

September 1963

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amateur

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PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE



ULTRA-COMPACT™ "A-SERIES"

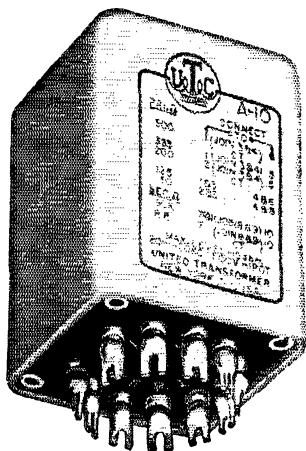
AUDIO TRANSFORMERS & INDUCTORS

FOR TRANSISTOR & TUBE APPLICATION

For over thirty years, UTC has pioneered in the design, development and production of transformers, inductors, electric wave filters, magamps and high Q coils.

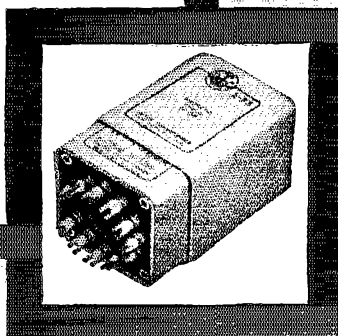
UTC's ULTRA-COMPACT, A-SERIES, are small lightweight audio units, ideally suited to remote amplifier and similar compact equipment. High fidelity is obtainable in all individual units, frequency response within the series extending from 10 to 50,000 cycles \pm 2 db. All units except those carrying DC in primary, employ a true hum balancing coil structure, which combined with high conductivity outer case, effects good inductive shielding. The die cast case provides top and bottom mounting. These units are adaptable for printed circuit use.

The conservative design and manufacturing procedures employed make these units suitable for virtually all types of commercial equipment and ideal for quality amateur service.



TYPE A CASE

- Length1½"
- Width1¼"
- Height2"
- Mounting1½" sq.
- Screws4-40
- Cutout1¼" dia.
- Unit Weight½ lb.



Hipermalloy Shield (A-33)
shown slipping
over "A"-line unit

Write for latest catalog of over 1,200 STOCK ITEMS with UTC high reliability

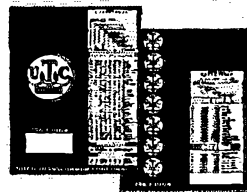
UNITED TRANSFORMER CORP.

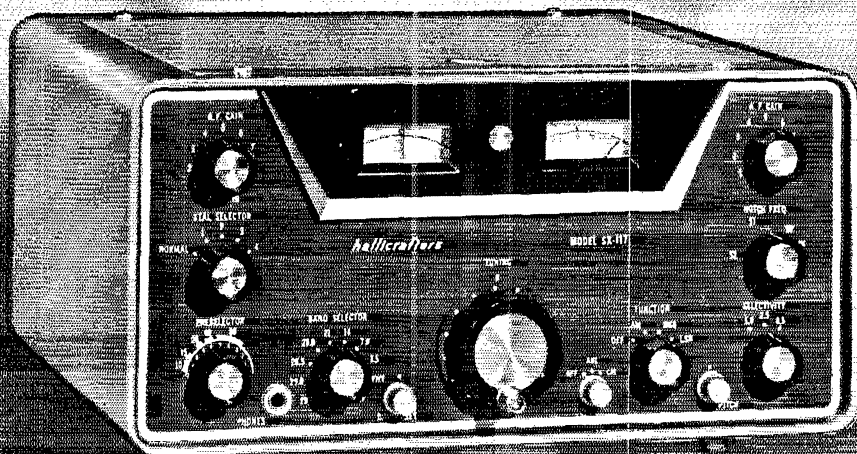
150 VARICK STREET, NEW YORK 13, N. Y.

PACIFIC MFG. DIVISION: 3630 EASTHAM DRIVE, CULVER CITY, CALIF.

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one good thing leads to another...

A single word, rather than any single feature, accounts for the enthusiastic acceptance we've experienced with the SX-117. The word is "*Versatility*."

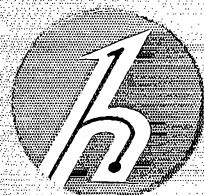
No other receiver in its class lets you work so much territory so well—wherever your present or future interests may lie.

For instance: You get all important coverage from 3.0 Mc. through 30 Mc. (five crystals provided) plus four positions from 85 kc.—3 Mc. for use with HA-10 low freq. tuner.

You get *three-step variable selectivity*, including a transmitter-type V.F.O. that can be *locked on frequency* . . . less than $1 \mu\text{v}$ sensitivity . . . extreme electrical and mechanical *stability* . . . up to *50 db.* attenuation to unwanted heterodyne in the pass band.

Looking ahead, you'll find interesting the oscillator output jacks for transceive operation with Hallicrafters' HT-44 matching transmitter.

The SX-117 costs \$379.95. The HA-10 adds just \$24.95 (less low freq. crystals).

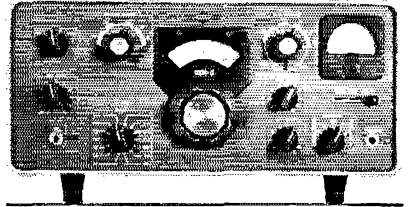


SX-117 triple-conversion receiver by **hallicrafters**

Export: Hallicrafters, International Dept., Commercial Div. 5th & Kostner Aves., Chicago 24, Ill.
Canada: Gould Sales Co., Montreal, P.Q.

SLOWPOKE!

The KWM-2 protects your investment with a depreciation so slow that if you had purchased a KWM-2 when it was introduced four years ago, it would take you until about 1975 to fully depreciate it. Actually, it will never fully depreciate, but the present rate is about \$70 a year or less than \$1.50 a week. There are several reasons why the KWM-2 is so slow in depreciating. One is that in four years there have been no design changes, no spec changes, few component changes. Another is that when the KWM-2 was introduced, it included 19 "first-in-the-industry" exclusives. Today that figure has been reduced because many of those "firsts" have been incorporated as standard in all amateur equipment. But Collins KWM-2 is still the only transceiver which includes all 19 features in one unit. □ See your Collins distributor and get full details on how little it really costs to own the finest... the Collins KWM-2. □





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EIMAC TYPE	CLASS OF OPERATION SERVICE	TYPICAL OPERATION — SINGLE TUBE								
		D. C. PLATE VOLTAGE	D. C. PLATE CURRENT (AMPERES)	D. C. SCREEN VOLTAGE	D. C. GRID VOLTAGE	APPROX. MAX. DRIVE POWER (WATTS)	APPROX. D. C. SCREEN CURRENT (AMPERES)	APPROX. D. C. GRID CURRENT (AMPERES)	APPROX. MAX. POWER OUTPUT (WATTS)	FILAMENT VOLTS AMPERES
3-400Z	B	3000	.100	—	0	32	—	.12	655	5.0
	SSB		.333 ⁽³⁾							14.5
3-1000Z	B	3000	.240	—	0	65	—	.30	1360	7.5
	SSB		.670 ⁽³⁾							21.3
4CX250B ⁽¹⁾	AB1/SSB	2000	.1/.25 ⁽³⁾	350	-55 ⁽⁵⁾	0	0/.005 ⁽³⁾	0	300	6.0 2.5
	C/CW	2000	.25	250	-90	2.9	.019	.026	390	
	C/AM	1500	.20	250	-100	1.7	.02	.014	235	
4CX300A	AB1/SSB	2500 ⁽⁶⁾	.1/.25 ⁽³⁾	350	-55 ⁽⁵⁾	0	0/.004	0	400	6.0 2.5
	C/CW	2500 ⁽⁶⁾	.25	250	-90	2.8	.016	.025	500	
	C/AM	1500	.20	250	-100	1.7	.02	.014	235	
4CX1000A	AB1/SSB	3000	.25/.90 ⁽³⁾	325	-60 ⁽⁵⁾	0	-.002/.035	0	1680	6.0 10.5
4-65A	AB1/SSB	3000	.015/.065 ⁽³⁾	360	-85 ⁽⁵⁾	0	0/.006	0	130	6.0 3.5
	C/CW	3000	.112	250	-105	1.6	.022	.009	270	
	C/AM	2500	.102	250	-150	3.1	.026	.013	210	
4-125A	AB1/SSB	3000	.03/.105 ⁽³⁾	510	-95 ⁽⁵⁾	0	0/.006	0	200	5.0 6.5
	B/SSB ⁽⁴⁾	3000	.02/.115 ⁽³⁾	0	0	16	0/.03	0/.055	240	
	C/CW	3000	.167	350	-150	2.5	.03	.009	375	
	C/AM	2500	.152	350	-210	3.3	.03	.009	300	
4-250A	AB1/SSB	3000	.055/.21	600	-110 ⁽⁵⁾	0	0/.012	0	400	5.0 14.5
	C/CW	3000	.345	500	-180	2.6	.06	.01	800	
	C/AM	3000	.225	400	-310	3.2	.03	.009	510	
4-400A	AB1/SSB	3000	.09/.30 ⁽³⁾	810	-140 ⁽⁵⁾	0	0/.018	0	500	5.0 14.5
	B/SSB ^{(2) (4)}	3000	.07/.30 ⁽³⁾	0	0	40	0/.055	0/.10	520	
	C/CW	3000	.35	500	-220	6.1	.046	.019	800	
	C/AM	3000	.275	500	-220	3.5	.026	.012	630	
4-1000A	AB1/SSB	4000	.17/.48 ⁽³⁾	1000	-130 ⁽⁵⁾	0	0/.04	0	1130	7.5 21.0
	B/SSB ⁽⁴⁾	4000	.12/.67 ⁽³⁾	0	0	105	0/.08	0/.15	1870	
	C/CW	4000	.70	500	-150	12	.137	.039	2100	
	C/AM	4000	.60	500	-200	11	.132	.033	1910	
3CX100A5	C/CW ⁽⁷⁾	800	.08	—	-20	6	—	.03	27	6.3
2C39A	C/AM ⁽⁷⁾	600	.065	—	-16	5	—	.035	16	1.0

(1) Ratings also apply to 4X250B.

(2) Ratings apply to 4-250A within plate dissipation limitation.

(3) Zero signal and maximum signal dc current.

(4) Grid and screen grounded, cathode driven.

(5) Adjust to give stated zero-signal plate current.

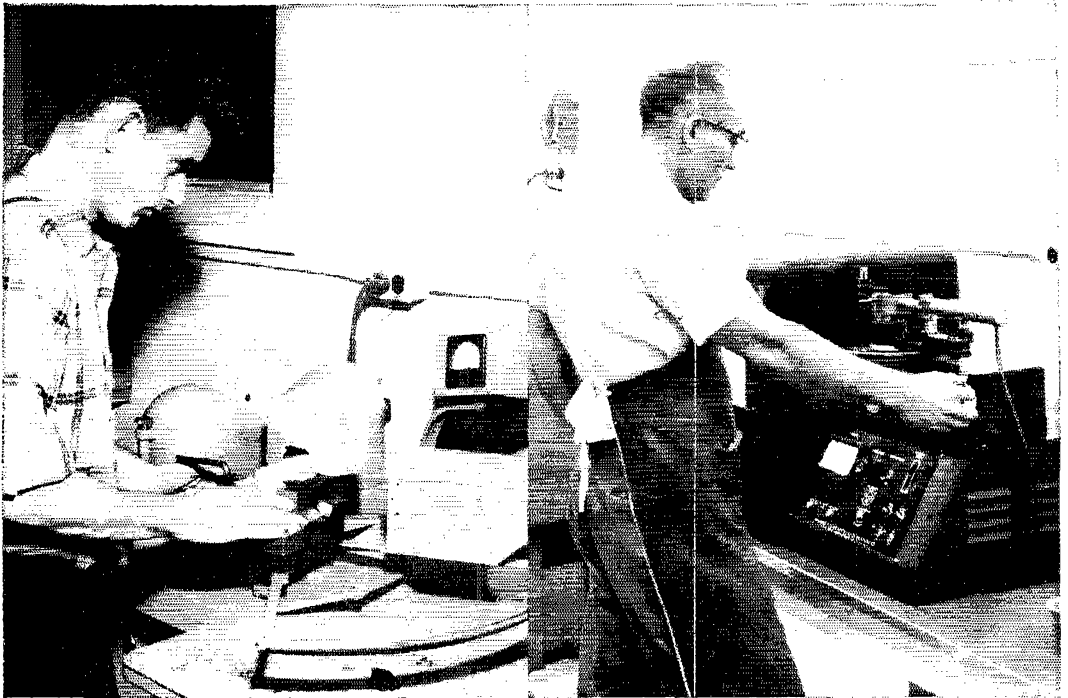
(6) For operation below 250 Mc only.

(7) At 500 Mc.

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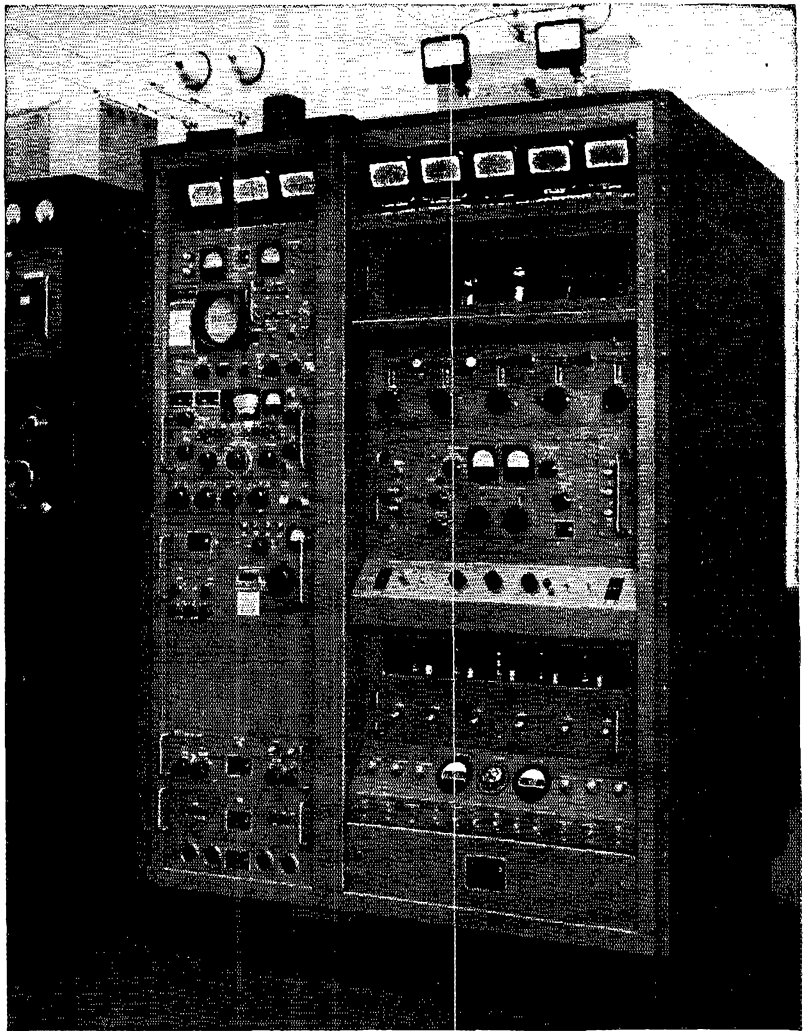
ORDER FROM YOUR JOBBER

Section Communications Managers of the ARRL Communications Department

Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in *QST*. ARRL Field Organization station appointments are available in areas shown to qualified League members holding Canadian or FCC amateur license, General or Conditional Class or above. These include ORS, OES, OPS, OO and ORS. SCMs desire applications for SEC, EC, RM and PAM where vacancies exist. OES, v.l.f. bands appointment, is available to Technicians and Novice, as well as to full-privilege amateur licensees.

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For complete details of the GPT-10K Transmitter request Technical Bulletin 1008.

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

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

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

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



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"It Seems to Us..."



The ARRL Program

At its annual meeting, the ARRL Board of Directors adopted a resolution of basic policy which has received wide discussion among radio amateurs — both inside and outside the League. There still exists some misunderstanding — not at all helped by rumors and misstatements — as to the real objective of the Board.

The objective, simply stated, is a program to preserve amateur frequency bands.

Many amateurs assume that the FCC has exclusive jurisdiction over frequency usage in the U. S. The fact is that frequencies for amateurs — as well as for all other radio services — are allocated at international radio conferences, and the Commission can make domestic assignments only within the basic pattern of international agreements.

International radio conferences are meetings of governments, held periodically to re-examine the use of the radio spectrum. Each nation has one vote, whether it has 250,000 amateur licensees, 1000, or none at all.

At each of the recent conferences — e.g., Atlantic City, 1947, and Geneva, 1959 — proposals were offered by other nations which would have deleted sizeable portions of our h.f. bands. League officers devoted thousands of man hours to preparatory committee work in Canada and the United States and later to the actual conference sessions as members of the official delegations. Through the backing of a number of countries supporting the amateur concept, most of the adverse proposals failed to gain a majority vote, though often by a very small margin. But some moves have been partially successful, as in the example of 7 Mc. Once exclusively amateur, two-thirds of this band is now available on a shared basis for broadcasting use by countries outside the Americas. This is perfectly legal, and is the result of views of the countries of Europe, Africa, Asia and Oceania simply outnumbering those of the Americas. The Board's action is intended, on a long-term basis, to prevent further encroachment on this and other bands. The loss of only a few kilocycles would have disastrous effects on our activities.

The demand for high-frequency channels (3 to 30 Mc.), the most congested part of the entire spectrum, is far greater than ever before. Nearly thirty countries have come into being as brand-new nations in the past few

years, with a strong feeling of pride in their newly found sovereignty and a desire to broadcast their virtues and philosophies to the rest of the world. When they find that all the present allocations for h.f. broadcasting are already crowded — even with use of time and geographic sharing as well as 5-ke. channel separation — they look with envious eyes on the amateur bands.

A number of high-powered international broadcasting stations, as well as several commercial RTTY operations, have moved into some of our bands, even in violation of the Geneva agreement. Most assuredly, proposals to legalize and expand such non-amateur uses will be submitted to and seriously considered at the next conference, possibly as early as 1965, in a concerted effort to take over amateur bands.

There are the votes this time to make it extremely difficult for us. The outcome will depend largely on what we as amateurs can accomplish in getting our house in order before the next conference begins to shape up.

The League believes that the present h.f. amateur bands can be preserved, but only if amateurs, both here and throughout the world, join forces and pull together. We in the U. S. and Canada must have the respect, cooperation and backing not only of our governments but also of the amateurs of other countries and their governments. To this end, League officers have visited amateur societies in several countries and attended the Region I conference of the International Amateur Radio Union in Malmo, Sweden. A League official, joining with several European societies, will also attend the space communications conference of the International Telecommunications Union to be held at Geneva next month. These activities will continue with increasing tempo, so that a concentrated united effort may be exerted by amateurs world-wide through their respective administrations.

But it should be obvious that, if we are to be successful on the international front, we must first have the active and whole-hearted support of all of our own governmental agencies.

The amateur bands have been made available to us in the U. S. because it is believed to be in the national interest. In preparation for the next conference, amateur radio will be

again held up to close scrutiny by government authorities to ascertain how well its purposes are being achieved. Amateur radio is most certainly serving the public interest, convenience and necessity. But improvement always is possible. The ARRL Board of Directors is determined that the results of any official look at amateur radio will continue to be highly favorable. It concluded that the risk of losing some h.f. amateur bands at the next conference is too great to simply sit tight and hope for the best, relying on historic achievements in the past. It decided that forceful, positive action — even if initially unpopular — is required if amateur radio is to retain our h.f. bands. To make certain of this objective

— and attaining it is essential to our very existence — the Board felt there must be, as one important step, a genuine upgrading of the amateur service, including a reasonable tightening of the regulations and license requirements.

Is not retention of frequencies, of inestimable value, worth a little effort by each U. S. amateur? Shall each of us sit idly by and risk the loss of our frequencies, or shall we join together in a common effort to preserve and improve amateur radio?

There is only one answer. It is the purpose — and the sole purpose — behind the Board's action. QST

COMING A.R.R.L. CONVENTIONS

- Aug. 31 and Sept. 1 — Atlantic Division, Washington, D. C.
- September 14 — Kentucky State, Lexington
- September 14-15 — Dakota Division, Sioux Falls, South Dakota
- September 28 — Ontario Province, Hamilton
- October 11-13 — Southwestern Division, San Diego, Calif.
- October 26-27 — Midwest Division, Wichita, Kansas
- November 29-30 and December 1 — Delta Division, Lafayette, Louisiana
- January 18-19, 1964 — Florida State, Miami
- April 3-5, 1964 — Great Lakes Division, Detroit, Michigan

DAKOTA DIVISION CONVENTION

Sioux Falls, South Dakota — September 14-15

The Dakota Division ARRL Convention will be held on Saturday and Sunday, September 14 and 15, at the Sheraton Cataract Hotel in Sioux Falls. Special luncheons are scheduled for net operators, s.s.b. and YL/XYL. The program will include lectures and discussions on various topics, displays and exhibits, a Novice Forum conducted by WØRRN, and an ARRL panel discussion of which Dakota Division Director Charles Compton, WØBUO, will be the chairman. There will be a talk-in station for mobiles on 3.987 Mc. A balloon ascension or a display by Raven Industries will take place, weather permitting. A buffet dinner will be held Saturday evening, followed by light entertainment. Sunday brunch will conclude convention activities.

The convention fee will be \$7.50 per person, including registration, the Saturday buffet, hospitality room refreshments and Sunday brunch. Requests for further information should be sent

to: D.D.C., Sioux Falls Amateur Radio Club, P.O. Box 91, Sioux Falls, South Dakota.

ONTARIO PROVINCE CONVENTION

Hamilton — September 28

The Ontario Province Convention will be held on Saturday, September 28, at the Connaught Sheraton Hotel in Hamilton. The Mural Room will be open Friday evening as a reception centre for out of town visitors. The program will consist of an ARRL forum headed by Noel Eaton, VE3CJ, Canadian Director; technical session on the Canadian satellite "Alouette" by the controller, Mr. R. W. Southern; s.s.b. transceiver design and construction by Mr. Bill Rolfe, VE3BJO; v.h.f. by Mr. Ed Tilton, WIHDQ, V.H.F. Editor, *QST*; and teaching amateur radio by Dr. John Card. Also included will be c.w. and QSL contests, a hat show and a fashion display for the YLs and XYLs.

Registration will commence at 9 A.M. Saturday and is \$6 per person. For hotel reservations, write P.O. Box 253, Hamilton, Ontario.

OUR COVER

Our cover this month shows George Wilson, WIOLP, launching a Piper Tri-Pacer radio-controlled model airplane built by Marv Fickett, WILAV. Marv is holding the transmitter which controls the plane's rudder position and motor speed. This model, although its wingspan is five feet, weighs only four pounds. George's article in this issue of *QST* (see next page) will bring you up to date on radio control of model planes.

(Photo by E. L. Williams, Lincoln, Mass.)



See page 27.

Radio Control of Model Airplanes

BY GEORGE A. WILSON,* W1OLP

RADIO control of models has long been a sideline facet of amateur radio. In fact, until a few years ago, an amateur license was prerequisite to the operation of an "r.c." system. During the period when permission was granted to amateurs to make what use they could of the 27-Mc. "diathermy" band, this band was the most popular of those available for radio control. When the band was finally opened up to citizen use, certain channels were set aside for radio control, and most amateur-licensed r.c. men applied for the Citizen's license required to continue operation in this band. However, it was not long before it became evident that the assignment of six channels was not adequate to avoid interference, and model planes were frequently "shot down" unwittingly by signals from transmitters controlling other planes in the same or adjacent channels. The present trend is toward the 6-meter band where many amateur-licensed "pilots" are already operating.

The article that follows has been prepared to acquaint the strictly-communicating amateur with a closely-related group of hobbyists. Like the majority of other amateurs, the r.c. buff is not a youngster, and he has considerable time and money invested in his hobby. The technical aspect of the electronic equipment is not always his prime interest. Like many DX men who prefer to operate rather than to build equipment, many r.c. men prefer to fly their airplanes. One well-known enthusiast coined the misquote: "To build is human; to fly is divine."

History

The claim may be made that model airplanes antedated radio, but this is of little importance since the first radio-controlled models obviously followed the development of radio. In fact, the first r.c. models that were publicized were made in the late 1930s.¹

In 1941, *QST* reported on amateur radio activities at the national model-airplane contest.² At that time, amateur radio participated in two ways: as part of the radio-controlled model event and as chasers of errant airplanes that flew away

Amateur interest in radio control dates back to the 1930s when *QST* carried several articles on the subject. Although an amateur license is no longer required for pilots operating in channels available outside the amateur bands, amateurs still form a nucleus of this highly interesting sport, especially in the development of control equipment. We think you'll find this article by W1OLP not only informative, but intriguing as well.

from the contest site. In those days, mobile rigs (as well as radio-controlled models) were new, but in the amateur tradition, those amateurs who were not contestants were assisting in "times of emergency." Amateurs have continued to assist at model airplane contests through the years. Activities of this sort at national contests are now handled by the contest sponsor, the United States Navy. On the other hand, we find an ever-increasing number of amateurs competing in radio-controlled model contests and enjoying the sport of "Sunday radio-control flying."

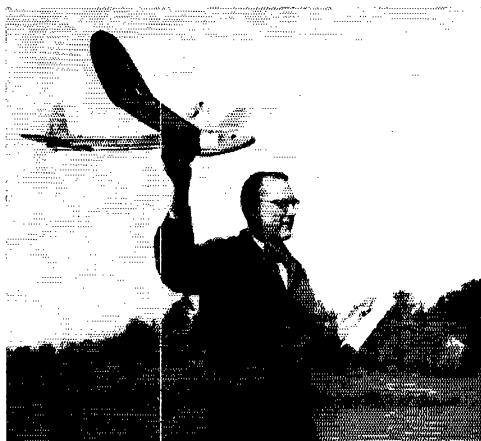


Fig. 1—The simplest type of r.c. airplane. The author is shown about to test glide a "powered glider." This airplane has an "all-up" weight of 10 ounces and provides left-right control using a self-neutralizing compound escapement. Airplanes of this type are excellent "trainers"—they will forgive "pilot error" and, because of their low weight and power, are relatively crash-proof.

(Photo by E. L. Williams, Lincoln, Mass.)

* 318 Fisher St., Walpole, Mass.

¹ E.g., Hull and Bourne, "Radio Control of Model Aircraft," *QST*, October, 1937; Hull, "New Gear For Radio-Control Systems," *QST*, July 1938; DeSoto, "Ham Radio and Models," *QST*, September, 1938; DeSoto, "Radio Control of Powered Models," *QST*, October 1938.

² DeSoto, "Radio at the National Model Airplane Meet," *QST*, September, 1941.

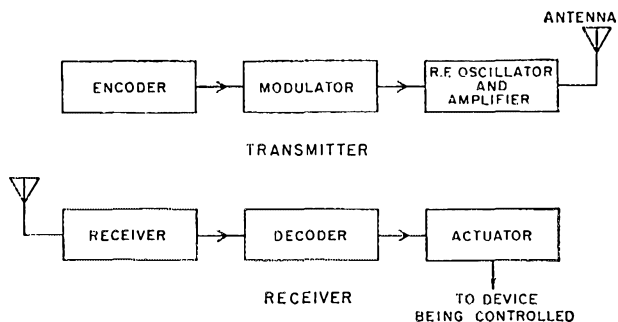


Fig. 2—All r.c. systems can be reduced to the generalized block diagrams shown above. In the simplest systems, the encoder and modulator of the transmitter may be a simple switch to key the r.f. carrier. The decoder and actuator may be a rubber-band-driven escapement device which rotates to various positions when the transmitter is keyed.

Just prior to World War II, radio control took a big jump forward. Transmitters, receivers, and motor-driven actuators for working the control surfaces were made available commercially, and the miniature model engine (2-cycle, gasoline type) was perfected. From the end of World War II until about 1950, the hobby seemed to struggle forward but from 1950 to the present, growth has been explosive. Advances have been made in all areas. Miniature motors are now of the "glow-plug type" (a semidiesel principle) which does not require an airborne ignition system. Extremely reliable electronic equipment and actuators are available and a special family of model airplanes has been developed.

In the 1940 era of r.c., the airborne electronic equipment used was heavy and its reliability questionable. Today, a great deal of highly-reliable, light-weight equipment is available. We have progressed from full-size vacuum tubes, through the miniature- and subminiature-tube phase and find ourselves now in an era where transistors are used almost exclusively. Reliable, motor-driven actuators which contain transistor switching circuits (to replace relays) are available to move the airplane's control surfaces. These actuators (or *servos*, as they are known in r.c. circles) weigh roughly 3 ounces, produce about 2 or 3 pounds of force, travel between limit positions in 0.1 second and, while running, draw about 300 milliamperes from a 3-volt battery.

These servo specifications are typical of the developments that have occurred in the past 10 years and, since it is not our purpose to write a detailed history of r.c. models, we will not dwell on details of this sort but will attempt to give a general picture of the r.c. hobby.

Radio controlled airplanes vary in size from those having 2-foot wing spans to giants with 10- to 12-foot spans. The r.c. equipment varies from simple "rudder-only" control to 12-channel "multi" systems which provide almost as many control functions as exist in full-size aircraft. As a matter of fact, *more* functions are provided than in some full-scale light planes!

Elements of R.C. Systems

Before describing the r.c. equipment in use today, we should look briefly at what an r.c. system must do. First, the transmitter on the ground must produce the signals that control the

airplane. Second, the receiver and its associated equipment must interpret the signal from the transmitter and must feed actuators which vary the position of the airplane's rudder, elevator and ailerons as well as control its motor speed, brakes, and other controllable features. On the ground, then, we must have a transmitter which has its modulation coded in a manner that can be properly interpreted by the airborne equipment (see Fig. 2). The coded modulation can take many forms. The simplest is c.w. keying. In a commonly used multichannel system, several switches turn different tones on or off. Each tone calls for a specific function, such as "up-elevator" or "right-rudder." A number of pulse systems are in use. These vary the frequency and duty cycle.

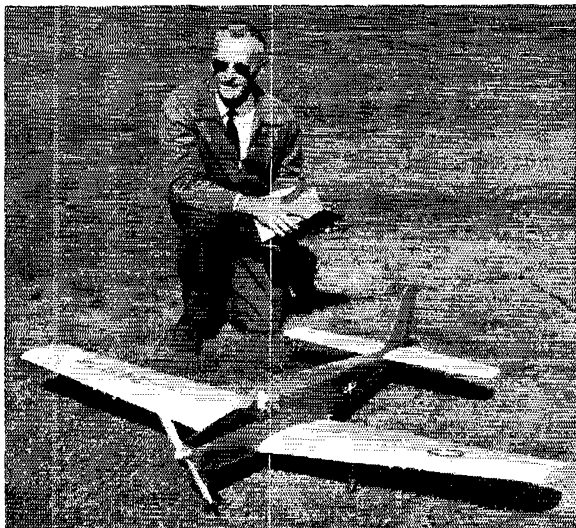
In the airplane, the simple c.w. or keyed-tone control system operates a rubber-band or electric motor-driven escapement which assumes various positions in accordance with the code sent from the transmitter. The most popular system is the so-called "self-neutralizing escapement" which gives right-rudder whenever you transmit a single sustained signal and returns the rudder to neutral when the signal is stopped, or produces left-rudder in response to an "A" with the dash held, and neutralizes the rudder when the signal is stopped. This type of escapement generally has a third position (obtained by sending "U" and holding the dash) which can be used for "up-elevator" or for actuating a switch to run an auxiliary motor-controlled escapement. Most of these escapements can be specially rigged to give motor control whenever a very short signal is transmitted — in r.c. circles known as the "quick-blip" method. So, with a simple keyed transmitter, a compound escapement and an auxiliary escapement, the plane can go left, right, up and change its motor speed. This is a lot of control from very simple equipment!

Airplanes

In the early days, r.c. was installed in very stable airplanes which had the ability "to straighten up and fly right" when the pilot stopped "controlling" them. In r.c. terminology these are known as airplanes that "forgive" the pilot for making mistakes. This type of airplane is still in use for training and sport flying. A good example of this type is the "powered glider" that the author is about to test glide in Fig. 1.

Fig. 3—A typical multichannel type r.c. airplane. This plane is an original design by Bob Wehrmann (ex-W6YTH) which features rudder elevator, aileron, and motor control. The nose wheel (and the model-pilot's head, in the first version of this airplane) is coupled to the rudder actuator to give improved ground-handling capabilities. Aircraft of this type fly at about 75 m.p.h. and require expert pilots to fly them.

(Photo by E. L. Williams, Lincoln, Mass.)



On the opposite end of the scale are the high-performance, multichannel airplanes which are designed aerodynamically to be on the verge of instability. Most of these aircraft will fly "hands-off" momentarily but require only the slightest amount of control to produce relatively violent maneuvers. Fig. 3 shows a multichannel plane, original design by Bob Wehrmann (ex-W6YTH). This airplane has rudder, elevator, aileron and motor control. The nose wheel is steerable (it is coupled to the rudder actuator) and, in the original version of this airplane, Steve Canyon, the model pilot, would turn his head right or left whenever a turn was called for. The original airplane was a trifle too hot for Bob (and Steve!) and the resulting crash "totalled" the airplane and left Steve in rather bad shape. Presently, he is quite happy to look straight ahead all the time.

The most practical compromise for most r.c. enthusiasts is a rudder-only airplane like the one shown in Fig. 4. That particular airplane and its pilot, Harry Morgan, W1SSK, finished in a heartbreaking second (rudder-only class) in the 1962 National Model Airplane Contest at the Glenview, Illinois, Naval Air Station. To comply with contest class regulations, this airplane has only rudder and motor control.

The addition of up-elevator control, as men-

tioned earlier, is simple but not in accordance with contest rules. With this addition, landing approaches may be flared out, loops made more easily and constant-altitude turns are possible by getting into the turn with the rudder and holding the turn with up-elevator as is done in full-size airplanes. Here we have an r.c. airplane which is reasonable in cost, is inherently stable for training purposes and yet is most exciting to fly.

Control Systems and Actuators

There are as many different variations in control systems as there are people who design them. Some people inherently move toward completely proportional controls — controls which allow the pilot on the ground to place the airplane's control surfaces (or any other control action) in any intermediate position that he desires. Others continuously look for simple systems that will provide more control from simple equipment. Sometimes the results of this approach are akin to the work of Rube Goldberg but, in many cases, reliable equipment, such as the Babcock Mark V hyper-compound escapement, has resulted. This escapement, designed by Ken Willard to extend the capabilities of rudder-only flying, provides up, down, left, right and motor control. It has been dubbed "the poor man's multi."

Fig. 4—Harrison Morgan, W1SSK, and his rudder-only airplane that took second prize in its class at the 1962 National Model Airplane Contest. Although primarily an r.c. fan, Harry operates on 6 meters from his Pembroke, N. H., QTH. His model is one of a long line of developmental airplanes. It uses only rudder and motor control but can do loops, touch-and-go landings and many other maneuvers.



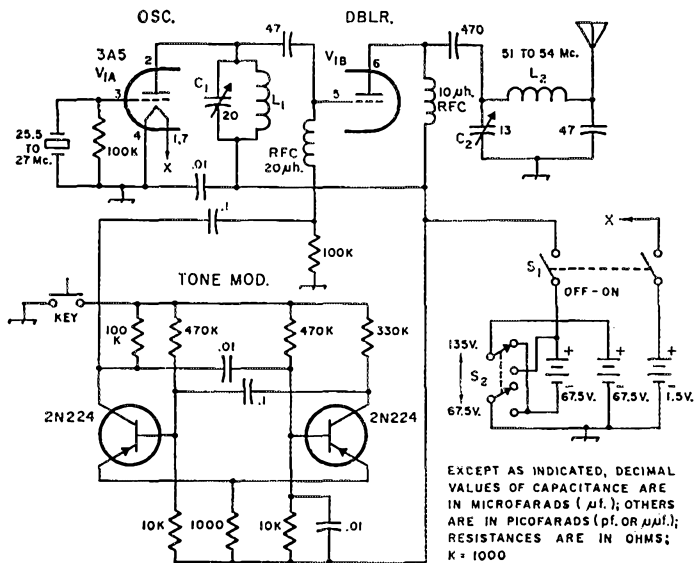


Fig. 5—The 6-meter Kraft tone-modulated r.c. transmitter. With 135-volt supply, the input is about 2 watts. At 67.5 volts, the input is less than ½ watt. The modulating frequency is approximately 400 cycles. The author's version uses a 67.5-volt battery and has never lost control of an airplane in several years of use. Fixed capacitors of decimal value are ceramic; others are silver mica or NPO ceramic. Resistors are ¼ watt.

C₁, C₂—Ceramic trimmer.

L₁—8 turns No. 16, ¾-inch inside diam.

L₂—7 turns same as L₁.

S₁, S₂—Double-pole toggle switch.

There are three basic control systems that the reader should know about. The first system uses escapements as actuators. The installation in the airplane consists of a receiver and escapement, and batteries to operate both. Most escapements get their driving power from a rubber band which must be wound before flying; some are driven by small electric motors. Auxiliary escapements operated from the main escapement are frequently used to give additional control. The most frequent auxiliary control regulates motor speed. Escapement systems are characterized by the fact that they provide a fixed sequence of controls. The simplest escapements give this sequence: neutral, right, neutral, left, neutral, right, and so on. A compound escapement automatically returns to neutral when a control action is completed, but it does so by rapidly passing through the other control actions in sequence. Note that motor control (or any control similarly connected) does not have to occur on every rotation of an escapement system equipped for this action. In such a case, the auxiliary control occurs only when the pilot deliberately calls for motor control. The escapement passes through the motor-control position but does not actuate the auxiliary control escapement unless a signal from the transmitter is energizing the receiver's relay and thereby is powering the auxiliary escapement through the main escapement.

Quite a few words have been devoted to escapement systems. This appears worthwhile since this is the best starting point for the novice. Most r.c. fans have started here. The knowledge

gained in this phase of the hobby is applicable to all phases.

The second type of control system is "pulse." The simplest such systems use pulse rate and pulse symmetry to drive a small motor in the plane backward and forward in accordance with the pulses sent by the transmitter. The motor is then both decoder and actuator. In this system, the control surfaces wag back and forth continuously and the airplane responds to the average position of the control surface. In more complex systems, the control surfaces do not vibrate — control action can be through feedback servos or "open-loop" by means of actuators which damp out the vibration. The school of r.c. enthusiasts who work with pulse systems is convinced that you get more control for your money with pulse than with any other system. A drawback to many pulse systems is high battery drain — the control actuator(s) must run continuously to establish average positions of the control surface. Some pulse systems overcome this problem by using feedback servos as actuators. In this case, the actuators draw current only when changing from one position to another, and the control surfaces do not vibrate. The latter refinement tends to defeat much of the inherent simplicity that makes the basic pulse techniques especially interesting.

The use of pulse techniques makes simultaneous the proportional control of both rudder and elevators (ailerons coupled to the rudder are included in some pulse systems) and, as a result, the range of possible maneuvers is enlarged and

the precision of piloting improved. However, the ultimate in control is provided by multichannel control systems. The basic multi system uses several different tones to modulate the transmitter and to cause, in turn, "on-off" or "trim" control action in the airplane. Even with on-off control (when a command is given the control surface goes to its extreme and stays there until the command is stopped) the maneuvers that can be performed rival the precision of that attained by real airplanes. Model airplanes can exceed their real counterparts in performance since they are not restricted by the frailties of a human pilot. For example, they can fly upside down or loop continuously — feats that would be at least uncomfortable for a full-scale pilot. In on-off control systems (note that escapement systems are also on-off) a gentle maneuver (such as a slow turn) is made by the pilot turning the control signal on and off a number of times. In most cases the airplane will damp out the wobbles in the maneuver and, from the ground, the airplane appears to move quite smoothly when it is skillfully piloted. Most on-off multi systems allow simultaneous control of rudder, elevator, and ailerons. Trim type of control (moving in one direction or the other upon command and stopping in position when the command ceases) is used for motor speed and for trimming the elevator to obtain level flight with varying motor speed and wind conditions.

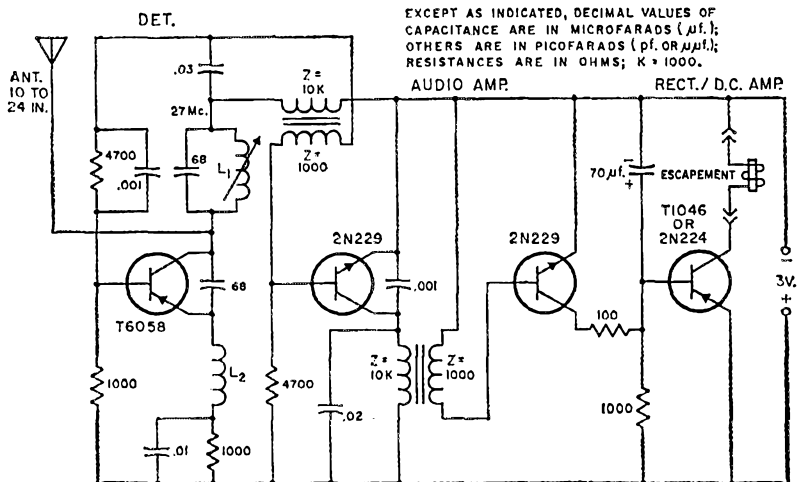
The ultimate in control is provided by multi systems which incorporate full proportional control of rudder, elevator and ailerons. In most cases, these systems combine pulse and on-off multi channel techniques. They are complex and

expensive and are certainly not recommended for the beginner.

Radio Equipment

Many amateurs will be interested in the radio equipment used in r.c. even if the foregoing discussion of control systems was not their "cup of tea." Unlike the amateur communication case, c.w. operation is almost never used today for control purposes because of its susceptibility to QRM. Tone modulation is used in all types of control systems; this allows the narrowing of receiver bandwidths and makes the receiver (and hence, the control system) somewhat insensitive to c.w. and voice interference. Multichannel systems using reed-type relays as decoders are particularly good in this respect. The bandwidth of each of their channels is 20 to 30 cycles per second.

Radio-control transmitters are generally low-power m.o.p.a. types. The Citizen-Band limit is 4 watts, but most transmitters have less than one watt of input to their final stages. Fig. 5 shows the circuit of a typical tone transmitter designed by Phil Kraft (K6SQF). This transmitter is useful in escapement control systems and in pulse systems when an external "pulsar" is used. Grid modulation is almost always used to produce 95% to 100% modulation of the carrier. Many systems use superregenerative receivers which require 100% modulation of the transmitter to ensure good range. Transmitting antennas are generally loaded whips on 27 Mc.; quarter-wave unloaded antennas are most often used on 50 Mc. The author (and a number of others) prefers the half-wave vertical, end-fed antenna for 6-meter transmitters which sit on the ground. This antenna is



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

Fig. 6—The Kraft transistor superregenerative receiver. This receiver and the transmitter of Fig. 5 were designed by Phil Kraft, K6SQF. Values are for 27 Mc. Several similar receivers are commercially available for the 6-meter amateur band. Receivers of this type are highly sensitive, and small in size and weight. Ground range of over 1200 feet is obtained using a transmitter of about 1-watt input to the final stage. Because most transistor superregens tend to overload easily, low transmitter power is very desirable. Fixed capacitors of decimal value are ceramic; others are silver or NPO ceramic. Polarity indicates electrolytic. Resistors are $\frac{1}{4}$ watt. Audio transformers are ultraminiature transistor types. L₁—5½ turns No. 26 on $\frac{1}{4}$ -inch iron-slug form. L₂—36 μ h.

enough the advice of 1) getting together with someone who knows about r.c. airplanes before you start any r.c. project, and 2) starting out with a simple project that has a high probability of success. Happy landings!

QST

Acknowledgements

The following organizations and individuals have given kind permission for use of material in this article:

Ace Radio Control, Inc., Higginsville, Missouri

Paul F. Range, who operates Ace, gave permission under his copyright for use of Phil Kraft's transmitter and receiver circuits.

Condé Nast Publications, Inc., Publishers of *American Modeler Magazine*.

Howard G. McEntee's MacTone receiver appeared in a copyrighted, two-part article in the July and August, 1962, issues of the *American Modeler*.

New Haven Electronics, New Haven, Indiana

Jack D. Fisher, who operates NHE, gave permission to use copyrighted material on his solid-state superheterodyne receiver.

Appendix

This appendix includes material for those who wish to find out more about the r.c. hobby. Clubs, books and periodicals that provide more detailed information are covered.

Clubs:

Local clubs can be located by contacting a hobby shop that caters to model-airplane hobbyists.

Nationwide, the Academy of Model Aeronautics, 1025

Connecticut Avenue, N.W., Washington 6, D.C., is the ARRL of the model-airplane hobby. Membership in this organization includes insurance coverage for damage that may be caused by the member's model airplane.

Books

R/C Primer by Howard G. McEntee, published by Kalmbach Publishing Company, Milwaukee 3, Wisconsin; 68 pages; \$2.00 postpaid.

Radio Control for Model Builders, John F. Rider, publication No. 235; 232 pages; \$4.25.

Best of Grid Leaks, Ace Radio Control publications, 36-page brochure slanted at the beginner; \$1.00.

Model Radio Control by E. L. Safford, Jr.; Gernsback publication No. 106; \$3.95.

R/C Handbook by Howard G. McEntee; Gernsback publication No. 93; \$4.95.

Fun with Radio-Controlled Models by E. L. Safford, Jr.; Gernsback publication No. 106; \$3.95.

The books listed above are stocked by hobby shops, electronic-parts suppliers or may be obtained from Ace Radio Control, Box 301, Higginsville, Missouri.

Periodicals

American Modeler, published bimonthly by the Condé Nast Publications, Inc., 420 Lexington Ave., New York 17, N.Y.; Howard G. McEntee, W2SI, Radio Control editor.

Flying Models, published bimonthly by Rajo Publications, Inc., 215 Park Avenue South, New York 3, N.Y.; Ted Strader, Radio Control editor.

Grid Leaks, published bimonthly by Ace Radio Control, Box 301, Higginsville, Missouri. Devoted entirely to radio control. 6 issues, \$2.00.

Model Airplane News, published monthly by Air Age, Inc., 551 Fifth Ave., New York 17, N.Y.; Edward J. Lorenz, radio control editor.

Strays



Six hams got together during a recent RCAF inspection at Communications Unit in Halifax, Nova Scotia. Pictured, left to right, are VE1s AFB and AHQ, VE3OJ, VE1s AJE, AHZ, and ABC.

WA9DHL claims to be the biggest ham of all — he's six feet, seven inches tall and weighs three hundred pounds.

A Hawaiian amateur of Japanese descent, KH6FF, vilified as a spy and traitor after bombs fell on Pearl Harbor, has been honored by the U. S. Navy for the service he performed as a radio operator during World War II. David Kiyo Enomoto disappeared into the hills near Puunene, Hawaii, for fifteen months after the outbreak of the War. There he took the oath of allegiance and became the only radio link to the outside for the Puunene Naval Squadron. Even his friends, meanwhile, began to suspect that he was hiding out and spying for Japan. Enomoto has been presented with a certificate naming him an honorary naval communicator.

The Aruba Amateur Radio Club, Netherlands Antilles, has announced a new award. It's the Aruba Ariba certificate, given for working three or more members of A.A.R.C. after January 1, 1963. More details available from A.A.R.C. Awards Manager, P.O. Box 273, San Nicolas, Aruba, Netherlands Antilles.

Care to play radio rummy? If you work certain members of the Central Radio Club of Hungarian Amateurs, and ask them for their special "rummy game" QSLs, you could win this handsome award. Send s.a.s.e. to the Central Radio Club, P.O. Box 185, Budapest 4, Hungary, to get full information on the "Rummy Game in the Ether" award.

How many of Africa's new countries can you name? Did you know that Ouagadougou is now a national capital? What's the population of Cambodia? These facts and others about new nations of the world are found in the new government publication, *Profiles of Newly Independent States*. The Superintendent of Documents at the United States Government Printing Office, Washington 25, D. C., will send you this booklet, including a world map, for 25c. It's the first of a series which will deal with sovereignty of the world's land and sea areas. A good aid to DXers who want to keep up with the newly-independent countries.

W0RXK tells us of smiling when he saw a truck with Missouri license RST 599. Better yet, he says, the truck belonged to a brick and stone company. Obviously a visible case of "coming in like a ton of bricks."

1963 VE/W Contest Announcement

September 28-29

THE Montreal Amateur Radio Club again invites all W and VE stations to participate in the 1963 VE/W Contest to be held from 2300 GMT Saturday, September 28, to 0459 GMT, September 30.

A "CQ VE" by a U.S. station alerts the VEs, while VEs try to raise Ws with a "CQ W." Exchange contact serial number, RS(T) report, and ARRL section. Yukon-N.W.T. (VE8) counts as a separate multiplier. *Example:* W4SVJ called VE7EH, who sends "W4SVJ de VE7EH NR 5 579 BC K," and W4SVJ replies with "VE7EH de W4SVJ R HR NR 7 589 GA K."

Follow the log sample shown below. Please don't write to ARRL or MARC for log forms, as they are not available. The over-all contest winner earns a handsome trophy, with certificates going to the top scorer in each ARRL section. The MARC wishes to emphasize that "This is NOT an endurance contest. It is strictly a one-man operation, no tapes, automatic calling devices, etc. The contest was sponsored initially to foster friendly relations between American and Canadian hams and we'd like to keep it that way. Secondly, W's are asked *not* to send self-addressed stamped envelopes for return of logs. U. S. Postage cannot be sent through the Canadian Post Office as outgoing mail. You fellows in Vermont, Canal Zone, Wyoming, Idaho, Kentucky and Sac. Valley, let's get with it—turn in your W/VE logs."

Check the rules which follow very carefully. To be eligible your log must be in the hands of the MARC Contest Committee by November 15. Mail logs to Mrs. G. H. Webster, 1550 Erin Place, Dorval, Quebec, Canada.

Rules

1) Any single-operator station in the 73 ARRL Sections may participate. Yukon-N.W.T. (VE8) also counts as a separate multiplier. An amateur may enter as mobile, portable, or fixed, but in only *one* category. Multiple-operator stations are not eligible to compete.

2) All contacts must be made during the period from 2300 GMT Sept. 28 to 0459 GMT Sept. 30, with a total operating time of no more than 20 hours for each entry. Times on and off the air must be clearly shown in the log.

3) Canadians will work only amateurs in the U.S. and Possessions, and vice versa. VE/VO to-VE/VO and U.S.-to-U.S. contacts do not count. A station may be worked once on phone and once on c.w. on each frequency-band.

4) The exchange consists of a QSO number, RS or RST report, and ARRL Section. Example of W4SVJ's message to VE2NI: "VE2NI de W4SVJ NR1 579 Ga."

5) *Scoring:* Count two points for a complete exchange of information; incomplete contacts do not count (no fractional breakdown of the two points per QSO). For final score, VE/VO stations will multiply their total contact points by the number of ARRL sections worked in the U.S. and Possessions, and then by the appropriate power multiplier listed below. For final score, W/K amateurs will multiply their total contact points by the number of Canadian areas (max. of 10; VE1-VE8 plus VO and VE0), then by 6.6 (ratio of U.S.-to-Canadian Sections), then by the appropriate power multiplier, and then by a 2.5 provisional multiplier (based on the ratio of U.S.-to-Canadian log entries received in previous contests). All stations using power inputs of 30 watts or less receive a power multiplier of 2, those using from 31 through 100 watts receive a power multiplier of 1.5, and those using over 100 watts receive a power multiplier of 1.

6) Each entry must be accompanied by the following signed declaration: "I hereby state that my station was operated strictly in accordance with the rules of the contest and governmental regulations, and I agree that the decision of the contest committee of the Montreal Amateur Radio Club, Inc., shall be final in all cases of dispute."

7) To be deemed valid, all entries must follow the form shown in the sample log and must be received no later than midnight, November 15, 1963. They should be sent to Mrs. G. H. Webster, 1550 Erin Place, Dorval, Quebec, Canada.

QST

LOG, 1963 VE/W CONTEST

W4SVJ		C.W.							Ga.					
Call.....		C.W., Phone, or Both.....							ARRL Section.....					
Date/Time On or Off Air (GMT)	Time of QSO	NR Sent	My Stn.	RST Sent	My Sect.	Freq. Band	Emis- sion	Power Input	NR Rcd.	His Stn.	RST Rcd.	His Sect.	New Sects. Wkd.	QSO Pts.
Sept. 28 On 2300	2300	1	W4SVJ	579	Ga.	3555	A1	75	1	VE2NI	599	QUE	1	2
"	2301	2	"	569	"	"	"	"	2	VE3BFF	579	ONT	2	2
"	2302	3	"	579	"	"	"	"	1	VE2OC	579	QUE	-	2
"	2313	4	"	559	"	7010	"	"	3	VE1EK	579	MAR	3	2
Off 2315														
Total Operating time: 15 min.			Bands used: 3.5 & 7 Mc.					3 sects., 8 pts.						
Claimed score: 4 QSOs × 2 (points per contact) × 3 (different sections worked) × 6.6 (section-balancing multiplier for all W/K stations) × 1.5 (power multiplier for 75 watts input × 2.5 (provisional multiplier for all W/K stations based on ratio of U. S.-to-Canadian logs previously entered) = 594.														
I hereby state that my station was operated strictly in accordance with the rules of the contest and governmental regulations, and I agree that the decision of the contest committee of the Montreal Amateur Radio Club, Inc. shall be final in all cases of dispute.														
Signature.....												Call.....		



This field full of phased log-periodic antennas was used by the author to obtain reflections from the moon in the 10-meter band. In case you'd like to duplicate the feat, the array is 1200 feet long and 75 feet wide. It has a gain of 27 db.!

The Moonbounce Problem, 28 Mc. and Up

*Basic Facts for Determining Equipment and Antennas
Needed for Lunar Communication*

BY H. T. HOWARD,* W5UGL

THE purpose of this article is to stimulate amateur interest in moonbounce communication, by presenting the basic parts of the problem, such as noise figure, path loss, and antenna gain, in familiar terms. Once these basic factors are understood, they can then be applied to equipment and antenna design for communication via the moon or man-made satellites.

Moonbounce was accomplished on ten meters several months ago at this station with about 1 kw. p.e.p. single sideband, using the array of 48 log periodics shown in the first photograph. The array is 1200 feet long by 75 feet wide, and it has a gain of 27 db., over the range of 20 to 65 Mc.! The beam produced is approximately $1\frac{1}{2}$ degree thick by 30 degrees in azimuth and can be placed to intercept the moon or sun track for about two hours each day. Power is distributed in the array with open-wire line, and tapered sections to maintain the wide bandwidth, and in the usual operation *each antenna* handles from 5 to 10 kilowatts.

* Radioscience Laboratory, Stanford University, Stanford, Calif.

A circuit diagram of the array would look like a corporation organization chart; that is, it starts with one feed line and progressively branches down to the individual antennas which are specially designed and built log periodics, each having a pair of 40-foot booms and a total of 48 elements.

At each power division point there is a movable tap arranged so that the relative phase between antennas is completely adjustable. In practice, the phasing is changed each day to follow the moon's elevation. It takes two men with wrenches and a jeep about two hours to move all of the taps. The array is normally used with a 300-kw. (600-kw. p.e.p.) c.w. transmitter for radar studies of the solar corona and the ionized regions between the earth and the moon.¹

The selection of ten meters for the moonbounce experiment mentioned above avoids controversy

¹ Research supported by the Electronics Research Directorate of the Air Force Cambridge Research Laboratories, Bedford, Mass., under contracts with Stanford University, Stanford, Calif.

over the use of large nonprivate antennas for v.h.f. records. Six or possibly fifteen meters might yield similar results if tried. The whole idea, though, is to demonstrate that the absolute minimum antennas for h.f. and lower v.h.f. moonbounce are ridiculously large for individual construction.

Since the array is linearly polarized, Faraday fading is a very important consideration,² and the unrecommended expedient of whistling into the microphone was used, until the signal faded up to a usable strength. Then the call was signed in voice and, with the help of some imagination, was received 2½ seconds later. The use of circular polarization will reduce fading, and is certainly required for any serious v.h.f. lunar-communication attempt.

The trick of ten-meter moonbounce points out several facts that will become obvious as you read further. First, station equipment needed for moonbounce on our lower bands is a minimum, and commercially available, but the antenna required is gigantic. Second, cosmic noise and ionospheric effects play a large role below about 100 Mc. With increasing frequency, the antenna becomes physically smaller, but the receiver and transmitter must be the best that amateur ingenuity can produce.

The average loss in decibels for the earth moon-earth path, assuming 500 watts of r.f. power at the antenna terminals and a moon reflectivity of about 7 per cent, is given in Fig. 1. Path loss will vary approximately ± 1 db. during each month as range to the moon changes.³ Moon reflectivity is currently the subject of several scientific investigations, and while reflectivity appears to be higher at frequencies below 450 Mc., and is perhaps lower above that frequency, the figure given should be accurate enough for a first approach to the problem. If the transmitter power at the antenna terminals is less than 500 watts due to feed-line losses or other practical considerations (such as money) this path-loss number should be increased by the number of db. difference.

The next problem is that of receiver noise figure and sensitivity. Fig. 2 is a plot of cosmic noise vs. frequency, presented to give the equipment designer an idea of what is needed for a front end. The *min* and *max* lines show the sky temperatures and minimum usable noise figure that can be expected when the antenna is directed toward the coldest and hottest portions of the sky, respectively. This variation is easily observable even with simple equipment and is a good method of checking antenna and system performance.⁴ Fortunately for the communications problem, larger areas of the sky are cold than are hot.

Below about 1000 Mc., cosmic noise is the

² Dyce, "The Appearance of the Moon at Radio Frequencies," *QST*, May, 1961.

³ Pettengill, "Lunar Studies," Lecture notes presented at course on Radar Astronomy, summer session 1961, Massachusetts Institute of Technology, Cambridge, Mass.

⁴ Downes, "A Simple Radio Telescope," *Sky and Telescope*, August, 1962.

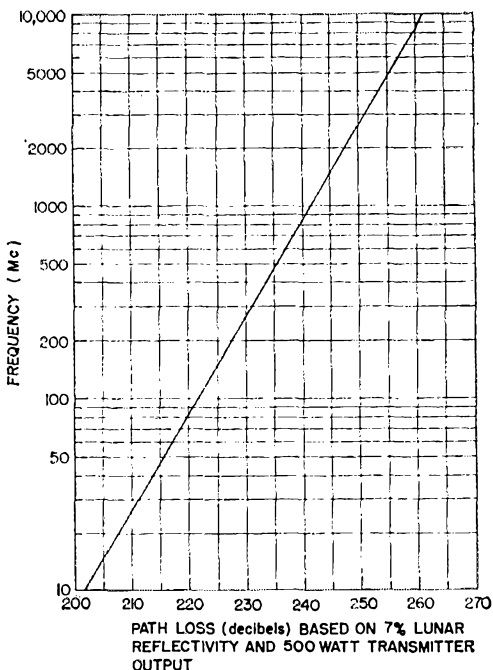


Fig. 1—Moonbounce-path loss vs. frequency.

dominant factor and varies with the portion of the galaxy observed. It can be seen that being cosmic-noise-limited, that is, having the feed-line loss and receiver-noise contribution less than the cosmic noise, at all times, is an engineering feat nearly impossible at 220 Mc. and higher, with the present state of the art.

Before going further, it is necessary to clear up some confusion concerning receiver sensitivity and noise figure that has arisen because of improper use of the relation:

$$\text{Ideal receiver sensitivity} = kTB$$

where

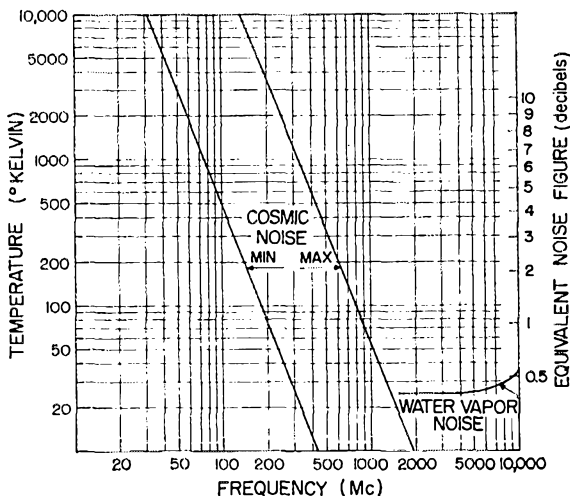


Fig. 2—Cosmic and water-vapor noise limits vs. frequency.

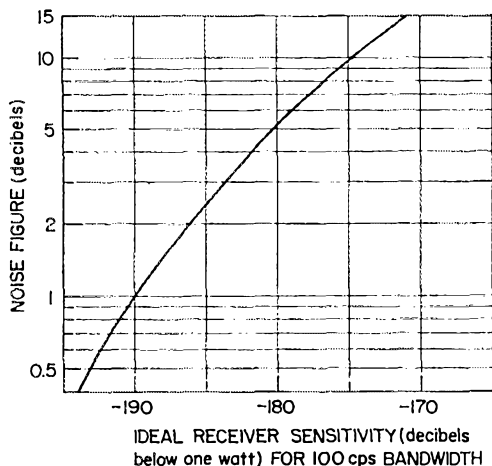


Fig. 3—Ideal receiver sensitivity vs. noise figure.

k is Boltzmann's constant, 1.38×10^{-23} joule/°K

T is temperature in degrees K

B is bandwidth in c.p.s.

If one uses room temperature of 290 degrees K, then it can be shown that:

Ideal receiver sensitivity (-dbw.) =
 $204 \text{ db.} - 10 \log B - \text{db. noise figure.}$

This relation is correct for systems with noise figures greater than 3 db. (system temperature greater than 290 degrees K), but needs revision to be correct for present-day low-noise amplifiers. By using an equivalent system temperature for T instead of 290 degrees K, we can still satisfy the IRE definition for noise figure and be consistent with present practice. All of this is simply saying that it is possible for a directive antenna and receiver at u.h.f. to look at a portion of the sky that is colder than 290 degrees K.

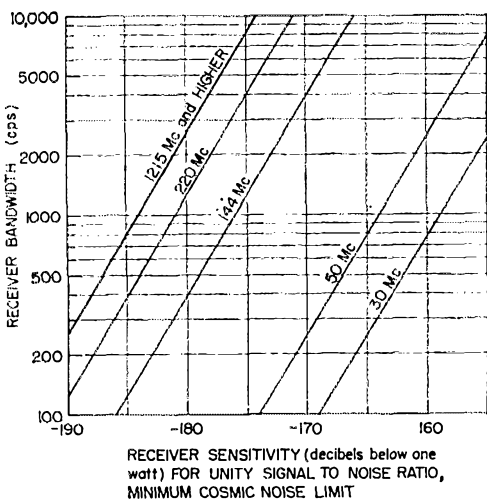


Fig. 4—Receiver sensitivity vs. bandwidth for the various amateur bands.

A plot of the above interpretation for a receiver with a 100-cycle bandwidth is shown in Fig. 3. There are some surprises in this graph that arise from proper use of noise figure. For instance, an improvement in receiver noise figure from 3 db. to 2 db. improves receiver sensitivity not just 1 db., but nearly 3. (Going from a 10-db. crystal mixer to a 2-db. paramp yields a sensitivity improvement of 12 db. This makes it pretty obvious that the best possible noise figure and the lowest possible line losses are all important, at frequencies where system noise is greater than cosmic noise.

Fig. 4 uses the information of Fig. 2, and assumes that the system performs to the lower cosmic-noise limit. It shows what receiver sensitivity to expect in each case, for unity signal-to-noise ratio with various bandwidths. If the system is not cosmic noise-limited, the number obtained from Fig. 4 should be decreased by the number of db. difference between the ideal case of Fig. 4 and the actual system. Again, both noise figure and transmission-line loss enter here. The number from Fig. 4, as modified by reality, is the receiver sensitivity in decibels below 1 watt, and can be added algebraically to the path loss of Fig. 1 to obtain the two-way antenna gain necessary.

For example, select 1296 Mc. and assume a parametric-amplifier front end with a 2-db. noise figure⁵ and 2 db. of feed-line losses. From Fig. 1 the total path loss is 244 db. and from Fig. 2 the system is definitely not cosmic noise-limited.

Example:

Fig. 1: Total path loss for 500 watts power output	244
Feed-line loss	2
	246 db.

Fig. 4: Cosmic-noise-limited receiver sensitivity (500 c.p.s. bandwidth) -187 dbw.

Fig. 2: Receiver n.f. = 2 db. = 170° K
 Line loss = 2 db. = 170° K

340° K = 3.4 db.
 Cosmic noise = 0.5 db.

Fig. 3: Difference between 0.5 db. cosmic noise and 3.4 db. actual receiver system

+ 10 db.
- 177 dbw.
69 db.

$$\frac{69}{2} = 34.5 \text{ db.}$$

This is the antenna gain required at each station for unity signal-to-noise ratio in a 500-c.p.s. bandwidth, but as W1FZJ has pointed out,⁶ the ear can be a narrower filter if properly trained.

(Continued on page 151)

⁵ Troetschel and Heuer, "A Parametric Amplifier for 1296 Mc.," *QST*, January, 1961.

⁶ Harris, "The World Above 50 Mc.," *QST*, June, 1961.

The Bugless Bug

An Electronic Key Designed for Convenience and Reliability

BY GILBERT L. BOELKE,* W2EUP

Special features of the electronic key described here include small size, low battery drain, minimum adjustments, rugged construction and solid-state circuitry. As the title implies, the author has probed the reasons for frequent erratic performance in earlier designs. His findings are reflected in the circuit described here.

AT first try, most amateurs are favorably impressed with the sound and feel of an electronic keyer (or bug). The precisely-formed characters and sending ease afforded by this type of device are quite convincing. However, the feel of perfection is not often backed up by a foolproof design. As some disillusioned operators have discovered, an ideal electronic bug is difficult to realize. An ideal bug is not necessarily any different in the manner of operation, but it is necessarily a convenient and reliable piece of equipment.

Most keyers occasionally make an error. The beginning operator, through unfamiliarity, will usually be unable to distinguish between his own sending errors and those made by the bug, since the error usually is not immediately repeatable. One unit the author has used would send for hours without an error, but inevitably some kind of a timing error would creep in. Nothing can be more frustrating to troubleshoot. Another shortcoming commonly encountered is dependence on line voltage. This is one which will spoil your first Field Day unless you are prepared to revert to a conventional semi-automatic key, or are lucky enough to have good line-voltage regulation.

Convenience is another important factor. Usually an electronic unit requires a line cord and a.c. power. This is decidedly inconvenient and sometimes becomes a shock hazard, since it is always operated in conjunction with other electrically-operated gear. There are bugs designed for battery operation -- usually transistor-

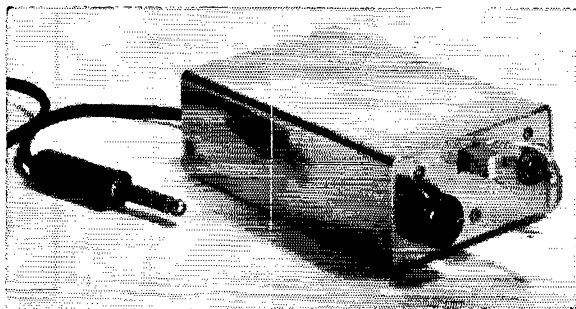
ized-- but the batteries are usually large, expensive, short-lived, or any combination thereof. Some of the transistorized units have no provisions for stabilizing against temperature variations.

The electronic bug shown in the photographs was designed to improve the reliability and convenience factors, without considering the cost. Nevertheless, a similar unit could be constructed for less than \$25, using currently-available components without depending on the junk box for parts. It measures just over 5 by 3 by 1½ inches, excluding paddle, and contains a mercury-battery supply. Idling life of the batteries is a minimum of three months, if you leave the switch on continuously. If you send for a solid half hour per night, seven nights a week, 52 weeks per year, one set of batteries will last more than 2½ years. It operates over a temperature range of approximately 10 to 110 degrees F. Since the maximum power required is less than 0.075 watt, self-heating from internal dissipation is virtually nonexistent. It forms self-completing dits and dahs (plus spaces) which are initiated by the action of the lever, rather than being controlled by a free-running time base. The first dit or dah of a string is always the same length as succeeding ones of a string.

Erratic operation is usually caused by erratic making or breaking of the lever contacts. In conventional bugs this makes no difference, other than a slight click on make and break. In an electronic bug it is disastrous because of the high speed of the circuits. Even the best contacts are not good enough to guarantee foolproof operation

*Sylvania Electronic Systems, 1100 Welch Dr., Buffalo 21, N. Y.

Fig. 1—The "Bugless Bug" is completely self-contained in an enclosure measuring 3 by 5 by 1½ inches. The speed control (the only control required) is to the left, and the on-off switch is to the right of the key lever.



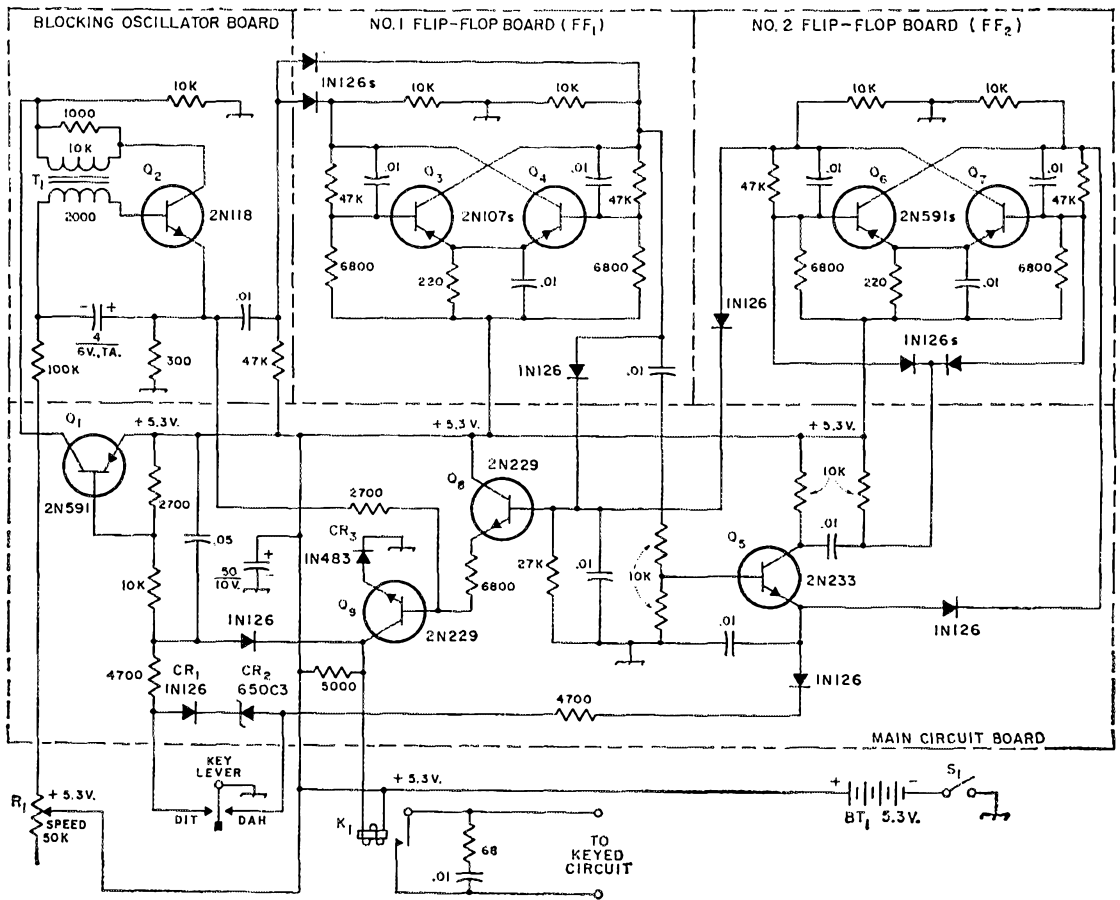


Fig. 2—Circuit of the "Bugless Bug." Capacitances are in μf . and resistances are in ohms. Resistors are $\frac{1}{4}$ watt. Capacitors are ceramic except those marked with polarity, which are electrolytic; TA indicates tantalum. Components not listed below are labeled for text-reference purposes. NOTE: Either 2N107s or 2N591s may be used for Q_3 , Q_4 , Q_6 and Q_7 .

BT1—Four 3400 ma.-hr. mercury cells (Mallory RM-4R).
 CR2—Zener diode (Texas Inst.).
 K1—S.p.s.t. relay, 1000-ohm coil; see text (Sigma 4F-1000-SIL).

R1—Miniature linear-taper control (Mallory MLC54L).
 S1—S.p.s.t. toggle switch.
 T1—10,000-ohm to 2000-ohm transistor transformer (Olson T230, Stancor TA-35 or similar).

of electronic bugs unless the circuit is specially designed to overcome this problem. This can be easily demonstrated:

Connect a high-resistance potentiometer across the contacts on either the dit or dah side. (The resistance should be high enough to avoid triggering the circuit at the maximum-resistance setting.) Now, gradually reduce the resistance and observe what happens. If it is up to the standards of this bug, it will do absolutely nothing until, at a certain resistance setting, it will suddenly start to form a string of perfectly timed and spaced dits or dahs, depending on which contacts are being tested.

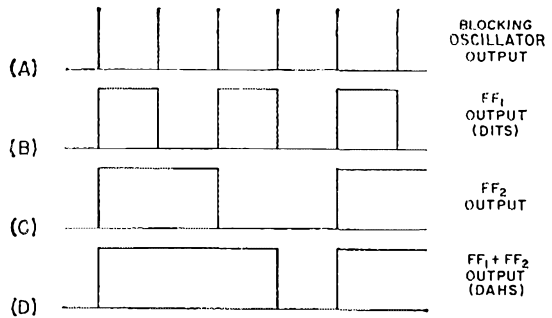
Both the dit-dah ratio and the keying weight are fixed by the design, although some adjustment of keying weight is possible at high speeds by mechanically adjusting the relay or by adjusting the value of the despiking resistor. Once this

adjustment is made, keying weight will be correct at all speeds.

Circuit Description

The circuit is shown in Fig. 2. When the key is depressed to the dit side, the transistor switch (Q_1) saturates, applying full battery voltage to the blocking oscillator. The blocking oscillator (Q_2) generates pulses at a constant rate which depends on the setting of speed-control R_1 . These pulses, shown in Fig. 3 as waveform A, are of short duration compared to the duration of a dit. The blocking oscillator triggers a flip-flop (Q_3Q_4) which changes state upon the arrival of each blocking oscillator pulse. (Hereafter when a flip-flop is referred to as being "off," it will indicate that it is in the idle state — as when the bug is idle.) Waveform B shows the resulting output of FF_1 . This output is fed through an emitter fol-

Fig. 3—Waveforms at various points in the circuit as described in the text.



lower (Q_8), which drives the transistor switch (Q_9), closing the relay to form a string of dits.

Notice that the blocking oscillator output is fed to Q_9 as well as FF_1 . Without this connection, it is possible occasionally to get a shortened dit because of erratic key-lever contact. With this connection, whenever a blocking-oscillator pulse is started, it feeds back through Q_9 to Q_1 , holding battery voltage on the blocking oscillator until the dit is completed. Thus, the blocking oscillator can never produce a "substandard" pulse because the feedback path through Q_9 and Q_1 always supplies full voltage as soon as any pulse large enough to trigger FF_1 begins to form.

For a dah, the key lever turns on Q_1 through CR_1 and CR_2 , simultaneously closing the gate (Q_5). Zener diode CR_2 provides a fixed voltage drop to the base of Q_1 . This drop is necessary to assure that the blocking oscillator can't be started until gate Q_5 is closed. The blocking oscillator and FF_1 function normally to supply a string of dits, but in this case alternate blocking-oscillator pulses slip FF_2 (Q_6Q_7) through the gate. The output of FF_2 is also fed to Q_9 through Q_8 , and the combined outputs of FF_1 and FF_2 result in a string of dahs. This can be seen in Fig. 3, where waveform C represents the output of FF_2 and

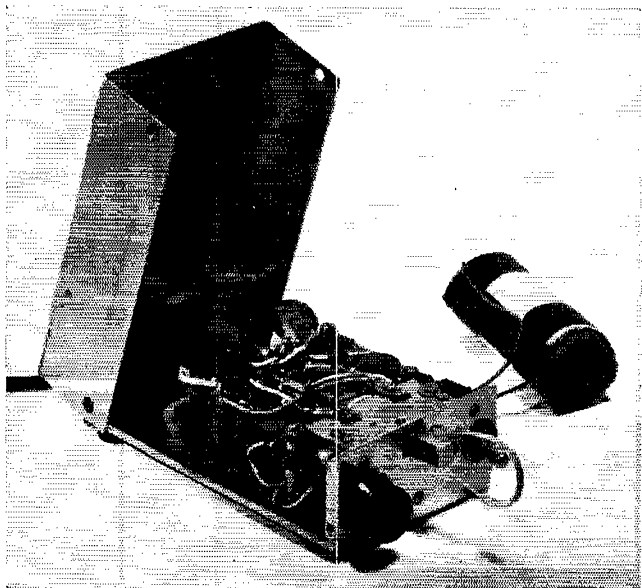
waveform D shows the result of combining B and C in Q_9 .

Because of different diode voltage drops and different transistor outputs at different times during these cycles, the outputs fed to Q_9 are not exactly constant. In Q_9 this variation presents no problem because Q_9 is sufficiently overdriven. If this voltage were fed back to sustain the blocking oscillator directly for self-completion, the blocking-oscillator timing would vary. By providing feedback through Q_1 , an absolutely constant voltage is maintained, since the saturation drop of Q_1 is independent of drive current as long as saturation is maintained.

The 5000-ohm resistor across the relay coil is necessary to swamp out the inductive "spike" generated by K_1 . Adjusting the value of this resistor will not only change the amplitude of the spike, but it also controls the drop-out time of the relay, for adjusting keying weight.

The diagram shown in Fig. 2, an exact schematic of the author's unit, may be modified with lower-cost components. Q_2 may be replaced with a 2N229 or a 2N233. Other diodes may be substituted, but CR_3 must be a silicon type, though not necessarily a 1N483. CR_2 may be replaced with a 1N704 or a 1N748, at a lower cost.

Fig. 4—Interior view of the "Bugless Bug." The mercury battery fits in the space at the rear of the box. The relay is mounted beneath the key-lever mechanism.



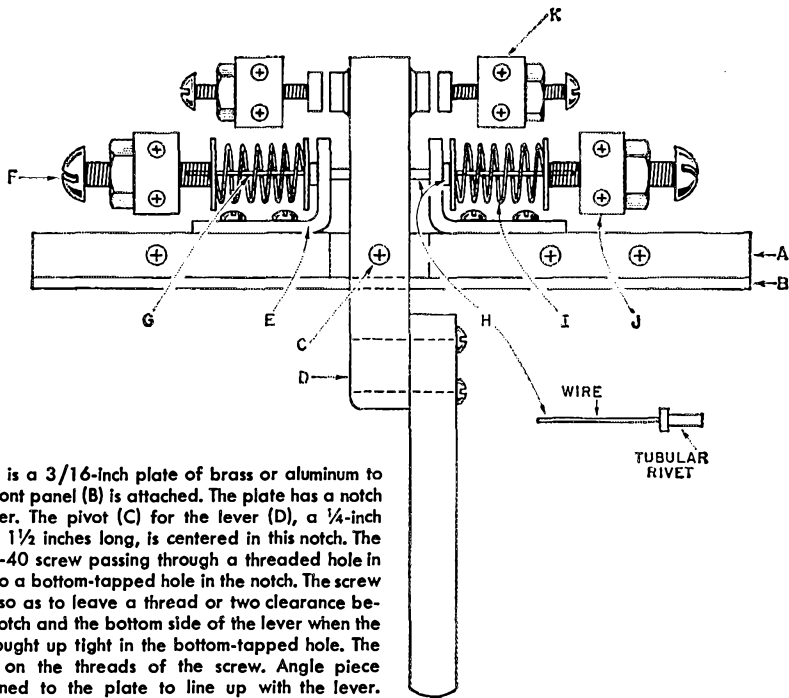


Fig. 5—(A) is a 3/16-inch plate of brass or aluminum to which the front panel (B) is attached. The plate has a notch at the center. The pivot (C) for the lever (D), a 1/4-inch square bar 1 1/2 inches long, is centered in this notch. The pivot is a 4-40 screw passing through a threaded hole in the lever into a bottom-tapped hole in the notch. The screw is adjusted so as to leave a thread or two clearance between the notch and the bottom side of the lever when the screw is brought up tight in the bottom-tapped hole. The lever turns on the threads of the screw. Angle piece (E) is fastened to the plate to line up with the lever. The angle-piece mounting holes are slotted to permit lateral adjustment. Tension screw (F), a 6-32 machine screw, is drilled to pass wire (G), which is cut from a paper clip. A tubular rivet (H) is centered about the paper-clip wire and soldered to its end. The angle piece (E) is drilled to pass the rivet shank. A 1/4-inch spring (I) is placed between the tension screw and the head of the rivet, enclosing the paper-clip wire. The spring is retained by washers at each end. As the lever is moved to one side, the rivet slides through the hole in E and is pushed against the spring washer. Tension is adjusted by turning the adjusting screw.

Stationary contacts are 4-40 machine screws to which contacts have been soldered. The outer end of the lever is drilled and tapped for short 4-40 machine screws whose heads are flattened. The movable contacts are soldered to these screws. A horizontal plate of 1/16-inch aluminum is fastened to the top edge of the 3/16-inch plate (see photo). The drilled and tapped blocks (J) and (K) are fastened against the under side of this horizontal plate. The blocks (K) carrying the stationary contacts are insulated by fiber washers or strips.

The original relay at K_1 was a 29-volt, non-adjustable miniature type. However, the spacing was adjusted and the contacts bent until the relay followed fast keying faithfully. The procedure is tricky, and it is recommended that the relay be replaced with a Sigma 4F with a 1000-ohm coil. The 4F, though somewhat larger, has fully-adjustable contact spacing and spring tension, and will fit into the case with a rearrangement of the parts.

Construction

The bug is built on a 1/8-inch aluminum base plate, measuring 3 by 5 inches, which can be cut from an old panel. Aluminum end plates 3/16-inch thick are fastened to the ends of the base plate, and everything else is fastened to the resulting assembly. Holes are tapped in the base or mounting of parts, and tapped holes in the

edges of the end plates provide anchorage for the cover screws. The cover is made of 0.051-inch aluminum, bent into a U shape to fit snugly over the assembly.

The key lever mechanism is homemade. Fig. 5 shows the essential details. When parts are completed and assembled, adjustments are made and locked in place. With careful construction and adjustment the lever has smooth, positive action, and is quite rugged.

This is the first electronic bug the author has used that has only one adjustment — speed — and that has never been the cause of a sending error in over three years. It is small enough to be carried conveniently in a pocket, but solid and heavy enough for comfortable sending.

Incidentally, the original batteries are still in use and going strong. QST

Strays

The Post Office Department promises faster mail service with the new Zip codes. Use yours when you write League Headquarters. Use ours, too. It's 06111.

On page 38 in the July *QST*, the price of Allied Radio's *Electronics Data Handbook* was given as 35 cents. In the current Allied catalog, however, its price is listed as 50 cents.

JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

Hamfest Calendar

California — SCARS, BAYLARC, and the radio clubs of San Mateo, Oakland, Hayward, San Francisco, and the North Peninsula will host the Greater Bay Area Hamfest on September 21-22. Scene of the two-day soiree will be the Edgewater Inn in Oakland. Write W6KZF for information.

Florida — The Daytona Beach ARA will host their annual hamfest at the Sunrise and Bluebird Motels, four miles north of Ormond Beach, on Labor Day weekend. C. W. Langer, club secretary, sez it will be an old-fashioned eyeball-type hamfest. And C.W.'s the man to contact for details. Write via P.O. Box 88, Daytona Beach, Fla.

Illinois — The Egyptian Radio Club will hold its annual hamboree on Sunday, September 15, at the clubhouse on the levee at the Chain of Rocks Canal near Granite City, Illinois. Games and fun for everyone; ample parking and swapping space will be available. Mobiles will be talked in on 29.64 Mc. by the club station, W9AIU. Location is 200 yards south of U.S. Rte. 66, two miles east of the Mississippi River bridge. For more information, contact the club at Box 1300, R.R. 1, Granite City, Illinois.

Illinois — The Fox River Radio League, Inc., will present their annual Swap and Shop picnic on September 22. The unusual displays, swap tables and games, begin at 10 A.M. Free coffee all day. The location is Phillips Park on the south side of Aurora, Illinois. For more complete details, write the club at P.O. Box 443, Aurora, Illinois.

Illinois — The Peoria Area ARC will sponsor their annual hamfest on Sunday, September 15, at Exposition Gardens on the north edge of Peoria (same place as last year). Lunches will be available, and coffee and donuts are free at 10 A.M. Swap shops, exhibits, games and contests will all be featured. Mail advance registration to Stan Kujawa, K9JSB, 1612 West Columbia Terrace, Peoria, Illinois.

Illinois — The annual meeting and banquet of the W9-DXCC will be held at Chicago's Sheraton Hotel at 1 P.M., Saturday, September 14. For details, write Mac Reynolds, W9EVI, 664 Caroline Court, Deerfield, Illinois.

Iowa — The Cedar Valley Amateur Radio Club will hold their annual convention August 31-September 1 at the Town House Motel in Cedar Rapids. Join a thousand other hams and ham families for two days of fun, games, swap shops and technical features. Contact Chuck Carney for details. The address is Box 1346, Cedar Rapids.

Kansas — No program! No registration fees! Just plenty of eyeball QSOs, swapping, and family fun. It's the annual swap-fest and picnic of the Arkansas City ARC, September 8 at the Lions' Club Park in Arkansas City, Kansas. For details, contact Hugh Metzler, K0OKA, 1026 North First Street, Arkansas City, Kansas.

Massachusetts — The 13th annual New England DXCC meeting will be held Saturday, September 21, in the Grand Ballroom of Motel 128 (at Route 128 and Route 1) in Dedham, Massachusetts. Cocktail hour will begin at 5 P.M., dinner at 7. Cost per person for a roast beef dinner,

gratuity included, is \$5.00. The deadline for reservations is September 16. Contact W1IIZ, 18 Whittemore Street, Concord, Mass.

New Jersey — The 15th annual hamfest of the South Jersey Radio Association will be held at Molia Farms in Malaga, N. J., on Sunday, September 8. Hamfest Chairman this year is Dick Denber, K2OYW. Write via P.O. Box 316, Haddonfield, New Jersey, for more information.

Ohio — The 26th annual stag hamfest of the Greater Cincinnati Amateur Radio Assn. will be held on Sunday, September 22, at Stricker's Grove, on Compton Road at Mt. Healthy, Cincinnati. Early arrivals get free coffee and donuts, and snacks will be served all day. For details and registration, write Elmer Schubert, W8ALW, 3965 Harmar Court, Cincinnati, Ohio 45211.

Ohio — The Findlay Radio Club, Inc. will hold their annual hamfest September 8 at Riverside Park in Findlay. This is annually one of the largest hamfests in northern Ohio. Information from Clark E. Poltz, W8UN, 122 W. Hobart, Findlay, Ohio 45840.

Pennsylvania — The Uniontown ARC will present their 14th annual gabfest on Saturday, September 7. Registration is \$2.00, and the location is the club grounds on the Old Pittsburgh Road, 2 miles north of Uniontown. For details, write to the club at 438 Braddock Avenue, Uniontown.

Pennsylvania — Four York County clubs are jointly sponsoring the 8th annual York County hamfest at the Adams County Fairgrounds in Abbottstown, Pa. on September 1. Admission for hams is \$1.50, families free. Among the all-day events are a rummage sale, an auction, a transmitter hunt, and children's games. Refreshments will be available, so bring your lunch and stay a while. Contact Dan Webster, K3BKX, 235 North 3rd Street, Columbia, Pennsylvania, for details.

Texas — The Central Texas ARC will hold their 8th annual hamfest in the air-conditioned mall of a local shopping center (unnamed) on Sunday, September 1. Details from James G. Brown, W5BOO, via P.O. Box 1032, Waco, Texas.

Washington — The Walla Walla Radio Amateur Club will hold their annual all-family picnic and hamfest on Sunday, September 15, at Wildwood Park in Walla Walla. There will be a full day's program, highlighted by a swap shop, games, and a potluck lunch at 12:30 (club members will bring the coffee, pop and dessert — just pack a lunch). Registration, from 10 A.M. to noon, is free. Licensed gals: this is the annual meeting of the MINOWS. The talk-in frequencies are 29.6 Mc. and 3970 kc. Contact Pat Stewart, W7GVC, 1404 Ruth Avenue, Walla Walla, Washington.

Ontario — October 1 is the date for this year's West Side (Toronto) Radio Club hamfest. This is WSRC's 25th anniversary conclave, and festivities are planned to make it the biggest, too. A king-size banquet, contests, games and more. At the Skyline Hotel, Dixon Rd. and Highway 27, Toronto, beginning at 7:30. Tickets available from committeemen or by mail from VE3CWN, 28 Shaver Ave., Islington, Ontario.

Strays

Stolen equipment — stolen from the MARS station at Little Rock AFB, Ark., recently were these items: 75A-4 (serial 5612), EV 664 microphones (ser. S49668 and 32636), 75S-2 (ser. 1018), Collins 312B-4 station control (ser. 1206), 516 F-2 power supply, (ser. 355), 32S-2 (ser. 1022), 30S-1 (ser. 515), and a WRL rotator and brake (ser. 54107). Contact Major Joseph Petronis, K5LIQ, MARS Director, Little Rock AFB, Jacksonville, Arkansas, if you know the whereabouts of any of this gear.

Stolen equipment — W8HHN's shack was stripped clean in Formosa last year. Among the

missing gear — which may have found its way back to the U. S. — were a 75S-1 (ser. 1690), a 32S-1 (ser. 1706), Collins power supply and control unit, and a D-104 microphone. If you have information concerning any of this equipment, notify Fr. McCausland, W8HHN/0, Chapel #2, Forbes AFB, Kansas.

Among the tennis greats elected to that sport's Hall of Fame this year was Wilmer Allison, W5VV. Allison, a Houston, Texas resident, won many tennis laurels, including the national championship in 1930.

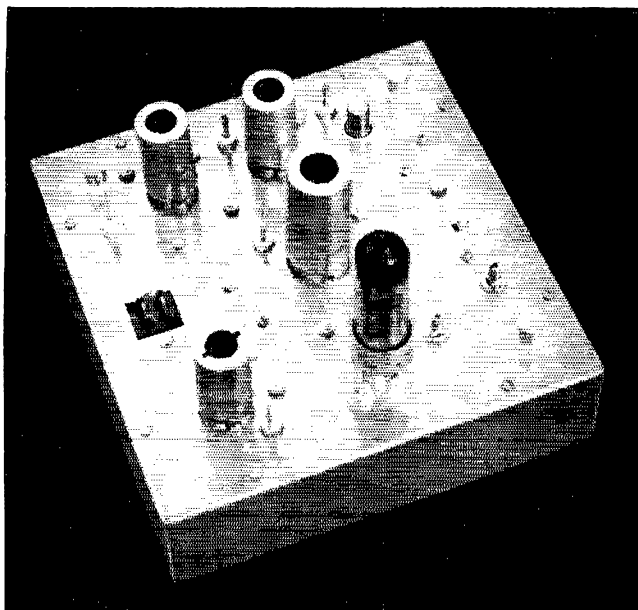


Fig. 1—This looks like a typical v.h.f. converter, but it is more than that: a 144-Mc. transverter which will handle both transmitting and receiving conversions from a 14-Mc. station setup for s.b. or other modes.

A Two-Meter Transverter

Converting To and From 14 Mc. for V.H.F. Sideband

BY ERNEST P. MANLY,* W7LHL

THIS 6-tube package will convert 144-Mc. signals down to 14 Mc., and a 14-Mc. transmitter signal up to 144 Mc. An s.s.b. transmitter for 20 will work beautifully with the transverter, or a communications receiver and a 20-meter transmitter may be used. The 20-meter band was picked for the conversion process because it was felt that there is more s.s.b. gear on 20 than on any other band that would be suitable for this purpose.

The block diagram, Fig. 2, shows how the system works. The top line of the diagram is a typical 2-meter converter, with 6CW4 and 6AK5 r.f. stages ahead of a 6AK5 mixer. Mixer output is 14 Mc. or higher. In the middle is the oscillator-multiplier, a 6AN5 with its triode working as a crystal oscillator on 43 Mc. and the pentode tripling to 130 Mc. This is standard

* 429 10th Ave. West, Kirkland, Washington.

v.h.f. converter practice so far. The difference is that the same injection stages are used for transmitting. In the bottom line, the 130-Mc. energy is fed to a 6AK5 amplifier, and then to a 6360 transmitting mixer. The 14-Mc. signal from the 20-meter sideband rig is also fed to this mixer, and output is on 144 Mc., with the same characteristics as the 20-meter signal. Though the transverter idea is associated with s.s.b. in most amateurs' minds, it can be used with other modes as well.

Circuit Details

The first r.f. amplifier in the receiver side, V_1 , Fig. 4, is a grounded-grid Nuvistor. Its cathode input impedance is matched by means of a quarter-wave section of 93-ohm coaxial line, L_{116} . An alternate method would be to tune the cathode coil, and tap the antenna line down on it. These

The "easy way" to go sideband on a v.h.f. band is to take the output of an s.s.b. rig on, say, 14 Mc., and heterodyne it to the v.h.f. band of your choice. If this is done at a low power level (recommended) the heterodyne oscillator and multiplier can also supply injection for a crystal-controlled receiving converter. Such a "transverter" is especially useful with the many s.s.b. transceivers now appearing on the market. This one has a hot receiving converter, the oscillator and multiplier stages, and an s.s.b. mixer with sufficient output to drive a high-powered tetrode amplifier — all in a package no larger than many v.h.f. converters.

matching systems give equal performance. Gain of the grounded-grid stage is about 10 db. The second stage, V_2 , is a 6AK5 pentode, with a gain of 25 to 30 db. If cross-modulation is expected to be a problem, a gain control could be included readily in this stage. Both this and the 6AK5 mixer, V_3 , follow conventional converter circuit practice.

The three parts of the transverter are separated by shields. This permits the injection to be adjusted to the desired level, and provides isolation, to keep down spurious responses. Output from the 6AN8, V_4 , at 130 Mc., is link-coupled to the receiving mixer grid circuit, with light coupling at each end. Noise figure of the converter is under 4 db. Other tubes could be used equally well in the oscillator-multiplier stages, and early versions of this transverter used a 12AT7 for this purpose. The triode-pentode gives somewhat more output, which is helpful in the transmitting side.

The injection stages run at low input, for good stability, so an amplifier stage is needed to build up the 130-Mc. energy for the transmitting mixer. This is done with the 6AK5 stage, V_5 , which also helps to keep down the energy injected into the transmitting mixer at frequencies other than 130 Mc. Its output is link-coupled to the cathode of the 6360 mixer, V_6 . Energy from the 14-Mc. transmitter is fed push-pull to the mixer grid circuit, which is tuned to 14 Mc. The mixer plate circuit is also push-pull, and tuned to 144 Mc.

A 22-volt zener diode, CR_1 , is used in the mixer cathode circuit for bias, eliminating the need for an external bias supply. Operating conditions are designed to keep the tubes below their maximum dissipation rating if the crystal is removed or if it drops out of oscillation.

Construction and Adjustment

The transverter is built on a $7 \times 7 \times 0.032$ -inch brass plate. The shields are also made from 0.032-inch brass. Aluminum should work equally well. A $7 \times 7 \times 2$ -inch aluminum chassis is used to mount the transverter. The insulated terminals are CTC type 15S1. Parts layout follows good

Fig. 3—Bottom view of the 2-meter transverter. Receiving stages are at the top, transmitting section at the bottom, and injection stages in the center section. Construction follows v.h.f. receiving converter practice.

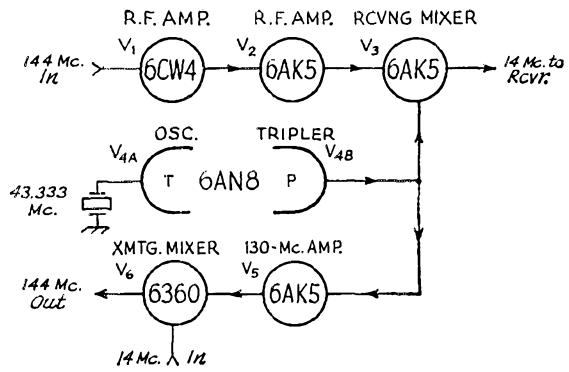
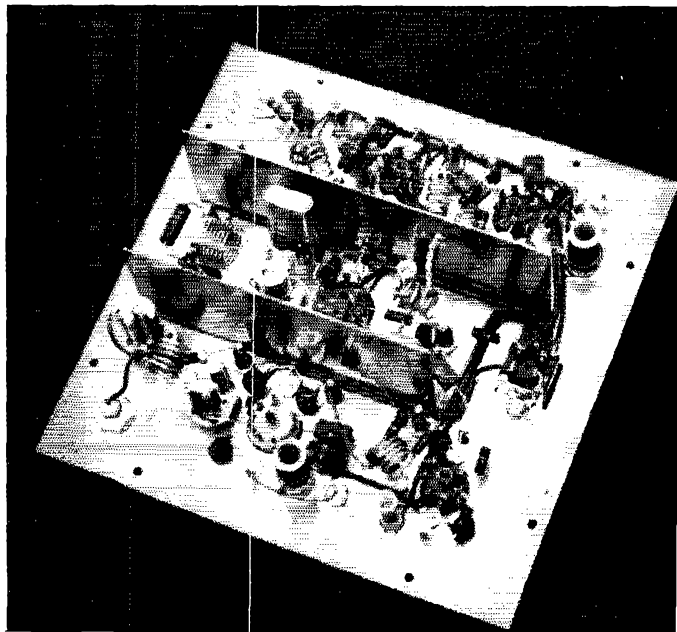


Fig. 2—Block diagram of the W7LHL 144-Mc. transverter. A single oscillator-multiplier section furnishes both transmitting and receiving injection, to separate mixers.

v.h.f. practice, but is otherwise not particularly critical.

Tuning the oscillator, tripler and 130-Mc. amplifier is done by inserting a 50-ma. meter in the 6360 plate supply lead. The tube will draw approximately 1 ma. of plate current without drive, increasing as each stage is peaked. A grid-dip meter may be used to check each tuned circuit, to be sure that it is on the right frequency. Adjust the link between the 130-Mc. amplifier and 6360 cathode for maximum plate current, 10 to 20 ma. when 130-Mc. tuning is completed. A 14-Mc. carrier is fed in and the 6360 grid and plate circuits are tuned for maximum output at 144 Mc. The 14-Mc. carrier will drive the plate current to about 40 ma. before the 144-Mc. output starts to flatten out. Output at 144 Mc. will light a No. 47 pilot light to near full brightness.

