

April 1966

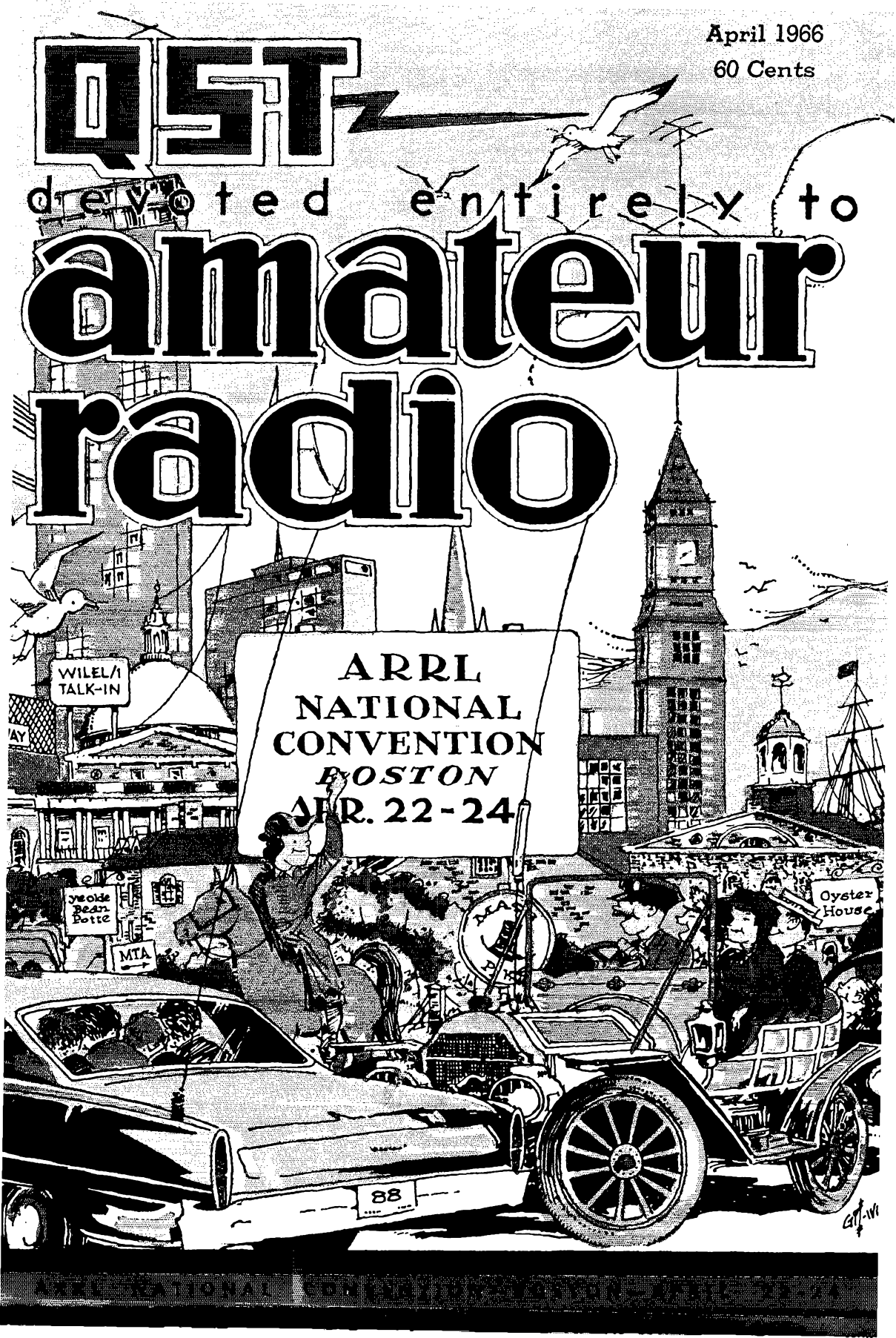
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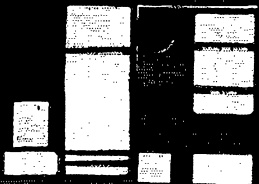
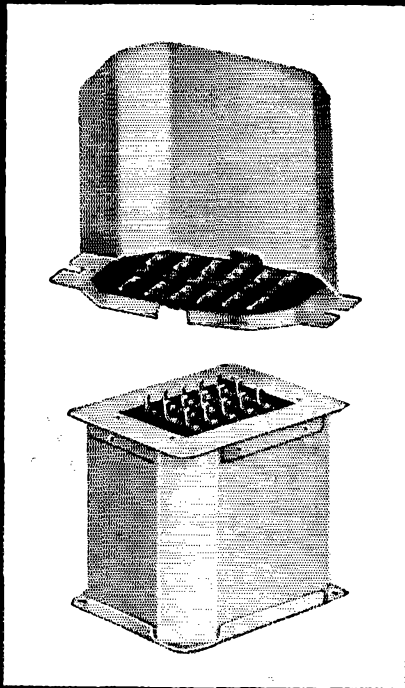
Oyster
House

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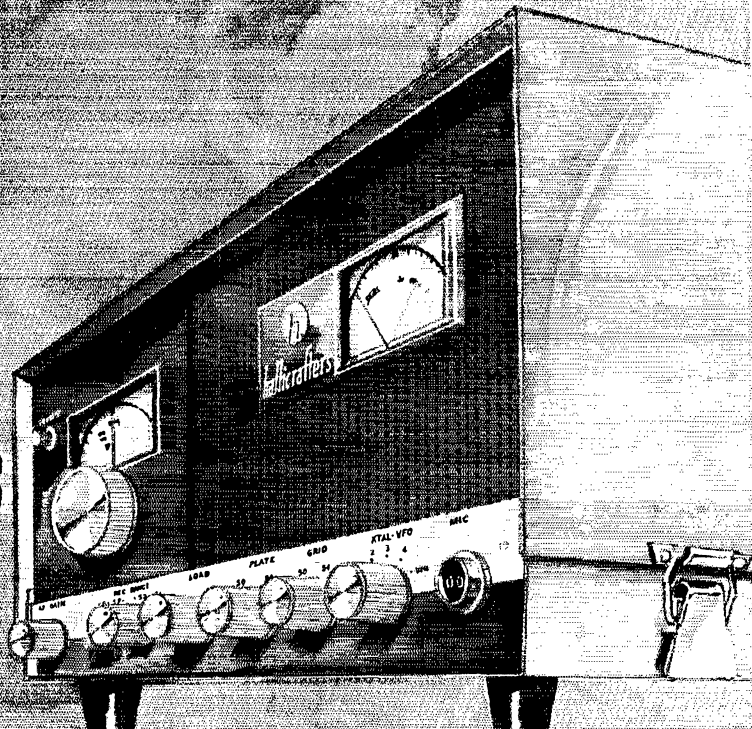
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FEATURES

Frequency Coverage: 50 to 52 Mc and 52 to 54 Mc (144 to 146 Mc and 146 to 148 Mc in the SR-42). **Power Input:** 10-12 watts. **Power Supply:** 115 VAC and 12 VDC (vibrator and line cord optional extra). **Transmitter Crystals:** high frequency type; provision for four (one furnished), plus external VFO, switch-selected from front panel. **Tubes:** 10, plus zener diode oscillator control and four diodes (11 tubes, 2 zeners and four diodes in the SR-42). **"S" Meter** automatically switches to RFO. **Cabinet:** "snap-off" type for easy access. **Size:** 5½" high, 12⅞" wide, 8¼" deep. **Shipping Weight:** 17 lbs. **Amateur Net Price:** \$199.95



SR-42A
SR-46A

*"Quality through
Craftsmanship"*



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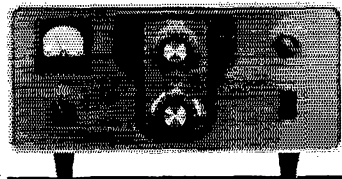
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PUBLISHED MONTHLY, AS ITS OFFICIAL ORGAN, BY THE AMERICAN RADIO RELAY LEAGUE, INC. NEWINGTON, CONN., U. S. A.: OFFICIAL ORGAN OF THE INTERNATIONAL AMATEUR RADIO UNION

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Subscription rate in United States and Possessions, \$6.00 per year, postpaid; \$8.50 in Canada, \$7.00 in all other countries. Single copies, 50 cents. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U. S. and for an equivalent amount in U. S. funds.

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INDEXED BY

Applied Science and Technology
Index
Library of Congress Catalog
Card No.: 21-9421

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SBE



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One particular pair, **SB-34** sideband transceiver/exciter and **SB2-LA** gallon linear amplifier—are small enough to beat a full house. Or, for that matter, any no-room-for-passengers KW mobile installation.

Proof. Photograph shows **SB-34** and **SB2-LA** together as a complete 1KW, 4-band sideband station (including receiver of course) beating a full house handily. The two units placed end-to-end occupy less than 2 linear feet—just over 1 foot in depth, less than 6 inches high!

But SBE didn't set out to produce a miniature transceiver at the expense of undue component crowding—transistors and diodes aided by advanced bilateral circuits did it with room to spare.

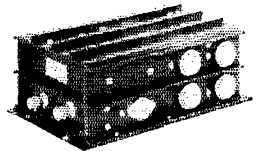
SB-34 specifically, is advanced equipment—predominantly solid-state—in pace with the trend toward elimination of all tubes in a host of electronic gear. The **SB-34** SSB transceiver costs only 395.00 (with 12V DC and 117V AC built-in power supply) and uses 23 transistors, 18 diodes, a zener, a varactor—and only 3 tubes!

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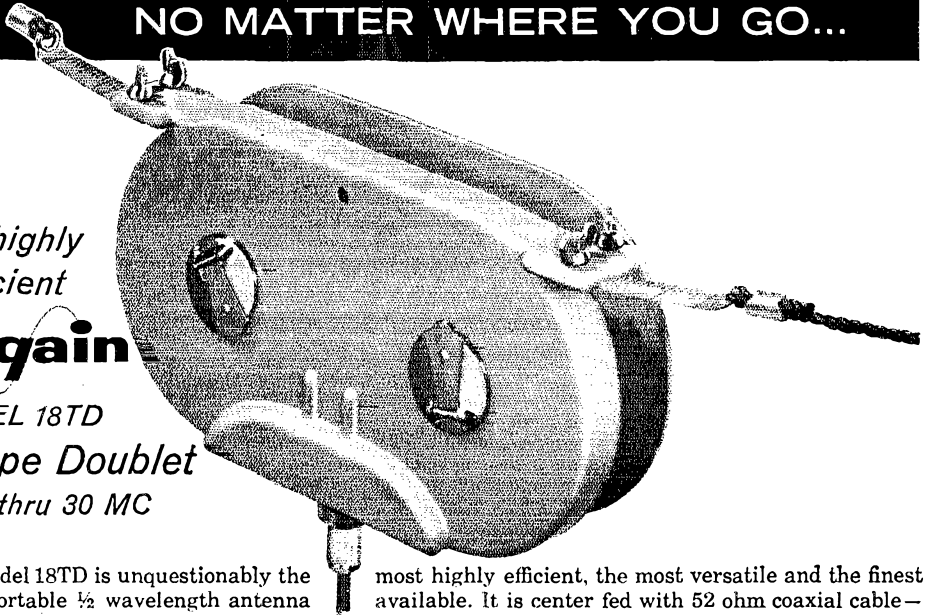
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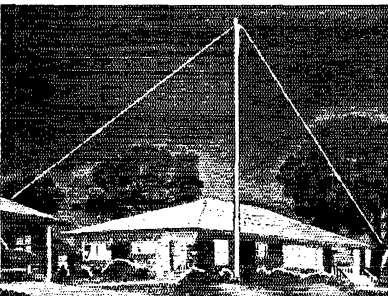
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Hy-Gain's Model 18TD is unquestionably the constructed portable $\frac{1}{2}$ wavelength antenna handles 3 kw P.E.P.; 2 kw CW; and, 1.5 kw steel tapes that conveniently reel out of and into a durable cyclac antenna housing. The elements are calibrated in meters for ready reference in establishing the exact distance each is extended from the center housing to form a full $\frac{1}{2}$ wavelength doublet antenna system for any desired frequency. Anybody can install ...any place. A "frequency-to-length" conversion chart integrated in antenna housing is correlated to calibrations on the elements for quick, positive reference in determining the exact distance each element should be extended for assigned frequencies. Its efficient performance coupled with its weatherproof construction makes it suitable for permanent and semi-permanent installations as well as for portable applications. For complete details, send for free Technical Data Report. Model 18TD **\$69.95 Net.**

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Section Communications Managers of the ARRL Communications Department

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

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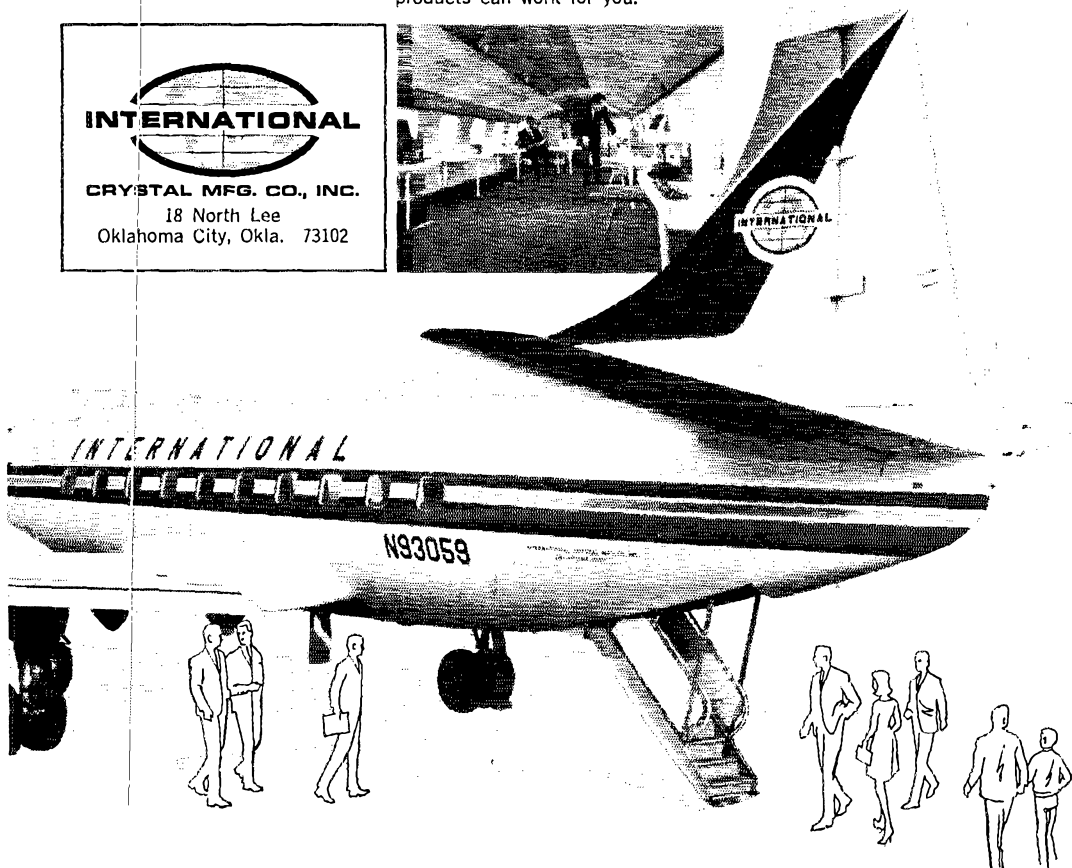
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THE AMERICAN RADIO RELAY LEAGUE, INC.,

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

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

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

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

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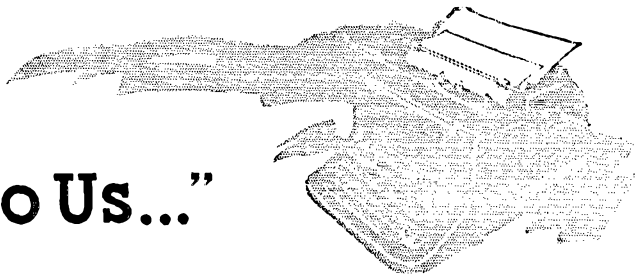
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"It Seems to Us..."



IARU PROGRESS

An affiliation of national amateur societies in countries (or colonies) around the world, the International Amateur Radio Union has grown from an original membership of 14 societies to its present total of 66. But more important than mere numbers is progress in the working effectiveness of the organization. Considerable strides have been made the past few years, especially in the area of regional coordination.

The amateur problems of one nation are largely similar to those of its immediate neighbors; thus adjacent-society liaison and cooperative effort are highly important. Further, area meetings of society officials become reasonably practical, as compared with the difficulty and expense of a truly worldwide gathering.

Region I (Europe-Africa) led the way, and has been an active division of IARU for some 15 years. This next month, representatives of member-societies will hold a week-long meeting in Yugoslavia for another in a series of conferences to discuss current problems and chart future aims. As always, strengthening of the amateur radio service, with the particular objective of protection of frequency allocations, will have a top spot on the agenda.

Two years ago Region II (N. and S. America) formed its divisional liaison mechanism, another large step forward in IARU effectiveness. As you read this, the six-man Executive Committee (two each from North, Central and South America) will be meeting in Salvador, appraising plans and activities such as hemispheric emergency networks, band subdivisions, etc., and probably setting a date and place for the next general Region II amateur conference. Here again, primary attention will be given to international regulatory matters.

A particularly bright spot in the current picture is organizational interest in Region III (Asia-Oceania), where the member-societies — especially Australia, India, Japan and New Zealand — are exploring ways and means to overcome their serious problems of travel distance, and attempting to establish a third divisional group. With its success, the regional organization of IARU will be complete.

This growing awareness by each member-society, and its officials, of the need for closer liaison and cooperation in establishing and

working toward common objectives, can only result in expanding — and much needed — strength in IARU.

NATIONAL CONVENTION

The crew up Boston way are hard at work putting the finishing touches on extensive plans for a bang-up ARRL National Convention.

Thoroughly skilled with a long string of highly-successful division conventions to their credit, the Federation of Eastern Massachusetts Amateur Radio Associations committee has long been eager to show its stuff to a larger segment of ham radio by throwing a national. The location: Sheraton-Boston Hotel, in Prudential Center, adjacent to the Massachusetts turnpike. The dates: April 22-24. The participants: a few thousand active, enthusiastic hams who populate the annual Swampscott affairs and wouldn't miss this one on a bet. The details: see page 37 in the March issue of *QST*. Join us? BCNU there.

BOARD MEETING

The annual meeting of the ARRL Board of Directors will be held this year in Hartford on May 13. This will, as always, be the culmination of the democratic process in your League — when your elected representatives meet to discuss proposals, compromise on divergent views of various parts of the country in the common good, and chart our course for another year.

What will be on the agenda? Practically anything pertaining to amateur radio, and certainly subjects which members have communicated to their respective directors during recent months. Your director will be glad to hear from you, or your club, expressing your views on matters of the day. He can represent you only to the extent you let him know your opinions and proposals. His address is on page 8 of this issue.

The views and recommendations of affiliated clubs are particularly helpful to a director, since they represent a composite of many individual opinions. Devote some time at your next meeting, therefore, to a discussion of League and amateur affairs, and request the club secretary to convey the results to your division director.

QST

COMING A.R.R.L. CONVENTIONS

- April 22-24 — ARRL NATIONAL, Boston, Massachusetts
May 28-29 — Roanoke Division, Natural Bridge, Virginia
May 27-29 — Southwestern Division, Anaheim, California
June 3-5 — West Gulf Division, Arlington, Texas
June 18-19 — Rocky Mountain Division, Colorado Springs, Colorado
July 2-3 — West Virginia State, Jackson's Mill
September 16-17 — Ontario Province, Niagara Falls
October 15-16 — Hudson Division, Tarrytown, New York
October 21-22 — Great Lakes Division, Muskegon, Michigan

Prospective convention sponsors are urged to check with ARRL Hq. to avoid possible date conflicts.

SOUTHWESTERN DIVISION CONVENTION Anaheim, California May 27-29

The 1966 Southwestern Division ARRL Convention will be held Friday noon through Sunday evening, May 27-29, at the Disneyland Hotel, Anaheim. The convention will offer top guest speakers, manufacturers' clinics, open forums, contests, mobile judging, ladies' luncheon and many other interesting events throughout the convention period. Speakers will include *QST* Novice Editor Lewis G. McCoy, WIICP, and ARRL General Counsel Robert M. Booth, Jr., W3PS. YLs and XYLs purchasing banquet tickets will also receive a free bus trip which will include stops at the Movieland Wax Museum and Knotts Berry Farm on Saturday; a chicken dinner at the Farm is included. Other area attractions include numerous electronics firms, Disneyland, Melodyland Theatre and the new Angels baseball park; an ideal family setting for the long Memorial Day weekend.

Registration is \$2, combined banquet and registration \$10, until April 15; \$3 and \$12 after that date. Make checks payable to ARRL Convention, and send to P.O. Box 217, Tustin, California. Room reservations should be made directly with the Disneyland Hotel, or through the Anaheim Convention Bureau, Anaheim.

Strays

QST congratulates . . .

Sergeant Forrest F. McClure, W1BJU, who has been selected Outstanding Airman of the Year for the Air Force's Office of Aerospace Research, and . . .

William W. Thompson, W2MTA, who has been appointed a project engineer, manager of Saturn V Data Adapter Test at IBM's Electronics System Center in Owego, N. Y., and . . .

Bill Beck, K4QOK, who was entertained aboard the U.S.S. *Howard M. Gilmore*, AS-16, and pre-

sented with a bronze plaque by its crew in gratitude for his message service through W4CSE aboard the *Gilmore*, and . . .

Ken Bowles, K0C1Q, and Larry Cumming, W1FB, who were elected to the grade of Fellow in the Institute of Electrical and Electronics Engineers (IEEE), and . . .

Roy Daniel Rosner, K2KHR, who received the Institute of Electrical and Electronics Engineers 1965 First Student Prize which was awarded for the best paper written by electrical engineering students. K2KHR coauthored a paper entitled "Antenna Scaling by Means of Microwaves and Laser-generated Coherent Light," and . . .

Lt. Gen. Theodore J. Conway, W4EII, upon his assuming command of the 7th U.S. Army, Europe, and . . .

Leland W. Smith, W4YE/W4AGI, who has been promoted to Brigadier General, USMC Reserve.

FEEDBACK

In the article "A 5-band 3-Transistor Receiver" that appeared in *QST*, January 1966, the value for the emitter resistor, R_3 , should be between 4700 ohms and 10,000 ohms — selected experimentally for a compromise between best noise figure and audio gain.

In the article "Practical Tripler Circuits," Blakeslee, *QST*, February 1966, change the input circuit (Fig. 1C and Fig. 4) to the following:

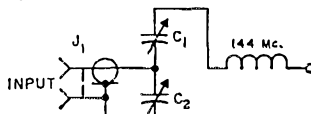


FIG. 4

FCC has extended until March 30 (from February 21) the time for filing comments in Docket 16420, which would make RACES a permanent part of the amateur service (see pages 40-41, March *QST*). Reply comments may be filed until April 14, 1966.

All members of the Quarter Century Wireless Association planning to attend the New England QCWA chapter luncheon at the National Convention on Sunday, April 24 (\$4 per person) are requested to make reservations as soon as possible with the chapter secretary, Stearns Poor, W1PO, Hanover, Mass.



OUR COVER

Don't forget the 1966 ARRL National Convention! Thousands of amateurs will meet at the Sheraton-Boston Hotel, April 22-24, for an action-packed weekend. For complete details, see page 37, March *QST*.

Electrical Interference

In Two Parts

Part I - Causes and Identification

BY W. R. NELSON,* WA6FQG

"INTERFERENCE" is defined as a confusion of received radio signals due to strays and undesired signals. It is also defined as something that causes this confusion. Interference to radio signals occurs whenever an undesired voltage, signal, or disturbance is present in sufficient strength to be heard in the presence of the desired signal. What are the confusions with which the amateur radio operator contends? TVI, BCI, QRN, QRM, NYLI, and RFI or EI. Cures have been found for the first four types, but there is no cure for the NYLI type!

The confusion of electrical interference (RFI or EI) will be discussed in this article. You will be informed of the sources of electrical interference, how it gets into your receiver, and the classifications of this type of interference. Photographs will show the "finger prints" of electrical interference and instructions on the location of interference will be given.

The interference problem of the amateur operator has increased in proportion to the number of hams and the increase in population. The ham has been accused of killing fish in aquariums and taking all the juice out of power lines with his big beam antennas. He has been heard on TV and radio and occasionally seen on his neighbor's TV set. Electrical interference to TV sets has been blamed on the poor ham operator, and he has been accused of breaking thread in a little old lady's sewing machine. This sounds ridiculous? Not so; the aforementioned is just a sampling of complaints received by the writer's company which have been directed against the ham operator.

A comparison of the interference problems of the amateur and the power company indicates a marked similarity. How many of these complaints are justified? The general public feels that all TVI complaints are justified. Ham operators feel that all electrical interference complaints are justified. But the amateur knows that only a small percentage of TVI complaints are justified, and the power companies know that only a small percentage of electrical interference complaints are justified. By far, more noises heard on your receivers are caused by consumer-operated devices.

RFI and the Power Company

It was for this reason that Southern California Edison Company, an investor-owned utility serving over 2,200,000 customers in a service

* Amateur Radio Representative, Southern California Edison Company, 501 So. Marengo Avenue, Alhambra, California 91802

area of 65,000 square miles, appointed an Amateur Radio Representative to work with the high concentration of amateur radio operators in that area relative to the causes of electrical interference. The amateurs are informed that the policy of the company is to do everything within reason, good engineering practice, and sound economy to eliminate or reduce to an acceptable level any interference created by its facilities. Those having interference troubles are requested to locate and correct any of the consumer-created interferences that may be a problem to them; it is pointed out that each one must take a cooperative and patient attitude toward the location and correction of consumer-created interference as well as the location and correction of power-line interference. Finally, amateurs are requested to deal directly with the company on interference problems.

To aid the amateur in identifying sources of electrical interference, tape recordings of the audible characteristics of interference are played at club meetings. These recordings are made by feeding the audio output of a Collins 51S-1, installed as a mobile receiver, directly into the input jack of a stereo tape recorder. In stereo, a comparison is made between consumer-created and power-line interference. Colored slides of the "fingerprints" of interference are used with the recordings.

Appliance QRM

Many feel that the power company should take care of all of interference, even though the company has no jurisdiction over devices used by its customers. It should be looked at from this point of view: An amateur is twice blessed when he locates a source of consumer-created interference: first, he has cleared up a TVI problem that his neighbor is accusing him of creating; second, he has taken care of his own problem, that of interference to his receiver.

Occasionally an amateur will request assist-

Radio noise originating in non-radio electrical equipment can make life miserable for the communicating amateur, and becomes more prevalent with increasing use of electricity, both industrially and in the home. There is something you can do about it. This two-part article tells you how.

ance in the location of a consumer-created interference. Generally, in these cases he has narrowed the source down to four or five houses and needs help in fixing it in one particular house. The correction is still the responsibility of the amateur since, legally, the power company can do no more towards the correction of consumer-created interference than the amateur. We can only ask the customer to correct the offending device because it is creating interference for himself and his neighbors. This is the same approach that the ham operator can use, and is why we believe that the amateur can do just as well in locating consumer-created interferences as the power companies. We feel that our personnel should not have to confront Mrs. Smith and say, "Ma'am, we believe you have a defective poodle warmer (one was found!) that is causing interference to the ham operator down the street . . ." In the first place, you are better known in your own neighborhood, and secondly, people are more receptive to those they know and have heard. The type of approach to use in this situation will be discussed in Part II of this article.

The company goes one step further in cooperating with the amateur. If an interference complaint is received from one of our customers and the investigation reveals that it is TVI caused by an amateur, no mention of that fact is made to the customer. He will be told that an effort will be made to clear up the problem, and then the complaint is turned over to a TVI committee of a radio club in the area.

Your Noise Background

It is a known fact that every location has a definitely-established ambient noise level, and any attempt to use a radio receiving set for reception of signals which are below the ambient noise level of a given location is doomed to provide unsatisfactory reception. The interference experienced in the operation of a receiver depends on the character of the offending radio frequency or random noise, the coupling between the source and the receiver, the susceptibility of the receiver, and the strength of the desired signal. In other words, what is the signal-to-noise ratio?

For good reception of an a.m. signal, tests reveal that a ratio of 20 to 1 is satisfactory, and intelligence can be extracted at a ratio of 10 to 1. Fifty years ago the signal-to-noise ratio was of little concern to the amateur operator because the bands were uncrowded, and if a signal could be heard over the noise level of the receiver itself the ham was elated. Today the S/N ratio of the receiver is excellent and it is more sensitive, but therefore more susceptible to the noise in the area. And today there are more devices to raise the ambient level.

There is a simple and economical method for improving the S/N ratio if you have a high level of noise — install a 30- to 50- μ f. capacitor across the voice coil of your speaker. This is very effective when the desired signal is just slightly

above the ambient noise level. Fig. 1A shows the pattern of an interference with the capacitor switched out and Fig. 1B is the same interference with the capacitor across the voice coil of a Motorola mobile speaker rated at 3.2 ohms. Note that the impulse spikes of the interference have been shortened by the use of the capacitor.

The desires of amateurs regarding tolerable level of noise varies from S0 to those who say they can live with an S4 to S6 level. We all know that an S0 level is impossible to obtain without an adjustment of the S meter. Every electric spark, no matter what its source, may provide some power at radio frequencies; therefore there always will be sources such as snap-switches, doorbells, and motors, which will add to the general level of radio noise. Some disturbance from such electrical devices is inevitable and must be regarded, like atmospheric static, as a limitation on reception. We have to be reasonable about our desires, and we have to be satisfied with the lowest level that can be obtained under all conditions. Electricity has been with us since the beginning of time; Adam and Eve undoubtedly wondered about the spark of static electricity they encountered!

In determining the type of amateur operating that you would like to do, an important factor must be taken into consideration — your QTH. Are you going to work for all the DX awards or are you going to be satisfied with local contacts? If you locate close to an industrial or commercial complex your DX contacts are going to be limited by the electrical interference-generating devices. Before you go into hock for a lot of equipment check out the area and govern yourself accordingly. Note the locations of the DXCC award holders; very few interference complaints originate from the serious DX operator.

Interference Paths and Sources

There are three ways by which interference will travel into your receiver. One is by *conduction*; the interference is carried by the power lines through the service wires and house wiring and then into the power supply of the receiver. The second is by *induction*; the interference is carried by the power lines, metal fences and communications circuits and then induced into your antenna system. A long-wire antenna running parallel with and close to any of the preceding will be more susceptible to noise than an antenna perpendicular to the lines. The same holds true for a beam antenna at the same height as any of these interference carriers. The last is by *radiation*; the interference is radiated from the source or lines and picked up by your antenna.

Conduction and induction will affect the receiver more at the lower frequencies, while radiated interference will affect all frequencies. Interference that is conducted and/or induced can travel a considerable distance.

Interference to receivers is a complex subject; however, each interference can be placed in one of three general categories and each category

has definite characteristics. These categories are *spark discharge*, *r.f. oscillation*, and *electrostatic discharge*. Of the three, the spark discharge category accounts for most of the interference heard.

The Spark Discharge

Typical sources of spark-discharge interference are appliances using the brush-type motor, such as the portable mixer, electric shaver, vacuum cleaner, small shop motors, and electric saws; and electrical appliances and devices which are thermostatically controlled by interrupting the supply voltage according to temperature requirements (unless they are of the snap-action type). Thermostats on heating pads, refrigerator butter conditioners, and water heaters for aquariums and brooders are the most troublesome, because of the slow-break contacts; in this type of service the contacts arc for a certain period during each break. Other devices in the home, industry and commercial establishments are neon signs, fluorescent lights and dimmer switches. A source in suburban and rural areas is the electric fence. You may wonder what an electric fence is used for in the suburbs, but recently an interference was found to be originating from an electric fence used to keep the dogs from running loose. One other item, not too common, but nevertheless a source of interference which is very difficult to locate, is the carbon-filament light bulb, occasionally found in older homes in the basements and closets. Certain types of power-line interference also fall into the spark discharge category.

The sounds associated with the spark discharge are a buzzing rasping, grinding, frying, or popping sound. Some of the devices mentioned above have a readily identifiable sound; for example, the thermostatically-controlled devices have this characteristic: buzzt — buzzt — buzzt —, on several seconds and off for several seconds. Ninety-nine percent of the time they will have this particular trait and the other one percent of the time will sound like some other source of interference.

The fluorescent light has a 120-cycle sound or roar associated with it. The one peculiarity of the fluorescent light is that it affects certain bands of frequencies. If a continuous-tuning receiver is used you may pick up the noise around 3400 kc. and lose it at 8300 kc. Another interesting fact about the fluorescent light is that the interference is not additive, i.e., if ten lights are radiating you will hear only that light with the highest level of radiation: when this one light is corrected you will hear the next loudest, and so on.

An undulating frying tone with momentary breaks is one of the characteristics of power-line interference. Very rarely will this type of interference begin at a certain time and stop at a certain time — unless, of course, it is caused by a street-light circuit.

Frequencies affected by the spark discharge are variable and depend on the source, distance,

and frequency. For example, the fluorescent light will affect 40 and 80 meters and is rarely found any higher in frequency. If you had a noise on these two bands but it could be heard no higher, would you assume that it was a fluorescent light or would you figure that it could be some other type of source a considerable distance from you? Here you are confronted with two possibilities, and this is the reason why the amateur radio operator needs to become familiar with the sounds of interference.

As the sounds of interference differ so do the fingerprints of the interference differ. This is shown in the accompanying photographs. Figs. 2A and 2B show the fingerprints of the electric fence in a.m. and s.s.b. reception (receiver b.f.o. off and on, respectively). Figs. 3A and 3B are power-line interference in a.m. and s.s.b. The fluorescent light is seen in Figs. 4A and 4B, the neon sign in Figs. 5A and 5B, and the typical thermostat fingerprint is seen in Figs. 6A and 6B. Each burst of noise is made up of these pulses.

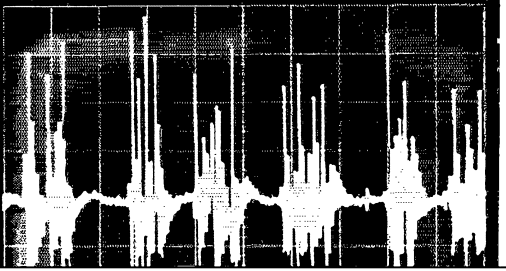
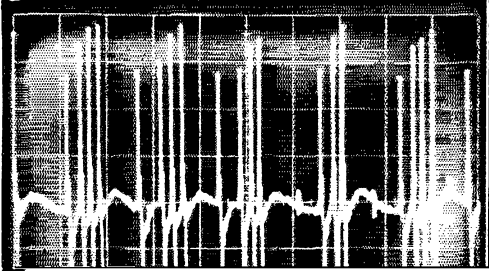
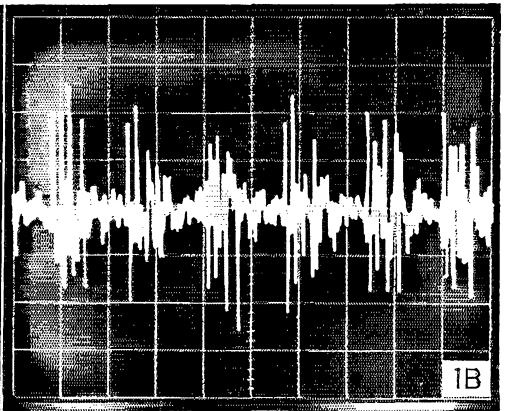
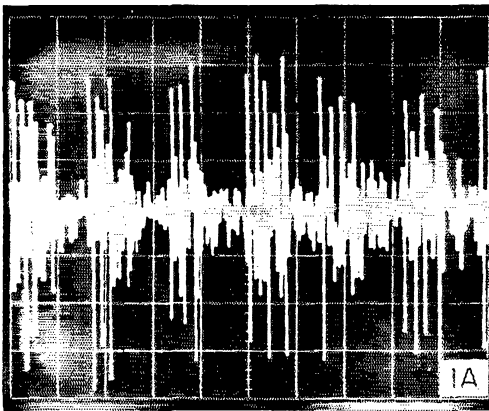
Incidental Radiation

The second category, r.f. oscillation, is interference caused by any device capable of leaking r.f. such as the heliarc welder, induction soldering machines, TV receivers, and diathermy machines; the device most heard on 40 and 80 meters is the heliarc. The sounds associated with this type of interference are whining, buzzing, whistling, or warbling. To become accustomed to these sounds listen on the 11-meter band. Improper shielding of the device causes this type of interference.

Another source of r.f. oscillation is your own receiver. One amateur had an embarrassing experience. He complained of interference to both his receiver and TV set, and although the interference investigator made several trips he was never able to hear the interference outside the ham's QTH. Finally, arrangements were made for the ham to meet with the investigator and an engineer from FCC. When the investigator heard the noise in the receiver he asked the ham to disconnect the receiver, and when this was done the TV picture cleared entirely. Further investigation revealed that a filter condenser had failed. Until the source had been located the power company was being blamed for the amateur's own interference.

Electrostatic Discharge

The third category, the electrostatic discharge, is caused by sources not connected directly to an electrical circuit. It is created by loose contacts between metal objects in an electric field. This type of interference is very difficult to locate because it is intermittent and the region of peak intensity is not readily determined. As a general rule the source is very close to the receiving equipment, such as guy wires touching or rubbing together, antenna lead-in conductor loose, and — most common — a loose pipe strap that holds the antenna mast to the side of a building. A call was received from a ham who



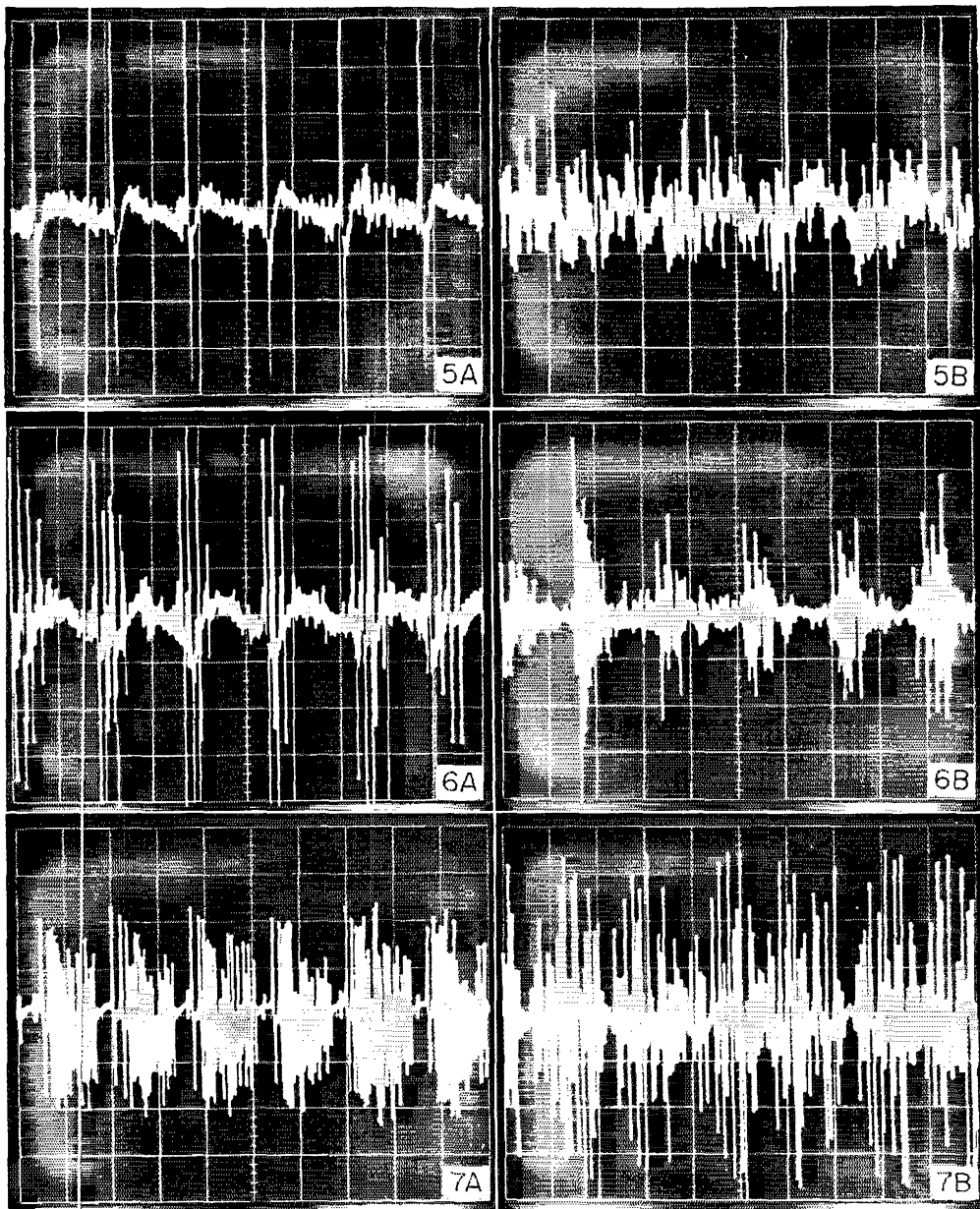


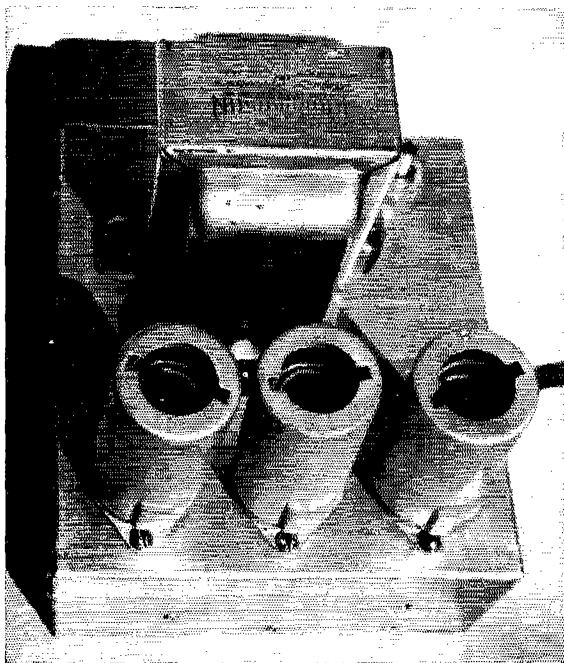
Fig. 1—A—Cathode-ray presentation of a typical spark-discharge interference; B—same noise with speaker voice coil shunted by a large capacitor. Fig. 2—A—Cathode-ray picture of electric-fence noise, a.m. reception; B—Same noise as recorded with the receiver's b.f.o. on (s.s.b. or c.w. reception). Fig. 3—Power-line interference in a.m. reception (A) and s.s.b. reception (B). Fig. 4—Fluorescent-light interference in a.m. reception (A) and s.s.b. reception (B). Fig. 5—Neon-sign interference in a.m. reception (A) and s.s.b. reception (B). Fig. 6—Thermostat interference in a.m. reception (A) and s.s.b. reception (B). Fig. 7—Heliarc interference in a.m. reception (A) and s.s.b. reception (B).

serviced CB rigs and said he had lost several sales because of the "power-line" noise at his shop. Investigation revealed his source of noise to be his antenna guy wires rubbing together.

To summarize, electrical interference is a complex quantity containing unknown factors, but this does not mean that it is an insolvable problem. Some things are known, such as the method interference uses in traveling to your

receiver, and the fact that most of the interference is caused by consumer-operated devices. There are three categories of interference, and in each instance many sources. Some of the sources have special characteristics that affect the sound of interference as well as the frequencies. Your location will determine the type of operating you can do.

(Part II will appear in an early issue of *QST*.)



Top view of the detector/a.g.c. plug-in unit. Components are assembled on a $4 \times 3\frac{3}{4}$ -inch chassis. The tubes are mounted in a row across one end of the chassis, with the audio transformer, T_1 , to the rear. The shaft of the audio gain control R_1 may be seen to the right of the transformer.

HRO-60 S.S.B. Modification

Adding a Product Detector and Hang A.G.C.

BY KERMIT B. CROWELL,* W3AJO

WITH the growing interest in s.s.b. on the ham bands, it became the author's desire to give this mode of communication a whirl. The first step was that of obtaining a suitable receiving system. The station receiver is an HRO-60, and the idea of trading this fine, if somewhat outdated, receiver did not appeal technically or economically.

Four or five different s.s.b. adapters were tried, including a homemade one, but none seemed to add very much to the receiver, or fit the station layout. Rather did they add complexity.

The idea of modifying the HRO appealed strongly, so plans were made to do this and the following requirements were set up:

- 1) A.m. operation not to be affected.
- 2) Good product-detector action should be obtained.
- 3) Fast or slow a.g.c. to be available.
- 4) No external units.

Once the operation got under way it was comparatively easy to execute. The product detector and audio-activated a.g.c. unit was built on a $4 \times 3\frac{3}{4}$ -inch chassis, and plugged into the n.b.f.m. socket. The circuit used is shown in Fig. 1.

There is nothing new or startling about this circuit. The a.g.c. system was taken from the *ARRL Handbook*. It was originally described by Luick in an earlier issue of *QST*.¹ A 6BY6 was used, rather than a 6BE6, because it can tolerate high i.f. voltages without overloading and producing distortion.

The modification is accomplished in the following four steps:

- 1) Build the product detector and a.g.c. on chassis as described above, and plug into n.b.f.m. socket. (Original connections to Pins 1 and 3 of X-1 must be removed.)
- 2) Modify a.g.c. line for slow and fast action as follows:
 - a) Remove lead to S_1 that grounds the a.g.c. line in the c.w. position.
 - b) Disconnect a.g.c. line from source, R_{23} .
 - c) Replace S_6 with s.p.d.t. switch.
 - d) Connect the a.g.c. line to the arm of the switch. Connect one switch contact to Pin 3 of X-1; connect other contact to R_{23} .

¹ Luick, "Improved A.V.C. for Side Band and C.W.," *QST*, October, 1957.

*710 Powder Mill Lane, Philadelphia, Penna. 19151.

EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS ($\mu f.$); OTHERS ARE IN PICO FARADS ($pf.$ OR $\mu\mu f.$); RESISTANCES ARE IN OHMS; K = 1000

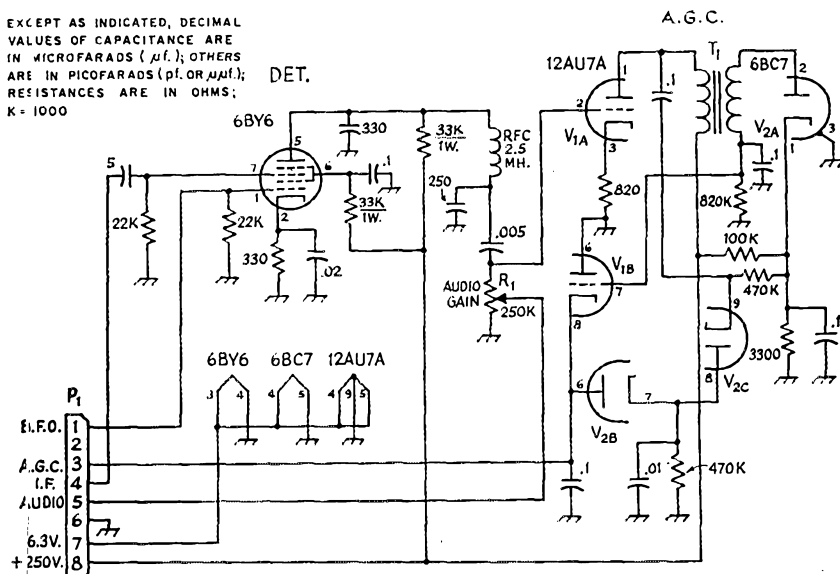


Fig. 1—Circuit of the plug-in product-detector/a.g.c. unit. Capacitors are disk ceramic or paper. Fixed resistors are 1/2 watt. P1 is a chassis-mounting octal plug. R1 is an audio-taper control. T1 is a 1:3 interstage audio transformer.

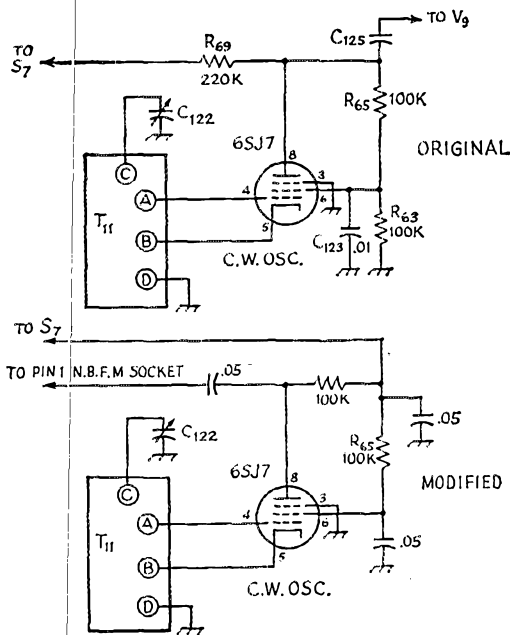


Fig. 2—Diagram showing modification of b.f.o. circuitry. Capacitances are in $\mu f.$, and resistances are in ohms (K = 1000). Capacitors are disk ceramic or paper; resistors are 1/2 watt.

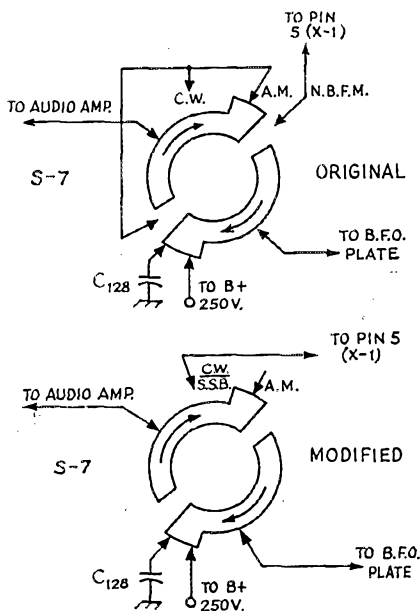


Fig. 3—Sketch showing original and modified mode-switch connections.

- e) Remove C_{125} and associated lead from Pin 3 of V_9 .
- 3) Modify mode switch as follows (see Fig. 2).
 - a) Remove jumper from a.m.-c.w. position.
 - b) Remove large grounding jumper.
 - c) Connect pin 5 on X-1 to c.w. position on switch.
- 4) Modify b.f.o. to obtain greater b.f.o. injection voltage for c.w.-s.s.b. use (see Fig. 3). About 8 volts needed for best results. Higher voltage causes distortion.

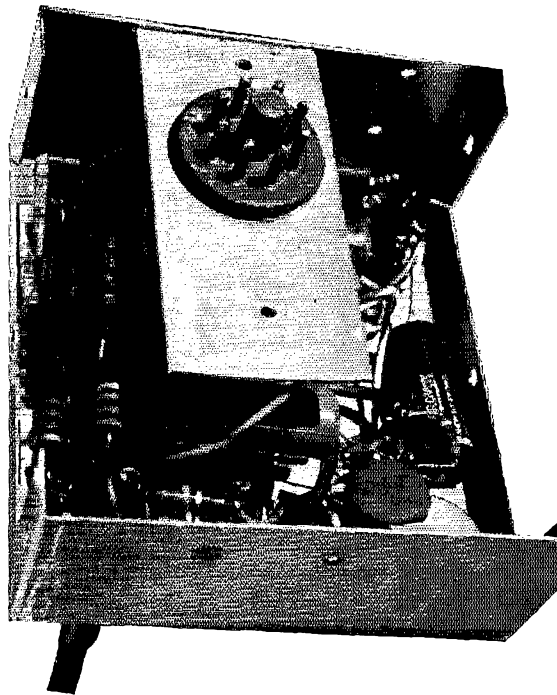
After the wiring was completed and the necessary changes were made in the receiver wiring, the unit was plugged in and checked out. It was found necessary to add the 250K gain control, R_1 , in the audio lead to reduce the output of the unit, as it was a bit "wild" on s.s.b. The control was adjusted to bring the s.s.b. output down to about equal that from the diode detector. The last i.f. transformer, T_3 , was repeaked.

Do not place any of the wiring for the s.s.b. unit in the rear power compartment of the HRO chassis, as this will give rise to a considerable amount of pickup trouble.

A further step could be that of crystal-controlling the b.f.o. to give sideband selection, but this was not thought to be necessary, as the proper sideband can easily be selected by adjusting the b.f.o. control on the front panel.

Several members of the local s.s.b. group listened to the finished product and the consensus was that it worked very well.

QST



The detector/a.g.c. unit plugs into the n.b.f.m. auxiliary socket on the HRO-60.

Hamfest Calendar

Alabama—The annual Birminghamfest will be held April 30 and May 1. For information contact K4AAU. The event will be sponsored by the Birmingham Amateur Radio Club.

Illinois—The annual auction of the Chicago Suburban Radio Association will be held on Wednesday, April 6 at National Hall, 3907 Prairie Ave., Brookfield, Ill. No admission charge. For information contact Bob Vlk, 3010 Forest Ave., Brookfield, Ill.

Illinois—Old Timers Night at the Egyptian Radio Club, Inc., will be held at the club house south of the Chain of Rocks Bridge at 8:00 p.m., April 21. Bill Du Bord, W0 QDF will present "Confessions of a Retired DXer." Old timers and new timers are cordially invited as guests of the club.

Illinois—The Kishwaukee Radio Club will hold its annual Swapfest Sunday, May 1 at the Hopkins Park Shelter House on Illinois Route 23 in DeKalb, Illinois. The usual swapfest activities will be carried on.

Illinois—The Moultrie Amateur Radio Klub is having its 5th annual Old Fashioned Hamfest and get together in Sullivan, Illinois at the American Legion Pavilion on April 24. For more information write P. O. Box 41, Sullivan, Illinois.

New Mexico—The Mesilla Valley Radio Club will hold its annual Beanfeud and Swapfest April 17, 10 miles southwest of Las Cruces, N.M. For information, contact W5WZK, 131 East Flemming St., Las Cruces, New Mexico.

New York—The third annual Clarkson College Northern New York Hamfest will be held April 16, Potsdam, N.Y. Registration will begin at 12:30 p.m. in Clarkson Hall on the main campus. Hamfest will conclude with \$2.00

dinner. For reservations write before April 11 to T. C. Bigelow, 22 Waverly St., Potsdam, New York 13676.

North Dakota—The North Dakota State University Amateur Radio Society will sponsor the Fifth Annual Hamfest on the NDSU campus in Fargo, N. D. on May 8. Registration will begin at 9:00 a.m. in the student union. Activities will include technical talks, a noon meal, hidden transmitter hunt, tours of the new engineering buildings, new equipment displays, and an "average ham contest" using the IBM 1620 computer. For more information write WA6-NJY, Electrical Engineering Dept., North Dakota State University, Fargo, N. D.

Ohio—The Dayton Hamvention will be held at Wampler's Arena Center, Dayton, Ohio on April 15 and 16.

Washington—The Yakima ARC will hold their annual Hamfest on April 2 and 3. On Saturday, there will be a v.h.f. gathering and dinner. Sunday, there will be two "bunny hunts." For more information, contact Norma Derrey, K7UTT, 2 North 16th Ave., Yakima, Washington 98902.

Strays

The British Amateur Radio Teleprinter Group has announced a new RTTY award. The certificate, called the Q.C.A. Award, will be issued to any amateur who satisfies B.A.R.T.G. that he has completed RTTY QSOs with stations in 25 different countries. Country status is determined by the ARRL list in current use. A sticker will be issued for each additional 25 countries contacted. Cost is 7/6d. or 1 U.S. dollar to cover the cost of postage and the certificate. Applications for the award should be made to G3CQE, B.A.R.T.G. Certificate Manager, Sea Kiwi, Tower Hill, Williton, Taunton, Somerset, England.

Yagi Arrays for 432 Mc.

Details of Effective Systems

Developed Experimentally

BY EDWARD P. TILTON,* W1HDQ

THE author of these lines has spent untold hours working with Yagi arrays, on all amateur frequencies from 28 to 1300 Mc. This began as far back as the late 1930s, when parasitic arrays were still looked on with suspicion, even for 28 and 56 Mc., and there was little or no agreement as to how they should be built. More recently, the emphasis in our work with parasitic systems has been on beams for 144 Mc. and higher, and particularly for the 420- and 1215-Mc. bands.

In this time we've seen v.h.f. and u.h.f. Yagis that left room for improvement, and these included some commercially-built products as well as the results of back-yard amateur efforts. It would be easy to conclude that the parasitic array is not well suited to use above the v.h.f. range, for you can find plenty of "evidence" to prove it, but the fact is that the Yagi can be made to deliver the same performance per element in the u.h.f. range as it does at 14 or 28 Mc.

Failure in this is mainly the result of failure on the part of the builder to scale critical factors in the array design according to frequency. This is not possible, in fact, but if we can come close, most of the common rules for building Yagis for lower bands will be found to apply in the u.h.f. range. We will be concerned here mainly with the factors that cannot be scaled, and the steps we have taken to get around this difficulty.

Element Lengths and Spacings

Perusal of amateur antenna literature on Yagis will disclose a wide variety of element lengths and spacings. What this adds up to is that there are many ways to make a Yagi, and one is not necessarily better than another. If the system can be matched properly and fed efficiently, it will be quite tolerant of variation in any of its dimensions. Generally speaking, parasitic arrays are more critical than those with many driven elements (the justly popular v.h.f. collinears, for

"Yagis don't work at ultrahigh frequencies." There are some grounds for this often-heard statement, but it should be modified to read "Some Yagis don't." Here are details of 432-Mc. Yagis that do very well indeed, together with background information on experimental work done during their development.

example,) but the Yagi is by no means so fussy as most people believe — if the matching system is adjustable. We have found an 11-element Yagi to work with little change in gain from 432 to 436 Mc., if the matching is readjusted as the operating frequency is changed.

In an extremely tedious and time-consuming program some years ago, we worked out experimentally the optimum element lengths and spacings for 432-Mc. parasitic arrays of from 2 to 11 elements. We tried many configurations given in *QST* articles in this field, as well as information in our *Antenna Book and Handbook*. We checked element diameters from No. 20 wire to $\frac{1}{16}$ -inch tubing, and lengths in increments of $\frac{1}{16}$ -inch change per element. The net result of all this was a bulging notebook and the 11-element wood-boom Yagi described in our new publication, *The Radio Amateur's V.H.F. Manual*. This Yagi is shown in Fig. 1, as modified for convenient stacking.

This array works. We do not claim to be able to measure antenna gain to fractions of a decibel, and we doubt that many amateurs can, but our experimental results with all numbers of elements up to the maximum of 11 tried followed closely the curves for Yagi design derived by Greenblum.¹ These are combined in Fig. 8-4 in the *V.H.F. Manual*. The text of the latter goes into some detail on Yagi antenna design, which will not be repeated here.

In building single and stacked systems for 432 Mc. we decided to use a 6-foot boom, this being a readily-available stock size, and a length that is easy to handle in stacked arrays. We were not interested in "how many elements," but rather in the maximum gain that could be obtained with that boom length. Bandwidth was deemed of no importance in this application, since all weak-signal DX work is done within a few hundred kilocycles (at the most) of 432.0 Mc.

¹ Greenblum, "Notes on the Development of Yagi Arrays," August and September, 1956, *QST*.

* V.H.F. Editor, *QST*.

Greenblum's work footnoted above has stood the test of time well, and our experimental antennas were almost exactly what we would have had (with much less work) if we had built from his tables, as reproduced in all modern editions of the *A.R.R.L. Antenna Book*. We could not quite agree with his element lengths, however. Though the difference in results is small, in terms of effective radiated power, we did slightly better with the lengths shown in Fig. 1 than when we used the up-and-down variation of director lengths that he shows. This discrepancy held up through countless combinations of element diameters and spacings.

Element Diameter

It is well known that the length of a half-wave element varies with its outside diameter, with the round rod or tubing commonly used. This is shown in graph form in most antenna texts, and in the Greenblum material on Yagi design. Our work on 432 showed some shortening of the resonant length with increased diameter, but it did not fit the theoretical information exactly. Within the range of practical element sizes the "K factor" can be ignored for the purposes of this article, which is to describe practical arrays for 432 Mc. For anything from $\frac{1}{16}$ to $\frac{1}{8}$ inch in diameter use the lengths of Fig. 1. Larger elements need not worry us, since the larger they are the broader their frequency response, and it is unlikely that anyone will find it advantageous to use smaller than $\frac{1}{16}$ -inch diameter. We used $\frac{3}{32}$ -inch aluminum welding rod, which works just fine, and is cheap and readily available.

About Driven Elements

The basic idea of using two conductor sizes in a folded dipole, to increase the impedance step-up and facilitate matching the transmission line to the low center impedance of a Yagi array, has been taken on faith for many years. It works well on lower frequencies, but somewhere above 150 Mc., scaling problems enter the picture. We ran into this with 220-Mc. and 420-Mc. arrays

worked out for our *V.H.F. Manual*, and described methods for getting around it in a recent *QST* "Technical Topic."²

In the book version of the 11-element basic Yagi of Fig. 1 we used a folded dipole made from a single piece of $\frac{3}{32}$ -inch rod, bent on a $\frac{5}{16}$ -inch radius at the outer ends. This was matched by means of a universal stub mounted below the boom. This is a complicated way of handling the feed problem when bays are to be stacked, and it results in a relatively high s.w.r. on the phasing lines, so we looked for a simpler method for the stacked array.

The delta-matched dipole is about as simple as you can get, and it does the job nicely. After some changes in length to longer driven elements than we expected, we were pleasantly surprised to find that a given power into our line gave us appreciably higher field-strength readings than had been obtainable with the folded dipole. We suspect that the wide spacing (in terms of wavelength) between the fed and unbroken portions of the folded dipole for 432 Mc. or higher prevents it from working the way folded dipoles do on lower frequencies.

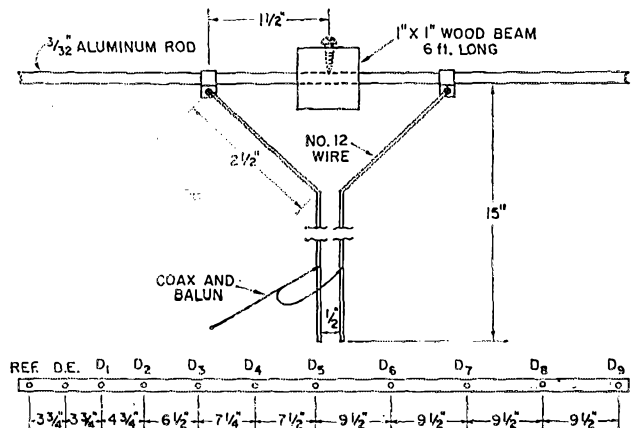
The principal advantage claimed for the folded dipole at any frequency is increased bandwidth, and this is of no importance to the 432-Mc. DX enthusiast. We wouldn't recommend a long-Yagi system to an amateur TV operator, nor to anyone interested in using a major portion of the 420-Mc. band with a single array. Collinears and plane-reflector arrays are better for them, but for high gain over a small segment of the band, the long Yagi is hard to beat.

Stacking

The farther apart you can stack a pair of Yagis before the minor lobes become excessive, the greater the gain obtained with stacking. Optimum spacing depends on boom length (not number of elements) and is about 2 wavelengths for the 2.6-wavelength boom used here. We let the length of a resonant phasing line determine the actual bay

² "Technical Topics," "Some Observations with V.H.F. Folded Dipoles," *QST*, April, 1965.

Fig. 1—Principal details of an 11-element Yagi of optimum design for 432 Mc. Dimensions of the delta matching system are not critical, as the actual matching is done by means of the universal stub. The positions of the short on the stub and the point of connection of the balun are adjusted for zero reflected power indicated in an s.w.r. bridge connected in the main coaxial line. Element lengths: reflector $13\frac{1}{4}$ inches; driven element 13 inches, D₁ 12 inches, and each director progressively $\frac{1}{16}$ inch shorter.



spacing in the 11-over-11 shown at the left side of Fig. 2.

Our phasing lines are No. 14 wire, spaced $\frac{1}{2}$ inch with five spreaders of $\frac{3}{8}$ -inch nylon rod. Each spreader is one inch long, with setscrews threaded into the ends to bear on the line and hold the spreader in place. The lines were cut to resonance at 432 Mc., and turned out to be 52 inches long. Half-inch open TV line is an acceptable, though more fragile, substitute. The lines connect to the driven elements by means of small wrap-around clips of sheet aluminum, as shown in Fig. 1. The delta dimensions are the same as for a single bay. Feed is at the midpoint of the phasing line, with the universal stub and balun adjusted for zero reflected power, as indicated on the s.w.r. bridge.

When this 11-over-11 was fired up it was immediately apparent that the radiation angle was lower and the gain was higher than for the single bay. The field-strength meter pickup antenna height had been set up for maximum reading with the single 11, and it was several degrees above the horizon. With the stacked pair it had to be lowered to a point almost exactly in line with the center of the array. The stacked pair gave the same reading with 2 watts antenna power that had been observed with 4 watts in the single bay. The stacked system was giving the 3-db. gain expected of it.

Next a 4-bay system was set up, and fed as shown at the right of Fig. 2. The center-to-center spacing horizontally was also made 2 wavelengths, and the actual dimensions were set by the length of the phasing line, as before. The universal stub, balun, s.w.r. bridge and coaxial line were connected at the center, and adjusted as before.

With this 44-element array our reference field-strength reading was obtained with just a shade over 1 watt of transmitter power, indicating very close to 3 db. more gain from the additional pair. Since the gain of the original 11-element had been measured at approximately 13 db. over a dipole, the 44-element array has about 19 db. gain.

Side lobes were checked by the relative-power method, and found to be about 14 db. below the main lobe, which is about what would be

expected with 2-wavelength spacing. The pattern is clean otherwise. Attenuation all the way around is so high that it cannot be measured accurately by our rough methods. There is the usual small bulge off the back, but it is inconsequential.

Construction

All-wood construction was used for low cost, ease of assembly, and freedom from worry over large amounts of metal in the field of the array. Lightweight wood design would be none too strong for large arrays on lower frequencies, but at 432 Mc. the wood frames are sturdy enough to stand up longer than most u.h.f. enthusiasts will want to stay with one array.

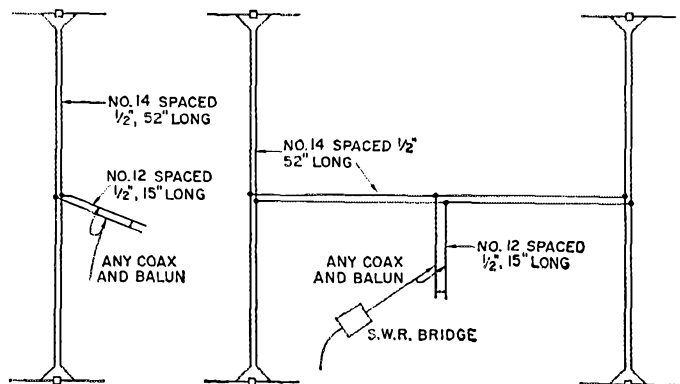
The wood is mostly 1×1 stock. Like all lumber dimensions for width and thickness, this is a misnomer. The actual size is likely to be more nearly $\frac{7}{8}$ by $\frac{7}{8}$ inches, but this is not important for our purposes. It merely makes it impossible to give precise dimensions for the supporting frame. If you've ever watched a carpenter doing interior woodworking on a house, you know what we mean. He fits his pieces together, and we must do the same. Get good-quality dry wood, free of knots, and preferably a kind that is not subject to severe warping. Most lumber dealers will be glad to advise you on the best materials for outdoor use, and available woods vary around the country.

The holes for the elements are drilled the size of the elements or slightly smaller, and the elements are forced into place. Half-inch brass wood screws that run in from the top or bottom, as shown in Fig. 1, hold the elements in position firmly.

Bracing can be whatever the wind and weather conditions in your locality demand. The principal details of the array, as presently used at WHHDQ, are given in Fig. 3. At the left is the assembly for two of the 11-element bays. The main vertical member, also 1×1 , is held perpendicular to the booms by means of gusset plates of $\frac{1}{2}$ -inch Masonite, as shown at the right of Fig. 3. If only an 11-over-11 is to be built, this vertical member can be dispensed with, and the bays clamped to the vertical support by means of U clamps.

When four bays are to be used additional

Fig. 2.—Phasing arrangements for two and four 11-element Yagis. Bay spacing of approximately two wave lengths is set by the length of the phasing lines. The universal stub matching device may be used with any type of transmission line, as well as with the coaxial line and balun as shown.



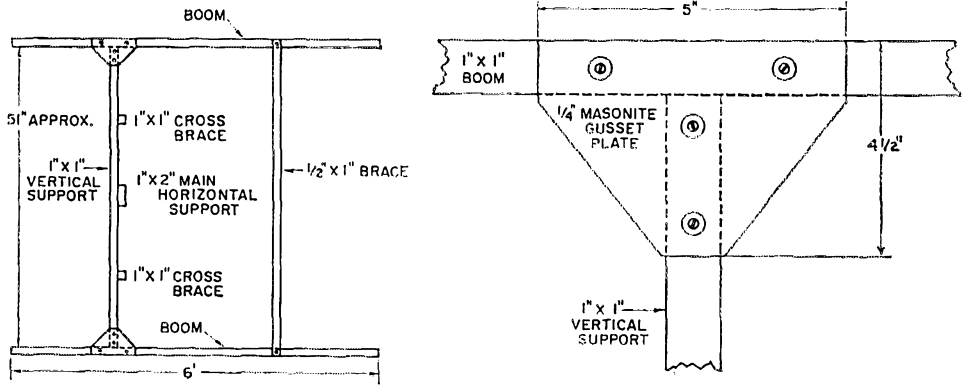


Fig. 3—Mechanical details of the 432-Mc. arrays. At the left is a side view of the 44-element system. The Masonite gusset plates used to hold the array in alignment are made as shown at the right. The array is supported on a round wooden closet pole, fastened to the three horizontal members shown in the sketch at the left, by means of U clamps.

bracing is needed, and the gusset plates and forward bracing become necessary. The front brace is $\frac{1}{2} \times 1$ -inch stock, bolted between the two booms to keep them in alignment. The two vertical supports with the gusset plates are tied together horizontally with two 1×1 -inch cross braces and a 1×2 -inch main support, as shown. Not shown in the sketch are two $\frac{1}{2} \times 1$ -inch wood sway braces that run from the mid-points of the two forward vertical braces to the 1×2 -inch main horizontal member. These are held in place by small brackets cut to fit from sheet aluminum. The main vertical support, not shown, is $1\frac{1}{4}$ - or $1\frac{1}{2}$ -inch round closet-pole stock. This is clamped to the pipe mast that supports and projects above the WHIDQ 50-Mc. beam, the two overlapping about 3 feet. Three U clamps hold the pipe mast and the closet-pole support in alignment. This arrangement, while not the ultimate in beauty, is inexpensive and strong—and there is no extraneous metal in the array proper.

To make the wood members reasonably durable and waterproof they were sprayed with Krylon before assembly. The Masonite gusset plates were also well soaked with lacquer spray. The whole assembly was painted with ordinary outside white house paint.

Adjustment

Matching the array should be done with the bottom bay at least four feet above ground, if in the position that it will be in use; that is, with the booms horizontal. The region in front of the array should be free of trees, buildings, wires or any other materials or objects that can reflect 432-Mc. energy. A high-gain array has a strong field out front. An appreciable reflection back has a marked effect on its impedance. If you don't have a good large open area, prop the array up with the vertical support in a horizontal position, and the four booms pointing straight up. Ground under the array will have little or no effect on its impedance in this position, as the

power radiated off the back is negligible, for this purpose.

With an s.w.r. bridge in the coaxial line near the antenna (preferably some small multiple of a wavelength away), adjust the short on the universal stub and the point of connection of the balun for zero reflected power. Once the proper points are found, permanent connections can be made. If you intend to use balanced line it may be well to do the adjusting job with coax and a balun, using coax of one-fourth the impedance of the balanced line to be employed. The connection point for the balanced line will then be the same as that found experimentally with the balun.

Evaluation

Don't expect a reliable indication of the antenna's capabilities on every signal you hear, nor from tests with every station you work. Especially with strong local signals from stations that are line-of-sight or nearly so, you are likely to find such tests very confusing. This is particularly bothersome in built-up areas, and if the other fellow is using a high-gain beam turned away from you. Comparison dipoles are also suspect, as considerable care is required to set one up so that it will have the normal 2.14-db. gain over isotropic. Often it may have several db. more gain, due to reflections, and the degree to which this condition exists may change with every movement of the beam and comparison dipole.

Outside of a workout on an antenna range, which not many of us have at our disposal, the best indication of the worth of the array is the results you get with it over a period of time. If you've just started on 432, this may not be too informative, but the experienced u.h.f. enthusiast will soon find out whether a new beam is really working or not. For him, consistently better results over long paths are the only reliable indicator of improved antenna performance, regardless of any published gain in decibels. QST

R.F.-Triggered Transistor Unit

BY FLOYD A. TRUEBLOOD,* K6ORS

PERHAPS the most convenient c.w. monitor is the audio-oscillator type turned on by r.f. voltage picked up from the final amplifier of the transmitter. The unit to be described uses this principle, and includes improvements not heretofore utilized.

Referring to the circuit diagram of Fig. 1, it will be noted that the oscillator is of the multi-vibrator type. This circuit was chosen over others because, in the experience of the author, the characteristic note is particularly suitable for monitoring. The variable resistance R_1 has been included as a part of the resistance in the base circuit of Q_1 so that the pitch of the oscillator may be changed to suit the individual operator.

Following the oscillator is a conventional audio amplifier. This amplifier has been included to bring the speaker output up to adequate level. The output transformer is a Japanese import having an impedance ratio of 2,000/3.2 ohms. The primary impedance value is not critical and other values in this general range will be found satisfactory. The value of the resistor in the base circuit of Q_3 has been chosen so that the total current drawn from the battery will be about 9 ma. when the monitor is triggered into operation. Other types of p.n.p. audio transistors are suitable for Q_3 and it is necessary only to change the value of the base resistor to suit.

The oscillator and the amplifier are powered by a 9-volt transistor-radio battery. However,

lower voltage may be used, and the output volume may be decreased by this method.

The battery circuit is turned on and off by means of a switching-type transistor Q_4 whose base, in turn, is turned on and off by rectified r.f. picked up from the transmitter. Since only enough r.f. need be coupled out of the transmitter to provide base current for Q_4 , very loose coupling to the transmitter may be used. This loose coupling is particularly desirable for reasons of safety if the r.f. is to be picked up in the proximity of high-voltage circuits. The coupling capacitor C_1 consists of two insulated No. 20 solid-conductor wires twisted together for approximately $1\frac{1}{4}$ inches. This capacitor should be included even if the transmitter is equipped with a monitor jack where r.f. may be picked up. In any case, coupling should never be tighter than that required to make the monitor function.

Although no conventional switch has been included in series with the battery, one will be required if the transmitter is to be used on phone. If c.w. only is used, no switch is required because the leakage through Q_4 will not significantly shorten the life of the battery.

The unit may be assembled on any suitable insulating material. Its layout is entirely non-critical and the circuit itself is not critical in any way. Caution in one respect is in order, however. The polarity of the diode must be correct; otherwise transistor Q_4 may be destroyed.

* 7335 Donna Ave., Reseda, California 91335.

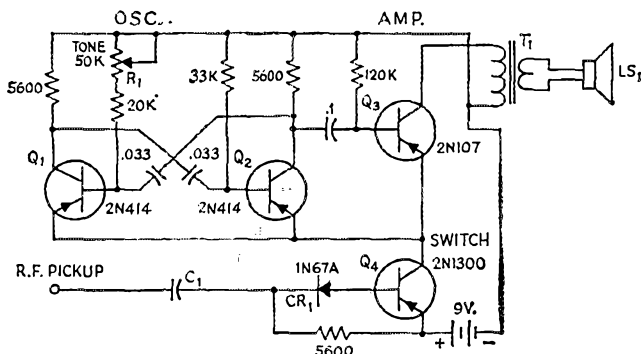


Fig. 1—Circuit of the r.f.-triggered c.w. keying monitor. Capacitances are in $\mu\text{f.}$; resistances are in ohms ($K = 1000$). Capacitors are paper or Mylar; fixed resistors are $\frac{1}{2}$ watt. C_1 is a "gimmick" capacitor (see text). LS_1 is a smallspeaker with 3.2-ohm voice coil. T_1 is a small output transformer approximately 2000 ohms to voice coil. The battery is of the transistor-radio type. Other component designations in the diagram are for text-reference purposes.

Amateur Radio — A National Resource

*Remarks of Herbert Hoover, Jr.
President, American Radio Relay League*

10th ANNUAL BANQUET

Quarter Century Wireless Association

Washington, D. C.

February 5, 1966

MY FELLOW members of the Quarter Century Wireless Association — and Distinguished Guests:

It is indeed a great pleasure to join my many friends in QCWA at this Annual Dinner celebrating the 10th anniversary of the founding of the Washington Chapter. It also gives me a chance to say "thank you" and express my appreciation — for the Honorary Membership which you bestowed on me in absentia on the occasion of your first meeting ten years ago. I remember that at the last moment one of our perennial foreign crises popped up in the Department of State, and I had to run off and help put out the fire.

And if my impressions from the newspapers are correct, this particular fire brigade is still on 24-hour duty — and with no bonus for overtime, either!

Nevertheless, I am most grateful for the honor you gave me — plus the fact that as an Honorary Member I need pay no dues, yet still have the privilege of occasionally speaking my mind as one of your fraternity.

It is a particular privilege to speak before you this evening because the members of the QCWA in the Washington area, as well as many of your distinguished guests who are present, in my opinion constitute the most influential single group of men affecting amateur radio today.

Many of you hold responsible positions involving communications in our government, while others are in the front line of a wide range of communications activities — all of vital importance, directly or indirectly, to amateur radio.

The purpose of my talk is, first, to thank you on behalf of amateurs everywhere for all you have done for amateur radio in the past; second, to report to you a few of our accomplishments; and, third, to try to assess some of the problems we will be up against in the future.

For more than 50 years, amateur radio has had a unique relationship with the government of our country. It was the determination that amateurs should have access to a limited but adequate share of the radio spectrum, under rules and regulations that would provide an incentive for voluntary public service, that originally made this activity possible — and has



Herbert Hoover, Jr., W6ZH, president, ARRL, addressing the 10th Annual Banquet of the Quarter Century Wireless Association.

kept it going ever since. On the other hand, without the kind of support and confidence it has received from the responsible people in our government, there is not the slightest doubt in my mind amateur radio would not exist today — either in the United States, or anywhere else in the world.

When it got started some 50 years ago, amateur radio was a phenomenon that probably could have happened only in the United States. Most other countries in the world regarded it, at best, as a nuisance; and more often than not, with open hostility and suspicion.

But our government fought for it over the years, not only because it was felt to be a valuable and legitimate activity in itself, but also because it seemed to fit in with our ideals of freedom — and the opportunity for the individual to be of voluntary service.

A great deal of the credit must go to Hiram Percy Maxim, the founder of the League, for originally propounding this philosophy after World War I. I know my father was deeply impressed by Mr. Maxim's vision of the future for amateur radio.

In 1927, at the International Conference of Washington, the question was hotly debated among the 80 participating nations as to whether or not amateurs should be allocated specific bands among the "short waves" they had discovered but a few years before. The United States viewpoint finally prevailed. At the concluding ceremonies my father, who was chairman of the American Delegation and also General Chairman of the Conference, had this to say in his closing speech:

"At this point I should mention that this Conference for the first time has recognized the amateur as an important element in radio communication and has conferred upon him by international treaty certain definite wavelengths. The effects of these arrangements for the amateurs have been agreed by their representatives as increasing and assuring their opportunities to make contact with their companions overseas. To have given the boys of the world a status in international life by treaty is a fine recognition not only of the rights of all boys but a tribute to their service in developing the art."

Did Mr. Maxim or my father, or any of the others who so staunchly defended the existence of amateurs, have any real conception of what would take place in the future?

I think they may have had an inkling, although their decision was undoubtedly based as much on faith in the future, as it was on any factual evidence of the moment. But the accomplishments of the boys of whom my father spoke have far exceeded anything he — or anyone else — might then have envisioned.

Their accomplishments have tended to fall into two distinct categories. First, there are those which pertain to amateur radio *per se*. Secondly, there are those of a more indirect nature, of which I will speak later.

In 1927 there were about 17,000 amateurs in the United States. Today there are over a quarter of a million. During the intervening period they have made great progress, and in many instances they have pioneered the way in the technological revolution of communications.

Their technical and operating competence, their numerous contributions to the art and science of communications, their voluntary public service activities during emergencies and local disasters, their availability for National Defense, and their other activities have been told on many occasions.

Moreover, in the same span of time the League has grown to an active membership of over 80,000, its publications exceed 2,000,000 each year, and its full-time staff is now over 70. The League is proud that the Canadian amateurs

have been an integral part of its structure since the beginning.

The generous citation to the League from the Red Cross this evening is a highlight in a close relationship that has existed between us for a great, great many years. It is a tribute we appreciate all the more keenly because the ARRL, like the Red Cross, is founded on a concept of voluntary public service.

I wish it were possible to give a replica of this plaque to the thousands upon thousands of amateurs who have participated in handling Red Cross communications, and willingly given their time and energy without any thought of compensation other than the satisfaction of a job well done.

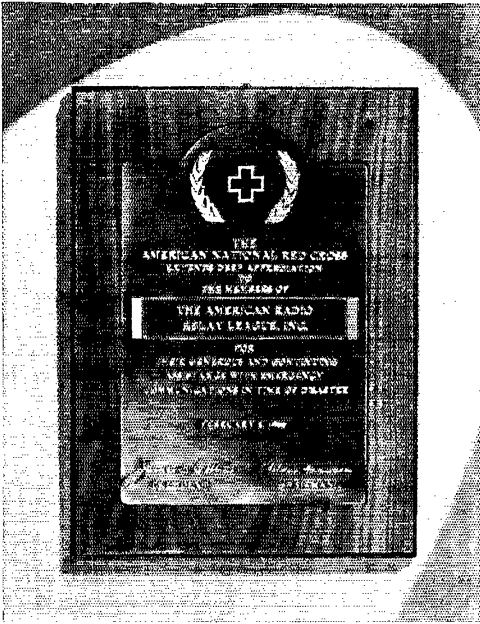
Personally, I think we could accomplish a great deal more in the public service area than we do at present. Unfortunately, on the governmental side in recent years, there have been a number of confused situations in the responsibility for emergency and Civil Defense communications. When — and if — they are cleared up the amateurs stand ready to cooperate to the best of their ability, and I believe they can make an even greater contribution to these vital services than ever before.

The idea is often expressed, in this sophisticated age of electronics, that amateur radio is no longer on the front line of technical progress. Yet I doubt if any project in recent years has had as much romance to it as the amateur satellite program of Project Oscar. With the enthusiastic support of the Air Force — and more recently NASA — these dedicated amateurs have successively put four successful satellites into operation, the last two of which were translating-type repeaters of advanced design. Their hamband signals have been copied by thousands of amateurs in every corner of the globe, and long-distance contacts by v.h.f. and u.h.f. have become commonplace.

This Oscar project has opened up exciting new frontiers, and our friends in other fields of com-



Mr. Robert C. Edson of the American Red Cross presents W6ZH with the Red Cross award to the ARRL for "generous and continuing assistance with emergency communications in time of disaster."



The Red Cross plaque presented to the ARRL, and now on display at ARRL Headquarters.

munication are just beginning to grasp its full significance. It has demonstrated beyond doubt there are now all sorts of possibilities for worldwide communication to remote places, using a combination of relatively low-power satellites and simple, inexpensive ground installations. The pioneering spirit is far from extinct.

The entire basis upon which our government has been able to permit and encourage amateurs to use valuable pieces of the radio spectrum is that their operation is in accordance with the public interest, convenience and necessity. I am confident a substantial majority of the 250,000 licensed amateurs in the United States thoroughly understand this. And they take the responsibility seriously.

There are some, of course, as in almost any segment of society, who will go along just for the ride. They regard an amateur radio license as they would a driver's permit, and expect to go any place, at any time their fancy dictates. It never occurs to them this particular highway could be taken away and given to somebody else some day, if it could be put to a better use. But those who regard amateur radio solely as a source of self-amusement are, in my opinion, a minority.

It is in connection with these sorts of problems, especially, where the element of leadership by our governmental agencies has been most helpful. In the early days when there were only a few thousand amateurs, most of us knew each other personally — or over the air. Today, with 250,000 licensees, the problems are far more complex; and the League, through its leadership

alone, cannot accomplish some of the things that must be done.

For example, about three years ago the League recognized that if the Amateur Service was to maintain its responsibilities for technical competence, in accordance with the definitions set forth in the Communications Act, there had to be a general upgrading of the Service. The Directors therefore recommended to the Commission that the Rules and Regulations be amended to require higher standards of technical qualification; and proposed, as an incentive, that all amateurs desiring to operate on certain popular bands be required to meet such qualifications. This became known as the incentive licensing proposal.

As expected, the idea created quite a furor in the amateur ranks. But I believe the Directors showed real courage and wisdom in proposing it. It is not often, in this day and age, that a membership society will ask that its licensing requirements be upgraded, rather than downgraded. But our Board felt that if the Amateur Service as a whole was to continue to operate in the public interest, and thereby qualify for whole-hearted support by our government, then the technical competence of the service must keep pace with present-day technology.

Our polls indicate that at least three-quarters of our 80,000 members favor some form of incentive licensing. About 55% favor the scheme proposed by the League, although there was no unanimity among the other 45% for any alternate system. We are most hopeful the Commission will take constructive action in the near future, and settle the matter one way or another. Many of our members have difficulty understanding why the "due process" takes so long!

I have touched — all too briefly, I am afraid — on amateur accomplishments *per se*. For a moment I would like to explore some of the indirect accomplishments of the system. And in many ways I think they may be the most important — although perhaps the least appreciated.

In the last 50 years I estimate at least a million American youngsters have passed directly, or indirectly, through the ranks of amateur radio. These are the "boys" my father referred to in 1927.

What has happened to these youngsters?

Many of them, of course, have long since grown up — though quite a few are still active on the ham bands. But *as* they grew up they became the backbone of our telecommunications and electronics industries. Without them, I seriously doubt we would have gained the position of world leadership in electronics, communications, broadcasting, aeronautics, geophysics, space, and so many other fields in which we now excel all other countries — both industrially and militarily. It has been said that amateur radio is one of our greatest secret weapons. And yet it has been out in full view, for all the world to see, for 50 years.

Lest this sound too far-fetched, let me ask where else a youngster of high school age — or earlier in many cases — could go through a similar process of natural selection for his life work?

How else could he have his imagination better stimulated, or his scientific curiosity aroused?

Where else, at an early age, is there a more unique opportunity to reconcile theory with practice, to build something and make it work?

No wonder these youngsters go on to careers in science and engineering, never suspecting they had such an interest before. As a system for selecting and stimulating scientific aptitudes, it is second to none.

Let me give you some examples.

Last year, as President of the League, it was my duty to write a formal letter to the Air Force asking their help in launching Oscar III — one of the amateur translator-satellites. In due course I received a formal reply approving the project, and directing Air Force personnel to give whatever assistance might be required. It was signed by the Undersecretary of the Air Force. But what caught my eye was that following his signature, he wrote "Ex-W9EAY." I was intrigued, and asked him about it.

Dr. McMillan told me he had no special interest in science at high school until one day he saw a friend's amateur set. He was immediately drawn to it, built a 210 TNT rig himself, and worked everything on the air. He proceeded to take all the high school physics he could get, went on to MIT where he received his B.S. and Ph.D. degrees magna cum laude, and followed with a distinguished career at Bell Labs. He said his one regret was that he had been so busy at MIT, Bell Labs, and in government, he hadn't had a chance to get back on the air yet!

Another example happened recently, from an equally unsuspected source. I was playing golf one day with my old friend Fred Kappel, the Chairman of A. T. & T. He turned to me and said, "Herb, how is the League doing?" You could have knocked me over with a feather, for

I had no idea he had ever been in amateur radio.

It seemed he had a rotary spark outfit when a youngster in Minnesota, before W. W. I. When the war came along, a Naval Officer turned up, made him seal it in a trunk in his mother's attic and, so far as he knew, it was still there!

Soon after, he went to the University of Minnesota, studied Communications Engineering, as a result of his interest in amateur radio, and upon graduation in 1924 entered the Bell System.

In still another instance, not long ago I was talking with the technical manager of one of our largest space laboratories. He confided he had been most discouraged because neither of his boys — both in their early 'teens — showed any inclination toward science at all. He was never a ham, but in desperation he gave them each a Hamkit for Christmas. Now he happily complains he has to stay up all night, cracking the books to keep ahead of them, and never had so much fun.

Isolated cases? Not at all.

Art Collins, Bill Pickering, Frank Gunther, Bill Halligan, Fred Terman, Bill Eitel, Jack McCullough, Pat Hyland — to name only a few — are among the hundreds who head up their famous organizations today and got their start through amateur radio. And right behind them are countless thousands more who are the sinews of their organizations.

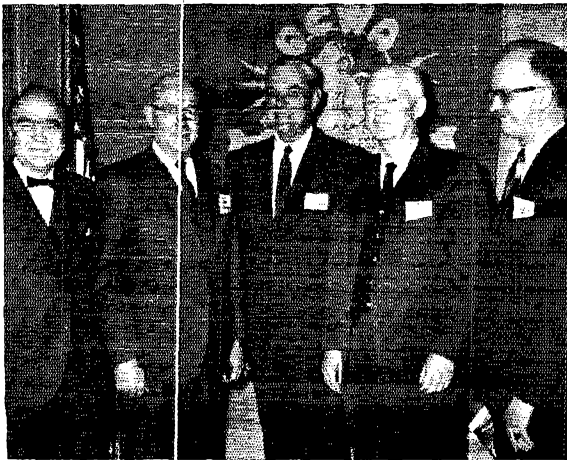
To substantiate our feeling of the important part these men have played in bringing our country to its present pre-eminent position in communications and electronics, the League last year commissioned the Stanford Research Institute to make an analysis of the subject. While their report is not yet finished, I understand they fully bear out these conclusions. Amateur radio is one of our great — though perhaps unrecognized — National Resources.

But what about the boys of tomorrow?

Here, it seems to me, we have to do some serious thinking. Can we afford *not* to carry on an institution that has been so vital in bringing us where we are today. I do not think so, and I propose we do three things about it.

First, within the last two years we have had a marked drop in the number of Novice licenses issued by the Commission. Indications are that the decrease has been in the neighborhood of 30 percent, but no plausible explanation is apparent. As a counter-measure I suggest the Commission review its licensing procedures, and make this grade of license as readily accessible and easy to obtain as possible. After all, this class of license is good for only one year, and then it is necessary to take a more advanced exam for a higher grade. If the bug hasn't bitten during the first year, the youngster is probably immune — and no harm will be done.

Among the distinguished guests attending the QCWA Banquet were (l. to r.): Lt. Gen. Harold W. Grant, FCC Com. Robert T. Bartley, Herbert Hoover, Jr., W6ZH, FCC Com. Rosel H. Hyde, and FCC Com. Kenneth A. Cox.



Second, I think the QCWA and the ARRL — and any other groups who may be interested — should join forces and explore the possibilities of an intensive campaign to interest more youngsters in amateur radio. And let me say here, the Quarter Century Wireless Association is looked upon by the younger generation with the utmost reverence and respect, although at times — like many of their age — these boys may not want to admit it. A friendly word of encouragement, some tangible help in getting started, and an example of good operating practices will do wonders. I recommend you consider it as a conscious policy in the years ahead.

Third, and most important of all, is the preservation of our amateur assignments at the next international allocations Conference. This situation is so serious I would like to spend a few minutes more on the subject.

I do not have to tell *this* audience that the radio spectrum is being squeezed today as never before. I am sure you are all thoroughly aware of it.

As civilization has moved forward and become more complex, the demand for radio communication has risen at an unprecedented rate. The increase seems to bear no simple relationship to population figures — or if it does, the demand has risen by some geometric n^{th} power of the number of people in the world.

Nor has the demand been confined to any one sector of society — it seems to be equally acute in meeting local, regional, and world-wide needs. In other words, it takes in all parts of the radio spectrum.

Until recent years the most popular solution has been to try to cram more and more communications — especially long distance ones — into an already overcrowded and relatively inelastic part of the spectrum. The potential pressure may have been alleviated to *some extent* on the higher density routes by improved submarine cables, and more recently by satellite-relay systems. Also, these innovations have vastly improved the quality and reliability of communication over the vagaries of the high-frequency transmission.

While these improvements — and others — will hopefully give more elbow room in the spectrum someday, it has not been noticeable on the air so far. Services using cables or satellites are still keeping their high-frequency circuits in operation as a back-up, and those which do not yet have such alternate facilities seem to be multiplying faster than the proverbial bunny rabbit.

We, as amateurs, probably experience this pressure more strongly than any other service. Our own numbers have increased dramatically, and the occupancy of our narrow h. f. bands is many times greater than even a few years ago. Furthermore, we are probably using the assignments we *do* have more efficiently than any other service. Single-sideband telephony and selective c.w. operation are the order of the day. But the encroachment into our bands by



Washington D.C. Chapter officers and committee members of QCWA which sponsored the 10th Anniversary Dinner are (l. to r.): Mac Williams, K3AC; Bob Hiltner, W3GHX; "Liz" Zandonini, W3CDQ; Tex DeBardeleben, W4TE; "Robbie" Robinson, W3RE and Harry McConaghy, W3EPC.

high-powered stations of other services — especially short-wave broadcasters — is rendering some of our assignments almost useless.

Where is this pressure coming from?

As one might suspect, it does *not* come primarily from the countries who have been Old Timers in communications for many years — the "Haves" of the business. Rather it comes from the "Have Nots." Many of the latter are countries who attained their sovereignty since the last ITU Conference in 1959, or were in the so-called "New and Developing" category prior to then. The thing that gives us deep concern — as amateurs — is that these countries not only seem to have a complete disregard for our ITU assignments, but in our conversations with their representatives at Geneva and elsewhere many of them see no reason for preserving the rather meager amateur allocations at all. And as we add up the potential number of their votes at the next Conference, we believe amateur radio may be in real jeopardy. For without the limited frequency assignments we now have, especially those between 1.8 and 30 megacycles, amateur radio — as we know it today — would no longer exist.

That brings us to the question: What can be done about it?

Four years ago the Officers and Directors of the League recognized that the next Conference would be a critical one; and while the outcome would depend upon the majority of those voting, the degree of support received from our own government would be among the most important.

Two courses of action were therefore decided upon. The first was to make every possible effort in the United States to up grade the Amateur Service in the public interest, and thereby merit the continuing confidence of our governmental agencies. This aspect I have already touched upon.

The second course was to strengthen and expand the International Amateur Radio Union,

which consists of our sister societies in other countries. To this end, the officers of the League — who by the Constitution of the Union are its officers also — made numerous trips to Europe to review plans with the IARU Region I Organization, and to exchange views with officers of individual societies. We believe coordination between members in Region I — both Europe and Africa — is better than ever before, and they are gaining increased awareness of the problems that lie ahead.

On a recent trip to Europe last fall, for instance, John Huntoon, Bob Booth and I had prolonged discussions with the officers of the Region I group, as well as with society officers in Switzerland, Great Britain, Ireland, Denmark, Norway, Finland, Portugal, Germany, Belgium and Holland. We found a reassuring unanimity of purpose and a complete desire for cooperation.

Two years ago the League was instrumental in the formation of the Region II Organization, comprising societies of some 18 countries in the Western Hemisphere. While this group is just getting started, they have a high degree of enthusiasm and their progress is most encouraging. Representatives of the League are taking an active part in this effort and we are assuming a substantial share of the financial costs.

The purpose of these efforts by the League, of course, is to impress upon our sister societies abroad that they have the primary responsibility for gaining the support of their respective governments at the next Conference. We believe their efforts are growing in effectiveness, but obviously there is still a long way to go.

Out of the 129 countries now participating in the ITU, less than one-half are represented in the councils of the IARU. Most of those remaining are in the "New and Developing" category where little or no amateur activity exists. When it comes to amateur matters, in many instances, I feel sure the decision of these countries will be strongly influenced by the position of our own government.

In the United States the League is, in effect, asking our government to make a new and critical evaluation of the Amateur Service.

We believe it will show amateur radio is a real and very valuable asset.

We think it is an institution worth fighting for.

And if our government, with all the elements of world leadership which it has at its disposal, will take a vigorous position: we feel there is an excellent chance for the preservation of this unique National Resource.

Thank you.

QST



April 1941

... K. B. Warner, in his editorial, has a bad time of it. He can't seem to get started. Balmey air wafts through his window and he has thoughts of golf, robins soon to be chirping and looking for succulent worms. He does briefly review some aspects of ham radio but never gets off the ground, since Roddy, the Managing Editor, is hot for copy. Perhaps some day, he'll mention single sideband. Anyway, it's good reading.

... The cover shows a self-supporting 127 footer, being a quarter wave for 160. Weighs three tons.

... Hamming on Howland Island is a dandy story of a real DXpedition written by Robert Lieson, W1KFV, using the call KF6SJJ. DX was sort of spotty, but they did pretty well. Bet it didn't cost a dollar to get a QSL card, either. Oh yes, their SW3 didn't quite reach the 40-meter band and most of the work was done on 20.

... A real sturdy 48-foot self-supporting mast is shown and described by Guy A. Stewart, W2JRG. Cost less than ten dollars and has been up four years without damage even by a hurricane.

... I got a little start when I saw the pictures accompanying an article on a "Bugless" 5-meter transmitter — it looked just like one I built along about then. Sort of breadboard using a metal chassis with all tubes, turning controls, etc. above deck where you can get at them. The good old TZ-40 was used in the final. J. C. Melton W3NT and M. W. Barrett, W3RZ are the authors.

... Byron Goodman, W1JPE (now W1DX) has a serious informative study of keying methods, using various filters. A number of oscillograms are included so you can see just what goes on. Really worth reading by the c.w. man today.

... It says here that while there is no legal prohibition against the use of code or cipher by amateurs, hams are enjoined to refrain from such practices. Must have been a change in the regs. since that time.

... Vernon Chambers, W1JEQ presents a nifty little emergency transmitter using a single 6L6, crystal controlled. Ideal for automobile installations if you also take along a 250-volt power supply. Dana Griffin, W2AOE concludes his opus on u.h.f. superhet design. The first part appeared in February.

... In case you don't know what "dynamic prognostication" is, read Larson Rapp's article. He is W1OU. He even uses conductive rubber in the construction, this material being said to enjoy certain highly desirable qualities. After all, it's April!

... I seem to be running out of space. Better dig up the issue, O.M.

— W1ANA

Strays

According to the magazine, *Radio*, Russian radio amateurs are now permitted to operate RTTY. Two of the first radio amateurs to come up on RTTY are UB5s AC and UN. In addition, the

Headquarters station, UA3KAA, may transmit bulletins on RTTY. Operating procedures, frequency shifts, etc., appear to conform to international amateur practice.

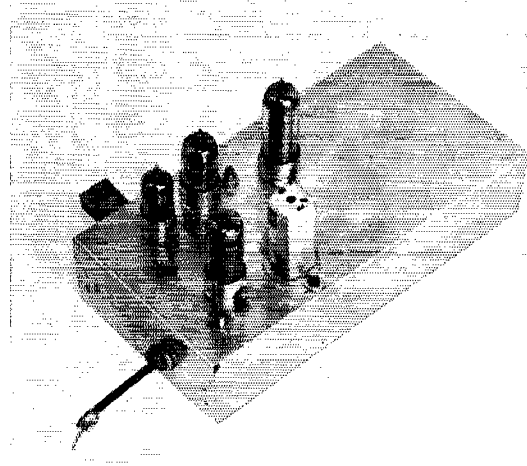
A Simple S.S.B. Exciter for 7 Mc.

Step-by-Step Construction for a Filter-Type Unit

BY CHARLES M. FULLINWIDER,* KØKVD

IN looking over literature on commercial s.s.b. equipment, I couldn't find anything that would fit my needs at the price I wanted to pay. However, fellow hams were not encouraging about building single-sideband gear. "It's too complicated and expensive; the days of home-built transmitters are over," they said. But I went ahead anyway, with the hope that even if the signal quality was not the best, perhaps I could get by with it for a while. As it turned out, results were most gratifying. The generator works well (. . . "sounds like commercial equipment"), and was inexpensive to build with the use of old TV parts. It can be aligned without difficulty with simple equipment—a general-coverage

* P.O. Box 326, Conway Springs, Kansas.



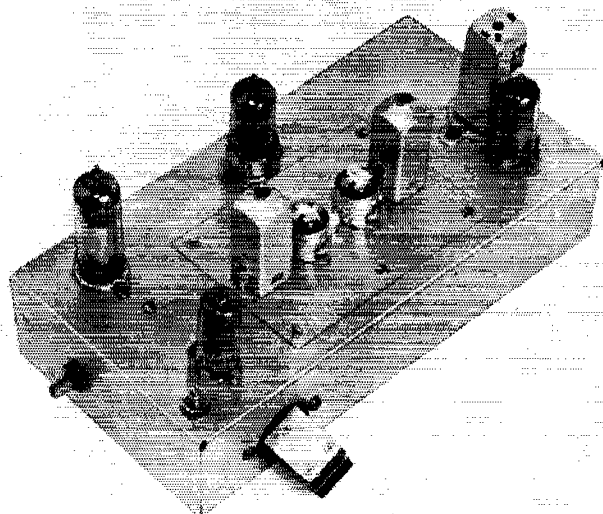
The mixer/amplifier chassis. At the rear, from left to right, are the conversion crystal, 6J6A, 6U8A, 6CL6, with the slugs of L_3 and L_4 on either side of the 6U8A. In front are L_2 , the 6BA7, and T_2 . The space at the right-hand end of the chassis may be used for the 6BQ5 output stage.

receiver, a v.t.v.m., a pair of headphones, and a 7-Mc. novice crystal.

To keep the initial construction as simple as possible, I decided to stick to one band—40 meters. However, I made provision for future expansion to other bands by splitting the exciter into two chassis—one for a 9-Mc. s.s.b. generator, and the other for a mixer/amplifier system. The v.f.o. was also built as a separate unit. Its output (5.0 to 5.5 Mc.) is fed by coaxial cable to the mixer/amplifier chassis.

Circuits

Fig. 1 shows the circuit of the 9-Mc. sideband generator. A 6C4 is used in the carrier oscillator, which has provision for switching the carrier to



The sideband-generator chassis. The crystal-filter unit is set in a cut-out at the center. The carrier crystals plug into the octal socket in the foreground. The 6C4 (front) and the 7360 are at the left-hand end of the chassis. The 12AX7 is behind the filter unit, and the 6BA6 with its output transformer at the right-hand end. The adjusting screw of the tubular ceramic trimmer used for C_3 is between the 6C4 and the 7360.

either side of the passband of the sideband filter, depending upon whether upper- or lower-sideband transmission is desired. The audio signal is provided by a two-stage amplifier employing the two triode sections of a 12AX7. The carrier is suppressed in the 7360 balanced modulator. (This circuit is one recommended by the manufacturer of the sideband filter.) The 9-Mc. d.s.b. signal is fed to the crystal filter, FL_1 , which filters out the undesired sideband, and feeds the desired sideband signal to the 6BA6 amplifier.

The circuits of the frequency-conversion and signal-amplifier stages are shown in Fig. 2. The 9-Mc. s.s.b. signal is fed to the triode section of a 6U8A where it is combined with a 5- to 5.5-Mc. v.f.o. signal. The difference frequency of 4 to 3.5 Mc. is selected in the output of the 6U8A mixer, and amplified in the pentode section of the same tube. The amplified 4- to 3.5-Mc. signal is then fed to the No. 3 grid of the 6BA7 mixer, while the signal from the 6J6A (only one triode section used) 11-Mc. crystal oscillator is fed to the No. 1

Although the s.s.b. exciter described here is designed primarily for 40-meter operation, it can quite readily be adapted to other bands by simply providing a suitable conversion crystal and tuned circuits.

grid. The difference frequency of 7 to 7.5 Mc. is selected by T_2 in the output circuit of the 6BA7. The 7-Mc. s.s.b. signal is amplified in the 6CL6 stage before feeding it to the 6BQ5 r.f. output stage.