There will be a little 130-Mc. and 116-Mc. energy appearing in the output, too. Some form of filter is desirable between the mixer output and the antenna or following linear-amplifier stages. A high-Q coaxial tank circuit with low-impedance coupling in and out will serve this purpose well. Adjustment of coupling into and out of such a filter should be made for maximum



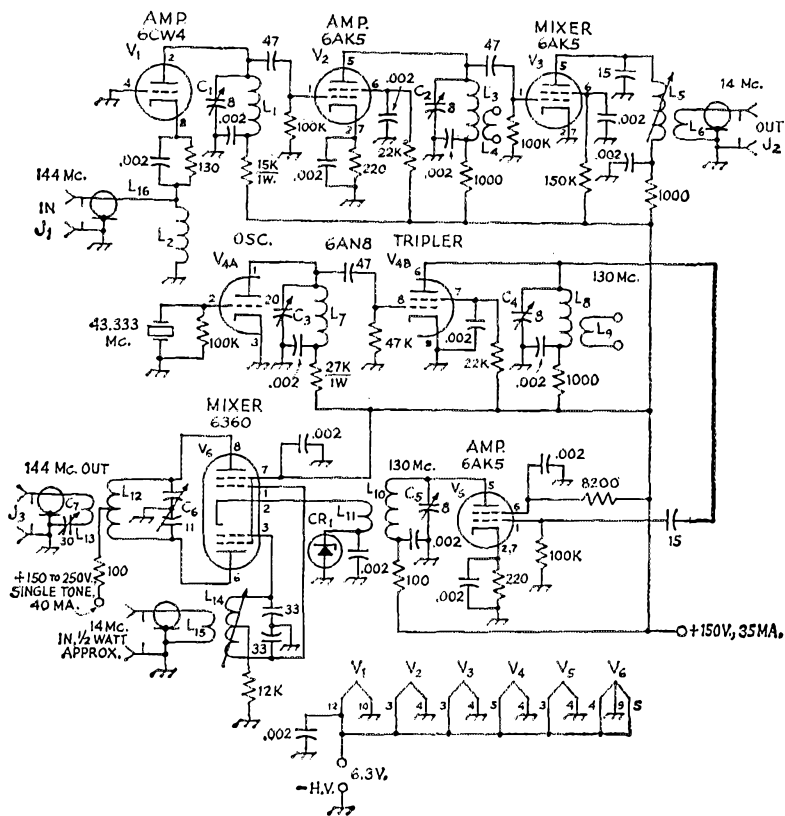


Fig. 4—Schematic diagram and parts information for the 144-Mc. converter. Capacitors are ceramic unless specified. Decimal values of capacitance are in μf ., others in pf. Resistors are $\frac{1}{2}$ -watt composition, unless specified.

- C₁, C₂, C₄, C₅—8-pf. cylindrical trimmer.
- C₃—20-pf. miniature trimmer.
- C₆—11-pf. miniature butterfly variable.
- C₇—30-pf. miniature trimmer.
- CR₁—22-volt zener diode. (International Rectifier 1N1527)
- J₁, J₂, J₃—Coaxial receptacle, BNC type.
- L₁, L₃—5 turns No. 18, $\frac{3}{8}$ -inch diam., $\frac{3}{4}$ inch long.
- L₂—4 turns No. 18, $\frac{3}{8}$ -inch diam., $\frac{3}{8}$ inch long.
- L₄—1 turn insulated hookup wire, $\frac{1}{4}$ -inch diam., at cold end of L₃. Connect to L₉ with twisted leads 2 $\frac{3}{4}$ inch long.
- L₅—35 turns No. 26 enam., close-wound on $\frac{3}{8}$ -inch diam. iron-slug form.
- L₆—3 turns insulated hookup wire around cold end of L₅.
- L₇—7 $\frac{1}{4}$ turns No. 20, $\frac{1}{2}$ -inch diam., 16 t.p.i. (B & W Miniductor 3003).

- L₈—5 turns No. 18, $\frac{3}{8}$ -inch diam., $\frac{1}{2}$ inch long.
- L₉—1 turn insulated hookup wire around cold end of L₈. Connect to L₄ with twisted leads. L₄ and L₉, plus leads, can be made from single piece of wire.
- L₁₀—5 turns No. 18, $\frac{3}{8}$ -inch diam., $\frac{1}{2}$ inch long.
- L₁₁—1 turn insulated hookup wire around cold end of L₁₀.
- L₁₂—5 turns No. 16, $\frac{3}{8}$ -inch diam., $\frac{1}{2}$ inch long, center-tapped.
- L₁₃—1 turn insulated hookup wire at center of L₁₂.
- L₁₄—33 turns No. 26 enam., close-wound on $\frac{3}{8}$ -inch diam. iron-slug form, center-tapped.
- L₁₅—2 turns insulated hookup wire around center of L₁₄.
- L₁₆—93-ohm coaxial matching section; RG-62/U, 16 inches long. See text.

attenuation of unwanted frequencies, rather than maximum transfer of 144-Mc. energy.

A Z-144 r.f. choke was used originally in the 6360 plate circuit in place of the 100-ohm resistor shown in Fig. 4, but this resulted in the mixer operating as a doubler from 14 to 28 Mc., because of choke resonance near the latter frequency. A Z-235 r.f. choke or the 100-ohm resistor will correct this tendency.

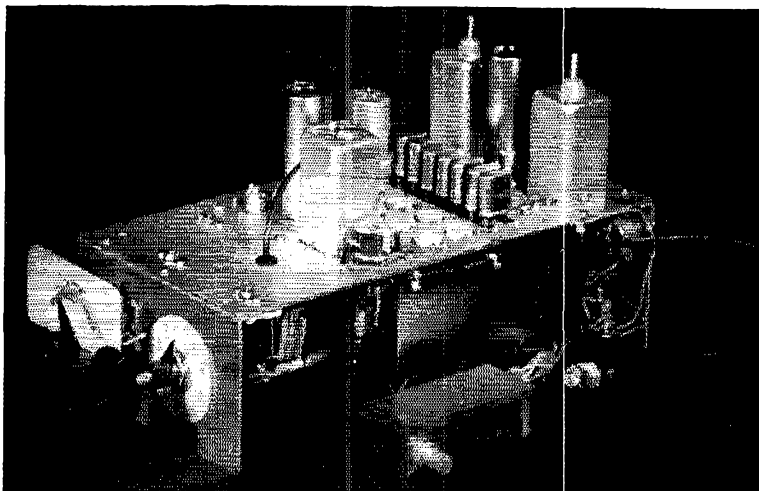
When using the circuit shown for matching with 93-ohm cable, Fig. 4, the input coil of the 6CW4 can be tuned to 144 Mc. by adjusting the turn spacing and using a grid-dip meter to indicate resonance. Disconnect the coaxial matching section when doing this. All other r.f. and mixer

circuits can be peaked for maximum response in the portion of the 2-meter band one prefers.

Most 20-meter transmitters and transceivers will have more than enough power to drive the transverter mixer. A way must be found to limit this power. Construction and use of a suitable step-type attenuator was described by W9ERU in *QST* for December 1959. Some transmitters have provision for taking off power at levels below that of their output amplifiers, and such a tap should be used, where available.

Output from the 6360 mixer is sufficient to drive a linear amplifier with a pair of 4X250Bs or similar tubes to several hundred watts input on s.s.b. or c.w.

QST



An experimental receiver front end using two beam-deflection mixers.

A New Approach to Receiver Front-End Design

BY WILLIAM K. SQUIRES,* W2PUL

Six years ago some of the principal weaknesses of contemporary communications receivers were outlined and a technique for alleviating at least some of the ills was described¹. At that time it was pointed out that overload and cross modulation were serious offenders and that "modern" multiple-conversion receivers behaved extremely badly in this respect. Six years later, most still do.

CURRENT receivers, having two or three stages of conversion plus one (or two) r.f. stages before any appreciable selectivity, perform very poorly under exactly those conditions that are most important, when the desired signal is weak and the undesired signal is strong. Even though the receiver's stated selectivity is superb and should be capable of rejecting the unwanted strong signal, cross modulation and overload result in the strong signal "riding through", often in the form of key clicks, "monkey chatter," squeaks and apparent noise. Often the operator is unaware of his receiver's misbehavior; he assumes

*% Squires-Sanders, Inc., 475 Watchung Av., Watchung, N. J.

¹ Goodman, "What's Wrong with our Present Receivers?", *QST*, January, 1957.

the band is that crowded and noisy. But some of those commercial radioteletype stations, foreign phones, and big military signals are not even in the amateur bands!

While *cross modulation* and *overload* are not the only deficiencies (spurious responses, twcets, and inadequate i.f. and image rejections are frequent offenders), the major attention in this article will be toward describing techniques for reducing both of these deficiencies while simultaneously offering a number of performance advantages.

General Principles

First, the principles outlined by Goodman² are still very valid:

- 1) As little gain as possible before taking full selectivity.
- 2) Superb linearity in any stage preceding selectivity.

To achieve (1), the ideal receiver should have *no r.f. stage* and have as few conversions as possible. Then what about sensitivity? Image and i.f. rejection? Oscillator radiation? We have been taught over the years that the more r.f. stages — and the more conversions — the better the receiver. But r.f. stages are simply an apology for poor mixer performance and inadequate image re-

² Op. cit.

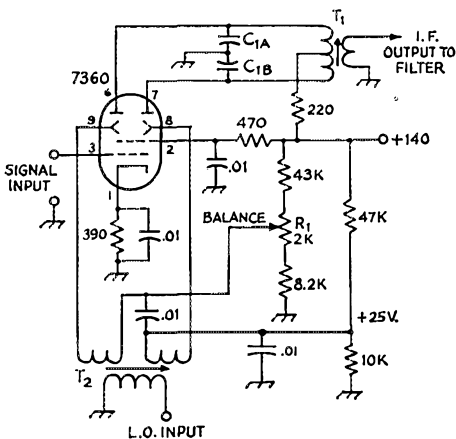


Fig. 1—Circuit diagram of the 7360 low-level mixer circuit.

jection, while numerous conversions make i.f. selectivity easy at the expense of miserable cross modulation behavior (and can cause serious spurious and tweet problems).

To achieve (2), the converter, or mixer, should be a linear device like a class-A amplifier, able to retain full linearity for big signals — as large as a volt! Conventional mixers perform only because they are nonlinear (for large signals), *i.e.*, the local oscillator voltage swings the tube from nearly cut-off to nearly zero bias and no tube is linear near cut-off or near zero bias. As long as the signal is very small compared to the local oscillator voltage, the mixer is quite linear; but when the signal grows large, violent cross modulation occurs.³

The Beam Deflection Mixer

While most of us are familiar with beam deflection tubes like the 7360, used as high-level mixers and product detectors, little has been published on their use as low-level receiver mixers. Theoretical analysis and experimental work have shown exceptional performance to be attainable with proper circuitry. The tube performs the mixing function by "switching" the current emerging from the screen-grid region back and forth between two plates. At the time the beam is centered on either plate, the tube operates as a conventional Class-A pentode. Properly driven it is *always* in the linear region. Moreover, since the two output plates can be operated in push-pull, the tube can be inherently balanced against the input signal frequency⁴ (hence, good i.f. rejection).

A typical low level mixer circuit is shown in Fig. 1. It should be noted that signal is applied to the No. 1 grid, local oscillator applied *balanced* to the deflection electrodes, and plates connected push-pull and balanced at the i.f. Used in this

³ How violent? At Squires-Sanders, cross modulation measurements on several current high-priced receivers showed that the *best* produced *serious* cross modulation with the unwanted signal 100 kc. away at a level at the antenna of 50 millivolts. The worst simply collapsed in *silence* at a level of 35 millivolts.

⁴ M. B. Knight, "A New Miniature Beam Deflection Tube", *RCA Review*, June 1960.

way, the mixer has a conversion conductance of one-half its g_m as an amplifier (compared to one-fourth for conventional mixers). Operated as described later, the plate-to-plate output impedance is relatively low, from 15,000 to 25,000 ohms.

T_1 must be constructed for optimum balance, with windings symmetrical for both inductance and capacitance to ground. Even with this precaution, the *effective* center-tap is established by the two identical output capacitors C_{1A} and C_{1B} , and the T_1 physical center-tap is not bypassed. With this careful attention, i.f. rejections of greater than 60 db. have been obtained, *excluding* any r.f. selectivity. The balance is affected not only by the current balance, set by R_1 , but by magnetic fields. If used on a steel chassis, or near power transformers, a mu-metal shield is necessary.

While not necessary for i.f. balance, the deflection electrodes are also carefully balanced, and T_2 must be given as much care as T_1 . In most designs to date T_2 is resonated by the tube and circuit stray capacities with the balance set to optimum with the slug (*not* used for tuning). The deflection-electrode balance achieves two things: (1) it reduces mixing at local-oscillator harmonics (and hence spurious and tweets) and (2) it reduces local-oscillator radiation since, at perfect balance, no oscillator voltage appears at the No. 1 grid.

The voltages shown are optimum for bogey 7360s. Certain tubes, or the presence of permanent magnetic fields, may require readjustment of the deflection electrode divider. For other plate voltages, the deflection electrodes should be set at 15 to 18 percent of the plate voltage.⁵ Apart from attention to balance and circuit symmetry, the tube is not "fussy", and considerable variation in parameters does not deteriorate performance.

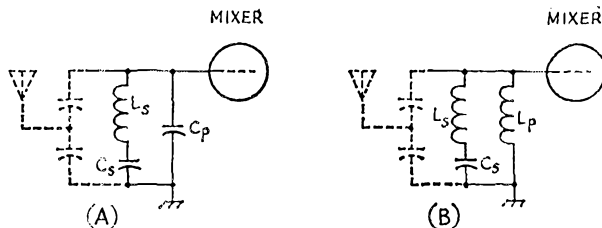
The r.m.s. oscillator voltage at a deflection electrode can be from one to ten volts. The higher voltages produce slightly greater conversion gain but may lead to harmonic mixing problems caused by curvature of the deflection electrode characteristics. Three volts is adequate and near optimum. A shield across the socket (between pins 9 and 1 to between pins 5 and 6) is useful at high frequencies, to aid i.f. rejection and to lower local oscillator leakage. A complete "front-end" bandswitched 80 through 10 meters and employing two such mixers is shown in the photograph. The i.f. rejection is greater than 80 db., and oscillator leakage to the antenna is less than 50 microvolts.

Cross Modulation Performance

Since the tube operates (as far as input signals are concerned) much as a Class-A amplifier followed by a good switch, its cross-modulation

⁵ One precaution: if deflection-electrode voltages exceed about 10 volts, even briefly, their secondary emission ratio may exceed unity and "sticking" or blocking can occur. The d.c. resistance in their returns should be kept low, 50,000 ohms or less.

Fig. 2—Image rejection circuits. (A) Local oscillator below signal. (B) Local oscillator above signal.



behavior is superb. With this circuit, followed immediately with a steep-skirted crystal bandpass filter, the following measurements were made.

Two signal generators (properly isolated and matched to the antenna input impedance) were used. One, the *signal*, was set at $2\ \mu\text{v}$.; the other, the *unwanted*, was set to $100,000\ \mu\text{v}$. The front end was tuned, of course, to the weaker signal. Then the unwanted was tuned as closely as possible to the signal frequency until interference was just barely discernable. Both generators were 30 per cent modulated at 400 c.p.s. With two different bandpass filters, the following results were obtained:

Signal = $2\ \mu\text{v}$. Unwanted = $100,000\ \mu\text{v}$.
(+ 94 db. above signal)

Filter	Unwanted (Frequency from Signal)	
Bandwidth	- 6 db.	- 80 db.
(s.s.b.)	2.5 kc.	5.0 kc.
(c.w.)	.35 kc.	1.7 kc.
		9 kc.

This means that when receiving a weak ($2\text{-}\mu\text{v}$.) s.s.b. signal, an unwanted signal only 14 kc. away must be 94 db. stronger — to be just noticeable. (That's about $S9 + 60\ \text{db}$. on an honest S meter.)

Placing the unwanted signal 100 kc. away (to simulate a big local, or an out-of-band commercial) and increasing the level of the unwanted until a just noticeable reduction in signal level occurred (using the same filters) required $400,000\ \mu\text{v}$. to just affect a $1\text{-}\mu\text{v}$. signal. When the unwanted signal was increased still further, it required 1,500,000 microvolts (yes, 1.5 volts), to produce a 3-db. reduction in wanted-signal output.

With cross modulation and overload well in hand, the next question is what kind of sensitivity, or noise figure, can be obtained.

Sensitivity

Although limited by outside (high antenna noise temperature) noise on the h.f. bands, low noise is still of some importance — and of course increasingly so as we go above 20 Mc. Theoretical analysis of the 7360 tube indicated excellent noise characteristics below 30 Mc. before the onset of transit time loading. The calculated value of the equivalent shot-noise resistance was 1500 ohms, leading to a calculated 5.3-db. noise figure (with 20-db. conversion gain) at 30 Mc. Measured noise figures are listed below:

Freq. Mc.	Noise figure, db.
20.5	5.5
21.25	4.4
14.25	4.3

This results in about $0.4\ \mu\text{v}$. for 10-db. $(S + N)/N$ sensitivity in typical s.s.b. bandwidths on 10 meters, which is more than adequate (goodbye r.f. stage!).

Image Rejection

With single conversion and no r.f. stage the problem of obtaining good image rejection remains. Either a comfortably high i.f. can be used (*à la* Goodman), or something must be done in the input circuit of the mixer. An extremely useful technique, particularly for our relatively narrow amateur bands is to employ an "image-rejection circuit" of the types shown in Fig. 2.

When the local oscillator frequency is below the signal, 2A is used and L_s and C_s are made series-resonant (and low impedance) at the image frequency. For any h.f. band except 10 meters they may be set at the center of the band minus twice i.f. and left alone. Then at the signal frequency, L_s and C_s look inductive and are parallel-resonated with C_p .

When the local oscillator is above the signal, 2B is used, and L_s and C_s are set at the image as before. At signal frequency they look capacitive and are resonated by L_p .

As a result, a curve of impedance versus frequency as shown in Fig. 3 results, using circuit 2A. The degree of image rejection is simply the ratio of the two impedances Z_s/Z_I (ignoring antenna-coupling effects). With coil Q_s of 200 and good shielding and grounding, measured rejection on 10 meters, with a 1.0-Mc. i.f., was greater than 90 db. With Q_s of 150, a 1.0-Mc. i.f., and normal care, 60 db. can be readily obtained on any h.f. amateur band. The "rejection notch" remains relatively broad and need not be tuned over an amateur band, except in covering 10 meters at one bite. The signal peak must be tuned for best sensitivity, but this is done with the usual antenna trimmer.

Summary

To obtain really good cross modulation and

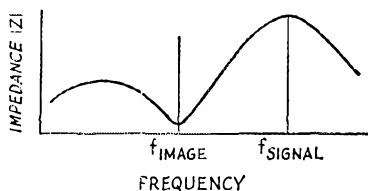


Fig. 3—Impedance curve of the image-rejection circuit of Fig. 2-A.

overload behavior, the r.f. stage must be eliminated and as few highly linear mixers used as possible, so that full selectivity is taken promptly after mixing. Using a beam-deflection tube as a balanced low-level mixer, high conversion gain, good i.f. rejection, and low noise can be obtained together with extremely linear operation—and consequent freedom from cross modulation. However, with no r.f.-stage selectivity, either a very high i.f., or unconventional image-rejection circuits must be used to obtain adequate attenuation of image frequencies. For amateur band use such circuits are comparatively simple, need not be tuned once set, and provide from 60 to 90 db. of rejection.

The resulting “front-end”, followed by a steep-skirted crystal bandpass filter, produces the expected results. On-the-air use shows a remarkable ability to “dig out the weak ones”, particularly when the band is crowded with big signals. The bands appear refreshingly cleaner and many of those “foreign phones” are gone. There is no wilting, collapse or distortion on big locals (in a really tough location, *delayed* a.g.c. can be applied to the 7360). Since the front end does not overload or “hang-up” on noise pulses the suggestion of protecting the *i.f.* with a *pre-i.f. silencer* appears attractive. This has been done with genuinely amazing results, as will be described in a subsequent article. **QST**

Strays

When W9CN and K6KP got together recently on s.s.b., it was their first meeting in thirty-seven years. They had met in April, 1926, when Art was W9CN and Lee was signing 3JK in Maple Shade, New Jersey.

Speaking of the old days, WA4LIG tells us this one. Seems that an amateur friend, using a carbon mike coupled to the plate coil of his transmitter, started to say “hello” into the microphone when it exploded, blackening his face and filling his mouth with mica and smoke. He later found that his young brother, curious tyke, had taken the microphone apart, spilled the carbon granules, and replaced the carbon with shotgun powder.

K1YMY was first licensed thirty years ago while he was a high school student. His first QSO was with W1AAJ. Followed 25 years’ inactivity as a ham until last summer, when Dick was assigned his present call. His first contact? Sure — W1AAJ!

To the ARRL’s new Newington, Connecticut address has been added the “Zip” number 06111. Use it when you write League Headquarters. The Zip code number should be placed two spaces to the right of the state.

The Tower ARC is appropriately named: their beam antenna is 465 feet above New York’s Madison Avenue, on the roof of the Metropolitan Life Insurance Building. Tower members are Metropolitan employees.

Passengers in the same jet flight to England recently, and in adjacent seats, were four hams: WA2WQA, K2MHH, W3HZZ, and K7LTT.

Calling all dental hams: Doctor Matt Eisenman, K3LEC, will speak on amateur radio at the American Dental Association Convention in Atlantic City, New Jersey, October 16. Dentist-hams are invited to join a Dental Ham Net. For information, write Matt at 907 Jefferson Street, Wilmington, Del.

FEEDBACK

In the circuit for the Two-Tone Test Oscillator (page 20, July *QST*), the resistor labeled 68K

should have been 6800 ohms — the same as the resistor to its right.

In the circuit diagram of the “High Quality Speech Compressor,” page 21 of the February, 1963 issue, the 470-pf. capacitor C_3 has been labeled twice, possibly causing some uncertainty as to the value of the adjacent cathode resistor. The cathode resistor is 10K, and the grid resistor 2.2 megohms.

In the circuit diagram of W4KCW’s d.s.b. transmitter on page 26 of the April, 1963 issue, the No. 1 and No. 2 grids of the lower 6BQ6GTB have been interposed. The pin numbering is, however, correct as shown.



September 1938

... J. A. Pierce, W1JFO, summarized 1938’s exciting experiments in five-meter DX. The big news of the month was the announcement of the first “trans-con” QSO on 56 Mc. W6DNS and W1EYM did it.

... Clinton B. deSoto reported on “Ham Radio and Model Airplane Control,” an aspect of hamming then only two years old. (For model control a quarter-century later, see the cover of this issue and page 11).

... The winners of the 1938 W/VE contest were announced. First place went to VE2EE. The U.S. winner was W6MVK.

... W3EMM and W3BEK detailed the efforts of Norfolk, Virginia amateurs to establish a city-sponsored emergency communications system, one of the country’s first.

... And technical features included a W1CC five-band 807 exciter with crystal or e.c. oscillator control; a deluxe rotary beam support by W9TMP; portable equipment used by the Norfolk emergency communicators; and a W1TS auxiliary transmitter for 160 and 80 meters. **QST**

September V.H.F. QSO Party

CQ CONTEST" on the v.h.f. bands the week end of September 14-15 will mark another popular ARRL V.H.F. QSO Party. This contest which gets under way at 2 P.M. (1400) your local standard (not daylight) time Saturday, September 14, and runs through 10 P.M. Sunday, September 15, is open to all amateurs in the 73 ARRL sections who can work 50 Mc. or above. For purposes of the contest Yukon-N.W.T. (VE8) will count as a separate multiplier. Contacts count only when the contest is in progress at both ends of the QSO.

Just exchange ARRL section (see page 6, this QST) and count one point for completed exchanges on either 50 or 144 Mc.; two points for contacts on 220 or 420 Mc.; and three points for contacts on higher bands. The sum of these points multiplied by the number of different ARRL Sections worked per band gives you your final score. Therefore, it pays to contact the same stations on different bands to increase both contact points and multiplier. Portables are urged to sign properly to avoid possible disqualification.

All foreign contacts count for QSO points, but *only once* for section multiplier per band, even if in different countries. See rule 4b.

A certificate goes to the highest single-op scorer in each section, as well as a certificate to the highest scoring Novice and multiple-operator station in each section from which at least three entries in that special category are submitted.

Send to ARRL Communications Dept., 225 Main Street, Newington 11, Conn., for free log forms as shown on page 39 of June, 1963, QST. Either follow that log format, or send for the log forms. Reports should include your call and ARRL section, as well as times, calls, and sections of stations worked. To report the results in December QST (so you'll know how you did before the V.H.F. SS starts), we must have the logs in before the deadline. Logs must be post-marked by October 7. Good luck!

Rules

1) The contest starts at 2:00 P.M. Local Standard Time, Saturday, Sept. 14, and ends at 10:00 P.M. Local Standard Time, Sunday, Sept. 15. All claimed contacts must fall within this period and must be on authorized amateur frequencies above 50 Mc., using permitted modes of operation. Contacts between stations in different time zones can be counted only when the contest period is in progress in both of the time zones concerned.

2) Name-of-section exchanges must be acknowledged by both operators before either may claim contact point(s). A one-way exchange, confirmed, does not count; there is no fractional breakdown of the 1-, 2-, or 3-point units.

3) Fixed, portable- or mobile-station operation *under one call*, from one location only, is permitted. A station used to contact one or more stations may not subsequently be used under any other call during the contest (with the exception of family-type stations, where more than 1 call is assigned to one location by FCC/DOT).

4a) Scoring: 1 point for completed two-way section exchanges on 50 or 144 Mc.; 2 points for such exchanges on 220 or 420 Mc.; 3 points for such exchanges on the higher bands. The sum of these points will be multiplied by the numbers of *different* ARRL sections worked per band; i.e., those with which at least one point has been earned. Re-working sections on additional bands for extra section credits is permitted. Cross-band work does not count. Contacts with aircraft mobile stations cannot be counted for section multipliers.

4b) Foreign entries: all contacts with foreign countries (such as Mexico and Cuba) count for score. All foreign countries are grouped together as one, and a section multiplier of *no more than one* (per band) may be claimed for contacts with all foreign stations contacted. Foreign stations may only work stations in ARRL sections for contest credit. Foreign stations will give their country name in the exchange.

5) A contact *per band* may be counted for each station worked. Example: W1FZJ (E. Mass.) works W1HDQ (Conn.) on 50, 144 and 220 Mc. for complete exchanges. This gives W1FZJ 4 points (1 + 1 + 2) and also 3 section-multiplier credits. (If W1FZJ contacts other Connecticut stations on these bands, they do not add to his section multiplier but they do pay off in additional contact points.)

Contacts made by retransmitting either or both stations do not count for contest purposes.

6) Each section multiplier requires completed exchange with *at least* one station. The same section can provide another multiplier point only when contacted on a new v.h.f. band.

7) Awards: a certificate will be awarded to the high-scoring single-operator station in each ARRL section. In addition, the high-scoring multi-operator station will receive a certificate in each section from which three or more valid multi-operator entries are received. Certificates will also be given to the top Novice in each section where three or more such licensees submit logs. Award Committee decisions will be final. Foreign entries will be grouped under a separate QST listing.

8) Reports must be postmarked no later than Oct. 7, 1963, to be eligible for awards. Follow the sample log for correct form, or a message to Headquarters will bring printed blanks for your convenience. QST

Strays

When the Missouri Net held their June 2 picnic, they chose a park just a block away from WØRGS's home. Naturally, WØRGS thought he'd have no trouble getting there. But because his son, KØQCQ, was soon to be married, a steady stream of visiting friends kept our OM from his picnic. So near and yet so far . . .

Here's the latest amateur radio contribution to using weapons peacefully. W6UUS, the General Dynamics Aeronautics Radio Club, loaded up an Atlas ICBM as a vertical antenna at the company's main plant in San Diego. The v.s.w.r. was 3:1 or less on 40, 20, and 15 meters.

When W2CJR moved to Flushing, New York, recently, he found that he lived two blocks away from W2CJK and less than a mile from W2CJF.

Five hams live in the same Bronx, New York apartment house — wonder what that rooftop looks like! Near neighbors are W2JIA, K2JEV, WN2DLB, WN2HSW, and WN2IOU.

Basics for Beginners

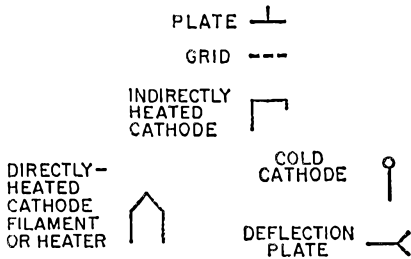
How To Read

Circuit Diagrams—Part II

THE first part of this article¹ was concerned principally with the symbols for the fundamental electrical quantities — resistance, inductance and capacitance. A practical circuit usually includes a large number of additional devices, among which the vacuum tube forms an important class.

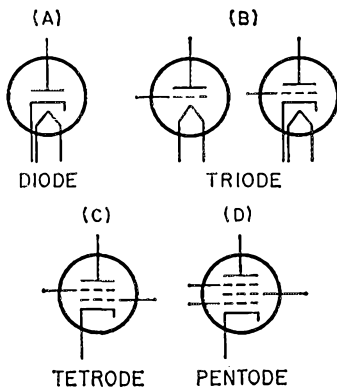
Vacuum Tubes

The circuit symbols for vacuum tubes are made by combining symbols representing the individual electrodes actually in the tube; the appropriate assembly is then enclosed in a circle or, in the more complicated cases, in an elongated circle. The element symbols most commonly used are shown below.



The basic tube types — diode, triode, tetrode and pentode — are enough to illustrate how the tube symbols are “manufactured.” The diode at A (below) consists of a plate, indirectly heated cathode, and heater. The two symbols shown for

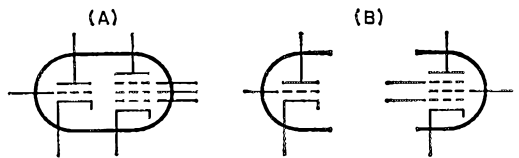
¹“How to Read Circuit Diagrams,” Part I, *QST*, August, 1963.



the triode, B, illustrate the use of two types of cathode; the symbol at the left has a directly-heated cathode or filament while the one at the right is indirectly heated. Either type of cathode may be found in any basic tube type, whether it is a diode, triode, tetrode, pentode, or one with still more elements.

When a tube has an indirectly-heated cathode it is common practice to omit the heaters from the tube symbols, as has been done in the tetrode and pentode symbols, C and D, and group all heaters in the circuit near the source of heater power. This is a legitimate procedure because the heaters have no other function than to make the emitting cathode hot enough to do its job; they take no other part in the operation of the circuit. Grouping them separately avoids cluttering up the diagram with numerous crossovers and makes the circuit easier to follow.

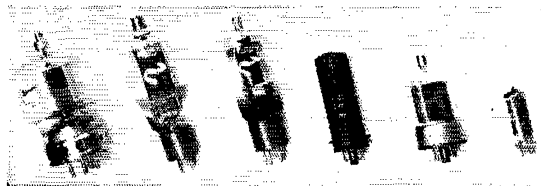
In practice you will often find two — or even more — complete tube structures in a single glass envelope. The most common examples are the dual triode (two triodes in one bulb) and the triode-pentode. The complete symbol in such cases includes the symbols for both tubes in one enclosure. However, it is seldom convenient to show multiple tubes all in one piece in the circuit, since the individual structures may be



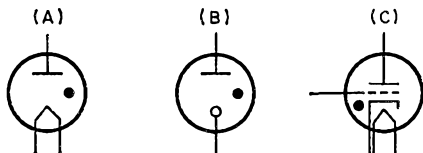
used for completely different purposes and would logically appear in widely-separated parts of the diagram. In such cases the enclosure is shown broken as in B, and the triode and pentode symbols are used in the circuit as though they were separate tubes. The separate sections are usually given a circuit designation (V_{1A} , V_{1B} , etc.) which identifies them as all being in the same envelope.

Some “vacuum” tubes have gas introduced into them intentionally. The ones most often encountered in amateur equipment are mercury-vapor rectifiers and voltage-regulator (“VR”) tubes. Both are diodes. The mercury-vapor rectifier usually has a directly-heated cathode, A,

Big or little, glass or metal, based or not based, the symbol is the same for any tube of a given basic type. The big tetrode at the left, capable of handling a full kilowatt, has the same symbol as the low-power tetrode at the right.



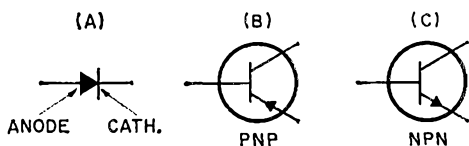
while the VR tube has a cold cathode, B. The presence of gas in the tube is indicated by the dot inside the envelope. Another gas type you will meet occasionally is the thyratron, or gas triode, shown at C.



As a help to the constructor, the socket pin number to which each tube element is connected usually is given on the tube symbol close to the appropriate element. (This information, however, is not a *required* part of the symbol.) In this connection, the vacuum-tube symbols used in *QST* drawings frequently omit elements, such as suppressor grids, that have only *internal* connections and are not brought out separately to a base pin on the actual tube. This makes the symbol less complicated and avoids internal crossovers in the tube symbols. The actual connections to the tube are not affected by this omission.

Semiconductors

The symbols for semiconductor devices such as crystal diodes and transistors have not yet been formally standardized by the A.S.A. Work is under way on this, and a new set of standards is expected in the near future. The symbols shown here are ones which almost certainly will



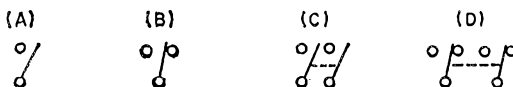
be standard. The diode is at A, and in interpreting this symbol it is important to keep in mind that the arrowhead represents the anode and the

line represents the cathode. That is, the direction of current flow is the same as between plate (anode) and cathode of a vacuum-tube diode.

This convention with respect to current flow is also used in identifying the emitter in transistor symbols. The "p-n-p" type of transistor shown at B has the arrowhead pointing toward the base symbol (the short line), while the "NPN" type shown at C has the arrowhead pointing away from the base. In both types the collector symbol is a slanting line touching the base. The distinction between the two types is important because the polarities of the d.c. voltages applied to the base and collector are reversed with the n-p-n type as compared with the p-n-p.

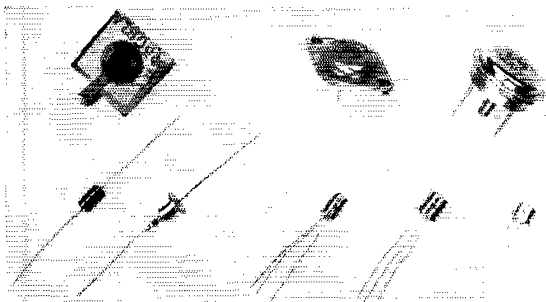
Switches and Relays

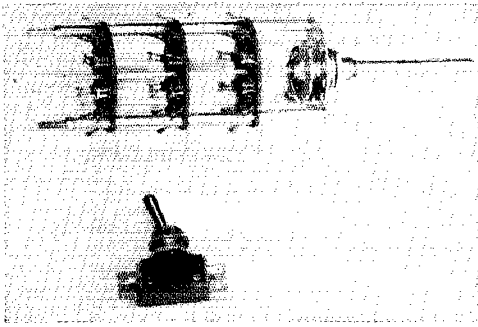
Shown below are the symbols for toggle switches. There are four common types — single-pole single-throw (s.p.s.t.) at A, single-pole double-throw (s.p.d.t.) at B, double-pole single-throw (d.p.s.t.) — at C, and double-pole double-throw (d.p.d.t.) at D. Note that in the symbols for the double-throw types the switch arm (straight line) always is touching one contact (small circle), since an ordinary toggle switch has no "open" position. The double-pole types



are ganged (that is, operated simultaneously from one control), which is shown by the dashes connecting the movable arms. However, ganged switches, like multiple tubes in one envelope, can have their separate sections placed in different parts of the circuit diagram, in which case the sections have appropriate designations (S_{1A} , S_{1B} , etc.) to show that they are all part of one switch mechanism. The dashed lines can be omitted when this is done, but are sometimes included when it is thought desirable to do so.

Semiconductor devices in various forms. At the left are three diodes—upper, a selenium rectifier; lower, two silicon diodes, one a "top-hat" type. Fives styles of transistors are grouped at the right, the two upper ones being power types.





The three-section rotary switch at the top is just one of many styles. The number of wafers may run from one to as many as a half dozen, and both phenolic and ceramic wafers are available. The familiar toggle switch is below.

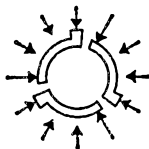
Multicontact switches, such as the rotary "wafer" type, can be represented by either of the symbols shown below. The choice is usually a matter of making the wiring diagram as easy as possible to follow. The straight-line arrange-



ment shown at A is used less frequently than the circular one at B. In either case, it is customary to show only the actual number of contacts used, although the switch itself may have more. (The number of contacts on small wafer switches is usually 11 on a wafer having a single arm or pole, 5 per pole on a wafer having 2 poles, and 3 per pole on a wafer having 3 poles.) Those not needed in the circuit are usually ignored in the diagram.

The separate sections of a multiple-pole switch, whether the sections are on the same or different wafers, can be shown to be ganged by using dashed lines as in the case of the toggle switches discussed above. However, it is more common to place the switch sections where they fit best in the diagram; the same circuit designation is used for all, with A, B, C, etc., identification to show that they are all operated from the same control.

A type of rotary-switch symbol frequently used in circuits of commercial equipment is a sort of picture diagram, illustrated by the example below. In switches of this construction the

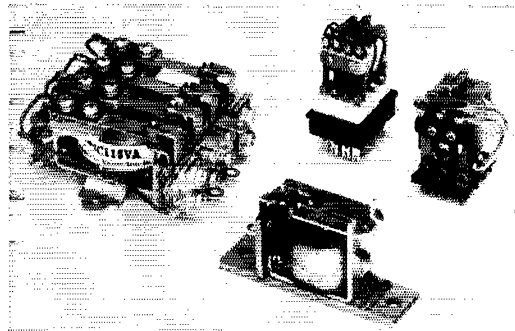
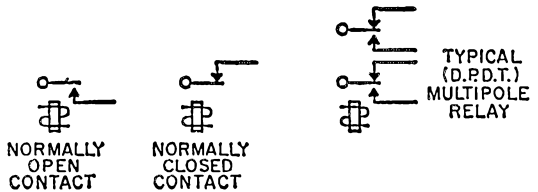


switch "arm" is a metal ring, or segment of a ring, on the wafer. It makes continuous contact with a fixed spring contact, indicated by the longer arrows in the example. The ring has one

or more projections that meet the shorter arrows as the wafer is rotated. These short arrows represent the fixed contacts or switch "points."

This type of symbol is very useful for indicating actual wiring of a switch wafer, since it shows exactly which contact to use for a particular circuit connection. The disadvantage is that it is difficult to trace out what the switch actually does in the circuit. However, there is a fairly simple way to find out what is connected to what at each position of the switch. Make a tracing of the ring or segments on transparent paper and place it over the symbol. Rotate the tracing one switch position at a time (each short arrow, in general, is placed at each switch position) and follow the circuit through the short arrow, projection, ring segment and long arrow. At times the projection will be large enough to make contact with two or more short arrows in one or more positions, so all the possibilities for contact must be observed.

The symbols for relays are shown below. Note that the arm moves toward the coil when the coil is energized, and springs away from it when the coil current is cut off. In actual circuit diagrams the contacts may be considerably separated from the relay coil as a matter of convenience. When this is done the contacts should be drawn in the same relative position in the diagram that they would have if the complete symbol were all to-



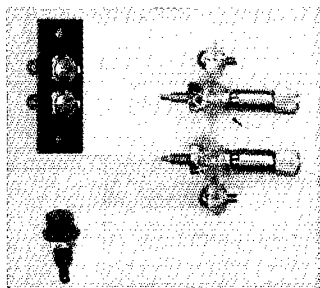
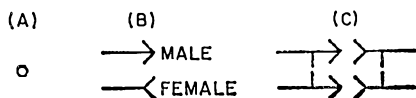
A few of the many varieties of relays are shown here. The large one at the left is for power switching. A miniature type is in the top center.

gether. Otherwise it may be hard to visualize the relay action. *QST* practice, when parts of a relay are separated in this way in the circuit, is to use the basic designation (K_1 , etc.) for the

relay coil and add A, B, C, etc., to the various contact groups (K_{1A} , K_{1B} , etc.).

Connectors

A fixed terminal is represented by a small circle as shown at A below. This symbol can stand for a binding post,



Terminal strips can be obtained with many more screw terminals than the two shown on the sample at the upper left. Below it is a tip jack. A binding-post strip is at the right.

screw terminal, or other type of contact to which a wire can be connected. It is also used as a general symbol for an external or internal connection when for some reason — for simplifying the appearance of the diagram, or because the exact type of connector used doesn't matter — no specific type of connector is to be represented. For example, this symbol may be used to indicate external connections to supply voltages. Thus, if he wishes, the builder may select any one of several types of plug-and-socket multicircuit connectors for the actual piece of equipment. The small terminal symbol also is frequently used to indicate connection points for plug-in coils inside the circuit, in preference to using the more complicated symbols representing the actual plug-in coil form and socket.

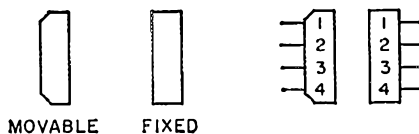
The basic symbols for plug-and-socket-type connectors are shown at B. When there are several prongs, dashed lines are drawn between the symbols as in C, to indicate that they are all part of one assembly. Two "mating" assemblies, one male and one female, are shown here. Note that either could be the fixed connector ("socket" or "receptacle") and either could be the movable one ("plug"), since both sockets and plugs are made with male and female contacts. In fact, both could be plugs if both symbols represented connectors on the ends of lengths of multiwire cable.

An alternative way of showing cable connectors is given below. These symbols can be used for any number of wires. They do not show which



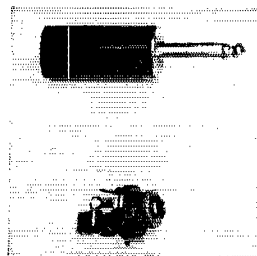
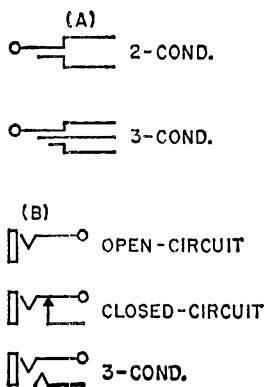
Plugs fitting into ordinary tube sockets (left) are commonly used in amateur equipment. Beside this one is a miniature plug with keyed prongs. Typical multiple-connection chassis-mounting connectors are at the right, one with female and one with male contacts.

contacts are male and which female, but this information is usually made available in the data accompanying the circuit. If the contacts in the actual connectors used are numbered, the exact



contacts to which the wires are connected can be indicated by placing the numbers inside the symbol at the appropriate point. They do not have to be in numerical order.

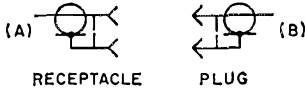
A few special types of connectors are used widely enough to have individual symbols of their own. Among these are the phone plug and jack.



Phone plug and jack. Jack styles include leaf switches which operate when the plug is inserted.

The symbols shown at A and B, respectively, are ones you will find frequently used. The rectangular block in the jack symbol represents the jack frame, usually grounded. The open "V" is the contact that connects with the plug tip, and the closed arrowhead represents a contact not touched by the plug tip but which makes or breaks when the plug is inserted. A number of such contacts, either normally open or normally closed, may be incorporated in a single jack, but these more complicated arrangements are not often used in amateur equipment.

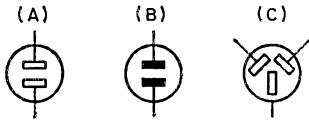
Another type of connector that occurs frequently in r.f. circuit diagrams is the coaxial receptacle shown at A below. The symbol is that of



The common type of coaxial receptacle (left) and plug. These belong to the "UHF" series, which does not mean a type preferred for u.h.f. work but is simply an early designation.

a basic two-conductor connector with the coaxial symbol added. Note that no attempt is made to show the actual male and female contacts of a conventional coax chassis fitting; in this one case the female symbol is used for both, indicating a receptacle rather than a plug. In the plug symbol, B, which you will see less frequently, the male contact symbol is used throughout, plus the coax indicator.

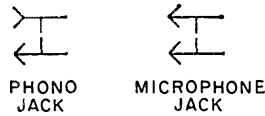
Still another special group of symbols is used for a.c. power connectors such as 115-volt plugs and sockets. These are drawn with the contacts inside a circle, as shown below. The open rectan-



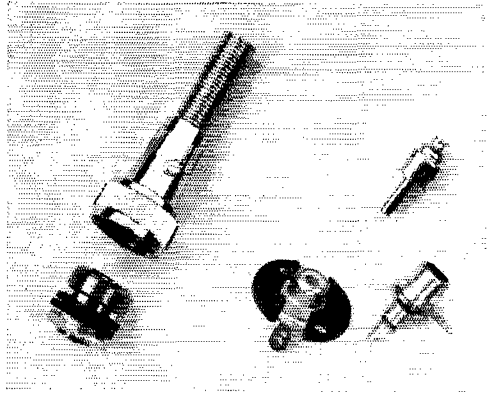
gles, A, indicate female contacts, used in what are usually called sockets, and the solid ones, B, stand for male contacts, usually in plugs. The system can be extended as shown by the example at C, which is a 3-conductor polarized connector with female contacts.

Aside from these special cases, connector symbols are constructed from the fundamental contact symbols, described earlier, assembled as required to represent the actual connector used. There are times when the choice of a symbol becomes a little puzzling for the circuit designer - for example, is the widely-used phono connector a "real" coaxial connector or not? The ques-

tion could be argued both ways. In *QST* the phono connector, and also microphone connectors such as the Amphenol type, are drawn from the basic contact symbols, omitting the coaxial indicator, thus:



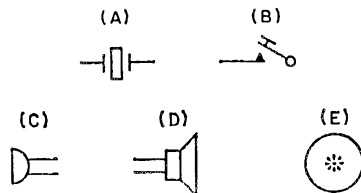
the bottom contact being the grounded one in both cases. The actual center contact (top, in the symbol) in the Amphenol connector is merely a spot of solder, and does not really qualify as a "male" contact, but neither is it female. There being no symbol for a butt contact, the male is used instead.



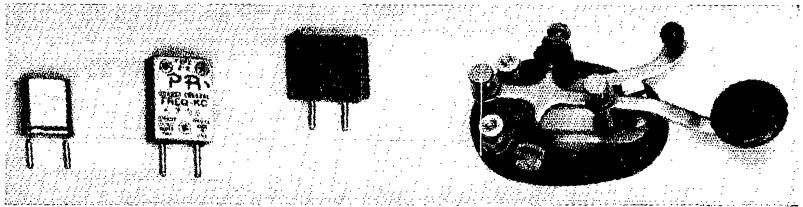
Microphone connectors, left, and phono jacks and plugs. Two forms of phono jacks are shown.

Miscellaneous Symbols

The list of symbols could go on and on, because there are innumerable varieties of components used in electronic circuits. However, we need only a few more to give a reasonably complete picture of what may be encountered in circuit diagrams of amateur gear. One is the symbol for a piezo-electric crystal, the kind used for frequency control in a transmitter, not the kind used as a rectifier. This is shown below at A. Another is the symbol for a telegraph key, shown at B. The microphone symbol is given at C, and the loudspeaker at D. Finally, there is a simple circle, somewhat smaller than the circle representing a tube, used as a general symbol for a number of devices such as meters, generators,



Three types of crystal mountings commonly used in amateur equipment, left, and a telegraph key.



motors, and the like. The asterisk in the symbol shown is replaced by a letter or abbreviation indicating just what the device is—MA for milliammeter, V for voltmeter, MOT for motor, GEN for generator, and so on. Thus the meaning of the symbol is identified in the actual circuit, so the component is easy to recognize. In many cases, too, a rectangle is used as a general symbol for a component or assembly, all in one piece, that either has no special symbol of its own or which it is not necessary to represent with detailed symbols since it has only a few terminals. One example is a filter, which may actually be quite complex in construction but fits into the circuit as a simple unit.

—♦♦♦—

In closing this introduction to the language of circuit diagrams, permit us to repeat a state-

ment that we made at the outset: a diagram does not attempt to give any information about how the components are laid out, but simply tells how they are electrically connected.

Neither does the diagram attempt to explain itself—that is, you cannot expect to look at a circuit and, from it alone, understand the exact function of every part. Nevertheless, with experience in reading diagrams you'll be able to make a pretty good guess as to the equipment designer's intentions, merely from looking over the circuit, if you know over-all what the equipment is supposed to do. A "good" circuit layout is one that helps get functional ideas across. In time, you'll come to appreciate those little points of style that mean the difference between clarity and obscurity. There's an art to laying out a circuit diagram, just as there's an art to laying out a chassis!

QST

• New Apparatus

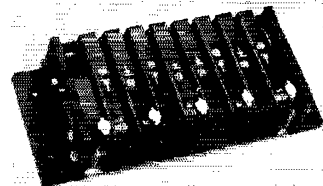
New High-Voltage Solid-State Rectifier Stack

The obvious advantages of semiconductor rectifiers for high-voltage power supplies were pointed out by WIDX in his article on a power supply for a kilowatt linear.¹ It is inevitable that 866s, 872s and other popular high-voltage rectifier tubes will make way for semiconductors in high-voltage power-supply applications.

The Westinghouse Electric Corp. has announced a new silicon high-voltage rectifier stack designed to replace almost any vacuum-tube rectifier used in amateur transmitters.

So confident is the manufacturer in the device that no specific ratings have been set for the unit, except to say that

it is "good for a kilowatt." This means that the rectifier will handle any reasonable combination of d.c. voltage and current at the kilowatt level. The savings in space, filament transformers, tube sockets and control



circuits make this device worth considering for existing commercial equipment or planned or existing home-built gear. To replace existing vacuum-tube rectifiers in a full-wave, center-tap circuit, it is only necessary to transfer the plate caps of the tube rectifiers to the terminals of the silicon stack. A connection from the stack to the titter completes the hookup. The silicon rectifier can work into a capacitive-input filter if it is desired.

Five terminal connections are provided on the stack and the rectifier can be used in either of the common configura-

tions, bridge or full-wave center-tapped. The rectifier package measures about 2 × 4 × 9 inches and has the individual silicon rectifiers, along with their transient-suppressor networks, potted in modules which are sandwiched on an insulated framework. Insulated end brackets have holes to facilitate attaching the stack to a flat surface. The unit can be mounted in any attitude.

The rectifier stack shown in the photograph costs approximately seventy dollars.

— E. L. C.

Strays

The ARRL Directors have voted the July QST cover plate award plaque to Larry Kleber, K9LKA, for his article, "The 4-1000A in Grounded Grid." This is K9LKA's second cover plaque award—the Directors voted his "Single-Band, Grounded-Grid Linears" the best article in QST for November 1961.

IMPORTANT NOTICE

Changes of Address

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

¹ QST, August 1963, p. 22.

Building

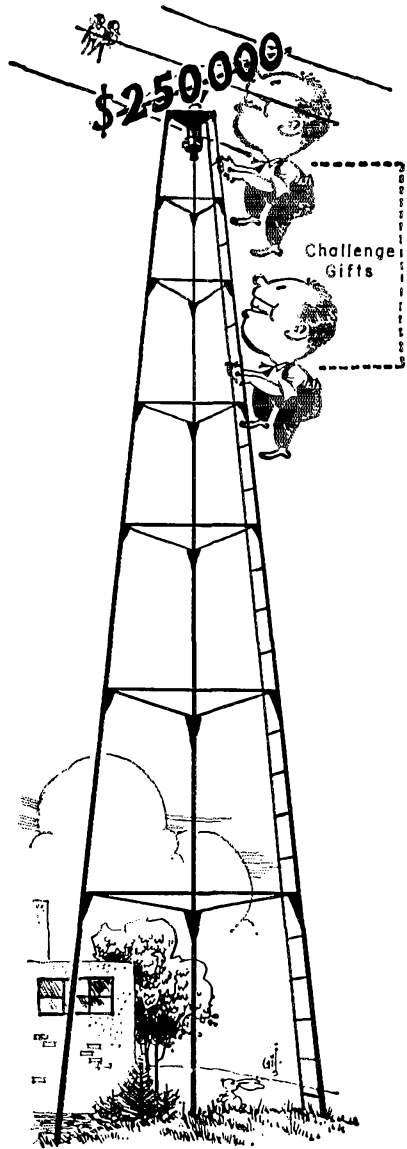
Fund

Progress

The slope of the curve showing our Building Fund growth points toward attainment of the goal by the end of 1963. This will not happen automatically, however; it will take continuing effort by all League officials and appointees, by affiliated clubs and by every individual amateur and member — first by becoming a participant, and then in spreading the word and encouraging others to take part. A good example is the Dakota Division, where a period of special promotion moved the division to the top of the pack — helped, of course, by the two-for-one matching fund pledges. The standings, showing percentage of quota achieved:

Dakota	87.0%	Central	50.7%
Hudson	77.9	Canadian	48.9
New England	76.8	Atlantic	47.9
Northwestern	71.4	Rocky Mt.	43.0
Southwestern	69.1	Delta	39.9
Midwest	62.4	West Gulf	39.6
Roanoke	56.9	Great Lakes	38.1
Pacific	54.6	Southeastern	34.9

The little man on the tower has come a long way since his depiction in the January issue. Not the least of the reasons is the generous offer by a small group of prominent amateurs, made in March, to match all future contributions dollar-for-dollar. Your dollar — or \$5 or \$100 — will be matched by an equal contribution from this special group. Have *you* yet helped your division in its path to 100% completion? Make your contribution (U. S. tax deductible) to the ARRL Building Fund and mail it today!



Members Are Saying . . .

Enclosed is my second contribution. I couldn't pass up this opportunity to double it from the matching funds which have been pledged . . . — *W3DPM*.

The enclosed check is long overdue. No excuses — just negligent. Hope it will help the total project just a bit. And, it might also be a token of thanks for a job well done . . . — *W9JNH*.

Here is my second contribution, this time to be matched by a challenge gift, due partly to your announcement of incentive licensing and also my

desire to see the little man reach the top of the tower . . . — *W3VQS*.

. . . Our auction was held last month and quite a bit of gear changed hands. The club charged a 10 per cent fee for each item auctioned. Enclosed is a money order, the donation from the Ozaukee County Radio Club. — *W9VLL*.

Congratulations on your new building! I am sorry that I didn't contribute sooner, but it is only recently now that I have got on the air with my new Technician license that I have had a chance to see

the good work that the ARRL does. Anyway, with the very generous matching funds, my small contribution goes a lot further towards sending the man up the tower to the top. Best of luck in reaching the goal. — *W12VSA*.

We are interested in the building fund progress and hope our small contribution will be of help. — *Chilliwack Amateur Radio Club (British Columbia)*.

This is a late but welcome opportunity to enable me to feel a little more a part of a fine-business group of hams and ARRL members. Thanks for the wonderful job you people are doing at headquarters. — *W1ZNY*.

Please accept the enclosed small check as a contribution to the ARRL building fund. I must admit that I have intended forwarding it for some time but somehow I just haven't been able to get to it. Procrastination and ham radio are two of my biggest weaknesses, although I enjoy the latter by far the most. — *W4ID*.

I am sorry that I didn't get this off to you sooner but like many others I have been putting it off for no other reason than getting a check in the mail. Let's hope the goal will be reached as the building is a monument to the radio amateurs and a memorial to Hiram Percy Maxim. — *K11AV*.

Altho we are a small club we are glad to contribute what we can. We are glad to see that a new and larger place of work is being constructed to carry on the important task of safeguarding our privileges and advancing the cause of amateur radio. — *Lake Drummond Wireless Association (Virginia)*.

Only wish I could do more since I feel that some of the most important things that the League has done for amateur radio cannot be bought. Other services rendered are of far more value than the member pays. — *W4MTM*.

Here are two small contributions — one is from myself and the other is from my son who is 12 years old. We are proud to be a part of the new building program. — *W3TRS*.

I have been licensed since 1930 so I feel guilty at not sending more. But I hope this little bit will buy a brick (or a tube or transistor!) Best wishes for the continued success of *QST* and the ARRL. — *W2CIL*.

At our May meeting the members decided that we should give something to the fund although the amount is small. We are very glad to be a part of this fine undertaking. — *Burlington County Radio Club (New Jersey)*.

We are happy to donate to an organization which has and will continue to do so much for those who have made radio a hobby and have opened up so much toward the benefit of man. — *Calhoun Amateur Radio Club (Michigan)*.

Enclosed is a check for the fund. I have been an amateur since April 1947, and while I do not always agree with the ARRL policies, I am sure I have received many times the amount of this contribution in services from ARRL. — *W7LAV*.

Although the York Radio Club, of which I am a member, has sent its contribution, I would like to add my personal contribution. You are to be congratulated on such a fine job in such a short time. — *K9GNR*.

Enclosed is a check. We are a small club and this amount represents about half of our yearly income from dues so you can see the importance with which we view the project. Even our non-members of ARRL enthusiastically supported the vote for the expenditure. We appreciate your efforts on behalf of radio amateurs. — *Arctic Amateur Radio Club (Alaska)*.

It is just a year since I got my General ticket, and I can't see any better way to celebrate than by helping the fund. Although I have never directly benefited from ARRL, except by *QST*, I don't think there'd be a general exam for me to take without the battles the ARRL has fought for ALL hams, not just League members. Maybe some hams will realize what they owe to whom. And I don't mean you brother, I mean to the ARRL! — *W12TVK*.

Here is my "two bits" for the Building Fund. I certainly wish it was more, but like many teenagers, I'm usually on the edge of bankruptcy. Maybe it will help get that brass door knob for the front door. Amateur radio is definitely a very worthwhile hobby and I will do all I can to promote it. — *K3NKL*

We as a club would like to go on record as contributing to something which we feel is a worthwhile project. This is the second check we have sent in, but the other one was sent in as a contribution from the club members and officers for last year and this one is from the present members and officers of the year 1963. — *Utah Amateur Radio Club*.

Well, here it is New Year's Eve, and January *QST* has a pix of the nice new building -- but the little red fellow is awfully low on his tower. Meant to send off a check months ago but never quite made it. Keep up the good publicity in *QST* and get more of us procrastinators going. — *K2IYC/K1RUH*.

I received my associate member card in December. With this letter I am sending in my pledge. The magazine is a book of knowledge, many interesting subjects — and lots of abbreviations which I don't fully understand, but I will when I pass the FCC test. — *Michael Ansaldi, Brooklyn, New York*.

I am enclosing a contribution. I believe that amateurs perform a wonderful service for our country and for its youth and feel that anyone who is able to do so should contribute to its continued success. As the sole representative of all interested amateurs you and your staff have done a wonderful job. Two of my loyal employees, W2AAG and W2ZAI, I know join with me in the sentiments I have expressed. — *W2HBB*.

Enclosed is a contribution. The members voted this at our last meeting and expect to contribute more later. — *Six Meter Mobile Association of Western New York*.

We are a small club and sorry the enclosed contribution could not be larger. We hope it will not be many months before the League can be using the new headquarters building. — *Cheraw Radio Amateur League (So. Carolina)*.

The attached money order is the final payment towards my pledge for the building fund. As time passes I may find another donation possible. It is truly regrettable that so many amateurs, fully capable of assisting with the drive, do not do so. Let us hope that as time goes on, they may realize the importance of helping. — *W9FJI*.

Send-Receive Switching

Minimizing the Number of Operating Controls

BY LEWIS G. McCOY*, WIICP

A FREQUENTLY asked question is that of how a beginner should connect all his equipment together in order to have a minimum of controls to go from receive to transmit or vice versa. If the station is all commercial gear the average instruction manual will show how a particular piece of gear should be connected in the station, but there is no over-all pattern to make a complete switching system. Still another problem along the same lines is the Novice who builds or buys a crystal-control rig and then goes up and passes his General exam. The first thing he wants is a v.f.o. but is at a loss when it comes to connecting it to his transmitter and still keep all the switching as simple as possible. In this article we'll show you some simple methods of doing the job, both with switches and relays. Also, some of the hookups for the various pieces of equipment, such as s.w.r. bridges, filters, transmatches, and so forth will be discussed.

A Typical Novice Station

Fig. 1 is a drawing showing a typical setup consisting of a transmitter, receiver, and antenna connected together via an inexpensive knife switch. In this case we have used coaxial cable for all the connecting lines but it just as easily could be Twin-Lead or open-wire line, particularly for the section going to the antenna. This is probably the simplest system of all. Operating c.w. you would merely turn on the rig and the receiver and when you go to transmit you would put the knife switch in the position that would connect the transmitter to the antenna. For re-

* Technical Assistant, QST.

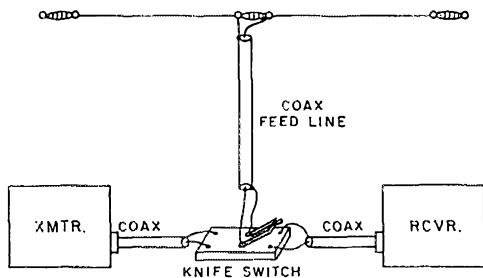


Fig. 1—Diagram of a simple antenna-changeover system using a knife switch.

ceiving you would just switch back. There may be too much pickup of your signal from the transmitter causing the receiver to overload. Many amateurs reduce the r.f. gain setting of the receiver while they are transmitting and then run it up when they switch back to receive. This of course means making an adjustment each time you switch from transmit to receive. In a moment we'll show you how to eliminate this adjustment and make it automatic.

A second type of system is shown in Fig. 2. In this setup a switch is used to control a relay. The relay serves to switch the antenna to either the transmitter or receiver: as a general rule, the relay is powered by 115 volts a.c. S_1 can be mounted in any convenient location at the operating position. Some commercial receivers have an extra set of contacts on their receive-standby switch and, if desired, these can be used for the relay. You can check your receiver instruction manual for these connections. The only problem with this type of control is that it makes your receiver completely mute during transmit operation.¹ In c.w. operation most amateurs use their receiver for monitoring their sending because for the most part the station you are working is usually on the same frequency or close enough to it so that you can hear your own signal.

When choosing a switch for S_1 , decide how many circuits you want to switch and then choose a unit that has adequate poles and positions to do the job. Some amateurs prefer to have their hands completely free. This can be accomplished by using foot-activated switches. A look through any parts distributors' catalogues will show there is a wide variety of foot switches on the market. The foot switch can be mounted under the operating table leaving the hands free for tuning, logging, and so forth.

Relays and T.R. Switches

The majority of amateurs prefer to use coaxial cable to connect all their gear together and even to feed the antenna. Also, most amateurs believe that they have to use coaxial-type relays if they use coax. This isn't true. Coaxial relays

¹ However, a similar switching provision is found on many manufactured transmitters, so if such a transmit-standby switch is used the receiver can remain in operation (although of course disconnected from the antenna) during transmissions. — Editor.

are relatively expensive and an inexpensive substitute can be used that will do the job just as well. Assuming you want a relay that will operate on 115 volts a.c. as in Fig. 2, *any* relay for this voltage will work for your antenna change-over, at least at Novice power levels. When you get your General and start to consider one-kw. power levels you will have to be more concerned about the insulation material on a relay, but for powers up to a few hundred watts any relay will work.

If you plan to use coax and don't have a coaxial relay but one of the other type, the simplest thing to do is mount the relay in a small metal box or chassis and install three coax or phono-jack fittings. One jack is for the pole and the other two for the contacts. For coax, a single-pole double-throw relay is suitable. You only switch the inner conductor as the shield braid makes its connections through the metal box. For Twin-Lead or open-wire line, then a double-pole double-throw relay is needed as both conductors are switched.

Many amateurs feel they must use coax relays for coax because if they don't, their feed-line s.w.r. will be upset. However, if the type of relay described above, the one mounted in a metal box, is used, the slight change in the s.w.r. is of no real importance as long as the relay is mounted close to the transmitter, say a few feet. Just keep in mind that the change in s.w.r., if there is any, will only exist on the piece of line between the relay and the transmitter, not the relay and the antenna. The additional losses caused by an increase in s.w.r. on such a short length of line are too insignificant to bother about.

If you operate on 50 Mc. or higher there are certain precautions you must take if you use a non-coaxial relay. The danger in using "just any" relay is that too much coupling may exist between the relay contacts, which would introduce an excessive r.f. voltage across the receiver input with the danger of burning out the receiver front end. A simple check to make sure this won't happen is to tune in a signal and then, while listening or watching the S meter, tune the transmitter tank circuit through its range. Be sure to leave the transmitter turned *off* during this test. If there is any detectable change in the received signal it means that you have coupling across the antenna relay. Try different lengths of coaxial line between the receiver and relay until you find a length that gives no change. Once you find this length it is safe to operate with power on the transmitter. It is also possible to minimize these dangers at v.h.f. by using special construction techniques when mounting a relay in a metal box.²

Still another method of switching the antenna feeder is with a t.r. (transmit-receive) switch. This is a completely automatic system that doesn't require any manual operation at all. The t.r. switch usually consists of a single tube and is simple to build.³

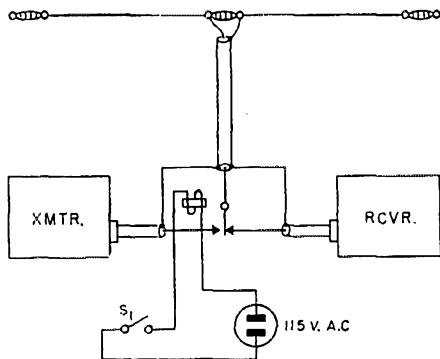


Fig. 2—Method of connecting an antenna-changeover relay.

Receiving Antennas

One other system of eliminating manual controls is to use two antennas, one for receiving and another for transmitting. With this setup there is no need for an antenna relay or switch. However, while such a system is suitable for low-frequency operation, 80 and 40 meters, it is not recommended for use on the higher bands. There is a very good reason for this. On 80 or 40 meters there is little directivity from the antenna. This of course doesn't hold true for the elaborate 40-meter beam installations but it is true for the average ham wire antenna. The lack of directivity works to the advantage of a ham using both receiving and transmitting antennas.

On the higher bands however, almost any antenna with the exception of a vertical will show marked directivity. If you were to try and use separate antennas, you could very well be transmitting a good signal in one direction but your receiving antenna wouldn't pull in signals from that same direction. Also, a ham will usually try to get his transmitting antenna as high and as best oriented as he can. Always keep in mind that the better your transmitted signal strength in any direction, the better will be the reception in that same direction.

Tying It All Together

In addition to the receiver and transmitter there are usually other items that the amateur will want to incorporate into his station. If he has a TVI problem, then a low-pass filter to attenuate harmonics may be required. Also, he may want to monitor the match on his antenna and check the power output in the feed line. In this case he may want to add a Monimatch.³ If he should be using a multiband antenna with tuned feeders, then a transmatch is in order. Fig. 3 shows how such a system would be tied together.

Either RG-58/U (50-ohm coaxial cable) or RG-59/U (70 ohms) can be used for connecting all the units together. One important point should be kept in mind when using coax. If you have a Monimatch or low-pass filter, then the coax

² Braschwitz, "Coaxial Switch Performance," *QST*, August, 1961.

³ Construction details can be found in *Understanding Amateur Radio*, published by ARRL.

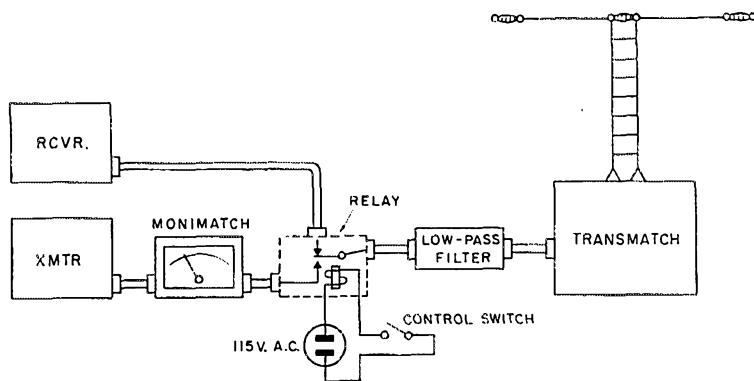


Fig. 3—This drawing shows a complete amateur station showing the method of connecting all units together.

impedance should be the same as the units. A low-pass filter designed for 50-ohm impedance should be used with 50-ohm coax, not 70-ohm. The same is true of the Monimatch. As a general rule the low-pass filter should be the last thing in the line, going from the transmitter, especially when a t.r. switch is used. Some t.r. switches will generate harmonics, but if in such cases the low-pass filter is installed between the t.r. switch and the antenna any harmonics generated will be attenuated by the filter. Note that in Fig. 3 we show a transmatch. In the event a coax-fed antenna were used you would simply have coax from the low-pass filter to the antenna. That would be the only change in the system. If you do use a transmatch it should be connected in the line as shown so that the receiver will get the benefit of the unit. A transmatch will help on reception by adding selectivity so it should serve the receiver as well as the transmitter.

Adding a V.F.O.

Another item in the switching problem is when the Novice becomes a General and wants to add a v.f.o. to his crystal-controlled rig. A great deal will of course depend on how the complete unit is to be keyed if c.w. operation is planned. If the existing transmitter is cathode keyed, a common system, and the v.f.o. is to be keyed the same way, then it is a simple matter to connect the v.f.o. and transmitter chassis together so they have a common ground and run the cathode lead from the v.f.o. to the key along with the transmitter keyed line. Of course in such a system whenever you lift the key both v.f.o. and transmitter are in the standby position so all you need do is switch the antenna.

In some cases cathode keying of the v.f.o. will cause chirp on the signal, so amateurs prefer to let the v.f.o. run continuously during the time the transmitter is keyed. In such a system provisions have to be made to switch the v.f.o. to the standby position otherwise the v.f.o. signal will be heard in the receiver. This problem can be taken care of by an extra set of contacts on the switch that controls the antenna relay.

Full Break-In Operation

In c.w. operation some amateurs prefer a system known as "full break-in." This means that

all that is necessary to go from receive to transmit is to merely press the key. One problem arises with this type of system. When you set your receiver at the normal operating level so that your eardrums aren't blasted out everything is fine until you close the key. When that happens your receiver will either block up completely or your signal from the rig will blast your eardrums. One way to get around this problem is to use an audio limiter.³ An audio limiter is a simple device made up from a few rectifiers and resistors. It limits the amount of audio a receiver will pass. When you close the key, a maximum point is reached in the receiver and the signal will come through at a comfortable level.

There are two ways of achieving full break-in. One is with a t.r. switch as described earlier and the other is with two antennas, one for receiving and the other for transmitting.

Similar to full break-in is the type of operation used on single sideband. In this case when you speak in the microphone a relay is activated in the transmitter. The relay switches the antenna and at the same time mutes the receiver. There is usually a delay built into the relay so that when you stop talking, or pause, the relay will kick out and the receiver will come on. If the reader is interested in this system, he should study the instruction manual for his equipment to decide on the best method of making the connections to the antenna, receiver, and transmitter.

For a.m. phone operation, switching would be similar to c.w. without full break-in. The switch that controls the antenna relay should have extra contacts which would be used to put the receiver in a standby or mute position. Nearly all receivers have extra terminals which can be connected to an external switch to provide muting.

In setting up your operating position give some thought beforehand to the arrangement of the receiver and transmitter and the necessary switches. We have seen stations where the operator tuned his receiver with his right hand but put the receiver on the left-hand side of the table. Or in other cases, where the operator was required to throw as many as four switches to go from receive to transmit. Do some thinking about your operating setup. A well-arranged operating position will provide a great deal of satisfaction to the operator.

QST



Team of the country's leading entry in the June V.h.f. Party, W1FRR/1, Mt. Greylock, Western Massachusetts Section. Left to right, rear, K1WTZ K1GSK K1BRO K1KEC K1NZF W1FRR K1VXD K1DIR W1LMZ W1ZIG. Front, K1PQO K1MVN W1EOA K1TCE K1COB. Missing are the photographer, W1ZBT, and K1BTF and W1RGM.

June V.H.F. Party Summary

Sporadic-E Skip Boosts Scores; Higher Bands Pay Off

JUNE being the prime month of the year for sporadic-E skip, it is not surprising that the ARRL V.h.f. Party often turns out to be a romp for 6-meter men. This possibility was, in fact, taken into consideration when our v.h.f. contest calendar was first laid out. And for the benefit of 2-meter men, September was selected for the other warm-weather v.h.f. party, as this is the year's best month for tropospheric propagation, over most of the United States, at least.

The 50-Mc. scoring possibilities always bring a few wails from the 2-meters-only operators, but our statistics for the 1963 June Party make it clear that use of both bands is a must, if one would place high in the more competitive ARRL Sections, or in the mythical national ratings. Starting down the list of high scorers in the single-operator category, you reach 9th place, nationally, before a one-band score is found. In the multioperator entries there isn't a one-band score in the top 20.

The sporadic-E skip in this year's hassle was not the equal of some past contests, in that

it was mainly a Sunday affair, but the second day surely was a wild one, almost everywhere. Unlike the usual condition, skip favored high-latitude contestants, as well as southerners, and some of the biggest multipliers were recorded by operators in the Middle West, the Plains States and even in Canada. The country's top 6-meters-only score was turned in by K4VWH, Herndon, Va.: 311-41-12,751. The fattest multiplier on 6 was 47, the work of W0YZS, Kansas City, Mo. His 247 50-Mc. contacts gave him 11,609 points. Third 6-meter score was by W4HFD, Eastern Florida Section, 273-38-10,374.

But look at a few of the scores resulting from use of more than one band. K3IPM, Philadelphia, leads all single-operator entries with 411-58-25,404, winning the Eastern Pennsylvania award. K2LNS, Somerville, N. J., took the NNJ award with 481-49-23,569. He used only 50 and 144, while K3IPM worked on these bands and 220 Mc. W1RJA, Milford, Conn., pushed hard on 50 and 144, for his 387-44-17,028 score and the Connecticut wallpaper.

Caravan of the Southern California V.h.f. Club arrives at the summit of 8000-foot Frazier Peak, in the Santa Barbara Section. The two camper pickups provided operating space for 220, 420 and 1215 Mc., while the club's trailer housed the 50- and 144-Mc. stations. K6BPC/6 compiled one of the biggest scores in the history of v.h.f. competition west of the Mississippi, 699 contacts, for 40,260 points. Operators in this picture are WB6COA WA6WIZ WA6AJT and WA6DJB. On the right, WA6AJT, trustee, and WA6DJB, president, unload some of the gear used by the Southern California V.h.f. Club station, K6BPC/6 in the June V.h.f. Party.





W4WDR didn't have to go hungry while rolling up points for K5FGI, Amarillo Air Force Base, in the June V.h.f. Party. His 312-40-12,480 score won in the North Texas Section.

K2CBA, Troy, N. Y. (a long shot in view of his location well out of local range from the high-activity metropolitan areas) used 50 through 420 Mc. effectively for a 303-52-16,796 total, and the ENY certificate. The operator of K2CBA for the contest was WA2IUL. A tremendous antenna installation and high power on all 4 bands were important factors in this achievement. W4LIP, Miami, would have done right well on 6 alone, but he fattened up his total with work on 144 and 220 and turned in 407-41-16,728 — the best score made outside the northeastern v.h.f. territory.

Fellows who have felt that living far from the high-activity centers is a severe handicap can take heart from 5-figure scores like that of K0UDZ, Rapid City, S. Dak., 312-38-11,856. This writer took time out from a Dakota Division Convention some years ago to make a try from a high spot near that Western South Dakota city — and got an 0-0-0 rating to show for it. Things must have changed since 1954! WA4FIJ won the Western Florida award with 329-40-13,160. K5FGI, operated by W4WDR, polished off North Texas with 312-40-12,480. XE1OE, Mexico City, won in the "foreign" category with 154-44-6336. And how about that Manitoba winner, VE4MA with 182-29-5278? Or K0ZZM, who won in Colorado with 199-37-7363. Even VE5BY was able to work 11 stations in 6 sections from Yellowknife, N.W.T.

Perhaps the rarest coup in the history of v.h.f. contests was pulled off by W5KHT, Oklahoma City. Bob was hearing very short skip on 6 around the time that he raised CO2DL, at 0851 CST. He changed quickly to 144 Mc. and worked CO2DL crossband duplex for several minutes. A neat trick — but no cigar. Crossband contacts don't count!

Expeditions to choice v.h.f. locations in many parts of the country provided hundreds of contacts that might not otherwise have been possible for most of us. Who would have gotten Quebec without VE2SH/2, 243-42-10,248, or West Vir-

ginia without KSOEN/8, 411-45-18,495? The mountains of our Pacific Coast states provide innumerable sites for this kind of thing, and group efforts enliven the contest immeasurably for the city dwellers.

Supreme western effort in the mountain-topping field was by the Southern California V.h.f. Club. With two camper-type pickups, the club trailer and a station wagon, this team trucked gear for 50 through 1215 Mc. to Frazier Peak, in the Santa Barbara Section. K6BPC/6 made 699 contacts, third highest in the nation, which with their 55 section total gave them 40,260 points, sixth in the country, and one of the best scores ever amassed west of the Mississippi.

W0WYZ/0 and W0DK/0 put Colorado on the map in a big way, winding up with almost identical scores. The former used 50, 144 and 420 while W0DK/0 worked all bands from 50 through 1215 Mc. Their tallies: 371-44-16,412 and 314-46-16,008.

Three multiop entries made scores over 50,000 points. The Dutchess County V.h.f. Society, K2CCH/2, Overlook Mountain, Eastern New York Section, worked all bands through 1215 Mc. for a 599-79-53,167 score. W1BU, the Rhododendron Swamp V.h.f. Society station, stayed home, and poured on the coal all across the spectrum for 823-74-70,152. And the top effort of all: W1FRR/1, King Philip Amateur Radio Society, operating from Mt. Greylock, highest point in Massachusetts — 970-84-89,292 points, made on all bands from 50 through 10,000 Mc.

Warning to the Over-Eager

Competition is getting keener with every v.h.f. contest, and in the drive to pile up big scores an increasing number of violations of either the spirit or the letter of the rules are being observed. We've done little policing of the v.h.f. contests in the past, but some will have to be done if certain operating trends are not corrected.



Highest station in Eastern U.S.A. was W4SKH/4, operating from the summit of Mt. LeConte, Tennessee. Seen here are K4OYF K4FPT W4SGI OZ9FL and a hiking companion.

1. Stations operating away from the licensed location must sign properly, to indicate their portable status. Many operators are skipping this necessary formality; necessary to comply with FCC regulations, and to keep contest records straight. Full compliance with FCC rules is required of all ARRL contest participants. Be sure that every one of your operators understands this, and follows through consistently with at least the "portable, Western New York" required by law.

This is important in other ways, too. W1HDDQ and W1HDDQ/1 are separate stations, and count as such in your log. The writer, who usually works portable on the second day of a v.h.f. party, has to explain this over and over to many operators. But if I do not sign /1 the second day, and your log-keeper does not enter me that way, the second contact will not count. It will be thrown out by the contest checker as a duplicate. Your entry may be disqualified if your operation has not been conducted properly.

2. Note carefully the new Rule 3. *A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest.* You can no longer use one set of gear for the microwave bands under various calls, to build up your score. One call *only* now, per station. The only exception is family-type stations, at the location for which family-type operation is licensed. This rule applies to all ARRL contests, including Field Day.

3. Several complaints have been received of illegal and apparently intentional interference by v.h.f. contest operators. Over-modulation, piling-on, malicious interference and other illegal or unethical practices have no place in the world above 50 Mc., at any time. Let's keep our perspective, during contests and at all times. Definite evidence of illegal operation can bring on disqualification, but matters should never have to go that far among friends. Who gains from such procedures? — E. P. T.

SCORES

In the following tabulation, scores are listed by ARRL Divisions and Sections. Unless otherwise noted, the top scorer in each section receives a certificate award. Columns indicate the final score, the number of contacts, the section multiplier, and the bands used. A represents 50 Mc.; B, 144 Mc.; C, 220 Mc.; D, 420 Mc.; and E, 1215 Mc. or higher. Multiple-operator stations are shown at the end of each section tabulation. An asterisk denotes a Novice Award Winner.

ATLANTIC DIVISION

Eastern Pennsylvania
 K3IPM 25,404-411-58-ABC
 W3SDZ 12,397-250-49-ABD
 K3HNP 5191-179-29-A
 W3ETB 4774-154-31-AB
 W3CLQ 4092-132-31-AB
 W3WJC 2016-84-24-AB
 K3AIKZ 1870-85-22-A
 W3AEM 1760-80-22-A
 W3ARW 1722-62-21-BCD
 K3JGU 1554-111-14-A
 K3ISH 1216-64-19-A
 K3TUX 1204-86-14-AB
 W3BS 441-49-9-B
 W3YC/3 150-22-6-ABC
 K3NII 87-29-3-A
 W3CCX/3 (18 ops.)
 28,050-504-51-ABCD
 K3JFL/3 (6 ops.)
 22,339-333-63-ABC
 K3DUW (multiopr.)
 16,383-381-43-AB

W3OI/3 (8 ops.)
 13,320-268-48-ABCD
 W3AD/3 (11 ops.)
 13,478-282-46-ABC
 K3UNZ/3 (4 ops.)
 12,742-277-46-AB
 W3JMP/3 (K3CSL, W3JMP)
 11,958-272-44-AB
 K3CQR/3 (K3S, CQR, MFE, TFK)
 10,249-277-37-AB
 W3HCW/3 (4 ops.)
 8460-235-36-AB
 W3FDH/3 (4 ops.)
 6669-151-39-ABC
 K3OKW (5 ops.)
 5796-161-36-AB
 W3VYM/3 (K3S, GX, MLI, ROK)
 2544-106-24-AB
 K3POH/3 (4 ops.)
 2120-106-20-A
 KN3WQ/3 (KN3S, WQR, WQC)
 518-74-7-R
 K3VZI (K3VZI, W3UNM)
 462-33-14-AB

K3SUH (K3S, SUI, TPI, KN3VKI)
 423-47-9-AB

Maryland-D. C.

W3NG 5952-188-42-AB
 K3VJH 1498-107-14-AB
 K3UVH 1036-74-14-A
 W3HB 610-61-10-B
 W3CPM 610-50-7-B
 K3IMV 310-31-10-AB
 K3AGN 148-37-4-B
 K3PPB 120-30-4-AB
 KN3UTC* 108-27-4-B
 KN3TUF 81-27-3-B
 K3GMB 80-16-5-AB
 W3BN 78-26-3-B
 K3BIZW 60-12-5-AB
 W3PIH 54-27-2-A
 W3AX 32-16-2-AB
 W3BNE 30-15-2-AB
 KN3UFV 28-14-2-B
 W3OTC 20-5-2-C
 W3JZY/3 (6 ops.)
 36,234-594-61-ABC
 K3EIV (4 ops.)
 5568-174-32-AB

Delaware

W3CGV 4290-97-39-ABCDE
 K3AZH 2300-109-20-ABD
 K3UNY 1586-61-26-AB
 K3OBU 374-34-11-AB
 K3SXA 288-32-9-A
 K3QHD/3 (multiopr.)
 4716-262-18-AB

Southern New Jersey

W2REB 8732-236-37-AB
 WA2EMB 1860-82-20-BD
 W2MQP/2 252-32-1-B
 W2HNF 308-24-1-B
 WN2HQ* 180-36-5-B
 WN2GBX 132-33-1-B

Western New York

K2ERQ 8246-217-38-AB
 W2UTH 8080-202-40-AB
 K2YCO 6370-182-35-AB
 WA2VAI 4867-157-31-AB
 K2GUG 3696-162-22-ABCD
 WA2TPR 3696-132-23-AB
 K2DRB 2852-106-27-AB
 K2SJB/2 2457-91-27-AB
 WA2TFS 1860-93-20-AB
 WA2MLV 1540-70-22-AB
 W2ROA 860-86-10-B
 WA2KND 756-63-12-AB
 K2IWS 350-50-7-AB
 WA2YRH 160-40-4-A
 WA2HKR 46-23-2-B
 K2IPV 28-14-2-B
 WA2RBF 22-22-1-A
 WA2KLM 20-10-2-B
 WA2WEH/2 (11 ops.)
 42,312-552-56-ABC
 K2RRM (8 ops.)
 28,210-455-62-ABC
 K2IXJ/2 (K2S, LXJ, SZK, W281U)
 34,278-381-61-ABC
 WA2JQ (13 ops.)
 16,192-346-46-ABC
 WA2VMB/2 (11 ops.)
 15,933-327-47-ABCDE
 W2MAU/2 (multiopr.)
 9758-221-41-ABCDE
 W2ZKP (6 ops.)
 9594-228-41-ABD
 WB2CCA/2 (10 ops.)
 5797-183-31-ABCD
 K2DUR/2 (14 ops.)
 4186-161-26-AB

W2ZJ/2 (W2K, KIJ, UZF)
 3276-156-21-A
 WA2KMF/2 (8 ops.)
 2060-103-20-AB
 WA2FGC/2 (WA2S, HFK, TGC)
 1700-85-20-AB
 WA2CYM (WA2S, CYM, VCG)
 VOD 715-55-13-A
 WA2JZN/2 (WA2S, DZN, YOB)
 296-37-8-AB
Western Pennsylvania
 W3RUE 4960-123-40-ABD
 W3BVU 4681-150-31-ABD
 W3CSA 2184-84-26-AB
 K3UQD 1938-102-19-A
 W3SYU 1242-54-23-AB
 K3PLX 1190-70-17-A
 W3FUE 104-26-4-B
 W3DJM 96-16-6-A
 K3PMH 56-14-4-B
 K3HWK (K3S, HWH, IWK, TID)
 5157-191-27-AB
 K3HKK/3 (6 ops.)
 2645-114-23-ABC
 K3GFP/3 (4 ops.)
 1309-73-17-ABD

CENTRAL DIVISION

Illinois

K9AAJ 5365-143-37-ABD
 K9DWR 3720-123-30-ABC
 K9CNC 3300-107-30-ABDE
 WA9CAVZ 2272-71-32-A
 WA9EPE 1000-50-20-AB
 WA9EJD 945-63-15-A
 K9TRG 615-123-5-AB
 WA9MPT 360-71-5-RD
 W9TC 234-26-9-AB
 WA9PTH 228-36-6-A
 WA9CVJ 208-26-8-AB
 WN9EOD 57-19-3-B
 WA9CTK 54-18-3-A
 K9RRN 36-13-2-AB
 WN9HSS 12-6-2-B
 K9JNY (4 ops.)
 10,947-267-41-AB
 WA9FCG (K9TSX, WA9FCG)
 2204-78-29-AB
 K9VCZ (K9VCZ, WA9BVD, WN9IBG)
 87-29-3-B

Indiana

K9OYD/9 3509-114-29-ABCD; 1
 W9MHP 2886-109-26-ABE
 K9MZY 1649-82-17-ABE
 K9ZUH 528-32-12-AB
 K9VPE (K9S, QCR, VPE)
 13,767-353-39-AB
 W9IGD/9 (W9IGD, K9COV)
 798-42-19-A

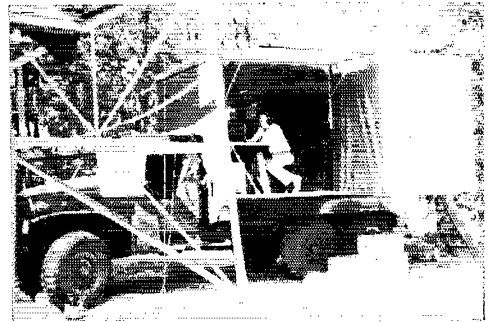
Iscosin

K9HBT 8988-236-38-A
 W9DHO 2813-97-29-AB
 WA9CBF 2700-106-25-A
 W9JQI 864-35-24-A
 W9JOT 602-43-14-AB
 K9QYA 294-21-14-A
 WN9GQS 34-17-2-B

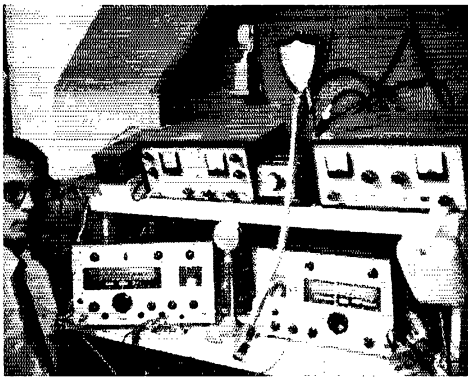
DAKOTA DIVISION

South Dakota

K0UD 11,856-312-38-AB
 K0CER 4158-154-27-A
 W0FTI 2675-107-25-A
 K0FKJ 1920-80-24-AB
 W0FPZ 60-10-6-AB



Deluxe transportation for W3JZY/3, June V.h.f. Party station of the Copperhead V.h.f. Society, is this surplus 6-wheel-drive army truck, complete with refrigerator and kitchen facilities for 4-man team. Location: Foxville Fire Tower, in the mountains of western Maryland.



Eastern Pennsylvania winner, and top single-operator entry in the June V.h.f. Party: Stan Smith, K3IPM, of Philadelphia. Score 411-58-25,404 on 50, 144 and 220 Mc.

Minnesota

K0DTA 2255-93-35-AB
K0GIG 2700-100-27-A
W4BCQG 1088-64-17-AB

DELTA DIVISION

Louisiana

WA5AVQ² 5382-207-26-A
K5ZQX 1260-60-21-AB

Mississippi

K5ZRK 574-41-14-A
WA6UYL 5 (4 oprs.)
2592-96-27-A

Tennessee

WA4CGA 5040-140-36-AB
K4JWZ 3169-132-24-A
WA4AWH 1722-82-21-A
K4NMI 1265-55-23-A
W4TZG/4 (4 oprs.)
13,356-318-42-AB
WA4ROZ/4 (4 oprs.)
1484-261-44-AB
W4SKH/4 (7 oprs.)
9652-254-38-AB

GREAT LAKES DIVISION

Kentucky

K4RZK 8765-205-33-AB
K4QPT 3567-124-29-A
WA4CQG 1034-86-19-A
WA4AXM 600-40-15-A

Michigan

K8LIO 2806-122-23-AB
K8IXU 2622-114-23-AB
W8CWA 1536-96-16-AB
1260-70-18-AB
K8HNB 854-61-14-A
K8GKX 408-34-12-A
W8VEH 224-56-4-AB
W8ZGW/8 1210-30-4-AB
K8TTN 7-7-1-AB
K8VPH/8 (8 oprs.)
8344-298-28-AB
W8JXU/8 (K8UOF, W8JXU,
W8BRS)
540-60-9-AB
W8BYL (W8AB, BYL, DZP)
520-65-8-AB
K8TIW (K8S, DVR, JZP, SBH)
221-32-7-A
K8RKF (K8S, KQV, RKF,
W8BIB)
132-44-3-AB

Ohio

K8YXV 5344-167-32-AB
K8ZPS 5100-150-34-AB
W8SEWT 2550-102-25-AB
K8SBU 2016-72-28-AB
K8KBJ 1300-65-20-A
W8ABMK 1045-55-19-A
K8TTO 896-64-14-A
K1CRQ/8 612-51-12-B
K8YVF 305-61-5-B
K8WV 288-24-12-A
W8HBJ/8 (12 oprs.)
21,986-476-46-ABDE
W8CCI (9 oprs.)
20,081-460-43-ABC
W8LT (K3TDR, K8S, BYT,
JZZ)
3168-132-24-AB

K8VGL (K8S, VAC, VGL)
2125-84-25-ABD
K8ZTV (K8S, UWZ, ZTV)
1459-104-14-AB

HUDSON DIVISION

Eastern New York

K2CBA3 16,796-303-52-ABCD
WR21P/1 789-240-32-AB
WB2DQO 2394-114-21-AB
K2GSF 913-83-11-B
WN2FXB 770-110-7-B
K2YZ 700-70-10-B
W2HJO 630-63-10-B
WB2HS 544-68-8-B
WN2GSK 474-79-6-B
WA2NRV 342-38-9-A
WA2O00 102-48-4-B
WB2EFT 51-17-3-A
WB2AGD 232-8-4-B
K2GCH/2 (14 oprs.)
53,167-599-79-ABCDE
K2YVE/2 (10 oprs.)
9672-290-31-ABC
K2BGU/2 (7 oprs.)
7392-224-33-AB
WA2SPL (WA2S, BVV, SPL,
WB2DDP)
6975-225-31-A
K1MLX/2 (K1S, MIX, QEO,
VGL)
4485-195-23-AB
K2XNT/2 (6 oprs.)
3393-261-13-B
K2CQG/2 (5 oprs.)
1242-49-18-BC
WA2HAQ (WA2B, HAQ,
RWJ)
8928-69-12-AB
WN2IBQ (WN2B, HDL, IBQ)
48-16-3-B

N. Y. C. - L. I.

WB2CZI 15,648-326-48-AB
WA2LRO 8316-231-36-AB
W2SEU 4983-133-33-ABC
K2MUB 4218-111-38-A
WA2FBA 2052-114-18-AB
K2RTH 1573-121-13-B
W2KXG 1355-123-11-B
K2IDK 1352-104-13-B
WA2YDN 1296-108-12-A
WB2DNZ 1111-101-11-AB
WB2PHL 1100-110-10-B
WA2BNK 1078-98-11-B
WA2GCL 1050-70-15-A
WA2FHO 1008-72-14-AB
WA2RJJ 861-102-8-AB
W2JLU 857-51-7-B
WA2RKH 720-80-12-B
WN2CLV² 707-101-7-B
W2RIZ² 690-69-10-B
WR2RQJ 649-59-11-AB
WA2LUS 450-48-9-BD
WA2LJ 440-14-5-C
WA2UNC 300-60-5-A
W2ZSQ 300-30-10-AB
WN2CNT 290-58-5-B
WA2ZCK 175-35-5-B
WB2DVK 162-18-9-A
K2DDK 140-14-5-C
WB2DGL 92-23-4-B
WA2OUM 78-26-3-B
WA2ZEW 76-19-4-B
WN2CNC 50-25-2-B
WA2VAG 10-5-2-A
K2SW/2 (17 oprs.)
22,090-437-47-ABCDE
K2LEJ/2 (K2LEJ, WA2S,
PZE, YX8)
13,156-286-46-AB

K2YGM/2 (K2YGM, WA2S,
VGX, ZUH)
8613-297-29-A
WA2RAT (WA2R, RAT, SLY)
6780-226-30-AB
W3ZYH (WA2S, OYMI, YDB,
YHS)
1716-143-12-B
WA2OOL (WA2OOL,
WB2DRM)
904-113-8-B
WA2LKN (WA2S, IKN, JUG)
608-76-8-B
WB2ONU (WB2S, ONU, COW,
11H, G)
264-44-6-AB
WA2YXK (WA2YXK,
WN2IEK)
260-52-5-B
WA2RTG (WA2RTG,
WB2BNW)
225-45-5-B
WA2WIH (WA2WIH,
WB2HES)
200-40-5-A

Northern New Jersey

K2LNS 23,560-481-49-AB
W7PUA/2 7289-193-37-ABD
WA2SAB 6078-193-31-ABD
WA2JVO 3944-136-20-AB
WN2CUD 1960-140-14-B
K2RGF 1508-52-29-AB
WA2JI 848-106-8-B
W2GYR² 584-73-8-B
WR2CRS 568-69-8-ABD
W2NTY 504-31-8-CDE
WA2AXV 49-48-8-B
WN2DDA 357-51-7-B
WB2ALF 352-44-8-B
WA2OOD/2 268-38-7-B
WA2UOZ 245-35-7-B
WA2REI 245-35-7-B
K2PQR 161-23-7-A
W2DMJ 132-33-4-AB
WA2LBI 126-18-7-B
WN2ESI 96-21-4-B
W2PEZ/2 (2 oprs.)
48,420-785-60-ABCDE
W2LRT (9 oprs.)
43,320-675-60-ABCD
WA2VLR (8 oprs.)
25,168-572-44-AB
W2ZDR/2 (8 oprs.)
22,673-511-41-ABC
K2BJP/2 (6 oprs.)
18,315-370-45-ABCDE
W2OYH/2 (8 oprs.)
18,142-386-47-AB
WA2FSQ (6 oprs.)
12,668-487-26-AB
K2TMA (8 oprs.)
9268-331-28-AB
K2UVG (K2UVG, WA2S,
SEF, VBI)
256-136-21-AB
K2KDG (5 oprs.)
2175-145-15-AB
WA2UUY (WA2A, UUY, VLB)
780-52-15-AB
WN2GFO (WN2B, EUI, GFO)
12-12-1-B

MIDWEST DIVISION

Iowa
K0KPK 5148-143-36-AB
K0BSY 424-150-36-AB
W0DRI 4216-136-31-A
W0EAB 35-7-5-A
Kansas
K0GIC 2010-67-30-AB
W001C 34-17-2-B
WN0END 6-6-1-B
Missouri
W0YZS 11,609-247-47-A
W0HEG 558-31-18-A
K0CWP (K0S, BYR, CWP)
3510-117-30-A
WA0CHE (WA0S, CHD,
CHE)
2929-101-29-A
Nebraska
K0PLE 836-44-10-A

NEW ENGLAND DIVISION

Connecticut
W1RJA 17,028-387-44-AB
K1E1R 5904-235-24-ABC
W1ULZ 2943-109-27-AB
K1PUG/1 2625-105-25-A
K1RCK/1 2119-163-13-B
W1HKL 1950-150-13-B
K1PKQ/1 1785-119-15-B
K1TOE 1166-106-11-B
W1DZA 704-64-11-B
W1HDO² 572-42-13-ABD
K1TRC/1 445-9-8-B
W1YDS² 480-27-15-ACD

K1RTS 343-49-7-B
K1VMI 270-54-5-B
K1WKK 220-44-5-B
K1MYQ² 185-37-5-B
K1PAI 168-28-6-B
K1RFX 150-30-5-B
K1JNH/1 (14 oprs.)
2664-216-29-AB
W1ORS/1 (8 oprs.)
3718-169-22-AB
KIMBA/1 (K1S, MBA, NTR)
423-47-9-B
W1AW (W1S, Q18, WPR)
171-19-9-AB

Maine

K1NTC 1648-103-16-A
W1COP 688-43-16-AB
K1MTJ 320-40-8-AB
W1PLX/1 320-40-8-AB
W1ECM 140-20-7-B
K1KKK 32-8-4-A
K1NAY/1 (K1S, NAY, QKM)
9083-293-31-AB
K1VEQ/1 (K1S, SEV, VEQ)
34-17-2-B

Eastern Massachusetts

W1OOP 1558-40-19-CDE
W1JSM 1422-74-18-ABC
K1NZG/4 120-24-5-B
W1BZ (13 oprs.)
70,152-823-74-ABCDE

Western Massachusetts

K1JXT 7866-173-38-ABCDE
W1VNE 2340-60-30-ABCDE
K1TCH 2100-100-21-A
W1HDQ/1² 400-50-8-A
W1UC 98-14-7-AB
K1VNP 96-94-4-AB
W1PFR/1 (9 oprs.)
89,292-970-84-ABCDE
K1YLU/1 (6 oprs.)
19,360-484-40-AB

New Hampshire

W2NSD/1 14,319-333-43-AB
W1FZ/1 11,250-234-45-ABCD
W1UON/1 2751-131-21-AB
K1WPF 468-36-13-AB
K1SFN 80-20-4-A
K3LNM/1 65-13-5-A
W1ALE (W1S, ALE, YQH)
5673-176-31-ABC

Rhode Island

K1CRN 7918-206-37-ABC
K1PAM 1005-67-15-AB
K1JSG 836-76-11-B
W1OP (K1S, HZM, LPL, NVS)
5060-230-22-AB

Vermont

K3KJ/1 1320-60-22-AB
W1GYT 1092-78-14-AB
W1HJ/1 (7 oprs.)
8328-185-40-ABCD
WB2CCO/1 (K1S, BVI, KJY,
WB2CCO)
3834-142-27-AB
K1CQX/1 (K1CQX, W1JVL)
112-10-8-BCD

NORTHWESTERN DIVISION

Idaho
WA6UYK/7 1387-73-19-AB
Montana
K7MFA/7 910-65-14-A
W7NPV 840-60-14-A
W7EQN 578-34-17-A
W7CJN 481-37-13-B
W7RZY 112-14-8-A

Oregon
W7ADR 1608-67-24-AB
W7CTV 1554-74-21-AB
W7TRR 1866-65-21-ABC
K7AAD 782-32-23-ABC
K7AUO/7 (11 oprs.)
2780-130-20-ABCD
W7HTX (W7S, DET, HTX)
108-27-4-AB

Washington

K7IQI 7655-217-35-ABCD
K7RIE 4992-156-32-A
W7ZOW 3886-134-29-A
W7RPT 448-32-14-AB
W7HZ/7 (13 oprs.)
4557-140-31-ABCDE
K7EEF/7 (K7S, DIF, HEF,
JZP)
6720-210-32-AB
K7PIN (7 oprs.)
5670-210-27-AB
K7BBO/7 (K7J, BBO, HSD)
4887-181-27-AB

(Continued on page 110)

Seventy-Three

BY LOUISE RAMSEY MOREAU,* WB6BBO

THE greatest expert in any field is a fellow named "They." Even more than "Pat. Pending," and "Anonymous," "They" has been an authority on, and has said more, and been responsible for almost everything from gardening to politics, and he has been particularly busy finding a derivation for "73." Every time we turn around this expert has come up with a new theory, each one more colorful than the last. Look at some:

1. As a telegraphers' toast to Andrew Carnegie on his 73rd birthday.

Not True. Andrew Carnegie heard 73 come over the wires in Pittsburgh, Penna., while he was still a messenger and just learning the Code. What is true is that on his seventy-third birthday the telegraphers held a celebration in his honor, and did indeed toast a "73" to this very successful graduate from their ranks.