The high-C Colpitts v.f.o. circuit is shown in Fig. 3. To reduce frequency drift, the tuned-circuit components (shown enclosed in dashed lines) were mounted in an aluminum box, with the shaft of C_1 protruding from one side. The box was then installed at one end of a cabinet that formerly housed a tuning unit from a surplus

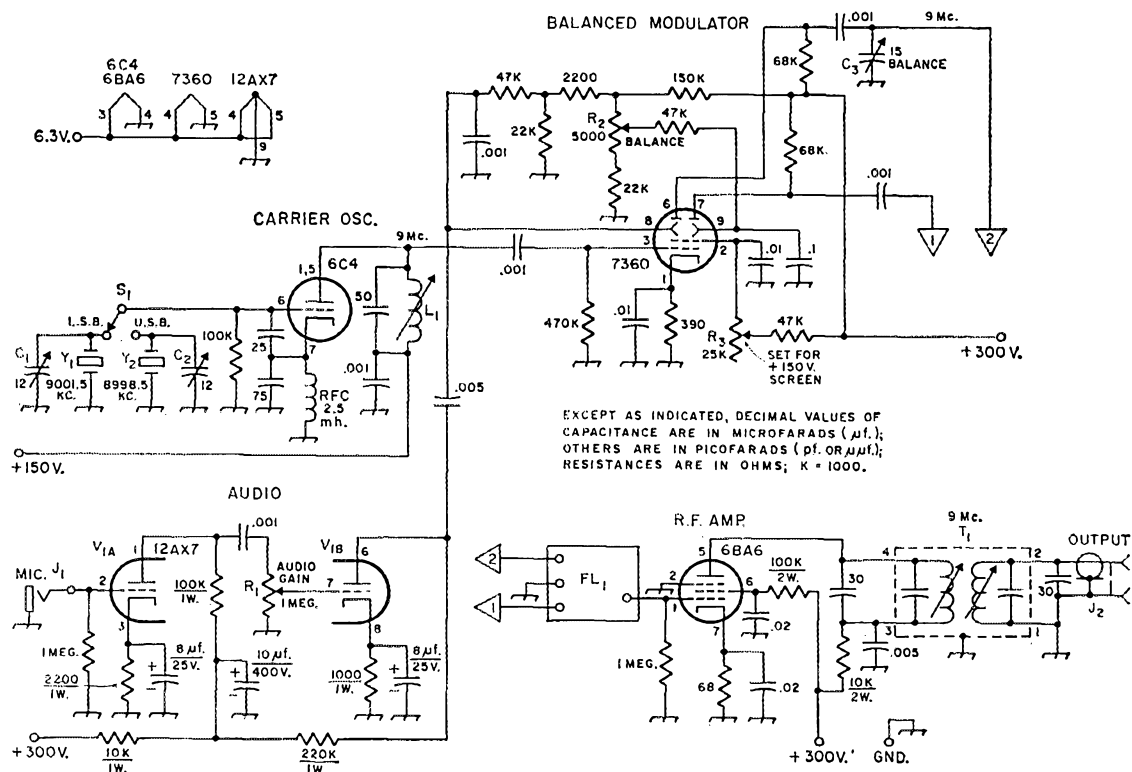


Fig. 1—Circuit of the s.s.b. generator. Fixed capacitors of decimal value are disk ceramic; others are mica or NPO ceramic, except where polarity symbols indicate electrolytic. Resistors are 1/2-watt, unless indicated otherwise. All r.f. chokes have a 50-ma. current rating.

C_1 , C_2 —3-12-pf. ceramic trimmer.

C_3 —Ceramic or air trimmer.

FL_1 —9-Mc. crystal sideband filter (International Crystal ACF-4).

J_1 —Microphone jack.

J_2 —Chassis-mounting coaxial receptacle.

L_1 —26 turns No. 30 enameled wire, 3/8-inch iron-slug form. (Miller 4400, or equivalent, form).

R_1 —Audio-taper control.

R_2 , R_3 —Linear-taper control.

S_1 —Single-pole two-position ceramic rotary switch.

T_1 —10.7-Mc. i.f. transformer, loaded with external capacitance as indicated (Miller 1463).

Y_1 —9001.5-kc. crystal (International Crystal CY-6-9LO).

Y_2 —8998.5-kc. crystal (International Crystal CY-6-9HI).

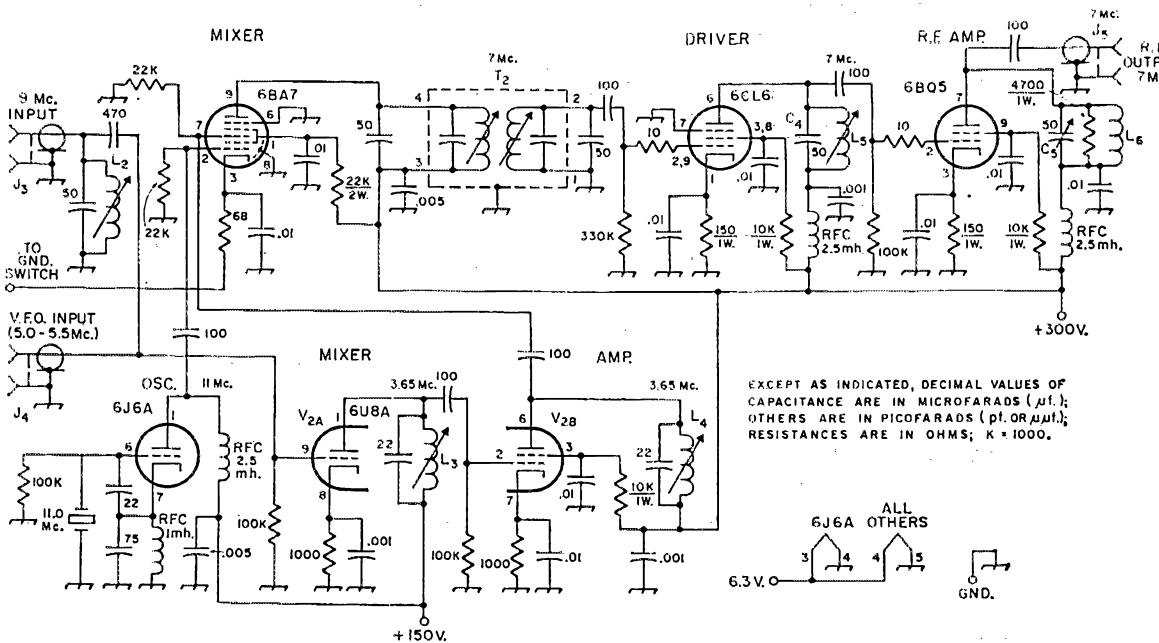


Fig. 2—Circuit of the mixer/amplifier section. Fixed capacitors of decimal value are disk ceramic; others are mica or NPO ceramic. Resistors are 1/2-watt unless indicated otherwise. R.f. chokes have a 50-ma. current rating.

C₁—Silver mica.

C₅—Air trimmer.

J₃, J₄, J₅—Same as J₂, Fig. 1.

L₂—Same as L₁, Fig. 1.

L₃, L₄—66 turns No. 30 enameled wire, scramble-wound.

L₅—22 turns No. 24 enameled.

BC-375E transmitter. The tube and remaining components were assembled at the other end of the cabinet. The tuned circuit was then connected to the tube through lengths of RG-58/U, as indicated in the diagram.

This arrangement follows the principle of the remotely-tuned v.f.o., several versions of which have been described in earlier issues of *QST*.

Above coils are wound on 3/8-inch iron-slug forms (Mille 4400 or equivalent).

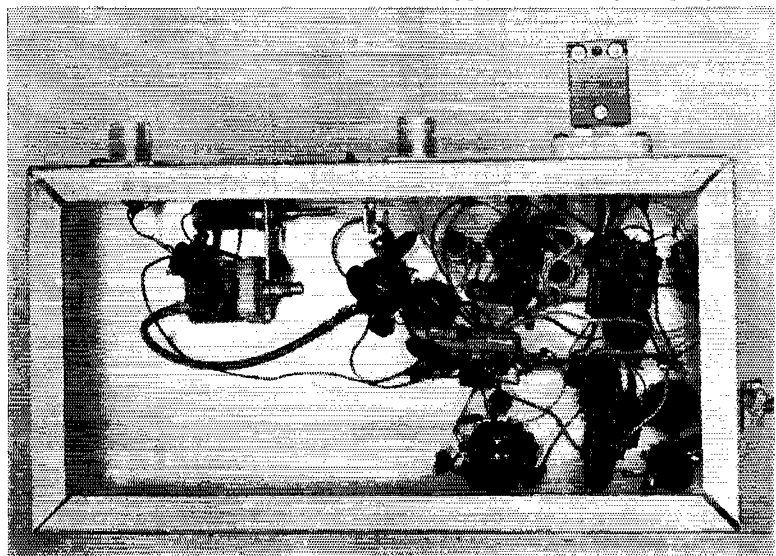
L₆—22 turns No. 20, 1-inch diam., 16 turns per inch (B & W 3015 Miniductor, or Illuminetics 816 AirDux).

T₂—Same as T₁, Fig. 1.

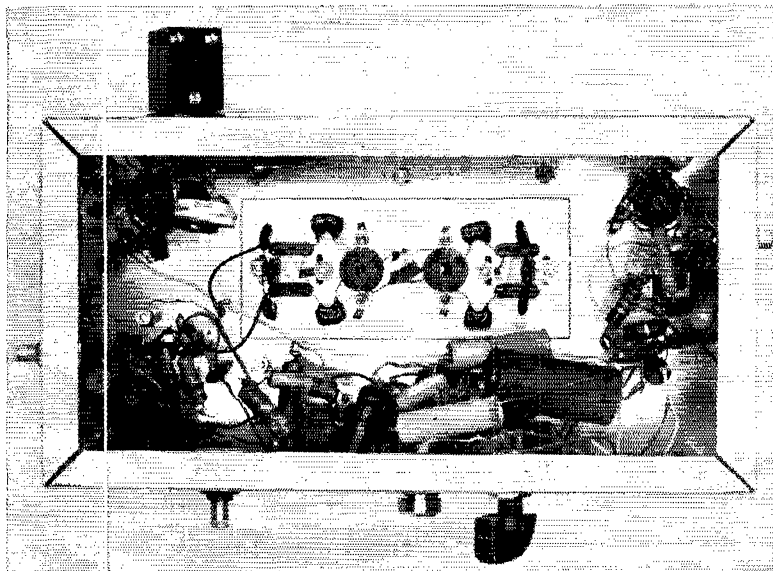
If desired, the 6AU6 could be mounted on the mixer/amplifier chassis, with the tuned circuit in a separate box at the operating position. The lengths of the coax sections should be held to a minimum, however.

Power Supply

The power supply was built principally from



Bottom view of the mixer/amplifier unit. Along the top edge are output connector, v.f.o.-input connector and the conversion crystal. The sideband generator feeds in at the right. Inside the chassis, at upper left, are the components of the 6CL6 output circuit.



Bottom view of the generator chassis. The control (R_3) at the left-hand end of the chassis is for setting the screen voltage of the 7360. Along the bottom edge, from left to right, are the carrier balance control, microphone connector, and audio gain control.

old TV components. The circuit is shown in Fig. 4. Regulated 150 volts is provided for the v.f.o., unregulated 150 volts for the crystal oscillators, and 300 to 350 volts for the remaining stages.

Construction and Adjustment

The two main sections were constructed on identical chassis, each measuring $9\frac{1}{2}$ by 2 inches. Sufficient detail of the component layouts is shown in the photographs. After the components had been mounted, and the heater wiring installed, stages were wired serially, checking each stage before proceeding to the next. Following this procedure makes it relatively easy to diagnose any trouble that may develop. Most of the checking was done with a vacuum-tube voltmeter fitted with the simple r.f. probe shown in Fig. 5.

The audio stages were wired first. This section was checked by connecting a pair of headphones

between the output plate and ground through a blocking capacitor. When speaking into the microphone, speech should be heard in the headphones.

After the 6C4 carrier oscillator was wired, the 9001.5-kc. crystal was switched in and L_1 was adjusted for maximum deflection on the v.t.v.m. connected from plate to ground.

The 7360 balanced modulator was wired up next. C_3 was left disconnected temporarily. Upon speaking into the microphone, the v.t.v.m. indicated r.f. at both plates of the 7360.

After connecting C_3 into the circuit, the wiring of the sideband filter and 6BA6 amplifier was completed. The crystal-filter unit includes input and output transformers, each having one slug adjustment. C_3 was set at maximum capacitance, and the filter input transformer was adjusted for maximum deflection on the v.t.v.m. connected across the output of this transformer.

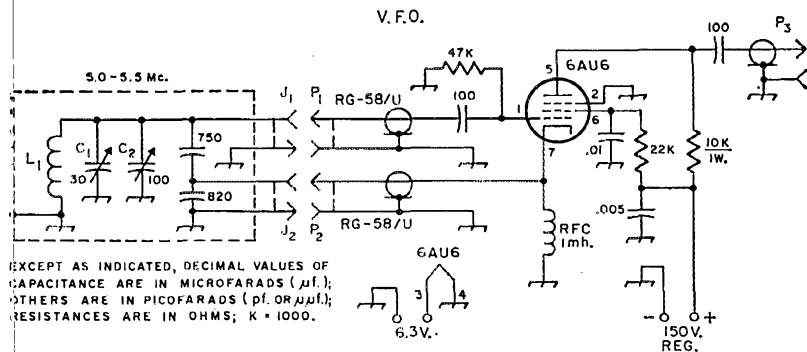


Fig. 3—Circuit of the v.f.o. Fixed capacitors of decimal value are disk ceramic; others are silver mica. Resistors are $\frac{1}{2}$ -watt, unless indicated otherwise.

C_1 —Air-trimmer type variable.
 C_2 —Air trimmer.
 J_1, J_2 —Phono receptacle.

L_1 — $8\frac{1}{4}$ turns No. 18, 1-inch diam., 10 turns per inch (Illumintronics AirDux 810).
 P_1, P_2 —Phono plug.
 P_3 —Coaxial plug.

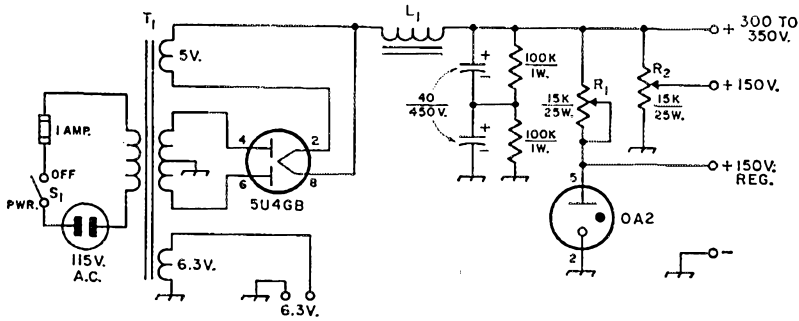


Fig. 4—Power-supply circuit. Capacitances are in μf .; resistances are in ohms. Capacitors are electrolytic.

L_1 —Filter choke approx. 2 hys. (from TV chassis).

R_1 —Slider adjustable. Adjust so that 0A2 stays ignited with load connected.

R_2 —Slider adjustable. Adjust for 150 volts with load

connected.

S_1 —S.p.s.t. toggle switch.

T_1 —Power transformer: 700 to 800 volts, r.m.s., c.t.; 200 ma; 6.3 volts, 3 amps. (from TV chassis).

The filter output transformer was peaked by coupling a signal from the carrier oscillator to the filter output transformer through a capacitor, and adjusting the second slug for maximum deflection with the v.t.v.m. connected from the filter output terminal to ground. The v.t.v.m. was then transferred to the terminals of J_2 while the slugs of T_1 were adjusted for maximum deflection, after which the coupling to the carrier oscillator was removed.

With the v.t.v.m. still connected across J_2 , C_1 was adjusted for maximum deflection, and then readjusted for about one third of the maximum reading obtained. (The same procedure should be followed with C_2 and the 8998.5-kc. crystal switched in, if the unit is to be used on upper sideband.) C_3 and R_2 were then adjusted for *minimum* deflection. Speaking into the microphone then resulted in fluctuations of the v.t.v.m. needle, indicating a 9-Mc. s.s.b. signal.

Mixer/Amplifier Chassis

Before starting the construction of the mixer/amplifier unit, the v.f.o. was built and adjusted to cover the desired frequency range (5 to 5.5 Mc.). The general-coverage receiver was used to check the frequency range.

Then the 6BA7 mixer and r.f.-amplifier stages¹ were wired. A 7-Mc. Novice-band crystal was plugged into the carrier oscillator, and the signal was coupled out to the No. 3 grid of the 6BA7 through a capacitor. In succession, the slugs of T_2 and L_5 , and capacitor C_5 , were adjusted for

¹ The 6BQ5 output stage does not appear in the photographs. This stage was added later when it was found necessary to obtain adequate drive for my 150-watt linear, which is patterned after the parallel-807 amplifier described by W5SQT in *QST* for February, 1963.

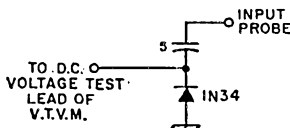


Fig. 5—Circuit of the r.f. probe mentioned in the text.

maximum v.t.v.m. deflection, with the meter connected across each output circuit in turn.

The 6J6A and 6U8A stages were wired as the last operation. When the wiring was complete, the 9-Mc. carrier oscillator was coupled to J_3 through a capacitor, while the slug of L_2 was adjusted for maximum indication on the v.t.v.m. connected across L_2 .

Leaving the 9-Mc. oscillator coupled to J_3 , the output of the 5-Mc. v.f.o. was connected to J_4 . With the v.f.o. tuned to 5350 kc., the slugs of L_3 and L_4 were adjusted for maximum output at 3.65 Mc., with the v.t.v.m. connected across each in succession. The receiver helped to determine that L_3 and L_4 were peaking in the desired range.

Next (with the 9-Mc. signal still fed in at J_3), the 11-Mc. crystal was plugged into the conversion oscillator, and L_2 , L_3 , and L_4 were trimmed up for maximum 7-Mc. output with the v.t.v.m. connected across the output of T_2 . The 9-Mc. oscillator coupling was then removed, and J_2 connected to J_3 .

After connecting the linear amplifier and adjusting it for proper loading, final adjustment of C_1 and C_2 was made for best voice quality.

Control Circuit

The transmit-receive control is a d.p.s.t. switch which, on transmit, grounds the cathode of the 6BA7 mixer, and applies voltage to the screens of the linear amplifier. For spotting frequency, a second switch is used which grounds the cathode of the mixer without applying screen voltage to the linear. With the microphone turned off, or the gain turned down, grounding of the mixer cathode provides sufficient carrier signal in the receiver to permit setting the output frequency. A third switch mutes the receiver and controls the antenna relay. These switches are mounted in a small Minibox near the operating position. The various functions could be combined in a single multiwafer switch if desired, of course.

QST

The Invisible Tower

Another Solution to a Difficult Problem

BY RALPH H. TURNER,* WSHXC

ONE of the most persistent problems facing many hams is the enactment of zoning ordinances governing erection of towers. While the ARRL has often helped beleaguered hams by collecting legal precedents which can be cited in their defense, a far better procedure would be to avoid the problem in the first place. As in the case of TVI, a little prevention is worth a couple of pounds of cure when it comes to soothing ruffled feelings. Several noteworthy attempts have already been made along these lines in concealing stretches of wire used for antennas.^{1,2} In both cases the problem was neatly solved by using wire of such small diameter that it could not be seen from a distance.

The Basic Idea

It is not possible to utilize this same principle when it comes to concealing something as large as a tower. Obviously an appeal must be made to a different set of principles in coming to grips with this much more difficult problem. Fortunately most of the relevant principles are already known to most persons and the several that are unfamiliar are easily grasped with the aid of a few examples.

As is known to almost everyone the visible portion of the spectrum extends from red at one end through orange, yellow, green, and blue, to violet at the other end. (You will recognize this sequence of colors as identical to the sequence used in resistor and condenser color codes. This order was adopted as a convenience in helping

to remember the numbers.) The colors to which the eye responds have a wave length of about 760 millimicrons at the red end and a wave length of about 400 millimicrons at the violet end. Colors which have wave lengths longer than 760 millimicrons or shorter than 400 millimicrons lie outside the visible portion of the spectrum and arouse no visual sensation. This knowledge is the key for a solution to our problem. Although a number of problems arise which must be discussed thoroughly in the next section, the basic idea is to paint the tower with a color which lies outside the visible portion of the spectrum. Such a color can produce no visual sensation, and the tower is thus rendered invisible. The problems encountered in achieving this desired end will be divided into practical problems and theoretical problems.

Practical Problems

An objection that has been raised to this approach is that if an object is coated with an invisible layer, you may see what is behind the layer and defeat your purpose. This will not be the case if the precaution is taken to use a paint that is rated by the paint industry as high in "hiding power"—a term that has additional significance for us. The paint industry has perfected products for painting over wallpaper where a paint rated high in hiding power can completely conceal a prominent wallpaper pattern with one coat. It is impossible to see through such a layer of paint because it is not transparent. Our layer of invisible paint is of this well-known type. Don't confuse an invisible layer with a transparent layer. If the invisible layer meets the current standards of the paint industry for high hiding power, it will not be transparent and nothing can show through.

* Department of Psychology, Oberlin College, Oberlin, Ohio.

¹ Scotten, "The Invisible Antenna," *QST*, February, 1949.

² Gordon, "Invisible Antennas," *QST*, November, 1965.

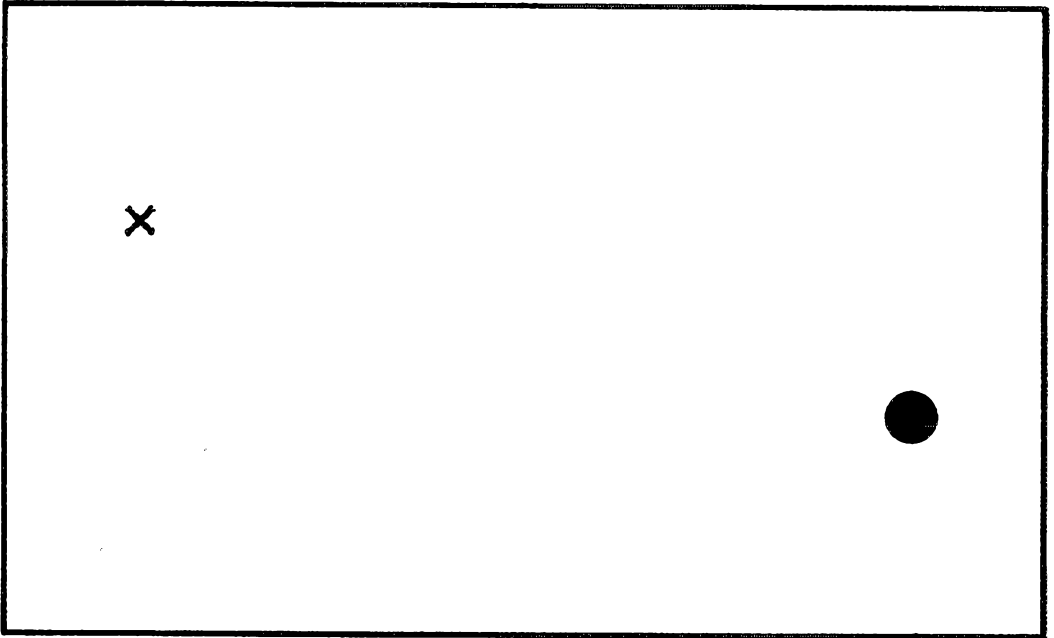


Fig. 1—Follow the instructions in the text carefully and you will be able to make the dot disappear from view.

A more serious problem is that of making sure that the pigment is not mixed with pigment that gives off wave lengths in the visible portion of the spectrum. If it is, the paint will be seen and the tower will be quite visible. Fortunately this problem is not as difficult to solve as the problem of trying to make sure that the pigment is pure and gives off only one wave length. This latter problem of producing a pure pigment is made difficult by the fact that different particles of the same batch of pigment tend to give off slightly different wave lengths. Our problem, however, is not that of producing a pure pigment having just one wave length. Rather, we have the simpler problem of just making sure that the several wave lengths do not fall within the visible portion of the spectrum. By selecting a color whose wave length is well below the red portion of the spectrum or well above the violet portion of the spectrum we can make sure that, even though our mixture is not pure, it does not give off wave lengths that are in the visible region.

Theoretical Problems

To the person who encounters this idea for the first time, one of the most troublesome matters is the answer to this question. "If a tower coated with invisible paint is seen against a solid background, such as the side of a house, won't it become visible? Since each section of the tower will block out a corresponding section of the house these holes in the visual field will have the outline of a tower and it will be easily recognized!" This sounds very logical but the perceptual processes just don't operate that way. These holes cannot be seen and we can prove it with the

following simple experiment which is designed to show what you see when there is a hole in the visual field.

In Fig. 1 there is a small x and a black dot having a diameter of about a quarter of an inch. With your left eye closed hold the page squarely in front of you at a distance of about one foot and look at the small x. If the dot does not disappear, move the page a little closer or a little further away or rotate the page *slightly* in a clockwise or counter-clockwise direction until it does. With a little care you can make the entire dot disappear because the image of the dot falls upon that portion of the retina that is blind since it is punctured by the optic nerve at this point. This portion of the retina is appropriately called the blind spot. But now for the important observation! Keeping your right eye on the x, adjust the page until the dot disappears. Now, without moving your eye from the x, do you see a hole in the page in the area where you know the invisible dot is located? The answer is, "no!" A process called "perceptual filling" fills in this hole so that it looks like the rest of the page. Draw Fig. 1 on a red paper, a green paper or paper of any color and try it again. You will find that the hole is always filled in with the appropriate color so that you still cannot see it. You may even want to try a plaid or polka dot background. In this case the hole will be filled in with a plaid or polka dot effect so that you will not see any hole in the visual field.

Now to get back to the invisible tower. As you view it against a background there are, to be sure, holes in the background which correspond to the portions of the tower that cannot be seen.

But we have just seen that the process of perceptual filling plugs in these holes with whatever is in the background so that the holes cannot be seen. An objection encountered here is that we have demonstrated this for holes at the side of the visual field (our experiment with the blind spot), but how about the situation for holes that are closer to the center of vision. Carefully controlled laboratory experiments have shown that when a subject is trained to fixate a white spot on a black background for a long stretch of time without blinking, the spot will periodically disappear due to fatigue or inhibitory effects. During these periods of disappearance no hole is seen in the background even though it is in the center of the visual field. Perceptual filling operates *anywhere* in the visual field and prevents the perception of holes which would make the tower visible against a background. If the tower is seen against a background of trees, the holes are filled in with trees; if the background is a cloudy sky, the holes are filled in with a matching cloudy sky.

This process of perceptual filling is not new and many of you are already familiar with the principle as it has been applied to the suppression of noise. A noise blanker for eliminating impulse noises of the kind produced by spark plugs or by the Loran navigational system works on the same principle of perceptual filling. As the impulse is received, the audio system is momentarily cut off for a small fraction of a second until the impulse is past. Thus a hole is created in the auditory field for the duration of the noise-producing impulse. But this hole is not heard at all. Perceptual filling operates in the auditory area and conceals the fact that there is a momentary interruption of audio. Otherwise the noise blanker would be useless since the perception of these auditory holes would be as distracting as the impulse noise itself. The perceptual processes operate so as to prevent us from detecting holes regardless of whether they occur in the auditory or the visual mode.

The only other major problem is whether there may be a limit to the size of the hole that can be concealed through perceptual filling. Let's go back to the blind spot experiment for a moment. Draw the x and the dot on a sheet of paper exactly as you see it in Figure 1. With the paper positioned on top of your desk, place a penny over the dot and look at the x with the

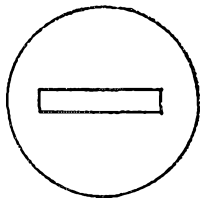


Fig. 2—The paint level indicator which may be cut out of sheet cork stock. The diameter of the disk should be slightly smaller than the inside diameter of the can of paint.

left eye closed. If you can see part of the penny push the penny into a position where it completely disappears. Then try it with a larger coin. Most persons can make an entire quarter disappear with the paper at a distance from the eye of one foot. Since a quarter is approximately an inch in diameter, perceptual filling can handle a hole having a one inch diameter. Now draw Figure 1 again but with the x and the dot separated by twice the distance found in Figure 1. Viewed at a distance of *two* feet, instead of one foot, you will find that an object of 2 inches in diameter will disappear and be completely filled in. By an extension of this same process you can demonstrate that, at a distance of 12 feet you can make an object a foot in diameter disappear. A hole in the visual field a foot in diameter can thus be filled in if you are 12 feet away, and much more extensive filling takes place as the distance is increased. Assuming that the tower is at least twelve feet from the street or sidewalk, this is really more filling than we need since the structural elements of a typical tower seldom have a diameter of more than two inches.

A problem that will be encountered has to do with the application of paint to the tower. Proper application of paint requires that the brush be loaded with enough paint to spread well but not so much that it drips and sputters. Ordinarily there is no problem since we dip the brush to the proper depth below the surface to obtain just the right amount of paint. But our paint is of such a color that the eye does not respond to it and its surface thus cannot be seen. Figure 2 offers a convenient solution to this problem. This level indicator is simply a disk of sheet cork cut so that the diameter is slightly smaller than the inside diameter of the can of paint. Since this will float on the surface of the paint the level of the paint becomes visible and the brush can be dipped to the proper depth through the slot cut for this purpose.

A word of warning. Towers near airports must be painted in appropriate, visible colors as specified by federal regulations. The author can take no personal responsibility for the irresponsible use of non-visible paint on towers located near public airports. As for damage to unsuspecting birds that might fly into one of these specially treated towers, there may be a way out of this difficulty. We have some evidence that the visual sensitivity curve for birds does not correspond exactly to that of human beings. If further work confirms this fact, it will be possible to utilize a color outside the range of human visibility that can still be seen by birds.

A final suggestion. When painting your tower, don't forget to paint the elements of your beam. You might find it hard to explain to neighbors how your tribander manages to stay suspended 60 feet in the air without any visible means of support. And another thing. Don't forget to paint the coax cable that goes up the tower and feeds the tribander. It might be even more difficult for you to explain a 20th century version of the old Indian rope trick!

QST

Happenings of the Month

RENEWALS BY U.S. AMATEURS OVERSEAS

Section 97.13 of the FCC amateur rules requires that an amateur applying for renewal of his operator license must certify that he can still copy code (at 5, 13 or 20 w.p.m., as appropriate to his class) and that he has had two hours operating time in the last three months or five hours operating time in the last year of the license term. This operating time can be by any mode and from any FCC-licensed amateur station, not necessarily the applicant's own.

Where a U.S. licensee is operating from a foreign country under his W/K callsign, the operation will count toward renewal. On the other hand, if operation in a foreign country is under a call assigned by the host government from its own callsign block, the operation will not count toward renewal as such. The arrangements, which were outlined in IARU News, page 74 of March *QST*, in the United Kingdom perhaps furnish near-perfect illustrations. W6XYZ, stationed in a European country with no reciprocal operating agreement, visits G1ABC for seven days, and — the British amateur having done the necessary in advance — is legally permitted to operate G1ABC under the watchful eye of its licensee. This operating time does not meet the requirements of section 97.13, because no station licensed by FCC is involved.

W4XYZ goes to England on a Rhodes scholarship, and takes out an Amateur (Sound) License C, receiving the call G5ZYX to be transmitted jointly with his FCC call (*i.e.*, G5ZYX/W4XYZ). Time logged in this instance does count for renewal, for the station is clearly licensed by FCC as well as the U.K.

How about the amateur in a country not permitting U. S. amateurs to operate, or permitting operation only under its own callsign block? A member of the U. S. Armed Forces or an employee of the U. S. government overseas is entitled to a waiver of the operating-time rule in Section 97.13. Other amateurs may be able to secure a waiver of the rule on a case-by-case basis, by attaching a letter to renewal form 610 setting forth the reasons he couldn't operate from an FCC-licensed station in the last year of the license term, and explaining how he has maintained his operating proficiency, as at an amateur station licensed by another administration.

One further word: the Communications Act was changed a few years ago, permitting FCC to renew licenses in the Safety and Special Radio Services at any time in the license term. An amateur who has been active at home, therefore, but anticipates going overseas to a place where no operation is permitted may renew his FCC license before he goes, receiving a new five-year license. (Where no such special consideration is involved, FCC expects the applications for renewal to be submitted 90 to 30 days in advance of expiration,



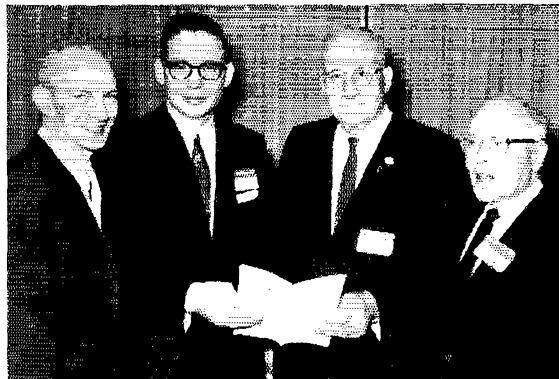
Samuel J. Knox, WB2MRA, has been selected as Amateur of the Year by the Southern Counties Amateur Radio Association. The travelling trophy marking the honor is presented each year by WFGP Atlantic City, New Jersey, to an amateur resident of Atlantic County. Here WB2MRA accepts the plaque from WFGP Manager John Struckell. Sam was also installed as president of SCARA at the meeting in January.

on FCC Form 610, to its office at 334 York Street, Gettysburg, Pennsylvania, 17325. A check for the renewal fee of \$4, payable to FCC, must be attached, along with the expiring license or a photocopy of it.)

A list of countries with which the U. S. has reciprocal operating agreements appears frequently on the IARU News page of *QST*. For information on whether courtesies are extended to U. S. amateurs by specific countries not listed in IARU News, write to ARRL headquarters.

SECOND PRISON SENTENCE

In January we reported that a licensee in the Citizens Radio Service had received a one-year prison term as a result of having transmitted profane or indecent language on the air. The Federal District Court at Boston, which was venue for the case, has now sentenced another man to a year in Federal prison. Richard F. Conefry, 24, of Brockton, Massachusetts, was convicted of sending a



Atlantic Division director W3YA was featured speaker at a banquet held in January by the Beaver Valley Amateur Radio Association. News-Tribune photographer K3HHC lined up W3SIK, BVARA president K3PQA, W3YA and W3LPP for this shot.

message on a CB channel on April 23, 1965, that a vessel was sinking in Yarmouth harbor. Judge Andrew A. Caffrey, who imposed the sentence early in February, said he regarded the offense as serious. He pointed out that when the Coast Guard commits its rescue craft to answer a distress call which turns out to be false, it may leave itself without sufficient vessels to answer legitimate calls.

FCC POLICY ON FM/TV RECEIVER DESIGN

On February 3, 1966 the Federal Communications Commission issued a policy statement on requests for changes in f.m. station allocations to protect users of v.h.f. TV sets from second-harmonic interference. While most of the letter is beyond our field, two paragraphs at the end are most encouraging as an expression of FCC policy:

The Commission wishes to emphasize that, in the electromagnetic environment in which receivers must operate currently and in the future, the allocation of frequencies to meet receiver inadequacies is not justified. The spectrum is simply too valuable to afford this luxury.

We expect receiver manufacturers to design receivers reflecting the state of the art. Where design inadequacies in various situations result in interference being received, we feel that the installation of suitable receiver filters is the appropriate remedy. If cooperative effort by all concerned is not adequate to achieve solutions to interference cases caused by receiver design problems, the public interest may require a request for legislation looking toward the protection of the general public by adequate regulatory authority over receiver design. (*Thanks to WILXO for first spotting this item — Editor*)

FCC DISMISSES PETITION AGAINST CONTESTS AND PLAYBACKS

In early 1964 Edwin L. Schaefer, W9AV, had filed a petition for rulemaking, asking FCC to amend the rules governing the Amateur Radio Service to prohibit the transmission of communications relating to amateur radio contests and the retransmission of recorded amateur radiotelephone communications for test purposes. By Memorandum Opinion and Order dated February 4, 1966, the text of which is reproduced below, FCC has denied the petition for rulemaking, RM-562.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

In the Matter of
Amendment of Part 97 of the Commission's
Rules governing the Amateur Radio Service
to prohibit transmissions relating to amateur
radio contests and the retransmission of ra-
dio telephone communications for test pur-
poses.

RM-562

MEMORANDUM OPINION AND ORDER

By the Commission: Commissioners Lee and Wadsworth absent.

1. Mr. Edwin L. Schaefer (W9AV) has petitioned the Commission to amend the rules governing the Amateur Radio Service to prohibit (1) the transmission of communications relating to amateur radio contests, and (2) the retransmission of amateur radio communications for the purpose of conducting radio telephone tests.

2. To support his proposal with respect to amateur radio contests, petitioner contends that contests do not serve any

valid purpose and that their prevalence has resulted in the unwarranted crowding of frequency bands to the point where more desirable types of communications cannot be effectively transmitted.

3. Petitioner's concern in the matter of amateur radio contests reflects a controversy which has arisen between those amateur operators who enjoy participation in amateur radio contests and those who do not. The Commission's concern, however, is limited to the question of whether or not operation of amateur radio stations in connection with contests is improper *per se* as being inconsistent with the purposes for which the Amateur Radio Service is established¹ or as involving operation contrary to good amateur practice. Reviewed in this light, we are not able to find that the nature, extent, and practices of current amateur radio contests are generally objectionable. In fact, while the Commission does not specifically endorse or encourage amateur radio contests over other amateur activities, it does recognize that they can often produce beneficial results. The popular Field Day² contest, for example, simulates disaster situations which call upon amateurs to perfect emergency operating techniques and procedures and to assemble and use equipment which will work on emergency power during blackouts and other emergency situations. Other contests require participants to develop peak efficiency in certain modes of operation such as single side-band, radio teleprinter, etc. The so-called "DX" contests encourage more communications between amateurs of all nations thus furthering international good will and increasing amateur knowledge of radio propagation over long distances. In short, therefore, the facts do not support petitioner's contention that amateur radio contests serve no useful purpose. This is not to say, however, that there are no faults in contests. Unfortunately, a few so-called contests appear to be nothing more than efforts on the part of sponsors to obtain publicity for their commercial activities. The propriety of this type of contest is certainly questionable. Then there is the matter emphasized by the petitioner as the crowding of certain frequency bands by contest participants to the virtual exclusion in some instances of other types of unessential transmissions. That this could become a significant problem is a possibility. Fortunately, most contest sponsors have exercised responsibility and discretion in this regard by planning major contests so that participants do not occupy all of the popular frequency bands at any one time and so that they do not operate longer than a few weekends each year. Assuming that this pattern is maintained, we believe that amateurs who are not interested in contests should be able to locate and utilize available frequencies for satisfactory amateur operations.

4. With respect to his proposal concerning the retransmis-
(Continued on page 154)

¹ See Rule Section 97.1.

² Operation of portable and mobile equipment by groups of amateurs away from their homes at temporary and isolated locations independent of normal living and electrical power facilities.



QST author Gerald Hall, K1PLP, finally stayed home long enough—in late January—for New England vice director W1EAE to present the May, 1965, Cover Plaque Award, won by the article, "The KH6EGL Frequency Standard." The event was recorded by WILZT and his Polaroid.

RTTY: Diversity Is Worth the Effort

BY C. H. COMBS *

THE signal is there, clear and loud, and the teleprinter copy is fine. Several lines of message come out without interruption, and then the signal fades, grows quiet, and pinches out. Just for a second or two, then it's back. Hardly noticeable in a voice transmission, perhaps, but the printer has stopped, skipped a character and started off on a cycle of false operation, and several words are lost before the message picks up again. Then after another thirty seconds or so the signal again wavers, with the bell-like clink of multipath audible in the headphones. Again the machine runs wild briefly; this time the carriage skids back across the paper and the next line of copy is typed over the preceding one.

You know your equipment is working correctly; it's just that the signal isn't there all the time. How wonderful it would be to be able to get rid of this fading trouble!

Diversity reception is based on this simple principle: The signal that fades out and is unreadable at your location is, likely as not, up to full strength at another location not 300 feet away. It isn't gone — it's just around the corner, or down the street, in the next lot, or maybe has shifted polarity. Since the actual percentage of time it is out at any one place is apt to be small, the random fade patterns at any two given locations, provided they are separated by certain distances, can combine to give a practically solid signal with nearly no fadeouts.

Multipath propagation is a very maddening form of trouble which can make strong signals completely useless very quickly. It can happen whenever the received signal consists of two or more components that have reached the receiver by different paths. Both paths are likely to be strong at certain times of the day for a given frequency, and if one is several hundred miles longer than the other the signal will arrive a few milliseconds later than the one coming by the shorter path. The resulting composite signal has areas where both f.s.k. tones appear to be on at once, with much "filling in" of the spaces when there is supposed to be no tone in one channel. This introduces an ambiguity in the positions of the crossovers from mark to space, and makes for very poor copy. It can be recognized by the peculiar bell-like ringing sound it makes. But like regular skip, the multipath effect fades in and out, and is greatly alleviated by diversity.

One thing that has deterred amateurs from trying diversity is the horrible-looking list of distances quoted by authorities as to how far apart the aerials must be. It has been stated that to achieve good results the two antennas

should be about 9 wavelengths apart at the operating frequency. This is 600 feet at 14 Mc., 1200 feet at 7 Mc., and a whopping half mile at 3.5 Mc. Few people have property that rich. But suppose you could get, say, 90 per cent of the possible theoretical improvement with, say, 20 per cent of the theoretical distance? For our purposes, something very like that can be arranged.

The antennas that produced the copy shown here (and others like it) were just two half-wavelength pieces of wire a few feet off the ground. They were about 150 feet apart, and I could see both of them from my kitchen window. Of course, I had to drag something else in. One aerial is crosswise to the other. This can be carried too far, because if the signal is weak, one aerial may not pick it up at all. But directive antennas pointed in somewhat different directions offer additional help.

In practice, a combination of one good rotating multiband beam on a house tower used for both the transmitter and one receiver, coupled with a good dipole 150 feet away for the other receiver, is a perfectly acceptable setup. But we have achieved remarkable things with two aerials in essentially the same location, at opposite ends of a house, with one vertical and the other horizontal, so don't let a 50-foot lot throw you. It would seem that having the diversity and the two antennas is the thing that does the trick, not so much the absolute distance between them.

The radio energy received from two such locations must be combined in some way to get this effect. This is not as simple as it sounds. It doesn't suffice, for example, to have one huge aerial long enough to reach into both locations, perhaps shielded in the middle, and running to a receiver. The fading destroys the phase relationships between the two locations quite effectively, making them completely random, and two signals meeting on a common aerial interact to reinforce and cancel each other and make the fading as bad as before.

Practical Application

There are two chief methods of producing diversity for f.s.k., the d.c. switching method and the d.c. combining method. The combining method is used here because it is simpler, can be easily adapted to existing equipment, and is the only method that works well on multipath.

The first thing you need is two receivers, connected to your two aerials. The receivers don't have to be the same type or the same quality. All that is required is that both will tune to the frequency you want to listen to.

The next thing needed is two audio-type f.s.k.

* 203 6th St., Apt. 1, Coralville, Iowa.

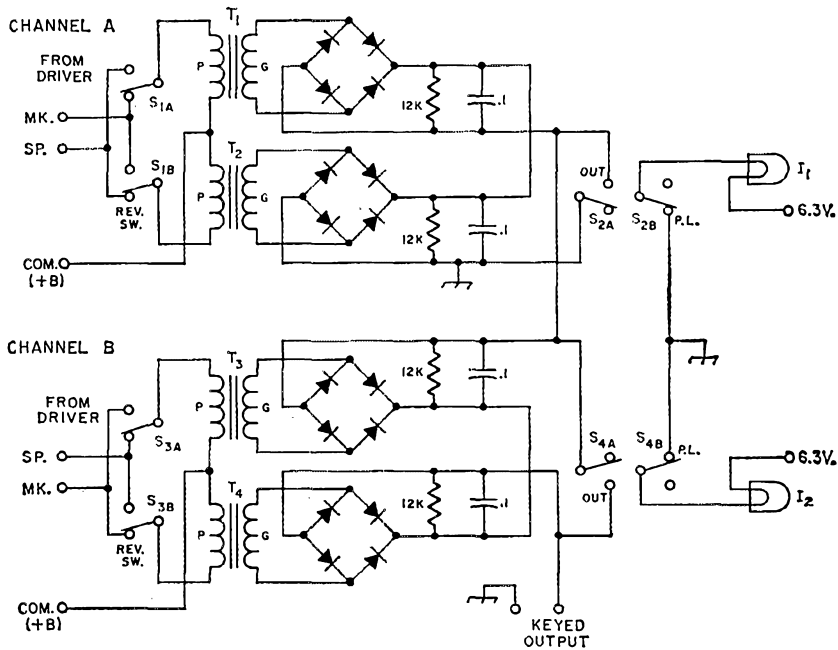


Fig. 1—Dual diversity detector/combiner. D.c. outputs are added in series. Resistances are in ohms ($K = 1000$); resistors are $\frac{1}{2}$ -watt. Capacitances are in $\mu\text{f.}$; capacitors are paper. Diodes are 1N69 or equivalent.

I_1, I_2 —6.3-volt pilot lamp.
 S_1 – S_4 , incl.—D.p.d.t. toggle.

T_1 – T_4 , incl.—Interstage audio, 10K plate to grid (Stancor A4723).

terminal units. If one complete one is already on hand, it will be necessary to build up another that duplicates its circuit, including the channel filters, up to the detectors or discriminator. A second keying circuit and loop output will not be needed, since the two receiver outputs will be combined in the TU detector circuit.

The detector/combiner circuit is shown in Fig. 1. Notice that there are two audio transformers for each receiver channel, one for each tone, and each driving a full-wave rectifier. The outputs are series added, effecting the diversity combining. The resulting combined voltage is used in my setup to drive the Schmitt trigger circuit shown in Fig. 2. This is a neon glow-tube device whose output suddenly trips from mark to space as the input voltage crosses zero. It is adjusted to work right on zero by R_1 , in the cathode circuit of V_{1A} . This adjustment only has to be made once when it is set up. The Schmitt trigger is very accurate and sensitive. The second trigger is just a convenience to invert the positive-going square-wave signal for driving V_3 , which drives a polar relay. Relay output is used here to obtain a loop connection that is entirely floating from ground, an advantage in making connections to other equipment. It also takes a relatively-low loop-voltage source and has proven reliable in service.

The Rectifier Circuit Theory

In normal operation, the two rectifier groups that are connected to the mark channels from each receiver produce, say, about +3 volts each.

These add to produce +6 volts with respect to ground which is applied to the Schmitt trigger, throwing it to mark. Then the f.s.k. tone shifts into the space channels, which are connected to two rectifier groups which produce -3 volts each. These add to produce -6 volts, which throws the Schmitt trigger to space.

Now suppose one set of tones from one receiver fades completely out. Then only the voltages from the other set are left, but the +3 and -3 volts continues to run the Schmitt trigger since it will respond accurately to as little as +0.2 volt. In a single-channel installation you would be losing copy during this fadeout.

Then the first tones fade back in and the other set fades out. Again the remaining set keeps the Schmitt trigger going. This is the operation during ordinary fades of signal strength.

Now suppose that bad multipath, or possibly some c.w. interference, hits the tones from one receiver. The effect of this is to "fill in" parts of the signal. When a tone should go off and the other tone come on, at a mark-to-space transition, the mark tone instead stays on for a while during the time the space tone is also on. Having both mark and space tones on at once gives both +3 and -3 volts output; these cancel each other, and the Schmitt trigger would chatter aimlessly. This is what happens in single-channel service. But added in series with this near-zero voltage is a correct +3 or -3 volts from the other receiver channel. This enables the Schmitt trigger to trip properly. Not until both channels are badly multipathed at once will trouble set in.

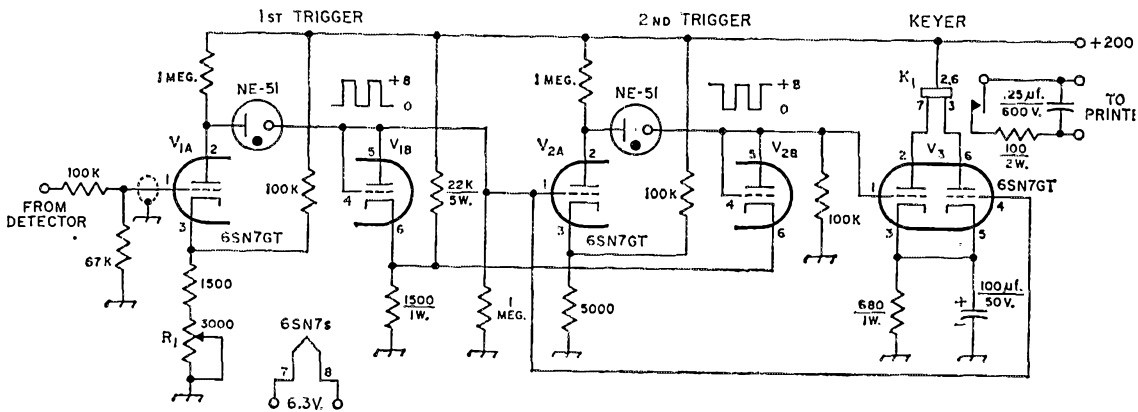


Fig. 2—Keyer circuit using Schmitt triggers. Resistances are in ohms (K = 1000); fixed resistors are 1/2-watt, except as indicated. Capacitors with polarity marked is electrolytic.

K1—Polar relay (W.E. 215 or 255A).

R1—Linear control, 2-watt wire-wound.

This is the reason for adding the voltages in series. It would be easy to combine them in parallel—in fact, this could be done in many types of terminal-unit circuits just as they stand—by installing jumpers at the detector circuit from one unit to the other. If you do that, your diversity will work for plain fading, but if one channel gets a voltage that doesn't belong there, say, a spurious 3 volts, the other tone has no way to overcome it. Even though both other tones are on, they can't rise above the 3-volt level to overcome the wrong 3-volt signal.

The 0.1- μ f. capacitors provide filtering for the rectifiers, giving a smooth, very square-looking output wave. Switches S_2 and S_4 are for shutting off each channel separately for tuning. When they are both off, a steady mark is maintained, as the Schmitt trigger is customarily set to fall into the mark condition when there is no signal at all applied to it. This is adjusted by R_1 , Fig. 2.

Do not attempt to eliminate the audio transformers from the design. Circuits that substitute coupling capacitors for these transformers fail to produce accurate detection because the a.c. ground returns that are then necessary conflict with the series connection of the outputs that is also necessary. The result is that some rectifier outputs have much more filtering on them than others, giving all different shapes of d.c. waves and destroying the symmetry.

This circuit will give best results in limiterless TUs where there is nothing to bring up the noise level when signals fade. Square bandpass filters consisting of two or more toroids each are another improvement that pays off, and it should also be emphasized here that the use of voltage doubler or half-wave single-diode types of rectifiers is bad practice. The outputs of these rectifiers require such heavy filtering to produce smooth d.c. that the shape of the keying wave is severely rounded off, causing much ambiguity in the positions of mark and space crossovers, and hence much possibility of bias in the signal.

It has been said that the variable decision threshold detection system (DTC) eliminates the need for diversity. It is true that practically any installation will work better with DTC, and undoubtedly such a device can be neatly spliced into the circuit shown here between the rectifier groups and the Schmitt trigger. But no detection system, no matter how clever, can detect a signal that has faded completely out, and this is a condition that diversity is uniquely able to correct, especially with narrow shift where both tones tend to fade in the same pattern. Diversity and DTC are both valuable improvements.

Adjusting the Detector Circuit

Connect an oscilloscope to the grid of V_{1A} . Feed an audio signal into one of the TU inputs, and center it in one of the filters. Adjust the level for a d.c. voltage of 3 or 4 volts or so at the grid of V_{1A} . The signal should look reasonably clean of audio on the scope display. (If the scope won't read d.c. accurately because of a.c. coupling, a v.t.v.m. can be used to verify the measurements.) If nothing is seen at all, check to see that the steady-mark switch, S_2 or S_4 , for the channel is open. The switch for the unused channel should be closed, causing the pilot warning light for that channel to be off, indicating the channel is blocked.

If this test is passed, move the audio to the other filter. The d.c. should reverse in polarity, but be otherwise about the same. Throwing the normal-reverse switch (S_1 or S_3) which is used to "turn signals over" into the other position should also reverse the d.c. polarity. Repeat this check with the other receiver channel.

All this time the relay should be clicking back and forth with the reversals in polarity at the grid of V_{1A} . Remove all signals coming into the TU and carefully turn R_1 until the relay just will click back and forth with very little motion either way. Now check the loop current being keyed by the relay contacts and leave R_1 in the position that just causes the relay to click into

the loop current on, or mark hold, position.

This is the only adjustment for R_1 . Note that it will not correct bias coming in on signals; the slope of the keying wave is much too steep for it to help significantly. Offsetting it will just produce errors.

Operation

Now it is time to put the diversity setup on the air. The only absolutely vital thing that must be checked on the receivers being used is the flatness of audio response. It is essential that the two audio tones of 2125 and 2975 c.p.s., or whatever tones your filters are tuned for, come out of the receiver at the same level.

Make a check of the output level at both audio frequencies while tuning a steady carrier or signal-generator output. If the amplitude of one tone is higher or lower than that of the other by more than a decibel or so, correct this with shaping capacitors in the receiver audio system.

Modern s.s.b. receivers often cannot reproduce an audio frequency as high as 2975 c.p.s. very well because of narrow i.f. filters. If one of these sets is being used, it may be expedient to design the audio filters in the TU for somewhat lower frequencies than the old standard ones.

Now, with the two receivers connected and a printer in the loop circuit, we are ready to tune up. Set the loop current to 60 ma. first. Loop current must be surprisingly close to what it should be, to get full accuracy out of a pulling-magnet printer. Errors of more than a few milliamperes at 60 ma. cannot be tolerated.

Tune one receiver to an f.s.k. signal, using whatever tuning indicator is provided in the TU. Now throw the appropriate mark-hold switch,

and after the usual correction has been made with the normal-reverse switch, the machine should print. If it does, throw back the mark-hold switch and tune up the other receiver the same way. Try out its channel independently and get it working the machine. Make sure, of course, that the two receivers are tuned to the same signal.

When all is well, open up both mark-hold switches and you are on diversity reception.

Make the usual test with the printer receiving distributor adjusting arm for range and bias. Good copy over a range of about 20 to 80 is fine. This assumes that the machine is working right to begin with, of course, as checked with the key board. A more accurate check on the loop signal is to splice a 100-ohm resistor into the loop circuit and read the current wave-form across it with the scope.

Set the scope's sweep for about 5 c.p.s., and the whole-character pattern of the RTTY signal can and will sync on a tape-sent RTTY transmission. It will lock on the mark-to-space transition at the beginning of the start pulse. All you have to do is get the sync polarity right and the sweep set accurately enough. (This assumes a scope that will sweep at 5 c.p.s.) Synchronization is not necessary for tests, if the pattern will stand reasonably still. The visual test for bias is made by observing the shortest right-side-up square-wave pulse that you can see, and comparing it in your mind with the shortest upside-down pulse. If they are the same time duration, there is no bias. Bias as little as 5 percent can be spotted this way.

Remember that in a low-priced scope the sweep may be far from linear at the low speed of 5

(Continued on page 154)

BOTH
TODAY WHETHER WARREN MIGHT HAVE TO DISQUALIFY HIMSELF IF THE SUPREME COURT ULTIMATELY HAS TO RULE ON THE CASE OF JACK RUBY, WHO HAS BEEN INDICTED IN OSWALD'S SLAYING. HATCHER WAS ASKED WHETHER JOHNSON HAD TAKEN THIS POSSIBILITY INTO CONSIDERATION. "I DO NOT KNOW WHAT CONSIDERATIONS WERE TAKEN," HATCHER REPLIED. THE COMMISSION REPRESENTS THE CHOICES OF THE PRESIDENT." HATCHER ALSO SAID HE ASSUMED THAT THE COMMISSION WOULD DETERMINE WHETHER JOHNSON SHOULD BE REMOVED FROM THE HOUSE, AND THAT FUTURE WORD ON ITS FACTIVITY IEQXH COULD SAID HE KNEW NOTHING OF WHAT PROCEDURES
DREN
1

CHAWA
THE COMMISSION MIGHT DECIDE TO ADOPT. THE MEMBERSHIP OF THE COMMISSION ITSELF INDICATED THAT JOHNSON HAD CAREFULLY SELECTED MEN WHOSE FINDINGS WOULD CARRY WEIGHT IN ALL SECTORS WHICH FORM PUBLIC OPINION. WITH WARREN, WHO IS CLOSELY IDENTIFIED WITH THE SUPREME COURT'S RULINGS AGAINST RACIAL DISCRIMINATION, JOHNSON CHOSE, FROM THE SENATE, SEN. RICHARD B. RUSSELL, D-GA., TOP STRATEGIST OF THE RIGHTS OPPONENTS, AND SEN. JOHN SHERMAN COOPER, R-KY., A RESPECTED MODERATE FROM A BORDER STATE. FROM THE HOUSE JOHNSON SELECTED ANOTHER SOUTHERNER, REP. HALE BOGGS, D-LA., THE DEMOCRATIC WHIP AND REP. JERRY FORD, R-MICH., LEADER OF GOP PROGRESSIVES. WELL KNOWN ABROAD AS A DIPLOMAT, JOHNSON APPOINTED NIMMO, A DIPLOMATIC TROUBLE SHOOTER FOR PRESIDENTS OF BOTH PARTIES IN SUCH ENDEAVORS AS THE LONG TEST-BAN NEGOTIATIONS. ALLEN W. DULLES, FORMER DIRECTOR OF CENTRAL INTELLIGENCE, IS ALSO KNOWN ABROAD, AND IS A VETERAN OF INVESTIGATIVE WORK.

BOTH
ALTHOUGH PARTISANSHIP IS NOT GENERALLY DISCUSSED WITH REFERENCE TO SUCH AS THE CHIEF JUSTICE, THE COMMISSION INCLUDES ONLY TWO MEMBERS WHO ARE IDENTIFIED AS DEMOCRATS -- RUSSELL AND BOGGS. IT THUS HAS NO SHADOW OF PARTISAN DEMOCRATIC CONTROL.

A tear-sheet of actual received copy showing the improvement effected by diversity. The top and bottom sections were made with both receivers, using the diversity system described. Copy from the individual receivers is in the middle two sections. Reproduced permission of United Press International.

AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* WINJM

Message Originations

At this writing we are gathering data on 1965 traffic handled. We do this every year, and it's a tremendous job if we are to do it properly, occupying a good portion of one man's full time.

One of the things we have noticed, and about which quite a few comments have been made, is that although the number of amateurs handling traffic seems to be going up, the actual amount of traffic being handled is staying the same or going down. Conclusion? Not enough amateurs are originating messages. We hear quite a few of them griping about not having enough traffic in the nets to make it worth while to take part but these same ones are doing little or nothing to contribute their share of traffic.

What's so tough about originating a message? As far as we can see, there are only two things required: someone to address it to, and something to say. All the rest is a matter of form — a form with which you are very familiar if you handle traffic regularly, so this is no problem. (If it is, get a copy of our Operating Aid 9A, which gives full details.)

Nearly everyone, these days, has a relative living at some distant place. If not relatives, friends — most of whom would be very pleased to hear from you. If neither relatives nor friends, other amateurs can be the addressees of messages. Perhaps all your relatives, friends and other acquaintances are local. In that case, *they* must have friends and relatives at distant points. Get a pad of message blanks and pass it around, suggesting that they originate a message. Just in this way, one may originate half a dozen or so messages per week.

There are other ways, if you really want to go in for it. Hospitals are excellent places to get message originations — particularly veterans hospitals — and often the hospital management will cooperate. Hotels always contain people away from home who will be glad for a chance to send a message (instead of a post card) to the folks back in Podunk. Sometimes it is possible to install a message box, appropriately labeled, in air, bus and rail terminals. Colleges and schools are excellent places to solicit traffic.

So much for the subject of whom to send the messages to. Now, as to what to say. The traffic we handle during normal times is not important traffic: if it were, it would not be on the amateur bands. Still, every amateur who handles it wants to feel that it is at least worth while. So when originating traffic yourself, or when others do so over your station, try to avoid stereotyping and try to avoid dumping huge quantities into the

traffic nets all at once. A good distribution of traffic among all stations in a net is a happy situation. Everyone can be kept busy and a lot of traffic can change hands. If one station has all or most of it, this station is so busy the operator can hardly draw a deep breath, while net members sit around and wait their turn.

So let's *all* originate some traffic, a little at a time. If everyone originates just one message per day, or one per each time he reports into a net, we will have sufficient traffic to keep all our nets and systems humming like beehives, provide training for all, keep ourselves in the public eye and, like a well-oiled machine, be ready to handle emergency messages in stride should the occasion demand. — WINJM

Convention ARPSC Meetings

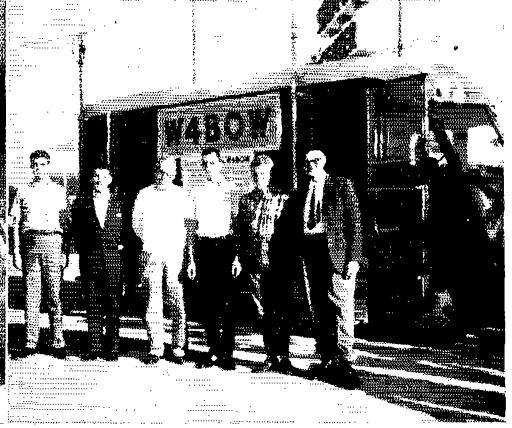
Late information reaching us at copy time indicates that there *will* be traffic and emergency net meetings at the National Convention in Boston, April 22-24. On Saturday there will be a general ARPSC Panel, moderated by former Director WIEFW, and on Sunday there will be some NTS doings in the convention program. At some point in the convention we hope to have a "first showing" of the new ARRL slide collection on ARPSC. We hope for a good turnout of NTS managers at all levels and of SECs. There will be talks on net procedure and general traffic handling and question-and-answer sessions.

We just mention this to make sure nobody stays away from the convention because he



This is Event Halbach, W5WJQ/5, operating from the off-shore installation of the Freeport Sulphur Company, 7 miles off Grand Isle, La. in the Gulf of Mexico, during Hurricane Betsy. An off-shore installation during a hurricane is an ideal place not to be, but W5WJQ turned in a creditable performance. See "Diary" for details.

* National Emergency Coordinator.



The above photos are of W4BOW, station of the Lakeland (Fla.) Amateur Radio Society, and the gang who operated it at the Southgate Shopping Center eight days before Christmas. That's W4BOW, who did most of the operating, at the control: (left). Shown at right are WA4SCA, K4LTX, W4WCI, WA4OWG, WN4AVN and W4FP. The latter is EC for Polk County.

thinks there will be no public service program. C'mon out and hobnob with the gang you've been working with all these years.

National Traffic System

Most of you NTSers have taken part, at one time or another, in your Region nets. Each year, since 1951, we have kept statistics on Region nets as to number of sessions, total traffic handlings, rate, average and representation, and have combined these factors into a single comparative standing with the other Region nets. The winner in 1951 was 4RN, and this was the only year 4RN ever won the annual statistical championship. It may be of some interest to indicate the winners for the last fourteen years:

1951 — 4RN	1958 — 9RN
1952 — RN6	1959 — 2RN
1953 — TEN	1960 — 2RN
1954 — 1RN	1961 — 9RN
1955 — RN5	1962 — 3RN
1956 — 9RN	1963 — 2RN
1957 — 9RN	1964 — RN5

In 1965, the Sixth Region Net came out on top of the statistical ratings, followed closely by RN5, a reversal of last year's front-runners. Here is the customary table, showing how each Region net placed in each of the five factors affecting the final standing: (Figures in parentheses are 1964 standings for comparison.)

Net	Sessions	Traffic	Rate	Average	Rep.	Final Standing
RN6	2	2	2	4	3	1 (2)
RN5	1	1	6	1	6	2 (1)
2RN	4	4	1	7	2	3 (3)
3RN	3	5	8	8	1	4 (6)
9RN	9	8	3	3	4	5 (4)
4RN	8	3	7	6	5	6 (5)
RN7	10	7	4	2	10	7 (8)
TEN	6	6	5	9	11	8 (7)
1RN	7	9	10	10	7	9 (9)
8RN	5	10	11	11	9	10 (10)
3RN	11	11	9	5	12	11 (11)
TWN	11	11	9	5	12	11 (11)
ECN	12	12	12	12	8	12 (12)

Note that RN6 beat out RN5 despite the fact that the latter was nationally high in three of the five factors. A mediocre record in rate and representation killed RN5 and RN6 won out despite the fact it did not place nationally high in a single category, but well up in all of them. We feel that we should mention that although most of the Regions are about equal in potential, RN7, TWN and ECN are at a disadvantage because of sparse population compared to other Regions.

If we average the standings of each Region nets since 1951,

we discover that our best all-around Region net has been 9RN, with an average standing of 3.47. Others line up as follows: 2RN (3.73), TEN (3.80), RN5 (4.47), RN6 (4.47), 3RN (5.40), 1RN (6.00), 4RN (6.47), RN7 (8.47), 8RN (9.47), TWN (9.87), ECN (10.60).

Statistics, of course, are incidental to the real job being done, a sort of byproduct thereof. We don't work for them. In general, however, they do appear to reflect the general efficiency of our Region NTS nets and add a little of the competitive aspect which attracts just a few more traffic men to NTS. Our congratulations to RN6 Manager WB6BBO and RN5 Manager K5IBZ for their fine showings. — WINJ.M.

January reports:

Net	Sessions	Traffic	Rate	Average	Representation (%)
PAN.....	31	1549	1.049	50.0	92.5
CAN.....	31	989	.816	32.9	100.0
PAN.....	31	1266	.996	40.8	98.9
1RN.....	61	514	.349	8.4	90.7
2RN.....	62	535	.770	8.6	98.0
3RN.....	62	580	.381	9.4	96.8
4RN.....	61	531	.350	8.7	96.8
RN5.....	62	663	.395	10.6	92.1
RN6.....	62	750	.580	17.2	93.1
RN7.....	31	469	.559	15.1	67.9 ¹
8RN.....	62	535	.321	8.6	97.4
9RN.....	31	454	.818	14.6	99.2 ¹
TEN.....	62	598	.412	9.7	90.0
ECN.....	31	142	.239	4.6	94.6 ¹
TWN.....	31	251	.278	8.1	76.1 ¹
Sections ²	2270	11,951		5.2	
TCC-Eastern.....	124 ³	678			
TCC-Central.....	90 ³	582			
TCC-Pacific.....	124 ³	817			
Summary.....	2,981	23,858	EAN	7.1	CAN
Record.....	2,181	25,982	1.039	12.5	100.0

¹ Region net representation based on one session per night. Others are based on two sessions per night.

² Section nets reporting (79): AENP, AENB, AENH, AENM, AENR, AENT (Ala.); CSN (Ariz.); OZK (Ark.); SVN, NCN, SCN (Calif.); CPN, CN (Conn.); WFPN, FMTN, GN, QFN (Fla.); GSN, GTN (Ga.); ILN/(Ill.); BENN, QIN (Ind.); Iowa 75; KYN (Ky.); LAN (La.); SGN, PTN (Me.); MTN (Man.); MDDDS (Md.-Del.-D.C.); BMNN, WMN (Mass.); Wolverine, QMN (2 Nets) (Mich.); MISS (Miss.); MSPN, MSPN Noon, MSN, MJN (Minn.); PHD, SMN, Mo. Teenage, Mo. SSB, MON (Mo.); NCN, THEN, NCNL, NCSSB (N.C.); NJPTN, NJ6-2 (N.J.); NLS, NYC-LIVHF, NYC-LI Phone (N.Y.); BN, Ohio SSB, Ohio Slow (Ohio); OQN (Ont.-Que.); GBN (Ont.); EPA, EPA Phone, EPEPTN, WPA PTTN, (Pa.); RIN, RISPN (R.I.); TN, Tenn. SSB, ETPN, TPN (Tenn.); NTTN (Tex.); BUN (Utah); VT-NH; GMIN (Vt.); VSN,

VSBN-E, VSBN-L (Va.); WVFN (W. Va.); WSBN (Wis.), YO (Wyo.).

³ TCC functions not counted as net sessions.

Well, there it is — another record broken as far as sessions is concerned, but we are a bit short of traffic. The 79 Section and Local nets reported represents about 79% of all NTS-registered nets, and this is a mighty fine reporting record, fellows. Before we know it, Section and Local nets that don't report will be the exception rather than the rule, as has been the case with the higher echelons for years.

K1WJD recently completed a very fine EAN bulletin, mailed to over 100 EAN regulars. W9DYG is having NCS troubles; he no sooner gets a good NCS trained and the guy moves into another Area. WB6JUH says RN6 has been 100% represented on PAN for a number of years running. W2GGZ has issued 2RN certificates to W2SEI, K2s JBX KTK, W'82s FIT HZY JWB KSG SLI; he suggests that NCS reports be given P precedence. K5IBZ is disappointed in the January RN5 showing, after December's stellar totals. Nevada is giving RN6 some representation difficulties. RN7, like most Region nets, showed a drop from December, but is still ahead of previous Januarys. W8CHT has issued 8RN certificates to W'48s HVR JXM and MQT, the latter a YL of 14; all three are high school students. W9QLW's monthly 9RN sheet keeps this net on its toes. W'40s FMP and KSB have earned TEN certificates after a good January. VE3CYR submits a good ECN report for Manager VE3BZB who is temporarily away. K7NIL says everything is down in TWN except Wyoming, which is a big bright spot.

Transcontinental Corps. The J-D function, long a bugaboo because of the time difference, now is functioning 100% with direct skeds three times a week (once on RTTY) and relay via W0OHJ the other four times. It's a nice arrangement and works well, but we haven't given up the hope that some time we can make all skeds direct. W4ZJY reports that of 20 "failures" in January, 11 were simply lack of reports. A TCC-Central certificate was awarded to WA9BWY.

January reports:

Area	Func-tions	% Suc-cessful	Traffic	Out-of-Net Traffic
Eastern	124	93.5	1833	678
Central	93	78.5	1162	582
Pacific	124	95.1	1634	817
Summary	341	90.0	4629	2077

The TCC roster: Eastern Area — W'1s BGD CRX EFW EMG NJM, K1ESG, W2SEI, W'42s BLV RUE UPC, WB2AEJ, W'8s EML NEM, K3s PIR MVO, W4DVT, K4VDL, W'8s CHT RYP, K3s KMJ NJW QKY, W'48s GYT HVR, W0OHJ. Central Area — W'2s OGG ZIY, WA4AVM, WA5CBL, W'9s CXY DYG JOZ VAY ZYK, W'49s BWY NFS, W0HXB/4, K0s AEM GSY. Pacific Area — WA2WBA/8, W'6s EOT IDY VNQ TYM HC, K6s LRN DYX, W'46s ROF WNG, WB6JUH, W'7s DZC GAC.

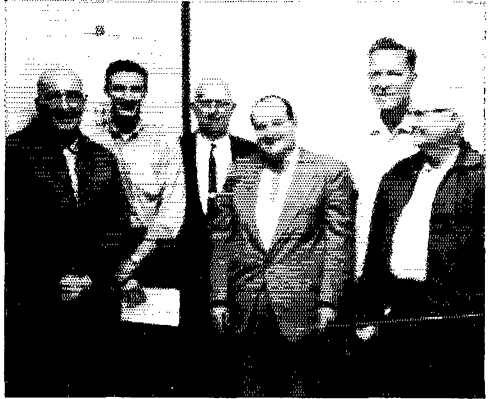
Net Reports. We aren't getting so many of these any more, but here in brief is the January summary. North American SSB Net reports 24 sessions, 433 check-ins, traffic 370. IMO (Ind., Mich., Ohio) Net reports 20 sessions, traffic total of 33. Hit & Bounce Net reports 31 sessions, 601 check-ins, traffic at 919. 7290 Net reports 40 sessions, 1613 check-ins, traffic 714. Mike Farad Net 42 sessions, 506 check-ins, traffic 535.

Diary of the AREC

While hurricane Betsy wreaked her fury on New Orleans, La., K5OAG, as did many others, jumped right in and helped wherever he possibly could. It wasn't until Sunday, Sept. 12, that he could really take part in a large operation. A sulphur company has a mine on a platform located seven miles out in the Gulf of Mexico, due south of Grand Isle, La. The microwave relay towers on the mainland were wiped out and there was no other means of communicating between the mine and the mainland. Good communication was needed immediately. K5OAG was contacted and company officials asked him to go to the mine and help set up a link. Since OAG's XYL was recovering from a recent operation, he requested that he be permitted to head up the mainland

operation. W5WJQ, a regular employee of the sulphur company, was then asked to go to the mine and set up a station. The operation lasted about three weeks, with W5HHT replacing W5WJQ. Toward the end of the three-week stint, K5OAG's power supply gave up. WEGHP came to the rescue, permitting OAG to operate from his shack. — K5OAG.

K4OJY/9 complains that scant mention was made of the operation on 20 meters during Hurricane Betsy, and supplies the following details: For two weeks, 14,250 kc. was utilized as an emergency frequency for handling queries



At an SEC-called meeting in Texas City, Texas, in January, Houston EC K5HXR got some of the gang together for this snapshot. Left to right are K5WYN, WNSLWR, K5EFH, W5AIR (SCM), K5OHA, K5QQG (SEC).

into the disaster areas in the Caribbean, Florida and Louisiana. When Betsy hit Louisiana, 14,330 and 14,335 kc. were also used to handle the flood of inquiries. Many stations operated for from 12 to 15 hours per day, handling a peak of 80 inquiries per hour into Baton Rouge and New Orleans.

At 1905 CST, Nov. 7, K0FLT contacted WA0EDN, EC St. Louis Co., Minn., via amateur radio while the latter was immobile, and informed him that the main telephone cable from the Iron Range (consisting of several communities in Northern Minn.) had been cut and the telephone company said it might take three to four hours before service was restored. When WA0EDN returned home, he and K0FLT got on 3880 kc. and informed the telephone company that they had contact with the affected area. W0UNC was contacted and asked to try to locate other stations in the emergency area. K0FCH and WA0AWZ also started hunting for emergency area stations. The local radio station broadcast a request for additional aid. The telephone company asked WA0EDN to get an emergency message to K0FLT, but by this time WA0EDN had lost contact. K0FCH and W0UNC tried to locate a station to relay. K8YWG was the first to offer assistance with W8CQB and W4HVA close behind. All three relayed traffic and helped keep the frequency clear. WA0IOU, WA0DVT, WA9FPV and WA9NWII offered their assistance and monitored the net frequency. The phone lines were restored by 2130 CST. — WA0EDN, EC St. Louis Co., Minn.

On the evening of Nov. 15, K7MGA, EC Yakima, Wash., was called by W7PIG, c.d. communications officer, who informed him that a man was lost in the American River area, 50 miles west of Yakima, and a search party was forming. K7MGA got on the phone and rounded up a crew to monitor the c.d. net frequency. WA7AVO went to the river and set up mobile operation until a generator could be brought in and set up. He stayed on duty until the following day, then joined the search party. Fifteen amateurs provided communications during the search parties, the base station and c.d. headquarters. Many messages were handled and much time was spent, but the search had to be called off ten days later when heavy snows threatened to leave the searchers stranded. — K7MGA, EC Yakima, Wash.

When a fire in Sitka, Alaska, destroyed a 121-year-old church and most of the main street, amateurs provided emergency communications where needed. KL7FLA called W7LMV and K7UZV advising them of the fire. KL7BJC and KL7BV, both in Sitka, W7ZEV and K7KAH in Seattle, Wash., soon joined them. KL7DRZ and KL7EBK reported in with the latter taking traffic for Juneau. The Seattle stations stayed on with the two Sitka stations until the hand went out. Reports were relayed to the Seattle television and radio stations by W7LMV and K7KAH while K7CHG was able to handle a few messages before contact was lost. — W7ZEV.

Heavy rains on the north coast of California during the first week of January showed signs of building up to repeat the disastrous floods of Christmas week, 1964. Preparations were made in Sonoma Co. to handle an emergency on the lower Russian River, and in Humboldt Co. amateurs were alerted for possible action on the Eel River.

Sonoma Co. amateurs were alerted when Flood Control Headquarters predicted a crest of from 42 to 45 feet on the lower Russian River in the Guerneville area. About the same time, the Sonoma Co. c.d. asked that the amateurs be alerted to provide emergency communications. WA6STS and WB6KT were alerted and went to the Guerneville area to join K6GOZ and WA6ESI who live in the area and who were already standing by. W6BCC and WB6KXL operated W6LFFJ, Sonoma Co. c.d., and acted as NCS. On the upper reaches of the river, a 6-meter f.m. mobile group was alerted, but not called into active service.

With a final fling, the storm moved toward the east, and out of California. The river reached flood stage, but didn't approach the flood of a year ago. When the crest passed and the river started dropping, the alert was ended.

Farther north, in the Eel River watershed, the local c.d. group alerted ranchers in the Loleta area where the Eel River nears the Pacific Ocean. On Jan. 5, residents in the river bottoms were warned to evacuate women and children and, remembering the floods of a year ago, somewhat better than 75% of the population were preparing to evacuate. On the morning of Jan. 4, the California Civil Defense Net went into action and a full red alert was declared as the danger of high water along the coastal rivers developed. In the Eureka area, W6BWV and W6YKS were the north coast back-up team for the CCDN. Throughout the day, the situation was touch and go on the Eel River, with the river finally cresting on Jan. 5 at 8 feet above flood stage. Some die-hards living in the river bottom had to be evacuated by boat but there was no loss of life. The bridges and roads in the area, hardly repaired from last year's flood, were again heavily damaged.

By the morning of Jan. 6, things were improving in Humboldt Co., but farther north, in Del Norte Co., there was a

continuing flood threat and amateurs remained active 'round the clock in case they were needed. Twenty amateurs were known to have participated. — WA6AUD, SCM San Francisco.

When the governor of Delaware announced a "state of emergency," created by the snow storm of Jan. 30-31, the Delaware Emergency Phone Net and the Delaware Six Meter Net were activated at 2220Z Jan. 30, with 14 stations participating for the 24-hour operation. Much health and welfare traffic was handled. During this operation, a severe fire broke out in Rehoboth, but fire fighters and equipment had a difficult time reaching the fire, especially with their communications van, because of the high drifts. W3PM assisted the fire officials by handling traffic for them from the scene of the fire to his home station where it could be relayed to the fire department. W3PM used a walkie-talkie and operated for some 36 hours until the fire could be brought under control. — K3NYG, SEC Delaware.

The AREC group of El Paso, Texas, was alerted during the power blackout which hit that area on Dec. 2. Two of the fixed stations, WA5BGE and K5LUG, operated from their own emergency tower units. Twelve mobiles covered all areas of the city. All stations were on the air without telephone alerting within minutes after the power failed and remained on the air a half hour after the power came back on. W5KOK parked outside the police station and was ready to handle any urgent communications should he be needed.

Fortunately, there were no unusual communications problems. — W5MVL, EC El Paso, Texas.

On Sept. 25 and 26, the AREC of Edmonton, Alta., provided communications for the Edmonton Light Car Club Klondike Rally over a 425-mile course. Mobiles were stationed at various check points and relayed car numbers to headquarters in Edmonton. From this point, data were sent by RTTY to the finish point. Both 75- and 2-meter frequencies were used. The group provided radio contact for the car club for sixteen solid hours. A total of 33 amateurs participated. — VE6XO, EC Edmonton, Alta.

On Sept. 25 the West Coast Amateur Radio Service (WCARS) put on a simulated emergency test on its regular frequency (7225 kc.) to demonstrate how quickly the group could supply communication to any needed point. WB6HZZ called the NCS who silenced the net. The place communication was needed was designated as the San Francisco airport. Three mobile stations, all within five minutes of this point, responded immediately. — W6VX, Pres., WCARS.

The AREC of Wyandot County, Ohio, provided radio contact for the Boy Scout Jamboree on the Air on Oct. 15-16 in Wyandot and Crawford counties. WA8HJU set up from the camp at Mohican State Park, near Mansfield, on 2 meters and the h.f. bands. WA8HJM provided long distance communications and WA8RDK operated on 2 meters to provide communication among local scout troops. This was a last-minute arrangement but worked out very well. — WA8HFI, EC Wyandot County, Ohio.

VE4HB was set up at No. 1 Boy Scout Troop Hall in Transcona, Manitoba, to provide communications for the Boy Scouts Jamboree on the Air, Oct. 15-16-17. VE4BR and VE4SZ supplied some of the equipment. A total of 28 contacts were made as scouts chatted with other scouts all over the U.S. and Canada. The station operated 14 hours. — VE4HB.

Still another report on the Boy Scout Jamboree on the Air comes from VE4GK, who along with seven other amateurs operated VE4JAM from St. Vital Park in Manitoba. No details are given.

On Oct. 16, Milwaukee AREC members had an opportunity to mix amateur radio with public service and some fun. The occasion was the Second Annual Nature Hike at Devils Lake, Wis. While the people were on the trail and until the last hiker returned, Milwaukee AREC units set up at check points counted their number and relayed via 2-meter f.m. the location of each group. Good cooperation was received from amateurs in Baraboo and Portage. Use of a 30-foot portable tower at Baraboo made contact with Milwaukee possible on 2 meters. We wish we had space for all the fine details included with this report. The AREC group did

NATIONAL CALLING AND EMERGENCY FREQUENCIES (kc.)

FULL TIME

3550	7100	50,550
3875	29,640	145,350

PART TIME

7250	14,225	21,400
14,050	21,050	28,100

Full time frequencies are for use 24 hours per day but only for emergency and traffic calling purposes. No transmissions for any purpose (except calling for emergency help) the first five minutes of each hour.

Part time frequencies are for traffic calling and general amateur use except in an FCC-requested or FCC-declared emergency, at which times they become full time frequencies.

This is a voluntary amateur program, designed to show what we can do without FCC regulation. Its success will require us all to work together. Any amateur wishing to assist is invited to use ARRL notification cards to be sent to stations not observing the rules.

itself a lot of good in the public image. Those included in the group were Wis. SCM K9GSC and SEC K9ZPP. Principal amateurs involved were old timers W9KQD and W9SUF, the latter serving as net control. Fifteen amateurs divided the various tasks involved and no one of them had too great a burden. Thanks to Milwaukee County EC K9KJT for the usual fine report.

Nine Houston area amateurs were on the air on Oct. 30 directing visitors to the various sites of the Houston Amateur Radio Club hamfest. Over 500 people attended, coming from all over the south and other places such as Alaska and Peru. — *K5HXR, EC Harris County, Texas.*

We have three reports of Hallowe'en Goblin Patrols. This is an ideal way to give your local AREC group a workout and at the same time provide a useful public service.

In Nutley, N. J., the Nutley Radio Club and the Police Department coordinated the operation. Eleven amateurs operated on 2 meters.

In Calgary, Alberta, eighteen mobile units and 35 amateurs cooperated with police. Net control for the operation was VE6TK, with alternate VE6AB. This patrol, says EC VE6SA, was a very quiet one compared with previous years, probably because of the advance publicity that patrols would be active.

In Kelowna, B. C., VE7AAJ says they call their Hallowe'en patrol "Thug Six Heading." The patrol consisted of two mobiles and a control station at c.d. headquarters, which is in the same building with RCMP headquarters. EC VE7AAJ says more mobiles were available, but things were exceptionally quiet this year.

Twelve amateurs with an assortment of hand-carried and portable units operating on 2 meters supplied communication for the Riverside (Calif.) Junior Chamber of Commerce at the Riverside International Raceway on Oct. 31. The JC's sell programs and direct traffic and parking at the raceway, and have previously been supplied communications by the amateurs, with great success. The operation requires a lot of briefing and cooperation. The network consisted of amateurs stationed at strategic points in the various parking areas. An additional unit was situated on a truck used to deliver programs, provide change, pick up money and run errands. Still another unit was placed in the control tower overlooking the track. Communications handled included such things as requests for change, additional programs, moves of personnel, arrangements for cash pick-ups, surveys of stock on hand, instructions for sales operations, instructions for removing road blocks to open additional parking areas as needed, etc. At one point the Red Cross asked for aid in finding a passed-out spectator. There was only one station failure, and another ran down the car battery but was successfully moved to another car. This report from W6WRJ, SEC Orange Section, Calif.

On Nov. 21, a Houston-Harris County (Texas) exercise was conducted in which the AREC group was deeply involved. The problem was the handling of welfare traffic, and the procedure was for a volunteer group of amateurs to travel to stricken areas and assist amateurs there in the handling of this traffic. Places involved were Galveston, Houston, Lamarque and Texas City. W5HNI/5 was the call of the net control and the Houston Red Cross amateur station. W5KWU, was alternate. W5KWU originated messages to W5HNI who passed them along to the mobiles in the four cities. These messages were delivered to local Red Cross headquarters, acted upon, and answers returned via the same route. The drill lasted an hour and 40 minutes on 3900 kc. sideband. Red Cross officials were impressed with the speed and accuracy of the amateurs. — *K5HXR, EC Harris Co., Texas.*

Newton, Kansas, AREC members held their own simulated emergency test on Nov. 21 to test their capabilities in conjunction with the local radio station. Twelve amateurs participated. — *WA0DDK, Asst. EC Newton, Kans.*

Forty-five SEC reports were received for December, representing 19,318 AREC members. This is an increase of 5 reports and about 500 AREC members. Sections reporting: Hawaii, E. Mass., W. Pa., Kans., Wyo., Mich., Ala., E. Fla., Wash., Nev., Ohio, Utah, Mo., Ont., N. Mex., W. Va., S. Tex., Va., Colo., S. Dak., N.N.J., Tenn., N.C., Ind., Nebr., N.Y.C.-L.I., Los A., Miss., Alta., Mont., Sask., E.

Pa., B.C., Man., La., W.N.Y., Del., Ga., S.F., S.V., Orange, Ky., Ore., S. Bar., Conn.

At the end of the SEC reporting year, we find 20 SECs with 100% reporting for the year. This pleasant surprise came when we totaled up the number of reports received and found it to be 537 as against 456 for last year, with 62 different sections heard from in 1965 as against 50 sections for 1964. The following are 100-percenters (number of years of consecutive 100 percent reporting): E. Fla. (14), N.Y.C.-L.I. (12), Mich. (7), S. Tex. (7), S. Dak. (6), Wash. (6), Nev. (5), Alta. (4), Utah (4), Ala. (3), N.C. (3), N.N.J. (3), Mo. (2), E. Pa., Los A., Man., Nebr., Ohio, Sask., Va. (hearty congratulations to you all. Now, how about the rest of you fellows? Let's make 1966 the best SEC reporting year in history.

RACES News

At 1915 local on Nov. 29, the members of the Santa Barbara RACES were notified of a search under way for a missing boy. The RACES net (K6BVA) was activated and mobile and walkie-talkie units were deployed to assist the police department and the sheriff's office in the search of the canyons north of the city. The missing boy was found at 2140 local. Operations were conducted on 147 Mc., f.m. Thirteen amateurs took part. — *W6BNDP, SEC Santa Barbara.*

On Sept. 25 the RACES radio officers of Redwood City and San Mateo County, Calif. (K6SAA and W46GVP) conducted a drill which simulated an airplane crash at the San Francisco airport, with part of the plane falling on the Ampex buildings nearby. RACES mobiles were sent to Sequoia Hospital, Palo Alto-Stanford hospital and Peninsula General Hospital to coordinate the arrival of injured persons, and to inform those at the crash scene of the arrival of the patients at the various hospitals. Amateurs were used first to take overflow traffic when the Ampex lines were overloaded, then to assume the full load when the phone line was declared out of commission. — *W6DEF, EC Redwood City Area, Calif.*

Members of the Oakland County (Mich.) RACES took part, on Oct. 23, in an all-out two-hour simulated disaster in the area including Rochester, Lake Orion, Addison, Avon and Oakland Townships. W8ZTX and K8MEH were set up as portable 10-meter net controls, and W8CQB did the job on two meters. On hand were a total of 12 mobile units. Each, with a trained first aid man as a passenger, was dispatched to one of the stricken spots designated. Victims were treated at the scene, then moved to the Township Hall for evaluation of the treatment. The test was conceived by W8DPE, a former ARRL director.

Texas Region 2 RACES RO W5VW was requested to provide RACES support and backup for a test conducted by the Civil Air Patrol on Nov. 13-14. W5VW in turn requested District RO K5LYO, Harris County RO K5HXR and Houston RO W5VCE for local support. W5VW and W5VCE set up a communications center at Airport Alpha, Mission Control, at Montgomery County Airport, Conroe, Texas. Equipment was provided to cover RACES frequencies on 75 and 2 meters, along with W5VW's all-band mobile.

It was a most successful exercise throughout, and at no time was there any difficulty in transmitting messages on the RACES channels. Net controls were W5s VW VCE EKP, K5s LYO IHK, W5s BUV DXU. A great number of local RACES members were also available. Contact was maintained between Conroe and Houston, Austin, Lubbock, Humble and Henderson, as well as between RACES and CAP officials at all times. Both the CAP and the Air Force were profuse in their praise of the amateurs. — *K5HXR, EC Harris County, Texas.*

Enfield, Conn., RO K1ZJFJ advises that a small group of hams in that town are trying to get the non-existent communications section of civil defense in operation. A communications center is being built in a federally-approved section of the Town Hall and the RACES group participates in a bi-weekly state RACES drill, operating on ten meters a.m. both for sector contact with the Manchester EOC and local purposes. Two-meter a.m. gear will be added soon. A full-scale information campaign is being planned. QST

• Beginner and Novice

A Mate for the Mighty Midget

80- and 40-Meter Receiver with Dual-Crystal Filter

BY LEWIS G. McCOY,* W1ICP

This receiver combines with the "Mighty Midget" transmitter in February *QST* to make a complete portable station. In itself, it is an excellent project for the new ham. It has plenty of bandspread and selectivity and most important, it is easy to build.

A short time ago "The Mighty Midget," a low-power, two-band transmitter, was described in *QST*¹. Several readers suggested a companion receiver, one about the same size as the rig, for those operators interested in having a ham station along when going on camping or vacation trips. The result of those suggestions is the receiver described in this article. It isn't quite as small as the rig but even so, it is only nine inches wide, six inches high, and five inches deep. Don't be misled by the small size. If you are interested in building your own gear, the receiver is excellent as a beginner or Novice project.

Circuit Details

Fig. 1 is the circuit diagram of the two-band superhet. Three tubes are used in the unit, all

* Beginner and Novice Editor.

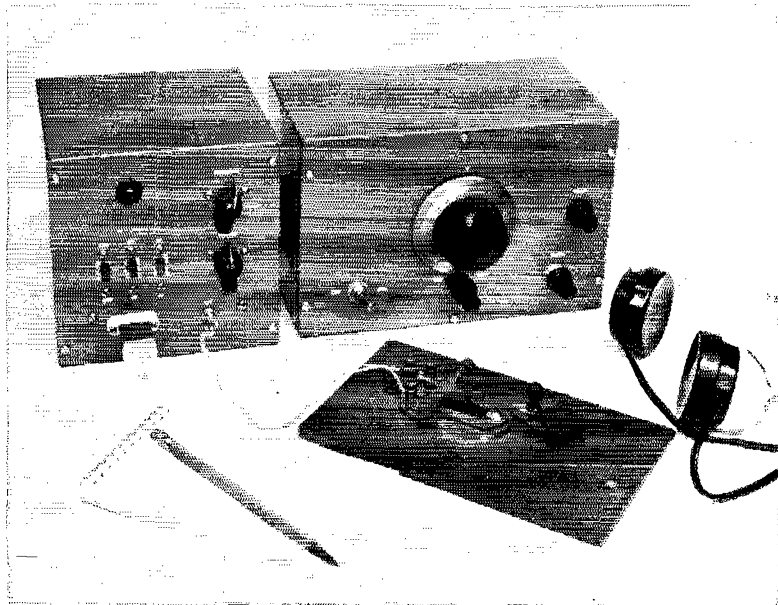
¹ McCoy, "The Mighty Midget," *QST*, Feb. 1966.

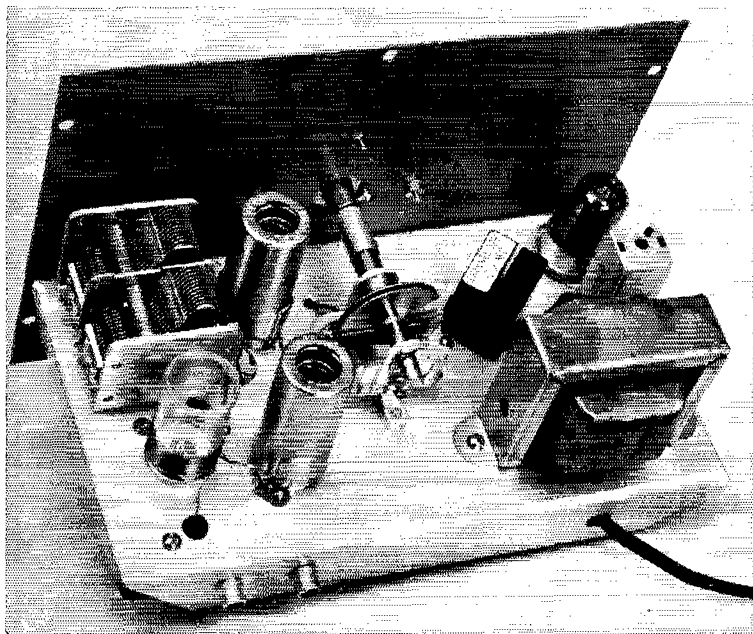
6U8s. One advantage in using the same tubes for all functions is that you only need one spare tube, not a variety of them. For the benefit of the newcomer just getting into ham radio, a 6U8 is actually two tubes in one envelope, a combination pentode-triode, so the receiver could be called a six-tube job.

The pentode section of V_{1A} is used as an r.f. amplifier. C_1 has sufficient range to cover both 80 and 40 meters so no bandswitching is required in either the r.f. or mixer stages. V_{2A} is the mixer with V_{2B} serving as the high-frequency oscillator. The intermediate frequency (i.f.) used in this set is 455 kc. so the oscillator is operated at 455 kc. above the signal frequency on both 80 and 40. Two tuning ranges are required in the high-frequency oscillator and this is achieved by switching in the proper coil-capacitor combinations with S_1 . Output from the h.f. oscillator is coupled to the cathode of the mixer. The mixer output at 455 kc. is fed to a dual-crystal filter which provides excellent single-signal selectivity.

V_{3A} is the i.f. amplifier and output from T_1 is fed to the diode detector, CR_1 , CR_2 . The detector is a voltage doubler to provide a little additional boost to the signal fed to the audio amplifier, V_{1B} . V_{1B} provides sufficient audio to run a pair of headphones. The phones are coupled to the plate of V_{1B} by L_6 , the primary of an audio output transformer, and a 0.01- μ f. capacitor.

Here is the completed station ready for operation. The entire station will easily fit into a small cardboard carton.





This view shows the arrangement above deck. At the left is C_1 and L_1, L_2 coils just to the rear of the variable. The high-frequency oscillator tuning capacitor is at the center of the chassis.

The transformer is the common garden variety used for b.c. and t.v. sets to run a 3- to 8-ohm speaker. We found that in a *quiet* room, there was enough audio output to run a small speaker but not enough output to drive you out of the room, so we stuck to headphones. The gain control, R_1 , is in the cathode circuit of the r.f. stage. No audio gain control is required. V_{3B} is used for the beat-frequency oscillator (b.f.o.).

There was sufficient b.f.o. signal injection in V_{3A} without using a coupling capacitor, so none was used.

A half-wave rectifier, CR_3 , is used in the power supply. The combination of C_3 and a 1000-ohm resistor provided adequate filtering. The voltage out of the filter is approximately 100 volts which is sufficient to run the receiver.

Getting the Parts

Nearly all of the components used in building the receiver are standard items available from any of the mail-order houses, or possibly your local dealer. All of the homemade coils are wound on plastic pillboxes, $\frac{1}{8}$ -inch diameter, $1\frac{1}{2}$ -inches long. These are obtainable from most drug stores for pennies and they make excellent coil forms.

Y_1 and Y_2 are surplus crystals². Any crystals in the range from 450 to 465 kc. will be suitable. These crystals are specified by frequency and channel number and we tried several combinations to see what type of selectivity could be obtained. Using two crystals of the same frequency gave extremely sharp selectivity, too sharp for practical purposes. Good single-signal selectivity for c.w. reception was provided for with 454.166 kc., Channel 327, and 453.704 kc., Channel 45, crystals, approximately 400 cycles

²JAN Crystals, 2400 Crystal Drive, Fort Myers, Fla.

separation. For phone reception, a Channel 327 and Channel 326, 452.777 kc., made a good filter. This separation is approximately 1.4 kc. In choosing your crystals, we would recommend about 400 cycles separation for c.w., and about 1 kc. for phone.

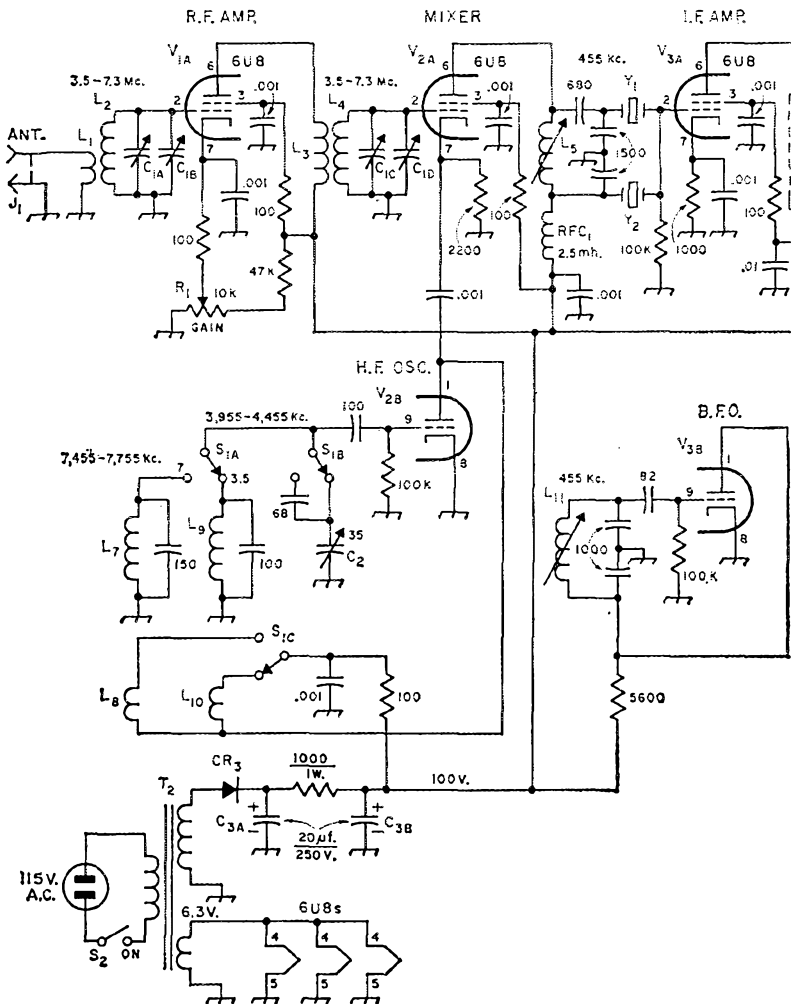
The dial and drive for the tuning capacitor is a National type AM, which provides a smooth action with no backlash. This dial costs a little more than some of the imported types but the cost difference is well worthwhile.

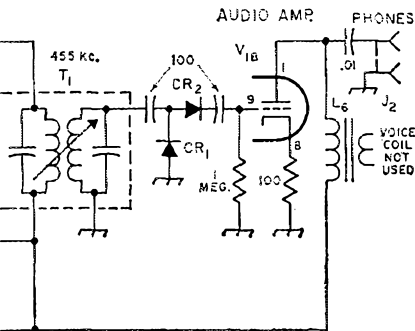
Construction Tips

The cabinet used for the receiver is a Bud type AU1040HG. Unfortunately, for our purposes, there is no chassis that fits this cabinet. A chassis can be made up from a piece of aluminum or copper roofing flashing. Fig. 2 gives the dimensions of the chassis. One trick in making a chassis is to clamp the piece of metal in a vise, using two pieces of wood to hold the piece at the point where the metal is to be bent. Using another piece of wood to give even distribution of weight, bend the metal to make a side. This method will give a smooth 90-degree bend in the metal.

We should point out that if you have a larger cabinet and chassis, there is no reason you have to duplicate *exactly* the unit shown in the photographs. However, we wanted a physically small unit to go with the rig, hence the reason for the small cabinet.

Refer to the top and bottom views when laying out your tube sockets and coils. Generally, construction isn't critical but you should avoid having any unnecessary coupling between the input and output of the crystal filter. This means between L_5 and the grid of V_{3A} . Too much stray coupling will degrade the performance of the filter.





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. 1—Circuit diagram of the Mighty Midget Receiver. All decimal value capacitors are disk ceramic. Other fixed capacitors are silver mica with the exception of C_3 which is electrolytic. Resistors are $\frac{1}{2}$ watt unless specified.

C_1 —Dual-section 365-pf. variable (Miller 2112 or equivalent). Sections B and D are trimmers furnished on capacitor.

C_2 —35 pf. variable (Miller 19035).

$C_{3A, B}$ —20 μ f., 250 volt electrolytic.

CR_1, CR_2 —1N34A germanium diode.

CR_3 —Silicon rectifier, 400 volt p.i.v. minimum, 100 ma. (Barry Electronics 600/750).

J_1, J_2 —Phono jacks.

L_1, L_3 —5 turns wound directly below L_2 and L_4 respectively.

L_2, L_4 —10 turns.

L_5, L_{11} —Approximately 300 μ h. slug-tuned (Miller 4411).

L_3 —Standard type output transformer, any range from 2000 ohms to 10,000 ohms primary winding is suitable. Voice-coil winding not used (Knight 61 U 400).

L_7 — L_{10} , inc.—See Fig. 3.

Note: $L_1, L_2, L_3, L_4, L_7, L_8, L_9, L_{10}$ are all wound with No. 26 enamel wire, all turns are close spaced and are wound on plastic pill boxes, $\frac{7}{8}$ -inch diameter, $1\frac{1}{2}$ -inches long.

R_1 —10,000 ohms, $\frac{1}{2}$ watt control.

RFC_1 —2.5 mh. R.f. choke (C Miller 34300-2500).

S_1 —3-Pole, 4-position rotary switch, 2 positions used (Mallory 3234J).

S_2 —Single-pole, single-throw toggle.

T_1 —I.F. transformer, output type, 455 kc. (Miller 12-C2).

T_2 —Power transformer, 125 v., 50 ma., 6.3 v., 2 amp. (Knight 61 U 411, Chicago/Stancor PA-8421).

Y_1, Y_2 —See text.

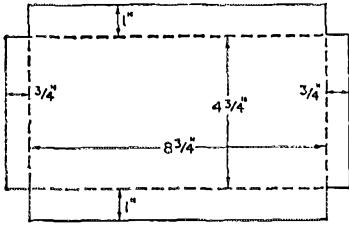


Fig. 2—Drawing of chassis metal. The four sides along dotted lines should be bent down at right-angles to top to form chassis.

Notice in the bottom view that plenty of tie-point terminals were used. You may note that some of the terminals have no connections but we believe in having plenty, rather than not enough.

Use particular care when mounting C_2 , the tuning capacitor, to be sure that it is perfectly lined up with the dial drive. If alignment isn't good, you may find that the capacitor will bind or not rotate freely. The top of the chassis should be $2\frac{1}{8}$ inches from the bottom of the front panel. The hole for the AM dial ($\frac{3}{4}$ -inch diameter) should be $3\frac{1}{8}$ inches from the bottom of the panel. Before actually drilling the mounting holes for the dial, temporarily install the drive and C_2 in place and check the alignment of the components. You can then mark off the correct placement for the dial mounting holes.

With the chassis width specified you'll find that the chassis won't fit into the cabinet without first removing some of the metal lip that is around the front of the cabinet. Use a hack saw and file to remove enough metal so that the chassis clears the inside lip and the panel fits flush to the front of the cabinet.

Coils and Coil Winding

First, when winding any of the coils, all turns must be put on the form in the same direction. For example, L_1 is the link, or antenna input coil and L_2 the secondary. L_1 consists of five close-spaced turns directly below L_2 and the two windings have no space between them. Be sure that the turns are put on in the same direction. L_3 and L_4 are duplicates of L_1 and L_2 .

The other coils you must make are the high-frequency oscillator coils. Again, be sure that all coils are wound in the same direction. If the feedback windings, L_8 and L_{10} are not in the same direction as L_7 and L_9 , the oscillator won't oscillate.