2. As a secret sign by the railroad telegraph union to designate membership.

Not True. Again, in 1909 when this was supposed to be happening, there wasn't a telegrapher who would not have replied to that 73 knowing full well what it meant.

3. The Winchester 73 Rifle. (One of the latest pipe dreams that was promoted in a syndicated column about two years ago.)

Not True. The Winchester Rifle wasn't even in the "bright idea" stage when 73 was first used on a wire. Later, perhaps, 73 could have triggered its use in the original meaning of the numeral, had conditions warranted this after the rifle had appeared.

These are the three most popular legends, but there are many more. There are some facts behind each one that make it seem to be possible, and each one has that most acceptable element of any legend — appeal to the imagination.

Just a year ago the Citizens Band set itself up as the authority with the wildest flight of fancy yet found. It is so completely in error, and so very funny, that it is worth mentioning as an example of how far imagination can go.

According to a CB publication, it would seem that it began in the early days of wireless in, of all places, the lumber camps. Now, according to this story, there were wireless stations at the camps. Also, according to the story, a lumberjack had done a good day's work when he had felled seventy trees. So, the wireless operator in one lumber camp would wish the operator in another (you guessed it) "seventy trees" when he signed. The author does not explain how that grew into a numeral.

All this has been theory, and legend. So what is the truth?

73 goes right back to the beginning of the land-

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line telegraph days. It is found in some of the earliest editions of the numerical codes, each with a different definition, but each with the same idea in mind — it indicated that the end, or the signature, was coming up. But there is no data to prove that any of these were used.

The first authentic use of it is in the publication, *The National Telegraph Review and Operators' Guide*, first published in April 1857. It is found in Volume 1, Number 1, along with other numerals then in use. At that time 73 meant "My love to you!" Succeeding issues of this earliest of telegraph publications continued to use this definition of the term. It is employed as well in some of the poetry of the telegraphers, and in comments regarding the two YL operators who had entered the profession. Curiously enough some of the other numerals then used have the same definition now that they had then, but within a short time 73 began to change.



In the National Telegraph Convention the numeral was changed from the Valentine-type sentiment to a vague sign of fraternalism. Here 73 was a greeting, a friendly "word" between operators, and it was so used on all wires and by all companies. The idea was instituted by James D. Reid, who was one of the members of the committee appointed to set up a standardized code of abbreviations for all companies to use.

In 1859, the Western Union Company set up the standard "92 Code." A list of numerals from one to 92 was compiled to indicate a series of prepared phrases for use by the operators on the wires. Here, in the "92 Code," 73 changes from a fraternal sign to a very flowery "accept my compliments," which was in keeping with the florid language of that era. Over the years from 1859 to 1900, the many manuals of telegraphy show variations of this meaning. Dodge's *The Telegraph Instructor*, shows it merely as "compliments." *The Twentieth Century Manual of Railway and Commercial Telegraphy* defines it two

(Continued on page 166)

Intermodulation Distortion in Linear Amplifiers

BY WILLIAM I. ORR,* W6SAI

IT is common communication practice to generate a single-sideband signal at a low power level for reasons of economy and then to amplify it to the desired strength by the use of one or more linear amplifier stages. The intelligence is contained in amplitude variations in the signal, and it is imperative that the linear stages amplify this intelligence with as little distortion as possible. Strictly speaking, an ideal linear amplifier is one in which the output envelope amplitude is at all times directly proportional to the input envelope amplitude. Amplitude distortion results when the magnitude of the output signal is not strictly proportional to that of the driving signal. This class of distortion (which is the principal type encountered in linear amplifiers) includes *intermodulation distortion*, a particularly interesting type of amplitude distortion encountered in single-sideband service. In passing, it should be noted that intermodulation distortion (abbreviated IMD) occurs only in a nonlinear device driven by a complex signal having more than one frequency. As speech is made up of multiple

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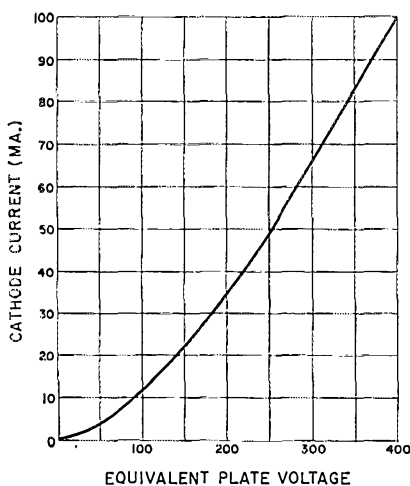


Fig. 1—The electron flow (cathode current) in a vacuum tube is a nonlinear function of the equivalent plate (or plate and screen) voltage and is described by the $3/2$ -power law. This curve illustrates typical electron flow, which plays an important part in establishment of tube linearity.

Although there has been much talk about intermodulation distortion in linear amplifiers, a search of available literature brings to light very little in the way of factual data. Here's down-to-earth dope on what linear-amplifier tubes can and can't do.

tones (or frequencies) and as the perfect linear amplifier has yet to be built, the situation leading to IM distortion exists in most s.s.b. amplifiers. Once the intelligence-bearing signal has been generated, the amplitude relationships existing in the intelligence must be faithfully retained or the s.s.b. signal will blossom into a broad, fuzzy caricature of itself, and the unlucky user of the nonlinear equipment will find his on-the-air popularity waning. Intermodulation distortion, therefore, is important to the s.s.b. operator, and the cause and effect of this unloved and unwanted mutilation of s.s.b. signals will be discussed in this article.

The Vacuum Tube and Linearity

The vacuum tube is the heart of the linear amplifier, and the amplifier is designed about it.¹ In addition to the tube, the amplifier is composed of auxiliary equipment — resistors, capacitors, inductors, etc. — chosen to permit the tube to operate in the most linear manner possible consistent with various restrictions imposed by economic, physical and electrical limitations. The auxiliary equipment may be considered to be made up of passive circuit elements while the vacuum tube is thought of as an active element by means of which the desired power gain is accomplished. The passive circuit elements are entirely linear and they affect circuit operation only insofar as they determine the operating parameters of the tube. The linearity of the tube is open to question. The more linear the tube, the less stringent the demand placed upon the circuitry to achieve a desired degree of over-all linearity. The results obtained are a balance between excellence and economy.

The vacuum tube utilizes electrons emitted from a hot cathode by impressing upon them an electric field which varies with time. During the passage of the electrons from cathode to plate, the field is manipulated in such a way as to alter the number of electrons arriving at the plate of the tube. The electric field reacts in a predictable way that may be accurately described by Maxwell's equations. The electron flow (or cathode current) is a $3/2$ power function of the applied electrode voltages. This so-called " $3/2$ -power

¹ This discussion applies to vacuum tubes. Similar conclusions may be drawn about transistors, but such conclusions are not within the scope of this article.

law" of Child and Langmuir is theoretically valid for uniform tube geometry and holds true for any space-charge-limited electron flow under the influence of an external field (Fig. 1). The $3/2$ -power law is not a linear function, and in practical tubes the cathode current is not a straight-line function of grid voltage. Further, practical tubes depart from the $3/2$ -power law to some extent, depending upon tube geometry, space charge, electron interception by grids, and emission limitations.

The relationship between the electric field and cathode-current flow within the tube described by this natural law plays an important role in the establishment of tube linearity. In practical amplifiers, for example, the magnitude relationship between input and output signals is not perfectly constant at all signal levels within a given range. The relationship defining *amplifier linearity* is termed the *envelope transfer function*, and ideal and typical transfer functions are shown in Fig. 2. The fundamental cause of a non-ideal, nonlinear amplifier transfer function may be traced directly to the nonlinear relationship between the plate current and grid voltage of the tube employed in the amplifier. This relationship *approximates* the $3/2$ -power law throughout the operating region above cutoff.² An examination of intermodulation distortion reveals the importance of significant cathode-current departure from this fundamental law as regards amplifier linearity.

Intermodulation Distortion Measurement Techniques

Leaving the vacuum tube for a moment, it is useful to examine means of testing tuned linear amplifiers for distortion. One such means is to apply two equal-amplitude r.f. signals of different frequency to the input circuit and then to measure the relative strengths of the output signals and the accompanying intermodulation products.³ This combination of input signals is often called a *two-tone test signal*. The action of the test signals beating with each other in the typical "nonlinear" linear amplifier having amplitude distortion produces intermodulation distortion, and the purpose of the two-tone test is to create this action under controlled conditions and to measure it. Maximum limits of intermodulation distortion have become an important specifica-

² Cutoff may be thought of as that amount of grid bias required to reduce the idling plate current of a vacuum tube to virtually zero.

³ "The Grounded Grid Linear Amplifier," Orr, Rinaudo, Sutherland; *QST*, August, 1961, pages 16-21.

Fig. 3—QST authors and prominent DXers W6KEV (standing) and W6UOV examine data plotted by Eimac Intermodulation Distortion Analyzer. General-purpose equipment permits IMD measurements to be made on a wide variety of transmitting tubes in either grid- or cathode-driven configuration. IMD products are seen on screen of panoramic analyzer.

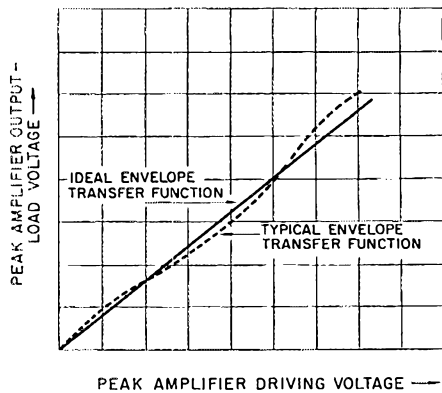
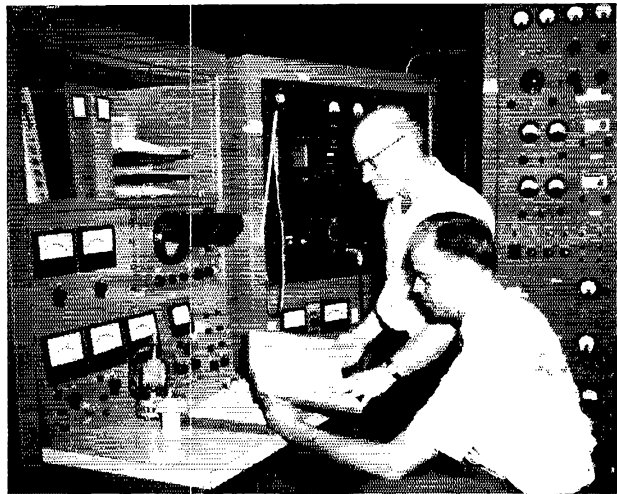


Fig. 2—Amplifier linearity is defined by the envelope transfer function. Departure from linearity is illustrated by curvature of the function (dotted curve) and may be traced directly to the nonlinear relationship between cathode current and electrode voltage shown in Fig. 1.

tion determining the excellence (or lack thereof) of linear amplifiers and tubes.

A practical test technique is to employ a two-tone, low-distortion test signal to drive a linear amplifier, and to use a spectrum analyzer to display a sample of the output signal of the amplifier (Fig. 3). A spectrum analyzer is a precision panoramic receiver having high resolution and capable of resolving signals separated in frequency by only a few kilocycles. The presentation of a portion of the spectrum in which the tests are taking place is given on a long-persistence cathode-ray tube. If the IMD products of the two-tone test signal are known and the amplifier under test is run with no feedback, at a frequency low enough to remove side effects due to circuit uncertainties, the IMD products of the tube under test may be readily determined by visual inspection of the picture on the screen of the spectrum analyzer. Equally important is the fact that the test is reproducible, and that the tube may be operated under any combination of electrode voltages and loads.

A block diagram of a typical IMD test experiment is shown in Fig. 4. The low-distortion signals are generated by separate stable r.f. oscillators operating on 2000 and 2002 kc., respectively, their outputs being carefully combined in a special isolator which prevents the oscillators



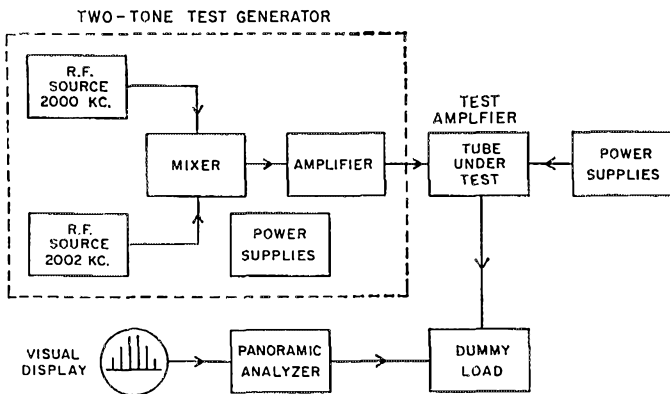


Fig. 4—Block diagram of Intermodulation Distortion Analyzer of Fig. 3. Low distortion two-tone r.f. signal is generated at 2 Mc. and applied to test amplifier. The output of the amplifier is dissipated in a dummy load and a portion of the output signal is examined on the screen of a high resolution panoramic analyzer. Distortion products as low as -60 decibels below peak power may be seen and studied.

from "seeing" each other. The resultant two-tone signal is amplified by successive class A stages until the desired driving level is reached. The two-tone generator shown in the photograph is capable of delivering a test signal having IMD products more than 60 decibels below the two-tone signals, at a power level up to 700 watts.

The tube under test is placed in a test amplifier operating at 2000 kc., and capable of permitting various electrode voltages and r.f. loads to be

impressed upon the tube at the convenience of the operator. The output of the test amplifier is dissipated in a dummy load and a small portion of the output signal is applied to a panoramic analyzer having a dynamic range of 60 decibels. The two-tone test signal, along with spurious IM products, may be seen on the screen of the instrument, separated on the horizontal frequency axis by the difference in frequency between the two test signals (Fig. 5). A reading is made by comparing the amplitude of a specific intermodulation product with the amplitude of the two equal test tones in the output signal. For convenience, the ratio between one of the test signals and one of the IM products (there are always two of the same order) is read as a power ratio expressed in decibels below the test-signal level. It is equally correct, and the absolute answer is the same, if the ratio of the sum of the powers of the two test tones to the sum of the powers of the two IM products of the same order is used. It is equally valid to express IM relative to peak-envelope power, (p.e.p.) provided it is done by taking the ratio of p.e.p. to the square of the sum of the two IM products of the same order.⁴ Referring IM to p.e.p. carries the additional information that the IM is specified for conditions of maximum signal level. Peak envelope power occurs when the two test tones are instantaneously in phase.

Measurements made on a wide variety of power tubes, from small to large, filamentary types and oxide cathode, triodes and tetrodes, in grid- and cathode-driven service, have shown conclusively that the magnitudes of the intermodulation distortion products are significantly affected by almost everything: changing heater or filament voltage by only a few per cent; slight shifts in bias voltage, idling current, screen voltage, plate or grid tuning; neutralization, loading — all these factors and others even more obscure enter into the determination of intermodulation distortion.

This might be a melancholy and discouraging picture, but it is a fact of life and is one of the

⁴ Expressions of IM without reference to conditions of measurement and techniques are — as expressed by Poo-Bah in "The Mikado" — "merely corroborative detail, intended to give artistic verisimilitude to an otherwise bald and unconvincing narrative." Unfortunately, a trend seems to be developing in this direction. The reader is hereby warned.

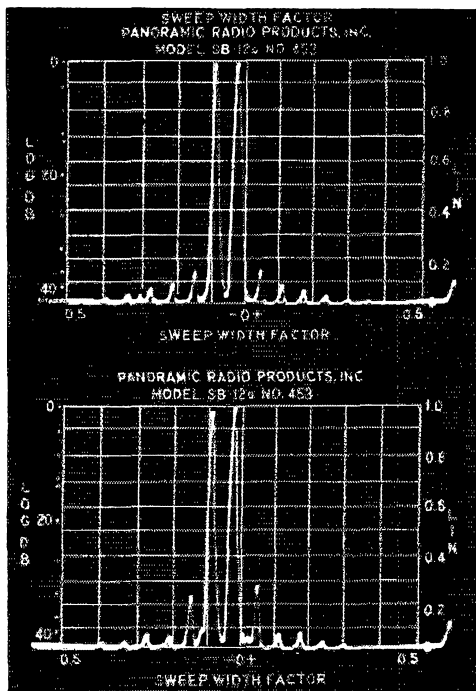
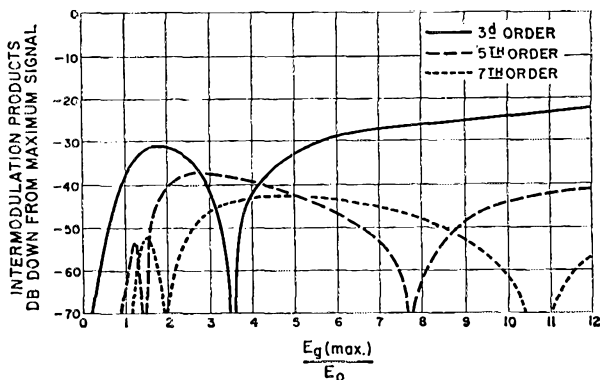


Fig. 5—Typical display on screen of IMD Analyzer. Top: Two test tones are seen at the center of the screen, with IMD products evenly displaced on either side of test signals. Third-order products are 35 db. down in amplitude from two-tone signal, and 5th-order products are 40 db. below test signals. Higher-order distortion products may also be seen. Bottom: Equipment parameters adjusted to raise third-order products and to drop fifth-order products. The linear amplifier may be adjusted to enhance or reduce various distortion products, if desired.

Fig. 6—Intermodulation distortion products may be predicted mathematically. This universal family of IMD curves applies to all perfect tubes obeying the 3/2-power law. The curves are plots of IMD level (Y axis) referred to the driving signal expressed as a ratio of drive to operating bias. As the drive is increased, the various IMD products pass through maxima and minima. Misleading conclusions of amplifier performance may be drawn if the equipment happens to be tested near a cusp on the IMD curve, where a particular product drops to an extremely low level. The whole operating range of the equipment must be examined to draw a true picture of IMD performance.



major roadblocks in joint industry efforts (working through the auspices of the Electronic Industries Association with the active cooperation of the U.S. Navy) to set up standards and testing procedures in order to establish a common yardstick for all to follow in vacuum tube IMD testing, rating and equipment design.

Mathematical Analysis

IMD products may be calculated by several methods.⁵ The results of different valid mathematical techniques are in good agreement with each other, and also agree in general with data obtained from two-tone tests conducted with the IMD analyzer. A theoretical family of IMD curves of a perfect tube obeying the 3/2-power law is shown in Fig. 6. This universal family of curves applies to all tubes, regardless of operating parameters or tube type. Changes in electrode potentials and circuit values (and even changes in tube type) will produce characteristic curves of this general configuration, but of course the signal level at which particular value of distortion occurs will be different in each case.

In Fig. 6 intermodulation distortion products, expressed in decibels below the output level of the tube, are plotted along the Y axis. The ratio of the two-tone driving signal $E_{g(max)}$ to operating bias, E_0 (relative to cutoff voltage) is plotted along the X axis. When E_0 is zero, the tube is biased at cutoff (class B). Ratios of $E_{g(max)}/E_0$ greater than one, but less than infinity, represent the possible range of class AB operation. Starting on the curve at the no-signal point ($E_{g(max)} = 0$), the IMD products are nonexistent. As $E_{g(max)}$ is increased, the IM products increase throughout the range of class-A operation and into the class AB region, until a maximum IM distortion figure for the 3rd-order products of about -30.7 decibels is reached at an $E_{g(max)}/E_0$ ratio of about 1.7. The 3rd-order product then drops to zero (minus infinity) again for a ratio of $E_{g(max)}/E_0$ of about

3.5, after which the IM product again increases, gradually rising to a level near -20 decibels for class-B operation. Fifth-order and 7th-order (and higher-order) products follow this same general behavior, compressed along the X-axis, and are shown in dotted lines on the graph.

The results of this theoretical study imply that the amount of intermodulation distortion in any vacuum tube that follows the basic 3/2-power law is predictable; further, that such distortion is inescapable and is independent of tube type. Moreover, the study indicates that the perfect 3/2-power tube will provide 3rd-order IM products no better than -20 to -30 decibels below maximum power output, and that the IM product varies markedly with drive level, dropping to zero at various points in the dynamic operating range. Thus, the perfect tube, obeying a fundamental law of physics, is a mediocre performer from a linearity point of view. As far as IM distortion goes, it is a poor device to use in equipment

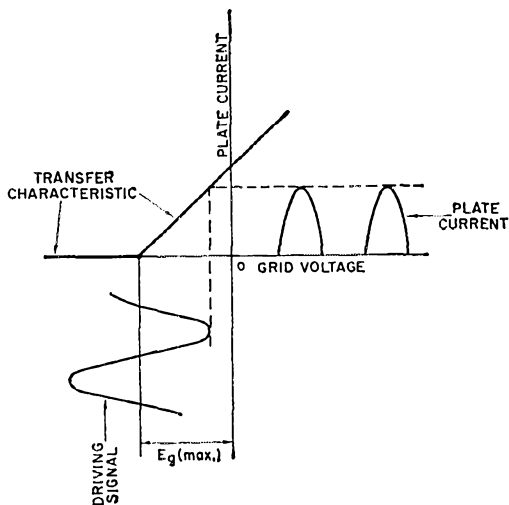


Fig. 7—An ideal tube transfer characteristic departs from the 3/2-power law. The ideal characteristic shown here consists of two linear portions, with the operating point set at the intersection. Half-wave plate current pulses are converted to sine waves by the flywheel effect of the plate tank circuit. Poor tank circuit Q, therefore, will have adverse effect on over-all linearity.

⁵ "Approximate Intermodulation Distortion Analyses," Report CTR-173 by R. E. Cleary, Collins Radio Co., Cedar Rapids, Iowa; "Linear Power Amplifier Design," W. B. Bruene, *Electronics*, August, 1955; "Linearity Testing Techniques for SSB Equipment," Teenbice and Tellhaver *Proc. I.R.E.*, December, 1956, pages 1775-1782. "Intermodulation Distortion in High Powered Tuned Amplifiers," R. C. Cummings, Consultant, Eitel-McCullough, Inc., San Carlos, California.

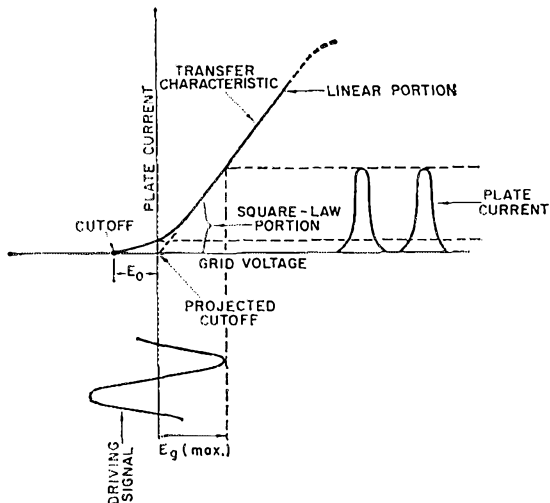


Fig. 8—Another ideal transfer characteristic for a linear tube consists of this form of curve, where the central portion is straight and the lower portion resembles a parabola. Practical tubes exhibit transfer characteristics of this general class, the upper portion of the curve showing additional curvature resulting from saturation of the electron stream in the grid-plate area of the tube. Plate current pulses are converted to sine waves by flywheel action of plate tank circuit.

designed for linear amplification of intelligence-bearing signals.

A Study of Practical Linear Amplifier Tubes

Does this theoretical study actually mean that all tubes are poor linear amplifiers or that it is impossible to achieve IM distortion products of a better order than -20 decibels? Not at all. The study concerns itself with a *perfect* tube that implicitly follows the $3/2$ -power law. Of course, there is no such device, and *practical* tubes (i.e.: tubes that can be manufactured) depart from this law to a greater or lesser extent. The practical tube, in general, shows an improvement in over-all linearity as a result of departure from the $3/2$ -power law. The practical tube, in addition, does not have a definite value of cutoff grid voltage, it does not have constant amplification at all points within the structure, and current deviations and amplification variations occur with changes in plate voltage. Current intercepted by the screen and control grids modifies the plate characteristic, and the "constants" that express the $3/2$ -power law vary with actual operating conditions. Theoretically, IM distortion as a result of this law should be independent of tube

type. We know from experimental data that such is really not the case, as practical tubes exhibit transfer characteristics departing markedly from the $3/2$ -power law. In many instances, an improvement in linearity occurs when the tube departs from this law. For example, an ideal transfer characteristic for a tuned amplifier is shown in Fig. 7, consisting of two linear portions with the operating point set at the intersection. The resulting plate current consists of rectified and amplified half sine waves, the plate tank circuit converting this misshapen wave into an equivalent sine wave by virtue of the fly-wheel effect. The equivalent sine wave is directly proportional to the input signal at all amplitude levels from zero to the maximum value shown.

Alternatively, distortionless linear amplification may be achieved from another transfer characteristic having, instead of the discontinuity exhibited in the first example, a smooth curve of the form shown in Fig. 8. The operating point of the tube is chosen at projected cutoff. Ideally, the curved portion of the transfer characteristic should be a portion of a so-called "second-order" curve (a half-parabola, to be exact). A characteristic such as this is termed *square law*. Distortion products added to the exciting signal by such a

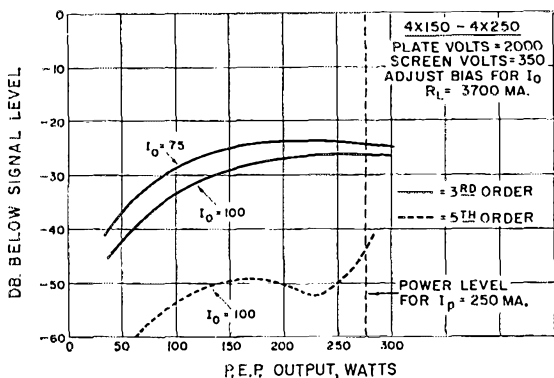


Fig. 9—A family of IMD curves for the 4X150-4X250 external-anode tubes. These curves are representative of this type of tube, and are typical for tubes made by different manufacturers. Intermodulation distortion products average about -25 decibels below peak signal, for 3rd-order products, while 5th-order products average -43 decibels below peak signal. These curves are representative of most small transmitting tubes of this type. Changes in loading or circuit parameters will alter shape and position of the curves.

curvature can be filtered out of the output signal by the tuned plate tank circuit because all of these products fall in the harmonic regions of the exciting signal. A distortionless replica of the input signal is thus available at the output circuit of the amplifier. Other transfer characteristics exist which also will provide lower-distortion output. Practical tubes departing from the $3/2$ -power law (wherein the exponent in the expression is $3/2$, or—expressed as a decimal—1.5) have exponents ranging from 1.3 to 3.4. This range covers quite a spectrum of possible tube performance! A practical tube may have a transfer-characteristic exponent falling somewhere between 1.5 ($3/2$ -power law) and 2 (square law); its transfer characteristic would approximate the curve of Fig. 8, wherein the central portion is fairly linear and the lower portion resembles a parabola. The upper portion of the characteristic may show additional curvature resulting from saturation of the electron stream in the grid-plate area of the tube. That is to say, the grid or screen “robs” the plate of the greater portion of the available electrons and causes a corresponding drop in plate current.

Intermodulation tests run on tubes having this general transfer characteristic show distortion products generally in agreement with the $3/2$ -power law. Shown in Fig. 9 are IM curves based upon typical measurements made on the 4X150-4X250 family of external-anode tubes. With fixed values of plate and screen potential and plate load impedance, measurements were made at two levels of resting plate current over the operating range of the tube. At the recommended value of resting plate current, the 3rd-order IM products rise gradually and smoothly as power is increased to the maximum value of 500 watts (referred to a single-tone plate current of 250 ma.) until at this value the products reach a level of -26 db. below the p.e.p. signal. Decreasing the resting plate current to 75 ma. will degrade the IM curve by several decibels, as shown. Fifth-order products at the recommended value of plate current are below -43 db. at maximum plate current level. The addition of 10 decibels of negative feedback to a circuit employing this style of tube will reduce the IM products below the values shown by approximately 10 db., so

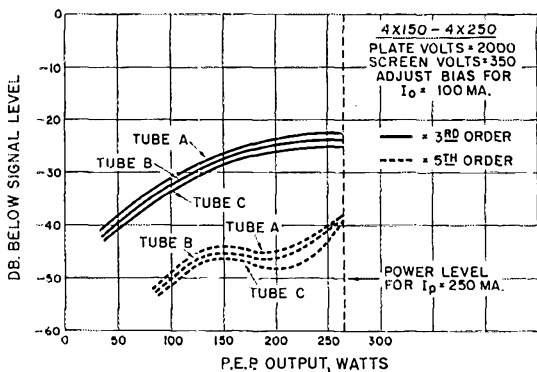


Fig. 10—Intermodulation distortion products vary from tube to tube of the same type, and also vary tube to tube as operating conditions are changed. Small “receiving-type” transmitting tubes are usually poorer than these curves by five to ten decibels.

equipment with feedback designed around this tube (other factors being equal) should be able to reach the region of -35 db. IM distortion at full power. Individual tubes (and similar tubes made by different manufacturers) will vary from these curves by two to three decibels. Fig. 10 shows the variation in IM products between three tubes under fixed operating conditions. Changes in loading or other parameters will alter the shape and position of these curves.

Referring back to Fig. 6, tubes of this type are operated under conditions corresponding to a ratio of $E_{a(max)}/E_0$ in the range of 2 to 3 at maximum signal, and therefore distortion must pass through the third-order product maximum of about -31 db. within the operating range. Actually, maximum distortion appears near the 70% to 100% power level and is of the order of -25 db. or so. These curves are quite representative of most power tubes employed in amateur equipment, common varieties of transmitting tubes falling in the “minus twenty” to “minus thirty” decibel intermodulation range. Judicious use of feedback with these tubes will allow IM distortion products to fall in the “minus thirty” to “minus forty” decibel range.

Recent tubes specifically designed for linear
 (Continued on page 154)

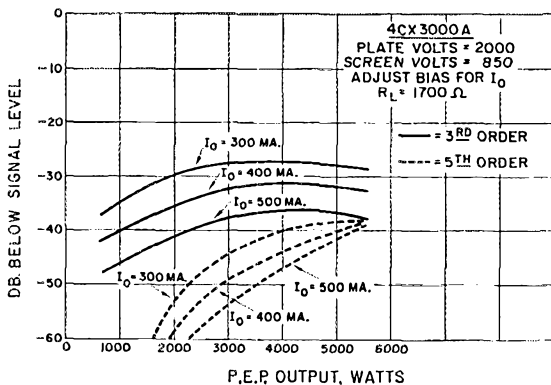
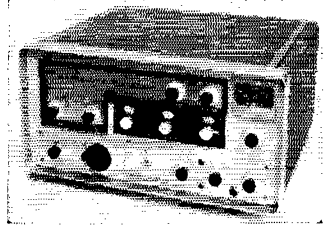


Fig. 11—Eimac 4CX3000A, specifically designed for linear-amplifier service shows substantially better IMD products by virtue of departure from $3/2$ -power law. With resting plate current of 500 ma., 3rd-order products are down better than 35 db. from peak signal level.

• Recent Equipment —

B & W 6100 Transmitter



THE B & W 6100 is a single-sideband, a.m. (carrier and one sideband), and grid-blocked-keyed c.w. transmitter rated at 180 watts peak envelope power on s.s.b. and c.w., and 90 watts on a.m. The operator has a choice of voice-operated break-in, push-to-talk or manual operation. For frequency control the 6100 uses a frequency synthesizer — a tongue-twisting word, but one you'll be reading quite often in this article since the frequency synthesizer is the big feature of the transmitter.

Except for the synthesizer, the 6100 is more or less conventional in its block diagram, shown in Fig. 1, although it has an unusual circuit in the mixer sections and an effective a.l.c. system, all of which will be discussed later in this write-up.

The speech section of the transmitter takes up very little space on the chassis because a 6C10 compactron is used for the speech amplifiers. Referring to the block diagram in Fig. 1, output from the microphone is amplified in the three stages of speech and fed to a semiconductor diode balanced modulator. Also arriving at the modulator is 3.2-Mc. r.f. from the carrier oscillator, V_4 . Output from the balanced modulator which is a double-sideband, suppressed-carrier signal which, when passed through the 3.2-Mc. crystal lattice filter, has the lower sideband lopped off, leaving an upper-sideband signal with a nominal carrier frequency of 3.2 Mc. The crystal-filter bandwidth at the 3-db. points is 3 kc. The rated sideband suppression for the transmitter is 50 db. below the peak output on s.s.b.

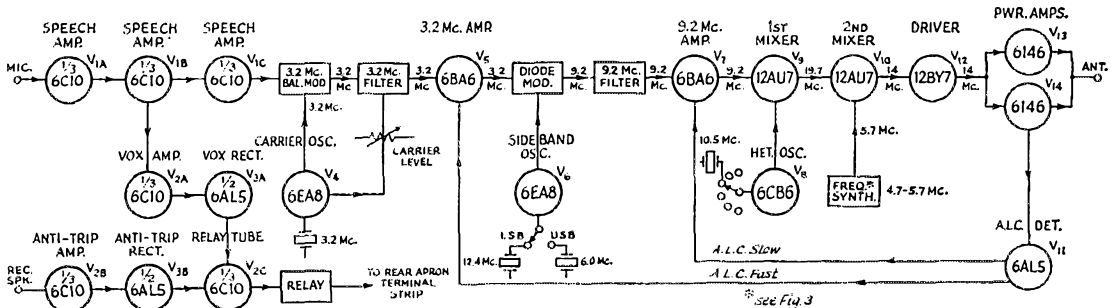
Output from the crystal filter is amplified by V_5 and then fed into the diode modulator. Here the signal is mixed with either 12.4-Mc. or

6.0-Mc. energy from the sideband oscillator, V_6 . If the 6-Mc. crystal is selected, the signal is added to the 3.2-Mc. signal, resulting in a 9.2-Mc. u.s.b. signal. The 12.4-Mc. crystal oscillator signal and the 3.2-Mc. signal result in a 9.2-Mc. l.s.b. signal.

Diode modulator output is passed through an LC filter, then amplified in V_7 and fed into the first mixer, V_9 . Injection for this mixer is furnished by the crystal-controlled heterodyne oscillator, V_8 . A series of five crystals are used in the oscillator and are selected by the front panel BAND SELECTOR switch. On 80 meters, the mixer operates as a straight-through amplifier and the heterodyne oscillator is inoperative. The mixer circuit used at V_9 is interesting and is shown in Fig. 2. This type of mixer, using a cascode configuration, is reported to have better stability than the more conventional type and, in addition, exhibits some conversion gain. Input to the mixer at the grid is high impedance, and is low impedance at the cathode input.

Output from the first mixer falls somewhere between 9.2 Mc. and 34.7 Mc., depending upon the frequency of operation. In the 14.0-Mc. example in Fig. 1, the heterodyne oscillator V_8 operates at 10.5 Mc., which, when mixed with the 9.2-Mc. signal, gives 19.7 Mc. at the grid of the second mixer, V_{10} . The second mixer incorporates much the same type cascode circuit shown in Fig. 2. In this mixer, injection comes from the frequency synthesizer, which is in the 4.7- to 5.7-Mc. range. This gives an output from the second mixer on the desired amateur frequency, which is then amplified in the 12BY7 driver and 6146 amplifiers. In the c.w. mode, grid-block key-

Fig. 1—Block diagram of the B & W 6100 transmitter. Frequency examples are for 14-Mc. operation.



ing is used in the second mixer and driver stages.

Protection against overdriving the final amplifiers is provided by a double-action automatic load control (a.l.c.) circuit which involves the a.l.c. detector, V_{11} , the 3.2-Mc. amplifier, V_5 , and the 9.2-Mc. amplifier, V_7 . R.f., taken from the 6146 grids, is detected in the a.l.c. detector, V_{11} . The detected signal is compared to a d.c. bias which is adjustable by way of a control, the a.l.c. threshold (ALC THR), located behind a door on the front panel. The detector conducts only when the a.l.c. bias voltage is exceeded. The 6AL5 a.l.c. detector, V_{11} , is a dual diode. Each section of the diode has a separate load of a different time constant; "slow" (1.5-second) t.c., and "fast," (0.03 second) t.c. The two time-constant buses return to the grid circuits of earlier amplifier stages (V_5 and V_7) where their gain is controlled so as not to overdrive the 6146 grids. The above time constants were chosen to control gain between words (1.5 sec.) and to control gain through variation of syllables (0.03 sec.).

A tunable, band-switched pi network in the final amplifier plate circuit is designed for non-reactive loads between 30 and 100 ohms. Provisions are made for metering the relative r.f. voltage appearing across the output of the transmitter. In addition to reading relative output, the meter can be switched to read plate current (actually cathode current) and a.l.c. In the latter case, the meter indicates the approximate amount of a.l.c. compression by measuring the unbalance in a bridge circuit which includes a constant voltage source and the screen circuit of the 9.2-Mc. amplifier, V_7 .

Audio VOX and anti-trip circuits in the 6100 are conventional and control the bias on a relay tube and relay which does the necessary switching between transmit and standby. Panel controls are provided to give variable VOX hold-in time, VOX sensitivity, and anti-trip sensitivity. A 6C10 compactron is used for most of the VOX and anti-trip circuitry.

The 6100 runs relatively cool when compared to transmitters using vacuum-tube power supplies. B & W has eliminated nearly 50 watts of heat dissipation inside the cabinet by using silicon

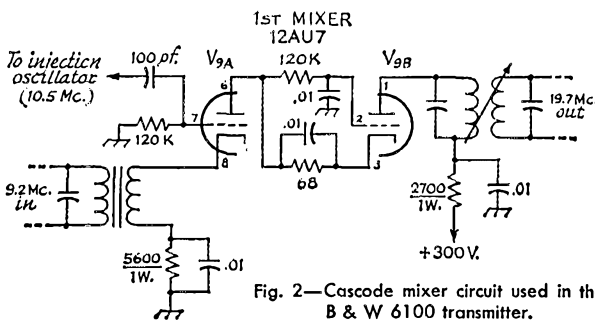


Fig. 2—Cascode mixer circuit used in the B & W 6100 transmitter.

rectifiers in the 700-volt high-voltage, 300-volt low-voltage and -100-volt bias supplies. A tapped power-transformer primary permits the use of the transmitter over three ranges of line voltage, 110-118 volts, over 118 volts, and below 105 volts. Either of the first two ranges can be selected by a rear-apron toggle switch. For operation on line voltages down to 105 volts, the cabinet bottom plate can be removed and a simple wiring change will tap the transformer primary even lower.

The Frequency Synthesizer

As mentioned earlier, the big feature of the B & W 6100 transmitter is its frequency synthesizer for frequency control. Whether called frequency synthesizer, VXO¹, or simply a mixer with crystal-controlled inputs, this type of all-crystal frequency control (there are no free-running oscillators in the entire transmitter) for amateur work is unique in the 6100 as far as commercial equipment for amateurs is concerned. Synthesizers have been used for some time in military equipment where "channel-type" operation is necessary. B & W uses the same general idea except that they provide for continuous variation of the frequency by "pulling" one of the crystal-controlled oscillators. A look at the block diagram in Fig. 3 will show how the system works. The output of V_{201} , which has a series of 10 crystals at 100-kc. intervals in the 24.7 to 25.7 Mc. range, is mixed with the output of V_{202} , whose crystals are spaced 10 kc. apart in the 20.1- to 20.01-Mc. range. These crystals can be pulled downward in frequency as much as 11 kc. by capacitor C_1 . The output of the subtractive mixer, V_{203} , is the difference between the two crystal-oscillator frequencies, and falls between 4.7 and 5.7 Mc. Filters following the mixers reject unwanted spurious frequencies (spurious mixture signals from the transmitter are rated at -50 db.), and an amplifier, V_{204} , boosts the mixer output to a useful value before it is injected into the second mixer.

¹ Shall, "VXO—A Variable Crystal Oscillator," *QST*, Jan., 1958.

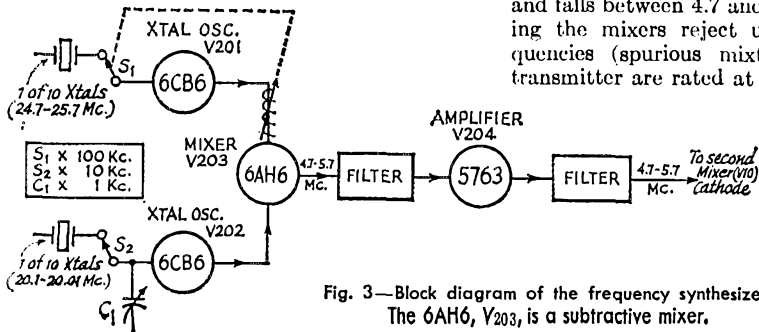
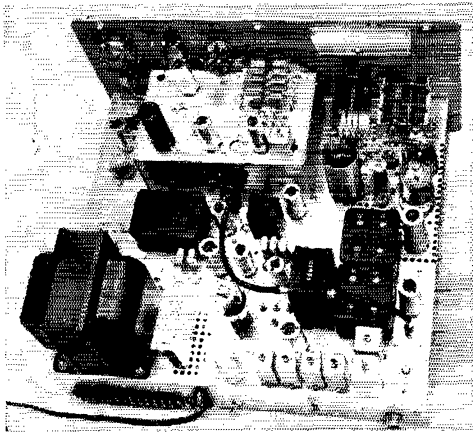


Fig. 3—Block diagram of the frequency synthesizer. The 6AH6, V_{203} , is a subtractive mixer.



This view of the B & W 6100 transmitter shows the frequency synthesizer chassis at the top just behind the front panel. The final amplifier stage is just to the right of the synthesizer deck and the power transformer at the lower left of the photograph. Rear apron connections include (from right to left): r.f. output connector (SO-239), line voltage toggle switch (for 125 or 115 volt operation), line fuse (top) and line cord, and 12-terminal barrier strip. The barrier strip is used for push-to-talk, external relay control, bias for external amplifier or receiver muting, and anti-trip connection to receiver.

excursions, the $\times 10$ or $\times 100$ knobs are used. The BAND selector is marked in frequency except on the 3.5-Mc. band where it is marked 80 meters and is printed in red. On this band a special red scale is used on the $\times 100$ dial which is calibrated directly in frequency, i.e.: 37, 38, etc.

All of the crystals used in the frequency synthesizer have been selected for uniform temperature characteristics so that they will all react the same way to a temperature change.

Fig. 4 shows the frequency synthesizer control area on the front panel of the 6100. Frequency coverage is in six bands: 3.5 to 4.1 Mc., 7.0 to 8.0 Mc., 14 to 15 Mc., 21 to 22 Mc., 28 to 29 Mc., and 29 to 30 Mc. Frequency is controlled by a band switch and three digital dials for hundreds, tens and units of kilocycles. The $\times 100$ knob is the crystal switch, S_1 , shown in Fig. 3. The $\times 10$ knob is S_2 , and the $\times 1$ knob is variable capacitor C_1 . If the BAND selector is set for 14-Mc. operation and a frequency of 14.052 Mc. is desired, the kilocycles panel would appear as shown in Fig. 4. To change frequency a few kc., as for zero beating, the $\times 1$ knob can be turned in either direction for a smooth slide-in on frequency. This knob covers 11 kc. through 180 degrees of rotation. For greater frequency

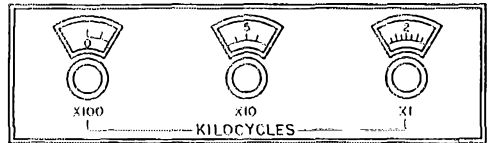
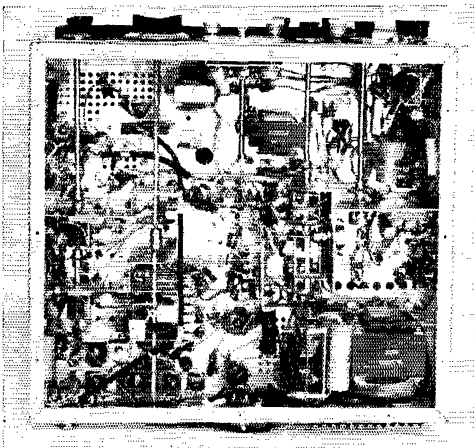


Fig. 4—The frequency control panel on the 6100 transmitter, shown set for a frequency of 14.052 Mc.

Dial accuracy is rated as plus or minus 1 kc. on any band and can be reset plus or minus 100 cycles. The stability of the system is impressive, too. It is rated as not greater than 100 cycles of drift during the first 15 minutes of operation (at normal room temperature), and within 25 cycles during any hour of operation thereafter.



Bottom view of the B & W 6100 transmitter. Although not all of them are visible in this photograph, there are several compartments which isolate the various circuits in the transmitter. The power supply area is at the lower right.

B&W 6100 Transmitter

Height: 9½ inches

Width: 18¾ inches

Depth: 16 inches

Weight: 60 pounds

Power requirements: 105-125 volts, 50/60 cycles, 125 watts.

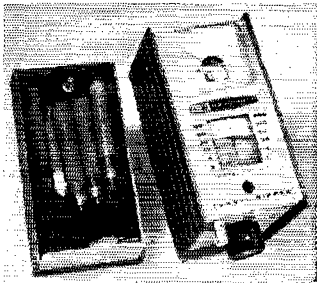
Price class: \$875.00

Manufacturer: Barker & Williamson, Inc., Bristol, Pennsylvania

A rear-apron barrier strip is provided on the 6100 transmitter for connecting all the outboard devices and accessories that are with us today: a negative 100 volts for receiver muting or amplifier biasing, three sets of relay contacts (one s.p.s.t. to ground, two s.p.d.t.), anti-trip connections (to the shack receiver), a push-to-talk connection, and a low-impedance (600 ohms) connection to the input of the audio stages of the transmitter.

For those interested in f.s.k., a diode f.s.k. kit is available that provides constant shift on all bands. The kit, or information on the circuit for do-it-yourselfers, is available from B & W.

— E. I. C.



Heath Tunnel Dipper

Model HM-10A

THE Heath Tunnel Dipper is about the only commercial application of tunnel diodes¹ for amateur equipment that we know of. It's a logical one: a portable h.f. and v.h.f. r.f. oscillator, independent of mains power, that can be used as a grid-dip meter and as a sensitive wavemeter. Unlike some of the early transistorized dip-meters, the tunnel-diode model has an unusually high upper-frequency limit — 260 Mc. as is, but it can be made to work up to approximately 350 Mc.

Except that there is no line cord, the outward appearance of the Tunnel Dipper is generally similar to that of a standard grid-dip meter: A sensitivity control, tuning control, a calibrated dial, an indicating meter and a set of plug-in coils. Inside the box is a different story: a tunnel-diode oscillator, a unique capacitor-switching gimmick, and a power supply of only 1½ volts!

The block diagram in Fig. 1 shows the general line-up of major components in the Tunnel Dipper. The heart of the unit is of course the tunnel-diode oscillator. A schematic diagram of this section of the circuit is shown in Fig. 2.

Looking at Fig. 1, when the slide switch S_1 is in the osc. position, power is applied to the tunnel diode oscillator (this switch actually has three positions, OFF, DIODE and osc). Frequency of oscillation is determined by the coil-capacitor combination, L_1C_1 . The variable TUNING capacitor, C_1 , contains two sections, with one connected permanently to the oscillator tank circuit. On the lower frequency ranges the plug-in coils have longer plug-in pins. These longer pins make contact with a spring switch which puts the second section of the capacitor in parallel with the first to maintain the proper LC ratio throughout its range.

R.f. voltage developed across L_1C_1 is rectified by CR_2 and the resulting d.c. bias is applied to the emitter-follower transistor, Q_1 . Transistors Q_2 and Q_3 are direct-coupled d.c. amplifiers and boost the current enough to give a healthy indication on the 0-1 ma. meter, which is calibrated with a linear 0-to-100 scale. A SENSITIVITY control in the bias circuit of Q_3 allows for adjusting the meter reading "on scale."

When the slide switch S_1 is set at DIODE, the tunnel diode is switched out of the circuit and the instrument can be used as a sensitive wavemeter.

Six coils, covering the 3- to 260-Mc. range, are supplied with the HM-10A. The coils are potted in an epoxy-looking sheath and have phono-connector plugs on one end.

The calibrated dial drum rotates behind a 1¼ by 1¼-inch window and has color-coded dial scales that correspond to a color ring on the proper coil for that frequency range. Actual dial calibrations for the six bands are 3 to 7.5 Mc., 5 to 13 Mc., 12 to 32 Mc., 30 to 90 Mc., 80 to 160 Mc., and 150 to 260 Mc.

Using the Tunnel Dipper is a breeze, especially since there is no line cord to restrict movement away from the power mains. It is small and light enough to be held in one hand, although it does

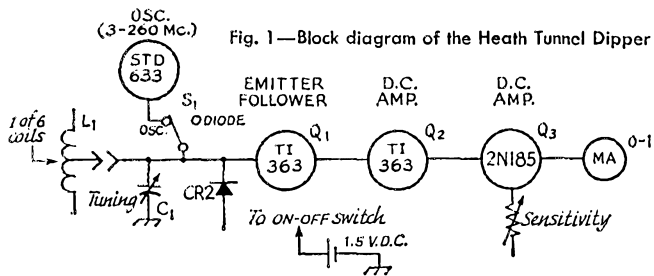


Fig. 1—Block diagram of the Heath Tunnel Dipper

require two hands to operate. The instrument is used just like the old-fashioned vacuum-tube grid-dipper and gives a good positive "dip" indication. The model we had here had a touchy sensitivity control that required some practice in order to set the pointer mid-scale. When the Tunnel Dipper is used as a wavemeter the transistor d.c. amplifiers give the device extra

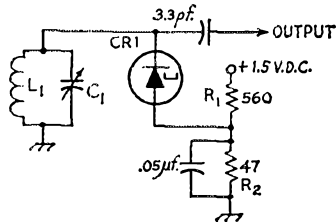
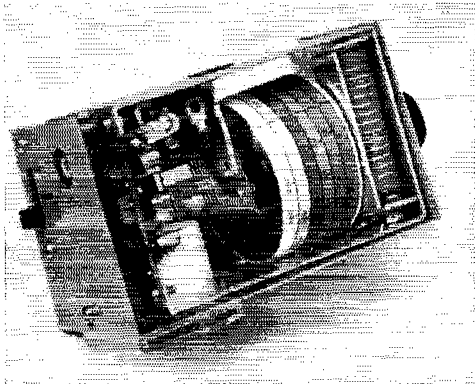


Fig. 2—Tunnel-diode oscillator circuit. CR_1 is an STD 633 tunnel diode. Resistors R_1 and R_2 form a voltage divider for supplying about 100 millivolts to the tunnel diode.

¹ QST, October 1959, page 40.



This view of the Tunnel Dipper shows the calibrated drum which rotates behind the viewing window on the surface of the box at the lower right of the photograph. Most of the components and circuits are located in the area just behind the panel at the left. The single-cell power supply is at the right end of the box. Plug-in coils attach to the recessed phono jack located at the top left corner of the panel.

sensitivity.

No firsthand comments on kit construction can be made since the model we had was factory wired. However, inspection of the unit and the instruction and wiring manual indicate to the writer an easy construction and wiring job. Most

Heath Tunnel Dipper Model HM-10A

Height: $4\frac{3}{16}$ inches.

Width: $2\frac{13}{16}$ inches.

Depth: $5\frac{7}{8}$ inches.

Weight: 1.5 pounds.

Power requirements: 1.5 volts at 5 ma. (self-contained cell).

Price class: \$35 kit, \$50 wired.

Manufacturer: Heath Company, Benton Harbor, Mich.

of the electrical circuits are printed board using only a handful of components. The instructions in the wiring book are short and sweet and well illustrated and shouldn't give even the beginner any trouble. One thing Heath has done in the Tunnel Dipper manual: the schematic diagram folds out into full view and remains there even when other pages are turned on top of it. This is a convenience especially when reviewing the theory-of-operation section of the manual, where the circuit may be referred to without flipping through the pages to find the diagram.

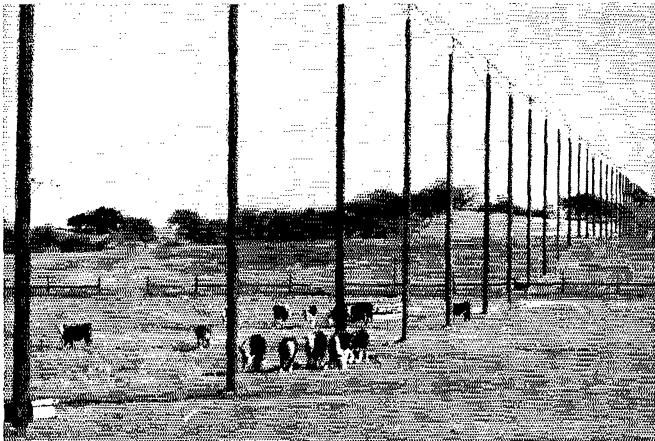
The Tunnel Dipper is housed in a blue anodized wrap-around case. The panel is gray with black and chrome knobs. Coils for the unit can be stowed in the removable cover.

— E. L. C.

Strays

The merger of the two amateur associations of Ontario has been announced by VE3RX, VE3VE, VE3AML and VE3BZA. The new group, the Radio Society of Ontario, Inc., follows the charter of the Ontario Radio Federation, Inc. and the Ontario Amateur Radio Association, its parent organizations. Further information will be transmitted periodically by VE3RSO and other official club bulletin stations. Details on membership and forthcoming elections are available from the Radio Society of Ontario, Inc., Box 762, Sarnia, Ontario.

The FCC's July 22 newsletter tells us of several instances of TVI complaints, each of which was quickly nipped in the bud. In one case, the complainant was advised to contact the ham involved. A few days later he wrote the FCC again, this time to say that the ham had installed a high-pass filter which cleared up the trouble. "And," he told the Commission, "you have helped us to make the acquaintance of a fine neighbor whom we might otherwise not have had the pleasure of meeting."



You country-bred hams will have no trouble recognizing a genuine antenna farm—complete with purebred Hereford cattle. A 40,000-watt transmitter at Stanford University, California, feeds a 48-unit Yagi system, all of which is part of a sky-analysis research project. Stanford scientists want to find out exactly what's up in the ionosphere—and that's no pun. By measuring the amount that particles are deflected by the Earth's magnetic field, they can tell just what ions are present, sixty miles high in the sky.

Election Notice

Amateur Radio Weeks

Intruders in Amateur Bands

ELECTION NOTICE

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

An election is about to be held in each of the above-mentioned divisions to choose both a director and a vice-director for the 1964-1965 terms. These elections constitute an important part of the machinery of self-government of ARRL. They provide the constitutional opportunity for members to put the direction of their association in the hands of representatives of their own choosing. The election procedures are specified in the By-Laws. A copy of the Articles of Association and By-Laws will be mailed to any member upon request.

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

Executive Committee
The American Radio Relay League
Newington 11, Conn.

We, the undersigned Full Members of the ARRL, residing in the Division, hereby nominate of as a candidate for director; and we also nominate of as a candidate for vice-director; from this division for the 1964-1965 term.

(Name Call City Date)

The signers must be Full Members in good standing. The nominee must be a Full Member and the holder of at least a General Class amateur license, or a Canadian Advanced Amateur Certificate and must have been a member of the League for a continuous term of at least four years at the time of his election. No person is eligible who is commercially engaged in the manufacture, sale or rental of

radio apparatus capable of being used in radio communications, or is commercially engaged in the publication of radio literature intended in whole or in part for consumption by radio amateurs.

All such petitions must be filed at the headquarters office of the League in Newington 11, Conn. by noon EDST of the 20th day of September, 1963. There is no limit to the number of petitions that may be filed on behalf of a given candidate but no member shall append his signature to more than one petition for the office of director and one petition for the office of vice-director. To be valid, a petition must have the signature of at least ten Full Members in good standing; that is to say, ten or more Full Members must join in executing a single document; a candidate is not nominated by one petition bearing six valid signatures and another bearing four. Petitioners are urged to have an ample number of signatures, since nominators are occasionally found not to be Full Members in good standing. It is not necessary that a petition name candidates both for director and for vice-director but members are urged to interest themselves equally in the two offices.

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

Voting by ballots mailed to each Full Member will take place between October 1 and November 20, except that if on September 20 only one eligible candidate has been nominated, he will be declared elected.

Present directors and vice-directors for these divisions are: *Atlantic:* Gilbert L. Crossley, W3YA and Edwin S. Van Deusen, W3ECP. *Canadian:* Noel B. Eaton, VE3CJ and Colin C. Dumbrielle, VE2BK. *Dakota:* Charles G. Compton, W0BUO and Martha J. Shirley, W0ZWL. *Delta:* Floyd C. Teetson, W5MUG and Graham H. Hicks, W5IHP. *Great Lakes:* Dana E. Cartwright, W8UPB and Robert H. Cooper, W8AQA. *Midwest:* Robert W. Denniston, W0NW X and Sumner H. Foster, W0GQ. *Pacific:* Harry M. Engwicht, W6HC and Ronald G. Martin, W6ZF. *Southeastern:* James P. Born, Jr., W4ZD and Thomas M. Moss, W4HYW.

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

For the Board of Directors:
July 1, 1963
JOHN HUNTOON
Secretary

CANADA-BOLIVIA THIRD PARTY

The governments of Canada and Bolivia signed an agreement on May 31, permitting amateurs to handle messages or other communications on behalf of third parties. The usual conditions prevail: the amateurs must not receive direct or indirect material compensation, and the messages should be of a technical or personal nature where recourse to public telecommunications services would not be justified. The agreement is the eighth entered into by Canada; notes permitting third-party traffic have previously been signed with Chile, Costa Rica, El Salvador, Honduras, Mexico, the United States and Venezuela.

United States amateurs may handle such communications with amateurs in Bolivia,

Canada, Chile, Costa Rica, Cuba, the Dominican Republic, Ecuador, El Salvador, Haiti, Honduras, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru and Venezuela.

FCC LICENSE FIGURES

The records of the Federal Communications Commission show 247,603 amateur operator and 255,140 amateur station licenses in effect as of June 30, 1963. These figures compare with 230,459 operator and 237,159 station tickets a year earlier; on December 31, 1962, the figures were 238,434 and 245,200, respectively.

LICENSE REVOKED

In the first amateur action of its kind, the amateur station license of Joseph John Brennan, WA4DMN, has been revoked effective July 23, but with the order specifically allowing the filing of a new application 30 days later.

The FCC had sent an Official Notice of Violation to Mr. Brennan dated November 20, 1962, for operation on A-3 outside an authorized amateur band. No answer was received to the citation nor to a follow-up letter dated December 20, 1962. Accordingly, the Commission issued an Order to Show Cause (released February 21) to which Mr. Brennan responded on March 24, waiving his right to a hearing. The response explained that his failures to reply resulted from several successive changes of address and residence, and he has now furnished a new mailing address through which he can be reached at all times. Corrective action had also been taken so that further off-frequency operation would not occur.

The Commission stated in its order that there is no excuse for failure to respond, and that revocation is justified in such cases. In view of the amateur's previously clean record, his correction of the conditions which had led to the proceedings, his promise to conduct future operations in accordance with the rules, and the Commission's feeling that the cited infractions were due to carelessness rather than willful intent, the Commission has waived its rules to the extent that Mr. Brennan will be permitted to apply for a new license after thirty days.

INTRUDERS

With the changes in band conditions due to the sunspot cycle, and the increasing congestion in the entire radio spectrum between 3 and 30 Mc., many amateurs are experiencing for the first time serious interference to their operations from nonamateur stations.

Some of it is unavoidable and is perfectly in accordance with international law. The 80-meter band is shared, under radio regulations confirmed by every international radio conference since 1927, with the fixed and mobile radio services and, above 3.9 Mc., with the broadcast service. The U.S. and Canada assign this band exclusively to amateurs, but elsewhere the band is used for low-power point-to-point

mobile stations on phone, c.w. and RTTY, and for broadcasting. During times of "normal" radio propagation, only amateurs in limited areas of the U.S. and Canada have experienced real interference from these sources, but recently these stations have been heard in all parts of the two countries and have been loud enough to disrupt amateur communications. Only time and an increase in sunspots will cure this particular problem. The amateurs are undoubtedly a source of trouble to the fixed and mobile services, too, and every amateur should be cautioned against intentional or avoidable interference, without curtailing his privilege to use the 80-meter band.

On forty meters, the full band 7.0-7.3 Mc. is available to amateurs in the western hemisphere only. In Europe, Africa, Asia and Oceania, the amateur band is 7.0-7.1 Mc.; the 7.1-7.3 portion belongs to the broadcasting service. There should not be any broadcasting below 7.1 Mc., nor should there be any fixed stations operating anywhere in the 300-ke. segment.

The twenty-meter band is exclusively amateur, with one exception: Russia is permitted to operate low-power point-to-point transmitters in the band 14.25-14.35 Mc., with directional antennas and otherwise protecting the amateur service outside of the U.S.S.R.

The ten- and fifteen-meter bands are exclusively amateur — there should be no nonamateur stations of any description operating therein.

The League has operated an "intruder watch" for the past several years. Whenever reports are received from Official Observers and other assisting amateurs about nonamateur stations intruding in our bands, a consolidated report on each station is sent to FCC. After confirmation by FCC's monitors, a complaint is relayed to the government responsible for the operation. Sometimes the complaints are effective and the offending stations shortly disappear. Other times, nothing seems to happen and the interference continues, sometimes for years. Even with these stations, however, continuing specific reports are desired. Through consistent reporting, we assist in building a record of noncompliance which is useful at radio conferences and in determining legitimate assignments of international stations.

Additional reports of nonamateur stations in our bands are hereby solicited. Please indicate (GMT dates and times, frequencies, identification, language used, mode of emission, defects in quality, nature of the traffic being sent, any indication of the point of origin (*i.e.*, your beam heading during the intercept), amateur stations being interfered with by the intruder, the make and model of your receiver (to assist us in screening out image reports and other spurious responses) and your complete name and address. A reporting form, CD-36, having spaces for all the desirable data, will be sent upon request to any amateurs interested in helping with the intruder watch. RTTY amateurs are especially

urged to assist, since growing amounts of the illegal QRM are from nonamateur RTTY stations. Your help will be greatly appreciated by the headquarters staff and by the appropriate branches of FCC and the Department of State.

STILL MORE AMATEUR RADIO WEEKS

The governor of California, in compliance with a resolution introduced into the legislature by Assemblyman W6REK, proclaimed the week of June 22 through June 29 as Amateur Radio Week in California. The many contributions of the amateur service, particularly cooperation with the military and emergency communications work by amateurs, were cited as the reasons for the observance. W6REK suited action to words, too: he was on during Field Day "7/6" from the state capitol in Sacramento!

The "twin cities" of Sterling and Rock Falls, Illinois, were among the many declaring amateur radio week coincident with Field Day. Spade work in this case was by the Y-Rad Club, an ARRL affiliate.

In Delaware, SCM Nelson and those working with him on Amateur Radio Week chose the week which includes their state hamfest, August 18-24. A letter was sent to Governor Elbert N. Carvel outlining activities of Delaware hams. In response, the Governor issued a statement to the press, radio and television stations endorsing Amateur Radio Week and mentioning the activities in AREC, RACES, and in handling traffic for servicemen overseas.

Our congratulations to all who helped in getting Amateur Radio Week, 1963, off the ground in the various towns and states. Perhaps these local actions will eventually lead the U.S. Congress to follow suit! Planning for next year's amateur radio week might well center on the week beginning Monday, June 22, and ending Sunday, June 28, to take advantage of ARRL Field Day activities on the 27th and 28th.

FCC INSPECTIONS

A Citizens Bander has lost his license after a hearing in which it was brought out that the licensee had refused to admit an FCC employee to his premises. We remind amateurs that the Commission (and other Federal enforcement officers) have a right to examine a licensed radio station at any time of the day or night when it is on the air, and at reasonable hours when it is not on the air. In any such inspections, of course, the licensee should carefully examine the credentials of the examiner before admitting him; bona fide Government endorsement officers will readily offer their credentials for scrutiny by the licensee.

Minutes of Executive Committee Meeting No. 294

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at the new headquarters offices of the League in Newington, Connecticut, at 9:30 A.M. July 12, 1963. Present: President Herbert Hoover, Jr., in the chair; First Vice President W. M. Groves; Directors Charles G. Compton, Robert W. Dennis-

ton, Noel B. Eaton and Morton B. Kahn; General Manager John Huntoon; Vice President F. E. Handy and Treasurer David H. Houghton. General Counsel Robert M. Booth, Jr., was also present.

On motion of Mr. Eaton, affiliation was unanimously GRANTED to the following societies:

Falls Radio Club.....	Menomonee Falls, Wisconsin
Pi(Co)Rams (Platt County Radio Amateurs).....	Monticello, Illinois
Aberdeen Amateur Radio Club.....	Aberdeen, Idaho
Berks Amateur Radio Club.....	Reading, Pennsylvania
Big Spring Amateur Club.....	Big Spring, Texas
Germantown Radio Club.....	Philadelphia, Pennsylvania
Hampton Roads 6 Meter Radio Amateur Club.....	Deep Creek, Chesapeake, Va.
Itasca Amateur Radio Club.....	Grand Rapids, Minnesota
Jim Thorpe Sparks Amateur Radio Club.....	Jim Thorpe, Pennsylvania
Saint Mary's County Amateur Radio Association.....	Leonardtown, Maryland
Hicksville Radio Club.....	Hicksville, L.I., N.Y.

On motion of Mr. Huntoon, unanimously VOTED to grant approval for the holding of a West Gulf Division Convention at Brownwood, Texas, June 12-14, 1964.

The Committee noted with deep regret a communication from the Cleveland Amateurradio Convention, Inc., announcing their decision not to hold a National Convention in October.

On motion of Mr. Denniston, unanimously VOTED that the President is requested to arrange for appropriate representation of the amateur radio service at the Extraordinary Administrative Radio Conference on space communications at Geneva in October.

On motion of Mr. Eaton, unanimously VOTED that the League accepts with pleasure the invitation of the Liga Mexicana de Radio Experimentadores to attend a convention of amateurs of the Americas in April, 1964.

On motion of Mr. Denniston, unanimously VOTED that the League casts its vote in favor of IARU proposal #104, relating to the admission to membership of the Ghana Amateur Radio Society.

At this point, Communications Manager Handy presented a detailed report on organized amateur communications preparation for emergency, with particular accent on relationships and plans to confer with the American Red Cross. On motion of Mr. Kahn, unanimously VOTED that, in furtherance of the League's continuing objective of sponsoring public service activities of amateurs the staff is requested to review emergency communications plans with representatives of the Red Cross and others and report progress at the next meeting.

The Committee next reviewed the directive of the Board of Directors concerning amendments of the rules and regulations of the Federal Communications Commission concerning amateur radio operators' licenses as set forth in Minute 15 of the meeting of May 3, 1963, and, after discussion, requested the League's General Counsel to submit a draft of a petition for rulemaking to the Committee members for comment sufficiently in advance of the next meeting of the Committee to afford full consideration at that meeting. During the course of the above, the Committee was in recess from 12:15 to 1:00 P.M.

On motion of Mr. Denniston, unanimously VOTED that the Committee congratulates the staff on the layout and appearance of the new headquarters building.

There being no further business, the Committee adjourned at 2:28 P.M.

JOHN HUNTOON
Secretary



Anyone wishing to donate to the USS *Thresher* Memorial Fund in memory of Tilmon J. Arsenaull, W1SNO, and Don R. Dundas, W0WB, *Thresher* crewmen, may send donations to the *Thresher* Memorial Fund, c/o Dolphin Scholarship Foundation, West Virginia House, Naval Station, Norfolk, Virginia.



Delegates, observers and wives attending the Region I Division IARU conference at Malmo, Sweden, the week of June 10. Seated, l. to r., DL1XJ, G6CL, HB9GA, Dr. Esping (technical director of Sweden telecommunications), F9DW, SM5ZD, RAEM, W6ZH, W1LVQ.

The Malmo Conference

European IARU Societies Discuss Mutual Problems

A "LITTLE U.N." of amateur radio convened at Malmo, Sweden on June 10, with *Sveriges Sändare Amatörer* (SSA), the Swedish equivalent of ARRL, as host; and nearly sixty delegates from 16 amateur societies in attendance. The five-day conference was one of a series held every few years by the Region I Division of the International Amateur Radio Union, at which the European amateur societies discuss their mutual problems and explore ways to strengthen organized amateur radio.

Dr. Erik Esping, Technical Director of Sweden's telecommunications authority, set the theme of the meeting in his keynote address which paid considerable compliment to the amateur body, yet at the same time admonished the group to face up squarely to serious problems which exist particularly in the field of international frequency allocations.

Major Carl Erik Tottie, SM4AZO, president of the host society S.S.A., was named honorary conference president; Harry Laett, HB9GA, Region I Executive Committee chairman, was named conference president. The conference then divided into three working groups to tackle the lengthy agenda: an administrative committee under the chairmanship of Lt. Col. Per Anders Kinnman, SM5ZD, with

R. F. Stevens, G2BVN, as secretary; a v.h.f. committee under the chairmanship of Dr. Karl Lickfeld, DL3FM, with C. van Dijk, PA0QC, as secretary; and a finance and credentials committee under the chairmanship of W.J.L. Dalmijn, PA0DD, with John Clarrieouts, G6CL, as secretary. After two days of extensive meetings, the committees made their reports for final adoption at a plenary meeting.

Considerable concern was expressed on the subject of non-amateur operation in amateur bands, and it was agreed each society would set up a permanent working organization for "intruder" monitoring and logging to report infringements, with RSGB to act as a clearing house for the European area.

There was considerable discussion of band planning, and, indeed, during the conference a special subcommittee took up the question. It was agreed that there no longer need be a recommendation (which had been adopted at an earlier conference) for certain segments of the voice bands to be used for a.m. on the one hand and s.s.b. on the other. One or two societies wanted to outlaw a.m. but were overruled. It was agreed, therefore, that when "telephony" is used in the band-planning allocation, it means all modes. The agreed band subdivision by



SM7BAC shows the display Oscar satellite package to presidents of the Russian and U. S. amateur societies—Ernst Krenkl, RAEM, and Herbert Hoover, Jr., W6ZH.

voluntary enforcement rather than government regulation, is as follows, the principal change being addition of a special segment for teleprinter operation in 14 Mc.:

3,500-3,600 c.w.; remainder, telephony and c.w.
 7,000-7,050 c.w.; 7,050-7,100 telephony and c.w.
 14,000-14,100 telegraphy; 14,100-14,110 teleprinter and c.w.; 14,110-14,350 telephony and c.w.
 21,000-21,100 c.w.; 21,100-21,450 telephony and c.w.
 28,000-28,200 c.w.; 28,200-29,700 telephony and c.w.

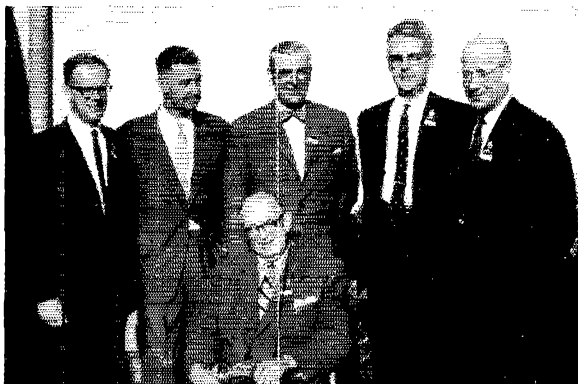
Recognizing the importance of promoting amateur activity and strength in newer and developing countries, both from the standpoint of formation and growth of amateur societies and from the standpoint of furnishing material assistance, a resolution was adopted asking the executive committee to come forth with a proposed program.

The conference discussed at length the growing problem of radio spectrum crowding on amateur bands. It was agreed that Region I IARU should be represented at the special conference on space communications commencing in October in Geneva. The member societies agreed unanimously to undertake all possible means to improve the stature of amateur radio in their countries as well as internationally, and to establish close and more effective liaison and cooperation with their telecommunications authorities.

Recommendations of the v.h.f. group involved mostly better organization of in-

ter-country activities, test schedules, contest and award rules, etc., plus the adoption of a program of investigation during the International Year of the Quiet Sun to be coordinated by DARC and RSGB.

The three western-hemisphere observers (W6ZH, ARRL-IARU president; VE3CJ, ARRL Canadian Director; W1LVQ, IARU secretary) were much impressed with the thorough organization and the capable handling of amateur problems by the many mature and knowledgeable officials of European societies. We extend our thanks particularly to the host society, SSA, for their warm hospitality in the true amateur tradition. QST



IARU Secretary W1LVQ; VERON president PAØDD; ARRL-IARU President W6ZH; ARRL Canadian Director VE3CJ; RSGB President G3BVG; and (seated) RSGB and Executive Committee Secretary G6CL

Strays MEMORANDUM

If you should hear someone call "CQ SAC" late this month, don't worry — it's not an Air Force alert, it's the Scandinavian Activity Contest. The c.w. portion will be held Saturday, September 14, 1500-1800 GMT; and the phone contest the next Saturday during the same time period, 1500-1800. Non-Scandinavian stations call CQ SAC and exchange RST and QSO number, a total of six digits on c.w., five on phone. For details, write to the SRAL, P.O. Box 306, Helsinki, Finland.

After WN2JET and WN2GFO QSOed recently, JET's QSL was lost in the mails. How do we know? Well, while waiting for a haircut, Alan spotted his

own card on the counter of a barber shop where it had been missent.

Calling all old, old timers — the Old Old Timers Club would like to hear from anyone who enjoyed two-way wireless communication forty or more years ago. This group, founded in 1947 to "keep the gang together," now has more than 450 very prominent amateur members. Lifetime membership is \$15.00. Several nets are running daily for rag-chewing, and OOTC business is conducted on 14.295 by s.s.b. Interested, qualified OOTs may contact secretary-treasurer Earl C. Williams, W2EG, 507 Wayside Road, Neptune, New Jersey.

Smiling but tired Chicago hams pose after fourteen hours of parade controlling recently. Left to right, they are K9DQU, W9HEP, W9OQN, K9EMS, W9CWH, K9LOK, W9UYA (holding the sign), W9INF, W9HPG, K9DOT, W9QKE, W9KUJ, Harvey Dow, and W9EFL. Missing is K9LDR. The hams are members of Chicago Area Radio Club Council organizations and AREC. They also gave a good public relations effort for ham radio via local network radio station WBBM.



Armed Forces Day—1963

Communications Test Results

Once each year the FCC allows cross-band contacts between U. S. military stations and amateurs. This event, by tradition, is held on Armed Forces Day, in the third week of May.

On May 18-19, six stations—three on the east coast and three on the west coast—operated for twelve hours and forty-five minutes of communications tests. In addition, a special message from the Secretary of Defense was transmitted by c.w. and RTTY. Special QSLs and certificates have been issued. Here are the results of the Armed Forces Day tests for 1963.

On 18-19 May 1963, Army, Navy and Air Force stations at both ends of the country joined with amateurs in cross-band contacts and tests, as part of Armed Forces Day activities. Participating stations on the west coast were AGUSA, NGP and AG6AA. On the east coast were WAR, NSS, and AIR.

The total of 7366 individual contacts made this the largest Armed Forces Day test yet. Special QSLs have been mailed to all stations whose addresses were listed in the Summer, 1963, edition of the

Callbook Magazine. If you haven't received yours, send date, time, frequency, and station contacted to Armed Forces Day Contest, Room 5B960, the Pentagon, Washington, D.C.

Messages from the Secretary of Defense were transmitted by c.w. and RTTY for competition purposes. Certificates of merit for solid copy of the messages went to 1237 hams and listeners this year. C.w. transmission was at 25 w.p.m., RTTY at 60 w.p.m.

Certificates went to 654 c.w. entrants who copied this text without error:

THROUGHOUT THIS UNSETTLED WORLD TODAY, THINKING PEOPLE ARE DEEPLY AND CONSCIENTIOUSLY CONCERNED WITH WAYS AND MEANS OF PROMOTING UNITY AND LASTING PEACE BETWEEN ALL NATIONS PD PEOPLE WHO VALUE A PEACEFUL EXISTENCE FOR THEMSELVES CMM THEIR DESCENDANTS AND THEIR FELLOWMEN CANNOT HELP BUT BE CONCERNED PD THE DEPTH AND GRAVITY OF THEIR CONCERN IS REFLECTED IN THE EFFORT WHICH THEY DEVOTE TO PROMOTING WORLD PEACE AND DISCOVERING EXPEDIENT METHODS TO THAT END PD IN YOUR AVOCATION OF AMATEUR RADIO EACH OF YOU HAS A UNIQUE CAPABILITY FOR PROMOTING INTERNATIONAL GOODWILL PD IT IS A CAPABILITY WHICH IS INFORMAL AND PERSONALIZED IN COMPARISON WITH THE SOPHISTICATED CMM FORMALIZED METHODS USED IN THE HIGHER LEVELS OF INTERNATIONAL DIPLOMACY PD NEVERTHELESS CMM IT IS AN IMPORTANT ASSET IN THE AREA OF INTERNATIONAL RELATIONS WHICH



This is the combined group of Army and Air Force operators who manned WAR and AIR on Armed Forces Day, from the Headquarters, MARS, station on the Concourse of the Pentagon. Front row, left to right: A1C James K. Smith; WA4KSG; W8PAC, Chief Operator, AF; SSgt. Kathryn Bushofsky; Major Henry Becker, Chief MARS Army; Jr. Op. of W4DIN, W4IRY, Chief MARS AF; Sp4 Janet Brackett; WA6OOP, Chief Operator Army; WA2OKP; W4PTL. Back row: K4KNV, Asst. Chief MARS Army; A3C LeRoy Buxton; SSgt. George Hoffman; K4GFM; W8JUW; W4LWG, Asst. Chief MARS AF; SSgt. Milton Bishop; SSgt. Herbert Smith; PFC Frank Dimmitt; W8HOV; K3CCI; SSgt. George Mandichak; K4SOZ K3IMG; WA4NJS; and W4DIN, Chief Engineer Army. Assisting in the operation but not pictured above were W4VLU, W3GRF, W3HXF/4, Mr. Jackie R. Johnson, and Mrs. Ruth E. Mills.

While W4KFC and another operator pound brass at NSS, four officers look on. They are (l. to r.) Cdr. W. G. Chartier USN; Capt. J. L. Hutchinson, CO, NSS; Cdr. Paul Lee, W3HJR; and Lt. S. M. Brackwell, NSS. During twelve hours and forty-five minutes of Armed Forces Day operation, NSS made 2894 amateur contacts.



EACH OF YOU SHOULD CMM IN BEHALF OF ALL OF US CMM USE WISELY AND CHERISH HIGHLY PD THE ABILITY TO COMMUNICATE SPONTANEOUSLY WITH FELLOW AMATEURS IN FOREIGN COUNTRIES MAKES YOU A SPOKESMAN CMM A REPRESENTATIVE OF THE UNITED STATES CMM AN AMBASSADOR PRO TEM PD THE MUTUAL FRIENDSHIPS AND GOODWILL WHICH YOU CAN COLLECTIVELY STIMULATE CMM PROMOTE AND INCREASE MAY WELL TIP THE BALANCE PERMANENTLY TO THE SIDE OF MUTUAL UNDERSTANDING AND LASTING HARMONY BETWEEN ALL PEOPLES OF THE WORLD SGT ROBERT S. MCNAMARA CMM SECRETARY OF DEFENSE BT

C.W. Certificate Winners:

I1GO, VE2HY, VE3BAQ, VE5VV, VE7JM, K1AAA, W1BDI, W1BGW, W1BMW, W1CBT, W1CMI/MM, W1CMW, W1ECH, W1ELL, K1GRS, WA1HJP, W1IIB, W1IUY, W1JNA, W1JOW, W1JPD, W1KMH, W1KQK, W1KQY, W1KYT, W1LZL, W1MC, W1MD, W1MEG, W1MIP, K1NOW, W1OPZ, K1QDN, W1QVK, K1RPZ, K1RYP, W1SAD, K1SDX, W1SGU, W1SWX/1, K1TFV, K1USN, W1WPR, K1YQZ, K1YRP, W1ZAD, W1ZY0/6, WB2AAV, WB2AVK, W2BVE, W2BXW, WB2CDB, WA2CKL, K2CJP, W2CLO, W2CLX, K2DDF, WA2DEX, WB2DLW, K2EEA, K2EQP, WA2EXP, WA2FQW, W2GKZ, W2GQN, W2HQL, W2HX, WA2IKT, W2JCA, K2JMI, K2JWD, W2JZG, WA2KFT, WA2KHV, WA2KIP, K2LBB, W2LRW, W2LYH, W2MFB, W2MPM, K2MTW, WA2MYS, W2MZB, W2MZV, WA2NMK, WA2OWQ, WA2PFZ, W2PKY, K2QDG, W2RJ, W2RUK, W2RUZ, K2SAV, W2SKX, WA2SRR, W2SWC, WA2TAF, W2TAP, WA2TEA, WA2TJA, WA2TKL, WA2TNT, W2TUK, K2UGZ, K2UTU, WA2VSO, WA2WJX, W2YJS, W2YQK, WA2ZGP, W2ZDD, W2ZMK, W2ZUX, WA2WKK, WA2ZPR, W3ADE, W3AX, AG3BA, W3BFF,

A/W3BHK, W3BKE, W3BUR, W3CA, K3CFR, W3DZL, W3ECP, W3ELI, W3EOV, K3EJZ, K3GOH, K3HTZ, K3ILC, W3IRS, W3IVC, W3JHR, K3JSK, K3JSX, W3KGB, W3LCB, W3LIV, K3LYW, W3MCG, W3MGU, K3MKZ, W3MNE, K3MNT, K3MTT, W3MWV, K3ODA, K3OTQ, K3OHR, K3OKJ, W3PIT, K3QXS, W3RKF, W3SCH, W3SXL, K3TLX, K3UPR, W3UQX, K3USH, W3UYN, K3VIV/1, W3WZC, W4ABY, W4ADN, WA4AGT, W4AGV, W4AIY, K4AO, W4ARH/6, K4BAI, K4BP, K4BYD, WA4CAW, W4CCC, WA4CTD, W4CXY, K4DAH, W4EFV, WA4EMY, W4FAS, K4FJH, WA4FRW, W4FRO, K4GFL, W4GM, W4GNU, W4GPH, K4HOE, W4HOS, W4HXW, WA4LJH, WA4ISM, W4JIT, W4JJU, K4KK, W4JLA, W4JRA, WA4JWV, W4JYR, W4KFC, W4KH, W4KR, W4KLT, WA4KPP, W4KVO, K4KHT, WN4LUO, K4LWL, W4LYW, W4MHV, W4MKU, WA4NDM, K4NHR, W4NPG, W4OBA, W4PCN, W4PQL, W4PUI, W4PVW, W4RRC, K4SCT, W4SLJ, W4SZZ, W4UUI, W4USA, W4VAY, W4VHX, K4WH, W4WHK, W4WQQ, W4YE, W4YPG, K4YRJ, W4ZJO, K4ZSX, W5AFK, W5AHC, W5AIR, W5AJG, A5ARK, AF5BMI, W5BW, K5CAT, W5CFE, W5CCK, W5CEZ, WA5CTW, W5CVZ, W5DWB, W5DXX, WN5ERR, W5FIW, K5GCK, W5HNF, K5JGZ, W5MFX, W5MSX, W5NOP, W5QXN, K5QVH, W5QVZ, A5RCE, K5RRZ, K5SBT, K5SGX, W5SQB, W5SYX, W5TZR, W5UPM, W5UY, W5ZU, W6AAQ, KH6AO, W6ASH, W6AXV, KH6BGW, W6BHC, WB6BIG, KH6BLT, K6BPI, KH6BZF, A6GCB, W6CBX, WA6CFT, W6CG, W6CGJ, W6CHL, W6CKU, W6CLB, W6CLY, WA6CMK, W6CWF, K6DCF, WA6DFW, W6DHX, K6DV, KH6DVD, K6DYX, KH6DUV, WA6DZM, K6EA, K6EEZ, KH6EGF, W6ELT, KH6ELW, WA6ERU, WB6EUJ, KH6EVU, A6FB,

(Continued on page 168)

At the NSS operating positions on Armed Forces Day, 1963. Facing the camera are K3JQU (dark suit), and K3JYZ. Other operators are unidentified. All of the 7366 amateur contacts made by NSS, WAR, AIR, A6USA, NPG, and AG6AA will be confirmed by special card. In addition, each station transmitted special messages from the Secretary of Defense for competitive purposes. More than 1200 certificates will be issued hams and listeners who copied the messages, which were sent by RTTY at 60 w.p.m. and c.w. at 25 w.p.m.





YL news and Views

CONDUCTED BY JEAN PEACOR,* K1IJV

Ah! Happiness

HAPPINESS, in part, is helping others. Few hobbies offer the participants the opportunities to benefit their fellow man as does amateur radio. Yet, in so doing, maximum enjoyment of your radio operating can be attained while increasing your hobby skills at the same time.

Traffic handling rates high as an example. There is a great sense of personal satisfaction in having learned how to handle messages efficiently on phone or c.w. Those made happier because of it include the numerous relaying stations, the net managers and, most of all, the happy recipients of the messages upon delivery. Books could be written about the general public's different reactions to receiving such messages; they vary from tears of joy to general wonderment at the whole procedure and most are deeply grateful. Opportunities run rampant to spread much good

* YL Editor, QST: Please send all news notes to K1IJV's home address: 139 Cooley St., Springfield, Mass.

will. Add to this the pleasure you derive from such a service -- here is happiness.

Offering aid to worthwhile fund-raising campaigns is another excellent way to create fine good will within the community. A well-known Floridana YL, Ruth Benzec, K4ANR, of Howey-in-the-Hills, Florida, discovered how much this can mean to a great many people more or less by accident.

While listening on 145.2 Mc. one evening earlier this year, she heard K4IRE/4 in Orlando, Florida, testing. After contacting the station Ruth learned that the portable station had been set up in the city auditorium, in conjunction with WDBO-TV, to handle traffic for the annual Cerebral Palsy Telethon.

Her offer to help was warmly welcomed; Ruth and her OM, Art, W4FE, relayed information to K4IRE/4, including progress reports from three different fire departments of neighboring towns who assisted in the campaign.

Berdie Tomok, WA2GAB, relates another wonderful story. Two years ago Berdie and her OM, Joe, K2SLD, volunteered to assist at the Brooklyn Veterans Administration Hospital's radio station, licensed WA2MAH.

Message forms are given all patients explaining their use and on each is an invitation to visit the radio station every Tuesday evening. The radio activities attract many, some curious regarding the strange sounds that can be heard and others with a genuine interest in amateur radio. They conduct code and theory classes and demonstrate



Louise LeGower (left), KN3VBK, of the Ivyridge Amateur Radio Club in Philadelphia, Pa., is one of six Temple University students who will study at the Sorbonne in Paris during Temple's 13th Annual Study program. With Louise is Professor M. Helen Duncan, chairman of Temple University's French department, and director of the Sorbonne study program. Twenty years old, Louise is a sophomore in the College of Liberal Arts majoring in French. She shares her AF-67 and HE-200 with her brother Don, K3TRH. When not studying, Louise is active on 40 meter c.w. trying to raise her code speed for her General ticket. (Photo via K3OQM)



WA5DJJ, Laura Knox, age 15, of Oklahoma City, Okla. has recently been elected President of the Northwest Classen High School Radio Club of which she has been the only YL member for seven years.

The Sakamotos, JA1YBS, have the distinction of being the first family club station in Japan, and are eager to contact other ham families. Shown seated: Michiko, JA1HLZ; and standing: Mitsuko JA1FPB; Arata; JA1WR/JA1BBM; Masaya, JA1ISL.



through practical experience radio's many facets.

Berdie advises any amateurs interested in working with veterans to contact the Director of Volunteers at your local V. A. Hospital. Your offer to help will be greatly appreciated and will prove to be a rewarding experience.

This mentions only a few ways YLs have brought happiness to others. There are certainly many others participating in various activities which help people to understand how amateur radio renders public service.

Howdy Days

The YLRL's fifth annual Howdy Days' Contest kicks off the fall YL activities. A fine chance to meet many new YLs and renew old acquaintances.

The following news of the contest was received from Blanche Randles, KI1ZT, Vice President of YLRL.

YLRL is our name.

Won't you help us spread our fame.

Encourage gals who don't belong.

Enter our contest — Join our throng.

A special award for their high score.

YLRL Membership, and friends galore.

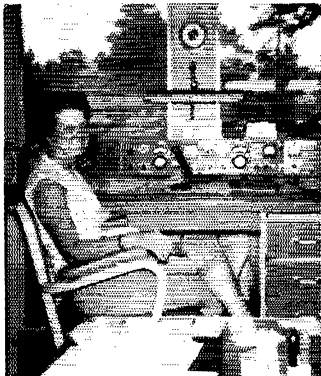
Starts: Tuesday, Sept. 24, 1963, 1200 EST (1700 GMT)

Ends: Thursday, Sept. 26, 1963, 1200 EST (1700 GMT)

Rules: Score will be based on licensed YL contacts only.

All bands and all modes of emission may be used. Only one contact with each station will be counted. Contacts on nets do not count.

Scoring: Score 2 points for each YLRL member and 1 point for non-YLRL member. No multipliers. Logs not required but both YLRL members and non-members are requested to submit a list of their contacts stating date, time, call, name, QTH and whether YLRL member or not to Blanche Randles, KI1ZT, 62 Linda Ave., Framingham, Mass. Score sheets must be received by October 18, 1963.



Marge Campbell, K4RNS, of Holly Hill, Fla. relaxing at new QTH. Marge is 4th District Chairman of YLRL and Certificate Custodian of the Floridora YL certificate.

Awards: Top scoring YLRL member receives choice of a pin, charm, or YLRL stationery. Top scoring non-YLRL member receives 1 year paid membership in YLRL.

It is suggested that all YL nets close during contest hours, as net contacts do not count.

Net News

Minor Net — the former Northwest YL Net has been changed to the Minor Net (new name includes the first letter of most states in the 7th call district). The board members have unanimously approved the election of officers, thus forming a new YL club, elections to be held in April, 1964. Net meets Friday at 1700 GMT on 3830 kc. All licensed YLs are invited to join the net.

Loaded Clothes Line Net — announces newly appointed Certificate Custodian, Helen Drake, K5ECP, 1717 Virginia St., N.E., Albuquerque, New Mexico.

Feedback

The July column's YL/OM Contest results should have shown Helen Phillips, WA4DBP, as high scorer of the phone portion for the 4th district.

Coming Events

24th YLRL Anniversary Party — C.w. portion, Oct. 23-24; phone portion, Nov. 6-7. Complete rules next month.

1964 YL Funfest — March 7, at Sacramento, Calif. when the Chirps will be hostess club. A unique, one of a kind, prize will be offered — a recipe box with autographed recipes. All YLs are invited to put a favorite recipe on a 3 x 5 file card, autograph it, and mail to Wanda Gluck, K6ENK, 8847 Pershing Ave., Orangevale, Calif. Q57



Lewis and Clark State Park near Dayton, Wash. was the scene of the new Minor Net's annual picnic in May. The fine attendance included: (back row, l. to r.) K7UTT, K7PVG, K7RBE, K7MRX, and K7KSF; (front row l. to r.) K7RBC, W7IXR, W7ONL, and K7RAM. Missing from the picture were KN7VHN and KN7VSG.

The World Above 50 Mc.

1215-1300

2300-2450

3300-3500 5650-5925

10,000-10,500 21,000-22,000

30,000-9

CONDUCTED BY SAM HARRIS,* W1FZJ

V.H.F. Expeditions

The past month or so has produced three v.h.f. expeditions, all of which were highly successful. The first of these was conducted by Hal, VP7CX. His trip to the Dominican Republic provided HIS contacts for just over 200 W stations on 50 Mc. Operating under the call HISXHL, Hal spent a little over a week in Santo Domingo. During the first part of his operation it looked like the openings would be confined to W4 land and it was quite exasperating to hear W4s working HISXHL with good signals and still not be able to hear any sign of Hal. However, the latter part of the week provided at least a couple of good openings and Hal managed to work 1s, 2s and 3s in fair quantity as well as some W5s, 8s, 9s and 0s. He also garnered KP4s and YV5AGM to provide a little DX for himself. On any future expeditions Hal has a new call for Santo Domingo, HISXAC. Details on QSLing for your HIS contact are given at the end of the 50-Mc. section of this column.

Hal points out that several stations are building six-meter gear in Santo Domingo and some activity should be forthcoming quite rapidly. HISORC is on and has managed to contact a number of W1s, 2s, 3s and 4s using a Sixer. Hopefully, future efforts will improve receiving conditions and allow more contacts with Santo Domingo.

St. Pierre — Miquelon

Hal Tingey, W1DDF and Chuck Coleman, WA2WBH operated from St. Pierre-Miquelon off the coast of Newfoundland from approximately July 4 until July 22. While all bands were employed and many contacts were made on

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



On the left is K8AXU, pride and joy of West Virginia on the v.h.f. bands, with 30 states on 144 Mc, 10 states on 220 Mc., and 3 states on 420 Mc., W8AJW, perennial I.f. contest winner and ARRL Assistant Director of the Great Lakes Division. Photo taken at the West Virginia ARRL Convention.

the lower frequencies, the prime purpose of the expedition was to provide St. Pierre-Miquelon as a new country for 50-Mc. enthusiasts. The first few days of operation were very encouraging as FPSCG's 50-Mc. signals were workable on forward scatter and meteor scatter ninety-five per cent of the time without the benefit of a band opening. Unfortunately the noise level on St. Pierre was such that return signals were very difficult to copy under this mode of transmission and establishing contact was a hectic three days of schedule-keeping before long-enough meteor bursts were produced to allow Hal to read the signals from W1BU. Naturally the 50-Mc. band opened up the next day and Hal managed to contact seven W1s in rapid succession on phone. W1BU, W1HOY, K1PBE, W1OSQ, K1FBD, K1GCU and W1QXX in that order were the first 50-Mc. stations to make two-way contact with St. Pierre-Miquelon. Helen and I managed to nab Hal on phone on this first opening but conditions deteriorated rapidly and the rest of the contacts were on c.w. Subsequent openings allowed Hal to make phone and c.w. contacts with 162 different W stations. The *pièce de résistance* was a contact with VP7CX. A fleeting glimpse of a KP4 and an even more fleeting glimpse of a W6 were the best DX that Hal and Chuck were able to hear on 50 Mc. The great majority of the contacts were along the eastern seaboard from Maine to Florida and very few signals inland were heard. Hopefully Hal will write a small blurb on the efforts and show a map of the distribution of signals which arrived at St. Pierre-Miquelon by way of 50 Mc.

The 144-Mc. schedules carried out the last week and a half of the stay were singularly unsuccessful in producing even a short meteor burst. Groundwave conditions over the 800-mile path from W1BU to FPSCG were never conducive to making a contact and the only hope was to possibly catch some meteors good enough to establish communication. Unfortunately none were forthcoming and St. Pierre is still to be worked on 144 Mc. from W land. Equipment on St. Pierre included a Clegg Zeus transmitter running approximately 100 watts due to power limitations on the island and a Teleo converter into a Drake 2B receiver.

A Plug for 432

For years, the ARRL was under pressure to get the 50-watt power limit lifted from the 420-Mc. band. This was done at the end of 1962, but the surge of activity has not been exactly overwhelming thus far. Most calls the writer encounters in nightly efforts on 432 have been around for quite a long time.

Some even date back to our previous intensive activity in this region in the early 1950s.

With the fall inversion season imminent, we should be making activity headway on 432, if the propagation breaks we're sure to get are to pay off. A coastal inversion 700 miles long, or an overland duct halfway across the country will do nobody any good if the people who might use it are on some lower band. What to do?

First, we should remember that the way to have activity is to make it. Sitting around waiting for a band to open can be most unproductive, if everyone else is doing the same. We need nightly operating, not just quick checking to see if anything is going on.

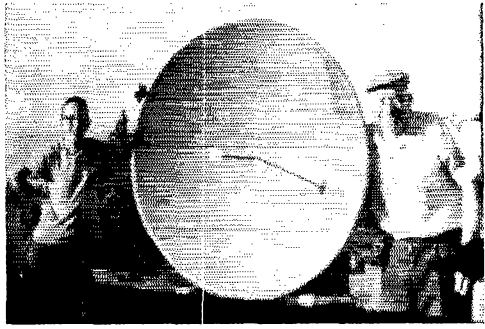
Second, we've heard of some potential 432-Mc. DXers who watch for favorable signs on 144 Mc. before firing up on 432. This is going about it bottom-side-up. Tropospheric propagation is not necessarily parallel on the two bands, and conditions that can hop up 432-Mc. signals may leave 144 sounding normal. Some fellows watch the high TV channels for clues. Good — but don't rely on it entirely. TV transmitting antennas are usually hundreds or thousands of feet higher than beams at ham stations in the same area. Consequently TV signals may be reacting to conditions out of reach of the average u.h.f. ham array. It can work the other way, too; some favorable propagation takes place very close to the ground. Furthermore, TV reception requires very high signal levels, while we can communicate with a small fraction of a micro-volt. We will hear DX before we'll see it, almost every time.

Third, we must bear in mind that our 432-Mc. beams have sharp patterns. Unless we line up with other operators as to times and beam headings we may miss many chances. Here's how some of us in the Connecticut Valley work it. We keep skeds to the southwest on the hour and half hour nightly, between 2000 and 2200 EST, and to the northeast at 15 and 45 minutes past the hour. Initial transmissions are on c.w., whether we're calling specific stations or CQs. This is almost a must, since you can detect and identify signals with the b.f.o. that would be hopeless without it. We usually switch to voice, if satisfactory communication is established.

If one of us raises someone he quickly gives others in the area a shot at the fellow, if a new station or area is involved. If, as is usually the case, the station raised is one that is worked regularly, other operators vary their pattern of calls and beam headings from the practice outlined above, calling CQs frequently and listening for weak signals, until the next sked period. All of us presently operate between 432.0 and 432.1 Mc., so that tuning for weak signals can be done with the care it requires. We have juggled our frequencies to avoid QRM insofar as possible. There will be time enough to spread out more when and if activity requires.

None of us is on every night, but we average several nights per week each, so there is always at least one following the routine. Operators in the Boston area, in Rhode Island, and in New York and New Jersey know this, so we make contacts regularly, over distances that would seldom be covered in random work.

These nightly workouts are of value in other ways. We're probing our way in unfamiliar territory, and by swapping ideas and experience we are helping one another to develop better reception, improved antennas, and higher transmitter efficiencies. There is always someone on, able to give a quick check or provide a signal for an adjustment, so we're moving ahead slowly but steadily.



Left to right: Frank Vernon, W1ZHF and Gordon Huggard, W1PZA at the Mt. Cadillac, Maine, end of the 2300-Mc. record-breaking expedition.

To this long-time enthusiast, such effort is the essence of ham radio. Perhaps we enjoy it more because of certain nostalgic memories of similar workouts on lower bands in other years, but we think the formula has merit. And when conditions break, we're *there* to take advantage of them.

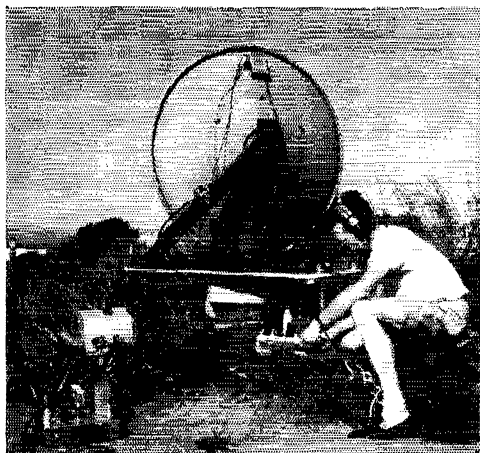
— W1HDQ

2300-Mc. DX Record Established

If you have been following the articles by W2BVU and W1QMN on 2300-Mc. pulse techniques you will be interested to learn that their equipment has been instrumental in establishing a new DX record for this band. Frank Vernon, W1EHF, accompanied by brother Dick, K1AIC and Gordon Huggard, W1PZA, took one of the two pulse stations constructed by W1QMN and W2BVU to Mount Cadillac in the state of Maine with the avowed purpose of establishing a new DX record on the 2300-Mc. band. W2BVU was operating portable from Cape Ann, Massachusetts and was assisted by Andy, W1AJR, Wayne, W1WID, and Bill, K1DRB. John set up in the front yard of a home overlooking the sea at Folly Point in Gloucester, Massachusetts. Liaison was established on 144 Mc. The first location chosen by Frank on Mt. Cadillac produced good 144-Mc. signals but was not satisfactory for establishing contact on 2300 Mc. Unfortunately the fog was so bad at the Mt. Cadillac end that none of the landmarks originally scheduled for use as "aiming aids" were visible from the mountain.

W1EHF/1 then moved to another spot clear of trees and near a survey marker bearing a north indication. The four-foot dish was placed on a card table on top of the roof of Frank's Volkswagen Microbus. Transmissions on 2300 Mc. were begun from this location and were immediately received by John on Cape Ann. W2BVU dish was already pointing in exactly the right direction while the one at W1EHF was five degrees off. (The dish beam width was seven degrees.) The two-way 2300-Mc. communication began at 1910 EST. Two or three transmissions were made in each direction finishing at 1930 hours. The two-meter link on the Mt. Cadillac end was open during the time that this contact was established and I was privileged to hear the excited comments from the bystanders by way of 144 Mc. while the contact was being established.

The record established was approximately 170 miles which is only 20 miles farther than the previous established record. A second attempt was scheduled to set a longer record and W2BVU struck his equipment and moved to the new location at Mt. Wachu-



Southern end of the 2300-Mc. record. John Zimmer, W2BVU/1, operating from Cape Ann, Gloucester, Mass.

sett in Massachusetts. Unfortunately while he was in the process the motor-generator set at W1EHF started to suffer from a slight lack of oil in the crankcase. By the time John had set up at the new location he was advised that the generator was faltering and before the 2300-Mc. gear could be turned on the generator gave up completely, and so the expedition ended. Both ends of the expedition were elated at the good results and plans for an increase in the record are scheduled for later this summer.

Box Listings

Don't forget to send in your "States Worked" this year for next month's "States Worked" box. Important: be sure to state what band it's for and include all states worked this year (not just new ones), plus your *all-time* states-worked total for each band.

144 Mc. and Up

July 2 was the turning point for Lee, K9AAJ, as far as two-meter activity goes. He had just about given up on tropo openings when on that auspicious day he heard W0YSJ in Fargo, North Dakota calling CQ on c.w. After a short contact John faded out, only to come back in after a few moments with an S8 signal. During the opening Lee heard just eight stations and four of them were on s.s.b. Among those worked were W0YSJ on both c.w. and s.s.b., and K0GQG in Minnesota on phone. At the present time, skeds are being kept between Lee and W5SWV on 144 Mc. The boys are hoping to make a go of it on that band and then switch to 432 Mc. In La Mesa, California the 432-Mc. R. & D. Net is being held up by W6BLK, W6AUB, W6GFJF, W6GTZ and W6IEY. W6IEY reports good inversion to the north during the last four days of June on 432 Mc. Dick is working on a TRC/8 surplus transmitter to get a cavity operating on 220 Mc., and a wide-band f.m. transmitter. We hear from K4EUS that he will be keeping skeds with W3GGR at Elkton, Maryland on 432 Mc. in the fall. Lou (W3GGR) will be running 90 watts to a 64-element collinear antenna.

Activity on 432 Mc. from Salisbury, North Carolina is reported by K4MHS who sez that conditions were fair to good during June. John is now keeping skeds with W4MKT and W4TLC on

432 and is beginning to build a transmitter for 220 Mc. Also from Salisbury and this time from K4YYJ we receive more "144 Mc. and Up" news. Jim reports that during the contest in June he worked six states on 144 Mc. and missed out on a Kentucky contact which should have been state #16 on that band.

Mobile activity on two meters is high in Jim's area. W4IEU is a new mobile in the group which now totals about 16 units. Stations do monitor 145.350 and can usually get a contact at any time on that frequency. A new 432-Mc. rig is in the works at the QTH of K4YYJ, and needs only a power supply and keying circuit and Jim hoped to be on the air with it by the end of July.

Down in Florida (Destin, that is), 220 Mc. seems to be the up-and-coming band. Doug, WA4EVU sez that W4ZGS and W4RKH are working on 222.5 Mc. with AN/PRC-14's; that WA4BOZ operates that frequency with an AN/ARC-27; and that WA4EVU has been running an AN/GRC-27 with 150 watts output. K3DJC sez that activity in the York (Pennsylvania) area on 432 Mc. is on the increase. Bob is building a paramp for that band and hopes to be more active in the near future. K2DDK in Manhasset, New York is a bit discouraged with 220 Mc. Al sez that after a month's operation on the band he hasn't even worked Connecticut (W1HDQ, please note!) However, with a total number of seventeen stations worked on the band he has managed to work four states, three call areas and a distance of 126 miles. The 220-Mc. rig at K2DDK's QTH consists of 20 watts a.m. and about 25 watts c.w. to an 832A. The navistor converter feeds a Collins 75A-4 in its 28-Mc. range. The 8-element yagi is inside the attic, 16 feet above sea level (at high tide). A different story from W2SEU at Freeport, Long Island, who reports "still more activity on 220 Mc." Fred checks into the Pack Rats Net at 221.4 Mc. every Monday night and signals are 5-7/9 with a little QSB.

TV on 420 Mc. is growing in strength across the country. W9ZIH and W9JEC recently put on a demonstration for members of the Chicago Microwave Club. Pictures of Ron (W9ZIH) were transmitted to Bob (W9JEC) solid T9 and snow free (approximately 14 miles). Both of the boys ran 4X250 cavities, driven by 2C39 Motorola surplus cavities from mobile transmitters. 440-Mc. r.f. stages at both ends are a must — 5 stages of 6AN4! Antenna at W9ZIH is an 80-element collinear array; at W9JEC a quad yagi 40-element is used. At Vallejo, California, WA6NOV, another member of the TV ham gang, sez that although his 420-Mc. TV transmitter is not completed yet, the oscillator works fine on 437.5 Mc. Bruce "desperately" needs a 931 photomultiplier so if any of youse guys know where there is one available, please get in touch with him. He is also looking for an old, worn-out TV set that nobody wants. From the South we hear that K4QIF in Salisbury, North Carolina has completed his vidicon TV camera and it is in operation. The 432-Mc. transmitter with video modulator is now under construction. Howie would like some skeds on 144 Mc. with anyone needing North Carolina during the early morning (0400-0500 — my aching back!) hours. He'd particularly like them with stations in Kentucky, Alabama, Michigan, 1s, 2s and 3s. Looks like Howie is ready and willing to add to his "States Worked" total on 144 Mc. WB2CRS reports that he and WB2CSE are going to try to break the record of 500' at 30,000 Mc. Carl is making an audio generator and is building

(Continued on page 142)

• Technical Correspondence

230L LINEAR

Technical Editor, *QST*:

Since the publication of my article on the 230-L linear amplifier in *QST* for February, 1963, I have received a great many letters asking about the design of the input network for 20, 15 and 10 meters.

For operation on these three higher-frequency bands, the grid network is changed from the L network used on 40 and 80 meters to a pi network. The circuit with reactance values is shown in Fig. 1.

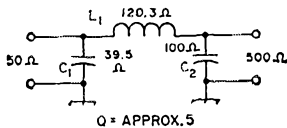


Fig. 1.

The equivalent values of inductance and capacitance are shown in the following tabulation:

Freq., Mc.	C ₁ (pf.)	C ₂ (pf.)	L _A (uh.)
14.2	283	112	1.38
21.2	190	75	0.925
29.1	138	54.4	0.673

The values shown for output capacitance (C₂) include tube and other stray capacitances which must be subtracted in determining the actual size of the capacitor that should be used. In the case of the amplifier under discussion (two 807s in parallel), the tube input capacitance amounts to about 27 pf. If a value of 10 pf. is assumed for all other stray capacitances, a total of 37 pf. should be subtracted from the values shown for C₂. The capacitor values to be used would then be 75, 38 and 17.5 pf., respectively, for 14.2, 21.2 and 29.1 Mc.

It is suggested that a variable capacitor (APC type), having a maximum capacitance of 10 pf. greater than the 75 pf. required for 14.2 Mc., be used to take care of possible error in estimating the stray capacitance. The coils should be of the iron-slug type with the inductance values shown in the table falling in the approximate center of each coil's inductance range. Both the variable capacitor and the inductor should be adjusted experimentally for minimum s.w.r. on the line from the driver.

Values for lower-frequency bands were given in the original article. On these bands a variable capacitor is not needed, since the unknown stray capacitance will usually be small compared to the total capacitance required.

These notes should be of use to not only those who wish to extend the operation of the RCC 230-L amplifier to higher-frequency bands, but also to anyone desiring broad-band grid circuits for other pentodes and tetrodes requiring peak driving voltages in the range of 20 to 120 volts.

— J. L. Copeland, W5SQT, Wolfe City, Texas.

TEN METERS "DEAD"?

Technical Editor, *QST*:

As we approach the bottom of the sunspot cycle, sporadic-E propagation on ten meters is on the increase. It occurs about three times more frequently than it did last year. At times, contacts are confined to specific paths between two small areas such as metropolitan New York to metropolitan Miami or New York to metropolitan Kansas City.

At other times, contacts can be made between wide areas spaced 1000 miles or more apart.

Far too many hams listen on ten and, hearing nothing, move to other bands. Get on and call CQ, gang! You may be sitting just right to work into a specific area when the band appears to be dead. The sidebanders are concentrated between 28,600 and 28,700 kc., while the a.m. gang holds forth between 28,700 and 29,000 kc.

Last but not least, many sporadic-E contacts are made long after dark when 10 meters "ought to be dead." Contacts up to midnight local time are not at all exceptional. Get on and talk it up; you will make many QRM- and QRN-free contacts.

— Dana A. Griggin, W210E, 139 Beckman Road, Summit, N. J.

MOVING PLATED CRYSTALS

Technical Editor, *QST*:

Received one complaint that the method outlined for raising crystal frequency in my March *QST* article (page 30) wouldn't work. I've checked over the "offending" crystal and darned if I could get it to move. Thus a modification was developed for moving plated crystals up in frequency. This involves simply grinding off a small amount of the plating with a bit of No. 400 grit, wet-or-dry emery paper. In the test a 4190-kc. crystal was moved up to 4200 kc. in about 15 seconds of very light grinding.

Incidentally, rubbing crystals with lead wire or solder seems to be preferable in lowering the frequency of crystals below 8 Mc.

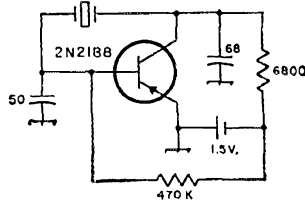


Fig. 2.

To check the frequency, the transistor oscillator circuit shown in Fig. 2 was used. It allows the crystal to be "worked" while it is oscillating.

— Robert C. Wilson, W5KTM, Independence, Kansas

COMMENT ON BROAD-BANDING

Technical Editor, *QST*:

Two recent articles in amateur-radio magazines prompt me to write this letter: "Three-Band Log-Periodic Antenna," Heslin, June 1963 *QST*, and "A Broad-Band Nuvistor Preamplifier," Kaiser, May 1963 *CQ*.

My point is this: both approaches provide broad frequency response which includes three or more ham bands and all frequencies in between. The idea of multiple band coverage is consistent with today's approach to versatility in amateur radio. However, deliberately making the receiver more susceptible to interference from outside the amateur bands is another matter.

In normal antenna and preamplifier designs used by hams, the equipment provides gain at amateur

(Continued on page 156)

Fun as a Technician

BY FRANCIS M. YANCEY,* W8DRU

APPARENTLY there are some Technician Class licensees who are unhappy with their status as hams.

The way I see it, there are about three things they can do about it. They can master the code and get General Class licenses, which should be one of their aims anyway. They can give up ham radio in favor of some other hobby. But, best of all, they can be hams and have just as much fun as any other ham can possibly have.

Here's how: find out if there are other Technician Class Licensees in the same general area with you. Band together. That doesn't necessarily mean forming a club. Just get together every week or two for an informal coffee-drinking and discussion time. Work out your problems together.

Second: set a goal for yourselves. If you live in rough terrain, a good goal is to be able to work each other consistently. V.h.f., of course. Make your goal flexible so it can be extended as you progress. And you *will* make progress.

Now let me tell the story of the Hill-Billy Hill-Toppers to show what I mean.

Four years ago there were two Technician Class hams in Summers County. Now there are eight. True, one of them has an Advanced Class License and one other has a General ticket. We class ourselves as Technicians because we operate only above 50 Mc. and we build just about all of our equipment.

We live in one of the worst places for v.h.f. you can imagine. Our town is located in a small valley about 1200 feet above sea level. It is completely surrounded on all sides by mountains going up to 3300 feet. The terrain of the whole country is extremely rough.

We decided to operate six meters and have as much fun doing it as possi-

* 203 8th Ave., Hinton, W. Va.

Interior view of the shack, with W8DRU at the rig. Handbook-inspired 6-meter transmitter uses a 6146 final, modulated by a pair of 807s in AB₁. The Navy receiver at the right serves as a tunable i.f. for a nuvistor converter, which is also of Handbook design.

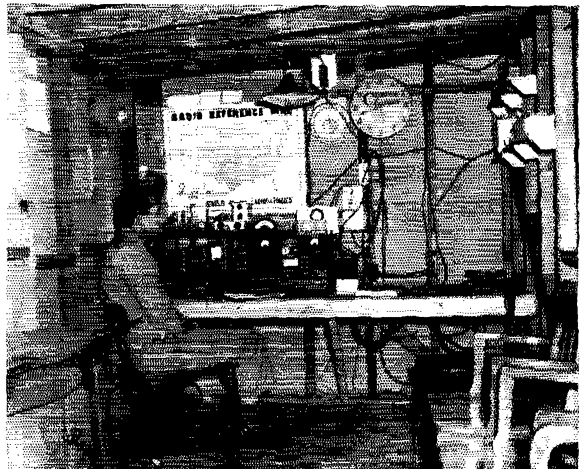


Left to right are WA8DIS, K8EAT, K8DRK, W8DRU and K8OHD at the earlier, temporary, hilltop setup. The portable antenna is supported on a mast made from sections of discarded tree pruner. The mast is mounted in a pipe, which is screwed into a floor flange, which in turn is fastened to a board. The wheel of the car is driven onto the board, holding the mast quite securely.

ble. We set ourselves a goal: to work each other consistently. Work each other? We couldn't even tell when any of the others were on. But we reached that goal by improving our receiving equipment and antennas. The transmitting power averaged fifty watts.

We turned to our TVI problems. TVI? We have one of the worst situations imaginable. Just a few people receive TV with their own antennas. There are several community TV systems which

(Continued on page 168)





How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

It's about time for another DX quiz, we are told. "Don't make it too hard," a correspondent urges. Well, Jeeves had an easy one all rigged up but he lost the answers and has to start all over again. Meanwhile let's try a warm-up test of general scope. Real easy for the A-1 Op crowd -- just fill in the blanks of the following:

**The R-S-T System
Readability**

- 1. —
- 2. —
- 3. —
- 4. —
- 5. —

Signal Strength

- 1. —
- 2. —
- 3. —
- 4. —
- 5. —
- 6. —
- 7. —
- 8. —
- 9. —

Tone

- 1. —
- 2. —
- 3. —
- 4. —
- 5. —
- 6. —
- 7. —
- 8. —
- 9. —

If you've been using the RST communications tool properly as a fairly seasoned c.w. operator you shouldn't have muffed more than three or four of the 23 answers required. If you failed to fill at least 17 of the spaces accurately, OMI, you must be perilously close to being a lid -- first class.

You voice communicators don't get off free, either. Take the same quiz but, in place of the "Tone" portion, write out ARRL's recommended phonetic alphabet (the current U.S. military version will pass you). Oh, you have your own clever homebrew set? To the foot of the class with you; you've missed the main point of phonetics.

"CQ Turkey," called Tom hungrily.

That, if you haven't heard, is a weak DX-style "Swiftie." Those old enough to recall the Tom Swift novels of their youth will remember that Tom never just *said* anything. He said it warmly, or coolly, or sharply or something. "Another martini," said an old-timer dryly, and a fad was born.

*7862-B West Lawrence Ave., Chicago 31, Ill., 60656.

"Anyone seen my dogs?" asked the KL7 huskily. That's a fair one-shot Swiftie. Another: "The handle here is Red," blushed the OM2. You'll note that puns are at a premium and the price of corn is high. "Why the T2 report?" rasped the K3. The one-shot Swiftie is good sport, but you can really swing out with extended dialogue jobs. Take this inanimate two-shot: "I've lost my grid bias," said the 6146 flatly. "Mine's gone, too," replied the 807 with some heat. Another: "QTH here is Kansas," said the K0 dryly. "Mine is Las Vegas," remarked the W7 brokenly.

Monologue Swifties can be amusing, too, especially when roundtabled on a can-you-top-this basis. You might nurse one along thusly: "I'm entering a tunnel," said the mobile hollowly. "I didn't make it," he continued, crushed. "Whip's too short now," he snapped at length.

Swifties can also be used to make points editorially. Like, "I rule in favor of the FCC," said the judge with conviction. Or, "This must be the high-voltage terminal," said Jeeves crisply.

What:

Good solid 807-and-dipole openings grow ever scarcer but the DX crowd continues to make the most of those hit-and-run breakthroughs. "Now you hear 'em, now you don't," rather sums up the situation as we near the end of another DX summer. Let's let some "How's" spokesmen speak for themselves: "Ten meters is often open but lack of activity makes it sound dead." -- K2YFE. . . . "DXers should watch 10 and 15 closely for openings. Europeans have been sneaking through on 21 Mc. around 1700 GMT, and 28 Mc. still has afternoon openings to South America." -- W42KSD. . . . "Ten phone is opening up a little!" -- K1YK. . . . "Good July openings on 15, 20 and 40 to all continents except Africa." -- W4A7A. . . . "QRN's plenty rough on 7 Mc." -- W9GAL. . . . "Skip really short on 20!" -- W8YGR. . . . "Twenty and 40 had good





ZS1A regularly works the States from coast to coast on 80 meters. Eric's venerable transmitter has seen service at ZSs 2BC and 6DY since 1946 and is still going strong. (Photo via WITS)

openings but none to the Pacific from here." — *K1PCE*. . . "Burns me up the way 7-Mc. Europeans get S7 and S8 reports on the east coast, yet are completely inaudible in Oklahoma." — *K5JTV*. . . "Solid 15-meter openings to VK-land but very few Europeans." — *K4OGV*. . . "Guess I'll have to go to work on that 7-Mc. vertical. Can't even raise C'Os and H'Ks with the old double anymore." — *K3CNN*. . . "Sure hope things get better soon!" — *W4CZII*. . . "Twenty's been real hot, best I've heard it in a long time." — *W4QMC*. . . "After some weeks of poor conditions old 20 c.w. began to sound like itself again." — *KahQG*. . . "Duly brought much improvement to 14 Mc." — *VE3AJE*. . . "Who says 20 is dead?" — *KAMYO*. Yes, it seems that the 14-Mc. range did itself proud this summer, so we'll give it a pretty close documentation this month, starting with

20 phone, where *Ws* 1ETF 2HVN 6ISQ 6KHS, *Ks* 1PCE 2AGJ 2UYG 3CNN 3JHE 3MNI 5JTP 9CZY, *Wa2s* 1KN 1PC KSD, VE7BBB, KH6EJL, KLF7AR (K6KYJ), K6AOC and listener C. Maher find such items as APs 2AM 2AR* 5DC 5FQ* 5KC, BVIs US (4,315 kc.) 1200 GMT, USC 17, USF (290) 12, CE8s CG CG, CN8s AQ FW* LA* MC* RZ, CO8BO, CPs 1AB 1BH 5AD 5AT 5EA (325) 2, 5EQ 5ER* (225) 3, 5E7*, GX8BM 22, CRs 6CG* 6CY* 9AH (111) 13, 9AN 12, Cts 1MC* 2AC* 3AV*, DUJs AA 17, EH 1K 16, JG, EAs 6AF* 8CP* (225) 22, ELs 1G 3A 6A (330) 20, 7A, EPs 2AK 2AR 2AW 2BP* 2BU* 3BS 3HS, ET3s FV MEN PP 19, PRS 21, RIS TP, FGTXT, FK8s AC (110) 15, AU (128) 5, AZ, FM7s WN* 23, WQ WS (273) 11, FRZC 22, FV7YJ*, GBs 2SM 3RAF, GC3MLR 19, GD8YS*, HA9OZ 9, HCs 10W* 1WU 2JF* 2JT 4, 2KG* 5EJ, HH2s CJ, J, HIs 3KZ 8AKU 8HV* (220), 8JSM* 8MAN 8MV* (210) 1, Hk2WC*, HIs K6E, KH (264), 7B TD, HR1BG* 20, HPs 1AP* 21, 3DA, HV1CN, HZ1AB, ITIs APD* (195) 0, BXX* TAL, JAs 1AEA 1ANB 1DM 3KZ* 6AV 6MV (313) 11, JTLs AC 20, GA (108) 17, 8s 8CQV/K56 7, 9CVJ/K6G, KAs 2BM 17, 7A 7BI 7SL, K6Bs AC (280) 3, CB CP (248) 4, CQ CY, EPs 305) 12, K6Gs AC (280) 12, BO KU (272) 12, PE (334) 11-12, K6s 1B2 IC (340) 11, ICX 5, 1FA 1FR 4AE* 4AF 4BH* 4BG 4BR 6AJ* 12, 6AIB 9, 6AJR 6AKR (300) 12, 6AUI 6J, KH6PD/KG 22, KJ6s BV (266) 5, 7B, KM6s BI (340) 7, BR (305) 11, CX, KR6s AF BD (318) 20, BP QP* CM DI QF QF (320) 10, GM MB 11, MX OF* RB*, KX6s AE (310) 12, AL BD (330) 4, BF (330) 7, BU 6, KZ5s AN LC 22, LA8SE/p (259) 17 of JAL, LJ2B of Norway, LX1s JW (341) 11, PE 9Q* 20-21, LZ1FO*, MIAB* OAs 3M 4DG 4HC 1HQ* 4OS 4M 4PE* 4PZ* 4HW, ODSX, OE2AL*, OH0s NC (293) 12, NI* RJ, OX3s KV XU, OY7AL (268) 13, PJs 2AA 2AF 3AO 0, PZ1s AD AX BJ 22, SPs 7LA (251) 22, 9FR (283) 10, 9RF* ST2AR, SVs 1AD 1AJ 1AO 1AP 1AR 0WB (335) 22, 0W1 0WL 0W0 (291) 22, 0WU (250) 0, 0WY, SU1As* TALAH, TF2s WHB WHP (270) 10, WHI, TG0s AZ NY (278) 3, SC (305) 5, T15G*, TU2s AE (252) 20, AF (254) 21, AK AQ (265) 21, UAs 1KBW (345) 12, 1Q4* 1MU 2AW 3CR 3FG 3KRD* 4KED (332) 21, 6FD 6AK 9BV* 9KCE (292) 10, 9XR 0EK (268) 11, 0KJA* 0KS 0KYA 0SK (126) 17, UB5s FJ JK KDS* KNP KSP* KYC* NP* WF* UC2s AX* 0, KAB* (205) 1, UD6s BR (270) 20, KAR (124) 2-3, KBR, UP6FB, UH8AY (330) 12, U18s AG KAA KAD* KAT* UL7A, UM8KAB, UO5s KRU* LP, UP2s KAB* KMP, UQ2s AN AS, UR2BU*, UWs 9CC 0JJ* (125) 1, VEs 3FFU/SU 20, 8MD 8ML 8TU 7, VKs 41Q (150, 300) 5-6 of Willis isle, 6BD (268) 8, 91R (120) 13, 9AS* 9LA 15-16, 0VK, VPs 1AB 21, 1LG 2AB 22, 2GAC 2AS 2SN* 28Y* (220) 1, 28YL* (220) 1, 3HAG 22, 3YG 5LA* 15, 5LG* (303) 1, 5TK 6K 6WR* 22, 6WV 7CC 7NS 8CQ 9BO (257) 2, 9FD, VOs 1GDW (296) 22, 2AT 17, 2RB* 16F, 2FM (265) 17, 4AQ 4GT* 4IE 91B*, VRs 1K 2BJ 2BZ 2DK* (180) 11, 3R 4CM 4CU (125) 12, VSs 1LP (339) 13, 1LQ* 1LW 4RS* 6BE 9AAA (128) 19, 9AB 9ABM (283) 21, 9MB,

VU2s PP* 17, RM, Ws 4EIL/KS6 5BRX/KJ6 5JDX/VP9, WA4s FVX/VF8 LUX/KJ6, XEs 1AB 1LL 2KO, taboo XW8AL, XZ2UF*, YALAK (215) 15, YNs 11HK 1NG 1ST 7CJ, YOs 3RN 4CT* 4KC* YSs 1AM 10 2SA, YVs 1BI (300), 1IQs 1LA* 2CJ* 16, ZB1s CR VJ*, ZDs 3A* 60L 18, 2AM, ZE1JE (310) 6, ZK1s AV BS BY, ZL1ABZ (320) 4, ZPs 8C CP JF QG 22, 4S7s IW 10-17, WP* 4Us 1TU 8U 4X4s 1DK DX FQ LK* HW* IX LC MS* NX*, 5As 1CG 1DM* 2TS, 4CW 4TH* 4TL 4TW 5CW 5TR, 5H3s 1G 1G*, 5N2SMW* 17, 5RBCM (252) 12, 5U7AH, 5X5s ES 1U 16, 6O1s FL* 18, WF (210) 14-16, 6W8CR* 6YAs BL (1H* 1G* 7X2VX, 9G1s AW (281) 23, LZ FE* EW FX GN ON, 9K2s AG 10, 9L1s 5, 9LRO, 9M2s CR GF* 16-17, GH GV (311) 15, 9M* 9Ms 01 (282) 15, MEAM (268) 13-15, 9Q5s CA EP* WH (323) 22 and 9U5JH*, the asterisks (*) representing non-s.s.b. hold-outs (and there still are quite a few!).

20 c.w. is home to *Ws* 1ECH 1IKB 2BVN 3GRS 3HNK 5ACL 6ISQ 6KHS 7DUJ 7VRO 8YGR 9GML, *Ks* 1PCE 1RHZ 1VFN 1VWL 2AGJ 2PHC 2UYG 3CNN 3JHE 3MNI 3QX 4MVO 5FQ 6TZX 7QNG 9CZV 0JPL, *Wa2s* 2PFC 2KSD 2QMC 2ZRR 2VJY 4CXII 4CZM 5CVK 6KHK 6AMN 6VAT 9ATA 0BAM 0BOP, *WBs* 2CAV 6AGT, *VEs* 3AWE 7BBB, KH6EJL, KLF7AR (K6KYJ), 11ER, KG6AOC and DL4BD (K2VHW) who slapped down the welcome mat at the front door for AP2AR (23) 15, BVIs US USA (14,045 kc.) 1500 GMT, USB USC (80) 18, BJs 1PK (10) 17, 9SX 12, CM2WS (6) 20, CN8s FR FX (85) 23, COs 2BB (15) 16, 2WD 14, 2XX 6AII, CPs 1CL (70) 23, 3CAs (38) 23, 3CN 5EA 5E7 (20) 4, CRs 6CA 6FW 7IZ (48) 21, 8AC (40) 13, 9AH (112) 14, CT1DJ (54) 0, DMs 2AND 2BDN 3JML (65) 3PVL 3RFD 3YFH 3ZOL, DUJs 1CN 1OR 6TY 0DM, EAs 8DO 0AB, ELs 2P 2T 8AF (58) 23, EP2s AM AS (28) 18, BN PT 16, RC, ET3s MEN PT USA, P8FC/FG 7, FB8s XX ZZ (60) 11, FK8s AC AT, FM7s WA (1) 3, WN, F0As AA 7, AC, PR7ZF (30) 12, FUBAG 8, FY7YJ (62) 23, GBs 2GC 3VER (125) 19-20, GC2FAV, HAAs 5KDF (30) 23, 6NI 8UD/p WHI (28) 5-6, 0HN 22, HC1G 12-15, HIs 3PC 8LC 8MIN (79) 14, 8STU, HKs 0AI 0AS, HL9s KH KK KP TG (10) 13, 4TH TK, HMI4Q (31) 14-15, HMIIs AB AP BM (7) 15, HPIs 1E FC, taboo HIs A P, HR2PG, HZIAB, ISIs AM 7, ZU (41) 22, ITIs 1AI (4), ZGY (4) 0, JAs 4YV 5AJQ 5FQ 5IP (65), 9CG 9GW 9JL, JTIs AD (84) 10, AE (67) 14, AG (72) 15, CA (39) 11, JY11S, K6CQV/K56, KAs 2CM 7AB 7TB (45) 12, 9MIF (78) 10, KB6K (16) 6, K6Gs BK (44) 3, PE (13) 15, KGs 1BR 1FR 4AB 4AM 4AN 4BR (4) 16, 4BX (31) 3, 6AAV (30) 8, 6AKS 6A 10-11, K6EDV (35) 6, KJ6BZ (10) 7, KR6s 6BH 6BF 6BO 14, 6DD 6FI (61) 9, 6GA (51) 8, 6GF 6LD 6ML 6MO (10) 11, 8AG, KVs 4s A (61) 21, CF 14, KX6s BK (16) 6, DB 2C 4, KZ5s FC 7, 3, MC 1M 10P, LAs 2NG p 20 of J.M. 5GF 7 (18) 1, LUZ1L LZ1 KPZ 1KSV 2AW 23-0, 2KSS, MF2s BBE (55) 16, BLD (25) 17, OAs CG (20) 13, AM (62) 7, N P, PF NQ, OD5LX (8) 22-22, OH0NC, OX3s AV DL DY (15), KW (72) 22, UD, OY7AL (67) 1, PJs 2AE 2ME 3AO (20) 3, 3AP PZIs AV BH (5) 1, RAEM (23) 21 of Moscow, SJs 5ZL 6AL, SM5s CGR, 9O5 5TU 9O5 (30) 1, SUs 1M (48) 1, 2IV, SV0s WF (22) 22, WY, TAs 1AH 2BK 2NK 2UN 4SO 4YV 5SR, TF2s WHY (29) 1, WID (82) 22, TGAD 7-12, T12s LA PZ WR, TN8AF (10) 18, TT8AL, UAs 1KED (40) of F.L.L., 1KAE of Mirny, 2AC (30) 2BD 9DA (50), 9FD 91N (37) 12, 9FX (20) 2, 9GE 9KF (30) 2, 9KDP 9FL 9WS (35) 9XG 9EA (50) 0EH (27) 5, 0EK 0EW (12) 20, 0FE (60), 0IN 0JQ 0KAR (35), 0KOC 0KDA 0KFG 0KIF 0KKB (45) 3, 0KQA (80) 2, 0KQB 0KSB 0KYA 0MIF 0RB (78) 18, 0SH 0ST 0VT, UB5s AC FG (50), NM (45), WU (11) 14, UC2s AW (5) 5, BU (60), WC, UD6s BE (25), RZ (19) 20, FD, UF6s CW (19) 20, FB FE FN KPA (31) 3, KPE (66) 22, UG6s AW GP JD (23) 14, UH8s BO (47) 2, KBC, U18s AM CZ KAA KAAD KBT KNA (63) 15, LB, UJ8s AB 16, AU KAA, UL7s AA CG CH (20) 18, GP JA JE (45) 2, KAA KAB KAR KBA KKB (36) 3, KCF (80) 2, UM8s AP 13, KAA (17) 15, UN1K (35), UO5PK (62), UPOL-12, UP2s KCF (65) 4, 00, UO2s CC (45), FGA (60), KAE KAN (87), KCA, UR2s BV KAN, UV3TG, UWs 3AP 9CD 0FK 0FM (61) 13, 0IF (55) 0IH 0, 0J 0IN 0J (61) 6, 0JK 0PL, YK8s DX MC WN, VKs 6CE 78M (52) 6, 8HB 9GW (78) 14, 0VK, VO2HA, VPs 2AV (41) 23, 28Y 4VP 22, 5GT 5LG 5TK (19) 3, 6KL (102) 16, 6LJ 6PV (65), 7BC (30) 17, 7NT 8GQ 8HD 9AX 9DH 9FC (25) 5, 9FK 9L, VOs 1AZ (3) 4, 1GDW 2AN (89) 0, 2EW 2FF 2W (21), 4AQ 4ERR 4ET 4IQ 8AI (61) 11-12, 91B, VRs 1A (40) 6, 2BZ (100) 7, 2EH (47) 7, 2DK 2EM 3E 3R 6TC (167) 5, VSs 1FZ (95) 14, 1LD (65) 16, 1LJ (7) 13, 1LK (66), 1LL 1LQ 4RS

(40) 14, 5CW 6EY (40) 13, 9AAA (35) 23, 9AB 9AJA 9ART 9MB (70) 14-15, VU2s AJ (30) 1-2, GG (57) 1-2, JA LN VDZ, Ws 5BRX/KJ6 5HCZ/VO2 5JDX/VP9 6FAY/KP6 (15) 2, 7ZQV/KG6, WA6QVR/KJ6 (11) 7, XEs 1FV 1SS 1VT 2DL 2EM 2MK, XZ2KN, Y2AP, YKs JAC (40) 1, 2SK (85) 16, YNs 1RN 3KM, YO2BB, YS1s OAJ (12) 7, ZBs 1BX 1CR (100), 1RM 2A, ZD6OL (35) 16, ZF8JJ, ZK1BV, ZLs 1ABZ (48) 4, 4JF (75) 3, ZP5OG, ZSs 2MI (20) 14, 3EW, 3A2DA (30) 0, 4S7s EC NE (66) 14, PG RN WP (33) 16, 4U1TU (62) 0, 4X4s JU (31), MI NX ON (30) 0, RII (99), 5As ITA (15), 3CJ 3CR, 5B4s OS PC TC TS (30) 0, 5H3s HD HG HZ 14, 5N2s ACB (39) 23, JKO 15, RSB, 5RBAI (45) 15, 5T5AD (85) 20, 5U7AC (38) 21, 5X5s IU UE (35) 20, 6O1s MT (35) 19, ND (10) 18-21, 6W8s AB (50) 2, AC 12, AD BL DD, 6YAs BL MJ (19) 13, XG, 9G1s DZ EI MB, 9K2LL (5) 19, 9M2s CR FK FT (37), GJ (13), MR 14, UF (30) 15, UH 14, 9Q5TJ and 9U5JH (45) 17. Good show, OMs!

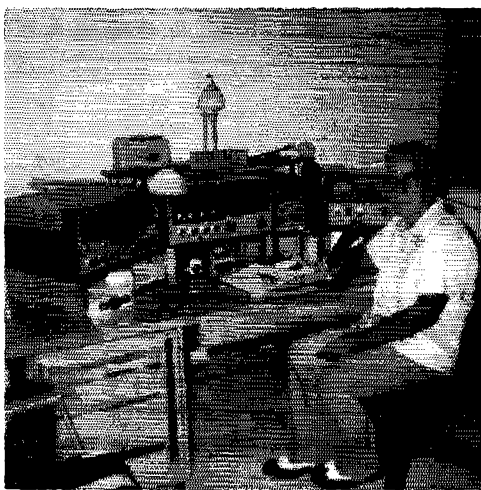
160 c.w. just has to get some space this month because W1BB crashed the 1.8-Mc. static barrier in mid-July to score stupendous two-ways with K1KSH/KG6 and ZS2FM. DX on 161 trends toward a year-round proposition, so don't wait till the frost is on the pumpkin to get in on the fun. By the way, all amateurs considering 160-meter work are reminded to scrutinize the table on page 60, July 1963 QST. Some of those nighttime power maximums are awfully limited, but look at what the G-men accomplish with their 10-watt regs. See you on 160!

Thanks, indeed, to Ks 1VWL 2YFE 4QGV, WAs 2KSD 2ZVJ 5CVK 6MIN 6VAT 9ATA, WB2CAV, WNs 411F 4KXC 8EWT and 11ER for reports re 15 c.w.; Ks 1VWL 2YFE 3CNN, WAs 2KSD 2ZVJ 4AYX 6KHK 6MIN and KG6AOC, 15 phone; Ws 6YKS 7DJU 8YGR 9GML 9NN, Ks 1PCE 1VWL 5JVF 6TZX 8GVA, WAs 2KSD 5CVK 6KHK 9ATA, WBs 2CAV 6CIN, WNs 411F 9FWB and 11ER, 40 c.w.; Ws 6YKS 7DJU, 80 c.w.; Ks 1YKF 2YFE and W5ERY for 10 phone data. Those slots are scheduled for the "How's" spotlight next month.

Where:

ASIA — "My QSL to HL6TB was returned to the former A holder of the call, K8BVI," comments W9CAQ. "I sent it back again to Korea via the chief signal officer who gave it to the present HL6TB." Those still-warm second-hand call signs that cause so much unnecessary confusion in DL4 and SV9 DX circles now rear their ambiguous heads in Asia. The current HL6TB (at least as of this writing) is listed in the roster to follow. . . . "I can supply QSLs for KA7TB QSOs from March 8 through May 4, 1963," offers K4SCT. "K2DSW has been at KA7TB since that period and will QRT shortly for Stateside return. KA7TB logs for operation from May 4 through July 12, 1963, will have been mailed from Japan just before Bob's departure. Self-addressed stamped envelopes, please." K1SCT also holds logs for W1KKA/am/EP/V89, the latter suffix for land-based Maldives QSOs. "Harry's operation on Gan was legal inasmuch as he had written permission from the Maldives communications office in Ceylon." Ex-HS2M-HS2MP writes, "I've been back in the States for almost a year now and I'm just clearing up QSL matters. If anyone who worked me has not yet received due confirmation he should send his QSL to [the address to follow]." In the PEARL News KA2EB chuckles, "I used to get many of Gus's choice DX QSLs back in 1936-38 when I was W4PBD." Was KVX and KXV know what Ed means.

AFRICA — "I now possess all logs of ZS2MI, Marion Island," notifies ZS1OU. "Until further notice I shall therefore handle QSLs for that station. I know that in the past cards for ZS2MI have sometimes been poorly handled and that there are many who have worked Marion but haven't been able to acquire confirmation. Anyone who contacts or has contacted ZS2MI may send his QSL to me including self-addressed envelope and appropriate International Reply Coupons for either sea or air mail. My QTH is okay in any Call Book and I will attend to the matter immediately." "EL2PN is now QRT for good," states W6PN who formerly signed KR6PN, DL4PN and W4PN. "All my Liberia QSOs have been confirmed, mostly via bureaus. If, after allowing reasonable time for the QSLs to clear the bureaus, anyone still needs an EL2PN confirmation he may obtain one by writing me [at the address in the list to follow]." 9Q5EP points out that Republic of Congo has a new QSL bureau address: UCRA, P.O. Box 1459, Leopoldville. Along with this notification comes a list of more than 100 9Q5 addresses which should be appearing in an early Call Book. Looks as though him



HP1ME's single-sideband signal is a 14-Mc. landmark. Manuel usually hangs out there with the Pan-American net and has a host of pals on 20. (Photo via K3DCP)

radio's status in the R.C. is rapidly solidifying. Ex-VQ1CJ declares, "In eight months of Zanzibar operation I mailed out some 7000 QSLs. I left in a hurry one day for a trip Stateside and did not return. When I receive a note now and then from someone who says he did not get my card I feel quite concerned, mail out a new one right away, and wonder who else may be looking for me. I have plenty of QSLs left and I'll welcome inquiries at [the address to follow]. I've applied for a license in Mexico and am waiting to get back on s.s.b." DXpeditionary QSLing is a problematic task at any time, and merely getting the logs back to "civilization" can be a project. LIDXA's DX Bulletin notes that VQ9HBA data wandered to Calcutta by boat before heading toward manager G8KS by air. W4BPD's transcripts arrive at W1FCI by equally devious routes, so if your deserved QSLs are delayed, late log receipts may well be a factor. Patience, OMs — the cards will be coming through.

OCEANIA — "You might mention in QST that my QSLing for KX61DB holds only for June c.w. work," specifies WA6HRS. "It's a club station with about half a dozen fellows operating, so I can't confirm contacts made by the rest of the boys." "I will act as QSL manager for ZM7AD," declares K6ERV. "He's ZL2BCH, formerly VR4AB, and was scheduled to be at the Tokelaus only during July." W6UED indicates to VE3AVE that he has no connection with KG6/p QSL matters. As a partial answer to would-be DXCC Honor Roll listees who wonder how to go about catching those really rare ones on the first bounce, WGDXC's DX Bulletin mentions that VK6ZS/VR9 received seventy commercial cablegrams from amateurs requesting schedules with Christmas Island. The same periodical publishes ZL2GX's plea that those seeking QSLs through him for QSOs with Chatham's ZL3VB, Campbells' ZL4JF and Kernadees' ZL1ABZ please use only Greenwich Mean Time on their cards. K6TZX reports receiving an interesting two-page write-up on Kure Island along with his QSL from KH6EDY. This reminds us of K7VAK's fervent recommendation that everybody get a full stamp's worth of mail service. When you pay five cents or eight cents for an ounce of mail why not see to it that you mail an ounce of mail, and thereby do somebody or something some good? Your local



F2BO, a fresh s.s.b. convert, is a hospitalty organizer in the International Ham-Hop Club (see p. 101, July 1963 QST). IHHC member W7QYA obtained this photo while in Paris on her recent world-wide tour.

chamber of commerce is a good source of material)
 K10EJM relays W6FAY/KP6's specification of GMT
 and s.a.s.e. if you would tuck up his Palmyra pasteboard
 Regarding confirmation of KX6 contacts in the
 WAKI DX Contest (see "Whence"), KX6BK writes, "If
 log entries are accompanied by s.a.s.e. and one IRC, QSLs
 will be sent direct to you by participating KX6s as soon as
 possible."

SOUTH AMERICA — "I'm now handling QSL chores for
 PZ1BW," affirms WA4EDY, "U.S. and Canada only.
 As of August 1st I will have Bert's logs covering operation
 from June 26 to July 31, 1963." "LU2JY has ac-
 cepted my offer to act as his QSL manager," says WA5CVK.
 "This will cover W/K/VE/VO QSOs made after August 1,
 1963. I'd appreciate all the help I can get in my first attempt
 at this service." This will of course include s.a.s.e., a cour-
 teesy to be extended any and all such Stateside QSL volun-
 teers.

HEREABOUTS — "WA5DAJ and K5YKO serve as
 QSL managers for 6YALT and would appreciate
 s.a.s.e. from applicants," writes the former. WA5DAJ also
 does QSL honors for H18MIN and has this complaint:
 "Only about half the gang has been sending self-addressed
 stamped envelopes but all request direct return confirma-
 tions." Absence of s.a.s.e. obviously rates the leisurely
 bureau route. Regarding his Prince Edward Island
 project as W9NLJ/VE1 later this month, Pete assures, "All
 QSLs will be answered via bureaus, or direct if s.a.s.e. are
 supplied." KPIYT now works in Mayaguez but
 DXCCPR's Dixer says it's business as usual at Joe's ARRL
 QSL Bureau branch, address unchanged. Concern-
 ing participation in the upcoming Scandinavian Activity
 Contest (see "Whence"), OH2XK emphasizes, "All partici-
 pants are requested to confirm each contest QSO with QSL.
 This voluntary habit is aimed at fostering the general policy
 of QSLing throughout the world." Well put, Niilo
 W9NN reminds us to remind amateurs outside this country
 that the new bunch of digits at the end of W/K addresses is
 a move to expedite Uncle Sam's mail delivery. Think you
 got troubles? How would you like to squeeze some 260,000
 Zipcode combinations into the *Call Book* without a disastrous
 gale in size? "QSLers of the Month" recognition
 goes to DJ4s AL KF, DLs 7CS 9PU, F2SY, FG7XL,
 HA8KCI, HCs 1DC 8CA, HKs 3RQ 7UL 7ZT, HL9KH,
 IU1IE, JA8s ADQ BY, KC6BK, KG4AM, KH6EDY,
 KR6HQ, KY4AA, KX6DB, OA4s NKY NPF, OE5BY,
 OZ7KV, PJ5ME, SL6BI, UA3GM, UB5FJ, VK2GW,
 XE1VT, XZ2KN, ZB1BX, ZK1AR, ZLIARY, 6O1ND
 and 9G1EW as a result of nominations by Ws 6KHS 7QB
 7VRO 8YGR, Ks 1PCE 2VFE 3CNN 4MYO 6TZX 9CZV
 9JPL, Ws 2TKL 6VAT 8AJZ and WN6BKE's brother,
 QSL managers Ws 1JYH 2'TN 2MES 9VZP and WA5DAJ
 also are commended. If you've been impressed by particu-
 larly prompt QSL action by DX stations recently, slip us
 their calls for our monthly salute to such deserving brethren
 Help! K2PHC wants a hint from the readership on
 running down addresses for ex-EL4A (W7VCB) and
 MP4BBA of 1957 vintage; WA5CVK needs help in ascer-
 taining the current whereabouts of last year's HL9KN;
 and XE2FL (XE5FL) is anxious for tracers on former
 VR4JB, ZD3G, 3V8s AS and FA Positions as QSL
 managers for rare-DX operators in bona-fide need are
 solicited by Ks 1PCE 3QJX 9CZV and the brother of
 WN6BKE. (Linda's brother is so designated in this month's
 column because Dennis's call became separated from his
 fine mailbag report and we're determined to credit the lad
 somehow.) Now let's see what individual postal
 recommendations tumble out of Jeeves's sack:

- AC5A (via W4ECI)
- CM2VQ, P.O. Box 6996, Havana, Cuba
- CR5AA (to W9JFF)
- DL4BD, M. Bronstein (K2VHW), 184th USASA Opns.
Co., APO 171, New York, N. Y.
- ex-EL2PN, P. Esten, c/o Raret, Aptdo. 1365, Lisbon,
Portugal
- EL7A, Box 565, Monrovia, Liberia
- EP2BR, B. Joannon, APO 305, New York, N. Y.
- ET3GB, RCA, USAID, APO 319, New York, N. Y.
- ET3MEN, A. Slurk, USAID, Box 1014, Addis Ababa,
Ethiopia
- ET3PRS, RCA, USAID, APO 319, New York, N. Y.
- F9RY/FC, Hammarlund DXpedition, Box 7388, G.P.O.,
New York, N. Y.
- FG7XG (via W3GJY)
- FM7WA, Lamentin Airport, Fort-de-France, Martinique
making FO8AU (via W3GJY)
- G8PL, L. Kippin, 73 King Henry's Rd., Hampstead, Lon-
don NW3, England; or Box BM/G8PL, London WC1,
England
- HK3RQ (via W2CTN)
- HK9LX (via HK3LX)
- HL9TB, W. Stepro, Box 9, APO 20, San Francisco, Calif.
- HR2FG (via W2CTN)
- HR6GCA, G. Arndt, Mision Evangelica Morava, Brus
Laguna, Depto. Gracias a Dios, Honduras
- ex-HS2M-HS2MP, M. Pioso, 2806 Blaine Dr., Chevy
Chase 15, Md.

- JA8ADO (via JA8BY)
- K1KSH/KG4/KG6 (via W1ETF)
- KX6DB (see preceding text)
- KZ5FC, Box 939, Ft. Clayton, C.Z.
- LU2JY (W/K/VE/VO via WA5CVK)
- OA4GY, Satellite Tracking Stn., Aptdo. 3747, Lima, Peru
- OA4NPF (via RCP)
- PX1IK (via USKA, attn. HB9IK)
- PZ1BW (W/K/VE/VO via WA4EDY)
- SM7WO (via W4OPM)
- SV0WW, U. S. Navy, MCB-6, FPO, New York, N. Y.
- TA2NK (via DJ2NY)
- TF2WID, Box 47, Navy 568, FPO, New York, N. Y.
- TH5BY, APO 116, New York, N. Y.
- TU2AO, c/o U. S. Embassy, Abidjan, I.C.R.
- UA9XB, Vorkuta, Nenets Nat. Ok., Archangelsk obl.,
U.S.S.R.
- UA0BZ, Norilsk, Taymyr Nat. Ok., Krasnyarsk Kray,
U.S.S.R.
- UT5FN, F. Gozoh, P.O. Box 30, Dnepropetrovsk, Ukrain-
ian S.S.R., U.S.S.R.
- VK4JQ (via W6HYG)
- VK9s DR XI, c/o TriState Radio Club, Box 5351, Memphis
6, Tenn.
- VK9NT (via W2CTN)
- VP2CC/c (via W8EWS)
- VP5LA, NavFac No. 104, FPO, New York, N. Y.
- VP6LT, Balmoral Gap, Hastings, Barbados
- ex-VQ1CJ, C. Jay, Project Mercury, Aptdo. 282, Guaymas,
Son., Mexico
- VQ2AB (via W6BAF)
- VR1K, J. Johnson, Met. Stn., Funafuti, Ellice Islands
- VS1FH, 102 Fuyong Estate, Singapore 23
- VS1LS, Traffic Troop, 237, Signals Sqdn., c/o GPO, Singa-
pore
- VS5CW (via MARTS, attn. VS1CW)
- VS9KDV (via W4ECT)
- W1DBN/VO2, E. Marex, 54th Air Rescue Sqdn., Box 79,
APO 677, New York, N. Y.
- W4BPD/4W1 (via W4ECD)
- W4KKA/EP/VS9/am (via K4SCT)
- W7UXP/KI16, G. Elliott, 6181 Ibis, Ewa Beach, Oahu,
Hawaii
- W9NLJ/VE1 (to W9NLJ)
- WA6QVR/KJ6, APO 115, San Francisco, Calif.
- WH6FAS/KM6 (to WH6FAS)
- XE1SS, Box 1150, Mexico, D.F., Mexico
- XE1UU, G. Robles, P.O. Box 173, Aguascalientes, Ags.,
Mexico
- XE2DX, Box 44, Hermosillo, Son., Mexico



W2QHH, a 300-country man on only 10 to 55 watts input and a simple end-fed wire antenna, has lately had his DX activities curtailed by family illness. How long ago helped establish the modern pattern of successful DXing wherein signal strength is often secondary to finesse. While the kilowatt-and-beam boys fiddled around making QRM, W2QHH and his pea-shooter quietly completed schedules with rare new ones. Patience, perseverance and a sharp ear to the DX grapevine produce Howy's juicy QSLs. W2QHH has worked all States on seven bands, all continents on six bands, has QSO'd some 1300 YL operators, and has scored many a first in the DX wallpaper line. C.w. is Howy's favorite mode but he has managed DXCC phone membership as well.

XZ2EM, Box 531, Monterrey, Mexico
YS1MM (via W2CTN)
YV3JZ, P.O. Box 348, Barquisimeto, Lara, Venezuela
ZK1AK (via W3GJY)
ZM7AD, c/o J. Brollier, K6ERV, P.O. Box 1772, San Mateo, Calif.
ZS2MI (via ZS1OU)
5A4CW, R. Wynhoff, P.O. Box 281, Benghazi, Libya
5N2AAK, c/o Railway Telegraph Ofc., Kaduna, Nigeria
5N2ACB, A. Bell, P&T Hq., Lagos, Nigeria
5N2DFT, D. Taylor, P&T Training Center, Oshodi, Nigeria
5N2DJH, D. Hume, DCA, Kano, Nigeria
5N2EGL, STO Sig Section, C/Aviation, Ijeka, Nigeria
5N2JAD, J. Daly, c/o Niger Marine Comp. Ltd., Box 50, Makurdi, Nigeria
5N2JEB, J. Burrell, Nigerian TV Svc., PMB 12005, Lagos, Nigeria
5N2JSC, J. Chapman, 138/146, Broad St., PMB 2143, Lagos, Nigeria
5N2JWB, J. Best, P&T Carrier Rm., NMS, Kaduna, Nigeria
5N2KHP, K. Perrin, c/o Glyndova (Nig.) Ltd., Box 127, Kaduna, Nigeria
5N2PJF, P. Fawcett, Regional Hq. (Police), Enugu, Nigeria
5N2PLH, P. Hamnett, 52A, Ikorodu Rd., Yaba, Lagos, Nigeria
5X5JE, Box 59, Entebbe, Uganda
6YALT (via K5YKO or WA5DAJ)
9A1TAI (via W4VPD)
9G1AW, Box 194, U. S. Embassy, Accra, Ghana
9Q5CA, H. Sheard, B.P. 1313, Leopoldville, R.C. (or to VE3BCL)
9Q5EP, R. Verselle, P.B. 7195, Leopoldville, R.C.
9Q5NQ, Ruth Bolton, P.O. Box 117, Luluabourg, R.C.
9Q5ZZ, V. Bossadi, P.O. Box 1459, Leopoldville, R.C.

Contributors of the preceding QTH selection are **Wa 1ECH 1ET7 1WPO 1Y1M 6KHS 6YKS 7DJU 7VR0 8AJZ 8YGR 9AKV 9GML, Ks 11QC 1PCE 1WKK 2YFE 3QJX 4MYO 5JVF 6TZX 8BIT 0GVA 0JPL, WaS 21PC 2KSD 2QMC 4EDY 5CVK 6VAT 8AJZ, 5N2JEB, KH16EJM, D. Moteschenbacher, DARC's DX-MB (DLs 3RK 9PF), DX Club of Puerto Rico (DXer (KPARK), Far East Auxiliary Radio League News (KA2EB), Florida DX Club DX Report (K4HF), International Short Wave League Monitor (12 Gladwell Rd., London N8, England), Long Island DX Association DX Bulletin (W2MES), Newark News Radio Club Bulletin (L. Waite, 39 Hannum St., Ballston Spa, N. Y.), Northeastern DX Association DX Bulletin (W2DGW, K2UVU), Northern California DX Club DXer (WA6TGY), Western Washington DX Association Northwest (W7JPC) and West Gulf DX Club DX Bulletin (W5IGJ). The gang can use your latest "Where" info, and Jeeves will be glad to pass the word along for you.**

Whence:

EUROPE—SRAL (Finland) invites your indulgence in the 5th Scandinavian Activity Contest, a DX affair in which non-Scandinavians will scare up as many LA/p OH OH0 OX OY OZ and SM/SL colleagues as possible and, of course, vice versa. The c.w. session commences 1500 GMT on September 14th and winds up at 1800 on the 15th; phone men take over on September 21st and 22nd, same hours. We call CQ SAC on c.w., "CQ Scandinavia" on phone, and the serial exchange in this brawl is the usual RST001, RST002, etc., the "1" omitted on voice. Scores are figured at one point per completed QSO, this total multiplied by the number of Scandinavian band-prefixes collected. With operation permitted on 3.5 through 28 Mc., a maximum of 40 multipliers is possible. Your log transcription listing date, GMT, station worked, serial sent, serial received, band, and notation of each new multiplier claimed, should be submitted with a summary sheet to SRAL, P.O. Box 306, Helsinki, Finland, postmarked no later than October 15, 1963, to qualify as a candidate for certifications of merit. Good chance to acquire credits toward OHA, OZCCA, WASM and WALA sheepskins, too. See you on the north Atlantic path, OMs . . . RSGB's 7-Mc. DX Contest holds sway on the 19th-20th of next month and November 2nd-3rd. We'll bring your participation particulars in October's "How's" . . . "The states of Arizona, Colorado, Hawaii, South Dakota, Utah and Wyoming have not yet had the pleasure of QSOs with G16YM," writes the secretary of Belfast YMCA Radio Club. "We are on the air regularly, 20 c.w. and occasionally sideband, at 2000-2200 GMT, on Wednesdays, Fridays and Saturdays. Special schedules can easily be arranged." . . . If you like to try for tricky operating certifications, consult HA5BB of Central Radio Club, P.O. Box 185, Budapest 4, Hungary, regarding CRC's "Rummy Game of the Ether" wallpaper. It's not impossible, for DL3TW earned No. 1 . . . DL4BD (K2VHW) likes 7044-ke. c.w. plus 2-meter a.m. and c.w., lamenting, "I use c.w. mostly because the s.b. boys won't tune in my a.m." W8YGR expresses a similar complaint in that s.b.ers won't respond to his c.w. calls. Cross-mode QSOs may not qualify for certain contest-type



VS1FJ is one of Singapore's best known DX hunters with 150 watts to a vertical radiator on 15, 20 and 40 meters. Frank prefers the code mode. (Photo by W7QYA)

two-way categories but, generally speaking, a QSO is a QSO. When amateurs using compatible modes get into the habit of ignoring each other, the emergency communications potential of the amateur service is obviously watered down . . . OT G15UR, noting our recent mention of G13OLJ's unique location at Blackhead light, informs us that Jack's son, G13NYT, now signs VE8WN with Federal Electric in N.A.V.T. . . . Club publications supply more Continental comment: IT1TAL plans an operational stop at S.M.O.M., an autonomous chunk of Rome, after his two-kilo QSO San Marino offensive as 9A1TAL. . . IB1s ABV/fl and ADZ/fl sneaked Lichtenstein into a few 75-meter phone logs in midsummer. . . IB9IK & Co. got away down into the lower layers with a thorough PA1IK program in June-July. . . We hear that G2DF joined the Century Club with a modest indoor antenna.

OCEANIA—Like to collect KX6s? Well, here's your chance. KX6BK of Kwajalein Atoll Amateur Radio Club announces a WAKI DX Contest to be held from 0600 GMT, September 14th, to 0600 on the 15th. The password is "CQ X", and non-KX6s may work KX6s once per band (no 160). W/Ks will transmit signal reports (RS or RST) and States of location; KX6s will transmit RS or RST, island abbreviations (et jik mo n ey, etc.) and operator names. Non-KX6s earn 10 points per QSO, this total to be multiplied by the number of band-islands accumulated. KAARC claims there are amateurs now active on Eniwetok, Parry, Roi-Namur, Ebeye and Majuro, with other activations possible. A log entry with five different KX6 stations will qualify participants for the WAKI award, and entries must be filed with the Contest Committee, Box 444, Navy 824, San Francisco, Calif., postmarked no later than October 15, 1963. Good beachcombing to you . . . K6ERV says ZM7AD's M.D. status and consequent QRL restricted his July Tokelau QSO output. Gerry ran only 15 watts of c.w. and a.m. on four 14-Mc. channels and doesn't thrive on pile-up pressures . . . "Had the pleasure of putting KH6DB on the air in June, c.w. only," reports WA6HRS. "I'm sorry I couldn't work all the gents who called. Prime DX time to the States falls right in the middle of working hours in the Marshalls. It's quite an experience handling pile-ups from the DX end!" . . . K1KSH swapped Guantanamo for Guam, expecting a logful of K1KSH/KG6 c.w. contacts on 3520, 7010 and 14,020 kc., plus 14,205-ke. a.m. at times. One-sixty is Gary's dish, too, and he hopes to continue his 1.9-Mc. doings right into the autumn season . . . More Pacificisms for your pleasure via aforementioned clubs and groups: VR1N's summertime Ocean Island output weighed in at over three kilococontacts, according to W2GHK of Hammarlund. . . The Henrys of W6TOU took a swing as F8ABF after a prosperous summer DX visit to the shack of VR4CU. . . W6FAY/KP6 May switch locale from Palmyra to Jarvis this month before heading homeward. . . VK9NT, spraying s.s.b. on 14,315 kc. around 1130-1200 GMT, seems to be best bet for Papua. . . VK8HB, Alice Springs, N.T., displays a rare prefix on 14,007 kc., 0700-0830 GMT. . . VK4Q's Willis isle log isn't being fattened by many W/K entries but you're welcome to join the wailing s.s.b. chorus on 14,300 kc. between 0300 and 1000 GMT. . . VK0VK and UA1KAE keep Antarctica available on 20 c.w., usually around 0500 GMT. . . W3AAY/mm was on the scene near Midway aboard carrier *Wasp* when astronaut Cooper completed his multi-orbital mission in May. . . ZLJFF, who takes a dim view of



VR2s EH, EO (VP2VB) and BZ strain some camera film with gay sportshirts in Fiji. This was the final operational stop for Yasmie III on VP2VB/mm's most recent Pacific DX program. QRD next, OC? (Photo by VR2EH's XYL)

boish operating tactics, may become more active on 20, 40 and 80 from the Campbells this month. Neighbor ZL1ABZ of the Kermadecs continues to slice through on 14 Mc. with his 80-ft.-high beam, also working 15, 40 and 80 meters on occasion. ZL3VB, however, is rarely heard from the Chathams these days.

AFRICA — ZSI0U records, "I'm running regular skeds with Ray of ZS2MI, Marion Island, Saturdays and Sundays at 1000-1145 GMT on 14,000 kc. We keep a lookout for W/Ks over the long path although conditions in this direction have been pretty poor." . . . ZD9AM may have his new rotary beam spinning by now. ZSI0U says Rob puts Gough isle on a.m. at 1100-1300 GMT, 14,120-14,135 kc., almost every week end. . . . Ex-BL2PN (W6PN) remarks, "In the months I operated in Liberia I was constantly surprised by the good operating, excellent sportsmanship and general helpfulness displayed by U. S. amateurs. The same generally applies to non-W/Ks as well. I particularly thank those who cleared my rock-bound spot while I kept in touch with my sons who were schooling in California. . . . Apparently seven 9Q5 cards will qualify a DXer for UCRA's *Diploma de Leopoldville*, a certification mentioned by 9Q5EP. Better check for details first, though, either via UCLA or with Ray (see "Where") . . . K4SCT apprises, "W4KKA also holds the call VQ4ZZ, am mad made good use of it while living over Kenya in July. No ground-based work in VQ4-land, though." . . . The U.S.A. tour of ZS6WS and XYL may continue well into this month. W1HZ says the Boston DXCC crowd gave Tom and Nancy a lively welcome to our country in late June. . . . Club periodicals supply additional Africa items: Rio de Oro, Hai, Fernando Poo, Spanish Guinea and Annobon isle are worthy DX objectives menaced by DXpeditionary plans of EA5 2CA 4CR 4GF and 7ID. . . . W9JIF played an a.s.b. hand as CR5AA, Portuguese Guinea, in July. . . . 5R8CM, thanks to crystals courtesy W2GKZ, prepares potent sideband propagation for the pack. . . . 5N2JKO, on learning that one can run 50 watts on 160 meters in Nigeria, began construction of a 530-ft. flat-top for the coming 1.8-Mc. season.

ASIA — "I came across your June 'How's' report on W4KKA's monsoon-hunting activities in southern Asia," recounts DL4DB (K2VHW), "and then was pleasantly surprised to work W4KKA/am on 20 c.w. He was bumping along in an old DC-6 at 15,000 feet en route Bombay from the Maldives." Rarely a dull moment on good old 14 Mc. W4KKA's QSL chief, K4SCT, writes, "Harry made a few overnight stops at Gan and knocked off several hundred QSOs as W4KKA/V89." . . . XZ2KN's Ranger is aimed at W/Ks almost daily on 20 c.w., according to W7YRO. Tara hears Statesiders bust around 1300-1400 GMT. . . . Stationed in Turkey, K3JHE keeps tabs on U. S. ham doings via the big 14-Mc. signal of W1AW. Bob also reports fat phone signals on 20 from K1PMR, W2s BN LPT, K2V5V, W3s BOA, mm WPI, Wis GL MVI PQ, K1VOF, W4MZZL, K5MDF and W8FOQ. 4. Lots of fancy Turkey-type calls reported active on 20. TA2NK, TA4SO, TI15BY, etc. — but no official relaxation of that country's ham prohibition seems imminent. . . . WA2IPC credits the 250 watts and ground-plane at 4X4DX for one of the most consistent Middle East signals on 20 sideband. Ami receives with a 2B. Quite a ham boom in Israel these days with plenty of three-letter 4X4 novices showing up in the *Call Book*. . . . Ex-HS2M-HS2MP, now schooling in Maryland, recalls better DX days in Thailand: "A few years ago, when I was WH6CZZ in Hawaii, my father, a U. S. Navy officer, was transferred to Bangkok. I obtained an Eico 720K, an 807s

modulator and an old RAL-8 receiver which barely reached 14 Mc., put up a pair of phased dipoles and a fixed 4-element array, and collected some 18,000 QSOs with 180 countries. Spending about four hours on the air daily, I made many friends throughout the world. Only eight per cent of my contacts were with the U.S.A., most of these being with west coast stations. It was just impossible to work everyone who called." Thailand still is on that pesky ITU/FCC Ban List and is off-limits to Canadian and FCC-licensed amateurs, current IISIP action notwithstanding. . . . W1BPD, hamdom's up-dated Marco Polo, celebrated his July arrival in Bhutan with an AC5A outburst on 20. Gus is notably less audible Stateside from his new area of operations, doubtless due to the polar propagation paths involved. Next month Gus may assault VK-type DX bustions in the Pacific. . . . Asian notes from the clubs press: VS9I*SU is said to radiate from Perim island, a five-square-mile speck at the Red Sea entrance administered from Aden. . . . APs 2AR 5CP 5JA and 5SS make lots of E. Pakistan QRM on 20 c.w. around 1700 GMT. . . . UA6s RT and RV reportedly ponder Wrangell isle DXpeditionary possibilities. . . . VU2MD's 227/205-country DX score is well geared with about 50 watts input to apartment-type wires. Dady still hunts Idaho, N. Dak. and Utah for WAS credentials, mainly near 14,050 kc., 1530 GMT. . . . HL9KH (W9WNV) has the official door ajar for AC AP and other tasty DX morsels but military duties come first. . . . KA2s AO DA JL and OP are back in the States with KA2OV soon to follow. . . . JPICA (UA3CA) may remain workable on 14-Mc. c.w. and single-sideband till 1964.

SOUTH AMERICA — Not many newangled countries in our neighbor continent to the south, but its unexplored and unexploited regions almost qualify it to supplant Africa as the truly "Dark Continent". Wis IKE and VG forward evidence of typical exploratory doings down that way. Seems that a chap named Peter Gimbel strolled into New York's Harrison Radio outlet, purchased two-way gear for 14,250 kc. and announced that the station would parachute with him into the Peruvian wilderness. No call specified, but Harrison offers to QSP QSLs. Similarly, the July 14-Mc. c.w. performance of HK9LX is said to have been HK3LX on location with an exploration party up the Amazon. . . . K5JVF comments on LU2XL's 8-line layout and substantial 7-Mc. signal. A New Orleans-oriented rhombic is no hindrance. LU2XL, a Texan, is said to be joining forces with LUs 4RAD and 4XG for a DXcursion to South Sandwich and South Georgia regions. . . . W2JTB tells us that CE0ZI/mm-KC4AAA/mm, research ship Etanin, will operate near South Sandwich isles until the middle of this month on 14,285 kc., also 15 and 40 meters, at 0300-0400 and 1100-1415 GMT, s.s.b. preferred. . . . W1WPO of ARRL's DXCC Desk notes that father-and-son DX team YV5s AXQ and AJK have confirmed 445 phone countries between them. YV5AJK is 39 countries up on the OM. . . . WB2ARD's first DX QSO was with YV5AK and he says he got so excited that his keying went to pot. Remember your first hop past Canada? (How could you forget!) . . . LU2JV, who assists WA5CVK with his high school Spanish course, sends a steady signal Statesward with but 20 watts. . . . According to WA2IPC, 800 watts and a six-element beam are responsible for those stout 14-Mc. sideband emanations of OA4M.

HEREABOUTS — The New England DXCC Group II invites DXers to attend its annual get-together on September 21st at Motel 128 (Routes 128 and U), Dedham, Mass. Five p.m. is kickoff time with dinner at 7:30, and the program will be highly entertaining, as usual. Check quickly with chairman W1HZ if you choose not to be left out of this impending festivity. . . . *Reminder:* As outlined previously, there's a gala W9-DXCC assembly coming up at Chicago's Sheraton on the 14th of this month. Rush an inquiry to chairman W9EVI. Contrary to rumor, W9YFV's station and QTH will not be raffled off to some lucky local. . . . XE2FL tots up his April 16th-21st Cozumel island XE5FL results at 639 QSOs with some thirty countries on five continents using a.m. and c.w. on 10 through 40 meters, W8EGF says XF3AQ, an ex-Detroiter who owns a hotel on Cozumel, sometimes fires up on the island. . . . W6PM celebrated fifty years of amateur radio with a Baja California fishing trip as guest of XE2s AB and UL. "The whole thing started several years ago," writes the OT, "after many enjoyable QSOs with both stations on 20 and 40 meters. XE2s AB and UL have identical stations — Johnson 500s, HQ-170s and TA-33 beams with 7-Mc. elements added. Due to their marvelous locations they always have outstanding signals." W6PM sent photos of a snailish catch that would nourish a small town for a week or two. . . . "I am a missionary with the Moravian church in Honduras," explains HR6CSA. "My wife also operates our DX-100 and S-40B. We use a rhombic antenna, and will appreciate any calls that come our way." Gerald should certainly get a few, for he appears to be the only HR6 on record. . . . Ex-KS4AT of the early '50s is lately heard as W5KWW around 7090 kc. . . . Between the hours of 1100 GMT, September 14th,

(Continued on page 152)



Hints and Kinks

For the Experimenters



TRANSIENTS AND POWER-SUPPLY DIODES

ONE of the important factors to consider when designing a power supply that uses semiconductor diodes is the p.i.v. rating of the diodes. Formulas are available for determining this value on the basis of the known r.m.s. values of the line voltage, but little information is available as to what can be expected from transients which appear via the power line. These transients are probably responsible for a large majority of semiconductor failures in power supplies. The following information and chart concerning transients appeared in a *GE Newsletter* for March 1963, and is reprinted here in part.

The chart (in Fig. 1) shows the frequency and severity of random voltage transients on typical 120-volt mains in seven homes, two hospitals, and three commercial establishments. The data represents approximately 8000 hours of testing time. Locations were in two

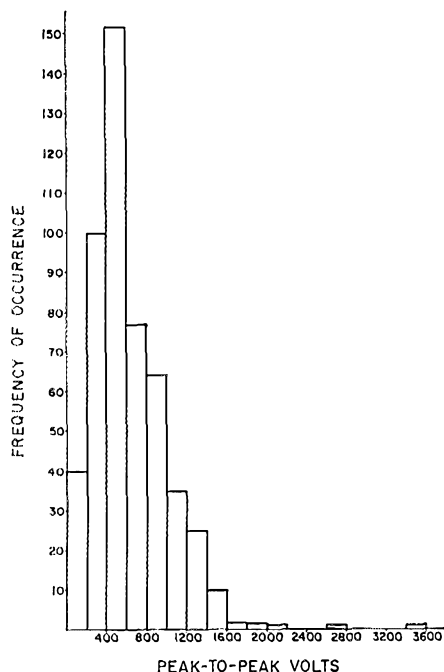


Fig. 1—Histogram of frequency of occurrence of surges. Data was taken with a Tektronik automatic oscilloscope 515A, Model 760A, a Beattie & Coleman automatic camera. Data includes 7 homes, 2 hospitals, 1 hotel, 1 motel and 1 department store.

states. What the data shows: 1. Some locations have considerably more and higher transients than others. In other words, just because you're not having trouble in one place does not mean you won't have trouble someplace else. 2. The highest transient measured to date on a 120-volt line was 3470 volts peak-to-peak. It occurred in a Florida home during a lightning storm. 3. Relatively frequent transients occur up to 1600 volts, with most frequent occurrence around 500 to 600 volts. 4. Most of the voltage surges last less than 50 microseconds.

While the data is limited, it still constitutes the most complete information taken to date. It proves conclusively that voltage transients must be reckoned with in semiconductor apparatus operating from utility lines.

GRID-DIPPER CALIBRATION

GOOD grid-dip meter accuracy over all the coil ranges is sometimes difficult. I have found that a gimmick capacitor, such as C_1 shown in Fig. 2, connected across the plug-in inductor for

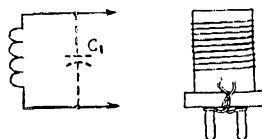


Fig. 2—A gimmick capacitor allows for calibration of grid-dip meters.

each range affords an effective means of calibrating the coils individually. A high degree of accuracy can be obtained this way for special segments of the coil ranges, such as the amateur band frequencies. The gimmick capacitor consists of two leads, each connected to a coil terminal, and twisted together. A communications receiver can be used as the frequency standard.

—Dick Kelly, K5SOD

HEADPHONE ADJUSTER SPRINGS

MANY headsets available nowadays don't have the spring loading device which holds the receiver units in their preset position on the headband vertical slide bar. I have found that springs from the retracting mechanism of defunct ball point pens may be curled on between the headband brackets to overcome this omission. My Trimm headset now stays in this adjusted position.

—Alan Parsons, K7UYJ



Correspondence From Members-

THE ARRL PROGRAM

☐ . . . I was around in 1949 and the mess that almost destroyed amateur radio was started by ARRL. Now history repeats. July *QST* proves that the ARRL Board is an undemocratic political machine that once again is taking steps to destroy amateur radio. In *QST* the Board is defending its outrageous anti-amateur proposals, as a member of the League it really burns me to see a bunch of dictators take over amateur radio with the intention of destroying everything that amateur radio stands for. . . . — *W2WLT*.

☐ . . . The League has taken a bold step in providing real *leadership* for the group it would represent. This is representation in its most profound form. A leader must always be one who is willing to act in cooperation with the most rational and the wisest members of society to provide the highest standards of action for the majority of society. If he is swayed by the will of the mob, he will always embrace mediocrity, if not for its own sake, at least then for the sake of avoiding antagonism. This can be rationalized but it is not wise. . . . — *W6TIN/1*.

☐ . . . Some years ago you advocated the removal of incentive licensing to increase the amateur membership; now you want to bring it back. I think this is a very *rotten* deal. I actually hope you drown in your mistakes. . . . — *W9WQG*.

[*W9WQG* is misinformed. The League was strenuously opposed to the removal of incentive licensing, as reference to *QST*'s of the 1949-1952 era will quickly show. — *EDITOR*]

☐ I do not choose to renew my membership in your organization, now that you have obviously designed its principals to become a Fraternity for Electronic Engineers, and Professional Test Takers. . . . — *K4ZJW*.

☐ . . . It would be laughable, were it not so serious, to read a statement on one page of *QST* by a self-appointed victim of calamity that only "electronics engineers" will be able to pass a proposed advanced license test, then only a few issues earlier read of a 12-year-old boy who has found time between his grade school classes to pass the same test as our complainer. . . . — *K4OQK*.

☐ In attempting the forced creation of a super breed of ham, why not do a complete job — require additional c.w. skill? You seem very wary on this point. Every time you mention advanced requirements you quickly say, "Further code examinations shall not be required." Why the heck not? Give the confirmed c.w. boys something to shoot at too. — *K3GEO*.

☐ . . . By looking back into history, we can find a parallel to our present situation. When people had built up a great civilization, they stood only as long as they had something for which to work. Without a continuing goal, they gradually lost all purpose to live and fell before the onslaught of a

determined enemy. We can apply this historical fact to our hobby. Without some goal toward which to work, we will gradually fall into a slumber which ultimately will spell disaster for our hobby. — *W9STG*.

☐ For reasons better expressed by editorial in the July issue of 73, I do not wish to renew *QST*. — *W5WJA*.

☐ The Saginaw Valley Amateur Radio Association voted 65-3 against your proposal. I'm very happy to report that vote. Can't you fellows find something more constructive to do than just think up and try to sell such nonsensical ideas. In 1964 I'm going to think twice before I send \$5 for membership because I now have the feeling that you guys are not representing me to the best of your ability. I'm going to take my money that I save and subscribe to *Playboy*, then I know I'll get something for my money. — *W5TOA*.

☐ We do not normally take time to write letters in controversial matters such as incentive licensing. We try to ride the fence thinking there are enough intelligent hams to keep things going right. The straw that broke the camel's back was *W2NSD*'s article in July 73 on incentive licensing. Our own club, Amateur Radio Club of Southwest Louisiana, unanimously voted disapproval of the proposed incentive licensing. The proposal was quite misrepresented at that meeting. Our hope is that hams will wake up to the fact that ARRL is looking out for the amateur and that cheap articles and false propaganda such as 73 put out are not for the best interest of our amateur bands. — *W5HCF*, *W15LRV*.

☐ In the past few months the ARRL has been widely criticized, both good and bad, for some of the issues it has supported. Some of the League members have felt so strongly against these issues that they have gone so far as to cancel their own ARRL membership. Even though I don't agree with the League on everything that they support I do want my voice to be heard. The League has my 100% support on all matters due to the fact that you people there at ARRL Headquarters are usually more in the know than I am and I have confidence that all of your decisions are in the best interest of amateur radio. — *KR6DD/K9TQJ*.

☐ I am renewing (lapsed for several years) because too many on the bands are saying "don't confuse me with the facts, my mind is made up." I am one of many who lost the privileges that you are now trying to restore. — *W9KCX*.

☐ I dropped out because years ago you ran a picture of the flag raising on Iwo Jima posted in fun, showing pants at half mast. I want back in because I like your fighting spirit in advancing the level of ham radio. — *W141G*.

☐ . . . It is certainly true that if we do not regulate ourselves, the FCC will do it for us. If this were to happen, the amateur ranks would regret it. Look what happened to the citizen banders! — *W6OPX*.

¶ Several weeks past I resigned my membership in your organization in demonstration of my protest of your arbitrary use of my own and what appears to be the overwhelming majority of the nonvoting membership, to further your own designs of power and grandeur. Your actions in representing yourself as the all encompassing voice of the U.S. amateur group clearly shows through the subterfuge of the incentive licensing program advocacy and transgresses all bounds of propriety, perhaps to the point of fraud. Your secret methods of director meetings, your chavinistic approach to revered antiquity and your juvenile "if I can't have my way" approach to the now cancelled Cleveland Convention all prove irrevocably your inability to represent my or the preponderance of membership's vote in any directive or dictate to the FCC, Congress or government. If you believe for any moment that the biased reflection of your house organ magazine are convincing "hamdom", listen on any band any time for a true reflection of how we feel about the ARRL's underhanded dictatorial ways. I and many others feel your organization has degenerated into a handful of despicable, power hungry, whimsical bolsheviks who are far removed from the intent or purpose of the U.S. amateur. — K3YDD.

¶ . . . The inescapable fact is that the FCC is now taking an absolutely agonizing look at all of its licensing and allocating concepts; it is measuring these functions against what it believes to be public service in a manner totally different from what has existed in the past, and it is moving with frightening velocity in areas that it thinks can be substantially improved. It has not hesitated to deal the maximum penalties allowed in cases it thought deserved it, and there is a profound lesson here for amateur radio. . . .

The average amateur, I think, had better learn that there is nothing sacred about the current table of allocations; his amateur license is not an inalienable right, and that his existence is not justified simply because there are 200,000 of us who think amateur radio is a wonderful hobby. The Communications Act of 1934 is quite clear on the reasons for the amateur service, and we had better be ready to render an accounting of what we have done with our privileges. There are 200,000 of us using spectrum that belongs to 185,000,000 Americans, and we are governed by a court that doesn't meet the usual definition, inasmuch as it places the burden of proof squarely on us. In the FCC's own words, we're going to have to show cause why our licenses and allocations should not be revoked; they are not going to have to prove us guilty. . . . — K4ZJF.

¶ I'm still somewhat concerned with some of the basic statements made, i.e. "officers and directors of the League have become increasingly concerned over recent trends in the amateur service." Now I ask you in all fairness, who are the officers and directors, except elected representatives from the ARRL? Why should they make decisions affecting all amateurs because "they" are concerned. "The Board feels a definite obligation to see that this phase of our amateur activity is considerably improved." Again I say, the Board is not a "big brother" to we amateurs, but is supposed to represent our interests however selfish they may be. . . . — K7SGV.

¶ . . . I cannot read the continuing stream of letters in *QST* wailing that "I can't," or "many of us just can't" or "not everyone is an electronics engineer," without experiencing mixed emotions.

I can only pity those weak-willed whimperers who are ready to admit defeat without even knowing the problem. And it is difficult to avoid some contempt for those alleged hams who cry foul without either understanding what ARRL is suggesting or looking beyond their own personal, selfish prejudices. . . . — K6CTV/4.

¶ . . . It's true that the more we can learn the better off we are but the average ham can not compete with all the services that are putting or pushing the state of the art ahead. . . . — KØPLX.

¶ . . . Opinion polls (and in marketing billions are put on the line on the results) are based on samplings. I am certain that the sampling would have reached thousands of amateurs, enough for a substantial sample. The results of the poll would have shown an amazing majority against the ARRL Board decision to ask for incentive licensing. — W8ZTX.

[Wrong. More than 4,000 comments received so far, certainly adequate for a sampling, show about an even division of opinion. — EDITOR]

¶ . . . As some have said before me, the Board is to be congratulated for its moral courage in issuing the incentive proposal. However, as far as I can see, it would do little or nothing to raise the technical level of ham radio in general, and the clearing off of the bands which would figure would be quite temporary. What it would do, and has already started doing, as is obvious from the storm of letters which you have received on the topic, is to make ham radio more conscious of the fact that our present privileges were not always there, but gained by hard work on the part of the early amateurs, and will not be kept up by less, most certainly not the know-nothing ham so common today. For this part of it, I congratulate the ARRL, and say, "keep up the good work." For amateur radio is most certainly not built on the complacency prevalent in some today. . . . — K1WPR.

¶ In the past thirty days, my entire opinion of ARRL has taken an about face. A month ago, I declared on the air that I would certainly quit ARRL, and get others to do so, if the incentive ruling proposed by the League were passed by FCC. I had heard of the injustice resulting from the former system. Then ARRL sent affiliated clubs bulletins filled with FACTS — not rumors — concerning the proposal.

These proposals are far different from those rumored and I, now well informed by the club publication, fully support ARRL in this measure. May I appeal to other amateurs to please find out the facts before condemning our fine organization. By the way, I'm a Conditional. . . . — W14EFA.

¶ Though I certainly dislike the prospect of losing, even temporarily, any of my present privileges as a Conditional class licensee, I must grudgingly admit the ARRL program as listed in June *QST* is probably for the good of U.S. amateur radio as a whole. . . . — W15AEK.

¶ Our club has discussed the present state of amateur radio and the recommendations of the Board for improving said state, at great length. Our club by unanimous vote supports the recommendations and will do all in its power to assist in implementing those recommendations. It will participate, to its utmost capability, in the League's program for im-

(Continued on page 156)



Operating News



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

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

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Conditions Looking Up This Fall. Have a good summer? Radio conditions were hardly ideal what with short skip and static levels. With the fall season the ham bands will be hot with activity. We look for a high order of results. Experts predict a turning upward of the sunspot cycle. Regardless of this, the large number of amateurs really active and in there pitching in each band will insure plenty of takers for traffic, good DX, rag chewing and we hope top emergency readiness on the part of all. ARRL appointments and awards (CP, WAS, DXCC) are available to add objectivity and results in our hobby. Essentially amateur radio is working together cooperatively, by radio. Join a net, or your local club where there is one. This opens wider fields of fraternalism and results than trying to hit it off as a "loner."

Which Appointment for You? There are three basic ARRL station appointments made by SCMs. The OES (Official Experimental Station) appointment is a recognition and responsibility for the active and outstanding v.h.f. worker. It is given equally for your reporting propagation results regularly, or for your v.h.f. netting and, or traffic-emergency know-how. ORS (Official Relay Station) is the designation by which the traffic-post mostly identified with 3.5- and 7-Mc. c.w. traffic workers and netters is known. The OPS (Official Phone Station) post is the parallel recognition that SCMs extend to consistent phone netters who conduct their traffic and other work mainly in these same bands. ORS and OPS posts are open to Conditional, General, Advanced and Extra Class FCC and equivalent Canadian amateur licensees. Stations consistently reporting activity at 50 Mc. or above, holding such licenses, als Technicians and Novices, are eligible for OES. Technician members also can apply for OBS (v.h.f. bulletin station) or VHF-PAM posts where there are vacancies. The latter post is one in the leadership category. Plans for this season are to expand the number of v.h.f. nets, where there are none. Wherever there are VHF-PAM volunteers and of course enough supporting v.h.f. netting to make it possible, SCMs are

ready to make these appointments in order to sponsor, expand and maintain useful section v.h.f. net facilities.

We extend a cordial invitation to all active amateurs to study the appointments and aim to become identified with the ARRL appointment that best fits. See the detailed descriptions of these posts in *Operating an Amateur Radio Station*. This is available to members on radiogram request. The application forms for appointment and decisions on applications also come from your elected operating-administrative ARRL official, the Section Communications Manager. You will find his address on page 6 of *QST*. The scope of each station and leadership post is indicated in the following:

LEADERSHIP AND STATION APPOINTMENTS

ORS — Official Relay Station. Noted for reliable traffic service, high procedure standards. Includes a 15 w.p.m. c.w. requirement.

OPS — Official Phone Station. For the voice operators; exemplary operating procedure expected. Appointment is identified with reliable traffic work when mainly accomplished on voice.

OES — Official Experimental Station. The post recognizing work in the v.h.f. regions, 50 Mc. and above. May involve reports on propagation data and experimenting, also the support of v.h.f. nets, traffic handling and individual schedules that build up or demonstrate dependable communications service, for the public or amateur radio itself (as ORS or OPS do in h.f. frequency ranges).

Unless already holding an SCM appointment in one of these fields, your application will be welcomed. There are other specialty assignments to provide different kinds of services for amateurs. (1) Phone Activities Managers to manage, promote and maintain voice nets. (2) Route Managers to manage, promote and maintain c.w. nets. (3) OBS for dissemination of radio bulletins to amateurs for reliable over-the-air information ahead of any printed word. (4) SECs and ECs to sponsor emergency communications recruiting, operation, organization, and planning for standby radio provisions in disasters in their areas of operation. (5) Official Observers to watch over the bands and send alerting notices to keep operators with defective signals from

FREQUENCY MEASURING TEST SEPTEMBER 12

ARRL invites every amateur to try his hand at frequency measuring when WIAW transmits signals for this purpose starting at 0130 GMT, Sept. 12. **CAUTION:** Note that since the date is given in Greenwich Mean Time, the early run of the frequency measuring test actually falls on the evening previous to the date given. *Example:* In converting, 0130 GMT, Sept. 12 becomes 2145 EDT Sept. 11. The signals will consist of dashes interspersed with station identification. These will follow a general message sent to help listeners to locate the signals before the measurement transmission starts. The approximate frequencies used will be 3506, 7016, and 14,017 kc. About 1½ minutes will be allowed for measuring each frequency, with long dashes for measurement starting about 0136. It is suggested that frequencies be measured in the order listed. Transmission will be found within 5 or 10 kc. of the suggested frequencies.

At 0130 GMT, September 12, WIAW will transmit a second series of signals for the Frequency Measuring Test. Approximate frequencies will be 3519, 7051 and 14,039 kc.

Individual reports on results will be sent to all amateurs who take part and submit entries. When the average ac-

curacy reported shows error of less than 71.13 parts per million, or falls between 71.43 and 357.15 parts per million, participants will become eligible for appointment by SCMs as Class I or Class II OOs respectively.

This ARRL Frequency Measuring Test will be used to aid qualification of ARRL members as Class I and Class II observers. Present observers not demonstrating the requisite average accuracy will be reclassified appropriately until they demonstrate the above-stated minimum required accuracy. Class I and Class II OOs must participate in at least two FMTs each year to hold appointments. SCMs (see listing page 6) invite applications for Class III and IV observer posts, good receiving equipment being the main requirement. All observers must make use of cooperative notices, reporting activity monthly through SCMs, to warrant continued holding of appointment.

Any amateur may submit measurements on one or all frequencies listed above. No entry consisting of a single measurement will be eligible for *QST* listing of top results. Listing will be based on over-all *average* accuracy, as compared with readings made by a professional lab.

getting into FCC difficulty. Recognition to active amateurs plays a large part in an SCMs action to appoint you OES, ORS or OPS if you meet the qualifications. In the service categories the SCMs approval for the post has to be based on whether it is filled and on what in his opinion will give the best "service to the membership" rather than the accommodation or wishes of the applicant.

Public Service and Your Participation.

The League's Board at its recent meeting approved the taking of steps to combine the strength and capabilities of the *Amateur Radio Emergency Corps* and the *National Traffic System* so these elements might constitute an *Amateur Radio Public Service Corps* of maximum amateur effectiveness. These patterns call for the participation of *every individual amateur*, whether a League member or not. Section leaders are discussing and implementing ways for the NTS and AREC groups working ever closer together in an ARPSC. John Banke, SEC, NNJ, K2ZFI writes, for example, "Our emergency drill called pre-SET was our first scheduled use of NTS in an AREC drill. The traffic net tie-in will do more for AREC than anything else. Our ECs made a very favorable comment on working with NJN and we hope all our ECs of NNJ can be in one of the NTS units. Plans are to run four drills a year on a section-wide basis with the help of NTS to build up our section ARPSC."

There'll be more details to release we confidently expect, as the season progresses. *You* will want to be part of this active operating setup, both to get the earliest information and to feel that you are doing what FCC expects in being ready to make some kind of communications stand-by contribution that counts, in event of emergency need. FCC's Basis-and-Purpose (§12.0) spells out the aims for the whole body of amateur licenses to include: (1) expansion of the existing reservoir within the amateur radio service of trained operators, technicians and electronic experts, (2) . . . Enhancement of the value of the amateur service to the public as a voluntary non-commercial communications

service, particularly with respect to providing emergency communications.

Wanted: Code Practice Stations. Radio amateurs who can schedule over the air code for our CD-62 form on which to report your proposed days, time, frequency and code speed range and your station call and address. Our Training Aids section will be pleased to send information helpful for the conduct of such programs on request. Since these schedules are set up and printed for distribution to those in need of such information, we feel that a schedule set up by you, should run for a minimum of six months or longer.

Field Organization Progress. There are now seventy-three ARRL sections in the field organization of the League. *Your SCM's* address is given each month on page 6 of *QST* so you can report your station activities monthly and contact him to get recognition through *station appointments*, if you are active on the air. Steady membership increases for several years now bring the average section size up to 1182 members. These are Full Members, amateurs government-licensed by the FCC or DOT. There are of course additional Associate Members in each area, most of them working to achieve licensed status. Operating leadership in the different sections is provided by the Section Communications Managers. They are nominated and elected by petitioning (and balloting where more than one candidate is named) in the membership. Last year, for example, there were elections called for in 37 of the League's sections. Balloting to decide between candidates was required in twelve sections. Twenty SCMs were returned to office; seventeen new SCMs were named and started their two-year term of office. The per cent return in SCM elections ran from as high as 64.5% in Nevada and 55% in Montana, Tennessee and South Carolina to a 34% return in Northern New Jersey.

We have but recently recorded operational highs in numerous departments of League operating activity. In '62 the number of nets registered, the issuance of Code Proficiency Awards,

and the numbers of RCC (7465) and WAS (1011) certifications issued reached new highs. The National Traffic System can transfer traffic systematically between 123 of the nets registered for participation in traffic and emergency work. The total number of amateurs certified in the League's Code Proficiency program has now reached 42,095. In 4049 papers submitted (up 16% from previous year) 3529 passed, the failure rate continuing at 12.8%.

DXCC certifications (796) topped the previous year, this in the face of difficult propagation conditions. There were some 2488 DXCC endorsements. Careful processing check required review of 126,467 cards in 4055 submissions of data! The top records for contacts and scores in the quarterly Appointee-CD Parties in '62 were as follows:

Station	Contacts	Sections	Score
W3TMZ, ORS-OO, Md. (Apr.)	747	64	239,040 c.w.
W9YT, ORS, Wis. (Jan.)	150	47	340,270 phone

K4PUZ, OO, Tenn. and K4BAI, ORS-OO-OBS (Ga. took honors in the other CD Parties (c.w.) while K4YZT-OPS, Va., K2PHF-ORS, NYC and W1PYM-OO, N.H., won the top phone positions.

Club Training Aids were used by 288 different ARRL clubs in '62. Bookings were fulfilled in 1075 cases. Quiz-type listings¹ as detailed below are expendable. The lithographed multiple answer question lists will be sent (no charge) to any U.S. or Canadian amateur radio club, affiliated or not, on a request giving the expected number who will attend a meeting and try the quiz. Interesting club discussions of the possible answers follow the collection and correction of papers! The use of TA quizzes has more than doubled in recent years. Our visual aids also are popular items of films and film-strip in the Training Aids program. These are limited to ARRL Affiliated Clubs *only* since we have a limited number of offerings for loan-booking to such clubs.

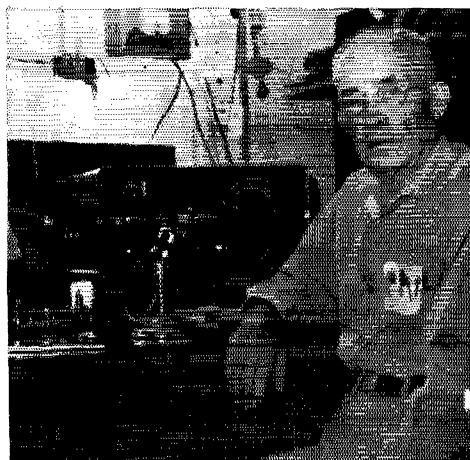
A new training-aids tape titled "How To Run Your Linear", based on the Nov. '62 *QST* article, is ready for circulation among the affiliated club groups, subject to prior bookings, of course.

There was a trend in the year to more 3.5-7-14 Mc. amateur operation since the sun-spot conditions and propagation cycle gave less good operating time on 21 and 28 Mc. However, these bands were also performing well in the periods when open.

— F. E. H.

¹ We suggest that clubs writing for quizzes select and request one of the following. Allow three to four weeks for shipping-mailing time ahead of the meeting date.

- | | |
|-------------------------------------|--|
| Q1. Operating Procedure | Q7. Public Relations and Interference |
| Q2. DX Operating | Q8. Technical Radio |
| Q3. Traffic Handling | Q9. TVI |
| Q4. ARRL Organization and Functions | Q10. The Novice |
| Q5. FCC Regulations | Q11. The Amateur Radio Emergency Corps |
| Q6. General | Q12. VHF |



MEET THE SCMs

Wyoming SCM W7AMU, Lial Branson, has been licensed since '28. This SCM/Ass't. Dir. has a colorful past in Wyoming as a cowboy, auto repairman and electrician. Although now retired, Lial keeps active with other interests in addition to ham radio; flying, horseback riding, rock hunting, etc. Current ham activity finds W7AMU on 80 and 40 with an HT-37/NC-300-HRO.

High Speed Code Test

The Connecticut Wireless Assn., Inc. (W1EIA, except on Field Day) will conduct another high speed code test on *Monday, Sept. 16*. The 100 or so amateurs who have qualified in these tests will testify how much fun it is, even if you don't make the grade (and many don't).