The oscillator is designed so that you will have 3500- to 4000-kc. coverage on 80, and 7000 to about 7300 kc. on 40. Because of stray capacitance or differences in wiring between your unit and the one described here, you may find that you don't get exactly the same coverage. This is unlikely but it can happen. If you find that either band tunes too low in frequency you can move the oscillator frequency up by removing turns from L_7 or L_8 , whichever band requires it. Only remove about $\frac{1}{2}$ turn of wire at a time and remove the wire from the top of the coil, not at the

point where the winding is next to the feedback winding. If the oscillator is tuning too high in frequency, you'll have to add a half turn or so.

Tune-up Adjustments

In order to tune up the receiver you'll need a signal source. Your transmitter or a grid-dip meter will provide an adequate signal for adjustment. Use a dummy load on the rig, such as a light bulb. If you have a d.c. voltmeter available capable of reading 150 volts, there are a few checks you can make before actually aligning the rig. Turn on the power, and first check to make sure the filaments in all the tubes are lit. This first test should also include what old timers call the "smoke" test. Simply, if something starts to smoke, turn the receiver off! You can usually spot the component that is getting hot and check the wiring around that portion of the circuit to make sure nothing is shorted. Assuming the heaters light up and there is no smoke, you can make voltmeter checks to make sure your wiring is all complete. Check at the output side of the power supply to see if the voltage is about 100 volts. Next check the plate and screen of each pentode section and the plate of each triode section to see if the voltage is present. If you find a terminal or tube pin where there should be +B and there isn't, check the wiring for open connections or a cold solder joint.

Assuming that everything checks out all right, tune up your transmitter on 80-meters, switch the receiver bandswitch S_1 to 80, and tune in the signal. You'll find that C_1 will peak with the plates about one-third meshed. If you're lucky, you'll hear the background noise peak up when you tune C_1 . However, there should be enough pickup from the transmitter signal for you to hear it. Aligning the receiver is quite simple. With C_1 peaked, adjust the slug in the b.f.o. coil to the point where you hear an audio beat. Next, peak the slug in L_5 for maximum signal. At some point, you'll have to reduce the signal input because it will become too strong. You can move

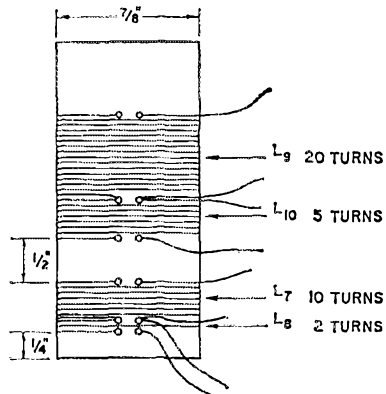


Fig. 3—Drawing of the high frequency oscillator coils. All coils are wound with No. 26 enamel wire. The holes drilled in the coil form to hold the windings are $\frac{1}{16}$ th inch diameter. The same method is used in making the r.f. and mixer coils.

the transmitter away from the receiver such as across the room or even into the next room. Also, reduce the r.f. gain control, R_1 , to where the signal is just barely audible. Next, peak the top and bottom slugs in T_1 , the i.f. transformer. At this point, you should be able to hear on-the-air signals. Put an antenna on the receiver and tune in on outside signal. Go back and forth over all the adjustments until you get the strongest possible peaking on the signal.

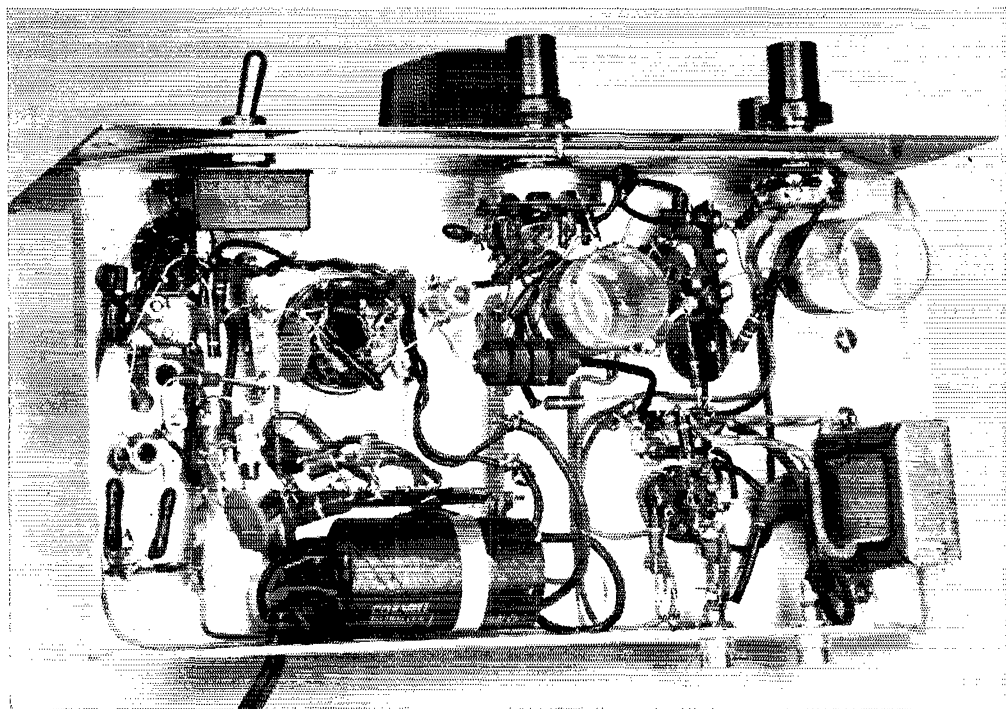
If you cannot hear any signal recheck your wiring to make sure there are no errors. Make sure the high-frequency oscillator is working. If you have or can borrow another receiver that tunes between 4 and 5 Mc. and 7.3 and 8 Mc., listen for the oscillator signal in the receiver. With the two receivers side by side, you should be able to hear the oscillator signal. Also, if you have an absorption wavemeter or a grid-dip meter couple either to the high-frequency oscillator coil, L_7 , and you should get an indication when the wavemeter or grid-dipper is tuned to the oscillator range. Remember, the oscillator works at about 450 kc. above the received signal range.

The Miller 2112 consists of two 365-pf. variables, C_{1A} and C_{1C} , and in parallel with each of these is a 3-30 pf. trimmer capacitor, C_{1B} and C_{1D} . Because the r.f. and mixer stages are gang tuned, it is possible they won't track perfectly. However, the adjustment is quite simple. First, tune in a signal near the high end of the 3.5-

Mc. band and peak C_1 for best signal strength. With the trimmer at maximum capacitance (the adjustment screws screwed all the way down), slowly unscrew the trimmer across the r.f. stage while listening to the signal. At one point, you may find a slight peak in the signal strength. If so, leave the trimmer at that setting. Do the same with the trimmer across the mixer capacitor. Don't be concerned if you don't get a peak. We found that with the coils specified, tracking was excellent.

Once you get the receiver peaked up, you can try different combinations of crystals for selectivity differences. Also, you may want to tune in s.s.b. signals. Tune in the phone-band range until you hear an s.s.b. signal. In s.s.b., there is no carrier transmitted. You provide the carrier at your receiver, and in this case it is the b.f.o. signal. If the b.f.o. signal isn't in the correct relation to the incoming s.s.b. signal, the received signal will be garbled and almost impossible to copy. To adjust the b.f.o., reduce the r.f. gain control so that the incoming signal isn't too strong and then by carefully tuning C_1 , the main tuning control and the slug in the b.f.o. coil, you should find a setting where the s.s.b. signal becomes good copy. Once you find that setting leave the b.f.o. slug alone. It will work equally well at that setting for c.w. and s.s.b.

You should have fun building the little receiver and you'll find that it is a real performer! **QST**



At the upper right on the panel is the r.f. gain control, R_1 , and just to the rear of the control, the L_3 and L_4 coils. The output transformer L_6 is at the lower right and to its left is the socket for V_1 . Directly behind the bandswitch, upper center, are the oscillator coils and the tube socket to its right is V_2 . To the right of the octal socket used for holding the two crystals is L_5 . At the upper left is the tube socket for V_3 and T_1 is just to the rear of the socket. The b.f.o. coil, L_{11} , is at the lower left.

• Technical Correspondence

THE CWX CONTROL SYSTEM

Technical Editor, *QST*:

In reference to my article on the CWX transmitter control system in the February (1966) issue, the following additional information may be useful to those who are building, or who have built the unit.

If K_1 does not follow the key precisely, measure the relay-coil current; it should be between 5 and 6 ma. If overdrive is excessive, the relay will not follow properly. The current can be adjusted to obtain excellent following by adding a suitable series resistance in the common +B lead to the coils.

Miniature tubes that can be substituted for the 6SN7GTB are the 12AU7, or 12BH7A. The latter will require a series resistance of about 6800 ohms in the common +B lead to the coils.

The 18-volt drop across the Zener diode provides cutoff cathode bias for the two triodes in the key-open condition. In the key-closed condition, the total cathode current flows through CR_1 . If a resistor were to be substituted for the Zener, as some have suggested, cathode-current flow through the resistor would increase the drop across the resistor. Since the effective plate-to-cathode voltage would be the supply voltage minus the drop across the resistor, the result would be a reduction in effective plate voltage under the key-down condition. When a resistor was used originally, this reduction proved to be sufficient to impair the operation of the relays. The use of the Zener to keep the drop constant with cathode-current flow avoids this difficulty.

The ratings for the supply rectifier, CR_2 , which are missing under Fig. 1, should be 500 p.i.v., 50 ma. or more. In addition to the shielded wire indicated in the diagram, shielded wire should also be used for the connection between K_{1A} and the grid of V_{1B} . — Dale J. Fisher, W4VQK, 22 Outer Drive, Oak Ridge, Tenn. 37832.

NOTE ON POLAR COORDINATE CONVERTERS

Technical Editor, *QST*:

The technical correspondence by Victor A. Michael, W3SDZ, (*QST*, p. 84, September 1965) stating, "no simple way is available to make an el-az mount auto-track, short of an IBM computer.", is not quite correct. Several methods are available and some have been used for nearly a decade in radio-astronomy installations.¹ The 210-foot dish in Australia has a permanently-mounted analog computer which continuously solves the equations of celestial motion with respect to the observer by using a polar mount linked to the telescope elevation-azimuth mount.² A commercial mechanical analog computer driven by a clock and with synchro transmitter outputs is available at far less cost than an IBM computer.³

A Cleveland, Ohio, area Science Fair award was won by John P. Fosdick for design of a circular

¹ E. F. McClain, "The Naval Research Laboratory's 84-Foot Radio Telescope," *Sky and Telescope*, #7, 609-610, October, 1958.

² F. J. Kerr, "Australia's 210-Foot Radio Telescope Project" *Sky and Telescope*, #3, 666-668, October 1959.

³ Victor E. Carbonara, Instrument Engineering Laboratories, 90 Harbor Rd., Port Washington, N. Y. 11050, Coordinate Converter Model 24A-01.

slide rule type of coordinate converter while he was a senior in high school in 1963. This device, while not directly adaptable to automated driving of elevation-azimuth gear trains, is quite useful. A similar device in principle involves a circular rotating star chart of the type sold at museums or planetariums and generally available to those interested in astronomy.⁴ An overlay grid computed for the observer's latitude is placed over the oval-shaped horizon circle normally included with the chart. Elevation grid lines are elliptical and the azimuth grid lines are skewed on the overlay. By driving the sky chart with a 24-hour clock and locating the desired object such as the moon with a small crayon mark, the observer can directly read out his local elevation and azimuth to within $\pm 5^\circ$ tolerances. The larger the sky chart in diameter, the more precise the grid overlay can be made to solve this problem. For pointing accuracies encountered with typical 144- or 432-Mc. moonbounce work, one need move the antenna only every 10 minutes or so unless an unusually large aperture such as the 1000-foot Arecibo dish is being used.

Still another method that has been used is to prepare a prepunched digital tape and run this through a digital-to-analog converter which gives shaft output for elevation and azimuth. The tape device can be modified from a teletype tape reader and perforating machine. The computation problem of determining elevation-azimuth coordinates for particular sets of declination-right ascension data such as for the moon has been excellently summarized by Don Lund, WA0IQN.⁵ The conversion from digital tape symbols to analog form, while complex, is not difficult for those skilled in related fields such as Morse code or typewriter converter systems. In this type of converter the tape is moved at a rate determined by the desired pointing accuracy, such

⁴ Sky Publishing Corporation, 49-50-51 Bay State Road, Cambridge, Mass. 02138, Phillips' Planisphere and other circular star charts available.

⁵ Don Lund, "How High the Moon," *QST*, #9, 55-57, July, 1965.

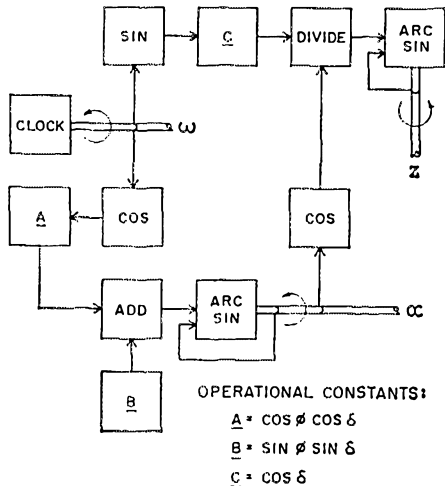


Fig. 1—Block diagram of typical coordinate converter.

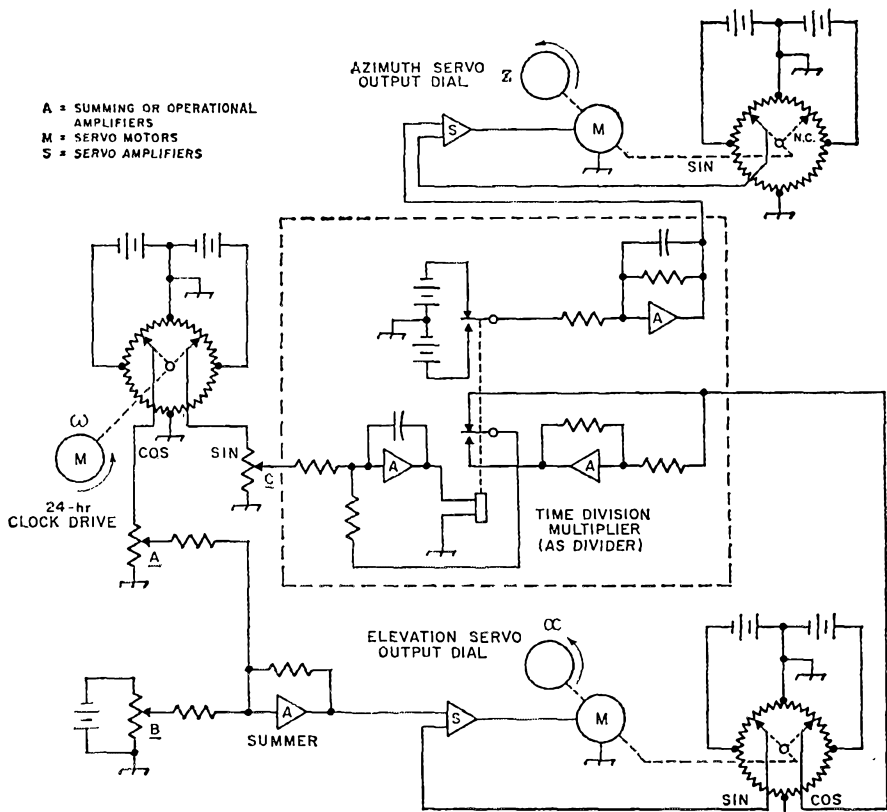


Fig. 2—Simplified diagram of analog computer for coordinate conversion.

as in increments once a minute or once every five minutes.

William G. Harter and the author have considered several possible schemes to solve this problem including both mechanical and electrical analog devices. All of the methods reduce to a means of solving the following set of equations:

$$\text{Cosine Law: } \sin \alpha = \sin \phi \sin \delta + \cos \phi \cos \delta \cos \omega$$

$$\text{Sine Law: } \sin \zeta = \frac{\cos \delta \sin \omega}{\cos \alpha}$$

Where:

- ω = Hour Angle (Right Ascension)
- δ = Declination
- ϕ = Latitude
- ζ = Azimuth
- α = Elevation

A block diagram of a mechanical or electrical analog of this problem is shown in Fig. 1. The terms A , B , and C are constants which depend on the observer's latitude and the desired declination. Thus the dial for these adjustments can be calibrated and set for the desired declination. A 24-hour clock drive can be used for the hour angle drive but needs to be reset periodically because the celestial sphere rotates slightly faster than solar time and for cases like the moon which does not quite follow celestial motion. In any case the error in using a 24-hour drive versus the exact celestial speed drive is very small compared to the pointing accuracy of real antennas in any given observing period.

A schematic of a simplified circuit using d.c. operational amplifier and servo techniques is shown in Fig. 2. The time division multiplier⁶ is a relatively low-cost way of obtaining an analog divider circuit but this could be accomplished in other ways, including another servo system with ganged potentiometers. The sine-cosine potentiometers are available in various surplus houses and consist of a square card taped as shown with the wiper arms mounted 90° apart rotating with respect to the winding card. Other forms of sine-cosine potentiometers could be used, including resolvers which employ a.c. voltages when used with a.c. amplifiers and phase-sensitive circuitry in place of the d.c. system illustrated. This particular circuit has not been fabricated by the author but the principle is similar to electrical analog computers used in various radio telescope installations.

Two additional aids that eliminate the calculating problem in point by point determinations are a slide rule that converts sidereal time to standard time⁷, and a nomograph for solving the coordinate conversion equations⁸.

— Ralph W. Burhans, W8FKC, Radar Hill Lab., Electrical Engineering Dept., Ohio University, Athens, Ohio 45701

⁶ G. A. Korn and T. M. Korn, "Relay Time Division Multiplier" Review of Scientific Instruments, 25, 977-982, October 1954.

⁷ Edmund Scientific Co., Barrington, N. J., Star Time Calculator, No. 40399.

⁸ L. Heflinger, "A Graphical Device for Converting Coordinates," Sky and Telescope 31, 92-94, February 1960.

I.A.R.U. News



INTERNATIONAL AMATEUR RADIO UNION

AMATEUR RADIO IN YUGOSLAVIA

This year marks the 20th anniversary of the Savez Radioamatera Jugoslavije (SRJ), the Yugoslav amateur society. As of the beginning of 1966, SRJ membership totaled 28,000; there were 4087 operators, 652 individual YU stations, 380 clubs, 481 club stations and 380 v.h.f. stations. Many are interested only in construction work and never become licensed operators.

Separate operator and station licenses are issued for three-year periods to citizens at least 16 years old who can pass the examinations and 12 w.p.m. code test. There is no license fee.

Station licenses are issued by the six Yugoslav area communication authorities: YU1, Serbia; YU2, Croatia; YU3, Slovenia; YU4, Bosnia and Herzegovina; YU5, Macedonia; and YU6, Montenegro. Available frequency bands include 3.500-3.800, 7.000-7.100, 14.000-14.350, 21.000-21.450, 28.000-29.700 and 144-146 Mc., with phone sub-allocations at 3.600-3.800, 7.050-7.100, 14.100-14.350, 21.150-21.450 and 28.200-29.700 Mc. First Class licensees may use up to 250 watts, all modes, on all bands; Second Class, 50 watts, phone or c.w., on the 3.5-, 7- and 14-Mc. bands; Third Class (issued to club station operators only), 100 watts, phone or c.w., 3.5 and 7 Mc. only; and Fourth Class licensees, up to 50 watts, phone or c.w., on v.h.f. only.

The official society publication is *Radioamater*; SRJ membership is 360 Dinars (approximately \$.50 U.S.). Requests for more information may be sent to Janez Znidarsic, YU1AA, President, or Suman Ferid, YU1AF, Secretary, SRJ, P.O. Box 324, Belgrade, Yugoslavia.

LU EMERGENCY NET

A December, 1965 government edict has established an emergency amateur radio network in Argentina. Stations in the net will use the LUØ

To help mark the 100th and 40th anniversaries of the founding of ITU and REF, respectively, the Réseau des Emetteurs Français activated F8ITU on December 4-5, 1965. This attractive souvenir QSL was issued to those contacting the station, operated by REF General Secretary F9OE.



As reported in March "IARU News", a reciprocal operating agreement was signed by the U.S. and United Kingdom on November 26, 1965. Shown at the signing are (left) Mr. Wallis C. Armstrong, U.S. Minister of Economic Affairs, and Lord Walston, British Parliamentary Under-Secretary for Foreign Affairs. U.S. amateurs seeking U.K. authorization may now obtain necessary forms from the Radio Services Dept., G.P.O. Headquarters, London, E.C. 1, England.

prefix. The edict also sets aside for emergency use only the frequencies 3.550, 7.075 and 14.150 Mc. The 3.550-Mc. assignment is identical to one of the National Calling and Emergency Frequencies in use in the U.S. and Canada.

AMATEUR TV IN FRANCE

The French Ministry of Posts and Telecommunications advised the president of REF on November 12, 1965 that applications could now be considered from French amateurs wishing to experiment with television. Transmissions are to be authorized on 435-440 Mc. (From January, 1966 "Region I Bulletin").



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F8ITU



Les fondateurs de F8ITU réunis à Paris le 17 mai 1965



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160-Meter "Solid Status"

A Chirp-Free C. W. Rig Using Transistors

BY T. J. LALLY,* KIUBA

As novelty items, transistors often appeal to the state-of-the-art frontiersman, but are they really in a position to compete with vacuum tubes for the generation of r.f. power? The answer to this question depends on what form the power source takes, and what the frequency of operation is to be. If the transmitter is to be plugged into an a.c. outlet, then watt-megacycles per dollar is clearly an important consideration. When battery operation is contemplated, over-all efficiency becomes the governing factor and transistors deserve serious consideration when compared to vacuum tubes.

Many amateurs shy away from the use of transistors in their transmitters because commonly-available types (capable of delivering more than a couple of watts of power in the r.f. spectrum) are too expensive to consider. High-power, high-frequency transistors have been available for a number of years, but they have been costly. Recently, however, production overruns and the availability of grade-out transistors have made r.f. power transistors available on the surplus market at reasonable prices, placing them within financial reach of the experimenter.

In recent months the Transiron 2N1212 transistor has become available for as little as \$1.00 on the bargain market.¹ This unit has a maximum frequency rating of 10 Mc. and a power dissipation rating of 85 watts. The collector-to-emitter voltage rating (V_{ce}) is 60 volts maximum, making it usable over a wide range of operating voltages. Additionally, it has demonstrated greater tolerance to transients and high operating temperatures than similar types that were tested. Because of the upper frequency

The author shows what can be done with bargain-priced solid-state components in this 160-meter c.w. transmitter. Although the circuit is basically an example of what can be done with power transistors, it is a workable unit that will produce power input levels that approach the legal 160-meter maximum in some areas of the United States.

limit of the 2N1212, the 160-meter band was selected as a proving ground for the transmitter. A nominal supply voltage of 24 volts d.c. was chosen for several reasons:

- 1) Two 12-volt auto batteries could be used to power the transmitter, with no d.c.-to-d.c. conversion losses. (Batteries connected in series.)
- 2) Portable operation would be practical and easily accomplished.
- 3) Many inexpensive surplus relays will operate at 24 v.d.c.
- 4) No dangerous d.c. voltages would be present in the transmitter.

The Circuit

The crystal oscillator stage, shown in Fig. 1, employs a 4-watt silicon mesa transistor. This unit, a 2N497 n.p.n. device, is keyed in the emitter lead to permit c.w. operation. The keying of subsequent stages was tried, but led to severe arcing at the key contacts because of the high current that flowed through that circuit. Furthermore, a strong backwave signal was evidenced when keying any stage other than the oscillator. The current being broken by the key is on the order of 30 ma., contributing to a marked reduction in the keying transients that existed when keying the high-power stages of the transmitter. In contrast to a power oscillator that was tried (2N1212), the low-power oscillator keyed readily, and without the chirp which was common to the power oscillator with its sluggish action. Additionally, by keying the oscillator stage the key-up current drain on the battery is limited to a few milliamperes because the buffer and p.a. stages are operating at near-cutoff with no excitation.

The buffer stage, Q_2 , idles along at its leakage-current level until it receives excitation from the

* 28 Amory Road, Waltham, Mass. 02154.

¹ Poly Paks, Box 942, So. Lynnfield, Mass.

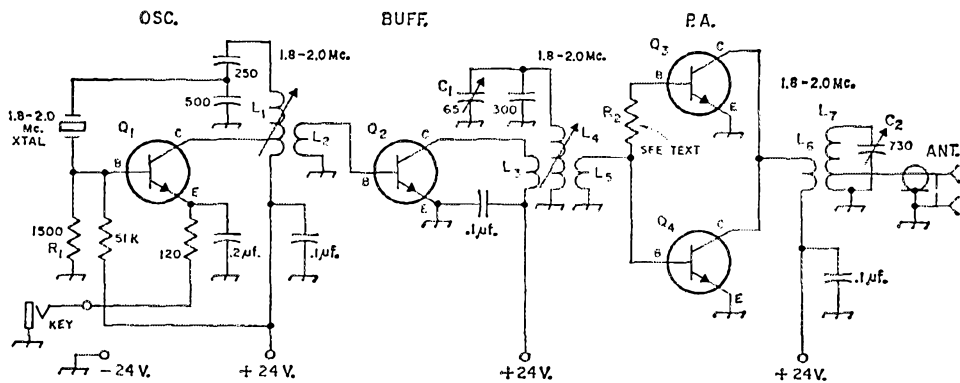


Fig. 1—Schematic diagram of the 160-meter transistor transmitter. Fixed capacitors are disk ceramic and are in pf. Decimal value capacitors are in $\mu\text{f.}$ and can be disk ceramic or molded tubular. Resistors are 1-watt composition and are in ohms. $K = 1000$. Antenna connector is an R.C.A. phono jack.

C_1 —5-65-pf. trimmer capacitor.

C_2 —2-gang variable capacitor (365 pf. per sec.).

L_1 — $1\frac{1}{8}$ inch winding of No. 30 enam. wire, close-wound on $\frac{1}{2}$ -inch diam. Millen slug-tuned form (Millen 74002). Collector tap $\frac{1}{4}$ inch up from cold end.

L_2 —3 turns No. 22 insulated hookup wire, wound over cold end of L_1 .

L_3 —8 turns No. 22 insulated hookup wire over cold end of L_4 .

L_4 — $1\frac{1}{4}$ -inch winding of No. 26 enam., close-wound on $\frac{1}{2}$ -inch diam. slug-tuned form (Millen 74002).

L_5 — $2\frac{1}{2}$ turns No. 22 insulated hookup wire, wound over cold end of L_4 and adjacent to L_3 .

L_6 —3 turns No. 22 insulated hookup wire inside cold end of L_7 .

L_7 —64 turns No. 18 wire, $1\frac{1}{4}$ -inch diam., tapped for best match to antenna; see text. (B & W 3019 Mini-inductor).

Q_1 —4-watt silicon mesa transistor. 2N497 or similar. (2N697, 2N498, 2N547, 2N717, 2N718, 2N1613 usable.)

Q_2 — Q_4 , inc.—2N1212 n.p.n. transistor or similar.

R_1 —Value shown for use with 2N497 using 24-volt supply (For 12-volt operation, see text.)

R_2 —See text.

oscillator. The base and emitter are returned to d.c. ground without provision for biasing, and the drive from Q_1 is supplied to the base of Q_2 through link L_2 which is wound over the cold end of L_1 . Despite the lack of bias on this stage, there has been no evidence of thermal runaway at 12, 24 or 32 volts, V_{cc} . The output energy from the collector of Q_2 is coupled into the buffer tank coil, L_4 , by means of a low-impedance, 8-turn link, L_3 . A second low-impedance winding, L_5 , couples the signal from Q_2 to the base of Q_3 and Q_4 .

The p.a. stage, containing two parallel-connected 2N1212 transistors, is similar to the buffer stage and also operates at near-cutoff without excitation. As is the case with Q_2 , thermal runaway does not take place in the p.a. stage even though no base or emitter resistors have been included in the circuit. An equalizing resistor, R_2 , is shown in the schematic diagram and is adjusted to permit matching the current drawn by Q_3 and Q_4 . (More on this later). The collectors of Q_3 and Q_4 are supplied with current through L_6 , which matches the 16-ohm collector impedance to the antenna through coupling to L_7 . The antenna is tapped down on L_7 until a suitable impedance match is effected.

Building the Transmitter

The transmitter is assembled on a 6×9 -inch piece of unclad vector board. The layout is shown in the photo. Vector board was chosen as a chassis material so that all of the components could be

placed above the chassis, and so that it would be less difficult to insulate the heat sinks from circuit ground. The interconnecting leads between sections of the circuit are passed through the holes in the vector board and are routed under the chassis. The heat sinks are mounted vertically to provide better convection cooling. Aluminum sheets, $\frac{1}{8}$ inch thick and of commensurate size to the commercial units shown, can be substituted for the heat sinks used at Q_2 , Q_3 , and Q_4 . A similar arrangement can be worked out for the heat sink at Q_1 . The heat sinks shown in this model are held in place by loops of wire which are passed through the circuit board. A more secure assembly would result if they were attached to the chassis with metal brackets, or held in place with epoxy cement. The final arrangement can be decided by the builder and will be dictated by the degree of ruggedness desired.

Coils L_1 and L_2 , and L_3 , L_4 and L_5 are housed in Millen plug-in assemblies. The shield covers prevent interstage coupling and discourage any tendency toward instability of the stages. The coil assemblies are plugged into ceramic tube sockets which are mounted on the vector board with standoff posts.

Transmitter Tuneup

Because of the somewhat limited output power from the oscillator stage, Q_1 , it is impossible to drive the buffer or p.a. stage of the transmitter to excess. Therefore, tuneup is a simple matter in that the transistors cannot be damaged by over-excitation. To exclude any possibility of over-

heating, however, it is suggested that the operator apply 12 volts to the buffer and p.a. stages (24 volts on the oscillator) during the initial tuneup period. This will allow sufficient safety margin with respect to junction temperature, until the tuned circuits can be brought into resonance. As is the case with vacuum-tube transmitters, there will be a pronounced dip in element current (collector current in this instance) when the tank circuits are tuned to resonance. The off-resonance collector current of the p.a. stage, with drive applied at the base elements, can rise to 3 amperes — causing considerable heating at the junction of the transistors during sustained key-down tuning. Since n.p.n. transistors are used in this circuit, make certain that a positive voltage is applied to the collector circuits of the transmitter. The negative lead from the battery can be attached to the transmitter ground bus when testing the unit. *Warning:* Incorrect voltage polarity can lead to the destruction of the 2N1212 transistors.

First, attach a 0 to 1-ampere r.f. ammeter or an s.w.r. bridge to the transmitter output terminal, J_2 . A 50-ohm dummy load is attached, next, to the output terminal of the ammeter or s.w.r. bridge, whichever is used for output power indication. Plug a key into J_1 and apply 24 v.d.c. to the oscillator circuit. While observing the S meter on the station receiver, adjust the tuning slug in L_1 for maximum meter indication with the receiver tuned to the transmitter crystal frequency. If no oscillation is noted, substitute a 10K potentiometer for R_1 and adjust it until Q_1 produces oscillation. R_1 should be adjusted to the point where the oscillator starts readily. The value of resistance that is established by the potentiometer can be determined by measuring it with an ohmmeter. A fixed-value resistor can then be substituted at R_1 and the testing can continue.

When oscillation has been obtained, apply 12 volts to the buffer stage, Q_2 , and tune L_1 for maximum Q_2 collector current (approximately 100 ma.) by placing a meter in series with the cold end of L_3 . Next, apply 12 volts to the p.a. stage (Q_3 and Q_4) and tune the slug in L_4 for maximum output as indicated by the s.w.r. bridge (forward-power position). P.a. capacitor C_2 is tuned, next, for maximum power output. The dummy load and power-indicator combination should be tapped at various points along the low-impedance end of L_7 , retuning C_2 for maximum output each time, until the best match is obtained between the p.a. stage and the load. After the best tap point has been selected, adjust the oscillator and buffer tuned circuits for maximum power output at J_2 . If difficulty is experienced in reaching resonance at L_4 , adjust C_1 and the slug in L_4 alternately until a peak in output is obtained.

After the initial tune-up is completed, attach the 24-volt supply to all stages of the transmitter and repeat each stage for maximum output. At this point it is important to determine how much collector current is being drawn by each of the p.a. transistors. This can be accomplished by

disconnecting the base connection of Q_3 and applying drive to Q_4 in the usual manner. By inserting a 0 to 5 ampere d.c. meter in series with the B-plus lead to L_6 the collector current of Q_4 can be noted. Next, reconnect the base lead of Q_3 and disconnect the base lead from Q_4 . Again, observe the meter reading to determine the amount of collector current drawn by Q_3 . The two current readings should be within 25 per cent of one another, or closer. If this condition cannot be met, try swapping Q_2 with Q_3 or Q_4 to see if a better match can be secured. If no combination of the three transistors will result in a suitable match, select the two 2N1212s that are the most closely matched and experimentally vary the value of resistance at R_2 (try about 10 ohms), with drive applied to the p.a., until equal collector currents exist at Q_3 and Q_4 . Now, retune C_2 for maximum power output from the p.a. stage. Vary the tap position between L_7 and the dummy load for the best match possible.

Typical collector current readings after tuneup (at 24 volts) are: Q_1 —35 ma.; Q_2 —150 ma.; Q_3 and Q_4 —1.5 amp. With 12 volts on the buffer and p.a. stages, Q_3 will draw approximately 100 ma. Q_3 and Q_4 will draw about 1 amp.

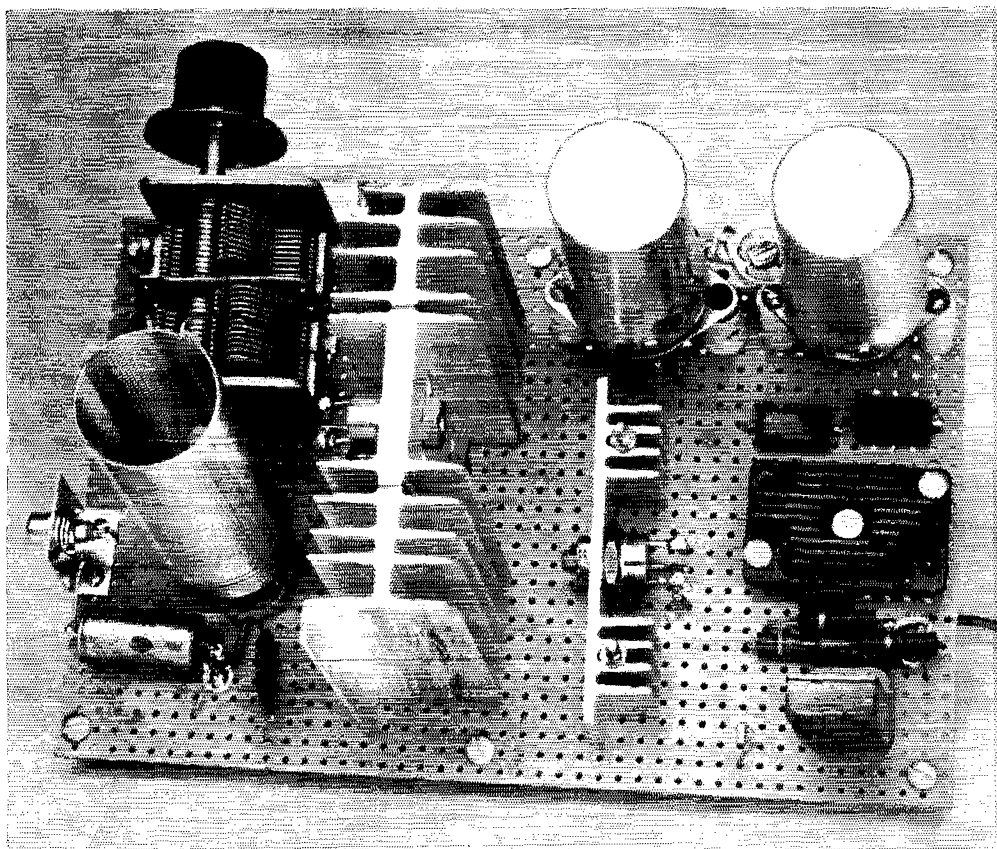
Operation

The tune-up procedure with the antenna attached to the transmitter is the same as it is for dummy-load operation. The transmission line is tapped down on the p.a. tank coil until a satisfactory loading is effected. This can be accomplished by inserting an s.w.r. bridge between J_2 and the transmission line and adjusting the tap on L_7 for maximum forward power. Naturally, the transmission line must be matched to the antenna feed point if this method is to be effective. Random-wire antennas can be used with this transmitter if tuning networks of the type described in Chapter 6 of *The A.R.R.L. Antenna Book* are placed between J_2 and the antenna. In some instances it may be possible to attach a random-wire antenna directly to L_7 and secure a reasonable match. This practice is not recommended, however, since there would be but little discrimination against harmonic radiation.

A power input of 36 watts (p.a. stage only) is typical when the transmitter is operated from a 24-volt supply. The measured power output, using a Bird Thru-line wattmeter into a 50-ohm load, was 18 watts with the 36-watt input figure. With 12 volts applied to Q_2 , Q_3 and Q_4 , the transmitter produced 8 watts of output with 16 watts of input power. In both instances the efficiency was on the order of 50 per cent — a common figure with Class B or Class C transistor amplifiers.

Some Added Thoughts

In view of the 2N1212's 85-watt rating it may be argued that a single transistor in the p.a. stage should be adequate. Two were used for the simple reason that a single unit would not draw sufficient



Top view of the solid-state transmitter. Inter-circuit wiring is routed through the holes in the circuit board and connections are made under the chassis. Connection to the key is made by attaching a shielded cable to the key terminals.

collector current at 24 volts to develop the desired amount of p.a.-power input.

The author cannot too thoroughly stress the importance of adequate heat-sink area. The vacuum-tube man, going the transistor route for the first time, need only touch the case of a power transistor that's drawing an ampere or two of collector current to realize the importance of convection cooling. When selecting heat sinks for the transmitter, secure the largest size that will fit into the chassis.

The entire transmitter can be operated from a 12-volt source but will function at a reduced power level. In order to use the oscillator at 12 volts, it will be necessary to experiment with the value of R_1 , selecting a bias value that will permit the crystal to oscillate. The correct procedure for doing this has been outlined earlier in the text. The legal power limit for 160-meter operation may be approached by using a 32-volt power supply. If this is done, the value of R_1 will have to be modified for best oscillator performance. The buffer and p.a. transistors run *quite* warm at 32 volts, but will remain within their dissipation ratings provided the key is not closed for more than a few seconds at a time.

In Conclusion

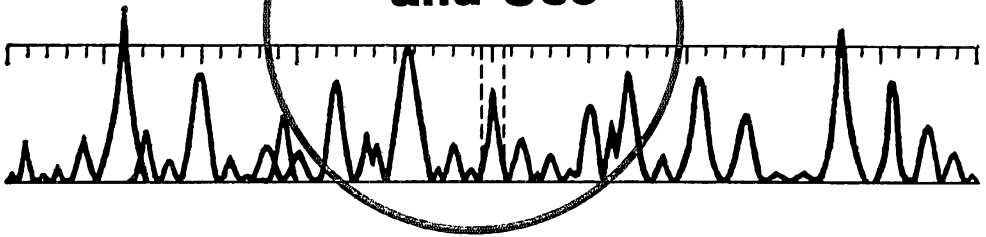
For back-country work, a pair of series-connected 12-volt automotive batteries, when fully charged, will provide approximately 16 hours of carrier-on time. Because c.w. operation will be carried on with this transmitter, the key will be up approximately 50 per cent of the time, permitting about 32 hours of actual operating time without recharging the batteries. Because of this, and provided a battery-operated receiver is used, an additional Field Day multiplier of 1.5 is available, making the use of a solid-state transmitter even more desirable. A battery-operated station eliminates the need for a gasoline-powered generator, which in turn contributes to better relations with fellow campers since they aren't plagued with the "putt-putt" drone of a power plant.

To anticipate a question the reader may have: "Yes, the 2N1212s will work on 80 meters, but at slightly reduced efficiency."

No attempt has been made to apply modulation to this transmitter, but it is reasonable to believe that a.m. phone operation would be possible by applying modulation to Q_3 and Q_4 .

(Continued on page 158)

Amateur Radio Frequency Allocations and Use



BY D. SCHMELING *

The Ministry for Posts and Telecommunications of the Federal Republic of Germany has requested me to take part in your convention, held in honor of the centennial year of the International Telecommunications Union — ITU. I bring you greetings from my Administration with their best wishes for this convention. My administration has always taken a lively interest in the amateur radio service, which — contrary to the commercial radio service — relies heavily on the idealism of the participants to make it work.

A point of major interest in your discussion today is the problem of “frequencies” — especially frequencies for radio amateurs. Before going into details allow me to make a few general remarks: The constantly progressing development of telecommunications by radio throughout the world, brought about by the extensive political, sociological and economic changes of our life, has for years increased susceptibility to mutual interference of the telecommunication carrier “radio.”

Although the International Telecommunications Convention requires

- an economical use of frequencies and frequency bands,
- a reduction to minimum of the number of frequencies used for a satisfactory service,
- the operation of all radio stations in such a manner as not to cause harmful interference to other radio stations of radio services,

a number of member countries allow their radio services occasionally a rather free interpretation of the internationally accepted rules, thereby involuntarily causing harmful interference to other radio services. This happens quite often to the amateur service, but also to the other services as well.

As all of you know, the ITU is deeply concerned about this universal problem and does

everything in its power to alleviate the situation. Some years ago a panel of experts was set up which came forward with a number of proposals on how the general shortage of frequencies could be lessened somewhat. Time does not permit to go into this matter more deeply here. Our concern is the frequency shortage and usage as far as the amateur service is affected. You all know that the congestion on the amateur bands has been constantly increasing during recent years.

The radio monitoring service of the German Administration of which I am a member is closely following the development in the entire frequency spectrum and in this connection, of course, in the amateur bands too.

Observation Methods

I have brought with me some samples of observation recordings made in Germany. Our method of observation is twofold: firstly, the *subjective* method is done mutually by operators. It is mostly used to identify an emission and assess its quality. The *objective* method is an automatic method which is done by means of apparatus running unattended over specified periods. This automatic method allows us to

This paper was delivered at the 1965 Convention of the International Amateur Radio Club, Geneva. The remarks are of such general interest to radio amateurs everywhere that *QST's* editor believes they ought to be more widely disseminated. Because of reproduction problems, not all of the slides and charts which accompanied the original talk could be presented in this printed version. The original text was in German, and was translated by DL1XJ of the IARU Region I Executive Committee.

* Ministry for Post and Telecommunications, Federal Republic of Germany

a motor over the band of frequencies to be analyzed. The intermediate frequency of 525 kc. is applied to the radio-frequency spectrum analyzer. In this r.f. spectrograph the signal is converted down to 8 kc. and after detection applied to a d.c. recorder. At the start and at the end of such a recording an amplitude calibration is made by means of a field-strength measurement. This semi-automatic method gives us rather good recordings of any chosen part of the spectrum with adequate resolution.

Amateur Bands

Let us now turn our attention to the problem at hand, the occupancy of the high-frequency amateur bands as they present themselves in central Europe:

The "top-band," the 160-meter band, is not really an amateur band anymore; it can only be used by amateurs of certain countries on a non-interference basis to the maritime mobile service with rather severe restrictions on the amateurs. So we leave 160 meters out of our discussion.

The 80-meter band is in Region I (and elsewhere) shared with fixed and mobile radio services (except aeronautical mobile) on an equal right basis. This equal right basis is, however, under the present regulations rather problematic. Whereas frequencies for stations of the fixed and mobile service must be notified to the IFRB (International Frequency Registration Board) here at ITU and eventually are entered in the Master Frequency Record, which gives them a measure of protection against harmful interference, no such procedure exists for the amateur service.¹ In fact, the IFRB receives no official information whatsoever as to the number of amateur stations, their mode of operation, etc., in the various countries, so any criticism levelled by radio amateurs at ITU or IFRB is really ill-founded.

Fig. 1 is a reproduction of part of the International Frequency List, published by the IFRB, showing the entries of fixed and mobile stations which fall into the 80-meter band. We find in this 300-kc.-wide band more than 400 entries in Region I alone, occupying a total of 249.85 kc. That means that theoretically only a spectrum width of 50.15 kc. remains for the amateur service. This remaining band of 50.15 kc. is, of

course, not concentrated in one lump but scattered in parts and bits all over the entire 80-meter band. But this is only the theoretical side of the problem: the practical side is even worse, when we consider the major operating hours of the amateurs.

If we investigate closely the number of the officially-recorded stations we find that 70% actually make use of their assignment. Some 30% of the stations entered in the Master Frequency Record can never or very seldom be heard. Yet the actual frequency usage is heavier. By statistics drawn from observations that my Administration has carried out in the past years in the band between 1600 and 6000 kc., it was found that per-frequency-usage recorded with the IFRB a factor of 1.6 to 2.1 unrecorded usage exists. In other words if we revert back to the 70% active officially recorded stations in the 80-meter band, the actual number of non-amateur stations operating there is somewhere between 175 and 217. This is just the plain number of stations, without taking into account their occupied bandwidth.

Our frequency sweep recordings and the fre-

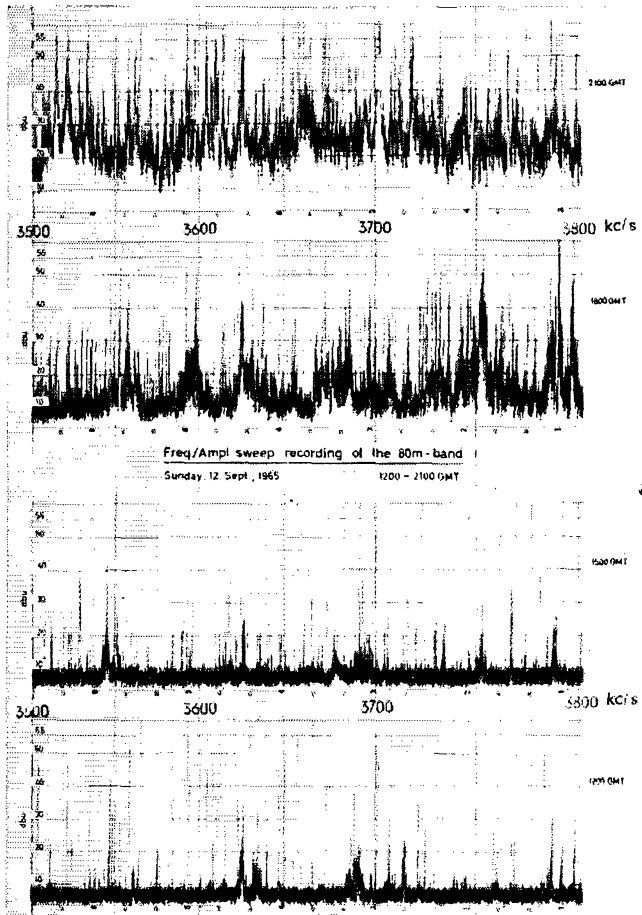


Fig. 3

¹ The author refers here to the practice in the International Frequency Registration Board of assigning a date of registration for the proposed use of each frequency, establishing a priority of assignment. Under this scheme, the user of any specific frequency is supposed to desist if he causes interference to a station which has been previously registered for that frequency. Amateurs, of course, are not required to register with IFRB.

quency *versus* amplitude analyses which were made under constant ionospheric conditions on two different week-days show that the peak frequency usage occurs on a week-day (Friday through Saturday) between 1400 hours GMT and 0400 hours GMT. The week-end (Saturday through Sunday) shows the peak usage between 1800 hours GMT and 0400 hours GMT in the morning.

The recordings show clearly the continuous frequency users on week-days and on Sunday (See Fig. 2). The amateur operation on Saturday sets heavily in at 1800 hours GMT, it has its peak one hour later and diminishes after midnight. In addition to the sweep recordings we have made in three-hour intervals closer analyses of the spectrum which show the frequency usage, and the respective field-strength values (Fig. 2). Since a very slow scanning speed was used for the sake of accuracy no clear indication of the class of emission is given. Our main objective was here to show the density of occupancy and the associated field-strength values. The recordings were taken at a scanning speed of about 3 centimeters per minute, the whole recording taking about 10 minutes. By a judicious choice of the scanning speed also the class of emission and occupied bandwidth can be recorded. The identification of the various types of transmissions, however, from such recordings requires some experience.

Another subject which may be of interest in this connection is the variation of the general noise level. This noise level is during day-time at 10 db. above 1 microvolt per meter and during the night at some 30 db. above 1 microvolt per meter at an analyzing bandwidth of 100 cycles per second.

Forty Meters

We come now to the 40-meter band which is restricted in Region I to 7000-7100 kc. Propagation conditions on 40 meters are often such that it cannot be regarded as the "playground" of the beginners or the ragchewing band for the old timers as is often the case with the 80-meter band. On 40 meters serious amateur work starts. Its 100 kc. are allocated exclusively to the amateur service — at least, the Radio Regulations say so. The practice is entirely different, as all of you know. The sweep recordings which we made on a Friday, a Saturday and on a Sunday show a constantly increasing intrusion by broadcasting stations which cover nearly the whole band with their occupied bandwidth and this during those hours which are by nature the best operating hours for the amateur service, between 1600 and 2300 GMT (Fig. 4).

The most prominent of the intruders squatting constantly in the exclusive amateur band are:

7006 kc.-Serrai/Greece	0500-1300 GMT
	1500-2000 GMT
7019 kc.-Radio Espana In-	
dependiente	1600-2230 GMT
7035 kc.-Radio Peking	1500-2100 GMT
	2130-2230 GMT

7040 kc.-Kozani/Greece	0430-0730 GMT
	1000-1200 GMT
	1500-2100 GMT
7060 kc.-Peking	1600-2400 GMT
7064 kc.-Teheran	0200-0600 GMT
	1200-2030 GMT
7075 kc.-Cairo	0300-0700 GMT
7080 kc.-Peking	1600-2230 GMT
7082 kc.-Cedaya Melatte	
Iran-Albania)	1400-1930 GMT
7085 kc.-Jeddah/Saudia Arabia	1530-2300 GMT
7090 kc.-Tirana/Albania	0400-0700 GMT
	1500-2300 GMT

Most of these stations operate outside the broadcast bands in blatant disregard of the provisions of the ITU's Radio Regulations.

If we assume that the bandwidth of these broadcast stations is 9 kc. (in some cases it is much wider) we arrive at a total occupied bandwidth of 108 kc. Since there is, however, some overlapping of the broadcasting sidebands some small gaps are left free of this 100 kc.-wide-band for its only legal user, the amateur service.

The casual observer might assume that the broadcasting programs are intended only for local or national use. However, the programs of Radio Peking beamed towards Europe and those of Radio Cairo which are directed to the Middle East show clearly that this is not so.

The number of normal non-amateur telegraph stations heard on 40 meters is not high; they do not present a severe problem, though legally they are frequency pirates the same as the broadcasting stations.

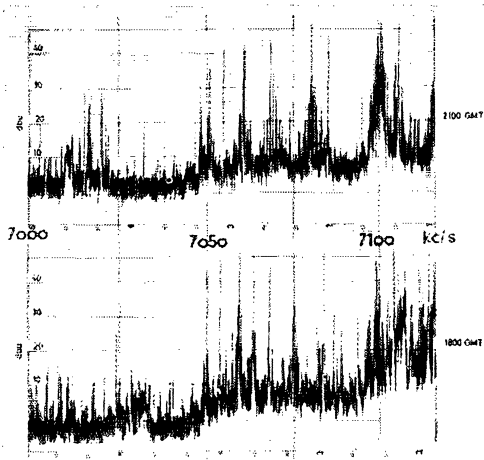
Further sources of severe interference which cannot be passed over lightly are the jamming stations which try with very high power to render certain broadcast emissions unreadable. These jamming stations which work often simultaneously from different widely separated locations spoil wide parts of the spectrum with their garbage modulation, thus making for still worse conditions for the amateur service.

The sweep recordings in Fig. 5 show the general occupancy of the 40-meter band quite clearly. It can be seen that on normal working days amateurs use this band but sparsely. On Saturdays, and still more so on Sundays, a distinct rise in occupancy by the amateur service can be seen.

The frequency-amplitude recordings taken for comparison purposes on a week-day and on a Sunday show a similar distribution. The general noise level during daytime between 0900-1500 GMT was found to be at 0 db. above 1 μ v./m and during the rest of the time at about 12 db. above 1 μ v./m taking into account the scanning bandwidth of 100 c/s used. For a receiver operated under normal conditions this would correspond to a noise level of 10-25 db. above 1 μ v./m.

Higher Bands

As regards the bands 14,000-14,350 kc. and 21,000-21,450 kc. the conditions are much easier to describe. Both bands still enjoy more or less their exclusivity even if in the 14-Mc. band



Freq./Ampl. sweep recording of the 40m - band
Friday 20 Aug 1965 1200 - 2100 GMT

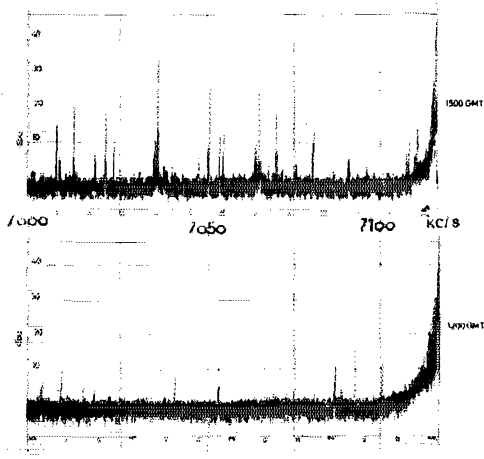
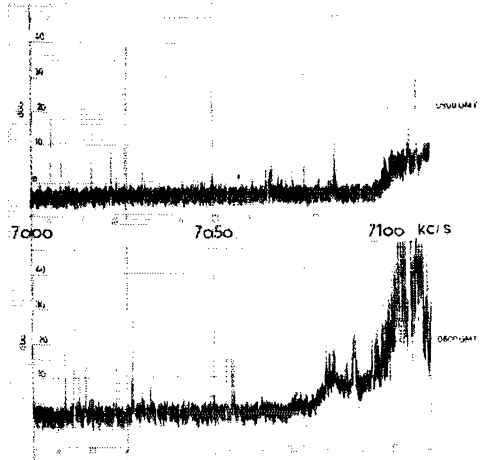


Fig. 4—Sweep recordings made on a Friday indicate the best operating hours for the amateur service is between 1600 and 2300 GMT.



Freq./Ampl. sweep recording of the 40m - band
Friday 20 Aug, 1965 0500 - 0800 GMT

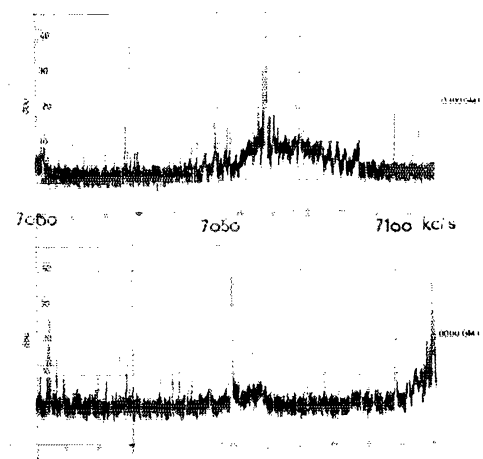


Fig. 5—On working days amateurs in Europe use 7 Mc. sparsely, but on Sundays a distinct rise in occupancy can be seen.

occasional foreign stations show up which work outside their assigned service bands.²

The best defense against intruders from other services into the exclusive amateur bands is to use these bands more fully all over the world. Such a measure is also legally irreproachable. Only by the full use of the allocated bands by its legal users are those administrations or radio services trying to go into frequency bands without any international right prevented from doing so.

As I have pointed out earlier, the general increase in interference due to the universal frequency shortage does not affect only the

² Exclusivity? Maybe. The operation of the ARRL Intruder Watch has turned up large numbers of c.w. and RTTY stations operated by the administrations of other countries, between 14,000 and 14,250 kc. ARRL has filed formal complaints on these intruders, resulting in the removal of a number of them, but the problem remains. — Editor.

amateur bands. I would like you to take account of this fact in all your deliberations.

Finally allow me to say a few private words how in my opinion the further influx of foreign stations into the exclusive bands of the radio amateur could be brought to a halt:

1. The ITU might be induced to recommend to the administrations to carry out a world-wide observation program of various amateur bands by the national monitoring services.
2. Request the ITU to analyze these world-wide observations and, similar to the special monitoring programs initiated by the IFRB, for observation of the aeronautical, maritime mobile and broadcasting bands to request the administrations concerned to remove their radio stations or services from frequency bands which are not allocated to these services according to the Radio Regulations.

(Continued on page 158)



Hints and Kinks

For the Experimenters



RESTORING ETCHED CRYSTALS

WHILE etching crystals with ammonium bifluoride there are some effects which will in many cases cause loss of oscillation. The etching action usually will eliminate the sharp edges, causing rounded corners. Also the edges will etch faster than the center of the crystal, causing "hills" on each side. This will either curtail activity entirely or reduce the output of the crystal. This condition is especially true when moving the crystal frequency any distance and becomes increasingly more important with higher frequency crystals.

To restore activity, obtain a good grade of plate glass, some No. 600 grinding compound and a little water. Make a thin paste on the plate glass and holding the crystal at a slight angle, proceed to grind a small bevel on all eight edges. A good micrometer is required to find the "hills." Take a reading at the edges first, then the center. Carefully mark the "hills" with a pencil and proceed to grind them down, a few strokes at a time. Check frequently with the micrometer until the crystal surface has been ground flat.

Before mounting the crystal in its holder, be sure to wash it thoroughly in soap and water to remove any grinding dust or other foreign material. Wipe the electrodes carefully with a lintless cloth and make sure you handle the crystal by the edges only. Grease from your fingers can ruin all your efforts to restore the crystal.

— Louis A. Gerbert, W8NOH/6

FULL BREAK-IN STATION CONTROL

FIG. 1 illustrates the simple full break-in system used at W8NQC. The ground end of the manual gain control, R_1 , is disconnected and an additional potentiometer, R_2 , wired as shown. R_2 is adjusted to provide additional bias to the gain controlled stages of the receiver to prevent their overloading during key-down conditions. Gain

is returned to normal when the key is up. Since K_1 doesn't handle any r.f. power, it can be any light-duty relay with fast enough action to follow the keying.

— Jim Denby, W8NQC

NEAT COAXIAL SHIELD CONNECTIONS

WHEN coaxial cable is to be used for intercircuit wiring, where coaxial connectors are not employed, a neater-looking job will result by wrapping small-diameter bus wire over the shield braid of the cable as illustrated in Fig. 2. The free end of the bus wire can be used to make the ground connection for the shield braid. A low-wattage soldering iron should be used to secure the bus wire to the braid, care being taken not to melt the polyethylene insulating material. This system works well with all types of coaxial cable and will dress up the appearance of shielded audio cable as well.

— WICER

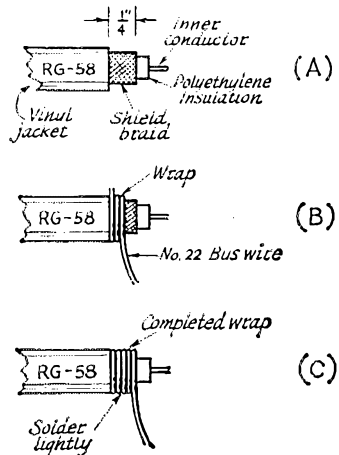
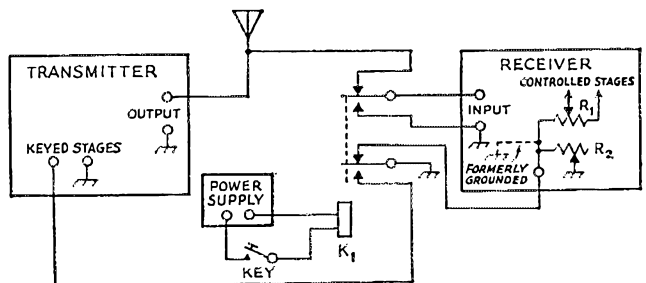


Fig. 2—Steps in forming a neat coaxial shield connection.

Fig. 1—Full break-in station control used at W8NQC.

K_1 —D.p.d.t. keying relay.
 R_1 —Receiver gain control.
 R_2 —15,000 or 25,000-ohm potentiometer.



IMPROVED MOUNTING FOR THE BALANCED-MODULATOR TRANSFORMER

THE balanced-modulator core, Hints and Kinks, *QST*, April, 1964, has given me good and faithful service, as it did W1QWJ. I constructed a storage case similar to the one described in Hints and Kinks, *QST*, April, 1965. However, it was annoying to transfer the core from case to rig every time I wanted to operate the equipment. I decided to mount the core permanently in my gear and, after giving it some thought, came up with the idea of simply threading the legs of the core and attaching the legs to a bracket with nuts. I borrowed a threading die from a former friend but I couldn't find a nut to fit since the thread required ambihelical threads. I finally had to cut my own on a lathe using a special internal reciprocal tool. The finished nut is shown in Fig. 3. Those who attempt to duplicate the nut are warned that removing the nut in the usual way only causes tightening. It must be fully screwed on before it can be screwed off.

— Robert L. Schaffer, W3EWP/K3BWI

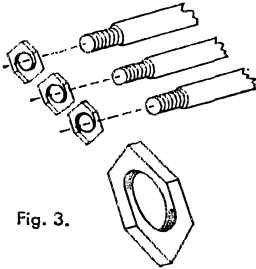


Fig. 3.

FINDING THE VALUE OF AN UNKNOWN INDUCTANCE WITH AN AUDIO OSCILLATOR

IT'S no chore to determine the value of an unknown inductance below 0.5 henry with a grid-dip meter and a known capacitance. Higher values of inductance require the use of a known capacitor so small in value as to make this method of measurement highly inaccurate. The circuit shown in Fig. 4 illustrates one method of measuring inductors of 0.1 henry to 100 henrys with good accuracy. A v.t.v.m. and an audio oscillator are used in place of the grid-dip meter. The v.t.v.m. is switched to a low a.c. scale, the oscillator adjusted for full-scale deflection of the voltmeter and the oscillator frequency varied for a dip in this reading. After noting the frequency at which the dip occurs, the value of the unknown inductance may be found by solving the formula listed below.

Lower and higher values of inductance can also be measured by this method, but C_1 will have to be changed accordingly to produce a resonant frequency within the range of the audio oscillator.

$$L = \frac{1}{4\pi^2 C_1 F^2}$$

where L = Unknown inductance in henrys.

$$\pi = 3.14.$$

C_1 = Capacitance of C_1 in farads.

F = Frequency of dip in cycles.

— Noel B. Sargent, K8QQQ

(If the inductor is to be used in an application where no d.c. passes through the inductor, as in an audio filter, this method of measurement will be satisfactory. Another technique is necessary if the circuit requires direct current to flow through the inductance. See Ellison, "Measuring Inductance of D.C. Loaded Chokes," *QST*, February, 1963. — Editor.)

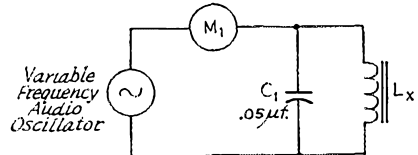


Fig. 4.—Circuit for determining the value of an unknown inductance.

L_x —Unknown inductance.

M_1 —V.t.v.m., low a.c. scale.

CONNECTION WEATHERPROOFING

LIKE many other amateurs, I run RG-8/U coax out through the yard to keep my little antenna farm supplied with r.f. One run of line, which is buried a couple of inches in the ground, goes to a tower supporting my beam. It required a coupling which was made up with standard coaxial fittings. About a year ago, a high s.w.r. problem was observed on this line. The coupling was dug up and found to be thoroughly waterlogged. Green-copper corrosion extended along the braid a couple of feet on each side of the connectors, causing a partial short circuit between the braid and the center conductor. This problem occurred within six months despite a quadruple layer of black vinyl electrical tape tightly wound around the connectors and adjacent coax. Ground moisture had readily seeped through the tape windings by capillary action even though both the adhesive layer and the tape are relatively waterproof.

The connection was repaired, wound with a single spiral winding of vinyl tape, then wrapped with a double layer of 11-inch wide Dow Saran Wrap (obtainable at any supermarket), and covered over with another winding of vinyl tape. I recently had occasion to examine the repaired connection after it had been buried in damp ground for over a year. It was still in perfect condition with no evidence of moisture penetration or corrosion.

This method of protection is recommended for weatherproofing connectors or assemblies that will be used either above or below ground. Saran Wrap will be much more efficient for this use than other plastic films, such as polyethylene or polypropylene. Saran film (polyvinylidene chloride) is by far the best of the common organic dielectric films with respect to having a low rate of moisture vapor transmission per unit thickness.

— Richard G. Rome, WA2OJD

Oscillating Crystals

By H. S. Shaw*

Can you imagine a transmitter that never shifts its wave even a hundredth of a meter? Can you imagine making a schedule for 96.38 meters and knowing that you will be right on that wave and know that the other man will be tuned right to you? And can you imagine getting from the receiving operator a report that during hours of operation the beat note in his phones never changed even a particle? These things are possible with the oscillating crystal.—Technical Editor.

ANYONE who has listened to short-wave transmitters will realize that the "dial acrobatics" needed to follow the beat-note do anything but aid reception.

The necessity of frequency control has been well shown by Dr. A. Hoyt Taylor in his article "The Navy's Work on Short Waves" in the May issue of *QST*. In the same issue there was an article on "Sta-



Dr. W. G. Cady, Wesleyan University, Who Did Some of the Earliest Work With Crystal Oscillators at Radio Frequencies.

tion Efficiency" by S. Kruse in which the advantages of constant frequency are mentioned. Its attainment is far from easy, however, as will be realized when we stop to think that at 2000 kc. (150 meters) a 1/10% frequency variation means a change of 2000 cycles in the beat note at the receiver. Swinging antennas and changes in plate voltage are almost sure to cause such changes. (Anyone doubting that such changes are at all scarce is asked to try copying on a windy night from a station using direct current plate supply.—Tech. Ed.)

Frequency changes are quite different from "fading," which is a variation of the energy received from a distant station. Fading is very little understood and almost entirely beyond our control. Frequency shifts (what we amateurs call "swinging") are understood and can be eliminated. This means, of course, that the frequency of the transmitter, and also of the local oscil-

lations at the receiver, must be kept constant. It is the purpose of this article to indicate a way in which this may be done.

Crystal Resonators

Certain crystals, notably Rochelle Salts and Quartz, have the peculiar property of becoming charged electrically when they are compressed or stretched in certain directions. On the other hand, they change their shape slightly when they are placed in an electrical field. If such a crystal is vibrated mechanically it will produce an alternating voltage. If it is put into an alternating electrical field it will, of course, vibrate. These actions are called "Piezo-Electric Effects".

Piezo-electric crystals have been used experimentally in various ways, such, for example, as for telephone transmitters and receivers and for under-water signalling, but the thing which is of most interest to us here is the fact that quartz crystals may be made to vibrate at radio frequencies.

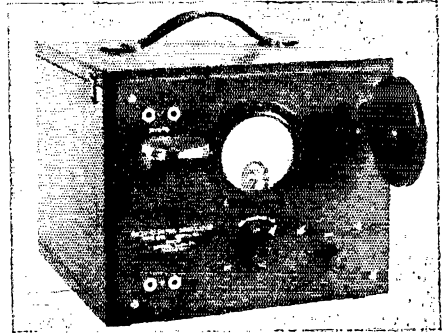


Fig. 1

For an account of early work with quartz crystals, particularly as "resonators" or radio frequency standards, the reader is referred to an article by Dr. W. G. Cady in the April, 1922, issue of the Proceedings of the I. R. E. Later Dr. G. W. Pierce of Harvard University worked on the development of quartz-crystal oscillators, publishing a paper on the subject in the Proceedings of the American Academy of Arts and Sciences, October, 1923. On January 25, 1924, he sent messages from 1XJ, at Harvard, to his house in Cambridge and to a nearby town.

*Treasurer, General Radio Co.

†See Nicolson, Transactions A.I.E.E., XXXVIII, 1467.

In this, the fourth in the series of classic articles from the first 50 years of *QST*, the amateur was introduced to the sensational stability of frequency control by means of quartz crystals.

A Standard Frequency Oscillator

Up to about this time the principal interest in crystal oscillators lay in their use as frequency (wavelength) standards, for which they are almost ideal, because they are so permanent and so little affected by temperature or other changes. Fig. 1 shows a laboratory frequency standard which has been developed by the General Radio Co., using a receiving tube, which gives plenty of output for this purpose. The crystal element is mounted in a holder which may be seen plugged into the panel at the upper left hand side, with a coupling coil at the right. While the word "crystal" has been employed a number of times above, it is generally only a small portion of a crystal which is actually used in an oscillator, this portion usually consisting of a thin slice cut out of the crystal in a plane parallel to the optical axis, and carefully ground and polished. The form used in the laboratory instrument mentioned above is a disc about an inch and a quarter in diameter and a sixteenth of an inch thick. The uncut crystals vary greatly in size, from very small ones to those which weigh

is supplied by the plate circuit. From this it will be seen that the action in a crystal oscillator is similar in principle to an ordinary oscillator except that in the latter the crystal is replaced by a tuned circuit, which determines the frequency. This is where the trouble with the ordinary oscillator comes in, because anything which may change the tuning of this circuit, as, for example, a swinging antenna, will change the frequency. Changes in filament or plate voltage are also likely to change the frequency because of their effect on the impedance of the tube, which is in parallel with the tuned circuit.

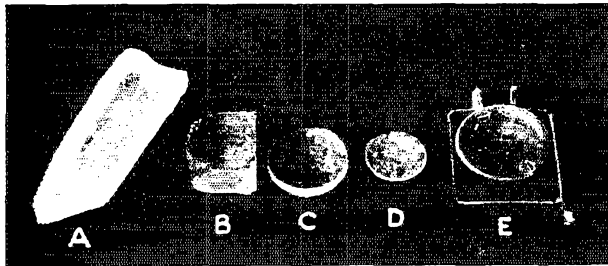


Fig. 3. Stages in the Finishing of a Quartz Crystal. A—Rough Crystal; B—Oscillator Bank; C—Low Frequency Oscillator; D—High Frequency Oscillator; E—Mounted Crystal.

The beauty of a crystal oscillator is that the frequency is determined entirely by the dimensions of the crystal, so that it is possible, (within limits which will be mentioned later), to make all sorts of adjustments to the set and to the antenna,

without having any effect whatever on the frequency. It is a novel and certainly a satisfying experience to operate a set and be able to turn a condenser or two, change the coupling to the antenna, and do various other things with the knowledge that if there are any oscillations at all, they are always of the same frequency, and that nothing is changing except the output or the efficiency.

It has been stated above that adjustments may be made "within certain limits" without changing the frequency, the reason for this statement being that most crystals can be made to oscillate at either of two (or more) frequencies, it being possible to select the desired one by properly proportioning the circuit. Fortunately the frequencies of any particular crystal are usually well separated, as for example 1176 and 121.3 KC. (about 255 and 2475 meters) in one case, so there need be little difficulty on this account.

IXAU's Crystal Transmitter

About the first of April of this year I decided to build a crystal transmitter to see how it would work at high frequencies (short waves) where I knew that constant frequency was particularly important. This transmitter, which is shown in Fig. 4, consists of a wooden framework and shelves, on which various parts may be conveniently mounted in experimental work. In this case it set up with two 5-watt tubes, using a



Fig. 2—A Mounted Crystal

many pounds. It is necessary to use crystal quartz, the fused variety being inactive.

How Crystal Oscillators Work

In a piezo-electric oscillator the crystal is placed in the grid circuit of a tube. The variations in the potential of the grid (which are necessary to sustain oscillations) are produced by the alternating E.M.F. of the crystal. The vibrations of the crystal are maintained by energy which

circuit which was suggested to me by Dr. J. M. Miller and which is shown in schematic form in Fig. 5. Most of the parts are exactly the same as would be used in an ordinary set and therefore do not require any comment. In experimental work it is important to have enough meters and in this case there are four—filament voltmeter, plate voltmeter, plate milliammeter and antenna ammeter. An R.F. choke is placed in series with the grid leak and is apparently quite essential. The crystal is mounted between two parallel brass plates, about an inch and a quarter in diameter, which in this case are adjustable as to spacing, to allow for the use of crystals of different thicknesses. The adjustment of these plates is usually not critical when a crystal is used in a low-power set, as with a receiving tube, it being necessary merely to allow a clearance of a few thousandths of an inch, so that the crystal can vibrate freely. With a 5-watt tube, however, there is usually a troublesome brush discharge, and sometimes a force which tends to make the crystal shoot out from between the electrodes, which makes it necessary to provide means for holding the crystal in position. Most of my experience with crystals and 5-watt tubes has been at frequencies in the neighborhood of 3000 KC. (100 meters), and such crystals seem to work best when there is actually a slight pressure on them.

It will be noticed that in the diagram of Fig. 5 the output circuit of the tube is tuned, and it is the adjustment of this circuit which selects the frequency and determines the power output. Starting at a point above the resonant frequency, if the capacity in the circuit is gradually increased the output increases, *without change of frequency*, until at a point close to resonance the oscillations stop rather abruptly. If the capacity is still further increased it may be possible to start oscillations at the lower frequency of the crystal but, as stated above, the frequencies are apt to be rather widely spaced, in which case it would be necessary to use another coil of considerably larger inductance. When the right adjustment of this output circuit is once found, which is an easy matter, it may be left alone, with the

assurance that whatever else is done the frequency will remain the same if there are any oscillations at all. The only way to change the wavelength is to grind down the crystal. The only other adjustments, aside from filament and plate voltages, etc. are the tuning of the antenna and the coupling, both of which should be made for maximum antenna current. At this point I should like to say that I believe that amateurs (and others as well) should be encouraged to use coupled circuits in their transmitters, thus minimizing the effects of key-clicks and harmonics. The latter are particularly in evidence in the region from 3000 KC. up (100 meters down) which, is infested with harmonics of broadcasting and amateur stations.

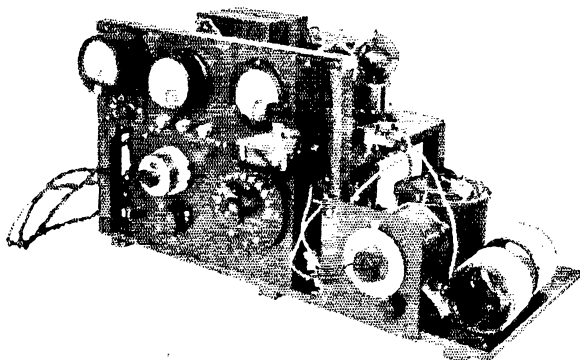


Fig. 4

In the case of most crystals which I have tried, a very appreciable time is required for the oscillations to build up, so that it is necessary to let the crystals oscillate continuously, which means that it is not possible to key the set in the usual way; but I found that in my low-power set it was perfectly satisfactory to place the key in the antenna. One of my crystals, however, required such a small fraction of a second to build up that it was possible to key it in the plate circuit, although I think that this is unusual, most of the crystals having a time lag of perhaps half a second or more.

Transmission Tests

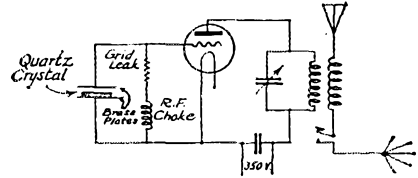
Soon after completing my transmitter I had an opportunity of trying it out under adverse conditions, in some tests which I had arranged with 1XAQ (S. Kruse) near Hartford, Conn., a distance of about 35 miles from my station (1XAU) at Newton Centre, Mass. Conditions for transmission between the vicinity of Boston and many points in southern New England have long been known to be unfavorable, and they proved to be so in this case, for signals from 1XAQ, using two 50-watt tubes on about 6000 KC. (50 meters) were not any too easy to read above a rather severe background of static. Likewise the signals from my crystal transmitter on about 3150 KC. (95 meters), with an output of about 5-watts from the two 5-watt tubes, were very weak at Hartford. Notwithstanding this, and bad fading, tests were carried on for three consecutive nights. On May 20

a 49-word message, to be forwarded to NKF, was handled. This message probably bears the distinction of being the first to be transmitted by crystal oscillator over a distance of more than a few miles, those of Dr. Pierce, referred to above, being quite local in character.

Quoting from a letter from 1XAQ he says: "The receiving conditions have so far quite uniformly been the worst I have ever encountered, even in New England. The only thing that made it at all possible to copy your signals was their absolute steadiness. Given the same signal strength and the same amount of interference it would have been perfectly impossible to copy you, had you been using any other sort of signal."

In order to realize the full advantage of quartz crystal transmission a crystal should be used at the receiver as well as at the transmitter and this may easily be done in cases where it is not necessary for

considered and that is: When and where will crystals be obtainable, and what will they cost? It is impossible at present to give definite answers to these questions, but it is hoped that in the not far distant future



Circuit used at 1XAU for operation with 5-watt tubes
FIG 5

crystals, properly mounted and calibrated, will be available to experimenters at a reasonable price.

Judging only from my very limited experience I believe that the most satisfactory and dependable form of crystal transmitter will be one in which the crystal is used at low power, probably with a receiving tube, the output of which is amplified, as in the usual master-oscillator arrangement. Another promising line of development, however, is the use of the crystal merely as a stabilizer or governor, to control the frequency of an ordinary oscillating circuit, in which case it should be possible to handle more power than could be done with the crystal alone. It is realized that much development work must still be done before a thoroughly satisfactory crystal transmitter is produced.

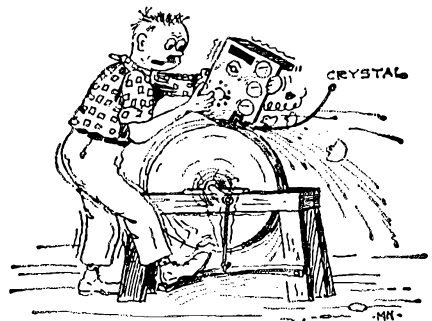
From a technical point of view, this article is, perhaps, premature, but I have

THE AMERICAN RADIO RELAY LEAGUE HARTFORD, CONN. RADIO STATION 11AQ RADIOGRAM	
Received No. 11AU Date May 30, 24 Time 7:34 P.M. Class L.Q. FROM 11AU TO NKF VTA This message sent with quartz crystal oscillator from 11AU to 11AQ direct H. S. Shaw	Sent No. 11AU Date May 30, 24 Time 7:34 P.M. Class L.Q. FROM 11AU TO NKF VTA This message sent with quartz crystal oscillator from 11AU to 11AQ direct H. S. Shaw

the tuning of the receiver to be continuously variable. Take, for example, two amateur stations which work with each other more or less regularly. If one station were supplied with a crystal of say 1500 KC. (200 meters), and the other with one of perhaps 1501 KC., each crystal could be used both for transmitting and as a separate heterodyne for receiving, so that each station would, of course, have a 1000 cycle beat-note with the other, which would certainly be a great advantage. I have often thought how nice it would have been if the "Bowdoin" (WNP) could have been equipped with a set of crystals adjusted to the wave lengths on which it was intended to transmit, so that listeners might have supplied themselves with crystals to beat against these and thus *feel sure that they were correctly tuned*, and that if they did not hear WNP it was for some other reason, thus eliminating one of the big uncertainties of reception.

Problems for Experimental Work

A very practical point remains to be con-



.....to change the wavelength.....grind down the crystal

written it in self-defence to protect myself from the onslaughts of the Technical Editor who has been on my trail for some time for the story.

November

1965

SUNDAY MONDAY TUESDAY WEDNESDAY THURSDAY FRIDAY SATURDAY

32ND SWEEPSTAKES PHONE—C. W.—CLUB RESULTS

COMPILED BY ELLEN WHITE,* WIYYM

"Long schedule or short, the SS is still the best of the contests, the free-wheeling climax to the amateur year. One needn't run up a large score in order to enjoy it. In fact, it's the one contest that is probably more fun for the losers than the winner. There aren't any real losers." — *K8IKO*

THE 32nd ARRL Sweepstakes now enters the history books recording the efforts of well over 2120 participants. We're pleased to be able to bring these results to you a month earlier than our customary May issue. The SS is truly unique. It isn't the usual hit-and-run contest, rather an exercise in patience and persistence in record copy. Analyzing both modes this time reveals two very evident facts. This was the year for phone and for an outstanding effort by west coast contesters.

This year 15 section leaders participating in both modes made the necessary effort, the extra something that lead to topping their section both modes. This elite group includes K2AJA W2VJN W3BES W3GAU K3KMO W4KFC WA5HS

* Assistant Communications Mgr., ARRL

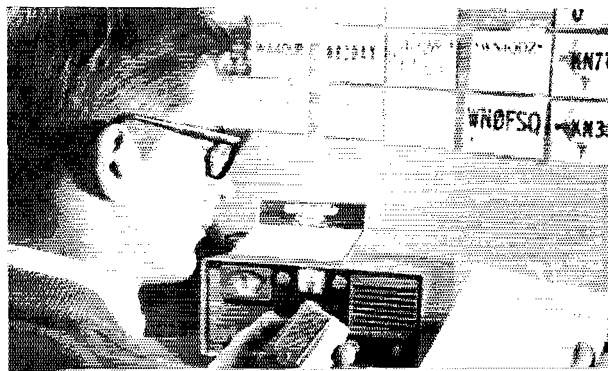
K6OIZ K7RAJ W7TSM W9AQW W9RQM VE4SC VE8BB and KZ5TD.

According to final score, the magic "top ten" includes *C.W. single operator*: **W4KFC 156,859**; W2PVX 141,844; K6OHJ 141,529; WA6GFY 139,590; K8TIG 139,219; W7TDK 135,716; W3BES 129,393; K2FIU/5 127,910; W2VJN 126,263; W9AQW 123,030. *C.W. multioperator*: **K5LZO 139,752**; W5LZG 136,688; K8HJR 91,696; K2ZWI 90,304; WA0DKA 86,748; W3BN 74,184; W2SZ 72,590; K2AA/2 71,363; K5QBN 66,248; W4WE 65,660. *Phone single operator*: **W4KFC 160,650**; W4BVV 158,625; W4MGM 156,399; K5RIH 155,052; K5LZO 151,548; W3GRF 150,959; K2FIU/5 148,500; WB6GVV 146,370; WA0EHS 145,013; W7DK 139,950. *Phone multioperator*: **K5HS 114,525**; K0UKN 108,186; K0PAU 94,044; WA9JC/V 74,960; W2SZ 72,288; WA4RES 71,400; W3BN 65,844; WA0HSX 65,760; K3KPV 64,185; K2AA/2 63,410.

Message Bonus

In a first-time try, a message credit bonus of 25 points before SS multiplier was offered in 1965 (p. 43, November 1965 *QST*). The message, a brief resume of the test results, was tried by a heartening 30% of the SS group. Almost an exact half of the 640 trying earned the credit. A brief analysis of reasons for lack of credit of the SS bonus include: no precedence, inadequate handling data and wrong check (almost always when punctuation wasn't spelled out).

A great phone SS this year reports South Dakota section leader WA0AYP. John found procedures and courtesy consistently laudable with participants willing to dig deep to pass missing information.



On c.w. K2EIU 5 led Northern Texas with 128-K and wound up in "place" on phone with 149-K trailing K5RHZ. Ken is a contest pro and reports that his quad on 20-15 is better than last year's dipoles. Biggest thrill was a last-hour Ontario for a clean-sweep on phone. In the station coax switches permit fast antenna changing and directional control of the 40-meter verticals.

W0DAK's comments regarding the message bonus conveys the spirit. "The message to the SCM for extra credit was a tremendous idea! I haven't handled traffic since the days of AARS, prior to WW-II. This caused me to do some digging on message form, counting messages, where and when the local nets met. I also observed the nets (MSN particularly) and found them to be well run. I got into the net, QSY'd and cleared my message in less than 4 minutes."

Club Scores

The club tabulation surely has a new look to it this year. All those aggregate scores formed by a minimum of three club entries, and supported by the required secretary's letter, appear in the club box. Dozens of clubs do not appear this year because of failure to comply with these rules. The thirty-three listings represent 47 coveted club awards. Interesting sidelights include top-ranking PVRC topping their 1964 mark with 20 fewer entries, better than 60-K points per member! The intra-team clubs for PVRC were captured by W3EIS and W3PZW with PZW's team the winners. Second-spot Frankford raised their points-per-member figure from about 33-K in 1964 to better than 40-K for 1965. This time W3BES took both phone and c.w. club awards. Third-spot Rubber City upped their aggregate by an enthusiastic club turnout, well documented by W8EXI. The Miami Valley group took a big step up from 11th to 4th place. New to the SS club picture and a sure group to watch is the 128 Contest Club of Eastern Massachusetts. First time around they nailed down 5th place with 744-K.



This is a group to watch for win, place or show. The Connecticut Wireless Association prodded by their Communications Chairman WIBGD moved from 8th to 6th. 47 members of the Rochester Amateur Radio Association supported their club efforts with both awards to WB2MFX. Significant place changes in the higher echelons were registered the Germantown Radio Club going from 17th to 9th place under the able guidance of W3LUW, and the West Park Radiops going all the way from 47th to 10th, f.b.!

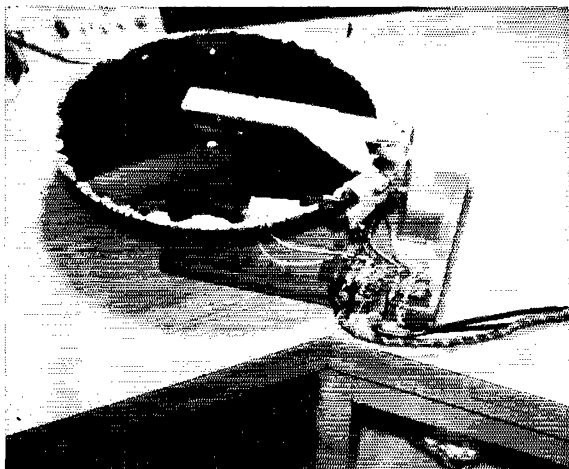
In the last SS report we showed a breakdown of the top ten clubs by mode: pointing up apparent weaknesses in effort. This proved popular and we're happy to repeat the comparison this year in the following list.

C.W.	Position	PHONE
Potomac Valley RC	1	Potomac Valley RC
Frankford RC	2	Frankford RC
128 Contest Club	3	Rubber City Hotshots
Miami Valley	4	Rochester AR Assn.
Rubber City Hotshots	5	Miami Valley
Conn. Wireless Assn.	6	128 Contest Club
South Jersey Radio Assn.	7	Germantown RC
West Park Radiops	8	Conn. Wireless Assn.
Rochester AR Assn.	9	South Jersey Radio Assn.
Germantown RC	10	West Park Radiops

CLUB SCORES

Club	Score	Valid Entries	C. W. Winner	Phone Winner
Potomac Valley Radio Club	3,739,539	62	W4KFC	W4KFC
Frankford Radio Club	2,384,491	56	W3BES	W3BES
Rubber City Hotshots	799,571	56	W8OYI	K8NMI
Miami Valley Amateur Radio Contest Society (Ohio)	774,103	19	K8BFX	W8LFT
128 Contest Club (Mass.)	743,998	19	K1WJD	W1EJ
Connecticut Wireless Assn.	602,805	15	W1ECH	W1BGD
Rochester Amateur Radio Assn.	526,882	47	WB2MFX	WB2MFX
South Jersey Radio Assn.	422,423	29	W2PAU	W2DAJ
Germantown Radio Club (Pa.)	377,241	15	K3KPV1	W3AXZ
West Park Radiops (Ohio)	368,642	18	W8XPT	W8WUO
Suffolk County Radio Club (N. Y.)	342,050	21	K2ZYR	W2GZ
Wisconsin Valley Radio Assn.	293,893	10	W9RQM	W9RQM
Central Michigan Amateur Radio Club	271,737	10	W8VPC	W8RXY
Buckeye Net Contesters Assn. (Ohio)	271,033	12	W8GYT	W8AEB
Tusco Radio Club (Ohio)	263,166	9	W8NBK	W8RFDL
Westchester County Contest Club (N. Y.)	252,351	7	K2AJA	
Lincoln Amateur Radio Club (Nebr.)	241,679	6		K0FA
Louisville's Active Radio Operators (Ky.)	230,525	8	W4BCV	W4NWT
San Fernando Valley Radio Club	193,112	5	W6HSO	
Newark Amateur Radio Assn (Ohio)	188,200	7	W8C8J	W8KZQ
Motor City Radio Club (Mich.)	160,161	13	W8VWY	K8LJD
Brasspounders Amateur Radio Fraternity (Pa.)	159,742	4		
Tennessee Treh Amateur Radio Society	149,379	6		
De La Salle Amateur Radio Club (Ill.)	133,017	8	K9LEO2	W99FGL
Penn Manor High School Amateur Radio Club (Pa.)	115,901	3	W40JS	
Pleasant Valley High School Radio Club (Iowa)	95,114	11		K3STQ
Horseshoe Radio Club (Pa.)	87,171	5		W8BNK/2
Columbia University Amateur Radio Club (N. Y.)	87,743	5	W8VTL	W8LDF
Locked Employees Radio Club	83,380	8		
Goose Bay Amateur Radio Club	63,147	4		
Hurrell Senior High School Radio Club (Pa.)	45,921	7	K3ZLR	
Parma Radio Club (Ohio)	42,995	7		W88US
Pop Bottle Net of S.T.A.R.S.	40,097	8		K3QGY

¹ K3MNI, opr. ² W9CIP, opr.



DIVISION HIGHLIGHTS

Atlantic

"My planned c.w. effort was to be made on 3 bands with 90 watts. It ended up as a one-band effort with 60 watts." — *K3ZMI*. "Murphy struck after just 10 hours with 43-K and 14 hours to go." — *K3MNT/3*. "Wonderful contest." — *K3RZE*. "All North Dakota stations must have moved to Minnesota or Missouri." — *K3IAM*. "Lots of good c.w. operators this year." — *K3WJV*. "Surprisingly enough, we had a 'zero defects' weekend compared to last year which was a complete equipment disaster." — *K3PLJ*. "It wasn't too bad although we were hoping for more sections." — *K3ZYT*. "It didn't take me too long to get away from the old Novice-band 4 X 4 call. Nobody answered me when I used that procedure!" — *W4SEV*. "Time scheme is excellent allowing time for sleep and breaks, plus no Monday-morning hangover." — *K3QDD*. "This birthday business is for the birds! It doesn't vary from previous years and can be picked up from later listening if missed." — *W3EIS*. "I believe a certain number of ten-minute outages should be allowed. For example, in my case, to exterminate a mouse that kept running back and forth in the station, referee the kids, etc." — *W3MFJ*. "I'll be listening from the sidelines in Germany for the next two years, but wait till '68 SS!" — *W3ZUH*. "I really goofed this year. I stayed up all Friday night so I could sleep Saturday and get all the good multipliers on Saturday night. Just one trouble, I had to work all day Saturday!" — *K3YCG*. "Who says school and SS don't go together? I had an E.E. midterm the Monday after and received 100%!" — *W4UXZ*. "Blew the rectifier on Saturday night and 'borrowed' one from the TV receiver. Boy, you should have seen my father when he got home. I blew that rectifier too!" — *W4PCW*. "A tape loop provided continuous CQ SS while eating. The loop provided a pause for replies and QSK permitted easy listening. If no reply was forthcoming, the sequence would repeat. It was somewhat embarrassing to note that the CQ machine could make contacts at as good a rate as the chief op. could." — *K3KMO*. "Hope to give the KFC type something to worry about next year." — *W4BGE*. "Worked a KL7 on 15 only to find out that he wasn't in the SS." — *K3ZLR*.

"Operated from Monroe County, Pa. on phone, away from TV, parents and girls." — *K3MNT/3*. "Where was South Carolina on phone?" — *W3CNS*. "Glad my KW

NOVICE CERTIFICATE WINNERS

WN2SMD	WN4BGL	WN7DNZ
WN2SOP	WN4WUM	WN8PDJ
WN2TEN	WN4YZC	WN8PYF
WN2TFK	WN5NLB	WN8ROJ
WN3CRW	WN6OJF	WN9NXN
WN4AHH	WN7CIP	WN9PQX
WN4AYP	WN7DMA	WN9PQY

One of the tricks used by the master W4KFC, tops over-all both modes, is a CQ SS wheel. Vic says his must be the granddaddy of them all after 17 SS contests. It is constructed from an old aluminum recording disc by making radial cuts with tin snips and bending down the segments that form the spaces, and driven by a 4 r.p.m. clock-type motor with a keying speed of about 20 w.p.m. Vic feels that the mechanical CQ seems to possess a "come hither" quality his own fist lacks. Conclusion: it's amazing how much one can accomplish during a 15-second interval while the wheel is drumming up business!

will be ready for '66!" — *K3WJV*. "My first phone contest, HELP!" — *W4BKP/3*. "Early in the phone contest I caught myself calling CQ DX from W3MSK two or three times and once for some unknown reason even CQ FD. I'll post a sign next time to remind me where I'm operating." — *K1ANY*, *opr. W3GRF*. "I found the going tougher on phone than on c.w. with 150 watts and my antique exciter. I couldn't seem to work the west coast on any band." — *W3EIS*. "Eleven new states for my WAS." — *W4LAI/3*. "Very fine phone contest." — *W4STD*. "Forty was solid QRM. No open spaces, even for foreign broadcasters." — *W3NWF*. "You can't do much with a.m." — *W3ERK*. "I used the IIX-50/2-B and SR-150 to set up for operation on two bands at a time without bandswitching. My phones were wired for independent operation of the two units with a switching arrangement so that either phone could be switched independently to either receiver. This permitted me to monitor a pile-up while tuning another band. I am researching techniques and equipment combinations so that one day, several years from now, I may try to run up a BIG score." — *K3KMO*.



Central Division

"New log forms good. Where was Kansas on c.w.?" — *W9LNQ*. "Congratulations on the rule changes. I feel much better knowing there was less chance of 'hanky panky' in time keeping." — *W9BUD*. "Lots of fun with many new c.w. calls heard." — *W9PNE*. "I like the idea of a six-hour break." — *K9SLK*. "QRM was terrific." — *W4IBT*. "Phew! C.w. is not my cup of tea. Plenty of operators on but most were speed merchants. I'll just have to build up my code speed." — *W9GQY*. "Glad you added the section check-off list to the log sheet." — *K9UQN*. "I tried 2 years to get my last state for WAS. I made it during the c.w. SS." — *W4NSD*. "Conditions very acceptable. The family took off for the weekend and no YLs to bother or distract me. Next year I hope to complete the clean sweep." — *K9UIY*. "The effort I devoted to transcribing my handwritten logs onto punched cards and developing the program to list my log and compute the score had mixed blessings. This elegant scoring technique revealed far more dupes than I expected leaving me shy of my 60-K goal." — *W9RGB*. "My first SS ranks with my first QSO,

the Novice Roundup and my first DX station. I really had a first-class ball. My excitement seems to have affected my Pop because he is getting his Novice soon." — *WA9NFB*.

"Really did enjoy my first good work at a phone SS since 1958. I suggest that the time be deleted from the message and replaced by the name, much more interesting." — *W9WGO*. "Missed a 24-hour WAS by Arkansas and the 'clean sweep' by Arkansas, Quebec and Yukon. On the Monday after the phone SS I set a new school record for the number of classes slept through." — *WA9/DV*. "Worked 75% of my phone contacts on 15 and 40." — *WA9IBT*. "I took this contest to convince an old die-hard a.m. addict like me that s.e.b. is as good as everybody says it is." — *WA9JCT*. "We should have a multiplier for that darned wood stove which smoked us out of the clubhouse more than just once!" — *K0AXU/9*. "The experience of operating a University radio station in an SS deserves a complete *QST* article." — *K9KGA*, *opr. W9YT*. "Nice phone contest, lots of activity and the hour limitation gives us 'ole timers' a chance to get our rest." — *W9VZP*. "Many thanks to WA6SLU for patiently waiting as I stumbled through my first contact. The SS always gets me excited." — *WA9HCZ*.

Dakota Division

"You have hit upon the best SS arrangement yet. Now I know how WA4NGO felt last year, getting a rather respectable c.w. QSO total, but missing 8 sections." — *W0ISJ*. "A relay ordered didn't arrive on time. After flipping dozens of switches during the SS I conclude that this could give a person muscles!" — *WA0KDS*. "I never thought that so many hams could survive on the air at one time." — *WA0HQT*. "I used to think of myself as a sharp operator but I now see I have a long way to go." — *WA0LOB*. "Next year we're going to operate in North Dakota. It borders our own section and we didn't hear a single station on." — *W0YC*. "Wasted ten minutes early in the contest trying to explain the SS to a KL7. But I really was shocked when KL7CGE called me in the wee hours on 80!" — *WA0HYT*.

"I didn't want to embarrass everyone by winning on my first try at the phone SS, so I took it easy. But wait till next year, hi!" — *WA00KW0*. "Very fine phone competition in North Dakota this year. Low power is the only solution to high scores." — *K0GII/0*. "My only complaint is against those stations who sign clear before I QSL their message, leaving me with only one point." — *WA0LY0*.


Delta Division

"I just had to sit back for a while and admire the W4KFC operation. What an operator!" — *WA5HNN*. "Without many stations in the Louisiana section participating, we generated quite a few c.w. pile ups!" — *K5QBN*. "Murphy

There was a real race out in the Santa Clara Valley where (left) W7WJB (now W6BHY) keyed K6OHJ to a winning 141,529 points. He had top competition by W6CUF operating WA6GFY in quite a comeback from his 1951 SS national-high score at W6BJU. Winner took all, including a dinner out on W6CUF!



"THE CLEAN SWEEP"
Worked All 75 Multipliers

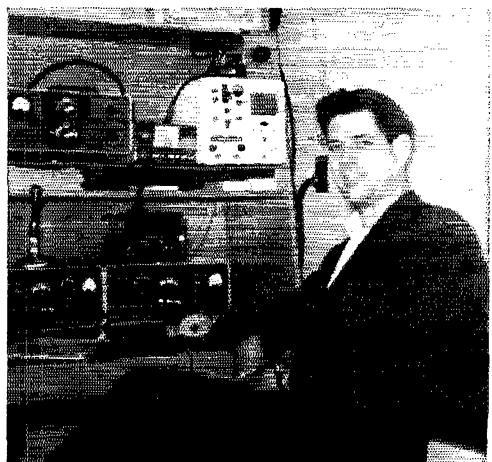
K2EIU/5		WB6NRO
W2PVX1	<div style="border: 1px solid black; padding: 5px; display: inline-block;">Break Out the Broom for the CLEAN SWEEPERS</div>	W7DK
W3AZD		W8CEA
K3LYW		K8KJN
W4BVV		K8TIG1
W4DVT1		W9WGO
W4KFC		WA0EMS
WA5ALB		W0LBS
1 C.W.		

made up for lost time this year. My 150-watt contest final refused to work at the last minute. If that wasn't enough, early in the contest the QRN started building up as a big thunderstorm headed this way. Static crashes rendered 80 and 40 practically useless. All in all it was a rough session and my QSO/hour rate never did get up to past performance." — *W4WZC*.

"How can you explain wave propagation to your Physics teacher the day after the phone SS?" — *WA5HGX*. "We love to talk and I guarantee we got loads of it during the SS." — *K5QBN*.

Great Lakes Division

"You just can't beat break-in for c.w. contest operation." — *WA4TTE*. "My best effort since I started operating the SS. You don't run low on people to contact and best of all you can sleep." — *W8CQN*, *opr. K8TIG*. "The present scheduling is great. I was against it initially and now am 100% for it." — *WA8DND*. "Supercalifragilistic-expilidocious-type contest. The innovations seemed to add to the contest and the overall excitement." — *K8DCP*. "I sure wish more Novices knew about the SS." — *W98PVR*. "My second year at it and I'm rather proud of my score. With 24 hours operation and 3-L on 20 next year. I hope to get the section award." — *WA8MQE*. "A first for me, working K1I6IJ both modes. Along the same line, my first 13 contacts netted me 6 in Arizona!" — *W8APC*. "Bonus points is a very good idea for getting operators to practice good message form." — *W8CHT*. "Too many hams don't know what section they're in and what 'BK' means. Hope to work many more SS contests, fun fun fun!" — *W98QWV*.



"Had just QSL'd my number 60 on phone when I looked over and saw my logger asleep." — *WA4WWT*. "My first and last phone SS. I know of no faster way to become an old man." — *K8MFO*, *opr. K8KJN*. "Lost some phone points due to activity from K9LEO." — *W48LEO*. "Dog-gone that Kansas." — *W8LXU*. "My first contest and most fun since my first out-of-state contact." — *W48OFM*. "Could use a much better antenna and a linear. First time I've worked old reliable KH6LJ on sideband." — *W8APC*.

Hudson Division

"The SS is the only contest that my mother brings meals to me down to the shack." — *WB2JTV*. "My folks really showed interest in this c.w. contest. All weekend they kept asking me when it would be over!" — *WB2HYZ*. "All c.w. contacts were made using transistor QRP, input 190 M.W. $\pm 30\%$ and all on 80." — *W2UUV*. "80 held up fine right down to the finish." — *K2UBG*. "New 40-meter beam at 90 ft. and 20-meter beam at 80 ft. helped a good deal. I prefer last year's 24-hour time rule." — *W2VJN*. "New log sheets are f.b. and 24 hours of 30 is perfect." — *W2NNL*. "Worked Hawaii three times in a row." — *W2PRF*. "Biggest thrill was my second contact. VE8BB." — *WB2LDX*. "Looks like lots of transceivers being used, judging by the instant mobility of many stations. Cuts down the number of hand swishers too." — *W2NEP*.

"Had a lot of fun running lower power on a single band in my first phone SS." — *WA2TIF*. "QTH here is in the middle of Manhattan, four blocks from the Empire State Building with antennas atop a 16-story building. A very high noise level." — *W2LEJ*. "My first phone entry and I was amazed at the spare time between phone contacts, even at high rates. Unfortunately after six hours my voice gave out and I chased sections for the balance. I'll stick to c.w. in the future where the main threat seems to be a sore elbow, hi!" — *W2VJN*. "Suggest that stations worked with the same birthday count more, say ten, points." — *K4HAY*, *opr. WB2RWB*. "Lots of action on all hands but would not get full operating time due to visitors. Now how do they know it is SS weekend? I've a plan for next year." — *W2PEV*.

Midwest Division

"Most enjoyable c.w. contest so far, hope to operate more next year." — *W40JSD*. "Was disappointed to work only one station in my section. Where were all the other Kansas c.w. operators?" — *W40EMQ*. "After being out of ham radio for almost two years the SS convinced me not to sell my gear. I've put up a 4-L 20-meter beam and am now very active. I'll be out in force in 1966." — *K0BHM*, *opr. W0ERH*. "Would like mention made in the rules regarding illegal use of two or more rigs simultaneously."



Michigan is a tough section to top, but W8CQN piloting K8TIG led both the section and division with 730 in all sections. John's winning c.w. performance bettered his 1964 effort by 40-K!

— *W40BYT*, *opr. W0ZLN*. (Ed. see p. 42, Nov. 1965 *QST*). "Good c.w. conditions, but where were the VEs?" — *K0QIX/0*. "Sounded like all the hams in the U.S.A. were on the air." — *K0YIZ*.

"My first phone contest and couldn't have hoped for anything better." — *W40KRL*. "In general, the phone contest showed some of the best operating procedures and courtesy I've seen in a long time. The high point was when



K6NCG took the time to hunt me up and tell me where there was a Wyoming station to finish off my clean sweep." — *W40EMS*. "My first SS and pretty exciting. How about considering no more than two consecutive QSOs on the same frequency. Instead of the world beating a path to one man's frequency, stations would roll on and off that frequency." — *W0UPH*.

New England Division

"Winning isn't everything, but it sure beats coming in second." — *W1WPO*. "Does Vermont really exist?" — *W1A1PY*. "My number 1 was W4KFC's number 519. Sort of takes the challenge out of it, doesn't it?" — *K1WYN*. "May not have picked up many contacts, but sure picked up my code speed." — *K1VTJ*. "I'll be back next year with a much better rig, I hope, and a General-Class ticket." — *W1NDJG*. "Used the xyl's hot pad under the bug to keep my fingers limber, it's cold in that basement. I sat there wrapped in a blanket with a stocking cap on to keep warm!" — *W1CRX*. "The amateur is balanced. Had a dress rehearsal for play being put on by community players starting at 1:30 and ending at 10:00 p.m. Sunday. Guess I qualify as a complete ham. The play? 'Little Mary Sunshine' set in Colorado and the Dakotas. Note I didn't work either of the Dakota sections, hi!" — *W1DYE*. "After the xyl and I worked up SS statistics, several things became obvious: 1) men born in March are likely to be phone men; 2) those born in November likely to be c.w. operators; 3) plenty of people are horn every month; 4) we're nuts to waste time on this!" — *W1ECH*.