The call-up will start at 0100 GMT (Note: if you are one of the *very few* amateurs who still use local time, you will want to listen on *Sunday evening, not Monday*.) and will last a solid half hour, to allow each listener to select the frequency of transmission being received best at his location. At 0130 *very important* instructions are transmitted. At 0150 sharp the 40 w.p.m. transmission begins and lasts exactly five minutes. This is followed by five-minute transmissions at 45 w.p.m. (at 0200 GMT), 50 w.p.m. (at 0210 GMT), 55 w.p.m. (at 0220 GMT) and 60 w.p.m. (at 0230 GMT). Copy one minute consecutively, solid, out of any five minute transmission and you qualify at that speed. CWA will issue you a certificate attesting your skill.

Speeds are intended to be exact (on the basis of 25 keying cycles per word), but it doesn't always work out this way. Certificates will be issued on nominal speeds, but the *exact* speeds will be computed and indicated on each certificate.

W1EIA will transmit simultaneously on 3637 and 7120 kc., this customary code practice frequencies. It is expected that K6DYX and W6EOT will cooperate by transmitting synchronously (same text, from copy of same tape) on 3695 and 7005 kc. respectively, but at this writing they haven't yet committed themselves. Identity of stations transmitting and their frequencies will be included in the call-up. Mark your calendars and plan to take part.

W1EIA transmits code practice each Monday simultaneously on 3637 and 7120 kc., starting at 0130 GMT, speeds from 15 to 65 w.p.m. Many amateurs use these sessions to sharpen themselves up for the semiannual tests. Why don't you join them?

NET REGISTRATION INFO

The October 1st deadline is drawing near — is your net registered? The year-end net directory will include your net, if you register in time and follow the instructions given on page 81 of August 1963 *QST*.



At this writing we are also in the midst of writing our first "Public Service Bulletin," which will take the place of our previous annual "Emergency and Traffic" bulletin. In it, we hope to outline in some detail a proposed national emergency and traffic plan utilizing to the full both the AREC and the NTS and showing how parts of both may be activated automatically and efficiently in accordance with need. This will be followed, in October, by a test of the plan in the Simulated Emergency Test.

It is mid-July as we write, but it will be September when you read this. Therefore, there isn't much time. Much remains to be done between now and then. We thought it might be apropos, at this time, to acquaint you with some of the plans.

For many years, our AREC has been a "stand by" facility which goes into action only when necessitated by an emergency of one kind or another. In recent times, however, many units of the AREC have instituted regularly operating nets in order to foster training and maintain a state of active readiness. These units are the ones which keep up coordination with local to-be-served agencies and which are ever on the alert to perform a community communications service, whether it be in an emergency or otherwise. That there are many such nets in operation can easily be ascertained by perusing the ARRL net directory.

Most emergencies are local in character, and quite often activation of the local AREC or RACES net will adequately take care of emergency communications needs. Once in a while there comes along an emergency of widespread character which requires communications over longer distances. Past practice has been to set up nets on the spur of the moment to handle such requirements, usually on the most crowded band available, request a clear frequency of FCC, and spend much of the time trying to keep it clear.

The new plans will call for utilization of existing facilities for this purpose, and will spell out just how existing nets at section level can be coordinated into a single facility to accomplish the desired end. Liaison will be effected with the proper region net of the National Traffic System and the really long-haul stuff handled through this daily facility, which can operate on a stepped-up basis if required.

A concerted drive is to be made at the local level for recruitment of all active amateurs, regardless of mode preferences, equipment availabilities or licensing status, to become a part of the new effort to make amateur radio public service the most active, as it is already the most important, part of the fraternity. New, active leaders will be appointed to replace older, inactive ones. Additional nets will be formed where a useful service can be performed. Nobody will be left out who wants to be in.

Irregular nets will be encouraged to meet regularly, and once-weekly nets will be encouraged to meet more often and become a regular local-level net of the National Traffic System, working through their NTS section nets to effect liaison with the system.

Many of these things, in some sections, have already been accomplished. Differences in progress levels are a major problem. But we don't want anybody to be held up waiting for someone else to get started, so this is a difficulty we'll somehow have to put up with.

One thing is certain: we'll never achieve our objective of maximum performance in the public interest unless we all work together — phone and c.w., a.m., and s.s.b., v.h.f. and h.f., RACES and AREC and NTS, pro-League and anti-League. We're all after the same thing; if we differ on how to accomplish it, let's resolve those differences as amateurs and forget prejudicial animosities in favor of getting the job done. — *W1N/JM*.

On May 3, the assistance of the Story County (Iowa) AREC was requested to provide communications during

the search for the body of a drowning victim in the Skunk River. AREC members put in over 100 man-hours manning communication points on bridges downstream in an operation lasting for three days, unfortunately without success. The following participated: *K0s QKH YLO KPG DUG, W0s NFL III EDQ UGR LST.* — *W0LSP, EC Story County, Iowa.*

At about 0110Z on June 16 W4VGQ heard a distress call on the aircraft distress frequency, the plane in distress giving his location as near Wadesboro. W4VGQ immediately reported into the Tar Heel Emergency Net and asked K4PTB to investigate. The result was that W4ZKE started a search via automobile and located the pilot and crash. He contacted K4PTB who radioed W4VGQ all the necessary information for the FAA records. The entire operation lasted about 45 minutes. The pilot was uninjured. — *K4QFV*.

On June 25 K1PCC noticed a truck afire on the Boston Post Road near Milford, Conn. He gave an emergency call and was answered by *K1s NML and PXE*, who called police and summoned fire department equipment. The fire, caused by overheated brakes, was quickly extinguished. K1PCC remained at the scene until the blaze was put out. His prompt action may have prevented an explosion, because the truck was loaded with gasoline.

On June 29, *K2s PQE TPB, W2IDM* and *WB2CET* operated for 20 hours without interruption at the scene of a search of a drowning victim in Lake St. Lawrence near Massena, N. Y. One fixed, one mobile and one marine mobile maintained communication with Massena on six meters. — *W2IDM*.

On Mar. 7 *WA2FFL* heard an emergency call on 15 meters from *PY2CLT*. Making contact, he was advised that a special medicine, not available in Brazil, was needed at Sao Paulo. *WA2FFL* called Varig Air Lines, then a pharmacy in Rego Park and arranged to have the medicine delivered to the air line in time to make the next available flight to Sao Paulo. *K3QJX* called on the telephone to verify that all the transmissions from *PY2CLT* had been correctly received by *WA2FFL*.

A series of weather alerts kept the Calhoun County (Mich.) AREC busy on June 9. At 0045 the power company advised of many power lines down in Albion. At 0052 they reported a man stricken under downed power lines in Albion. At 0105 amateurs assisted the sheriff's department in Albion with their area radio connections. At 0133 traffic to Marshall passed by amateur radio. All this occurred in the early morning hours. The same afternoon *K8CIS* and *K8AEM* activated another weather net when two fronts of violent weather masses collided over Calhoun County, but although severe weather conditions prevailed, no communications emergencies developed. Those active in the early morning emergencies were *K8s AXV CIS NEY REM UCY UCQ/mobile TDF, W8s MF VZY, VE3CYG/8*.

The Milwaukee AREC provided dispatching for AREC mobiles on May 5 when the group assisted in a leukemia fund drive. The entire operation was conducted on 146.67 Mc. f.m. with a 30-watt portable base station installed at the drive headquarters. Dispatching was done by *K9RCP/9*, who had pre-assigned each mobile to a specific area. All pick-up points were coded, so casual listeners would not be able to identify them. As a pick-up was ready, headquarters would be telephoned and the amateur car nearest the pick-up point would be dispatched. So successful was the operation that *K9RCP* has been invited to a national meeting of ALSAC (Aiding Leukemia Stricken American Children) to explain the operation. Thirteen amateurs took part. — *K9KJT, EC Milwaukee County, Wis.*

The Galveston County (Texas) AREC from May 5 to 12 supplied communications from six polio vaccine drives. Operation between the various cities of the county was maintained on 2 meters, with back-up communications provided by ten meter mobiles. The county medical director was so impressed that he requested permanent inclusion in

the county RACES plan, which request was approved by RO K5VHH. Twelve amateurs took part under the leadership of K5YYD (EC), K5HFC (asst. EC) and WA5CIT (NCS).

On May 11 the Southern Chester County Amateur Radio Club provided communication for the 125th Anniversary Parade in West Chester, Pa. The actual event was preceded by extensive plans and dry runs, but equipment difficulties developed nevertheless during the actual parade. In spite of this, an excellent job was done by the amateurs, who manned thirteen stations. The parade started promptly at 1430 local, but by that time not all companies had checked in and been recognized by the reviewing stand. As time went on, the amateur communicators at the reviewing stand had been able to contact their various stations and bring the reviewing stand completely up to date before the company involved passed in review. Fixed stations were provided a.c. power by business firms along the route; one even went so far as to install an outside outlet for the purpose. Because of the strategic deployment of the amateurs along the parade's route, the committee was able at any time to obtain information on just what was going on at any point in the parade. Operation was on 50.5 Mc., and the activity was chaired by W3ZAT.

On May 18 the South Carolina AREC held a section-wide Simulated Emergency Test, planned and executed jointly by SEC W4BCZ, Spartanburg County EC K4YWI, and PAM K4JOQ. A hurricane example was used. Twenty-two EC's were active or had assistants send messages, and the SCMI, RM, SEC, PAM and all net managers were on hand. K4UZZ, from the Marine Corps Airstation Amateur Radio Club, also took part. A number of two-meter nets, the Spartanburg County 10-Meter Net, the South Carolina Net (SCN) and the AREC net were all very active. Several individuals not in the AREC organization also participated. Altogether, 24 of 46 counties were covered. SEC W4BCZ, to whom we are indebted for this report, advises that cross-membership in AREC, RACES and MARS would just about cover the State.

The Story County (Iowa) Amateur Radio Club on May 19 provided point-to-point communications in Issac Walton League Park during an annual open house for the public. Heath "Sixers" were used successfully, with a link into town via ten meters. — W0LSF, EC Story County, Iowa.

On May 18, seven members of the Milwaukee County AREC provided communications for the Armed Forces Day parade in downtown Milwaukee. Basic function was to provide and maintain coordination between the reviewing stand, parade marshall, official starter, parade physician and Red Cross first aid units. Communication was conducted on 146.67-Mc. f.m. Four mobiles and a hand-carried unit were used in conjunction with the fixed station. — K9KJT, EC Milwaukee County, Wis.

On May 25, Northern New Jersey SEC K2ZFI, with the cooperation of RM W2QNL, conducted a pre-SET drill in which the purpose was to test the practicality of using the National Traffic System as an emergency communications facility. More than 50% of the N.N.J. ECs showed up for the drill. The c.w. net (NJJN) covered its frequency all morning and the complete results of the exercise were in the SEC's hands by 2300Z — a great improvement over previous SET experiences.

On May 26 from 0930 to 1130 local, a simulated emergency test was held on 75 meters in metropolitan Toronto. Ten mobile and six fixed stations participated and, in addition, three mobile stations from outside the area reported in. The test was conducted on 3770 kc. No particulars of the exercise were divulged prior to the time of its commencement, and details were then given over the air to all stations. The simulated emergency was to locate a vehicle approaching from the East and to observe and report on the activities of its driver and passenger. At the beginning of the exercise each mobile was directed to take up a position at a specified point on a main artery with a view to facilitating interception of the approaching vehicle. As the exercise progressed, movements of mobiles were directed from the control station in order to cover and pick up the trail from time to time. The "fugitive" vehicle was equipped with

A.R.R.L. ACTIVITIES CALENDAR

(Dates shown are in GMT)

- Sept. 6: CP Qualifying Run — W6OWP
- Sept. 12: Frequency Measuring Test
- Sept. 11-15: V.H.F. QSO Party
- Sept. 21: CP Qualifying Run — W1AW
- Oct. 3: CP Qualifying Run — W6OWP
- Oct. 5-6: Simulated Emergency Test
- Oct. 12-14: CD Party (c.w.)
- Oct. 22: CP Qualifying Run — W1AW
- Oct. 19-21: CD Party (phone)
- Nov. 1: CP Qualifying Run — W6OWP
- Nov. 20: CP Qualifying Run — W1AW
- Nov. 9-11, 16-18: Sweepstakes Contest

OTHER ACTIVITIES

The following lists date, name, sponsor, and page reference of QST issue in which more details appear.

- Sept. 9: W1EIA High Speed Code Test, C. W. A. (p. 88, this issue).
- Sept 11-15: WAKI DX Contest, Kwajalein Atoll ARC (p. 81, this issue).
- Sept. 11-15, 21-22: Scandinavian Activity Contest, EDR (p. 81, this issue).
- Sept. 28-29: WAVE Contest, Montreal ARC (p. 19, this issue).
- Oct. 19-20, Nov. 2-3: R.S.G.B. 7 Mc. DX Contest (next issue).

a receiver and was thus able to take effective evasive action. No pre-arranged plan or course of travel was set. Everybody seemed to be of the opinion that the exercise was successful. — VE3LI, EC 75 Meters, Metropolitan Toronto.

Thirty-nine SECs reported May activities, representing 18,491 AREC members. This is the first time we have fallen under 40 reports this year. It's still better by quite a few, however, than the 32 reports we received in May of last year, is still an easy record for the month, and the AREC members represented are not only high for the month, but are an all-time high.

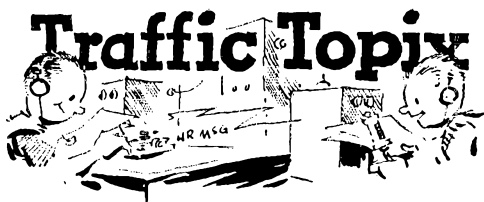
Sections heard from: Mich., Del., E. Mass., S. Texas, Alberta, Mo., E. Bay, N. Dak., Ala., Ind., Minn., Ohio, Ariz., NYC-LI, Maine, Nevada, Utah, Ore., Wash., E. Fla., W. Fla., E. Pa., Mont., W. Pa., N.N.J., Sac. Valley, R.I., S. Dak., Tenn., Okla., Iowa, S.C.V., B.C., Md.-D.C., Ga., N. Car., New Mex., N. Texas, Ont.

Races News

We are informed by the Hawaii State Communications & Radio Officer, one Stanley E. Harter (apparently not an amateur) that Hawaii now has an approved and established RACES plan, and that each of the counties also has an approved plan. As soon as new crystals are obtained, the conversion from non-RACES amateur frequencies will be made. Each county has a RACES net and, in addition to a radio officer, a RACES licensee if the RO is not eligible. Mr. Harter provides the following list: *State*: Stanley E. Harter, state r.o.; RACES licensee, James Dennis, KH6DYG. *Oahu County*: Ronald Kiaaina, r.o.; RACES licensee, Dr. Fred Lam, KH6CG. *Kauai County*: Edward L. Williams, KH6BAS, r.o. and licensee. *Maui County*: Kiyoto Murakami, KH6CFA, r.o. and licensee. *Hawaii County*: M. J. Brown, KH6EIW, r.o.; RACES licensee, William Seymour, KH6EJ.



Any of you RACES ROs having trouble getting decals? We have a limited supply here at headquarters which we'll be glad to parcel out upon request until they are gone. Only requests from bona fide ROs will be honored, however.



Browsing through our source material file for this column, we have come across a bit written several months ago by one Ed Erickson, W2CVW, a long-time traffic handler and at present SCM of Northern New Jersey. Thinking it about time for another "guest" appearance in this column, we herewith present a paraphrase (this means we hacked it to pieces and added some of our own ideas) of his thoughts on "fair" traffic.

The criticism leveled at some of the messages originated at fairs, expositions, hobby shows and similar displays is, in some cases, justified. Some of these messages when put on the air, especially on phone, give listeners (traffic-handlers, non-traffic-handlers and the general public) a very poor impression of our public service image. Moreover, some of the texts contain phrases most embarrassing to deliver; some are even legally libelous.

The messages may be perfectly understandable and even humorous to the originator and recipient, and criticisms may be laughed off as being generated by old fuddy-duddies. But the fact of the matter is that such criticism does reflect public opinion, and public opinion is important. We believe that most such traffic is originated by amateurs who just don't know any better, and perhaps a set of standards for message origination is in order, for the only place such traffic can be arrested is at its point of origin. Once it is accepted by the first relaying station and on its way, we are stuck with it and must relay it just as received.

Where messages are solicited from the public, a notice should be posted with the following principles:

1. A brief description of amateur radio message handling; how and under what circumstances such traffic is handled.

2. Refer originators of messages to the ARL text numbers and encourage their use.

3. Request that all messages be limited to 25 words. It is a good idea for the operator or the person accepting the message to suggest the elimination of superfluous or meaningless words or expressions in order to reduce the length of the text. Even 25 words is too long if the same thing can be said in 10.

4. Point out that the person accepting the messages will refuse to accept messages written in secret codes, languages, or that contain profane, obscene, insulting or libelous words or phrases. It is similarly good policy to turn down messages written in foreign languages and those that contain facetious, childish, suggestive or superfluous words, phrases or colloquialisms. You cannot tell the originator what to say, but it is good policy to remonstrate with him in order that the traffic on the amateur bands be of the highest standards and not make us look ridiculous. Because our service is free, the public will allow us to be more particular than they would a commercial service.

5. Make sure all messages have a complete mailing address and telephone number (if possible). Point out that messages addressed to box or route numbers will have to be mailed unless a phone number or telephone information is

given, and get such information if possible (most amateurs don't like to mail messages — it gets pretty expensive).

6. Get the signature, full name and address of the originating person on each message. Many "fair" messages are undeliverable and are the subject of "service" messages from potential delivering stations.

7. Look over each message carefully before accepting it for transmission. The time to make changes is *then*, while the originating person is present and with his consent. Once he leaves, you have no authority to make any changes in the message.

W2CVW sends along a number of examples of message texts of the type which are often seen but could have been drastically reduced in number of words or changed to lend more dignity to our service which, after all, is audible to the public. Here are a few such texts: "YOU SET MY HEART AFIRE X MY HEAD WHIRLING X MY BLOOD BOILING X IN OTHER WORDS YOU MAKE ME SICK X LOVE YA." (Pretty sickening stuff.) "HI HONKY X WANT TO GET MARRIED QUERY MARCH 23RD SOUNDS LIKE A GOOD DATE X MISS AND LOVE YOU." (Definitely not in good taste.) "SIRS PLEASE SEND ME A COPY OF THE TECHNICAL BULLETINS FOR THE RCA 6146 AND 6293 POWER TUBES X WOULD APPRECIATE ALSO A COPY OF THE COLOR CODE FOR CRYSTAL DIODES IF AVAILABLE FROM YOU X THANK YOU 73." (This 39 words can be reduced to 19 without eliminating any of meaning, or the "please" and "thank you.") "I HAVE ONLY TWENTY FIVE WORDS THAT I CAN WRITE AND DO NOT KNOW WHAT TO SAY X I WILL WRITE SOON." (How superfluous can you get?) "HI." (Nothing wrong with this.)

Let's see if we can't clean up some of our originations, fellows and gals. Originate more traffic, but make it good traffic, the kind that will impress the casual listener with our dignity and sobriety instead of making him think we are a bunch of morons playing kid games. — WINJMI.

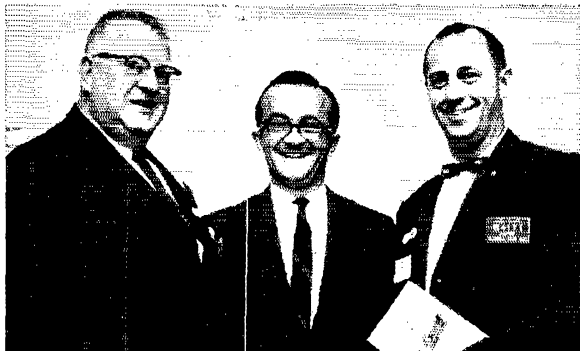
June net reports.

Net	Sessions	Check-ins	Traffic
All Service	5	31	23
Early Bird Transcon	30	—	83
Northeast Area Barnyard	—	677	6
Seven-Eleven Traffic	16	3	91
75 Meter Interstate SSB	30	1000	1004
7290	40	1538	1159
20 Meter N. American SSB	22	504	1058
20 Meter Side Band	21	426	2938
Eastern Area Show	28	96	18

National Traffic System. One of the best NCSs in NTS history (next to ourselves, of course) is K1WJD, who also owns the call K2KJR, which might be more familiar. Bud holds forth on EAN Thursdays, and he runs a very tight net. No reflection on the other EAN NCSs, who are also excellent, but we think Bud has that snap and precision that inspire net members to their best efforts and make us all proud at the end of a particularly good session.

Some time ago, Bud sent in a description of some of the antics used by certain net members on EAN, and his reaction to them. Of course you never do anything like this, but you probably know many others who do. For example: (1) When a station is on its way back to net frequency (after having been QNY) and hears me calling him, and comes

During the Orlando Hamfest in April 1963, W4NVD took this cheerful photograph at the conclusion of a successful LO meeting. From left to right, W4ZD, S. E. Division Director; W4QVJ, newly elected SCM of E. Fla. and W4IYT, SEC of E. Fla. and Editor of Florida Skip.



swishing down to the net with full power on (FUNNY). (2) When one QNY station comes back from passing traffic two or three minutes before the other one (PUZZLING). (3) When the net station with the worst list tries to shoe CQers away from the net for me, as if he were my guardian angel (FUNNY). (4) When a station QNIs without listing all his traffic (DUMB), but then takes it upon himself to clear it without letting me know about it (ANNOYING). (5) When half of the top net in the country (EAN, he means) can't figure out how to zero-beat the NCS (PUZZLING), and UNLUCKY for those who can't because I often don't hear and don't answer them. (6) When a station QNIs five minutes before QNP and says "Need help with -RN?" (FUNNY). (7) When net stations can't remember that the receiving station should call first and so each is blindly calling the other, 3-ke. apart, and then they report back to the net with a QNP (PUZZLING).

"Thank goodness," says Bud, "EAN has a time limit, a finite percentage of poor ops, a finite amount of bad propagation conditions, and K9NBH traffic — for without these, I'd be running a dull, uneventful, perfect session every Thursday. As it is, I have the time of my life and wouldn't miss it for the world." — W1NJM.

June reports:

Net	Ses-	Traffic	Aver-	Represen-
	sions		Rate	tation (%)
1RN	60	685	.589	11.1
2RN	60	697	.654	11.6
3RN	60	861	.106	14.4
4RN	57	805	.396	14.1
RN5	60	909	.396	15.2
RN6	42	493	.340	11.7
RN7	60	468	.256	7.8
SRN	58	429	.243	7.4
9RN	30	631	.651	21.0
TEN	59	688	.492	11.6
ENC	24	70	.176	2.9
TWN	21	114	.265	5.4
EAN	30	1684	.991	56.1
CAN	29	1445	.853	48.1
PAN	30	965	.605	32.1
Sections*	1134	7043		6.2
TCC Eastern	101 ³	437		
TCC Central	90 ³	192		
Summary	1774	18596	EAN	10.1
Record	1865	19944	.991	15.9

* Region net representation based on one session or less daily. Others are based on two or more daily.

¹ Section nets reported (41): NITN & TEX (Texas); Ont. Fone; Sus. Valley 6M (Pa.); NEB (Neb.); VSN & VN (Va.); OZK (Ark.); OQN (Ont.-Que.); NCN, NCSN & TIFN (N.C.); MDD & MDD5 (Md.-Del. D.C.); Tenn SSB, ETN & TN (Tenn.); EPA (Pa.); BEN (Wis.); AENB, AEND, AENH, AENM, AENO, AENP Morn, AENP Eve, AENR, AENS, AENY & AENT (Ala.); W. Fla. Fone; MSPN Noon, MSN & MJN (Minn.); GBN (Ont.); SCN (S.C.); ILN (Ill.); FMTN (Fla.); GSN (Ga.); QAIN (2 Mich.); SCVSN & SCN (Calif.); BUN (Utah).

² TCC functions reported, not counted as net sessions.

We broke one record for June: EAN made the highest rate ever. Otherwise, although we broke no records, our over-all performance was a big improvement over last June.

The way the net managers are bleating, you would think the system is rapidly going down hill, but the statistics do not bear this out. Nevertheless, the going is tough and it seems to be getting harder all the time to find good operators to fill the vital functions on anything like a rotational basis. We had a personal visit from IRL Manager WIBVR, who deplores his decreasing representation. WA2QQZ says 2RN had it rough in June because of school exams for the younger element, of which there are many. W3UE says 3RN still acts like the No. 1 region net. W4SHJ has issued 4RN certificates to WA2WBA/4, K4s CNY QFV VFY and WJ.WZ. Quite a few missing reports on RN6, but K6LKD didn't have time to hunt them down (he shouldn't have to). RN7 data about the same as last month except for a slight drop on representation (let's go, Idaho and Montana); certificates were mailed the end of May to all active net members. Main problem on 8RN is lack of traffic, but the net is slowly building up steam. W9ZYK notes that 9RN will resume its second session on July 1. TEN is really having troubles, with severe QRN, heat, foreign QRM and absenteeism; W8SCA had a heart attack but is doing okay

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for June Traffic:

Call	Orig.	Recd.	Del.	%	Total
W3GJL	272	233	242	36.1	508
K6BPL	84	1999	1750	219	4082
W9JOZ	23	1720	1680	5	3428
W9IDA	16	1671	1570	32	3289
W9AIM	51	1187	1191	0	2409
K9ONK	142	1035	1067	69	2373
W9LQY	115	933	899	4	2011
W3EML	28	900	827	35	1790
K9KZB	15	771	752	19	1557
K6LPT	41	717	414	303	1475
W7BA	6	714	664	46	1430
W1PFX	33	621	590	30	1274
K4PQL	12	543	527	15	1032
WA9AJF	16	508	356	149	1029
W8UPH	7	482	407	74	970
W8SCA	19	475	474	1	969
WA9GCP	5	437	236	197	875
W3ZGTF	31	424	394	24	873
K9JEN	25	441	371	4	844
W6RRY	51	383	292	81	807
W3VR	31	377	361	12	781
W3IVS	27	328	374	48	777
K7IWD	44	366	365	1	776
W1EXL	68	358	325	14	765
K2YML	149	369	272	10	760
K3MQE	6	339	324	15	684
K1LOM	30	330	300	5	665
K9ZLA	18	326	308	13	655
W8RUF	17	342	248	50	657
K1GNW	24	318	255	57	654
K4WML/9	16	312	293	9	640
K9AIR	22	308	175	131	636
WA4JH	6	348	267	38	619
K8MDD	4	302	297	15	618
W7DZX	5	308	285	8	606
WA6NFI	117	238	191	47	593
W4ZFY	15	295	289	0	579
W4BYG	24	274	266	8	572
K4ROR	1	285	283	2	571
K8GOU	2	281	150	133	560
W9DYG	30	286	234	16	566
K8PBE	3	280	280	1	564
W6EOT	1	276	280	3	560
K3QFG	15	275	210	53	553
K8FPC	35	254	227	23	549
WA2EXP	10	264	240	20	534
WA6LWV	8	280	234	26	528
W4DLA	24	268	219	10	521
W4NTE	18	252	194	58	519
K4PNY	70	224	100	125	519
W2GVH	46	234	226	7	513
W4KIS	4	254	242	12	512
W2MTA	31	239	193	42	505

Late Reports:				
W3IVS (May)	.21	262	247	22
W3IVS (Apr.)	.12	256	246	28
W3IVS (Mar.)	.26	239	186	53

More-Than-One-Operator

Call	Orig.	Recd.	Del.	%	Total
K9NBH	6639	1811	0	9	6670
W6IAD	383	1761	46	4001	
W8YFK	253	309	21	287	
W4PFC	487	557	525	32	1601
K8AIR	120	590	305	405	1420
KR6GF	734	93	10	67	904
WA6ZOW	81	423	214	109	827
KR6MD	34	248	240	8	580

BPL for 100 or more originations-plus-deliveries

W4ODR 349	K4WOP 192	W4GWTK 118
W2ORS/2 340	K6GJM 177	W9BUQ 115
K6LZ 282	K4VEY 160	W3KUN 113
W9NZZ 290	WA2TQT 142	K4SHJ 110
W4MLF 272	WA6MIE 128	W4H6RRO 108
W7AFS 250	WA2RUE 124	WA2CCF 103
W5LIF 217	WA4AMC 102	K1WKK 102
W2EW 204	W8YGH 124	W4RHA 100
	K3APM 121	

More-Than-One-Operator Stations

K3ORS 247	KR6DI 161	KR6MB 101
	KR6MH 122	

BPL medallions (see Aug. 1954 QST, p. 64) have been awarded to the following amateurs since last month's listing: K3OOU, W4UGI/θ, W9AKV, WA9BYO.

The BPL is open to all amateurs in the United States, Canada, and U. S. Possessions who report to their SCM a message total of 500 or more or 100 or more originations plus deliveries for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

at last reports, meanwhile we're delighted to have W8BDR back with us. TEN certificates have been issued to K0s VNB YTA ZPN, W0s SAF LOD, W40s ABU ARA AOY, W6JCF/θ. VE3BZB is making a personal trip to VE-land to try to stir up some support for ECN. W4UGI/θ makes a "not very encouraging" report; says he has an apathy problem and hopes a bulletin he is working on will solve his

TWN problems. EAN just keeps rolling along; certificates have been issued to K1WJR, W4PNI, W8AJZ and W83CP. W9DYG reports a pile of troubles on CAN. So does W6ROF on PAN, but Jerry has K4AKP/6 coming on the air soon, and along with W6BBO (ex-W3WRE) and his lineup of regulars should have things under control again. It's this summer slump that makes it look bad, but we're doing pretty well at that.

Transcontinental Corps. W3EML makes a complete and detailed report that must have taken him hours. There are five or six stations waiting for assignments, but no

counterparts available in other areas. (How about moving some of them out west?) W9JOZ is greatly discouraged in TCC-CAN, and maybe W7DZX is too, because no report received from him at all. June reports:

Area	Funcions	% Suc- cessful	Traffic	Out-of-Ncl Traffic
Eastern	101	68.4	1452	437
Central	90	75.1	1219	192
Summary	191	71.4	2671	629

Neither of the reporting TCC directors gave us a roster this month.



DX CENTURY CLUB AWARDS



Honor Roll

The DXCC Honor Roll consist of the top ten numerical totals in the DXCC. Position in the Honor Roll is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total DXCC credits given, including deleted countries. Positions in cases of ties are determined by date of receipt. All totals shown represent submissions received from June 1, thru June 30, 1963.

W1FH...309/330	W1ME...307/325	CE3AG...304/323	W2TQC...304/318	W7GBW...303/322
PY2CK...309/327	W8BF...306/322	G2PC...304/322	9NDA...303/322	W1BHH...302/321
W2ACW...306/327	W7HML...306/321	CX3CO...304/321	G3AM...303/322	W9AIW...302/320
W1GKK...308/328	W9RBI...306/326	W6EBG...304/324	W8HKP...303/320	W8DAW...302/320
W8BRA...308/326	W8DMD...305/322	W5ADZ...304/322	W4GD...303/320	W4TM...302/320
W4DOH...308/326	W9YFV...305/324	W4OCW...304/317	HB9J...303/322	W2HUO...301/320
W6CUG...308/328	LU6DJX...305/324	W1GLX...304/322	W9LNM...303/321	W3JNN...301/320
W3GHD...308/327	G4CP...305/324	W1JYH...304/322	W3LMA...303/320	W3JTG...301/319
4X4DK...307/321	W9HJZ...305/320	W2JIT...304/318	W6AM...303/323	W8EWS...301/320
W8JIN...307/327	K2GFO...305/322	W0QVZ...304/321	W2LPE...303/319	W0EIA...301/319
W8KIA...307/326	W7GVU...305/324	W0DU...304/321	W6GPO...303/320	K2DCA...300/313
KV4AA...307/327	W6Y...305/321	W5MMK...304/320	W8LKH...303/319	W4AIT...300/317
W8UAS...307/323	W3KT...305/324	W8KML...304/320	W2BXA...303/322	W5ABY...300/313
W7PHO...307/321	W5ASG...304/323		VE7ZM...303/322	W2ZX...300/315

Radiotelephone

PY2CK...309/327	W8GZ...306/324	CX2CO...304/321	W8KML...302/318	W6AM...296/315
W3RIS...306/326	W9RBI...306/324	V04ERR...304/322	W2ZX...299/314	W2JT...295/306
4X4DK...306/322	W8BF...305/321	W6Y...304/320	W3JNN...298/314	W9AIW...295/312
W1FH...306/322	W7PHO...305/319	W8FQO...302/315	PY4TK...298/311	W2BXA...294/312
		W4DOH...302/318		

New Members

From June 1, through June 30, 1963 DXCC Certificates and Endorsements based on contacts with 100-or-more countries have been issued by the ARRL Communications Department to the Amateurs listed below.

W8YBZ...253	K6POC...114	Z8EJW...108	K8OCO...104	W9DGG...102	K4UTE...100
W3QMZ...137	K4LIF...111	Z83AH...108	K4AUL...103	HK1AAF...102	K8NCG...100
7C1A...131	W9RDI...110	W3ZVJ...108	V1EAGE...103	W2RBB...101	W6WXC...100
W7JAP...129	W4ZMR...108	W1DQF...105	W4ZUJ...102	K4BZK...101	W9CPL...100
W9JQP...122	W4ZFOY...108	W4DQM...105	W4RBP...102	0E1I7...101	W9OKM...100
K4JEF...121	HB9FT...108	W6BKI...105	K4PSQ...102	K3CNN...100	DJ4VO...100
VQ8AL...119					

Radiotelephone

FA7GK...119	W4NI...113	K1IGO...108	W4ZVOH...104	W4JRW...101	W4GESB...100
W1KJB...113	HE2P...112	K6RSY...105	K1ANV...102	K9ICU...101	K8PIE...100
	D19YX...108	K6SOK...105	K4UAS...102	K9WEN...101	

Endorsements

W2BOK...311	W4UKA...265	W00AQ...240	W3QMG...209	W9YTO...161	W1AIO...130
K6YR...311	W9VYB...265	VE2YA...239	W5FMK...202	W8OQV...166	K1KPS...130
W5PQA...310	W6KYG...264	W3NOH...233	W3PSP...200	PA0FAB...160	W4ZJBV...130
W6T8...310	W2FAR...261	W9IRH...233	W8DZP...200	W3AHX...157	K3MNJ...130
W0NTA...308	W3WU...261	K1MOD...231	OK1ZL...200	K9JIR...156	P3A0...130
W6BVM...304	DL3BK...261	K4AJ...230	EAIGZ...199	H99JG...154	PY4AP...130
W6POZ...303	DJ3JZ...261	W4QEP...230	K0PIE...194	K4VTU...153	W6YHT...127
W9MLY...301	HXK...261	K8KB...230	K4SCT...193	098KI...152	D1HKL...125
W0QGI...298	W6BYB...260	W0AUB...230	DL1FZ...181	W5LJ7...151	W9CKE...124
K4AIM...295	EA1BC...260	KP4AQ...230	W1IKE...180	W6KNE...151	DJ5LA...123
DJ7AA...293	ZLIPV...260	W3PN...226	K0MAS...180	K9LSN...151	K6QVH...122
W2HO...291	W3RBW...259	W42AEI...222	W1DBM...178	K21BB...150	K4BYN...120
W8ONA...291	K1MLL...258	W3AFM...222	K9ALP...172	F2PO...146	W6YZD...120
W5OK...290	K4TWF...258	W8QOH...220	D2HJ...172	K6ASC...144	W9RZZ...120
W9RKP...290	W7BTH...253	W3INH...220	Z81ACD...172	W46PTM...144	DL9NF...120
W1WDD...281	W4PAA...252	DL9YX...220	DL9CT...170	K90JJ...143	L45QC...120
DL3RK...281	DL3ZL...251	W46TGY...217	VR2DK...170	W0HNA...141	K6UWD...118
K41CK...280	W0DEI...249	W6ABA...216	DJ4HR...167	K2OXN...140	K3JCT...115
K9CJG...271	W3KA...246	K4TKM...213	DLTJA...163	K4RLO...139	W44DCP...112
W6LN...270	DL1DC...244	K4EY...210	W1AID...162	TT1ZDA...136	W4ZKL...111
W2SBC...268	W7CSW...242	W4YMG...210	K6OHJ...162	K8ZPK...135	W3ZAQ...110
	W6ATO...240	GB3DI...210	K8ANX...161	HK3RQ...133	

Radiotelephone

W5PQA...294	K9FCE...250	W4VZU...215	W3QMG...189	K4TWF...147	TT1ZDA...128
K4AIM...291	W4PAA...243	ZLIPV...212	W1DGG...181	DL3BK...147	DJ5LA...121
K6YR...286	K4AJ...240	PV1AGH...202	K0MAS...180	H3KX...140	W1VRK...120
W8YBZ...253	W6CHV...230	W2CFI...200	W1DRM...178	W46GY...131	W3ZQ...113
PA0HBO...253	W0QGI...223	W42ROQ...190	W7BTH...159	W1HZE...130	V3DDX...113
W42IS...252	DL3RK...220	W4PJG...190	DL9CT...154	K2KGS...130	K1UDP...112
W5KC...251	W2BOK...219	11ZCF...190	W9MRL...150	K2POA...130	

NATIONAL CALLING AND EMERGENCY FREQUENCIES (kc.)

3550	3875	7100	7250
14,050	14,225	21,050	21,400
28,100	29,640	50,550	145,350

During periods of communications emergency these channels will be monitored for emergency traffic. At other times, these frequencies can be used as general calling frequencies to expedite general traffic movement between amateur stations. Emergency traffic has precedence. After contact has been made the frequency should be vacated immediately to accommodate other callers.

The following are the National Calling and Emergency Frequencies for Canada: c.w. — 3535, 7050, 14,060; phone — 3765, 14,160, 28,250 kc.

SUGGESTED OPERATING FREQUENCIES

RTTY 3620, 7040, 14,090, 21,090 kc.

WIDE BAND FM 52.525 146.94

GMT CONVERSION

To convert to local times subtract the following hours
ADST -3, AST -4, EDST -4, EST -5, CDST -5, CST -6, MDST -6, MST -7, PDST -7, PST -8, Hawaii -10, Central Alaska -10.

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made Sept. 21 at 0130 GMT. Identical tests will be sent simultaneously by automatic transmitters on 3555, 7080, 14,100, 21,075, 28,080, 50,700, and 145,800 kc. The next qualifying run from W6WXP only will be transmitted Sept. 6 at 0400 Greenwich Mean Time on 3500 and 7129 kc. **CAUTION:** Note that since the dates are given per Greenwich Mean Time, Code Proficiency Qualifying Runs in the United States and Canada actually fall on the evening previous to the date given. *Example:* In converting, 0130 GMT Sept. 21 becomes 2130 EDST Sept. 20.

Any person can apply. Neither ARRL membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers.

W1AW conducts code practice daily at 0130 GMT on all frequencies listed above, with speeds of 15, 20, 30, and 35 w.p.m. on Tuesday, Thursday, and Saturday, and at 5, 7½, 10, and 13 w.p.m. on other days. Approximately 10 minutes' practice is given at each speed. To check your copy, the texts used on several transmissions are listed below. The order of words in each line of QST text is sometimes reversed. To improve your list, try to send in step with W1AW. (Please note that there will be no code-practice runs on the nights of the quarterly Frequency Measuring Tests).

- Date Subject of Practice Text from July QST.
Sept. 5: A Stable but Variable Frequency-Control . . . , p. 11
Sept. 9: Two-Tone Test Oscillator Using Transistors, p. 20
Sept. 10: The 4-1000A in Grounded Grid, p. 29
Sept. 20: The Traveling-Wave Tube, p. 35
Sept. 21: The Novice RS-3, p. 42

- Date Subject of Practice Text from *Understanding Amateur Radio*, First Edition
Sept. 18: Receiver Muting, p. 10
Sept. 27: Other Methods, p. 10

W1AW SCHEDULES (Sept. 1963)

Operating-Visiting Hours

Monday through Friday: 1 P.M.-1 A.M. EDST.
Saturday: 7 P.M.-2:30 A.M. EDST.
Sunday: 3 P.M.-10:30 P.M. EDST.

The ARRL Maxim Memorial Station welcomes visitors. The station address is 225 Main St., Newington, Conn., about 10 miles south of Hartford. A map showing local street detail will be sent on request. The station will be closed Sept. 2, Labor Day.

Operating Frequencies

C.w.: 1820, 3555, 7080, 14,100, 21,075, 28,080, 50,700, 145,800 kc.
Voice: 1820, 3945, 7255, 14,280 (s.s.b.), 21,330, 29,000, 50,700, 145,800 kc.

Frequencies may vary slightly from round figures given; they are to assist in finding the W1AW signal, not for exact calibrating purposes.

Official Bulletins

Bulletins containing latest information on matters of general amateur interest are transmitted on the above frequencies according to the following schedule in Greenwich Mean Time.

C.w.: Monday through Saturday, 0000; Tuesday through Sunday, 0400.
Voice: Monday through Saturday, 0100; Tuesday through Sunday, 0330.

Caution. Note that in the U. S. and Canada, because times are GMT, bulletin hours actually fall on the evening of the previous day.

W1AW CONTACT SCHEDULE

Would you like to work W1AW? W1AW welcomes calls from any amateur station in accordance with the following schedule:

Time (GMT)	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000-0030 ¹	14,280	3555 ³	14,100	14,100	7080 ³	14,100
0030-0100	14,280	3555	14,100	14,100	7080	.....
0100-0130 ¹	145.8 Mc.	21,330	145.8 Mc.	50.7 Mc.	21,330	.....
0230-0300	1820	.....	1820	.....
0300-0330	3555	.....	3945	.....
0330-0400 ¹	3945	7255*	3945	3945
0400-0500 ¹	3945	7080*	.....
1700-1800 ²	21/28 Mc.	21/28 Mc.	21/28 Mc.	21/28 Mc.	21/28 Mc.	.....
1900-2000	7080	14,100	7255	14,100	7080	.....
2000-2100	14,280	7080	14,100	14,280	14,100	.....
2200-2300	14,280	14,280	14,280	14,100	7255	.....
2300-2330	7255*	.....	21,075 ³	.....	14,280	.....
2330-2400	14,100	.....	3555	.....	14,280	.....

¹ Starting time is approximate. General-contact period on stated frequency begins immediately following transmission of Official Bulletin, on c.w. at 0000 and 0400, on phone at 0100 and 0330.

² Operation will be on 21,075, 21,330, 28,080 or 29,000, depending on band and other conditions.

³ W1AW will listen for Novice Class licensees on the Novice portion of this band before looking for other contacts.

*Operation may be on s.s.b. as announced at the beginning of the period.

HAVING just returned from the Open House (for advertisers) at the new ARRL Headquarters building, I want to express what I saw and felt during my brief visit.

OVER the years, the affairs of the league have grown so fast that the need for a new home has been long overdue. (How the staff had been able to work so efficiently in those previous cramped quarters will always be a mystery to me.)

EVEN more than the building itself, the ample grounds, and the W1AW antenna farm; I observed the members of the staff — mostly young men — but all of them truly dedicated. Despite some recent slings and arrows they appear to be going about their chores calmly and capably. One comes away convinced that the long-term interests of amateur radio are indeed in good hands.

SPACE doesn't permit a longer dissertation, but I think a mention of some of the names of those present has great significance for the future. After so many years in ham radio, perhaps one gets a bit sentimental and enjoys recalling past years.

REALLY, it was "old home week" for many of us. Every ham enjoys an eyeball QSO; but rarely does one have the opportunity to meet so many ham leaders all in one group. Many of them have been in ham radio for years. Anyway here are some of those who were present and with whom I had a chance to chat:

Bill Eitel W6UF, John Rider W2RID, Al Pichitino W0EDX/2, Royden Freeland W5EMH, Chuck Carney W0GDJ, Adrian Clark W2PDH, Lee Aurick K3QAX, Trav Marshall K9EBE, Dick Marder, Ozzie Jaeger K3OKX, Harry Paston W2OAA, Prose Walker W0DCA, Jim Pearce W3YXG, Ward Hinkle W2FEU, Bob Jorgensen, Tim Coakley W1KKP, Leon Adelman W2AFS, Bill Dostal WA2GMN, Les Cushman W1AWZ, Karl Stanley W0YZD, Bud Drobish W9QVA, Stu Meyer W2GHK, Bob Cushman, Bil Harrison W2AVA, Eric Firth W6EAY, Howie Goldberg W2IEK, Jack Williamson W3GC, Tim Coakley, Jr. K1PRD, Frank Lester W2AMJ, Fritz Franke, Phil Smith K2ATA, Bob Finlay, Jr. WB2HSF, Ron Levine K2JXB, Al Robertson K8BLL, Bob Finlay, Bob Freeland W5BAR, Bill Pritchard W6YWS/2, Earl Brohier, Art Taylor W0EYC, Wade Caywood W1KRD, John Doremus W2ADE, Ben Snyder W2SOH, Corky Gedney W1KXM, Bill Bryson W2VHP, Stuart Cowan W1RST, Moe Joffe W2BNY, John Altmayer K8UQV, Chet Drexler K2EAF, Sam Harris W1FZJ, Mage Magers W0OJI, Bruce Adams W1UPB, Dean Morgan W4GGS. These men, now all in commerce, got their starts in ham radio.

NOTWITHSTANDING the sometimes vicious spewing of venom from members of the fringe area, the ARRL has always been, and still is, the living symbol of ham radio. Those of us at the Open House were there to give to John Huntoon and the entire staff our warmest wishes. I'm sure the rest of the radio amateurs of the world would do no less.

BILL HALLIGAN W9AC

W. J. Halligan W9AC

Trav Marshall K9EBE

hallicrafters



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IS DECIDED IN THE MARKET PLACE, BY PUBLIC CHOICE. AN ANTENNA THAT SURVIVES THE COMPETITIVE STRUGGLE CONTINUES TO BE ADVERTISED. THE FREAKS, EXPERIMENTS, AND REJECTS DISAPPEAR FROM VIEW.

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CASE HISTORY #71

"I am very delighted with the first V80 and want another for a different location." A. C., California.

CASE HISTORY #159

"I ordered a Gotham V40 Vertical Antenna and found it so successful that several others are wanting them, too. Will you please send me four more." W. A., Alaska.

CASE HISTORY #248

"I just wanted to let you know how pleased I am with my Gotham V80 antenna. I have worked a W.A.S. of 46/43, a WAC of 3/3, and DXCC of 14/12 in about 12 months." G. W., Maryland.

CASE HISTORY #111

"The V160 did a beautiful job on a VE1 for me. Also, I forgot to take it down during the hurricane of last week. It is just as straight as it was when bought it." D. S., New Jersey.

CASE HISTORY #613

"I have never been happier with any antenna than I have been with the V80. I have worked all bands with it and have had tremendous success — i.e., DL4s, ZS3, etc., all solid copy." R. D. S., Penna.

CASE HISTORY #483

"My V80 is working wonders. I am able to maintain a 1:1 SWR all across the 40 meter band. After many years on 10, 15, and 20, the XYL and I are getting great kicks out of some of the lower bands." J. A., New Mexico.

CASE HISTORY #146

"I have had very good luck with mine (my V80) feeding it with a Johnson Adventurer; works fine on all bands." B. I., Nebraska.

CASE HISTORY #555

"Being an owner of your V80 vertical I would like to let you know of the excellent results I am getting with it, both working the DX and the local stations on the lower bands. It certainly is an excellent antenna system." F. H. Jr., New York.

CASE HISTORY #84

"A few months ago I purchased your V40 vertical and have achieved outstanding results on the air." K. G. B., North Carolina.

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15 Meters, 3 Element	\$26.95
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- Special B & W loading coil furnished.
- Every vertical is complete, ready for use.
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- No relays, traps, or gadgets used.
- Accepted design—in use for many years.
- Many thousands in use the world over.
- Simple assembly, quick installation.
- Non-corrosive aluminum used exclusively.
- Multi-band, V80 works 80, 40, 20, 15, 10, 6.
- Ideal for novices, but will handle a Kw.
- Will work with any receiver and xmitter.
- Overall height 23 feet.
- Uses one 52 ohm coax line.
- An effective modern antenna, with amazing performance. Your best bet for a lifetime antenna at an economical price.

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Name.....

Address.....

City..... Zone..... State.....

Station Activities

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA—SCM, Allen R. Brien-er, W3ZRQ—SEC: W3DUI, RM: W3EML, V.H.F. PAMs: W3SAO, W3SGI, W3BKF has been appointed EC for Bradford County. The Shamokin AREC Net has become active on 50.4 Mc. The E.P.A.C.W. Net had 340 QNI and 601 QTC. K3LHN is running a Heath Sixer as a mobile unit. Note: K3GSU's traffic total was 94. The Susquehanna Valley 6-Meter Net passed 386 QTCs in 28 sessions. The Susquehanna Chapter of the QTCWA held a dinner at Lancaster. W3HNK had just finished a choice bit of DX when his keyer blew up. K3JIG operated in the DX Test to work into W6-Land. K3LTI is gathering RTTY gear for his v.h.f. setup. *Vacation Done*: K3MVO spent his again in Dixieland. W3YFE and W3ID are putting the antenna farm back in order again. K3KTH spent a month as portable in Mass. This year it's K3RFH painting the house instead of me. New Gear Dept.: W3AEZ changed mobiles and added a 10-through 75-meter mobile unit. From QST, a converter for 6 meters by K3HAQ. The Heath S.S.B. transceiver to K3NLW, and to K3RBN a new QJII in Ohio. K3PPR and K3PPS are now Tech. Class. K3YOH is a Novice in the Boothwyn area. New club officers West. Phila. ARC—K3SPS, pres.; W3VDN, vice-pres.; K3PIG, secy.; K3PHC, treas. ARTICS officers—K3OMP, pres.; K3SME, vice-pres.; K3RZL, secy.; K3WAK, treas. The University of Penna. ARC—K3JTE, pres.; W3JNS, vice-pres.; W3IZI, secy. treas. The following countries have no Emergency Coordinator: Luzerne, Lebanon, Lycoming, Sullivan, Columbia, Montour, Union, Snyder, Perry, Susquehanna, Wyoming, Wayne, Pike and Monroe. Anyone interested in this appointment may get further information by dropping a line or radiogram to the SEC or SCM. There are still some OO appointments available, preferably in the 2- and 6-meter bands. By the time this gets in print schools will be reopening and we will be dusting the moths out of the heavy overcoats for winter. Brrrrr. Traffic: (June) W3CHU, 5038, W3EML 1790, W3VR 781, W3IVS 777, K3MIOE 684, W2ORS 3 340, K3MVO 307, K3DCB 291, K3JSX 272, K3GSU 94, K3CAH 88, W3RV 81, K3MNT 79, K3HNP 78, W3FLP 31, W3IKX 30, W3ELI 24, W3NNL 21, K3JIG 20, K3LSX 16, W3OY 14, K3ADS 12, W3LXN 9, K3TNH 9, W3VAP 9, W3RKF 7, W3BUR 6, W3CHU 6, W3DUI 5, K3EMA 5, K3LTI 5, W3BFF 4, K3AKN 3, W3DGX 2, W3EEN 2, W3ID 1, K3RBN 1. (May) W3IVS 552, K3GSU 7. (Apr.) W3IVS 504. (Mar.) W3IVS 542, K3GSU 18.

MARYLAND-DISTRICT OF COLUMBIA—Andrew H. Abraham, W3JZY—SEC: W3CWE, RMs: K3JYZ, W3TN for the MIDD Traffic Net, which meets on 3649 kc, daily at 0000Z; W3ZNV for the AUDDS (slow) traffic net on 28.1 Mc, and 3649 kc, daily at 0130Z. PAM: W3EQK. The MEPN meets on 3820 kc., M-W-F at 2300Z and Sat. and Sun. at 1800Z. W3EBF was a regular member of the MEPN, and had many friends who were shocked to hear of Elmer passing away so suddenly. W3ATQ has been tops for QNI on MIDD for the past three months. W3CDQ has been visiting Greece, Italy and Switzerland. W3CJT is EC for the D.C. area and is busy getting the AREC nets going. W3ECP reports the Washington Radio Club Field Day team had a successful week end operating at Gambril State Park. W3GNQ has set aside his bug and is now using an automatic keyer. K3NNC is engaged in several construction projects but still is active as operator at W3PZA. K3DNO sends in a fine OES report. W3GCO had a fine time working in the V.H.F. Contest from the lowlands. K3-EIW, a member of the National Capital V.H.F. Club, is sending code practice each night on 50.41 Mc. at speeds from 5 to 15 w.p.m. The time is from 9 to 10

p.m. W3NG worked the double hop skip stations on the West Coast. K3LLR is having modulator trouble with his 6-meter rig. K3PEJ is a new OES and sends in a sketch on his report of a new type of antenna using the trunk lid as the antenna. K3YIK is a new amateur in our section. K3PRN and K3QOY send in very fine OES reports. W3HQE is on vacation. W3IVC didn't quite make BPL this month. Red had a good time operating FD from his station wagon. K3OAE has a new Ranger along with new antennas, keyer and tr. switch. W3OHI has acquired an HT-37 and a Drake A1 receiver and is operating s.s.b. in the evenings. W4OSG/3 is going 6-meter mobile with a Heath Sixer. K3ORS is the call of the Baimbridge Brass Pounders Amateur Radio Club. K3QDD reports that his antenna came down twice and also blew a capacitor in his rig. K3QFG made BPL the hard way. Phil is working at the National Bureau of Standards again this summer. K3RQH has his receiver working and has completed an HB tri-band antenna that has a low s.w.r. K3SVA reports that AREC and RACES activity in Wicomico County are on the upswing. W3TN reports traffic is moving along smoothly on the MIDD. There were two new QNIs, K3URZ and K3RUA. W3YZI is moving to a hilltop QTH. W3ZNV is looking for prospective traffic-handlers on the MDDS on 28.1 Mc. Lee King, ex-K8-of Frederick, Md., passed away and was buried in the Arlington National Cemetery. Traffic: K3QFG 553, W3IVC 456, K3ORS 265, K3-APM 227, W3TN 219, K3QDD 168, W3HQE 55, K3GZK 40, K3WBJ 34, K3OAE 27, W3PCP 25, W3BKE 20, W3-YZI 20, W4OSG/3 16, W3PQ 13, K3NCM 12, K3LLR 6, W3ZNV 4.

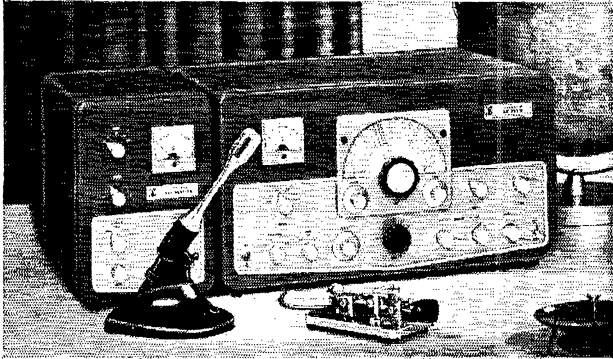
DELAWARE—SCM, M. F. Nelson, K3GKF—PAM: K3LEC, RM: W3EBE. The DEPEN meets Sat. on 3905 kc. at 1830 local time, the DSMN meets Tue. on 50.4 Mc. at 2100 local time. Appointments: K3WVJ as OES, K3-MPZ as Asst. EC for New Castle County. Kent ARC Club officers for 1963-64 are K3RUJ, pres.; K3OPF, vice-pres.; K3WEE, secy.; K3RUD, treas. W3DQZ has been hospitalized with pneumonia. W3EBE is now MIDD representative to EAN Sun. K3OWS is temporarily assigned to instruct military classes in Detroit and Pittsburgh but will return in late summer. K3RUG is a new 11-year-old General Class licensee in Kent County. Has there ever been a younger General Class licensee in the First State? K3PZL has a new home-brew rig on the air. K3SXA has been enjoying traffic work as an ORS. Traffic: W3EKO 64, W3EBE 35, K3PZL 18, K3KAJ 14, K3SXA 10.

SOUTHERN NEW JERSEY—SCM, Herbert C. Brooks, K2HG—SEC: K2ARY, PAM: W2ZI, RM: WA2VAT. New appointment: WA2VWF, Wenonah, as Official Bulletin Station. Field Day messages were received from SJRA, Gloucester County RC, Levittown (N.J.) Radio Club and K2QJ with a group of 6 operators at Bear Hill Fire Tower, near (Chatsworth, K2-JKA, Gloucester County EC, has started an AREC net (6 meters) Fri. at 8 p.m. WA2BLV, Somerdale, is now a member of TCC handling CAN and PAN traffic. N.J. Phone & Tlc. Net June totals: 30 sessions, QNI 234, traffic 86, W2ZI, net mgr., retired as Supv. Engr. N.J. State Police Radio System, after 20 years of service, W2AEZ has just returned from a vacation in Florida. W2LVW, Blackwood, is editor of GCARA's paper *Crosstalk*. W2MBC is the call of the Cherry Hill HS Amateur RC. SJRA's Field Day site in Pennsauken proved to be an ideal location. K2HBY, Collingswood, received WAC and 25-w.p.m. certificates. On 144 Mc. K3JXC worked Mass., R.I., Conn. and N.Y. WA2EMB keeps a 432-Mc. sked with K4KNS. NJN held its annual picnic at the QTH of WA2GQZ, Red Bank. The Gloucester Co. ARC Hamfest was held at Crystal Birch Lake. SJRA's Hamfest will be held at Molia Farms Sept. 9. *Traffic Lines*, edited by WA2GQZ, is filled with traffic news from NLI, NYS, EAN, 2RN and NJN. NJN's roster includes 8 from S.N.J. WA2MGV again is active after a recent illness. WA2TOV expects bigger and better things from his new tower. All appointees are urged to check expiration dates of their appointments and apply for renewal if active. W2PWP, Delancey, Burling Co. Radio Club pres., and his XYL are vacationing in Vancouver. Traffic: WA2BLV 257, W2RG 223, W2MMD 106, WA2VAT 52, W2ZI 23, K2CPR 16, W2BEI 4.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2ICZ, RMs: W2RUF, W2EBZ and W2FEB, PAM: W2PVI. NYS C.W. meets on 3670 kc. at 1900. ESS on 3590 kc. at 1800. NYSPTEN on 3925 kc. at

(Continued on page 109)

1st Choice Among Nation's Amateurs!



"SSB ADAPTER"—The new filter-type SSB generator—with bandswitching 80 through 10 meters . . . more than 50 db sideband suppression . . . more than 45 db carrier suppression! When used with the Viking "Valiant" or "Valiant II" it places 275 watts P.E.P. at your command. Two compact units and interconnecting cables . . . RF unit is only 8" wide—may be placed on your operating desk. Power supply unit may be placed in any convenient location. Features built-in multiplier requiring VFO input only—band-pass interstage couplers require no tuning—design and front panel make operating practically fool-proof. Superb audio fidelity and balanced audio response; excellent sideband, spurious and carrier suppression. Other features: positive VOX and anti-trip circuits with built-in anti-trip matching transformer and adjustable VOX time delay. With remote power supply, tubes and crystal filter, less microphone.

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INVADER—More exclusive features than any other Transmitter/Exciter on the market today! Specially developed high frequency, symmetrical, multi-section band-pass crystal filter for more than 60 db sideband suppression—more than 55 db carrier suppression! Instant bandswitching 80 through 10 meters—no extra crystals to buy—no realigning necessary. Delivers a solid 200 watts CW input; 200 watts P.E.P. SSB input; 90 watts input on AM! (25-30 watts output—upper sideband and carrier). Built-in VFO—exclusive RF controlled audio AGC and ALC (limiter type) provide greater average speech VOX and anti-trip circuits. Fully TVI suppressed. Self-contained heavy-duty power supply. With tubes and crystals.

Cat. No. 240-302-2 Wired, tested Net \$619.50

INVADER 2000—Here are all of the fine features of the "Invader", plus the added power and flexibility of an integral linear amplifier and remote controlled power supply. Rated at a solid 2000 watts P.E.P. (twice average DC) SSB, 1000 watts CW, and 800 watts AM! (250 to 300 watts output—upper sideband and carrier.) Wide range output circuit (40 to 600 ohms adjustable). Final amplifier provides exceptionally uniform "Q". Exclusive "push-pull" cooling system. Heavy-duty multi-section power supply. With power supply, tubes and crystals.

Cat. No. 240-304-2 Wired, tested Net \$1229.00

HIGH POWER CONVERSION—Take the features and performance of your "Invader" . . . add the power and flexibility of this unique Viking "Hi-Power Conversion" system . . . and you're "on the air" with the "Invader 2000". Wired, tested, includes everything you need—no soldering necessary—complete conversion in one evening.

Cat. No. 240-303-2 Net \$619.50

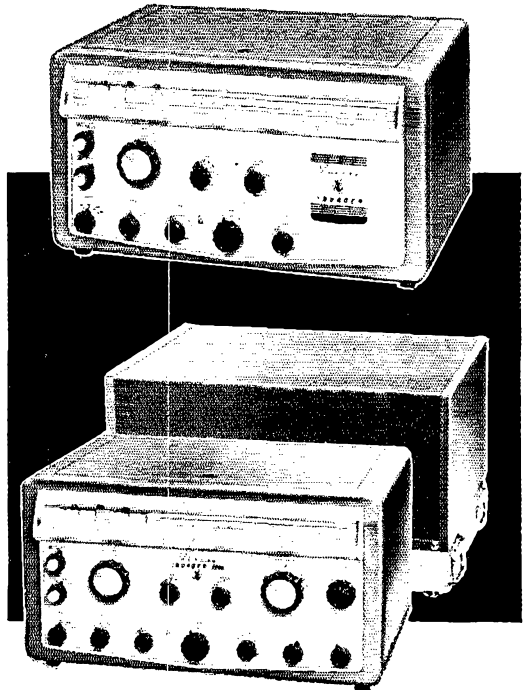
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Outstanding performance on SSB, AM and CW with absolutely no compromise on any mode!

"VALIANT II"—Outstanding flexibility and performance—bandswitching 160 through 10 meters—delivers 275 watts input CW or SSB (with auxiliary SSB exciter or Viking SSB adapter) and 200 watts AM! Low level audio clipping—differentially temperature compensated VFO provides stability necessary for SSB operation! High efficiency pi-network tank circuit—final tank coil silver-plated. Other features: TVI suppression: time sequence (grid block) keying; high gain push-to-talk audio built-in low pass audio filter; self-contained power supply; and single control mode switching. As an exciter drives any popular kilowatt level tubes and provides quality speech driver system for high power modulators. Provision for plug-in SSB operation with no internal modification. With tubes, less crystals.

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Cat. No. 240-105-2—Wired, tested Net \$495.00



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Station Activities

(Continued from page 98)

1800, NYS C.D. on 3610.5 and 3993 kc. (s.s.b.) at 0900 Sun. and 7102.5 kc. at 1930 Wed., TCPN 2nd call area on 3970 kc. at 1900. LPN on 3980 kc. at 1600. 2RN on 3690 kc. at 0045 and 2345 GMT. BPL certificates for June go to W2RUP and W2GVH. Congratulations! The Rochester DX and Niagara Frontier DX clubs got together for a Lawn Social in Punia Corners and the stories were as good as the steak and a rare Chilean brew. From all reports received here Field Day was a huge success, with perfect weather and many groups out for the first time. The NEDXA, top winner in the 2-transmitter class was missing this year because key operators (?) were out of town. The Syracuse V.H.F. Club, organizer of the V.H.F. Roundup has started publishing a monthly newsletter which has great promise. W2AID has a new Viking Challenger. Genesee Radio Amateurs, known as GRAMS, have initiated a time newsletter. The club sponsors a Novice class with 14 out of 16 making the grade the first time around. Erie County RACES supplied communications for a "Boatarana" held on the Niagara River in conjunction with safe boating week. The RAGS elected WA2PQG, pres.; W2LBO, 1st vice-pres.; K2KJZ, 2nd vice-pres.; WAZAD, treas.; WA2QMJ, secy. Clara, W2RUF, has been issued a W2JVG call in the State RACES Net. She is recruiting a c.w. operator in each county for a state-wide AREC or Public Service Corps Net. Liaison with v.h.f. AREC Nets is the ultimate goal. Send W2-10% data on your AREC-RACES Nets so that coordination can be worked out. AREC and RACES networks are a vital necessity and a state-wide network maintained on an efficient basis using existing traffic circuits on h.f. to tie the various county v.h.f. nets together all at the same time would comprise a communications system second to none. Your suggestions are welcome. I would like to hear from those who can work v.h.f. and h.f. simultaneously. Traffic: W2RUF 657, W2GVH 513, W2OB 393, WA2KQG 177, W2EFZ 160, W2-FBR 136, K2SLI 43, WA2KJZ 40, W2FCG 30, K2IAM 23, WA2CLA 17, WA2WFE 17, K2RYH 15, W2RQF 11, K2TBU 7, K2TGD 7, WA2DAC 6, W2EMW 3, WA2PFR 2, K2VRV 1.

WESTERN PENNSYLVANIA—SCM, Anthony J. Alroczka, W3UHN—SEC, W3LIV, RMS: W3KUN, K3-OOU and W3NUG. The WPA Traffic Net meets Mon. through Fri. at 2400 GMT on 3585 kc. The Keystone Slow Speed Net will begin operation sometime after Labor Day, same evenings, time and frequency. The South Hills Brass Pounders & Modulators has moved into its new meeting room at the Whitehall Borough Building. A new Novice around Pittsburgh is KN3YNC. K3OOU now has a FCC appointment as station A Sun. evenings. K3SMB has an HE-50A mobile on 10 meters. The Cumberland Valley ARC at a recent meeting visited with the Ward Leonard Electric Co. located in Hagerstown, Md. K3ODD is vacationing in Wyoming. K3YHT operated 6 meters monitoring to California. The Coke Center RC reports: K3KUF passed the General Class exam; W3NCE got his Extra Class license; K3-JDZ is ready to fire up his kw rig. K3UTR has a Meteor SB-175 now. The Nittany ARC reports via QST the K3HKK that the Penna. Counties awards are available by contacting the club. The Uniontown ARC Magazine reports: W3RUC has a 40-meter vertical; K3WBA passed the General Class exam; K3OQP is going 6-meter mobile, Silent Key; W3LOC, of Pittsburgh, Up Erie way; K3GAO and W3KNQ are new directors of the RAE; W3TJA is using a 2-meter communicator; W3-JCQ is building an s.s.b. rig for 6 meters; K3UOC is operating the Boy Scout Camp Sequoia (K3ERK) for the summer season. The Horseshoe RC *Hanateur News* reports: K3PCE joined the Navy; W3TAW now is on 6 meters; K3JCZ is working DX on 6 meters; K3HHD and K3TRD participated in the club's FD. The new name of the Conemaugh Valley V.H.F. Net is now the Johnstown Emergency Traffic System (JETS) and the net meets every Wed. on 50.385 Mc. at 2400 GMT. Traffic: W3NEA 380, W3KUN 285, K3OOU 281, K3VPS 190, W3IYI 50, K3TEZ 44, W3OEO 19, K3SMB 10, W3UIN 5, K3COT 4, W3LDD 4, K3EXE 2.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—Asst. SCM: Grace V. Ryden, W9GME, SEC: W9RYU, RM: W9CSR, PAM: W9WJ, EC of Cook County: W9HPG. Section net: 1LN: 3515 kc. Mon. through Sat. at 1900 CDT. All ECs are asked to check into the new EC every Sun. at 1600 GMT on 3840 kc. W9LNQ, W9YYG, W9MAK, K9GSD, K9UCG, W9EET, W9NPC and K9-RIN were top scorers in the Illinois section in the April CD Party. W9WNV is active on 14,050-ke c.w. as HL9-KH. W9KCR is back to work after a hospital sprint. Twenty members of the Northwest Amateur Radio Club provided communications for the Evanston Coun-

oil of Boy Scouts of America during its Camporee. Official Experimental Stations report that many new stations were heard during the June openings on 6 meters. Many of the gang added to their WA lists. WA9CCP has reported that she has a new HT-37 and her traffic work has increased. Danny, the 11-year-old son of W9-DDX, president of the York Radio Club, has passed the General Class exam and is awaiting his call, W9-FGG, W9IAX, W9JUV, K9OSO, W9KCR, W9YUQ, K9-UCG, W9UA and K9QIZ participated in the recent League-sponsored Frequency Measuring Test. WA9EIT has a new NCX-3. K9YMD has a new Hallcrafters HT-41. K9UCG received his Worked West Virginia Award. The Joliet Township High School Amateur Radio Club has modified its beam and is working EB contacts on the new version. New officers of the Tri-Town Radio Amateur Club, Inc. are W9OQN, director; W9-GMS, pres.; K9OQQ, secy.; and W9NQZ, treas. K9-TOK's new QTH is Chicago. New appointees are K9-EIV, as OBS, K9YRA as OO and WA9DKM as OBS. Inter-state Subband Net traffic was 1004, while 1LN piled up a count of 160 messages. W9IDA reports that the North Central Phone Net's morning traffic was 462 and the Noon Net had a message count of 267. Recipients of the BPL award for June traffic are K9NBH, W9IDA, K9KZB, WA9AJF, WA9CCP and W4WRM/9. Traffic: (June) K9NRH 6670, W9IDA 3289, K9KZB 1557, WA9AJF 1029, WA9CCP 875, K4WRM/9 640, W9AKV 273, W9USR 119, K9BTE 82, K9LRN 67, W9JYU 60, K9CRT 17, W9PRN 14, K9TYA 14, K9RAS 12, K9QMJ/ W9CSG 7, K9DRS 5, W9DRQ 1, W9LNQ 1. (May) K9-UCG 8.

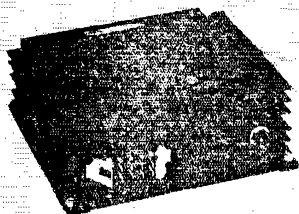
INDIANA—SCM, Donald L. Holt, W9FWH—Asst. SCM: Clifford M. Singer, W9SND, SEC: W9SNQ, PAMs: K9KTL, K9CRS, K9GLL, RMS: W9TTF, K9-DHN. Net skeds (all times in GMT): 1FN, 1300 daily except Sun. at 1330 and 2300 M-F on 3910 kc. 1SN (s.s.b.), 0030 daily on 3920 kc. QIN (training), 0000 M-W-F on 3745 kc.; QIN, daily at 0000 and RFN, at 1200 Sun. at 3656 kc. New appointments: W9RGY as EC of Tippecanoe County. W9UNA as EC of Rush County. The number of Field Day radiograms sent to the SCM indicates that Indiana had a good turnout with many AREC members active. There are a few counties in Indiana without Emergency Coordinators. Your SEC would like to hear from anyone interested in an EC appointment. The Columbus Hamfest was a great success with the weather cooperating for a change. K9-KGJ, K9CGO and K9CGR recently passed the General Class exam. QIN Honor Roll: K9LHY, W9TTF, K9-DHN, K9HYV, K9ZLA and K9WVJ. Those making BPL: W9JOZ, W9MIM, K9DHN, K9ZLA, W9NZZ and W9BUQ. *Amateur Radio exists as a hobby because of the service it renders.* June net reports: 1FN 231, 1SB 5041, QIN 225, QIN (training) 0, RFN 59, Hoosier V.H.F. 157, 9RN 631. Indiana is represented 100 per cent. Traffic: W9JOZ 3428, W9MIM 2409, K9DHN 844, K9ZLA 663, W9NZZ 451, K9JVG 407, K9ZLB 214, W9-BUQ 234, W9JLV 178, W9BFB 175, W9ZYK 174, W9TTF 163, K9KTL 141, K9FNR 139, K9RWQ 130, K9CRS 99, K9ARW 93, W9QYQ 80, W9FWH 73, K9HYZ 69, K9-VHY 59, W9DOK 58, W9SNQ 36, W9RTH 30, W9CC 26, K9MWC 21, W9AEEP 20, K9LLA 20, K9BSL 19, W9Q-TY 19, K9HMC 19, W9AELY 16, K9MAN 15, W9O-E 15, K9WVJ 15, K9YXK 14, W9YYX 12, W9MIM 11, K9-PVS 11, W9BDP 9, W9FYM 9, K9DUV 8, K9QVT 8, K9VIC 7, W9SW 6, W9AQW 5, K9UUF 3, K9GEL 2, K9WTF 1, K9WET 1.

WISCONSIN—SCM, Kenneth A. Ebnetter, K9GSC—SEC: W9BCC, RM: W9KQB, PAMs: W9NGT, W9NRP and W9SAA. Nets: WIN on 3535 kc. daily at 0045Z. BEN on 3950 kc. daily at 2300Z and W9BN on 3985 kc. daily at 2245Z. New appointees: K9GBV as EC for Winnebago County. K9RIZ as EC for Oneida County. Renewed appointments: W9NLJ as OBS, W9MWW has a new Ranger. W9HHX has installed new v.h.f. equipment. New in Baraboo is W9ILL. FMT reports: W9-RKP 35.7 p.p.m. and W9LEK 74.6 p.p.m. W9NLJ will be operating from Prince Edward Island Sept. 24-30. W9-VSO again topped the OOs in Wisconsin with 175 notices sent in June. W9ONI received RATT and C.W. certificates for Armed Forces Day. Our new RM, W9-KQB, says the WIN needs more good c.w. operators and a return of the old-time winners. WA9CWU and WA9-ESX have graduated from Novice to General. W9WV awards No. 8 and 9 went to W8NAN (the first out-of-state station to win) and W9OKN. K9BLN is now receiving on an SX-96. The Milwaukee AREC assisted in the Fourth of July Parade. W9SZR is leaving Wisconsin for Washington, D.C., and then overseas. Net reports: WIN, 135 offered, 118 cleared by 212 stations; W9BN, 867 offered, 637 cleared by 967 stations; BEN 521 offered, 322 cleared by 953 stations. BPL for June traffic went to W9DYG and K9IAR. Traffic: (June) K9IAR 636, W9DYG 566, W9AOW 362, W9SAA 259, W9CXY 224, K9GSC 146, K9IME 122, WA9AKE 76, W9VHP 45, W9-HHX 42, W9KQB 39, K9BLN 38, W9NRP 35, W9CBE

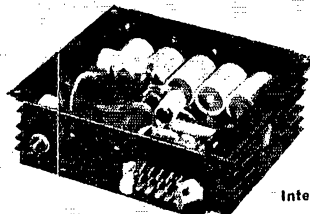
(Continued on page 102)

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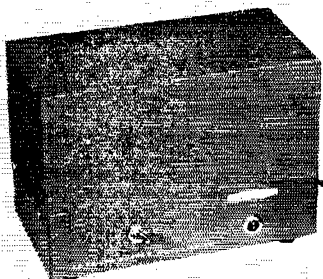


Interior

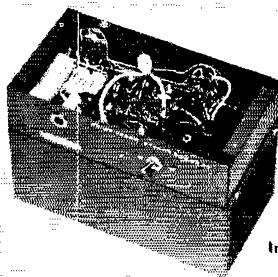
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SPECIFICATIONS—Input voltage: 12 to 14 volts DC. **Input current:** 25 amperes maximum with full load. **High voltage output:** 800 volts DC, no load; 750 volts DC @ 250 ma. **AC ripple,** less than 1% @ 250 ma; **Duty Cycle,** 150 ma continuous; 150 to 300 ma @ 50%. **Low voltage output:** (high tap) 310 volts DC, no load; 300 volts DC @ 150 ma. (low tap) 265 volts DC, no load; 250 volts DC @ 150 ma. **AC ripple,** less than .05% @ 150 ma. **Continuous duty cycle,** to 175 ma. **Adjustable bias voltage:** —40 to —130 volts DC @ 20 ma max. **Duty cycle,** continuous. **Dimensions:** 7¹/₂" W x 7¹/₂" L x 2³/₄" D. All voltages referenced at 13 VDC input.



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SPECIFICATIONS—Power requirements: 120 volts AC, 50-60 cycles, 350 watts maximum. **High voltage output:** 820 volts DC, no load; 700 volts DC @ 250 ma. **AC ripple:** Less than 1% @ 250 ma. **Duty cycle:** 150 ma continuous, 150 ma to 300 ma @ 50%. **Low voltage output:** (High Tap) 350 volts DC, no load; 300 volts DC @ 150 ma. (Low Tap) 275 volts DC, no load; 250 volts DC @ 100 ma. **Less than .05% AC ripple @ 150 ma, continuous duty to 175 ma. Fixed bias:** —130 volts DC, no load; —100 volts DC @ 30 ma. **Adjustable bias:** —40 to —80 volts DC @ 1 ma maximum. **Less than .5% AC ripple, Continuous duty to 20 ma. Filament voltage:** 6.3 V. AC @ 11 amps; 12.6 V. AC @ 5.5 amps. **Dimensions:** 9" L x 4³/₄" W x 8³/₄" H.



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31, W9HPC 21, K9GDF 20, W0OTT, 19, K9DOL 17, K9-LGU 17, K9CJP 16, W9UEB 15, K9OUT 13, W9VIK 9, W9MUG 8, W9AESP 7, W9APB 6, K9ZAU 6, W9ONI 3, K9FPM 2, (May) K9GDF 21, K9YPT 14, WA9BEK 10, WA9ESP 2.

DAKOTA DIVISION

NORTH DAKOTA—SCM, Harold A. Wengel, W0-HVA—SEC: W0CAQ, PAMs: K0TYT 75 meters, W0-QEL 160. W0CAQ has been doing some building and came up with a new amplifier. New appointments are KOMHB as OO and W0OEL as PAM for the 160-Meter Net. K0GGI had a picnic at his farm for area hams and about 150 hams and their families turned out for the fun. A good time was had by all. The 75-Meter Fone Net reports 23 sessions with a total of 378 check-ins, max. 29, min. 10, 50 pieces of formal traffic and 65 informals were handled with 15 relays. Traffic: K0ITP 143, W0YCL 26, K0GGI 11, W0CAQ 10, W0AAD 8, W0A0V5 8, W0AYL 8, K0FRP 8, W0PHC 4, W0AYM 2.

SOUTH DAKOTA—SCM, J. W. Sikorski, W0RRN—SEC: W0SCT. The Black Hills ARC 2-Meter Net meets every Wed. and Sun. at 2000 (MST) on 147.6 Mc. K0CXL has a 2-meter mobile in his VW. There's a new Ranger at W0BLK and W0SVI has a new Halli-craters 150SSB. W0ACWW and W0ACWX have moved into a new home. W0SCT turned in his 48th consecutive report as SEC and has never been late. W0ZWY/O, operating from Newton Hills, set new records for the number of stations worked. W0ACXB received his Technician Class ticket. W0TUC is spending the summer in Canada, working with a balloon-launching re-search team. Traffic: W0SCT 499, K0VYV 116, K0-GSY 113, W0DVB 108, K0BMQ 57, W0ZWL 26, K0-BSW 16, K0ZTY 13, K0YJF 12, K0K0Y 8, W0ACKH 4, K0ZLJ 6, K0TXW 5, W0YVF 4, K0ZBJ 4, K0-HQD 3, W0AGD 2, W0A0Y 2, K0JGM 2, K0JHJ 2, W0ZLS 2, W0ARZ 1, W0OFP 1.

MINNESOTA—SCM, Helen Mejdrich, W0OPX—Asst. SCM: Emerson Mejdrich, W0RIQ. SEC: K0-KEQ, RMs: K0ZRD, K0JJI, PAMs: W0GCR, W0-HRY, MSSB PAM: W0HEN. Appointments issued are KOMGT' as PAM; K0GPI and K0ZRD as OPS; W0HEN as PAM for the S.S.B. Net; K0YPI as PAM for MSPN. Dakota Division Director W0BUO spoke on incentive licensing at the June meeting of the Man-kato Area Radio Club. FD messages were received from K0QIK/O, W0MBD/O, K0TLP/O, W0ASC/O, W0-REA/O, K0CRO/O, W0LUX/O, K0VXW/O, K0-ZNE/O and W0LGN/O. OO W0TVI cited 8 violations. OO W0WMA placed in Class I in the recent FMT. RM K0ZRD reports increased QNI and traffic in her slow-speed c.w. net (MJNI), including a roll call of 9 Novices. All hams are invited to participate. Many thanks and good wishes to our retiring PAM, W0GCR. Clarry's best report shows QNI 1056, QTC 319 for 30 sessions. W0OPX and W0RIQ attended the Itasca Radio Club Picnic and had a most enjoyable evening. Hams gradu-ating from high school: K0PFW, who is studying under a Minn. Heart Assn. Fellowship at the Mayo Clinic in the field of science. K0VXW, who plans to continue in electronics. K0UKL, who will enter the Navy Sub service. W0FAAL, who will study law. New General Class licensee W0AEGT uses Pacemaker 2B, TH-Z and 40-meter dipole. OBS W0ADIE has a new DX-100 and is working short skip on 28 Mc. W0KJZ has been giving code practice to Novices W0N0FK, W0N0GAC and W0N0FCJ. How about fixing up that so-so antenna situation now while the warm breezes blow and try to include one for 160 meters to combat that long skip problem? W0ZTJ, W0SV and W0FYW are Silent Keys. Traffic: W0ARA 291, W0BYO 214, W0HEN 148, K0JJI 75, W0OPX 66, K0YJF 62, W0ADGW 53, K0ZKK 53, W0ASC 47, W0KJF 45, W0ABU 41, K0ZRD 40, W0MNX 37, K0HSD 35, W0GCR 34, K0MIZ 33, K0MGT 31, K0YPI 31, K0JFY 26, W0-YHR 26, W0BUO 21, K0UXQ 20, K0YJY 19, W0-DSH 18, K0ICG 17, W0RIQ 14, K0LWK 13, K0-IKU/O 12, W0THY 10, W0ACPW 9, K0FLT 8, W0-RQJ 8, K0IFS 6, W0ADBW 3, K0WY 3, K0ZRC 3, W0N0FCJ 2.

DELTA DIVISION

ARKANSAS—Acting SCM, Curtis R. Williams, W5-DTR—SEC: W5KRO. PAM: K5SGG, RM: K5TYW. New appointees are K5SGG as PAM/OPS/ORS, K5-KQD as EC of Mississippi County, W5FDM as EC of Union County, K5GKQ as EC of Faulkner County, W5ACG as EC of Baxter and Marion Counties, K5-GFN as ORS/OPS, K5TCK as ORS/OPS, W5AYO and W5AID as ORS. The South Arkansas ARC recently handled traffic in a Cerebral Palsy Telethon. FD messages were received from W5GRO, K5AKS, W5-FMC and W5YM. W5EKA can now work 20 and 10 meters with his new antennas. The Arkansas Emergency

Fone Net meets on 3885 kc. at 1200 GMT and had 1145 check-ins and passed 126 pieces of traffic in 25 sessions for the month. The Arkansas C.W. Net (OZK) meets on 3790 kc. at 0100 GMT and needs more operators. During severe weather warnings the Arkansas Weather Net meets on 3990 kc. W5ABE is moving to a new lo-cation so he can get up some better antennas. W9PHR/5 has started to help with OZK again. K5CQP is the new net manager of CAREN. W5KRO's new QTH is 124 Harrell, Hot Springs. Make your traffic handling errors before an emergency; originate and handle more traffic regularly. K5GKN reports that the Osceola ARC has 12 members with W5ZZY as president. Traffic: W5-AVO/5 409, W5DTR 194, K5SGG 38, W5HPL 19, W5-EKA 14, W5COK 12, K5TCK 11, W5BQL 9, W5FML 7, K5ICH 7, W5AMM 5, K5WSS 5, K5GKQ 4, W5-CAG 3, K5TYW 3, W5AID 2.

LOUISIANA—SCM, Thomas J. Margavi, W5FMO—News of the passing of K5CEG and K5VHJ was re-ceived in June. June Field Day must have been a great success judging from the messages received from W5-YMY/5, K5SVE/5, W5UKJ/5, K5HUU/5, K5WOD/5 and K5CDC/5. After reading a long letter from W5BQA, it seems like he has become DX-minded. K5CIT won both first and second prizes at the Biloxi Hamfest. K5-KQG is now permanently located in Houma, La. W5-JPB had some eyeball QSOs with some WIs. W5HHA is busy on AF MARS and RTTY. K5YET operating from the Boy Scout camp at Edgewood, La. K5TJG has been appointed OO. K5PGS was active during FD. That Jefferson ARC Steakout really was a great suc-cess. K5KMG, Beauregard Parish EC, is busy forming an Emergency Net. K5TAV and K5CRD are his assis-tants. K5QXV has a nice traffic count despite his desire to slow down. W5CEZ is back home after a vacation, a Boy Scout Camp trip and swimming in the Gulf. W5-IIF and W5SKW have their hands full handling traffic for the Scouts at the camp. There is no land line so all traffic is by ham radio. W5EA has his ART-13 go-ing. W5KAT raised his 2-meter beam to 65 feet with outstanding results. K5BIB has been appointed OO. K5KQG, an OPS, has been appointed OO. K5PME is pounding brass at sea. K5CME takes part in the ARRL Frequency Measuring Tests with better results all the time. Those participating in the latest test included W5EM, K5KQG, K5TJG and W5FMO. Traffic: W5ITF 243, K5QXV 195, K5PGS 129, W5SKW 120, K5ARI 104, W5CEZ 95, K5KMG 60, W5MXQ 47, W5HNS 33, K5-YET 26, K5OKR 25, W5EA 12, K5GKK 8, K5TJG 5, K5PYI 4, K5MOJ 2.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—W5JDF reports that Aberdeen is forming a 6-meter net with his mobile "sixer" and K5KSK as fixed station. K5RUO is having good luck specializing in South American traffic. K5GAD has a new Harvey-Wells TBS-50D. Columbus has two new amateurs: W5TIEE and K5ZNH. Welcome, fellows. The Columbus Club had a fine H-B-Q and also has several new hams in the club. K5AFO is the new net manager for the Miss. Magnolia Net. Glad to hear W5AIV on the air and handling traffic. W5VOO, K5HKE and K5CIT/S are do-ing a good job with their new SR-150s. W5ADMI/5 is now mobile with a fine signal. W9MKI/5 is on SSN with a 20-A. K5CIT is building a fine line. Congratulations to K5VHE, just married. W5LWQ is on 8 meters. New appointment: K5PNV as EC for Noxubee Co. Traffic: W5JDF 176, K5AFO 16, K5HJQ 13, K5RUC 13, W5-GEK 12, K5GVV 11, K5PPI 11, W5AIV 9, K5DZE 6, K5GAD 6, W5RIM 2, K5YTA 2.

TENNESSEE—SCM, David C. Goggio, W4OGG—SEC: W4WBK, RMs: W4OQG and W4ZJY, PAMs: K4-WWQ and W4A4IS. New appointments: K4JTO as Marion County EC, W4TXX as c.w. OO, W4A4IS as PAM for East Tenn Net. Net reports for June

Net	Freq.	Time	Days	Ses-sions	QTC	QNI	Aver-age
TRSN	3980	1900C	M-Sat.	25	144	634	25
ETPN	3950	0640E	M-Fri.	20	38	414	21
TN	3635	1900C	M-Sat.	25	98	158	6

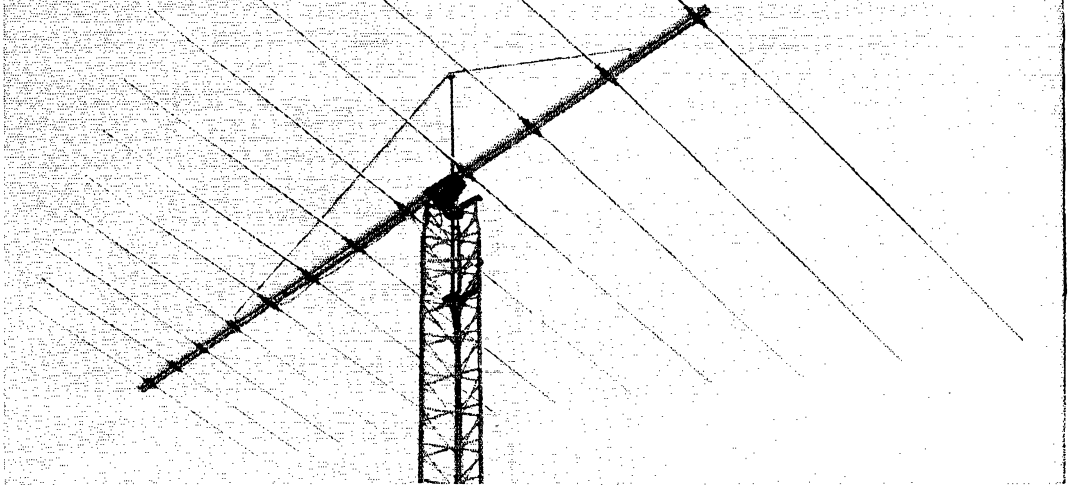
Field Day messages were received from Chattanooga, Kingsport, Knoxville, Memphis, Nashville, Newport, Oak Ridge, Paris, Shelbyville and Whitehaven, 160 meters for state change: 1800, 25 kc., 200 watts day, 50 night; 1975-2000 kc. 100 watts day, 25 night. At Chat-tanooga a meeting to hear Delta Division Director W5-MUG attracted 80 interested in the new ARRL incen-tive licensing proposals. The RAC of Knoxville set up a club house building fund and reports a fine turnout at the AF MARS Picnic. The Mid-South V.H.P. Club reports the VL Net on 50.3 Mc. at 9 p.m. Charter members include W4TFU, W4UDQ, K4UCB, K4IHL and others. The MARA had over 100 applications for its radio school. OES W4EYU worked every call district and 7 countries during the v.h.f. openings in May. The

(Continued on page 104)

For Reliable Broadband Performance on 13 thru 30 Mc...

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**Model LP-13/30
Log Periodic**



Hy-Gain's Model LP-13/30 is a logarithmic periodic array of center fed dipoles designed for the 13 through 30 megacycle frequency range. The geometry of the LP-13/30 is such that the input impedance and the free-space radiation pattern vary periodically with the logarithm of the frequency. Variation of these characteristics over a period is small. Therefore, the variation for all periods is small with the result that outstanding broadband performance is achieved.

Electrically and mechanically, the LP-13/30 has proven extremely reliable in various applications throughout the world. Because of its low cross-sectional configuration, it is very easily rotated.

SPECIFICATION SUMMARY

Frequency Range.....	13 thru 30 mc.
Power Capabilities ...	5 KW P.E.P.; 2.5 KW continuous wave
Gain.....	8db average over isotropic
VSWR.....	Less than 2:1
Input Impedance.....	50 ohms
Boom Length.....	26.5 ft.
Turning Radius.....	22.5 ft.
Longest Element.....	38 ft.
Total Number of Elements.....	12
Net Weight (Incl. Boom to Mast Assembly).....	140 lbs.
Max. Wind Velocity for Survival (no ice).....	100 MPH
Max. Wind Velocity for Survival (1/2" ice).....	60 MPH

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Hy-Gain's lightweight, compact Model RBX-5 is a heavy duty azimuth rotating system designed to rotate and hold large communication antenna arrays. The system is supplied complete with rotator; control unit including directional rotation switch, master off/on switch, and Selsyn operated azimuth indicator; and, universal mounting brackets for just about any type of mounting application.

SPECIFICATION SUMMARY

Overall Dimensions.....	22"x15"x12 3/4" high
Total Weight.....	151 lbs.
Rotating Torque.....	9,000 inch pounds minimum at output shaft
Braking Torque.....	Tested to 23,000 inch pounds without failure
Velocity.....	.96 RPM at 60 cycles per sec. A.C. motor operation
	.79 RPM at 50 cycles per sec. A.C. motor operation
Total Motor Reduction.....	1800 to 1
Output Shaft Travel.....	360 degrees (optional continuous)
Acceleration.....	1.9 sec. to .96 RPM with 3,000 inch pound load
Time Required to Stop and Initiate Reverse Movement.....	1.8 sec. to .96 RPM with 3,000 inch pound load
Motor.....	1/4 HP Electric with drip-proof ball bearings
Motor Windings.....	Reversible, series wound with starting winding
Operating Voltage.....	105/125 V
Operating Current.....	4.2 amp., 49 to 61 cycles per sec., single phase
Power Consumption.....	483 watts

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THE AMERICAN RADIO RELAY LEAGUE

NEWINGTON 11, CONNECTICUT

Delta RC held successful hamfest and Field Day operations. W4FX still is handling traffic on 40-meter c.w. Tenn. C.W. Net certificates were issued to W44GX, W4KAT, W44MCC, W4MXF, W4OGG, K4OUK, W4PHW, K2WUG and W4ZJY. Make plans now to attend the Convention to be held Nov. 29-30 at Lafayette, La. Coming events: The V.H.F. QSO party Sept. 14-15. Additional openings for Official Observer are available as a result of new ARRL proposals. Four years experience is required. Traffic: W4ZJY 579, W4ODR 353, W4RMJ 318, W4PQP 229, W4KAT 106, W4OGG 103, W4MXF 90, W4CVG 44, W44AVX 40, W44GLS 40, K4WWQ 26, W4VTS 24, W4LLJ 19, W44AIS 18, W44HG 18, W4WBK 17, K4JIG 16, K4JXG 14, K4EWT 12, W4HHQ 11, W4OQG 10, W4ZAC 10, W44DHG 9, K4OUK 9, W4FMF 8, K4STR 8, W4DQR 6, K4MIF 6, K4CPC 5, W44PH 5, K4NRZ 5, K4PYH 5, K4AAE 4, W4CAT 4, W4HRG 4, W4WBY 4, W44GX 3, W44IRX 2, K4NZN 2, W4NSI 2, W4YEL 2.

GREAT LAKES DIVISION

KENTUCKY—SCM, Elmer G. Leachman, W4BEW—SEC: W4TFK, PAMs: W4SZB, K4ECJ, W4BEJ, V.H.F. PAM: K4LOA, RM: W4CDA, Asst RM: K4NYO, RM (KNN): W44APU, KYN (s.s.b.) reports QNI 268, QTC 52. Early morning KPN reports 20 sessions, QNI 280, QTC 34, 10 states reporting in. Our SEC has returned from an extensive tour of the west. Sorry to learn of W4SZB's illness. Harry is our faithful morning PAM for KPN. W4CDA is working on a new design for the station and antenna system for his new home. W4USE submitted a report indicating outstanding AREC and RACES organization in the Louisville area. Eventually it will be composed of five sections, 53.6-Mc. f.m.; 50.68-Mc. a.m.; 10-meter s.s.b.; 2 meters, mode to be determined, and RTTY. All nets have c.w. capability. The Louisville Chapter is fully integrated and K4ZQQ makes the following report in part. "The Louisville Chapter of the American Red Cross, with K4ZQQ as chairman of communications, has now purchased and installed the S-Line with a k.w. (P.E.P.) linear final, and using a Hy-Gain Hytower antenna installed on the roof of the Chapter House. This equipment, together with a 250-watt 6-meter f.m. rig operating at 53.6 Mc. and a Gonset G-50 on 6-meter a.m. at 50.68 Mc., places the Chapter in good shape so far as communications may be required in any kind of disaster or emergency that may occur, with the S-line for the long hauls and the two 6-meter rigs for work within a fifty mile radius." Traffic: W4BYG 572, K4VDN 193, K4KWQ 133, W4USE 90, W4CDA 64, W44LCH 45, K4ZQQ 37, K4VDO 24, W4CQG 20, W44QR 14, W4KJP 14, W4EKK 12, W44ENH 11, K4LOA 8, K4TQZ 6, K4YZU 6, K4SWL 5, K4YCB 3.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: W8LOX, RMs: W8EG1, W8INJ, W8FWQ, K8KMQ, PAMs: W8CQU, K8LOA, V.H.F./PAM: W8PT, Appointments: W8AHQ, W8RWK, W8ZHB as RCs; K8OVJ as OD; K8KLY as OBS; K8TJD as ORS; K8GJD, K8LQA, W8QPO and K8VDA as OPSs. New officers: Metropolitan Racchewers Club—K8PUS, pres.; W8GJM, vice-pres.; K8OJL, treas.; K8UXY, sec.; K8WTU, K8WMH and W8FNR, boardmen. The club meets the 1st Sun. of each month at Lakewood House at 2000 GMT, and the members are interested in handicapped people as hams. Many Michigan clubs did not get FD message credit because they were not sent or delivered in proper form. W8IA lost his Dad, who was 87. Calhoun ARC now has the call W8MF. Hillsdale ARC Sparks says "Maybe they ought to permit only S.S.B. phone on 160-2 meters. This would be a real step forward." K8E2D got his Master's Degree and now is working for Collins on the Apollo Moon shot. W8C'DL is recovering from open-heart surgery. K8TDJ has taken over as editor of GRARA's QRM. Every XYL should be made to read "FD from a Woman's Point of View" in the MCRG bulletin! W8NAN made the "Wkd 99 Wise" award. Congrats to the Metro. Racchewers on its newspaper publicity. Is it true that Catalpa CARS News is being discontinued? From Central Michigan ARC Scope: K8ETU says, "If we don't use our 10- and 15-meter bands, we'll sure lose 'em." W8DZP made General, and K8LLR made CP-35. W8SKI is back from a 17-day trip to Eire and the RSGB. K8GOU RPLs again. W8BEZ made a trip in a compact, with 8 jr. operators and the XYL. The new Post Office Department ZIP code should be in radiogram address where there's a chance mail delivery is required. W8QBE and K8OID are father and son. New officers of the Michigan Six Meter Club are K8BOU, pres.; K8TCL, vice-pres.; K8JGF, sec. K8LUY, treas. There still are many "mentally lazy" hams who claim they "cannot" figure GMT. Remember for Michigan, 7 P.M. EST is 0000/2400. Traffic: (June) K8GOU 566, W8QFO 274, K8-NJW 221, K8KMQ 183, W8DZP 146, W8FLW 100, W8-ENO 93, K8LNE 90, W8BEZ 83, W8ASV 78, W8DSW 77, K8BYX 66, K8YAY 66, W8FWQ 51, W8FX 45, K8-

(Continued on page 106)

Fastest way to learn code

RIDER SOUND-n-SIGHT CODE COURSE

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"We have found the Rider Sound-N-Sight Code Course to be a successful training method. We are currently employing this method with modifications to fit our training requirements. We have found that this method of teaching code saves an appreciable amount of time in our training program." Thus stated the Commanding Officer, U. S. Coast Guard Training Station, Groton, Connecticut . . . Proof once again that the Rider SOUND-N-SIGHT CODE COURSE is the easiest, fastest way ever developed to learn code.

The NAVY TIMES gives details of the successful Coast Guard test that led to the adoption, at the Coast Guard Groton, Conn. Training Station. "The Army at Ft. Monmouth, New Jersey, adopted the radio course. The Coast Guard was impressed with the Army results and gave the method a try . . . According to the Coast Guard trial runs, the men taught by the new method take a lead immediately in building speed and remain ahead by nearly 100% throughout."

"After 30 hours for example, the first experimental group averaged 19 words per minute, the second averaged 16.9 and the third 18.5. Men in the first class under the old method were clocked at 9 words per minute at this point and those in the second had 9.4 words. There was no comparison in the third class, since all were on the new method."

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- uses identification "flash" cards to teach you the correct letter association with each signal pattern.
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OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM; J. C. Erickson, W8DAE. SEC: W8HNP. RMs: W8BZX, W8DAE, W8IEP and K8ONQ. PAMs: W8VZ, K8BAP and K8UBK. Your SCM attended the Northeast Ohio V.H.F. Groups' Hamfest/Picnic which drew about 500 people. 312 of them amateurs. 150 mobile check-ins. K8TCP won a 66-ft. Ezeway crank-up tower. K8ORG a Clogg 99er, W8DRX a Clogg 99er, W8WRH a 2-meter converter, K8LDG a D-104 mike, K8KTM a 2-meter beam and K8IGT a 6-meter beam. The Holmes County ARC was organized and elected K8ZAV, pres.; W8AUK, vice-pres.; W8AOK, secy.-treas.; K8KDR and K8RPO, trustees. K8MTI received his amateur Extra Class license. The Six Meter Novice's *The Amateur Extra* states that K8YMG left for Ohio State U. and the club held a hidden transmitter hunt. Cincinnati ARA's *The Mike & Key* says the telephone company presented the Telstar Story with pictures. Parma RC's *P.R.C. Bulletin* tells us that W8LYO told about the commercial communication satellite Telstar and K8DHX returned after 13 months in S. Korea with the Air Force. Dayton ARA's *R-F Carrier* informs us that W8AUQ gave a rundown and demonstration of satellite communications and told of many wonderful openings on 6 meters. K8BTT sent this news in: WTC certificates were sent to K8OAS, W8BBG and W8ACAJ; K8BXT and K8ORG are mobile on 2 and 6 meters using Polycom 629 transceivers; W8EEH is on s.s.b. with a Pacemaker; K8ZNE has a new NCX-3 and K8ORG has a new Clogg 99er. Findlay RC's *W8FT News* states that W8GXF still is confined to the hospital. The ARC of the Ohio State University's *W8LT Log* reports that K8VPW has a new Seneca, K8GHJ has a new 75A-4 and club officers starting this fall are K8GHJ, pres.; K8TDR, vice-pres.; Mel Roach, secy.; K8RLS, treas. Warren ARA's *Q-Match* tells us the members voted on new rules and regulations, a group of club members attended the G.E. Amateur Night at Nela Park in Cleveland and the Trumbull County Ham Directors is being mailed, W8FIF, W8NJJ and W8EEH were on vacation, K8DDB vacationed in Arizona. Toledo's *Ham Shack Gossip* says that K8LFG is the proud father of a baby boy and K8NCS received his 1st-class commercial license. K8VGL received his General Class license. Appointments made in June were W8SIX as EC, W8GKU as OO and W8AMK as OES, W8UPH and K8PBE made the BPL in June. W8AL received Cardinal E.D.C and B. Cardinal Cities and Cardinal Novices certificates. W8TBL joined Silent Keys, W8Ns IZF, IZP, IZR, IZS, JAB, JAC, JAG, JAJ, JAJ, JAK, JAL, JAM and JAN graduated from the Canton ARC code and theory classes and received their Novice Class licenses, K7ZCS, K7ZRS, W1RCJ and W1ZEN visited the Canton Club meeting, W8AJZ received his QRP membership and an award for placing third in the QRP contest. Massillon ARC elected W8NWR, pres.; W8YUJ, vice-pres.; K8ZBY, secy.-treas. W8ANQ reports the Eastshore V.H.F. Radio Club has a Cushcraft 6-meter beam, 85 feet. Traffic: June: W8UPH 970, K8PBE 564, W8ACX 413, K8LGA 285, K8DIU 273, W8CHT 194, W8AJZ 170, K8UBK 124, K8MTI 97, W8BZX 95, W8RO 86, W8OCU 72, K8RXD 63, K8LGB 55, W8AWV 48, W8BOV 43, W8CXM 40, W8ECP 40, W8AT 29, W8DAE 25, W8LZE 20, W8BZR 18, K8HNL 15, W8LT 15, K8ONQ 15, W8DTH 12, W8OUU 8, K8DDG 5, K8VGL 5, K8PBZ 4, K8EKG 3, K8PJH 2. (May) W8CHT 440, W8RO 93, K8DDG 85, K8MTI 22. (Apr.) K8MTI 46. (Mar.) K8MTI 45.

HUDSON DIVISION

EASTERN NEW YORK—SCM, George W. Tracy, W2EFU—SRC: W2KGC. RMs: W2PHX and K2QJL. PAM: W2JG. Section nets: NYS on 3670 kc. nightly at 0000 GMT; NYSPTEN on 3925 kc. nightly at 2300 GMT; ESS on 3590 kc. nightly at 2300 GMT; MHY (Novice) on 3716 kc. Sat. at 1800 GMT; Inter-club on 28,600 kc. Mon. at 0130 GMT; Emergency Coordinators on 146,550 kc. Fri. at 0015 GMT. Endorsements: K2-SJN as OPS, W42HGB as ORS and W42LOJ as OBS. New officers of the Schenectady Club include K2ONF, pres.; W2DAG, vice-pres.; W2AZH, secy.; W42TAG, treas.; K2OIC, W42GCD, W2FBS and K2HNW, directors. The winner of the Broughton Award for meritorious service was W2ODC. Speakers at the Westchester Club were Director W2KR and Vice-Director W2TUK. The new officers at Westchester are W2AMK, pres.; W2ANRV, vice-pres.; K2ZYI, secy.; K2CJL, treas.; W2KGV, W2KKE and K2SJO, directors. Field Day messages were received from the Rip Van Winkle and Schenectady Clubs plus W2FBA, who was operating with battery power in Albany County. The joint hid-

(Continued on page 108)

WHAT'S MISSING IN THIS PICTURE ?

Missing—the inevitable operating restrictions found in present-day “No-Knob” amateur equipment.

Hammarlund does not subscribe to the current theory that Amateur Radio Equipment must be “compact”—with minimum and over-simplified operating controls. Equipment of this type is self-limiting—and therefore imposes severe restrictions on the amateur who wants to be in control—and obtain the best possible performance under infinitely varied operating conditions. For example, the “pro” might reinsert the carrier off-center on SSB in order to dodge QRM. (Try to do this on a “no-knob” receiver).

Hammarlund communications receivers contain the control functions that can spell the difference between mediocre and excellent. These include: ■ Variable selectivity regardless of operating mode ■ Fast AVC attack—adjustable decay ■ Individually controlled noise limiter and (optional) IF noise silencer ■ Direct reading frequency calibration . . . just to name a few.

Compromises are missing with Hammarlund equipment. We design and manufacture amateur radio equipment that the novice can grow with—and the expert will enjoy.

Why buy built-in obsolescence?



Established 1910

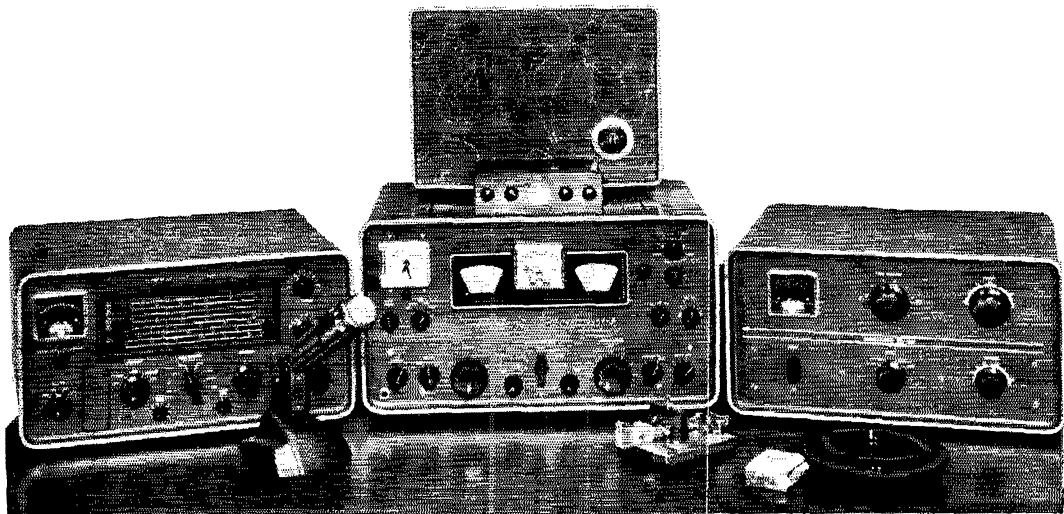
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All-Hammarlund station including the versatile HX-50 SSB exciter, the new HQ-170A receiver which has earned an envied and enviable reputation as the Amateur Band Specialist, and the “Instant-On” HXL-1 Linear Amplifier for booming 1500 watt P.E.P. (twice average DC) performance.



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den transmitter hunt, sponsored by the Westchester and New Rochelle Clubs, was won by K2BVC, with WB2GMN and WA2TEQ close behind. K2SJM has been appointed an Asst. Director of the division. WA2VGT now has an XXL. Congrats to both. WA2DTE is trustee of the fund for the Coudon Award at the Albany Club. An illustrated talk on the old Erie Canal highlighted the "family night" at the Schenectady Club. Don't forget, send in those certificates if your appointment is due for renewal. Traffic: (June) W2THE 210, WA2UZK 204, WA2VYS 163, K2SJM 94, WB2FZC 76, WA2PUM 43, WA2LJM 20, W2PKY 20, W2URP 19, WA2KUL 16, WA2HGB 11, K2DEM 3, (May) W2URP 41.

NEW YORK CITY AND LONG ISLAND—SCM. George V. Cooke, Jr., W2ORU—SEC: K2OVN, RM: W2WFL, V.H.F. PAM: W2EW, Section nets: NLI, 3030 kc. at 1500Z nightly; NYCLIPN, 3908 kc. at 2300Z nightly; V.H.F. Net, Tue.-Wed.-Thurs. on 145.8 Mc. at 0100Z and Fri. through Mon. on 146.25 Mc. at 0000Z; Mike Farrad on 7238 kc. at 1700Z; All Service Net at 1900Z on 3925 kc.; Q5 Net on 3935 kc. at 2100Z daily. The following stations received BPL certificates for good work in traffic-handling for the month of June: WA2GPT, K2YMU, WA2EXP, W2MTA, W2EW, WA2TQT and WA2RUE. This SCM wishes to thank all of the clubs and groups for the many Field Day messages, which demonstrated the high interest and experience gained by such an endeavor. WA2LJY, WB2AKW, WB2FUL and WN2FLJ have been called into the Navy, Marines and Air Force and will be QRT here for a while. K2YMU has gone s.s.b. with a Heath HW-12. WA2RUE received his CP-30 certificate. W2GKZ entertained ZS6WS, who is traveling around the U.S.A. these days. K2IDB has gone mobile with an NCX-3 and WA2SOZ followed suit with an SR-150. W2BO spent 6 weeks mobiling on the West Coast and in Alaska and returned home with a new Invader 2000 and a Telrex three-element beam. The Rockland ARC is a new group in Suffolk County. WA2PAW received #97 Worked All Monks Award. The AREC of Queens has a new listing, "AREC Century Club," for signing into the net one hundred times. For six years W2PF, W2RFD, W2KW, W2DAK, O4J and W4ODK have maintained skeels with former and present members of the Brooklyn Radio Club on 14291 kc. Sun. mornings. WA2GGB runs some interesting skeels on 8 with W1DDF/EP8 on scatter. W2DBQ is back home after a long hospital visit and is getting back on the air again. The Long Island Tri-Banders ARC elected WA2OFY, pres.; WA2ZTV, vice-pres.; XYI, WA2OEFY, treas.; WA2LPV, secy. The club announces the Tri-Banders Bunny Hunts each month on the 2nd Fri. at 0130Z starting at the Jolly Rodger Rest. in Bethpage. K2QBW/K1WXC graduated from M.I.T. and entered Harvard Business School for a 2-year graduate course where the KWM-2 Raph uses will be heard from. WB2CAV has gone s.s.b. and has a satellite up 60 feet. W2MTA received a well-earned TCC certificate for effort in the National Traffic System Corps. K2KHK has started his engineering course at R.P.I. W2SEU has returned to civilian life from the Air Force. WA2TKL received a WAC certificate, has a new GSB-201 and an RCC award. WB2ALE is now attending Cornell. New stations on 220 Mc. are WA2FFB in N.N.J. and W2FJH, the first YL known to work that band here. W2EW, V.H.F. PAM, is seeking new net members in Nassau and Suffolk Counties; contact Hank for particulars. WB2CKF now is in Nebraska. WA2HIQ conducts code practice in Brooklyn on 28.6 Mc. between 9 and 10 A.M. local time Sun. WA2VKK has received an OPS appointment and is reporting into the V.H.F. Net. WA2VLK attained the ORS appointment by constant high traffic work in the NLI Net. With September we start a new operating season and as your SCM I look forward to high gains in our operating practices and performance. Club bulletins and items of news are always welcome. Traffic: WA2GPT 873, K2YMU 760, WA2EXP 534, W2MTA 505, W2EW 390, WA2TQT 394, WA2RIE 326, K2UAT 288, WA2YLK 264, WA2RMP 141, WB2CAV 108, K2KYS 102, WA2QJU 86, K2UFT 68, W2GKZ 48, K2THY 47, WA2LJS 42, WA2ZXR 42, W2HSB 35, WA2PSL 38, WA2YNH 16, W2OBU 15, WA2UYQ 14, WB2EGV 13, WA2PMW 12, W2PF 6, WA2WAO 6, WA2EFN 4, WA2FUL 2, K2KHK 2, WA2ICV 1, WA2RAQ 1.

NORTHERN NEW JERSEY—Acting SCM, Edward F. Erickson, W2CVW—N.N.J. amateur radio public service Corps nets (June):

Name	Freq.	Time	Days	Secs.	(QNI-QTC)	Mgrs.
NJN	3695 kc	2300Z	Dy			W2QNL-RM
NJ						
Phone	3900 kc	2300Z	ExSun.	30-284-86		K2SLG-PAM
NJ						
6 & 2	51.15 mc	0300Z	M, Th, Sn	22-133-59		K2VNL-PAM
		1300Z	Sa			
	146.70 mc	2200Z	Tu, Sa			

(Continued on page 110)



SELECTIVE

SSB/AM/CB/Recording/PA... Improved with Electro-Voice Model 729

Now! A low-cost microphone that offers the enormous advantage of true cardioid directional pickup, plus a virtually indestructible ceramic element! This design, by rejecting surrounding noises from the sides and rear, provides substantially improved voice pickup at greater working distance and with less room-noise pickup.

Smooth response assures natural reproduction without boominess or "peaked" sound, for better intelligibility and maximum power output. High output is ample for any inputs, and does not change with high humidity or temperature. The 729 can be comfortably hand-held, and slips easily into the

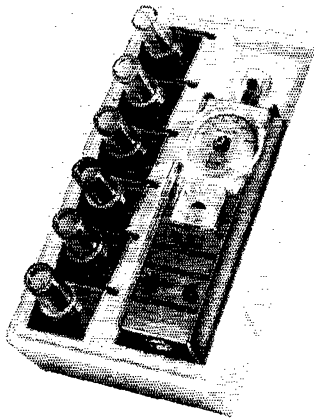
desk stand or the floor stand adapter provided. You get all this, and more, in the new 729 at a list price of only \$24.50, with normal trade discounts applying. For equipment requiring a relay-control switch on the microphone, select the Model 729SR, (illustrated) for only \$26.50 list. Either way you get traditional E-V quality, plus a money-back guarantee. Write for full information and list of Electro-Voice microphone specialists.

SPECIFICATIONS: • Polar Pattern: Cardioid • Frequency Response: 60-8,000 cps • Output Level: -55 db • Impedance: Hi-Z • Size: 7-3/4 in. long • Weight: 1 lb. • Cable: 8-1/2 ft. shielded.

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Transistorized Radio Frequency Dip Oscillator
Model 331

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The "LITTLE DIPPER" consists of: 1) a stabilized MADT transistor RF oscillator covering 2 to 230 mc in 7 overlapping, plug-in coil ranges (each coil carries its own linear calibrated frequency scale), 2) a transistorized 1,000 cycle audio oscillator for modulation, 3) a transistorized DC amplifier and meter for detecting the dip. Power is provided from four Size AA penlight batteries within the stainless steel case.

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WAYLAND, MASSACHUSETTS

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Switches • Grid Dip Meters • Dummy Load/Wattmeter

AREC Net schedules (local nets) are available from K2ZFI. New appointees: WB2DDA, K2LNS, WA2UDT and WA2FSQ as OPSs, WA2ZKO as ORS. The Windblowers will hold its 8th "Big Blow" Sept. 25, 1400-2400 local time, with W2NUU, K2KSH, W2NLN and W2ZDR operating from Pa., N.Y., Conn. and N.J. Summer visitors to NNJ included WB2GQT and WB2CLV, of Brooklyn, and K3YQJ, of Pa. WA2ZKT wants Somerville area hams to contact him for his AREC net. K2ZFI has a good signal with his new antenna. WA2VCQ is DXing on 40 and mobiling on 8 meters. WA2OVK is going into the Army Sig C. WA2KRC will be a Rutgers student. Congrats to WB2CRX and WB2AWR on receiving their General Class licenses. W2ZI retired from the State Police Radio. W2N1Y has held an appointment since 1926. WA2APY, K2AHV, K2AGJ and W2CVW operated FD. K2UKQ is active on 2 meters from Orange and low bands from Colt's Neck. WA2SRV runs an AREC net on 29.02 Mc. at 8:30 Tue. nights. WA2WSB has moved to Connecticut. WN2IVS is organizing a radio club for the handicapped at Belleville. WA2ZRR, WB2COZ and WB2CRS continue to observe propagation on v.h.f. WB2USE and WB2CRS are out to break the record on 30 Mc. Civil defense officials congratulated members of the ARRL on their Field Day effort. Comments were expressed in the *Bergen Defender* and *The Minuteman*, official e.d. newsletters. Your SCM and SEC would like to issue a call for Emergency Coordinators. Your SCM also would like to issue a call for about eight additional OOs in this section. Applicants must be able to devote sufficient time to this appointment in order to make at least 25 observations per month. Only one Observer is meeting this quota now. About half of the others are doing some work. The other half are not doing anything to speak of and are in danger of having their appointments cancelled. With all the complaints I hear about poor operating and signals, surely you fellows can find some signals to report. We need OOs that are hard-headed enough to use more Forms 12. Traffic: (June) K2UCY 275, WA2WSB 209, K2VNL 186, WA2UOO 184, WA2SRK 148, K2SBS 121, WA2ZKO 117, WA2CCF 111, W2CVW 78, WA2GQZ 76, WA2LUD 55, K2JTU 52, WA2MYB 52, WA2WAJ 45, WA2SRV 42, WA2ZKT 40, W2FNX 34, WA2GQT 25, WA2QPX 21, WA2QQP 16, K2SLG 15, K2ZFI 14, W2ANG 13, K2MFX 12, W2ABL 10, K2EQP 10, WA2APY 9, W2DRV 9, W2NAK 9, WA2KRC 8, K2UKQ 6, WB2COZ 5, W2OXL 5, K2AGJ 4, W2EWZ 4, W2LQP 4, W2N1Y 3, WA2SWP 2. (May) WA2KRC 6, WA2OVK 2.

MIDWEST DIVISION

IOWA—SCM, Dennis Burke. WONTB—SEC: KOEXN. RM: W0LGG. PAMS: W0LSE, W0PZO, K0BBL. New ECs: KOHGH and KOEFQ. Class I OO, W0USL. New OES: WA0BRE. Your SCM has received 18 FD reports. W0IH turned in his usual fine report. KOQWM had a fine score with his multiplier of 13½. The Ill.-Iowa Club at Davenport had an outstanding record. It is with regret that we note the passing of W0ISV, of Omaha, who was well known in Iowa. W0SCA and KOYCO had light heart attacks but are mending nicely at this time. New hams at Spencer are WNOGHS and WNOGHT. KOHGH is the new EC for Clay County. Too many FD reports reported that no AREC members were present. OESs report a slowing down for the summer although generally speaking conditions are pretty good. Had greetings from two old friends, W0PP and W0FP. They are both fine and hamming it up on s.s.b. Nets reports for June: 160 M—QNI 583, QTC 14, sessions 30. Hamilton County—QNI 195, QTC 3, sessions 30. Webster County RACES—QNI 45, sessions 25, 75-Meter Phone—QNI 806, QTC 143, sessions 28. Traffic: W0LGG 2011, W0SCA 969, W0BDR 265, WONTB 140, KOQKD 118, W0USL 73, W0YDV 13, W0RTX 12, W0MMZ 9, K0TDO 8, K0GXP 6, KOIGH 5, KOJST 4.

KANSAS—SCM, C. Leland Cheney, W0ALA—Asst. SCM: Richard G. Caspari, W0YZB. SEC: KOBNF. PAMS: KOEFL and W0BOR. RMs: W0QGG and W0PFG. V.H.F. PAMS: W0HAJ and KOVHP. New appointments: KOBNF as OO. June net reports:

Net	Freq	Time	Day	Ses- sions	QTC	QNI	Ave.
KPN	3920	1245Z	M-W-F	15	69	239	16.0
QKS	3610	0050Z	M-W-F-Sa	21	60	70	3.5

Net controls: KOYTA, KOOKS, KOEFL, KOJH, W0FHU, W0IFR, W0BYV, W0CGZ, W0QGG, K0ZPN. Traffic operators are needed for KPN and QKS traffic nets. Contact your SCM. The Midwest Division Convention will take place Oct. 26-27 at the Broadway Hotel in Wichita. Assist the committee by preregistering. There will be lots of fun for all and interesting exhibits and eye-ball QSOs with League officials and your airtime friends. Hospitality will be the order of business. Mark it on your calendar as a must. All op-

(Continued on page 112)

NEW Mosley EL TORO antennas



TW-3X
\$19.95

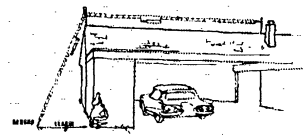
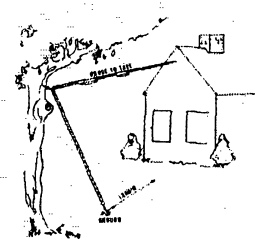
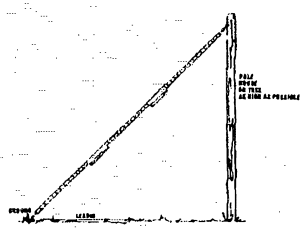
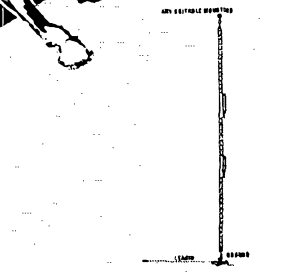
TW-3X Jr.
\$14.95
NS-3

- **THREE MODELS** - Mosley El Toro antennas are available in three models, TW-3X - NS-3 and TW-3X Jr., designed to give outstanding performance. These versatile antennas were developed for the ham with a limited budget, limited space and the traveler working portable.

- **THREE BAND OPERATION** - Mosley TW-3X and TW-3X Jr. antennas operate on 20, 40 & 75/80 meters. Mosley NS-3 (Novice Special) operates on 15, 40 & 80 meters. All Mosley antennas feature pretuned, compact design & excellent broad band characteristics.

- **TWO POWER RATINGS** - Mosley TW-3X has an AM rating of 1000 watts input to the final amplifier and a CW/SSB rating of 2000 watts P.E.P. Mosley TW-3X Jr. and NS-3 (Novice Special) have ratings of 300 watts on AM & 1000 watts input to the final amplifier on CW and SSB.

Mosley El Toro antennas are trap type grounded quarter wave antennas using a unique method of tuning and a single 52 ohm coax line. Antenna is 58 ft. long and can be mounted to fit most any location. No radials are needed when mounted at ground level. Antennas come pretuned, in kit form and can be easily adjusted to resonate at any portion of the rated bands.

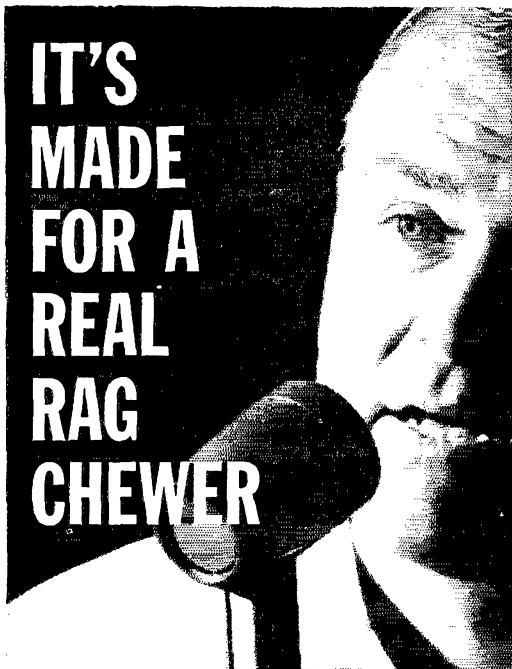


Mosley Electronics, Inc.

4610 N. LINDBERGH BLVD., BRIDGETON, MISSOURI

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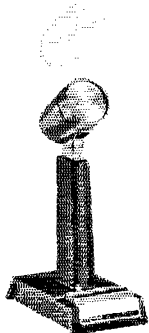
IT'S MADE FOR A REAL RAG CHEWER



At last! A quality microphone designed specifically for the ham. Features galore that hams have asked for. Tops in voice punch, intelligibility. Unique convenience features to minimize operator fatigue. Great for AM & FM, unsurpassed for SSB. • "Shaped" response—cuts off sharply above 3000, below 300 cps with rising characteristic to curve; gets message through with top audio punch! • Push-to-talk bar-switch with optional locking feature to control relay and mike muting circuits. • Separate slide-switch gives choice of press-to-talk or VOX operation. • Exclusive adjustable height stand. • Rugged Shure Controlled Magnetic element (U.S. Patent 2,454,425). • Field replaceable cartridge and cable. • ARMO-DUR case and stand—can't rust, peel, crack, or dent. Write for data sheets!

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ADJUSTABLE HEIGHT



ALL NEW

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HAM MICROPHONE

only \$2550 amateur net

enters in the section are urged to send activity reports each month to the SCM for inclusion in this write-up. Let's show that the Kansas section is a really active one. Send your nominations for "Kansas Amateur of the Year" to the SCM. The winning candidate will be presented the WOFNS trophy at the Midwest Division Convention. Nominations must be received not later than Sept. 6. Traffic: (June) WOBVY 216, KOYTA 86, WOCGZ 52, WOQGG 43, KOGH 36, KOGIG 35, WOLA 22, KOEFL 15, KOJMF 12, KOKKS 12, WOERO 9, KOLHF 8, WOIFR 7, WORMW 4, KOGQO 4, WOFDJ 3, KOTGR 1. (May) KOTGR 3.

MISSOURI—SCM, Alfred E. Schwancke, WOTPK—SEC: WOBUL, RMs: WOOD, KOONK, PAMs: WOBUL, WOBVL, WOLFE (y.h.l.), WOOMM, KOONK, WOBUL is our new SEC. Other appointments: KOBWE as OBS and KODEW as OBS. Renewal: KOONK as RM. Field Day messages were received by the SEC and SCM from the following portable stations: WOA-JN, WOBIN, WOEAO, WOFEQ, WOEIE, WOFHM, WAFYA, WOGUI, WOGWX, KOKXC, KOKKI, KOOFY. The Jefferson County ARC and RACES held a picnic and drill in the field June 30. WOOMM was honored with a banquet in Columbia for her work on the Eyeball Net. KOFPC and KOONK made the BPL in June. WAFBQ built the 20-meter beam from June QST. KOOMA built one for 15 meters. WOWAP is back in Clinton again. WAODSE, WODBU and KOFPC are mobile on 6 meters. WAOFLL now has 25 states confirmed on 6 meters. KOLJJ has worked 48 states on 6 meters since spring. WOHIG reports hearing Hawaii and Alaska on 6 meters and has schedules with the W3 area. KOJWN worked Wichita on 2 meters. KOGSV, KOJPL and KOVIP are now on 2 meters. WAOCHE, WOCWP and WOYZS participated in the V.H.F. Contest. Net reports: MEN, QNI 329, QTC 291, NCSs KOONK 5, WOTPK 3, KOVPH 3, WOBUL 2, PON, QNI 229, QTC 89, NCSs KOBWE 9, KOONK 5, KOVIO 4, WOHVJ 2, MON, QNI 105, QTC 90, NCSs WOULD 6, KOFPC 4, WOKIK 4, KOVPH 3, KOGFA 2, MSN, QNI 117, QTC 77, NCSs KOONK 10, WAOCWY 9, WAOCXG 4, KOFPC 6, SAIN, QNI 13, QTC 10, NCSs WOOD 3, KOFPC 1. Traffic: KOONK 2373, KOFPC 549, KOVPH 252, K9VXW 0 245, WOOD 73, WAOCWY 62, KOTGJ 57, KOBWE 53, WOTPK 39, KOVIP 37, WOBVL 36, WOKIK 34, KORKW 30, WAOCXG 24, WOPXE 23, WOBUL 12, WORTW 9, KOVIO 9, KORDJ 7, WOGBJ 6, WOOFV 6, KOMMR 5, KOVAZ 3, WAOFLL 1.

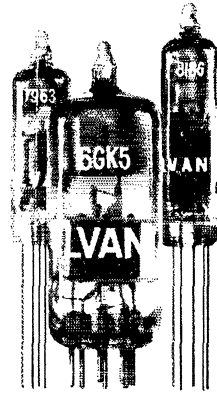
NEBRASKA—SCM, Frank Allen, WOGGP/O—New appointments: WJGFO as RM, KOFLS as OBS. Endorsements: WOXK as OBS and RM. Net reports: Nebraska Storm Net: WOFIG NC, QST 343, QTC 4, sessions 28. Western Nebr. Net: WOXK NC, QNI 529, QTC 39, 100 per cent, check-ins WAOAES, WLOLD, WOFPP, Nebr. 75-Meter Morning Phone Net: KODGW NC, QNI 461, QTC 140, Nebr. Emerg. Phone Net: WOEQO NC, QNI 712, QTC 74. New members: WAOAKG, CML, QOS, KOMZV, OAV, QEW. Please note the change of address for the SCM to Box 272, Gering, Nebr. Field Day activity this year seemed somewhat limited, with a need for more AREC participation. Many EC, OBS and OPS appointments are available. Contact the SCM if interested. Good 2-meter contacts have been reported by WOPHA and WIKLD from Scottsbluff to Cheyenne. V.h.f. interest seems on the upswing. Truth: WOLOD 115, WAOBES 100, WAOBID 70, WOXK 39, WOXOW 0 32, KODGW 30, WOVZI 20, WOFYR 17, KONO 16, WAOAES 15, WOFIG 15, WAOPYK 4, WOEQO 12, WOGGP 12, WOVEA 11, KOJFN 9, WOROQ 8, KOMSS 8, WORJA 6, WALEE 0 5, WOLO 5, WICJP 0 4, KODVT 4, WOTOP 3.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, Robert J. O'Neil, WIFHP—SEC: WLEKJ, H.F. PAM: WYBH, RM: KIGGG, V.H.F. PAM: WIFHP. Traffic nets: CPN, Mon. through Sat. at 1800, Sun. at 1000, 3880 kc. CN, daily at 1845, 3640 kc. CVN, Mon., Wed. and Fri. at 2030 on 145.980 Mc. NCS Lincs 147, to 144, Mc. on all call-ups. Certificates and awards: Renewals OBS to KIPKQ and KIRIS, OBS to WICHR; OPS to KINTR, KILOM made the BPL again for June traffic. Plenty of QRC certificates are left for working members above 146, Mc. Send a copy of your log with date, time and station worked to WIFHP. A few openings are left for Official Observers, with four for the low- and high-frequency bands. Reports received show more splatter and a.m. activities in the e.w. portion of 50 Mc., also some side-band operations. Ex-officio WICHR made the busy of WIRAN, worked ex-WITQ, former SCM, at HZ1AB, and had a nice long chat. KIOJZ broke in as NCS on CPN. WIOV made a short trip to New Orleans, San Francisco and Seattle. The Connecticut Wireless (WITX-1), QRC, (KIBCL-1) and the Southington ARC report things looked up for Field Day this year. OBS report forms were received from KIPKQ, KIVMI, KISDX,

(Continued on page 114)

Hot tubes with cool noise figures...

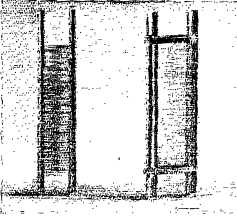


There are numerous ways of escaping receiver background noise. One is to move to the hills.

But, even with such heroic countermoves, we're all confronted with "The Years of the Quiet Sun" and weaker signals. So, what to do?

There's nothing one can do about noise from outer space and little about antenna and first-circuit noise. But there's a lot to be gained by using a hot tube in the r-f stage...and that goes for all bands. Because a tube with good gain and a beautiful noise figure lets you dig down into the mud for a bare whisper of a signal.

All of which you know. We mention it only to point up something that may have escaped your notice: Tubes have not become just a little bit better, but much better over the years. Which accounts for the fact that more than a single, conventional r-f stage today is a superfluous appendage.



A contributing factor is Sylvania's "Strap Frame Grid." Compare it with the conventional grid structure in the illustration. The Strap Frame looks like the support of a suspension bridge. It has such unusual rigidity that it is possible to use a far finer grid wire and thereby vastly increase the number of turns per inch, and at the same time place the grid much closer to the cathode. The end result is a tube with much greater transconductance and a considerably lower noise figure.

A notable example in the inexpensive class of receiving-type tubes is the Sylvania 6GK5 triode. We checked its performance in a conventional tuned circuit at 50 megacycles and came up with a gain of 30 db for a 2-mc bandwidth, and a noise figure below 2 db. Even better figures are coming from a new version, the 6HK5.

The Strap Frame Grids are also used in a series of nine subminiature triodes and pentodes that offer unusual performance in industrial and military gear. For instance, the type 8210 sharp cutoff pentode for r-f and i-f service to 400 mc offers 50% greater gain/bandwidth and has a Gm of 8500.

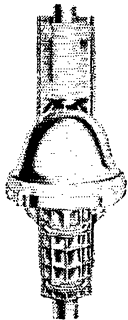
These new subminiatures will interest you if you're involved in commercial or military designs. You can get a brochure on the available types by writing the Electronic Tube Division, Sylvania Electric Products Inc., P.O. Box 87, Buffalo, N. Y.

73, *Bob Lynch*
K2RMM

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SUBSIDIARY OF
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\$59.95
amateur net



Introducing the TR-44, a high-performance rotor system for the Amateur on a budget who's ready to upgrade his antenna installation.

The TR-44 approaches the accuracy and ruggedness of the famous Cornell-Dubilier HAM-M but is designed specifically for intermediate loads.

Check these features:

- Control box contains the HAM-M meter.
- Dimensionally identical to TV rotor types AR-22, TR-2 and TR-4. The TR-44 even fits the same bolt holes!
- End of rotation electrical motor cut-off.
- No mechanical clanking, no electrical pulse noise.
- Increased rotational torque...up to twice as much as TV rotors!
- 48-ball bearing movement.
- New idiot-proof brake system.

If you are now getting marginal results using a TV rotor, the TR-44 is for you! It will give you the increased torque, braking and accuracy that are needed for large VHF arrays and small HF combination antennas. For technical information, contact Bill Ashby K2TKN or your local CDE Distributor.



CDE makes a complete line of the world's finest rotors: the HAM-M; the new TR-44; heavy-duty automatic TV; heavy-duty manual TV; standard-duty automatic TV; standard-duty manual TV; and the industry's only wireless remote control rotor system! Cornell-Dubilier Electronics, Div. of Federal Pacific Electric Co., 118 East Jones St., Fuquay Springs, N. C.



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KIRTS, WIZGO, WINGR and KIPLR; OO report from WIZGO. WIEEP reports his four-element cage helped him work WAC during the winter months. New AREC members are WIBNB and KN1PV. A new Official Phone Station appointee is KIWKJ. We are looking for more Official Observers. Page 10 of *Operating an Amateur Radio Station* gives basic information. KIRJK is heading for W6-Land to live and will work this way on s.s.b. Traffic: (June) K1LOM 865, K1WKK 412, W1-RZG 190, W1EFW 188, K1DQC 148, K1GGG 94, W1RFJ 83, W1AW 81, W1CTI 65, W1FHP 65, K1WKS 65, K1-PQS 61, W1MPV 50, W1YBH 49, W1OBR 48, K1DGG 45, K1YIX 38, W1BDI 35, K1EIR 24, K1PUG 20, K1-MBA 19, K1NTR 17, K1TGC 16, W1QV 12, K1OJZ 9, K1SDX 8, W1BNB 6, W1CUH 6, K1QVX 2. (May) W1RZG 178.

MAINE—SCM, Arthur J. Brymer, W1AHM—SEC: K1DYG, PAM: K1ADY, RM: K1MZB. Traffic Nets: Phone—Seagull Net, 3940 kc., 1700-1800 EDT daily except Sun. Pinetree Net, 3598 kc., Mon-Fri, 1900 EDT. First Regional Net, 3605 kc., 1815-1930 daily. Maine State C.D. Net meets Sun. at 1100 EDT on 3993 kc. and Wed. at 1900 on 3530 kc. W1YBK is net control. The AREC Net meets Sun. at 0900 EDT on 3940 kc. K1DYG is net control. The new SCM still is looking for certificates for his endorsement; the certificates are returned promptly. The new SCM also is looking for more notes of interest from hams in the state. It is quite difficult to write a column if you don't get help. Thanks in advance. The PAWA meetings will start the first of October. It is about time for the southern exposition of the Barnyard Net to start packing and head for the sunny climate of W4-Land. W1BRU left on Aug. 12 to check on things on the continent (Europe) and will proceed to Florida from there. Field Day was very enjoyable in the Portland area. K1MZB now is using an SB-10 on s.s.b. K1LPC spent the summer in New Hampshire with W2NSD. The PAWA mobile hunt was much fun. K1LRSAM won with K1IMI right behind him. K1LMIJ was the hidden transmitter and he was really hidden, battery-operated in the woods. Traffic: K4BSS/1 158, K1MZB 26, K1MDM 21, K1VEQ 8.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—W1AOG is our SEC. He received EC reports from W1s RON, STX, K1s PNB and JCJ. New appointments: W1OSQ as OO, K1SCJ as OBS, K1QIG as EC for Norwood, W1UAI is Radio Officer. W1EFPW presented the Norwood Club with its ARRL Charter at a dinner meeting at Mary Hartigan's. W1s EAE and ALP were there, too. K1RVH is club treas. New officers of the Framingham Club are K1TPJ, pres.; K1KCG, vice-pres.; K1KAV, secy.; W1ZEN, treas.; K1CQO, act mgr. I received many Field Day messages from various clubs. W1BGW, W1FZJ, W1AYG and K1-WJD took part in the May FMT. K1FMD is the call of the Sperry Employees ARS in Sudbury. K1LVP is pres.; W1KNI is trustee. W1RWU is on s.s.b. with a Valiant and an SB-10 and passed the Extra Class exam. W1VAH has an electronic key and keyer and is going to Wisconsin for a visit. W1ZBL moved to California. New officers of the Middlesex ARC are K1OQG, pres.; K1SNP, vice-pres.; K1OGA, secy.; K1TWW, treas.; W1HH and K1-QXJ, act. mgrs. W1UE has a new Eico 90W with a modulator and is on 2 meters. K1RZK has a Globe Scout 680-A and an ARC-5 on 6 meters. Mass. VHF held a meeting at K1AAA's and W1HO's QTH. W1BGW has QSLs from 49 states on RTTY and needs Delaware. Can anyone help him make it? W1PEX and K1ONW made the BPL again. K1ONW has an Area Net certificate for EAN. K1SGZ is Asst. EC in Townsend. K1OMS and family are on a 6-weeks trip. We wish K1AII the very best of luck in Fairbanks, Alaska, where he is going to take a job and go to graduate school at the U. of Alaska. Drop us a line. Art, Congrats W1AKY, who has been made Grand Chief of the Independent Order of Vikings. W44KU is ex-W1RCQ in Duncan, S.C. K1VPJ is trying c.w. on 6 meters. The Fort Banks Radio Club is new in Winthrop. K1KYN got a 4-year scholarship to Clark U. K1KPD is going to the U. of Mass. The Framingham Club held its annual banquet; as did the Yankee Radio Club. K1FUP is KN1ESG's father. The Bedford Radio Club, K1GAY, held an auction. K2-AXA/1 was on FD in Framingham by himself. K1UMP is pres. and K1UMI treas. of the Whitman ARC, which is building a club room at 413 Wash St. K1s NUP, UMI, ABU and TZC are mobile on 6. K1s ABU and WNJ built 50-ft. towers. K1YBS has 100 watts on 6 meters. K1TLO is now in So. Carver. K1WNJ is on 6 meters. Heard on 75: K4JHV1 in Falmouth, W1s LZB and GLX. The EM2MN had 21 sessions, 174 QNTs. 204 traffic. K1SRZ worked WA9CWD, Ill., K0EQI, Neb. K0VSVZ, Iowa, on 6 for 3 new states. Two new 16-year old Generals in Hingham are K1YOT and K1WYF. K1GVM has an s.s.b. rig for 2 meters. W1AYG is s.s.b. on 10 meters. Appointments endorsed: W1AYG as OO, W1STX Needham, W1UE Wellfleet as ECs. W1UE as ORS, W1YYI Carlisle as Ec. Traffic: (June) W1PEX 1274, K1ONW

(Continued on page 116)

MANY OF our friends have expressed much interest in National's advanced military/commercial communications products — since they are excellent examples of the present ultimate in equipment design and also give a hint of what type of features the amateur may expect in sophisticated ham equipment in the not too distant future.

NATIONAL'S AN/PRC-54 frequency synthesized SSB transceiver should be of particular interest to the VHF gang. Completely transistorized, the 'PRC-54 is the size of a small shoebox and provides 4000 pre-tuned channels between 28 and 68 MC. The 'PRC-54 is tactical — designed to be carried in combat. It should also be handy for mountain-topping between battles.

ONE OF the most widely travelled of National's current equipments is the AN/WRR-2 drift-cancelled SSB receiver designed for the U. S. Navy Bureau of Ships. The Navy standard shipboard SSB receiver, the WRR-2 covers 2-32 Mc. with long term stability of less than one cycle (at 10 MC.) and calibration/resetability of 100 cycles. The multiple lattice SSB filters have a 6-60 db shape factor equivalent to 1.05:1. Both sidebands may be detected and amplified separately, if desired, thus allowing reception of two different types of intelligence on one channel.

NATIONAL'S new AN/WRR-6 receiver, about the size of an NC-303, is probably the most advanced communications receiver in the world. With stability similar to the WRR-2, the WRR-6 utilizes a fully solid state frequency synthesizer to provide channels 100 cycles apart throughout its tuning range of 2-32 MC. All tuning and bandswitching is done electronically, and the WRR-6 employs National's wide dynamic range circuitry to eliminate strong adjacent channel interference by up to 140 db. This latter technique, by the way, has somewhat the same effect as putting an extremely effective tunable filter right at the antenna terminals, and has been hailed by the Military as the most important development in communications receiver design in the past 25 years.

THE ONLY commercially available primary atomic frequency standard is National's Atomichron®. The U. S. Naval Observatory maintains A. 1 atomic time (upon which all time systems are based) by using the Atomichron as a frequency standard and utilizing reports from similarly equipped laboratories in other countries. In addition, WWV's standard frequency transmissions are produced directly from a National Atomichron. How accurate is the Atomichron? Compare it with the 100 KC calibrator in your rig, which varies approximately 100 cycles in 24 hours. Minimum Atomichron stability *for the life of the equipment* is five ten-thousandths of one cycle at 10 MC. 24 hour stability is 20 millionths of one cycle at 10 MC.

THERE REALLY isn't enough room here to discuss other National Company products of interest to the amateur — tropospheric scatter systems, range technology as applied to tracking systems, navigation and collision avoidance, atomic beam and plasma physics, Maser/Laser communications, etc. You may be certain, however, that we are working on applications of this advanced technology in new National products for the amateur.

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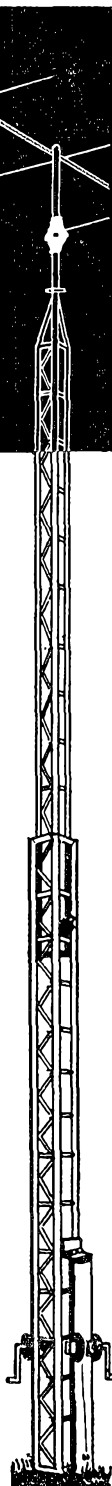
Model HD-40 Painted ..	\$ 99.50
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654, WIOFK 213, WILES 219, WIEMG 187, WIZSS 112, KIPNB 84, WIDOM 65, KILCQ 37, WIFON 36, KNI-ESG 35, KIGKA 34, WIAUQ 33, WIVYS 20, WIAOG 25, KIOCD 20, KICMS 11, WIDLY 10, KIAII 6, KIOWK 2, KISMT 2, WIIYY 1, (May) KILCQ 19.

WESTERN MASSACHUSETTS—SCM. Percy C. Noble, WIBVR—SEC; WIBYH, RM; KILJV, PAM; KIRYT, RM KILJV reports 15 stations active on WAM during June with the top seven in attendance being KISSH, KILJV, WIZPB, KIZBN, WIBVR, WIAMI and KILBB. WIQPM has a new Gonset Communicator III and is now Radio Officer for Leominster Civil Defense. WJYH now has a 758-1 receiver and a 328-1 transmitter and spends 15 minutes morning and evening checking the DX bands to be sure he isn't missing anything. (He sure ain't missed many!—SCM). WIZPB is very pleased with his new HQ-170A, KILBB and WIBVR have a new Valiant II's. OBS KITTT says he has a great following after each Official Bulletin sent. He has a new Hornet TB500 three-element beam and is working DX on 30, 15, and 10 meters. WJYA reports that Sector 3E RACES drills are held the first Mon. of each month. EC KILNC reports that his AREC members are active in this. KISSH is now running a DX-100. As you are reading this, September is getting near. It is time to begin making plans for your fall and winter activity if you haven't already done so. Your ARRL offers many opportunities to increase your pleasure of amateur radio—and not only to League members either. We welcome you on WAM which meets nightly on 3560 kc. at 7 local time, or on the Mass. Phone Net Mon. through Fri. on 3842 kc. at 5:30 P.M. local time. Your Emergency Coordinator would like your assistance in the Amateur Radio Emergency Corps. Drop a line to WIBYH or WIBVR if you don't know who your local EC is. Or maybe you would be interested in being an Official Observer, Official Bulletin Station, Official Experimental Station or Emergency Coordinator for your locality. Surely we have something that can interest you. Please let us know! Traffic: KILJV 201, KISSH 135, WIBVR 98, KILBB 45, KILNC 34, WIZPB 31, KITTT 6, WJYA 2, KNIZVJ 2.

NEW HAMPSHIRE—SCM. Albert F. Haworth, WYHI—SEC; WITNO, PAM; KINXV, RM; KIBCS. Appointment: WYHIE as EC for Belknap, Grafton and Carroll Counties. A fine dinner meeting was held by the Mid-States Amateur Radio Club at which time its League Affiliation charter was presented. The May frequency test was completed by KIULIE, WIQHS and WITFS. WIBYS completed a twelve day trip to the West Coast. WICBB is active as an OO. Field Day results shows activities were well represented by clubs. WIALE was net control of the Merrimack County AREC Net for June. KNIZWF reports the Port City Amateur Radio Club is looking for new members. Granite State Award certificate No. 1 was awarded to WISWX. WIIHV will become WITA shortly. Summer activities show a decline in operating news so here goes on appointments in a way to congratulate all for their FB job being done: ECS: WYHIE, KICXP, WIGAH, WIRAH, OOS: WITFS, KINBN, WIPYI, KIAEG, WICBB, WIJJB, KHK, WISWX, WIQHS, OESS, WICTV, WIQD, KICIG, KIPDA. OBS: WICBB, KICIG, KIECU, KIAOZ, WITNO, WYHI. Next month's a thanks to the traffic men. More appointments are available.

RHODE ISLAND—SCM. John E. Johnson, KIAAV—SEC; WIYNE, RM; WIBTV, PAM; WITXL. New appointment: WIBTV as RM. The RISP reports 30 sessions, 55 QNI, 142 traffic. Field Day reports were received from the following stations: KIFJI/1, WIOP/1, KIWQW/1, KINQG/1, WIAQ/1 and WISYE/1. The PRAA Club of Pawtucket held an election with the following officers appointed: KILSA, pres.; KIQY, vice-pres.; KICOB, secy.; WIWCF, trans. WISMIU has resigned as RM because he cannot give enough time to the appointment. I wish to thank Frank for all the time and effort that he put into the appointment and hope he can join us again soon. WIBTV is no stranger to the RM appointment as he held this appointment in prior years. Nick lives at 66 Victory St., Cranston 10, R.I. and would like all c.w. operators to get in contact with him. KIKAZ has installed a new tower for his 6- and 2-meter antennas. KIQFI has a new five-element beam for 6 meters. KITDR is now on 6-meter phone and 20- and 40-meter c.w. Editors for WIDD's D'er are KITTD and KIQFI. This newspaper is published monthly by the Woonsocket Club. Traffic: WITXL 765, KITPK 78, KISTB 27.

VERMONT—Acting SCM. E. Reginald Murray, K1MPN—The Green Mt. Net meets on 3855 kc. at 2130Z daily, the Vt. Fone Net on 3855 kc. at 1300Z Sun., the Vt. C.W. Net on 3520 kc. Mon., Wed., Fri., at 2300Z. Welcome to new bans KNIFU, FMIJ, FMK (an 11-yr. YL), ESY, all in the Central Vt. area. Good luck to our SEC KUDQB, who has moved to Texas. WIEOX has moved to Connecticut and VFR to Maine. WIRXT is Army MARS Director, with KIOAJ as assistant. Con-

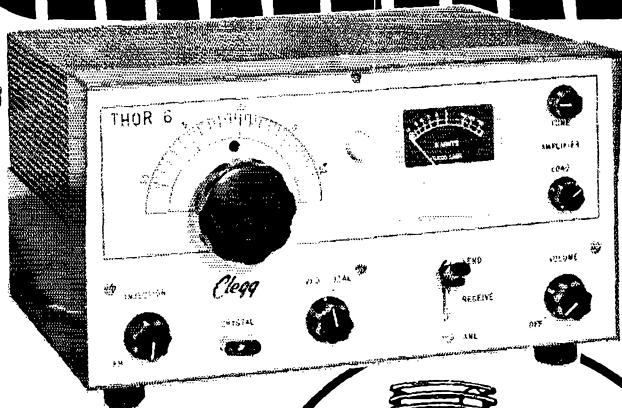
(Continued on page 118)

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Clegg THOR 6 60 watt phone or CW transceiver for 6 meters. Built-in VFO, push-to-talk & keying relay. Receiver features nuvistorized front end crystal lattice filter. BFO for SSB and CW reception . . . price \$349.95.

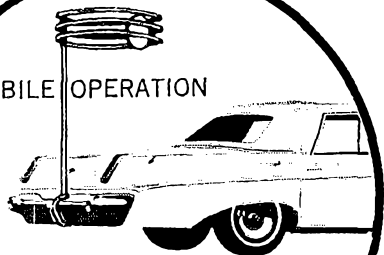


... and the best way to verify these opinions is right at your own receiver.

Listen across six or two. Pick out the best signals and you will find a piece of Clegg equipment behind them every time! Listen to the ham who's hearing and working the choice DX . . . the guy who's digging them out of the QRM and noise . . . he's probably using Clegg gear too!

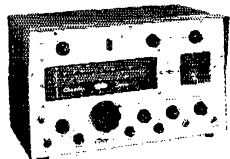
A little more eavesdropping will provide the clincher. The enthusiastic, on the air endorsements by Clegg users (and those who wish they were) should convince the most skeptical. They all add up to the one word . . . "UNBEATABLE". So . . . times a'wasting . . . see your dealer today. He's got a Clegg rig to match any pocket-book or any requirement.

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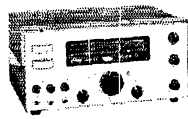
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A Word from Ward . . .



SOME LIKE 'EM NEW . . . SOME LIKE 'EM USED!

While on a tour of Rome, Mark Twain, the daddy of Huckleberry Finn, found himself intrigued by the painting of a landscape done long ago by an old Italian master. A dealer hurried over. He gushed about the picture, the colors, the frame — and told the Mississippi Pilot he could have the whole shebang for only fifty thousand dollars.

"Wrap her up," said Twain.
"Now?" squeaked the dealer.

"Absolutely. But first, I want you to give me a guarantee that this picture is brand new. Only a leather-head would pay that kind of money for anything second hand."

There is no record that this particular transaction ever went through. But it does go to prove that some things have a mighty high value — even if they are a little used. So be it with ham equipment.

From time to time, I've told you about the new equipment we sell — and sure enjoy doing it. But I'd like my friends to remember that we also stock one of the cleanest inventories in the country of good, used gear — Johnson Invaders & Pacemakers, Gonset Communicators, Hallicrafters HT-37, SX-101As, RME-6900 — plus many, many other transmitters, receivers, amplifiers, power supplies, and what have you.

Why not tell us what used equipment you're interested in? Unlike what happened to Mark Twain — you won't be asked to pay fifty thousand dollars for it, either.

Sincerely yours,

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grats to K1RSJ who is Cond. Class. The Green Mt. Net reports 302 check-ins for June. Clubs should make plans for their fall activities and programs, and in the light of proposed FCC rulings it might be prudent to allow more time for technical education. The ham population in Vermont has doubled in the last 6 years (over 600), which means there must be many newcomers to the electronics field. Traffic: (June) K1SLU 46, K1BQB 32, K1MPN 1. (May) K1SLU 16.

NORTHWESTERN DIVISION

IDAHO—SCM, Raymond V. Evans, K7HLR—The Eagle Rock Radio Club furnished communications for the East Idaho Sports Car Race. Those interested in Navy MARS should contact K7KBY or W7GOM. Chick Rooney, WB6CFH, formerly K7NNM, was killed in an auto accident in California June 30. W7NGA has a new SB-33 and W7DWE a new HT-37. Sideband activity still is on the increase. K7KBY, K7KBZ and K7DZA put out a real fine bulletin for the Eagle Rock Radio Club, the *ERRC News*. A new station in Idaho Falls is K7YMN. Ray Lee Blumhurst, W7FKU also is sporting a new HT-37. Traffic: K7HLR 62, K7KBY 45, K7OAB 13, W7GGV 12, K7SJM 6, K7NEY 5, W7MJZ 1.

MONTANA—SCM, Walter R. Marten, W7KUH—Asst. SCM: Dr. Marvin F. Hash, W7YHS. SEC: K7-AEZ. L.F. PAM: W7YHS. V.H.F. PAM: W7FYN. RM: W7FIS. Endorsements: W7NPV as OES, OPS and OBS; W7IDK as OO; K7EWZ as ORS. The following participated in Field Day: W7FO/7, W7ZOD/7, W7ECA/7, K7DGR/7, W7TCK/7, W7YB/7, K7OOO/7, W7TQC/7, W7TCK/7 and K7MOY/7. OO reports on the ARRL Frequency Measuring Test were made by the following and show average error parts per million: W7FIS 9.9, W7NPV 101.9 and K7OGF 12.0 An OO report also was received from K7VAJ. K7EWZ returned from a vacation in Arizona. K7VMJ went to Nebraska on vacation, K7-KOK left for Bangkok, Thailand, where he will be project technical director of the Stanford Research Institute communications lab. K7CPE graduated from MSC with distinction and received a graduate research assistantship in psychology at the U. of Calif. K7NEF earned a scholarship from Hughes Aircraft Co. and will be working for his Master's Degree at UCLA. W7BUT and W7FLC graduated from MSC with Bachelor of Science degrees. A new Novice call in Bozeman is KN7YFT. W7FLC and K7NKS assisted law enforcement officers in recovery of the body of a drowned man in a lake near Three Forks. K7UAY moved to Utah. W7BUT moved to Helena where he will be employed by the Mont. Highway Department. W7ZAZ got married and will be working for Montronics, Inc. W7NPV scored 840 in the ARRL V.H.F. QSO Partv. K7PKV is operating from his home station with an HT-32. W7FGZ is on the air with a new sideband transceiver. W7IDK has returned from a vacation trip. KN7ANNV is working on a new mobile rig. KN7YEN got his Novice Class ticket. W7JAU is back in Fort Braag after 2 months at Yuma missile center. K7BCO is in Germany. K7BFJ made a vacation trip to the San Francisco area. K7BKII had surgery. K7NHV copied the Armed Forces Day message and received a certificate. GDSMIK (VE3BKK) visited friends in Billings. W7LHJ returned from a vacation trip to South Dakota. W7VZQ has been net control station for A7LBBK/C MARS radioteleprinter net. W7JRG has taken up motorcycleing. K7CZN is recuperating from an operation. W7MYN and family vacationed in Calif. KN7YEM received his Novice Class ticket. W7AYG has been operating mobile between his ranch at Forsyth, Billings and Yellowstone Park. K7MOS is the proud father of a boy born June 29. K7VSS has finished a new modulator and has a new v.f.o. in his shack. K7-UPH has finished installing a new half-wave antenna at his cabin on the Boulder. K7TGR added a WAS certificate to his shack. K7NKK was in Billings where his father underwent surgery. W7KUH left for a vacation in Arizona. Endorsements: W7KGJ and W7COH as ORSs. W7COH, W7JIZ and W7QZJ are on 2 meters. Traffic: K7NHV 4.

OREGON—SCM, Everett H. France, W7AJN—SEC: W7WKP. RM: W7ZFH. Field Day reports: K7CBP/7, 14 operators, 10 AREC members, reported by K7JY EC; W7OTV/7. Tualatin Valley ARC, 23 sopping wet operators, reported by K7EPA, pres. W7SO/7. Albany ARC, 5 operators, no AREC, reported by W7SO EC. K7NEC/7, 3 operators, reported by K7NEC. K7CCH/7, Coos County RC, 4 transmitters, 6 hands, 8 operators, reported by W7EUG. K7JUC/7, 3 operators, 2 transmitters, 3 hands, generator supply. W7DEM reports K7VEF is a newly-licensed ham in the Grants Pass area. Newcomers on 2 meters: K7RDP, K7PMB, K7BZP, W7SUE and W7EMF. W7ESJ and K7ERY loaded a Navy Model TBX-8 into the new MGB roadster and headed for Depoe Bay for the QRP DXpedition. Results were encouraging with contacts K7RRY/7. Gold Beach, Ore.; K7OKC/7, Centralia, Wash.; KN7VMZ,

(Continued on page 120)

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Hy-Gain's MODEL 402B
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It's true... with Hy-Gain's Model 402B, you can work signals on 40 meters that you never knew existed. And, you can work 'em 24 hours a day - 365 days of the year.

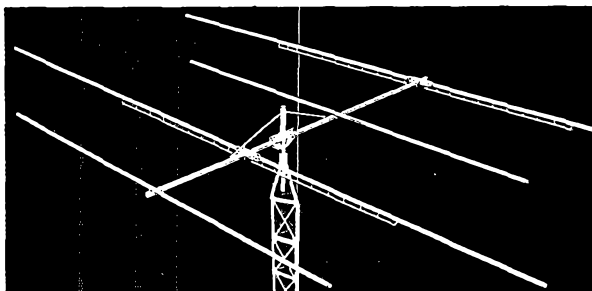
Hy-Gain's 402B gives maximum obtainable forward gain and attenuation of unwanted signals off the sides and back for an antenna of this type.

How can the 402B deliver such amazing performance? Well, there are several reasons but probably the most important surrounds Hy-Gain's perfected linear loading which extends parallel along the elements and delivers maximum possible performance from a shortened antenna. Linear loading, another Hy-Gain innovation, eliminates the need for lossey center loading coils.

The 402B feeds with 52 ohm coax. Elements are 43 ft. long. The 2-inch boom is 16 ft. long. The 402B is constructed of seamless, taper-swaged aluminum tubing offering very low wind resistance. Insulators are of high impact, fiberglass impregnated plastic. All steel parts iridite treated to MIL specs. Since it weighs only 37 lbs., the 402B can easily be stacked with any tri-bander or 20 meter beam with a scant 10 ft. separation required. A sensational buy at only **\$99.75** Ham Net.

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Here's an antenna that will give you the unparalleled performance of Hy-Gain's 402B on 40 meters *PLUS* full-sized 3-element performance on 20 meters - Hy-Gain's DB-24. Unique linear stub decoupling reduces the overall length of the DB-24 to $\frac{2}{3}$ full size for 40 meters and makes possible 2-band operation without traps. Three full-sized elements on 20 meters deliver 8.1db forward gain; 20 to 30db gain in F/B ratio. Two 40-meter elements same as on Model 402B. Fed with 52 ohm coax, the DB-24 easily handles maximum legal power. Insulators are of high impact, fiberglass impregnated plastic and all steel parts are iridite treated to MIL specs. Longest element is 43 ft.; shipping weight, 64 lbs. The DB-24 is the ultimate in 20 and 40 meter antennas. Priced at **\$169.50**.

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Portland. Contacts were made on 80 meters using an old-style antenna counterpoise system 60 feet wire each leg. The Navy only intended this rig for 30-mile contacts. Let's hear from other QRPers. K7ERY now is at Corpus Christi Naval Air Station for more officer training. W7ZFH, OSN mgr., reports sessions 20, total attendance 153, traffic 63. BRAT awards to W7AJN, W7BVH, W7ZFH and K7IWD made BPL again. Your SCM attended the OARA Convention and wishes to congratulate those who made it possible. Traffic: (June) K7IWD 776, W7ZFH 71, K7SHC 34, W7AJN 27, W7BVH 14, W7KTG 12, W7DEM 8, K7JRA 5. (May) W7MAO 36.

WASHINGTON—SCM, Robert B. Thurston, W7PGY—Asst. SCM/SEC: Everett E. Young, W7EMQ, RM: W7AIB, PAM: W7LEA. Nets in the Washington section affiliated with the NTS are the Washington Section Net (WSN) and the Washington Amateur Radio Traffic System (WARTS). The WSN meets on 3535 kc and WARTS on 3970 kc. The SCM received 13 Field Day messages. W7IST believes he holds the first 220-Mc. contact between Oregon and Washington made during the V.H.F. June QSO Party. K7NPII joined the ranks of Silent Keys. W7HZ is on a world tour and now is visiting in Italy. W7OUL, W7JJK, W7AICU, W7SLB and W7HMQ are all on RTTY on 145.65 Mc. K4IRFX, 7 is waiting for a new camper and equipment in the form of a DeSoto TR-3 and 2-meter gear. K7IISH installed Gonset Twins in the 1963 Chev. station wagon. K7KJB installed a National NCX-3 in his Rambler. When visiting in Aberdeen and Hoquiam and vicinity contacts can be made on 3.92 Mc. W7JC is using his old stand-by because of dx in the Valiant. K7YHQ is a new Novice in the Bellevue area. K7JRE received his CP-25 and applied for CHC membership. Jim has worked 10 states on 40-meter c.w. running 5 watts. W7AIB has a new HQ-130C on order and operated portable near Dungeness during July. W7AMC is QRL building a 160-meter rig. W7BTB joined Navy MARS. The Northwest Slow Speed Net (NSN) had 30 sessions with 415 QNTs and 229 QTCs in June. VE2BKK/m/W7-GD3MIK was a recent visitor at the Richland Amateur Radio Club. W7-OEB reports that equipment failures during the Field Day exercises of the Richland gang were held to a minimum. K7OFW and K7OFX operated s.s.b. from Twin Lakes during their vacation. A new Novice in the WA WA area is K7WIG. K7AVX is on the teaching staff of IBM at Lexington, Ky. K7PVY has a QSL card from every county in the state. W7GVC and his XYL are heading for a big vacation. W7FIX is sporting a new '63 Ford. K7DED is having lots of fun with a new SBE-33. K7QQM finally locked keying transients. W7-JII is ready to give up on keying his rig. W7CXJ now has the Ranger going 'B. K7PVO is rebuilding his DX-60. W7UOI is active on two MARS nets, one s.s.b. transeon net and an RTTY net. The Walla Walla gang will hold its annual picnic Sept. 15. The Northwest YL Net has come up with a new club called the MINOW Net. The name is derived from the first letter of the states of Montana, Idaho, Nevada, Oregon and Washington. The SCM and the Director of the Northwestern Division plan on seeing all at the Walla Walla Convention. Traffic: (June) W7BA 1430, W7DZX 606, W7APS 303, K7JHA 205, K7CTP 182, W7OEB 149, W7BTB 47, W7AMC 35, W7AIR, 29, K7JRE 17, W7IEU 14, W7JC 4. (May) W7GIP 123.

PACIFIC DIVISION

NEVADA—SCM, Leonard M. Norman, W7PBV—The Nevada Amateur Radio Association of Reno held its annual dinner with the following club officers installed: K7TAO, pres.; K7HRW, vice-pres.; K7NOM, secy.-treas. W7CX, trustee; W7FJV, Sgt. at arms; K7-NKF, director. K7QPK has added 200 feet more to his long-wire antenna. W7JU and W7PBV each received the Armed Forces Day Certificate of Merit. The Las Vegas Radio Amateur Club's station, K7LGE, is located in Room 202, Thunderbird Hotel. The Nevada Centennial Committee is printing special QSL cards for Nevada amateurs and a special certificate will be issued to any amateur who contacts a certain number of Nevada amateurs in 1964. W7HQS is setting up an amateur TV camera. K7TKS and W7BJY are vacationing in California. K7RKH is vacationing on the East Coast. W7TGG is converting a BC-733 to a 2-meter transceiver. K7TYE has a 2-meter transmitter and receiver almost completed. W7PRM has been in New Mexico and Colorado on business. Traffic: (June) W7PBV 6, K7QPK 4. (May) W7VU 23.

SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W6ZRJ—Asst. SCM: Edward T. Turner, W6NVO. SEC: WA6EIC, RM: K6KCB. PAM: WA6HVN, V.H.F. PAM: WA6RRH. OOs: K6MZN, W6CBX, W6ISQ, W6ASH, WA6RXI and W6WX, and non-observer K6OHJ took part in the May FMT. Congratulations to K6MZN on his average error of 2 p.p.m. K6OHJ and W6CBX also

(Continued on page 122)

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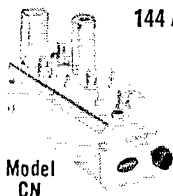
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Panel contains bandswitch, tuning capacitor and a three-position switch which puts the unit into "Off" position, "Standby" or "On," and transfers the antenna directly to the receiver or through the Preamp. 3" high, 5" wide, 3" deep. wired and tested \$24.95

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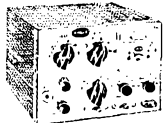
Has 3 Nuvistors (2 RF stages & mixer) and 6J6 osc. Available in any IF output and do NOT become obsolete as their IF is easily changed to match any receiver. Average gain - 45 db. Noise figure - 2.5 db. at 50 Mc., 3.0 db. at 144 Mc., 4.0 db. at 220 Mc. Power required 100-150V. at 30 ma., 6.3V. at .84A. See PS-1 Power Supply.

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Model CHT will convert any single frequency or band between 108 and 174 Mc. down to the broadcast band or any other IF output. Has a 1/2 microvolt sensitivity. Complete with one crystal ... \$35.95 Model CLT same as above except that it receives any frequency or band between 2 and 54 Mc. Complete with one crystal \$35.95

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CB-6

CB-6K - 6 meter kit, 6ES8-rf Amp., 6U8-mix./osc. \$19.95
 CB 6W - wired & tested \$27.50
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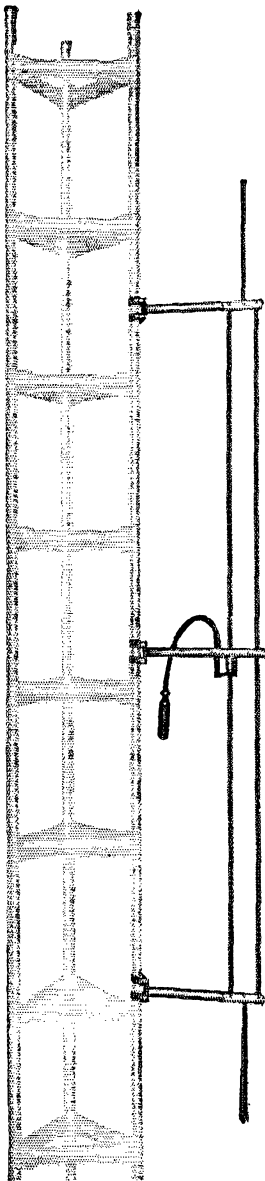
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did well, both with 9.9 p.p.m. A large number of clubs and groups turned out for Field Day with messages sent to the SCM. W6RSY made the BPL in June reports working into the Poi Net (KH6) on 7 Mc. Ed says that while PAN is holding up on 80 meters, conditions to TWN are not good. K6GZ made the BPL on originations plus deliveries and reports conditions for him are normal. W6YBV is active on NCN. W6DEF sends in a fine article complete with pictures on amateurs in the Bay Area which appeared in *Wing Tips* of the San Francisco Mainliner Club. Hal also reports taking part in the search for a lost boy in Marin County. W6RFF is active on NCN and renewed his ORS appointment. W6AUC is active in the Sketo Net and as OO and is now mobile with an NCX-3 W6ZRJ soon will be mobile again in his new Greenbrier Sports wagon. W6HC also sports a new car and is planning on 2-meter mobile. Harry is active as TCC operator. W6OII is active on APTN and took part in FD on Chew's Ridge in the Monterey area. W6PLS, EC for Half Moon Bay, sends a fine clipping from the Half Moon Bay paper on his EC appointment. Gene is busy building up the AREC in his area and now has eight actives. He also sports a new CP-35 sticker. K6VQK was on at home during PD and reports that K6DYX vacationed in the east in July. K6TEH is busy with OBS and club activity. W6MMG was active with the MARS group during FD. K6MTX still is in high spirits as W6ZRJ has moved away (were only nine houses apart). Jim built a new terminal unit and is busy making new RTTY contacts. W8OCT/6 is taking an active part in building up AREC in the Milpitas area. W6IBW is active with SPECS 2-meter net. K6YKG/W6LW reports the SCCARA took part in the V.H.F. QSO Party. The highlight was amateur TV work on 420 Mc. between Mt. Hamilton and Fresno. ARRL Hq. has nothing on your SCM, who also moved in June. The new season is upon us. Your League officials stand ready to help your club or group with any League problems you have and are ready to give your group League information. Remember your section nets and give them support if possible. NCN, 3635 kc. O3OOZ daily and SCVSC, 146.7 Mc. O3OOZ daily. Traffic: W6RSY 807, K6GZ 358, W6YBV 152, W6DEF 115, W6RFF 46, W6-AHC 33, W6HC 20, K6EQE 12, W6OII 12, W6PLS 11, K6VQK 10, K6TEH 4.

EAST BAY—SCM, B. W. Southwell, W6OJW—W6MIE made BPL. W6MJJP made DXCC. W6ANEL worked 25 out-of-state stations on 50 Mc. W6ANOV is looking for a 931 photo-tube and worked some DX on 50 Mc. W4FOR/6 is readying a new antenna. W7QOH/6 has a new bug. W6AVAT has a new 20-meter quad and has a DX score of 63/41. Lots of Field Day portable stations were logged at the SCM's QTH. FB. K6GK is leaving for a 3-month European vacation. W6EKK has a new kever. W6BJJ/6 had 333 QSOs during FD. W6ERW is debugging a Marauder. W6ANOV dlobbered 50 on the 50-Mc. opening. W6ECF had his DX-100 blow up, and grabbed DUF, WUN-3 and WAK Awards. The Berkeley School for the Blind has four new Novices and a new Drake 2-B. W6WLE is on 144 Mc. with a twoer. W6ANOV built a new scope. W6-OBL's two rigs went up in smoke during FD. W6CZQ is on 144 Mc. W6PKF is back from SU/Land and getting his gear ready. W6APK has completed a 220- and 432-Mc. rig. W6ZTY is now General. Congrats. K6JHY has G-76/Mobile. W6VAU is eyeing 432 Mc. W6MIE operated at W6CX/6 on FD. Don't forget the Greater Bay Area Hamfest Sept. 21-22. Write W6-KZF for information. Attention OES: Oscar III will be launched sometime in October. W6YST, K6BYQ, W6-LGE and W6HYO were on Mt. St. Helena during the V.H.F. QSO Party. K6RQX and his XYL have a new OM harmonic. Congrats. WN6CSJ has a new Twoer. W6NXC took first place for E.B. in the V.H.F. Sweepstakes. K6BXH has a new Shawnee on 50 Mc. W6TKY, W6NWL, W6VMG, W6ERU, W6ANA, W6EKK, W6BUE and W6OPL are new members of the MDARC. The Mt. Diablo Club reports 30 mobiles in the area. K6PRK is going s.s.b./mobile. W6UQM was QRL Sierra park trip in June. W6EKK is a new ORS. W6-GMQ, K6GVV, W6BID, W6VWHW and W6B8P are new members of the LARK. The Vikofron Amateur Radio Club is a new one at Irvington High School. K6YTA got his WACC Award. NCARTS is on 3620 and 146.475 RTTY at 7:15 p.m. PDST Thurs. K6ESZ sent an RTTY AFD message from A6USA. Thanks for all the information gang and keep it coming. Traffic: (June) W6MIE 156, K6GK 135, W4FOR/6 95, W6EKK 24, W6OJW 10, W7QOH/6 6, W6AVAT 2. (May) K6GK 70, W7QOH/6 5.

SAN FRANCISCO—SCM, Wilbur E. Bachman, W6-BIP—Our SEC says "When you sign up for civil defense communications you are protected by State Compensation Insurance during drills or actual emergency operations, so do your part." Reports from the S.F. Club, Marin, Humboldt, Baylax, Cathay, Tunalpais and HAMS verify that all section clubs went all out for
(Continued on page 124)



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VSWR	1.5:1
Bandwidth	±1.0%
Maximum power input	500 watts
Flexible terminal extension	18 in. of RG-8A/U
Termination	Type N male with Neoprene housing
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Radiating element material	6061-T6 aluminum
Insulated support material	Phenolic
Feed point insulator	Polycarbonate
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Rated wind velocity	100 MPH
Lateral thrust at rated wind	45 lbs. at 30 Mc
Weight	15 lbs. at 30 Mc

Stainless Steel Mounting Clamps supplied to mount antenna on round tower legs 1 in. to 1½ in. diameter.



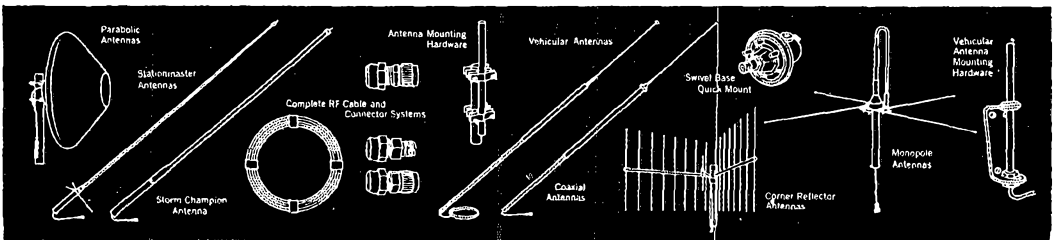
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Field Days. The July CCRC meeting was held at the QTH of W46KLL, Livermore. W6SLX and his NYL recently were in a bad auto accident when a drunken driver smashed into their car. Ed always is right on the job to help his fellowmen when disaster strikes and was very happy to have three citizenbanders come to his aid when he needed it most. Shortly after the smashup Al Pierce, of Bureka, drove up and called for help over the radio. It was heard by Don Balke, who relayed the call to Wayne Walker, who called Calif. Highway Patrol. Ed is well on the way to recovery but Ellen will have to wear a back brace for many months more. New calls in Humboldt are W6BDGJ, W6DKC, W6FAJ, W6FBK and W6UJU. "SLX" relays that W6ZSE is back in S.F. Hospital. K6LCF is looking forward to having a new noncom, to help run K6AIR. K6TWFJ will rap the gavel another year as president of the Golden Bear Net. Sorry to report that on June 5 W6QNC became a Silent Key. The Tarnapais Club now has guest speakers first on the club agenda so they will not have to sit through the business meeting if they wish to leave early. Other clubs might check on this method. K6CJO's and W6JFI's code and theory classes have proved very successful. The Greater Bay Area Hamfest will be held Sept. 21-22 at Edgewater Inn, Oakland. Keep these dates on your *must list*. W6BIP is back from his Alaska work assignment. Bip was delighted that he worked W6MLK, HAAS station, on Field Day. W7ZT and his NYL attended the Jim Boyce Farwell dinner at Hyatt House in San Jose recently. About one hundred were present to wish W6DCH and Kaye happy days in their future home in the East. Traffic: K6AIR 1420, K6TWFJ 66, W6QXV 16, W6GGC 12, W6PZE 12, W6UHN 3.

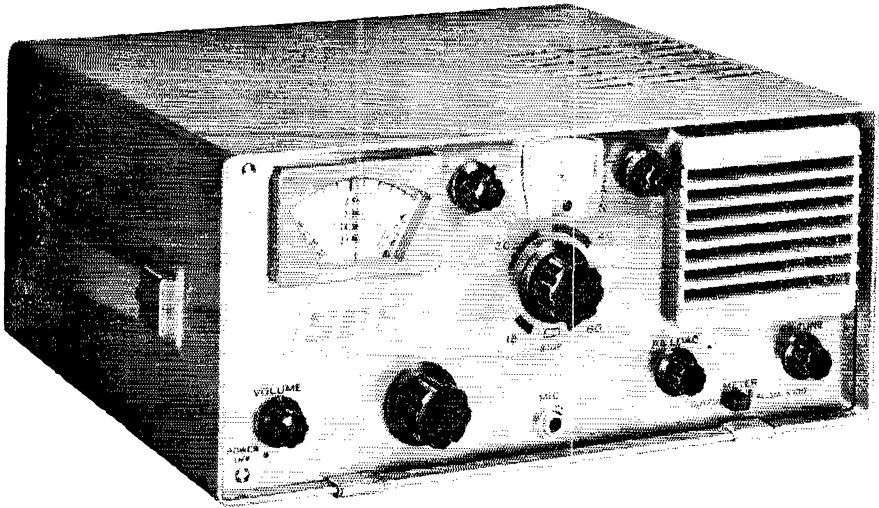
SACRAMENTO VALLEY—SCM, George R. Hudson, W6BTY—Asst. SCM/SEC, Anton P. Buzdas, K6IKV. How was your FD? The Eldorado County ARC gang puts it this way: "gone but not forgotten?" The Downtown SARC said in their radiogram they were on FD at Grizzly Flats with 25 operators, 20 AREC members, 4 transmitters and lots of cold, windy wx and even some rain! From W6DQR, at the Eldorado TV tower, another message said lots of action but no AREC here! From W6SLU/76 the word was 6 operators and 2 transmitters but no AREC members. The Yolo County ARC set up FD camp at Yolo International Airport, and its presy, W6MIO, radioed they had 9 operators and 9 AREC members. Nice going, Curly! W6HTS relayed a message that K6FAV/6, McCellan AFB (MARS) ARC, at its FD site on the American River had 4 transmitters, 56 operators and 10 AREC members present. The "champs" of the mobile FD entries last year, and the year before that, the Radio Amateur Mobile Society (RAMS), sent 39 individual messages to your SCM this year, showing 39 mobile units in the field and 39 operators (not counting the NYLs and the little harmonies); but the score was zero on AREC members! Nice going, RAMS, and keep up the fine work. W6NRIH is a new entry in Sacramento, W6ZJW visited in Sacramento recently. New North Hills ARC officers are K6VPE, presy; W6LPS, vice-pres.; W6ZDE, sec.; K6EJX, activities. The Downtown SARC 2-meter net has been logging 7 to 9 check-ins and has regular liaison with Yolo, Placer and Eldorado County outlets. We hear that during the past V.H.F. QSO party, W6GDO worked all California and Nevada sections on 2 meters! W6WLI has very little time for ham radio now; he has been working on Telco bargaining coram, in S.F. K6HEZ has been on TDY at Ft. Monmouth, N.J. W6AF has a heavy power line noise at his QTH, so can only hear the S9-plus sigs! W6REK, popular member of the state legislature from Santa Barbara, had a complete ham station set up and operating during past sessions in the State Capitol Bldg. in Sacramento. Traffic: K6HEZ 22, W6TUUN 12.

SAN JOAQUIN VALLEY—SCM, Ralph Sarovan, W6JPU—The Fresno Amateur Radio Club held its Field Day near Monkey Creek with 25 operators and W6JPS in charge. The Delta Amateur Radio Club held its Field Day at Manzanita Point, W6BWM, with W6WWT and W6EFW, held Field Day at Music Mountain and reported rain and snow and good results. K6AXV has built a receiver for 75 and 6 meters and reports good results. K6MIO is active on amateur TV. W6PZA is reported on 420-Mc, s.s.b. He also is active on 6-meters s.s.b. W6NFC is on the air with a new keyer. W6-DTT is W6NFC's mother. K6ZCD has a new keyer. W6-NKZ is mobile with his SB-33 on 40 meters. W6QOK is on 6 meters and is thinking of going s.s.b. K6RIT has a four-element beam on 6 meters. W6TJZ has his RTTY going on 6 meters and is thinking of 420-Mc, s.s.b. K6UDX has built up a 1206-Mc. converter with a Parametric amplifier. I would like to know how my remote-controlled 2-meter fm. station is getting out from the Meadow Lakes area. It is operating on 146.9 Mc. I would appreciate hearing from any of you who have heard it and a signal report. The call is W6JPI. Vacations should be over, fellows, so please take 5 and drop

(Continued on page 126)

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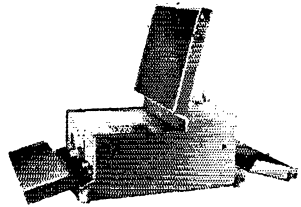
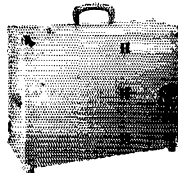
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me a line telling me of your activities or your friends' activities and, above all, send in those reports. Traffic: WA6ESH 140. K8ANV 3.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, K4QFV/W4YZH—Asst. SCM; Robert B. Coons, W4FDV, SEC; W4MFK, RM; W44FJM, PAM; K4QDX, V.H.F. PAM; W4BUZ. Field Day reports were received from W4MDE/4 Buncombe County, K4SWN, Davidson County, W4LEN/4 Durham County, K4WLX, Forsyth County, K4YYJ, Rowan County, W4AJT, Guilford County and K4CYP/4 Wayne County. W4BUZ reports that the Greensboro—Guilford County V.H.F. AREC Net is now in operation and there are about seventeen counties in the state that can take part in a v.h.f. net system. K4IEX is interested in forming a North Carolina chapter of the Certificate Hunters' Club, with a North Carolina QSO Party in the offing. K4SWN also is interested in having an N.C. QSO party. W4EJP/W4EJQ are now back on the air and active on NCN after getting equipment difficulties cleared up. W4AEIS reports the Gaston County RACES Net meets on 145.6 Mc Mon. nights. A field organizational meeting of all Section LOs was held in Charlotte in conjunction with the Charlotte Hamfest. K4QIP has completed his Vidicon TV camera for 432 Mc. THEN is now using its new net procedure and traffic-handling is picking up. Net traffic: NCN 308. THEN 118. Traffic: (June) W4WB/4 401, W4LWZ 143, W44FJM 93, K4CDZ 92, K4QDO 86, K4PTB 75, K4QFV 70, W44EIS 61, W4EJP/4 58, W44ANEH 53, W4BAW 36, K4IEX 35, W4EJQ/4 26, K4ZVK 24, W44DAA 9, W44IUP 9, K4ODX 9, K4YYJ 8, W4AJT 7, K4EO 5, K4MSG 4, K4SWN 4, K4WLV 2. (May) K4TPK 27.

SOUTH CAROLINA—SCM, Lee F. Worthington, K4HDX—SRC; W4BCZ, RAI; W4PED, S.S.B. PAM; K4JOQ, A.M. PAM; K4KCO, Nets: C.W., 2400Z and 0300Z, 3795 kc.; S.S.B., 0100Z, 3914 kc.; A.M., 0100Z, 3930 kc.; AREC S.S.B., 2400Z, 3914 kc. Wed. From all indications South Carolina turned out in a big way for Field Day this year. At this writing reports still are coming in from clubs and individuals. The ARRL affiliated clubs competing for the State Radio Council Field Day Award will know the results officially after publication in QST. The total points scored will be divided by the number of transmitters in simultaneous operation with the highest score winning. South Carolina needs more Official Observers covering all modes of operation. If you can qualify for this job of service and help for your fellow amateurs, contact your SCM—now! The Low Country ARC held a successful hamfest in Charleston Aug. 10-11. Nice going for a newly-formed club! Net traffic: S.S.B. 108, C.W. 93, A.M. 19, AREC 2. Traffic: K4LND 132, K4OCU 47, K4VWL 44, W4WQM 40, W4AKC 32, W44CAW 17, W4NTO 16.

VIRGINIA—SCM, Robert L. Follmar, W4QDY—Asst. SCM; H. J. Hopkins, W4SHJ, SEC; W4QDY (temporary), RMs; W4LK, K4ITV, W4SHJ, W4QDY, W4IA, W4KFC is on the air with a temporary setup because of repairs. His XYL took the Novice Class exam from W4ZM. He is sponsoring the Fairfax Co. 4-H Radio Club and worked MP4QAR/4WL for a new country. K4CG, USCG station, in Alexandria, is active on the 80-meter novice band with 4 operators. K4YDL disassembled the quad for storage but a storm took down the dipole! From Richmond W4BZE reports that Field Day took its toll; also that they operated strictly c.w. W4CYO now is exclusively mobile because of the move to a new QTH. The following stations are on vacation or have suspended operations for the summer: K4HP, W4LRN, W4NTR. The VAH-500 Awards were earned by W4SHJ, W4DLA, W4LK, Asst. SCM W4SHJ visited ARRL and saw the new building. W4PFC is losing a couple of operators and hoping for replacements. W4MXU is trying to get a suitable antenna for all bands. K4MYO qualifies for WAS. New faces in the Virginia section jobs: W4TBX, V5BN Mgr.; W44GWD, Asst. V5BN Mgr.; W4ZAU, V5N Mgr.; K4MXF, V5N Mgr.; W44PCS, V5N Mgr.; and K4LTK, Asst. W4PTR is itching to build sumpin' new. Old trafficker W4IA is headed for a tour in Greece. W4MK is working 7-Mc. c.w. with his Ranger. K4RNH is glad to be back after a trip to Yankee-Land. W4BGP and his XYL W44RVE are expecting a jr. operator. K4PXY says he's going to work some DX instead of so much traffic. W4RHA is installing 36000 BTU air conditioning in the shack. Good activity in the Virginia Section is indicated by the total number of reports (over 50). Even the SCM's traffic total is up! Traffic: (June) W4PFC 1601, K4PQL 1032, W4DLA 521, W4NTR 519, K4PXY 519, W44FCS 215, W4RHA 195, W44GWD 188, W44EUL 126, W4DVT 119, W4LK 107, K4RNH 72, W4QDY 68, K4FSS 50, K4ITV 46, W4MXU 46, W4IA 44, K4WVT 40, W44HHP 34, W4SHJ 28, W4PTR 25, W4BGP 24, W4ZAI 24, W4NLC 20, K4BAV 18, K4SDS 17, W4ZAU 15, K4GRZ

(Continued on page 128)

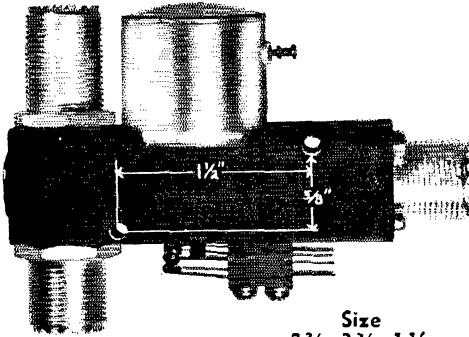
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Size
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Less than 9 oz.,

COIL RATINGS: 6, 12, 24, 28, 32, 48, 110 and 220 V DC @ 2 watts. 6, 12, 24, 110 and 220 V AC @ 6 VA, 50-60 cps. Special coil voltages available on request. Coil terminals are solder connections feed-through insulators.

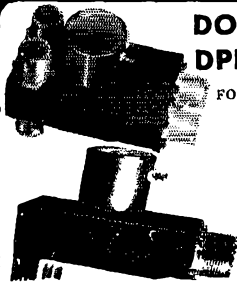
r.f. RATINGS: 1 kw power rating to 500mc. 20 watt power rating to 500 mc in DK60-G and DK60-G2C in de-energized position. The DK60-G and DK60-G2C have a special isolation connector in the de-energized position to reduce crosstalk to a minimum.

AUXILIARY CONTACTS: Form 2C (DPDT) on DK60-2C and DK60-G2C, Bifurcated contacts rated at 5 amperes at 110 V AC non-inductive.

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SPECIFICATIONS: Freq. range 0 to 500 mc. to 1 kw; VSWR 1.15:1; Isolation 30 db at 500 mc, 50 db at 30 mc; Insertion loss 0.03 db at 30 mc; Available in all std. AC and DC voltages. Connectors: UHF std., type N, BNC, TNC and C available.

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DK60-G2C
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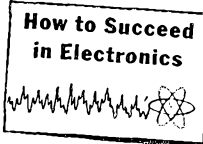
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14. K4HP 11, W4OWV 10, W4BZE 9, W4NVX 9, W44-BVE 8, K4DCN 7, W4KN 6, W4LRN 6, K4MYO 6, K4-SGQ 5, W4MK 4, W4CVO 2, W4KFC 2, W44DUW 1. (May) W4NVX 34, W4ZM 16.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8SSA, PAM; K8CFT, RM; K8HID, West Virginia nets: Phone, 2890 kc, at 2330; C.W., 3570 kc, at 0000; S.S.B., 3903 kc, at 0100; PON, 3905 kc, at 2215. Sam and Helen Harris attended the Fifth Annual West Virginia Radio Convention at Jackson's Mill, Alice Nelson, K8MIQB, was named the Most Outstanding Amateur. K8TPF won the Centennial QSO Plaque and K8-ACN won the V.H.F. Cup Award. Congratulations to W8DUV for her outstanding score in the NLRJ Party. Old-timers W8VA, ex-8VZ, W8GBF, ex-8ACZ, W2GM, ex-8CVX, and W8AKQ held a reunion at the State Convention. The ARRL booth was operated by the Kanawha Radio Club and the Wouff Hong ceremony was conducted by the East River and Mara ARC. K8TPF reports for the PON: phone, 253 stations, 91 messages; c.w., 50 stations, 20 messages. K8CFT reports for the Phone Net: 18 sessions, 422 stations, 91 messages. Thanks to W8CKX and W8ACPY. West Virginia meets 8RN schedules. Traffic: W8CPCY 118, K8TPF 94, W8DUV 49, K8CFT 45, K8VFK 44.

ROCKY MOUNTAIN DIVISION

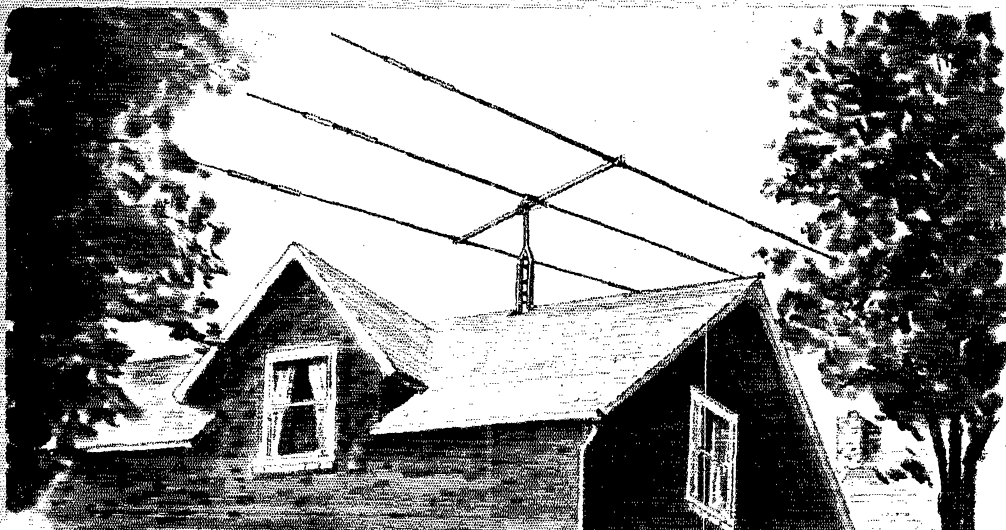
COLORADO—SCM, Donald Ray Crumpton, KØ-TTB—SEC: WØSIN, PAMS; WØCXW, WØGNK, RMs; W4UGLO, KØFDH, The Rocky Mountain Division Convention held at Southern Colorado State College in Pueblo was a real get-together for hams from around the good old U.S.A., with California, Colorado, Connecticut, Florida, Illinois, Nebraska, New Mexico, North Dakota, Wyoming and Utah represented. Carol, WØ-EVT, of Colorado Springs, won a car and since she already had two cars she promptly traded it for two 6146 tubes. Andy Balah, the FCC Engineer from Denver, had about 30 for the Extra and General Class tests. In addition there were 30 new members initiated into the ROWH. Station reports were very good this month. The Columbine Net reported 193 and HFN 76. Traffic: KØZSQ 145, KØDCW 96, KØWGC 56, WØSIN 45, W2-VQS 0 36, KØAID 23, KØQGO 18, WØCBI 7.

UTAH—SCM, Thomas H. Miller, W7QWH—Asst. SCM: John H. Sampson, W7OCX. SEC: K7BLR. The Beehive Utah Net (BUN) meets daily at 1930 GMT on 7272 kc for the purpose of handling traffic. Band conditions on the BUN have been poor but all traffic has been cleared, which is a plus credit to all net members. W7QWH is burning the midnight oil at the Missouri School of Mines. K7BLR is doing an active duty stint with the Marine Corps. W7OCX attended the Rocky Mountain Division Convention in Pueblo, Colo. W7ST's office work is keeping him busy. W7RQT just got under the wire in getting himself a June bride. K7POZ has kicked the troubles in his rig. During the temporary absence of our SCM, submission of this report has been taken over by W7OCX. If you would like to see your call in this column be sure to submit an activity report each month to the SCM. Traffic: W7OCX 115, W7MWR 26, W7JHM 4, K7CLO 2, K7HFV 2, K7-MPQ 2, K7QEQ 2, K7RGY 2.

NEW MEXICO—SCM, Carl W. Franz, W5ZHN—SEC: K5QIN, V.H.F. PAM; W5FPB, 10 Meter PAM; W5WZK. We welcome W5MHT to New Mexico. He recently moved to Albuquerque from Denver and shortly will be working with us as an OO. The SCM would appreciate your suggestions for a scoring system for Division Award for high scoring clubs in Field Day operations. Consideration should be given to allow equitable opportunity for clubs of both small and large membership. The deadline is Nov. 1, 1963. The SCM has received 25 Field Day messages. Looks like the gang really was after it this year. The SCM's field gear burned up before he even got started. Two Yale ARC boys are about ready for the General Class license. Your SCM has received a number of letters pro and con about the Board's proposals. They would seem to indicate many writers do not understand the intent for long-term betterment and preservation of our bands for our entire amateur fraternity. I would like to suggest that we all carefully read both the proposals plus the preamble to Part 12 of the Rules and Regs. Do not help spread erroneous information. Traffic: W5UBW 56, K5-ONE 31, W5WZK 12.

WYOMING—SCM, Lial D. Branson, W7AMU—The Pony Express Net meets Sun. at 0800 MST on 3920 kc.; the YO Net is a c.w. net on Mon., Wed. and Fri. at 1830 MST on 3610 kc.; FWN Net is a daily net at 2000 MST on 3570 kc. W7BKI and his XYL took advantage of the July 4th weekend with the trailer and went fishing. The Wyoming Hamfest was held Aug. 10-11 at Pines Lodge, west of Buffalo; the Estes Park Club Hamfest was held Aug. 3-4. W7TAQ has a new Galaxi transceiver. W7HEB has been on a v-s-t in the Ozark

(Continued on page 130)



Announcing *Hy-Gain's* new
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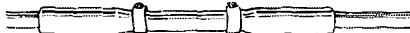
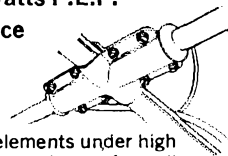
Now... a famous Hy-Gain Thunderbird Tribander for the Ham with severe space limitations who wants top performance on 10, 15 and 20 meters... Hy-Gain's all new Model TH-3Jr.

Constructed of durable, lightweight taper-swaged aluminum tubing, the TH-3Jr offers very low wind resistance and can be easily rotated with a heavy duty TV rotator. Weighing only 28 pounds, it's ideal for rooftop or lightweight tower installations. Features include famous Hy-Gain Slim Line Junior Traps; hardware that is iridite treated to MIL specs; and, molded high-impact cycolac plastic insulators.

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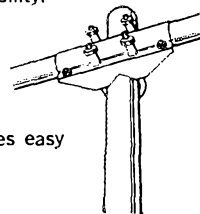
It's a real buy at **\$69.50** Ham Net.

Injection molded plastic sleeve effectively insulates elements under high power conditions and transfers all mechanical stress to die-formed heavy aluminum bracket.



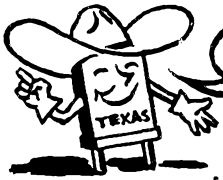
Unique new lightweight high reliability trap utilizes high impact styron coil form for frequency stability... is completely enclosed in die-formed aluminum for mechanical strength and lifetime weatherability.

Rugged die-formed, all aluminum boom to mast bracket clamps securely to any mast diameter of 1 1/4 to 1 3/8 inches O.D. Facilitates easy one-man installation.



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3rd overtone — .005% tolerance — to meet all FCC requirements. Hermetically sealed HC6/U holders. 1/2" pin spacing. .050 pins. (Add 15c per crystal for .093 pins).

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All 23 channels in stock: 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, 27,255.