"W. Mass. again proved hard on phone. Big thrill to work W4PTR with date Feb. 29." — *K1THQ*. "After this I must confess that sideband can do it better and faster than the old standby c.w." — *W1ILV*. "Wonder what the odds are against working two guys with the same birthday (mine) consecutively?" — *K1ZND*. "Once again K1THQ and I confused our quota of operators." — *K1THP*. "Never heard so many great operators on one frequency in all my life." — *W1A1PY*. "Antenna blew down 20 minutes before the phone test started. I looked like a monkey for 15 minutes, 50 feet up in an oak tree re-stringing the 75-meter doublet. Real wild!" — *W1CRX*. "How I used to chuckle as I read the soapbox comments of past SS results, when fellow hams would say the rig blew up. I never thought it would happen to me. I'll never laugh again, however. One hour before the start of the contest I turned on the big rig and it went up in smoke. I was stunned! I got the mobile rig out of the car and worked a few on 40." — *W7UXP/L*.

K3KMO topped both modes in W. Pa. Al is currently researching contest techniques and equipments combinations for a really big score several years from now.

Northwestern Division

"The prevalent poor transmitting conditions which seem to plague us at these latitudes at this time of year did not fail to materialize."—*KL7PI*. "Located on Shemya Island in the Aleutians and the westernmost station in America didn't help matters any. High winds in the winter prevented us putting up anything bigger than a dipole or longwire."—*KL7FMM*. "The added hours made the SS more enjoyable over last year."—*W7HAH*. "Real fine late Sunday evening 20-meter opening."—*K7QCO*. "My best shot at a clean sweep but no South Dakota. Sure liked the 30-hour period permitting some sleep."—*W7TDK*. "Contest was the usual utter bedlam and one of the greatest."—*K7BPR*. "My biggest surprise was getting an answer to my CQ SS on 80 c.w. from *KL7AIZ!*"—*W7NCIP*. "Poor signals were the exception and many new operators take to the SS like ducks to water."—*W7OEB*. "How come I get a VES on phone when the score is so low it doesn't matter, but couldn't get one on c.w.?"—*K7VPE*. "Next year I'm going to add three things: a beam, a keyer and a plane ticket for the xyl."—*W7WMY*. "My new recently erected 'unbreakable' wire antenna came unraveled Saturday night in the middle of the c.w. weekend. Spent Sunday a.m. festooning it back into the air whilst reflecting on the unpermanence of things ethereal."—*W7RGL*.

"Our first phone SS and we were hampered by scores of JA's ignoring our CQ SS calls."—*KL7FMM*. "Four times the phone score I had last time."—*K7PGL*. "The idea of the chance for a six-hour break was perfect. If the contest would have lasted just ten more minutes, however, my voice never would have made it. Plans for 1966 SS include a 40-meter beam."—*W7WLL*. "First time I've operated under the club call and I apologize to all I answered as *W7BSW*."—*W7BSW*. *opr. W7DK*. "I had a great time until I lost my voice."—*K7YDZ*.

Pacific Division

"Great fun. Received a new W6 call three days before the c.w. SS and had to put up a huge sign saying 'your own call is now W6CNA.'"—*W6CNA* (*ex-K4GWO*). "I'll be glad to QSL anyone needing Nye County, Nevada."—*W7BKK*. "My xyl sure likes the idea of separate c.w. and phone weekends."—*W6BIP*. "My fourth SS and still haven't QSO'd my own section, *SJVI!*"—*WA6TZN*. "Rats, my transmitter blew up three hours after I started and I stood my date up for this?"—*WA6VML*. "This was the most enjoyable c.w. SS yet. W6CUF (*opr. by WA6GFY*) and I had a dinner riding on the outcome."—*W7WJB*. *opr. K6OHJ*. "The 24 out of 30 provision of the rules was a welcome change and enough to get me back into serious SS competition. I came out owing *W7WJB* a steak dinner!"—*W6CUF*. *opr. WA6GFY*. "Hope to be on from my Montana home station *K7CTI* in 1966."—*W6BZZ*. "Twelve E. Fla., zero W. Fla."—*K6LY*.

"Excellent conditions but not much 40-meter phone activity."—*WA6IVN*. "As I prepared to call *K1RQE* in Maine he asked where is Sac. V.? I quickly answered his query, hi!"—*WA6JDT*. "On the Thursday before the phone test I had my four wisdom teeth extracted."—*W6MZZX*. "Conditions seemed improved over recent years."—*WA6AUD*. "Sure have trouble getting my section across on phone. San Joaquin Valley just doesn't sound like it looks."—*W6TZN*. "After a few frustrating hours I started work on my new sideband exciter."—*WB6NCJ*.

Roanoke Division

"Elated to have *KH6FIF* call me for that rare section but what a let down when I finally heard *KL7AIZ* about a 339 and he couldn't pull me through."—*W4OMW*. "Anyone who thinks c.w. is a dying art should try the SS."—*K4QWQ*. "Pleased to give S. C. to a few of the gang."—*WA4TLB*. "Change in hours produces a slower start for us East-coasters with the poorest first hour in any SS in the past 13 years. Would like to see the RST restored and the birth-date item dropped."—*W4KFC*. "Don't see



how I missed those easy c.w. sections."—*W4PTR*. "Contest period just right now, don't change a thing for 1966."—*K4MXF*. "My first SS and I had a ball. Most of the fellows had fine operating procedures so it wasn't too hard for a newcomer to catch on. Thanks!"—*K8MBH*.

"I worked for 15 hours putting up a full-sized 20 meter beam for the phone contest and I think it was well worth the effort."—*K4WJT*. "Biggest thrill was working *KL7CGE* on 75 phone. W. Mass. last section worked, about 90 minutes before I ran out of time."—*W4KFC*.

Rocky Mountain Division

"Rules much improved over last year. My first c.w. SS in New Mexico after several in Minnesota. Surprised how well my 110-ft. inverted vee worked on all bands. Trouble working WI's but plenty of W6's."—*W0JPH/5*. "The Monday following the SS I was NCS of the Twelfth Regional Net. To my utter dismay, I discovered that I was starting the net with CQ SS, hi!"—*WA6DUH*. "Thought I had it made when I got *KP4 KL7 KH6 KZ5 SC* and W. Fla. right at the start, but New England tripped me up. Although I complained bitterly when the contest was clipped to one weekend, I think I was wrong and it did improve things this way. Thanks for an f.b. job for us all."—*W7POU*. "I exceeded W6ISQ's 'AA' requirements. Will the award be automatic?"—*W7TSM* (Ed., yes Nick, QRX).

Southeastern Division

"How does *W4KFC* do it?"—*WA4KXC*. "I'll do better next year, the only possible direction is up."—*WA4VUG*. "Man, talk about competition! *W4JTA* apparently took E. Fla. and only lives 6-8 blocks from me."—*W4YDD*. "Seems like in all of these years I would find some other person born on January 10!"—*W4HOS*. "Last contest without padded headphones and full break-in."—*WA4QHQ*.

"A great number of fine courteous phone operators."—*W4USM*. "The S-Line operated very efficiently, the operator somewhat less so!"—*W4SMK*. "It sure was a thrill when *VE6RR* gave me section 75, in under 14 hours!"—*W4FQX*. "Look for *WA4* Never Gets Out under a new call."—*W4ETO/WA4NGO*.

Southwestern Division

"Just when I get all situated and used to propagation from one place, I have to leave. Next year it will be N. C."—*W0YFT/7*. "A lot of fine operators and a lot of lids too, like the guy who kept insisting his check was 67."—*WA7EBR*. "Use of a KW keeps 'em calling but it sure hurts to have to pass up that low-power multiplier."—*K9ELT*. *opr. W6RW*. "Biggest thrill was having *W4KFC* call me on 40."—*WB6HSO*. "Always nice to work old friends in the SS."—*WA6VTL*. "Lost *WA8HXR* from rare Antelope County, Nebr. when *WA8HXR* from rare Van Wert County Ohio called me on top of him!"—*WA6KHK*. "Your idea of reporting SS scores via radio for bonus points was a good one. Those traffic fellows are terrific operators and I'm glad I don't have to compete against them in a contest."—*W6RCV*. "*W4SKI/5* needs a new receiver."—*W6MEQ*. "By my calculations, more hams have birthdays in October than any other month."—*WB6KVA*. "Finished my WAS."—*WB6NRK*. "En-

joyed my first SS since before WW II." — *W6QFU*. "Lots of fun operating from Santa Barbara though hard to get that section across. The master *W4KFC* has real ears, got him two hours before anyone else would come back to me on 80 and he says I was 5791!" — *W3TMMZ/6*.

"Never thought I worked all sections until I checked my logs." — *W6BNRO*. "Finally worked Delaware." — *W6BNRK*. "Contest recap, my wife was out of town, my two children (2 and a half and six months) were not." — *W6ELX*.

West Gulf Division

"Excellent 20-meter conditions this time." — *K5OCX*. "Message credit belongs in the FD but not in the SS. Enjoyed the contest, best way yet to test a new QTH." — *K6IQA/5*. "First c.w. SS in about ten years and it was a real pleasure to hear such good operating techniques." — *W5PXN*. "Good to see so much 21 Mc. activity." — *K5ABV*, *opr. K5HRR*. "A really fantastic contest this time, please retain the time-out rule." — *W45HZY*. "Conditions were good for us on the higher frequencies, but 40 and 80 proved to be the real test in grinding out steady contacts. Next year we will beat *K5LZO* — grrr." — *W5JZG*. "Due to the overestimation of our station and the underestimation of Murphy . . . wait till next year." — *W45HQY*.

"All sections, broke 500 contacts and still only second best on phone!" — *W4SALB*. "Five years since I tried the phone SS and I like the new rules and operating time much better." — *K5BYM*.

Canadian Division

"Another 700 contacts and 47 sections and I might have won!" — *V6DGB*. "Plenty of c.w. activity but not too many VE3s." — *V6SCBG*. "My first SS and a very fine contest." — *V67BQB*. "Terrific QRM and practically impossible to copy the weaker East Coast stations." — *V67JO*. "Once again I favored 21 Mcs. to escape QRM." — *V68BB*.

"During the phone test the quad fell down in the worst sleet storm we have had in years." — *V6SDAM*. "I like the single week-end contest but it sure interferes with my moose hunting." — *V6SDQL*. "Highlight of the phone weekend was giving *W4BVV* his last section." — *V68BB*.

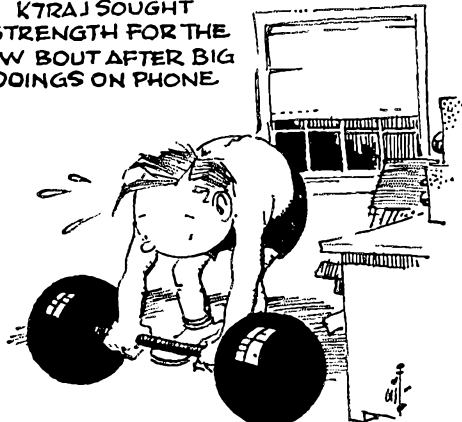
PHONE SCORES

Thirty-second Sweepstakes Contest

Scores are grouped by Divisions and Sections. . . . The operator of the station first-listed in each Section is award winner for that Section unless otherwise indicated. . . . Likewise the "power factor" used in computing points in each score is indicated by the letter A or B. . . . A indi-

icates power up to and including 150 watts (multiplier of 1), 1.25 c.w., 1.5 phones), B over 150 watts (multiplier of 1). . . . The total operating time to the nearest hour, when given for each station, is the last figure following the score. . . . Example of listings: *W3GAU* 30,723-209-49-A-6 or final score 30,723, number of stations 209, number of multipliers 49, power factor of 1.5, total operating time 6 hours. . . . An asterisk denotes Novice certificate winners. A double asterisk denotes Technician certificate winners. Multi-operator stations are grouped in order of score following single-operator station listings in each section tabulation.

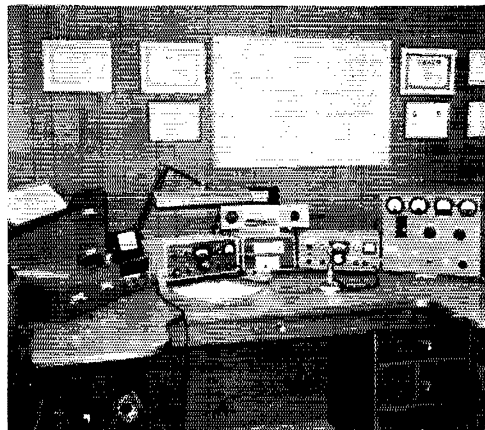
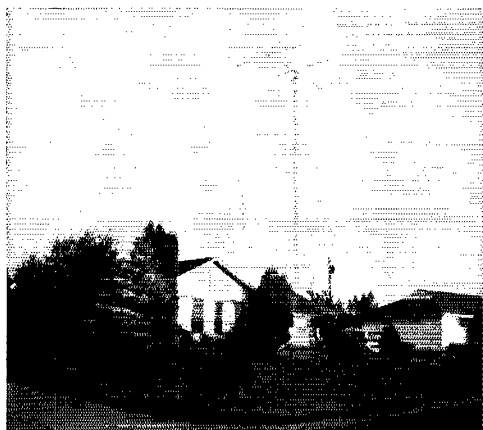
K7RAJ SOUGHT STRENGTH FOR THE CW BOUT AFTER BIG DOINGS ON PHONE



ATLANTIC DIVISION

Delaware		W3AUN	17,550-150-39-A-14
<i>W3GAU</i>	30,723-209-49-A-6	<i>K3ZUQ</i>	16,269-164-31-A-19
<i>W3ADM</i>	6099-92-22-A-8	<i>W3CGB</i>	15,444-201-39-R-12
<i>W3IYE</i>	4860-81-30-B-8	<i>W3KDF</i>	13,663-111-31-A-11
<i>W3HC</i>	2185-49-23-B-8	<i>K3QGY</i>	12,276-158-24-A-15
Eastern Pennsylvania		<i>W3BYX</i>	10,998-94-39-A-12
<i>W3BES</i>	135,890-624-73-A-24	<i>K3GNI</i>	10,353-90-34-A-13
<i>K3MNT/3</i>	108,153-591-61-A-24	<i>K3WJV</i>	9810-109-30-A-9
<i>W3HHK</i>	88,389-425-69-A-18	<i>K3JLI</i>	7134-83-28-A-11
<i>W3GHM</i>	83,235-455-62-A-21	<i>K3YVG</i>	6475-73-25-A-5
<i>W3CCOJ</i>	71,100-400-60-A-22	<i>W3AYV</i>	5190-74-20-A-5
<i>W3WTD</i>	46,016-360-64-B-15	<i>K3LBM</i>	5184-72-21-A-7
<i>W3KFP</i>	39,150-218-60-A-8	<i>K3FSV</i>	3780-60-21-A-10
<i>W3ISE</i>	39,074-217-57-A-17	<i>W3CGS</i>	3591-63-19-A-10
<i>W3AXZ</i>	38,829-301-43-A-20	<i>W3EQA</i>	3564-54-22-A-5
<i>W3QMZ</i>	38,430-315-61-B-22	<i>K3ZOL</i>	3441-56-31-B-4
<i>W3NOH</i>	38,765-215-57-A-10	<i>K3TYL</i>	3348-62-18-A-4
<i>K3TUP</i>	35,280-210-56-A-16	<i>W3CJI</i>	3120-65-16-A-7
<i>W3CNS</i>	34,209-183-63-A-16	<i>K3NOX</i>	2875-63-23-B-4
<i>K3BNS</i>	30,975-250-59-B-17	<i>W3PTK</i>	2064-43-24-R-11
<i>W3ACEJ</i>	30,294-198-51-A-21	<i>K3JLI</i>	1890-45-21-B-6
<i>K3DVS/3</i>	25,620-157-54-A-10	<i>W3LUW</i>	1260-60-7-A-10
<i>K3JGJ</i>	25,434-157-54-A-22	<i>W3BKP/3</i>	1188-67-9-B-19
<i>K3PSW</i>	19,247-167-39-A-17	<i>K3ZDM</i>	885-59-5-A-10
		<i>W3ADNJ</i>	798-40-7-A-10
		<i>K3RFB</i>	783-29-9-A-7
		<i>W3ABZ</i>	549-61-3-A-8
		<i>W3AAN</i>	378-42-3-A-7

indicative of what can be done with interest and ability is the superb Oregon performance of *W7TDK*, President of the Willamette Valley DX Club. Bob wound up with 917 in 74 for a final score just under 136-K. The antenna is a Telrex tri-bander on a 70-ft. steel tower with inverted vees for 80 and 40 and an additional ground-plane for 40. The transmitter line up is an S-3 line driving a home-brew 4-1000A grounded grid linear.



DIVISION LEADERS

C. W.
Single Operator Multioperator

W3BES K2ZWI
W9AQW W9HHX
W9AIH WA0DKA
WA5IHS K5QBN
K8TIG K8ILR
W2PVX W2SZ
W0TDR W0ZLN
W1KMY W1MX
W7TDK K6TAIZ
K6OHH K6LY
W4KFC W4WE
K7RAJ WA0KLP
K4BAI WA4OKV
W6RW WA6VSI
K2EUU/5 K5LZO
VE3BIS VE6RR

Atlantic
Central
Dakota
Delta
Gr. Lakes
Hudson
Midwest
New Eng.
Northwestern
Pacific
Roanoke
Rocky Mt.
Southeastern
Southwestern
West Gulf
Canadian

Phone
Single Operator Multioperator

W3GRF W3BN
W9WGG WA9JC
K6GLI/0 K0PAU
WA5KIX W5XM
K8DOC WA8GUF
W2RLM W2SZ
WA0EMIS K0UKN
W2NSD/1 W1JYH
W7DK WA7CGR/7
K6J6DA
K6NCG WA4YYF
W4KFC K0GAS
K7RAJ WA4HRES
W4MCM WA86OFX
K5RHZ K5IIS
VE3FUX VO2HA

Northern New Jersey

W2VJN 54,122-258-71-A-10
W2DMJ 48,686-251-62-A-10
W2LQJ 35,805-217-55-A-16
W244RWB 25,440-237-60-A-16
W2PEV 27,450-237-61-B-16
K2ZRS 20,196-153-44-A-15
W2BPRF 17,351-136-43-A-20
W2BOHK 12,816-136-32-A-17
W2ZUDT 12,258-113-36-A-10
W092V 10,962-131-28-A-12
W2BHVH 7,569-892-8-A-15
K2KFF 5,292-63-28-A-6
W2BFUU 3,315-65-17-A-7
W2AGM 3,300-55-30-B-6
W2QOGB 3,078-54-19-A-8
W2LYO 3,060-60-17-A-6
W2BKQC 2,875-59-25-R-5
W2B2IG 2,352-49-16-A-5
W2BCZZ 1,050-50-7-A-10
W2B2YN 578-21-8-A-2
W2BCX 552-23-8-A-3
W2HCH 293-75-6-A-1
W2B2BK 293-33-3-A-10
W2B2NH 126-21-2-A-11
W2BLDX 30-20-1-A-2
K2QOJ (4 oprs.) 22,995-260-15-B-24

MIDWEST DIVISION

Iowa

W0LBS 96,525-440-75-A-19
WA0LEW 81,686-386-71-A-21
W0EQN 71,795-301-69-R-18
W0EJN 27,022-235-61-B-18
W0PFWN 21,150-143-50-A-13
WA0KRL 18,696-164-57-B-17
WA0HQJ 7,875-50-30-A-16
WA0TFF 5,873-69-29-A-9
WA0LAA 4,329-56-26-A-4
WA0KWH 4,249-75-21-R-8
K0VEJ 1,710-30-19-A-2
WA0JSD 1,485-50-10-A-7
W0SON 1,302-31-14-A-3
W0TYK (W0TYK, K0YVU) 33,400-120-60-B-10
W0DSP (4 oprs.) 23,571-127-54-A-10
WA0JEK (WA0S, IJW, JPK) 2,739-43-22-A-24
WA0HXV (W0DSP) 2,343-36-22-A-11
WA0BJN 35,295-181-65-A-11
W0LXA 35,100-225-52-A-23
WA0DOZ 3,970-37-20-A-4
WA0LWC 1,239-30-14-A-8

Kansas

WA0BJN 35,295-181-65-A-11
W0LXA 35,100-225-52-A-23
WA0DOZ 3,970-37-20-A-4
WA0LWC 1,239-30-14-A-8

Missouri

WA0EMS 145,013-636-75-A-24
WA0AJV 56,232-285-66-A-20
K0IQG 48,453-248-62-A-4
K0DRE 31,736-189-57-A-19
WA0APC 23,328-219-01-B-20
WA0KPY 19,734-149-46-A-23
W0PEM 14,124-107-14-A-12
K0LZG 12,258-114-36-A-5
K0LJG 8,708-79-37-A-10
W0PDM 8,708-68-13-A-9
WA0JNF 6,840-87-32-A-10
W0LLE 5,198-53-33-A-10
W0BUL 4,929-61-36-A-4
K0PUZ 3,968-18-11-B-1
K0TJ 8-2-B-1
WA0LVC (WA0S, ELM, LCV) 62,278-333-63-A-2

Nebraska

W0GYM 56,090-396-71-B-18
K0LFA 15,124-384-58-B-2
W0BHG 16,689-56-A-17
K0VVO 27,189-173-53-A-14
W0JZY 12,341-110-39-A-10
WA0KHE 3,270-42-20-A-5
W0UPH 1,827-45-21-B-7
K0UKN (5 oprs.) 10,168-749-73-B-24
WA0HSX (WA0S, HX, MOB) 65,760-357-64-A-24

NEW ENGLAND DIVISION

Connecticut

WIRGD⁹ 89,424-609-72-R-22
K1THQ 61,803-387-54-A-21
W1ECH 56,283-247-73-A-17
K1JL 39,123-204-97-B-11
W1AIBL 28,835-205-47-A-21
W1AW¹⁰ 24,305-281-51-R-10
W1ILY 26,508-291-47-R-14
K1ZND 19,673-140-43-A-10
K1PKQ 15,620-125-39-A-8
W1E 15,610-140-07-A-15
W1ALPY 12,545-119-35-B-3
W1AAYR 7,104-111-32-R-5
K1RVU 5,772-75-26-A-13
K1HTV 5,441-60-31-A-6
K1VTM 1,955-43-23-B-3
K1AFC⁹ 1,681-40-21-B-4
K1V 1,519-40-18-A-5
W1AICC 1,305-32-15-A-8
K1PQA 756-21-12-A-6
W1BD⁹ 616-16-11-B-3
W1ACYT 84-7-4-A-3

WARMCR 50,049-253-67-A-18
K8ORL 46,040-275-57-A-23
WARKZQ 44,321-208-67-A-19
WRWUO 38,888-200-81-A-20
W8AUX 34,000-250-68-B-20
W8HTR 33,696-209-54-A-16
W8CHX 32,776-241-68-B-22
W8VQI 31,720-245-65-B-20
WA0FDL 30,356-172-59-A-17
W8OYI 29,811-256-57-B-15
W8YCP 27,930-200-70-B-12
W8SFR 27,600-230-00-B-17
W8KPN 27,566-199-47-A-15
W8CWU 27,495-212-65-B-19
K8ZSZ 24,750-150-55-A-13
W8LHV 24,644-202-61-P-17
W8LWZ 23,684-191-62-B-18
K8VYK 23,028-191-38-A-14
W8OFM 22,400-177-64-B-24
W8JPN 20,938-183-58-B-19
K8VGL 20,907-139-46-A-14
W8IDM 20,580-140-49-A-15
W8EOG/8 18,738-161-38-A-16
W8QAO 18,350-118-52-A-22
W8HWY 18,165-174-35-A-22
W8SOL 17,370-193-45-B-11
W8MLO 17,015-87-57-A-9
W8HXR 15,933-113-47-A-14
W8VDA/8 15,383-147-35-A-7
W8AJW 15,360-116-08-A-12
W8NQR 15,120-140-36-A-20
K8BSM 14,560-130-56-B-9
W8QES 14,208-148-32-A-13
W8RNI 12,600-100-42-A-11
K8YFR 12,488-134-46-B-8
W8PNQ 11,718-139-31-A-7
W8RED 11,459-95-41-A-8
W8OAC 11,400-150-38-B-8

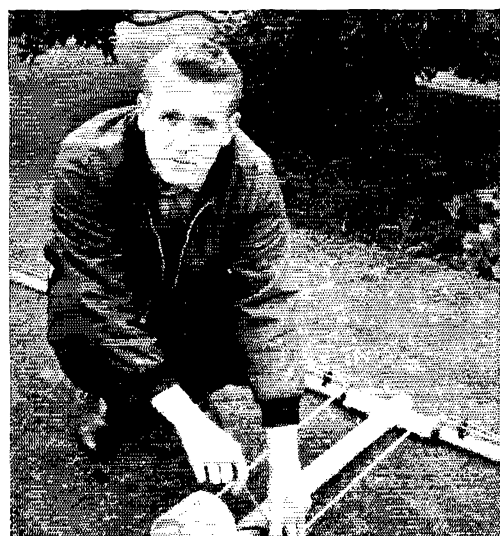
W8GPE 10,368-108-32-A-8
K8MLV 9,945-85-34-A-9
K8YSO 9,207-101-31-A-10
W8YHU 9,108-92-33-A-11
W8UPH 9,075-121-25-A-10
W8KNZ 8,900-100-44-B-9
W8DGG 8,620-71-40-A-11
W8ZAH 8,400-20-14-A-7
W8SPJA 7,482-87-29-A-10
W8OYL 7,341-77-34-A-7
W8BFH 6,610-80-28-A-8
K8NVC 6,160-77-40-R-16
K8GHE 4,830-70-23-A-19
W8TYI 4,526-73-31-B-10
K8ANA 3,234-49-22-A-8
W8ZJM 3,168-41-24-A-4
K8QOJ 3,094-60-26-B-5
K8LCN 3,000-50-30-B-9
W8SJO 2,550-50-17-B-9
W8NNS 2,550-50-17-A-12
W8VZE 2,112-48-22-B-6
W8NHO 2,040-40-17-A-14
W8APC 1,696-28-19-A-5
W8GTY 1,440-40-12-A-4
W8ARD 1,386-33-14-B-20
W8PHS 1,386-33-14-A-13
K8RMY 1,215-28-10-A-2
K8VVB 1,071-21-17-A-4
K8OKK 864-21-12-A-3
W8LZE 826-18-14-B-2
W8BSR 756-21-12-A-7
W8IBX 540-15-12-A-1
W8EYA 533-23-5-A-11
W8RMQ 528-22-12-B-3
W8IGY 483-23-7-A-5
K8LW 330-11-10-A-2
W8SLO 318-27-5-A-7
K8LGB 300-5-4-B-1

W8NNR 243-14-9-B-3
K8GRO 216-24-3-A-6
W8CCG 100-10-7-A-2
W8FWB 168-8-7-A-2
K8DHF/8 72-6-4-A-1
W8APL 45-5-3-A-1
K8YFC 30-5-2-B-1
W8TVN 24-8-1-A-7
W8QXT 3-1-1-A-1
W8WEV 2-1-1-B-1
W8EDU (7 oprs.) 25,191-156-54-A-24
WRCZM/R (K8NVA, W8CZM) 1242-46-9-A-12

HUDSON DIVISION

Eastern New York

K2AJA 83,124-420-64-A-22
W2TIF 22,365-201-35-A-19
W2MBI 13,500-125-36-A-18
W2EXZ 10,582-144-37-R-23
W2IEW 4,020-87-30-B-5
K2JCN 3,060-51-20-A-8
W2BYI 1,080-30-12-A-10
W2OQO 270-10-9-A-2
W2SZ (6 oprs.) 72,288-513-72-B-24
N. Y. C.-L. I.
W2RLM 137,751-629-74-A-23
W2IYW 60,645-471-65-B-20
W2BHC 57,270-214-61-A-19
K2RAE 46,854-276-57-A-14
W2BNZH 46,008-284-54-A-19
W2BNIK/2 41,580-301-44-A-24
W2BFAJ 40,392-264-51-A-21
W2GKZ 32,802-237-66-B-14
W2EMJ 31,800-200-53-A-14
K2CHQ 31,260-262-60-B-2
W2QEB 27,360-190-48-A-24
K2HQR 25,551-167-51-A-13
W2RTL 21,024-152-48-A-15
W2MQR 16,254-144-33-B-25
W2IHS 14,720-160-46-B-2
K2PVQ 14,670-163-45-B-19
W2DID 13,899-113-41-A-15
W2OIV 12,636-108-39-A-15
W2LEJ 11,820-99-40-A-18
W2EXI 11,600-105-37-A-17
W2ZY 8442-67-42-A-17
W2OQO 8268-107-26-A-17
W2MJD 8148-87-28-A-10
W2AEE 6966-86-27-A-23
W2BPC 5811-76-26-A-11
W2P 5150-56-23-A-19
W2BQJ 2952-41-24-B-5
W2KXC 1938-38-17-A-4
W2MIG 1890-42-15-A-9
W2MDH 1811-38-17-A-2
W2NTI 1800-60-14-R-9
W2EMJ 1428-55-17-A-8
W2ZZF/2 1028-70-5-A-17
K2PNR 683-33-7-A-2
W2NBI 683-18-13-A-2
W2OLD 212-11-3-A-4
K2HVN 210-10-7-A-11
W2UMS 108-9-18-A-5
W2AUB (W2BS, AUF, KUL) 61,596-354-58-A-24
W2BVU 55,881-443-63-B-24
K2CHS/2 32,681-232-55-A-22
W2PXB (5 oprs.) 23,688-282-42-A-15
W2HJ (6 oprs.) 23,296-224-52-B-20
W2DXM (W2BS, DNM, ZLF) 2294-49-18-A-5
K5VIP/2 (WA2S, LEN, SLD) 372-42-3-A-17
W2AXH (W2BS, AXH, QJB) 149-33-3-A-7



Leading that lengthy Los Angeles phone tabulation requires a certain extra something. Here we have WB6GVV (close to 150-K) tending to his beam.

Eastern Massachusetts
 WIJRJ 78,971-382-69-A-20
 KIHVV 56,871-404-71-B-21
 KIWJD 47,939-240-67-A-14
 WICRX 20,700-196-50-B-12
 WILBY 20,328-21-15-A-11
 KIDIR/I 14,577-113-43-A-9
 WITKG 11,940-87-40-A-15
 W1BVP 9398-77-35-A-4
 W1PLJ 2678-103-28-B-12
 WA1BME 1103-25-15-A-7
 F1OJQ 1080-24-15-A-3
 W1KNU 27-3-3-A-1
 W1JYH (W18 EOB JYH)
 14,280-140-51-B-5

Maine
 W1GKJ 950-108-44-B-9
 W10XP/I 697-47-21-A-5
 W1D18 289-27-13-B-1
 WA1CKD 44-2-1-A-17

New Hampshire
 W2NSD/1 119,647-823-73-B-24
 W2DYE 38,098-300-58-A-11
 K1UHM 30,192-300-51-B-14
 K1KSD 21,828-202-51-B-24
 K1H/L 7722-99-26-A-10
 K1FTG/I 18-3-2-A-1

Rhode Island
 W1HFQ 43,066-362-61-B-20
 W1HFB 41,769-223-63-A-16
 K1V5J 16,412-187-44-B-16
 K1HMO 450-15-10-A-12

Western Massachusetts
 K1NWE 67,620-322-70-A-24
 W1FZD 23,485-214-55-B-18
 K1KNQ 3339-56-21-A-10
 W1BRG 2132-41-26-B-4

NORTHWESTERN DIVISION
Alaska
 K17FMM (WA2WVV, K17PMM) 2916-56-27-B-7
Idaho
 K7HLR 37,017-230-54-A-17
 K7WYM 21,684-140-52-A-16
 K7NEY 16,875-116-50-A-11
Montana
 K7PGL 36,612-200-62-A- -
 W7TYN 15,867-123-43-A-10
 W7FF 3944-58-34-B-9
Oregon
 W7WLL 114,048-795-72-B-24
 K7STK 42,572-370-58-B-10
 W7OVV 17,043-124-46-A-18
 W7FKF 6240-65-32-A-6
 W7LNG 3952-52-38-B-6
 K7WVR 60-10-2-A-2
 WA7CGR/7 (5 ops.) 4560-77-20-A-24

Washington
 W7DKJ 139,950-622-75-A-24
 K7SNB 62,100-303-69-A-18
 K7YLD 21,300-203-60-B-20
 K7VDF 15,840-125-40-A-23
 W7WMY 9711-84-39-A-8
 WA7RLC 7292-17-39-A-8
 K7WVC 2860-55-26-B-3
 WA7AC 1674-31-18-A-6
 K7ZXS 1485-33-15-A-10
 WA7BR8 972-36-9-A-17
 K7TTS 324-12-9-A-2

PACIFIC DIVISION
East Bay
 WB6RKB 47,520-240-66-A-18
 WB6RPP 26,712-169-53-A-22
 WB6LRF 15,732-143-38-A-17
 WA61VN 10,920-91-10-A-7
 W6LDD 7105-102-35-B-5
 W60JW 32-4-4-B-1
Hawaii
 KH6FRT 59,280-304-65-A-18
 KH6J 31,378-271-58-B-16
 KJ6DA (K4DRD, K0AZZ) 22,275-205-55-B-19
Nevada
 W7KOI 11,077-106-53-B-15
 W7VIU 9533-78-41-A-9
Sacramento Valley
 WB6LTT 31,721-186-57-A-22
 WA6JDT 15,048-102-44-A-11
 WB6MZX 12,064-116-62-B-15

San Francisco
 K6NCG¹⁴ 81,840-388-70-A-24
 WA6AUD 26,400-160-55-A-14
 WB6IF 21,214-129-59-A-14
 WB6OC 2160-40-18-A-10
 WB6MOE 2133-40-27-B-7
 WB6ZJ 495-15-11-A-1
 WB6GYI 293-7-5-A-2

San Joaquin Valley
 W6TZN 46,282-318-73-B-24
 WB6DQR 4060-73-28-B-9
 WB6NCJ 1440-81-18-A-7
 WA6TZN 93-3-2-A-1
Santa Clara Valley
 K6GVW 33,408-296-58-B-14
 WB6JKQ/6 16,497-117-17-A-13
 W6T1PL 14,800-149-50-B-11
 WB6RCC 7110-79-30-A-4
 WB6JOD (W614S, WB6RFB) 21,978-167-44-A-15

ROANOKE DIVISION
North Carolina
 WA4LSA 35,040-184-61-A-16
 W5TFP/4 10,314-98-36-A-22
 WA4NUO 450-15-10-A-5
 WA4NO 42-22-10-B- -
South Carolina
 K4WJT 80,800-572-70-B-24
 W4ZRH 49,982-276-61-A-18
 W4YSJ 16,352-146-56-B-21
 W4ULY 6216-56-37-A-7
 W4PED 3402-41-28-A-5
 WA4VZK 3221-41-27-A-10

Tennessee
 W4KFC 160,650-706-75-A-24
 W4BVV¹⁴ 158,625-713-75-A-24
 W4PTR 89,838-349-67-A-20
 K4CVN¹⁶ 71,442-379-63-A-24

Utah
 K7TRAJ 103,707-492-69-A-24
 W7GXC 19,030-185-14-A-14
Wyoming
 W7TSM 46,589-250-63-A-13
 W7ASD 32,208-267-61-B-12

SOUTHEASTERN DIVISION
Alabama
 WA4AKS 38,430-308-63-B-13
 W4DS 33,744-228-74-B-18
 WA4U8M 22,275-165-45-A-8
 WA4TID 10,973-110-35-A-7
 K4WHW 3623-45-21-A-4
 K4CFM 2876-44-27-B-15
 WA4RES (W488 RFR RFB) 71,400-355-68-A-24
 WA4OYZ (WA4AS OYE PLG) 21,445-100-38-A-8
Canal Zone
 KZ5TD 6965-102-35-B-3
 KZ5LC 3500-50-35-B-5
Eastern Florida
 WA4NGO 133,663-926-73-B-24
 W4PZV 60,390-334-81-A-21
 W4MVE 43,084-292-74-B-20
 WA4UFW 34,961-234-51-A-23
 W4RC 25,816-232-56-B-15
 WA4HO 13,916-122-49-B-10
 W4KET 13,125-75-50-A-7
 W48MK 12,711-100-38-A-8

34,440-206-56-A-14
 24,900-100-60-B-12
 WB6RFP 24,000-200-60-B-14
 K6YFZ 17,550-117-50-A-22
 WA6STJ 16,758-114-49-A-19
 WB6LDF 16,611-113-49-A-19
 WB6LCS 16,245-144-57-B-16
 WA6VTL 12,480-110-40-A-3
 K205 10-25-2-A-5
 WB6KPN 4212-55-28-A-6
 K2PHF/6 4200-70-30-B-4
 W6BRS 3564-66-27-B-11
 WB6AKZ 2889-54-18-A-1
 WB6KVA 330-25-5-A- -
 WB6KCS 1807-25-2-A-5
 WA6VTM 132-11-4-A- -
 KR6DW 78-7-1-A-2
 K6ICQ (K68 ICQ ICS LOP) 12,600-107-40-A-8
 K6IC8 (K68 ICQ ICS) 90-6-5-A-1
Orange
 K6OIZ 47,031-257-61-A-22
 WB6AD/6 24,000-100-60-B-12
 WB6NRK 21,600-144-50-A-20
San Diego
 W6LWAI 31,860-188-59-A-20
 W6NAT 17,76-214-56-A-4
 WB6IEU 2706-41-22-A-10
 WB6OHz 312-13-8-A-5
 WB6OFX (K6RDP, WB6OFX) 53,105-420-65-B-24
Santa Barbara
 W3TMZ/6 40,455-218-62-A-12
 W6BLIV 15,018-138-57-B-12
 W6OUL 11,682-89-44-A-8
 W6GBE 7207-65-31-A-11

WEST GULF DIVISION
Northern Texas
 K5RHZ 155,052-708-73-A-24
 K2EIU/5 148,500-652-75-A-24
 WA5ALB 114,413-510-75-A-24
 WA5EHD 104,025-475-73-A-24
 K5YAA 41,730-216-65-A-19
 K53YAI 14,211-105-46-A-8
 W5EIO 5110-73-35-B-6
 WA5DAF (multiop.) 12,461-110-39-A-14
 WA5BNK (2 ops.) 12,005-76-53-A-15
Oklahoma
 K5HWO 88,047-453-85-A-18
 K5JTT 27,018-183-56-A-21
 W1B8L/5 19,404-132-49-A-15
 W6KX/5 16,907-111-51-A-14
 W5OYQ 13,568-119-38-A-9
 K5JKG 10,176-106-48-B-16
 K5TQA 5712-66-32-A-13
 W5YJ (6 ops.) 37,680-319-60-B-19
Southern Texas
 K5LZO 151,548-701-73-A-24
 W5JHU 157,881-195-61-A-23
 K5CWB 26,500-123-46-A-12
 WA5HXD/5 3402-29-27-A-6
 W5RO 546-14-13-A-4
 K5IIB (W58 LZG PTV) 11,525-770-75-B-24
 WA5OBK (8 ops.) 53,495-424-65-B-24

CANADIAN DIVISION
Maritime
 VE1NV 15,821-195-41-B-20
 VO2AW 5738-65-25-A-10
 VO2HA (5 ops.) 51,744-458-56-B-22
Ontario
 VE3FUX 51,893-302-55-A-16
 VE3DAM 40,013-248-55-A-22
 VE3CQH 16,728-136-41-A-16
 VE3LDL 12,582-118-54-H-11
 VE3RVZ 8970-115-39-B-8
 VE3RFQ 336-14-12-B-8
 VE3VX (5 ops.) 25,674-194-44-A-24
Manitoba
 VE48C 34,224-174-62-A-16
 VE4EO 33,096-199-56-A-14
 VE48D 23,100-200-40-A-15
Alberta
 VE6OR 31,871-207-51-A-10
 VE6NE 28,500-191-50-A-23
 VE6MA 16,673-144-39-A-15
British Columbia
 VE7AA 37,672-278-68-B-19
 VE7VT 3102-47-33-B-17
 VE7BQB 6-2-1-A-1
Yukon-N. W. T.
 VE8BB 26,491-200-59-B-17



SOME STATES WERE MOST ELUSIVE
 W4BFA¹⁰ 52,163-268-65-A-16
 W4ZM 44,702-232-62-A-14
 W4VBX 38,874-209-82-A-14
 K4NCP¹⁷ 37,572-202-62-A-20
 W4CZ 8052-93-4-B-9
 K4T5U 6700-100-31-B-6
 W4DKU 3948-47-28-A-4
 W4JUJ 263-5-5-A-1
 K4IKF 120-8-5-A-1
 WA48GD 5-1-1-A-1
 WA4YFF (WA4YFF, WB1AKK) 15,984-167-48-B-18
 WA4KBG (WA48 KBG QOC) 14,900-140-35-A-15
West Virginia
 WA8RE 45,398-285-52-A-17
 K8UZX 39,576-293-68-B-18
 K8WVV 27,048-187-49-A-18
 WARKAN 18,445-189-29-A-18
 WAFMA (WA88 FMA KQX) 10,659-83-38-A-11

8636-132-31-B-5
 WA4LYG 5040-56-30-A-5
 WA4NEV 2778-35-23-A-10
 K4PQU 3276-42-20-A-7
 WA4HFB 2160-8-24-B-6
 W4WYJ 644-21-11-A-3
Georgia
 W4MCM 156,390-708-74-A-23
 K4BAJ 112,860-510-72-A-24
 W4FQX 49,950-338-75-B-14
 W5IIR/4 44,073-251-59-A-17
 W4BVC 26,553-170-53-A-10
 K4NFP 3483-43-27-A-7
 WA4QPL (10 ops.) 30,628-248-62-B-23
Western Florida
 W4JJ¹⁸ 70,785-363-65-A-24

SOUTHWESTERN DIVISION
Arizona
 W7AYY 111,362-515-73-A-23
 W7ZMD 100,890-492-70-A-24
 W0YFT/7 77,022-396-65-A-20
 K7AAB 17,340-145-53-B-21
 K7ZZH 6552-81-28-A-9
 W7ENA 1989-30-17-A-6
 K7UHE 1485-28-18-A-4
 WA7EBR 941-16-11-A-4
 K7UHN 12-2-2-A-1
Los Angeles
 WB6GVV 146,370-703-70-A-24
 K6QPH 98,325-475-69-A-24
 W6BNRO 66,275-295-75-A-24
 W6KPM 37,769-301-61-A-16

¹ K1ANV, opr. ² K9KGA, opr. ³ WA6GVW, opr. ⁴ K6MFO, opr. ⁵ W8ACZ, opr. ⁶ WA2WA, opr. ⁷ K6H6P, opr. ⁸ K4HAV, opr. ⁹ Hq. staff, not eligible for award, ¹⁰ WA2BAH, opr. ¹¹ K3OKJ, opr. ¹² W7BSW, opr. ¹³ WB6FCE, opr. ¹⁴ K3EST, opr. ¹⁵ K3JWU, opr. ¹⁶ WA4RPK, opr. ¹⁷ WA4VOH, opr. ¹⁸ K4VFF, opr.

WA0MFX 27,720-198-56-A-16
 WA9JDT 27,638-201-55-A-17
 W9KXK 27,195-178-61-A-18
 WA9FTL 22,139-231-41-A-24
 WRKJY 18,281-150-45-A-15
 WA9NFB 18,120-154-56-A-15
 WA9KHC 17,150-142-19-A-15
 WA9LW 16,125-150-43-A-10
 WA1UJN 15,583-141-46-A-10
 WA9M10 10,710-102-42-A-8
 WA9EKL/9 5,320-76-28-A-7
 WA9HCZ 4,465-68-27-A-13
 W9YT* 2,420-45-22-A-3
 W9GMV 2,162-47-23-A-5
 WA9NVY 2,083-60-17-A-14
 W9N1J 1,395-32-18-A-14
 W9N9XN* 1,000-28-16-A-19
 W9N9NU 861-27-13-A-17
 W9BCC 660-24-11-A-8
 WA9HRS 538-22-10-A-8
 WA9MJG 260-11-8-A-13
 WA9NDV 131-8-7-A-2
 W9HHLX (4 oprs.) 53,140-398-66-B-24

W9JQY (W9JQY, KYLL1)
 27,878-208-54-A-24
 W990QZ (W9N9 OIF OQZ)
 375-20-10-A-23

DAKOTA DIVISION

Minnesota

WA0AII 99,760-580-68-A-11
 W9J8J 89,556-653-68-B-24
 W9YCR 82,875-511-65-A-19
 R0J1J 65,280-347-68-A-21
 WA0KDS 55,024-324-67-A-24
 W9J8J 51,429-29-68-A-19
 WA0HQT 25,600-192-56-A-13
 WA0IKP 25,448-176-54-A-18
 WA0GBO 23,418-162-68-A-19
 WA0IDK 16,018-153-43-A-14
 WA0JHB 9,013-106-39-A-8
 W9J8J 861-27-13-A-17
 WA0KQU 5,085-86-28-A-4
 W9KUI 4,402-71-31-B-15
 WA0I1J 3,750-51-30-A-3
 WA0L0L 3,640-44-25-A-5
 WA0KNP 1,105-28-17-A-9
 K93XQ 81-28-12-A-1
 WA0LJY 40-5-4-A-1
 WA0DKA (WA0S BWM DKA)
 86,748-507-69-A-24
 W9YCC (5 oprs.)
 62,880-393-61-A-24

North Dakota

WA0HYI 65,033-381-69-A-22
 WA0ELO 2,800-40-28-A-6

South Dakota

K0ZTV 27,795-221-51-A-13
 WA0LJY 6,533-70-39-A-18
 WA0JLQ 6,162-79-39-B-13
 WA8VFN/Ø 4,875-55-34-A-10
 W9WUW 3,936-62-32-B-6
 K1CAU/Ø 2,400-40-20-A-3

DELTA DIVISION

Arkansas

WA5IIS 69,445-411-68-A-20
 WA5BHM 53,924-422-68-B-21
 WA5HNH 49,088-384-55-A-20
 K5TAY 30,215-223-66-B-9
 WA5KUD 20,000-63-32-A-8
 W5YM (5 oprs.)
 65,000-107-65-A-24

Louisiana

W5YDC 28,840-206-56-A-8
 WA5KBK 10,666-111-43-A-10
 WA5GVB 6,163-73-34-A-14
 W5N5LJ 4,000-18-10-A-12
 K5QNL (4 oprs.)
 66,248-412-66-A-23
 W5N5NUB (4 oprs.)
 7,446-91-37-A-23

Mississippi

WA5FII 8835-94-38-A-9

Tennessee

WA4PCW 68,970-406-66-A-24
 W4WZC 66,563-381-71-A-24
 W48QE 64,515-380-68-A-22
 K48JZ 54,123-347-67-A-15
 WA4CGA 47,109-303-69-A-20
 K4RUW/4 46,776-45-51-A-24
 W4DRT 22,689-189-49-A-18
 W4VRD 19,623-167-47-A-14
 W4OGG 19,319-130-55-A-13
 WA4UMU 14,513-133-42-A-12
 K4YFC 9,073-99-38-A-8
 WA4GQU/4 6,916-87-38-B-12
 WA4NEC 5,915-72-28-A-13
 WA4PRX 375-15-10-A-2
 W4NAFE 131-9-7-A-14
 K4RKG/4 (4 oprs.)
 21,088-159-53-A-18

GREAT LAKES DIVISION

Kentucky

W4BCV 100,368-687-72-B-23
 W3DGM/4 61,250-350-70-A-8

W4CVI 59,450-327-70-A-18
 K4SSQ 39,563-307-50-A-24
 WA4TTE 23,785-197-49-A-14
 WA4VCN 21,011-211-39-A-16
 WA4WWT 18,810-174-14-A-11
 WA4TWP 18,285-159-45-A-22
 WB4BEO 11,574-100-17-A-19
 W4NWT 6845-81-34-A-8
 W4LDL 5539-96-29-B-6
 K4IGUD/W4-1
 VGG) 35,712-288-62-B-23

Michigan

139,219-730-75-A-24
 W4VPC 91,889-505-73-A-24
 K4UDJ/Ø 90,703-571-71-A-24
 W4CRD 78,575-449-70-A-24
 W4D1Q 59,509-355-68-A-18
 W4ROQH 56,730-366-62-A-23
 W4RGUF 55,900-314-65-A-23

W4NDQ 63,866-393-63-A-24
 W4RMJQ 61,153-391-61-A-21
 W4RGYT 59,958-401-58-A-22
 W4W8W 58,500-325-72-A-15
 W4R8G 57,955-308-70-A-24
 W4R8T 54,113-323-65-A-20
 W4R8R 47,912-260-60-A-18
 W4R8V 47,850-308-60-A-13
 K4ORL 45,873-311-59-A-22
 K4SNY 45,150-258-70-A-20
 W4R8H 44,925-287-60-A-24
 W4R8P 44,376-263-71-A-13
 W4R8T 44,037-351-63-B-24
 W4R8V 42,636-318-68-B-22
 W4R8F 42,090-278-61-A-21
 W4R8J 39,750-300-53-A-28
 K4Z8Z 32,700-219-60-A-17
 W4R8T 31,993-191-67-A-8
 W4R8G 31,740-265-48-A-19
 W4R8V 31,075-226-55-A-12

W4N8PLR 1800-37-20-A-23
 K4YFX 1650-33-20-A-7
 K4VGL 1594-30-15-A-5
 W4R8MD 1505-35-18-A-12
 W4R8CSJ 1410-27-20-A-8
 W4R8T 1275-17-1-A-7
 K4H4Z 1231-30-15-6
 W4R8PL 1140-26-19-A-3
 W4R8Q 1138-26-14-A-15
 K4DHFJ/8 1035-22-12-A-2
 K4R1G 945-27-14-A-4
 W4R8P 870-21-9-A-3
 W4R8IDT 800-25-17-B-15
 W4R8AUZ 400-16-10-A-9
 W4R8EY 383-18-9-A-8
 W4R8R8N 358-12-11-A-4
 W4R8QAR 325-13-10-A-13
 K4R8M 270-12-9-A-3
 W4R8IDT 238-11-9-A-3
 W4R8OYR 135-9-6-A-5
 K4K8K 120-8-8-B-2
 W4R8V 90-8-6-B-2
 W4R8QJ 20-4-2-A-2
 W4R8EK (WA4R8EKX NTU)
 48,429-353-53-A-24
 W4R8U (W88 AZA EDU)
 36,480-224-64-A-21
 W4R8ZM/8 (K8A1VA, W4R8ZM,
 W4R8V) 4433-75-31-A-17

HUDSON DIVISION

Eastern New York

K2AJA 82,338-458-70-A-24
 W4B2JV 37,390-252-53-A-24
 W4B2PU 27,601-204-51-A-11
 W4B2YK 23,626-218-41-A-11
 W4A2LJM 16,807-159-49-B-16
 W4B2UW 3100-63-20-A-4
 W4B2LUW 2700-52-21-A-6
 W4N2BOP* 1843-35-22-A-22
 W4N2HUZ 1233-31-17-A-24
 W4B2TUU 983-55-7-A-20
 W4B2S (4 oprs.)
 72,590-523-70-B-24

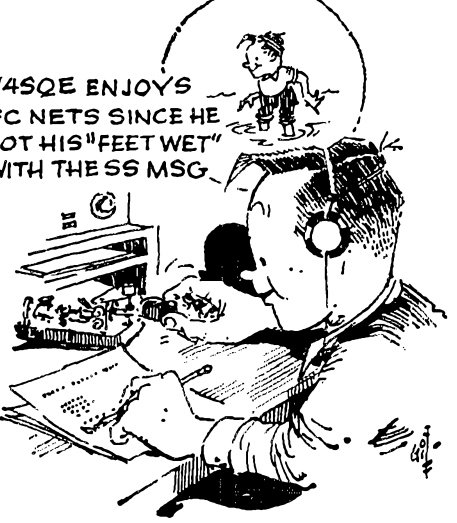
N. Y. C. - L. I.

W4P2VX 141,844-745-75-A-24
 K2DGT 120,250-650-74-A-24
 K2C8Q 58,958-435-68-B-16
 K2ZYR 47,502-371-63-B-8
 W4B2H 40,920-100-36-B-17
 W4A2TGL 38,719-250-59-A-18
 K2KJ 36,383-231-63-A-22
 W4B2LJF 35,145-321-55-B-23
 W4G2L 34,839-264-63-B-16
 W4B2N 32,085-207-62-A-15
 W4B2OM 24,212-22-53-A-16
 K2GBH 28,755-214-54-A-22
 W4B2DXM 26,458-266-38-A-16
 W4B2BPI 20,995-223-38-A-17
 W4D2US 20,563-175-47-A-9
 W4B2HLX 19,661-162-40-A-24
 W4B2Z 18,828-129-56-A-10
 W4B2BU 15,680-128-49-A-9
 W4B2SRL 12,350-190-26-A-18
 W4Z1L 11,424-112-51-B-15
 W4A2VDA 10,024-109-33-A-16
 K2A8A 9,880-100-38-A-6
 W4B2S 8,905-137-26-A-8
 W4B2LWE 8,455-92-38-A-12
 K2GJN 7,668-107-36-B-19
 W4B2QNF 7,014-78-31-A-14
 W4B2E1* 6,913-80-35-A-4
 W4B2E2 6,850-76-26-A-22
 W4B2EON 4,650-75-3-A-10
 W4L2A 4,118-61-27-A-7
 W4B2SEJ 3,933-51-26-A-12
 W4B2CAN 354-53-27-A-11
 W4B2BWM 3180-53-24-A-14
 W4B2E1 3125-55-13-A-14
 W4D2ID 3048-23-10-A-10
 W4B2QJL 2750-50-22-A-19
 W4A2URD 2220-37-19-A-10
 K2UBG 2185-35-23-B-11
 W4A2VQY 1845-41-18-A-5
 W4B2ZG 1825-37-19-A-6
 W4B2EMJ 1758-37-19-A-6
 W4B2H1R 1710-36-19-A-14
 W4B2H1R 1710-36-19-A-14
 W4B2H1R 1275-30-17-A-8
 W4B2UGP 823-28-14-A-15
 W4B2E2 806-28-14-A-15
 W4B2A2 750-21-15-A-8
 W4B2MJD 700-28-10-A-3
 W4N2UHY 495-21-11-A-16
 W4B2OLD 210-12-7-A-2
 W4B2N 130-11-5-A-1
 W4A2QW 85-7-4-A-3
 W4B2SD 40-5-4-B-1
 W4B2PHO 3-1-1-A-1
 W4B2W1 (W4B2FAJ IW)
 39,375-317-50-A-21
 W4B2DU (K2UAT, W4B2S
 MJB UQE) 33,809-315-43-A-23
 W4B2QKJ (W4B2S P7S QKJ)
 23,214-193-19-A-21
 W4B2JY (W4B2DXM, W4N2
 QHX) 5160-78-28-A-19

Northern New Jersey

W4V2JN 126,263-670-71-A-24
 W4B2AL 118,620-67-72-A-40
 W4B2NLF 88,638-117-70-A-24
 W4B2B 74,723-144-67-A-24
 W4B2J 54,035-36-17-A-10
 W4D2M 56,856-414-55-A-23
 K4K2PK 51,816-381-68-B-18

**W4SQE ENJOYS
 TFC NETS SINCE HE
 GOT HIS "FEET WET"
 WITH THE SS MSG**



WB2CRX 50.143-324-62-A-24
 W21WP 47.973-311-82-A-24
 WB2HLH 37.918-250-58-A-12
 WB2CRK 31.668-339-49-A-21
 WB2FWP 37.433-238-47-A-1
 WB2JQC 21.621-229-45-A-20
 W2LQP 23.875-191-50-A-9
 W2GBY 19.600-180-49-A-15
 WB2KSN 19.065-186-41-A-1
 WB2CZZ 18.601-155-60-B-11
 W2LYO 18.093-155-47-A-11
 K1HAW/2 17.013-181-53-B-16
 WB2JYM 15.723-153-18-A-12
 WB2PRF 15.000-120-50-A-19
 WB2LDX 13.888-119-50-A-13
 W2NRP 12.285-182-37-A-9
 W2HRIG 10.916-109-11-A-17
 K2PTI 10.684-131-33-A-4
 WB2NLH 10.083-110-37-A-18
 WB2PYN 8.755-103-34-A-4
 WB2KQC 7.380-103-36-B-17
 W21BZ 7.200-90-32-A-8
 WA2UDT 6.760-104-26-A-8
 W2ECO 6.750-90-30-A-15
 WB2KNN 5.740-82-28-A-10
 WB2RKK 5.625-90-25-A-17
 WB2QJH 5.270-68-31-A-18
 W2BSC 4.840-85-26-B-20
 W2JDH 4.538-65-33-A-5
 W2BWW 4.275-57-30-A-10
 WB2GGO 3.253-63-27-A-12
 WN2TFK* 3.438-67-22-A-13
 WB2BPE 3.371-90-29-A-13
 WB2PW4 2.445-45-22-A-5
 W2MPP 2.100-53-16-A-4
 WB2ICH 2.052-54-13-B-1
 WB2UCC 1.925-40-20-A-10
 WN2TBA 1.849-46-17-A-21
 K2ZSS 7.80-28-12-A-6
 WN2SQJ 4.05-25-12-A-19
 WB2FUT 2.45-14-7-A-2
 K2SBW 2.40-24-8-A-3
 WB2PKK 1.31-8-7-A-2
 WN2RSS 2.0-4-2-A-2
 WB2KU/2 (WAZWZ, WB28
 RTF FVT) 10.643-129-33-A-24
 WB2LPX (WB28 LPX REL) 6.023-76-33-A-22
 K2GQ (multitr) 5.491-99-23-A-12

MIDWEST DIVISION

Iowa
 W01YH 79.740-443-72-A-20
 K0AZJ 89.845-447-61-A-19
 W0CXN 68.210-368-72-A-21
 K0GVV13 49.326-327-61-A-22
 W0FEJ 37.489-274-55-A-22
 W0BGN 36.608-275-64-B-16
 W0RHS 25.872-231-56-B-15
 W0STA 23.030-189-49-A-12
 W0A1A 14.720-129-46-A-22
 W0BJSD 14.625-150-39-A-19
 W0DSF 14.000-112-50-A-13
 W0AUFK 13.922-177-53-A-12
 W0AKXJ 9.000-111-32-A-18
 W0AKT 5.480-70-32-A-12
 W0JTC 4.844-67-36-A-18
 W0ALZO 4.800-40-18-A-9
 W0AKIE 7.48-41-13-A-8
 W0NHPZ 1.922-177-53-A-12
 W0NMTXV 40-4-4-A-6
 W0AHLXW (W0A1WJ, W0N0-
 MWX) 263-15-7-A-0

Kansas

K0BYC 18.315-167-55-B-24
 W0AFM 7.290-83-36-A-11
 K0GZP 4.350-48-29-A-7
 W0BRY 6.15-22-12-A-7
 W0BRH (4 ops) 37.685-279-54-A-22
 W0A0MLE (W0A8 IYX MLE) 6.075-68-38-A-13

Missouri

W0TDR 80.400-600-72-B-24
 W0QW 55.829-343-65-A-24
 K0QIP 48.300-280-89-A-20
 K0BDE 42.303-278-62-A-18
 W0A0JZ 39.225-271-60-A-21
 K0JPL 37.808-278-64-B-16
 K0GAS 35.100-216-65-A-14
 W0C1G 35.016-216-65-A-14
 K0YGR 13.800-160-32-A-15
 W0AKBZ 11.40-72-23-A-6
 W0AFKD 2.235-39-18-A-5
 WN0LEM* 1.870-41-22-A-19
 K0LQZ 1.575-35-18-A-2
 W0N0LG 1.283-37-18-A-10
 W0N0LY 1.069-30-15-A-22
 W0A0JN 630-19-12-A-18
 W0ZLN (6 ops) 53.014-306-67-A-18
 W0TGB (W0A0CJ, W0B7E) 23.100-214-55-B-20

Nebraska

W0ABQ 61.200-390-72-A-18
 W0GVY 40.320-358-60-B-24
 W0AGED 37.400-358-60-B-24
 K0QLX 35.200-259-55-A-21
 K0YLZ 19.620-168-48-A-10
 W0A0TE 17.026-129-53-A-7
 W0AGZY 13.275-131-45-A-13
 WN0MNO 79-7-7-A-13

NEW ENGLAND DIVISION

Connecticut
 K1ZND 57.371-494-69-A-24
 W1EWP04 82.972-584-68-B-24
 W1WGH14 80.119-554-71-B-24
 W1BGG14 75.117-502-73-B-17
 W1BTH14 73.698-500-71-B-24
 K1ETV 73.219-400-71-A-18
 W1LHB 55.520-347-64-A-17
 W1ALPY 46.168-400-50-24-A
 W1AWW, 15 35.510-269-87-B-18
 K1JHX 34.510-250-56-A-11
 K1PKQ 32.646-259-49-A-17
 W1T 30.552-268-57-B-16
 W1AFCB 28.320-295-48-B-21
 W1ETX 26.603-196-57-A-10
 W1ILY 25.688-247-52-B-13
 W1AFM 22.610-266-34-A-19
 W1ACKI 22.313-177-51-A-22
 K1EYV 20.770-270-31-A-20
 W1RZG 20.445-205-47-B-15
 K1MOT 19.470-238-35-A-24
 W1IFM 18.253-149-49-A-14
 K1LMS 11.250-100-40-A-6
 K1WXN 9.180-108-34-A-7
 W1AAHQ 8.500-100-34-A-11
 W1AAV 7.513-81-39-A-16
 W1AFJU 6.100-84-74-A-16
 W1AIDWE 4.095-63-26-A-19
 W1BDJ14 4.084-48-27-A-4
 K1VJ 3.185-50-26-A-9
 W1EFP 2.970-54-22-A-5
 W1T 2.310-46-21-A-3
 W1NIM14 2.300-17-8-A-10
 W1ACQW 1.963-35-19-A-13
 W1EXE 1.190-28-17-A-21
 W1CEP 878-20-18-A-2
 WN1DJG 780-15-8-A-14
 WN1EPT 309-17-8-A-10
 K1PHR (K1s FFX PHR WNH) 20.970-234-45-B-20
 K1EPW (K1EPW, W1A1CJD) 11.310-175-27-A-20
 W1LXV (4 ops) 0003-139-26-A-13

Eastern Massachusetts

K1WJD 93.323-542-69-A-24
 K1KXT 61.350-510-70-A-24
 W1WIZ 80.763-449-70-A-24
 W1JY 65.120-440-74-B-16
 W1CRX 64.878-479-66-B-21
 K1LAY/1 50.583-296-55-A-23
 K1CUD 32.855-224-61-A-1
 W1BPW 32.513-297-61-B-10
 K1BEV 32.289-270-61-B-10
 W1DAL 31.553-303-42-A-24
 W1KRE 24.671-194-51-A-22
 W1ACZH 19.438-158-50-A-17
 W1AOE 18.500-148-50-A-1
 W1WJ 18.250-170-50-A-1
 W1W 16.100-140-46-A-18
 W1FJ 14.750-118-50-A-5
 K1UCA 11.625-127-37-A-21
 W1PLJ 9.870-105-47-B-13
 W1A1DSZ 9.663-107-35-A-18
 K1CQ 4648-107-35-A-18
 K1CG 4.900-10-16-A-7
 W1A1DHC 1.595-29-22-A-6
 W1AFCD 1.368-46-12-B-6
 W1TKG 1.090-27-16-A-8
 WN1FFY* 1.024-34-13-A-2
 WN1WIK 1.024-21-13-A-18
 W1A1RS 936-17-13-A-4
 W1MRS (6 ops) 6.018-142-58-A-23

Maine

K1GAX 36.560-229-64-A-19
 W1UOT 4.940-45-38-B-12
 W1KJK 2.988-53-28-B-4
 K1TKM 1.636-26-17-A-4

New Hampshire

W1DYE 60.638-374-62-A-17
 K1WPK 26.000-250-52-B-22
 W1PEP 7.437-104-37-B-16
 W1DAE 4.531-73-25-A-10
 K2EPP/1 3.250-50-26-A-10

Rhode Island

W1KMW15 105.200-590-72-A-24
 W1JFV 37.263-273-55-A-14
 W1A1P 12.600-120-42-A-7
 9438-137-33-A-15
 W1EWF 9.000-100-32-A-3
 W1A1BLC 7.381-90-33-A-18
 W1SX 1.710-36-19-A-6
 WN1EJ* 1.295-40-14-A-10

Vermont

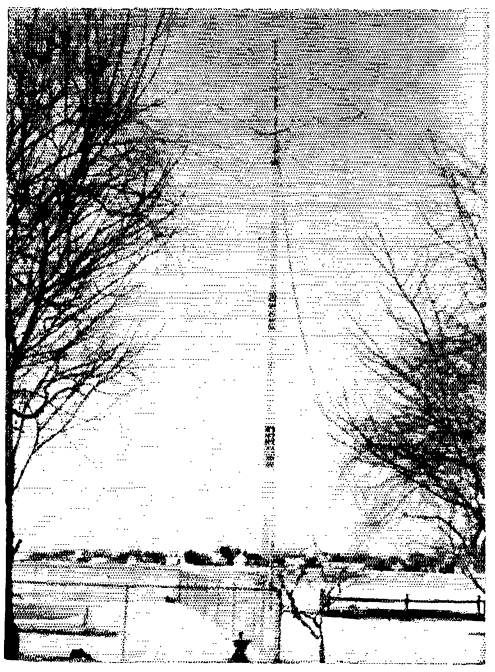
W1QZE17 9974-128-39-B-15

Western Massachusetts

W1E2D 41.216-522-64-B-17
 W1CRD 35.170-227-59-A-22
 K1UJ 37.300-196-56-A-13
 W1FOB 25.060-179-70-B-8
 K1HSH 21.474-210-41-A-15
 W1BKG 10.000-100-50-B-8

NORTHWESTERN DIVISION

Alaska
 K1L7PI 22.843-219-53-B-19
 K1L7FMM 3388-63-25-B-7



That 2nd-high 141,844-K c.w. score, topping the Hudson Division, belongs to W2PVX. Chuck's location overlooks the Great South Bay on the south shore of Long Island. The salt water ground sure adds to the performance of that array!

KL7AZL (4 ops) 14.811-132-41-A-20

PACIFIC DIVISION

Idaho
 K7CPC 52.883-324-08-A-22
 W7BUE 28.650-192-60-A-22
 K7LRL 26.520-221-48-A-16
 K7GJZ 14.300-110-52-A-14
 W7BFD 6.804-82-42-B-1
 W7ZRP 5.885-63-38-A-17

Montana
 W7HAG 57.183-329-69-A-18
 K7GAH 36.250-253-58-A-17
 K7QCG 5.031-129-39-B-17
 W7AQZ 2.912-37-23-A-7
 WN7DMA* 1.825-25-20-A-16
 W7TF 578-20-17-B-4

East Bay

W6TYM 73.780-422-68-A-22
 W6BHK 68.138-375-73-A-21
 K6AUD 41.928-272-82-A-23
 W6CNA 41.176-300-59-A-22
 W6BDI 37.744-250-61-A-18
 W6BFTY 34.200-228-57-A-24
 W6BHDH 27.675-210-54-A-22
 W6BTV 18.698-131-57-A-9
 K6LBN 16.395-131-50-A-18
 W6AGNY 16.085-130-51-A-17
 W6BBBC 22.40-40-28-B-7
 W6BRI 50-10-5-B-2
 K6BRJ (K6s BXD BXD) 8768-84-42-A- -

Hawaii

K6HJL 49.010-378-65-A-22
 K6HFLN 7219-85-35-B-9

Nevada

W7BKK 67.878-420-69-A-21
 W7AECT 29.820-216-58-A-18
 W7ATE 12.784-136-47-B-15
 W6AEC* 12.131-116-45-A- -

Sacramento Valley

W6ZGM 39.193-258-61-A-20
 W6GSVY 31.013-289-51-B-12
 W6RQX 31.658-201-63-A-19
 W6AJDT 6724-41-33-A-13
 K6TWE 5836-68-29-A-10

San Francisco

W6BPI 43.300-310-70-B-24
 W6BRXM 42.703-277-62-A-24
 W6BLL 40.300-267-62-B-23
 W6BRC 12.625-104-50-A-12
 W6BJQP 6953-77-33-A-9
 W6BMDW 633-23-11-A- -

San Joaquin Valley

W6GTN 40.635-259-63-A-20
 K6RTK 37.515-246-81-A-13
 W6BJKY 2530-41-23-A-9
 W6BMCA 2014-47-18-A-16
 W6BVM 1008-28-18-B-6
 W6BDR 672-21-16-B-3
 W6BNCJ 583-10-10-A-5

Santa Clara Valley

K6OHJ18 141.529-779-73-A-24
 W6AGFY19 39.590-781-72-A-24
 W6UTV 76.125-435-70-A-24
 W6BZZ 58.400-320-72-A-17
 W5P1/6 40.205-237-04-A-14
 W6BRCK 35.775-270-53-A-24
 W6AUVR 20.500-200-41-A-18
 W6BNNX 13.276-127-43-A-19

WA6LFA 9680-95-42-A-20
W6CLLA 9588-102-47-B-6
W6KLS 8786-103-44-B-15
WA6TCF 7761-100-39-B-5
WA6VAS 3325-87-20-A-15
WB6AIG 3281-63-21-A-8
K6LY (4 oprs.) 64,138-351-70-A-24
WB6EFO (W76E FOU FFM)
(17,401-139-51-A-20)

ROANOKE DIVISION

North Carolina

W4OMW 60,860-359-68-A-24
W4UW54 50,676-319-70-A-15
K4E0F 16,681-327-55-A-21
WA4ICU 35,943-310-44-A-10
K4MVB 35,444-270-53-A-16
K4QWQ 12,954-179-34-B-13
WA4QLP 8810-84-41-A-12
WA4TXU 7020-72-39-A-15
WN4RGL* 2090-39-22-A-14
WN4ZQM 1995-42-19-A-24
W4VON 1541-35-23-B-1
WA4VTT 1350-25-18-B-13
W4ZTO 9925-11-9-A-7
WA4K (K48 CQF CWV,
WA4CTT)
65,600-494-67-B-24
WA4YBB (WA4YBB,
WB4BHQ)
17,501-268-37-B-23

South Carolina

WA4HW 68,073-363-73-A-24
W4ZRH 31,995-237-54-A-12
WA4TLB 29,380-228-52-A-21
W4YYS 12,938-115-45-A-21
W41YS 9806-107-33-A-15
W41ZY 7939-79-28-A-14
WN4YZK 6290-63-37-A-24
W4PED 4185-54-31-A-1

Tennessee

W4KFC 156,859-848-73-A-24
W4YGY 104,381-500-73-A-24
W4AVT 99,391-163-68-A-24
W4BFA²⁰ 97,240-583-68-A-24
W4PFR 96,985-560-69-A-24
K4AEV 74,661-470-85-A-18
W4BVV²¹ 71,400-401-70-A-13
K4IAN/V4 62,942-342-71-A-15
W4WZM 59,676-319-70-A-15
W4NH 59,200-370-64-A-17
K4CZF 56,420-364-62-A-17
K4MXF 56,160-339-81-A-17
W4DKU 55,520-347-64-A-14
W4YZO 53,630-346-62-A-20
W4TKR 51,430-347-64-A-13
WA4TUF 46,835-313-58-A-23
W44DUS 45,600-304-60-A-20
W4PNK 43,291-297-59-A-11
K4IKF 39,025-194-60-A-13
K4NCO²³ 36,036-190-55-A-20
W4BYB 31,436-163-38-A-24
WA4UMX 21,376-162-49-A-19
W4LK 18,270-128-58-A-11
W4QEF 16,320-136-48-A-10
K4LEF 14,050-142-40-A-12
WA4WVH 12,460-136-38-A-24
W4JAT 8788-95-37-A-6
K4ZPL/4 8453-91-29-A-9
W4JUL 4978-53-38-B-3
W44VXR 2209-49-19-A-15
W4WUM* 2818-62-23-A-19
W4JXD 1300-29-12-A-9
K4DJG 810-27-12-A-6
W44TUE 75-6-5-1
WA4IZK (WA4IZK,
WN4NNJ)

22,330-204-11-A-23
W4HWG (W4HWG, WA48
TBJ VDR)
18,330-156-47-A-14
WA4QOC (WA48 KBQ CQC)
16,018-150-43-A-24

West Virginia

W8HRH 18,750-325-60-B-20
K8MBH 15,500-325-70-B-22
K8UZX 43,794-270-65-A-19
W3EYF/X 42,521-247-69-A-21
W4RNHF 37,931-300-51-A-21
K4MYU 21,790-136-61-A-9
W4CXZ 13,986-189-37-B-7
W4KAN 7860-131-24-A-17
W4BXP/ 5363-72-26-A-12
W4BXP/ 5363-72-26-A-12
W8AWX 1860-35-23-A-17
W4NRDJ* 1500-15-20-A-17
W4NRPW 1020-29-17-A-8
W4SKQX (WA88 FMA KQX)
18,791-210-43-B-21

ROCKY MOUNTAIN DIVISION

Colorado

W4GCVB 108,680-581-72-A-24
W4WME 84,240-291-67-A-24
W4KAB 48,240-291-67-A-24
W4OYZS 28,600-231-52-A-16
W4ONQL 15,730-123-62-A-14
W4OKLP (WA08 KLP KYV)
3879-55-29-A-9

New Mexico

W0JPH/5 88,785-511-67-A-24
W3CJ 76,351-447-99-A-22
WA5DUFH 75,650-433-68-A-24
W4BZY/5 56,348-343-66-A-24
W5DZA 37,031-236-63-A-17
K5STPL 35,400-260-56-A-11
W501J 10,803-140-39-B-11
W4SMHR 1395-32-18-A-11

Utah

107,476-598-71-A-24
W7NPU 30,281-233-57-A-14
K7JWN 37,145-178-61-A-1
W7A1B 24,120-149-67-A-20
K7CLS 10,605-101-42-A-8
W4VBSG 5,600-74-32-A-10
WA7AUW 3,338-45-30-A-7

Wyoming

W7TSM 40,880-303-56-A-20
WN7DNZ* 3375-45-27-A-14
W78QT 1980-72-18-A-5

SOUTHEASTERN DIVISION

Alabama

WA4TID 63,173-393-66-A-24
WA4KKC 42,370-328-60-B-13
K4NIM 21,333-162-53-A-11
W4AKS 17,214-151-57-B-5
WA4OQL 13,076-128-39-A-20
W4DB 1500-60-30-A-11
K4BSK 1193-52-26-A-3
WN4AHH* 2925-5-26-A-18
K4VOP 825-30-11-A-2
WN4ALN 798-28-13-A-10
W478M 328-14-10-A-1
WN4AYL 26-1-6-A-2
WA4VUG 26-1-3-A-26
WA4OKW (WA48 OKW RNP,
WA4RER (WA48 RER RES)
59,680-374-61-A-24
WBAANP (WA48 THY YDR)
8361-103-41-B-8

Canal Zone

KZ5TD 52,650-326-65-A-19

Eastern Florida

W4ZXI 85,760-512-67-A-22
W4JTA 82,125-499-69-A-24
W4YJY 70,855-412-67-A-20
W4KIT 70,013-415-66-A-20
W4YDD 64,840-411-64-A-24
W4BBB 55,920-353-64-A-18
W4PZY 52,408-331-65-A-22
K4XCG 44,900-300-16-B
WA4UFW 29,970-225-84-A-24
W4NTE 28,856-205-57-A-23
W4LCO 28,350-182-63-A-24
W4NCS 23,680-150-61-A-13
WA4HDH 20,655-153-54-B-16
WA4NGO 18,400-149-49-B-7
W44YUM 7703-81-39-A-16
W4ZOK 1550-65-35-B-16
WA4IYG 3476-39-27-A-5
W4MYB 1354-29-19-A-8
WA4FRB 1080-30-18-A-4
WA4UCG (WA48 RKB OGC)
14,238-139-42-A-22

Georgia

W0726-612-69-A-24
W4YE 37,858-452-64-B-17
W4QZY 14,845-363-59-A-24
K4CBE 31,620-187-68-A-18
W4BXV 18,563-153-50-A-11
K4EZ 14,373-113-53-A-6
W44QH/ 11,615-103-46-A-17
K4NFB 9630-107-45-A-7
W44QJN 8760-101-36-A-24
W4DXF 4230-71-30-B-5
WN4AY* 1144-38-15-A-24
WA4TLJ 336-14-12-B-1

Western Florida

K4VRT 35,888-266-55-A-18
W4AOAB 17,361-165-13-A-16
WN4ZAZ (WA48 GD, WN4-
ZAB)
1950-36-24-A-18

SOUTHWESTERN DIVISION

Arizona

W7ZMD 100,100-558-73-A-23
K7TNW 92,246-531-71-A-24
W0YFT/7 88,395-499-71-A-23
W7A7HU 70,175-402-70-A-24
W7CAL 63,958-437-66-A-23
W7COC 57,440-361-64-A-12
K7SD 33,295-349-68-23
W7A7BN 37,331-274-55-A-24
W7AYC 35,175-225-60-A-24
W7A7ER 22,063-165-50-A-18
K7UTP 21,333-161-53-A-12
W7FCO 20,400-162-51-A-17
W7CZ 14,000-162-49-B-11
W7AYY 11,760-112-42-A-6
K7UHE 8550-100-36-A-10
K7RLL 6705-77-36-A-13
W7ENA 4613-62-30-A-5
K7KGG 2145-33-26-A-8

W4JUD/7 4881-36-17-A-8
W4NDZU 219-19-7-A-22
K7ZZC 2-4-3-A-1
W47BKJ (WA7BKJ, WB2-
JDW)
32,330-177-61-A-15

Los Angeles

W6RW24 120,102-799-74-B-24
W6BKAZ 94,938-517-70-A-24
K6QPH 94,164-518-71-A-24
K6AEH 89,250-510-70-A-24
W6BHSO 80,803-354-67-A-24
W6BFRJ 51,403-371-58-A-24
W6BABS 30,669-303-67-A-24
W6AYEE 50,558-321-63-A-17
W6NKR 45,900-270-64-A-15
W6OEO 43,050-277-60-A-23
W6OYU 43,014-322-47-B-20
W6BURY 41,519-286-59-A-1
W6BKLJ 39,611-252-63-A-1
K6VNX 38,192-309-42-B-21
W6BHG 37,800-256-60-A-20
W6B8B 36,575-268-55-A-11
W6AVTL 35,200-220-66-A-23
W6AKHK 26,475-181-60-A-23
W6BKN 24,191-188-55-A-16
W6ONG 23,355-173-54-A-20
W6MOC 23,161-225-53-B-14
W6RCV 11,736-154-49-B-14
W6BPCV 13,513-115-47-A-13
W6BMEQ 10,875-60-60-A-19
W6PTE 10,164-109-14-B-4
W6BKVA 9689-169-23-A-16
W6OC 9080-114-32-A-1
W6LED 8645-121-35-B-12
W6BGD 8177-111-37-B-13
K6CPL 4169-58-29-A-1
W6HTM 21,910-188-55-A-16
W6BMPM 3255-42-22-A-1
W6ARQQ 1285-46-19-A-12
K6YFZ 2100-30-16-A-5
W6KUC 175-10-7-A-2
W6NPO 123-13-4-A-6
W6QWE 55-5-3-A-1
W6AVTM 50-5-3-A-1
W6BNWK 2-1-B-1
W6VSI (WA68 88Z YLW,
W6BKVG)

38,983-262-62-A-34
WA6WZD (WA68 WQV WZD)
31,528-289-56-B-20
WA6UCW (W6BHE)
W6UCV) 6468-100-26-A-20

Orange

K6OJZ 65,493-391-67-A-22
W68NRK 62,188-175-37-A-22
W6AROF 23,816-230-62-B-10
W6QFU 23,790-198-61-A-24
W6AWOZ 20,564-175-47-A-18
W6BME 18,375-294-50-A-1
W6AJZZ 15,950-157-50-A-19
W68ND 19,499-187-25-A-9
W6BIMN 1680-32-21-A-3
W6JQB 683-21-13-A-1
W6NPPV 350-23-7-A-24
W68WJO (WA68 WJW ULF,
W6WKO) 33-88-23-28
W68NGE (W688 LCG NGE)
10,480-131-32-A-17

San Diego

K6LKD 73,260-407-72-A-24
W6BIEK 34,800-232-61-A-23
W6OIZ 3240-42-24-A-9
W6ROFX 29,580-244-60-B-21
W6NUN 6713-94-30-A-19
W6NOJF* 3846-52-24-A-23
W6YZD 2800-50-29-B-8

Santa Barbara

W6CFB 78,985-453-68-A-24
K6CAA 61,812-463-68-B-24
W3TMZ/6 54,113-343-65-A-18
K6LBV 43,306-268-65-A-20
W6BLV 25,172-206-62-B-18
W6BQJ 14,175-142-45-A-19
W6OUL 3875-62-25-A-8

WEST GULF DIVISION

Northern Texas

K2EJU/5 127,910-675-74-A-24
K5RHZ 113,156-611-71-A-20

ARRL thanks the following amateurs for submitting their logs for clearing purposes: C. I. F., W1FDL W1JLY W2H4A K3CVW W4401 W4JUL Y4VFF W6GCL W6UJA K6VZA W7HRM W7ZC W8QQK W8TKW W9HPG WA9NQ KZ5LZ *Home, W1JLY W3ZSR/3 K4ZYR WA5EUB W6BCLY K6ECY W6UJA K6VZA W7ZC K0BXN/0 WA050 VE6IN.



¹ K3MNI, opr. ² W2NRDJ, opr. ³ W6HOH, opr. ⁴ WA9CIP, opr. ⁵ WA2BJ, opr. ⁶ K9ZMS, opr. ⁷ K9WIE, opr. ⁸ K9KGA, opr. ⁹ W8WUN, opr. ¹⁰ K4WFO, opr. ¹¹ W4VZ, opr. ¹² W6BLS, opr. ¹³ W6CCO, opr. ¹⁴ Hc. staff, not eligible for award. ¹⁵ WA2BAH, opr. ¹⁶ K1LLP, opr. ¹⁷ W4BHGT, opr. ¹⁸ W7WJL, opr. ¹⁹ W6CUP, opr. ²⁰ WA4RPK, opr. ²¹ K3BET, opr. ²² K3WUB, opr. ²³ WA4VOH, opr. ²⁴ K9ELT, opr. ²⁵ WA6OUQ, opr. ²⁶ K5ABV, opr. ²⁷ VE5FU, opr.



Correspondence From Members-

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

FEWER NEWCOMERS

☐ The recent controversy concerning incentive licensing has underscored the reality that amateur radio is *not a hobby* but a responsibility to provide public service. The cost to the amateur is high and the pay is, generally, low. It is not hard to understand that a man wanting a hobby would not turn to ham radio. Nor is it difficult to feel sympathy for the amateur radio man who is now "turning in" his license to turn instead to puttering with hi-fi electronics, which allows him to relax in an atmosphere free of guilt but as technically challenging as ever . . . — *Steven J. Bomba, K9IER, Madison, Wisconsin.*

☐ Your editorial in February *QST* does a masterly job of analyzing a development of genuine concern to all radio amateurs. You considered most of the possible reasons for the apparent decline in the amateur population, but as I look back over some 40 years as a ham, I think of one or two areas that you may have overlooked . . .

Today there is little real challenge in entering amateur radio. Whereas one once darned well had to learn how to utilize schematics, use his bench tools, test and trouble-shoot, now all that is required is a source of cash (or credit), plus a not-too-complex or involved capability to absorb instruction on code and theory — also for cash or on credit. In a sense, amateur radio has been pretty much relegated to the super-market philosophy. A license is in many, many cases essentially a package deal, and this neither offers a pathway to a new and exciting arena of effort, nor does it develop the camaraderie that gave strength and purpose to the amateur radio group, as it was constituted, possibly as recently as the late 1930s.

Furthermore, I see a definite significance in the electronics-oriented population explosion induced by World War II. Thousands of military personnel were brought into contact with a new and somewhat mysterious thing, and for the first time met radio, radar or sonar on a basis geared solely to developing many so-called operators in as short a time as possible.

I believe this had the effect of creating a mass of new amateurs, but with emphasis on quantity rather than quality, and without the basic and dedicated type of interest that could support sturdy growth and development in a world of burgeoning collateral interests that seemed more attractive than hamming could ever be.

Consequently, amateur radio lost not only a certain element of unity, but it also lost, in a sense, its sales appeal as well as its best salesmen. A by-product of all this was the development of a dog-eat-dog attitude on the part of all too many hams, with the result that numberless potential newcomers became wholly disenchanted with the game during their pre-license period, or very soon after being licensed.

You suggest that implanting the virus is best accomplished by visits to the shack, and I must agree

in principle. However, in thumbing through the logs of past years I find notes concerning scores of visitors who initially reacted with enthusiasm, were licensed, and then found themselves unable to digest the actualities of operation on the ham bands.

What we grievously need is more maturity all the way down the line. The quarreling and back-biting among individuals, organizations, publications and splinter groups is a significant element in the whole sorry picture. The utility of ham radio, the pleasures of operating and the opportunities for technical exposure *can* still be sold to newcomers — but not as long as the facts and actualities of the game today make liars of the salesmen. — *Al Smith, W2AFJ/K3ZMS, Doylestown, Pennsylvania.*

☐ Could the problem be due to SWLs, boy scouts, et cetera, looking at the garbage that NSD/1 puts out indicating "It just ain't worth it!"? If so, I can not blame them! — *Errett G. Taylor, W7BYF/K7YSB, Scottsdale, Arizona.*

☐ Fundamentally, what makes a ham? Two things: The thrill of communicating with someone far away, and building and perfecting the rig to do it. When the radio bug first bites, the victim memorizes the code and makes his 5 w.p.m. He studies the *License Manual*, gets his Novice ticket, and then makes plans to *buy* a rig. Every Young Squirt used to build his own first receiver and transmitter. Nothing else was good enough for him. There are some such now, perhaps, but I've never met one. The beginners I know started out with factory made jobs — and in most cases, pop bought it. The thrill is absent . . .

. . . The age of purchased rigs is upon us. The age of the pioneering constructor is decadent. — *N. A. Canfield, W6KKF, Petaluma, California.*

☐ . . . Are we as quick to help as we once were? I can say positively that I've helped beginning hams as much this last year as during any other of my 34 years as an amateur. I hope all other hams of my "graduating class" can say the same. — *Ken Hungerford, W7CVJ, Moscow, Idaho.*

☐ . . . Ask the fellow who showed some interest in ham radio, and did not follow through. Ask the has-been Novice, who did not continue. Ask the old-timer who has let his ticket drop. I did, and got some answers: "I cannot understand half what they are saying, how can you listen to it?" "Crowding on c.w.; plenty of room, but just start to QSO and guys move in and swamp you; phone gear too much money." "If that is ham radio, I have had it. Start a QSO (even with some old friend) and someone moves in and clobbers you — then tells you to get some good gear." — *Dayton L. Plifer, W0VE.1, North Platte, Nebraska.*

☐ I think we should stop evaluating the strength of our organization by just its size in numbers . . . and become more concerned over improving our own skills so we can be better servants of the people through the use of amateur communications. — *Ron Poduska, WN4APT, Springfield, Virginia.*

☛ . . . I'm not the least bit worried about the number of license applications dropping. I can very well understand your viewpoint but with the bands as crowded as they are and as many "sorry" amateurs as we have now, I don't see why we need add to the problem. I may be wrong but that's exactly how I feel. . . — *Larry Nelson, WA5MHE, El Paso, Texas.*

☛ . . . A factor which limits the addition of newcomers to our ranks relates to the tremendous advance in electronic technology coupled with the decrease in parts which lend themselves to alteration to suit a specific requirement . . . Scrounging parts from TV and radio receivers has its appeal for the fellow who can use them, but how can the tyro evaluate the usefulness of some of the parts he finds in the jungle under a punched chassis? Since coils are no longer wound on 2-inch forms and tuning condensers cannot be restored once plates have been pulled out, the cut-and-try approach has its limitations. Everything is now welded, riveted or press fitted. If you wish to use parts for a purpose other than that intended, you have to hazard a pretty accurate guess before you reach for the pliers and screwdriver. The breadboard layout has also passed into limbo and I, for one, see no reason to revive it. To purchase new parts may be more costly than buying the completed product, but who can learn about ham radio by buying the completed product?

The range of useful knowledge has so far expanded that the newcomer may leaf through the *Handbook* and wonder where he should start. The fact that fundamental laws of electricity apply with equal certainty to reception and transmission and to TV, vacuum tube and transistor circuits is little comfort to the fellow who has not yet learned how to apply solder. Even in some *QST* articles for the beginner and Novice, coils are described by inductance and not by diameter and number of turns. Maybe there is such a thing as making instructions too simple, but some fellows progress rapidly if given complete cook-book directions . . . To keep new blood coming into the fraternity, we must seek the opportunity to tell the newcomer about things we have learned the hard way. — *Paul R. Flaughter, W8VEL, Cincinnati, Ohio.*

YOUR NOVICE ACCENT

☛ Upon receipt of the leaflet "Your Novice Accent," I wondered if I had been reported for sloppy operating practice or some other shocking offense. I think it is the best help to the new ham that there is — I was never aware of my Novice accent until reading this. When a Novice hits the air, he can usually copy c.w. at about seven words a minute and is not familiar with standard operating practices. If every Novice had one of these booklets, I'm sure that code operating would be more fun for all of us. We could do the job right instead of just following the trend . . . — *Ken Vincent, WN7EFP, Shady Cove, Oregon.*

[EDITOR'S NOTE: "Your Novice Accent," by Keith Williams, W6DTY, originally appeared in *QST* for November, 1956. Reprints have been mailed by ARRL Hq. to every Novice licensed since then.]

CALL-LETTER PLATE INSPECTION

☛ Hams in North Carolina who have amateur call letter plates for their cars may have trouble figuring out the new automobile inspection schedule due to go into effect in March. As set up, the month during

which an auto is to be inspected is determined by the last number on the license plate. An inquiry to the N. C. Dept. of Motor Vehicles brought the reply from the assistant director that since ham plates ended with a letter, the call area number, 4, is to be considered as the last number. This will make autos with call letter plates due for inspection during April. — *M. W. Wood, Jr., W4PVT, Winston-Salem, North Carolina.*

CODE COPYRIGHTS

☛ A word of warning to amateurs considering code practice activity over the air: Before buying any records or tapes make sure they are not protected by copyright. If they are, it will be illegal to put their contents on the air, since this would be the same as reproducing the contents of a copyrighted book. It would be advisable to seek permission in writing from the copyright owner. — *W. E. Cary, W6DYQ, Santa Maria, California.*

DXCC HONOR ROLL

☛ Congratulations on your recent Honor Roll stand. For the past month I have been weighing the pros and cons of the subject but it was not 'til I was looking through my meager collection of *QST* that I ran across something which now truly haunts the fraternity. I refer to an article ("DX of the Month Club") by W6ISQ in the June, 1962 issue . . . Now this story could be reprinted as an editorial but this time it would be read with perhaps a little more depth and insight.

In my opinion this mess is getting to the point where DXCC should be rephrased DX-pedition, Continuing Countlessness. This may seem unreasonable on my part, but when I work a "new country" I enjoy knowing his name, rig, WX and perhaps even his vocation. Nowadays the DX QSO consists of four words: W1AAA 58 QSL QRZ. In some people's eyes this is still not too bad but the kicker comes in about three months. You rush to the mailbox and find an envelope postmarked in some exotic paradise like Alabama or New York City. With great anticipation, and in some cases a fit of heart seizure, you rip open the flimsy container with the rare Lincoln on the outside. There it is — that beautiful work of printing art with all the nice information on it, like "W1AAA 2xSSB 59 1/1/66 14 Mc." Down at the bottom there might be small pen scratching or maybe if you're lucky a name stamped on. This is a DX QSL card. For the same buck you could have bought a few IRCs, maybe an airmail stamp and received a card from a DX station.

Thank you for taking the first step in bringing the true meaning back to the word "DX". — *Ralph McClinton, K1SCQ, Milton, Massachusetts.*

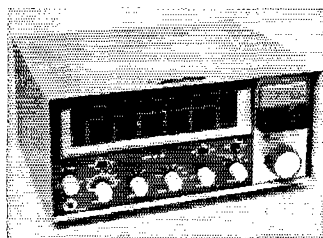
FB 4X4 COOPERATION

☛ I congratulate the Israeli radio authorities for their very sensible and progressive approach to licensing of foreign hams in Israel, with practical minimum of red tape and without insistence on reciprocal agreement. This courtesy extended to non-Israeli amateurs is an important step in promoting good will and friendship among nations.

This new policy of Israeli Ministry of Post is not very surprising as they have been, for quite a long time now, very liberal in granting operating permits to foreign nationals. I spent many months in that wonderful country, and am the proud owner of 4X4PQ. — *Stan Dabrowski, VE8ECN, New Delhi 11, India.*

• Recent Equipment —

Hallicrafters SX-146 Receiver



THE SX-146 is a transceiver-style amateur-band receiver without sending facilities, having been designed to mate with the yet-to-be-produced HT-46 transmitter for transceiver operation. The transceiver philosophy has resulted in a band-selection arrangement that has some rather desirable features, as compared with other methods that have been used to get uniform kilocycle handsread on all the h.f. amateur bands. The SX-146 is a single-conversion job using crystal filters in a 9-Mc. i.f. system. The high intermediate frequency takes care of the image problem. Further, the fact that the i.f. is not tuned across a range of several hundred kilocycles for ham-band coverage makes it a simple matter to prevent feedthrough of unwanted i.f. signals.

Of course, in any single-conversion receiver the h.f. oscillator has to cover a different frequency range for each amateur band, in order to get the right injection frequencies for the mixer. In the SX-146 there is only one v.f.o. tuning range — 5.0 to 5.5 Mc. In conjunction with the 9-Mc. i.f., this leads to the classic 4- and 14-Mc. combination when used alone, thus taking care of two bands. The other three, 7, 21, and 28 Mc., are handled by using a crystal-oscillator-and-mixer

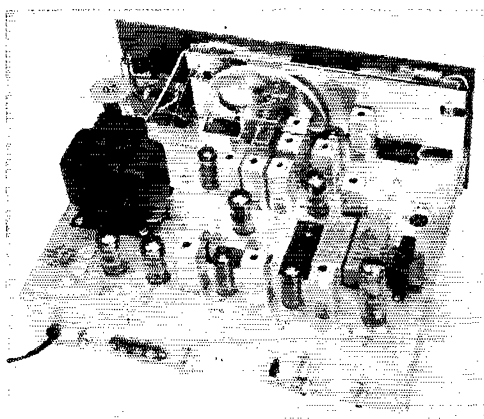
setup to convert the v.f.o. range to the part of the spectrum where it is needed. Since the crystals are inherently stable, the overall stability is essentially the same on all bands. This is not the first time this scheme has been used for reception, but we do not recall having seen it before in an independent receiver, its use having been confined to a few one-box transceivers.

There are nine tubes in the receiver, some of them multi-unit types. The block layout is shown in Fig. 1. V_1 , the r.f. amplifier, and V_{2A} , a triode mixer with cathode injection, are gang-tuned with each having the basic tuned-circuit scheme shown in Fig. 2. L_1 and the tuning capacitor form a 7-Mc. tuned circuit coupled to the antenna for 50- to 75-ohm input. On 3.5 Mc. a 240-pf. fixed capacitor is shunted across the circuit to lower its frequency. On 14, 21 and 28 Mc. the circuit is shunted by successively smaller amounts of inductance to make the circuit resonate in the proper band. The three coils used for this purpose are connected in series: all three are used on 14 Mc., L_3 and L_4 are used on 21 Mc., and on 28 Mc. just L_4 . This avoids the more-complicated transformer switching that would be needed if completely independent circuits were used for each band. The arrangement should interest home builders.

The receiver has provision for three 9-Mc. crystal filters having bandwidths suitable for s.s.b. (2.1 kc.), c.w. (0.5 kc.), and a.m. phone (5 kc.). The s.s.b. filter is furnished as standard equipment, the other two being available as accessories. When more than one is installed the desired one can be selected by a panel switch. The filters go between the mixer and first i.f. amplifier, putting the principal selectivity as close to the front end as is possible in a practical receiver design.

Two i.f. stages follow the filters, the last working into a diode a.m. detector/a.g.c. rectifier and a triode product detector. The b.f.o. for the product detector is crystal controlled, with two crystal frequencies available for selection of upper or lower sideband. The oscillators are separate sections of a 12AT7, the one required being switched on by closing its cathode circuit.

The a.m. detector is followed by an automatic noise limiter using a semiconductor diode. This is useful in a.m. reception but of no value for s.s.b. or c.w. since it is carrier-operated. The



Chassis layout of the SX-146. Oscillator and converter circuits are clustered around the tuning capacitor. Two of the i.f. filters are shown in place in this view at right center.

The i.f. and audio system runs along the near edge of the chassis.

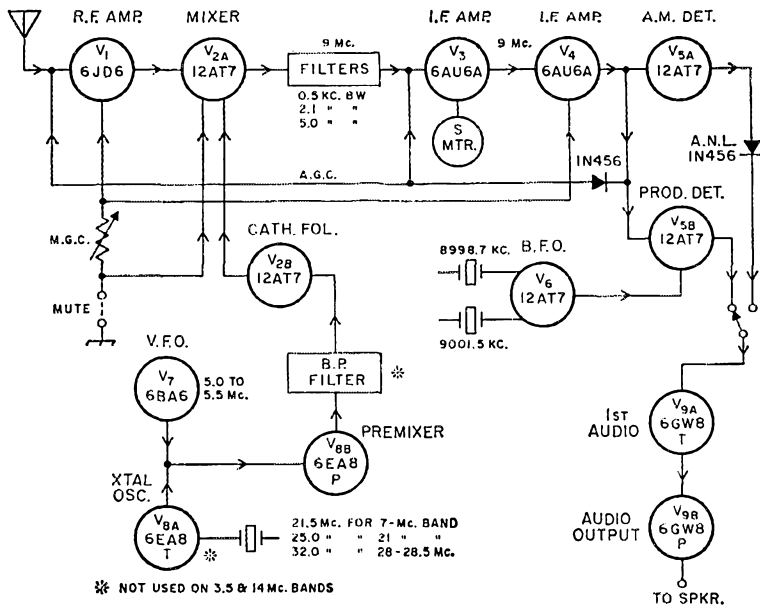
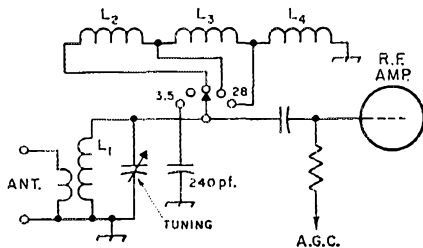


Fig. 1—Block diagram of the SX-146 receiver. Power supply (integral) is not indicated in this diagram. Only the 2.1-kc. i.f. filter is furnished as standard equipment.

output of either detector can be selected by a switch for delivery to the audio stages, the triode and pentode sections of a 6C1W8.

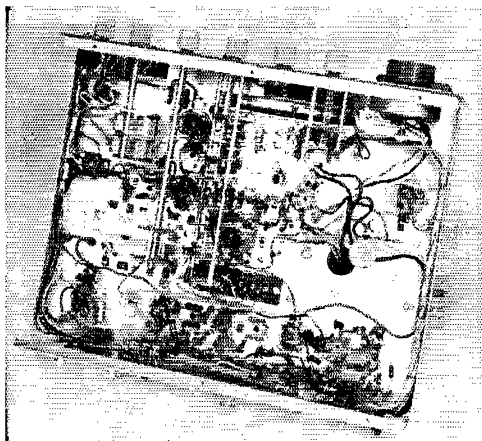
The manual gain control operates on the r.f. and last i.f. stages, and the automatic gain control is applied to the r.f. and first i.f. stages. The first i.f. has the S meter in its cathode circuit. There is a switch for shutting off the a.g.c., a much-needed control that unfortunately is not available on most current receivers. The bottom end of the manual gain control is above ground by a 1/2-megohm resistor which allows muting the receiver by a pair of contacts on the antenna-changeover relay when transmitting. For normal reception the muting terminals must be short-circuited.

So much for the overall circuit rundown. There are some interesting points in the circuit design. One is the a.g.c. system: the a.g.c. voltage is applied directly from the rectifier to the first i.f. stage, with no delay in rise time other than that caused by the r.f. filter in the amplifier's grid



circuit. As the time constant here is negligible, the gain of this stage is cut back practically instantaneously when the signal strength rises. A fairly long delay is used on the r.f. stage, however, and the delay here causes the overall control to release slowly. The result is a fast rise time—and a very rapid rise in the S-meter reading—with an appreciable hold-in period. The S meter consequently holds at the signal's peak level. It reads the same, for example, on a c.w. signal either at normal keying speeds or with the key held down. The circuit, which could easily be applied to most receivers, is given in Fig. 3. The gate diode is not an essential part of it: the diode is used in the SX-146 to isolate a positive d.c. voltage that is applied to the a.n.l. circuit.

The power-supply circuit, not indicated in Fig. 1, is simple: a non-tapped transformer with a semiconductor half-wave rectifier and an RC filter with three high-capacitance electrolytics and two resistors. It does a good job, hum in the headphones being negligible. But one thing is missing that is usually taken for granted in a communications receiver—there is no voltage regulator tube for the oscillators. And although there is nothing particularly strange-looking about the 5-Mc. v.f.o. circuit—it is an electron-coupled oscillator using a cathode tap on the tuned-circuit coil—there has evidently been some nice balancing of values in the design. The manual gain control can be wiggled back and forth without a perceptible change in the beat tone of a c.w. signal, even on 10 meters. Also, a change of ± 10 per cent in primary voltage about a mean value of 117 volts causes, at the most, a change in frequency of only 20 cycles or



The tuning capacitor for the r.f. and converter stages is at the upper left in this below-chassis view of the SX-146. The long shaft to the right of the capacitor operates the switch that selects the i.f. filter to be used. The band switch is the long one with several wafers.

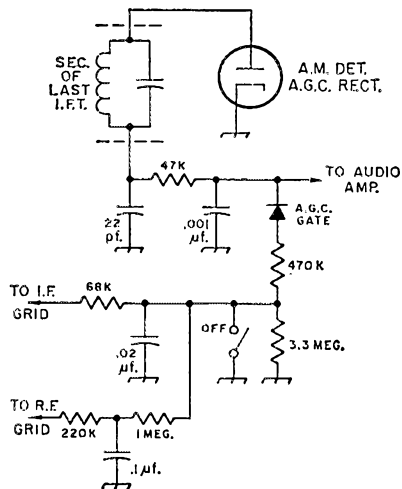


Fig. 3—The a.g.c. circuit in the SX-146 has different time constants for the two controlled tubes, giving fast attack with peak S-meter reading plus slow decay.

so in the v.f.o. frequency after the oscillator has had a few seconds to get used to the shift in heater voltage.

The dial calibration is almost linear over the 500-kc. range, and has 5-kc. division marks. The average tuning rate is a little over 40 kc. for each turn of the knob — perhaps a little fast for some

tastes, but not actually difficult to handle for s.s.b. The conversion frequencies are such that frequency increases from left to right on the slide-rule dial on 3.5 and 7 Mc., and from right to left on the other three bands. The 500-kc. tuning range means that the 10-meter band must be split into four segments, thus requiring four crystals to provide the beating frequencies. Only one of these is furnished, that for the 28.5 to 29-Mc. range; the others must be purchased separately. The ganged r.f. and mixer stages have a separate "preselector" control, and must be aligned along with the main tuning. This is getting to be customary on current receivers.

An available accessory, in addition to the two filters mentioned earlier, is a 100-kc. calibrator which plugs into a socket on the chassis.

The receiver's v.f.o. can be used to drive an accompanying transmitter for transceiver operation. The v.f.o. output for this purpose is taken through a phono jack on the rear of the chassis. The take-off point is the cathode of V_{2B} . There is also provision for making use of the receiver on most frequencies outside the amateur bands in the 3-30-Mc. range, in that an external oscillator can be substituted for the built-in v.f.o. and crystal oscillators. A phono jack on the rear is included for feeding the beating frequency to the cathode of V_{2B} . The switch that makes the connection also cuts off the internal oscillators. A list of required frequencies for various tuning ranges is given in the instruction book.

The book, incidentally, is one of the few we have seen that explains what is supposed to go on when the various switches are in their numerous positions. Since tracing out the pictorial switch symbols used in commercial circuit diagrams is about as confusing a process as anyone could hope to avoid, the SX-146 book deserves a few cheers from the receiver owner who wants to find out how the set actually works.

— WIDF

Hallicrafters SX-146

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

Width: $13\frac{1}{8}$ inches.

Depth: 11 inches.

Weight: 18 pounds.