Matched crystal sets for ALL CB units (Specify equipment make and model numbers) **\$5.90 per set**

CRYSTALS IN HC6/U HOLDERS

SEALED OVERTONE .486 pin spacing — .050 diameter — .005% tolerance
15 to 30 MC **\$3.85 ea.**
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All crystals made from Grade "A" imported quartz—ground and etched to exact frequencies. (Unconditionally guaranteed! Supplied in:

FT-243 holders Pin spacing 1/2" Pin diameter .093	MC-7 holders Pin spacing 3/4" Pin diameter .125
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1001 KC to 1600 KC: .005% tolerance **\$4.50 ea.**
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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) **50c ea.**
Pin spacing 1/2" Pin diameter .093
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200 KC Crystals, **\$2.00 ea.**; 455 KC Crystals, **\$1.25 ea.**; 500 KC Crystals, **\$1.25 ea.**; 100 KC Frequency Standard Crystals in HC6/U holders **\$4.50 ea.**; Socket for FT-243 Crystal **15c ea.**; Dual Socket for FT-243 Crystals, **15c ea.**; Sockets for MC-7 and FT-171 Crystals **25c ea.**; Ceramic Socket for HC6/U Crystals **20c ea.**

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Mountains. W7PVN was a city visitor and called on W7AMU. W7CQL spent a two-week vacation in Colorado. K7QYG is at summer school; he is a teacher at Rock River, Wyo. W7DXV is busy herding dudes at Moose, Wyo. W7E2U and his XYL, W7EDS, have a nice sideband rig but Frank still thinks a.m. is the best. Traffic: W7BHH 52, W7AMU 14, K7AHO 8, W7AEC 4, W7DW 4, K7QJW 1.

SOUTHEASTERN DIVISION

ALABAMA—SCM, William S. Crafts, K4KJD—SEC; W4NML, RM; W4USM, PAMs: K4BTO, K4DJR (v.h.f.). K4TNS and K4WHW. June reports of all section nets (all times GMT):

Net	Freq.	Time	Days	Ses.	Ave. Tfc.	Attend-ance
AENB	3575	0100	Daily	30	3.2	7.9
AEND	3725	2200	M-Sat.	25	.88	7
AENM	3965	0030	Daily	30	4.7	40.7
AENO	50.55	0115	M.W.F.	12	5.75	29
AENP	3955	1230	M-Sat.	27	4.4	16
AENP	3955	0000	Daily	35	2.3	28.7
AENR	50.55	0115	Tue./Thurs.	8	.375	26
AENT	3970	2230	Daily	33	2.66	9.5

K4WHW was named Ham of the Year in Tenn. Valley by the HARC. WA4BDW was voted outstanding NCS on AENT last quarter. AENT is running a participation contest. Check in for information. K4ROR now has WAS. K4NXD has the SB-33 he won at the Birmingham Hamfest on the air. W4NET added a match-box to the rig. W4CTU finally got the 6-meter rotor up. K4PHN is going high power on 6 meters. We welcome WA6UWQ/4 to 6 meters. The following are new Novices in Decatur: WN4NWF, WN4NWX, WN4NWH, WN4NWI, WN4NWX and WN4NWK. WN4NML spent 3 days building a new antenna and a storm got it the next day. Traffic: (June) K4ROR 571, K4WOP 342, WA4EXA 203, K4AOZ 120, WA4BDW 99, W4OGT now K4NGD 77, K4WHW 74, K4B8K 65, K4NXD 48, K4KJD 44, K4FZQ 41, K4NUV 35, K4HJM 33, K4RWV 28, K4ANB 26, WN4NML 25, WA4HFE 20, W4ZNI 20, W4US 18, WA4ENJ 10, K4ZBX 10, WA4IHI 9, K4DSO 8, K4GXS 7, K4NKT 7, K4GRA 6, K4PHH 6, K4WSS 6, WA4EEC 4, K4JDA 4, W4FWP 3, W4NET 3, K4RIL 3, WA4CWI 1, K4RSB 1, K4TDJ 1. (May) WA4EEC 1.

EASTERN FLORIDA—SCM, George E. Cushing, W4QVJ—SEC; W4VYT, RM; K4KDN, PAM 75; K4LCF, S.S.B. PAM; W4OGX, PAM 40; W4SDR, Congrats to new V.H.F. PAM, WA4FVD at Marathon Shores, who comes with an extensive v.h.f. background and experience. W4SGH, Cecil Field NAS, now is a good traffic outlet for the Jacksonville area. Long haul DXers K4WIS and W4BJ now are on 2 meters in the Miami area. The Florida DX Club had Danny Weil, VP2VB, as guest of honor upon his return from 8 years of world-wide DXing. The Lake Placid DX Convention now is growing to major event proportions. Lack of reported news makes this column difficult to make interesting to you. A short note telling of your accomplishments will get in the column. There is a need for responsible OO applicants, both for lower bands and v.h.f. frequencies. Several Florida OOs were mentioned in the ARRL annual report for their outstanding efforts and accomplishments. The SCM got rid of that greasy kid stuff and now has a new rig, exciter, receiver and amplifier. The contest season is coming up with a good opportunity to test the rig, antennas and operating skill. Many appointments are due for endorsement. Check the dates on your appointment certificate. Traffic: WA4IHH 619, W4KIS 512, K4BY 244, W4MIN 198, W4AKB 172, WA4GBM 163, K4SJV 146, WA4AMC 144, WA4FGE 135, K4CQP 130, W4QVJ 122, K4JLD 119, K4NVD 116, K4COO 110, W4TRS 110, WA4BGW 109, W4DVR 102, K4DBT 82, W4ZBL 80, K4ILB 79, WA4CJC 62, W4VWL 58, K4DAX 46, W4OGX 40, W4BKC 37, W4IYT 34, W4GUJ 31, WA4JQQ 30, K4LCF 17, W4LMT 17, K4MTP 17, K4MZR 12, K4ENW 11, W4CKB 10, W4DQS 10, WA4ESS 10, W4IEI 10, K4PVP 10, K4ZIF 10, W4F P 8, K6SXX/4 2.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC; W4MILK, PAM; W4WEB, V.H.F. PAM; W4SGZ, RM; W4BVE, Clubs at Pensacola, Eglin AFB and Panama City were out for Field Day; the PCAR is the section winner with an FB score. Tallahassee: New officers of the TARC are K4YPI, pres.; Bill Eaton, vice-pres.; W4AMH, secy.-treas. Madison: EC W4PBO hopes to have a 2-meter local net going soon. Ft. Walton: Hams again provided communications during the Billy Bowlegs Festival. W4TJO and W4BPJ operated from their boats. Others active were W4UXW, W4EBV, W4ZGS, W4HNI, W4BOZ, W44PRK, W4PLK, W4RKH and W8DCU/4. Operation was on 145.2 Mc. Panama City: The PCAR now meets the 1st and 3rd Wed. at 7:30 p.m. at the Red Cross. W4FIU is now on (Continued on page 132)

New from Gonset

A HIGH QUALITY TRANSISTORIZED SSB TRANSCEIVER



that is

ULTRA-COMPACT • LIGHT WEIGHT • low in cost

Gonset has scored a breakthrough with the new "Sidewinder"—a 2 meter SSB, AM and CW transceiver that combines technical excellence with contemporary design and compact, sturdy construction.

The Gonset "Sidewinder" provides coverage of the entire 2 meter band in four segments 1 Mc wide. It has built-in VFO and the receiver is *completely* transistorized. There are a total of 21 transistors, 6 diodes and three tubes in the "Sidewinder," which operates on either SSB, AM or CW.

The power supply is designed for snap-on back or remote installation and is available either as a kit or a wired and tested unit.

CHECK THESE DELUXE FEATURES AT YOUR LOCAL DISTRIBUTOR!

- Receiver and transmitter utilize dual conversion.
- Designed for mobile and fixed station operation.
- Illuminated dial and "S" meter.
- High voltage power supply is used only in transmit mode.
- Highly Stabilized VFO.
- Crystal lattice filter for both receiver and transmitter.
- 20 watts PEP input SSB, 6 watts input AM, 20 watts input CW.

Transceiver: 8¾" wide, 4¾" high, 7" deep.
Weight: 7 lbs.-10 oz. Amateur net price \$349.95

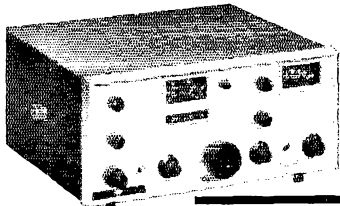
Power supply: 8¾" wide, 4¾" high, 5½" deep.
Weight: 11 lbs.-2 oz. Amateur net price—kit \$39.95
Wired and tested unit \$49.95

The new Gonset "Sidewinder" SSB Transceiver will be on display at your local distributor's in August.

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s.s.b. with an SB-33, WN4JIM (Additional Class, K4FQQ operated portable on a Scout trip to St. George Island, WA4FLI won the W. Fla. Phone and V.H.F. SS Contacts, WA4EJF now is on 8-meter s.s.b. with a pair of 6146s. Ellen has worked 39 states on 8 meters in the last 18 months. The Bay Co. AREC Net is now on 145.3 Mc. K4VFLY is net mgr. WN401P is new on 40 meter. Pensacola: USNCTC club station WA4ECY is active on many traffic nets. Main operators are K1GMW, WA2KVF, WA2NPU and WA5GIW. New officers of the PARC are K4BZJ, pres.; W4FRJ, vice-pres.; K4KQP, secy.; K4CFS, treas. Sally Dennis is the new presy of the Auxiliaries. Traffic: (June) K4VYF 397, W4MLE 305, W4ZWD 132, WA4ECY 83, WA4FJ 55, K4BDF 16, K4QAC 16, WN4IMC 14, W5BJG/4 14, W4ZGS 7, W4-PBO 4. (May) K4BDF 29, W5BJG/4 6.

GEORGIA—SCM, James A. Giglio, W4LG—SEC: W4YE, PAMs: W4KR, K4PKK and W4RZL, RM: W4-DDY, W4YE, on a trip to New England by car, maintained c.w. contacts from every state. K4WVY reports working K9PED 280 mobile on 8 meters recently. K4-SUD and W4TJS have a 2-meter t.m. project that is going great guns. It involves adapting Motorola TRU-41V second-hand units for operating in the ham bands. Contact either ham for complete data. K4FRM, in addition to handling traffic, finds time for new countries DX. The old reliables, K4YRL, W4PIM and W4DDY, came through with FB jobs during the Georgia SET. W4AY reports great fun with the Augusta Radio Club on Field Day. Welcome to new hams WN4OLQ, K4UUV, WN4KIL, WN4KSE and WN4NFV. The Relief Teenage Net meets weekdays on 825 kc. at 1600 EST. K4DKY is busy erecting antenna systems at his new QTH. K1-KSH/KGG reports a QSO with W4ML on 160 meters 15,000 miles away. Congrats to K4TKM on his graduation from high school. He will enter Georgia Tech this fall. W4BZ displays a special talent for photographing hams at the most unexpected times. He got some swell shots at the Atlanta Hamfest. W4GTS has a new kw. linear that is working up a storm. New appointments: K4ZSX and K4KLD as OOs, K4TKM as OBS, K4VGO as OBS. Traffic: W4DDY 355, K4WVY 277, K4FRM 111, W4YE 57, K4RAI 20, W4OHA 20, K4YRL 14, K4BYD 13, W4AAY 9, K4DKY 5, K4FUE 2.

SOUTHWESTERN DIVISION

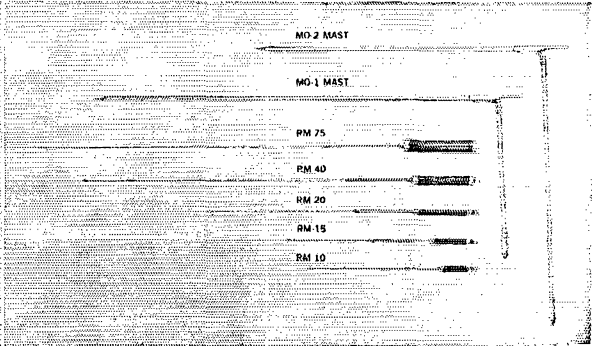
LOS ANGELES—SCM, John A. McKown, W6FNE—Asst. SCM: W46DJB, SEC: K6YCX, RMs: W6BHG, W6QAE, PAMs: W8ORS, K6PZM, W6ATWS. Traffic for the month again hit the 6000 mark. K6EPT, K6MDD, WA6KWV, W6BBO, W6GYH and WA6WTK made the RPL. You boys and girls who operate c.w. had better get on the ball as the phone RPLs are outnumbering the rusty-arm type. K6EPT, with his wild score, was all phone. AREC activity has slipped badly in this section. Let's get on the air and support your local EC who are trying to keep the emergency end of ARPSC going. The Salvation Army Disaster Net station again will be operating at the Los Angeles County Fair at Pomona. Drop in and send a message. The So. Cal. V.H.F. Club, K6BPC, operated on Frazier Peak during the June V.H.F. QSO Party and made themselves known nationwide. Stations and clubs reporting Field Day were W6QFK/6, WA6TXU/mobile, WA6NTC/8, WA6-1BM, K6CLZ/6, W6TOI/6, K6YXH/6, WA6OVN/6, W6-SD/6, K6QYF/6, W6BLY/6, K6LDA/6, W6MSO/6, K6-ZPE. Congrats to a new grandmother, K6IWW. WA6-TYV has ARC-5s going on 80 meters now. K6PZM is active with 20-meter DX. WA6ZID now is in the L.A. section. WA6USU is flirting with the Camp Fire girls on 75 meters, providing a constant traffic outlet. W6-ORS is attending High School Resident Honors Program at U.S.C. W6VOZ vacationed in KP4-Land. W6BZK is DXing on 8 meters with new beams. W6SRE is getting his usual sunburn during the hot months at his beach QTH. W6CKR enjoyed the MTN Roundup at Santa Cruz recently. W6NAA spoiled his holiday and gear by wrecking his new car in the mountains during FD. New officers of the Tri County Amateur Radio Assn. are K6JOC, pres.; WA6ORJ, secy.; WA6RSY, treas. Congrats to new OBS WA6YMB, who is active on 1220 Mc. The Southern Calif Net had a get-together that looked like the Who's Who of trafficers on the West Coast. This meeting was held June 30 and was attended by W6MLZ, S.W. Division Director; K6AAK, Santa Barbara SCM; PAN Mgr. WA6ROF; RN6 Mgr. K6LKD; SCN Mgr. W6BHG; and SCS Mgr WA6TWS. Support your area contact K6YCX for information. Support your section nets, Southern Calif. Net 3600 kc. 0300Z and SoCal Six 50.4 Mc at 0200Z. Traffic: (June) K6EPT 1475, K6MDD 618, WA6KWV 528, W6BBO 453, W6GYH 440, WA6WTK 406, WA6TWS 377, W6QAE 357, K6IWW 308, WA6YLZ 201, K6HIT 167, WA6TYV 109, W6BHG 103, WA6KAW 101, K6PZM 90, WA6ZID 81, WA6USU 77, WA6AAH 63, WB6AJT 57, W6BBBH 40, WA6DJB 15, K6SIX 15, K6JCT 14, WA6PDS 14.

(Continued on page 134)

GOOD MOBILES GO...



10-15-20-40-75 METERS NEW-TRONICS MOBILE ANTENNA



● **Now, Get Fixed Station Reports with the "HUSTLER"**

Buy only the mast and resonators for the bands you operate. No need for matching devices, no feed line length problems. Use any length of 52 ohm cable. This is a new, efficient concept of center loading. Each of the five resonators has a coil specially designed for maximum radiation for a particular band. Center frequency tuning is by means of an adjustable stainless steel rod in the resonator.

The 54-inch fold-over, heat treated, 1/2-inch aluminum mast permits instantaneous interchange of resonators. Mast folds over for garage storage. When opened to full height, the two sections of the permanently hinged mast are held rigidly in position by a shake proof sleeve arrangement. Mast has 3/8-24 base stud to fit all standard mobile mounts. Power rating is 75 watts dc input A.M. — 300 watts PEP input for SSB.

ANTENNA ASSEMBLY CONSISTS OF 1 MAST and 1 RESONATOR

Part No.	Description	Total Height of Antenna (For Rear Deck or Fender Mount)	Amateur Net
MO-1	54" Mast folds at 15" from base	(For Rear Deck or Fender Mount)	\$ 7.95
MO-2	54" Mast folds at 27" from base	(For Bumper Mount)	7.95
RM-10	10 Meter Resonator	Maximum 80" — Minimum 75"	5.95
RM-15	15 Meter Resonator	Maximum 81" — Minimum 76"	6.95
RM-20	20 Meter Resonator	Maximum 83" — Minimum 78"	7.95
RM-40	40 Meter Resonator	Maximum 92" — Minimum 87"	9.95
RM-75	75 Meter Resonator	Maximum 97" — Minimum 91"	11.95

ANY MAST OR RESONATOR MAY BE PURCHASED SEPARATELY

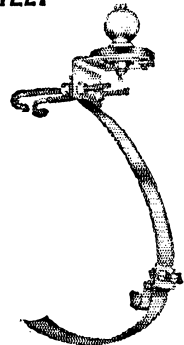
FITS MORE CARS THAN ANY OTHER BUMPER MOUNT!

MODEL BM-1 Flat alloy steel strap fits tightly against any shape bumper yet is inconspicuous. Length of strap permits its attachment to both large and small bumpers.

Assembly is held in place by two "J" bolts at the top of the bumper and strap clamp at the bottom. "J" bolts may be inserted between top of bumper and car body where clearance is as low as 1/4".

Whip receptacle assembly consists of a heavily chrome plated 1 1/2" die cast Zamak ball with 3/8-24 thread. Adjustable so as to maintain whip in true vertical position. Black phenolic base. All metal parts of the bumper mount are heavy cadmium plated.\$6.95

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SQUIRREL-CAGE BLOWER: 115 VAC @ 60 CPS. Rectangular, 3" x 3" opening, W/mount flange, Fasco. R/6. 8 1/2" x 7" x 8". 6 lbs. Order cat. #12-22. \$9.75.

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ROTRON 8" DIAM. FAN: 5 blades in aluminum housing. Blows air into cabinets or racks. R/E. 220 VAC @ 50 or 60 CPS. 1500 RPM. \$9.25. Cat. #12-21.

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HAMMARLUND HC-1B ELECTRONIC KEYS: \$39.95; HQ-180-AC \$449.00; HXL-1 Linear Amp. \$395.00.

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OPERATOR'S HEADSET - W.E. Type #52-A. This is the regular headset used in telephone switchboards and monitor boards and ideal for Ham Radio Operator's use. Complete with cord and plug. \$19.50.

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TELEX BOOM MIKE DUAL HEADSET -HCW-02. Sensitivity: 120 db above .0002 dynes per sq. cm per 1 milliwatt of input. Freq. Resp: entire system covers range up to 5000 CPS. Imped: Receiver 500 Ohms. Carbon mike: 50 Ohms. 3 1/2 Oz. Excel. for Amateur Radio, Aircraft, TV Studios, Receptionists, etc. \$39.00 complete with cord and plugs (similar to PL-55 & PL-68).

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50 AMP. CHOKE. Matches above Xfmr. \$22.00.

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SAN DIEGO - SCM, Don Stansifer, W6LRU - A total of 19 different stations and five clubs in the section sent in monthly reports to your SCM. This is a high for any month in the past ten years. Keep the news coming in like that all the time. Asst. SCM and EC W6FWU returned to San Diego in late June after a month in KH6-Land. K6BPI again heads all stations in the section including multi-operator, with a traffic total of 4082. W6AUGG, former W6LAB operator, is now at MCRD in San Diego attending school. Seven stations in the section made the BPL, K6LKD, Esccondido, reports an exceptional Field Day this year; nothing went wrong. W6ACDD, however, reports the El Cajon Club nearly froze in the Laguna Mountains when it got down to 32. W6ABRG, ex-W6OET, OO and ORS, is active again from San Diego after a month in KH6-Land on business. K6TFT reports a pick-up of 2-meter AREC check-ins. W6WRJ is now Assistant Radio Officer in RACES for Orange County. Others in the program are K6RCK, K6QEB, W6QAT, W6AWVJ, W6AKNE, W6DEY and W6WCI. A word of thanks to K6COE, editor and publisher of the Orange County Amateur Radio Club news, RF. Also well done to the editor of *Squelch*, official bulletin of the Anaheim Amateur Radio Association. With school starting and vacations ended don't forget the big Convention in San Diego, the second week end in October. Traffic: K6BPI 4082, W6IAB 4001, W6YDK 2871, W6ZOW 827, W6A6NPI 593, W6EOT 560, K6GJM 367, W6AROF 267, K6LKD 128, W6CDD 89, K6LME 72, W6ABRG 47, K6TFT 40, W6ABDW 21, W6APDE 11, W6WRJ 6.

SANTA BARBARA - SCM, William C. Shelton, K6AAK - SEC: W6AOKN, RM: W7WST/6, K6KCH has a new KWAM-2, W6CQO reported for the Ventura area with very nice report. The Pointsetta Club ran an exhibit at the hobby show. All of Ventura County has a serious P/L noise problem and all clubs and C/B are co-operating: 16KVA is now universal in residential areas for distribution. 146.7 Mc. is the PRC net frequency. W6CQO has a new SX-117 and an HX-500. The VCARC held its annual B-Q and about 40 attended. The RM and the SCM attended the SCN luncheon in L.A.; about 35 attended. W6BHG puts out a real newsy paper in TTY format on the SCN doings, W7ZYV/6 and W6-UJP scored 1584 points for FD. W6TNS was the June speaker at the SBARG. They also had a team out for FD. K6BUD and his XYL had a nice vacation trip to the Midwest. W6AOKN now is the owner of an NCX-3, as is your SCM. Traffic: W7WST/6 114, K6AAK 14, W7-ZYV/6 5.

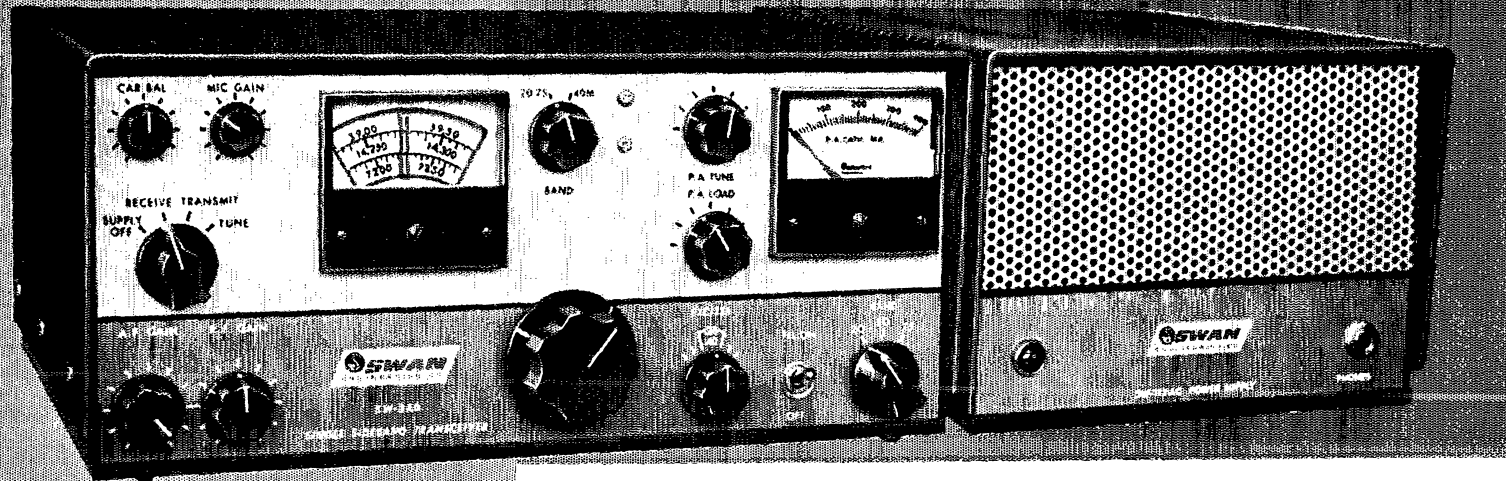
WEST GULF DIVISION

NORTHERN TEXAS - SCM, L. L. Harbin, W5BNG - Asst. SCM: E. C. Pool, W5NFO, SEC: K5AEX. PAM: W5BOO, RM: W3LR. The Magic Valley Amateurs was host for the 33rd Annual West Gulf ARRL Convention held in McAllen June 7-8-9 at which 375 registered and had a wonderful time. The ladies' luncheon was attended by 75 XYLs. After lunch the XYLs were taken on a tour of the shopping center in Old Mexico where the XYL finished draining the pocketbook of the OM. Border Buttermilk was served at the pre-convention party and many hams tried to buy the cow. The Brownwood ARC served Pecan Bayou water to quench the thirst brought on by the heat in this South Texas area. Apparently it was very effective as the Brownwood Club won the bid for the 1964 convention. It is not too early to start making plans to attend: June 12-13 and 14 are the dates. Field Day was a great success if reports and FD messages mean anything. FD messages were received from W5ABF, K5WUE, K5KNX, W5-ZDN, W5EGW, W5AEXX, W5SJZ, W5FC, W5ACKF, K5KYG and K5TMS. Many more groups were heard but failed to file FD messages. The Garland ARC elected K5RAC, pres.; K5GGU, vice-pres.; W5DAJ, secy-treas. The KC Club of Ft. Worth is sponsoring a code and theory class at the Naval Reserve Army each Tue. and Thurs. at 7 P.M. W5MSG has a new SX-117 receiver and advises it is going to be a big help in his OO work. Traffic: W5BKH 138.

SOUTHERN TEXAS - SCM, Roy K. Eggleston, W5QEM - SEC: W5AIR, PAM: W5ZPD, RM: K5BSZ. Reports from the clubs on Field Day activity show that everyone was out working, and some of them had very good reports. W5QKE and W5AIR visited with the El Paso Amateur Radio Club on Field Day. W5QEM and K5COZ visited in Illinois with their daughter, K5CPA. Everyone connected with the Magic Valley Amateur Radio Club of McAllen is to be congratulated on the FB West Gulf Convention. Speaking of Field Day, the Lost Pines Radio Club, at Smithville, really did things up in a big way. This is one of our newer clubs, but the

(Continued on page 136)

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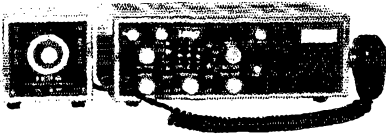
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members really have a nice setup for CD and all phases of public service. W5HQZ writes "Include this in your QST column." As that was all there was on his card, nothing, that is what I am writing about him, nothing. The officers of the Brazos Valley 2-Meter Experimenters Net are W5IRP, NCS; K5ZUA, ANCS; WA5ABU, serv.-treas. The net meets weekly Wed. at 8 P.M. on 145.2 Mc. and certainly would appreciate some additional check-ins. W5AIR and his XYL paid us a very enjoyable visit while on the way to McAllen, Traffic: K5ZJK 339, K5ANS 242, K5HDU 166, W5AC 128, W5AIR 29, K5ABV 14.

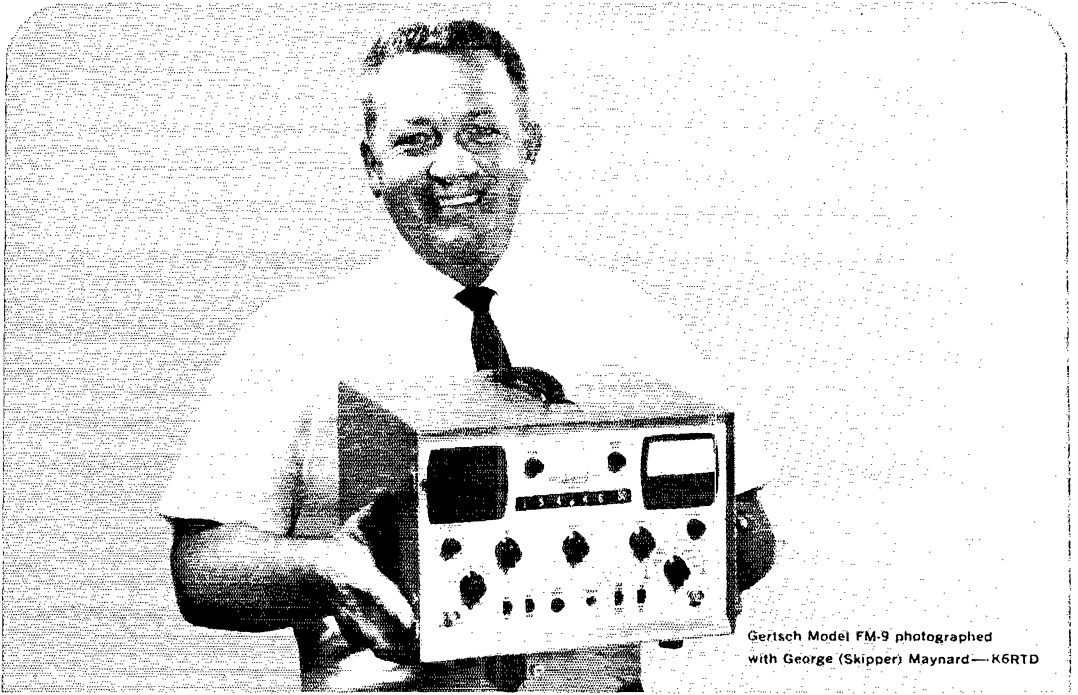
CANADIAN DIVISION

MARITIME—SCM, D. E. Weeks, VE1WB—Asst. SCMS; A. E. W. Street, VE1EK, and H. C. Hillyard, VO1CZ. Congratulations and best wishes to VO1DS and his bride on their recent marriage. Congratulations to VE1AJF and his XYL on the arrival of a new jr. operator. All amateurs are reminded that Bolivia (CP) should be added to their list of countries for third-party traffic. Congratulations to VE1VL, who is the first VE1 to capture the WAZ award. VE1AEB has installed a rig at the lake in order that he may enjoy his second (?) hobby when the fish refuse to QSO. New calls include VO1GC and VO1GE. Thanks to the editors of *SONRA NEWS* for the inclusion of an up-to-date listing of VO1 and VO2 calls in a recent issue. VE1AFB has been transferred to the Yukon and soon will be active with a VE8 call. VE1MM and VE1OC recently appeared on a TV program and gave our hobby some good publicity. VE1TA has been operating 7MM from his motor launch. The Halifax Club recently held a very successful campfest. Could be an annual event? Traffic: VE1AEB 6.

ONTARIO—SCM, Richard W. Roberts, VE3NG—We regret to announce a Silent Key, VE3ASA, of Toronto and Bermuda. Ches was a past-pres. of the Sky-wide ARC. VE3ELQ is now at Picton. VE3RN was portable at Lake of Bays. Thanks to the York North ARC for a nice paper called *Splatter*. VE3BUR's rig was hit by lightning. VE3FOU is a newcomer in London. The Sarnia ARC held an FB Dinner in May. Officers of the Sudbury ARC are VE3BLZ, pres.; VE3EK, vice-pres.; VE3EXL, secy.; VE3CUO, treas. WESTXK ARC's Twenty-fifth Anniversary Dinner will be held Oct. 1. Details from VE3JJ. Hamilton ARC is on the move with the Ontario ARRL Convention on Sept. 23 in the Royal Connaught Hotel and a contest for the "Crawford Trophy." Windsor ARC had a showing of "Friendship Seven." VE3ETM was under the weather for a spell. VE3YN is on s.s.h. VE3AFA is going into the bodyshop. VE3CYR reports good results and lots of interest in the Ont.-Que. C.W. Net. Newcomers still are welcome. The net meets on 3535 at 2300 GMT night-ly except Sun. VE3CYR is RM. The Toronto and Oshawa AREC got together for a fine demonstration of communications with the Oshawa Flying Club. The event was the Governor General's Air Efficiency Rally. Under the Control of ECs VE3LI and VE3ATI all went very well. Twenty eight operators provided mobile and portable stations to effect complete communications. Headquarters was at Oshawa Airport under SCM VE3NG and the two ECs. VE3DRF has a new 2-meter rig. VE3AJA was a visitor to W3-Land. VE3RX and VE3LI were portable in Kwartha Lakes while fishing. VE3BD has a new receiver. VE3AUH is portable at Sunridge for the summer. Traffic: (June) VE3CYR 124, VE3NG 114, VE3CFR 105, VE3EHL 93, VE3DPO 73, VE3AGG 52, VE3GI 32, VE3ETM 29, VE3BAQ 28, VE3RUR 22, VE3FGV 21, VE3FAX/VE2 20, VE3BLZ 19, VE3DRF 19, VE3AKQ 15, VE3DU 14, VE3VD 4. (May) VE3CYR 182. (Apr.) VE3CYR 226.

QUEBEC—SCM, C. W. Skarstedt, VE2DR—Asst. SCM: Jean P. Aehim, VE2ATL. *Your attention and cooperation:* The 6th Boy Scouts Jamboree will take place Oct. 19-20. Please contact scout leaders in your locality and arrange to have a few of the lads visit your station. This event is world-wide and growing in popularity each year. Much greater activity was noted in this section during Field Day. VE2IQ tells us he caught only one fish while visiting the mighty Restigouche but as this one was a 38-lb. salmon he was quite satisfied. Many VE2s attended and paid respects to Vic McCormand, of the D.O.T., at his retirement farewell party. He has been a great friend and most helpful to VE2 amateurs. L'information de VE2BEU: A la suite de recherches effectuées au vue de retrouver 3 jeunes hommes de la localité, disparus au cours d'une excursion sur le Saguenay, un fort groupe d'amateurs, réunis sous l'indicatif VE2CDC dirigé par VE2RD, opéré par VE2BMY et VE2CDB avec VE2AOS, BJA, BJC, BJW, et stations mobiles dissimulées en des endroits stratégiques, ont opéré un réseau sur 80 M, 5750 kc. pour une période de 24 hrs. L'opération a été un succès. La liaison entre groupes, hélicoptères, chaloupes, a été maintenue continuellement. Les mobiles étaient VE2TW, VE2AYT.

(Continued on page 138)



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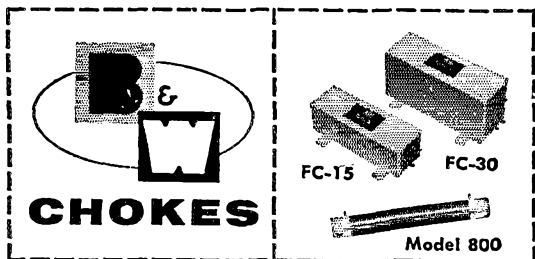
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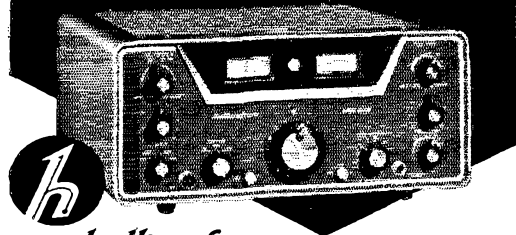
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VE2AAW, VE2BDX, VE2BEL, VE2AZH, VE2BEM, et VE2ACC maritime mobile. Traffic: VE2AGQ 47, VE2DR 41, VE2VH 38, VE2BG 38, VE2EC 28, VE2AIR/2 23, VE2SC 2, VE2RS 1.

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FS, PAM: VE6PV, RM: VE6EAN, ECs: VE6FK, VE6SS, VE6ABS, VE6AJY, VE6AFJ, VE6PZ, OPS: VE6CA, VE6PV, VE6HM, VE6SS, VE6BA, OOs: VE6HM, VE6NX, VE6PL, O88s: VE6HM, VE6AKV, ORS: VE6BR, OESs: VE6DB, VE6HO, VE6AKV. Thanks to all who made my field work trip so enjoyable. I have rezoned the AREC and picked up three more ECs. Keep up the good work, fellows. Field Day activity this year more than doubled despite the rain, with lots of new hams taking part and enjoying it. Meetings were attended at Edmonton Red Deer, Calgary and Vulcan that were very interesting, with some of the fellows learning something. Your SEC was quite pleased with the new setup for the AREC. Sav, fellows, let's all go down to VE6PV's new summer cottage at elk Water some week end and find out the attraction. VE6JL, mobile, is coming out of mothballs; have heard him on several times lately. VE6HM took a flying trip to the Far North to see the Eskimo way of living. VE6MIK is visiting in the south from Watson Lake. Traffic: VE6HM 192, VE6TG 9, VE6ABS 7, VE6FK 5, VE6BA 4, VE6PV 4, VE6WN 4, VE6ADS 3, VE6AFJ 2, VE6AHA 2, VE6FS 2, VE6SS 2, VE6CH 1, VE6VE 1.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB - It is with regret that we report the Victoria Short Wave Club is forced to sell its club house and property. The advancement of new homes into the area has put too great a strain on trying to improve the club house to meet the modern times. *Zoo Beat*, a VSWC's magazine, is increasing in its popularity and the editor, VE7KY, is really to be praised for its growth through his efforts. We are pleased to hear VE7BAH back on after his hospital bout. VE7AFZ had a tussle with, of all things, a wrecking truck. Yes, he lost and broke a leg but is doing OK. VE7BJV is now Class A. I wonder if a good c.w. man is lost. VE7BHW is sporting a three-element beam to help the HT-37. VE7BHH is the B.C. representative for the QCWA, as of the QCWA Convention in Pasco, Wash. VE7BBB is improving her Spanish on Latin QSOs. If you are interested in homemade gear see VE7PS's mobile rig. VE7ALU is blowing 1616 tubes like tree samples. The Boy Scout Jamboree is not too far away and we hope to see the response this year as we given last year. News and letters seem to be dropping off. What is the matter? Nothing doing? Traffic: VE7BJV 205, VE7BHH 112, VE7KZ 99, VE7AC 6, VE7BHW 6, VE7AKE 2.

MANITOBA—SCM, M. W. Watson, VE4JY—Acting SCM, Gert Elliott, VE4GE. Through the untiring efforts of VE4HW and his enthusiastic committee Manitoba amateurs are, at long last, going to have call letter license plates. The mobiles are quite active and recently they assisted a Sports Car Rally in Winnipeg. The program of the June meeting of the ARLM was a very interesting illustrated talk on a tour through Europe. The net on 75 meters has been experiencing difficulties because of heavy static and poor skip conditions. New hams who have joined our ranks are VE4KQ, VE4WQ and VE4XF, all of the Greater Winnipeg area. The Winnipeg DX Club operated Field Day at Falcon Lake, Man., under the call VE4CJ4. The Beaujeour Radio Club was active on a farm near Beaujeour. There were four operators participating and two transmitters installed. Congratulations to VE4JQ and his XYL, VE4SQ, on the birth of their third son. VE4WS again has appeared on 75 meters after quite a long absence. VE4YZ has been silent for the last few years but was heard on 75-meter mobile recently. Our SCM, VE4JY, may be back for the next report. I thank you for your indulgence. It has been a pleasure. Traffic: (June) VE4JA 9, VE4QD 8, VE4SE 6, VE4AM 4, (May) VE4JA 11, VE4QD 8, VE4SE 8.

SASKATCHEWAN—SCM, Jack Robinson, VE5BL—Club stations at Moose Jaw, Saskatoon and Regina were active during the Field Day week end. The QC Club was located at Jackfish Lake and VE5BO.P at Bittern Creek, with VE5DN assisting. In spite of weather conditions the hamfest at Moose Jaw was a very successful event with about 200 registrations. Guest speaker at the banquet was Alex Reid, VE2BE. Hams from the VE4, VE5, VE6, VE7 and K7 districts attended. The Gus Cox Trophy was won by VE5JT. VE5TO took the prize for the best homebrew equipment. VE5YJ had the best mobile and VE5SY the best emergency mobile. VE4EF is the proud holder of the tur-lined buttonhole for the next year. The Art Driver Award went to VE5CU and the CKBI Trophy went to VE5GH. VE7QG came the greatest distance. VE6AJX was the youngest ham and VE5AT the oldest ham. The associate membership award went to VE5CB. VE5JU was reelected SARRL pres.; VE5HQ, vice-pres.; and VE5JW, secy. The 1964 hamfest will be held in Regina.

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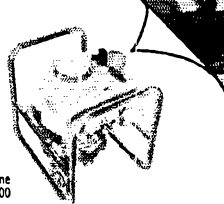
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June V.H.F. Party Summary

(Continued from page 50)

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Santa Clara Valley

- K6QHC 1734-102-17-AB
- WA8LHS 1680-120-14-A
- WA6RRH 1507-137-11-AB
- WA6QQH 320-81-4-AB
- WA6BYA 315-35-9-AB
- WA6VGR 294-42-7-AB
- WN6FESR 292-75-4-B
- WA6MXJ 75-25-3-B
- WA6RFN 75-25-3-B
- WA6UAM 54-27-2-B
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- 3332-196-17-AB

East Bay

- K6ZXS/6 1725-118-15-AB
- W6URD 324-44-7-BC
- WB6APK 306-52-6-AB
- W6KG 93-31-3-B
- WA6VGR/6 33-11-3-B
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San Francisco

- K6VXI 408-51-8-AB
- WA6NDZ 312-39-8-AB
- W6HUR 140-20-7-A
- WA6VGR/6
- 48-12-4-B

- WA6YYM (WA6BS DHA)
- YYM) 152-38-4-AB

Sacramento Valley

- WA6GER 3300-111-20-ABC
- W6GDO 1026-114-9-B
- WA6PAB 895-59-15-A
- K6CFF 320-62-2-B
- W6HBU/6 (8 oprs.)
- 1936-114-16-ABC

San Joaquin Valley

- W6OVR 870-55-15-ABC

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- K4HJE 3344-152-22-AB
- K4PRG/4 2958-135-21-A
- WA4FLU 2545-133-18-AB
- K4YYJ 2079-99-21-ABD
- K4MHS 2064-84-24-ABD
- WA4DYN 938-67-14-AB
- K4QIP 935-85-11-AB
- WA4B3W 694-63-11-AB
- K9KVV/4 464-29-18-A
- W4BUZ 365-73-5-B
- W4MKT 312-51-6-BD
- K4GPI 172-86-2-B
- K4BE 132-66-2-B
- WA4MFG 120-64-2-B
- W4RRK 100-50-2-B
- WA4CCK 98-44-2-B
- WN4MST 80-40-2-B
- WN4KAC 68-34-2-B
- K4QFV 40-20-2-B
- WA4BN0 27-9-3-A
- W4IUX 21-21-1-B
- W4PAR/4 (5 oprs.)
- 11,037-282-39-ABC
- W4GG/4 (8 oprs.)
- 3858-153-25-ABC
- W4FDO/4 (W4S FDO YBN, WA4BRY)
- 1819-107-17-AB
- W4URS/4 (4 oprs.)
- 1540-110-14-AB
- W4ZOF/4 (15 oprs.)
- 1270-105-12-AB
- W4DGF (2 oprs.)
- 441-62-7-B
- WN4JOA (WN4S JOA JVD)
- 104-52-2-B

South Carolina

- W4VIW 3744-117-32-AB
- K4JQY 3618-113-32-AB
- W4TLC 2520-88-28-ABCD
- W4DEN 2350-94-25-AB

Virginia

- K4VWH 12,751-311-41-A
- W4KDH 3039-101-30-AB

- W4T2I 756-62-12-ABD
- WA4GFV 715-55-13-AB
- W43GDT 159-65-2-A
- WA4CLS 12-12-1-B

West Virginia

- K8AXU 3000-28-10-BCD
- K8OEN/8 (6 oprs.)
- 18,495-411-45-AB
- WNFGL (8 oprs.)
- 1898-158-31-A
- WA8FSE (K8QYG, WA8S)
- CTS WXB)
- 3770-128-29-ABC

ROCKY MOUNTAIN DIVISION

Colorado

- K0ZZM 7363-199-37-A
- W0EVZ 1502-77-20-ABD
- K0CLL 572-44-13-AB
- K0MNG 360-36-10-AB
- K0ADT 135-15-9-A
- W0RPT 56-28-2-B
- W0WYZ/0 (5 oprs.)
- 16,412-271-44-ABD
- W0DK/0 (6 oprs.)
- 16,008-314-46-ABCDE

New Mexico

- W5DWB 3630-121-30-A
- K5UNK 3045-105-29-AB
- K5UYF 1176-56-21-AB
- K5KJW 507-39-13-AB
- K5HMN/5 (K5HMN, W5KDT)
- 4408-152-29-AB

Wyoming

- W7VTB 2450-98-25-A
- K9DNW/7 20-5-4-A

SOUTHEASTERN DIVISION

Alabama

- K4PND 4000-125-32-A
- K4SFT 3724-133-28-A
- K4HPR 3536-104-34-AB
- W4DSQ 2392-92-26-AB
- K4WHW 2016-84-24-A
- WA4ONG 312-26-12-A
- WA4GGG 66-11-6-A

Eastern Florida

- W4LIP 16,728-407-41-ABC
- W4HFD 10,374-273-38-A
- K4QOK 3484-134-26-A
- K4NTD 680-40-17-AB
- W4RKC 364-28-13-AB
- K4ZPI 72-32-1-B
- WA4DBX 18-18-1-B

Western Florida

- WA4FJ 13,160-329-40-AB
- K5FUM/4
- 5304-156-34-A
- W4ZGS 3225-129-25-AB

Georgia

- K4SLX 2725-109-25-A
- K4YZE 32-13-4-AB
- W4GIS 33-11-3-B
- W4AJCX/4 (W4WKP, WA4HHP, WN4MKZ)
- 1349-71-19-AB

SOUTHWESTERN DIVISION

Los Angeles

- W6ABN/6
- 4465-127-35-AB
- WA6OZR 1255-115-11-A
- K6HIL 752-188-4-B
- WA6SLF 366-122-3-B
- K6ASK 234-78-3-B
- W6HPH 200-14-8-BDE
- K68SN 168-21-8-AB
- WA6CXB 75-25-3-B
- W6SD/6 (6 oprs.)
- 3096-258-12-AB
- K4RAY/6 (K4RAY, K6RCW)
- 2178-95-22-AC

Arizona

- K7WAZ 1900-100-19-A
- WRNAF/7 352-32-11-A

San Diego

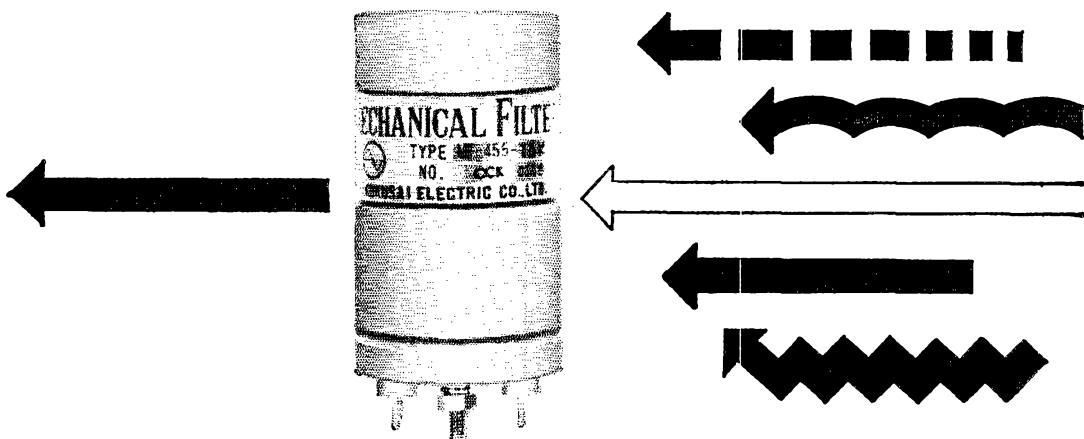
- W6GZK 2907-171-17-A
- WA6NCV 1280-50-18-AB
- K6C0E 1280-126-10-AB
- K6KMJ 75-25-3-B
- WA6WCI 24-12-2-B
- W6RGO/6 (8 oprs.)
- 18,241-598-29-ABCDE

(Continued on page 142)

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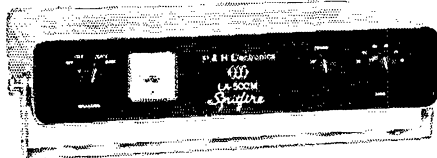


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W5EME 7029-214-33-A
K5CMC 3150-126-25-A
K5IVB 1782- 81-22-A
K5FVH/5 (multitop.)
7740-216-36-AB

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8992-184-38-AB
W5PPE 6930-198-35-AB
K5WQE 5610-165-34-AB
W5FUI 2208- 92-24-AB
WA5FVY 1804- 82-22-AB
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1024- 64-16-AB
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W5BRR 1908- 82-24-A
WA5AUA 1364- 62-22-A
WA5ACF 1190- 70-17-A
W5VY 858- 39-22-A
WA5CB8 680- 40-17-AB
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VE3CRU 3140-157-20-AB
VE3ATB 3125-123-25-ABC
VE3HGA 2900-115-26-A
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VE3DFB/3
306-100- 5-AB
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VE3BYU 365- 7- 5-AB
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EUH EWR)
1530-102-15-AB
VE3BTO (VE3s BTO GWQ)
96- 48- 2-B

Manitoba

VE4MA 5278-182-29-A
VE4GI 1552- 97-16-A
VE4HS 186- 31- 6-A

Alberta

VE6DB 1422- 79-18-A
VE6FF 242- 22-11-A
VE6MC 80- 16- 5-A

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VE7MT 106- 53- 2-B
VE7ASM (5 oprs.)
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VE8BY 68- 11- 6-A

FOREIGN

XE1OE 6336-154-44-AB
XE1CT 406- 29-14-AB

* W3NSI, opr. * W4AWF, opr. * W42IUL, opr. * K1BZB
opr. * W82BHG, opr. * Hq. Staff, not eligible for award.
* W2BVU, opr. * W4WDR, opr.
Check logs: K1ZGH, W1JVL/W1W3ZR WA6VGR.

The World Above 50 Mc.

(Continued from page 74)

gear for the 30,000-Mc. effort at the present time.

Skeds are being kept on 144 Mc. between K0JWN in Harrisonville, Missouri and K8UTY/5 in Miami, Oklahoma. Larry tells us that the skeds have been most fruitful with good reports both ways. A tropo opening on June 7 netted three stations in and near Wichita, Kansas and all were Q5 and S9; and a station in Grand Prairie, Texas was heard in Harrisonville by K0JWN.

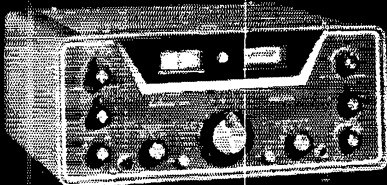
K7ICW in Nevada reports that K6IBY is the first station to contact him on 50, 144 and 220 Mc. Successful contact was held with Joe on 144 Mc. on June 30.

More skeds being kept by Paul, W4HHK who has regular ones with W4HJQ, W5ML, W4RFR and new ones starting with W9WDD. All fairly reliable, sez Paul. He also comments that the majority of the two-meter stations in his area are now using s.s.b. One of the few reports we've had on 144-Mc. activity being less than usual is the one from Neal, K3MIW. He reports that activity on 144 Mc. has dropped a good bit recently. Neal is hoping to be on 432 Mc. in the near future but is having converter problems at the moment. However, his 16-element array for that band is now ready and eager to be used. One of the many reporting 144-Mc. activity on the increase is K9DAF in Appleton, Wisconsin. Bob reports a good westerly band opening on the night of June 30 which began before 2200 CST and lasted three hours. During this period a number of Minnesota stations were heard but contact was made with WA0DFY only.

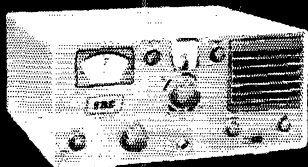
W8ZGW in Michigan also reports good band conditions on two meters several times during the

(Continued on page 144)

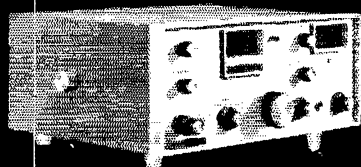
HALLICRAFTERS SR-150



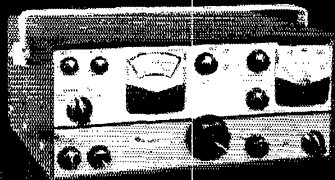
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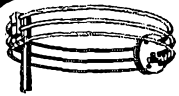
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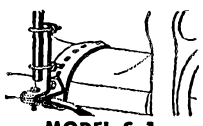
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144-Mc. Transatlantic Tests

Plans for the 144-Mc. tests mentioned in August QST are as follows: The call will be EI4R/P, the frequency 144.22 Mc. Liaison will be handled by EI4AD on 14.18, A3, and 14.08, A1. Tests will begin Sept. 7. Correspondence regarding the tests is being handled by F15AJ.

Latest information will be transmitted over W1AW during regular evening bulletin periods just prior to the tests.

month of June although he only worked to a distance of about 250 miles. Jack Woodruff, W8PT, agrees with Ed about conditions although he could work a distance of 350 miles quite frequently. "Dozens of stations worked, but no real DX," sez Jack. Another 432-Mc. "sked keeper", Jack is presently holding skeds on this band with seven different 8s and 9s. Anyone else interested get in touch with W8PT.

S.s.b. seems to be the answer in Tennessee, too. W4LOJ in Jackson sez that during June he worked eleven Tennessee stations, all on s.s.b. Jim also worked W4MNT in Orlando, Florida and W5UKQ in Baton Rouge, Louisiana on c.w. Beginning to sound like the 50-Mc. portion of this column, but K3OBU in Wilmington, Delaware reports two-meter openings on June 1 and 2, 19 and 24 and July 1. During these openings Joe worked Rhode Island and Massachusetts for "two new ones" on 144 Mc. New transmitter at K3OBU (on 144 Mc.) runs 65 watts on a.m. and 80 watts c.w. All reports say it sounds good. In New York City the June 1-2 opening was also observed by WA2VKK who heard K1PLR, W1BU, W1AJR and also heard K2IEJ working W8KAY. Up in Portland, Maine, K1RSA sez, "two meters is heavily populated now with activity about doubled in one year and QRM sometimes a problem! I'm thinking of moving to 220 Mc. I understand it is quieter there." You'll never know 'til you try, Harry. Certainly the gang down this way would like to have you move to 220 Mc. (The 220-Mc. gang, that is.) Harry also comments that the band looks better as the summer progresses with openings so far to VE1 and W2 lands.

This month our DX correspondent for 144 Mc. turns out to be Don Baillie, VE7BBA who reports: "wanted to let you know that on June 8 at 8:00 p.m., PST. I worked W7ICS on Oregon who was operating portable from Mary's Peak (4,000 feet.), and using a Gonset. I was running 100 watts input to a 5894. Using a ten-element beam and a W2AZL-style converter. This makes about 400 miles airline from W7ICS to VE7BBA. Also worked about a dozen 7s in Washington on the same night." Nice going, Don! Glad you let us know.

50 Mc.

Out in South Dakota where 50-Mc. activity is slowly growing, K0FKJ tells us that he got the 829B going on 50 Mc. just in time to make a few contacts with it before the June contest. Ray sez that the band was open for him every day during the month except June 8 (of course). However, the 9th was much better with the opening starting to the south and southwest of him and slowly working around to the northeast. More stations in this hard-to-get state now operating on six meters are: K0YWP, K0PAT and K0CER, all in Sioux Falls. K0JWN decided to change his operating habits a bit and has been operating c.w. on six. Located in Harrison-

(Continued on page 146)



TERRY
W9DIA

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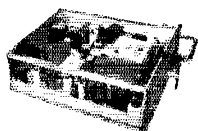
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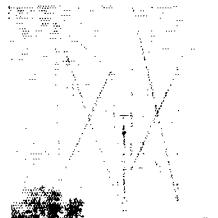
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ville, Missouri, Larry has worked both coasts via this mode. Sixteen states heard at his QTH during June.

In Columbia, Missouri W0HHG heard all states except Kentucky, Oklahoma, Hawaii and Alaska during the month; and he worked four new states. Charlie noted openings on a number of days including both days of the VHF Contest. Among other projects, he is working on a d.s.b. rig for 50 Mc. and hopes to be on the air with it soon. Twenty-five was the lucky number for WA0FLL in Kansas City; that's the number of states worked and heard during the month. Bob is looking for info on a quad for six meters, so if any of you have any dope please get in touch with him. One of the Missouri stations that probably wishes we were still "48" is K0JJ/0 who has worked all forty-eight this spring and early summer. Wichita, Kansas, Dot, K0GIC heard fourteen states during this month of openings; and in Iowa, W0BMN sez the band was open almost every day to South Dakota, Minnesota, Colorado and Wyoming. (Doesn't he know that those states are "hard to get?") In Iowa City Bob, WA0NZ, noted that the band seemed to open up near the end of the month, especially on June 24 and 25 when stations in North and South Carolina and New York were heard. Bob reports that there are now about five stations (locals) on 52.25 fm.

W9JOT, K9HBT, K9FPM and others in Wisconsin all send good reports for 50-Mc. skip during June. Phil (W9JOT) sez conditions were good to all parts of the U.S. and KP4 land; Randy (K9HBT) sez he worked W7DXN in Oregon for State number 47 (we're pullin' fer ya!), and also reports aurora on June 6 and 18, and sporadic E on nineteen days. K9FPM in Beloit sez six is in very good shape and adds H18 to "new things heard". Ron has been working with mobile antennas on 50 Mc. and has this to say: "I have two antennas for mobile work — a halo and a six meter whip. On groundwave the halo is best for distance and signal strength, but on sporadic E the whip has the edge over the halo even though I get more noise." Bob Zuelsdorf in Madison heard VP7CX and KP4s during the skip session of June 15 and on 26 worked H18XIL and heard a number of KP4s.

Reports from Illinois measure up to those already reported: skip to all call areas in the U.S. plus VE4GL. At Peoria, Stan, K9JSB received confirmation of his Oregon contact and this brings him up to 48 States confirmed (Oh that Alaska and Hawaii!).

The openings have become almost a set pattern for Phil, WA9EJA in Clinton, Illinois. He reports that since the middle of June he turns his beam to the northeast around 0900 CDT and works into the New England states. As the morning and day progress the openings move from northeast to southeast and then to the southwest. The month proved to be a most interesting one for WA9CWZ and started on the first with a contact into California. Aurora was heard on the 7th but no luck; however during the contest Bill worked his first VE4 and added five new states to his total. On June 9 he worked every section (except Mississippi) from New Mexico along the Gulf coast and up the east coast to Maine. In fact twenty-three states were heard during the contest at Bill's QTH.

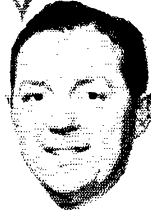
Reports from Michigan via W8HFA, W8EIQ and W8MBH all state practically the same thing: "band open almost every day during June." Zanesville, Ohio and WA8AMK worked first California station on June 27, and first Washington and

(Continued on page 148)

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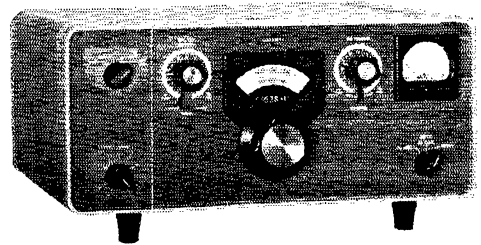
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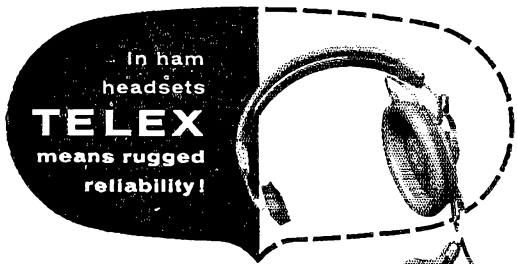
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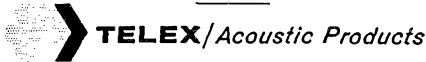
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VE4 on the 9th. Lou also heard COs and FG7 on June 30. Another Ohio station to work a 6 was K8REG who worked WA6MIC/7 in Boise, Idaho. This made State #48 for Vince. Oh, for Hawaii and Alaska! Or did I say that before? Transplanted Buckeye W8NAF/7 in Scottsdale, Arizona loves Scottsdale and sez he just happened to buy a home and property which included a 60-foot tower plus a CDR rotator plus a large beam. The third ham to live at that QTH. (Hm-m-m, must be a good location.) From this location Ev has worked 34 states since May 16 and says that we can look for s.s.b. stations K7JTG, K7JUE, K7OED, W7RUX and W8NAF/7.

In Tacoma, Washington, K7BBO heard and worked all call areas except the first during the month, plus VE4, 5, 6, and 7. And in Burlington K7MQE reports stations in his area working Utah and Wyoming among others. W7ADR in Portland, Oregon wonders if anyone has worked 48 states during the past few years. (Think we've mentioned at least three stations who have recently made it in the foregoing part of the column.) Miles has heard everything except New England, Minnesota and Wisconsin so far this season. He sez that double hop has been in evidence less than last year and last year was less than '61. (Nice to hear from Oregon, Miles.)

K7ICW in Nevada observed openings on 15 days during which time he heard or worked 35 states plus KP4, VP7, XE1, VE6 and VE7. At his new QTH in Fortuna, California, W6YKS/6 sez there is no local 50-Mc. activity and he would like to keep skeds with any local (?) interested in working groundwave. John's frequency is 50.040 and 50.160. Anyone interested can get in touch with him thus: John Lee, W6YKS/6, 1476 Christian Ridge Road, Fortuna, California.

K6VXI, K6SPP and W6IEY all report from California: K6VXI worked South Dakota for a new state; K6SPP either heard or worked (among others) Alaska, Hawaii and Puerto Rico; W6IEY reports openings on all but six days of the month of June. W4GVQ in Virginia puts it quite well when he sez: "It used to be that an opening just isn't expected." Dave comments that the south, southwest and mid-west are coming through into Virginia most consistently, and that on June 1 W6KD was banging into that area with other 6s and 7s bouncing in on occasion.

First report from Pennsylvania this month was from Jean and Jim, K3OAU and K3JFL. Jean sez: "being a newcomer to six meters I am thrilled with the openings since May 2, but I think the biggest surprise was working Michigan on Aurora." To date this pair have worked twenty-eight states and two foreign countries. In Lebanon K3QCQ mentions that his states total now numbers twenty-five. Bill would like to sked stations in R. I., Mass., Ver-

(Continued on page 150)

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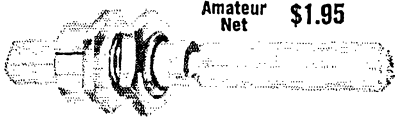
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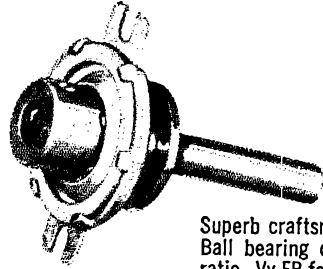
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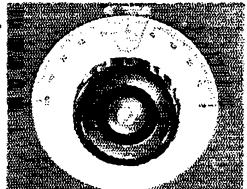
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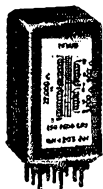
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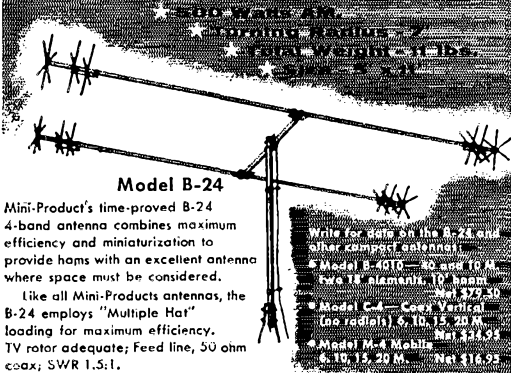
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mont, New Hampshire and Delaware; c.w. operating frequency is 50.004. K3IPM was the first station in the third call area to work H18XHL. In Maryland K3PRN worked ten states during his "skip listening periods"; K3LLR mentions that some of the gang claims to have worked all "48" on Field Day, and W3GCO sez that during the contest WA8DFA in Georgetown, Ohio was heard working southern sections (approx. 425 miles from Wash., D.C.). "We surely would have worked him if he had pointed his beam our way although there was considerable QSB on his signal." K3KEO in Delaware reports working 33 states 2-way S.S.B. since January 1 of this year. Sam says that 50 Mc. has been open for him to all districts plus VE1, VE3, VE4, VP7, VP9, FG7, CO2 and XE1 during June.

June was good to Doc, K4PZT, who worked twenty-one states plus VE4MA, KP4BEO, CO5CN, and CO2DL. Another station in Knoxville, K4KYL sends us a detailed report of his activities for the month but too much to set forth here. However Jim sez that during the past six weeks (middle of May to end of June) he has heard every state on the mainland plus VE1, 2, 3, 4, VP5, VP7, VP9, XE, CO, FG7 and KP4. In Memphis WA4IRX noted openings on eleven days of the month and heard eight states plus VP7CX and VE2BEW.

K4WOD and K4YYJ report from North Carolina; K4WOD sez that six-meter activity has not increased as expected for the summer months although numerous openings have been observed. K4YYJ sez the 50-Mc. band is open at some time every day.

"In my opinion there have been more band openings than last year but fewer good ones" sez WA4CQG. Besides hearing all call areas Dale has heard VE2, 3, 4, VP7, KP4, CO2, FG7 and XE1. At Fort Walton Beach, Florida W4ZGS has only good things to say of six meters for the past month. Til sez that on June 4 and 5 he heard no DX in the late afternoon and evening; on June 7 he feels he must have had a bug of some kind 'cause he didn't even turn the rig on; June 15 and 16 he was too involved with other things to get on the air (huh?!), but on all other days of the month the band was open to any and all areas. Another Floridian, WA4GDC confirms Til's report on conditions but adds the openings on June 4 and 5, 7, 15 and 16. On these particular 5 days that Til missed Kris heard or worked 14 states and Puerto Rico. Along with working "skip" and the June Contest, WA4FIJ has completed his 6-meter s.s.b. exciter, a heterodyne unit using the main station rig as s.s.b. generator and sez it is working out fb with a 2E26 in the final. Dick has worked out a linear using the Seneca as the basic rig and it is really putting out a signal. He'll be heard on either a.m. or s.s.b. in the future. Matching 2-meter s.s.b. rig is now "in the works".

The score at Destin, Florida (WA4EVU) was upped when Doug worked K7HRW and K7ILB in Nevada for a new state during one of the many openings. WA4BMC (Big Mike) sends in her day to day record of "skip" worked and apparently the big one for her was VE2BEW on June 25. K4SFH reports twenty good days of openings into Mobile, Alabama; Paul sez all call areas heard there except Alaska and Hawaii.

A few comments from New York: WA2ZXR sez: "band openings were numerous, DXing excellent." WA2VOK: "skip has been predominant during June, with skip coming in every day during the last two weeks of the month." WA2TFY: "been open daily down to Florida and up to Maine." WA2TQT: "groundwave conditions were excellent on June 2,

(Continued on page 162)

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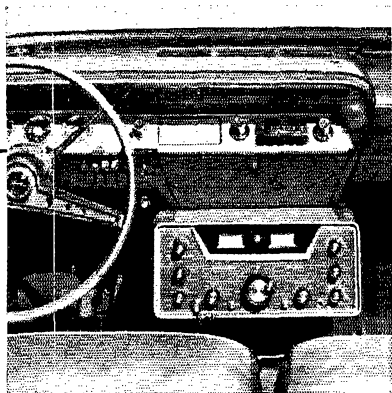
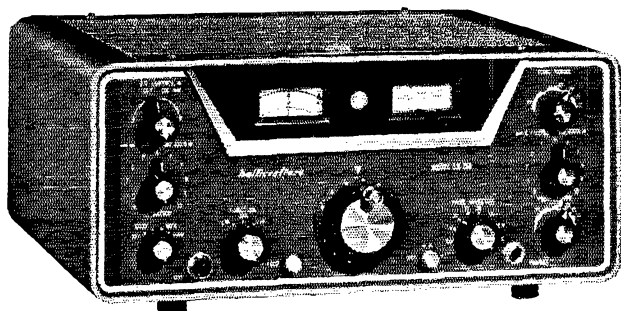
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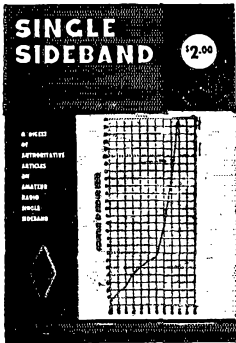
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3-10, 13-20." W2SEU: "six has been hopping, with openings nearly every day starting with 4s then shifting to 0- and 9-lands. Noted on June 30 that VE1GC/1 and Cuba were both coming in at the same time." WA2RAQ: "six meters open almost every day. Noticed that groundwave contacts have not been as good or as consistent as during this same period last year." WA2DRP: "Usual band openings observed at this QTH. On June 29 heard K1RMI/1 in Vermont working Cuba." And — in Needham, Massachusetts K1UPJ sez that although "skip was relatively low during June, when it was in it was of good distance." Bruce heard approximately ten states. K9AAJ sez: "big news is the opening during the v.h.f. contest — best opening ever heard on this band from this part of the country. Open every day for two months. My only DX, KP4AST.

Two stations completing their 50-Mc. WAS (50 states) within the past few months are W7DYD-#81, and K6ZEE-#82.

Just a bit of information concerning a couple of DXpeditions which have returned to home base. For those who wish to QSL Hal, HISXHL, please send your QSLs care of Edward Jensen, W9ZDI, 5221 S. 104th St., Hales Corners, Wisconsin. QSLs for Hal, FP8CG, go in care of Harold Tingey, W1DDF, 16 Gill Road, Watertown 72, Mass. Both of these boys would greatly appreciate s.a.s.e. along with your QSL. QST

How's DX?

(Continued from page 82)

and 0300, the 16th. Western Pennsylvania DX Society members will concentrate on rolling up overseas QSOs. DX ops are invited to check with W3CJY for information on WPDXS's "Hearts & Diamonds" certification.

K9GVA understands that the large c.w. signal of YN3KM on 40's low edge is caused by a mere 20-watter.

W7DJU finds the lower kilocycles on 40 entirely too cluttered by broad RTTY signals when DX is peeping through. We've noticed generally that U. S. beedle-beedles usually busy themselves higher in the band, possibly realizing that the overseas DX slot on 40 is narrow and jammed enough as it is.

WA6MIN makes his own sunspot counts with a filtered 80-power telescope. He declares, "When the spots move beyond the sun horizon, DX drops off accordingly. I can spot good DX conditions coming up, and I find there are usually about ten favorable DX days per month at present."

The FG7XLS make a well-balanced DX team. K2YFE hears that Jean Pierre prefers single-sideband while Monique sticks to a.m. and c.w. Their Valiant II and HQ-170 are responsible for plenty of Guadeloupe DXCC credits far and wide.

"Sure wish DXpeditions would use more c.w.," opines K9CZY, "but I guess they can't please everyone."

K2PHC will be gunning for DX from Vermont as K1FUU this month on 20, 15 and 10 c.w.

W9NLJ: VE1 intends to make P.E.I. very available September 24th-30th, using mostly c.w. on 3542, 7042 and 14,012 kc., and this should interest many a WAVE hunter. Pete also will have sideband gear along.

NCDXC's brass lineup now lists K6OHJ, pres.; W6JWD, v.p.; and incumbent W6CBE, secy.-treas. The late Horace Greer's famous W6TT call rides again when W6WX transmits periodic bulletins of DX interest on 14,002 kc.

K2UCV gives W2DGW a hand with NEDXA's *DX Bulletin* while John is tied up with a heavy work schedule and new QTH.

DXCPR'S *DXer* gives a left-handed salute to the YV4 who recently called a 20-meter CQ and signed his call sixteen times. "The effectiveness and desirability of short calls cannot be overemphasized," K9EAB. Wa 5NXP and 7NNF recently collected DXCPR operating awards. Check with DX Club of Puerto Rico, P.O. Box 10525, Caparra Heights, P.R., for the full group on 8X8X8, All-P.R. and E.W. Mayer (KP4KD) Memorial certifications.

Carriacou, largest of the Grenadines, saw VP2CC/rack up some 1600 sideband QSOs, 400 in response to c.w. callers, in early July. This island is close to the spot where VP2VB/mm piled up a *Yasme* some years ago.

Ten Years Ago In "How's DX?" — Pipeline O'Droole, believe it or not, makes DXCC without a receiver in September, 1953.

Pretty good summertime stuff on 20 phone is reported: AC4AC, CR6SP, FL8BC, FQ8AR, KG6IC, KS6AB, M1B, OE13BR, CR4D, VK1HM, VR4AE, VS2s BS DL DY CW, YA6XY and ZC23MWW. The 14-Mc.

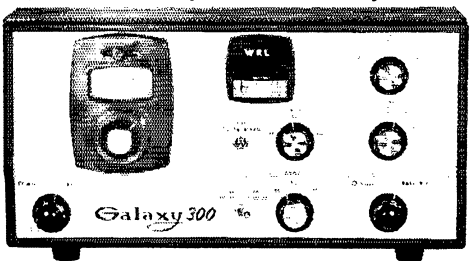
(Continued on page 153)

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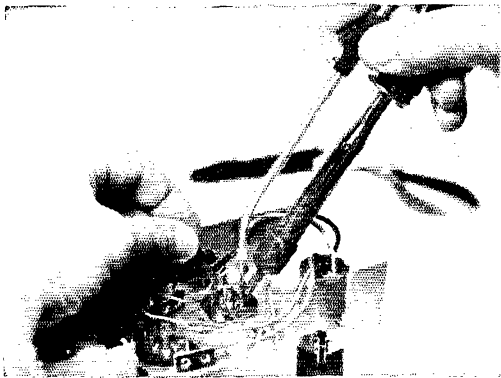
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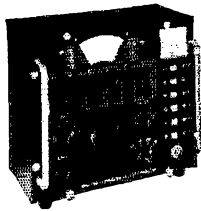
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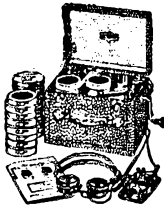
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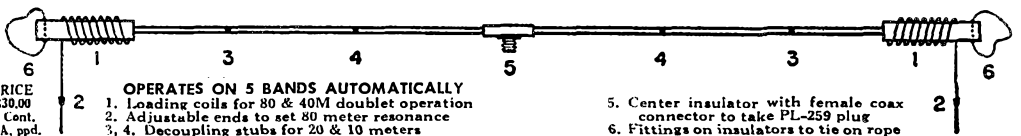
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c.w. crop is choice, too, led by AC4NC, C3BF, CRs 5AA 10AB, FK88AA, PU8AC, HE9LAA, KA0JJ, AIF2AG, NI3LK, OQ5GU, TA3AA, UG6KAA, VK1BA, VSs 2CP 2DF 7MC, YI2AM, ZCk 3AC 6OR, 984s AZ and BS
Forty c.w. is fine for FK8AN, KW6BB, OQ0UJ, UI8KAA, VS2CC, WSTUX/KJ6 and YA3FOV, while 7-Mc. phone followers mention DU9BL, KW6BI and PJ2CE Fifteen phone turns up CR4AI, EA9AR, YI3WH and ZD9AA. Code merchants on 21 Mc., including a few ambitious Novices, deal with FF8AG, TA2EFA and VU2ET Some odds and ends: HSIWR is all set to work Ws when the ban is lifted there. . . . ZL3JA threatens Tokelaus DX developments. . . . W7PGX (c.w.) and W6DI (phone) top U.S.A. scorers in the 1952 VK/ZL Test. VE7AIH led Canada in both categories. . . . East German DMs are said to be ready for action. . . . W9s KA and NN work up a W9-DXCC get-together. . . . CE8AA (CE3AG) pulled off a huge Easter Island DX contest in mid-August. **QST**

The Moonbounce Problem

(Continued from page 22)

These figures show, among other things, that the initial 1206-Mc. moonbounce, with an 18-foot dish (35 db.) and 300 watts of transmitter power, was both a technical triumph and an operating feat. It is also clear that the higher frequencies are the logical choice for both commercial and amateur work of this type.

As Soifer⁷ recently noted, the basic problem is to obtain adequate signal-to-noise ratio, and the graphs presented here should help the equipment- and antenna-oriented amateur get a feel for the moonbounce problem. It should be remembered, however, that marginal systems give marginal results (if any at all), and that these numbers should be used conservatively if reliable communication is the goal. **QST**

⁷ Soifer, "Space Communication and the Amateur" QST, November, 1961.

Intermodulation Distortion

(Continued from page 67)

amplifier service show a decided improvement in IM distortion figures. Fig. 11 shows typical IM values for the 4CX3000A. Depending upon the value of resting plate current, the 4CX3000A is capable of delivering a p.e.p. output of 5.5 kilowatts with 3rd intermodulation products as low as -36 db. or more below the signal level. With the addition of ten or fifteen decibels of feedback, the construction of a high-power, high-quality linear amplifier having IM products in the region of -50 db. below the signal level becomes a reality.

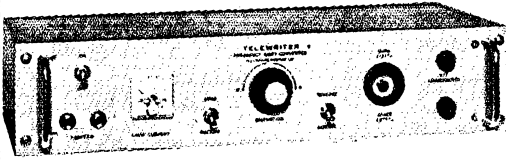
Conclusion

The idealized vacuum tube is a 3/2-power-law device, and theoretically is incapable of low intermodulation distortion, except for low-efficiency class-A operation. By careful design of tube parameters aimed to remove the tube from this style (Continued on page 166)

by hams...
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Harvey is reliability

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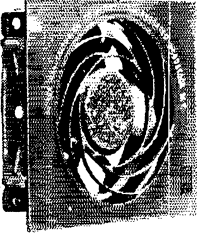
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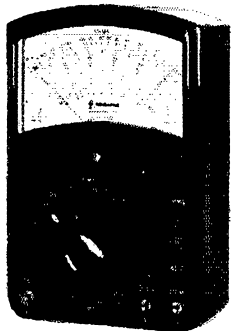
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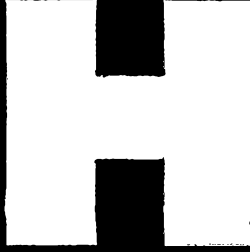
Ranges — DC Voltages: 0 - 2.5 - 10 - 50 - 250 - 500 - 5,000 Volts (20,000 ohms per volt) . . . AC Voltages: 0 - 10 - 50 - 250 - 500 - 1,000 Volts (10,000 ohms per volt) . . . DC Current: 0-0.05 - 5 - 50 - 500 ma . . . Resistance: 0 - 12K - 120K - 1.2M - 12M ohms (60 - 600 - 6K - 60K midscale) . . . Decibels: -20 to +62 db. Amateur Net.....\$14.95

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of operation, a considerable improvement in linearity is possible. Even so, the circuit designer must follow the tube manufacturer's recommended operating conditions closely (voltages, loading, etc.) to achieve optimum performance, as these recommendations are usually based on exhaustive tests. Most of us, unfortunately, simply do not have comparable test setups to allow us to know what improvement or (more likely!) degradation will take place when operating conditions begin to wander, or when a desire to "push the tube to the limit" overcomes common sense.

As the state of the art advances, more and better tubes — designed for linear amplifier service — will appear on the market, making the equipment manufacturer's job an easier one, and helping the equipment operator to have a high-quality, low-distortion signal on the air. **QST**

Acknowledgements: Grateful thanks to the following amateurs who offered helpful criticism and suggestions during the preparation of this article: Bob Morwood, K6GJF; Bob Sutherland, W6T OV; Ray Rinando, W6KEV; Bill Foote, K6BCM; Bill McAulay, W6KM; all of Eitel-McCullough, Inc., and Don Norgaard, W6VMH, of Hewlett-Packard Co.

Correspondence From Members

(Continued from page 85)

proving operating conditions and weeding out those individuals who either cannot, or will not, distinguish the woods from the trees. — *Johnson County (Kansas) Radio Amateur's Club.*

☐ . . . Those howling about the added effort needed to gain the higher class are all too content to join that sliding group of amateurs. If we maintain the present trend of licenses we will be another CB band . . . — *W12DJJ.*

☐ Without the League ham radio wouldn't be the same. I am in favor of incentive licensing. I received my General license at age 13 (two years ago) and truly believe that anyone who tried could meet further qualifications. — *W4BNB.*

Technical Correspondence

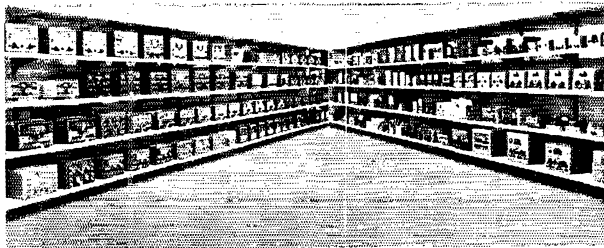
(Continued from page 75)

frequencies, and at least some rejection of signals outside the ham bands. With both of the schemes mentioned above, the level of the nonamateur signals at the receiver input is increased as well as the amateur band signals. This can result in problems in two areas: reduced image rejection (due to the use of components which amplify rather than reject the image frequency), and increased susceptibility of the receiver to overloading from strong non-amateur signals.

Another problem which could arise due to the broadband characteristics of the log-periodic antenna is that of efficient radiation of undesired transmitter outputs. These outputs might be undesired multiplication products in the usual a.m./c.w. v.h.f. transmitter, or undesired heterodyne products with v.h.f. s.s.b. rigs. In either case, the antenna would give excellent gain rather than attenuation (as would be the case with a Yagi-Uda antenna) at some of the frequencies at which undesired outputs occur. This obviously increases the

(Continued on page 168)

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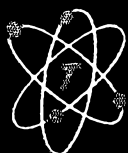
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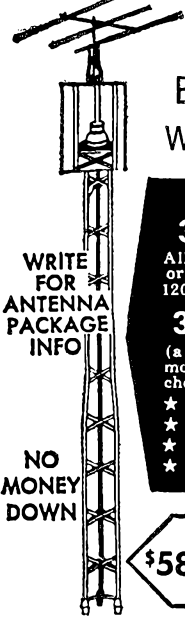
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possibility of the amateur interfering with the high TV channels and other v.h.f. radio services.

Both authors are to be congratulated for their work along the lines which they have followed. However, the techniques which they describe are much more valuable to commercial and military users than to amateurs.

As for amateurs, unless we make the change to a completely new mode of communication, such as that outlined by Mr. J. P. Costas in his article, "Poissin, Shannon and the Radio Amateur," in the *Proceedings of the Institute of Radio Engineers*, vol. 47, December, 1959, pp. 2058-2068 (and that is unlikely, since we can't even get some hams to accept single sideband), we have no choice but to follow the funnel to progressively narrower bandwidths, in antenna and receiver front-end design as well as i.f. amplifiers, in order to make the most efficient use of our stations and frequencies.

— Al Brogdon, K3KMO/DJ0HZ, P.O. Box 60, State College, Penna.

Armed Forces Day

(Continued from page 69)

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(Continued on page 160)

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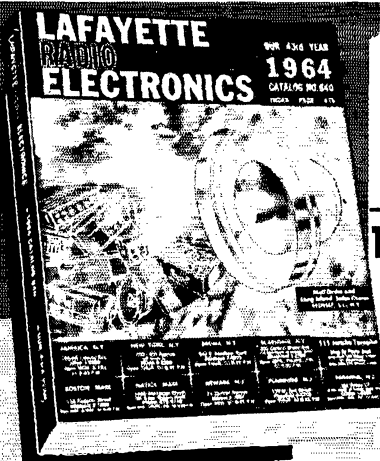
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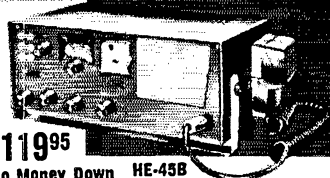
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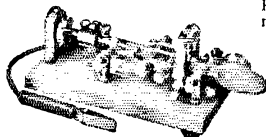
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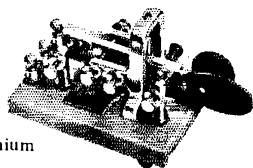


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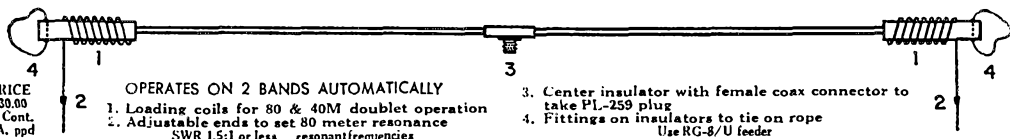
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(Continued on page 162)

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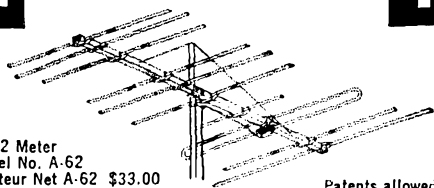
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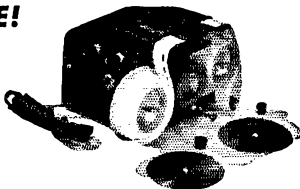
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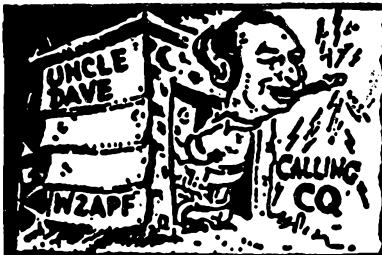
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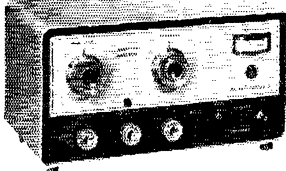
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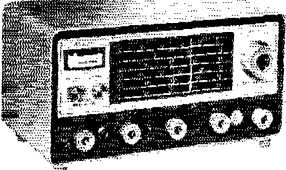
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- K4MKO, K4MKQ, W4NTK, W4NZY, A4HOHL,
- W4OSC, K4PAN, K4QLH, W4RDE, W4RHZ,
- W4RWM, K4TGZ, K4TKU, W4TQD, W4UFP,
- W4ULM, K4UMK, W4UNA, W4USA, W4VEY,
- W4VHX, W4VUE, K4VYX, W4WQQ, W4YFG,
- K4YTB, K4ZSX, W4ZZV, K4ZVQ, W5AJG,
- W5ANH, W5BHO, K5BQA, K5BTZ, K5CIL,
- W5DDK, K5DNH, W5EDZ, W5DMM, W5EUT,
- W5FCP, W5FHW, W5HCS, AF5HXW, K5JIC,
- W5LDU, K5LEP, K5LFS, W5LHX, K5MBB,
- K5OMQ, W5QJD, K5RAV, K5RDP, K5SGX,
- W5SQB, W5TBV, KN5UWE, K5UY, K5VHM,
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- A6GCG, W6GEB, W6GGC, WA6GHC, K6GNT,
- W6GYH, K6GZ, W6HKB, W6HTS, K6HWL,
- W6HNQ, K6IBE, K6ITY, K6JDN, W6JDN,
- W6JOX, WA6JSA, K6JWS, WA6JXW, K6KFF,
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- WA6MQL, WA6MRK, W6MTJ, K6NIYH,
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- W6OWP, K6OWQ, WA6OXR, A6PDD, WA6PDQ,
- WA6PLV, W6PRY, W6PSW, W6QID, W6QKN,
- K6QKY, K6QMJ, K6QQV, K6RBB, W6RGG,
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- WA8GWK, W8HPR, K8HTS, W8IMK, W8IND/2,
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- W8LGL, K8LXJ, W8MGG, W8MTI, K8MYF,
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- W8QWE, K8RJI, K8SOE, W8SWC, K8SXE,
- W8TV, WA8TZO, W8VMP, K8WNE, K8YCO,
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- W8ZCK, W8ZEP, W8ZYW, W9BAJ, K9BRL,
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(Continued on page 166)

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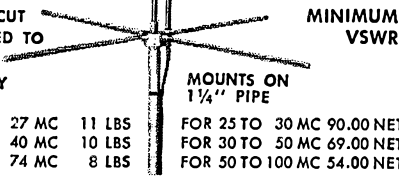
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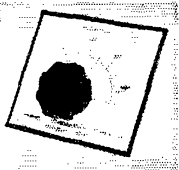
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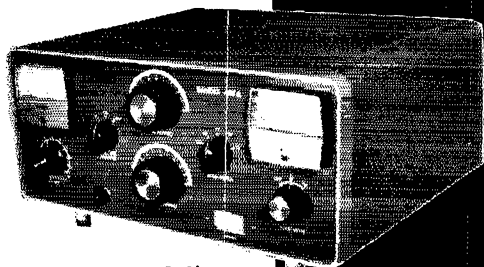
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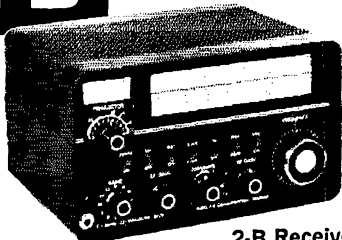
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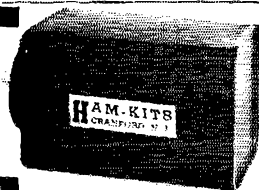
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52 ohm, non-reactive
film oxide R.F. unit. All
band, SWR 1.2 to 1.

Kit \$7.95 postpaid.
Wired, add \$2

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stains from all metal surfaces
for good electrical contact

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FybRglass Refills, pkg. of 2 — 25¢

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W9TVN, K9UHR, W9UMJ, W9WBE, W9WKM,
W9WMR, W9ZGC, W9AJL, N9AQJ, N9ATZ,
W9AUS, WA0BBA, WA0BDZ, W9BHA, K0CGP,
W0CHV, K0CZO, W0DEL, W0EKJ, W0FAH,
K0FLK, K0GXL, W0HAH, AFA0ILC, K0IEB,
W0HVA, W0HVY, K0HZO, K0IQR, W0JHY,
W0JQQ, W0KIS, W0LFH, W0LQV, K0MAL,
W0OKH, K0ONK, K0OYI, K0PHD, N0RQR,
W0RWG, W0RWH, W0TUH, W0UMG, W0WWN,
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Plans for 1964 were underway before this year's
contest ended. Mark your calendar for 16 May 1964
and join the Fifteenth Armed Forces Day com-
munications tests. RST

Seventy-Three

(Continued from page 51)

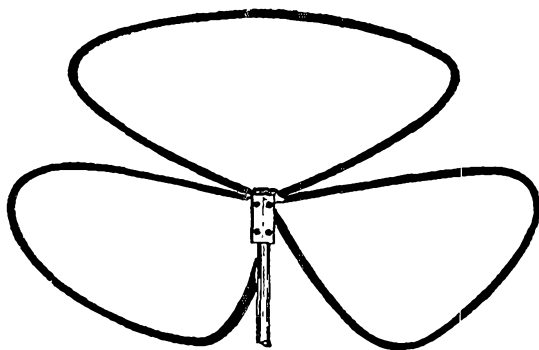
ways, one listing as: "my compliments to you;"
but in the glossary of abbreviations it is merely
"compliments." Theodore A. Edison's *Telegra-
phy Self-Taught*, shows a return to "accept my
compliments." By 1908, however, a later edition
of the Dodge Manual gives us today's definition
of "Best Regards," with a backward look at the
older meaning in another part of the work where
it also lists it as "compliments."

"Best regards" has remained ever since as the
put-it-down-in-black-and-white meaning of 73,
but I doubt if any of us think of it in that cut-
and-dried way. Today, we amateurs use it more
in the manner that James Reid had intended that
it be used. From our keys we roll that rhythmic
pair of numerals, or say it in our favorite phone
type of emission, as an indefinable expression of
friendship, the sign of fraternalism probably
more familiar, and more used, than anything else
except "CQ."

Nobody loves a "legend-smasher" unless he
can present a story more interesting than the one
that he is exploding. But where in all the many
theories for which "They" is credited, can we find
one that can touch the the "hearts and flowers"
meaning back in 1857?

"My love to you," "Compliments," "Best Re-
gards," or the fraternity handshake — take your

360° GAIN



The **AMAZING BIG WHEEL** offers substantial gain over a halo in both single and stacked models. Plus 360 degrees horizontally polarized coverage.

NEW — Low prices: 2 Meter — ABW-144 \$10.95,
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NEW — Improved materials and construction.

NEW — Add on stacking kits

See your distributor or write for free facts on a fantastic antenna system.

**Cush
Craft**

521 HAYWARD ST. • MANCHESTER, N. H.

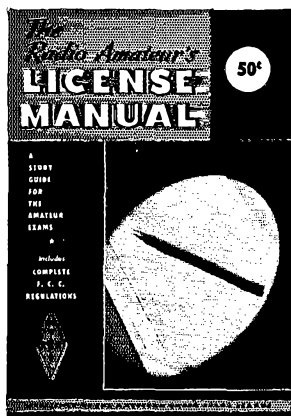
\$64 QUESTIONS?

- Q.** On what frequencies and under what conditions may amateur maritime mobile stations operate?
- Q.** Is a photocopy of an amateur station license valid during mobile operation?
- Q.** How do U.S. amateurs obtain authorization to operate in Canada?
- Q.** Under what conditions may applicants for amateur licenses take examinations by mail?

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Attractive black and gold ARRL emblem decals are available to League members from Headquarters. They measure approximately 4 by 2 inches, will adhere to almost any surface, metal, glass, wood, plastic, and come complete with directions for applying. Use them to dress up your car, station equipment and shack. They're supplied at 10 cents each — no stamps, please — to cover costs.

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931 No. Euclid Ave., Anaheim, Calif.

choice, but please lay that rifle down, and leave the lumber camps to Paul Bunyan.

AUTHOR'S NOTE: I still wonder if I *have* found the origin? I wonder if, maybe, Napoleon didn't send it to Josephine via the Chappe Semaphore. After all, the Chappe system was numerals you know. Perhaps, it was shouted from tower to tower via the lung telegraph from Caesar's camp in Gaul to Rome. Maybe it was banded out on the drums of the jungle — "Tarzan loves Jane — 73" — Who knows? Well, I shall keep on looking, anyhow. QST

Fun as a Technician

(Continued from page 76)

run coax or open-wire line from their mountain-top antennas to homes in the valley. One of the better systems connects 800 houses. The high channels are converted to low channels at the antenna so they will carry better through the transmission lines. What does that mean to the ham? No r.f. in any channel. We operate on six meters and channel 13 is converted to channel 2. So far, our TVI has been minimized by Drake high-pass filters supplied by the TV set manufacturers. Of course, our transmitters had to be clean, but that's not a hard job for a technician.

Our next goal was to work 300 miles on six meters, consistently. We knew we couldn't work that far from our home QTHs every day, so we decided to follow the example of the TV systems. We went to the mountain top. We found a desirable location on one of the higher mountains, 3360 feet high. We approached the owner, told him our story, asked his permission to use a small plot of land and were very pleasantly surprised when he said we could lease the land — for a dollar a year.

We operated from that location for some months with a portable antenna and rig and had no trouble working out 200 miles on six meters.

We made plans over our coffee cups to build a small, inexpensive shack on the site. We built a six-meter transmitter from *Handbook* plans (using a 5763-5763-6146 lineup). We decided to use an old Navy regenerative receiver as a tunable i.f. for a nuvistor converter, which was also built from *Handbook* plans. The modulator uses a pair of 807s in Class AB₁ service.

We rounded up some junked TV antennas and built them into two beams: six elements for six meters and ten for two. We stacked them on a mast which is supported by a convenient tree (see pictures).

We built a small shack and furnished it with old chairs and an older stove. Total cost: \$150.92.

Now, every Saturday evening we load up with food and head for the mountain. We build a fire in the stove and spend our time eating hot dogs, drinking coffee, and working six meters.

Results on the air have been gratifying, too.

new issue just out!

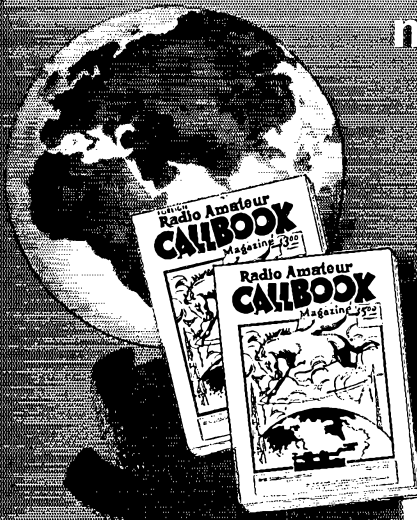
the radio amateur

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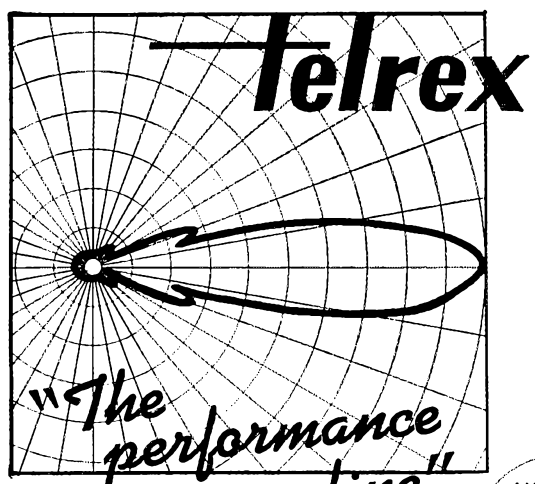
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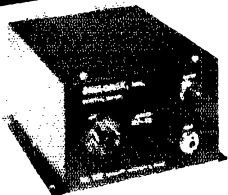
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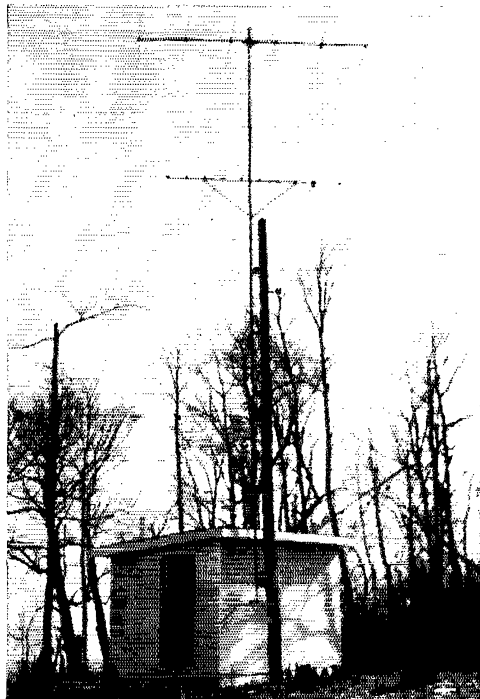
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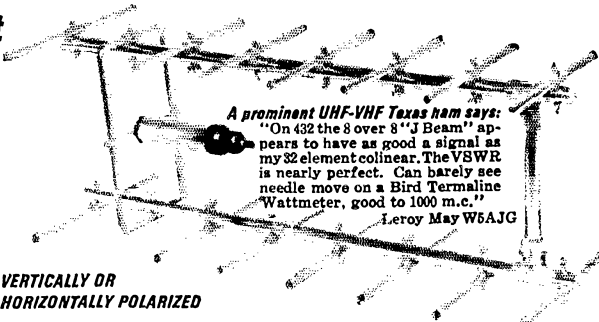
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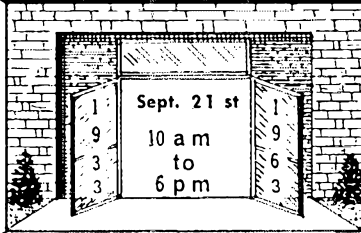
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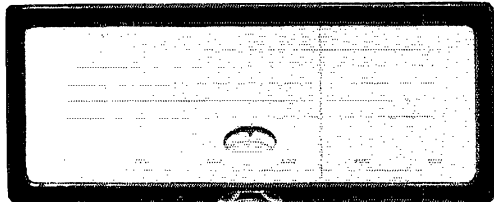
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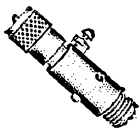
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W5, K5 — Brad A. Beard, W5ADZ, P.O. Box 25172, Houston 5, Texas.