Power Requirements: 55 watts, 105-125 volts, 50/60 cycles.

Price Class: \$250 less accessories.

Manufacturer: The Hallicrafters Co., Chicago, Ill.

Strays

The Somerset County ARC (Pa.) hosted the 1965 Picnic of the Graveyard Net. The local paper, a daily, in writing up the story, headed it "Graveyard Net has Picnic." They placed the story in the Obituary Column!

It kind of bugged him! Isaac Roach thought the FCC's wit was a bit nit when it assigned him the call, WA3DDT. However, things are a mite better now. The FCC recently changed his call to W3-ABI. (From Actna Life & Casualty News Release)



How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

Where:

"I'm considering a DXpedition this summer — what's rare enough to interest the lads?" We receive more than a few inquiries along this line. They're not easy to answer concisely.

W6RW takes care of things nicely for the moment, however, thanks to his recent survey of sentiment at January's joint meeting of the Northern and Southern California DX Clubs. Roger asked fifty-six 250-or-more-countries-confirmed DX men which ARRL DXCC Countries List items they still sought. The consensus, relayed through W1WPO of our DXCC Desk, comes out like this:

- St. Peter & Paul Rocks, all 56; Albania, 50; Azalega Island, 38; Heard Island, 35; Rodriguez Island, 34; Glorioso Island, 33; Laccadives, 32; Rio de Oro, 28; Aldabra Islands, 26; Navassa, 22; Iraq, 22; Spanish Guinea, 21; Malpelo Island, 20; Turkey, 19; Tromelin Island, 17; and Kamarin Island, 17.

There you are, you chaps with the wanderlust and time on your hands. The DX gang, to put it mildly, is QRV!

But be careful. DXpeditionary circles were jolted by the tragic disappearance of K7LMU and ZL2AWJ at sea in late January. Chuck and Ted, with others, left Wallis for Samoa aboard ketch *Marinero*, evidently encountered a disastrous storm, and are since unreported. Colleague W9WNV, traveling elsewhere at the time, joined the search for their whereabouts. W9WNV-K7LMU operations from remarkably rare regions in 1965 helped inspire new peaks of widespread DX interest.

What:

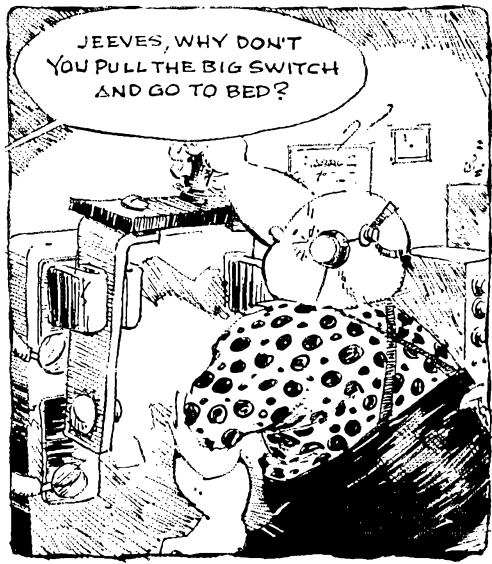
You have only until the 23rd of this month to file those ARRL DX Test reports, you know. Might as well do it right now before it slips your thought. Then man your dials and switches again to munch some of the multiband sweetmeats mentioned in this springtime DX sampler courtesy "How's?" correspondents far and wide. Remember that "EA9AZ (362) 16" means that EA9AZ was observed 362 kc. above the lower band edge at 1600 GMT.

160 c.w. quiets down now after a notably successful season that saw W1BB and friends chasing and/or working one CO2QR, GX3BH, DJ68I/LX, DLs 2CT/LX 9KRA, E19J, a flock of Gs, G13PDN, GM3FXM, GW3s P5P LDH NJW NNF PMR SSK, HB9s CM TT, KV4CI, LZ1ARN, NS1A of the BC ship *Caroline* off England, OE1FLW, OH3NY, OKs 1ALG 2KGU 2KGV, OLs 1AEF 3ABO 6AAR, PA6s DC PN, VK5KO, VO1s AW P'B HN, VP8s 1PV 9EU, XE1OK, ZB2s AE AJ AL AAL, 4U1TU, 5N2AAF, 6Y5XG 9L1HX and 9M6BM. Conditions tapered off when the new year arrived but some outstanding QSOs of late '65 featured DL1FF working HK4EB, JA6AK and 9M4LP, and G2PL catching 9M4LP. With sunspot activity gradually building up, what will next season bring on 1.8 Mc? Will anything pop on 160 before next fall? Have we had it for this sunspot minimum or will the 1966-'67 topband season be another dinger? Interesting questions, and there are plenty of long-wire fans determined to answer them.

15 Novice doings come next, for we've been somewhat neglectful of our newcomers lately. The 21-Mc. band is quickening nicely, so WNs 2RTX 2UHK 3DYT 4YZC 8QJK 9OZC and 9PQY decorate their shacks with

colorful wallpaper from CP5EZ, CR6s EI HH JA, two dozen DJ/DLs, DMs 3BLOG 4PKL, EL2D, F6s 3IZ 3NB 3YR 80P 9ID 9JY 9MC, FO8BI, plenty of Gs, GC4LI, GI3s AXI SSR, GMs 3HSF 3MPA 3P1P 6TF, GW6YQ, HA6s 6VK 8VH, HB9s ACP TE, H1IARM, HK7YB, I1s C/S IR QC, JAGETJ, KL7s COV CUK, KP4s BPW CKY, LU8 7BN 80I, OA-INQN, OE1NY, OHs 1AA 2BZ, OKs 1FF 2BCI 3HM, ONs 4DK 4FU 4NC 4NM 5DS 5IU 5LB 5W, OZ4H, PA6s GMU GNU JVM LX ZAV, PJ3CI, a dozen SMLs, SPs 5YC 8MJ, TL8SW, UB5LS UW3EX, VP8s 1PV 2AR 2KJ, WS6BW of Samoa, YO8CF, YV6s 5BHR 9AA, ZC4KF, ZL1HW, 5A3TX, 9HIAF, 9J2IE, 9Q5s JR and P. . . . Moreover, on 40 meters WNs 3DQR 4BCL 4YZC and 9OZC gobbled up CM6LA, CO5s EC FA, HK4YL (185) 1, HP3MC, KL7AL, KR6BF, KZ5EJ, OX3JW, PJ3CJ, VE8CO, VP8s 1PV 7DI, W9YKD/-K54, WBQOE/VP9, WP4s CNA COW COZ, XF2s AKG CCI, YV4OE and ZF1BP. . . . Down on 80, where Novices aren't expected to work much beyond the back fence, WN4YZC comes up with KP4AQL and 6Y5BB. Listening to some of the freshmen knocking 'em off on 15 lately inclines Jeeves to endorse the old adage that DXers are probably born, not made.

15 phone DX is spring-feverish with Ws 3IINK 8YGR, Ks 1ZJA 6CAA 7YDZ 8Y80, WAs 1BDR 1CYT 4YDR 8GGN 8MAT 8MGD 9BCK 9IBT 9OIT 9LWC, WB2s JYM OLN, VE2ANK and listener P. Kilroy racking up CE Ks 1FL* 17, 3KW (400) 23, 3XG*, COs 1EG* 17, 2DL*, 2DL/* 5BP* 5QX* 6FA* 7AM* 8HT* 8RA* (310) 22, CRs 3KD* (160) 16, 4AG* 19, 4BC (315) 17, 5SP 6AR* 6CZ* (290) 8, 6DU* 6DX 21, 6FE 6JA* 19-20, 7BF (260) 19, 7GF 19, 7TZ* (230) 19, CT1s EE PQ (350) 18-19, SQ (413) 14, CXs 2AAJ* 22, 4AAQ (407) 18, 5AS* (270) 22, 7BY* 8IB*, EA8s AII (357) 16, 8AQ* 15, 8BQ* (250) 14-15, 8FD 17, 9AZ (362) 16, ELs 20 8H, ET3USA (372), FB8s XX* WW* both (120), FG7s XL (375) 13, XT XY (315) 20-21, FM7s WE* WI* WN* 18, FS7RT (440) 20-22, FR7s ZD* ZI/mm (378) 14, GCs 2AAO (405) 16, 8HT, GDs 3RFX (365) 14, 8IA 16, HCs 1CB (316), 1JJ (440), 1JQ* 1RY (341) 16, 2TH (210) 16, 5BJ* (20), 6GM* 7FD* 8FN* 15, H1s 8AGS* 16, 8JGM (287) 21, 8XGP (343) 16, HKs 3AZ* 8AI 15, HPs 1AP* 19, 1GH* 3MC (400), 9FC/mm 15, HRs 1CP* 17, 5ML (390) 19, HV1CN, IS1RUA (390) 16, JAs 2CUE* 2OYE* 2DDN (370) 23, 5BDZ* 8BOV (370) 1, 8BUW*, K9HLL/-KH6*, KG4CB* 21, KJ6DA, KL7s FAO WAH, KM6CE, KP4s BAL* CAX 19, CS* PT*, KS6BV 21, KV4CX*, KW6EM, KX6s BQ BU (426) 23, DC EA, ten KZ5s, LAs 6U 7VE (390) 14, LU8s 3DRH 6MP*, LZ2ZA, OAs 1W (43) 19, 2J 3J 4MM (380), 4QH 14, 4SG* 6AM (435) 18 OD5s AL 12, EG (360) 16, OH1AA (360) 14-15, PJs 2AP* 3AJ*, PZ1s AP* CM*, SM1BZH/mm 15, SVs



*7862-B West Lawrence Ave., Chicago, Ill. 60656

1D1* 0WF (100) 18, TF2WJK (410) 15, TG8 81A* 8RH* 16, 90P (420) 16, T12s NAG W, TN8s AA* HK* (252) 17-18, VK9J, VOIDW* 16, VP8 1RC* 15, 1WS* 17-20, 2AR* 17, 2AX* 2DA* (238) 13-18, 2GAJ* (215) 13, 2GAZ* 2GLE (370) 15, 2KJ 2SJ (380) 17, 2VD (395) 20, 2VE (395) 19, 6BW* 6TP* 6LX* 7KI 1, 7CC (215) 20, 9AK 9BP* 9IT*, VS8 6FF 9AAS (386) 16, 9AFR (375) 17, 9AWR (248), 9PCZ (320) 17, Ws 1RYT/KV4 23, 2IDL/HIT 15, 7I1H/YN6 19, WAG8FS/KM6 7, many XEs including 3MF 19, YNs 1RL* 22, 31A* (250) 17, 4GVH* 4JAB* 4WD (410) 14, 4VW, YV9AA, ZB2s AJ (435) 14, AK 17, AO (320) 17-18, ZD8AR (420) 13, ZE1 JE (372) 19-20, 2JJ* 20, 3JO* 6JL* 15, ZS8 3AH* 3HT 8K (255) 17, 9G* (239) 16, ZLs 1CA* 2ABP* 2BE* 23, 2UD* 3KA* 4UISU (370) 15, 4X4QC (400) 7, 5As ATK 14 3TX (375) 15, 5TJ* 5H3JR, 5Js 31R (405) 16, 4RCA 5LR (417) 15, 5N2s AAF FEL* (220) 17, JRM, 5R8AS (405) 14-16, 5VZ8CM (435) 17, 5XSU, 5Z4JW, 6Y8s AH* 19, WF* 21, 7Q7s BN 20, PBD (360) due for QRT, 9F3USA (350) 15, 9G1s FL* 18, KM* 18, 9J2s BA (437) 16, DT* 17, FK JC* 9Ls HS* JW (435) 18-21, 9Q5s AA AI* NT*, 9Y4s LQ*, R*X* R*X* and VT*, the asterisks representing non-s.s.b. specialists.

15 c.w. is a bomb for five-year licensees, too, as Ws 1BGD 1CNU 2ICO 3AG 3HNK 4DXE 8YGR 9CVZ, Ks 1ZJA 6CAA 8HLR 8YSO, Was 1CQA 1CYT 1DBR 2LDX 3CUO 4YDR 5EID 6JDT 7BOA 7BOB 8GGN 8MGD 9BGK 9BRT 9NHZ, Wbs 2FMK 2J1D 2JYM 2NLH 6MEQ 6NXX, VE2s ANK and BUW rake in CE1s AV DN (51) 22, CMs 1AR 21, 2WS, CO2BO (45) 14, CRs 3AD (65) 20-21, 4AE 6DX 6EI (50) 16, 6FW 6HG (63) 19, 6HH 19, 6JA (100) 19, 6JJ 6LAS 7HC 18, 7HD 7IZ (60) 18, CX2s CO (30) 22, P.D. DI2DR, DM3s LOG ZH, DU7SV (90) 0, E18H, EL2AD (20), ET3USA, FB8s RW XX both (120), FG7s XQ XX, FL8s MC (50) 15, RA, FO8BI (59) 20, FR7ZD 17, GCs 3KCE 8HT, HC8s 1JQ 2SB (70), HK4J, HM8s 1AB 1DE 23, 2BV 5BG 5CO 5CY, JAs 1AFX 1FAF 1NUH 1SEP (40) 1, 1YFT 3RGE 3FKP 3GZN (40) 23, 4AHV 5AJY 6RXX 6CUX (53) 0, 7BJL 8AUS 8ZO 8CJ 23, KA2Ks, KB6CY (18) 22, KG6AAy, KL7JDO (50) 21, KM6DJ (61) 22, KR6s MM 10, KV4s AA CT 12, KZ5TD 18, LZ1KPK, OD5LX (20) 14-15, OE8s 2BSL 5CA 5PWL, OH0VF, OX3UD 19, QY2H, PJ2s ME MI (30) 20, PZ1s RF CP 22, TN8AF (50) 18-19, TT8AE (40) 19, TY3ATB (35) 14, UB5KAK 15, UH8BO 12, UL7HB 10, UR2KAN, VE8s 8BZ 0MC (44) 18, 0NG, VKs 9N (90) 21, 9WE 6KH, VO1AW, VP8s 1WS 2AR (52), 2GC 17, 2SY 8HR (80) 20, VO8AW (103) 13-16, VR8s 2DK (40) 23, 61C (65) 22, VS9AMD, WA1EAV/VP 17, WH6FOO, WP4s COW 18, CPG 30, XEs 1FE 2DD, YN1JLA, YO2BB, YS1RFE (30) 20, YU3YU, YVs 1AR 2AH, ZB2s AM AP, ZC4GB, ZDs 5M 7IP (59) 17, 7RIH 8WZ 19, 8TV (33) 19, ZEs 1AS 1BO (59) 19, 3JJ 3JO, ZLs 1AJU 1ATH 1HW 3Is (55) 23, ZP5EC, ZS8s 1OU 4KC (34), 5K1 6AA 6AMS, 4U1PTU, 4X4s NVE (50) 16, PC (410) 18, UL 14, VG 14, 5A3TX, 5R8s AS (95), BC CB (110) 15, 5VZ8CM (35) 19-20, 6W8s BF 19, BL DD, 7G1A (53) 19, 7Z3AB, 9G1s FQ (29) 1Y, 9H1s AB AD 16, AF (30) AG, 9J2s GJ 18, IE (98), JB (40) JC (72), W 21, 9K2AD 14, 9L1TL (40) 17, 9M4MX, 9Q8s CZ PA (75) 19, QG 1 and TJ.

40 c.w., except for encroaching SWBC monsters, has never seemed better. Ws 1BGD 1CRX 1VAH 2APH 2ICO 3HNK 4OMW 4UJT 6YKs 8YGR 9ACS 9NN, Ks 1ZJA 3FKU 3SLP 6CAA 8HLR 8YSO 0JPL, Was 1BDR 1DBR 1CWT 2J1D 2JYM 2LDX 4UMX 4YDR 5EID 9BRT 0FRM, Wbs 2LSV 2NLH 0CGL 6MEQ 6NAX 6PCV 6QOE/VP 9 and VE2BUW have to practically beat off CE1s 1AD 1DN (14) 3-7, 2BC 4, 2CR (14) 7, 4AD 0AC 5 of Easterlike, CMs 2BL (17) 4, 2II 3, 6LA, COs 2BB 2BO 2DR 2FC 2FY (9) 6, 2RL 3BU 0, 3NR 6AH 6PP 8AE 2, GRs 6AI 19, 6EI 7CD 7CI, CTs 1GE 1JD (24) 2, IOI 2AA 0, GXs 2CO 8CD, Germans galore including a dozen DMs, 0C7S 13, EAs 6BD (10) 1, 8CP (15) 1, 8ER (28) 12, ET3USA, FG7s XD XF (2) 15, XJ (12) 15, GDSUB, HAs 1KSA 5KFRs YL Eva, H8XAL, H8s 3AVK 3ASJ (21) 7, 4PP 7AJP 3 7BE, HMs 1DE 13-15, 1DM 3CG 15, 5CL, HPls IE MN, HRs 1DK 1FD 1RD (8) 4, 5NLC (9) 15, HV1CN, IT1AGs 3, JAs 1ADN 1EQM 1PJ 1KHK 1KKZ 1MJA 1MAM 1PAX 1PVK 1RRU 1YQH 2CIR 2BHG 2EPK 3AYL 4BJO 4CTUE 4UE 5AOY 6BE 7AZL 8RRD 9SI, KIRNA/KG4 1-2, KAs 2KS 2PG (8) 15, 8JJ 9MF 15, KB6CY (11) 7, KL7s EDY PI (10) 3, KM6s CE (5) 10, DJ (10) 13, KP4ASN, KR6MM 15, KS6BO, KV4s AA

(15) 23, LB, KW6EK (12) 10, KX6BU, KZ5s AY FX JF (145) 14, TV (16) 4, TW (20) 12, LU8DQ, LZs 1KKZ (3) 12, 1KPK (23) 12, 1KPV 1KSF 2KGO 2KHN 2KZK (4) 0, 2KSK 2SA, OA1s KPW NUO (5) 11, OBs ITAW 3FS, OXs 3BB (10) 1, 5CF, PJs 2ME 3CC (6) 5, a dozen PYs, 2L8AY/mm 1, SM5CCT/mm 5, SP1BHX, SVs 1CC 0WAA, TG9AI), T12LA, UAs 1KED 1 of F.J.L.; 2AR 22-23, 2CD 2, 9ER (15) 14, 9KCA 19, 9IX 18, 9VB (8) 1, 0EY 0GU 14, 0KFP 15, 0KKB 12, 0KCK 0KZD 0LII 11, 0NC 14, UB8s KAC KBA 0, KJE QS, UD6BV 0, UF6HK 0, UP2KBA 23, UZOKCR, UTSPX, UW0FK, UY5III, VE8BB, two dozen VKs plus VQ0AK, VO1HQ, VP8 1PV (4) 2, 1WS 2AZ 23, 2SV 2VD (14) 23, 5AR (1) 10, 6AK (10) 10, 6BW 6HX 6PJ (8), 6YL 7NP 6-7, 7NQ 7NW (1) 0-1, 8HJ 9L (4) 11, 9WB, VO9TC (3) 0, VR8s 2DK (6) 12, 4ED (7) 11, VS8 6FF 14, 9MP (15) 23, WPCOZ (167) 11, XEs 1NL 4, 2CJ (10) 8, 2DDF (21) 5, 2POU, YN1s JLA SL, YOs 2AFB 5TH 6AW 7VS 7VU 9EF, YVs 1AD 1EN 4FR 9 4NB 6, 9AA, ZC4GB 17, ZDs 7IP (5) 6, 8RH (3) 3, ZLs 1AIR 1OY (3) 7, 2OY 3VM, ZS8s 5QU (1) 23-4, 5UR 5, 6OS (3) 4, 4X4s FA 5, MR (5) 23, NV (10) 1, NXM (15) 1, PC QA (7) 2, UF (8) 0, 5A3TX, 5H3JJ (2) 4, 5VZ8CM (1) 0, 6O6BW (11) 23, 6Y5BB (4) 1-9, 7G1A (30) 6, 7X2AI (1) 5, 9G1FQ (10) 4, 9Ms 4MT (10) 14, 6DH, 9Y4s DS PS and RS (20) 15, etc. Forty phone produced CO2ME*, EA8DB* (43) 7, G2PL, HR1s RD RP, IT1PRB* (10) 9-10, JA1AEA, K4C4U, KP4s BBN (229) 4, CL, KS6BO, PY7AOT (65) 9, T12TI, VK2AVA (92) 8, VP8s 1BE 1JR 2LD 2VD (209) 4, 5AR 1, 9AK 3, 9EP 3, XE2BE 1, YS 1SR, YVs 1PW 7, 5AFH 5BIG 5BTS (70) 8, 9AA 22, ZD8AR 3 and 6Y5OF for W1BVP, K0JPL, WA4YDR and P. Kilroy, but not without difficulty. In this case the stars blink for straight a.m.

80 c.w., nearly as red hot as 40, gladdened Ws 1BGD 1BSW 6YKs, Ks 1ZJA 0JPL, Was 1BDR 1DBR 4UMX 5CTD 8UGN 8IT and s.w.l. R. Johnson with a logful of CR7CI (5) 4, CT1TF, CX3DN, DJ2RT (5) 2, 3VZ (1) 0, 5DT (7) 4, 7LQ (6) 2, 9ZF (2) 1, DLs 1QW 3BA (1) 21, 4DN (2) 2, 0TUT, DM2ANG (4) 4, EA8EN (5) 2-3, Els 8H 9J, ET3USA, F8KA (4) 6, numerous Gs, GC2FMV (5) 23, GD3USX (1) 2, G3S8KH (5) 23 GM3s, PPJ TCW, GW3s NAM 2, SVY (4) 0, HAIKSA (3) 0, HB9KC (4) 4, H3PC (4) 0-1, HK3RQ 5, HPIIE, ILLAO (2) 5, JAs 4BJO 6AK 6AQ, KIUZH/KM6 (2) 5-6, KL7PI, KV4CT, LU6DYU (6) 4, LZs 1AM (1) 3, 1DD (8) 5, 1KPW 2KBA (9) 4, OA1s FM (5) 10, PZ (1) 3, 1O, 0E51T, OH1SH, a dozen OKs, ON4ZY, OX8s KI (9) 0, LP (9) 3, OYs 2Z 6FRA 7ML, OZ7s CF (2) 23, RQ, PA0s BRM (1) 21, LBN (8) 0, PE2VO 21, Pys 1BTX 5XG 7AQK (1) 2, SM3s CIZ TW, SPs 6IP (1) 1, 6MJ (12) 5, 6QH (11) 1, 7HX (2) 3, 8AL, TFs 3JA 5TP (6) 12, TI2PZ (6) 6, UAs 1KBA 1KCU 2CD (4) 4, 2KAP (5) 2, 2KAW 6KAF 0NR, UB5s BU DP 1BA KDS (4) 0, VR (7) 4, ZE, UC2VF, UD6s AI AM, UL7SA, UP2KPN, UO2KAA, UT5TC, UW3CS (7) 4-5, UY5MU (8) 3-4, VKs 1DA 2QL, VO1EM, VP5AR (6) 2, XEs 1AX 1BB 6, 1KKV 2FJ 5, YO5KA, YS1WF (3) 5-6, YU8 1KC (3) 1, 1MV 3LB 3LC 3TCN (3) 4, YV4NB (6) 3, ZC4AD, ZD7IP, ZLs 3ABV 4LD, 6O6BW (5) 1, 6Y5BB (9), 7G1A (4) 6, 7X2AI, 9F3USA (6) 2 and 9M4LP. Sunspots are a-comin'! — is this 80's last big thing?

75 phone is a real swinger right now, giving a nighttime impersonation of 20 by day. W3HINK, Ks 2GTF 0JPL, Was 6JDT SGGN, VE3FUX and tuner Kilroy live it up in the company of GN8AA 21, DJs 1NY 7, 4WN 6, 5BV 9GD 7, DLs 2IX 7, 5UW 7GA 8, 7IWA 7, F2MO 21-7, Gs 2PU 3EPL 3FPQ 3IWW 3KPV 3PFZ 6LX 8PO, GC2FMV 21, GLs 3CDF 7, 6TK 7, GWs 2HFR 8, 3AX 5TJ, HB9s EP 7, MQ, HK0KL 2-5, HPIJZ 4, IIs AHN 7, 1LD 6, KC 7, KDB 8, ZSQ 7, IS1s BMIN 21, DMN 23, IT1ZYG, KIUZH/KM6, KE7EBK 8, KP4-CU 3, CNM 3, CO 1-2, ES 1-2, KW6EJ 7, KZ5MV 7, LAs 1K 6, 9RI/p/x 4, MP4s BXA TBO 23, OAs 4KY 1-2, 8V 8, OH5NW 7, ON4YN 6, OXs 3FM 23, 5BO, OZs 5Y 6, 4FA 7, 5GT 21, PX3YR 0, SMs 4CJM 7, 4SB 7, 5AM 7, 6CKU/mm 2-7, TG9AD 5-6, UA2KFG (3645 kc.) 16-21, VO1s AL FX 2, GO GR, VE8RX 7, VP8s 1PV 4, 2AA 4, 5CC 9FJ 9WB 21, 21Z, W1FZ/KP4 8, WA5FCX/VO2, XEs 1KKV 8, NNN OE 7, YNs 3JG 5, 3EM 5, 4D 7, YS1FSE, YURAZ 6, YV5BTs, ZB2AJ 23, ZC4MO 23, ZD8HL, ZL2s AGZ AZK 7, 5Z4AA 21-22, 7X2AI 19 and 9X5MH, all s.s.b. and almost all just below 3800 kc. with a secondary DX pocket just under 3700 kc.

10 phone can hardly be expected to be fertile so long as our lower frequencies remain on an almost unprecedented DX rampage but WAs 2VFA 7BOA 7B0B 8OWX and 9QJW get the 28-Mc. ball rolling with CE3PT,

Here's research ship Meteor, floating base of DJ2KS and DL6XP who put St. Peter & Paul Rocks on the air last August (pictures on p. 100, December QST). They operate aboard the vessel as DI2DR when duties permit. Meteor is engaged in extensive equatorial studies for the Max Planck Institute of Ionospheric Physics. (Photo via W6AM)

QST for



OE2EGL has a delightful DX location a few miles from Salzburg. Gene enjoys turning in top Austrian phone entries for annual ARRL International DX Competitions. OE2EGL's signal is emphasized by a 2-element 3-band quad about 50 feet high. (Photos via W1YYM)

COs 1AF 8RA, CXs 2AAJ* 7AAS, GC8HT (533) 14-15, HC8FN, HI8XAL*, HK1ZU, K9HLL/KH6, LUs 1DTJ* 4EK, PJ2s AP (520) 16, CR* (600) 20, VPs 2KJ* 2VD* (59) 18, 9BP, WIFZJ/KP4* (580) 19, XEs 1KKV* 1NN 2RJ*, YN1MAV, ZL2PI (330), ZS1s AB* and JA*, the asterisks denoting s.s.bers. Pioneers of the new era on 10 c.w. include CR6EI (39) 16, CX2CO (52) 16-19, HP1IE (50) 15, KV4CI (48) 17, OY6FRA 0, VP2GLE (56) 20, YN1AA (50) 22, YV9AA (51) 17 and ZD7IP (35) 18. Spring's equinox is causing a 28-Mc. pulse as this goes to the printer. How's ten over your way?

It's twenty's turn for "How's" inspection next month, honors in care of Ws 1BGD 2ICO 3HMK 4UJT 7VRO 8YXR 9CZY. Ks 3SLP 7UHE 8YSO, Ws 3CUO 4CWA 6JGM 6MLW/KH6 8GGN, Ws 2JID 2LDX 2NLH 2NZU 6KIL 6MEQ, VE2BUW and Mr. R. Johnson for c. w.; Ws 2HNK 4EFX 8YGR, K7YDZ, WAs 6MWL/KH6 8GGN, WB6KLL, listeners WN9PQV and P. Kilroy for phone, plus subsequent reporters. With the night skip coming on strong and the long path holding up well we ought to have quite a batch to rifle through.

Where:

ASIA — KA2JG (K9EIV) tells ARRL Assistant Secretary A WIECH that FEARL(M), APO, San Francisco, Calif., 96525, is the correct KA QSL bureau address. Jim adds that only cards for FEARL-member KAs are handled. This members-only QSL bureau policy is not unusual among overseas societies, by the way; use bureau routes *only* when so instructed by DX stations worked. . . . "For three years I tried to take care of my own QSLs," writes 9M4LP. "The situation was getting out of hand because my work schedule just doesn't permit spending the necessary amount of time on them. People were waiting too long. I ran across W2CTN on 40 c.w. a few months ago, so I jumped at the chance when Jack offered his services as QSL manager." 9M4s may all be signing 9V1 shortly, suffixes probably remaining the same. . . . W2CTN knows naught of "PA3AF". . . . WRQWI has sixty AP2AR QSLs to deliver. If you're on the waiting list check with him, including self-addressed stamped envelope. . . . "Have logs and QSLs covering operations of K1YPE/XV5 and XV5AA," affirms W4UWC. "QSL to me only with s.a.s.e." . . . MP4TBU, via W6PQT, says the MP4TBE club QTH still is okay for incoming cards to MP4s despite the scarcity of activity there. . . . "I am now QSL manager for VS9A-K-M-O-P-S stations," informs VS9ABL (G3TXU) whose address appears in the list to follow. . . . K7VPZ rightfully expects s.a.s.e. and GMT-only concerning his QSL managership for club station JATYAG. . . . LIDXA has it that 7Z3AA will be home vacationing at W8CGN till the 24th of this month and will acknowledge QSL inquiries from W. Va. . . . W7VRO's idea: "W7SFF and I are interested in getting cards out of JT1KAA. W7SFF had a hundred QSLs printed for him with the thought that we'd get log data from fellows who also need his QSLs, send it along with the cards, and see what we come up with. Send your JT1KAA log data and/or QSL with s.a.s.e. to W7s SFF or VRO and we'll take care of the rest. No promises; just wish us luck."

AFRICA — Lots of 7G1A QSL advice on hand in addition to the address in the roster to follow. "He may also be QSLd via the Czech bureau but it took me four and one half years to get a card," says W2HLL. W8CVZ testifies, "I mailed Josef a QSL to his Conakry QTH with three In-

ternational Reply Coupons and received his card in three weeks." K9YRA remarks, "Most hams are told to QSL via OK1PD or OK1ACO in care of the OK bureau. If this doesn't work, try a card via SL3ZO." Clincher from K5JVF: "7G1A is an avid stamp collector. A few commemoratives or loose odd-value stamps should bring shoutin' return." . . . "I have logs dating from February 1, 1966," records W4HKJ, new QSL aide to ZDR8WZ. "I'm also trying to obtain previous logs." . . . W6MHB, according to W6PQT, mailed ten packs of VQ9J QSLs in November. As of late January only the W3/K3/WA3 bureau had reported receipt. . . . K1NTS of the W1OP ARRL Bureau says WIBPM requires s.a.s.e. along with QSLs for TL8SW, so consult Dick only direct. Same goes for his ZS2GF, ZS6OS and 6Y5AH services. . . . "I'll be handling QSLs for ZS8G commencing January 1, this year," declares VE4OX. "I can also assist with cards for prior QSOs and for his previous five-year ZS3O operation. This is a new ZS8G commencing late in '65 and should not be confused with earlier operation under that call. I also look after 601AU's QSLs. Smitty likely will operate from other countries as well, and I will do QSL chores." VE4OX requires s.a.e. with coin or IRCs to defray mailing costs, no U.S. postage acceptable. . . . "7X2MD has appointed me his QSL manager for 1966 QSOs," reports VE3EUV. "Logs will be along monthly, or every two weeks if activity is heavy." Bert wants s.a.e. and will accept unaffixed U.S. postage in lieu of IRCs. . . . According to LIDXA, ZS2MI QSL agent ZS1CZ should have received a batch of Marion Isle logs last month, the first delivery since September. . . . W7VRO's responsibilities for ZS1XR QSLs concerns QSOs dated on or after January 20, 1966.

OCEANIA — "I still have logs and blank QSLs for my operations as KG6SX KR6EV, KH6FBJ/KJ6 and KH6FBJ/KW6," writes KH6FBJ/4 from the address in the catalog to follow. He also can confirm his QSOs as XW8AS and HS5OSQ, the latter predating present Thailand placement on ITU/FCC ban status. . . . Listener P. Kilroy warns that KS6BO's QSL helpers and VK2AVA are not receptive to s.w.l. reports. . . . WA6MFY, who mans KX6BQ with WA6TKI, observes: "After a year on Christmas Island (1962-'63) as VR30 I'm still amazed to see how many cards we receive here bearing local time instead of Greenwich Mean Time. Since last June we have QSLd for KX6BQ 100 per cent in response to cards received, mostly via air. S.a.s.e. are appreciated." . . . No, WC6s are not KC6 Novices. P. Kilroy reports hearing the new California breed first on 40 phone.

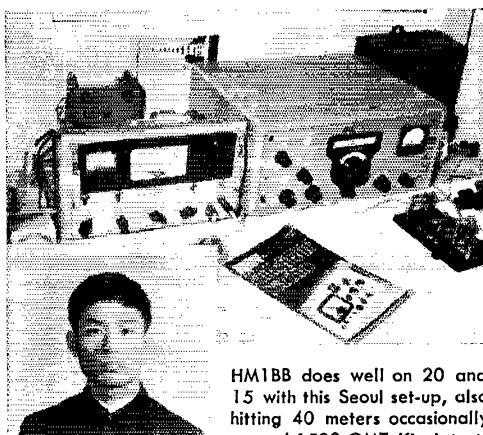
EUROPE — Patience paid off for W9GHK. Bill finally got his QSL for an F9QV/FC QSO scored back in 1959, along with Raoul's comment: "I QSYd to France in 1963. Please QSP to all my U.S.A. friends that ex-F9QV/FC is QRV for QSLs to confirm c.w., a.m. and s.s.b. QSOs made in Corsica from 1949 to 1963. As I am not an REF member, write direct only." F9QV's current address is included in the list to follow. . . . The real LX1TP uses only a.m. and is not named Walt. . . . LA8FG/p tells W4EFX he dispatched some 900 QSLs in December. Neighbor LA2JK/p intended to fire off a slew of cards via steamer last month. . . . VE3FXR says he may be able to help W/K/VEs with OY confirmation difficulties, if any.

SOUTH AMERICA — W8GIU is 9Y4VT's QSL charge for '66 contacts, also FM77U QSOs since February 1, 1965. . . . This year's HK7WL contacts can be confirmed through W7VRO. . . . "I've recently been assigned to

USNS *Ellanin*," notifies WB6LZP. "The ship signs CE9Z1/mm or KC1A4A mm depending on our area of operations. Would appreciate any help QST could give me in finding a QSL manager." WILKE of Hq. hears from FCC that KC1AAD is newly licensed at the Byrd a.l.f. site in Antarctica.

HEREABOUTS— "QSLers of the Month" this month include DL5AO, EA5 3KI 8EN, F2HM, FL8AIC, F08s AG BI BJ, G3IAP, GM3TCW, HKs 5BA1 8A1, Ks ISAT 7NAU, KC1USB, KH6FIC, KL7PI, KX6SZ/-Ehon, LA2QJ p, LZ1KAA, MP4TBA1, PA6PFW, PY2CO, SP5AVL, SV6WBW, TZ5H, UT75EW, YK7SM, YP5 1LB 2AA 2SK 5AR 7CC, YR6TC, W0YKD-KS4, WA80TL, WN3EAP, X76H, YN1JLA, YV5CEY, ZB2AJ, ZD7RH, ZL1HW, ZS8K, JUITU, 5R8AS, 5VZ8CM and 9G1FO, these nominees of "How's" contributors Ws ISWX 8YGR, K3SLP, WAs 4CWA 4WIP 4LXM 60ET 6WTD 8DXW 8G6N, WBs 2LDX 2NLH 2NZU 4MEQ 6MPE 6QOE/VP9 and W. Smith who also commend QSL agents Ws 1YDO 2GKH 3HNK 4ECI 4TAJ 5EJT 6BCT 6ZPX 7WLL 9WHAI, Ks ITWK 6UTO, WAs 2FEN 4PXP 6MVG 8CXY 8GUA, VE3s ACD EUU and G2IO, all elected for postboard promptitude and punctilio. Got any candidates for this donor roll? Halpl W5QIX hints a hint toward a QSL from VQ1AN, '63; W7VRO wonders about Z13R; K8YSO needs a ZB1BX '63 nudger; WA6CTD solicits a UA0KZD '63 clew; WA6KHK pleads for CE3ZK '62, KCs 4USB '64, 6BK '63, ZL5AA '64, 4X4MZ and 5W1AZ aid. W7VRO, WA83GN and VE1DH volunteer to take on QSL managerial duties for rare overseas ops in bona-fide need. W8BRL writes from Hell (Mich.) that our recent mention brought him requests for skeds. Steve also operates from near-by Paradise now and then. VE2BUW remarks, "My QSL returns approach 100 per cent by QSLing direct airmail with a.s.c., IRVs and personal notes to the operators." Rod's ref. helps, too. WA4HIE/KS4 of Swan, who should have his own KS4 call by now, could use a reliable Stateside QSL manager. Here's that rundown we were referring to, but remember that each item is necessarily neither official, complete nor accurate:

- AP2AR (see preceding text)
 CO2JB, P.O. Box 6082, Havana, Cuba
 CPEIO (via WA6FVR)
 CR6FW (via W8GIU)
 CT1JJ (via W6LDA)
 DM3LOG, H. Krause, 301 Magdeburg, Luxemburgstr. 18, G.D.R.
 EA8ER (via EA8AH)
 EA8FD, Box 393, Santa Cruz, Tenerife, Canary Islands
 EL2D, A. Vinicombe, P.O. Box 98, Monrovia, Liberia
 EL2Y, Box 98, Monrovia, Liberia
 ex-1R9QV/FC, R. Novallas, F9QV, 1 rue du Cannel, Lorgues var., France
 FM7WI (via W8GIU)
 HB0AR (to DL3AR)
 HC1CG, Box 15, NASA, U.S. Embassy, Quito, Ecuador
 HH9DL (via DJ3JZ)
 HI7NSB (via HI7NFA)
 HK3RO (via W2CTN)
 HK7UL (via W7VRO)
 HK0AI (via W9WHM)
 HK0KL (to HK4KL)
 HM9AB (via W7VRO)
 HP9FC/mm (via VE1s AKZ or DH)
 HR1HC, P.O. Box 27, Tezucigalpa, Honduras
 HSIAX (via HS1s)
 ex-1HS5OSQ-KH6FBJ/KJ6/KW6-KG6SX-KR6EV, H. Sherrord, jr., KH6FBJ/4, Apt. 301, 3635 Barecroft View Terr., Falls Church, Va., 22041
 JA7YAG (via K7VPZ)
 KIYPE/XV5 (via W4IWC)
 KH6RCB/KS4, J. Takaki, P.O. Box 1148, Miami, Fla.
 ex-KM6BL (to WA6MLW/KH6)
 KM6DJ, c/o Page Comm. Engrs., P.O. Box 26, FPO, San Francisco, Calif., 96640
 ex-KP4TZ (to KH6FHI)
 KZ5JF (to K8JAD)
 LX2UW, c/o S. Meyer, W2GHK, P.O. Box 7388, Newark, N. J., 07107
 MP4TBU, J. Rayment, Trucial Oman Scouts, Sharjah, BFPO 61
 OA1BC, Box 163, Sullana, Peru
 OK2WCG, I. Chladek, Krondlova 22, Brno 16, Czechoslovakia
 OY6M (via W2VCZ)
 PZ1WB (via VE3EUU)
 SM6CNX/mm (via SM5CIL)
 TF2WJO (via K5UBL)
 TU2BD, P.O. Box 2261, Abidjan, Ivory Coast Republic
 UA1CX, P.O. Box 910, Center, Leningrad, U.S.S.R.
 UA6NL, Box 8, Vladivostok, U.S.S.R.
 UP2OK, B. Arrydas, P.O. Box 310, Kaunas, Lithuanian S.S.R., U.S.S.R.
 VEA1ED/SU, W. Frost, c/o 56th Canadian Sig. Sqdn., CFPO 5049, UNEF, Bellville, Ont., Canada; or, W. Frost, Base Post Office, Beirut, Lebanon
 VE8NO (via WA4KXC)



HMBB does well on 20 and 15 with this Seoul set-up, also hitting 40 meters occasionally around 1500 GMT. Kim is testing a new homebrew 700-watt linear on 14 and 21 Mc. (Photos via WA6KHK)

- VP2s AL ML SK (via VE3EUU)
 VP2KY (via W9NGF)
 VP5RB, P.O. Box 322, Boca Raton, Fla.
 VP7NP, P.O. Box 2288, Nassau, Bahamas
 VR1Z, Yasmie Foundation, P.O. Box 2025, Castro Valley, Calif.
 VS9ABL, Cpl. B. G. Levett (G3TXU), Sig. Sqdn., RAF, Khromaksar, BFPO 69, London, England
 W6FHM/DUI, B. Brunemeier, New Tribes Mission, Box 2570, Manila, P. I.
 WA4HIE/KS4, P. Holbrook, P.O. Box 1148, Miami, Fla.
 WA4SII/KH6 (via KH6EQQ)
 WA6MLW/KH6, L. McCullough, 876a Ashley, Pearl City, Hawaii, 96782
 YV9BW, P.O. Box 18, San Fernando de Apure, Apure, Venezuela
 ZD8WZ (via W4HKJ)
 ZF1GC, Boddien Town, Grand Cayman, W. Indies
 ZL5AA (via ZL2GK)
 ZS1XR (via W7VRO)
 ZS3XC, P.O. Box 42, Walvis Bay, S.W. Africa
 ZS8G-ZS3O (see preceding text)
 4M5A, c/o S. Meyer, W2GHK, P.O. Box 7388, Newark, N. J., 07107
 5Z4DW, J. Ferrait (GM3PYA), P.O. Box 834, Nakuru, Kenya
 5Z4IR (via RSEA)
 6O1AU (via VE4OX)
 6O1GB, c/o U.S. Embassy, Mogadiscio, Somalia
 7G1A, J. Plzak, B.F. 477, Conakry, Guinea
 XZ2MD (via VE3EUU)
 ZJ3AA (see preceding text)
 9L1BC (via W2CTN)
 9L1JW (W/Ks via K9RNQ)
 9L1TL, T. Lloyd, N.U. College, Njala, via Mano, Sierra Leone
 9M4LP (via W2CTN)
 9M6KS (via 3GPE)
 9QSDP (via W2SNA)
 9Q5YL, P.O. Box 1573, Elizabethville, R. C.
 9T5CU, P.O. Box 129, Gitega, Burundi
 9Y4VT (via W8GIU)

Thanks for the preceding glossary go to Ws 1BGD 1CNU 1SWX 1WPO 1YYM 2APII 2EAF 3HC1 3AG 4DII 6PQT 8YGR 8CVZ, Ks 2BJR/1 3NLP 4PRT 5JVT 6KA 6LJY 8YSO 9YRA 0RPW, WAs 4WIP 6WTD 8DOY 8G6N 8HFN, WB2NLH, WN9PQY, VE3FXR, Messrs. Kilroy and Johnson, DARC's D X-MB (DLs 1EP 3RK), DX Club of Puerto Rico D Xer (KP4RK), Far East Auxiliary Radio League News (KA2LL), Faroe Amateur Radio Society FRA (OY7AL), Florida DX Club D X Report (W4LVV), Japan DX Radio Club Bulletin (JA1DM), Long Island DX Association D X Bulletin (WB2HXD), Newark News Radio Club Bulletin (L. Waite, 39 Hannum St., Ballston Spa, N. Y.), North Eastern DX Association D X Bulletin (K1IMP), Northern California DX Club D Xer (Box 608, Menlo Park, Calif.), Puerto Rico Amateur Radio Club Ground Wave (KP4DV), VERON'S DXpress (PA6s FX LOU TO VDV WVP) and West Gulf DX Club Bulletin (W5IGJ). Got any noise for the boys along this line?

Whence:

EUROPE— From 1200 GMT, April 23rd, to 1800 the E 24th, you can choose phone or c.w. weapons for battle in the 1966 PACC Contest sponsored by VERON (Holland)

wherein non-Netherlanders will work as many PA/PE/PI persons as possible, once each per band, 1.8 through 30 Mc., using the customary RS- or RST001, RST002, etc., serial swap. You earn 3 points per two-way exchange, this point total to be multiplied by the number of Dutch band-provinces worked, for final score (province abbreviations to be used: DR FR GD GR LB NB NH OV UT ZH and ZL). Each log, postmarked on or before June 15, 1966, should be sent to PA8VB, VERON Contest Manager, Keizerstraat 54, Gouda, The Netherlands, accompanied by a signed statement that the participant has observed the contest rules as well as regulations for amateur radio in his country, to be eligible for possible certifications of performance. At the same time you might request specifications on VERON's various DX diplomas. A resumé of last year's PACC results appeared here last month.

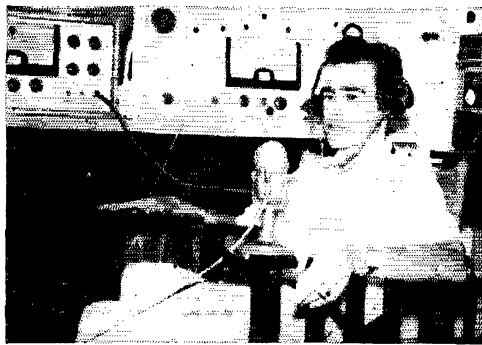
UQ2GA tells K2GTF of UQ2KFG's hunt for W/K/Vs on 75 s.s.b. each Tuesday at 1600-2100 GMT, transmitting 400 watts near 3645 kc. . . . Miroslav Vcelar, Husova trida No. 3, Brno, Czechoslovakia, desires to correspond with a W/K who can handle the Czech language. . . . K5UBL finds TF2WJQ's SR-150 and dipole regularly available on 14,050 kc. . . . VE3FXR lists OYs 2H 2J 2Z 3R 7M 7S and 7ML as active on c.w., OYs 6M (W5RMP) and 7ML on sideband. Club station OY6FRA is busy on 80, 40 and 20, staffed by OYs 2H 2J 3B 5Q 7M 7ML and 7X. . . . Check with OH2YV of Award Hunters Club International for info on the outfit's new "XL Operator" certification. Only seasoned DX men will make the grade on this one. . . . W4EFX finds LA8FG/p of Jan Maben hunting high and low for Ariz., Ark., La., Mont., Nev., N. C., R. I., S. C., S. Dak., Utah and Wyo. Any DX men out there in radioland? . . . WB6MEQ capsules Czech ham license requirements and privileges: *Novice*, 10 watts c.w., 160 meters only, age 15-18; *Class C*, 10 watts c.w. on 160 and 80, 18 meters plus; *Class B*, 50 watts, all bands and modes; *Class A*, 150 watts; and special authorizations for inputs to a kilowatt. Novices use the OL prefix over there and they really shake up 160.

ASIA — "We had a period of tremendous 160-meter propagation between here and Europe from mid-November to mid-December," exclaims 9M4LP. "Twenty-two stations were heard, some with S8-9 signals. But the next two weeks brought in just one amateur signal on the band. I've listened carefully every day for W/Ks on 1.8 Mc. but none came through in late '65. I worked four Sixes and W1BB in the winter of 1963-'64." . . . Despite the big batch shown in the *Callbook*, MP4TBU tells W6PQT there are only three or four Trucial States MPs active at present. MP4TBU, licensed since December, likes 20 c.w. . . . Saigon-stationed WB2s LZBE and PVV contemplate organizing some sort of DXhibition over there by fall. . . . New or renewed FEARL memberships are held by KAs 2DD (WA8OHH), 2DJ (WB6AGZ), 2EE (W4WNY), 2QX (WB6ASG), 2RA (KIWUO), 2RJ (W9VCH), 2TJ (WA3DBX), 9AK (K6KXG) and 9MF (K3MYD).

AFRICA — "FL8MC tells me that a third French Somali land station is FL8AO with a Viking on 15 and 20 phone," writes K1QHP to W1ECH. "FL8RA is probably active on voice now with a newly acquired Cheyenne transmitter." . . . "91.1WV plans on staying in Sierra Leone for another two years," learns K9RNQ. "Woody operates week ends around 21,430 kc. or higher, 1600 GMT, single-sideband." . . . VE1AED/SU likes 14,135 and 14,281 kc., according to ARRL's W1YYM, the latter spot for W/K customers. . . . W8GIU finds the CR6 lads hot after s.s.b. gear and literature. . . . W7VRO credits the Viceroy rig and 3-element wide-spread 50-ft.-high whirler of ZS1XR for that fine 14-Mc. signal from Capetown.

More from the brightening dark continent courtesy the clubs press: F2YR is mentioned in connection with more 5T5L output. . . . EA8 2CA and 4CR intend Rio de Oro radiations early this month, possibly as EA9IC on phone and c.w. . . . ZS1RV reportedly radiates from Curam isle. . . . 7X0CL, French Sahara, is a cutie on 14,115-ke. sideband, 1800-1600 GMT. . . . EA8s AH BD EX and FD led the Canaries gang in a contest-like February attack. . . . VQ9HB apparently has the best immediate DXpeditionary shot at Aldabra, Chagos, Desroches and Farquhar isles. . . . TU2s BA and BD like 14,203 kc. around 2:00 GMT, the latter being ex-XT2HV.

OCEANIA — "I became custodian and trustee of KX6BQ, Eniwetok, last June," details WA6NFP, ex-VR3O. "We have an excellent location, Collins equipment, a 90-ft.-high TH-6, 75-ft.-high TA-33, an 80-meter extended double-Zepp, dipoles, and await delivery of a 6-element 14-Mc. Telrex job. I've been spending some time on 80 meters where signals to the States are pretty good. My company, Holmes & Narver, and the USAF are to be commended for their support of amateur radio out here." . . . "9N16KS (G3GPE) hears a few U.S. Sixes around 0000-0100 GMT but usually can't get himself heard," remarks K6KA. "He's active on 7 and 14 Mc. and has worked a few western W/Ks at 1600 or so. Early-'65 conditions have been poor in Sabah." . . . Virginia Century Club's 1965 DX award goes jointly to W9WNV and K7LMU for outstanding Pacific and Asian DXpeditionary achievement. . . . "Seems as though I'll never com-



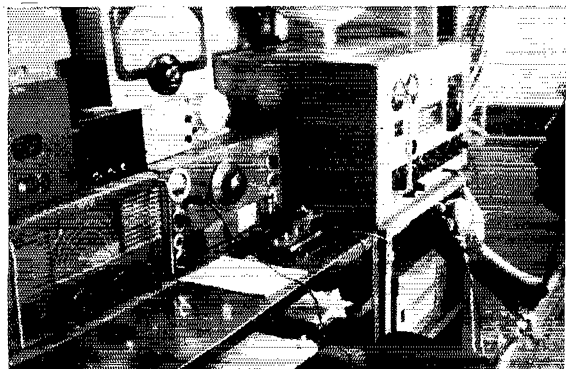
CR6HF enjoys the armchair DX approach in Gabela and keeps an ear on 28 Mc. for improved openings to the States. (Photo via W1YYM)

pletely escape the Pacific," says WA6MLW/KH6 who started off out there as KM6BL in '57. Mac is Director, Navy MARS, Pacific, and fires an HT-37, Swan 350, and two finals into a 3-element tribander and 75-ft.-high 2-element 7-Mc. spinner. An SX-115 receives. "The bands, even when good, have been erratic with excellent long-path skip." . . . Oceanograms via club literature: The cruising Colvins, W6KG and XYL, visited California after February's VR1Z effort. . . . ZL5AA (ZL1ABZ) has Collins apparatus at Scott base, but ZL2GX says the Kermadecs and Chathams remain dormant DXwise since Ian's last stints there. ZL1s CH and JF keep the Campbells coming, the latter a new man on 80 c.w. only. . . . BC technician FW8RC is reported active on Wallis around 14,120 kc, with sideband and a vertical. . . . Europeans flip over K6GIF of Marcus on 20 a.s.b., 0800-1000 GMT. . . . VK0TO leaves Macquarie in the able fist of VK0FO, 14,050-ke. c.w., 0900 GMT or so. . . . FURAG may close shop this month.

HEREABOUTS — W6ITH's recent spate of FS7RT KWN-2 operation reared the a.s.b. gang on 7, 14 and 21 Mc. This, agrees W1WPO, is the first genuine French St. Martin hamming since Reg's previous FS7RT work in '63. W6ITH also is licensed as PJ2MC, VP3 2MR and 0RT. . . . Up Coral Harbour way VE8NO works 80 through 10 with a KVM-2, 20L-1, TH-3 and long-wire. . . . W6s IIC QUU and VP2AZ pooled talent for last month's multiband, multimode VP2KY outburst on Anquilla. . . . Giant-killer notes: W2ICO's 35-watt Navigator needs only Oceania for WAC and has 68 countries on indoor dipoles. VE2BUW has 41 quick countries on his modified HX-11 at 35 watts but he sports an outdoor half-wave. Rod says proper timing of calls, plus full break-in, helps him swipe a few goodies from less maneuverable kilowatts. W2APH notes KZ5JF (K8AD) having a DX ball with only six 7-Mc. watts. . . . W4DII expects to operate 4Y5BB DXtensively in July, mostly 20 c.w. with some sideband. . . . WB6QOE/VP9 infests 40 c.w. almost nightly, 0100-0700 GMT. . . . An Idaho QSL will wrap up PJ3CD's long-sought WAS. . . . W4HQ says PY2QT works 14-Mc. s.s.b. DX at will with a small transceiver and a whip poked out his Sao Paulo hotel window. . . . VE3FXR, no longer editing Ontario DX Association's *Long Skip*, hopes to continue news contributions to the DX grapevine. . . . Localisms via club periodicals: HK0AI wants to wade into Bajo Nuevo or Serrana Bank this spring, and more Malpeo monkeyshines may not be far off. . . . W2IP, WBs 2J1Y 6JUH, KP4BJM and 5X5IU are new possessors of DX Club of Puerto Rico 8X8X8 sheepskins. . . . W1SWX needs but a handful of countries to hit the 100 mark on 3.5-Mc. c.w. . . . HH9s DL and GR, the latter on 14,339 kc. around 1200 GMT, keep Haiti barely represented on DX bands.

QST

9Y4VT is a widely worked member of Trinidad's DX gang. Cyril concentrates mainly on 20 phone and c.w. (Photo via W8GIU)

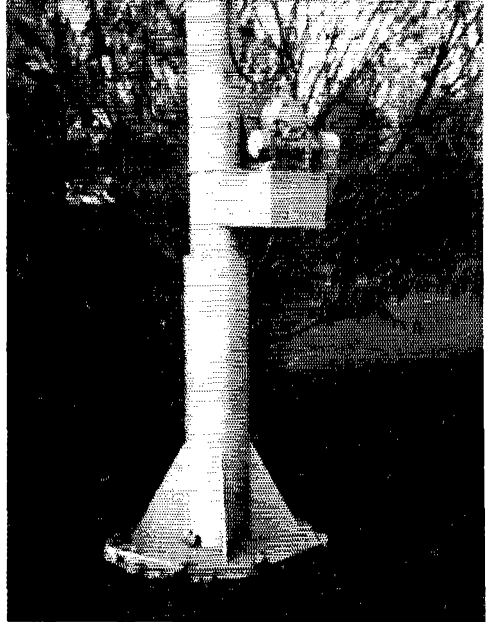


A Telescoping Mast, Mark II

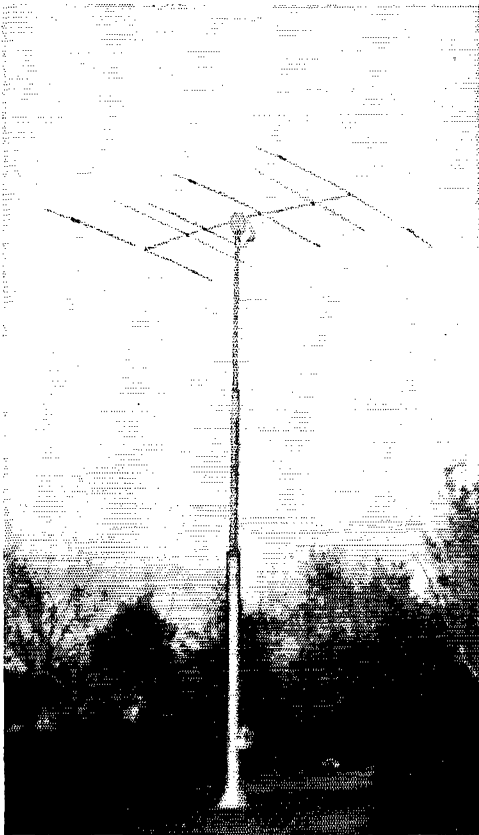
If you happen to have a *QST* for August 1948, you can find an interesting article on page 46, titled "A Telescoping Mast." The author, Frank Corgiat, W9QLJ now W0LAG, made some improvements over his original design and sent us some photographs of his latest installation.

The mast is self supporting, has a collapsed height of 24 feet and can be extended up to 60 feet. Both elevation and rotation are remotely controlled from the shack. A control panel is programmed to permit setting the mast at any predetermined height. The mast has been in service since August of 1961 and requires only an annual change of gear motor and winch lubricant.

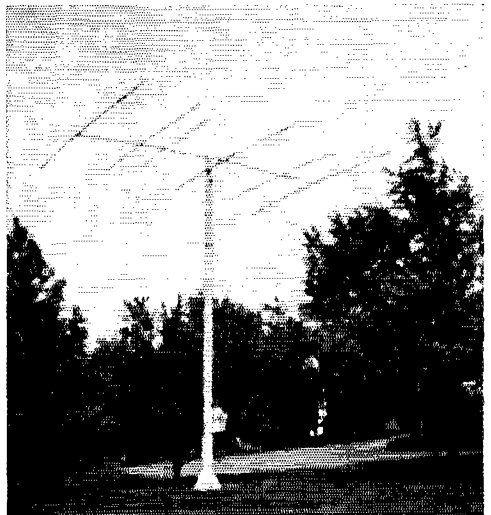
QST



A close up of the mast base, which is 12¾ inches in diameter. Aircraft control cable for operating the mast is ⅜ inch in diameter for the top section and ¼ inch for the middle section. Only one cable is attached to the winch.



The mast extended to 60 feet. The bottom section of the mast is 8¾ inches o.d., the middle is 6¾ inches, and the top is 4¼ inches.



The mast at 24 feet.

The World Above 50 Mc.

1215-1300

2300-2450

3300-3500

5650-5925

10,000-10,500

21,000-22,000

39,000-7

CONDUCTED BY SAM HARRIS,* W1FZJ

More Noise about Noise

LAST month we talked about noise figure and temperature, the point being the inconsistency between noise-figure improvement numbers and signal-to-noise improvements when your receiver noise figure gets below 6 db. The chart in Table I will save the effort of converting receiver noise figures back to temperature. We pointed out that a 420-Mc. beam antenna might have a temperature of 100-degrees K. If we take a feedline temperature of 70 degrees K, our combined antenna-feedline temperature would be 170-degrees K. This assumes a good beam tilted up 3 degrees or so from the horizon and a feedline with something less than one db. attenuation. If we feed this nice antenna system into a 6-db. noise-figure receiver we end up with a system temperature of 170-degrees K plus 838-degrees K (see 6 db. n.f. in Table I) equals 1008-degrees K. So far the majority of our system noise is contributed by our receiver. We can easily obtain a 3-db. improvement in signal to noise by dropping our receiver noise temperature to 334-degrees K for a system temperature of 504 degrees. Note that the noise figure only went down to 2.7 db. for this 3 db. improvement. To get another 3 db. signal-to-noise improvement we must drop the system temperature to 252-degrees K. Now this would be easy if we had only receiver noise to contend with. Unfortunately, we have our antenna-feedline temperature fixed at 170-degrees K. In order to get the system down to 252-degrees K, we have to drop the receiver to 82-degrees K. Referring again to Table I, we find about 1.25 db. n.f. If our front end is a paramp this is still pretty easy and we find that for a 4.75-db. improvement in noise figure we obtained a 6-db. signal-to-noise improvement. On the other hand that 70-degree K feedline temperature has now become a big factor in our system noise. With an 838-degree K (6 db.) front end, 70 degrees more or less means nothing in terms of signal to noise. With a 252-degree K system it starts to hurt. If we eliminate the feedline loss by mounting the preamplifier at the antenna, we could get by with a 152-degree K front end. This is just under 2 db. n.f. and can be just obtained if we make use of T.I.'s latest germanium transistors (TIX100M). Note that our antenna is now contributing a large part of our system temperature. For tropo-type contacts we have to live with it. For a satellite or moonbounce efforts we get a break. Under good conditions the antenna temperature, when aimed well above the horizon, might get as low as 20-

degrees K. In this case, our antenna mounted preamp would give us a system temperature of 172-degrees Kelvin — a signal-to-noise gain of 7.5 db. for a noise-figure improvement of 4.2 db. It is interesting to observe that eliminating the feedline loss and tilting the antenna would yield less than 1 db. in signal to noise improvement, with a 6-db. n.f. preamp, a negligible amount. The important thing is the improvement in signal-to-noise as the system noise temperature drops. Each time you cut your system temperature in half you improve your signal-to-noise ratio by 3 db. With a poor receiver this is the same as improving your noise figure by 3 db., i.e., 18 db. to 15 db. is a change from 18,000-degrees K to 9000-degrees K. 15 db. to 12 db. cuts the noise temperature in half again to 4512-degrees K. When you get down to 3 db. noise figure, however, a 3-db. signal-to-noise improvement requires only a little more than 1.5 db. n.f. improvement, depending on your antenna and feedline temperature. Now, I am aware that you quit paying attention as soon as I mentioned the TIX100 M transistors. To relieve your anxiety I will point out that next month you will get all the pertinent details on how to get the transistors and how to build the preamp. Be patient. Meanwhile, if you are in the paramp building or thinking stage you can get some good information on 3-part circulators for 432 or 1296 Mc. by dropping a line to Melabs, 3300 Hillview Ave., Palo Alto, California, and asking for details on their amateur model J-6970 (432 Mc.) or J-6979 (1296 Mc.). I also have a copy of their specs (courtesy of K6HCP) and will be glad to send same to anyone interested.

TABLE I
Noise Figures vs. Temperature
in degrees K.

Noise Figures	Degrees K
24	72,200
21	36,100
18	18,000
15	9,000
12	4,512
9	2,010
6	838
3	290
2	170
1.5	118
1	75
0.5	35
0.25	15

* P.O. Box 1738, Arecibo, Puerto Rico 09613.

DXpedition

It may be a little early to alert all hands but we decided that while the news is new and fresh in mind we had better hand it on. We'll do a repeat in a later column so that you won't forget.

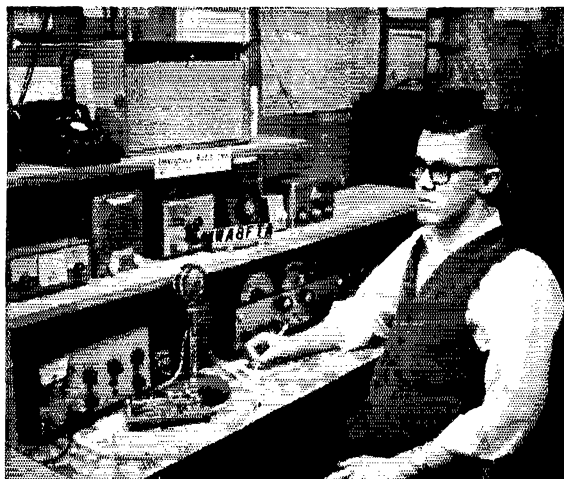
Rich Wujciak, K2OJD/FP8CA, is planning his sixth expedition to St. Pierre for early September of this year, and will be operating on both 50 and 144 Mc., along with lower bands. Last year Rich and K2KIB were up there during July, caught some *E_s* openings on 6, and worked more than 300 contacts on this band. This year they will be on during the period in which fall coastal inversions are most likely, hoping to work some 144-Mc. DX. If an amateur communications satellite is in operation at that time they will attempt to set up for it as well.

St. Pierre is about 785 miles northeast of Boston which puts it a long way from much 2-meter activity. According to Rich most of the time the weather is rough there, not appearing to offer the calm periods necessary for coastal inversions much of the time. However, the operating site is open to the southwest, and should there be an extended inversion there is a possibility that they still might do some 2-meter business. The boys will also be watching closely for aurora. At the present time it looks like FP8CA will be on the air about September 4 or 5, and will be operating through about September 18.

144 Mc. and Up

Rochester, New York will soon have quite a few on 432 Mc. according to K2YCO. Chuck sez that K2PEY, W2FDI, WA2KND, W2ALL, K2EYJ and K2YCO are all now operational on that band and several others including K2CEH and WA2HWC are building equipment. W3MMV writes to tell us that way last November he worked Andy, W1AJR in Rhode Island for state number 11 on 420 Mc. Since the wind tore the phasing lines off of Fred's expanded collinear, the band has been very quiet. Nearest stations active on 420 Mc. are close to a hundred miles away so it's really no wonder that the band is quiet for Fred. While waiting for antenna repairing weather he's working on new moonbounce gear and hopes to get something bigger and better going before summer comes around again. Guess Bunky, K4EJQ, is getting lonely at Bristol, Tennessee on 420 Mc. He's now on the air with 300 watts and "looking for QSOs anywhere!" "Conditions excellent!" says K8ZES concerning 420 Mc. during the evening of January 4. There was even QRM between 432.000 and 432.1, with stations using a.m., i.m., c.w. and s.s.b. Sid worked WA9HUV and W9ZIH in the Chicago area with all signals being S9. Work goes forward at Galion, Ohio, with a transistor 432-Mc. converter built and being tuned; a 100-watt rig (4CX250) completed for 432; and a tripler in the works.

The following received from W6ORG: "ATV activity in the Los Angeles area. Crystal video frequency, 434.7 Mc., 435 Mc. mod. osc., 439.2 Mc. f.m. audio, 147.6 Mc. a.m. queuing and calling frequency. 40 members in the L.A. ATV Club, ten on with video, most with ART-26 or 28s or 4X150 final. Many with transistor preamps and converters. Tuesday and Sunday at 9:00 p.m. is usual activity but CQ ATV on 147.6 a.m. will get results. Anyone interested get in contact with me, Tom O'Hara, W6ORG, 10253 East Nadine, Temple City, California 91780."



Operating position at WA8FTA in Evert, Michigan

According to reports received, K4MOC and K4NIN, both of Columbia, South Carolina, have about completed their 432-Mc. ATV units and should be operating shortly. And in Pennsylvania K3ADS is operating almost nightly on amateur TV at 445.249 visual, and 449.749 aural. Larry is running regular checks with K3KFL TV (3 miles). K3JPB should also be operational by the time you read this. If the weather lets up enough for him to install his 32-element colinear, he'll be all set to go.

K1PSR at Amherst, New Hampshire, would like skeds for 220 Mc. late in the evening. He's completed a 30-watt transmitter and is presently using it to test out a TRA-19 amplifier. Hopes to have it on 220-Mc. n.b.f.m. soon. Nick would also like to contact someone interested in u.h.f.-pulse work and rtty. Watervliet, Michigan, is back on the v.h.f. bands again with the return to Michigan of Jack Woodruff, K4GL/8. Jack has rebuilt his old 220-Mc. exciter and will use it for beacon work and local contacts. The new 220 rig will have 500 watts as soon as he can get his 13/13 yagis in the air. K6UMV writes to let us know that the W6SD 222 Mc. Net (8:00 p.m. local time Sunday nights) is quite a success with about 31 stations checking in from all over the Los Angeles area.

Activity on 144 Mc. is growing by leaps and bounds in Maine and as in many areas a great deal of it is on s.s.b. K1MTJ tells us that among others K1OEX, K1EVO, W1SDE, W1SJS and W1GJZ are all operating 144-Mc. s.s.b. Joel also sez that the nights of January 5 and 9 were good ones for working 2 land from Maine and on the 9th he heard W3MFY and WA3CAG in eastern Pennsylvania. Marty, K1OYB, had one successful contact during the Quadrantids and that was with W8YIO in Michigan. The contact brought Marty's states worked on 144 Mc. up to 15 and all of these were worked with a homebrew 5894 at 100 watts using a 12-element J beam. Another Mainiac, K1WNC, reports that conditions were average on 144 Mc. during January with occasional strong signals from Massachusetts, New Hampshire and New York. Barry also reports another station in Maine active on two, K1JAP using a 522 and an eleven-element beam. From Framingham, Massachusetts, K1BTF suggests that anyone in New England needing New Jersey on 144 Mc. should look for WA2LTM

in the first 100 kc. of 145 Mc. K1ABR in Rhode Island notes that although c.w. activity is lagging on 144 Mc., a.m. operations seem to be up with the area around 145 Mc. quite busy. Dick is working on a 6252 rig for 220 Mc. and should be on that band by spring. From New York, WA2IPC is another unfortunate who's had trouble with winds and wires. On returning home for the inter-session vacation, Mal found that the feedline and tuning stub had come down. He's wondering if sparrows carry screwdrivers. Now he has his work cut out for him for Spring vacation when he's hoping to get ready for the June QSO Party. "Propagation on two meters was good on January 1," sez K3CFA who heard W3MBN in western Pennsylvania putting in a very strong signal. However, no other stations were active. January 8 was also good into Joel's QTH from western New York but nothing else was heard. Minnesota, Missouri and Ohio were added to the score of WA4LTS on two meters during the January contest. Rick says the band was quite active during the contest with an abundance of meteor scatter work going on. Increased activity in the El Paso area is reported by W5YI who sez that as many as eight to ten stations have been checking into the Yucca Net on 145.2 Mc. From California we learn, via W6QJW, that 144 Mc. signals are copied all of the time at 150 miles and that signals from 250 miles are copied in the evenings only. Howie reports clear copy of W4AGH's signal via Oscar IV and many signals partially copied. Quadrantids skeds were happy ones for K7NII who made it with two out of his three skeds. New state was Utah (W7MFP) and brought Tom's states to 19. Michigan stations all agree that January 4 produced good conditions on 144 Mc. K8AQA reports openings into Wisconsin and Indiana on the 4th; into Wisconsin, Illinois, Ohio and Indiana on the 5th; into Indiana, Illinois, Ohio and Ontario on the 8th. W8CVQ sez: "Spectacular tropo opening on January 4, and propagation conditions generally good during January. W3GLC at Beaver, Pennsylvania heard often and northern Ohio stations, especially WA8GKK, heard frequently and worked occasionally." K8PBA notes that 144 Mc. was open to the south and west on the 4th with W4BCV in Kentucky putting in a good signal using 20-watts input on s.s.b. K8VEX at Wayland, Michigan writes that two was open into Ohio on January 4. Jack Gates, W8IBB, at East Lansing, Michigan, writes that good activity was noted in the 145 to 145.5-Mc. segment of the band during the V.H.F. Contest, but only two c.w. signals were heard during the entire contest. Jack bemoans the fact that he had to resort to a.m. to make contacts. K8YWF at Tiffin, Ohio noted good conditions on 144 Mc. on January 16 to Ontario, and on January 20 and 25 to northeastern Ohio. W8BBB in South Euclid, Ohio writes us that there are now three stations in the Cleveland area using a.f.s.k. f.m. on 146.7 Mc. Ron would like to hear from anyone having information on a.f.s.k. f.m. on two meters or on operation on 146.7 Mc. (He hopes they are one and the same.) Our lone report from Illinois was received from WA9LYV who reports two meters open on January 5 to Ohio, Indiana, Iowa, Wisconsin and Michigan.

Clubs

432-Mc. hearing aids for VE3s were undertaken by members and associates of the York V.H.F. Society in Ontario, Canada. Twelve of these units have been duplicated under the direction of club engineers VE3DIR and VE3DKW. Further credits

going to VE3BPR, VE3HC, VE3BRI and VE3DSE. VE3s CRU, EVW, BRI and DKW have their converters operational now, with the others due to be finished shortly. This has been the single, biggest boost to 432-Mc. activity in the area, and achieved at only an outlay of 32-dollars per unit. This included the metal work, silver plating, chassis, 1N21F mixer diodes and oscillator crystals. Sez Gus, VE3DSE: "Now that we can hear them, the next step is to get those 432-Mc. rigs going and work them!" So true, Gus. Keep us informed.

During 1965 a number of engineers at Naval Avionics in Indianapolis formed the Indiana Amateur T.V. and U.H.F. Club to further interest in u.h.f. radio and television. The club held its second meeting of the year on January 15 with about seventy amateurs attending from Indiana, Ohio and Kentucky. Speakers were W9KVK and W9JIY, both of whom gave talks on the various approaches to low noise, high gain, wideband-u.h.f. receiver design and overall receiving systems considerations. Following the talks various contests were held involving homebrew gear. Dave, W9ZRX, tells us that due to these meetings, activity on 432 Mc. has increased 100 per cent during the past year. This club provides a number of special services for its members such as the following: special club discount rates on hard to get semiconductors, crystals and varactors; technical literature and a directory and location map of club members. Con-

220- and 420 Mc. STANDINGS

220 Mc		WA2HQR.....	8	4	280	K2HQL.....	8	4	250
W1BU.....	14	5	600	K2ACQ.....	5	5	525		
W1HDQ.....	12	5	450	K2YCO.....	6	5	500		
W1AJR.....	12	4	480	W2YPM.....	3	3	300		
K1JIX.....	11	4	615	WA2TOV.....	3	3	140		
K2CBA.....	16	7	660	K2GGA.....	4	4	383		
W2AOC.....	15	5	530	W3MMV.....	11	5	470		
W28EU.....	12	5	450	W3RUE.....	10	5	410		
K2DZM.....	12	5	400	K3GJK.....	9	4	300		
W2LWL.....	12	4	400	W3FEL.....	8	4	296		
K2KIB.....	12	4	300	K3IUV.....	8	3	310		
K2ITP.....	10	5	265	W38ZD.....	5	4	300		
K2ITQ.....	11	5	265	W3UJG.....	4	2	350		
K2ISA.....	11	4	300	W4HHK.....	9	4	550		
K2AXQ.....	9	3	240	W4TLV.....	6	2	500		
K2JTW.....	8	3	244	WA4BYR.....	6	2	420		
K2UUR.....	6	3	210	W4GOO.....	6	2	415		
WA2BAH.....	6	3	200	W4RFB.....	5	2	685		
W3FEY.....	11	5	350	W4TLV.....	4	2	500		
W3RUE.....	10	5	480	K4QIF.....	4	1	285		
K3IUV.....	10	3	410	W5RCT.....	16	5	725		
W3LCC.....	10	3	300	W5AJG.....	7	3	1010		
W3JYL.....	8	4	295	W58WV.....	7	3	525		
W3JZT.....	4	3	250	W5HTZ.....	5	3	440		
W4TLC.....	5	1	315	W5ML.....	5	1	350		
K4QIF.....	1	2	500	W5UKQ.....	3	2	500		
W5AJG.....	3	2	1050	W6GDO.....	2	2	385		
K7IGW.....	1	2	250	W6EZA.....	1	1	280		
W7AGO.....	2	1	160	K6GTG.....	1	1	180		
K8AXU.....	11	5	1050	W8PPT.....	11	7	600		
W8PPT.....	11	5	660	W8YTO.....	11	6	560		
W9JCS.....	6	2	340	W8TYY.....	9	5	580		
VE3BPR.....	3	3	300	W8IFX.....	8	5	470		
W1BU.....	13	3	390	K8RDE.....	6	4	275		
W1AJR.....	12	4	410	W8JLQ.....	6	3	275		
W1OOP.....	11	3	390	W8RQU.....	6	3	270		
W1FHE.....	10	4	430	K8AXU.....	3	3	660		
W1HDQ.....	10	4	250	W8TWF.....	5	3	150		
W1QWJ.....	10	3	230	K9AAJ.....	9	5	425		
K1JIX.....	9	3	230	K9UIP.....	9	5	390		
W2RIV.....	13	5	460	W9GAB.....	9	1	608		
W2ZDT.....	6	3	200	W9HUV.....	8	5	450		
K2DZM.....	10	4	390	W9AAG.....	4	2	525		
W2OTA.....	10	4	300	W9NKT.....	7	3	310		
K2CBA.....	9	7	220	W9OJI.....	6	3	330		
W2VCG.....	9	4	280	W0IDY.....	9	5	560		
W2EFG.....	9	4	200	K0ITF.....	3	2	158		
K2UUR.....	9	3	280	VE3AIR.....	5	4	450		
W7PUA.....	7	1	500	VE3BQI.....	5	4	147		
W4ZEUS.....	7	2	130	VE3BPR.....	4	4	600		

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

gratulations to this group of hard-working club members and hope your membership doubles this year too.

The Marlboro Amateur Radio Association has a moon-bounce project in the works. A twenty-eight foot dish has been obtained and equipment is well under way. The club is looking desperately for some means of rotating the dish *el az* fashion. If anyone has anything that will do the job please get in touch with the club. They have a few surplus rotators that will rotate about anything smaller than the 28 footer and would be pleased to trade for a suitable gun mount or what have you. Contact Curtis P. Hoffman, W1ELU, 169 Millham Street, Marlboro, Massachusetts 01752 if you can help.

50 Mc.

Up in Portland, Maine, K1MTJ notes poor openings into 0 and 4 lands on January 11, and to 4 land only on the 27th; while Murty, K1OYB comments that the few openings during the month were poor ones to 4 land. From Pennsylvania, WA3BNO and K3ZHH both noted an opening on January 22 when 4s, 5s and 7s were heard. John, WA3BNO, has recently erected an 8-element wide-spaced beam and hopes to double his states worked on 50 Mc. Total to date is 21 states worked with a halo. Bill, K3ZHH, tells us that s.s.b. is rapidly becoming the mode in his area (Sharon, Pa.) and that DX is available most any time on s.s.b. Several of the boys in the Shenango Valley, Mercer County area are currently trying to organize a club and you can get in touch with K3ZHH if you are interested. Dave, K3RLO, writes from Sayre, Pennsylvania, that there are about 20 stations in the immediate area active on v.h.f., mostly six or 2 a.m. A couple of the fellows have s.s.b. rigs going but there is next to no c.w. activity. Some of the Elmira boys are on RTTY, K3RLO operates 50 Mc. a.m. and c.w. most of the time although he is building an all-transistor converter for 432. "No unusual conditions observed during January" sez K4FJZ, but he does report that there are 10 or more stations in the area active on 53.4 f.m., and very little a.m. activity. In Florida WA4FJO has been keeping an ear on the 50-Mc. band and noted openings on January 3, 9, 14, 22 and 25 to 1, 2, 3, 4, 8, 9 and 0 lands. South Carolina also caught a number of openings during the month reports WA4LTS. January 9, 10, 21, 22 and 27 were the dates that Rick heard 1, 5, 8, 9 and 0 lands. WA4ZBV in Clemson, South Carolina is now on 50-Mc. s.s.b. with 250 watts and is constructing a new 6-element beam to go atop a 60-foot tower. "No openings in January" sez W4WQZ in Tennessee.

W6GZK wants to know who sez that CO2GS doesn't QSL. Cal worked him in 1963 and after 2 and a half years the QSL from Cuba arrived. New QTH for Tony is Antonio Gutierrez, CO2GS, Simon Bolivar 315, Box 6996, Habana, Cuba. According to K6HGV, 50 Mc. has been quite dead during January with only a few s.s.b. contacts to Washington being made. W6YKS reports scatter signals from the south about average. John tells us that K6IBY, W6NLZ and W6ABN have the most consistent signals into Fortuna (about 600 miles). Nevada, via K7ICW, reports "More than usual sporadic E activity with openings on January 1, 8, 17, 23 and 26. E backscatter to southern California good on the 1st. Iono-meteor scatter very good. Worked W0EYE several times on ionobackscatter. Tropo signals picking up to the southern California area. W6NLZ's s.s.b. signals again manageable for

an occasional two way, while regulars as K6IBY and K6GJD make it almost anytime. Ionosscatter tests with W0KMW in Missouri at 1300 miles were a flop. Apparently north-south signals are still the mainstay." Thanks again Al, for an interesting and complete report. K7MGB reports quite a bit of six-meter f.m. activity in the northern part of Seattle at 53.38 Mc. We're happy to receive a report this month from West Virginia. WA8JWM of Newell, W. Virginia caught openings on January 18 and 24 to the south and southwest. He also reports that two-meter activity is excellent in his area. Tell us more, Tony. We don't receive much information from your fair state. Michigan reports are somewhat mixed with WA8FTA reporting that he noticed more openings in January than he's heard since being on 50 Mc., with 14 states heard or worked during openings on 11 days. On January 22, Bruce worked WA4LTS with signals S9 plus for a period of 7 minutes. January 21, 23 and 26 were the good days for WA8EGA in Detroit when Texas, Alabama, Georgia and Florida were worked. From Saginaw, K8AQA reports only fair conditions during January with some ground wave openings throughout the period with maximum distances of about 150 miles. However, Bob says there were openings on the 21st and 22nd into 4 and 5 lands with strongest signals from Florida, Mississippi and Texas. Wayland, Michigan and K8VEX report that the six-meter band has been dead except for occasional ground wave into Ohio and a period of an hour and forty minutes during the contest when it was open into Texas.

Below is a portion of an interesting letter received from Ron Will, W8GGE, in Kettering, Ohio. "Quite a lot of v.h.f. activity in this area over the contest weekend. As luck would have it, there was some real fine ground wave that evening and I did snag western Pennsylvania, West Virginia, Kentucky and Indiana for a few multipliers. Then a very brief opening occurred to the southwest and I managed to get North and South Texas on s.s.b. One quick burst brought in Michigan but only long enough for me to give him my count. Another 15 seconds and I would have had another multiplier. The contest was a lot of fun and brought out a lot of guys who have been relatively inactive on v.h.f. A quick estimate shows something like 300 to 350 v.h.f. stations were operated in this area during that weekend. Not all were in the contest of course, but did get in there to hand out points. It's quite surprising to note this many v.h.f. stations in this part of Ohio, since all too often it's almost impossible to find someone on either 6 or 2 to ragchew with. (Let's see now. There are ragchewers, contesters and pointers.) We did have another brief opening to the southwest on January 22 with all of Texas and Arkansas coming through strong for several hours. A local net that meets at 2100 EST on 50.538 Mc. was delayed for half an hour because the 5s were so strong on frequency that they overrode the locals. Not very often that this kind of circumstance occurs." Write more often, Ron, makes interesting reading. 3, 4, 5 and 7 lands were worked by W0PFP in Iowa on January 15, 22 and 23. K7YAE and K7YFR were heard for about an hour in Ames on the 23rd. Jim (W0PFP) tells us that he has resumed construction of a new six and two-s.s.b. rig and hopes to have it completed soon.

From Rhode Island K1ABR writes that he will be available for scatter skeds on 50 Mc. every weekend. Mode is c.w., power is a kw, frequency is 50.080. QST



Operating News



F. E. HANDY, WIBDI, Communications Mgr.

LILIAN M. SALTER, WIZJE, Administrative Aide GEORGE HART, WINJM, National Emergency Coordinator

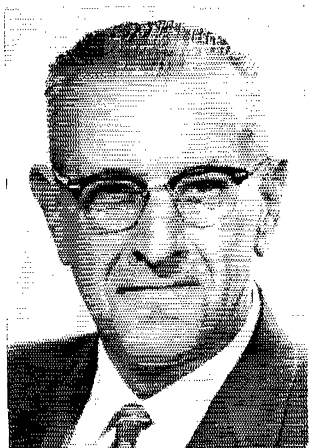
ROBERT L. WHITE, WIWFO, DXCC Awards ELLEN WHITE, WIYYM, Ass't. Communications Mgr.

GERALD PINARD, Club Training Aids PETER CHAMALIAN, WIBGD, Communications Asst.

FD Forms Ready. ARRL's annual June Field Day is an operational opportunity you will not want to miss. We suggest that you ask for the Field Day log-report forms by radio or mail now, whether you are going to be part of club Field Day plans, or operating portable alone or with some other amateur this June 25/26. This will give us a chance to place our convenient forms in your hands. FD log-forms are now ready and available.

About Field Day Rules Changes. Following considerable study and discussion we can now say the changes indicated are by no means radical. Advance planning will not be far off the track, if one goes by the pattern set forth in last June's *QST*, in deciding the number of teams and groups that will be operative. There will be, however, a bonus provision added in the rules as was discussed in *QST* and may we

thank all who gave us their comments. Considering the "for and against" on several points, we limited the bonus items to those practical to do and involving least objections. To be in the spirit of the thing requires, in this exercise, doing *everything* afield by emergency-power, just as if the chips were down. Your letters helped to point up the two-out-of-three approach for 500 bonus points to be added to scores after the appropriate multipliers (customary levels for power-bracket and emergency power). There are no changes except to add your earned "bonus." To get this requires FD classes A, B or C to comply with *two out of three* of the following objectives. (1) Using emergency power for *everything*, and no commercial power for any purpose, during the operating hours of the Field Day. (2) Securing and submitting proof of FD publicity-for-amateur-radio. (3) Exercise of message handling techniques and submitting proof of same, by starting an on-the-air Field Day message in perfect form and procedure. The rules spell out in more detail how you meet these objectives; we hope every club will get a bonus credit.



Congratulations are due Frank L. Baker Jr., W1ALP, on well over a quarter century of service as SCM of Eastern Massachusetts. He has also served ARRL as Vice-Director and been President and Secretary of the South Shore Amateur Radio Club. Frank has brought Eastern Massachusetts to be first in leading the nation in number of ARRL Emergency Coordinators. Meetings with his leader-appointees have helped towards keeping this section ahead operationally. Serving as SCM since early 1940, all members will now join us in best wishes and good luck. W1ALP is today senior among the 74 elected by members to hold SCM operating-leadership posts.

Getting Ready for the Field Day. Some clubs have had committees on the job for months, planning equipment, investigating new sites, going over last year's showing to make a better disposition of operating shifts, new plans for commissary for this year. Our FD rules, already sent out to over 1300 affiliated clubs in early '66 will be reprinted in June *QST*. Clubs and groups have to make their own decisions as to what transmitter class to enter. Some clubs operate with teams under a chairman for each band. In other clubs one Field Day Chairman is usually appointed over all details to formulate and implement plans. He may bring up at each club meeting those proposals that require club support or suggestions and appoint as many committees as he feels necessary to accomplish the club's objectives.

Operational Preparedness. All results depend on individual operator-proficiency and handling of equipment. In emergencies, all types of communications must be utilized effectively. Emergency-power is vital and of course is emphasized in our rules. It is not sufficient to brief operators inadequately at the last minute on a large variety of equipment set up for a Field Day. Many oper-

ators are only familiar with their own home gear. Accordingly, we suggest that there be some briefings at club meetings, perhaps demonstrations at the club, dry runs in which newer operators can sit in with the more experienced. Operating procedures, the timing of calls to get best results, matters of logging (in which department so many critiques after Field Day show deficiencies!) and other things, should be discussed and reviewed.

If a club or group is new to emergency and Field Day work, it is especially important that attention be given these things. *Larger clubs can well make a scheduled program on the subject of "field day" organizationally.* Why not at a second type of field day meeting line up your SEC or more likely the nearest ARRL Emergency Co-ordinator to explain that the equipment and operating side is *preparation* for meeting the personal amateur responsibilities in Public Service Communications: Every active amateur should be registered in our AREC. ARRL now has a new booklet out too (successor to the *Emergency Communications Manual*) covering Public Service Communications. There ought to be, we think, a tie in which all those who will take part in the Field Day are signed up in the local AREC and are ready to utilize their skill in support of the ARPSC (Public Service Corps.)

While we're about it, let us also say there's no better operator preparation for the Field Day than to hold appointment as ORS, OPS or OES and take part in quarterly CD Parties (Jan.-Feb.-July-Oct.). At any rate, the least a club can do on promoting operator readiness and know-how might be to invite all club members to report on their section's e.w. and phone nets. Such operating gives a full chance to enhance those operating skills, as well as to enjoy the fraternalism there apparent.

Move Higher Precedence Messages First. In amateur radio we have a tool known as "precedence." This refers to the classification of messages and the indication in the preamble as Emergency, Priority (P), Priority two (P2) and Routine traffic. Each meaning is spelled out in Operating Aid 9A and, as well, in our Operating Booklet, *Emergency*, when used connotes life and death urgency. It goes on official messages in emergencies.

PRIORITY (P) indicates a time factor, a degree of urgency less than top need. **P-2, second-priority**, goes on inquiries concerning the *health and welfare* of people in disaster areas. Traffic bearing this must receive attention *after any outgoing traffic* from such areas. **ROUTINE (R)**

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for Jan. Traffic:

Call	Orig.	Recd.	Rel.	Del.	Total
K6BPI	112	2241	2129	84	4566
W3CUL	352	1691	1622	43	3708
K6MCA	273	1199	1149	14	2635
W9KJ	1996	0	120	0	2116
W1PE	62	718	667	34	1481
W0LGG	15	629	563	13	1220
K0ONK	44	618	522	17	1201
K6EPT	118	536	350	186	1190
W3EML	29	505	384	5	923
K9TVG	153	415	328	2	898
W6ZJB	23	437	41	16	897
W9CNY	227	410	58	117	812
W7HMA	9	372	371	1	753
W6GYH	121	327	295	4	747
W7BA	21	361	309	48	739
W8JUF	28	351	314	37	730
W4BMC	607	47	54	7	715
W2RUE	41	334	273	21	659
K8YVN	6	305	301	11	623
W3VR	83	291	244	2	620
K3MYS	35	294	254	24	607
W9DEM	73	283	245	11	592
W4SCK	12	279	283	6	580
W0ZWL	0	374	0	205	579
W4ATMX	34	270	256	3	563
W8RSY	92	252	115	90	549
K3PYS	154	249	84	59	546
W9JKT	32	257	170	87	546
W3EUN	165	296	46	36	543
W8BVK	17	347	268	9	539
W9JOZ	23	256	256	0	535
K9GSY	45	244	241	0	530
W1AIPY	21	251	58	161	521
W8BRO	72	237	187	23	519
K9PPE	35	237	231	6	509
W8MKE	18	252	53	149	502
Late Reports:					
W0LGG (Dec.)	4	868	814	4	1690
W9JOZ (Dec.)	32	498	497	1	1028
W8BHRH (Dec.)	42	494	332	116	984
K9JTB (Dec.)	18	500	315	6	837
K7JHA (Dec.)	11	317	349	2	679
W9BWWY (Dec.)	27	253	235	15	530

More-Than-One-Operator

W6IAB	986	2176	1578	598	5338
W8YDK	1984	675	499	178	3334
K6WAH	82	1017	1099	27	2225
W4LEV	302	669	623	46	1640

BPL for 100 or more originations-plus-deliveries

W8MKB 287	W9SUF 138	W3TN 109
K3ZYP 263	W8KME 129	W3HNE 104
K1CLM 213	W9LWJ 128	K8YSO 102
W4P 203	K4EYV 124	W4SEJ 101
K1GPH 187	W6LXJ 124	Late Reports: 1
W4PQP 157	K5MBK 121	KIENS (Dec.) 189
K9IMR 142	K3SOH 117	W1AIPY (Dec.) 106
	W9GJU 112	

More-Than-One-Operator

W0YC 127

A BPL medallion (see Aug. 1954, p. 51) has been awarded to the following amateurs since last month's listing: W1AIFP.

The BPLs open to all amateurs in the United States, Canada and U.S. Possessions who report to their SCM a message total of 500 or a sum of origination and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

is the label carried by most of our traffic in the amateur bands under normal conditions.

All the definitions of the different precedences are set forth in greater detail in Operating Aid 9A. We wish here only to voice concern that operators, even some who are supposed to be traffic-skilled, do not always realize that these precedences must be observed. On a circuit, whether voice, e.w., or RTTY, it is a first duty

C. D. ARTICLE CONTEST

A Communications Department article contest, a continuation of the very successful QST Article Contest during the 1964 anniversary year, needs your best ideas (in 300-1200 words) relating to League organization, clubs, training exercises, and operating techniques. Periodically, the best articles submitted for the "CD Contest" will be chosen to appear, with the winner electing to receive (a) a bound 1965 *Handbook* or (b) a QST binder, League emblem and the ARRL DX map.

of any and all operating personnel (and station supervisors) to see that the messages bearing the higher precedences are moved first. Any old way of just moving all the traffic there is on the hook regardless of its content must bow to a consideration of the classification of the traffic as to importance. Action-considerations must give practical effect to the designation appearing on the message! Always move any P and P-2 traffic ahead of R (routine) filings.

— P. E. H.

JANUARY CD PARTIES

Both portions of the January 1966 CD Parties were well attended with superb scores turned in on both modes. Comparing phone results with the previous party, we find 27 topping the 10-K mark vs. 10 last October! Highlights: the top-notch showing by CD pro K2EIU/5 leading both sections; W1YNP/6 with the highest San Diego and W6 performance in ages; the hope-springs-eternal recording of a VE8 c.w. multiplier (sorry but we've no OES ORS in Yukon-N.W.T.) and far from least, the record-breaking claimed score by the WIAW crew (W1s BGD ECH WPR, K1AFC) multioperating the Headquarters Station when station time was available.

The following high-claimed CD party scores show claimed score, number of contacts and sections. Final results will appear in the April 1966 CD Bulletin.

— W1YYM

C. W.

K2EIU/5... 253,750-718-70
 K1WJD... 212,520-609-69
 W9EWC... 208,950-593-70
 K5OCX... 193,380-580-66
 W1YNP/6... 181,815-520-69
 K2AJA... 181,025-550-65
 W8ZLF... 180,900-534-67
 W4DVT... 176,750-498-70
 W9QQQ... 176,460-512-68
 W3NOH... 171,020-503-68
 K0AZJ... 155,105-459-67
 WISWX... 150,810-450-66
 W9YYG... 149,160-447-66
 K2UFT... 148,830-445-66
 W9LNQ... 145,073-473-67
 WA5IIS... 143,045-421-67
 VE7BDJ... 142,460-412-68
 K8HKB... 141,700-430-65
 W2QJD... 139,400-410-68
 W6CXN... 138,125-425-65
 W4YE... 136,500-413-65
 W1YYM... 136,343-400-67
 K8TIG2... 136,320-420-64
 W6GXQ/4... 136,080-401-67
 K3KMO... 135,585-386-69
 K1ZND... 133,575-404-65
 W6TYM... 133,560-419-63
 K4SXD... 131,950-400-65
 W4LK... 131,840-412-64
 W9AQW... 130,560-408-64
 K9UIY... 130,410-410-63
 WA2SRQ... 129,600-400-64
 W4UWS... 128,205-401-63
 K4RAD/2... 128,050-389-65
 K1QPL... 125,730-377-66
 K4BA1/4... 125,685-392-63
 WA0CVS... 123,825-378-65
 W9NPC... 122,945-361-67
 K3URZ... 121,655-408-59
 K1YKT... 120,960-378-63
 K3HNP... 113,920-351-64
 WA2WBA... 113,100-342-65
 W1DYE... 111,825-351-63
 W8RYP... 109,760-336-64
 W1WAJ... 109,620-341-63
 WA8GYT... 106,240-325-64
 VE7BKM... 104,650-316-65
 W8CKX... 104,135-353-59
 VE7AC... 104,000-318-64
 W7BAJ... 101,760-311-64
 WA8GYX... 101,760-313-64
 K6JPL... 101,120-311-64
 W1KFC... 101,115-314-63
 KZ5FX... 100,750-318-62

K3GUR... 100,320-298-66
 K5ARH... 100,200-331-60
 WA9IZR... 100,200-328-60
 WIAW... 292,875-818-71
 (4 ops.)

PHONE

K2EIU/5... 86,710-292-58
 W1BGD... 84,900-276-60
 K2ODT... 73,060-277-52
 W1FJ... 71,250-244-57
 W3TMZ... 62,700-220-57
 K2AJA... 57,460-214-52
 W1YNP/6... 51,940-204-49
 K5MDX... 51,545-169-61
 W1JYH... 45,370-179-49
 K8HKB... 45,080-178-49
 WA9BWY... 42,720-174-48
 K2KNV... 40,670-160-49
 K3KMO... 38,640-161-46
 K0YIP... 37,835-154-47
 W6JBK... 37,575-167-45
 W9NPC... 36,570-153-46
 K4TTN... 31,390-146-43
 W1PYM/6... 30,360-133-44
 WB2EDU... 30,340-148-41
 WA5GKL... 28,280-128-42
 K5ARH... 26,240-125-41
 K3RFH... 25,400-127-40
 W2ZVW... 24,790-127-37
 K1CAU/6... 22,600-109-40
 W8AEB... 20,670-101-39
 W9EWC... 20,500-100-41
 K0GSV... 20,125-110-35
 WA5GAC... 19,980-108-37
 WA8MRK... 19,080-103-36
 W5VZO/4... 18,640- 94-36
 WA9LWJ... 18,180-112-33
 W9LNQ... 15,300- 80-36
 K4VOP... 15,200- 95-32
 W8WUU... 14,800- 80-37
 W4AKS... 14,440- 76-38
 W3KJJ... 13,500- 84-30
 W6FNE... 13,455- 69-39
 W2GKZ... 13,365- 74-33
 WISWX... 12,300- 75-30
 K2ARY... 12,245- 79-31
 WB2FAJ... 11,850- 74-30
 K4YZU... 11,550- 70-33
 K6FPC... 11,520- 65-32
 WA5IIS... 10,730- 68-29

1 K9WIE, opr.
 2 W8FAW, opr.

ELECTION NOTICE

To all ARRL members in the Sections listed below:

You are hereby notified that an election for Section Communications Manager is about to be held in your respective sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned in good standing, are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been a licensed amateur for at least two years and similarly a full member of the League for at least one continuous year immediately prior to his nomination.

Petitions must be received at ARRL on or before 4:30 P.M. on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, and station call of the candidate should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reasons of expiring memberships, individual signers uncertain or ignorant of their membership status, etc.

The following nominating form is suggested. (Signers will please add city and street addresses to facilitate checking membership.)

Communications Manager, ARRL [Place and date]
 225 Main St., Newington, Conn. 06111
 We, the undersigned full members of the.....
 ARRL Section of the.....
 Division, hereby nominate.....
 as candidate for Section Communications Manager for
 this Section for the next two-year term of office.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence the names of all eligible candidates.

You are urged to take the initiative and file nominating petitions immediately. This is your opportunity to put the man of your choice in office.

— P. E. Handy, Communications Manager

Section	Closing Date	SCM	Present Term Ends
Idaho	Apr. 11, 1966	Raymond V. Evans	Apr. 10, 1965
Saskatchewan	Apr. 11, 1966	Mel Mills	Dec. 17, 1965
Wyoming	Apr. 11, 1966	Wayne M. Moore	June 8, 1966
Louisiana	Apr. 11, 1966	J. Allen Swanson	June 10, 1966
Quebec	Apr. 11, 1966	C. W. Skarstedt	June 11, 1966
Maritime	Apr. 11, 1966	D. E. Weeks	June 11, 1966
Eastern			
Massachusetts	Apr. 11, 1966	Frank L. Baker, Jr.	June 15, 1966
South Carolina	Apr. 11, 1966	Charles N. Wright	June 26, 1966
Connecticut	Apr. 11, 1966	Fred Tamn	Resigned
Arizona	May 10, 1966	Floyd C. Colyar	Apr. 15, 1966
Utah	May 10, 1966	Marvin Zitting	July 15, 1966
Western			
Pennsylvania	June 10, 1966	John F. Wojtkiewicz	Aug. 7, 1966
Western			
New York	June 10, 1966	Charles T. Hansen	Aug. 10, 1966
Santa Barbara	June 10, 1966	Cecil D. Hinson	Aug. 10, 1966
San Joaquin			
Valley	June 10, 1966	Ralph Saroyan	Aug. 20, 1966
Ontario	June 10, 1966	Richard W. Roberts	Aug. 20, 1966
Montana	July 11, 1966	Joseph A. D'Arcy	Sept. 9, 1966
Northern Texas	July 11, 1966	L. L. Harbin	Sept. 12, 1966

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed by members in the following Sections, completing their election in accordance with regular League policy, each term of office starting on the date given.

West Indies	Albert R. Crumley, Jr., KP4DV	Jan. 10, 1966
Eastern New York	George W. Tracy, W2EFU	Feb. 10, 1966
East Bay	Richard Wilson, K6LRN	Feb. 10, 1966
Georgia	Howard L. Schonher, W4RZL	Mar. 26, 1966

A.R.R.L. ACTIVITIES CALENDAR

(Dates shown are in GMT)

- Apr. 8: CP Qualifying Run — W6OWP
- Apr. 16-18: CD Party (c.w.)
- Apr. 15: CP Qualifying Run — W1AW
- Apr. 23-25: CD Party (phone)
- May 5: CP Qualifying Run — W6OWP
- May 11: CP Qualifying Run — W1AW
- June 11-12: V.H.F. QSO Party
- June 25-26: Field Day

Apr. 9-10: Iowa QSO Party, Sioux City Amateur Radio Assn. (p. 122, this month).

Apr. 23-24: Ohio QSO Party, Ohio Council of Amateur Radio Clubs (p. 116, this month).

Apr. 23-24: PACC, VERON (p. 91, this month).

May 7-8: Russian Contest, Radio Sport Federation (next month).

May 14-16: Georgia QSO Party, Columbus Amateur Radio Club (next month).

May 21-22: Kansas QSO Party, Jayhawk Amateur Radio Society (next month).

OTHER ACTIVITIES

The following lists date, name, sponsor, and page reference of QST issue in which more details appear.

Apr. 2-3: Florida QSO Party, Florida Skip (p. 136, last month).



DX CENTURY CLUB AWARDS



From January 1, through January 31, 1966, DXCC Certificates and Endorsements based on contact with 100-or-more countries have been issued by the ARRL Communications Department to the Amateurs listed below.

New Members

LU4DMG... 323	K8TVO... 118	OK1KTL... 109	K1MRP... 103	K3AFO... 102	K9WMAI... 100
W9ILW... 301	WA2LRK... 118	G3OAG... 108	SPTAOD... 103	VE7BHW... 102	OK2KZC... 100
W8YMV... 283	WA4HOM... 118	OK1VR... 106	VE3CDX... 103	DJ2OEC... 101	VE2RR... 100
YV2CJ... 217	DL1ND... 117	WB2FBN... 106	K9AGT... 102	EP3AAI... 101	WA4CJV... 100
W0JQQ... 192	K8IAJ... 115	CE3LR... 105	WB2PQM... 102	WA4MCV... 101	WA4SSM... 100
SP2IU... 186	DJ6N8... 113	K1KQJ... 105	W7UXP/1... 102	W7YBX... 101	WA4TJM... 100
S9WFP... 151	KZ5AG... 112	K9BHT... 105	W3QRL... 102	DJ85L... 100	W8AFN... 100
OK2YE... 142	ON4MW... 111	WA4OJN... 105	W8VQM... 102	G3MWP... 100	WA9JDV... 100
SM2CXU... 129	WA4GCS... 110	DJ7XC... 103	DJ2RT... 102	HA3MJ... 100	W0YI... 100
DJ7AY... 121	W6SUD... 110	DM3YFH... 103	DM2AAM... 102	HA0HH... 100	WA0DKA... 100
OK1BAM... 119		HA18D... 103		K4KSB... 100	

Radiotelephone

DL9LW... 149	W8LUT... 114	JAIHG... 108	W2LJF... 105	YV5CHO... 103	W5MIUG... 100
S90WPP... 131	OE1WP... 109	K4UFE... 105	W3KEK... 105	W8EHV... 102	WA2RUB... 100
WA5LOH... 130	W6SUD... 109	KZ5AG... 105	K1ZQL... 104	WA8OJ... 101	WA4HOM... 100
K5YCP... 121	DJ1YL... 108	W1LEL... 105	K5TOK... 104	WB2FJ... 101	

Endorsements

Endorsement listings through the 300 level are given in increments of 20, above the 300 level they are given in increments of 10. The totals shown do not necessarily represent the exact credits given but show only that the participant has reached the endorsement group indicated.

320	K8IKB	K6JIC	K1DIR	W1ECH	WB2EPG	I1PP	180	W2MZV	K1SCQ	120	W3HNK
W4BJ	W1JNV	K8WOT	K1HVV	WB2PMK	W3BSC	K1LWI	K3JLI	WA2KSD	K3TVU	HA5AW	W3MHR
W0BMQ	W1RAN	W2AZS	K7ADL	W3HTF	W3WJD	K1TUQ	PY2BKO	WA2RMP	K9KGF	K1EUV	W3TIE
	W2PDB	W2EMW	SP7HX	W6EHV	W4BRB	K40EI	W3URE	W4HKQ	OK2KOS	K1MXY	W4WHF
310	WA2ELS	WA2DIG	W1YYM	W4FRO	W4FRQ	PY2BGL	WA4WIP	W5NXX	VE2AJV	K5BXC	WA4HHW
W2BQM	W31NH	WA2RAU	W2PZI	220	WA4XP	VE3BCT	WA5CBE	W6EUF	WA2HJF	K8YTY	WA4HCX
W2TOR	W6KUT	W4HKJ		DL1HH	W6FLT	VE3EUU	W6CLS	W6HJ	W2AMO	K9DWG	WA4NRC
W2ZYS	W7UMJ	W5VA	240	JA1BN	W8MCC	W2RSJ	W6RGG	W9RGX	W4LIU	XE1TQ	WA4NGO
W8JSU	W7GHB	D4FTZ	K4RZK	K2LAF	W9UXS	W3UHV			W4LXX	W1GTO	W6NUU
W9JUV	W8KIT	K2INP	K7MKW	SM1CXE	200	W4ASW	160	140	W5DWB	W1LEL	WA6YVW
	DL1DC	K4RZK	SM1CXE	200	W4JDM	K7CVL	DL9KJ	WA6KMF	W2HL	WA8GUA	W9ECF
300	I1UA	K8VUR	VE3AAZ	DJ6LA	W6FET	KL7BZO	EP2RC	W86LZI	WA2KHD	W9ECP	
K4HYL	K3DCP	G3FPK	UA2AO	W2FVI	DJ9KQ	WA6HR8	OK2KJU	JA1HG	W8CVD	WB2FON	
			VE3AGC	WA2JBV	G3CEG	WA6SLU	W2LWI	K1JHX			

Radiotelephone

320	DL1IN	W4PAA	WA2ELS	W2TQR	UA2AO	220	VE3EUU	180	WA6KNE	W5NXX	W9PBY	PY2CTI
K4AIM	W6BAF	WA2RAU	W3YZI	W2CYX	W1DCJ	K1UDP	W3LFF	EP3RO	W5LZZ			W2RIR
JU4DMG	W0BQM	W6YMV	W4PJG	W4HKJ	W2YEG	WB2EPG	W3NIG	K3HHY	160	140	120	W8WVQ
T12HP				W2LKW	W4HKJ	200	WA4JOS	K9IKB	DJ4TZ	G3CEG	HB9BR	W6WVQ
	280	260		W48AJ	DJ5LA	DJ5LA	W9JUV	OE2EGL	K1HVZ	K4DI	K1LWI	W2JWE
W5PQA	I1UA	FRDJ	240	W9HP	VE2BCT	YV2CJ	W9RKT	W2CES	K4FA	K6WTS	K4YLL	W8FPM
DJ2BW	ON4DH	K1ASU	K8VUR				W9QQN	W4SKBK	W1FJJ	W6MBV	K9RPO	W9WFS
							W6CLS	WA4WIP	W9KXK	KW5EJ	WB2GYD	XE2WH

OPERATOR OF THE MONTH

Have you thought back over the past month and picked out your nomination for "operator of the month?" Considerations to bear in mind include a clean signal, good keying, careful enunciation, correct procedure, judgment and courtesy. The League's Operating Aid No. 11 lists further examples. Send your vote for "Operator of the Month" to the ARRL Communications Department.

During February the following additional amateurs were nominated in recognition of their extra skills and courtesies:

W1GIV	W4ZAU
K1HWD	WA5EVU
W2GP	W6MLU
W2NHB	K6YTA
W3LAT	K7JVF
K3VOX	K8BSH/1
WA4ANH	W9QVE
WA4EUL	WA8FSR
W4IYT	VP5AR
WA4VVM	YK1AA
W4WHK	9J2AB



runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted. 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m. you may try later for endorsement stickers.

Code practice is sent daily by W1AW at 0030 and 0230 GMT, simultaneously on all listed c.w. frequencies. At 0230 GMT Tuesday, Thursday and Saturday, speeds are 15 20 25 30 and 35 w.p.m.; on Monday, Wednesday, Friday and Sunday, speeds are 5 7½ 10 13 20 and 25 w.p.m. For practice purposes, the order of words in each line may be reversed during the 5 through 13 w.p.m. tests. At 0030 GMT daily, speeds are 10 13 and 15 w.p.m. The 0230-0320 GMT runs are omitted four times each year, on designated nights when Frequency Measuring Tests are made in this period. To permit improving your list by sending in step with W1AW (but not on the air) and to allow checking strict accuracy of your copy on certain tapes note the GMT dates and texts to be sent in the 0230-0320 GMT practice on those dates:

Date Subject of Practice Text from Feb. QST

Apr. 4: *It Seems to Us*, p. 9

Apr. 7: *A Low-Cost 700-Watt Linear Amplifier*, p. 15

Apr. 19: *Hurricane Betsy*, p. 26

Date Subject of Practice Text from *Understanding Amateur Radio*, First Edition

Apr. 20: *Grounded-Grid Amplifiers*, p. 43

Apr. 29: *Oscillators*, p. 44

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 Apr. 15 at 0230 GMT. Identical tests will be sent simultaneously by transmitters on c.w. listed frequencies. The next qualifying run from W6WP only will be transmitted Apr. 8 at 0500 Greenwich Mean Time on 3590 and 7129 kc. **CAUTION:** Note that since the dates are given per Greenwich Mean Time, Code Proficiency Qualifying Runs in the United States and Canada actually fall on the evening previous to the date given. *Example:* In converting, 0230 GMT Apr. 15 becomes 2130 EST Apr. 14.

Any person can apply. Neither ARRL membership nor an amateur license is required. Send copies of all qualifying

SUGGESTED OPERATING FREQUENCIES

RTTY 3620, 7040, 14,090 21,090 kc.

WIDE-BAND F.M. 52.525 146.94 Mc.

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, Hawaiian —10, Central Alaska —10.

A convenient conversion card is available free from the ARRL communications Department, 225 Main St., Newington, Conn. 06111.

W1AW SCHEDULE, APRIL 1966

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 3 P.M.—3 A.M. EST, Saturday 7 P.M.—2:30 A.M. EST and Sunday 3 P.M.—10:30 P.M. EST. The station address is 225 Main Street, Newington, Conn. about 7 miles south of Hartford. A map showing local street detail will be sent upon request. The station will be closed Good Friday, April 8.

GMT*	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0030							
0100		C.W. OBS ¹	C.W. OBS ¹	C.W. OBS ¹	C.W. OBS ¹	C.W. OBS ¹	C.W. OBS ¹
0120-0200 ⁴			7.080	3.555	7.080 ⁹	3.555 ⁶	7.080
0200		Phone OBS ²	Phone OBS ²	Phone OBS ²	Phone OBS ²	Phone OBS ²	Phone OBS ²
0205-0230 ⁴			3.945	50.7	145.6	1.82	3.945
0230		Code Practice Daily¹ 15-35 w.p.m. TThSat., 5-25 w.p.m. MWFSyn.					
0330-0400 ⁴			3.555	7.080	1.805	7.080	3.555
0400	RTTY OBS ³		RTTY OBS ³	RTTY OBS ³	RTTY OBS ³	RTTY OBS ³	RTTY OBS ³
0410-0430 ⁴			3.625	14.095	3.625	14.095	3.625
0430	Phone OBS ²		Phone OBS ²	Phone OBS ²	Phone OBS ²	Phone OBS ²	Phone OBS ²
0435-0500 ⁴			7.255	3.945	7.255	3.945	7.255
0500	C.W. OBS ¹		C.W. OBS ¹	C.W. OBS ¹	C.W. OBS ¹	C.W. OBS ¹	C.W. OBS ¹
0530-0600 ⁴			3.555 ⁶	7.080 ⁹	3.555	7.255	3.555
0600-0700			7.080	3.945	3.555	7.255	7.080
0700-0800			3.945	7.255	3.945	3.555	3.945
2000-2100		14.280	21/28 ⁵	14.100	21/28 ⁵	14.280	
2100-2200		14.100	14.280	14.100	14.280	14.100	
2300-2345		7.255	21/28 ⁶	21.1 ⁶	21/28 ⁶	7.255	

¹ C.W. OBS (bulletins) and code practice on 1.805 3.555 7.08 14.1 50.7 and 145.6 Mc.

² Phone OBS (bulletins) on 1.82 3.945 7.255 14.280 50.7 and 145.6 Mc.

³ RTTY OBS (bulletins) on 3.625 and 14.095 Mc.

⁴ Starting time approximate. Operating period follows conclusion of bulletin or code practice.

⁵ Operation will be on one of the following frequencies: 21.075 21.1 21.41 28.08 or 28.7.

⁶ W1AW will listen in the novice segments for Novices on band indicated before looking for other contacts.

Station Staff: W1QIS W1WPR W1NPG. * All times/days in GMT, general operating frequencies are approximate.

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

DELAWARE—SCM, Roy A. Belair, W3IYE—SEC: K3NYG. RM: W3EEB. V.H.F. PAM: K3OBU.

Net	Freq.	Local Time	Days
DEPN	3905 kc.	1800	Sat.
DSMN	50.4 Mc.	2100	Tue.
Dover 6 & 2	50.4 Mc.	2000	Wed.
KCEN	3905 kc.	1300	Sun.

Renews: W3HC as ORS, K3KAJ as ORS and EC, K3CNI as OES, K3BBR as OBS, W3EJU as OO. W3-EEB was relected Commissioner of Newport, Del. W3-EJU is looking forward to retirement this year. May it be long and interesting. Ted, K3YHR is working two jobs, which doesn't leave much time for ham radio. W3IYE is operating portable W4 from Spartansburg, S.C. with a new Eico 753, missed the big northeast snow. Traffic: W3EEB 160.

EASTERN PENNSYLVANIA—SCM, Allen R. Breiner, W3ZRQ—SEC: W3ELI. RMs: W3EML, K3YVG, K3MVO. PAMs: W3SAO, W3BYH. The EPA C.W. Net had QNI of 408 with QTC of 292. PTTN Training Net had QNI of 374 with QTC of 219. EPA Emergency Phone & Traffic Net had QNI of 408 with QTC of 105. New appointments: W3HWC as EC for Bucks County; W3ACFU and K3FSV as ORSs; K3GLK as OES. W3VR retired Jan. 1. W3ADCK is on 40 meters with a home-brew 400-watt. W3BUR did all right in the DX Test, on 160 meters. W3PUZ was guest speaker at the Penn-Elec. Dinner in Towanda. W3ACTW dropped the "N." W3ABB1, K3BIG and W3BZO are on RTTY 80 and 6 meters. New Gear Dept.: To W3-DBC a 100-watt s.s.b. rig. K3KXJ added a 136-ft. dipole. W3ACFU added an HBR keyer. K3FCB added a 500-watt linear. K3MYS erected an 80-meter inverted "V" for 80. Santa dropped a new mill off at W3CUL. W3AFGU is now General Class in the Conyngham area. K3SLP is chasing DX when not handling traffic. W3ID lost the 10-meter ground plane in a recent snow storm. W3ACLV is active on 6 meter c.w. W3ZCV and W3JSA have resigned as co-editors of the North Penn State club bulletin. K3RLO is operating on 80-meter c.w. 6- and 2-meter phone. W3ACRM would like to hear from all former members of the 807 Society of Central High School. New club officers: Lehigh University Radio Society—K3VZQ, pres.; W3VUY, vice-pres.; K3YEO, secy.; W3BQJ, treas. Philmont Mobile RC—W3ADV, pres.; W3QZO, vice-pres.; K3UWO, secy.; W3GOW, treas. The Spring Dinner Meeting of EPA appointees and traffickers will be held at the Casa Conti, Glenside, Pa. Apr. 16. Information and reservations can be made with any of the section officials. Traffic: W3CUL 3708, W3EML 923, W3VR 620, K3MYS 607, K3PIE 509, W3AIT 248, K3MVO 218, K3YVG 149, W3HKN 104, W3BYH 103, W3ZRQ 103, K3ZSK 81, W3JKX 63, K3KTH 62, W3ESV 60, W3CBH 51, K3RZE 49, W3KJJ 41, W3AFI 39, K3VEU 39, K3FSV 36, W3ACFU 35, W3FGQ 34, W3OY 33, W3VAP 32, W3BSV 28, K3LPT 27, K3TNL 25, W3RV 24, W3ATQ 22, K3KXJ 19, W3ELI 16, W3-ACC 15, W3ADBC 12, K3KKO 12, K3RLO 12, W3BUR 11, K3MDG 10, W3ABB1 9, W3BKF 9, K3SLP 8, K3IHF 7, K3YQJ 7, W3ADE 4, K3WAJ 4, W3BFF 2, W3ID 2, W3VPY 2, W3ABJQ 1, W3ACUI 1, K3HNP 1, K3MINT 1.

MARYLAND—DISTRICT OF COLUMBIA—SCM, Bruce Boyd, W3QA—SEC: W3CVE. RMs: K3JYZ, W3-PRC, W3QCW, W3UE, W3ZNV. PAMs: W3JZY, K3-LFD.

Net	Freq.	Time	Days	Sess.	QTC	Are.
MDD	3643	0000Z	Daily	31	292	17.9

MDD(s)	3643	0130Z	Daily			
MEPN	3820	2200Z	M-W-F	21	32	1.5
MEPN	3820	1700Z	S-S			
MSTN	50150	0100Z	Daily	29	72	2.5

MDDS now is on 3643 instead of 28.200. Many thanks to K4LFD for writing the December report while W3QA was toiling in the desert. Silent Keys are regretfully reported for K3EJU and W3VRJ. New appointments: W3ACRA as ORS, W3NEOP as OES, W3PRC as RM. W3WCV has passed his MDD mgr. job to K3JYZ and W3PRC takes over for K3GZK as asst. mgr. W3ZUH is leaving for 3 years in DL-Land. OO K3DNO says school plus job combination will keep him off the air. K3IPX/3 expects to move on next summer and will liquidate his present gear. K3ZYP and W3TN share BPL honors again this month. K3TJE says January was too cold for hamming. W3MCG added a TR-4 transceiver to help in the DX Contest. W3ACFK is trying a.m. but W3WTV has a new TO keyer and is giving c.w. a whirl when not organizing Montgomery County AREC. W3JZY had a good time in the VHF SS but is now snowed for the rest of the winter. K3UXY is enjoying 3RN and EAN traffic sessions. Your SCM had to cut this report rather short this month for lack of time; three days home then back to New Mexico. Traffic: (Jan.) K3ZYP 401, W3TN 185, K3IPX/3 145, K3UXY 104, K3JYZ 86, K3ZIX 80, K3GZK 60, K3PKY 58, W3BTA 32, K3OAE 30, K3ZSX 30, W3ACFK 28, W3QCW 24, K3LLR 22, K3TJE 22, W3MCG 21, K3LFD 20, W3EOV 19, W3UE 19, W3-RK 17, K3QDD 14, W3ZNV 14, K3EJF 12, K3NCM 12, W3ACEK 11, W3ACRA 11, W3CQS 10, W3NEOP 9, W3WTV 8, K3URZ 6. (Dec.) W3QCW 99, W3ACFK 12, W3CQS 12.

SOUTHERN NEW JERSEY—Acting SCM, Edward G. Raser, W2ZI—SEC: K2ARY. PAM: W2ZI. RM: W2BLV. N.J. Emergency Phone & Traffic Net reports 31 sessions, QNI 615, traffic 147. Officers of the SJRA are W2FYS, pres.; K2BG, vice-pres.; K2PI, secy.; W2ORA, treas. K2PI resigned as editor of *Harmony* the club paper. K2ERG wants to become an ORS. W2-MBD is a new ORS. W2ORS and K2JJC renewed their ORS appointments. W2GTE visited with VP9NQ and met VE2FY while in Florida. W2HAZ has returned after 7 years off the air. W2ZI has a new Heath SB-200 running 500 watts s.s.b. W2ORS is back on NJN and 2RN. W2AKIP is 2RN rep. W2BZJ is off the air. K2CID is going to school in Baltimore. W2RLY has a new beam antenna. W2WI was issued the call K4GO at Leisure City, Fla. He keeps skeds with W2HX, W2WOA, W2ZI, W2RLY and W2ASQ. W2EWH monitors 3999-kc. s.s.b. K2AAR has a new job at McGraw-Hill Pub. Co. in Hightstown. K2PDM is custodian of the DYRA club shack, where W2ZQ is located. K2PGB is assigned to Willow Grove Naval Air Station. Our sympathy to W2LLV, who recently lost his son. W2HX, going RTTY, has a new Bell Tel-typewriter and accessory gear. W2BF is DYRA chaplin. K2TQI is busy with the local C.D./DC control center in Lawrence Twp. K2ARY transmits OBSs faithfully. Would like to see more stations interested in traffic work. I hope the v.h.f. men soon will become interested in organizing local nets throughout the state. Traffic: (Jan.) W2UPC 244, W2-REG 60, W2AKIP 53, W2ORS 36, W2ZI 35, K2JJC 18, W2MRD 16, W2EWR 12, W2BEI 8, W2GTE 2, W2-KAP 1. (Dec.) W2AKIP 75, W2KAP 3.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2ZRC. PAM: W2PVI. RMs: W2RUF, W2EZB, W2FEB. NYS C.W. meets on 3670 kc. at 1900; ESS on 3590 kc. at 1800; NYSPTEN on 3925 kc. at 2200 GMT; NYS C.D. on 3510.5 kc. and 3993 kc. (s.s.b.) at 0900 Sun. and 3510.5 kc. at 1930 Wed.; TCNP 2ND Call Area on 3970 kc. at 0045 and 2345 GMT; NYS County Net on 3510 kc. Sun. at 1000 and 3670 kc. at 1700 Sat. W2BERK is a new OES. W2WUX (Utica ARC) renewed as OBS and K2AYQ was endorsed as EC for the Glens Falls Area. W2TPV/4 writes from Pilot Training school at Moody AFB, Ga. He graduated from the Air Force Academy and married a girl from his home town of Greene, N.Y. K2GUG was guest speaker at ARATS, Subject—"Oscar." Fran has done a lot of work on v.h.f. and he is a popular speaker at club meetings. W2SSC has expanded meeting notices of the NFDXA to a newsletter. I note that W2SSC, W2UVE, K2LWR and W2FXA, all members of this relatively small club (20 members), are on the Honor Roll. The Annual

YOU may remember that back in April of '65 we mentioned on this page that the NCL-2000 2 KW linear amplifier had just won the annual *INDUSTRIAL DESIGN* award for appearance, construction, and human engineering factors. We're very proud to announce that the NCX-5 five band transceiver and HRO-500 solid-state receiver have each won similar awards by the Boston Chapter of the Industrial Designers' Society of America!

BUT top-notch industrial design is only part of the story with the NCX-5. Here, in one compact package, is a transceiver that not only equals the best in separate transmitter-receiver combinations, but in most areas, actually *exceeds* the best that competition has to offer at any price.

TAKE the receiver portion of the NCX-5. Fantastic stability as the result of a double-regulated solid state VFO is coupled with the most precise dial read-out ever offered on amateur gear — a *digital counter* accurate to one kilocycle over the entire 500 KC range of the VFO on each band between 80 and 10 meters, with direct counter read-out to 100 cps for unequalled resettability. The selectivity of the NCX-5 is similarly superior. The 2.5 KC wide crystal lattice filter employed for the receiver uses *eight* crystals to achieve a 6-60 db shape factor of 1.7:1 — for single signal reception and adjacent channel QRM rejection available elsewhere only on expensive commercial and military communications equipment selling for many times the cost of the NCX-5. Naturally, the NCX-5 receiver section includes instantaneous selectable upper or lower sideband with no retuning; beautifully smooth AGC control of CW or SSB signals without pops, clicks, or thumps; a high quality rear-illuminated D'Arsonval S-meter; and a *separate AM detector* for truly compatible AM operation at will.

AND the transmitter section exceeds the best that other transceivers (or even transmitters only) have to offer. A conservatively rated 200 watt PEP wallop on all bands with sideband and carrier suppression in excess of 50 db as the result of the steep-skirted filter and solid-state balanced modulator; effective ALC control for maximum talk power without flat-topping; break-in grid-block keying for effortless CW QSO's; and, of course, built-in front-panel choice of manual, push-to-talk or VOX operation with no extras to buy. The NCX-5 also includes an important plus — *Transceive Vernier* control which allows the operator to independently tune the receiver section 5 KC each side of the transmit frequency.

AND for the amateur who wishes to retain all the advantages of transceive operation plus fully independent control of transmit and receive frequency, the VX-501 VFO console is available. The VX-501 provides choice of transceive operation controlled by either the NCX-5 or VX-501, or separate control of receive or transmit frequencies by the NCX-5 or VX-501 at the flip of a switch. Plus the choice of five crystal channels for net or novice operation.

TO top it all off, the NCX-5, VX-501, and NCX-A AC supply/speaker console all have available special oiled walnut custom enclosures at moderate prices for that really deluxe installation in the den or living room.

AND best of all, the NCX-5, at \$685.00, sells for *half* the price of the most closely comparable receiver plus transmitter (or transceiver), and only \$100.00 to \$250.00 more than ordinary transceivers.

AS we say . . . award-winning industrial design is only part of the story. The rest is in the "innards." It's nice to have both.

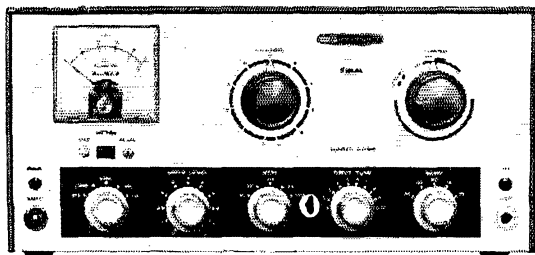
MIKE FERBER, W1GKX



National Radio Company, Inc.

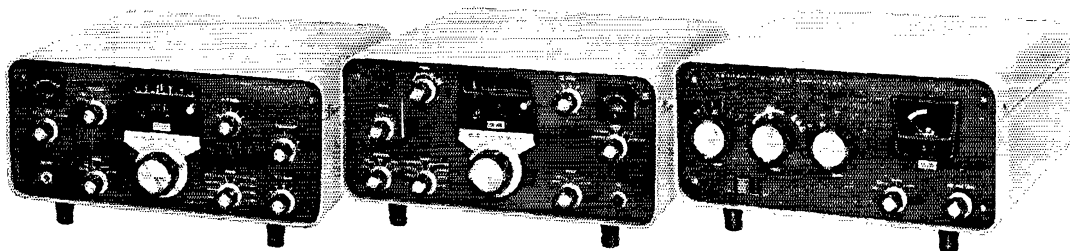
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Heathkit® DX-60A Phone & CW Transmitter



Perfect Low-Cost Transmitter For The Novice Or Beginning Ham. Operate at required 75 watts (crystal control) for novice class CW . . . or full 90 watts phone or CW for general class. • 80-10 meters • VFO input • switch selection of four crystals • low-pass filter output • grid-block keying. Truly "one" for the money.
Kit DX-60A, 25 lbs. \$79.95

THREE, TO GO STEADY!



SB-300 Amateur Band Receiver

- Complete 80-10 meter amateur band coverage, plus provisions for optional 6 & 2 meter converters • Crystal-controlled front-end for same rate tuning on all bands • 1 kc dial calibrations—10 feet per megacycle bandspread • Famous Heath LMO • Operates transceive with SB-400

Kit SB-300, 23 lbs. . . . \$250.00

SB-400 SSB Transmitter

- Complete transceive capability with SB-300 Receiver • Heath LMO tuning • Built-in power supply • Built-in antenna change-over relay • All crystals supplied for complete 80-10 meter coverage • Automatic Level Control • 180 watts P.E.P. SSB & 170 watts CW • PTT & VOX control • Drives most KW linears

Kit SB-400, 34 lbs. . . . \$325.00

SB-200 KW Linear Amplifier

- 1200 watts P.E.P. input SSB—1000 watts CW • 80-10 meters • Built-in SWR meter, antenna relay, solid-state power supply • Automatic Level Control (ALC) • Shielded, fan-cooled amplifier compartment • Pre-tuned cathode input • Circuit-breaker • Designed for 120/240 volt

Kit SB-200, 41 lbs. . . . \$200.00

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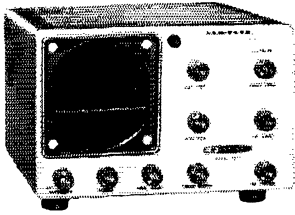


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See the wide array of Heathkit Amateur Radio Equipment available at tremendous do-it-yourself savings! Everything you need in "mobile" or "fixed" station gear with full descriptions and specifications . . . Send for Free copy!

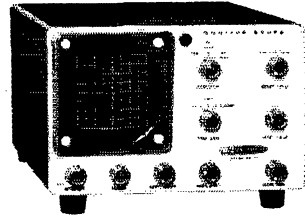
HEATHKIT 1966



TWO, FOR THE SHOW!



**Heathkit
"Ham-Scan"
Spectrum
Monitor**



**Heathkit
HO-10
Signal
Monitor**

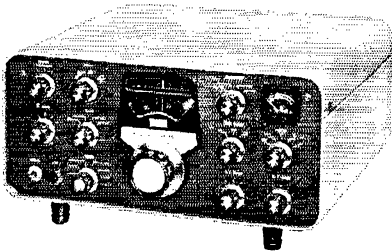
"Ham-Scan" Visually Shows All Signals Up To 50 KC Above And Below The Frequency To Which You Are Tuned. Operates with IF's of 455, 1600, 1650, 1681, 2075, 2215, 2245, 3000, 3055, 3395 kc. Identifies signal types & quality and displays band activity.

Kit HO-13, 13 lbs.\$82.95

Shows Transmitted Envelope, AF & RF Trapezoid Patterns. Most widely used monitor scope on the market. Handles power outputs from 5 watts to 1 kilowatt. The HO-10 is simple to connect, yet provides the true accurate display of your transmitted envelope ... spots overmodulation & non-linearity.

Kit HO-10, 13 lbs.\$64.95

FOUR, TO GO!



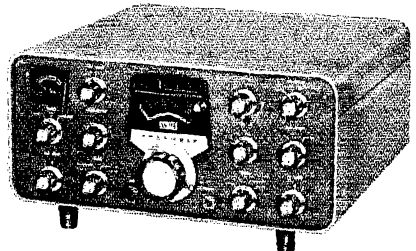
**SB-100 Fixed/Mobile
80-10 Meter SSB Transceiver**

• 180 watts input P.E.P. SSB-170 watts input CW on five bands 80-10 meters • Switch selection of Upper or Lower Sideband or CW • Built-in CW sidetone • PTT & VOX with ALC • Fixed or mobile with appropriate power supply • The most advanced SSB transceiver on the market • Compare! Send for complete specs.

Kit SB-100, 23 lbs.\$360.00

Kit HP-23, AC Power Supply, 19 lbs.\$39.95

Kit HP-13, DC (Mobile) Supply, 7 lbs.\$59.95



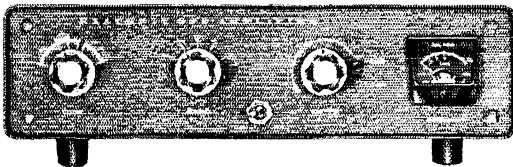
**SB-110 Fixed/Mobile
6-Meter SSB Transceiver**

Now You Can Put A Truly High Performance SSB Rig On 6 Meters. • Heath SB-Series LMO for 1 kc dial calibration & linear tuning • 180 watts input P.E.P. SSB-150 watts CW • ALC & ANL • 100 kc crystal calibrator • Antenna changeover • Fixed or mobile with HP-23 or HP-13 power supplies.

Kit SB-110, 23 lbs.\$320.00

Kit HP-23, AC Power Supply, 19 lbs.\$39.95

Kit HP-13, DC (Mobile) Supply, 7 lbs.\$59.95



"KW Kompact" Mobile Linear Amplifier

• 1000 watts P.E.P. • Tunes 80-10 meters • ALC output to exciter • Built-in antenna change-over relay • Built-in SWR meter • Fixed or mobile with HP-24 or HP-14 power supplies.

Kit HA-14, KW Kompact, 10 lbs.\$99.95

Kit HP-24, AC Power Supply, 22 lbs.\$49.95

Kit HP-14, Mobile Supply, 10 lbs.\$89.95

**"Single-Bander"
Fixed/Mobile
SSB Transceiver
Choose 80, 40, or
20 Meter Models**



• Complete single band transceivers • LSB on 80 & 40 meters, USB on 20 meters • 200 watts P.E.P. input • excellent exciter for KW Kompact • ALC, AVC, & S-meter • Built-in VOX or PTT control • 2 kc dial calibrations • Fixed or mobile with HP-23 or HP-13 power supplies.

Kit HW-12, 80 meter, 15 lbs.\$119.95

Kit HW-22, 40 meter, 15 lbs.\$119.95

Kit HW-32, 20 meter, 15 lbs.\$119.95

W.N.Y. Hamfest, sponsored by the RARA, will be held Sat., May 14 at Vince's Fifty Acres. For copies of the program send a card to the club, P.O. Box, 1388, Rochester, N.Y. 14603. In case you're new, this is the biggest hamfest in our section and everyone goes. New this year will be a special breakfast at the Trenchum for the out-of-town guests. The Walton Radio Assn. elected WB2-FWG, pres.; WB2AGX, vice-pres.; W2OSL, secy.; K2-ST5, treas.; W2FMU, act. mgr. and custodian. WA2-CYL and WB2UCX were appointed Net Mgr. and Asst. Net Mgr. for the 6-Meter AREC Net in the Glens Falls area. Luckawanna ARA elected WA2JWV, pres.; K2-AIQN, vice-pres.; WB2JFP, secy.; WA2BFO, treas. WB2EDU left for military service. WA2STX and W2-EUP are teaching a class for Amateur Extra at Kenmore West Hs. Present officers of the Squaw Island ARC at Canandaigua, N.Y., are WB2GNC, pres.; K2-ISP, vice-pres.; WB2LZM, secy.; WA2BMA, treas.; K2GMZ, WA2VZF, WA2RHW, WA2SVA, K2ZVF, executive committee. Traffic: WB2GAL 200, WB2EL 200, WA2-HSB 123, W2FEB 109, WA2IHP 80, W2HLV 71, WA2-FOJ 69, WA2NKC 96, K2QDT 44, K2OFV 39, W2RFQ 34, W2MTA 28, K2AIQN 21, K2DNN 17, WB2RLJ 15, W2FCG 14, WA2NKI 11, WA2GLA 9, WA2RLV 9, WA2-ANE 8, WB2EDU 5, W2PNW 5, WA2UFI 5, K2HOH 3.

WESTERN PENNSYLVANIA—SCM, John F. Wojtkiewicz, W3GJY—Asst. SCM: Robert E. Gawryla, W3-NEM. SEC: K3ZMH. PAMs: W3TOC, K3VPI (v.h.f.). RMs: W3KUN, W3MFB, K3SOH, W3UHN. Traffic nets: WPA, 3585 kc. 0000 GMT Mon. through Sun. KSSN, 3585 kc. 2330 GMT Mon. through Fri. K3SOH has been appointed Net Manager for KSSN, K300U being unable to carry on because of his work schedule. The WPA Traffic Net set a new all-time high traffic record during Jan. with 592 messages handled and W3KUN, K3PYS and K3SOH making the BPL WA3CDL sports a new beam and an HA-350. K3AUC, K3AUD, K3LTY and K3FNG use F-3 emission on 449 Mc. K3VBF moved to Corry. WA3AWB operates on 14 Mc. with an HW-32. K3SBT is hospitalized after suffering a stroke. WA3-BGF, WA3BBJ, WA3CXF, K3ZFP, K3ZHH and K3ZLJ want to organize a radio club in the Shenango-Mercer County area. K3CFA was flooded with questions after an article he wrote appeared in Feb. QST. WA3BNO attends Penn. State. WN3DCN is back on the air with a 1X-80 and an HE-30. K3KMO has reorganized the Centre County AREC. K3ZUZ looks for activity on 2 meters with a new transmitter and beam. K3FJF received a WAC S.S.B. certification. WA3EPQ is newly-licensed at State College. WA3DJH and WA3DJJ are active on 432 Mc. W3QCX has an Amoro TX-88 and a Hallcrafters SX-146. A new Novice is WN3EVP. Six-meter activity beacons WA3EAY, K3YLM, K3FQK and WA3BAH. W3KPJ transmits code practice and ARRL Official Bulletins on 6. W3NXX is now owner of Erie Electronics at Erie. WA3BLW and K3MMO have gone mobile and will be joined by K3QHM. Amateur Transmitter Assn. ARC's officers are W3OJW, pres.; W3OVM, vice-pres.; K3RAD, secy.; W3UL, treas.; W3IWF, W3-VPK, K3OTY, directors. South Hills Brass Pounders & Modulators' officers are W3LDB, pres.; K3MDY, vice-pres.; W3WFR, secy.; K3AJQ, treas.; W3QNI, W3WNN, W3HND, directors; W3QNI, W3LTH, K3KZD, trustees. New appointments: K3ZMH and W3ELZ as OOs. WA3-DJL and K3ZHH as OESs; K3SOH as RM. Endorsements: W3OCR as EC; K300U as ORS; W3KPJ as OBS. Traffic: (Jan.) K3PYS 546, W3KUN 543, W3NEM 270, K3SOH 140, W3SMV 115, W3LOS 89, W3GJY 82, W3ELZ 63, WA3AKH 44, WA3AKB 43, W3IYI 16, K3-KMO 14, K3ANB 14, W3AUD 13, W3UHN 11, W3MFB 10, WA3RGE 4, WA3DGI 4, W3YA 3, K3AKR 2, W3OEO 2. (Dec.) K3EXE 17, K3ZMH 13, K3FNG 4, WA3AKB 1.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—Asst. SCM: George J. Nesbed, W9LOF. SEC: W9RYU, RM: W9EVJ. PAMs: W9VWJ, WA9CCP and W9KLB (v.h.f.). Net reports:

Net	Freq.	Times	Days	Traffic
ILN	3760 kc.	1800 CST	Daily	178
II PON	3925 kc.	1700 CST	ALF	73
III PON	3545 kc.	1830 CST	M-W-F	20
III PON	50.28 Mc.	2000 CST	M & Thurs.	6
III PON	145.5 Mc.	2000 CST	AL-W-F	51
No. Cent. Phone Net	3915 kc.	0800 CST	M-Sat.	159
No. Cent. Phone Net	3915 kc.	1300 CST	M-Sat.	
Phone Net	3940 kc.	9000 CST	Sun.	183
ILN	3940 kc.	9000 CST	Sun.	No report

Amateur radio station W9KJ/9, located in the lobby of the *Chicago Tribune* Tower, has been handling thousands of messages to Viet Nam personnel with many volunteer operators. The station has received daily newspaper stories covering its activities both in Chi-

cagoland and other parts of the state. W9WYB, K9RAS, W9WQG, W9HPG, W9REC, W9VBY, W9QKE and W9-JUV/K9OSO participated in the League's latest Frequency Measuring Test. W9UHD is the newly-appointed EC of Douglas County and is sporting a new Swan 350. WA9IEN, W9AVD and K9DRK are the elected officers of the newly-formed Chicago club known as Field Amateur Radio (FAR) and will operate the station from the premises of WFLD, a local u.h.f. television station. The newly-elected officers of the Loyola Academy High School Radio Club are WA9DXO, WA9KUC and WA9-MGS. The club is operating with a NCX-5 transceiver and Hy-Gain antennas on a 40-ft. tower. The traffic-handlers will greatly miss Claude Tague, K9UOV, who contracted acute leukemia in May of 1965 and passed away Jan. 11, 1966, at the age of 20. He left a widowed mother and two sisters. Our sympathy to his family and the many friends of this fine young man who gave so much of his time to many. New appointments include W9MTO as EC of Champaign County and W9IZF as an Official Observer. WA9MLX as active on 420 Mc. K9-WMD has left the ranks of single operator and has taken an NYL for a duo operator. From reports received many Central Division operators have taken advantage of K1YPE/KV5 and have added Viet Nam to their DX. WN9QJ8 is a new Novice in Glen Carbon. The Starved Rock Radio Club has been conducting a code and theory class with W9TLC as instructor. WA9GVW is the new net control of the ILN. W9PCY received his Extra Class license and WA9OBR is operating with a General Class license. W9PLA returned active operating with a new Heath SB-300. W9DA recently celebrated 50 years as an amateur. BPL certificate recipients include W9KJ, WA9-CCO and WA9CNY. Illinois Bell will demonstrate light beam communication Apr. 5 at the Deerfield Park House. . . more information from WA9LOL, secy. North Shore ARC, Traffic: (Jan.) W9KJ 216, WA9CCP 1083, WA9CNY 812, WA9NFS 398, W9EVJ 207, K9AVQ 98, W9DOQ 82, WA9GUM 67, K9WMP 61, W9EET 54, W9ELL 42, W9JXV 42, K9BTE 39, W9HOT 36, W9NXG 30, WA9POZ 28, WA9AJF 19, W9AISD 17, W9PRN 16, K9UTY 16, W9DDY 15, W9SER 12, K9TSK 7, W9LNQ 6, K9RAS 6, K9TOK 5, K9DQU 3, K9QPJ 2, WA9KLB 1. (Dec.) W9JXV 136, WA9GVW 98.

INDIANA—SCM, M. Roberta Kroulik, K9IVG—Asst. SCM: Ernest Nichols, W9YYX. SEC: K9WET.

Net	Freq.	Time	Jan. T/c.	Mgr.
IFN	3910	1330 daily, 2300Z M-F	246	K9IVG
ISN	3910	0000Z daily, 2130Z M-S	485	K9CRS
QIN	3658	0000Z daily	276	WA9BWW

K9GLL, PAM of Hoosier V.H.F. nets, reports Jan. traffic of 78. K9EFY, Mgr. of PON, reports Jan. traffic of 20. WA9IZR, Mgr. of RFN, reports Jan. traffic of 180. QIN Honor Roll: K9HYV 27, WA9IQV 23, K9RGR 20, W9HR19, W9RGR 19, K9VJ 17, W9QLW 16, K9-WVJ 16, K9DHC 15, K9KTL 15. BPL certificates went to W9JOZ and K9IVG. W9RJD has been named pres. of the City and County Health Board of Vanderburg Co. WA9QXAL is the new call of the Anderson Red Cross station. W9GRG is building a keyer. Congratulations to WA9OYI on receiving his General Class ticket. W9BUU is the proud owner of a new Ameco 67 2-meter transmitter. New calls heard in the Petersburg area are W9VHB and W5LOA/9. WA9AWA claims his SS-1R receiver works just great and W9NTA claims the same for his new transceiver. New officers of the La Porte Amateur Radio Club are K9RMJ, pres.; WA9OCQ, vice-pres.; WA9NLU, secy.; K9WHF, treas. New officers of the Purdue Amateur Radio Club are W9EOZ, pres.; WA9GXF, vice-pres.; K9DHN, secy.; WA9GFD, treas. K9FUJ is building an HW-12. W9QLW, RM of 9RN, reports that Indiana was represented 100% in Jan. *Amateur radio exists because of the service it renders.* Traffic: (Jan.) K9IVG 898, W9JOZ 535, W9MAM 428, K9HYV 229, WA9IZR 213, W9QLW 182, K9ZLB 164, WA9BWW 155, WA9EHC 110, K9CRS 104, K9KTL 99, WA9IQV 70, W9ZYK 69, W9BUU 59, W9ABRD 41, WA9BGI 39, WA9-BV8/9 37, W9EJW 28, W9EFY 27, W9HRB 25, W9VWJ 22, WA9CXY 21, WA9FDQ 20, W9DOK 19, W9YYX 18, W9HWR 17, WA9CJR 16, W9PMT 16, W9SNQ 16, WA9-AU4, W9DZC 14, K9VHY 14, WA9KAJ 13, K9UEO 13, K9ILK 11, W9CC 10, WA9JWL 10, W9URQ 10, K9-WET 10, K9BSL 9, K9FHQ 9, W9FJI 9, WA9LW 9, K9ILV 8, W9BDP 7, W9DGA 7, K9DHJ 7, W9ZZR 7, W9CLY 6, WA9GZ 6, W9RTH 6, W9TKK 6, WA9DBK 5, K9PPA 5, WA9GKF 5, WA9CFW 4, WA9CYZ 4, W9-JPX 4, K9FUJ 3, W9AQW 1. (Dec.) W9JOZ 1028, K9IVG 837, WA9BWW 530, W9VAY 185, WA9IQV 24.

WISCONSIN—SCM, Kenneth A. Elneter, K0GSC—SEC: K9ZPP. PAMs: K9IMR, W9NRP, K9ILS. RM: Still looking.

Net	Freq.	Time	Days	Seas.	QNT	QTC	Mgr.
BEN	3985 kc.	1300Z	Mon.-Sat.	26	153	37	W9NRP
BEN	3985 kc.	1800Z	Daily	31	636	37	K9HJS
WBN	3985 kc.	215Z	Daily	31	1033	37	K9IMR
WIN	3535 kc.	0045Z	Daily	31	348	136	W9KCB
SWRN	50.4 Mc.	0300Z	Mon.-Sat.	23	322	4	K9ICU

EIMAC

introduces 5-500A pentode for retrofit into 1 kW AM transmitters

If you use 400 feet of RG8U coax between transmitter and antenna, your 1 kW AM transmitter using a pair of 4-400A's has to work harder to generate 1200 watts so you'll have 1 kW at the antenna base. That's marginal operation. There's no need for marginal operation with Eimac's new 5-500A power pentodes. Running well within ratings, this inexpensive new 500 watt tube is ideal for retrofit in 1 kW AM transmitters: just change the filament transformer and re-adjust bias and screen voltage. The 5-500A features a balanced filament which comfortably exceeds FCC hum and noise specifications. As a linear amplifier, the 5-500A will provide a two-tone signal with third order products of -39 db at 450 watts PEP, or -32 db at 600 watts PEP. Write Power Grid Product Manager for details or contact your local EIMAC distributor.

5-500A CHARACTERISTICS CHART

Maximum Ratings Plate Modulated

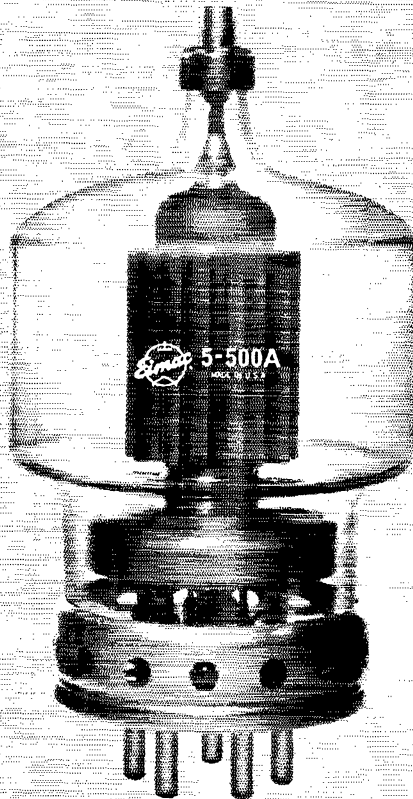
Radio Frequency Amplifier	
DC Plate Voltage	3200 V
DC Plate Current	340 mA

Typical Operation (Carrier Conditions)

DC Plate Voltage	2700 V
DC Screen Voltage	475 V
DC Plate Current	280 mA
Carrier Power	600 W

EIMAC

San Carlos, California 94070
A Division of Varian Associates



Net certificates went to WA9GJH, WA9OEF, W9SUF, WA9NPB and WA9NFG for BEN; W9SUF and WA9NPB for WIN; WA9NPB and W9BUG for W9SBN. New appointments: WA9NBU as EC for Outagamie County, K9LBRQ and WA9JFM as OFSS, W9HWQ and K9QUJ as ECs, K9DKU as ORS, W9VSO and W9GFL as OOs, Four Lakes ARC officers for 1966 are W9FNT, pres.; WA9EBP, vice-pres.; K9EEQ, secy.; WA9JAY, treas.; WA9KNU, K9FPJ, W9ORS, directors. FMT results: W9RKP, 21.3 p.p.m. error. New in Madison is WN9REC, WA9NFG and WA9GJU had a 5-hour QSO. W9IQW is active on WIN again. WA9MIO has a new keyer working. W9KQB still says his 31-year-old homemade bug is as good as any keyer. WA9MRG is operating s.s.b. mobile. W9VSO led the OOs with 11 notices. BPLers for Jan. were K9MR, W9SUF, WA9LWJ and WA9GJU. Traffic: (Jan.) K9MR 324, W9SUF 290, WA9LWJ 215, W9DYG 212, WA9GJU 202, K9HJS 156, WA9MIO 151, WA9NPB 116, K9UTQ 89, WA9NFG 88, WA9NBU 70, W9NRP 62, W9KQB 49, WA9IVH 23, W9CBE 27, W9HWQ 26, W9BLQ 25, W9AYK 23, K9GSC 20, W9YT 20, WA9LWJ 17, K9HCK 17, K9FH 16, W9IQW 15, W9RZR 12, K9KCU 12, W9ONI 6, WA9GJH 4, W9RTP 4, W9GJN 3, W9OTL 2, WN9OMO 1. (Dec.) W9RTP 12, W9CBE 8.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopischke, Jr., W0TCK—SEC: WA0BZG. RMs: W0ISJ, WA0EPX (acting). PAMs: K0QBI, WA0JKT, W0HEN, WA0IWM. Novices are encouraged to take part in MJN. They can be placed on roll call by notifying any Net Control Station, stating the frequency on which they will be operating. New appointees are WA0DFT as EC for Nicollet Co., and W0LW as EC for Wilkin Co., WA0KQU as ORS. Renewals: WA0FPX as ORS, K0ZRD as OPS, W0HEN as OO, K0ZZR as EC. Appointees, please remember your monthly activity reports. Thanks to K0FTL for faithful PAM service these past several years. Congrats to WA0JKT, who took over the PAM duties on the evening MSPN. This net now meets 7 days a week at 6 p.m. The Minn. County Hunters WX Net meets Sat. on 3820 kc. at 1500Z. On Jan. 9 the Ramsey Co. AREC provided radio control for the ice gumkham on Lake Minnetonka. Participating were WA0FUR, K0KWK, K0PML, K0WPK and K0WYY. The PICNet group had good participation in its emergency drill at Wahasha despite below-zero WX. We envy vacationers W0TJA and his XYL, who motored to Baja, Calif., and WA0KLL, enjoying Guadalajara, Mexico. W0RA has left Minnesota to accept employment in Peterborough, N.H. WA0TEF and K0LXQ have gone to SB-200 and SB-300, respectively, while W0JYA has been busy working DX. A new 250-ft. antenna overlooks the shack of W0YX. K0VTV is studying IBM matters in Endicott, N.Y., and K0UKU spent 6 weeks in London studying drama. Those awarded BPL certificates are WA0JKT, WA0MKF and WA0MKB. Traffic: (Jan.) WA0JKT 546, WA0MKF 502, WA0MKB 384, WA0BWH 264, WA0LOB 178, WA0KQU 144, K0PZ 114, W0YX 73, W0TCK 63, WA0EPX 60., W0LAW 50, WA0LX 47, K0QBI 46, K0ZRD 44, K0FLT 38, W0ISJ 37, WA0LW 20, WA0DYH 25, W0HEN 25, WA0KFJ 25, WA0ACI 20, W0ATO 20, WA0TEF 20, WA0BZG 19, K0ICG 19, WA0LCF 18, WA0FUR 14, W0UMX 13, K0ZKK 13, WA0EDN 12, W0MXC 12, K0VPL 12, WA0KP 10, WA0KUD 10, WA0LOH 10, W0KLG 9, WA0DFT 7, K0SRK 7, K0SXQ 6, WA0IJ 5, K0IGZ 4, WA0IJ 4, WA0EZX 3, W0FHO 3, WA0LYK 3, W0HRM 2, WA0DWM 1, W0FKC 1, W0SZJ 1. (Dec.) K0PLZ 65, W0ISJ 37, K0UXQ 37, WA0IJ 14, W0KLG 5, WA0FCJ 4.

NORTH DAKOTA—SCM, Howard L. Sheets, W0DM —SEC: WA0AYL. W0PHC has been in the Veterans Hospital at Fargo so the Bismarck gang came up with an HW-12 and installed it for him. W0DXC got a new Swan 400 on the air, while W0EJF is blasting the air with a new Loudenshooper linear. WA0MND is back home after a short stay in the hospital in Devils Lake. She and WA0GRX still are doing the Weather Net in the mornings. WN00AT is a new call in Grand Forks with a Challenger, a 75-A2 and a vertical antenna. During one of the recent blizzards, K0KRI with his wife and baby ran off the road miles from town. Roger contacted a Morris, Minn., ham station which in turn contacted the Minn. Highway Patrol. The North Dakota Highway Patrol was alerted by teletype and within thirty minutes the Cando sheriff and a patrolman were out there to help them. WA0KSB has been busy handling traffic on several c.w. nets. The N.D. RACES Net reports a total of 1118 check-ins for January, 187 messages handled, with 42 sessions called in spite of bad skip conditions which necessitated a 5:30 p.m. session. Traffic: (Jan.) WA0KSB 54, W0WWL 52, W0CGM 15, W0DM 12. (Nov.) WA0KSB 75.

SOUTH DAKOTA—SCM, Seward P. Holt, K0TXW —SEC: W0SCT. RM: WA0AOY. K0BSW holds daily schedules with WA0BYO, Rochester, getting a daily report on the condition of Paul Olman, who had a kidney transplant. The report is used by local news media since so many are interested. W0ZWL reports an average of 25½ QNI for Jan. on the WX Net. A new ham at Custer is WA0NZY, WA0LLG, at Estelline, has now received his General Class ticket. The Mitchell Radio Club plans on a South Dakota amateur radio directory. Let's give this worthy project our support. W0DJJ has a new SBE-34 on s.s.b. So. Dak. has 26 members on Navy MARS. Traffic: W0ZWL 579, K0G5Y 530, W0SCT 55, K0V5Y 55, WA0AOY 44, K0YCG 21, W0DJJ 15, K0BSW 12, WA0LYO 11, WA0RZD 10, W0BQS 6, W0ZAL 6, W0JCE 4, K1CAU/0 3, K0KOY 3, K0TNN 3, WA0JBZ 2.

DELTA DIVISION

ARKANSAS—SCM, Don W. Whitney, K5GKN—I am happy to inform you that W5GZP has been appointed Asst. SCM for Arkansas and should you need assistance Lyle or I will be happy to assist you individually or as a club. W5KUD reports working 6Y5XG on 160 meters. WA5KJT reports heavy QRP activity from Craighead County on 7125 kc. and 7050 kc.—50 milliwatts. Congratulations to WA5KJT on making the BPL. Late Dec. 1965 net reports:

Net	Freq.	Time	Day	Sess.	QTC	QNI	Time
OZK	3790 kc.	0100Z	Daily	26	107	209	656 min.
RN	3815 kc.	0010Z	Daily	30	66	457	559 min.

January 1966 net reports:

Net	Freq.	Time	Day	Sess.	QTC	QNI	Time
RN	3815 kc.	0010Z	Daily	31	63	518	619 min.
AFN	3885 kc.	1200Z	Mon.-Sat.	26	18	833	1755 min.
OZK	3790 kc.	0100Z	Daily	30	62	213	574 min.
APON	3825 kc.	2130Z	Mon.-Sat.	21	74	304	?

Traffic: (Jan.) WA5KJT 127, W5MJO 102, WA5IIS 51, W5YM 48, K5TYW 42, WA5HNN 18, WA5KUD 18, WA5GPO 16, K4MBX/5 10, K5VBF 15, K5GKN 10, WA5KQU 7. (Dec.) WA5HNN 445, K5TYW 47.

LOUISIANA—SCM, J. Allen Swanson, Jr., W5PM—SEC: K5KQG. RM: W5CEZ, V.H.F. PAMs: W5UQR, WA5KHE. New officers of the Lafayette ARC are W5EXI, pres.; K5DPH, vice-pres.; W5NQZ, secy.; WA5BIM, treas. W5GHP received his BPL medallion. WA5FNB, LAN C.W. Mgr., says we need more stations in Central and Northern La., 3615 daily at 2330 GMT. W5MBC uses a vertical from 20, 40 and 80. W5JYA has a new 2-meter transceiver. W5JFB lost his six-element 6-meter beam during raising ceremonies and ended up with a three-element up 40 feet. WA5HGK is a new OO. W5KC is leader in PO Net activities. WA5JVL is most active on the GNOARC Net. 50.25. WA5JOL made a QSO with W5JDF in Miss. on 80 meters using 1-watt v.f.o. K5OKR reports to RN5 twice weekly as La. representative. WA5NOS works from Viet Nam in less than 72 hours after origination. K5FYI is chasing DX. W5PM now has 317 cfm. W5NZY, W5ZBC is back on the air with four 1625s and an HQ-140X. W5UKQ is running skeds with W4GJO on 432 Mc. W5EM uses a beam on 10, 15 and 20 with trap doublet for 40 and 80. WA5EVU, NCS for the Delta 75, reports an average check-in each Sun. of 23 stations. The Chetmachi ARC is now an ARRL affiliate. The Ozone ARC of Slidell publishes a very nice monthly bulletin called QRI. W5OJY is pres.; WA5PKV is vice-pres.; WA5FDD is secy.-treas. WN5NS and WN5NT are building their own gear. WA5CKJ is operating 1/5 week ends on 8 meters from Mississippi. WA5LQZ has earned a LAN C.W. Net certificate. The LARC 2-Meter Net meets daily at 0130 GMT and the 80-Meter C.W. Net meets Sun. at 2000 GMT. WA5JQJ, W5JHF, WA5CRU and W5DQR have completed their f.m. mobile installations. W5UPM passed away recently. W5CEW, W5BIM, W5BY, W5HKJ, W5KHC and WA5CAU keep 3900 hot daily at 1230 GMT. WA5GHP 309, WA5NOS 142, WA5JOL 131, W5PM 60, WA5DES 57, K5OKR 52, WA5FNB 47, W5JYA 35, W5MBC 32, W5MXQ 18, W5CEZ 16, W5EA 14, W5KC 7, WA5BCH 5, WA5JVL 4, K5FYI 3.

MISSISSIPPI—SCM, S. H. Hairston, WA5EMM—SEC: W5JDF. WA5ETL is teaching amateur radio to young men studying to be missionaries. New officers of Old Natchez ARC are K5MID, pres.; WA5LBU, vice-pres.; W5GRP, treas.; K5MDX, secy.; WA5EBZ, FD chmn. W5KEB has a new SB-100; W5WQM a Galaxy III. K5MKA has built a triband transceiver with a fine signal. K5MID spent a busy 10 hours in the Phone CD Party with 167 contacts in 61 sections for 49,300 points. Listen for WA5ETL mobile now living in Laurel. W5-

When you weigh all the facts about the



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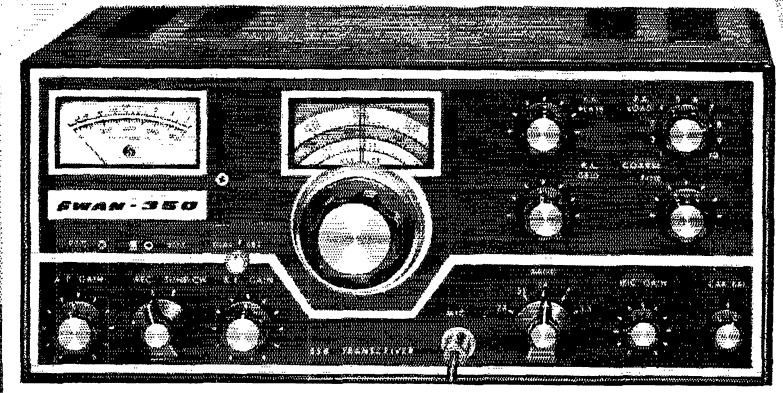
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New low cost vertical antenna which can be tuned to any amateur band 10-80 meters by simple adjustment of feed point on matching base inductor. Efficient radiator on 10, 15, 20, 40, 75 and 80 meters. Designed to be fed with 52 ohm coaxial cable.

Conveniently used when installed on a short 1-5/8" mast driven into the ground. Simple additional grounding wire completes the installation. Roof top or tower installation. Single band operation ideal for installations of this type. Amazing efficiency for DX or local contacts. Installed in minutes and can be used as a portable antenna.

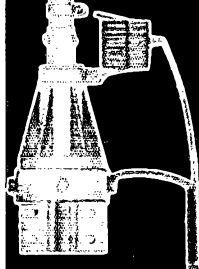
Mechanical Specifications:

Overall height - 18' Assembled (5' Knocked down) Tubing diameter - 1 1/4" to 7/16". Maximum Wind Unquyred Survival - 50 MPH. Matching Inductor - Air Wound Coil 3 3/4" dia. Mounting bracket designed for 1-5/8" mast. Steel parts irridated to MILS Specs. Base Insulator material - Fiberglass impregnated styrene.

Electrical Specifications:

Multi-band operation - 10-80 meters. Manual tap on matching inductor. Feed with 52-75 ohm line (unbalanced). Maximum power - 1000 watts AM or CW-2KW PEP. Omni-directional. Vertically Polarized.

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CKY and W5PWW both did well in the last FMT. W5YD is very active now. K5VYP and WA5EAD have potent mobile signals. Congratulations to K5VBA/5 on his speed in the CP Qualifying Run. W5ODV has built keys for handicapped hams. Welcome back to W5OYL. Congratulations to WA5FH on junior's arrival. Check in with our nets: G.C. Sideband, daily 3925 kc. at 1730 CST; Miss. Sideband, daily 3888 kc. at 1815 CST; Miss. Magnolia, daily 3870 kc. at 1900 CST; Miss. C.W., daily 3647 kc. at 1845 CST. Traffic: W5ODV 20, K5VBA/5 17, WA5EDN 3.

TENNESSEE—SCM, William Scott, W4UYP—PAMs: WA4GQI, WA4EWW, W4PFP, RM: W4MXF

Net	Freq.	Days	Time	Sess.	QNI	QTC
TN	3635 kc.	Daily	0100Z 0230Z	58	410	108
TSSB	3980 kc.	Tue.-Sun.	0030Z	26	1062	57
ETPN	3980 kc.	M-F	1140Z	21	296	18
TPN	3980 kc.	M-Sat. Sun.	1245Z 1400Z	31	1113	240

Knox ARC reports 40-45 prospects in the Novice-General classes. TN QNI has shown a large increase, but still need more in many areas in the state. We need volunteers in the AREC and ECs in most counties. W4-PQP is to be congratulated on again making the BPL on originsations. W4WQZ and K4EJQ still are plugging on 432-Mc. equipment. W4GGG and W4WBK continue their OO work to our benefit. The Tennessee QSO Party was widely participated in on c.w., limited results on phone. The RATS deserve thanks for sponsoring this activity. Traffic: W4FX 335, W4GGG 304, W4PQP 203, W4MXF 124, W4RUU 97, K4SXD 94, W4UVP 70, WA4-GQM 69, WA4AFP 44, WA4IBZ 41, WA4SQE 39, WA4-KVR 37, K4UWHI 30, W4WBK 27, W4PFP 24, WA4NUJ 23, WA4YNE 23, W4T7B 22, WA4CGK 15, WA4EWW 14, W4T7J 14, WA4YDT 14, WA4GOL 12, WA4CTQ/4 11, W4DMS 10, K4UMW 8, K4BTY 7, W4TYV 3, W4VTS 3, W4VJ 2.

GREAT LAKES DIVISION

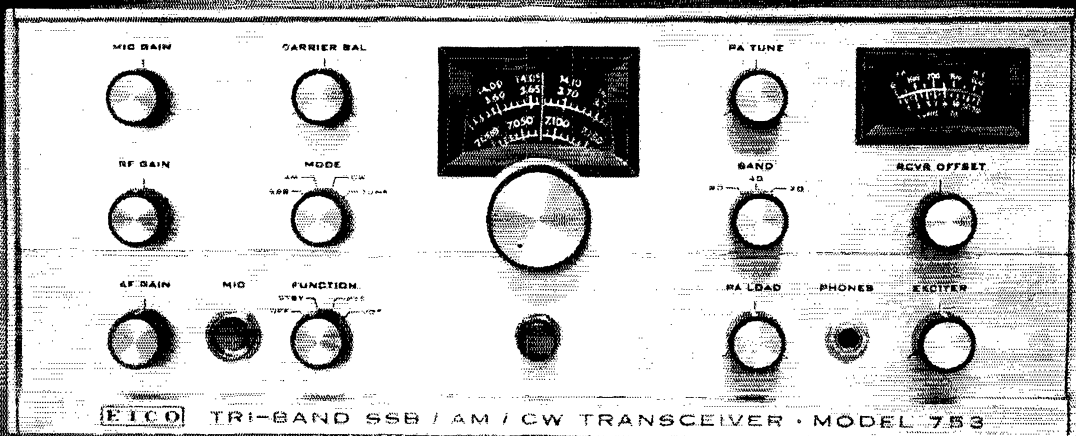
KENTUCKY—SCM, Lawrence F. Jeffrey, WA4KFO—SEC: K4URX, PAMs: W4BEJ, K4YZU, RM: W4BAZ, V.H.F. PAMs: K4KZH, WA4GHQ. Appointments: WA4GHQ as V.H.F. PAM, WA4TTE as ORS, Endorsements: WA4GHQ as OES, W4YYI as OPS, W4WNH as OES.

Net	Freq.	Days	EST	Sess.	QNI	QTC
EMKPN	3980	M-F	0630	21	247	51
MKPN	3980	Daily	0830	31	421	105
KTN	3980	Daily	1900	31	711	126
KYN/KSN	3600	Daily	1900/1700	66	480	308
RPN	3945	Sat.	1300	5	131	58

W4TPB is the new NCS for the Central Ky. Emergency 6-Meter Net and reports QNI 91 with 25 stations and 10 cities. This net meets Mon. and Thurs. at 2100 EST on 50.3 Mc. WA4YSK now is on 2 meters. W4URB is back after a month in Hawaii. K4LIA/4 is back from school in Wise, and W4LRT and W44LRU are working on a radio control model plane. WA45FG is getting RTTY equipment. WA4ROC has an SH-110 transceiver. WA4TNI says the Union College Radio Club has been reorganized. WN4CFH is a new Novice in South Carrollton. WA4YDO has a new Swan 350 and is heard on KTN, W4JU1 and WA4OMH are working too hard for much activity. In the Dec. FMT: W4JU1, W4CMP, K4IAA, W4BEJ has moved to Elizabethtown and has a new Eico 753. K4URS also has new Eico 753. The Owensboro c.d. and AREC station now operates from the new room in the NG Armory. Don't forget the KENVENTION in Louisville, Oct. 15. Traffic: W4BAZ 204, WA4KFO 167, W4RHZ 122, WA4DY1 113, WA4HJM 113, K4YZU 80, K4MAN 78, W4EON 72, K4DZM 69, W4CDA 48, WA4GMA 40, WA4WWT 39, WA4UAZ 37, WA4VCN 37, WA4TTE 34, WA4FBG 24, W4YOK 24, K4HOE 22, WA4WQZ 22, WA4BZS 17, WA4YDO 16, K4SWL 14, W4KJP 13, W44ZIF 9, W4OYI 7, W4JU1 3.

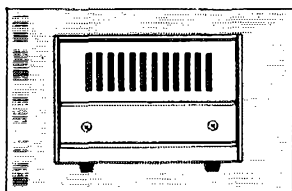
MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: K8GOU, RMs: W8ELW, K8QKY, W8EU, K8-KMIQ, PAMs: W8CQU, K8LQA, KRJED, V.H.F. PAMs: W8CVQ, W8YAN, Appointments: W8CKK, W8DEX, W8AEZB, W8GRI, K8IGQ, W8UCU, W8OQQ, W8RWK, W8UCG as ECs: W8AUD, K8QLL, W8QQO, W8TBP, K8TIG, K8WGV as ORSs: W8DVB, K8LNV, W8SS, W8SWE as OPSs: W8IBB, W8IBM, K8VEN as OESs: W8HGE, W8SS, W8SWF as OESs, New officers: Detroit ARA—K8DYI, pres.; W8FBH, vice-pres.; W8-MIGQ, secy.; K8AMH, treas.; W8JKD, W8LEU, board. M & M RC—W8AFHD, pres.; K8ZZV, vice-pres.; W8-QGQ, secy.-treas. Kent ARC—W8A0ET, pres.; K8-BPT, vice-pres.; W8DOA, secy.; K8CGD, treas.; W8AC7C, W8IWF, W8M7ZG, K8UPI, W8VU, K8ZKU, board. Van Buren County ARC—W8DEX, pres.;

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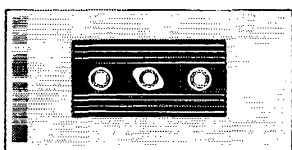


NEW EICO 753 SSB/AM/CW TRI-BAND TRANSCEIVER

Power Supplies Tailored for Optimum Performance of the 753.



Model 751 Solid State AC Supply/Speaker Console. Matching table-top companion unit. Built-in PM speaker. Kit \$79.95 Wired \$109.95



Model 752 Solid State Mobile Supply. For use with 12 volt positive or negative ground systems. Fully protected against polarity reversal or overload. Kit \$79.95 Wired \$109.95

Build the finest of SSB/AM/CW tri-band transceivers with 200 watts of SSB punch and every wanted operating facility, plus the extra reliability and maintenance ease inherent in kit design. Assembly is made faster and easier by VFO and IF circuit boards, plus preassembled crystal lattice filter. Rigid construction, compact size, and superb styling make this rig equally suited for mobile and fixed station use. The new EICO 753 is at your dealer now, in kit form and factory-wired. Compare, and you will find that only the 753 has all these important features:

- Full band coverage on 80, 40 and 20 meters. ■ Receiver offset tuning (up to ± 10 kc) without altering transmitter frequency. ■ Built-in VOX. ■ Panel selected VOX, PTT & STANDBY. ■ High level dynamic ALC to prevent flat-topping or splatter and permit the use of a linear amplifier. ■ Automatic carrier level adjustment on CW and AM. ■ Dual ratio ball drive permits single knob 6:1 rapid tuning and 30:1 vernier bandspeed (over 10 degrees of scale). ■ Position of hairline adjustable on panel. ■ Illuminated S-meter/PA Cathode Current Meter and tuning dial. ■ Fast attack, slow decay AGC. ■ Grid-block break-in CW keying. ■ Product detector for SSB and CW, triode detector for AM. ■ TR relay with auxiliary contacts for use with high power linear amplifier. ■ Includes mobile mounting bracket.

ADDITIONAL SPECIFICATIONS

FREQUENCY COVERAGE: 3490-4010kc, 6990-7310kc, 13890-14410kc. SSB EMISSIONS: LSB 80 and 40 meters, USB 20 meters. RF POWER INPUT: 200 watts SSB PEP and CW, 100 watts AM. RF POWER OUTPUT: 120 watts SSB PEP and CW, 30 watts AM. OUTPUT PI NETWORK MATCHING RANGE: 40-80 ohms. SSB GENERATION: 5.2 Mc crystal lattice filter; bandwidth 2.7kc at 6db. STABILITY: 400 cps after warm-up. SUPPRESSION: Carrier-50db; unwanted sideband-40db. RECEIVER: Sensitivity 1uv for 10db S/N ratio; selectivity 2.7kc at 6db; audio output over 2 watts (3.2 ohms). PANEL CONTROLS & CONNECTORS: Tuning, Band Selector, AF Gain, RF Gain, MIC Gain with calibrator switch at extreme CCW rotation, Hairline Set (capped), Mode (SSB, AM, CW, Tune), Function (Off, Standby, PTT, VOX), Carrier Balance, Exciter Tune, PA Tune, PA Load, Receiver Offset Tune, MIC input, phone jack. REAR CONTROLS & CONNECTORS: VOX Threshold, VOX delay, VOX sensitivity, Anti-VOX sensitivity, PA Bias adjust, S-Meter zero adjust, power socket, external relay, antenna connector, key jack, accessory calibrator socket. METERING: PA cathode on transmit, S-Meter on receive. SIZE (HWD): 5 $\frac{1}{4}$ " x 14 $\frac{1}{4}$ " x 1 $\frac{1}{4}$ ". POWER REQUIREMENTS: 750 VDC at 300 ma, 250 VDC at 170 ma, -100 VDC at 5 ma, 12.6 VAC at 3.8 amps.

The Model 753 is an outstanding value factory-wired at \$299.95.



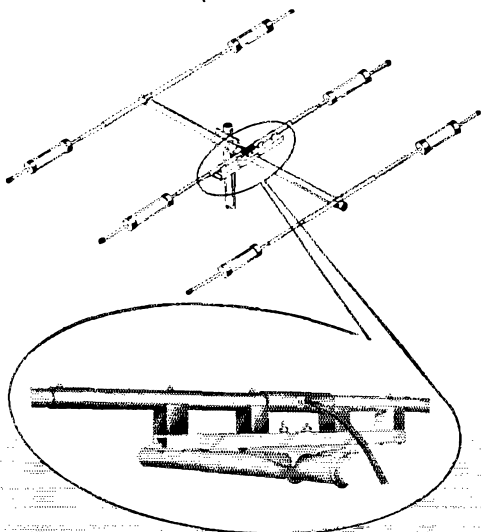
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For 10, 15, and 20 meters



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This 'Classic' New addition to the Trap-Master family of beams, incorporating the All-Metal encased traps made famous by the original and still extremely popular TA-33 beam, brings you: (1) An exceptionally outstanding front-to-back ratio. (2) A gain which puts this beam in a DX class by itself. (3) A longer boom for even wider element spacing. (4) A SWR of 1.5/1 or better.

All these features in a beam at a price you can well afford!

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WA8IKL, vice-pres.; K8JTO, secy.; WA8AMA, trans. Silent Keys: W8APL and K8SJJ. WA8QFC (OM), WA8PIL (XYL), and K8CPW (son, now in Korea. WA8RO is now a General. W8SWF modified his NCX-5 to a Mark II. W8YAN (PAAI) is doing well with the Michigan Six-Meter Net, on 50.7 Mc, at 0000 Daily except Sun. K8-ZJU put up a new two-element Quad for 10-15-20. Our sympathies to W8RTN, who lost his mother. MCRC will operate W8MRM May 7, for O'T Nite on 1815-3663-3900-7070-7215-14,300-50,178 and 14,694. A special QSL will be issued. K8JJC built an HO-10 Monitor Scope. W8HIR has a Drake R4-A and K8IRW a new Matchbox. WA8CTC is the new GRARA secy. The SEMARA has a new gasoline generator for Field Day. WA8EMJ is working England on 160. W8MGQ has a new NCL-2000. W8ZAN and K8MIJK finished an HW-12 for WA8DHB. W8CQB lost his father. Traffic: (Jan.) K8KMQ 356, K8LNE 331, K8QKY 214, WA8KNE 192, K8NJW 162, K8HLR 156, WA8PII 154, W8ELW 122, K8JJC 111, WA8MCO 102, WA8PIM 98, W8UFS 92, WA8BQK 84, W8CQB 77, K8GOU 77, K2SL/8 76, WA8MQT 62, W8PBO 56, W8EJ 54, WA8MIL 52, WA8MVP 46, W8BEZ 42, WA8CZJ 38, W8FX 37, W8SWF 32, K8BYX 31, W8TBP 30, WA8LRB 28, W8YAN 27, W8AUD 26, K8ZJU 23, W8RTN 18, K9RHU/8 18, K8WQV 17, K8LQA 16, WA8LRC 15, W8ZLK 14, WA8HGE 13, WA8MGM 13, W8AHV 12, K8JED 11, WA8CQR 10, K8QA 7, W8MRM 7, K8QLL 4, WA8OEE 3, K8VDA 3, W8TBB 2, W8WVL 2, (Dec.) W8CQB 128, WA8ROJ 45, WA8PII 40, WA8CZJ 39, WA8OEE 21, WA8DOP 6, K8YEK 4.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM; J. C. Erickson, W8DAE, SEC; W8HNP, RMs; W8BZX, W8DAE and K8LGB, PAMs; W8VZ, K8BAP and K8UBK. The Fourteenth Annual Ohio QSO Party will be held Apr. 23 and 24. Canton ARC's *The Feedline* informs us the club toured the Ohio Power with W8LQQ as its host and saw an introductory film of power dispatching, load frequency control and microwave system. WA8SMZ and WA8SOG are new Technicians and K8BZC was home on leave from the Air Force. Newark ARA's *NARA News* reported that the club's 1966 officers are WA8KZQ, pres.; W8MRN, vice-pres.; K8ZSZ, secy.; W8CSJ, treas.; and W8EON joined the Silent Keys. W8BKF joined the Silent Keys. Canton Chapter QCWA's 1966 officers are W8LWV, pres.; W8ZA, vice-pres.; W8NAL, secy.-treas.; W8HR and W8NBK, trustees. From Pioneer's *Ham O Gram* we see Westlake County ARC's 1966 officers are W8SIX, pres. WA8ODB, station of the Howland Jr. High School of Warren, has three operators, WA8PFD, WN8QLM and WN8QQM and would like to hear from other junior high school club stations. WA8HDQ reports consistently for them. WN8SL and WN8JC are new Novices in Cleveland. Springfield ARC's *The Q-ser* informs us WA8IGD was awarded the book, *Understanding Amateur Radio*, Santa brought W8TE, K8MUV and WA8IGD a Swan 350, K8HS a Galaxy V, K8WQE a TR-4, WA8FZS a Poly Comm 2 and WA8MILB a Heathkit SB-400, and W8PIV moved to N.Y. W8YKF is recuperating after a stay in the

FOURTEENTH OHIO QSO PARTY

April 23-24, 1966

All Ohio amateurs are invited to take part in a QSO party, sponsored by the Ohio Council of Amateur Radio Clubs.

Rules: 1) The party will begin at 2300 GMT Saturday April 23 and end at 2300 GMT April 24. 2) All types of emission and all bands may be used, but a station may be worked only once regardless of mode. A maximum of ten stations may be worked in a single county. 3) The general call will be "CQ Ohio." 4) Scoring: Multiply the number of Ohio stations worked by the number of Ohio counties contacted. Logs should include calls of stations worked, time, date and the county in which the station is located. 5) Suggested frequencies are: 3550, 3740, 3860, 7100 and 7250 kc. On the other bands, take your choice. 6) A cup and four appropriate certificates will be awarded to the highest scoring stations. 7) All contest logs must be postmarked not later than May 14, 1966, and should be sent to the contest manager, Miss Karla Hamel, K8HDO, 81 West Main Street, Westerville, Ohio 43081.

hospital, K8PMI was home on leave. The AREC of Lucas County held a large meeting. Toledo RC heard W8TKS speak on meters. Wood County RC elected K8UGC treas. and WA8CJJK vice-pres. Toledo Mobile RA's 1966 officers are K8LFI, pres.; W8WHD, vice-pres.; W8KJP, secy.; WA8JTB, treas. St. Lawrence Seaway 2-Meter Net's 1966

SS-1R



The New 701 Series SS-1R is Greater than Ever

The SS-1R, with its unique approach to receiver front-end design, has been called a major advance in HF receiver art. Continuing engineering improvements now incorporated in the 701 series make the SS-1R greater than ever. For example:

Sensitivity has been improved by 3 to 6 db. Typical production units measure $0.25 \mu v$ for 10 db S+N/N.

Sideband Stability is even better; USB and LSB BFO frequencies are now *crystal-controlled* while retaining variable BFO for CW.

Sideband Quality is clean and distortion-free over a tremendous range of signal strengths (from a microvolt to as much as a volt!). An improved product detector (employing a 6BY6) combined with an i.f. cathode-follower (now a 6AV6) to drive the a.g.c. circuits has increased the already large dynamic range of the SS-1R.

Reliability and Performance Stability have been improved through 1) redesign of a simpler, rugged dial-drum and display mechanism, 2) use of precision glass and ceramic piston trimmers in all critical circuits, and 3) an effective quality - assurance program throughout production and test.

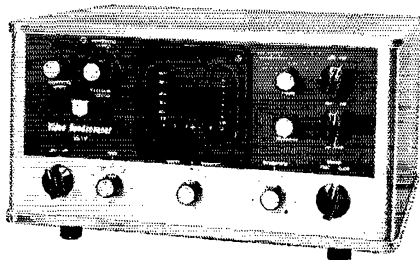
Plus: Crystals for full 10 meter coverage provided.

Improved super-durable sand-blasted finish for the rugged extruded cabinet.

Superior SS-1R Speaker quality.

SPECIAL FEATURES: Freedom from Cross Modulation and Overload • Extreme frequency precision with digital readout in kilocycles. Slow (10 KC per turn) manual tuning rate provides precise tuning of sideband signals • Motor Drive of tuning mechanism for fast traverse of band • 5.0, 2.5 and .35 KC Selectivity with 2:1 60/6 db skirt characteristic • Crystal Lattice Filters • Special Hi Q IF Circuits • Autocalibration of amateur bands to WWV • Choice of AM, USB, LSB or CW modes • Provision for use with the unique SS-1S Noise Silencer and with dramatic new SS-1V Video Bandscanner.

SS-1V, Video Bandscanner. This unique oscilloscope display unit, when used with the SS-1R shows all signals in the band in use, or any portion of the band can be expanded to full screen for detailed examination. Both linear and logarithmic displays are provided. A marker pip constantly shows the exact frequency to which the receiver is tuned. The sharp resolution of this unit permits observation and measurement of two AM sidebands displaced only 2.5 kc. from the carrier. Provision is made for transmitter monitoring or analysis.



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2 KW P.E.P.

Mobile Antenna



LANCER 1000

new from
MOSLEY

Here's the greatest advance in mobile history - - the Lancer 1000 rated for 1000 watts DC input or 2000 watts P.E.P. SSB (input to the final). Now enjoy the ultimate in 5-band mobile DX'ing with one dependable high power rated antenna featuring:

- (1) Interchangeable coils for your favorite bands - - 15, 20, 40, 75/80.
- (2) Direct coupling on 10 meters.
- (3) Mosley-designed corona ring at antenna tip for elimination of corona power losses.
- (4) Capacity coupled top whip section for maximum antenna efficiency.
- (5) 52 ohm impedance.
- (6) VSWR 1.5/1 or less on all bands.
- (7) Hinged whip for easy fold-over.
- (8) Lower antenna section reverses to provide choice of hinge use on trunk or bumper.

FOR MORE INFORMATION WRITE:
(code no. 95A)

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officers are WA8DEO, net mgr.; WA8IUR, asst. net mgr.; WA8NPG, rec. secy. The Greater Cincinnati ARA's *The Mike & Key* had a large picture of W4CDA seated in his wonderful station. W8BZX reports WN8RQA and WN8RRA are new hams in Sidney. K8DHJ reports WA8NCK was elected pres. of Canton ARC, replacing K8AGB who moved to Cochocton. K8DHJ has a new baby boy. W8WEG reports WA8NFY received his General Class license and Lima Area ARC has a Heath SB-100. Kettering ARC's A-O says they heard a talk on "DX Go-Go." K8YSO made the BPL in Jan. Lancaster & Fairfield County ARC's *The Rag Chewer* informs us the club held a discussion on matching devices under the leadership of WA8BT. According to Columbus ARA's *Carascope* K8YCH spoke on his amplifier-metering display and W8KJM is vacationing in Florida. The Miamisburg Wireless Assn. heard Mr. Bailey talk on the care and feeding of antenna towers; also W8FYR gave a talk on cubical quad antennas, *The Spectrum* informs us.

Ohio S.S.B. Net QNIs 1677 Sess. 57 QTC 806 14.1%
Huckeye Net Sess. 31 QTC 347 11.27%
Traffic: W8UPH 439, W8RYF 333, WA8CFJ 300, W8CHT 239, K8YSO 239, W8DAE 221, WA8BUW 198, WA8GYT 142, WA8FSX 123, K8LGA 115, W8FSM 110, K8UBK 99, W8RZX 94, W8WEM 92, W8PMN 82, WA8AUZ 67, WA8JXM 60, W8FGD 41, K8LGB 35, WA8FKD 34, K8YDR 33, K8BYR 29, W8NLXO 28, K8DHJ 27, W8LZE 25, W8NGA 23, K8BNI 13, W8GOE 9, W8WEG 8, W8FZJ 7, K8LRK 6, W8EEQ 3.

HUDSON DIVISION

EASTERN NEW YORK—SCM, George W. Tracy, W2EFU—SEC: W2KGC, RM: WA2VYS, PAM: W2JJG. Section nets: NYS on 3670 kc. nightly at 2400 GMT; NYSPTEN on 3925 kc. nightly at 2300 GMT; ESS on 3590 kc. nightly at 2300 GMT. Appointment: WB2PYZ as OES. The Albany club held a mid-season dinner party at Thruway Motel with WA2DTE and WA2DTF as committeemen. At its meeting, safety was featured by a representative of the Niagara Mohawk Power Company. At the Westchester Club, Kahn Engineering discussed its time-division Echoplex. Up at Schenectady, the speaker was WB2EAF, who discussed r.f. amplifiers and transmission lines. During the V.H.F. Party, WA2NRJ and WB2HZY worked 101 stations in 8 sections using low power from a high hill. WB2TNB has his CP-20 and is trying for 25. The ESS Net handled 231 messages in Jan., according to RM WA2VYS. WB2QYZ has his CP-25 sticker. WB2HZY is using an SX-115 while the owner is in the Air Force. The new officers of the Albany Club are K2BUF, pres.; WA2BLC, vice-pres.; WB2BZE, secy.; WA2YRF, treas.; WA2DTF, dir. WA2PBX is a member of the QOTC and formerly W9CDI in Ill. The National Award Hunter's Club meets on 145 Mc. each Sun. at 0930 EST: WA2SAZ is the custodian. Sorry to report as Silent Keys K2CT and WB2ICS, in Troy and White Plains, respectively. WB2POM has a new Seneca with a console for the rest of the station. K2YRZ is the new Radio Officer for New Rochelle RACES. Traffic: WA2VYS 201, WB2HZY 123, WB2TNB 87, K2SJM 82, K2TYP 70, W2THE 40, W2UC 36, WA2JWL 31, WB2DXL 28, WB2JYV 24, W2EFU 19, W2URP 17, W2ANV 12, K2AJA 11, W2BXP 11, WA2WGS 11, WA2ZPD 6, W2ODC 5, WB2SEV 4, WA2DXB 2, WB2FYF 2.

NEW YORK CITY AND LONG ISLAND—SCM, Blaine S. Johnson, K2IDB—Asst. SCM, Fred J. Brunjes, K2DGI. SEC: K2OVN. Section nets:

NLI	3630 kc.	1915 Nightly	WA2EXP — RM
VHF Net	145.8 Mc.	2000 TWTh	W2EW — PAM
VHF Net	146.25 Mc.	1900 P5S5M	W2EW — PAM
NYCLIPN	3932 kc.	1600 Daily	WB2DXM — PAM
NLS (Slo)	3630 kc.	1845 Nightly	WA2RUE — RM

NYC-LI nets: See Dec. 1965 column for schedules. Reelected officers of the Crossband Communications Club of N.Y., are WA2IOT, pres.; K2SSXN, vice-pres.; K2ZKE, secy.; WB2DUK, treas. WB2RQF is sporting a new 50-watt rig on v.h.f. with matching QSYer. WN2TCS racked up a nice score in the V.H.F. Sweepstakes, 3660 points. WB2NGZ's TA-33 and off-shore breezes don't get along too well. Togetherness lasted only 24 hours. WB2QBP is looking for stations in Queens for AREC on 10 meters. How about it, gang? Here is your chance for public service and to help your community! W2EHA has a modified "Cantenna." Always thought he used a dummy load for an antenna; or is it the other way around. Hi! W2OWS is sporting a new 2-meter baggage rack (Squalo) on his mobile. WB2FXN has a new bucket of bolts on 2 meters, looking to burn up the air waves. WB2AWX is looking for new stations for the Brooklyn AREC 10-Meter Net. How about helping him out, gang, Mon. at 0130Z on 28.620-Mc. a.m., and s.s.b. on 28.610 Mc. at 0200Z. WA2VKK would like Bronx

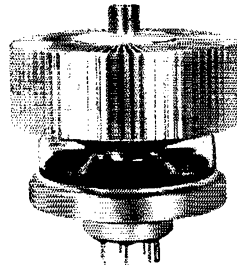
PENTA Beam Pentodes for Amateur Radio



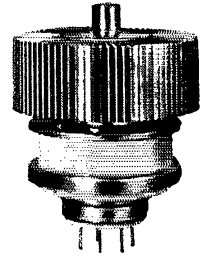
PL-175A



PL-177A



PL-8295/172



PL-8432

RATINGS

Type	Filament		Max. Plate Dissipation (Watts)	Useful Output* Class AB ₁ Linear Amplifier Plate voltage in volts				
	Voltage (Volts)	Current (Amps)		1000	1500	2000	2500	3000
PL-175A	5.0	14.5	400	—	—	445W	570W	680W
PL-177A	6.0	3.3	75	96W	140W	210W	—	—
PL-8295/172	6.0	7.8	1000	—	—	1020W	1280W	1540W
PL-8432	6.0	7.8	1000	—	—	1020W	1280W	1540W

*Actual power output delivered to load from typical amplifier.

These Penta beam pentodes are finding wide use for linear amplifier service. Reason: You get higher power output at lower plate voltages with minimum distortion. For 50-watt to 200-watt peak output service, choose the PL-177A. With the PL-175A, a 400-watt tube, you can replace the 4-400A, directly, provide substantially higher output without circuit or voltage changes. Both of these plus the PL-8295/172 and PL-8432 feature Penta's exclusive vane-type suppressor grid design for extra efficiency and linearity. Ceramic construction of the PL-8432 means greater shock and vibration resistance, plus high allowable operating temperature capability. For details, write The Machlett Laboratories, Inc.—Penta Operation, 312 North Nopal St., Santa Barbara, California 93102.

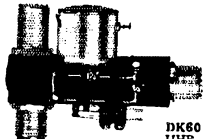
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DOW KEY COAXIAL RELAYS

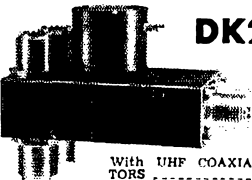
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HEAVY DUTY SPDT COAXIAL RELAYS

DK60 SERIES, AC or DC UHF connectors from \$12.45



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A DPDT SWITCH for SWITCHING 2 COAXIAL LINES SIMULTANEOUSLY

With UHF COAXIAL CONNECTORS from \$19.00 ea.



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A DPDT SWITCH INTERNALLY CONNECTED IN DE-ENERGIZED POSITION

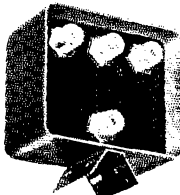
Available in all standard AC DC voltages from \$19.00 ea.



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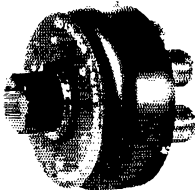
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WITH UHF CONNECTORS \$22.95 ea.



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NEW MANUAL COAXIAL SWITCHES (Not Wafer Switches)

Available: 1P2T, SP3T, 1P6T and crossover switch from \$12.75 ea.

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DOW-KEY CO.

Thief River Falls, Minnesota

AREC members to send expired cards to him for endorsement. WA2RKK has a new homebrew 6-meter rig percolating nicely. K2DGI is sporting a new receiver and a slightly-bent tower (ill winds again). WA2JKX has made the FMT Honor Roll. New officers of the Mid-County Net Amateur Radio Club are WA2EQK, pres.; K2CCX, net control; WA2JFA, secy.; WB2ASA, secy. New officers of the SIARC are K2EFB, pres.; W2EUY, treas.; WA2ULL, secy.; WA2PMC, corr. secy., with Honorary Membership to K2TEM. K2DGI is planning a vacation-DXpedition to the Windward and Leeward Islands (VP2-Land) some time in July or Aug. WA2KSP is on a new type of QRM campaign! He's taking up gun collecting. I use a notch filter myself! WA2SAR was home on a furlough on his way to the Orient. Best wishes from all of us! W2BCB is ORS No. 28 after many years of layoff, last ORS 1930! Appt. No.? You guessed it! W2EW is looking for 2-meter stations for the N.Y.C.-V.H.F. Net to handle traffic. Contact him via nets or direct. Rockaway ARC will have an "On The Air Day" Sun., Apr. 17, from noon to 6 p.m. on 2 meters. A certificate will be issued to anyone working 5 members of the RARC. Send entries to P.O. Box 205, Rockaway Park, N.Y. 11694. New appointments: WB2DXM as OBS; K2QMM as OO; WB2MBU, WB2UIV, WB2UKQ as OESs. Because of a heavy schedule of mining salt, Blaine has entrusted the writing of this month's column to me, K2DGI. BPL was awarded to WA2RUE. The Tuboro RC will hold an auction Apr. 17 at 104-19 127th St., Richmond Hill, \$1.00 including refreshments. Traffic: WA2RUE 659, K2UBG 209, WB2DXM 165, W2EW 91, W2GKZ 87, WB2EUH 83, WB2FAJ 78, WB2AEK 70, WB2EMJ 54, WB2RQF 45, WN2TCS 35, K2UAT 25, W2DBQ 30, W2BNGZ 30, K2UFT 29, WB2GKX 23, WB2UDD 24, WA2LJS 20, W2PF 20, WB2EMJ 17, W2BCB 14, WB2SEQ 14, W2EC 12, W2VAWO 10, WB2MLN 8, WA2DTY 7, W2EHA 6, W2IAG 6, WA2QJU 6, W2LGK 4, WB2FXN 3, K2KYS 2, WN2UBE 2, WB2AWX 1, K2PSQ 1.

NORTHERN NEW JERSEY—SCM, Edward F. Erickson, W2CVW—Asst. SCM: Louis J. Amoroso, W2LQP. SEC: K2ZFI. NNJ traffic nets:

NJN	3695 kc.	7:00 P.M. 1cl	Daily	WB2AEJ mgr.
NJ Phone	3900 kc.	6:00 P.M. 1cl	Ex. Sun.	W2PEV mgr.
NJ Phone	3900 kc.	9:00 A.M. 1cl	Sun.	W2ZI mgr.
NJ 6&2	51,150 kc.	11:00 P.M. 1cl	M-W-Sat.	K2VNL mgr.
NJ 6&2	146,700 kc.	10:00 P.M. 1cl	Tue.-Sat.	K2VNL mgr.

For AREC net skeds write to K2ZFI. New appointments: WB2DXM as EC for Hawthorne and Vicinity; WA2KIN and WA2IDE as OESs. The Central New Jersey V.H.F. Society meets the 2nd Fri. of each month at 8:00 p.m. in the Agricultural Library, Rutgers U. New Brunswick. New officers of the Knight Raiders V.H.F. Club: K2KIQ, pres.; K2RPZ, secy.; WA2SEI, treas. The club plans to install a satellite-tracking station at a high location in NNJ. The Bergen County AR Assn. announces the following slate of officers: WA2IDH, pres.; WB2QNE, vice-pres.; WB2JWU, secy.; WB2PYE, treas. This club meets the 1st Sun. of the month at the New Milford Town Hall at 8 p.m. When no meetings are held, a Sun. net is conducted at 145.8 Mc. at 8 p.m. and on 50.4 Mc. at 9 p.m. OO K2LSX still is settling in the new QTH, but find time for OO work and RTTY. WA2TEK will be on RTTY by now, we hope. Ernie ran into some problems modifying the Swan. WA2TWS is active in MARS, N36Z, RACES and AREC. K2UKQ has made DXCC on s.s.b. and hopes to set the cards before the award is consolidated. WB2UIR is active in the Empire State Slow Net which meets on 3590 kc. daily at 6 p.m. The Monmouth County AREC was activated for flood conditions on the North Jersey Shore during the recent snow storm with WB2KTO as NCS. WA2SRQ has a new 40 meter dipole and t.r. switch. WB2QEA has 30 states on 6 meters and received a high score certificate for the Sept. V.H.F. QSO Party. WA2GOD keeps active on RTTY and v.h.f. while attending RCA Institutes. WB2MXZ worked W3-Land on 2 meters using an indoor whip despite QRM from the eager beavers. WA2UDT reports on aggregate score of 40,000 points in the V.H.F. SS for the Central Jersey V.H.F. Society. K2RDX has changed from a 417A to an RCA nuvistor 8058 in his 432-Mc. converter, but still cannot hear any hams because of lack of activity. WB2BXX is using a home-brew 1-watt transmitter on 2 meters. Don't forget the Pre-SFT operation May 14. Contact John W. Banke, K2ZFI, SEC NNJ, Main Rd., Box 177, Towaco, N.J. 07082. QO Totals: W2TJF 48; K2AGZ-11; K2LSX-2. Traffic: (Jan.) WB2AEJ 215, K2VNL 158, WB2JWB 146, W2CVW 103, K2ZFI 102, WB2HLF 67, WB2CFK 63, WB2IYO 37, K2ZFI 34, WR2QLF 29, K2EQP 20, W2PEV 20, WB2GFY 19, WA2SRQ 19, K2SLG 14, WA2SKQ 12, WB2BCS 11, WA2CCF 10, K2MFX 10, WB2KTO 6, WB2QGG 5, W2DRV 4, WA2TAF 3, WA2DEW 1, W2NTY 1, WB2UIR 1, (Dec.) WB2BCS 107, WA2KHL 9, WA2UOO 2, (Nov.) WA2UOO 5.

New Webster
 "Circle W" quality symbol
 heralds the

BIG K

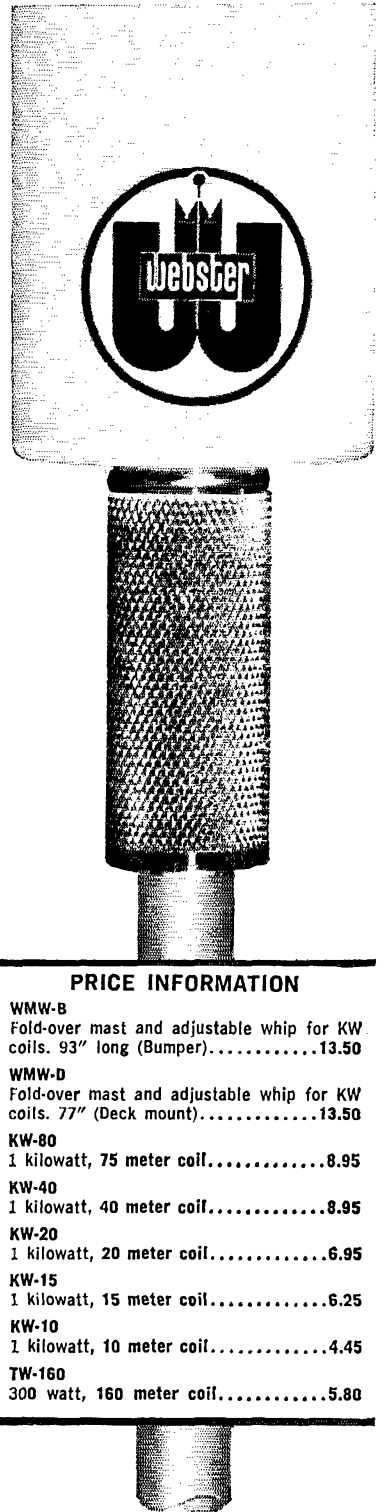
**high power
 antenna at a
 low power
 price**

Now . . . **BIG-K** . . . basically an improved version of the well-known Top-sider mobile antenna but with ONE-KW (p.e.p.) coils and priced to represent exceptional value.

New techniques and large quantity production have lowered manufacturing costs while maintaining highest quality. All of the savings are being passed along to the customer. **Compare these prices for a KW-rated mobile antenna!**

There will be only one type of coil—**BIG-K**—1000 watts p.e.p. for all bands (except the coil for 160-meters which is 300 watts p.e.p.). The basic antenna remains the same with the exception that the **BIG-K** aluminum column will be given a special coating for environmental protection. As before, the column is hinged, permitting coil and top whip section to fold over. Webster's exclusive fast release and positive lock-up feature remains intact.

Write for descriptive literature.



PRICE INFORMATION

WMW-B	
Fold-over mast and adjustable whip for KW coils. 93" long (Bumper).....	13.50
WMW-D	
Fold-over mast and adjustable whip for KW coils. 77" (Deck mount).....	13.50
KW-80	
1 kilowatt, 75 meter coil.....	8.95
KW-40	
1 kilowatt, 40 meter coil.....	8.95
KW-20	
1 kilowatt, 20 meter coil.....	6.95
KW-15	
1 kilowatt, 15 meter coil.....	6.25
KW-10	
1 kilowatt, 10 meter coil.....	4.45
TW-160	
300 watt, 160 meter coil.....	5.80

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K7ASK

TWO CATEGORIES TO CHOOSE FROM

Standard Duty Guyed in Heights of 37 - 54 - 88 - 105 and 122 feet

Heavy Duty Self Supporting and Guyed in Heights of 37 - 54 feet (SS) 71 - 88 feet (guyed)

ROHN has these 6 IMPORTANT POINTS:

Ease of Operation—roller guides between sections assure easy, safe, friction-free raising and lowering. **Strength**—welded tubular steel sections overlap 3 feet at maximum height for extra sturdiness and strength. Unique ROHN raising procedure **raises all sections together**—uniformly with an equal section overlap at all heights! **Versatility**—designed to support the largest antennae with complete safety and assurance at any height desired! **Simple Installation**—install it yourself—use either flat base or special tilting base (illustrated above) depending on your needs. **Rated and Tested**—entire line engineered so you can get exactly the right size and properly rated tower for your antenna. The ROHN line of towers is complete. **Zinc Galvanized**—hot dipped galvanizing a standard—not an extra—with all ROHN towers! Prices start at less than \$100.

SEND FOR ROHN TOWER HANDBOOK

—\$1.25 Value

—ONLY \$100 postpaid (special to readers of this magazine). Nearest source of supply sent on request. Representatives world-wide to serve you. Write today to:



ROHN Manufacturing Co.

P. O. Box 2000

Peoria, Illinois

"World's Largest EXCLUSIVE Manufacturer of Towers; designers, engineers, and installers of complete communication tower systems."

IOWA QSO PARTY

April 10, 1966

All amateurs are invited to participate in the Iowa QSO Party, sponsored by the Sioux City Amateur Radio Association.

Rules: (1) Contacts will be made during the 24-hour period starting at 0000 GMT April 10, and ending at 2400 GMT. Full or part time operation is permitted. (2) All bands, all modes and the same station may be worked on different bands and different modes for extra points. (3) The general call will be CQ Iowa. (4) Exchange QSO number, report and state, province or country. (5) Score one point for each contact and multiply by the number of states, provinces, countries or for out-of-staters, the number of different Iowa counties worked. (6) Awards will go to the first three winners in each state and to each county winner in Iowa. (7) Suggested frequencies plus or minus 15 kc. of 1820 3620 3970 7070 7270 14120 14270 21070 21270. (8) Logs showing date, time, band, mode and location of station worked, with claimed score, to be mailed no later than April 30, 1966, to W9EQN, Cliff T. Taylor, 3818 5th Avenue, Sioux City, Iowa 51106.

MIDWEST DIVISION

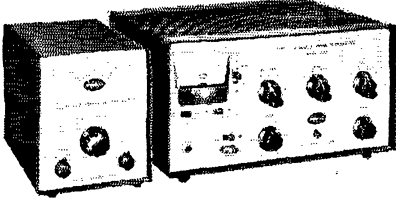
IOWA—SCM, Dennis Burke, WONTB—SEC; KÖBRE, Iowa 160 Meter Net meets daily at 1900 on 1815 kc. Iowa 75 Meter Net meets daily ex. Sun. at 1230 on 3970 kc. Hamilton County Net meets daily at 1830 on 1815 kc. Jasper County Net meets daily at 1930 on 1820 kc., Net reports: Iowa 160, QNI 989, QTC 11, Sessions 31.75 Meter Net, QTC 1454, QTC 143, sessions 25. Hamilton County, QNI 231, QTC 4, sessions 31, Jasper County Net, sessions 31. WÖNWX reports this net is monitoring the low segment of the 160-meter band around the clock for emergency traffic; also reports working 9L1HX in Africa on the low end of 160. Officers of the Des Moines RAA are KÖTEK, pres.; WAÖDGM, vice-pres.; KÖQNL, secy.-treas. Lee Roy won the Win Mager award for the past year. Benton County ARC officers are WÖEEG, pres.; WAÖDAG, vice-pres.; WAÖAMG, secy.-treas. Fairfield H.S. ARC officers are KÖFLY, pres.; KÖBRE, vice-pres.; KÖLQV, secy.-treas.; KÖEAK, KÖMEP, KÖVXW, act. conum. Inquiries regarding the Iowa QSO Party should be sent to WÖEQN, Sioux City, Iowa. The new pres. of Sioux City ARA is KÖVEJ. Traffic: (Jan.) WÖLGG 1220, WAÖDEM 592, WÖNTB 112, WÖUSL 81, WAÖJEG 36, KÖASR 33, WÖQVZ 13, KÖEVC 11, WÖNGS 10, KÖTDO 10, WÖBKR 9, WÖJPJ 9, WAÖJYT 9, WAÖDYV 4. (Dec.) WÖLGG 1690.

KANSAS—SCM, Robert M. Summers, KÖBYF—SEC; KÖEMB, RM; WAÖJJI, PAM; KÖJMF, V.H.F. PAM; WÖHAI. The Kansas WX Net seems to be picking up on QNI. WÖZYN recently lost all his radio gear in a fire that left his family with only the clothing on their backs. A new ORS is WAÖMLE, Manhattan. The JARS of Kansas City is working on a new certificate that will be of interest to all certificate hunters. New officers of the Boot Hill Amateur Radio Club of Dodge City are KÖJDD, pres.; WÖWYH, vice-pres.; WAÖKHN, treas.; WAÖJFV, secy. The club also announces Aug. 21 as the date for the Boot Hill Hamfest at Hoover Pavilion, Wright Park. WAÖCAM is sporting a new Eiro 753. The Wichita Amateur Radio Club's officers are KÖVBD, pres.; KÖIFG, vice-pres.; WAÖDEK, secy.; KÖPII, treas.; KÖYJZ, pub. dir. Net reports for Jan.:

	Sessions	QNI	QTC	Net Mgr.
EC Net	5	79	42	WAÖCCW
KWN (Wx.Nete)	26	300	6	KÖEMB
QKS (c.w.)	28	155	47	WAÖJJI
KPN	inc.	130	32	KÖJMF
KSBN		201	36	KÖJMF
Zone 11 AREC	5	181		KÖJDD

ORS, OO, OBS, OES, V.H.F. PAM appointees are needed. Write for more information. Traffic: WÖOJLJ 337, KÖHGI 99, KÖGII 84, WAÖJJI 71, KÖBYF 63, WAÖMLE 61, KÖGZP 46, WAÖFCO 42, KÖJMF 38, WAÖCCV 36, WÖFRG 33, KÖEMB 28, WÖFDJ 19, WAÖMQI 13, KÖJDD 12, WAÖCAM 5.

MISSOURI—SCM, Alfred E. Schwaneke, WÖTPK—SEC; WÖBUL, SEC WÖBUL, painfully injured in an auto accident, is recovering. WAÖJDR/O renewed as OPS. New officers of the Harrisonville Club (HARK) are WAÖDSE, pres.; KÖFFC, secy.-treas.

AMECO*Leader in Compact, Quality Ham Gear***NEW VFO FOR TX-62 or any other VHF TRANSMITTER****The NEW AMECO TX-62**

In response to the demand for an inexpensive compact VHF transmitter, Ameco has brought out its new 2 and 6 meter transmitter. It is easy to tune because all circuits up to the final are broadbanded. There is no other transmitter like it on the market!

SPECIFICATIONS AND FEATURES

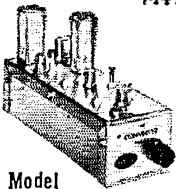
Power input to final: 75W. CW, 75W. peak on phone.
 Tube lineup: 6GK6—osc., tripler, 6GK6 doubler, 7868 tripler (on 2 meters) 7984-Final, 12AX7 and 6GK6 modulator. Crystal-controlled or external VFO. Crystals used are inexpensive 8 Mc type.
 Meter reads final cathode current, final grid current and RF output.
 Solid state power supply.
 Mike/key jack and crystal socket on front panel. Push-to-talk mike jack.
 Potentiometer type drive control. Audio gain control.
 Additional connections in rear for key and relay.
Model TX-62 Wired and Tested only \$149.95

NEW AMECO VFO FOR 6, 2 & 1 1/4 METERS

The new Ameco VFO-621 is a companion unit designed to operate with the Ameco TX-62. It can also be used with any other commercial 6, 2, or 1 1/2 meter transmitter.

Because it uses a transistorized oscillator circuit, it is extremely stable. An amplifier stage provides high output at 24-26 MC. The VFO includes a built-in solid state Zener diode regulated AC power supply.