W6, K6 — San Diego DX Club, Box 6029, San Diego 5, Calif.

W7, K7 — Salem Amateur Radio Club, P.O. Box 61, Salem, Oregon.

W8, K8 — Walter E. Musgrave, W8NGW, 1245 E. 187th St., Cleveland 10, Ohio.

W9, K9 — Ray P. Birren, W9MSC, Box 510, Elmhurst, Illinois.

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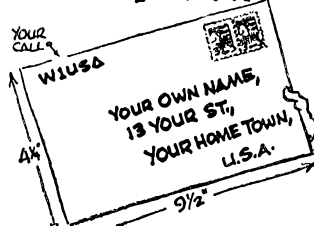
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KZ5 — Ralph E. Harvey, KZ5RV, Box 107, Balboa, C. Z.

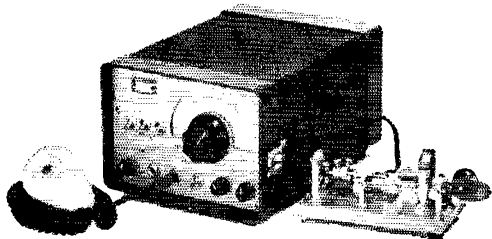
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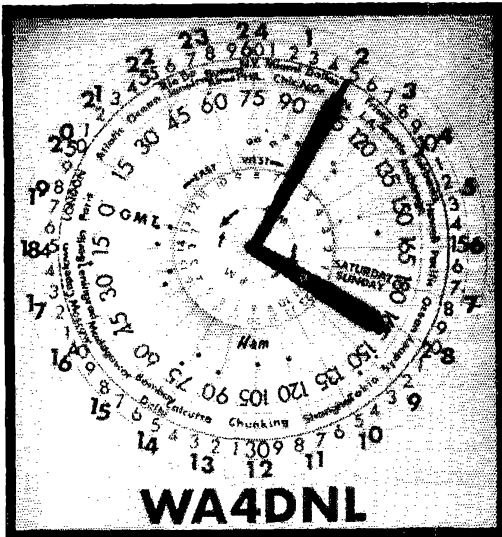
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- W1HXQ, Ralph J. Kempton, Presque Isle, Me.
W1IEJ, Harold B. Greene, Ashaway, R. I.
K2ADE, Harry Cohen, Liberty, N. Y.
W2DDZ, Robert J. Marshall, Huntington Station, N. Y.
K2GCF, Charles L. Dew, Moonachie, N. J.
WA2JYO, Anthony C. Traynelis, Cliffsdale, N. J.
W2PSN, Glenn P. Kopper, Buffalo, N. Y.
K2SYQ, Irving N. Herman, Marathon, N. Y.
WV2ZZW, James E. Jones, Shrub Oak, N. Y.
W3EBF, Elmer J. Sonn, Glen Burnie, Md.
W3FHV, Charles O. Aston, Lancaster, Pa.
K4HAT, Clyde Williams, Barnwell, S. C.
W4OZT, Holmes O. Bridges, Wanchese, N. C.
K4WRY, Charles B. Dodds, Memphis, Tenn.
K5JOF, Alvin E. Petering, Yoakum, Tex.
K5YZM, Oliver C. Goddard, Yale, Okla.
K6HOV, Robert W. Wellet, Los Angeles, Calif.
K6ISB, James V. Baumgartner, Piedmont, Calif.
K6MLS, George G. Stauch, Sacramento, Calif.
W6WR, Clarence H. Warme, Sherman Oaks, Calif.
K7AKZ, Tharold E. Robison, Amity, Oreg.
W7RWC, Lawrence A. Crull, Tucson, Ariz.
W8MET, Myron R. Wright, Detroit, Mich.
W8OED, Fred Ierlan, Willoughby, Ohio
W8PWG, Charles T. Celmar, Avon Lake, Ohio
K8PZE, J. A. Bower, East Liverpool, Ohio
K8QJQ, Daniel H. Dyni, Clawson, Mich.
W8TTS, Floyd R. Myers, Ashland, Ohio
K9AFP, Robert W. Hale, Fort Wayne, Ind.
K9APQ, John F. Stokely, Chicago, Ill.
K9BCJ, Henry F. Blackburn, New Castle, Ind.
WA9FUV, Larry L. McGinnis, Indianapolis, Ind.
W9GIP, Joseph H. Blair, Jr., Milwaukee, Wis.
K9JVO, Harald Lindholm, Chicago, Ill.
K9PRX, Horace E. Bergae, Elgin, Ill.
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K9YRJ, James V. Hamilton, Canton, Ill.
W0BSX, Edwin H. Terrill, Wichita, Kans.
K0JWD, Melchoir W. Marks, Wichita, Kans.
W0RD, John E. O'Hara, St. Louis, Mo.
W0SV, Robert B. Witschen, St. Cloud, Minn.
K0SYW, Cecil I. Noble, Gilman City, Mo.
G2AYC, S. E. Vanstone, Surrey, England
G8MU, Justin C. Egerton, Ipswich, Suffolk, England
PA0FP, J. J. Frederikse, Zandvoort, Holland
VE1ADE, Leonard J. Ayers, North Rustico, PEI, Canada
VE3ASA, Chester E. Murray, Toronto, Ont., Canada
VE5RR, Robert D. Shirley, Moose Jaw, Sask., Canada
VE7ARX, Oscar J. Dietz, Vancouver, B. C., Canada

Correction

June Silent Keys listed the passing of WA2VFM, while August Silent Keys listed WA2OUS. These notifications were sent to us because of someone's misdirected sense of humor. We are glad to report that neither of these lads is deceased.

It is with extreme regret that we publish news of the death of "Buddy" Goddard, K5YZM, in this month's "Silent Keys" column. "Buddy," an avid v.h.f. operator who was active with Army MARS, RACES, and AREC, was electrocuted while erecting a 2-meter antenna at his home. The mast was only 26 feet high, but a high-voltage line was even lower.

Switch to Safety! Never try to install an antenna or mast without help; and never take chances — especially near a power company high-line!

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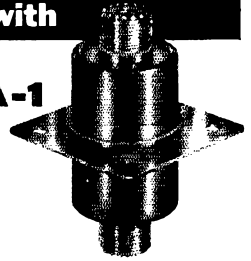
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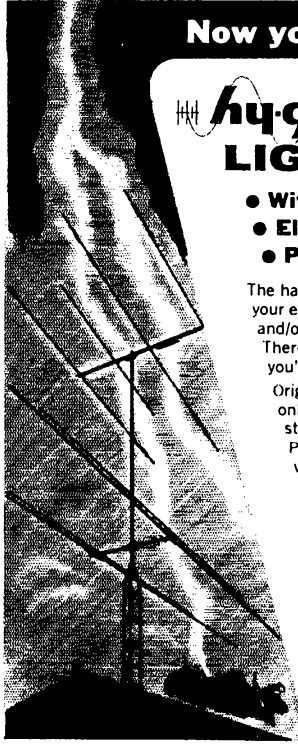
Originally designed to protect electronic gear aboard military aircraft, the precision-built LA-1 is the only lightning arrester on the market today that will safely bypass to ground 10 or more direct lightning strokes (that's a lifetime). It is designed for installation in any standard 52 or 72 ohm coaxial feedline. Properly installed, the LA-1 effectively removes static build-up around your antenna system thus vastly reducing the possibility of your equipment being hit by a direct stroke of lightning. Don't confuse the LA-1 with combination spark gap fuse type devices that "blow" when subjected to minor electrical surges. The LA-1 properly installed and maintained offers you lifetime protection against the hazards of lightning being carried through your feedline. Truly the only long-term lightning protection you can buy. Only **\$19.95** Net.

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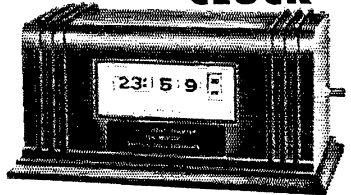
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 (5) Closing date for Ham Ads is the 20th of the second month preceding publication date.
 (6) A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for. 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 be applied.
 (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.

DON'T Forget! The Annual W9DXCC Banquet and DX Get-Together, Saturday, Sept. 4, Sheraton Hotel, Chicago, 1:00 P.M. Reservations and dinner, \$6.25. Will arrange hotel room if you wish. MacReynolds, W9EVI, 664 Caroline Ct., Deerfield, Ill.

PEORIA Hamfest: 15th of September 1963. Exposition Gardens, all-weather site. For tickets write Stan Kujawa, 1612 West Columbia Terrace, Peoria, Ill.

S.R.R.C. Hamfest: June 7, 1964. Write for details after April 1, 1964. Starved Rock Radio Club, W9MKS/W9QLZ, RFD #1, Box 171, Oglesby, Illinois.

14 WEATHER Instrument Plans \$1.00. Saco Industries, Box 2513, South Bend, Ind.

WANTED: Early wireless gear, books, magazines, catalogs before 1922. Send description and prices. W6GH, 1010 Monte Dr., Santa Barbara, Calif.

MOTOROLA used FM communications equipment bought and sold. W5BOC, Ralph Hicks, Box 6097, Tulsa, Okla.

We buy all types of tubes for cash, especially Elmas, subject to our test. Maritime International Co., 199 Front St., Hempstead, N.Y.

TOROIDs: Uncased 88 Mhz. like new, Dollar each. Five/\$4.00. P. P., DaPaul, 309 So. Ashton, Millbrae, Calif.

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. KE1098 8-0500.

CASH for your gear! We buy, trade and sell. We stock Hammarlund, Hallicratters, National, Johnson, RME, 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.

WANTED: Military or Industrial laboratory test equipment. Electroncraft, Box 399, Mt. Kisco, N.Y.

WANT 1925 and earlier ham and broadcast gear for personal collection. W4AA, Wayne Nelson, Concord, N.C.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W9RFP, Puregold Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan. Tel. Normandy 8-8262.

HAM TV Equipment bought, sold, traded. Al Denson, W1BYX, Rockville, Conn.

TOROID RITTY Kit: Mark-Space discriminator and bandpass filters. Includes 4-88 Mhz and 1-44 Mhz uncased like new condx. toroids; information sheet, mounting hardware and six mylar capacitors. \$5.00 ppd. Toroids; specify 88 or 44, less capacitors. \$1.00 each. 5/\$4.00, ppd. KCM Products, Box 88, Milwaukee 13, Wis.

ACT NOW! Barry pays cash for tubes (unused) and equipment. Barry Electronics, 512 Broadway, NYC 12. Call 212-WA1ker-5-7000.

COMPLETE Ham Station with Collins S/Line transmitter and receiver; 516F-2 power supply and 312B-4 station control, brand new. Present market price over \$2100 plus provincial taxes. Will consider all reasonable offers. Write J. Lonk, 920 Chenier Ave., Ottawa 13, Ont., Canada.

C. FRITZ QSLs. Highest quality consistently for a quarter century! Samples 25¢ deductible. Box 1684, Scottsdale, Ariz. (formerly Joliet, Ill.)

QSL SWL, cards that are different. Quality card stock. Samples 10¢. Home Print, 2416 Elmo, Hamilton, Ohio.

QSLs. Twenty exclusive designs in 3 colors. Rush \$3.85 for 100 or \$6.90 for 200 and get surprise of your life. 5 days' service. Satisfaction guaranteed. Constantine Press, Blandensburg, Md.

QSL Specialists. Distinctive Samples 15¢. DRI Studios, 2114 N. Laverne Ave., Chicago 39, Ill.

QSLs "Brownie." W3CJ1, 3310 Lehigh, Allentown, Penna. Catalog with samples. 25¢.

QSLs-SHLS. Samples 10¢. Malgo Press, Box 375 M.O., Toledo 1, Ohio 14107.

QSL-SWL-WPE. Finest. Since 1946. Largest assortment. Priced right. Send 10¢ for samples to: Glenn Print, 1103 Pine Heights Ave., Baltimore 29, Md.

DELUXE QLS. Petty, W2HAZ, Box 27, Trenton, N.J. Samples 10¢.

QSLs. Special, 100 50 Star U.S. Flags on glossy cards. \$3.70. Ppd. Other samples 10¢ or 25¢ refunded. Dick, W8VXK, Rt. 4, Gladwin, Mich.

QSL-SWLS. 100 2-color glossy. \$3.00; OSO file cards. \$1.00 per 100. Samples 10¢. Rusprint, Box 757, Kansas City 16, Mo.

PICTURE of yourself, home, equipment, etc. on QSL cards made from your photograph. 25¢—\$7.50 or \$0.50—\$10.00 postpaid. Samples free. Write to Picture Cards, 129 Copeland Ave., La Crosse, Wis.

QSLs: samples 25¢ (refundable). Schuch, W6CMN, Wildcat Press, 6707 Beck Ave., North Hollywood, Calif.

QSLs. Distinctive samples free. Volpress, Box 133, Farmingdale, N.Y.

CREATIVE QSL Cards. Free, new catalog and samples. Personal attention given. Wilkens Creative Printing, P.O. Box 1064-1, Atascadero, Calif.

QSLs. SWLS, WPE, Samples 5¢. Nicholas & Son Printery, P.O. Box 11184, Phoenix 17, Ariz.

QSLs. 100 2-color. \$3.00. Samples 10¢. Brigham, 32 Colson St. North Billerica, Mass.

QSLs. SWLS, XYL-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, 961 Arcade St., St. Paul 6, Minn.

SUPERIOR QSLs. samples 10¢. Ham. Specialties, Box 73, Hobbs, New Mexico (formerly Hollar, Texas).

DON'T Buy QSLs until you see my free samples. Holles, W5OWC, 7701 Tisdale, Austin, Texas.

QSL 300 for \$4.35. Samples 10¢. W9SKR, "George" Vesely, Rte. #1, 100 Wilson Road, Ingleside, Ill.

QSL. Samples 25¢. Rubber stamps; name, call and address \$1.55. Harry Sims, 3227 Missouri Ave., St. Louis 18, Mo.

QSLs 3-color glossy, 100, \$4.50. Rutgers Vari-Typing Service. Free samples. Thomas St., Riegel Ridge, Milford, N.J.

QSLs. Kromekote 2 & 3 colors, attractive, distinctive, different. Free ball point pen with order. Sample 15¢. Agents for Call-D-Cal decals. K2VOB Press, 62 Midland Blvd., Maplewood, N.J.

RUBBER STAMPS. \$1.00. Call and Address. Clint's Radio. W2UDD, 32 Cumberland Ave., Verona, N.J.

QSLs. \$2.50 per 100. Free samples and catalog. Garth, Jutland, N.J.

1 1/2" Call QSLs (2 sides printed) 100, \$3.15. Sample free. Garlepy, 2624 Kroemer, Ft. Wayne, Ind.

QSLs At the sign of the "Hobby Horse". Quality at uninflated price and quick delivery. Glossy, red and green. \$2.00 per 100 postpaid. Free sample. Hobby Print Shop, Umattila, Fla.

QSLs. 100, \$2.50. Samples free. Amec's Printery, W9FXQ Box 13A, Oak Lawn, Ill.

FREE Catalog of QSLs, WPE and CB cards. New designs. Longbrook Press, Box 393-A, Quakertown, N.J.

QSLs. All kinds, free samples. W711Z Press, Box 183, Springfield, Ore.

QSLs! Send 10¢ for current specials. Harrison, Box 1171, Hyattsville, Md.

PICTURE QSL Cards from your photograph, 1000 \$13.00. Also new and different designs of conventional QSL cards. Samples 20¢. Raum's, 4154 Fifth St., Philly 40.

AT Last! Something new in QSL cards! All original designs. Send 10¢ for samples to Yarsco, Box 307, Yorktown Heights 1, N.Y.

QSLs?? WPE?? Rainbow maps? State maps? Cartoons? DeLuxe? Religious? Largest variety samples 25¢. (retunded). Sakkers, W8DED, Holland, Mich.

QSL Cards. Largest selection. Lowest prices. Samples and catalog. 25¢. Refund or 25 extra cards with your first order. Debbeler Printing, 1309-T North 38th St., Milwaukee, Wis. \$3208.

FINE QSLs. Dime. Filmcrafters, Box 304, Martins Ferry, Ohio.

ATTRACTIVE QSLs: Large variety of styles; cartoons, colors. Samples 25¢ (deductible). Paul Levin, K2MTT, 1460 Carroll St., Brooklyn, N.Y. 11213.

RUBBER Stamps for hams, sample impressions, W9UNY, 542 N. 93, Milwaukee, Wisconsin.

QSLs by the Ink Well. Spencer, Mass. Samples free. Menard, W1DQU.

QUALITY QSLs. New designs monthly. Samples 10¢. Giant, 25¢. Savory, 172 Roosevelt, Weymouth, Mass.

QSLs. Stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md.

QSLs-SWLS. Rainbows, etc. Best quality; immediate service; low prices. Samples 10¢ refundable. Joe Harms, WA4FJE, 905 Fernald St., Edgewater, Fla.

CANADIANS: Want Johnson Courier final, only top condx. VE3EGG, 64 Barrie, Galt, Ont., Can.

CANADIANS: Sell Apache \$300 or Apache plus SB-10. \$375. Will not sell SB-10 only. In exclnt condx. Will sched any area, deliver 100 miles Toronto. VE3CRM.

CANADIANS: Comanche receiver with matching speaker, \$130. Eico 730 modulator, \$55. VESRO, R. C. Lapp, Kistey, Sask. P., Canada.

WANTED: All types of aircraft or ground radios. 17L, 618F or S 388, 1940, GRC, PRC, 511, RVX. Especially any item made by Collins Radio, ham or commercial. Also large type tubes and test equipment in general. For fast cash action contact Ted James, K2KUH, 308 Hickory, Arlington, N. J.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, P.O. Box 155, Barrington, Ill.

FOR Sale: Collins 30L-1 linear, 32S-1 transmitter, 75S-3A receiver with complete set of crystals. All late models, used less than fifty hours \$1500.00. W4KGR, 2333 Elizabeth, Winston-Salem, N.C.

INTERESTED in two-meter linear amplifiers, transmitters, receivers, etc. If the price is reasonable, for members of St. Mary's Radio Club, or as tax exempt donation to Missions, K8WLB, St. Joseph's Mercy Hospital, Centerville, Iowa.

304TL tubes wanted. Also other xmtts and special purpose tubes. We will buy military or commercial transmitters and receivers with destinations ARC, GRC, URR, 51 and MN. Air Ground Electronics Co., 64 Grand Pl., Kearny, N.J.

CASH promptly paid for your ham gear. Trigger, 7361 North River Forest, Ill. PR 1-8616.

TUBES Wanted. All types, highest prices paid. Write or phone. Lou-Tronics, Inc., 131 Lawrence St., Brooklyn 1, N.Y. Tel. UL 5-2615.

ATTENTION Mobilizers! Heavy-duty Lecce-Neville 6 volt 100 amp. system, \$50; 12 volt amp. system, \$50; 12 volt 60 amp. system, \$60; 12 volt 100 amp. system, \$100. Built-in silicon rectifier alternators 12 volt 60 amps, \$100; 12 volt 100 amps, \$125.00. Guaranteed no-exp-police car units. Herbert A. Zimmerman, Jr., K2T, 1907 Coney Island Ave., Brooklyn 30, N.Y. Tel. DI 5-6738.

WILL Ship to best offer, mint condx, HT32A, HT-33A, new spare PL-172; SX-101-3A, K5HOB, 1807 Wyoming, El Paso, Texas.

MUST Dispose: 82 copies Proceedings of the IRE, 3 volumes complete, 1926 to 1952. Real bargain for lot. Write for list. Mrs. Miriam Y. Knapp, WIZIM, 191 Beechwood Rd., West Hartford 7, Conn. Tel: 521-2055.

WANTED: For personal collection: QSTs January through August 1916; ARRL Handbook Edition 1. WICUT, 18 Mohawk Dr., Unionville, Conn.

NEW And used ham gear. Top trades. Norm, K9HRI at Dahn Electronic Supply, 14 Jayne St., Algonquin, Ill. Mail orders welcome!

ELECTROSTATIC Generator wanted: with output from 20,000 to 80,000 volts; 0-2 Ma. DC of course. Preferably variable. Send all dope to W7FVW, Karl Oksanen, 4740 E. Cambridge, Phoenix, Ariz. Phone: WH 5-5570.

FREE! Send for free copy of The Ham Trader if you are looking to swap, buy or sell equipment with other hams. The Ham Trader, Box 153Q, Franklin Square, N.Y.

HO-60 or -50 wanted. Please state appearance, condx, history, wire price and transport arrangements. Robt. Parkison, K0JRU/4, Box 246, Savannah, Ga.

MUST Sell antique wireless collection. Send large SASE for list, W6LM, Box 308, Wrightwood, Calif.

PANADAPTER BC-101C for receivers with 450-470 Kc IF's. V-gud condx. Scans 100 Kc each side of center: \$75.00. E. Shafer, 3479 Kersdale Rd., Cleveland 24, Ohio.

FOR Sale: BC-610 complete with speech amp and extra 250TH. Mint condx. Never used by military. \$395. Luster U. King, W5NLL, 701 Vine, Corning, Ark.

HAMMARLUND HQ-145X xtal calibr. New, original carton, \$225. Mr. Boord, HY 4-8200 Monday-Friday 8 AM-6 PM, 379 13th St., Brooklyn 15, N.Y.

SELL: SX-101A, \$260; HC-10 SSB converter, \$75; KW linear SSB-1000F Eldico, \$350; Transtenna T-R switch, outboard model, \$50. All like new condx. Lamb, 1219 Yardley Rd., Morrisville, Penna.

SELL: G-76 with Gonset DC supply, Brackets, cables, Band Spanner antenna, Master Mobile Mount. In exclnt condx: \$175. William Schubeck, W2GSL, 52 First Ave., Franklinville, N.Y.

COLLINS 75S3, \$550; 75A2 \$275; Johnson 500 FW, \$500; Telrex 503 3-element 20-mc. beam, \$70; brand new PL-172, \$85. Paul Balco, W1KHW, Hillcrest Road, New Canaan, Conn.

TRADE: 6 meter transceiver Lafayette HE45B, still in warranty for any all-band receiver. Write to Sam Unger, W3ZCM, 3518 Milford Mill Rd., Baltimore 7, Md.

HO-60T with five coils and speaker. All are in top condx: \$300. C. J. Scott, 1564 Maple, Cleveland 21, Ohio.

FOR Sale: HQ-170 receiver, in mint condx. Must sell: \$275. Thomas C. White, RFD 3, Chariton, Iowa.

HRO-50T spkr and CE Model B slicer. Used vly little, \$200. W3VFE.

SALE Or Trade: Hallicrafters S-85 receiver with Q-multiplier and build-in xtal calibrator. Best offer over \$60. Heath signal generator Model RF-1, new still over \$20. Heath in-circuit capacitor tester, \$5. Need signal tracer; tube tester, VTVM, other instruments. All inquiries answered. Pike, 1211 Virginia Road, Wilmington 3, Del.

MAURAUDER HX-10, \$350; Drake 2B/2BO, \$250; Louden-boomer and P/S, \$325; Heath Shawnee, \$199; Johnson CB Messenger w/3 xtls, \$85; Johnson T-R switch, \$20; Hammarlund HK-1B keys, \$20. All of the above is in v-gud condx, and some less than 2 months old. A fair deal. If needed, I can pack and ship for export. Send certified check, or money-order, and I will ship collect. Reass in sale: "Going Collins's", Wally Shapiro, WA2OHN, 845 Cliffside Ave., No. Woodmere, N.Y. Tel: 516-PY-14783.

SELL: DX-100, all Heath approved modifications, \$160; SB-10, \$60, both \$190. In exclnt condx. Spare tubes. WA2VKV, Tel: TR-8-0200 NYC.

HEATH Mohawk, In exclnt condx. Sell to first \$250 offer. K1RBP.

WANTED: Plug-in coils for National HRO rcvr. Particularly want "A" 14-30 Mcs. Advise separately by type and price. J. M. Palmer, 2261 Fifth Ave., Youngstown 4, Ohio.

RATIOTELETYPE Parts, filters, circuit boards. Model 28KSR, \$350. WSIEZ, Houston 18, Texas.

KITS Professionally assembled, calibrated, Inquiries, Bill Clough, R. 4, Mexico, Mo.

SELL: HT-30, \$200. John Gillen, 912 So. 57th St., Philly 43, Penna.

FOR Sale: SX-111, Globe Chief 90A, F/W; Vibroplex Bug, Heath, HP 20 pwr supply, Johnson Signal Sentry, 40 mtr, dipole, all for \$250. Thomas Dalton, Box 95, Hackettstown, N.J. Tel: 425-9664.

A-1 Reconditioned equipment. On approval. Trades. Terms. Hallicrafters S-85, \$79; SX-99, \$99; SX-110, \$119; SX-111, \$159; SX-101 III, \$159; SX-101A, \$229; Hammarlund HQ-100, \$119; HO-100, \$159; HO-170, \$239; Ranger 1, \$149; Valiant 1, \$249; NC-300, \$199; Collins 75S-1, \$359; 32S-1, \$495; 20A, \$129; National, Gonset, Elmco, Heath, Johnson, RFD, and many others. Write us for lists. Henry Radio Co., Butler, Mo.

CONVERT To 160 Jefferson Travis obsolete ship-store radio-telephone tube with microphone, \$15.00. K8ONM, 37610 Lakeshore Dr., Mt. Clemens, Mich.

HEATH Seneca, professionally wired, \$150 or best offer. Elmco AF-67 and PMR-7 \$140. Both perf condx. Hammarlund HQ-129X, \$90; Johnson Viking II, \$99. Mike Anderson, K5-FPW, 3202-30th St., Lubbock, Texas.

FOR Sale: Gonset Super-receiver, No. 3041, mint condx, instruction manual, squelch, BFO, RF gain, double conversion, several watts audio, built-in PS (6 or 12). Makes any converter into complete receiver with all trimmings. Just tuned up by Gonset, \$75.00. Also Gonset built-in-Pick power supply, 12 volts, output 180 at 150 Ma., \$18. Richard M. Jacobs, WA0AIV, 1015 Glenside Pl, University City 30, Mo.

FOR Sale: Mobile P.A., 20 watts, built-in PS (6 or 12), \$25. Brand new. Slightly used Electro-Voice 205KK differential noise cancelling mobile mike: \$15. K9EOX/O, Box 9500, St. Louis 12, Mo.

CAN Anybody supply an old Grebe or Klittenzkr? Will also buy other pre-1925 radios, Worcester, R. D. 1, Frankfort, N.Y.

VALIANT 1961 factory-wired with Johnson low-pass, \$300; HO-170 with matching speaker, \$200. Both in perf. condx and like-new. Pick-up deal. Tom Egan, WA2BDY, 744 Myrna Rd., Paramus, N.J.

SALE: Viking I; HT40, Globe Spot 680A make offer. Going to college. Info on request. F.o.b. K3OZS, 116 E. Eleanor St., Phila. 19120, Penna.

CALL Cards, badges, decals, "All the Goodies". Illustrated literature with samples, 25¢. (Club) Write on your letterhead for special prices. Becker, K1VRO, c/o Etrol Engraving, 36 Hampden St., Westfield, Mass. 01085.

FREE Catalog of OSIS, WPE and CB cards. New designs. Longbrook Press, Box 393-A, Quakertown, N.J.

BC610E incl. SA, BC614E, ant. tuner, spare tube kit, \$200. You pick up. WITKI, 41 Burnham Hill, Westport, Conn.

COLLINS 32V-3, in exclnt condx: \$160. W9KOK, Rt. 1, Box 59, Winnebago, Ill.

SX-111 SSB receiver, \$195; Eico 720 transmitter, \$45; Hy-Gain 4-El, 20 meterbeam and CDR AR-22 toro, \$65. Heathkit VFI, VFO, \$10. K3NKKV.

APACHE transmitter, \$200; DX-40 w/VFO, \$50. C. N. Smith, Box 336, Hollis, N.H.

SELL: Gonset II, 2-meters 5 xtls, ant., mike, new tubes and send-receive switch, \$125.00. I will pay shipping on all, Viking I, in exclnt condx, 10 xtls, heavy-duty 5U4's, 807's, TVI suppressed, \$95.00; LM-7 2-20 mc. freq. meter AC supply, \$45.00. W2JGM, Dick Marsino, 66 Columbus, Closter, N.J. Tel. PO 8-1884.

75A4 serial #5491, \$475. In mint condx. Original warranty still in manual. Used less than 80 hours. Vernier knob, AM, SSB filters. SAC model, same as regular A4 but covers 11 Mc in excess of 11 meters; and has provision for the 2 ten meter band positions but will need some additional components to operate on 10. Also LaVoc IA6 100 mc-500 mc. freq. meter in A-1 shape. W0KGR, Phone 333-3393, Denver, Colo.

KWM2 in Europe. With PM-2 115/230V supply, CC-2 carrying case, FB condx. \$1050. H. Koch, c/o Eckert, 435 Windeckweg, Hinterzarten/Schw., Germany.

SELL: Ameco CN-50K 6-meter Nuvistor converter, practically new, factory aligned and tested, 14-18 Mc output, connecting cables, with Ameco PS-1W power supply, \$42.00; Heath HW-29A "Sixer" mike, with GP-111 mobile power supply, connecting cables, all new condx, \$45.00. J. L. Higgins, K4TSM, P.O. Box 3230, Charlotte, N.C.

FOR Sale: Gonset GSB-100 SSB transmitter, \$290. I have not had it on the air. Apache, like-new condx, \$200; Receiver HO-170 with clock and Hammarlund's IF noise silencer. Can't be told from new, \$270. Will ship Gonset and Hammarlund in original cartons. All items warranted. E. A. McCall, 10004 E. 34th St., Independence, Mo.

75A-2, in mint condx, w/prod. detector: \$230.00. Phasing SSB'er, like New, 1959 OST, Allband, 60W, \$115. K8PXV, Joel Thurlert, Rte 3, Box 291, Lowell, Mich.

MOBILEERS: New alternators with transistor regulators and mounting brackets. 40 amp, \$55, 50 amp, \$60. Transistor regulators for Chrysler Corp. alternator equipped cars, \$19.95. Ciro (Cyr) Carriozzi, K2ZME, 19 Saddle River Ave., Garfield, N.J. Tel. GREGORY 3-9422.

SELL: 32V1, \$150; HO-129X, \$100; as unit with cables, relay, spare final tube and D-104 mike. Also: 32V3, \$22.50; HQ-180, \$150 with cables relay, spare final tube, spkr, and mike as unit. Includes instruction books. All in v-gud condx. W2MYU, 42 Fourth St., West Sayville, N.Y.

HAM Station! Hammarlund HQ-145X rec. DX-60 trans. 40-10 M vert. trap Hy-Gain ant., 1 yr. old, with less than 20 hours operation. See, write, or call 761-2971 Milford, Nebraska. Gerald Frimans.

G-76 Gonset Transceiver, v. clean, latest model, with matching Gonset AC power supply; \$350. Richard Subin, 309 North Thurlow Ave., Margate City, N.J.

HT-37 late model in perfect condx. Original owner. \$335. WIHUM, I. J. Hemingway, 12 Sunset Terr., West Hartford, Conn. Tel. 232-6520.

75S1, No. 1584, \$360 prepaid, 32V2, No. 2333, \$200. Both are in exlnt condx. No trades. Can deliver most parts of Minnesota. Wis. Iowa, Liebi, Medford, Wis.

FOR Sale: Polycomm 62B six and two meter transceiver. 115 VAC and 12 VDC plus 6 meter halo. All for \$260. Contact: L. Swart, 150 Long Dr., Hempstead, L.I., N.Y. K2TGR.

JOHNSON TR switch. Used very little, \$20. W9GLB/8, 3062 Kingsport Circle, Cuyahoga Falls, Ohio.

WANT Unmodified ART-13. State condition and price. All answered. WN9GRI, RR #11, Elcho, Wis.

SELL: 75A4 two filters 3 kc., 3 kc v. yud condx. \$500; Heathkit Tenner, new, \$25; Slim Jim mobile, all-band ant., \$10. Homebrew Keyer from Handbook, \$15; Joe Gravel, W2DMM 150 Katkind Rd., Bloomington, N.J. Tel. 8-0118.

DX-60 almost new, perfect condx. \$58. Hank, K1ZDI, 36 Rossmore St., Somerville, Mass. Tel. 625-5537.

SELL: 900 watt PEP linear, contained (including AC supply) in Heath HR-20 cabinet. Designed to match the HX-20. No junk, brand new 4X250's. Asking \$250 or you make offer. K0KLU, 990 Third Ave. West, Dickinson, North Dakota.

HEATHKIT "Tenner" and power supply; also Heath walkie-talkie connected to 29.6 Mcg. Guaranteed gud condx. BC-611 handie-talkie. New. No batteries or tubes. Make offer. K0KHQ, 102E 17th, Hutchinson, Kans.

FOR Sale: Mosley mobile all-band antenna Model TM-5, brand new, \$50.00 F.o.b. W6GMC, 614 Bradbury Rd., Monrovia, Calif.

FOR Sale only: DX-100 and NC-300, in exlnt condx. Both presently on the air. Best reasonable offer. Also Gonset Super Six and Superceiver. Gene, W2ELZ, 7015, 19th Ave., Brklyn BE2-8606.

OHM'S Law never forgotten with copyrighted tool. \$2.00 postpaid. Beck Radio, 6323 So. Dale Mabry, Tampa, Fla. 33611 VHF Converters: National, for 6, 2 and 1 1/4 meters. All in National converter cabinet with switch and cables. Ideal for NC-300, NC-303 or SX101A. Over \$150 value for only \$75.00. W4GJO, Box 1294, Sarasota, Fla.

SALE: Johnson Navigator, \$35.00. Also Heathkit balun, \$7. C. Campbell, W1PDD, 20 Louis St., Danbury, Conn.

VIKING Valiant, \$295; Viking Challenger, \$75. Jerry C. Kloehr, 206 N. Walnut St., Coffeyville, Kans. W0ROU.

HAMMARLUND HQ-129X, exlnt. Accept best cash offer, old coins or guns. Owen Barton, 1205 Park Ave., New Haven, Ind.

HALLICRAFTERS SX-111 receiver. Excellent condx. For sale: \$175 or trade on tape recorder. Henry T. Maschal, 235 Montgomery St., San Francisco, Calif.

VALIANT Transmitter. Factory wired, sud condx. \$225. Will ship or trade for middleweight motorcycle. Write or fone WA2AYA, 224 Kossuth St., New Market, N.J. Tel. 201-752-0861.

THE Famous talking dog of W5HO-K4DP. Hey Yew, passed away June 17, 1963. Electricians, straining a power service to K4DP's new ham shack, ran over him in the carport as he rushed to greet his mistress. He was a black cocker and was known for many years for his friendly bark of greeting to hams on the 75 meter phone band over W5HO, Oklahoma City. He was judged to be more than 15 years of age.

VALIANT, exceptional condx. \$250; 75S-1, immaculate No. 10,553, \$395; Tri-Ex 71 ft. crank-up tower, \$120; 600 ft. 5/8 x 1/2 x 19 aircraft cable for tower guys, unused, \$40; APA-17 surplus 5" oscilloscope, works fine, \$20; D-104 mike with model G stand, new, \$25; AR-22 rotor and indicator, never used, \$25. Dummy load; SWR meter, misc. parts. 675 Sierra Meadow, Sierra Madre, Calif. Tel. EL 61214, K6MIV.

WANTED: Commercial, military, all types. ARC, ARN, ARM, BC, GIC, PRC, TRC, URR, URM, TS, 618S, 17L, 51R, others. Ritco, P.O. Box 156, Annandale, Va.

LAFAYETTE HE-30, new in carton, good standby receiver, \$59; Matching speaker, \$5.00; 32-element 2-meter beam, \$16. You pick up. W1PRT, 19 Bidwell Parkway, Bloomfield, Colo.

WOGFO: Leo has big discounts on overstock of used equipment due to so many trades on the fabulous new Galaxy SSB Transceiver. Now's the time to save on reconditioned equipment. Write for our latest list, over 1000 items. World Radio Laboratories, Box 919, Council Bluffs, Iowa.

FOR Sale: Complete station. Gonset GR-212 receiver, \$79; Knight 1-60 xmitter, \$39; Clegg 99'er 6 mtr. transceiver, \$95; all units \$200. In exlnt condx. K9GGZ, 1311 N. Church, Rockford, Ill.

KNIGHT T-150, \$100; DX-20, \$25; B&W low-pass No. 425, \$12.50; G-E 5" scope, \$15; AM-2, \$10; 115V Dow-Key relay, \$10; Simpson tube-checker, \$10; Simpson signal generator, \$15. K1WGN, RFD #3, Great Barrington, Mass.

SELL Complete station: Marauder, Drake 2B with spkr and Q-multiplier, homebrew linear using 3 811As, Elicdo EE 3 keyer, Hy-Gain 14AVS181 vertical, Heath AM 2, harmonic filter, Dow-Key relay. Also have Cheyenne with HP-20 power supply. All for \$875. W5HNF, Box 212, Hamlin, Texas.

SELL Or trade: Mosley TA-36, \$60; TCS-15-1.5-12.0 Mc revr. and xmitter complete with cables; instruction manual and mobile P/S \$65. Want gud 2-meter rig. Ken Spaulding, 15 Minivale Rd., Springdale, Conn.

WANTED: December 1958 QST. C & R Mfg., P.O. Box 1206, Aurora, Ill.

HALLICRAFTERS: HT-37, perf., \$335; SX-111 plus xtal conv. for 20-15-10, \$165; F.o.b. James Miller, 73 Woodcrest Blvd., Kenmore 23, N.Y.

SELL, Swap: Baluns, BC-342, Jennings UCS vacuum, 100 ft. new Amphenol 72 ohm Twinlead, best offer cash, coins, guns, K3OUO, 2 Haskell, Shirley, Mass.

HT-37, exlnt condx. Any reasonable offer considered. Ed Lauster, WA2MXW, 209-14 82 Ave., Queens Village 27, L.I., N.Y. Tel: HO 8-5320.

COLLINS 51J-4 w/3 and 6 mechanical filters, cabinet, best offer over \$975. NC-303 w/xtal calibrator. \$310. Both: recently factory checked. In exlnt condx. Guaranteed. K10GA, Boston, Mass.

SIDE BAND Marauder, Drake 2B, Hy-Gain 3-band doublet, mike, relays, Q-multi, etc. All perfect, S. Personick, 3230 Cruger Ave., Bronx 67, N.Y. Tel: OL 4-2381.

BARGAINS: SX-110 with Q-multi; \$100. Heath "Tenner" with 6 VDC supply, \$30. UTC plate xtrim, 3000 VCT dual primaries, \$20. W1MBX, \$389 Winsted Road, Torrington, Conn.

SEATTLE Area: For sale: DX-100, \$125; Heathkit "Tenner" transmitter with crystal and GP11 power supply, \$40; RME VHF152A converter, \$25; RME Preselector DB23, \$30; Heathkit VFO-VF1, \$10; Vibroplex Presentation model with case and cord, \$25; Johnson Signal Sentry, \$15. B&W T-R switch 380B, \$18. W7ZRZ, 17005 3rd Ave., N.E., Seattle.

JOHNSON Matchbox, \$15; 5736 Tube with chimney, \$10; Jennings vacuum variable CSL, 750 with counter dial, \$15; Vacuum variable "VT" with counter dial, \$7.50; vacuum capacitor "ICS" \$2.00; BC-343, N, \$50; counter dials spinner knobs, \$2.50. 4-400 Eimac socket, \$7.50. John Barwell, Somerville, Tenn.

WANTED: Collins 30L1, will trade new Leica M-3 camera dual range Summicron F-2 lens. W8ZMC, 1113 Lois Dr., Cincinnati 37, Ohio.

PROP Pitch motors, medium OK tested, \$29.50, exlnt AF overhauled, \$39.50 F.o.b. Oklahoma City. J. C. Brooks, Box 19232, Oklahoma City, Okla.

TRADE Heath Q-Multiplier and Heath reflected power and SWR meter for Gonset Monoton Monitor, #3022, W2LZW.

HALLICRAFTERS S-38E, Heath HD-11 "O" multiplier, LaVette TM-59A S-meter. In yud condx. Mailed postage collect. \$60. WN8IFU, 3915 Kittyhawk, Dayton, Ohio.

HAM-M Rotator 120 ft. cable: one year faithful service: \$65 or best reasonable offer. Please write W4NO, 1705 Essex Road, Charlottesville, Va.

VIKING Ranger, factory-wired, used v. little, \$175. Come and get it. Write Eric Shaheen, W2OGR, P.O. Box 87, Monsey, N.Y., or tel: Monsey EL 6-3566.

LOOKING? Shopping? Trading? Trying to save money? Write Bob Graham for special deals on new and reconditioned used gear. Cash or budget. Graham Radio, Dept. A, Reading, Mass. Tel: 944-4000.

ANY Amateur in the U.S.A. wishing to be listed in the Ham Phone Directory, please send your full name, address, phone number and \$1.00 to Ham Phone Directory, 1136 S.W. 74th Court, Miami, Florida, 33144, and you will receive a postpaid copy with your listing therein. All profits go to Variety Children's Hospital.

VALIANT, f/w, exlnt condx and appearance, \$300. DFR, K8RMT, Dave, 3536 Bidde St., Cincinnati, Ohio 45220. Tel: 861-3489.

FOR Sale: Loudenboomer Mk III, new, \$170 prepaid. 3600-0-3600 at 800 ma, transformers with 110 and 220 volt primary \$30 f.o.b. W0AIH, 814 4th St. South, Virginia, Minn.

WANTED: TA-32 Jr or equivalent and rotator. Bob Olsen, WA2QPK, 50 James St., Westwood, N.J.

KWM-1, AC pwr. supply, transistor mobile supply, mobile mount, and connecting cables, complete \$600. Perfect condx. Karp, RFD 1, Millville, N.J.

SX-111 Receiver less than year old, exlnt condx, back apron jack for monitor scope otherwise unmodified, R-47 matching speaker, both for \$150 F.o.b. Will ship in original carton with manual. W4SCSG, Meisner, 3500 Lucy Lane, Ft. Smith, Ark.

WANTED: QSTs, 1920 and before. Callbooks before 1932, 1st, 3rd, 5th, 8th, 9th editions ARRL Handbook. Will pay cash or trade extra QSTs 1923-1945. W6IBD, 780 S. Grand Ave., Pasadena, Calif.

SELL: DX-40 with VF-1 and Astatic mike complete, \$55.00. Ready to go. K1MVZ, Charles Kelli, 59 Southmayd Rd., Waterbury, Conn. 7534383.

HAMMARLUND HQ-129X, \$140. Heath HX-11, \$40. Both in exlnt condx. Write Mike Shimp, 131 Letch Rd., Waterloo, Iowa, G66B, \$75; Heath HP10 mobile supply, \$35; Mark Weiss, K6-PBI, 4204 Stansbury, Sherman Oaks, Calif.

HR-10 Heathkit for sale (see July 1963 QST for write-up). Exlnt wiring; perfect electrical, mechanical and exterior condx. No scratches. Price complete with crystal calibrator, \$85. Dana Wood, K6AHM/5, 466 Galveston Ave., Ft. Worth, Texas.

VALIANT, exlnt condx. \$225. Going SSB. W2R1R, 209 Lake Ave., Trenton, N. Phone 888-0178.

SELL 2 mtr. Communicator \$30, 10 mtr. Communicator G28. In exlnt condx. You make offer. K6EEC.

SELL: Complete station! Viking Ranger, exlnt, \$140; RME 6900 revr, almost new, \$230. Will include mike, key and antenna relay as package for \$370. Prefer not to ship. David Linick, 1435-53 St. Brooklyn 19, N.Y. UL 1-7696.

MOSLEY Tote-Tenna, SWR and case. FB, \$80. F.o.b. or will consider local swap. K1OMI/2, 2526 Watt, Schenectady, N.Y. Tel. 372-8144.

ATTENTION: Novice or General: SX-99 perfect, not a scratch, used total 15 hours, manual, speaker, see it, you can't beat it anywhere for \$95. Hallcrafters HA-5 VFO, perfect, used for 17 OSO's only, manual, works beautifully. See it and you'll buy it for \$58. DX-20, clean, works gud, no TVI, manual, \$22. Reason for selling: bought Collins. W2NDP, Triple 15-IVS-3190.

COLLINS MP-1 DC supply for KWM-2, \$140. Triplet 3444 laboratory tube checker. Latest model, \$200. WA2BKJ.

HALLICRAFTERS HA-5 VFO, almost new, \$70. Eico 730 modulator with condx. \$50. Eico 720 xmt, \$75. Exlnt trio. All in perf. condx. Don Gibbs, Box 277, Oxford, Penna.

UNUSED SX-111 in factory sealed carton, \$235 or best offer. Wanted: six meter transmitter, Walt, W1ZPB (498-5527) Mount Hermon, Mass.

HAMMARLUND HQ-100A with clock and xtal calibrator. Like new condx. W2BAA, Tel FL 9-4009.

LIKE new, in original cartons, Hallcrafters 2-meter HA-2 with power supply, \$295; SX-101A, \$245; HT-32, \$345; L1001A linear, \$150; MM1 R.F. analyzer scope \$40. Will consider all offers. George McKinley, W9ONO, 6149 N. Ozark Ave., Chicago 34, Ill.

FOR Sale: Heath DX-35, \$35; National NC-125 with matching speaker and Heath Q-multiplier, \$80; Weston 776 RF oscillator 550 Kc-30 mc, \$10; Webcor 3-speed record changer, \$10. Hugh Smyser, W3GNZ, Student Union, Williams College, Williams-town, Mass.

JOHNSON Valiant factory-wired, in excnt condx with Johnson Matchbox, \$250; Hy-Gain Tri-band antenna, \$50, 106 feet RG-8/U coax, \$8. Dr. Patrick, Box 103, Caldwell, Idaho.

SELLING Out: Going transceiver, Heath Marauder, no scratches, SX-111, in excnt condx; half-year old, \$500 or highest bid takes all! Will throw in matching speaker and Dow-Key. WAZUBA, Mark Silverstein, 99-11 60th Ave., Flushing 68, L.I., N.Y.

HQ-170-C, #4937 w/spkr, \$240; DX-100 special \$125; Heath Tower master, halo, mast, 4 crystals, \$50. K8JIC, Box 182, Allen Park, Mich.

SELL: DX-100B, \$175; HQ-110, \$175; A-54, \$50. Bon Cook, 407 New Meadow Rd., Barrington, R.I.

GLOBE Chief, UM-1 modulator, Heath VF-1, \$50. K3OKF.

SELL: 3-30 Mc, KW pair 813's, Rack mounted 36" varloc P.S. 0-3700VDC, 5-813's and 5-800's, best offer and info on request. Used one year. K4CLE, Charlotte, Tenn, 3/736.

B348C with AC supply, \$50; DX-20, \$30; 3ry w/ sharp audio filters, \$40 each at 1275, 1445, 1615 cycles. K5RVV, 4575 Highland, Baton Rouge, La.

MARAUDER, \$280; Drake 1B, 2BQ and Knight calibrator, \$260; VF-1, \$12; Eico 723, \$35. Bob Fortman, WAZYZN, 636 Chilton, Niagara Falls, N.Y.

JOHNSON KE w/desk, latest factory mods, \$650. F.O.B. Morrow FTR w/3Br conv., make offer. W2KJF, 62 Bacon Hill Rd., Pleasantville, N.Y.

JOHNSON VALIANT II, factory-wired, excnt. condx, orig. carton, w/ two hours of operation, \$395. Roy E. Pellegrini, K9GNR, 21 W. 215 No. Ave., Lombard, Ill.

HY-GAIN TH-4 Thunderbird beam, Latest 1963 model, \$75. W6JZP, 2709 Fragaica Ave., Hacienda Heights, Calif. Tel 330-2494.

HT-37, like new, \$325.00. W2KHK, L. Anderson, 31 Akate Road, East Brunswick, N.J.

75A3 with speaker, \$325. One each only, showroom units not used or handled, SX101A, \$325; SX111, \$205; HX 500, \$515. Organ & Electronics, Box 117, Lockport, Ill.

SELL: Complete and new SSB mobile and fixed station. Heath HX-20 SSB mobile transmitter; HR-20 SSB mobile receiver; HP-20 AC pwr supply; HP-10 transistor mobile power supply; AK-6 mobile base and AK-7 speaker. Equipment professionally assembled, tested but never installed or used. On-the-air tests excellent. Going overseas so now cannot use. Will sacrifice for \$375 complete. W7AHW, B. A. Neuman, 3613 Battery Road, Alexandria, Va.

SELL: SX-101 Mark III, spkr, and phones; \$225; HT-32A, new condx, Electro-Voice mike, Vibroplex bug, coax relay and cable; SWR meter, included, \$450; operating desk, reasonably priced. Won't ship, sry. Will deliver New York City vicinity. Raymond Furr, 42-12 Elbertson St., Elmhurst 73, N.Y. Phone NR 2-7484.

HAMMARLUND HQ-129X, Harvey-Wells TBS50-D w/VFO, IT-30 mike, plus miscellaneous equipment; all in mint condx. Free delivery any W2. Write for info to W. N. Howard, Ex-K2BXB, 339 E. 9th St., New York 10003, Apt. 4C.

FOR Sale: Complete SSB mobile/fixed station; Heath HX-20 xmtr, HR-20 rcvr, HP-10 mobile pwr. supply, HP-20 AC pwr. supply. All cables, manuals, mount and all for \$319.85 or let's talk. Mint condx. W8DOS, Harvey Kline, 20611 Baitour Road, Detroit 36, Mich.

ATTENTION! Your equipment, components wanted! Many private offers to buy, sell, swap or yours in "Equipment Exchange", 10 big interesting issues, \$1.00 or sample free. Address: Brand, publisher, Sycamore, Ill.

SELL: 300 watt 811s Class B modulator, rack panel with 100 ma meter, Multimatch transformers, filament transformers 310 or 220 VAC, 2 used 811s, instructions, \$40. F.O.B. K3TXG, Box 87, Mechanicsburg, Penna.

FOR Sale: Hammarlund HQ-129X with speaker, \$110; Hallcrafters SX-38, \$190 Central Sideband Slicer Model B with "Q" multiplier, factory wired, plus AP-1 adapter and AP-3 cable, \$45. All w/ gud. F.O.B. W3YTL, 848 Medway Rd., Phila. 15, Penna.

COLLINS 30-S-1: Purchased new this year. Cash & carry; \$1150.00. Srv, no trades and will not ship. L. Macomber, 2 Plumtree, Huntington Station, N.Y. AK 3-726.

GOING Sideband: Must sell Apache TX-1 with D-104, \$225; Hammarlund HQ-170C, \$225; Eimac PMR-8 with AC and DC supplies, \$125; 40 ft. hinge base galvanized tower, with AR 22 rotator, 4 element 10 meter beam, \$110. All equipment with manuals and guaranteed to be in mint condx. K2TCQ, 282 W. 23rd St., Deer Park, L.I., N.Y. Tel. MO 7-7725.

TRADE: KWS-1, 75A4, Rohn tower, rotator, beams. Want: Late automobile or sailboat. Give or take. Tom Hopkins, 7224 Alexander, Dallas 14, Texas.

B&W 851 inductor, unused, \$8.00. K2EGL.

BARGAIN: Engineer-built Warrior KW linear, almost new. Best offer over \$215. F.O.B. Manning P.O. Box 563, Riverside, Michigan.

WANTED: Hamrotor, Spaulding 50 ft. tower, mobile transceiver, GR or HP test equipment, W4FR, Box 73, Thomasville, Georgia.

TERRIFIC Buy! Pacemaker, excellent, \$200. Fvers Mick, W4-KPM, Marion, Ky.

COLLEGE BOUND. Must sell shack! Heath Mohawk mint condx w/spkr, \$225; Heath Seneca w/acc., \$100; Heath HO-10 monitor scope, \$45 or all for \$320. Ralph Jilson, 108 Main St., Bass River, Mass.

SELL: OST Jan. 1947 through December 1962. Best offer for all issues. F. Prote, W1OXT, 487 Pine Rock, Hamden, Conn.

FOR Sale: Hallcrafters HT-30 sideband exciter \$200; Globe linear 400W amp., \$75; Collins 7551 rcvr, \$300; P & H 600A, 4 meter transmitter with matching power supply, \$45. In excnt condx. D. R. Schmieg, WØDRV, 1308 Plank, Burlington, Iowa.

2.5 KW transmitters. Wilcox 96D1 2-450THs in final, 813 driver, Jennings vacuum cap. Exciter will make 300 w. RTTY-c.w. rig. Slide out rack with tubes and blower. Orig. cost \$3500. Will sacrifice at less than 5% of orig. cost. Details: John Stephens, W4YXG, 4 Azalea Ave., Titusville, Fla.

NEED College money. DX-60, in excnt condx, \$65, plus postage. W5BFR, 2105 David Dr., Ft. Worth, Texas.

IGNITION Interference? Mobile operators get complete instructions with detailed schematic to eliminate ignition interference. Send now only one dollar to Erie Instrument Co., Dept. T, P.O. Box 1047, Sandusky, Ohio.

SALE: 6146, 6893, new, guar., 3-\$5; HS-32 headset, new, \$1.50; Variacs, \$5 up; test equipment and parts at low low prices. Free list. Open 1-6 PM. A & B Engineering, 1040 E. 45th St., Brooklyn, N.Y.

COLLINS 32V2 in excnt condx. No modifications. Extra -4D32, \$200. W1BGW, 28 New Haven St., Boston 32, Mass.

NYC Area hams! Sell Heath Pawnee 2-meter transceiver, \$150; Heath Mohican GC-JA receiver, \$75; both less than 6 months old and in excnt condx. Pick-up only. Sry, no shipping! W2GWU, Brooklyn, N.Y. Tel: EV 8-1893 after 5 PM, 115 South 2nd, Brklyn 11, N.Y.

ART-13, less tubes, \$30; ATD xmtr w/dynamotor, 150W AM-cw 160, 80, 40, like new, \$35; National NC 240-D rcvr w/spkr, \$125; Hammarlund SuperPro SP-600-JX, \$600 or best offer. May consider trade for what have you? See ad test gear like HP, Technic, etc. W7LIU, 20277 Avon, Detroit 19, Mich.

HEATH AT-1 and VF-1, \$25; SX-43 with spkr and Q-multiplier, \$85; 28VDC stepping relays, \$1.00; assorted chokes and transformers. F.O.B. WAZ2DD, 38 Appletree Dr., Rhinebeck, N.Y. Tel. TR 6-4762.

SELL Or trade: Scintillator, v/ sensitive radiation detecting instrument cost \$595 new. Will consider high grade ham gear in trade, give or take difference. WØBNF, Box 105, Kearney, Nebr.

VESTO 61 ft. tower, heavy-duty rotator, 3-element 10 meter beam, 250 ft. RG-8/U, Standing, \$100. Disassembled, \$150. Located in Cincinnati, Ohio. Dick Werner, IØ83 Sells Ave., Columbus 12, Ohio.

SELL: Dukane portable tape recorder, \$35; Precise 111 tube-tester, \$30; Webster 50-watt amplifier, \$30; Collaro 3-speed record-changer, \$15. V. R. Hein, 418 Gregory, Rockford, Ill.

TRANSISTOR Power supply, 12v x 250v, \$20; Millen PSN's, unused, \$3; Advance DPDT 15 amp. relays, unused, \$1.00; National XR-62 coil forms, 50¢; Bruning, 2699PC drafting machine, new condx, \$60 or trade. WØLWZ, 1030 So. Dudley, Denver, Colorado.

AF67, DC and AC pwr. supplies, Gonset Superceiver, Super 3S converter, mobile antennas, mikes, Vibropaks, small and large pwr supplies, Variacs, modulation meter, Drake LP filter, meters, relays, miscellaneous parts, 1935-45 OST and Radio magazines, all items reasonable. W3BS, 1012 Wilde Ave., Oxeel Hill, Penna.

SELL: Lampkin type 205A FM modulation meter, dual scale, S/N 4187 used twice, \$200. Emil Kubanek, East Saugatuck, Mich.

WANT For cash—a good complete station. Must be perfect, like-new condx. Offers and complete information: Al Claib, Box 7565, Mexico City.

SALE: Complete mobile station. Cheyenne, Bandsanner w/mount, HB transistor pwr. supply, xtal converter, cables, \$150. Tom Evans, K1JLF, Jelliff Mill Rd., New Canaan, Conn.

SELL: Vesto 61-ft. tower, crankover head, mast clamp, thrust bearing, motor plate, new, never erected, \$495. F.O.B. W3LOS, 138 Chautauqua, Erie, Penna.

WANTED: To borrow or buy the instruction manual covering the Power Monitor SWR indicator made by Airborne Instrument Laboratories. W2ADD.

SELL: QSTS 94/18 to 1959. Mae Paulette, North Troy, Vt.

WANTED: S/Line package: 75S-1, 32S-1, 312B-4, 516F-2. Please quote lowest firm price, condition, and serials. Reward for information leading to recovery of stolen 75S-1, #1690 and 32S-1, #1706. Fr. McCausland, W8HHN/Ø, Chapel #2, Forbest AFB, Kansas. 913-AM6-7289.

NEW RCA 5527 Iconoscope with socket and data sheets. Best offer. R. Mueller, K2SUR, 11 Whitebirch, Pompton Plains, N.J.

SELLING: AM cleaning house. Send for list of tubes, connectors, resistors, capacitors, etc., etc. at vud prices. J. D. Bryant, W4PZO, Box 1715, Coaco Beach, Fla.

WANTED: TS-330/TSM, TS-683/TSM, TSM-537/TSM, HF counter. State price. K8DOT, 4410 Grange Hall Rd., Dayton, Ohio 45430.

CUSTOM Building VHF gear, converter, transmitter, etc. \$32 Mc equipment. Free quotes. Frontier Electronics, Orr 1, Minnesota. Everett. WØHPS, and Frankie Hoard, WØPYC.

FOR Sale: New KWM-2 with Waters rejection tuning, 516F-2 power supply with speaker. Both units still in warranty. No time to operate. Martin, Box 1275, Bluefield, W. Va. Tel. 327-9254.

SELLING Out: No time. Perfect HQ-170, \$239; DX-100B modulator not working, otherwise good, \$115 as is, Mosley 20M beam, \$15. All f.o.b. Wm. Kindler, W3STV, 328 Cluuston, Turtle Creek, Penna.

HALLICRAFTERS SX-99, in exclnt condx. \$95. Will ship. John Boyd, WA0AYP, Egan, South Dakota.

SELLING all ham gear reasonable. Cash and carry. Write for list. W2SUK, Harold Eli Owen, 762 West Lake Rd., Penn Yan, N.Y. RD #5, 14527.

GONSET GSB-100, best of the phasing exciters. This one has had TLC, perf. condx, recently lab realigned. Best offer over \$265. Will deliver 100 miles or ship your cost and risk. Nickerson, Box 1832, New Haven 8, Conn.

SELL DX-100 modified sideband with SB-10. Works sideband and CW. Cliff dweller, none mobile. T. H. Monroe, Jr., W6GGR/4, 2005 Columbia Pike, Arlington, Va.

SELL: Thor 6 transceiver and pwr. supply mod. brand new, hardly used, in orig. carton. Best offer over \$285. WBZCOM, Brooklyn ES 2-1396, 73 Bay 26th St, Brklyn, N.Y.

GLOBE Scout 65B with Heath VFO, \$70; S-85 receiver with S-meter. \$65; SX-28 receiver, \$80; MK II surplus transceiver -12 Mcs. Needs pwr. supply, \$40. Heath 12V vib. pwr. supply, \$18. K2DAC, Larry Finch, 16 Linden Blvd, Great Neck, N.Y.

KWM-2 serial 13,155, used two months. \$825; KWM-1, exclnt. \$350; 32S-1, \$435; 75S-1, \$350; 75A-4, #3310, \$465. W8WGA, Phone 513-2770409.

CRYSTALS Airmail: Kits, SSB, Nets, MARS, Marine, CD, CAP, etc. Custom finished FT-243 .01% any kilocycle 3500 to 8600 \$1.75 (five or more mixed or same frequency F1-243 \$1.50) (ten or more same frequency FT-243 \$1.25) 1500 to 1709 \$3.95, 1710 to 21,000 Kilocycles \$2.25. Overtones supplied above 10 megacycles.) Fundamentals 10,000 to 13,500 \$3.25. Add 50¢ each for .005%. Above 2000 add 65¢ each for HC-6/u hermetics. QST kits (FT-243): "SSB Package" five mixer \$11.95, seven matched filter (FT-241-A) \$11.95; "DCS-500" "IMP"; "Phasing" \$9.95/set. 400 to 500 Kilocycles .01% FT-241-A \$2.95. HC-6/u \$5.95. Add \$1.00 for .005%. Write regarding specific needs. Airmailing 10¢/crystal. Surface \$6. Crystals since 1933. C-W Crystals, Box 2065-Q, El Monte, California.

SPECIAL! Sylvania 30 KV VTVM probes, new, cartoned. Orig. \$15. Our price only \$1.95. Attention: We buy all types of tubes and test equipment. Top prices paid. Rex Radio Supply Co., 84 Cortland St., N.Y. 7, N.Y.

OSCILLOSCOPE. 5" Eico model 425, factory wired. New condition. \$50 delivered. W1MZB.

WANTED: SRT-145 units number 1,2,4,6,7 and 11C. Also AN/ARC2 Collins Transceiver. R. Gonzalez, 2504 East Engin. Bldg., Ann Arbor, Mich.

HIGHEST Offer takes exclnt HQ-110 and fair condx DX-100. Will ship. Mike Jacobs, Box 535, Davenport, Iowa.

SX-100 in meticulous condx. \$150. F.o.b. N. Hale, W0JTH, 1220 W. Essex, Kirkwood 22, Mo.

JOHNSON Gear: 250-23-3 Matchbox, \$70; CW/phone Monitor, \$15; P & H audio compressor/amplifier AFC-2, \$40; Heath DX-60 transmitter, \$60; B&W electronic TR switch, \$50. Exclnt to perf. condx. Ten percent extra discount for the lot. W. Harris, No. 7 Belvoir Circle, Chattanooga, Tenn. 37412.

WANTED: Collins 51J-2, 3, 4, R-388, R-390, R-390A, R-391, 51S-1 Teletype, test equipment. Cash or trade for new amateur equipment. SELL: 200V \$649., Ranger \$159., 75A2A \$269., URA8A converter scope indicator, wide-narrow shift \$225., URA8A Comparator \$95., FRR-23 low freq. receiver \$245., Hechme automatic CW keyer \$125., CW tape perforator \$175., Althronics-Howard Co. Box 19, Boston 1, Mass (Richmond 2-0048).

WANTED: Collins mechanical filter 1.5 or 2.1 Kc for 75A4. K2MLB, Frank Grosso, 45 Rock Spring Ave., West Orange, N.J. HQ-150, immaculate product detector, fast AVC, built-in, vernier knob, spare tubes, manual. Gone home-brew. 127.50 F.o.b. W8VOB, Roger Hamel, 28409 Herbert, Madison Heights, Mich.

TRADE Heath Shawnee in perf. condx for Heath Pawnee in similar condition. Robert Thornton, 1402 Nelchina St., Anchorage, Alaska.

SELL: PL-172, new, W2EVV, Leon Steinberger, 55 Lenox Road, Brooklyn 26, N.Y. Tel. BU 2-4737.

SELL: Surplus signal generator, homebrew mobile PS, transformers. Best offer. WB2GGW, 32 Overpeck Ave., Ridgfield Park, N.J.

UNUSUAL Opportunity! Have to clean out accumulation of equipment, raddets, tubes, parts every ham wants cheap. Needs? List for stamp. W4AP1, Box 4095, Arlington, Va. 22204.

SR-150 AC-DC pwr. supply. Mobile rack. In mint condx, 3 months old. \$625, complete. R Bartholow, W4CFN/9, 700 Marine Dr., Portage, Ind.

SELL: SX-88, NC-240C and SX-24 receivers. Viking I and Viking 122 VFO. Will not ship, sry. Seven R. Hesla, W0NAN, Waterville, Iowa.

SELL: Apache TX1, \$200; SB-10, \$50; HQ-110, \$150; Dow-Key relay, Mod. DK60C \$10. Drake 1000LP filter, \$5; Calrad Crystal mike, \$5; B&W 55A coax switch, \$5; Hy-Gain 5B10T trap doublet, \$5; Hy-Gain 14AVS vertical, \$5, in exclnt condx. Package deal, \$400 plus shipping. D. E. Thacker, K4TUD, Rte. 1, Dayton, Va.

WANTED: KWS-1 preferably without pwr. supply; KW-1; Johnson desk kilowatt, Ray, W2LNP, 134 Wheatley Rd., Glen Head, N.Y. Tel: 516-626-1584.

WANT Copies, in gud condx. Modern Radio published by Kraus in 1932; the Oscillator, published by P. E. Wipazin and Radio Engineering Society of Pittsburgh, 1921-22 and Pacific Radio News published West Coast in 1921. State issues available and price. Marcy, W4ID, 461-3rd Ave., Sea Park, Eau Gallie, Fla.

FLORIDA Lot: 100 x 300 ft., 25 miles north of Panama City. Value: \$750. Will trade for radio equipment. Interested in F/W Viking 500 or what have you. John H. Ashley, W4OSC, Box 254, Ware Shoals, S.C. 29692.

GONSET G-50 6M transceiver, brand new condx. \$195. Write S. Banks, WA2PTG, 2630 Kinsbridge Terrace, Bronx 63, N.Y.

COLLINS 75S-1, \$325; 75A-1, \$200, factory wired Valiant, \$275; NC-125, \$75; pair 3850 KC BC-611 handie-talkies, \$50; Johnson TR switch, \$15; Elmac A54, \$42; PSA-300 AC supply, \$20; all in gud condx. Ship prepaid on receipt of certified check or m.o. Want W4M-2 and AC supply. State details in first letter. David Hohlstedt, 2216 South Broadway, Wichita, Kansas. MU 4-4424.

NEW Topaz mobile power supply C10WDD, 12VDC in 650 VDC 385 Ma, 270 VDC, 130 Ma., relay, \$60; Astatic matching transformer 1-1-6, \$5; new 7094 tubes, \$11; pair BC611 walkie-talkies, \$50; Polycom 6 and 2 meter transceivers, \$195; P&H 400C linear, \$125; Hammarlund HX-500, \$495. HQ-180C with clock and spkr, \$310. Williams, 64 Prospect Ave., Hackensack, N.J.

HAMMARLUND Super Pro receiver SP-400-X 5 to 30 Mc., \$95. 522 transmitter (new), \$15; 12 volt 522 dynamotor, \$10; Cece-Neville 6 volt alternator, 60 amps, \$25. PE-103 new \$10. (2) 832-A tubes (new) \$3.00 each. Peter Boudreau, 10 Forbes Ave., Burlington, Mass.

COLLINS 75A3 3 kc filter, no spkr. In exclnt condx. \$295. W4-MFW, 3197 Harris Drive, East Point, Ga.

SELL: Waterman S-11A pocket scope, \$45; OM-14 freq. meter with calibration and instruction book and power supply, \$45. Jim Manship, K4ET, Rte. 3, Box 246-D, Greensboro, N.C.

SALE! Complete station: Collins 32S-1 with military type power supply, Collins 75S-1, Barker & Williamson L-1001-A 1 KW linear; matching power supply using silicon diodes, sealed transformer, Variac, meters and relay supply, rack-mounted. Mosley TA33, SR. 40 ft. alum. mast, CDR rotator, D-14 mike and other extras. Complete package, ready to go! \$1295.00. Colin A. Campbell, W1PPD, 20 Lois St., Danbury, Conn. 748-8152.

HEATH Mohawk with spkr, \$210. Absolutely in perf. condx. WA2SEU, Burmaster, 3823 Macklem Ave., Niagara Falls, N.Y. F/W Valiant, HQ-170, D-104 and connecting cables, \$500. K1OBA.

FOR Sale: HQ-110-C, \$150; DX-35, \$35; VFO, Heath, \$15 with P.S., all in time working order. K1TVY, William McIntosh, 52 Rotch St., New Bedford, Mass.

POLYCOMM PC-6, 6 meter transceiver and HiPar halo, \$200. K1QQT, 22 Woodridge Rd., Wayland, Mass.

TRANSMITTER: Harvey Wells T-90 with pwr. supply. In brand new mint condx. A small compact xmt with all the features. A6WV. Write to The Model A man, Neil Kysyth, WA6CRS, Clarion, Iowa.

SALE: Components of the IRE, 1957 through 1962, \$2.95 a year, \$293/\$E29 tubes \$2.95 each. You pay postage. Charles Gardiner, W2TB, 39-20 220th St., Bayside, L.I. N.Y. 11361.

FOR Sale: Best offer: 417A 2-meter converter, Heath GP-11, K3BCV.

BARGAINS K-W-P.E.P. transformer, chokes, \$20; Johnson Adventurer, VFO, Modulator, \$35, 600V 400Ma supply, \$12. Signal Generator, \$15. K2KGU, MO 6-8513, 420 Riverside Dr., N.Y. 25, N.Y.

BARGAIN Priced factory-wired Valiant, \$225. Guaranteed electrically perfect. R. B. Cooper, W8AQA, 132 Guild St., Grand Rapids 5, Mich.

SELL: Collins 30L-1 linear amplifier, never used. Sold my KWM-2, and first check for \$385 takes it. Serial No. 10015. Price is firm. W9HOM/O P.O. Box 5962, St. Louis 34, Mo.

SELL: HQ-180C, \$300; AutoMate (equivalent Hallicrafters TO) electronic keyer with Vibroplex Vibrokeyer, \$50. 1959 Cushman Eagle motor scooter, \$250. Fully equipped. Scotty, K0GTTG, Seneca, Nebr.

75A4, No. 5000, 3.1-1.5-500 cycle filters. Cleanest creambuff available. \$575. Write W2RLI, Joe Crags, 111 Copeland St., Rochester 9, N.Y.

SSB Station, complete: Drake 2B with xtal calibr., \$225; Apache-SB10 (professionally wired, matched pair) with Dow-Key relay, \$325. Will be willing to deliver within 200 miles radius. First check \$525 takes all. WA2QNW, 548 W. 51st St., NYC 19.

FOR Sale: HQ-150, in exclnt condx, built-in xtal calibr. and Q multiplier, \$200; DX-100, late model, professionally wired, \$150. If package deal on above, additional accessories will be included. Globe Chief 90 with Bud lo-pass filter, \$45.00. Custom-built, E. H. Scott, console D-381 (1930's), \$100. Looking for KWM-1, W8SZF, 3075 Scarborough, Cleveland, Ohio.

QST run for sale: 1934 through 1960, complete with 1934 through 1947 in binders. Make offer. Send for equipment and parts list. W4UW, Box 4061, Roanoke, Va.

G-50 Six-meter transceiver. Appearance and performance as brand new. \$750 or trade for ham-band receiver of comparable value and condition. All offers answered. Mike Hauer, 351 West 34th St., NYC, WA2TRX.

FOR Sale: HQ-140 X, B slicer, AP-1, xtal calibrator and 50 Mc converter, all for \$160. W0CV, 715 West Chestnut St., Junction City, Kansas.

SELL: KWM-2, No. 11287, AC, DC pwr. supplies, Mobile Mount and mike. \$1000. W4BLX.

COLLINS 75A-3 for sale Best offer over \$300. In perf. condx. Will be willing to ship. J. Milton, W2OCG, 3 Henry St., Great Neck, L.I. N.Y.

NC-300. Immaculate, with matching spkr and xtal calibrator. \$215.00. John Kane, 1518 Longfellow Dr., Cherry Hill, N.J. SELL: SX-28, \$80; DX-20, \$30; Q-multiplier, \$8. Complete outfit: \$100. William Simpson, 115 Harvard St., Alexandria, Va.

75S-3, \$495; 32S-3, \$540; 516-F2, \$80; 30L1, \$380. New, local pick-up deal only, sry. Tim Apostolos, WIKY/G/6, 866 Cornwall Court, Sunnyvale, Calif. Tel: 736-1018.

KNIGHT R100A, S-mtr., spkr. In exclnt except needs alignment, \$75.00. WA2VHR.

DETROIT Area: Navigator for sale, like-new condx, exclnt wiring job: \$80. J. Ladd, W8BJO, 5775 Kingfisher, Clarkston, Mich.

SX-101 MARK III-A, \$190.00; BC221AA freq. meter AC instructions, \$58. Gardner, 53333 Waterman Blvd., St. Louis 12, Mo.

COLLINS 75A-4, three filters; KWS-1, extra tubes. Looks and works like brand new. \$100. Come and get it. W2MFS, Dan Wolfe, 37 Hridge Rd., Hartsdale, N.Y.

MOBILE: Must sell Heathkit MT-1 transmitter and HP-10 power supply in exclnt condx. Will consider trade for receiver or HF amp. W8EAB, 8534 Kirkwood, Chesterland, Ohio.

FOR Sale: Heathkit Marauder, factory checked: \$300. Alien Strong, K4JVQ, 2006 East Robson, Tampa, Fla.

FOR Sale: Drake 2B with O-mult., spkr and xtal calibr. in mint condx, used but little. Need money for college. \$269.00. Tom Lund, W6SVO, 2233 Lafler Rd., Los Angeles 32, Calif.

WANTED: Mechanical filter Collins #F-500B-31 or F-500B-60, W7YIG.

FOR Sale! SX-100 and spkr, used only 20 hours. \$245.00: Viking I. \$100. Need money for school. Ralph Payne, K5ZTQ, 259 Pentland, Baylor University, Waco, Texas.

HAM Buergers, used equipment, money-back guarantee: B&W 51SB, \$399.95; Globe Chief Deluxe, \$65; Globe Scout Deluxe, \$109.95; Globe Champ 300A, \$285; Gonset G-76 AC PS, \$125; Gonset G-76 transceiver, \$375; Hallicrafters SR-34, \$274.95; Hammarlund HQ-129X/spkr, \$139.95; HQ-180C, mint, \$369; Johnson Viking II, \$149.95; National NC-300, \$239. Trades: Write for Free List. Ham Buergers, Wyncote, Penna. CA 4-1740 or TU 7-7350.

SELL: Hallicrafters SX-115 receiver and speaker. In exclnt condx. Will ship prepaid for \$475. A. J. Worth, 10560 Fairlawn Dr., Cleveland 30, Ohio.

TOROIDS, 88 mhy., 60¢ each or 5/\$2.50. Fasold WA6VVR/WA6FKN, Box 34, Dixon, Calif.

HOWARD Radio: We take pride in our top operating, clean used gear all of which have been reconditioned and carries a 30-day warranty. Listed below are a few bargains from our \$30,000 stock of used equipment. KWS-1, \$875; 75S-1, \$395; 32S-1, \$535; Viking 500 FV, \$495; Vik KW w/rf det, \$595; Invader 700, \$495; Valiant, \$290; HX-500, \$495; HQ-170C, \$295; HR-50R, \$175; HX-500 and spkr, \$215; NC-183T, \$210; Globe 500B, \$395; SX-01A, \$295; RME 6900, \$275; B&W 5100B and 515B, \$375; AF-67s, \$75 and up, and many others. Write for free new and used list. Cash or trade. 1475 Pine St., Box 1269, Abilene, Texas. P. OR 2-9501.

KWM-2 owners, save 50%. Brand new MPI mobile supply and 351d2 mount, \$160. W9LOI, 606 Campbell St., Joliet, Ill.

TOO Much gear: SR-150, 3 months old. Best offer over \$580.00. K5GGU, 3501 Cherryhill, Garland, Texas.

NEED Money at medical school. DX-100; RME 4350A; VOX; antenna relay; microphone; code monitor; cables; new tubes in DX100B, \$410 for all. Everything works perfectly. K8GJM, 20942 So. Woodland, Shaker Heights, Ohio.

SELL: DX-100 transmitter. Good condx. K5HGF, Box 937, Abernathy, Texas.

BOOST Reception: 3.5-30 megacycle SK-20 Preselector kit, \$18.98. Boost modulation, AAA-1 clipper-filter kit, \$10.99. Reduce noise, NC-7 noiselector, JF, wired, \$4.49 postpaid! Literature free. Holstrom Associates, Box 8640-T, Sacramento 22, Calif.

WEST Los Angeles Area: Repair and Calibration service for all communications gear and all test equipment. Also: used test equipment. Phone 24 hrs. a day. Panco, 2112 Pontiac Ave., WLA 25, Phone 477-4761.

HAM Discount House. Write us for lowest prices on Ham Equipment. Factory sealed cartons. H D H Sales Co., 170 Lockwood Ave., Stamford, Conn.

NEED 51SB. Have B&W 5100. Want to go Single Sideband. K4TSH.

WANTED: Model 18 HT Hy-Tower. State condx and best price in your first letter. E. Titcomb, 8 Surrey Lane, Rolling Hills, Calif. Tel: FR 7-3508.

WANTED: Telrex 5 or 6 element beam for 20 meters. Deal within 200 mi. radius please. Dave Haymond, W1HN, 61 Norwood Road, West Hartford, Conn. 232-2483.

"HOSS TRADER" Ed Moory, opens the barn door on package deals: New KWM-2 with used mobile mount and DC supply, \$1152.00; new TH-4 beam and demo Ham-M Rotor, \$168; new Swan Tri-Bander & dcom supply, \$369; Will allow \$305 on a 2B toward new Collins 75S-3; "Used Horse-Thief Specials": HT-37, \$289; A, \$169; 2-B, \$189.00; HT-32-A, \$379; 75A-4, \$419.00. Used 75 meter Swan, \$159.00; New Johnson Invader 2000 conversion, regular \$619.00, special: \$429.00; new Electro-Voice microphones Model 729, \$9.95; used KWM-2, serial 11,000, \$785.00; Johnson Invader, \$395; Thunderbolt Linear, \$229; Terms: Cash. Money Wholesale Radio, Box 506, DeWitt, Arkansas. Tel: WHitney 6-2820.

SELL: Lafayette HF-50 all modifications—\$50 or best offer. Paul Mayo, Cowell Rd., Salem N.H. W1ADX.

COMPLETE Station: Hallicrafters SX-140, \$112.00; HT-40 \$30.00; HA-5 V7 O with crystals \$72.00; relay, mike, speaker, \$31.20. All for \$300. W5LDM, 29 Snipe, New Orleans, La.

SELL: Heathkit HW-10 6 meter transceiver complete with cables and mobile whip, \$125.00. Gud condx. Merton Robinson, K6PIX, 1401 E. Essex Dr., La Habra, Calif.

FOR Sale or swap for G-76; NC-155 receiver 80-6 meters, one month old. \$145.00; HT-40 trans. 80-6 meters 18 months old, \$65.00; Globe 755A VFO, needs dial assembly, worked good, \$20.00 Interested in G-76, Mini-Products ant, B-24, or what have you. K1QWJ, 216 Sawyer St., New Bedford, Mass.

E-Z Way crank-down foldover heavy-duty tower, model old, cost \$400. Will sell for \$250.00. W3GKM, A. Young, 28 Durham Road, Ellicott City, Md.

MUST Sell Valiant, factory wired \$270; NC-300, \$195.00, or \$420.00 for both items. Excellent equipment. WA6HTV, Robert Rissman, 4258 Kling, Burbank, Calif. Phone 849-4517.

SALE: SX-101A, in excellent condition, \$225.00; Johnson Ranger, \$130.00, in excellent condition. Going mobile. HY 9-6691. WAZFNI.

COLLECTION OF QST magazines dating from 1915 to 1934. Will sell to highest bidder. Communicator or write: Miss Jessie York, Box 130, Downsville, N.Y. Phone Downsville 3-1582.

COMPLETE Station: 2000 watts P.E.P. SSB, 1000 watts A.M. Hallicrafters T.A. factory modified to 33B; spare PL 172, \$400.00; HT-37, \$350.00; SX-101A \$275; Johnson K W Matchbox with coupler, \$90. All connecting cables and semi-consol operating position. Prefer to sell complete station for \$1000. Sry, will not ship. F. N. Klooster, W9MIR, 7318 West 119th Place, Palos Heights, Ill.

HEATHKIT Mobile: Cheyenne Comanche, AC, DC power supplies, mike, speaker, cable, mounts, all in excellent condition. Best offer takes. K0CCU, Denny Eschlimen, 210 West 32nd, Kearney, Nebraska.

FOR Sale: Johnson Ranger II, factory-wired, \$240 and Poly Comm 62B, \$260, both in like-new condition. Will ship. John Christianson, WA9EDG, 22 W. 431 Elmwood Dr., Glen Ellyn, Ill.

QST Magazine file in excellent through 1956 for \$75.00. Eugene Butt, P.O. Box 569, Kerrville, Texas.

COLLINS KWM-1, 351D-1, 312B-2, 516E-1, good condition. Complete. \$650. John Evans, 65 W. Oak St., Ramsey, N.J.

VIKING II, factory built, good condition, for sale. Carl Fisher, WOHIK, Carbondale, Kansas.

SWAP: Aesa camera, 1:2.8/150, like new, for good ham receiver. Backus, WVSF, Millers Tavern, Virginia.

SHACK Sweepin' Season: Most equipment in exclnt condx. Quotations write or name for descriptions/list other gear. Light Tunnel Dipper, \$26.00 postpaid; mobile SSB HX-20, \$145.00; HR-20, \$95.00 or both \$225.00 (write); 3x MTR SSB HX-30, \$155.00; Tapetone No. 345 receiver, \$135.00 or "perfect pair", \$275.00; GW-11a CB, \$48; FM portable (GR-61), \$28; O-Multiplier, \$9.50, 225 watt 52.525 Mc. FM base station, \$125.00; damaged Mosley 40-mtr. beam, \$24.00; Johnson Navigator, \$105.00; transistor speaker, \$4.00; Want Hallicrafters SR-70 to 143 mc.; Jim Trout, W8GGK, Route 1, Box 724, Stevensville, Mich.

FOR Sale: Collins 75A-4, serial #2193 with 3 filters (factory reconditioned); KWS-1, serial #1117, Multiphase RF analyzer, Model MM2, \$1400.00. John Hanayk, K2GWD, 1131 Belden Ave., Syracuse 4, N.Y.

GONSET G-50 transceiver, \$200; Hallicrafters S-130 receiver, \$40.00; Both in like-new condition. Locascio, 8420 51st Ave., Elmhurst, N.Y.

COLLINS 75A-4 serial No. 786, real clean. Will take best offer over \$325.00. P. J. Giacoma, 615 N. 9th Street, St. Louis, Mo.

VIKING Ranger with time sequence keying in excellent condition, \$125.00. WA6MGO, 213 N. Dianthus, Manhattan Beach, Tel: FR 4-4318.

SACRIFICE Mint condx. Viking Invader, \$450.00; RME 6900, \$600; \$275.00; Hy-Gain DB-24, \$100.00; Ham-M rotor, \$100.00; Rohm follow-tower, #25, \$150.00. K3TKA, 408 Mallard, Feasterville, Penna.

SHAWNEE 6 meter transceiver for sale. Less than three months old and is in perfect condition. I must sell for personal reasons. \$180.00. Bill Robbins, WA6GCP, Dalmation, La Mirada, California. Phone: 714 LA 13379.

KWM-2 with 516F-2 and MP-1 power supplies. Like new condx, never mounted: \$925.00; 75S-1 in mint condition, \$340.00. Direct sale only, no shipments. W7ZJI, Glen Harding, 2737 Pierce Ave., Ogden, Utah.

WANTED: Tubes, all types, write or phone W2ONV, Bill Salerno, 243 Harrison Avenue, Garfield, N.J. Tel: GARfield 471-2020.

SALE: Globe King, 500-C, \$290; Hallicrafters S-40A, \$50.00; Eldico TR-75A, \$20.00; Heath A-7 6 watt amp, \$15.00; Transistor code oscillator mon., \$12.00; CDR TR-2, \$20.00; Sams Vol. 1-20 and Binders \$12.00 each. Precision TVM, \$35.00; 1075 TV-Analyst, \$50.00; Precision Mod-300 "R" scope, \$50.00; Precision E-400 sweep generator, \$65.00; ARC-5 2 mtr. receiver, \$10.00; 32-el. Cush Craft 2 mtr. collinear, \$40.00; Minolta camera w/flash \$20 (or trade); Kodak 828 Pony w/Flash, \$20.00 (or trade); Heath color bar can., \$40.00; Simpson Capacometer, \$45.00; Keystone 8 mm turret with light meter and lenses, \$60.00 (or trade); 6146's new, \$4.25; B&K 360-VOM, \$40.00; Lampkin 105-B w/Ham Gen. and attenuator, \$180.00; George Magera, W4YLT, 107 McIntyre St., Mullins, S.C.

PMR-7 and AF67, in exc. condition. First \$150.00 check f.o.b. Chicago sets mobile trims. J. Abramson (K9KWV), 522 South Dearborn St., Chicago 5, Ill.

POYLCOM 62B transceiver, mike, cables, bracket, manual, etc. Just realigned and checked, 7 watts RF output on 2 meters, 12 watt on 6 meters. Best offer for mobile locally \$280.00. Also: TV B/U tube tester, very latest data, \$100.00. K2VEY, SW 6-8486.

NEW: Collins 312B2, \$75.00; Gonset 3156B, \$95.00; Hammarlund HQ-110, HQ-180C, HQ-170, Ham net, less 1075 Hallicrafters G2 trans., \$145.00; Navigator kit, \$100.00. Used Hallicrafters HT-33, \$250.00; Elmac AF67, \$50.00; PMR6A, \$40.00. Genese Radio, & Paris Co., Inc., 2550 Delaware Ave., Buffalo, N.Y. Tel: TR 3-9661.

SELL: 275-watt Johnson Matchbox with indicator and directional coupler, \$65.00; Johnson low-pass filter, \$10.00; mobile rig, Gonset Super 12 converter 10 thru 80 plus noise-limiter plus Ameco xmtr TC86 plus mike plus Honeywell transistorized pwr. supp., \$185. Sry, no shipping. W2MNB, Leo Israel, 35 Henry Dr., Glen Cove, L.I., N.Y. OR 6-7046.

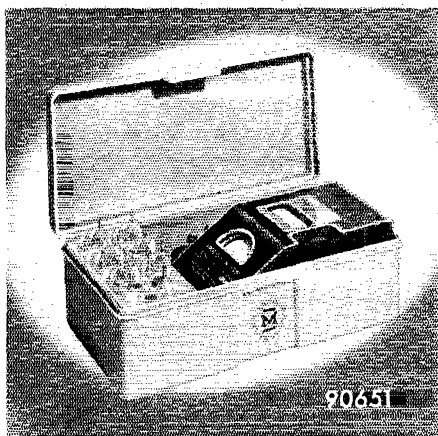
COLLINS 351D-2 mobile mount, \$60; KWS-1, extra set of new tubes including 4X250. Waterman 'scope, \$95.00; 75A4, extra set new tubes, 3 filters, Collins station control with rotor, \$600. One price, \$1350 takes all. Exclnt condx. Would prefer local deal. WA2IZU, Bill Schiffrin, 212-PV-9122, 15 Family Lane, Levittown, L.I., N.Y.

KNIGHT R100A, S-mtr., spkr. In exclnt condx except needs alignment. \$75.00. WA2VHR.

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The No. 90651 MILLEN GRID DIP METER is compact and completely self contained. The AC power supply is of the "transformer" type. The drum dial has seven calibrated uniform length scales from 1.5 MC to 300 MC plus an arbitrary scale for use with the 4 additional inductors available to extend the range to 220 kc. Internal terminal strip permits battery operation for antenna measurement.

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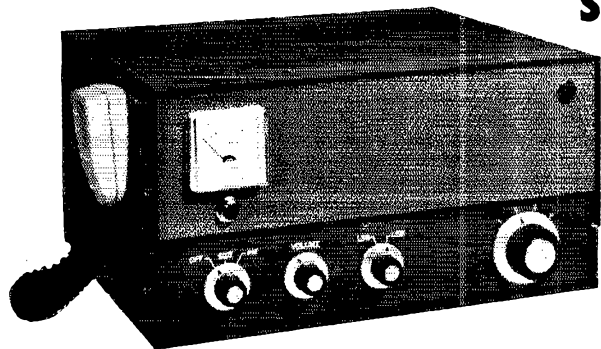


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The *NEW COMPACT Series*



SSB TRANSCEIVER

SUGGESTED LIST PRICE Upper Sideband

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- 2 Channel\$795
- 3 Channel\$870
- 4 Channel\$925

COMPLETE with coils, ovens, channel crystals and mike. Fully aligned and ready to operate.

The new COMPACT Series of single sideband transceivers are priced for use in applications formerly reserved for AM radiotelephone equipment. The COMPACT can be equipped for 1, 2, 3 or 4 channel operation, upper or lower sideband only—or selectable sideband. Channels can be set anywhere between 1.6 and 16 Mc. Power output is 100 watts, p.e.p. Compatible AM is standard, as is the front panel meter.

The COMPACT weighs only 34 pounds and measures 15½ x 13 x 8¼ inches, *including power supply*. Automatic level control (ALC) and receiver AGC are standard. A Collins mechanical filter is used for sideband selection. Remember, under poor signal conditions, the COMPACT has approximately the same communications range as a 700 Watt AM transmitter. Can be used to drive the RF-101 Linear Amplifier.

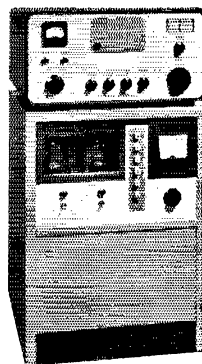
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RF-101 LINEAR AMPLIFIER



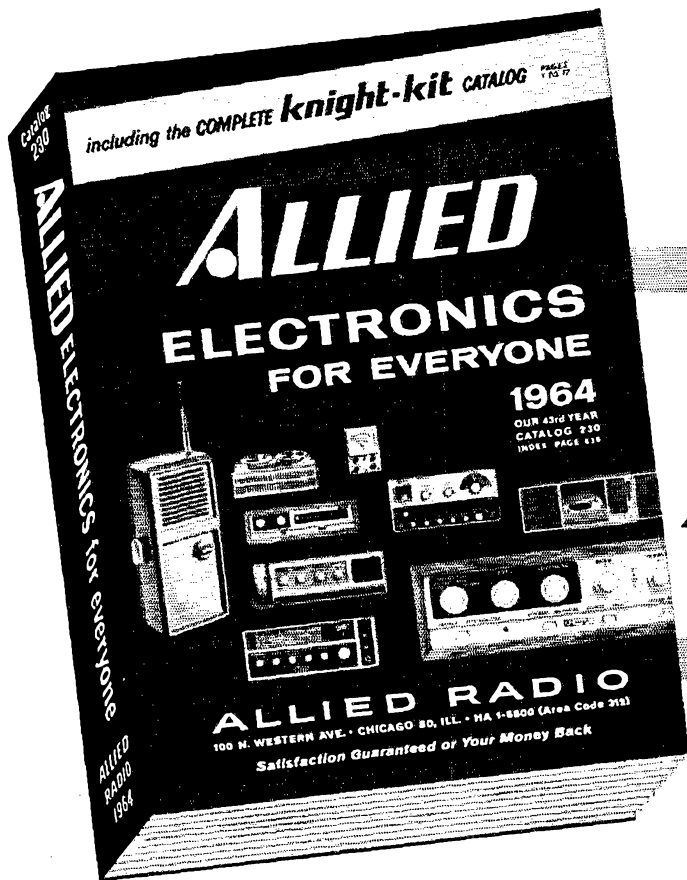
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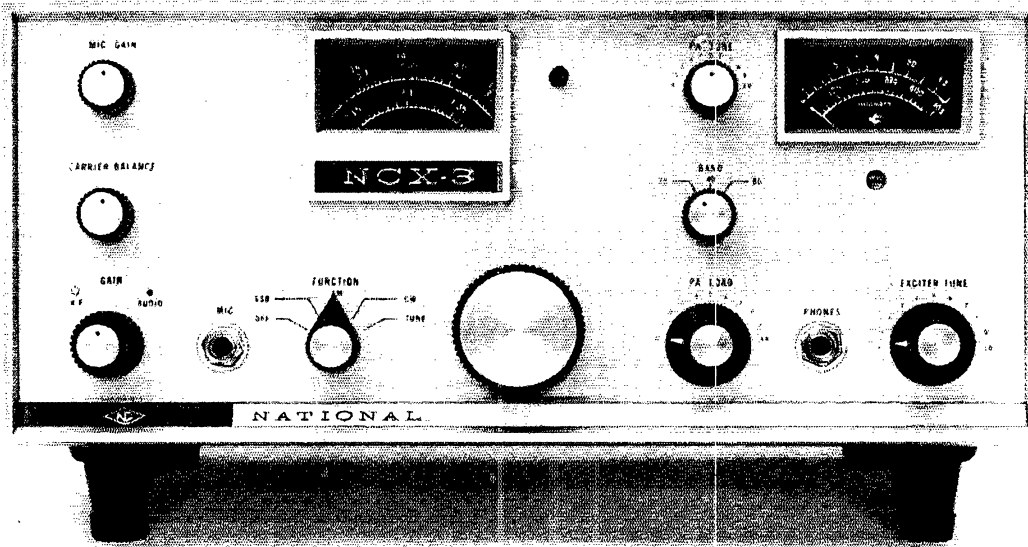
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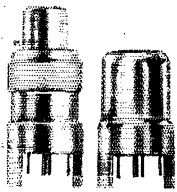
RCA NUVISTOR QUICK-SELECTION CHART

RCA TYPE	CLASSIFICATION	INTENDED APPLICATIONS	RCA DARK HEATER Volts/Amp.	CHARACTERISTICS, CLASS A ₁ , AMPL.				MAX. RATINGS, Design—Max. Values				
				Amplification Factor	Transconductance μ hos	Plate ma.	Plate Volts	Grid Volts		Cathode ma.	Plate Dissipation Watts	
								Neg. Bias.	Pos. Bias.			
2CW4	High- μ Triode	TV, FM VHF Tuners	2.1/0.450	65	9800	7	135	55	0	15	1.5	
2DS4	High- μ Triode*	TV, FM VHF Tuners	2.1/0.450	63	9000	6.5	135	55	0	15	1.5	
6CW4	High- μ Triode	TV, FM VHF Tuners	6.3/0.135	65	9800	7	135	55	0	15	1.5	
6DS4	High- μ Triode*	TV, FM VHF Tuners	6.3/0.135	63	9000	6.5	135	55	0	15	1.5	
13CW4	High- μ Triode	Antenna-System Booster Amplifiers	13.5/0.060	65	9800	7	135	55	0	15	1.5	
Types subjected to special tests and controls.											MAX. RATINGS, Absolute—Max. Values	
7586	Medium- μ Triode	General-Purpose RF Amplifier to 400 Mc RF Oscillator to 800 Mc	6.3/0.135	35	11500	10.5	110	55	4#	15	1	
7587	Double-Ended Sharp-Cutoff Tetrode	General-Purpose RF Amplifier to 250 Mc RF Oscillator to 850 Mc	6.3/0.150	—	10600	10	250	55	2#	20	2.2	
7895	High- μ Triode	General-Purpose RF Amplifier to 400 Mc RF Oscillator to 800 Mc	6.3/0.135	64	9400	7	110	55	2#	15	1	
8056	Medium- μ Triode	Low B+ Type (12 to 50 V) RF Amplifier to 400 Mc RF Oscillator to 800 Mc	6.3/0.135	11.5	7500	8.7	50	55	2#	15	0.45	
8058	Double-Ended High- μ Triode	Cathode-Drive Amplifier to 1200 Mc RF Oscillator to 1200 Mc	6.3/0.135	70	12400	10	150	55	0	15	1.5	

*Having special cutoff characteristic approaching that of a semi-remote cutoff tube

Peak-positive value

Which RCA Nuvistor for your Circuit?



RCA Nuvistors—actual size

This chart shows you at a glance the ratings and characteristics you will want to know when selecting nuvistors for that new high-frequency job.

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**WIDEN BANDS BY EFFICIENT OCCUPANCY
INSPIRE GOOD OPERATING BY EXAMPLE**

The AMERICAN RADIO RELAY LEAGUE in view of increasing congestion in our limited frequencies, urges upon all amateurs a generally strict observance of the following principles, and some suggested operating procedures:

MAKE proper choice of bands below 30 Mc. for DISTANCE to be covered.

ACHIEVE equipment flexibility. Build, acquire, arrange equipment and station controls so you have a *choice* of all the frequency bands; make provision for changing *Power* quickly as well as *Band*.

USE minimum band width, consistent with good engineering practice, and compatible with the mode of transmission being employed.

EXPAND your use of v.h.f. for LOCAL contacts wherever possible. Aim to conduct SHORT DISTANCE communications in this part of our frequency spectrum.

ADJUST to minimum power necessary to communications. (Sec. 324, Comms. Act.)

IN OPERATING

LISTEN with care before transmitting and in the course of making contacts to minimize conflict in channel use.

BE BRIEF and this will make contacts with you a pleasure. Whether c.w. or voice is used, be concise; avoid monologuing or speech-making to make on-the-air work more pleasurable.

DUMMY-ANT should be switchable for tune-ups. Keep unnecessary testing and transmitter-adjusting for resonance, or output, off the air.

USE VOX or break-in c.w. Such operation will raise the effectiveness of your time on the air, and the efficiency of your exchanges with other amateurs.

SWITCH to the band adapted to your DX purpose. Avoid the unnecessary use of DX frequencies for short distance contacts.

USE *minimum power and band width*, as required by regulations, with respect to the authorized mode you are using.

MONITOR preferably with gear that *directly samples* your on-the-air signal. This aids c.w. keying and detection of any defect. Scope and receiver checks* are recommended, to avoid flat-topping, splatter or over-modulation effects.

FOR A CLEAN SIGNAL

CHECK* operating conditions regularly. Re-check transmitters for harmonic suppression, freedom from clicks or chirps, or gain control or other limit points beyond which splatter, flat-topping and spurious effects occur.

FOR LOCAL CONTACTS USE LOCAL FREQUENCIES; BANDSWITCH! MAKE OPERATIONS CLEAN-COURTEOUS-CONCISE PASS ON ACCURATE HONEST SIGNAL REPORTS. INCLUDE TACTFUL MENTION OF ANY SIGNAL DEFECT . . .

*For reference:

1. How to Run Your Linear (On avoiding spurious radiations). Nov. '62 *QST*, page 11.
2. Looking at Phone Signals; the Receiver as an Analyzer. Pages 46-49 Dec. '62 *QST*.
3. Checking Signal Quality with the Receiver

- (Test Set Up & Dummy Ants.) Page 34 Mar. '63 *QST*.
4. Criticizing c.w. Signals. June *QST*. Page 53.
5. Testing Your Keying, Pages 245-256, *The Radio Amateur's Handbook* ('63).

A.R.R.L. Communications Department

Operating Aid No. 11