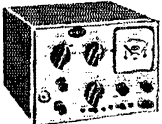
This new VFO is truly an exceptional performer at a very low price **Model VFO-621 \$59.95 net.**

AMECO EQUIPMENT CORP., 178 HERRICKS RD., MINEOLA, L. I., N. Y.**NUVISTOR CONVERTERS FOR 50, 144 AND 220 MC. HIGH GAIN, LOW NOISE****Model CN**

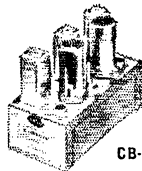
Has 3 Nuvistors (2 RF stages & mixer) and 6J6 osc. Available in any IF output and do NOT become obsolete as their IF is easily changed to match any receiver. Average gain — 45 db. Noise figure — 2.5 db. at 50 Mc., 3.0 db. at 144 Mc., 4.0 db. at 220 Mc. Power required 100-150V. at 30 ma., 6.3V. at .84A. See PS-1 Power Supply. Model CN-50W, CN-144W or CN-220W wired, (specify IF.) \$49.95. Model CN-50K, CN-144K or CN-220K in kit form. (specify IF.) \$34.95

ALL BAND NUVISTOR. PREAMP 6 THRU 160 METERS**MODEL PCL. Wired, \$24.95
MODEL PCLP, with built-in power-supply, wired, \$32.95**

2 Nuvistors in cascode give noise figures of 1.5 to 3.4 db. depending on band. Weak signal performance, image and spurious rejection on all receivers are greatly improved. PCL's overall gain in excess of 20 db. Panel contains bandswitch, tuning capacitor and 3 position switch which puts unit into "OFF," "Standby" or "ON," and transfers antenna directly to receiver or through Preamp. Power required — 120 V. at 7 ma. and 6.3 V. at .27 A. — can be taken from receiver or Ameco PS-1 supply. Size: 3"x5"x3".

COMPACT 6 THRU 80 METER TRANSMITTER**Model TX-86**

Handles 90 watts phone and CW on 6 thru 80 meters. Final 6146 operates straight thru on all bands. Size — only 5" x 7" x 7" — ideal mobile or fixed. Can take crystal or VFO. Model TX-86 Kit \$89.95 — Wired Model TX-86W \$119.95. Model PS-3 Wired \$44.95. Model W612A Mobile Supply wired \$54.95.

**CB-6**

CB-6K — 6 meter kit, 6ES8-rf Amp., 6U8-mix./osc. \$19.95
 CB-6W — wired & tested \$27.50
 CB-2K — 2 meter kit, 6ES8 1st rf amp., 6U8 — 2nd rf amp./mix, 6I6 osc. \$23.95
 CB-2W — wired and tested, \$33.95
 Model PS-1 — Matching Power Supply — plugs directly into CB-6, CE-2 and CN units, PS-1K — Kit \$10.50
 PS-1W — Wired \$11.50

EASY TO UNDERSTAND AMECO BOOKS

Amateur Radio Theory Course \$3.95
 Amateur License Guide50
 Radio Operators' Lic. Guide, EL 1-275
 EL 3 1.75 EL 4 1.25
 Amateur Log Book50
 Radio Electronics Made Simple 1.95

**CODE PRACTICE MATERIAL**

Ameco has the most complete line of code records, code practice oscillators and keys. Code courses range from start to 18 W.P.M. and are on 33, 45, or 78 r.p.m. records. Model CPS oscillator has a 4" speaker and can be converted to a CW monitor.

Write for details on code courses and other ham gear.

Dept. QST-4

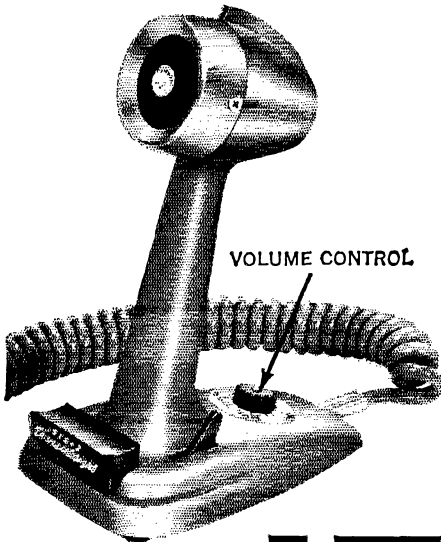
Ameco equipment at all leading ham distributors.

AMECO EQUIPMENT CORP.

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Affiliated with American Electronics Co. and Ameco Publishing Corp.

EVERY HAM SHOULD HAVE ONE



THE TURNER



WITH VARIABLE OUTPUT LEVEL

Now, from Turner comes the very finest base station and hamshack microphone ever designed. The **2** features a two transistor pre-amp with volume control to give you up to 50 times the output level you now have. Just dial your desired signal for maximum modulation all the time — every time. You can work close or far away from this microphone, or change the output for a big or little voice. Eventually, all equipment loses some of its initial power. Turner's **2** puts the zip back into your transmitter and keeps it up to full strength at all times!

The **2** has tailored voice frequency response of 300-3500 c.p.s. for best and clearest signal with knocked down local noise interference.

Exclusive touch-to-talk or lock on-off switching — the **2** works with all tube or transistor equipment regardless of switching requirements or type.

ASK YOUR DEALER ABOUT THE

NEW **2** \$49.50 LIST



THE TURNER MICROPHONE COMPANY
917 17th Street N.E.
Cedar Rapids, Iowa

AVAILABLE IN CANADA

EXPORT:
Ad Auriema, Inc., 85 Broad St., New York 4, N.Y.

MTTN (Teenage Net) certificates go to W0YO, WA0EMX, WA0JVV, WA0ELM, WA0JEG and WA0BGU. WA0MRN is a new Gen. Cl. in Wellington. WA0MIGV is a new Gen. Cl. in Elsherry. His son is WN0MHP. WA0FLL reports that PHD still is on 50.4 Mon. at 0130Z (7:30 p.m. CIST). The NW St. Louis ARC, K0AXU, is awarding a new certificate in observance of the Bi-Centennial for contacts with St. Louis stations after Jan. 1965. WOZLN (U. of Mo.) reports Project Oscar beams for 432 and 144 Mc. arrived and the final for h.f.s using two 250THs is finished and operating. K0YIP and K0JJP participated in the Dec. FMT. W0RTO is on 144 Mc. to clear traffic from the low frequency nets into the St. Louis-St. Charles area. The PHD Club (North K.C. area) elected WA0KGM, pres.; WA9KXX/O, vice-pres.; K0SPE, treas.; W0AMO, secy.; WA0FLL, act. mgr. W0AMO has a new tower with 2- and 6-meter antennas. SMN (10 p.m. CST daily 3580 kc.) reports lots of traffic but no one to take it. Net reports for Jan.:

Net	Freq.	Time	Days	Sess.	QNI	QTC	Mgr.
MEN	3885	2230Z	M-W-F	13	224	20	W0BUL
MON	3580	0100Z	Daily	31	198	143	W0WYJ
SMN	3580	0400Z	Daily	27	82	52	K0AEM
MNN	3580	1900Z	M-Sat.	25	54	21	W0UOD
QMO	3580	2200Z	Sun.	5	21	7	WA0FKD
MoSSB	3963	2400Z	M-Sat.	26	672	108	K0TCB
MoPON	3810	2100Z	M-F	21	237	128	W0HVJ
MTTN	3940	2300Z	M-F	20	242	105	WA0EMX
"	3940	1700Z	Sat.	3	24	21	WA0EMX
HBN	3880	1805Z	M-F	21	901	123	WA0HWJ
PHD	50.4	0130Z	Mon.	5	87	24	WA0FLL

Traffic: (Jan.) K0ONK 1201, W0TDR 162, K0AEM 155, WA0FKD 132, W0YO 113, WA0FMD 109, W0HVJ 98, W0UOD 87, K0DEQ 70, W0EEE 62, WA0CMO/O 38, K0TCB 38, WA0LYE 35, WA0HOQ 34, W0WYJ 33, WA0ELM 29, WA0FLL 27, W0TPK 26, WA0CHH 24, W0RUL 23, WA0HWJ 23, W0RTO 23, K0FPC 22, K0JPL 13, K0LGZ 12, WA0BGU 9, WA0EMX 7, K0YIP 7, K0JPS 6, WA0KNW 5, W0BVL 3, W0JBK 2. (Dec.) WA0ELM 14.

NEBRASKA—SCM, Frank Allen, W0GGP—SEC, K0JXN. Appointments: W0VRE as OO; W0FQB as ORS. Monthly traffic net reports: Nebr. Morning Phone Net, K0UWK, QNI 664, QTC 32. Nebr. Emergency Phone Net, WA0GHZ, QNI 1516, QTC 86. Nebr. Storm Net, K0JXN, 1st session, QNI 996, QTC 25; 2nd sessions, QNI 774, QTC 8. Nebr. AREC Net, W0IRZ, QNI 143, QTC 7. 160-Meter Net, WA0CBJ, QNI 673. Nebr. AREC C.W. Net, WA0EEI, QNI 10. Nebr. C.W. Net, WA0GHZ, 1st session, QNI 145, QTC 51; 2nd session QNI 98. West Nebr. Net, W0N1K, QNI 454, QTC 15, WX 192. The Nebr. Centennial Commission has started its Centennial QSL Program, developed with the cooperation of the Lincoln Amateur Radio Club. Nebraska hams can get further information by contacting WA0CKX, chairman of the Centennial QSL Committee, Lincoln Hotel, Lincoln, Nebr. Traffic: WA0DOU 288, WA0GHZ 158, W0LOD 122, W0N1K 122, K0JFN 57, W0GGP 52, K0RRL 52, WA0GVJ 50, K0KJP 47, WA0BID 44, WA0AES 22, WA0HVR 21, WA0IXF 21, W0RFV 20, W0VEA 20, WA0BE 19, W0EWZ 17, W0WRY 16, W0UKD 15, WA0XD 13, K0BRG 10, WA0EEI 10, WA0GD 10, K0HNT 10, W0YFR 10, W0HYD 8, K0DGW 7, K0FRU 7, WA0BK 6, W0FQB 6, K0HLY 6, W0AGK 5, WA0ERN 5, K0UWK 5, W0FBY 4, W0FTQ 4, W0YOY 4, WA0FIQ 3, W0EGQ 2, WA0LRQ 2, W0WHY 2.

NEW ENGLAND DIVISION

CONNECTICUT—Acting SCM, Milton E. Chaffee, W1EFW—SEC, W1PRT, RM, W1ZFM, PAM, W1YBH, V.H.F. PAM: K1RTS. Net reports:

Net	Freq.	Days	Time	Sess.	QNI	QTC
CN	3640	Daily	1845	31	292	334
CPN	3880	M-S	1800	20	402	139

High attendance: CN—WA1APY, W1RFJ, W1ZFM, K1LMS. CPN reports 29 sessions, total 139 messages handled, ave. 5, ave. daily attendance 19 with a 402 RNI, ave. net time 43 minutes. High attendance: W1FVU, K1DGK, W1MPW, W1YBH, W1LUH, K1EIC, K1LMS, K1SRF, K1YXK/1, W1CTB, K1EYY. Your SEC, W1PRT, reports increased activity on AREC with 175 full and 125 limited members in our section. If your town has no EC appointee, why not contact W1PRT for information how to get the AREC program rolling? The Connecticut Council of Amateur Radio Clubs welcomes HARA as its ninth member. How about your club? CCARC pres. W1WHQ publishes an FB newsletter about the council's business. CWA notes: W1ZJJ is enjoying retirement as W1ZJJ/VE1 on Prince Edward Island. The locals are working your ex-SCM, W1TYQ, now HZ3TYQ,

ANTENNA BREAKTHROUGH

IN PERFORMANCE, VALUE, QUALITY, PRICE, AVAILABILITY

ALL-BAND VERTICALS

QUALITY MATERIAL

Brand new mill stock aluminum alloy tubing with Aluminite finish for protection against corrosion. Loading coils made by Barker & Williamson.

ALL-BAND OPERATION

Loading coil not required on 6, 10, 15 and 20 meters. For 40, 80, and 160 meters, loading coil taps are changed manually except if a wide-range pi-network output or an antenna tuner is used; in this case band changing can be done from the shack.

EASY ASSEMBLY

Less than two minutes is all you need to put your vertical together. No special tools or electronic equipment required. Full instructions given.

SIMPLE INSTALLATION

Goes almost anywhere. On the ground, on the roof, or outside your window.

AMAZING PERFORMANCE

Hundreds of reports of exceptional DX operation on both low and high power. You will work wonders with a Gotham vertical.

NO GUY WIRES

Our design eliminates unsightly guy wires. You save time, trouble, space and money by avoiding guy wires.

"All band vertical?" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, TI2FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HG Y, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWI, VE3KT. Moral: It's the antenna that counts!

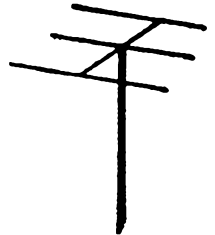
- V40 vertical for 40, 20, 15,
10, 6 meters \$14.95
- V80 vertical for 80, 75, 40,
20, 15, 10, 6 meters \$16.95
- V160 vertical for 160, 80, 75,
40, 20, 15, 10, 6 meters . . . \$18.95

ALSO AVAILABLE AT
AIREX RADIO CORP., NEW YORK CITY
CANADA—ON REQUEST

HOW TO ORDER: SEND CHECK OR MONEY ORDER. WE SHIP IMMEDIATELY UPON RECEIPT OF ORDER BY RAILWAY EXPRESS, SHIPPING CHARGES COLLECT.

BEAMS

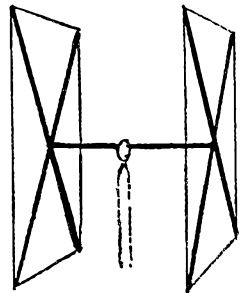
Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new; full size (36' of tubing for each 20 meter element, for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; 7/8" and 1" aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.



- 3 EL-20 METER \$22.00
- 2 EL-20 METER 16.00
- 3 EL-15 METER 16.00
- 2 EL-15 METER 12.00
- 4 EL-10 METER 18.00
- 4 EL-6 METER 15.00

QUADS

NEW! NEW! NEW! CUBICAL QUAD ANTENNAS — these two element beams have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a fool-proof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you! Now check these startling prices — note that they are *much lower* than even the bamboo-type:



- TWENTY METER CUBICAL QUAD \$25.00
- FIFTEEN METER CUBICAL QUAD 24.00

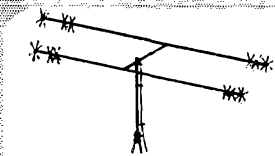
GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139

CRAMPED FOR SPACE?

NOW . . . MINIATURIZED,
QUALITY ANTENNAS FOR . . .

- APARTMENTS
- SUBURBAN HOMES
- PORTABLE USE

featuring heavy wall
aluminum and stainless
steel construction
throughout



6-10-15-20 METERS

The time proved B-24 4-Band antenna combines maximum efficiency and compact design to provide an excellent antenna where space is a factor. New end loading for maximum radiation efficiency. No center loading.

Oper. Freq.	6-10-15-20 Meters
Power Rating	600 Watts AM
Turn. Radius	7'
Total Weight	11 lbs.
Single Feed Line	52 ohm
SWR at Resonance	1.5 to 1.0 max.

Model B-24
Net \$59.95

MULTIBAND COAXIAL ANTENNA FOR 6-10-15-20 METERS

Needs no ground plane radials. Full electrical 1/2 wave on each band. Excellent quality construction. Mount with inexpensive TV Hardware.

Power Rating	2000 Watts AM
Total Weight	6 lbs.
Height	12'
Single Feed Line	52 ohm
SWR at Resonance	1.5 to 1.0 max.

Model C4 Net \$34.95



40 plus 10 METERS

New end loading for maximum radiation efficiency. No center loading employed. Element length only 18.5'...boom 10'.

Oper. Freq.	40 and 10 Meters
Power Rating	1000 Watts AM
Single Feed Line	52 ohm coax.
SWR at Resonance	1.5 to 1.0 max.
Total Weight	22 lbs.

Model B 4010 Net \$79.50

RUGGED 6 METER BEAM

Rugged construction with no holes in elements or boom to weaken antenna. Heavy wall seamless aluminum and stainless steel throughout.

Power Rating	1000 Watts AM
SWR at Resonance	1.4 to 1.0 max.
Impedance	52 ohms
Longest Element	9'8"
Boom	12'



Model B6M5
Net \$24.95 each
Two for \$44.50

Write for Mini-Products' Miniaturized Antenna Catalog.

If there is no stocking distributor near you . . . order direct from factory. Free shipping to your QTH and we will pre-pay the costs in continental U.S.A.

DISTRIBUTORS WANTED IN KEY AREAS. Write for details to Tom Vanable, K3JZJ, Sales Manager

Mini-Products, Inc.

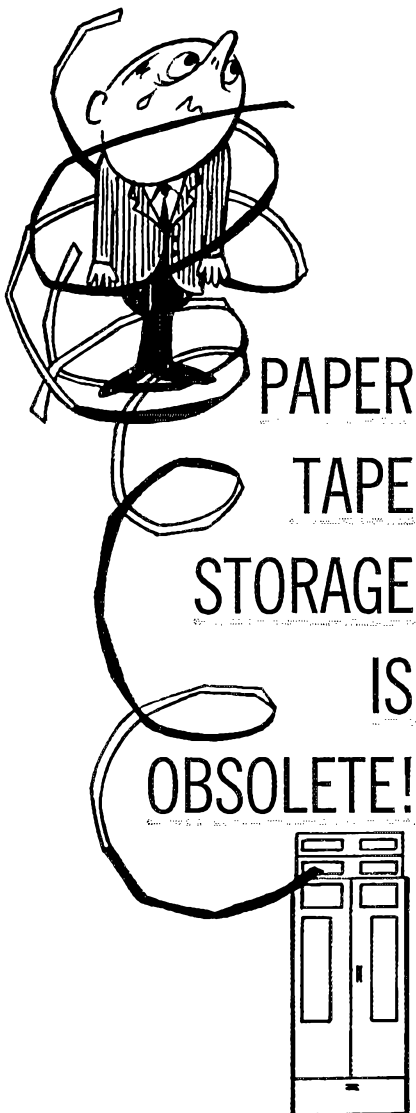
1001 West 18th Street, Erie, Pennsylvania

• LEADERS IN COMPACT ANTENNAS •

as HZ3TYQ/8Z4. W1ADW lost his dipole feeders to the strong winds and W1QV ditto his triband TA-38. W1VB is in Florida. K1UYZ is away at college operating W2-TAB. K1QGC is back on 40 and 15. New Generals: K1TMV, W1ADIH, W1AW was in the CD Party with K1AFC. W1BGD, W1ECH and W1WPR sharing the operator's chair. W1ECH reports 42 states on 160 and DXCC at 255/244. K1JXH has a DXCC standing at 189/156. Appointments: W1BHV as ORS; K1MIRI as OES; K1QPM, K1ILJ, W1VIV, W1MGF, W1CGD as ECs. Endorsements: W1CTI as ORS. A new AREC member is W1BZS. Reports were received from OOs W1-BGD, W1OJR, K1JXH, K1QGC, W1ECH and W1PRT. BPL was made by W1APY in Dec. and Jan. Traffic: (Jan.) W1APY 521, W1EFW 310, K1ZND 239, W1ZFM 218, K1LMS 125, K1RQO 117, K1EIR 100, W1YBH 70, K1EIC 68, K1EYV 62, K1LFW 60, W1GKF 55, W1BGD 53, W1BDI 47, W1QV 44, K1GGG 42, W1MPW 33, W1CTI 31, W1VU 31, K1YGS 23, K1YXK/1 21, K1NTR 18, K1SRF 8, W1ACYB 16, W1ZL 16, W1OBR 9, W1CWH 7, K1OQG/1 6, K1PKQ 5, W1BNB/1 4, K1UYZ 3, W1BIY 2, W1NEZW 1, K1TKS 1. (Dec.) W1APY 265, K1SRF 69, W1NEZW 9, W1OBR 8, K1UYZ 4.

EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—W1AOG, our SEC, received reports from Wis QFN, LVK, K1s 10ZG and PNB, W1WCI is EC for Newburyport; W1HIL is a new OO. We are very sorry to have to report the death of an old-timer, W1SS. Ex-W1BNU is now W4CEH in Clearwater, Fla. K1QAG is in Tucson, Ariz. with the call W7CAR. W4AAEU, in Shirley, is on 20. K1BUP/W1ZQM have a new baby boy, W1BYU is on 10. K1KTC is out of the hospital. The 8 Meter Crossband Net had 21 sessions, 303 QNIs, 29 traffic. K1YMW is on 15 with a Swan 350. W1AEC had movies on communications and lasers and guests from the Fall River Club. W1BZJ has a plaque from the crew of USS *Cascade* for his many phone relays. K1YUB sets the club at the "Y" is going good. The T-9 Club met at W1MVQ's. W1NBI and K1TUX are Silent Keys. W1-CRO, in the Coast Guard, is now in Va. W1ALB is all over the USA. W1CND now is a 2nd Lt. at Ft. George Meade, Md. W1AAU is Deputy C.D. Director in Dedham. K1WKK, NCS in EMN, is on at W1KBN. W1A-EVD has General and a Drake T4. W1AIDW is on 75. EMNN, on 3733 kc, had 13 sessions 89 QNIs, 28 traffic, W1NEUU and W1AODB check in. W1MX is on the air, reports W2QHQ. W1HIL is building a scope. K1BIF says that in the "blackout" they had 33 people in communications. W1MFI, K1BIG, W1ACMG and W1BCN were in there. W1FON says Army MARS in Dec. had 2259 hours, 1918 traffic, 80 members in this state. W1PEX has 55 BPLs, 48 are consecutive. K1CLM, K1GPH and K1ENS also made it. K1CLM is a member of the Handicappers Net on 20. W1CRX is busy with school, work and nets. K1GPH has a 2E2E rig on 6. K1GKA made SB with an SB10 feeding an ART-13. W1AIDWZ has a Viking Valiant. W1AIDSZ worked ZS6AL. W1A-DEC/DED are going to the Bahamas. W1ADRH has a T-150 transmitter. New appointments: W1KBN as ORS, W1AIDZJ and W1NIFYF as OESs. W1AJWJ is on many bands. Appointments endorsed: W1s AQE, BB, EMG, PEX, JYH, K1WJD as ORSs; W1s BB, DOF, ZSS, JYH as OPSs; W1AQE as RM, W1s DOF and KZV as ECs; W1HGT as OES, W1s VMD, TZ, KBN as OESs, W1s VAH and TZ as OOs. New on 2: W1NIFYF, W1AIDVR, W1JVE/1 is at WKON. W1HWK on w/s.s.b.. K1BTF is trying to get more activity on 2. W1A2RYJ/1 is at W1KBN. W1TZ-K1ANB drove across Canada last fall to Vancouver. B.C. EM2MN had 21 sessions, 187 QNIs, 180 traffic. W1NIFLR is on 40-80 c.w. K1MER is on 6 and working with K1WNJ. Radio Officer for Hanover, K1ZQL moved to Reading, W1s BGW, BB, ZLN and TZ took part in the Dec. FMT, W1VRK and his XYL have a baby YL. New officers of the Quannapowitt RA are W1FSN, pres.: K1LJT, vice-pres.: K1ZQL, secy.: K1NKP, treas.: K1s UOQ, NKA, YKW, CCW, W1AIDBF, directors. W1NYU and W1PRT spoke at meetings of the QRA. Marlboro ARA visited the Mass. C.D. Center in Framingham. W1ELU is trustee of the club station. The South Shore Wellesley and Middlesex Clubs held meetings. The Yankee RC held a penny auction. W1DWY spoke at a recent meeting. W1THT has a new Drake TR-4. W1ZQQ sold his mobile gear. K1OPQ and W1AOFMY will be operating at Fort Devens. W1DXQ is the new Civil Defense Director for Quincy. Traffic: (Jan.) W1PEX 1481, K1CLM 409, W1CRX 391, W1OFK 264, K1GPH 212, W1EAM 180, K1VPJ 59, W1DOM 46, W1AOG 42, W1KBN 41, W1EAT 40, W1ACEV 39, W1LES 34, W1ZSS 33, K1WJD 32, W1AIDT 25, K1VOK 25, W1JDP 19, K1LCQ 19, W1CTR 18, W1DWZ 18, K1GKA 18, W1SIV 16, W1ADEC 15, W1AICRR 13, K1EYM 10, K1BGG 9, W1AIDSZ 9, W1BGW 5, W1AIED 4, W1YAC 4, W1ADRH 3. (Dec.) K1ENS 286, W1ACEV 66, K1BGG 44, W1AIDBF 29, W1AICKJ 28, K1FJM 21, K1WJD 17. (Nov.) K1WJD 21.

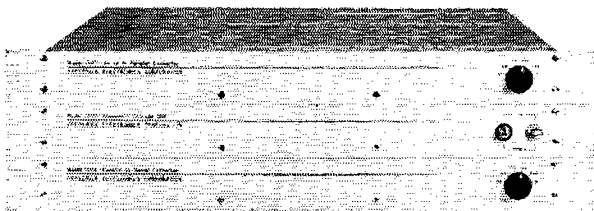
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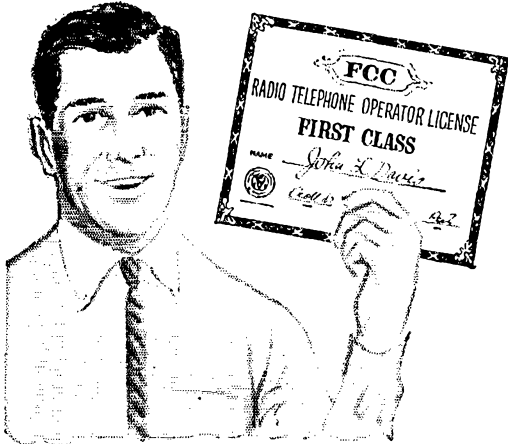


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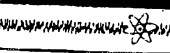
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K1QIG. RM: K1TMK. PAMs: K1WQI, K1ZVN, V.H.F. PAM; K1OYB. Traffic nets: Sea Gull Net, 1700 to 1800 and 2000 to 2100 hours on 3940 kc. Mon. through Sat. Pine Tree Net, daily at 1900 hours on 3598-kc. c.w. The PAWA elected K1VVG, pres.; K1PSF, vice-pres.; K1OYB, secy.; W1BTR, treas.; K1JKT, chief op. The club meets every Tue. at 7:30 p.m. in the Portland Boys Club and would like new members. WAIDTZ is working 10-15-20 meters, both a.m. and c.w. Congratulations to the winners of the Maine QSO Party: First W1UOT, second W1DPJ, third K1WQL. These fellows worked mostly c.w. Certificates will be out soon for this. Many thanks to all who helped to make the QSO Party a success. W1EIO has a Swan 350 on s.s.b. K1ERI is moving back to Maine. Many of the active stations have gone into the Armed Forces. We are looking for new ones from all parts of the state. Traffic: K1TMK 24, K1WQI 88, WA1AVO 37, WA1BEB 37, K1VUU 32, K1ZVN 24, K1WNC 4.

NEW HAMPSHIRE—SCM, Robert C. Mitchell, W1SWX/K1DSA—SEC: W1ALE/W1TNO. PAM: K1APQ. RM: W1DYE. The GSPN meets on 3842 kc. Mon. through Fri. at 2330Z and Sun. at 1430Z. The VTNI Net meets on 3685 kc. Mon. through Fri. at 2330Z. Endorsements: W1QKA, K1WKP and K1PSR as OESs; W1BYS and W1RCC as OPSS. W1JB (OO) did a fine job in a recent FMT. K1MOZ received his 40-w.p.m. certificate from W1EIA. K1PSR is looking for skeds on 220 late in the evening. K1DPQ reports 704 check-ins and 33 traffic for GSPN. W1NDZX reports the following new officers of the Manchester Radio Club: W1PZU, pres.; W1ASH, vice-pres.; W1NDZX, treas.; W1BGR, rec. secy.; W1DEI, corr. secy. K1UZZ reports 111 check-ins and 46 traffic for VTNI. W1CTW solved his coax entrance problem at W1IQD with a bit and brace-holes right through the wall. W1BYS now is out of the hospital and doing fine. While he was there W1ALE set up a 6-meter station for him. K1APQ is building a new amplifier, 2300Zs. It has been reported that some stations just can not get or stay on GSPN frequency. K1QES is now on s.s.b. W1CNX and W1SWX were active in the Feb. LO Party. K1VMR is now on s.s.b. and RTTY. I would like to hear from others who have modified Johnson 500s for f.s.k. Traffic: W1ALE 38, W1PFU 17, K1MOZ 6, W1EVN 4, W1SWX 2, W1BYS 1.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: W1YNE. PAM: W1TXL. RM: W1BTV. V.H.F. PAM: K1TPK. R1SPN report: 31 sessions, 560 QNI, 90 traffic. R1N report: 23 sessions, 65 QNI, 29 traffic. Endorsements: W1BTV as RM, OO and EC; K1NKR as OES. The W1AQ Club of Rumford elected K1LII, pres.; W1AEQ, vice-pres.; K1QLM, secy.; K1CZD, treas. W1EJ, club trustee, was reaffirmed by the membership. The Providence Radio Ass., W1OP, is the new QSL Bureau for New England. PRA elected W1EYH, pres.; W1D00, vice-pres.; W1UP, secy.; W1KKE, treas.; W1BIL, K1NTS and K1HZN, board of directors. The PRA will hold the Annual R.I. QSO Party Mar. 19 and 20. The Harvard Wireless Club, W1AF, announced that a R.I. ham, K1PAM, was elected vice-pres. and station manager of the club. Bob also is in charge of the club's Fund Drive to raise money for two new stations. K1YVN has a new S/Line on the air and anyone interested in joining Army MARS should contact him. W1YKQ has a new monitor scope in operation at his station. Traffic: (Jan.) W1BTV 156, W1YKQ 99, K1NJT 71, W1TXL 63, K1TPK 59, K1VYC 57, K1YEV 32, WA1FAV 19, K1YVN 18, WA1CSO 18, K1VPK 16, WA1BJS 13, K1SXY 10. (Dec.) WA1FAV 28.

VERMONT—SCM, E. Reginald Murray, K1MPN—SEC: W1VSA. Jan. net reports:

Net	Freq.	Time	Days	QNI	QTC	NCS
Gr. Mt.	3855	2330Z	Dy KS	611	18	W1VMC
Vt. Fone	3855	1400Z	Sun.	178	—	W1UCL
VTNH	3685	2330Z	M-F	11	46	K1UZZ
VTCO	3990.5	1500Z	Sun.	44	5	W1AD
VTSB	3309	2300Z	M-S	569	19	W1CBW
		1330Z	Sun.			
CVARC	145.8	0100Z	Mon.(Z)	35	0	W1JLF

Logs for the Vt. QSO Party should be mailed to K1MPN by Mar. 31. W1FT has a new SB-300, W1CBW a new vertical and K1OXD a new daughter. K1OXG has Transmatch operational. K1HDB, K1FSY, K1OMO, K1OAJ and K1OXG handled much serviceman traffic during "The Bedford Incident" with K1YMZ/1 being manned by K1MPN, K1ZKW, W1ERT, K1NEI, K1PQN, W1CBW, W1JLF, K1WSP, W1AIM and K1WNU. Traffic: K1QBQ 152, K1YMZ/1 44, K1UZZ 42, W1IDM 15, W1FRT 13, K1FSY 10, K1MPN 9, K1LLJ 5.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—SEC: K1JUJ. C.W. RM: K1JIV. W1GZD recently passed the Extra Class exam and is now on teletype 2 and 6 meters. WA1CQA worked DL8PI and

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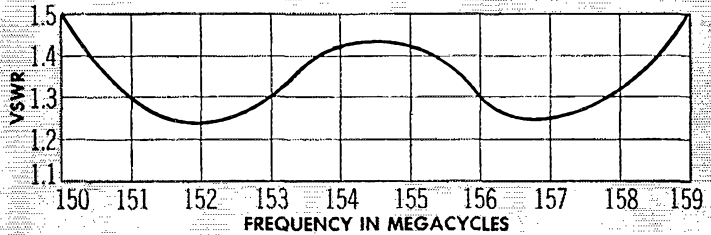
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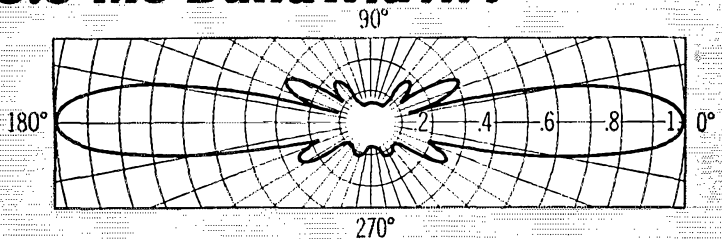
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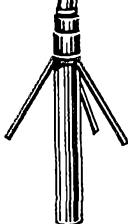
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 and Type N male
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 Lightning protection . . Direct ground

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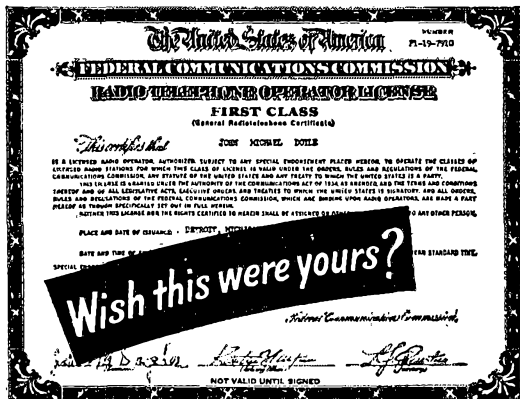
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SP6FZ on 21-Mc. c.w. W1EOB spent a week in Antigua and Grenada. RM K1IJV reports that W1MN handled 97 messages during January with the following stations in attendance (in order of activity): K1IJV, K1WZY, K1SSH, W1DWW, W1BVR, K1LBB, W1ZPB, K1ZZI, W1YK, W1AMI, W1DWA, W1MNG, K1FJS. The Hampden County Radio Association plans to start a course in basic math for the amateur. W1DZZ and K1PKZ were active from Mt. Tom during the V.H.F. Contest. Total HCRA score was 45,906. A telephone company engineer showed the movie "Transistor—the Mighty Midget" at the Valley Amateur Radio Club. W1BRU is the new editor of *The Oscillator* (publication of the Valley Club). The following was gleaned from *Random Scatter* (Berkshire County bulletin): K1ZIJ has a new NCX-3. Ex-K1OOV now lives near Syracuse, N.Y. K1GFT has moved to the sunny South. By the time you fellows read this it ought to be getting close to "the sunny warm North!" Traffic: W1BVR 99, K1IJV 93, K1SSH 64, W1WZY 51, K1LBB 36, W1DWW 9, W1ZPB 3.

NORTHWESTERN DIVISION

ALASKA—Acting SCM, Daniel R. Wright, K17-ENT—The Anchorage Radio Club's new secretary and treasurer are K17BTP and K17APV with K17ENT the new pres. The Championship Dog Sled Races were held in Feb. There have been two more applications for RACES in January.

IDAHO—Acting SCM, Raymond V. Evans, K7HLR—PAM: W7GGV. New officers of the Lewiston-Clarkston ARC are W7ZNN, pres.; W7VOU, vice-pres.; W7-DAM, secy.-treas. The club also is putting station W7-VJD back on the air. New officers of the Moscow University Club include W7GGT, pres.; K7CPC, vice-pres.; K5PPB, secy.-treas.; K7EZZL, activities; W7-CVJ, trustee. Present activities include new licensing classes and operation of the club station, W7UQ. FARM Net: 19 sessions, 328 QNI, 23 traffic. Traffic: K7HLR 136, W7GMC 22, W7GVI 12.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—SEC: W7RZY. V.H.F. PAM: K7IOA. OBRs: K7UPII, K7EGJ, W7NVP. OOs: W7LBB, W7FIS, K7SVR.

Montana S.S.B. Net	3910 kc.	1800 MST	Mon.-Fri.
Montana PO Net	3885 kc.	0900 MST	Sun.
Montana RACES Net	3995.6 kc.	0900 MST	1-3 Sun.
Missoula Area Emergency Net	3890 kc.	0903 MST	Sun.

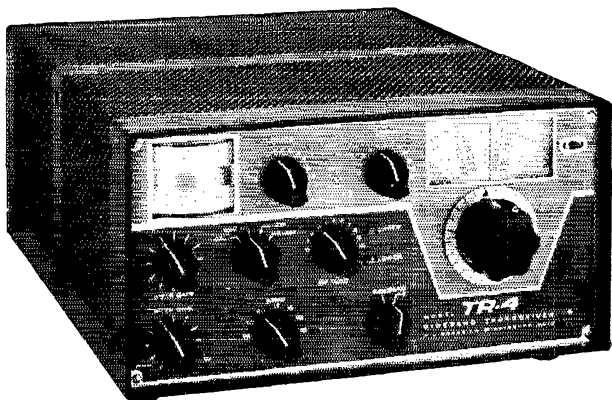
Butte-Anaconda 2 Meter AREC Net 144.450 Mc. 1900 MST Wed. Appointments: K7DCH is the new Kalspell EC. Montana hams were saddened by the death of W7-TGR, Billings. The Bozeman Club has a new SB-100. W7FC has a new TR-4. W7JMX has a new SB-34. W7-MAE, W7ACOY and K7LZF have new 753s in the works. The Billings bunch is busy getting on 2-meter 1.m. and plans to use 145.350 as its net frequency. A group of Anaconda clubs have joined together to form the Anaconda Hamfest Committee and will sponsor the Glacier Park Hamfest. If you or your club are interested in putting on one of the contests at the Aggar site drop a line to the Hamfest Committee at P.O. Box 655, Anaconda. Traffic: K7EGJ 15, K7DCH 11, K7UPH 7, W7FIS 3, W7NVP 1.

OREGON—SCM, Everett H. France, W7AJN—Acting SEC: W7AJN. RM: W7ZFH. On Jan. 14 the Portland Amateur Radio Club and Portland area AREC group, held a joint meeting in the Oregon Trail chapter Red Cross building. Guest speaker was Mr. Claude C. Haggard, of Pacific Power and Light Company, who demonstrated the hazards of handling electricity by using remote control on various objects and bringing them in contact with high voltages. K7IFG, Oregon State Net mgr., reports sessions 21, attendance 132, traffic 45. W7-DEM, Josephine County EC, reports the AREC of Grants Pass was activated and on a stand-by basis during the recent flood scare. K7VLC, reports amateurs at the V.A. Domiciliary at White City, Ore. have a station on the air using a Viking Invader and a DX-60A. K7-ZRL, new Yamhill County EC, reports AREC is progressing very nicely with 10 mobile units. W7LNG reports working 9M4LP on 160 meters. A new club, the St. Helens Amateur Radio Klub (SHARK) has been formed in one of the schools. Officers are WN7CPI, pres.; WA7EBL, vice-pres.; Dennis Stevens, secy.; Ron Smallwood, treas. Records indicate that 90% of our 1965 traffic total was handled by 8 c.w. operators. How about the voice operators reporting? Traffic: K7IWD 234, K7IFG 195, W7ZFH 35, K7BEJ 20, WA7CAQ 14, W7AJN 7, W7DEM 7.

WASHINGTON—SCM, Everett E. Young, W7HMQ—SEC: W7UWT. RM: W7OEB. PAM: W7LEC. V.H.F. PAM: W7PGY—NYS Nets

WSN	3535	Daily	0100Z	QNI	292-QTC	512—Sess.	31
NTN	3970	X Sun.	1930Z	QNU	1232-QTC	471—Sess.	31
WARTS	3970	X Sun.	0100Z	No report—No tlc.			

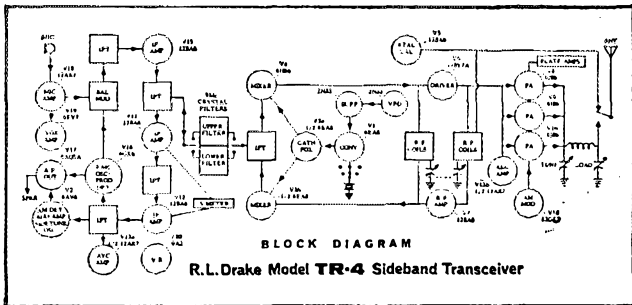
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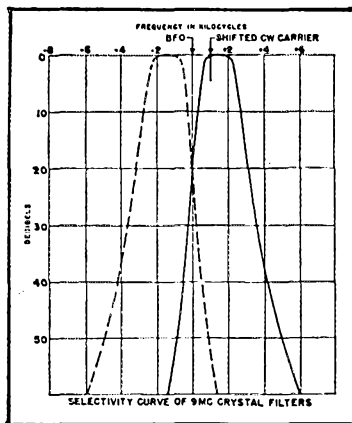
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SOMMERKAMP FR-100B Double Conversion SSB/AM/CW Receiver. With two mechanical filters. Brand new. \$250.00. Net weight approx. 24 lbs.

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Sale — Ideal Model 350P, 0 to 50 Ma. D.C. 3 1/2" Square modern clear plastic meters. See QST Feb. '66, page 15 thru 19. \$5.50.

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Eimac SK-610 Air System Socket: Ideal for 4X150A, D, R, S; 4X250B, F; 4CX250B, F; etc. These sockets regularly net for \$11.25. Special industrial purchase allows us to offer these for only \$7.50. New.

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- Send 10¢ for Fall "Greensheet" catalog #17.
- Send information.

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Correction! Feb. QST reports WARS officers. It should have been NTN officers are K7CTP, mgr., K7FHG, sec.-treas. Sorry. K7MGB/W7AKJ/7 now is a Seattle resident. W7AXT now is QCWA NCS Sun. on 3950. K7JEA now is on second go with the Technical Net, 3970 Sun. W7EVW keeps Fox Island alive, hamdon-wise. K7CHH/7 transmits Official Bulletins Mon.-Tue.-Wed. 1900 PST 7070 kc. K7ZVA states DX conditions are improving. Wallagram shows W7FDN and W7NFC presenting special film and slides at meetings. W7GJL, NARCS secy., states all members are requested to carry first aid (auto) kits. W7GXU moves to Bremerton. W7WFR, W7ZQB and K7YRB are on a.s.b. from the Kitsap Area. QRS/OPS W7DZX missed the BPL for the second time in four years. W7JEY makes WSNRNT on regular skeds. KL7BBL reports more QNI on 160 Wed. and Sun. nights-0300Z. Richland ARC published an FB 1965 newsletter with copy by EC W7YFO and editing by K7KSF. K7-PWM is now phone 2nd. W7JER recently visited W7-OEB's shack. Northwestern Director W7PGY was a visitor to W7HMQ's shack. ORS W7AIB reports Clallam County ARC's 1966 officers are W7GVV, pres.; W7-EAK, vice-pres.; W7IBR, secy.; W7AIB, trustee, with meetings the 1st and 3rd Thurs. 8 p.m. EC/ORS W7GYF now is active on 146.16 Mc. RM W7OEB finally received a TOPS certificate from GW8WJ, No. 1425. A real FB item in *Ham 'N Eggstras*, BEARS publication by W7RJW on Home-Built-Equipment, a new slant. Write BEARS, c/o Puget Sound Council Box 6237, Riverton Heights, Seattle, for issue No. 1/9/66. Mt. Baker ARC, with W7JWJ as auctioneer, upped the treasury by \$43.26. Active on 2 in the Bellingham area are W7PCH, W7PVG, W7GOR, W7DQM, W7IIZ, K7HSF, W7GKG, W7AIB, W7YHS, W7BZO, W7JIM, W7BZR, K7GJN, K7ETY, W7DDX, W7ADYD, NWSSN 3700 Daily 0130Z QNI 151 QTC 21 Sess. 31. Traffic: (Jan.) W7HMA 753, W7BA 739, W7DZX 498, K7CYA 441, K7CTP 216, W7JEY 179, K7JHA 172, W7BTL 92, W7OEB 92, W7HMQ 80, W7PWA 77, W7PT 66, W7APS 46, W7AMC 35, W7PGY 33, W7AIB 20, W7GVC 18, W7GYF 13, K7VNB 10, K7YDZ 10, W7-EVW 3. (Dec.) K7JHA 679, W7PWA 91, K7VNB 36, W7AXT 4, W7AVJ 3. (Nov.) W7AVJ 5.

PACIFIC DIVISION

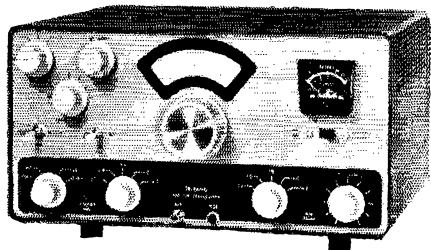
EAST BAY—SCM. Richard Wilson, K6LRN—The section traffic count for 1965 was 12,193 with 125 reports, against 84 reports for 5658 for 1964. That is an average of 98 per report versus 60; which is misleading because some stations had counts of 300-400 and others had much less. In 1966 EVERYONE, League member or not, who handles a piece of traffic in ARRL form should put it down on a Form 1 card and mail it to me. The inauguration of Ban (Bay Area Net) on 146.7 Mc. should give a good many v.h.f.ers a chance to handle some traffic. Contact WA6RRH for details. In appointments we finished the year with 1 SEC. 1 V.H.F. PAM, 1 RM 2 OPSS, 5 ORSS, 7 OOs, 7 OBSs and 3 ECs, or 20 people holding 27 appointments for less than 3% of the East Bay section participating in ARRL CD programs. There were five BPLs earned in 1965. WA6WNG/WB6CRC getting 2 and W6TYM, WB6APK and WB6 ILH getting one each. W6TYM and W6IDY came close. Participation in contests was good with an average of 4-5 in the CD Parties and a good turnout in the SS and on Field Day. In AREC we could use a lot of improvement. Too many people have an "it can't happen here" attitude. The beginning of BAN was a big step forward with our section emergency plan. With more QNIs to BAN and more AREC groups sending liaisons, preferably with traffic, our AREC program will get off the ground. A little effort by all is a lot better than a lot of effort by one man. Let's all get together and make the East Bay section No. 1 in the Pacific Division. WA6RRH reports 63 QNS to BAN with a QTC of 15.-146.7 Mc. nightly at 0245Z. W6OJW is back on the mid-to-8 shift and K6TFT is QRL on the swing shift at Mare Island. The ORC is planning an exhibit for the June Hobby Show. WA6KUK joined the Silent Keys. K6LRN is now running 500 watts to a T-bolt and has a TH-3 up 60 feet. WB6NUI went the route with a 32S-1 and a 37-ft. tower and a TA-33 jr. Thanks to the MIDARC, ORC, IIRC, NBARA, LARK and to WA6-AUD for bulletins received during Jan.

NCN	0300Z	Dy.	3,635 Mc.	W6QMO Mgr.
NCTN	0200Z	Dy.	3,905 Mc.	K6YBV
BAN	0245Z	Dy.	148.7 Mc.	WA6RRH

Traffic: (Jan.) W6IDY 375, W6TYM 217, WA6WNG 185, K6LRN 109, WB6ETY 73, WA6RRH 39, WA6PTU 11, WA6QZA 5. (Dec.) WB6RKQ 166.

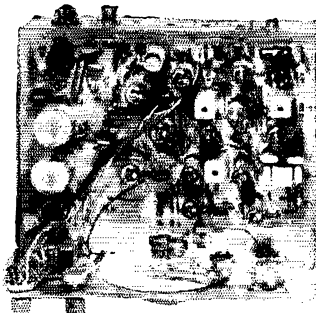
HAWAII—SCM. Lee R. Wical, KH6BZF—Asst. SCM/SEC: Ernest J. Kurlansky; KH6BCL, PAM: KH6ATS, RM: KH6EWD, V.H.F. PAM: Vacant, Our

NEW! INTRODUCING . . .



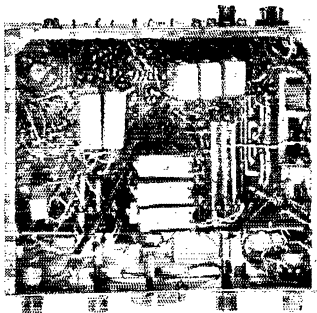
**A TRIBAND SSB & CW TRANSCEIVER
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SINGLE BAND TRANSCEIVER.**

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Front panel view shows a new etched blue modern style panel with 5 extra "balanced" control mounting holes. No drilling or labeling required.

Front panel controls include: function, RF Gain, AF Gain, three 5 position bandswitches, SSB select switch, AVC slow/fast select switch, Vox sensitivity, Vox delay, S meter adjust, final tune, key jack.



Rear chassis controls include: MIC Gain, tune level, bias set, MIC jack.

FINISHED TRIBAND TRANSCEIVER SPECIFICATIONS: RECEIVER SECTION: SENSITIVITY: 1 microvolt for 15 db. signal plus noise-to-noise ratio for SSB operation. SELECTIVITY: 2.7 kc minimum at 6 db down, 6 kc maximum at 50 db down. INPUT IMPEDANCE: Low impedance for unbalanced coaxial input. OUTPUT IMPEDANCE: Unbalanced 8 ohm speaker. POWER OUTPUT: 1 Watt with less than 8% distortion. SPURIOUS RESPONSE: IMAGE AND IF REJECTION BETTER THAN 60 db. Internal spurious responses below equivalent antenna input of 1 uv.

TRANSMITTER SECTION: DC POWER INPUT: SSB 200 watts P.E.P. continuous voice, CW: 120 Watts— 50% duty cycle. RF POWER OUTPUT: 100 watts SSB, 65 watts CW OUTPUT IMPEDANCE: 50 ohms to 75 ohms with less than 2:1 SWR. HARMONIC RADIATION: At least 40 db. below rated output. TRANSMIT/RECEIVE OPERATION: SSB: PTT or VOX, CW Provided by cathode keying of the driver. (AB1) INPUT IMPEDANCE: High impedance. CARRIER SUPPRESSION: 45 db. minimum below peak output. UNWANTED SSB SUPPRESSION: 45 db. down from single tone output. THIRD ORDER DISTORTION: 30 db. down from 2 tone output. RF COMPRESSION: ALC

GENERAL: FREQUENCY COVERAGE: 3.8-4.0 mc, 7.0-7.2 mc, 7.2-7.4 mc, 14.0-14.2 mc, 14.2-14.4 mc. FREQUENCY STABILITY: 200 cps per hour after 20 min. warmup under normal ambient conditions. Less than 200 cps for 10% line voltage variations. MODES OF OPERATION: Selectable upper or lower SSB (Suppressed carrier) and CW. DIAL ACCURACY: within 2 kc, resettability within 1 kc. AUDIO FREQUENCY RESPONSE: 400 to 3100 cps.

TUBE COMPLEMENT: Fourteen tube heterodyne circuit; (3) 6EA8's mic. amp, VOX relay amp, IF amp. Rcvr. mixer (5) 6AU6's VFO, VOX amp. IF amps, Xmtr. mixer, (1) 6BE6 VFO Isolator, Heterodyne-oscillator-mixer (1) 12BV7 Driver; (1) 12AT7 Xtal osc., product detector, (1) 6EB8 Audio Amp. and output; (2) 6GE5 RF output. POWER REQUIREMENTS: 800 VDC @ 250 ma peak, 250 VDC @ 100 ma. — 130 VDC @ 5 ma, 12 VAC or VDC @ 3.75 amperes. CABINET DIMENSIONS: 6 1/4" H X 12 1/4" W X 10" D.

The assembly manual may be purchased for \$3.00 deductible from the Triband modification kit price if the kit is purchased later.

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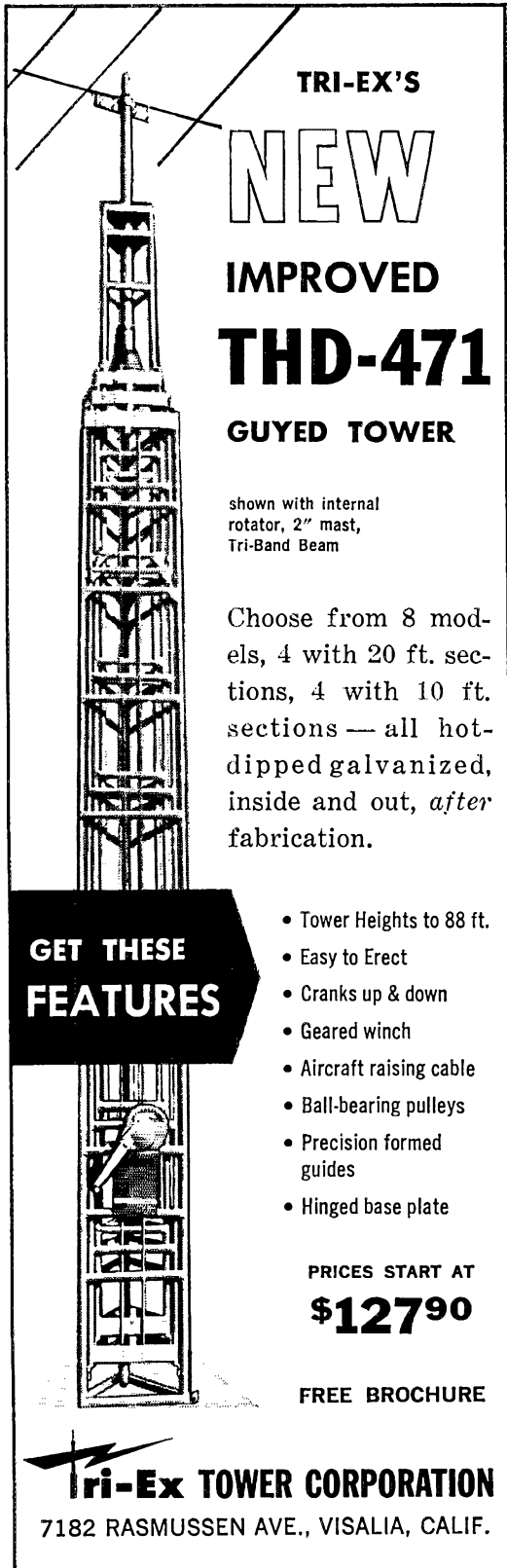
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SCM is somewhere around the Far East. KH6FS has received his well-deserved retirement from the FAA. Hawaii was very much honored by a visit from W6ZH, who discussed a very interesting topic regarding the future of ham radio and the ARRL. KH6BB is on a temporary assignment somewhere at the South Pole. KH6IJ had a very interesting column in the local newspaper on incentive licensing views by the FCC. His column ended with "The Public Confuses Novice with 'Ham'." It is about time we changed the image. Traffic: KH6ATS 15, KH6CCL 2.

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC, W4ZBEU, W7JU/K7JU, former SEC, is just going to take it easy. W7RY is in the 2-meter beam business. W7ZCA, K7ZRG and K7ICW were active on 160 meters with i.e.w. working 30 ARRL sections. K7NYU is active on 6 and 2. W4TCOL is active on 2. W7DSE is working DX on 20 and 15. W7CSB, ex-W5BNJ, has taken up boating and will be mobile on Lake Mead. The 2-Meter F.M. Net has about 20 stations on the air. The repeater receives on 146.96 Mc. and transmits on 147.5 Mc. W7YDX's new QTH is Ely. W7NTEG, W7NEGS, W7NEGV, W7NEGW, W7NEKN and W7NETD are new amateurs in the Reno area. W7NETD is off to Alaska. W7AAZ and W7YKN have moved into new QTHs. W7CNI has a new QTH in Arizona. The 1966 "SAROC," Sahara Amateur Radio Operators Convention, was a wonderful success. Dates for 1967 are Jan. 5-6-7-8 and again will be hosted by the Southern Nevada Amateur Radio Club. Send a QSL to get on the mailing list. Traffic: W7RY 14, W7PEV 2.

SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT—ECs: WB6MXD, W6SMU, WA6TQJ, RA1: W6CMA, PAMs: K6RHW, WA6YYK, ORSs: W6CMA, W6LNZ, OPs: WB6EAG, K6IKY, WB6MAE, WB6RCR, WA6TQJ, OBSs: W6AF, WB6PHQ, WA6SLU, WA6TQJ, WA6YYK, OOs: W6ECE, W6GDO, W6WLI, W6ZJW, OESs: WA6FWU, W6GDO.

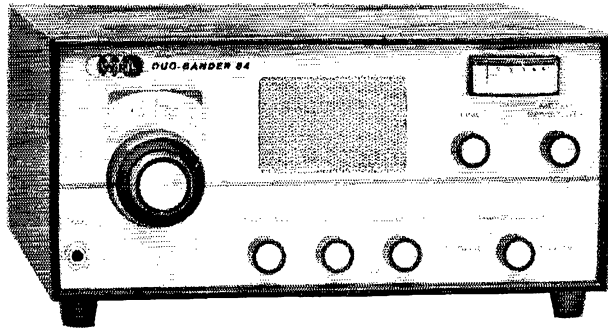
Net	Freq.	Time	Days	Net Mgr.
SVN	3690 kc.	0230Z	Daily	W6CMA
	146.28 Mc.	0130Z	Th-F	WA6YYK
SCEN	146.28 Mc.	0500Z	Wed.	WB6BWB
NCN	3935 kc.	0300Z	Daily	W6QMO
NCTN	3905 kc.	0130Z	Daily	K6YBV

The 2-meter section of the Sacramento Valley Net is looking for QNI from Placerville, Davis, Woodland, Auburn, Grass Valley, Marysville, etc. WB6MXD is the new Del Norte County EC and needs Crescent City support to set up an ARPSC program. W6ECE, W6WLI and W6ZJW participated in the Dec. FMT. All Sacramento Valley Official Observers are now Class I! New officers of the Camellia Capital Chirps are WB6LFO, pres.; K6GUQ, vice-pres.; K6DLL, secy.; WB6PHQ, treas. The RAMS are wondering when the North Hills RC members are going to attend one of its meetings to take back their gavel. Your SCM would appreciate being placed on club mailing lists. The Oroville ARS and the North Hills RC are having instructive talks on theory to upgrade themselves. The Nevada County ARC Net is now on 52.525 Mc. On Jan. 29 SCEN held a very effective SET. W6GQMT is recovering from surgery. A word to DXers: Let W9BRD of "How's DX" know what you have worked. KH6BD, who maintained constant schedules with W6LNN of Sacramento, is a Silent Key. Traffic: K6YBV 71, WB6MAE 58, WA6JDT 21, W6LNZ 20.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—SEC: W6KZF, W6MTJ made DXCC in 1965. WA6IVM is getting a rotary dipole up to replace the inverted "V." WA6MGG, Eureka, says he is ready to run 2 kw. on all bands at once. 4CX1000A supplying the push. WA6BHX reports from Santa Rosa way that he is using some 572s to put muscle in his signal with a linear. New appointees are W6WLV, Santa Rosa, as ORS and WA6MGG, Eureka, as OES. New officers in the Humboldt Radio Club are W6YKS, pres.; WA6MGG, vice-pres.; WA6JYB, secy.-treas. W6YKS has his tower and beam for 6-meter operation back up and working. W6GQA has completed 12 years as an OO without missing a single FMT—48 in a row and the best record in the ARRL. New officers of the Tamalpais Radio Club in Novato are W6SBD, pres.; WB6MFL, vice-pres.; WB6FDP, secy.; WA6SBA, treas.; WB6NOV, treas.; WA6RWII, sgt.-at arms. W6DUL and WA6IVM attended the Northern California DX Club meeting and the Southern California DX Club Convention. WB6AIS, home after extensive surgery, is on the air from Pt. Reyes. In the December F.M.T. both W6GQA and WA6IVM had line scores. WB6GDJ and K7UZQ have HA-6 transverters for 6 meters and are usually found around 50.25-Mc. s.s.b. WA6SQF and WA6JYB have returned to 6 meters after an absence. Fine reports were received on the January flood warnings from W6DTV, Sonoma

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5" HIGH
11 1/4" WIDE
10" DEEP



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300 Watts PEP-SSB input, covering 3.8 - 4.0 and 7.1 - 7.3 mcs. (LSB-80 and 40 meters). A pair of proven 6HF5 final tubes. Separate, relay switched, tuned RF receiving stage, 1/2 uv. sensitivity at 10DB S/N. Rugged printed circuit board, combination tube-transistor circuitry for best performance. Stable, solid state VFO and balanced modulator, zener regulated. Selectivity 2.5 kc @ - 6DB receiving and transmitting with a 4 crystal filter. Carrier and unwanted sideband suppression - 40DB. 1 watt of audio with built-in speaker. Fixed 50 ohm input/output impedance. Excellent AVC. **COMPACT SIZE: 5" high, 11 1/4" wide, 10" deep, less power supply. Net weight 10 3/4 lbs. Shipping weight 15 lbs.**

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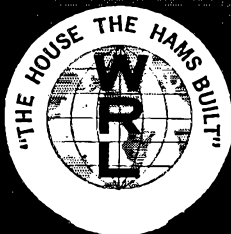
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ZL4GA
WORKS G5WP
ON 80 METERS

INDOORS—ZL4GA's JOYSTICK got him 569 on 3.5 mcs from G5WP on 21st February, 1965, at 0850 GMT. Alan had worked VE7BIY on 3.5 mcs at 559 and also logged 59 countries on 14 mcs by that date, including LU1HBS and 9M4LP. Testimonials continue to pour in—read W7OE's fantastic results!

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PROSPECT RD., BROADSTAIRS, KENT, ENGLAND.

County, and W6BWW, Humboldt County. The San Francisco Net continues to meet Mon. and Fri. at 1830 local time on 3900 kc. WB6GVI, in Eureka, is Net Control. There was a large turnout for the San Francisco Radio Club auction Mar. 18. The HAMS Club again provided communication for the Chinese New Year Parade in San Francisco with W6JWF at the reviewing stand and W6AQQY, W6ADPJ, W6GHI and W6GGC along the parade route with their mobiles. W6EAJ reports from Humboldt County that water power provides the necessary electricity at his QTH, and that Michigan and Ohio are his best DX to date on 160 meters. Traffic: W6YKS 158, WB6GLD 94, W5WLV 29, WA6IVM 17, WA6RHX 16, W6BWW 11, WA6AUD 10, K6SAA 8, W6CVO 7, WB6GVI 5, WA6QXV 5, K6BAQ 4, W6BIP 4, K6TZN 3, WB6IMO 2, WA6MGG 2.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan. W6JPU—W6QFR is putting a kw. mobile rig in his car. K6LJ is planning to move to Oakhurst. WB6NCJ is building a phasing-type exciter. The Annual DX Convention held at the Del Webb Townhouse was attended by W6KTW, W6AWXP, WB6JRL, WB6HVA and WB6MIWY. W6PXP handles overseas traffic nearly every evening. W6KTW handles occasional overseas traffic. WB6MIVY is in the Coast Guard. WA6BUH has a 20-meter beam. WB6MCG and WB6LYU have a Poly Com transceiver. W6NCG has a 2-meter f.m. repeater going and plans to hook up with the Los Angeles gang. This would be a continuous hook-up from the San Francisco Bay Area to Los Angeles with the aid of 420-Mc. gear. K6LUJ is planning to put up a 2-meter repeater in Meadow Lakes. WA6TZN has started up a slow-speed c.w. net. WN6NZM has been attending the Fresno Amateur Radio Club, driving 70 miles to do this! WA6TZN has joined the Navy. Your new Merced County EC is WB6KQJ. WB6FRM is attending Brigham U. W6RMS reports his receiver didn't work when he turned it on; it hadn't been turned on for three years. The Central California Sideband Assn. held its Christmas Party with 25 in attendance. WA6RLW is on 420 Mc. WB6GIT passed the Gen. Cl. exam. WA6FBL has a new Galaxie V. The Delta Amateur Radio Club meets the 3rd Fri. of each month. Traffic: WB6HVA 150, WA6TZN 87, W6ARE 34, W6ADB 26, WB6MZU 25, WB6NCJ 5.

SANTA CLARA VALLEY—SCM, Jean A. Gmelin. W6ZRJ—Asst. SCM, Ed Turner, W6NVO. SEC: WA6HVN. RM: W6QMO. New ORSs in the section are WA6CVU and W6ACW. Both work on NCN. W6SAW is active as OO and OBS and sends in a particularly fine copy of the RTTY bulletins he is transmitting. W6AGR is active flying and so has not gotten his antenna back up. W6YHM overhauled and modified the keying circuit of the frequency shift keyer. Don is active on RN6 when possible. WB6IZF, EC for King City, sends in a fine report. Post 1, Explorer BSA of King City, now has the call WB6SBL. W6RFF had much antenna trouble in recent storms but is back on the air. Jettie works NCN. K6YKG built a 1/2-wave filter for 80-meter receiving and now has difficulty "tuning them in." K6HGV is active as OES and OBS and sends in a fine OES report. W6VZE, active EC for Burlingame, reports drill activity with control station and mobiles. Red Cross cooperation is high in the area. K6GK is active as OO and OBS. Both W6HC and W6ZRJ were preparing for surgery. W6DEF reports active on NCN. SCARAS and SPECS CD. W6ASH is active in Oscar work as well as OO. Walt is the chief operator of W6EE and has been handling the Oscar Bulletins. He reports high traffic was from East Coast trackers of Oscar IV. W6YBV is active on NCN and helping W6QMO. K6DYX reports that the Monterey Bay Club held an auction at the Jan. meeting. Smitty is handling both bulletins and traffic via RTTY. W6QMO is busy with the managership of NCN. Jerry is very active in the discussions on making net changes for NTS. A possible split of NCN into BAN and CVN is contemplated. W6MIKE gave an excellent talk on the Oscar program to the Cambrian Park Kiwanis Club, and the SCM received a special letter of commendation and thanks. K6TEN is very active in working on antenna legislation for the City of Cupertino. W6RSY made the BPL. Ed is active on RN6. SCCARA made plans for a movie on the Alaskan Earthquake with Milt Caston narrating. Milt was active in emergency communications in Alaska during the quake. WA6HVN visited the Philco Club and spoke on the ARRL and emergency communications. K6MPN, pres. of SCARAS, reported that membership in the club is at an all-time high and a bump-up year for 1966 in Redwood City is expected. The PARA made plans for a presentation on the Apollo Space Control Center. The group meets at the Menlo Park Civic Center the 1st Fri. Traffic: (Jan.) W6RSY 549, K6DYX 217, W6YBV 186, W6ASH 150, WA6CVU 84, W6DFP 60, W6AIT 58, W6HC 47, K6GK 30, W6VZE 26, W6AUC 23, W6ZRJ 18, K6HGV 7, K6YKG 6, W6RFF 3. (Dec.) W6AGR 72, W6YHM 14. (Nov.) W6SAW 4.

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Shown to the left is "Butch" Greve, W9EJC (Eat Wisconsin Cheese), operating his new SWAN 400 mobile rig. Butch, who started operating in 1975, has confirmed hundreds of countries and holds many DX Contest Certificates. The W9EJC home station is located at #1 Cheddar Lane, Hilbert, Wisconsin. When Butch is not Hamming, he is busy manufacturing the famous Wispride Cheese.

TERRY SEZ . . .



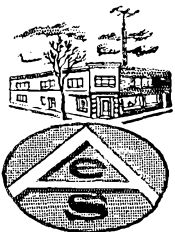
Terry Sterman
W9DIA
Proprietor

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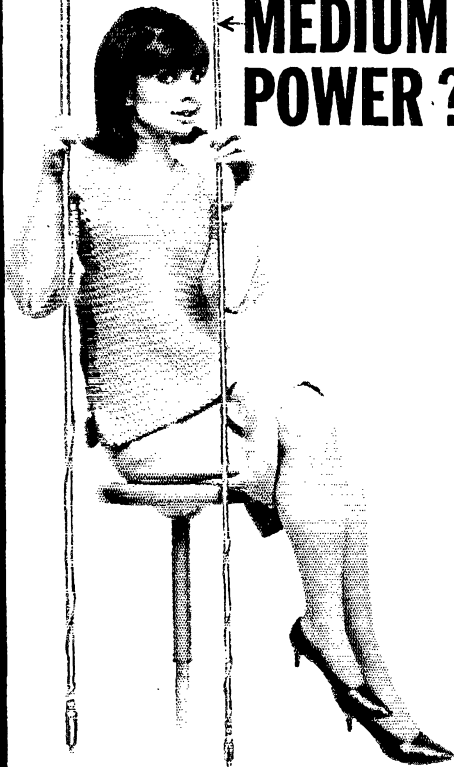
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ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4-BNU—Asst. SCM: Robert B. Corns, W4FDV. SEC: W4MFK. RMs: W44ANH and K4CWZ. PAMs: W4AJT and W44LWE. V.H.F. PAM: W4HJZ. K4EOF as been appointed EC for Davidson County. W4LYV has accepted the job of assistant net manager of NCN(L). K4TTN had a great time in the Jan. CD Party. W44-FJMI has a brand-new piece of wallpaper in the form of a DXCC certificate, earned with under 75 watts of power and an all-band dipole. K4BBK says that he enjoyed the Jan. CD Party and that he has a new CP-30 sticker. W4LEV's CHOP says, "KIDMA, one of the jr. ops., has departed the service and is now up in Conn., but we have a good replacement in W41FDG.

Net	Freq.	Time	Days	QTC	Mgr.
NCN(E)	3573 kc.	2330Z	Daily	159	K4CWZ
NCN(L)	3573 kc.	0300Z	Daily	130	W44ANH
NCSSBN	3938 kc.	2330Z	Daily	73	W44LWE
THEN	3865 kc.	0030Z	Daily	18	K4WLW

Traffic: W4LEV 1640, W4IRE 145, W4EVN 129, W4LWZ 105, K4EOF 103, W4UWS 59, W44ANH 57, K4CWZ 52, W44UFQ 41, K4IEX 40, K4TTN 36, W44FJMI 29, K4-ZKQ 29, W44CPN 24, K4OXMI 24, W44KVC 23, K4GNX 22, W4GKX/4 20, W44TV 16, K4DJZ 14, K4EO 11, W44ICU 11, K4CVJ 7, W44EYA 7, K4BBK 2, W44NUO 1.

SOUTH CAROLINA—SCM, Charles N. Wright, W4PED—SEC: W4EECJ. Asst. SEC: W4WQM. RM: K4LND. PAM: K4WQA.

SCN	3795 kc.	Daily	0000Z/0300Z	Jan. Tfc.
SCSSBN	3915 kc.	Daily	0000Z	Jan. Tfc. 148
SCFPN	3930 kc.	Sun.	1330Z/2030Z	
SCSN	3795 kc.	Daily	2330Z	

W4JA, now active on SCN, has a new Ranger II, K4-KSU, from Greenville, is active on 20-meter s.s.b. from Nuremberg, Germany, as DL5CO, looking for S.C. contacts. The newly-formed Greenville V.H.F. Society, with W44LTS as pres. and W44ZBV (ex-G3NVS) as vice-pres. is behind the big increase in v.h.f. plans and activity in the Greenville-Spartanburg area. Present plans should result in increased exchange of information between other S.C. areas and surrounding states concerning v.h.f. frequencies, net times, etc. A successful statewide EC meeting was held in Columbia Feb. 20. Plans for setting up 10 area net across the state were discussed. Traffic: W4WQM 62, K4LND 48, W4NTO 41, W4PED 37, K4EIB 31, K4OCU 25, W4VIV 20, K4WQA 19, W4JA 15, W44QKQ 10.

VIRGINIA—SCM, H. J. Hopkins, W4SHJ—SEC: W5VZO/4. PAM: K4SCL. RMs: W48IJ, W44EUL. Winter activities included an alert of section nets and some local nets; this was brought on by heavy snow and extreme cold but fortunately a communications emergency did not materialize. W44UMX was active every day of the month in nets, made the BPL and still maintained his "A" average in school. Several members express surprise that antennas were still up after storms and high winds; others lost skywires and towers in the same storms. W4DVT has the 3.5-Mc. endorsement for W4C and W4NLC was nominated as A-1 Operator. PAM K4-SCL is retiring from the U.S. Navy after a long and fruitful career and hopes to remain in the section. Many report the Va. QSO Party was a real blast. W44OXG is a new ORS and K4SUM a new OES. Don't forget the ARRL National Convention Apr. 22-24 in Boston. Support your section nets:

CW.	3680 kc.	2330 & 2400	GMT daily
S.S.B.	3935 kc.	2300 & 0300	GMT daily

Traffic: (Jan.) W44UMX 563, W4DVT 188, W4RHA 162, W44EUL 138, W44URN 125, K4SCL 84, W4BZE 83, W4-OWE 76, K4MNF 69, K4FSS 50, W4TFE 43, W5VZO/4 43, W44DAI 33, K44MB 30, W4OKN 30, K41JK 28, W44AU 26, W44TNS 24, W4GPD 23, K4SDS 22, W44NJG 21, K4VCY 20, K4TV 15, W4JUJ 11, W44ONG 11, W4MK 10, K4YCH 10, W44TUF 8, W4KX 7, W44YZC 7, W4SHJ 6, K4YEE 4, W44PHG 3, W4WG 2, W44JRY 1. (Dnc.) K4LJK 195, K4CC 128, W4GPD 40, W44FR 27, K4NLC 8.

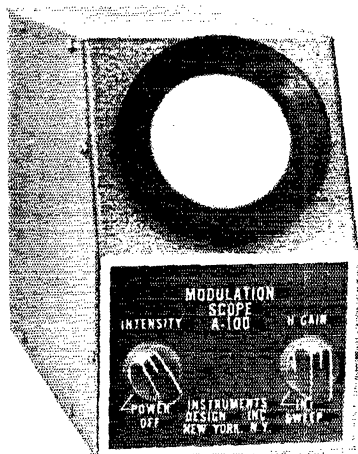
WEST VIRGINIA—SCM, Donald B. Morris, W8-JM—SEC: W8SSA. RMs: W8LME, K8TPE. PAMs: K8-CHW, W8IYD. S.S.B. Mgr.: K8SHP. C.W. Mgr.: W8-GRE. Nets are on 3570, 3890, 3903 and 3905 kc. Regional, county and city nets on 10, 6 and 2 meters. W8SMA is active in rare Webster County. W8PXF, new ORS, has a new NC-155 receiver. Silent Keys: W8CHP, Charleston; W8CVK, Buckhannon, K8WIP, Parkers-

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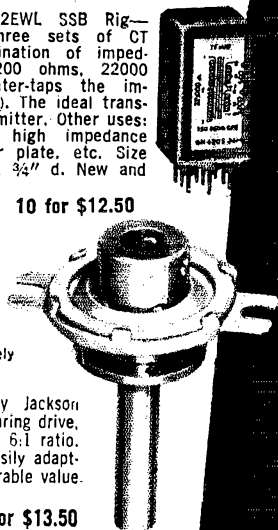
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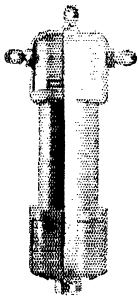
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burg, W8HZA, W8PQQ and K8NNG were active during the 160 Contest, WA8MAT with a new TR-4 reports WAC and WAS. W8IYD reports 4 net sessions on 29.6 Mc, with interest growing state-wide. W8WHQ decreased mobile operation, because of a job change. WVN Phone Net, 21 sessions, 571 stations and 133 messages.

PON Net, 13	"	222	"	54	"
CW Net, 20	"	140	"	120	"

WA8MRK enjoyed his first CD Party working over 100 stations on s.s.b. W8CKX said "over 100K on c.w. in the CD Party for the first time." K8QYG has a new s.s.b. transceiver. W8GUL and K8INA accepted EC responsibilities for another year. Active YLs: WA8KSR, K8AIQB, WA8OKG, WA8DOY, W8DUV. Don't forget the Roanoke Division Convention, Natural Bridge, Va., May 28-29 and the West Va. State Convention, Jackson's Mill, July 2 and 3. Traffic: K8TFP 168, WA8MRK 80, W8CKX 73, K8WVW 67, WA8PXF 49, WA8KMZ 44, W8HZA 42, K8BIT 30, WA8QNP 17, WA8IMY 14, WA8AY 11, K8AIQB 11, W8JIM 10, WA8MAT 9, WA8CKN 7, WA8NDY 4, WA8EXP 2, WA8GRE 2, K8QYG 2, K8VAI 2, K8WNQ 2, K8ZPN 2, K8ZWM 2, W8AEN 1, K8CHW 1, K8CZT 1, K8DPS 1, WA8FIE 1, WA8HKF 1, W8UDG 1.

ROCKY MOUNTAIN DIVISION

NEW MEXICO—SCM, Hill Farley, WA5FLG—SEC: K5HTT, PAM: W5WZK, SCM WA5FLG visited the Mesilla Valley Radio Club in January and enjoyed it very much. W5BCT spent some time in the hospital after a nasty auto accident. WA5MAI, the voice of Hollaman AFB (K5FIU), is leaving for Turkey soon. WA5KZP is working that rare DX with his new beam. The Albuquerque bunch reports a good turnout for its monthly Breakfast meeting. Our SCM reports good results with a new Swan 350. He is also on 6 meters with a 250-mw, walkie-talkie. He is getting good results through the 6 and 2 translator. The repeater frequency is 146.34 Mc. in and 145.94 Mc. out. It's 52,525 on 6. Our SEC, K5HTT, spent some time in the hospital recently and certainly was russed on the bands. WOBOP went aeronautical mobile and gave us all a rare opportunity. It was a shock to say the least to hear him that node. Can anyone furnish our SCM with any voltages, etc., for the FT210 Edgerton Bulb? We welcome K5BAN, a new EC, and W5UBW, Otero County EC. Traffic: W5UBW 51, WA5FLG 19, K5ONE 14, W5DAIG 13, W8BZY 12, K5HTS 4, W5WZK 4, K5VXJ 3.

UTAH—SCM, Marvin C. Zitting, W7MWR/W7OAD—Asst. SCM: Richard E. Charman, W7APY. SEC: W7WKF. Section nets: BUN meets daily on 7272 kc. at 1930Z. UARN meets each Sat. and Sun. on 3525.5 kc. at 1400Z and on 3987.5 kc. at 1500Z. W7FYR has earned the BUN certificate. W7VSM has applied for DXCC on phone. W7BAJ went to the Las Vegas Ham Convention, School and a part-time job has cut down on W7RAJ's DX-chasing lately. W7VEX will be off the air for awhile because of a QTH change from Sandy to Salt Lake. The UARC old-timers program was a big success at the January meeting. Much ancient ham equipment was displayed but no one was able to come up with a spark-gap transmitter in operating condition! Traffic: W7OCX 88, W7BME 39, K7CLS 39, W7MWR 2, W7BAJ 1.

WYOMING—SCM, Wayne M. Moore, W7CQI—SEC: W7YWE. SCM: W7BHH. PAMs: W7TZK, K7SLM. OBSs: W7TZK, K7SLM and K7ZHT. Nets: Pony Express, Sun. at 0830 on 3920; YO, Mon., Wed., Fri. at 1830 on 3610; Jackalope, Mon. through Sat. at 1230 on 3920. W7AJP is the new EC in Sheridan. In January, the Wyoming hams were saddened by the sudden death of K7LAY. Rudy had been an active ham since he was licensed in 1959 and was very well liked. WA7AXX is on with a new s.s.b. rig. Some of the other newcomers to the airways are WN7EWC, of Casper, and WN7EUX, of Worland. K7OWX is on RTTY and looking for more local contacts. Don't forget the Annual Wyoming Hamfest to be held this year July 23-24 at Deer Haven in the Big Horn Mountains. Hamfest chairman is W7VB. Traffic: W7DXV 43, WA7CLF 21, W7BHH 12, W7HLA 10, K7SLM 4, W7YWW 4, W7CQP 2, WA7EDC 2, K7-ITH 2.

SOUTHEASTERN DIVISION

ALABAMA—SCM, William S. Crafts, K4KJD—Asst. SCM/SEC: William C. Gunn, W4NML. RM: W4LXA. PAM: K4WHW. I picked up much interesting information at the Southeastern Division Convention Jan. 22 and 23. If anyone would like details or to ask any questions just contact me. Was much impressed with the dedication of ARRL officials I met. Remember the Birminghamest May 1. Jan. net reports (times GMT):

Net	Freq.	Time	Days	Sess.	Ave. Tfc.	Ave. QNT
AENB	3575 kc.	0100	Daily	31	1.8	5

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WA4YTJ is a new General in Athens. K4WIV reports band opening during the V.H.F. SS. Ack Radio has agreed to make trophies for Alabama winners in the ARRL DX Contest permanent instead of rotating. W4-DGH is back on s.s.b. New equipment: WA4UXC-keyer, K4WHW-4-65As, W4SNP-KWM2, W4USM-HO-10, WN4AYL has a WAS of 26. WA4OCY is moving to W2-Land. Traffic: (Jan.) W4ZJY 244, WA4TID 107, WA4RES 60, W4NML 56, WA4UXC 31, K4KJD 28, K4-BSK 27, WA4EXA 26, K4NUW 23, K4WHW 19, W4HON 12, WA4FYO 11, WA4AWV 6, W4CIU 6, K4NSU 6, WA4HUO 5, K4ANB 4, W4WDG 2, K4FZQ 1, K4WOP 1. (Dec.) WN4AYL 16, WA4ERU 16.

CANAL ZONE—Acting SCM, Marvin G. Flynn, KZ5-MV—New officers of the CZARA, installed at the Feb. meeting, are KZ5AG, pres.; KZ5MM, vice-pres.; KZ5-EF, secy.; KZ5WJ, treas.; KZ5FX, act. chm. A 15-meter s.w. net was inaugurated to meet every Wed. night on 21.100. Two more new stations are KZ5NH and KZ5DM. KZ5NH, who fell off the roof while adjusting his beam antenna and broke his leg, put his hospital stay to good advantage by constructing a 2er. Three stations are now on 2 meters with more planned. KZ5JT soon will be QSLing to W. Palm Beach, Fla. KZ5FX hit 100K in the Jan. CD Party. KZ5KR has his new SB-100 going. KZ5HJ and KZ5MV have new compressors which sound FB. KZ5GE is at Okla. City operating as W6PAA. KZ5EX is awaiting a new Heath keyer. All reports of station activities should be sent to your SCM. Traffic: KZ5FX 41.

EASTERN FLORIDA—SCM, Albert L. Hamel, K4SJIH—SEC, W4YIT, RM C.W.; W4LUV, RM RTTY; W4RWL, PAM S.S.B.; W4OGX, PAMS; W4SDR, W4-TUB, PAM V.H.F.; WA4BMC. Strong urgent appeals for applicants as OO have fallen on deaf ears. Decreased OO activity can mean that the first notice of anything wrong with your gear will come from the FCC. You don't have to be an engineer to be a good OO nor spend several hours per day listening. Write your SCM for details, please. We will all miss W4FE, a most dedicated ham. Happy DXing. Art. By now W4GUJ should have a mended back and be active again. According to W4YD that "never say die," club at Ft. Pierce is fighting its way back up after a bad slump. Looks like the Broward club is going great guns in its efforts to provide communication linkage with the boys in Viet Nam through the MARS program. The Ft. Myers Club again will provide communications assistance during the Annual Pageant of Light Parade. Traffic: (Jan.) WA4BMC 715, WA4SCK 580, WB4AIW 418, WA4RQR 320, WA4-NEV 307, W4FP 242, WA4NBT 204, K4EYV 187, WA4-LJH 162, W4FPC 128, WA4DEL 126, K4ADD 110, WA4-FGH 109, K4SJIH 106, W4OGX 96, WA4HDIH 95, W4IAD 93, K4KDN 84, W4SDR 84, W4DFU 80, K4BNE 79, WA4IWO 79, K4COO 78, WA4OHO 47, W4VPQ 47, W4-EHW 43, W4SMK 43, W4IE 37, K4ILB 37, W4LUV 37, WA4CIQ 36, WA4WEB 35, WA4NBE 34, K4DAX 30, W4TJM 30, W4BUB 28, W4NUH 28, W4KRC 27, K4BY 26, WA4VZD 26, W4VDC 25, WA4LXY 21, WA4ZZ 24, W4JDM 24, WA4MOL 23, W4MVB 16, W4YIT 14, W4-BNE 12, W4HFR 12, W4ABGW 10, WA4PDM 10, W4-RKC 9, W4SCY 9, W4AYD 7, W3CWI 7, K4EBE 6, W4ASHJ 6, WA4QLZ 5, WA4WAJ 2. (Dec.) W4VAF 68, WA4IWO 36, WA4WZZ 30, W4GUJ 16, W4IEI 11, W4HFR 8, WA4RXG 5, W4LMT 2, WA4WAJ 1.

GEORGIA—SCM, Howard L. Schonher, W4RZL—Asst. SCM: James W. Parker, Sr., W4KGP, RM: W4-CZN. PAMs: K4PKK, WA4JSU, WA4GAY, WA4UYT made CP-25, W4NBXZ is a new AREC member, K4-GBL and W4OJF are active from Cobb County on 146.94-Mc. f.m.

Net	Freq.	Time and Days	Sess.	ONI	QTC	Mgr.
GSSN	3595	0000Z & 0300Z	62	600	232	W4CZN
		By				
GSSN	3975	2300Z Dy.	31	1008	78	WA4JSU
GCEN	3995	1300Z Sunday				W4KR
		0000Z Tue. & Thurs.				
GTN	3718	2200Z Dy.	30	163	25	K4NFP
GTAN	3855	1600Z Sat.	5	47	19	WA4GAY
Cobb	115.8	0100Z	9		233	K4YZE
AREC		Mon. & Wed.				
NEGEN	50.25	1400 Sun.				WA4QOW

New club officers: Lanierland ARC—K4FLR, pres.; WA4HQK, vice-pres.; WA4NED, act. mgr.; WA4JYA, secy.-treas. Charles D. Newton ARC—WA4UET, pres. The Augusta ARC is planning a 2-meter repeater. Its new club station is W4DV and c.d. station is W4ZO.

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32V3.....199	DRAKE 2B CALL... 14	H0180C.....249	DX60.....69	SK117.....247
75S1.....259	DRAKE TR4.....499	HX50.....199	VHF1 SENECA... 179	SK130.....137
75S3.....389	AC SUPPLY..... 69	GONSET G50.....229	HR10.....69	SR46.....147
32S1.....379	DC SUPPLY.....115	GONSET G76.....169	HR20.....99	SR150.....349
KWM2.....699	DRAKE R4.....319	G76 DC SUPPLY... 59	DX100B.....119	AC SUPPLY..... 69
PM2 SUPPLY... 99	CENTRAL 100V... 379	IV 6METER.....179	TX1.....129	HT33.....147
SM2 MIKE..... 29	THOR 66AC.....249	SUPER 12CONV... 47	HW12.....99	HT37.....229
SWAN 350.....339	POLYCOMM PC6... 159	NCX3.....199	HW22.....99	HT40.....69
AC SUPPLY..... 72	EICO 720FW..... 77	NCX5.....439	HW32.....99	HT41.....179
DC SUPPLY.....109	EICO 730FW..... 59	NCX AC SUPPLY... 79	VF1 VFO.....17	CR72A 152-174MC. 69
SWAN 120.....119	JOHNSON TR SW... 19	NC155.....119	UTI SUPPLY.....22	HAS VFO..... 57
SWAN 240.....229	MATCHBOX W/SWR.. 69	NC183D.....167	HP10 SUPPLY... 29	HOW1 SCOPE..... 69
SBE33.....199	CHALLENGER..... 69	NC300.....149	HP20 SUPPLY... 24	P&H DD1 SCOPE/W tone osc..... 67
SBE34.....339	RANGER I..... 99	HRO60 AD COIL... 37	KNIGHT T60..... 39	HICKOK 539A..... 67
SBZ1A LINEAR... 209	RANGER II.....169	LAFAYETTE HE45B. 77	KNIGHT T150A... 87	HICKOK 820..... 57
DRAKE 2A.....149	VALIANT I.....159	LAFAYETTE HA350. 119	S40B.....47	TRIPLETT 3414... 47
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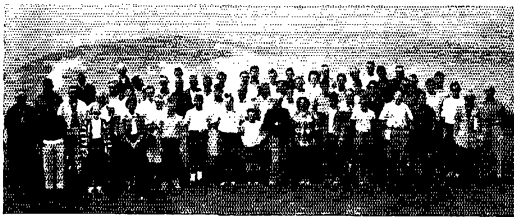
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They will provide communication for camera crews at Masters and for the Powder Puff Derby. W4AN and W4AFB are recovering from recent illnesses. Columbus Hamfest will be held Mar. 26/27. Atlanta will sponsor the Georgia State Convention June 4/5 and the Griffin Annual Picnic is scheduled for the 2nd Sun. in Sept. Traffic: (Jan.) W4RZL 183, W4DDY 118, K4FLR 89, W4FOE 88, W4PIW 81, W4CZN 71, K4NFP 66, WB4BDG 58, WA4LL 42, WA4GAY 35, W4TFL 34, WA4UYT 28, WA4JSU 24, K4YZE 20, WA4WKZ 17, WN4ARB 10, WA4JES 10, K4BYD 5, WN4AU 2, WN4BXX 2, WA4BYD 1. (Dec.) WN4ARB 17, WN4AU 7, W4HYW 2.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4MLE, PAM: K4NMZ, RM: W4BYE. Section net reports:

Net	Freq.	Time	Days	Secs.	QNI	QTC
WFPP	3950 kc.	2300Z	Daily	31	714	175
QFN	3851 kc.	2330/0300Z	"	60	715	359

QFN is short of operators. Regulars K4BSS, K4LAN, WA4EY and K4VND. Pensacola: W4BYE, Ft. Walton: WA4AIC and K4VYF. Panama City and W4MLE, Tallahassee need your assistance. Pensacola: W4PAA got a nice write-up in Navy *Gospport* for his traffic handling with the USS *Independence*. K4SOI worked several Z86 stations on 10 meters. W4VMS is back on 10. K4VND is now ORS and OES. K3NYX is training at NAS. W4UUF is working on a 482-Mc. rig. Milton: K4IOX is on 14.5 Mc. with two homebrew rigs. K4NMZ is an OES. Ft. Walton: W6RTD/4 designed and built his own 12-v. d.c. to 115-v. a.c. inverter, and now runs 1-kw. mobile on all bands. W4BYE visited several QFN members in E. Fla. during his trip to the Miami Hambores. WA6EDE, WILBV, K7CMH and WB4CVQ are newcomers on the 14.5-Mc. Net. DuPont: W4BYO will be on 2 meters soon. Panama City: WA4NRP made contact with W4MVB, near Jacksonville, on 2-meter c.w. WA4FIJ is back on RTTY looking for W. Fla. contacts. PCARA members WA4IMC, WA4VNM, WA4OLP, WA4NLD and WA4FIJ took part in the March of Dimes Radiothon. Traffic: (Jan.) W4BYE 113, WA4EOQ 98, K4NMZ 94, K4VWE 72, K4BDF 71, WA4FIJ 32, WA4JIM 7, WA4NRP 6, WA3APO 2, K4SOI 2. (Dec.) K4SOI 4.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Floyd C. Colvar, W7FKK—SEC: K7NTY, PAM: W7CAF, RMs: K7NLL, K7TNW. W7PJY was awarded a Hallcrafters HA-1 keyer at the Las Vegas Convention. WA7BIA is sporting a Peugeot while mobile on 2 meters. Our congratulations to W7EQF, who was awarded a plaque by top Air Force officers at Kadena Air Base, Okinawa, for the wonderful services he rendered in connecting thousands of servicemen in the Far East with their families here at home. W7AYY, K7YSE and WA7CQ participated in the ARRL V.H.F. SS. W7AYY has his SR-34 back in operation. W7BBW has a new T4-X. The Cocoon County Amateur Club, WA7EUT, meets every Wed. at 0230 GMT in the Cocoon Sheriff's Office in Flagstaff. K7ZZG is pres. The Scottsdale Amateur Radio Club did a very fine job in providing communications on the parade route for the annual Parada del Sol in Scottsdale. Stations helping out were K7QWR, chmn., K7UXG, NCS, W7ALC, W7APE, K7VKH, W7BBW, W7CAF, W7ATF, W7CIC, K7JKG, K7KAW, K7KZF, K7OYE, K7PYD, K7RJD, K7UJW, W7UXZ, K7YAM and K7ZXB. K7RGG won the last transmitter hunt of the AARC. New appointment: W7BYF/K7YSE as OI. Traffic: K7NLL 268, W7CAF 54, W7FKK 27, W7AHH 21, K7RUR 11.

LOS ANGELES—SCM, H. G. Garran, W6BHG—Asst. SCM/SEC: J. A. Vaidean, W6BNX, RMs: W6BHG, W6BBBO, W6QAE, PAMs: K6MDD, W6MLZ, W6ORS, ECs: W1KUX/6, W6LVQ, W6MLZ, W6OI, WA6WJT, W6BBBO, W6BYK, K6EPT, W6GYH, W6-TXJ. New appointments: W6MLF and W6BIMQF as ORSs. The cooperation of all ARRL members by sending in ideas and comments will help your Director, Howard F. Shepherd, Jr., W6QJW, do a much better job for the Southwestern Division at the Board of Directors meetings. K6IOV reports good mid-day 10-meter contacts with the East Coast. K6ASK has a 18AVQ and is on s.s.b. K6GIL was back East operating W2BNJ for 3 weeks. W1KUX/6 and WA6UCR say there is more AREC activity on 2-meter f.m. W6MSU (age 16) is using an 8B-300 and an 8B-400 and says that W6BIMQF, now an ORS, is his little brother. K6UMV chases DX when time permits and is developing antennas to be used on the ARIES Satellite. W6NKR got into the CD Party. W6HUJ finally got his vertical working and will be QNI for traffic again. W6MVF put up a wire too long to measure and is building two 420-Mc. transceivers for the school science project. W6NCF contacted a station in Barstow using a three-element beam

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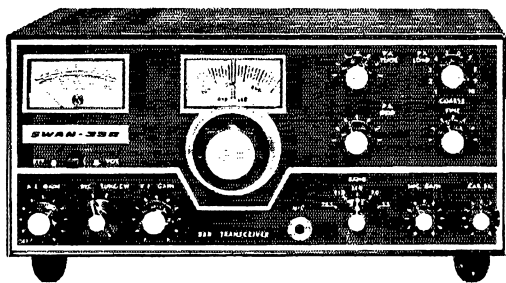
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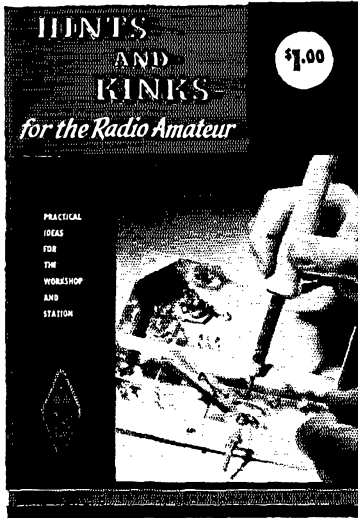
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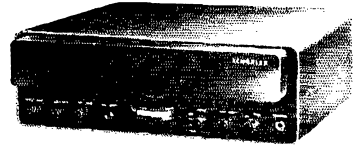
on 145.8 Mc. WB6BOW has the W6AJF 432-MC. colinear up 70 feet which survived the first big blow (Dec. '65) K9ELT/6 worked HK4, 8Y5 and KLT on 160 meters during the contest. K6IYF discovered DX on 80 meters late at night and early mornings. K6KUC still helps those who desire to get their ham licenses. WA6OKZ is secy. of the I.A. Council of Radio Clubs. W6ORS has trouble shooting difficulties with s.s.b. W6-PUZ still is pursuing Oscar IV. W6BRWF has a word of caution in matching the *Handbook* omni-directional vertical collinear for 2 meters; it is supposed to have some gain but it must be untried and cut properly. W6SD now has Notice and General classes going. W6-BHG was awarded the Swan 350 at the SAKOC Convention. SCM meets daily at 0300Z on 3600 kc. and EBN meets Mon. through Fri. at 1515Z and Tue. through Sat. at 0130Z on 30.5 Mc. Traffic: (Jan.) K6WAI 2225, K6-EPT 1190, W6CYH 747, K6YVN 623, W6BYK 539, W6-BBO 519, W6QAE 292, W6BHRH 279, W6NLF 263, K6-IVY 259, K6MDD 200, W6QXN 197, W6TXJ 162, K6IOV 119, K6ASK 83, WA6WKF 83, K6CIL 74, WB-KGK 56, W6WPF 49, W6BNX 47, W6BGG 23, K6LDM 20, W6U5Y 20, W6LD 17, W6BHG 15, W6AEL 14, W1-KUX/6 12, WA6USU 12, W6HMSU 11, K6UMV 11, W6-PCP 10, W6NKR 9, W6HUJ 5, W6MLZ 5, W6MMP 5, W6NCF 5, W6BBH 4, W6BGX 4, W6OI, K2PIF*8 2, W6QJW 2, W6KVA 1, W6VUZ 1. (Dec.) W6BHRH 984, K6UMV 11, W6OI 3, W6LVZ 2. (Nov.) WA6WTX 1.

ORANGE—SCM, Roy K. Maxson, W6DEY—ARRL appointees as of Feb. 1966: Asst. SCM: W6JQB, SEC: W6WRJ, ECs: WA6TAG, K6LJA, K6GGS, K6RCK, OO: W7SNB/6, W6IQB, W6VOZ, W6CJS, W6OTL, K6LJA, WA6JV, OBS: W6WRI, WA6TAG, W6IDN, RM: WA6ROF, ORS: K6IME, W6DGM, W6DNA, WA6ROF, WA6WTD, OPS: K6GNZ, W6OTL, W6-ERG, WA6JFO, W6MIVU, W6IDN, OES: K6JYO, WA6CXE, W6MIVU. These active members and many others have given our SCM wonderful support in our first year as a new section. 246 Net report for Jan. per K6DLY: Sessions 30, checkins 721, traffic 126. W6MIVU is the new treas. of the So. Cal. V.H.F. Radio Club. W6FB advises he, WA6AWD and WA6CRE have RTTY equipment now and that the Desert Rats had a picnic and transmitter hunt Feb. 12. On Jan. 24 W6WRJ, WA6-ODG and W6HTI mobiles assisted in the search for a missing 9-year-old boy from 4:30 to 9 p.m. when the boy finally contacted his parents, who were very grateful and appreciative of the spirit of amateur radio and the AREC. W6GPA is back as CHOP of K6MCA and W6BPRP is en route to the Viet Nam area. Traffic: (Jan.) K6MCA 2635, W6ZJB 897, WA6ROF 200, W6JFO 157, W6IDN 59, K6IME 53, K6DLY 33, WA6QQM 20, W6WRJ 10, W6MIVU 6. (Dec.) W6BERG 4, W6OTL 2.

SAN DIEGO—SCM, Don Stansifer, W6LRU—The San Diego V.H.F. Club will sponsor a family picnic to be held at Santa Clara Point in Mission Bay Sun., May 15, from 10 a.m. to mid-afternoon. All area hams are welcome. K6BPI was awarded the San Diego County Ham of the Year award by the SOBARS at a special dinner meeting Feb. 25. New officers of the North Shores Club are W6CPD, pres.; W6HPJ, vice-pres.; W6-LNR, secy.; W6SK, treas. The National City Operations Center, WA6UO, is to be dedicated Apr. 3. SCM W6-LRU attended the Palomar Radio Club meeting at Oceanside in Feb. W6BIS was married in Dec. The February V.H.F. Club meeting featured a c.d. film on the Alaskan Earthquake and a visit from SCM W6LRU. 1966 officers of the San Diego Council of Amateur Radio Organizations are WA6OSB, chmn.; WA6TAD, vice-chmn.; W6BOX, secy.; K6KX, treas. The newest V.H.F. Club member is K6RYR. A new member of the San Diego DX Club is W6ISA. The San Diego V.H.F. Club welcomes visitors at its meetings the 1st Wed. of each month at Red Cross Headquarters 7:30 p.m. Traffic: W6IAB 5338, K6BPI 4566, W6YDK 3334, W6JUH 730, W6VNQ 435, W6EOT 353, W6BGF 182, W6GMM 30.

SANTA BARBARA—SCM, Cecil D. Hinson, WA6-OKN/WOCUG—SEC: W6NDP, RM: W7VST/6, W6-MISG is the frequency measuring champ of the section. W6DYQ is active as the OBS in Santa Maria almost every evening on 3695 kc. after 7 p.m. Ed also is publicity chairman for the Satellite ARC. W6AGO sends a long list of observations as OO in Paso Robles. K6CAA reports 136 countries worked in 4 months but I understand he had Uncle's help with the amplifier (1 kw.) and the log periodic antenna at 125 feet. New officers for the Santa Barbara ARC are WA6PFF, pres.; K6FAQ, vice-pres.; W6LKE, secy.; W6AMI, treas.; W6JQL, sgt. at arms. W6DJK reports that the Satellite ARC had a score of 3222 points in the recent V.H.F. Sweepstakes. WA6UEF and WA6UXP, Mr. and Mrs. V.H.F. of Santa Maria, are leaving the area for Smogsville. WA6VJP is running code practice and theory sessions for Scout Troops 205 and 202 in the Oxnard area. K6-

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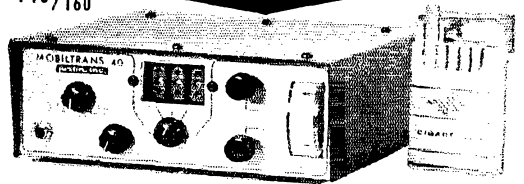
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ANZ and K6ZYP check in regularly on the SoCal Six Net and they need a check in from Thousand Oaks. Traffic: WA6DRO 12, W6DYQ 7.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L. L. Harbin, W5BNG—Asst. SCM: E. C. Pool, W5NFO. PAM: W5BOO. SEC: W5PYI. RM: W5LR. The ACCNT ARC at Denton, Tex., has received its club call, WA5OLO, and has the station located above the Denton Police Station. Complete emergency power is available at all times. K5LQP has been appointed by the FCC as RACES Radio Officer for Denton County. The frequency for the RACES Net is 145.94 Mc. and the club has four base stations and three mobile stations in operation and several more under construction. If you live in Denton County or nearby give the net a hand. The North Texas Traffic Net, has organized a morning session starting at 9 a.m. on 3960 kc. with the idea of getting better coverage and more outlets for the mounting traffic on the evening net. Because of skip conditions in the evening it has been necessary to relay traffic with a destination of 100 miles via El Paso or some other distant station. It is hoped this morning net will relieve that situation. W5VFM is on the way to Midway Island and will be gone for three to six months. Although I am late in making the announcement, the following amateurs deserve credit for qualifying for Section Net certificates: W5CVB, K5DBJ, WA5DQP, W5EFO, W5EXR and W5HFU. Don't forget the West Gulf Convention June 3-4-5 to be held at The Inn of Six Flags near Arlington. Traffic: K5DBJ 106, K2GKK/5 34, K2EIU/5 24.

OKLAHOMA—SCM, Daniel B. Prater, K5CAY—Asst. SCM: Sam Whitley, W5WAX. SEC: K5DLP. RM: W5QMJ. PAM-75: WA5BTQ. PAM 2-Meters: K5PIA. PAM 6 Meters: K5VFR. Net reports:

Net	Freq.	Times	Days	RM-PAM	QNI	QTC
OPEN	3850	0800 CST	Sun.	W5PML	330	10
STFC	3850	1745 CST	M-Sat.	WA5BTQ	106	77
OLZ	3682.5	1900 CST	M-Fri.	W5QMJ	86	92
SSZ	3682.5	2145 CST	M-Fri.	W5QMJ	72	75

New officers of the Wheat Straw Amateur Radio Club (WA5IPE) are WA5GHK, pres.; WA5CCU, vice-pres.; K5GBN, treas. New officers of the Okla. Central V.H.F. Radio Club are K5VFR, pres.; WA5EQW, vice-pres.; WA5HUN, secy.; WA5LBI, treas. New officers for Aeronautical Center Radio Club (W5PAA) are W5UZZ, pres.; pres.; W5NTL, vice-pres.; W5EHC, secy.-treas. The Electron Benders Amateur Radio Club (W5OK) has started a Novice class in Tulsa. The Wheat Straw Club has a school going about transistors. The EARC, Enid, under the guidance of WA5CHD and WA5NYC, have come up with the following new Novices: WN5OUB, WN5ODU, WN5OUE, WN5OUF and WN5OUO. K5ZEP has about six ready to take the Novice test at the Oklahoma School for the Blind. Traffic: (Jan.) K5TEY 386, K5MBK 167, W5MFX 34, W5BTQ 14, K5CBA 9, K5DLP 9, W5WAX 6, W4EHC 4, W5FFJ 3, K5OXC 3. (Dec.) W5NBI 180, W5PML 36, W1BEL/3 19, K5CBA 11.

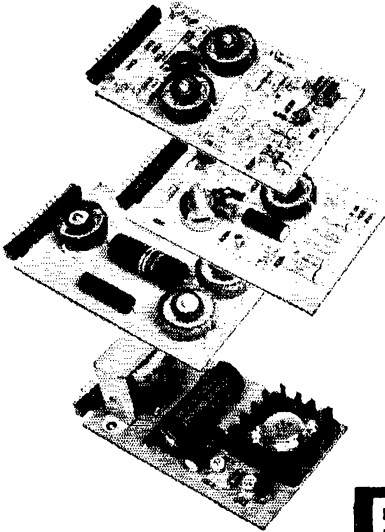
SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5AIR—SEC: K5QQG. PAM: W5ZPD. RM: K5ANS. New appointee: W5HWY as PAM 40 meters. Galveston County is planning a new v.h.f. club and a v.h.f. network under the direction of EC K5EFH. Good to see Galveston County going into action. W5AQN now is in the new house and shack. W5ABQ reports that W5EJJ is working Florida and Louisiana on 2 meters, K5NIZI is teaching the San Antonio Police Cadets Radiological Monitoring and wants to know who the Spanish station is on 7291 kc, who never signs a call. Anyone have the answer? EC W5DAA reports new officers of the Kingsville Radio Club are WA5CQD, pres.; Jim Turner, vice-pres.; W5DAA, secy.-treas. The Kingsville Club now has a new HW-12 for net operations. WA5CZR soon will be on RTTY. WA5AU advises the Corpus Christi v.h.f. gang had a fine time in the V.H.F. Sweepstakes. Those participating were WA5AUA, K5WED, WA5AUB, WA5CYU and WA5AZF. W5KLV and new PAM W5HWY are busy on the 7290-kc Net from Victoria and San Antonio. K5HMF is the new Brazoria County EC with AREC members providing communications for the Mothers March of Dimes. SEC K5QQG, with the help of many AREC members, provided communications Feb. 6 for the Annual Channel Derby. Approximately 50 boats made the 100-mile run. Communications were provided without a hitch on 3900 kc. and 146.88 Mc. over the 45-mile course. ECs K5HMF, Brazoria County; K5-EFH, Galveston County, and K5EXR, Harris County, furnished the communications to AREC operators from their area members. Congratulations to all operators on a job well done. They operated mobile units and porta-

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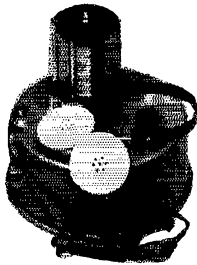


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CANADIAN DIVISION


ALBERTA—SCM, Harry Harrold, VE8TG—SEC: VE8FK, PAM (APN): VE8ADS, PAM (S.S.B.): VE8FK, ECs: VE8SA, VE8SS, VE8AFJ, VE8UB, VE8ALL, VE8NO, ORS: VE8RR, OPSs: VE8CA, VE8HM, VE8SS, VE8BA, VE8ADS, OOs: VE8HM, VE8NX, VE8TY, VE8AKV, OHSs: VE8HM, VE8AKV, OESs: VE8DB, VE8AKV, VE8FK is working as liaison with three of the W nets. It looks like all the old reliable stand-by fellows have left the lower bands and are hunting 1X on the higher bands. VE8UK is thinking of going s.s.b. VE8AAX is making contacts on 75 and 20 meters so that he can talk to his boys in Edmonton and Ottawa. VE8CA now is out of the hospital but will have to take it easy for a long time to come. VE8HM is not heard too much anymore. VE8ADS and VE8ALQ are looking for you fellows on 3770 kc. on any mode at 1800 MST. VE8AAI still is pounding brass and putting out a very nice signal. After two years VE8IB is back on the air. Look for VE8WK; he is using s.s.b. in his mobile. Traffic: VE8HM 92, VE8XC 29, VE8ADS 22, VE8FK 20, VE8ALQ 14, VE8SS 6, VE8AOC 3, VE8WN 2.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB—Thanks to VE8SL and others on the nets in heating the skip conditions. Much 1X was recorded in Jan. VE7RV had the first issue of ZFIRV and his operating was three hours per day over 400 contacts. VE7BJO spent January in the hospital. VE7AMW had his new car pranged from the rear. VE7ALR and his XYL were injured in a car crash. VE7BCV has been in Vancouver learning how outboards work. VE7AKE is s.s.b. with his own home-brew rig. VE7BOA is coming along slowly after a hangar door closed on him. VE7BBB had surgery but she is going strong again. The Royal City ARA's new officers are VE7AKW, pres.; VE7KD, vice-pres.; VE7NW, secy. We are losing one bachelor: VE7BJQ is engaged. VE7S NH, HL and ALA are looking for more VE7s. VE7AC is finding good contacts on 1995 kc. VE7BMR is rebuilding his receiver and transmitter. West Kootenay ARC's monthly letter reports some very interesting activities in the way of lectures and talks. VE7FN and VE7BJ are holidaying in Honolulu. VE7AKY reports that there are postal cost changes for DX mailing. Traffic: VE7BJV 404, VE7BEH 79, VE7QQ 58, VE7AC 48, VE7BLS 18, VE7AKY 17, VE7BRE 14, VE7BLO 6.

MANITOBA—SCM, John Thomas Stacey, VE4JT—VE4NE is on with a Heath SB-100, VE4FW has a Swan 350, TH3 beam and a 37-ft. tower; VE4EI has added a new v.l.o. and upped his power to 50 watts. VE4SC is a brave soul experimenting with antennas at 40 below zero. VE4LG is burning the midnight oil on 80 with the long skip. Jack went over the 10K mark in the last CD Contest. With the DX bands now in a lively state it would be a good idea to get some stamps along to the QSL Mgr., VE4OX. Those of you looking for VE8s on 75 look around 3760 kc. at 0300Z. That's when the Polar Net meets. VE4IU, at Carberry, is ex-VE2BQY from Mont Joli. A new ORS is VE4EI and VE4JT has been issued a CAN certificate. VE4TY, from Carman, has been checking into the C.W. Net. The same faithful few are sending in monthly reports. It takes just a few minutes to send along a card or note. How about it fellows? Traffic: (Jan.) VE4LG 107, VE4JT 92, VE4EI 77, VE4SC 39, VE4NE 30, VE4OX 27, VE4EO 21, VE4EF 18, VE4QD 12, VE4EG 10, VE4QJ 6, VE4JA 4, VE4LQ 4, VE4SW 4, VE4TM 4, VE4DL 3, VE4GN 3, VE4XN 3, VE4JP 2, (Nov.) VE4EF 16, VE4OL 10, VE4JA 8, VE4NW 6, VE4XN 6, VE4EG 2, VE4JQ 2, VE4EX 1.

MARITIME—SCM, D. E. Weeks, VE1WB—Asst. SCMs: A. E. W. Street, VE1EK and R. P. Thorne, VO1EI. SEC: VE1HJ. VE1AKO reports that the Maritime YLs have formed a club, the Maritime Sparkettes. Meetings are held at 1900 GMT on 3740 KHz. All Atlantic provinces are represented and newcomers are welcome. VE1PX now is operating VE0NB. Congratulations to VO1FY and his XYL on the arrival of a new jr. operator. VE1ABS has his A3 endorsement. Welcome

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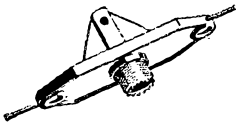
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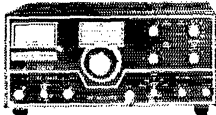
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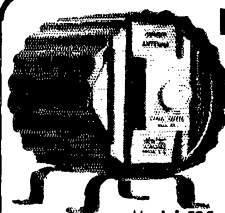
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to newly-affiliated ARCON (Amateur Radio Club of Newfoundland). VE1CL and VE1KX have been operating RTTY on 144 MHz. VO1EH has transferred to the W6 district. VE1HE wants to know why a c.w. net cannot seem to survive in the Maritimes when the rest of Canada has little difficulty. ECN, 0045 GMT, 3.540 MHz daily. Welcome to new amateurs VO1CW, VO1LL, VO1IM, VO1IN, VO1O, VO2AG and VO2AL. The ARPC Net still is battling QRM Sun. at 2230 GMT. near 3.75 MHz (this frequency often fully occupied). Since thanks to those who attend regularly and an invitation is extended to all. Traffic: (Jan.) VE1HE 34, VO1FX 15, VE1DB 13, VE1ABS 12, VE1AEB 12, VO1CE 8, VE1WB 5, VE1OM 3, VE1ES 2. (Dec.) VO1AW 60.

ONTARIO—SCM. Richard W. Roberts, VE3NG—SEC: VE3EUM, PAMs: VE3CFR, VE3CQN, VE3HW, RM: VE3CYR, VE3DPO, VE3BUR, VE3RZB.

GBN	3645 kc.	2330	GMT
OQN	3535 kc.	2400Z	
ECN	3540 kc.	0045Z	C.W.
EAN	3670 kc.	0130Z	
OFN	3770 kc.	1900Z	Phone A.M.
C.J. (S.S.B.)	3790 kc.	1830Z	S.S.B.
LAURENTIAN.	3755	1845Z	Phone ETC.

All above nets operate daily except Sun. The Hamilton ARC elected VE3FMT, pres.; VE3FLK, vice-pres.; VE3FIM, treas.; VE3CZN, secy. The Niagara Peninsula ARC is going all out on the Ont. Div. Convention. VE3CBG is on the air with an SB-100. VE3HW, PAM for 2 reports that a new net is in the offing, the Golden-Horseshoe Net. This will encompass all the north shore of Lake Ontario (Niagara Falls to Cornwall) all on 2 meters. May 14 is the date of the Annual Dinner of the Northshore ARC in Pickering. Pres. is VE3-DTS. VE3OU rates high in the League's C.D. contests. VE3AV is operating from Richmond Hill. VE3CGO was a visitor to VE4-Iand. VE3ABC is running a kw. mobile, on s.s.b. VE3CLW and VE3CGD are working on a repeater in the Ottawa area. Kenfrew County ARC puts out a fine paper, Box 2255, R.R. 1, Petawawa, is the QTH. The Ont. DX Assn. Bulletin is a new editor, VE3EUV. VE3DWS is Class AA. The York V.H.F. Society has its repeater on 2 working well. The Eastern Pennsylvania AREC Net wishes to integrate with Ontario nets. Net Managers write G. Trively, WA3BYH, 221 N. 4th St., Hokendauqua, Pa. 18057. Traffic: VE3GI 160, VE3GYR 130, VE3NG 95, VE3BTV 93, VE3DMU 84, VE3FGV 63, VE3EAM 61, VE3TT 58, VE3EBC 54, VE3LK 39, VE3DV 28, VE3DVE 28, VE3BUR 26, VE3-CFR 26, VE3EHL 24, VE3ATI 13, VE3BLZ 11, VE3BZT 11, VE3VD 6, VE3APM 3.

QUEBEC—SCM. C. W. Skarstedt, VE2DR—Asst. SCM: Claude Duberger, VE2ALH. SEC: VE2ABV. RM: VE2OJ. VE2AZF is the new EC for Montreal and district. VE2WM, Mont Joli, reports that a new club has been formed at Rimouski with VE2AW, pres.; VE2BGV, vice-pres.; VE2BAD, secy.-treas. Another traffic outlet is the Chicken Junction Net on approximately 3690 kc. at 2330 GMT. It handles traffic from Nfld., Mar., Que. and Ontario on s.s.b./a.m./c.w. VE2s ANK, BHZ, AUN and ARZ operate a net on 146.5 Mc. in the St. Maurice Valley. VE2AMA is very helpful, not only to beginners but OTs as well. VE7APU now is stationed at Great Whales River (near Hudson Bay) and is heard on the OQ, WB6LBP operated as VE2 while visiting Quebec. VE2BLL is new net manager of the RTQ as VE2BVY is temporarily QRL. VE2TQ was transferred to P.E.I.: his new call is VE1CO. The VE2NE gang won the Windsor Club trophy during the Field Day Test. VE2-

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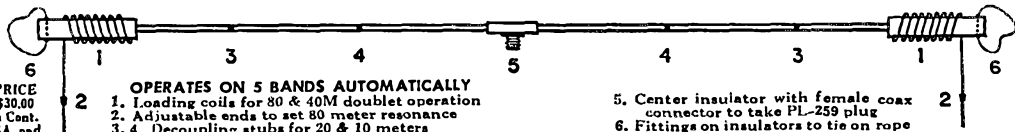
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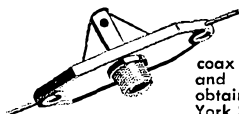
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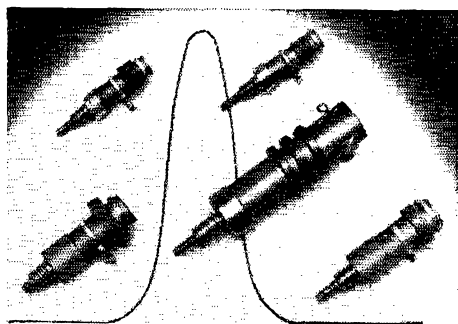
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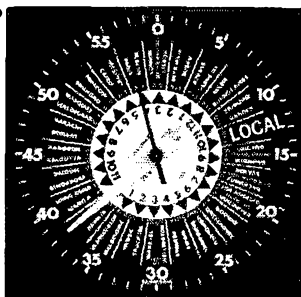
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DAL is a new call at Les Boules. VE2BZH (until recently VE2BKJ) is a new QES. The French weekly, *Photo-Journal*, published a full page article on amateur radio featuring our NEC, VE2AUU. The MARC will attempt to run instructional and code classes in French. Traffic: VE2DR 83, VE2OJ 60, VE2WM 40, VE2EC 26, VE2CK 23, VE2BVY 21, VE2CP 19, VE2BG 18, VE2UN 18, VE2AZF 13, VE2BGJ 10, VE2BRT 7, VE2BRD 6, VE2BPT 2. **QST**

Happenings of the Month

(Continued from page 39)

sion of communications for the purpose of conducting radio telephone tests, petitioner notes as follows:

"... a method of tape recording and replaying a conversation back to the original station has become a practice in some areas. Since the reproduction of the transmission is no better than the equipment utilized in making the recording, since the recording not only will reproduce heterodynes originally superimposed on the senders signal by other spurious signals, and since the receiver of the original source of the transmission may again hear his original voice with the deficient qualities of the sender's equipment, plus additional interference from the various sources, it is believed that the practice should be discontinued and treated in the same manner as the use of music for Radiophone testing. Even a mediocre oscilloscope will prove this point when the viewer is watching an envelope pattern. Therefore, nothing is gained except that an additional emission is repeated and added to the long list of sources of QRM."³

5. Petitioner's description of the inherent difficulties involved in the retransmission of voice communications is essentially valid. However, the very problems he cites have had the effect of limiting the practice to a minimum so that it cannot be regarded as a particularly important source of interference. Therefore, the Commission believes that the practice is not likely to become widespread.

6. For the foregoing reasons, it is concluded that the institution of Rule-Making as requested by petitioner is neither necessary nor warranted and it is, therefore, ORDERED this 2nd day of February, 1966, that the petition filed by Mr. Edwin L. Schaefer is DENIED.

BY DIRECTION OF THE COMMISSION

HEN F. WAPLE
 Secretary

Released: February 4, 1966

QST

³ QRM is the international "Q" code abbreviation for: "I am being interfered with." Commonly used by Amateurs as an abbreviation for "interference."

RTTY: Diversity Is Worth the Effort

(Continued from page 43)

c.p.s., so make your visual checks all in the same spot on the screen. Rounded-off wave shapes are not bias, and are usually produced by the inductance of the printer magnet.

If you see bias, go back and look at one of the audio outputs of the receiver to see if it seems to be in the signal itself. If not, check the Schmitt triggers with the scope, looking at the square-wave inputs and outputs to find the trouble. Almost always it will be in the relay-driver area, and then almost always in the relay itself.

Sometimes the neon trigger lamps work all right in a well-lighted room, but start jumping and skipping when the room is dark. This means the lamps are working marginally, using the light from the room to get enough ionization to fire. This condition sometimes develops after a few hours of normal operation. Install a new set; they're cheap. Once good ones are found they will last indefinitely. Mine have already outlasted some of the tubes. **QST**

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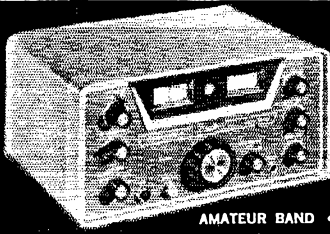
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Silent Keys

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

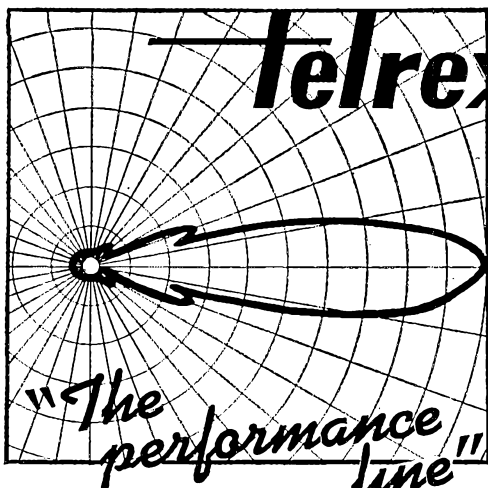
- K1ABK, Ira D. White, Jr., Medway, Mass.
- K1AQA, Arthur Coates, Plymouth, Mass.
- W1SS, Arthur A. Stockellburg, Lincoln, Mass.
- W1WFG, Charles H. Rogers, Scarsdale, N. Y.
- W1ZAT, Oscar R. Poulin, Leominster, Mass.
- W2ARJ, Hadley Henderson, Millville, N. J.
- W2BGR, Tremaine Hulse, Huntington, N. Y.
- W2BOH, James A. Edwards, Bellerose, N. Y.
- W2EVN, Walter F. Mays, Laurence Harbor, N. J.
- W2GSG, Harold E. Brooks, Brooklyn, N. Y.
- W2B1CS, Francis M. Blauston, White Plains, N. Y.
- W2LYW, Charles A. Appell, Hudson Falls, N. Y.
- W2ZOS, Frederick F. von Rekowski, Glendale, N. Y.
- W3ADN, Norman G. Hopseger, Erie, Penn.
- ex-K3EFU, Andrew J. Fisher, Saverna Park, Md.
- W3HOV, Wayne Kissinger, Fredericksburg, Penn.
- W3LCE, Fred J. Cusanek, Philadelphia, Penn.
- W3LJA, Raymond R. Robinson, Gwynedd Valley, Penn.
- K3OFV, Arthur B. Trezise, Sr., Irwin, Penn.
- K3VWH, Peter I. Somssich, Coplay, Penn.
- W4BNW, Charles K. Rice, Sr., Lebanon, Ky.
- W4EMY, James A. Mares, II, Charleston, S. C.
- W4FF, Arthur H. Benze, Howey-in-the-Hills, Fla.
- W4URX, John P. Lupien, Tampa, Fla.
- K5BII, Earl A. Morton, Sherman, Texas
- W5HQU, Floyd M. Sanders, Port Arthur, Texas
- W5IWC, Porter E. Covington, Arlington, Texas
- W5UPM, Joseph L. Vidrine, New Orleans, La.
- W6AAS, Ralph N. Adams, Mt. View, Calif.
- W6ELS, James R. Cornell, Alondra, Calif.
- W6KUK, Robert Scheile, Oakland, Calif.
- W6NPL, Elmer F. Maryatt, Vacaville, Calif.
- W6SAT, Frank C. Day, Windsor, Calif.
- W6WTH, W. A. Wilson, San Fernando, Calif.
- ex-7AIO, G. Edwin Grady, Anacortes, Wash.
- K7LYQ, Alvah N. Carnes, Phoenix, Ariz.
- K7TGR, Warren D. Nelson, Billings, Mont.
- K7UMG, Eugene M. Fields, Salem, Ore.
- W8APL, Robert E. T. Cover, Warren, Mich.
- W8CHP, Joe W. Krantz, Charleston, W. Va.
- W8CLS, Bernard M. Dabney, Jr., Cincinnati, Ohio
- W8CVK, Robert P. Shafer, Buckhannon, W. Va.
- K8HGB, Frederick A. Davis, Detroit, Mich.
- K8KEB, Stanley F. Martin, Sturgis, Mich.
- W8UDQ, Harry J. Mitchell, Alliance, Ohio
- K8WIP, David O. Trout, Parkersburg, W. Va.
- K8YTT, George D. Oberdier, Columbus Grove, Ohio
- W8ZQZ, Robert L. Ritz, Allegan, Mich.
- K9EQY, Jeffrey O. Lindstaedt, Des Plaines, Ill.
- W9EUX, Frank R. Cooke, Franklin Park, Ill.
- K9KJG, Fred R. Smith, Spencer, Ind.
- W9PNX, Robert G. Vande Zaude, Waupun, Wisc.
- K9UOV, Claude A. Tague, Chicago, Ill.
- W9UXO, Frank W. Veith, Hinsdale, Ill.
- W9CCD, Arnold G. Rognlie, Minneapolis, Minn.
- W9ETG, William H. Dorival, Caledonia, Minn.
- K9JPM/1IDFA, Kenneth G. Rounds, c/o FPO, New York
- HP1RA, Adolfo Arias P., Panama

Because of the need for accuracy in our "Silent Keys" listing, please send all notices to the ARRL and include both name and call of the deceased.

SURPLUS WANTED

We'll pay you the absolutely Highest Prices for almost any piece of equipment in any condition. We'll trade also. We'll pay in 24 hours too. Just send list, or telephone collect for quick quote. Particularly interested in all AN/GRC, PRC, ARC, ARM, UPM, USM, APR, APN, URM, RT-66-70, T-195, R-392, etc.
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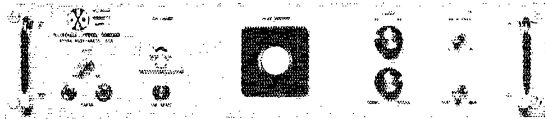
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Telewriter Model "L" frequency shift converter designed for two-tone AM or FM with Limiter operation available by switch. Solid state ratio corrector compensates for fading signals. Permits copying on Mark or Space only. Selector magnet dc loop supply built-in with bias supply and octal socket for optional polar relay to key transmitter. 6W6 keyer tube. Plug-in discriminator for 850 cycle or other shifts. Cathode ray or dual eye indicator. Auto-start control system optional. Prices for 19" rack mounting: Model "L" with dual eye \$199. Model "L" with C. R. tube indicator \$279. Cabinet \$19.50

QUICK QUIZ

Q. When may third-party messages be handled between amateur stations of different countries?

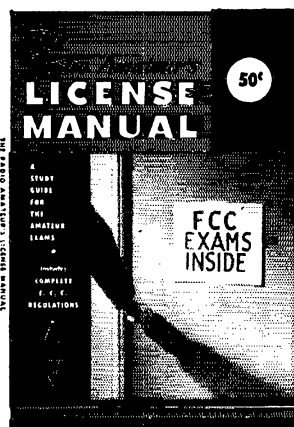
Q. When does a state of emergency affecting amateur communications become effective and when is it terminated?

Q. On what amateur bands is portable operation permitted without prior notification to the inspector of the district in which such operation is contemplated?

Score 100%? If not, better get the 55th Edition of the License Manual. Complete FCC and International Rules and Regs governing amateur radio . . . detailed explanations of amateur licensing . . . separate study guides for all amateur operator exams. The up-to-date license and regulations manual for all, newcomer and oldtimer alike.

The ANSWERS?

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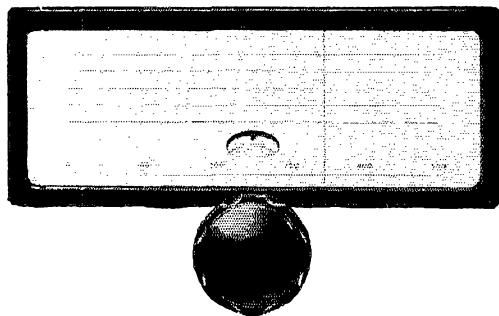


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Newington, Connecticut 06111

EDDYSTONE



GEARED SLOW MOTION DRIVE For Amateur Radio & Communications RECEIVERS & TRANSMITTERS

A high grade assembly, flywheel loaded, manufactured to fine tolerances, provides a smooth positive drive with a reduction ratio of 110:1. The vernier with its 100 divisions rotates 5 times for one pointer traverse, giving 500 divisions with positive reset readings. A cam adjustment on the vernier assures correct zero setting. A spring loaded jockey arm maintains tension of the pointer drive. Overall dimensions 9 1/4" x 5 3/4".

Manufactured by
Stratton & Co., Ltd. (Eddystone) PRICE \$21.50 NET
Birmingham, England Postpaid

Distributed by

BRITISH RADIO ELECTRONICS, LTD.

1742 Wisconsin Ave., N.W.
WASHINGTON 7, D. C.

160 Meter "Solid Status"

(Continued from page 60)

with a solid-state modulator of conventional design. The circuit described in the ARRL Handbook (43rd edition, p. 489) could be used if T_3 were modified to match the 16-ohm collector impedance of the p.a. stage in the transmitter described in this article.

The availability of such transistors as the 2N1212 at bargain prices varies from time to time. Comparable transistors are sometimes available in lieu of the 2N1212 type.² Watch for power transistors that have dissipation ratings between 50 and 100 watts, and that are designed to operate at 10 Mc. or higher.³

Reports have indicated that the signal from this transmitter cannot be distinguished from that of a well-engineered tube rig. The T9 note available from this transmitter makes it, indeed, a real 160-meter "status symbol." **QST**

² A valuable cross-reference data book, *Transistor Select-A-Spec*, is available from Tech Press Publications of Brownburg, Indiana and is helpful to the bargain hunter. — Editor.

³ A 2N1016 transistor, available from Allied Radio Co. for \$8.25, could be used in place of the 2N1212. It has a 30-watt rating and is a p.n.p. type, therefore a minus 12 volts would have to be supplied to the collectors of the stages using 2N1016. Less power input would be possible than with the 2N1212 units. Author suggests 2N2832 (p.n.p.) at \$9.00, or 2N1905 (p.n.p.) at \$1.13, as additional "off the shelf" possibilities. — Editor.

Amateur Radio Freq. Allocations

(Continued from page 65)

3. If this proposal is not acceptable to the ITU, the regional radio amateur associations should carry out a world-wide observation of the amateur bands³ and if they find that their home services are actually operating in these exclusive bands the national societies should approach their administrations and point out the infringement of the International Convention and ask for appropriate measures to remedy this situation.

4. As regards the shared bands — that is to say, those bands which are in common with other services — the administrations should be similarly approached and requested not to establish new stations in these bands with the final goal to remove such other services from the amateur bands and re-allocate them in other frequency bands. **QST**

³ The International Amateur Radio Union has been emphasizing the need for an effective Intruder Watch for several years. Intruder Watches are operating in the United Kingdom and in the United States, and additional volunteer participants are always welcome. Write to ARRL or RSGB if you would like to take part in this program to help ensure the future of amateur radio.



I can give you personal service on helping you select better gear per dollar for your operating pleasure. Over 30 years' experience. Big trades, easy terms. Used bargains.
VAN SICKLE RADIO SUPPLY CO.
Gene Van Sickle, W9KJF, Owner
4131 N. Keystone Ave.
On the northeast side of
Indianapolis 5, Indiana

ENJOY EASY, RESTFUL KEYING

With **VIBROPLEX**

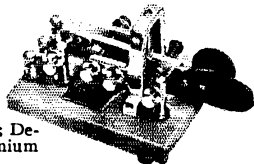


Sending becomes fun instead of work with the SEMI-AUTOMATIC Vibroplex. It actually does all the arm-tiring nerve wrecking work for you. Adjustable to any desired speed. Standard models have polished Chromium top parts and gray base. DeLuxe models also include Chromium Base and red finger and thumb pieces. Five models to choose from priced at \$17.95 to the 24K Gold Plated Base "Presentation" at \$33.95.

thumb pieces. Five models to choose from priced at \$17.95 to the 24K Gold Plated Base "Presentation" at \$33.95.

VIBRO-KEYER

Works perfectly with any Electronic Transmitting Unit. Weighs 2 3/4 lbs., with a base 3 1/2" by 4 3/4". Has Vibroplex's finely polished parts, red knob and finger, and thumb pieces. Standard model \$17.95; DeLuxe model includes Chromium Plated Base at only \$22.45.

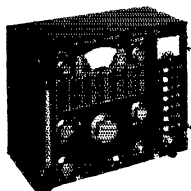


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SIGNAL GENERATOR**
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160,000 microvolts. Pure sine AM to
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NEW SUPER HEAVY DUTY DIPOLES 66' LONG, RATED 4KW PEP-2000 POUND BREAKING STRENGTH—DELTRIN CENTER & CERAMIC END INSULATORS—OUT PERFORM FULL SIZE DIPOLES;
75/40 SHD \$30.00; 75-20 SHD \$35.00; 75-10 SHD \$42.00

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MODEL 80/40CW.....	\$27.00	• 69 FEET LONG
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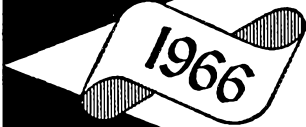
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AIRCRAFT RADIO SETS: Collins: 51R - 51X - 51Y - 51V - 51Z
Bendix: T-21; R-21; DFA-70; RA-18C; MK-7; GSA-1

TEST SETS: ARC, Boonton, Collins, Hewlett-Packard, Bird, Textronics
LIGHT WEIGHT RADIOS: Lear - Narco - Bendix - Motorola - ARC (including parts & accessories) • Headsets, Microphones, Antennas
G. duBord, Box 105, New Haven, Conn. Phone: 865-0164

WANTED • WANTED • WANTED

EASTER SEALS



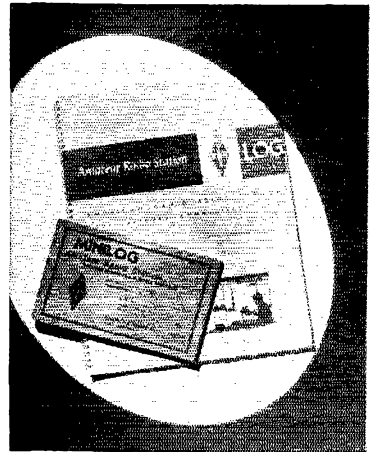
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Address: Easter Seals, c/o Postmaster
(Include local Zip Code)

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Mobile? Your log-keeping needs can be met by the ARRL MINILOG. Convenient, pocket-size, it contains proper headings for all necessary entries. MINILOG will help you comply with FCC regs, provide a lasting record of the many pleasant QSOs you'll enjoy the year round. *Spiral bound, 4" x 6".....30¢*

U.S.A, 35¢ elsewhere



At Home? If so, you may prefer more detailed station records, and the ARRL Log Book with ruled 8½ x 11 sheets (also spiral bound to lie flat when open), will make record-keeping a pleasure. Useful also for portable or mobile as well as fixed station operation!... *50¢*

U.S.A, 60¢ elsewhere

These are available in loose-leaf form (punched for 3-ring binders), *100 sheets.....\$1.00*

The AMERICAN RADIO RELAY LEAGUE, INC.
NEWINGTON, CONNECTICUT 06111

HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in those columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a box number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment (wired, used, and for sale by an individual or apparatus offered for sale) or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 35¢ rate. Provisions of paragraphs (1), (2) and (5) apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking-copies can be supplied.

(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 QSL are unable to vouch for their integrity or for the grade or character of the products or services advertised.

ROANOKE Division Convention, Natural Bridge, Va. May 28 and 29, 1966. Varied program includes Home-brew Contest. Enjoy the Convention and see Natural Bridge, too! Special Advance Registration package, \$6.50. Reservations handled. Inquiries to Box 2002, Roanoke, Va. J. M. Evans, K4RDT, Program Chairman.

DAYTON Hamvention April 16, 1966. Everyone welcome at the Dayton Amateur Radio Association's 15th annual Hamvention, Wampler's Ballroom, Dayton, Ohio. Come and participate in the technical sessions, forums and banquet. See new equipment exhibits. Take part in "home brew" contest and hidden transmitter hunt. New this year: Giant "Flea Market", Bring the XYL for the best in women's activities, FCC General Class examination at 09:00 Saturday. Exhibits open Friday evening. For information write Dayton Hamvention, Department P, Box 44, Dayton, Ohio 45401.

ROCHESTER, N.Y. is again headquarters for one of the largest Hamfests in May 4-6. Write for free program. Rochester Amateur Radio Assn., P.O. Box 1388, Rochester, N.Y. 14603.

HAMFEST: Annual SRRC hamfest, June 5. Same place as last year. See May Hamfest calendar in QST for details or write G. E. Keith, W9QLZ/W9MKS, RFD 1, Box 171, Oglesby, Illinois 61348.

DETROIT Area Swap 'n' Shop: Sunday, May 1st, 10 to 4 at K of C Hall, Grand River Ave. at Lesure. No dealers, just hams! Detroit Amateur Radio Assn. George Goldstone, W8M6Q.

OLD Timers Night at W9AUI, the Egyptian Radio Club, Inc., 8 P.M. April 21. Amateurs of all vintages welcome for an evening of entertainment and fellowship.

HAM Auction: May 2, 1966. Check gear in at 6 P.M. Auction at 8 P.M. River Park Amateur Radio Club, 5100 North Francisco Ave., Chicago, Ill.

MOTOROLA used FM communication equipment bought and sold. W5BQC, Ralph Hicks, Box 6097, Tulsa, Okla.

WANT Callbooks, catalogs, magazine, pre-1920 for historical library. W4A Wain, Nelson, Concord, N.C.

MICHIGAN Hams: Amateur supplies, standard brands, Store hours 0830 to 10:00 M-F, through Saturday. Roy J. Pichase, W4RP, Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan. Tel. NOrmandy 8-8262.

WANTED: all types of aircraft on ground radios. 17L 618F or S388, 390, GRC, PRC, 51 JRVX. Collins linear amplifier. Type 294; 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 Dames W2KUW, 308 Hickory, Arlington, N.Y.

SELL, swap and buy ancient radio sets and parts magazines. Laverty, 118 N. Wycomb, Landsdowne, Penna.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

SAVE On all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Road, East Wauscott, Massachusetts 017-598-2530 for the gear u want at the price u want to pay.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, 118 S. Clinton, Chicago 6, Ill.

304TL tubes wanted. Also other xmte and special purpose tubes. We will buy military or commercial transmitters and receivers with designations ARG, GRC, URR, 51 and MN. Air Ground Electronics Co., 64 Grand Pl., Kearny, N.J.

QSL'S? SWL'S? Personalized made-to-order! One-day service! Largest variety samples 25¢. Religious, 25¢ (deductible). Rus Sakkers, W8DEB, Box 218, Holland, Michigan 49423.

QSLs, samples 20¢. QSL Press, Box 281, Oak Park, Illinois 60303.

QSL "Brownie" W3CJI, 3111 Lehigh, Allentown, Penna. Samples 10¢. Catalog 25¢.

C. FRITZ For better QSL's! Bringing hams greater returns for over a quarter-century. Samples 25¢ deductible. Box 1684, Scottsdale, Arizona 85252 (formerly Joliet, Ill.).

QSLs: Quality with service. Samples free. R. A. Larson Press, Box 45, Fairport, N.Y.

QSLs-SMS. Samples 10¢. Malgo Press, Box 373 M.O., Toledo 1, Ohio 43601.

DELUXE QSLs Petty, W2HAZ, P.O. Box 5237, Trenton, N.J. 07638. Samples 10¢.

QSLs. See our new "Eye-Binder" cards. Extra high visibility. Samples, 5¢. Dick, W8VXK, 1994 N. M.-18, Gladwin, Mich.

10¢ Brings free samples. Sims Advertising Service, 3227 Missouri Ave., St. Louis, Mo. 63118.

DON'T Buy QSL cards until you see my free samples. Bolles, W5OWC, Box 9163, Austin, Texas.

CREATIVE QSL cards, 25¢ for catalog samples, 50¢ coupon. Personal attention given. Wilkns Printing, Box 787-1, Atascadero, Calif. 93422.

QSL Specialists. Distinctive Samples, 15¢. DRJ Studios, 2114 N. Laverne Ave., Chicago, Illinois, 60639.

SUPERIOR QSLs, samples 10¢. Ham Specialties Co., 108 East Palace, Hobbs, New Mexico.

QSLs, SWLs, XYL-OMs (sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing, eye-catching, comic, sedate, fabulous, DX-attracting, prototypal, snazzy, unparagoned cards (Wow!), Rogers K0AAB, 961 Arcade St., St. Paul 6, Minn.

QUALITY QSLs. Samples dime (ex-W3QCC). Ted Beseparis, WA4WVK, Box 1275, Lake Worth, Fla.

QSL, SWL, cards that are different. Quality card stock. Samples 10¢. Home Print, 2416 Elmo Ave., Hamilton, Ohio.

QSL, SWLs, WPF. Samples 10¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix 17, Ariz.

QSL 300 for \$4.35. Samples 10¢. W9SKR. George Vesely, Rte. #1, 100 Wilson Road, Ingleside, Ill. 60041.

QSL 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. Samples 15¢. Agent for Call-D-Cal decals K2VOB Press, 31 Arville Terrace, Irvington, N.J.

QSLs \$2.50 per 100. Free samples and catalog. Garth, Box 510, Jutland, N.J.

3-D QSL Cards have that prestige look, with glittering colors and metallic in raised space-age designs fused to brilliant plastic finishes. Cost so little more than mere mediocrity! Samples 25¢ (refundable). 3-D QSL Co., Monson 2, Mass.

QSL-100 3-color glossy \$3.00; silver globe on front, report form on back. Free samples. Rusprint, Box 7575, Kansas City, Mo. 64116.

QSLs, Finest, YLRs, OM's, samples 10¢. W2DJH Press, Warrensburg, N.Y. 12885.

AT Last! Something new in QSL cards! All original designs. Send 25¢ for samples to Yarsco, Box 307, Yorktown Heights 1, N.Y.

QSLs Stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md.

DX-QSL. The original plastic display for ur cards. Holds 20 cards. 3 for \$1; ten for \$3. Satisfaction guaranteed. Dealers' inquiries invited. DX-QSL, Box 19033, Houston, Texas 77024.

QSLs Moyer Printing, 846 Rising Sun, Telford, Penna.

FINE Embossed QSL cards. Ace Printing Service, 3298 Fulton Road, Cleveland, Ohio 44109.

HUNDRED QSLs: \$1.00 Samples, dime. Holland, R3, Box 649, Duluth, Minn. 55803 (formerly Meininger, Jesup, Iowa).

QSL. Free offer with samples, 10¢. "Jack", W3PRU, Rice's Lane, Baltimore, Maryland 21207.

RUBBER STAMPS \$1.00. Call and address. Clint's Radio W2UDD, 32 Cumberland Ave., Verona, N.J.

QSLs. Cartoons, colors, something different, samples 10¢. Chris, W9PPA, Route 1, Box 31, Crystal Lake, Ill.

QSLs—Free samples. Attractive designs. Quick Service, W7IIZ Press, Box 183, Springfield, Ore.

ORIGINAL EZ-IN double holders display 20 cards each in plastic. 3 for \$1.00 or 10 for \$3.00 prepaid and guaranteed. Free sample to dealers or clubs. Tepabco, John, K4NMT, Box 198T, Gallatin, Tenn. 37066.

QSLs. 18 samples. 10¢. Filmmasters, Box 304, Martins Ferry, Ohio.

SMART Ham operators buy their QSL cards from the Ham Wholesale Card Club. See 1/2 p. ad (p. 155) in this magazine.

LOW Cost QSLs: 100 4-color glossy, \$3.99. Free samples. Ed's Press, 3232 Lc Moyne, Chicago, Ill. 60651.

COMPLETE QSL Rubber Stamp, free sample print. W1FP, Blanchard, Wes's Rubber Stamp Shop, RFD 1, Amesbury, Mass. 01913.

QSL Cards. Quality printing. Samples 15¢. Sargent Press, 19 Glenn Ave., Lynn, Mass.

QUALITY QSLs, new designs monthly. Samples 10¢, 25¢, 50¢. Savory, 172 Roosevelt, Weymouth, Mass.

QSLs, SWLs 3 & 4 colors, 100 \$2.00. Samples dime. Bob Garra, Lehighton, Penna.

SAMCO QSLs presents "Pronto-Call" for '66; samples 10¢. Rubber stamp owners: Stamp-Ett Multi purpose cards, only \$1. Hundreds, ppd. Samco, Box 203, Wyantonskill, N.Y. 12198.

QSLs, 18 samples 10¢. Filmercrafters, Box 304, Martins Ferry, Ohio.

HUNDRED QSLs, \$1.00. Samples, dime. Holland, R3, Box 649, Duluth, Minn. 55803.

QSLs, Free samples. Radio Press. WA6QAY, Jule, Box 17112, San Diego, Calif.

QUALITY Rubber stamps: Complete OSL 3" x 5", \$15.00. Call, name, address: \$1.50. Wes's, W1FP, RFD #1, Amesbury, Mass. 01913.

DAZZLING QSLs. Samples 10¢ (ex-W2OCC) Ted Besesparis, WA4WVK, Box 1275, Lake Worth, Fla.

QSLs. Large selection, including photos, rainbows, glossy stocks, cuts, etc. Fast service. Samples 25¢. Ray, K7HLR, Box 1176, Twin Falls, Idaho 83301.

QSLs. Crafted by Samco. The "Proto-Call" for '66. Samples, 10¢. Stamp-Ett Cards, \$1.00, Hundred, ppd. Samco, Box 203, Wyantonskill, N.Y. 12198.

PERSONALIZED Photo QSL Cards. Samples, prices 15¢. Mike Boyer, G.P.O. Box 2066, New York, N.Y. 10001.

CANADIANS: Eico 720 and 730, excellent condx. \$120.00. VE7YV, Ray Taylor, 8112 MacPherson Ave., South Burnaby, B.C., Canada.

CANADIANS: Apache transmitter, mint condition, one hundred twenty-five dollars. Walker, Box 114, Virden, Manitoba P, Canada.

WANTED: Teletype machines: Model 15 and 28 page printers, type A. S.R. and K.S.R. Also, teletype model 28 L.P.R. Typing reperfors: Model 28 L.X.D. tape readers. Highest prices paid. Contact: I.T.E.C., 455 Craig St. West, Suite 207, Montreal, Quebec P., Canada.

CANADIANS: Sell Seneca, Waters Compramp, both one year old, in mint condition. Hy-Gain DB-62, Alliance C-225 rotor and cables 3 months use in attic only. Best offer over \$200.00. F.O.B. Ottawa, Tom Harp, 1387 Wesmar, Ottawa, Ont., Canada.

CANADIANS: Johnson Ranger, \$175.00. Johnson Kilowatt Matchbox, best offer. Both in perfect condition. VESVC, Box 51, Montmartre, Sask. P., Canada.

CANADIANS: Mobile bumper mount, heavy spring, Hy-Gain 75-meter Topper and base. New. E. Crump, 64 Barrie, Galt, Ont. P., Canada.

WANTED: Collins Parts. BC-610, GRC-27, Autodyne, Bethpage, L.I., N.Y.

WE Buy all types of tubes for cash, especially Fimac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y. ACT NOW! Barry pays cash for tubes (unused) and equipment. Barry Electronics, 512 Broadway, NYC 12. Call 212-Walker-3-7000.

TUBES Wanted. All types, highest prices paid. Write or phone Coo Communications, 120 West 18th St., N.Y. 11, N.Y. Tel: 242-7359.

WANTED: Tubes, all types, write or phone W2ONV, Bill Salerno, 243 Harrison Avenue, Garfield, N.J., Tel. GARfield Area code 201-471-2020.

4000 Ham words German-English, \$1.25 bill, stamps or 11 IRCs. Christian Zangerl, OE9CZ1, Dornbirn, Austria.

HELOW Distributor cost: SR-150 with P-150 AC, P-150-DC, MR-150, \$550; SR-160 with P-150-AC, \$335.00; CDR TR-44, \$47.50 F.o.b., Stamford, Conn. Send certified check or m.o. HDH Sales Co., 170 Lockwood Ave., Stamford, Conn. 06902.

TELETYPE Machines, converters, R-38K, 51J3 and 51J4, R-390; R-390A receivers, mechanical filters for R-390A (455 IF) Want: CV89/UR8A converter, Altronics-Howard Co., Box 19, Boston, Mass. 02101. Tel: 617-42-0048.

OLD Old Timers Club now over 600 members with verified 2-way contacts before 1925. Life membership, \$15 Bi-monthly "Spark-Gap Times", \$2.50 annually; also available to non-members, \$3.00. Write Secretary W1MPP, Lovell, Maine 04051.

SELL: Eimac 4X250B tubes. Guaranteed gud condx. \$6.50 each, \$10.00 pair prepaid in U.S.A. Send check or m.o. Everett Stidham, Jr., W5JLQ, 722 So. 30th Muskogee, Okla.

MANUALS for surplus electronics. List, 10¢. S. Consalvo, 4905 Roanoke Drive, Washington, D.C. 20021.

FOR Sale: Plate transformers, 3600-0-3600 VAC @ 1000 ma. CCS, with 120/240 VAC primary. Commercial-quality units carry one year unconditional guarantee. Price \$39.95. Peter W. Pahl Co., 401 4th St., S.E., Minneapolis, Minn. 55414. Tel: 338-9077.

WANTED: For personal collection: OST, May 1916, W1CUT, 18 Mohawk Dr., Unionville, Conn.

NOVICE Crystals 80-40M, \$1.05 each. Also other freqs. Free list. Nat Stinnett, W4AYV, Umatilla, Fla. 32784.

SELL: OST 1915-51 (Vol. I: photocopy). Best offer. Ianda, Clayton, Ga. 30525.

HQ 180C, matching speaker, \$180; Globe Champion 350 PTT mike, \$170.00; Telrex beam 10/15; w.tower, \$50. B&W loss, \$6.00. WA2OFK, 596 Rutland, Teaneck, N.J. Tel: 201-836-2836.

JOHNSON Viking KW Model No. 240100, brand new, tubes still in boxes, best acceptable cash offer. Sorry, no trade. W4IKM, P.O. Box 9187, Mobile, Ala.

G-E 600L, mint condition: \$175.00. W4IEN.

CERTIFICATE Will be issued by Henry Ford Museum to any station that works the Motor City Radio Club station, W8MRM, during the 24 hours prior to the Old Timers Night banquet. Work W8MRM on May 7 (GMT) on or near 1.815, 3.663 (even hours), 3.900, 7.070 (odd hours), 7.215, 14.300, 50.178 or 146.94 Mc. Novice contacts by schedule. OSL for certificate. Beverly Stoner, K8ZJU, Sec'y. Motor City Radio Club, Greenfield Village, Dearborn, Mich.

WANTED For cash: Collins 30L-1, 351-D2 mount, MP-1 supply, W0DVZ, Box 475, Ottumwa, Iowa.

COLLINS S/Line, 75S-1 with 500 cycle filter and Waters Q-multiplier, \$37.00; 12B4, \$123.00; 32S-1 all factory modifications, with 516F2, \$410.00; 30L-1, \$350.00. All equipment used very little and in spotless condition. Package price, \$110 and will include free, custom birch operating bench. WA2OBZ, 3 Pryor Place, New Rochelle, N.Y. Tel: NE-2-7450.

TELETYPEs, parts. Fast service. Schmidt, W4NYF.

HOUSE, Custom-built estate home, ideal ham location. 400 ft. high point in Stamford ridges 35 miles from NYC. 3 bedrooms, den, 2 full baths, solarium, terrace, 2-car garage, sun-deck, large kitchen, privacy. On landscaped acre: \$46,000. Two adjoining acres available. Financing arranged. 60" telescoping attached tower included. W1TZX, Erich Quast, Skymeadow Drive, Stamford, Conn. 06903.

FOR Sale: Heathkit HK-11 transmitter, like-new condx. \$36.50. Bill Vaughn, 202 Ward St., St. Joe, Mich.

WANTED: BC-610 transmitter. W5PIN, 5744 Argonne, New Orleans, Louisiana.

WANTED: Counselor for summer camp. College student general license and equipment necessary. Contact W2GON, Shelly Well, 114 Phyllis Court, Elmont, N.Y. 516-HU-8-3555.

BRAND New SB-300 with SSB filter, professionally wired, \$245.00. Used but in excellent condition. Challenger 80, 6 mtr. transmitter, \$70.00; matching 80-6 mtr. rock stable VFO, \$25.00; Johnson 275 Matchbox with SWR, \$65.00. Write WA2-SZ, R. J. Christie, Box 18, Queens Village Station, Jamaica, L.I., N.Y.

SELL: OST, CO. Radio, Modern Electrics and Handbooks, any quantity. Buy: old radio gear and publications. Erv Rasmussen, 164 Lowell, Redwood City, Calif.

COLLINS S/Line AM adapter, \$5.00! Install five minutes! Switching! Kit Kraft, B-763, Harlan, Kentucky.

FM Equipment Schematic Digest: A comprehensive collection of Motorola schematic diagrams covering low-band, high band and 450 Mc equipment, manufactured between 1949 and 1954. Crystal formulas, alignment instructions and a wealth of technical data included in 92 pages. Price \$3.95 ppd. Two-Way Engineers, Inc., 1100 Tremont St., Roxbury 20, Mass.

RTTY Gear for sale. List issued monthly. 88 or 44 mhy toroids, five for \$1.75 postpaid. Elliott Buchanan, W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94610.

NCL 2000 plus one unused 8122, \$450.00. Condition perfect. W. Sabin, 1400 Harold Dr., S.E. Cedar Rapids, Iowa.

RTTY Channel Filters, octal mounted, 2125/2975 cps, \$5.95 pair. 88 mh toroids, uncased, 5 for \$2.50. WA6IGI, 3232 Selby Avenue, Los Angeles, Calif. 90034.

EXCELLENT OST October 1953 thru December 1965; CQ May 1956 thru January 1965, \$35.00. F.o.b. W3MSN, 5400 Boulder, Oxon Hill, Maryland 20021.

COMPLETE Sideband station, both like-new condx: HT-37, \$250.00; SX-101A, \$225.00, if sold together: \$460.00. Will ship. K2QEV, Gerald Hartenstein, 3567 Centerville Ave., Wantagh, L.I., N.Y. Tel: 516-SU-5-6275.

75A4 with 3 filters, speaker, extra set tubes, mint condx: \$350.00; 32V-3 with low pass filter, extra set tubes, mike, coax relay, \$150.00. Cash and carry, cannot ship. sry. Joe Mullen, 101 Ferncliff Dr., Williamsburg, Va. Phone: 229-6071.

DRAKE RA4 receiver. Latest '66 Model. New. Will sacrifice, \$330 or best offer. Call or write W9AW. (Tel: RO-3-2265), 7239 North Oconto, Chicago, Ill. 60648.

SELL OR trade: G-77 & p.s., mod. and cables (very good condition) for roof photo enlarger. State make, model. Will accept any reasonable offer. R. J. Locher, K0EMS; 1019 Alpine, Boulder, Colorado 80302.

JOHNSON Viking II factory-wired with built-in push-to-talk and T-R switch, also new panel, no scratches and Heath VE-1 VFO, \$125.00; Hammarlund HO-160 receiver, excellent condition, \$199.00; Eimac PM R-7 mobile receiver with mounting rack, \$69.00; Eimac AF-68A mobile transmitter and mounting bracket, mint condition, \$99.00; Minneapolis Honeywell transistor power supply 12VDC 500V 150W \$30.00. Brand new Johnson Mobile VFO, \$30.00; Heath EA-3 hi-fi amplifier \$20.00; Dynamos 12V to 440, \$8.00. Also 12V to 230, \$4.00. John Winward, 12711 Medford Road, Philadelphia, Penna. 19154. Phone: 215-NE-7-4619.

MUST Sell: Complete SSB station: Drake 2B, Q multiplier/spkr, calibrator: HT-37, coax relay, mike, all in mint condition. \$400. Valiant, 75A1, best offer. WA5ESW, 646 Mc-Clendon, Cornus Christi, Texas.

SELLING out, Heath AG-9 \$20.00; 15 ampere Variac, \$20.00; BC-457, new, \$9.00; RCA scope, \$20.00. Many other items SASE for list. W2EET, 2 Ridgeway Ave., Oaklyn, N.J. 08107.

KNIGHT T-60, \$36.00; V-44 VFO, \$22.00. Both are in xclnt condx. WA6ZMR, David Fisher, 243 Cimmoner, Glendora, Calif.

KNIGHT T-150A and KT-320, Lafayette \$120.00. Also either alone. W200S.

SELL or swap for linear Sonar 20 meter transceiver, 180 watts DC SSB and tone CW. With p/s. Best cash offer over \$185.00. Dwight McCall, Rte. #1, Young Harris, Ga.

CAMP Winnipeg wants electronics counselor over 21 to bring own complete rig to camp. Must be able to teach, build simple sets and give qualifying exams. Phone or write, Roberts, 353 W. 56th St., NYC, N.Y. Tel: 212-246-0052.

HAM with General Class license, high school graduate minimum. To teach radio to campers at outstanding co-ed camp. Write for application blank to New Jersey YMHA-YWHA Camps, 589 Central Ave., East Orange, N.J. Phone 201-674-1311.

TROPICAL Holiday: Swap your SSB TX/RX excellent condition for two/three weeks' holiday in sunny Trinidad. Now, or next year for our unique carnival. OSC D. Gittens, "Carty Drive", Gordon Street, Curepe, Trinidad, B.W.I.

COMPLETE Collins station: KWM-2A, 312B4, 516F-2, MP-1, 30L-1, 180S-1, antenna, tuner, cables, manuals. New! Mobile, used but in excellent condition. Call WB6BLE at 415-589-4510 and haggle price.

FOR Sale: Nice S-53A, \$24.95, 6M converter, (as is), \$50.00. Both, \$25.01. Shipping extra. K4JXC, Box 162, Oak Ridge, Tenn. 37830.

SELL: SB-33, Hustler mobile antenna, 2 KW parallel 813 linear. Will sell separately. Lawrence Krasnow, WB2HTL, 101 Old Mamaronck Road, White Plains, N.Y.

NCX-3 with AC and DC supplies, mike, Hustler, 20-meter ant., bumper mount, universal. Hallicrafters SX-100 receiver. All equipment FB condx. Bargain, W2BAS, Tel: FL 9-4009.

SWAN 350, mint condition, AC power supply, selectable sideband, \$410, reg Westmoreland, WA5EW1, 1916 Cornell Lane, Denton, Texas.

APACHE Transmitter, nice condition with manual. First certified check \$120. F.O.B. C. D. Roberts, W5NBD, 4942 Gabriel Dr., New Orleans, La. 70127.

APACHE Owner in school. Must sell: \$135.00. K9QFL, 605 Spring, Glenview, Ill.

HAMMARLUND HQ-145-C with matching speaker. Exclnt condx: \$150.00. Local deal (pick-up) only. W1KHW, P. G. Balko, Hillcrest Road, New Canaan, Conn. Tel: 966-1406.

DRAKE R-4 with speaker, \$300.00. Clegg 22'er, \$175.00. Both less than 4 hours on air. #19 teletype w/power supply table and TD unit, \$150.00. Pick-up only. WA8BSL/4, 6420 5th Ave., N., St. Petersburg, Fla. 33710.

HEATH HX-30 six-meter SSB transmitter, including Dow-Key T-R relay, \$165.00; Clegg Apollo linear amplifier practically new, \$200; Elenco compression amplifier, \$20.00 Terafit six meter converter, \$35.00; Hallicrafters S-108 general coverage receiver \$40.00; Comair six meter resonant cavity filter, \$20.00. Dave Polisky, WA2YVM, 27 Humminbird Lane, Willingboro, N.J. Tel: 609-877-7443.

WANTED: Riders Radio Manual 23, RCA Manuals V, VI, VIII; Gernsback Official Radio Service Manuals 4, 5, up; Weston & Jewell catalogs before 1930; General Radio catalogs before "K"; Radio Masters before 10th Edition; Radio Parts catalogs before 1930. W2NCE, 139 Grand St., Jersey City, N.J. 07302.

FOR Sale: 75A4, 5N4998, 3 filters, 500 cycles 3.1, 6 Kc., A-1 shape, speaker, \$425.00. Firm! Will ship collect. K8HBR, 215 N. Murray Ridge Rd., Elvira, Ohio 44038.

WANTED: Collins 312B5 Price? W4BRE, 1207 Locust Ave., Huntsville, Alabama.

HT-37, \$260.00; LA400C, \$90; 440 SL mike, \$15.00; SWR Bridge, \$15.00. Alan Davis, WA2URT/2, Route 106, Syosset, L.I., N.Y. Tel: 516-921-6188.

FOR Sale: NCX-3 transceiver, NCX-A, NCX-D, also SSB Panoramic analyzer SB12A, Hewlett-Packard Model 201C variable AF oscillator (all with manuals and in excellent working condx), misc. KW components. Will deliver in NYC or Washington area. Write W2GBS, 341 Stanley Ave., Mamaronck, N.Y. 10543.

MUST SELL: Hallicrafters SX-111, Eico 720, 730, 722, excellent condition. Stuart Shydlow, WA2YTM, 2853 West 22nd St., Brooklyn, New York 11224. Phone 212-C06-1546.

QSTs 1933 thru 1957, in binders, best offer. Also misc. OST, Radio and CO, 1924 to date. Send for list. Want: 15-M coils for HRO-50, W0MTH, 1015 Edgewater Blvd., St. Paul, Minn. 55119.

SELL: Heath Cheyenne MT-1, \$50.00; Gonset Super 12 converter, \$200; Central Electronics 10B, 2 sets coils (80-40 and 20 meters) with VFO, \$80.00; homebrew linear, 300 watts, R13, w/p.s., \$50.00. Certified checks only. You pay shipping. Jim Scott, 4310 Hazard St., Houston, Texas.

SELL: Mosley TA-32 Senior Beam for 10-15-20 meters, in original factory carton, never assembled. \$45.00; Pick-up deal only, sry, Ed Abbott, 127-04 109th Ave., So. Ozone Park, Queens, N.Y. Phone (212) M1-0502.

IN Service, must sell: Hammarlund HQ-145C, DX-40, VFO and plate modulator, \$150.00. Foxarts, 85-50 Forest Pkwy, Woodhaven, N.Y. 11421.

HAM Radio Counselor, male, for co-ed camp in the Berkshires, Mass. Able to instruct campers in fundamentals of ham radio. Fully equipped, ham radio station. Write to Robert Kinoy, Camp Taconic, 451 West End Ave., N.Y.C., N.Y. 10024.

WANTED: For personal collection; WE 1A mike mounting case with or without 387 carbon mike. Also WE 618-A dynamic. Gardner, W0JJD, 223 Welch, Ames, Iowa 50010.

SALE: T150A xmt, R100A rcvr, mint condx, \$150.00 or \$80 apiece. WA9KYT, 2815 Vine Lane, Crystal Lake, Illinois 60014.

SELLING Hallicrafters SX62A, \$265.00. Wanted HT-33B linear kilowatt Matchbox. Gomme, 37-20 75th St., Jackson Heights 72, N.Y.

WANTED: 500 watt Multimatch modulation transformer. Matt Grove, W3BWW, 132 Bel Air Drive, Cumberland, Maryland.

BEAM Antenna, Hornet TB-500, \$25.00. Mosley RV4 vertical \$15.00. W2VHK, 210 Utica St., Tonawanda, N.Y.

GALAXY V AC supply, speaker console, \$400.00 cash, f.o.b. Omitting. Bought new last August. Perfect. K5YOB, Norris Russell, Stamford, Texas.

SELL: Collins 51J3 receiver converted for SSB, \$500; dual channel FSK exciter 2-6 Mc, power supply, cables, \$75.00; dual diversity audio RATT converter with spares, \$100; dual diversity IF RATT converter, power supply, cables, \$50.00; Model 19 teletype top condition, clean, \$150.00; Model 15 teletype, same condition, \$100; manuals on all except teletypes. Pack and ship all collect for \$85.00. You pick up for \$80.00. W. L. Brown, WA4TNW, Box 541, Sullivan's Island, S.C.

NCX-3, NCX-A, new, \$350.00. Need Novice gear. L. L. Baumgartner, Croton Falls, N.Y.

WRL Blue Book prices save money! Take 10% off these prices without trades. Communicator IV S, 2M or 6M, \$199.00; HT-37, \$269.00; SX-99.00; SX-101A, \$209.00; SR-150, \$389.00; Galaxy 300, \$189.00; Galaxy III, \$219.00; SB-33, \$209.00; NCX-3, \$219.00; RX1, \$149.00; TX1, \$139.00. Hundreds more. Free list. Leo, W0GPO, Box 919, Council Bluffs, Iowa.

PLATE Transformer 690 v. @ #450 Ma. No C.T. 117 v. 60 cy. pri. Sealed. New, \$3.95, plus postage. Wt. 19 lb. Other good transformer buys. Write for free list. A.R.C. Sales, P.O. Box 12, Worthington, Ohio 43085.

SWAN 350, complete with power supply, speaker. Like new, \$429.00 (no trade-ins). W8DEI, Box 218, Holland, Mich.

INTERESTING! Officers galore! Ham's trading paper. Next 12 big issues, \$1.00. Sample copy free. "Equipment Exchange-Ham Trader", Sycamore, Ill.

HALLICRAFTERS FPM-200 transistorized transmitter-receiver-transceiver. Complete self-contained, compact station incorporating advance features not found in any amateur radio at any price. Transistors, two VFO's for transmitting and receiving on different frequencies. AM, SSB, CW, VXC. Complete coverage from 10 through 80-meters, plus WWV. 6" wide, 5" high, 11" deep. Complete with AC unit and self-contained mobile bracket. Can be moved in seconds. This magnificent piece of equipment sold for \$265.00. Absolutely perfect condition. Will sell for less than half-price. WA6TLS, 7549 East Fourth Place, Downey, Calif.

COMPLETE Station for sale: Knight T-150A transmitter, Knight R-100A receiver (with S-8A speaker, 5-meter, and X-10 100-Kc crystal calibrator). Heath HW-32 transceiver with GH-12 PTT and VOX microphone, and HRA-10-1 (100 Kc. crystal calibrator). Heath 10-12 laboratory oscilloscope (with EF-2 applications course and low capacitance probe); Knight KG-650 R signal generator, Astatic DN-50 HIZ microphone with Model G desk stand; Dow-Key GK-60 GK relay; AIX manuals included. All like new, in excellent condition. Must sell. Going into Armed Services. Complete: \$440—no more, no less. Ronald Maloney, 639 Madison St., Brooklyn, N.Y. 11221. Tel: GL 3-5509. WBRZE.

FOR Sale: NC-300, Viking II with VFO, original owner, in good condition, \$250.00 for all. Equipment now in service. Brandon Ewing, K5DSJ, 2607-Hynson St., Alexandria, La.

CHRISTIAN Ham Fellowship being organized for Christian fellowship, tract ministry, missionary efforts among hams. Christian Ham Callbook, \$1 donation. Write for details from Christian Ham Fellowship, 5857 Lakeshore Dr., Holland, Michigan 49423.

SALE: Clegg Zeus xmitter and interceptor receiver, 150 hours in use, like new, must see to appreciate. Reasonable. Edward Pardocch, 117 Woodbine Street, Brooklyn 11221, New York. Tel: GL-5-0922 between 8-10 PM.

SELL: T-150-A, \$75.00; 75W CW xmt, \$35.00; 20W CW xmt, \$10; BC457A VFO, \$10. Will ship. WB6IEX, 4745 Mt. Durban, San Diego, Calif. 92117.

FREE 4CX300A tubes worth \$192.00 with purchase of HT-33 linear. Maximum legal power. Call A. Salzman, WB2NEE, 203-TR-9-6369.

ANYONE Ever have luck de-TVing the B&W 5100? W3PLK. COLLINS KWM-2 with Waters Q-Multiplier, 312B-5 console with 516F-2, low hours, like new, \$950.00. Ashton, 1 Dew Lane, Darien, Conn. 203-655-9997.

FOR Sale: 32S-1, 75S-1, rejection tuning, 800 cycle c.w. filter, aligned last year by Collins; \$750.00; HRO-5, power supply, spkr, 3-7.3 Mc. coil, \$45.00; 4 section 40 ft. crank-up, stainless cable. Needs 4-5 element Telrex 20-meter and 2-element Telrex 40 meter. W2LEC, 60 Willow Court, Shrewsbury, N.J.

WANTED: Many types Military, Commercial, Surplus, Airborne, Ground, also test-sets. Try the Big Boys, then write or call collect Area Code 703-560-5480 and give us your price. We pay cash and freight. Ritco, P.O. Box 156, Annandale, Va.

RME-6900, \$185. Dave Bates, W2HLI, 40 Scudder Ave., Northport, L.I., Tel: AN 1-3568.

FOR Sale: SB-100, SB-200, SB-300, Wanted. Any kit to wire and repair, prefer Heathkit. Most Heathkits in stock. Business ref. on request. Ian Richter, 131 Florence Dr., Harrisburg, Penna. 17112.

FOR Sale: Hallicrafters SSB Station: SX-101A, HT-32, HT-33A with manuals and Dow-Key relay with cables, \$700.00. Ameco CN-144 converter/power supply, \$30.00, 80 through 10 meter trap dipole, \$10.00. For estate of W9ITZD, contact WA9AB1, 305 North Middle St., Portland, Indiana.

DX-100B/SSB modification. Excellent, \$115.00 WA6GOJ.

HEATH HR-10, \$50.00; Heath HD-11 Q-Multiplier, \$80.00; Knight R-55, \$25.00, all with manuals, you to pay postage. De-Voc. Apt. C-8, 5314 85th Ave., Lanham, Maryland 20801.

FOR SALE: NCX-3, with AC and mobile supplies, all \$340.00; Olsen RA570 6 Mtr. rcvr and 4 ele. beam, both, \$90.00. Will ship W9GVB, Bob Fisher, 5828 W. Washington Blvd., Chicago, Ill.

HAMMARLUND HQ-145X. Little used, Best of care. \$135.00. KH6EWG/O, 4181 Chartley, Bridgeton, Missouri.

TR-3, AC, DC. Best offer around \$500 before month end. Might consider HW-12. WA9JPU, 828 Reba, Evanston, Ill.

BC-221 with AC supply, \$50; Hammarlund HK-B keyer, \$25.00, both in excellent condition. W5MUG, 2469 Paden St., Jackson, Mississippi.

WANTED: CE-200V or B&W 6100 mint condition, unmodified. Offers to Rylands, VE2 AKQ, 214, S. 152nd St., Seattle, Wash. 98148.

DRAKE 2-B with calibrator, \$190.00; SX-110 with matching R-48 speaker, \$90.00; Eico 720, \$50.00. Each is perfect electrically and physically. Manuals included. K3MTG, 202 Gilbert E., Newark, Delaware.

TR-4, \$480.00; AC-3, \$68.00; DC-3, \$108.00; all factory sealed, never opened. Warranty, naturally. Sell separately. Perfect SB-200, \$185.00. K4LGR, Box 10021, Greensboro, N.C.

TWOER, \$40.00; DX-35, \$30.00. WB2QJA, 116-02-221 St., Cambria Heights, N.Y. 11411.

SELL: HW-32 transceiver 20-meter, \$110.00; HRA-10 crystal calibrator and HP-23 AC power supply, \$37.00, or, take all for \$145.00. New condition. Also have Hallicrafters S-76 double conversion general coverage receiver with matching speaker. When new over \$300. Will take \$80.00. Marsh, 16 Dellwood Court, Colonia, N.J.

SELL: SR-150, AC, DC power supply, mobile mount \$650.00; linear P & H LA 400C factory wired, \$150.00; Mosley 1A-33 Sr w/40 meter conversion, \$100.00. Hustler mobile antenna with 20-20 resonators, make offer. All equipment in excellent working condition. Your offer? W8SZF, 3075 Scarborough, Cleveland, Ohio 44118.

HA-5 VFO, excellent, with manual, \$40.00. WB2NLA, 368 N. Monroe Ave., Lindenhurst, L.I., N.Y. Tel: 212-TU-4-7970.

SALE: 6 meter rig. Clegg 99'er complete with mic, 4 xtals, new ant., hook-up cond. mint. cond. first \$800.00 takes all. John H. Edris, Jr., WA9IRH, 901 Parkway Drive, Bluffton, Indiana 46714.

SELL: VHF-UHF gear. Gonset 900A 2 mtr. SSB/CW/AM transceiver, \$299; Clegg 99er 6 mtr AM transceiver, \$90; Int'l Xtal AOA-420 5/4 mtr ptr/amp mod; ext. bias, BNC in-out; w/1 \$50; Hy-Gain 5-cl. 2 mtr. ant., \$6.00; Skybeam 10-cl. 3/4 mtr. ant., \$15.00; Homebrew 10 cl. 4/2 Mc. crossed yagi, \$19.00; Finco A62GMC 2 bnd ant., \$22.00; ASB-6, -7 CRT indicator-ball OSO. SASE for accessories, components, forms cash, F.o.b. except ants. Pickup only. R. P. Britt, 1500 Simpkins, Raleigh, N.C. 27606.

MUST Sell: Heath Marauder HX-10 SSB TX; all bands, modes, like new. \$210.00; make offer. Hiram Jackson, WA4UET, 1106 E. College, Griffin, Ga., Tel: 404-227-8496.

FOR Sale from the estate of Hal Woods, WA2OUE: Hallicrafters HT-33B, \$425.00 and SX-101A, \$225.00. Mrs. Zadie L. Woods, 150 E. Valleybrook Rd., Cherry Hill, N.J.

SB-33 with D.C. Supply and mounting plate: \$240.00 firm. WA2FSD, Tel: 516-HU-2-2737.

ATTENTION: Large ship maritime mobile, Gothard Dynamotone input 110 D.C. 2.5 amps continuous duty, output 550 volts, 275 watts D.C. and 78 volts 1.28 amps, 60 cycles Complete with starter, \$65.00. Also Lampkin 105A frequency meter, excellent condition, \$150.00. W2KZ, 61 East Depew Ave., Buffalo, N.Y. 14214.

ARIZONA: HQ-160, matching spkr. DX-40, HG10 VFO, relay, Gonset c.w. monitor. Shure mic, key, manuals, like new, wkd VKs and ZLs. Will ship, w/ pay. First certified check for \$230.00 takes all. K7FEZ, Ken Stroud, 4139 E. McDowell, #C-102, Phoenix, Ariz.

2M Communicator III, \$150.00; Communicator IV, \$190; Heath Apache xmr, \$135.00; Ranger I xmr, \$110; Johnson Matchbox with built-in SWR, \$60.00. Send stamp for list. John Kalstys, W2FNT, 18 Hillcrest Terrace, Linden, N.J. 07036. Tel: 201-486-6917.

SELL Together: NCX-5, NCX-A, xtal calibr., mount, MK II carrier balance kit, but not installed: \$525.00. You pay shipping. R. J. Doherty, Box 247, Rye, New Hampshire 03870. Tel: 603-964-8912.

COLLINS 32V2, very good condition, \$100. Cash and carry only. WA2LJX, Gerald Byrnes, 203 High Ave., Nyack, N.Y. 10960.

SELLING: AF67-PMR7-M1070. Good cond. \$100. W2RSV, Fine, N.Y.

SELL Twoer, \$40.00; DB-23, \$20.00; Johnson T-R switch, \$15.00; all excellent. Swap like-new K-W Matchbox for 775 Matchbox with SWR meter, plus \$40.00. Want Alko keyer, K7-HLR, Box 1176, Twin Falls, Idaho 83301.

SELLING: Heath Marauder, HX-10, \$225.00; Heath Mohican, F.C.A., \$40.00; Heath Tunnel Dipper, HM-10A, \$24.00; HQ-180C, \$225.00. All with manuals and like new. Also have, CV-60/URR (URA-8), freq. shift conv. and FRA conv. Write K2CIP, Leo W. Schubert, 73 Jefferson St., Brooklyn 6, N.Y. 11206.

SELL: Hallicrafters SX-117 revr, \$299.00; HT-44 xmr, \$288.00; PS-150 AC power supply, \$69.00; HT-45 linear w/P-45AC power supply, \$390.00. All one owner, excellent condition. You pay shipping charges. WA1AKL, 49 Pondview Drive, Chicopee Falls, Mass.

HAM Paradise for sale on beautiful Maine lake. Fully equipped station with 200 sq. ft. main tree, 300 ft. lake frontage, 10 acres, boating, fishing, swimming. W1AUR, H. G. Riley, Fayette, Maine.

SELL: Heath HW32 transceiver, excellent condition. V1VW, 41 Middlefield Drive, West Hartford, Conn.

WANTED: CV253/ALR, TN-17 tuners; Mercury (Quicksilver); standard meters; electronic counters; test equipment. Engineering Associates, Dayton, Ohio 45419.

DRAKE TR-4 MS-4, new at Xmas with Astatic G-stand, D-104 microphone, B&W 426 low-pass filter, \$575; homebrew linear 3 811A with power supply, \$60.00. K6JVT, 1247 Encinitas Road, San Marcos, Calif.

SELL: AC model Instructograph with manual, ten Continental Morse code tapes and Buco Codemaster oscillator, \$25.00 postal money-order. Albert Martin, DAC, G4, 8th Army, APO San Francisco, Calif. 96301.

SELL: New Heathkit HX-11 xmr, assembled. In exclnt condx. \$40.00. Will ship c.o.d. Roger Harding, 2490 36th Ave., San Francisco, Calif. 94116.

SELL: Heath HW-12 80M SSB transceiver in mint condx; \$100 plus shipping. K0DXX, 700 E. 1st, #10, Orange, Calif.

HEATHKIT Mobile power supply HP-13, excellent condx. \$45.00. G Richard Cartledge, K4FGX, Rte. 1, Box 53, Abbeville, South Carolina. Phone 803-446-2603.

COLLEGE Expenses force sale of 6K2 meter Hallicrafters transverters Model HA-6 and HA-2 with P-26 power supply. New factory warranty. Will work with any low-band equipment to produce 200 watts P.E.P. any model on 6 & 2 meters. Nuvistor receive section. Cost \$600 new. First \$400 takes all. Equipment now in Barrington, Ill. Contact Craig Pitcher, WA9HRN, c/o 1202 Roads Hall, Indiana State University, Terre Haute, Indiana.

COLLINS 75S-3B, 32S-3, 516F-2, 62S-1, all in mint condx. postage and factory cartons included. First \$1425 takes all K90PC, RR #4, Huntington, Indiana.

\$24 Vibronex Original, practically new: \$15. Mike Truitt, 2705 Sunset Lane, Greeley, Colo. 80631.

VIDICONS, RCA and GEC, image orthocon, CDE rotor, Heath test equipment, Radar Sentry, VHF frequency meter, inverter, plus more. Write for list. WB2GKF, Stan Nazimick, 506 Mt. Prospect Ave., Clifton, N.J. 07012.

THORDARSON Multimatch 250 watt input and output pair. Several milliammeters, Simpson, Several 300 Ma chokes. New 813 tubes. Write for list, or make an offer. WA4YM.

DRAKE 2A receiver with xtal calibrator 2-BQ, Q multi/spkr combination, \$199.00. Instructograph, \$25.00. Bob McDowell, 18916 Rynnmede St., Reseda, Calif. Tel: 343-9741.

HAM, over 18, General Licensee, to instruct at a children's camp in Pocono Mountains in Pennsylvania. Own equipment required. Please explain type equipment and further qualifications to Pocono Highland Camps, 6528 Castor Avenue, Phila. 49, Penna.

SB-300 for sale, \$240.00. K1RFB, 36 Maple St., N. Wilbraham, Mass.

WANTED for cash: Precision E200-C Signal Marker generator in perfect working order. Local preferred. Harry Register, 25-94 42nd St., L.I.C., 3, N.Y.

WANTED: DX-60, HG-10. Write to A. Windsor, 23550 Whitaker, Farmington, Mich.

COMPLETE Toroidal transformers, cores for the "BKG", D.C. power supply, Dec. 1965 QS". G. S. Toroids, 24236 Walnut, Lomita, Calif., 90717.

RANGER II, like new appearance, in exclnt condx, \$185.00. J. J. Bittens, W8WTK, 6463 Buckingham Dr., Parma, Ohio 44129.

CE20A; OT1, Lakeshore Bandhopper VFO, homebrew, 200 w/P.E.P. linear with p/s, \$160.00. WA2TIF, RD 3, Box 314, Saugerties, N.Y.

SELL: Invader 200, \$260.00; Cesco reflectometer, \$15.00; Johnson T-R switch, \$15.00; Johnson low-pass, \$7.00; Hy-Gain R-4, \$75.00, with ground rods and coax. All complete with manuals and in excellent condition. Will consider trade for good general coverage receiver or stereo phono or tape system. D. Kurs, 775 Plympton St., New Milford, N.J.

WANTED: Drake R4-A receiver. Will pay cash or will trade in Drake I-A, Lewis West, W0AIO, 3514 St. Louis, Wichita, Kansas. Tel: 1-316-WH3-5179.

CIRCUITS Constructed from ARRL Handbook, QST, etc. Work guaranteed. Free information, (new address) WA6IKV/9, George Whitmore, 430 W. Elliott, Springfield, Ill. 62702. Tel: 528-0514.

6N2 Thunderbolt, \$395.00; new vacuum variable 1000 mmfd, \$29.50; 50 mmfd, \$25.00; Comm. Inv. 220 Mc, \$185.00; Centimeter 432 Mc tone xmr, w/ swr supply, \$150.00; Olson transistorized TV camera, Panadaptor VM-2 and other bargains to clean shack. List for stamp, W4API, Box 4095, Arlington, Virginia 22204.

DX-100 for sale, in good condition, \$75.00. For information, write: Alton Czichos, WA5LLJ, Moulton, Texas.

KWM2-516F-2 supply, 1J2B5-301I, dual serial numbers: Milken Transmatch 92200; Hy-Gain dual-bander 30-40, 1144 Tri-band Ham-M rotator; 75M Cliff Dweller, 660 E-V mic. Make an offer, by piece or all. WA9DSY, Tel: 812-476-3426.

10 Volt, 20 amp, plf, xfers; size: encased 5 1/2 in. square, \$7.50 plus shipping. K3MNI.

SELLING Excellent Eico 720, 730; Knight VFO; Ameco CPO monitor, w/manuals: \$145.00. Will deliver locally. Lawr. Serra, 213 Foulke, Princeton, N.J. Tel: 609-924-3383.

WANTED: Antique transmitting and receiving tubes made prior to 1920. W2EZM, 431 Oakland Ave., Maple Shade, N.J.

RANGER II, PTT, FW, in exclnt condx, \$165.00. K1IGO, 9 Captains Walk, Clinton, Conn.

FOR Sale: JX-60, \$70.00; HG-10 VFO, \$25.00; HQ-110 with speaker, \$150.00; KW with two 813's, \$100.00; all in excellent condition. Larry Rothschild, 700 West 178 St., New York, N.Y. 10033. Tel: (212)WA-8-9067.

HALLICRAFTERS SX-117 receiver, \$285.00; Johnson Viking kilowatt amplifier, \$1095.00. W. Bruring, Route 2, Box 313, Onalaska, Wis.

REAL Bargains! A ton of tubes, variable capacitors, crystals, transformers, meters, tool, surplus. No room left to keep it all. SASE for list. R. L. Baldwin, W1KE, 26 Ridge Road, Simsbury, Conn.

HEATH Marauder HX-10 SSB transmitter, excellent condition, recently factory overhauled: \$165.00; SX-99, good working condition: \$50.00. F.o.b. Radio Club, Maryknoll Seminary, 1316N Elwyn, Illinois 60137.

MARAUDER HX-10, factory tuned, \$300 or best offer. Gonset G-630 ham-band receiver with Collins 3.1 Kc mechanical filter, \$130.00 or your best offer. K3ICY, 2450 Laketon Road, Pittsburgh, Penna. 15221.

SELL: 40W Homebrew 40 mtr. QRP xmr in blue steel cabinet. \$35.00; new Lafayette VFO HA-90, \$25.00. Both in excellent operating cond. Tom, WB2PAR, 1090 Arlington Road, New Milford, N.J.

GYPSIES Going into air-conditioned Dodge motor home; need Gonset 2-meter VHF linear, CB walkie-talkies; selling, so will trade or take highest bid soon on new Collins 516E1 12V DC power supply, Heathkit MR-1 receiver, Communicator IV 220 Mc. Also self-contained 20 ft. Mallard trailer with awning, axle hitch and so forth. Picture shown in May issue QST, p. 93. No ridiculous offers considered. W9OKM, 1207 Oneida St., Joliet, Ill. Phone 815-725 3468.

600 pIV at 750 Ma. Topbats, includes by-pass capacitors and resistors, 10 for \$3.00. Postpaid USA. Fully guaranteed, East Coast Electronics, 123 St. Boniface Rd., Buffalo, N.Y. 14225.

SELL: SBE-33 mobile supply. Hustler with 40880 coil. All for \$200.00. Robert Klausner, 1339 Shanabrook, Akron 13, Ohio. NEW Galaxy II with D.C. supply. Like new NCX-3 with both supplies. Best offer. Lots of other gear, SASE for list, R. P. H., 9600 S.W. Highway, Oaklawn, Ill. 60453.

NAVY Receiver, 15 to 600 kilocycles, 74 pounds, \$45.00. Dumont Model 405 VTVM, original cost \$260.00, 120 megohm input impedance, \$75.00. Will swap for VHF gear. H. Ohlander, WA6SPJ, 3762 Gondar, Long Beach, Calif. 90808.

SELL: Heath Marauder excellent condx. Will deliver to within 200 miles, \$210.00. Gonset Super 12 converter, \$25.00. Robert W. Curry, W9UYW, 5227 E. 21st St., Indianapolis, Ind. 46218.

TOOOBES: 6146B \$4.00; 6CW4 \$1.40; 417A, \$3.95; 6360, \$3.45; 6146, \$2.55; 5894, \$1.50. All new, boxed and guaranteed. No pulls, seconds or JAN. Catalog of many other types, free. Vanbar Distrib., Box 4442, Stirling, N.J. 07980.

HA1 electronic keyer and Vibroplex key. Almost new. Will swap for Triband beam or \$70. WA1BWS, Roger Burnham, RFD #1, Danby, Vt.

SELL: Eico 753 transceiver with factory transistor VFO modification for stability. Very stable. Neat. \$185.00 plus postage. K3JML, 142 South St., Nanticoke, Penna.

LAFAYETTE HE-80 receiver, speaker, manuals, original carton, excellent, \$90.00. You ship. WB2SYH, 25 Pheasant Lane, Orchard Park, N.Y.

RANGER I, factory PTT, \$130.00; HQ-129X receiver, \$100. Both in mint condition w/manuals. W2ZBS, 57 Alda Drive, Poughkeepsie, N.Y.

SB-200: in excellent condition. Best offer over \$180.00. WA1-AOE, 103 Mendon St., Hopedale, Mass.

GUARANTEED A-1 reconditioned equipment on approval. Terms: Collins 755-1, \$299.00; 301-1, \$349.00; 75A-4, \$395.00; 325-1, \$439.00; 305-1, \$675.00; Hallicrafters SX-101A, \$219.00; HT-37, \$269.00; National NCX-3, \$225.00; NCX-3, \$225.00; NCX-5, \$445.00. Other equipment. Write for lists. Henry Radio, Butler, Mo.

TB-500, TV rotator/control, \$65.00; Heathkit AA-151 stereo amplifier, \$45.00; Knight V44 VFO, \$15.00; UE577A, \$15.00 pair; Hallicrafters R48A speaker, \$12.50; CF-145 Century crystal filter, w/one Osc. crystal, 12.50. Prices prepaid. WA5ENP, 145 Karen Dr., Lafayette, Louisiana 70501.

HT-37, \$245.00; 2B and 2BQ, \$210.00 or best offer. Also EV729 mike, \$7.00; AT-1 xmt, \$10.00. Don, K7SDF, 510 Columbus, Salt Lake City, Utah.

COLLINS 755-1, \$280. DX-60, \$60. Both excellent. Tom Tichy, 11 Hiawatha, Clarendon Hills, Illinois. Tel: 312-323-7017.

WANTED: Johnson Thunderbolt for 6 & 2 meters in sud condx. WA9FNH, 1118 Douglas St., Alton, Ill. 62002.

HEATHKIT Tunnel-Dipper, HW-10A, Complete. Hardly used. \$21.50. WA3BSV, Bates, 532 Locust St., Hazleton, Penna.

POST-CHECK Extra Class, Amateur Extra and General Class FCC type exams, complete in detail and style, even to the IBM TYPE ANSWER SHEETS! A must for checking before taking an exam. General Post-Check consists of 297 questions and explained answers for only \$2.98. Extra Class, 175 questions and diagrams with explained answers, \$2.00. A very good aid to learning and a Must in preparation for FCC exams. 138 questions of the 297 in the General Post-Check apply directly to Extra Class also. Get both for only \$4.50 postpaid. Post-Check, P.O. Box 3564, Urbandale Station, Des Moines, Iowa, 50322.

BIRD Thru Line wattmeter, model 43 wanted. Super Pro SP600 series or IC 778-79 wanted. Rcvs must have instruction books and schematics. Wilber Cox, 810 Pendleton Ave., Anderson, Indiana 46014.

NEW YORK City area: NC-303, \$225.00; Viking II w/122 VFO \$120.00; Johnson T-R switch, \$12.00; W9TO keyer, \$25.00; Meissner Model EX Signal Shifter, \$20.00; W8FYQ key, \$15.00; Mark Krisburn, WB2HWB, 250 Sharpe Ave., Staten Island, N.Y. 10302. Phone: (212) 442-1352.

MOHAWK, in mint condition; no scratches! \$165.00. Apache in condition. Shows some wear but works great. \$120.00. Both for \$275.00. F.o.b. Ray Hess, WAOKLH, Henry, Nebraska.

20A and VFO, in good condition. General Radio 1175B freq. monitor, new; \$110.00 each. Bob Snider, WA3BNB/3, RD#4, Lewistown, Penna.

HELP! Spring cleaning: S-120 receiver: DX-60, Beautiful Eico VFO. Want Triband quad. WA5CTD, 4308 Briarcliff, Wichita Falls, Texas.

HALLICRAFTERS SX-140, exclnt condx, \$65.00. Norman De Ved, WB2TVV, 636 Shirley Parkway, Piscataway, N.J. 08854. Tel: (201) 469-0820.

SELL: NCX-5 transceiver and NCX-A power supply, perfect. \$495.00. W5NTL, Rte. 3, Box 794, Oklahoma City, Okla.

HALLICRAFTERS SX-100 and R-46A speaker, \$130.00. F.o.b. W5EDX, 645 East Woodlawn, San Antonio, Texas.

SELLING Collins 32V3, \$200.00 and HW12, \$100.00. All in good condition. Doug Smyth, Bridgewater, Conn.

COLLINS 32V2 transmitter, good condition, \$98.00. M. B. Johnson, 1135 Tamarack Trail, Chattanooga, Tenn.

CLEANING Out: Going to college. Pacemaker, \$150.00; SB-300 with c.w. filter, \$250.00; TH-4 beam, \$40.00; HK-1B keyer, \$20.00; AR-22 rotor, \$20.00, \$460 takes everything. Keith, WB6ILH, Hilldale, Berkeley, California.

HIGHEST Bidder takes R-100, Phil Goodman, Box 442, Akron, Colorado.

LAFAYETTE H-E 45 w/crystals, PTT mike, cables for 12v and 115v shipped, \$90.00. Two RME DB-23 Preselctors, shipped \$20 each; Heath QF-1, O-Multiplier, shipped \$15.00; rebuilt Hallicrafters S-40B w/Q-Multiplier. Nolstop, 100 kc xtal calibrator, Shipped \$125.00. E. D. Yoes, Jr., W5MOL, 1400 Lorain, Austin, Texas.

SELLING NCX-3 transceiver AC/DC power supply, \$300. Mavor, 115 Stuyvesant Place, Staten Island, N.Y. 10301.

BEST Offer: QSTs 1930 through 65 except 42 to 46; COs 1947 through 1965, plus old radio books and magazines. 500 antique Bodine Motor generator, excellent. Ellis Tovrea, WOFKA, deceased. Ida Lee Tovrea, 303 West Saunders, Mt. Pleasant, Iowa.

6-12-115V G66B, G77A, perfect condx, \$159.00. K6EWM, Gordon, 2820 Benvenue, Berkeley, Calif.

CRYSTALS Airmailed: SSB, Marine, Novice, Etc.—Custom .01% FT-243 any frequency 3500—8600 \$1.90. (More than four \$1.70 each.) (Nets above 9 same frequency \$1.35) 1700—2000—\$2.50. Overtones above 10,000, 370—540 FT-241-A, \$2.95. Add \$5.00—.005%. Above 2000 add 75¢ miniature HE-36/U. Write regarding ARRL-QST Handbook, SSB and Mobile Handbook, G.E. Crystals, Airmail 10¢/crystal, surface \$¢. Since 1933. Write for literature. C-W Crystals, Rt. #2, Box 22-B, Marshfield, Missouri 65706.

CASH For Collins gear. For offer state condition and serial number. Elvin Miller, 3845 Kipling Avenue So., Minneapolis, Minn.

NEW GPR 90 rcvr and new PAL 350 SSB power amp. Both used less than 10 hours. First reasonable cash offer, or trade for 10 1/2" reel tape deck. N.Y.C. Tel: ST-9-4170.

WANTED: NC-101-X, QST January 1920. Selling Johnson Mobile, \$25.00; BC-459, \$8.00, 50-watt 160-meter c.w. transmitter, VFO, p/s, \$20.00. Charles Copp, W2ZSD, 337 Jamaica Blvd., Carle Place, N.Y.

RANGER I, \$110.00; RME-6900 \$250.00. Mike Bellinger, 2110 Lincoln Way, Ames, Iowa.

SELL: TH-3 beam, new, sealed carton, Leon Steinberger, W2EVV, Tel: (212) BU-2-4737.

SELL: HR0-60 with Universal Product detector, A, B, C, D, AA, AC, AD coils and Collins 32V-3 with three spare 4D32s. Equipment in like-new condition. Both \$395.00. Harris Yarbrough, W5JPC, 3937 Millanov, Dallas, Texas 75225.

FOR Sale: Lafayette HE-80 receiver, like new, \$100.00; DX-100, \$100.00. Barry Rupp, WA3AJU, #52 Martin, Ephrata, Penna.

4-400A, \$9.00; 813's, \$5.00, 866's, \$2.00; 3B28s, \$3.00; Johnson Bug, \$5.00; Dug coaxial relay, \$3.00. Used transformers; 3000V \$175.00. Hoge Auto, \$10.00. Soda constant voltage, \$10. All good. Write: WA5IBV, Harris, 422 Retama, Harlingen, Texas. COLLINS KWM-1, perfect, no mobile use, \$290.00. KOGVX, 1900 Muscatine, Iowa City, Iowa.

SX-111 Hallicrafters receiver in like-new condx, \$145.00. K3JPSW, 240 Irochthay Lane, Wayne, Penna. Tel: 215-687-3194.

DRAKE 2B in 2BQ and calibrator, almost new condition, \$200; also National NC-155 with calibr., \$80.00 and DX-40 with push-to-talk, \$40.00. Both in exc. condx. General Radio LR-1, good condition, \$30. (Geoff Peters, WB2GWT, 182 Vreeland Ave., Midland Park, N.J. 07432.)

SR-160 with 12-vo DC supply, PS-12 DC exc. condition. Make reasonable offer. K9DQO, Dres. Brox 273, Palos Heights, Ill.

SPRING Specials: HO180C—\$219.00; HO110C—\$119.00; HO100C—\$99.00; NC300—\$179.00; SX100—\$179.00; Drake 2A—\$159.00; SX101A—\$189.00; LSA3 W/D.C.—\$189.00; 75A4—\$379.00; GSB100—\$225.00; HT37-New, Boxed, \$345.00; 75A3—\$250.00; 75A-1—\$145.00; Free List. Howard Radio, Box 1269, Abilene, Texas 79604.

KILOWATT Linear, Gonset GSB-201, worked over 220 DXCC countries in a year with this bomb. First certified check for \$175.00. F.o.b. W3FLY, Herb Strauss, 420 Bluebird Lane, dresher, Penna.

HW-32 Transceiver, in sud condx, \$85.00; HA-14 linear and HP-24 AC supply (both in exnt shape), \$125.00, HP-14 DC-KW p/s for HA-14, never used, \$75.00. HP-23 AC supply, \$30.00. If bought complete, \$300.00. John Permen, W6BMF, 11861 West St., Garden Grove, Calif. 92640.

SELL Drake 2B, excellent, \$190. Cash and pick-up only, no shipping. Write G. Hertzsch, 400 W. 119th St., N.Y., N.Y. 10027.

SALE: Oen Viking Invader, new condition, no scratches, \$385.00. No trades. W2STW, Frank Andrews, Harding Highway, Newfield, N.J. 08344.

FOR Sale: Johnson Invader 200 transmitter, and E-V PTT mic. Good condition. \$285.00. Henry Miller, W4VCJ, Hudson, Fla.

KWM-2 \$550; PM2 AC supply, and mobile DC supply, \$200. W9ATU, 1206 Fremont, Belleville, Ill. or Don Klein, Good Samaritan Hospital, Cincinnati, Ohio.

SX-117, HT-44, P-150AC, CA-44, all in mint condition, original cartons. First certified check or money order \$600. Robert W. Raymond 108 Osage St., Virginia Beach, Va.

GSB-100, for sale. Gonset SSB AM CW PM transmitter in excellent condition with manual \$200. Will ship collect for charges. Bruce Haskin, WA8FGD, 612 E. Tallmadge Akron Ohio 44310. Call 216-376-4201 in P.M. No one else can answer phone but me.

COLLINS: 75 S-3 \$400.00, 32S-3 516F2 power supply excellent condition \$550.00, RME 4300 with 4301 SSB adaptor \$90.00, HT 37 \$215.00 B&W 370 SSB adaptor \$25.00, RDO receiver with two tuning units and manual \$50.00, Commercially bound volumes of QST with gold embossing 1940 thru 1964 \$150.00, Push pull 4CX300A's kw 2 meter, final including tubes, blower complete, test power supply \$100.00, New 4A0 A's \$20.00 each, new 4X150 A's \$8.00 each, PP4-65 A's in table top cabinet with built in 110 volt power supply 80 thru 10 GG 500 watt final \$75.00. Write or call James N. Long W4ZRZ P.O. Box 6742 Birmingham, Ala. 35210, phone 592-9998.

QST 1956 thru 1965; CO 1958 thru 1965; single issues 25 cents each, postpaid. W2KJY/4, 2804 Broadview Dr., Huntsville, Ala. 35810.

SURPLUS Navy type TBK-19 c.w. transmitter, 2000-18100 Kc. 75 to 500W output. Unused. Never uncrated, \$275.00, less motor gen. power supply. Ship anywhere U.S. shipping charges collect. Electronics Surplus Co., P.O. Box 1225, Boaton 02104. HALLICRAFTERS SX-99 receiver with Heath O-Multiplier. In excellent condition. \$75.00 WA8OTM, 926 So. 13th St., Niles, Mich.

COLLINS S/Line 32S-2, 516-F-2 AC supply, \$650.00; 75S-3, \$475.00; HW12, HP13-DC power supply, GH-12 mic, scrk, Hustler 80 resonator all cables, \$165.00, DX-35, VF1 VFO, \$50.00, R. Levine 19 Jackson Ave., Washington, N.J.

SELL: Eico 720 transmitter, perfect for Novice, \$65.00; Gonset all-band comm. receiver, \$100. Both in perfect condition. WN2TAN, Paul Bergmann, 147-31 38 Ave., Flushing, N.Y. 11354. Tel: 212-FL-8-0951.

MUST Sell! SB-33 transceiver, mobile mount and power supply. New-Tones Model MO-2, butane mast, heavy-duty spring, 15-20-40-75 meter resonators, Shure 401A mike; \$325 or best offer. Also 53A, heavy duty alternator, \$30.00. All used only five months. Jim Crouse, CT1, K4SET, U.S. NCTC, Corry Field, Box 15368 Pensacola, Florida 32511.

75A4 and KWS-1. Pick-up price both \$875.00 or KWS-1, \$575.00 or even trade on complete KWM-2. Tom Hopkins, 7224 Alexander Dr., Dallas 14, Texas.

USED Industrial instruments for sale or trade for ham gear. 1 to 10 Leeds & Northrup Electromax DAT temperature controllers 0-550 degrees C. 1 Foxboro M/45 30" VAC-150 PSI pneumatic transmitter. Want to buy HA-2 and PS. Curt Fouse, Box 2, Washington, W. Va.

APACHE: Like new, \$100. K8ORO/1, 3 B Denton Road, Westover AFB, Mass. 01022. Phone 593-5217

TELETYPE: Model 28 KSR. Excellent condition. Home-brew converter included. Write for price or make offer. You ship. WASOAK, 1613 North 17th St., Sheboygan, Wisconsin 53081.

SELL Or trade. Need transistorized marine equipment or machinery like router, bandsaw, mill, lathe. Have two KWM-2, 301-1 516F, 516F-2, 312B. G. A. Walters, W6MUY, 6530 Mana Mana Pl., La Jolla, Calif.

CW Inking Recorder, BC-1016. Speed variable from 0-400 wpm. Records directly from receiver audio, or from a key for making practice tapes. Tapes can be read visually, or run through IG-10 or IG-34 keyers. Brand new; including all tubes, manual, extra pens, maintenance tools, power cord, etc. \$139.95 F.O.B. Cleveland, Ohio. Telemethods International, P.O. Box 18161, Cleveland, Ohio 44118.

DRAKE 7AX, \$280; R4 receiver, \$280.00; MS4 speaker, power supply, \$45.00. Bought new Nov. 1965. Ray Conway, W6WNA, 2012 No. 6th St., Burbank, Calif. Tel: VI-9-3720.

VALIANT FW Good condition. \$150.00; Meissner FX Signal Shifter adapted for 19" rack, \$25.00; Revere 888 automatic slide projector, 32 trays and carrying case, \$50. W9JIC, 1424 East Main, Saint Charles, Ill.

"HOSS-Trader." Ed Moory—Offers New Equipment in Factory sealed cartons at Fantastic prices: CASH ONLY, SR-500 & P-500-AC supply Regular price \$515.00, Special Price \$379.00; Mobile Package, SR-160, P-150 D.C. Supply and MR-160 Mobile Mount Regular New Price, \$473.95, Special Price \$259.00; New Galaxie 2000 Watt linear, \$339.50; Swan 350, \$349.00;

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S/LINE, 32S-1, 75S-3, 516F-2, \$750. K3JZH.

NC-98, excellent condition, quick sale, \$70.00. W2ETB, 1028 76 St., Brooklyn, N.Y. Tel: BE-1-2360.

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FOR Sale: KWM-2 (Serial 11.300) 516F-2, 312 B-5, \$1000; TR-4, AC-3, new, \$595.00. James Craig, 172 White Birch, Portsmouth, N.H. Tel: 603-436-9062.

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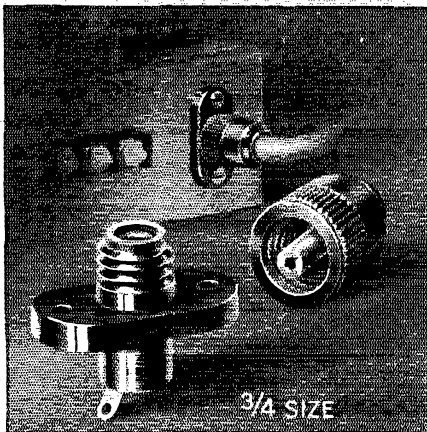
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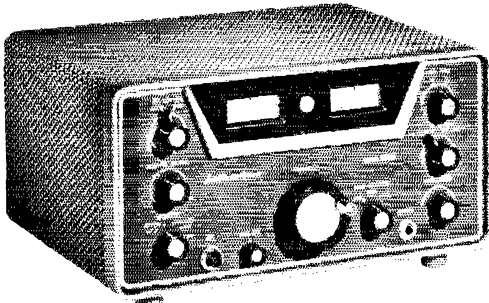
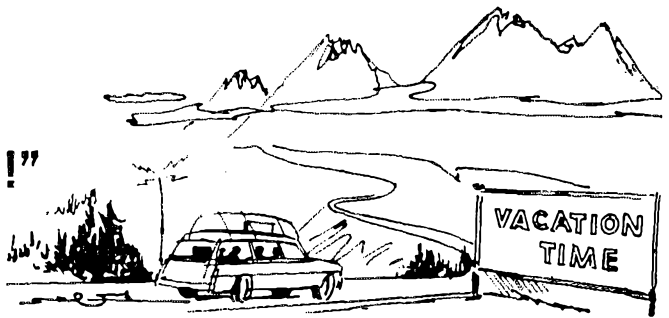
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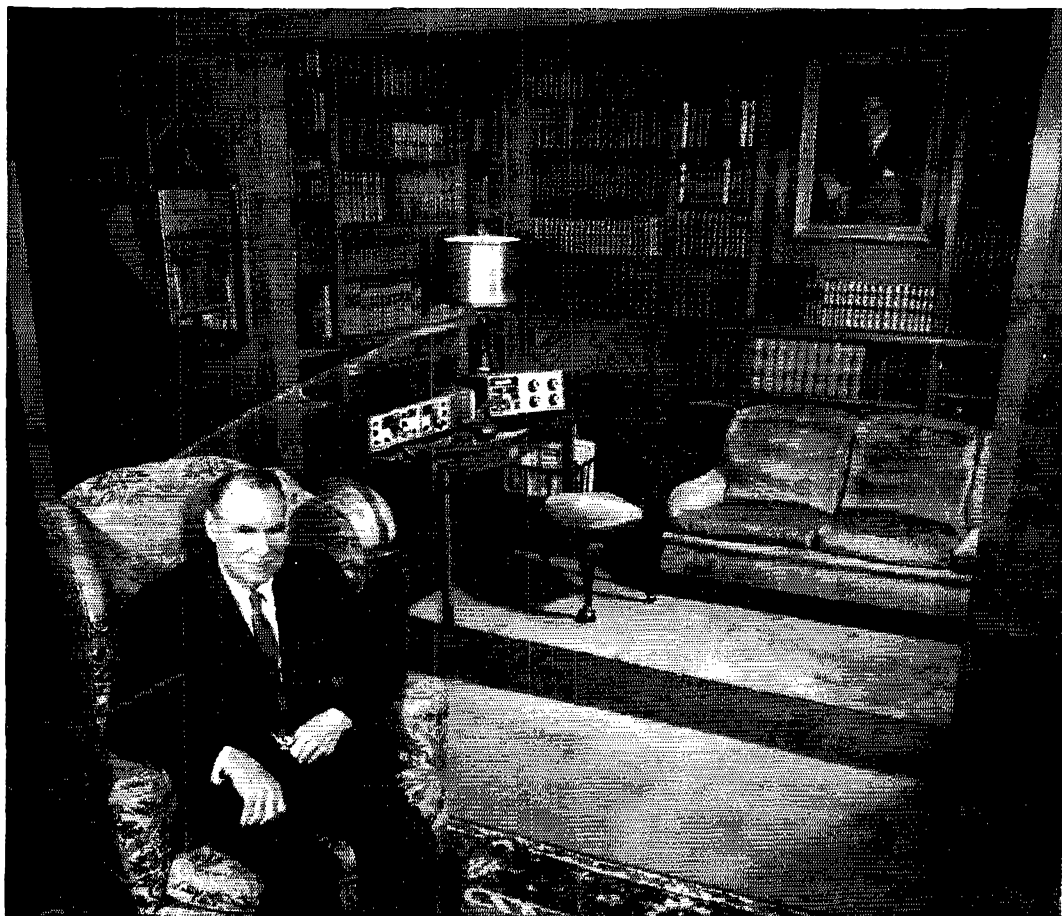
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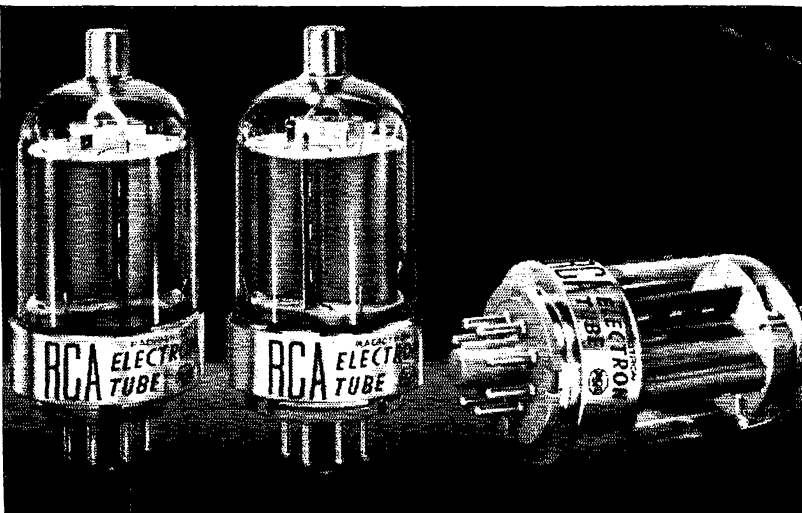
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RCA-6146A

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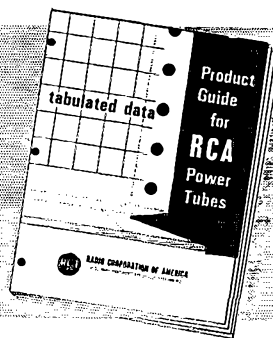
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Modified RCA-6146A with higher power output for critical 6.0-volt mobile applications.

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For tabulated data of technical information on specific tube types, see your RCA Industrial Tube Distributor and ask for your copy of “Product Guide for RCA Power Tubes” (PWR-506A).

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