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# amateur radio

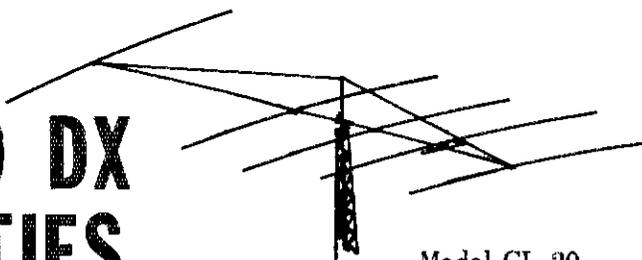


OFFICIAL JOURNAL OF THE ARRL

## NEW SINGLE-BAND BEAM FROM MOSLEY

# The Classic 20

## WITH EXPANDED DX CAPABILITIES



Model CL-20

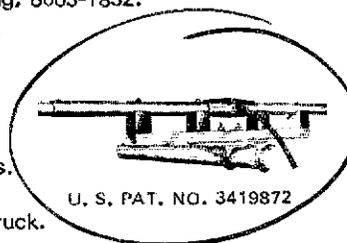
### ON 20 METERS

#### DON'T LIMIT YOURSELF!

When you install a 20 meter beam, there is only one antenna investment you can afford . . . The NEW CLASSIC 20 with expanded DX capabilities, thanks to the new Classic Feed System "Balanced Capacitive Matching." This new array promises to be the most universally accepted amateur beam ever developed for 20 meters.

#### TAKE A LOOK AT THE VITAL STATISTICS!

- POWER RATED: 1 KW AM/CW; 2 KW P.E.P. SSB input to the final.
- SWR: 1.5/1 or better.
- MATCHING SYSTEM: Balanced Capacitive.
- FEED POINT IMPEDANCE: 52 ohms.
- NUMBER OF ELEMENTS: 5. Aluminum tubing; 6063-T832.
- MAXIMUM ELEMENT LENGTH: 38 ft. 1½ in.
- BOOM LENGTH: 46 ft.
- RECOMMENDED MAST SIZE: 3 in. OD.
- TURNING RADIUS: 28 ft.
- WIND SURFACE: 18.7 sq. ft.
- WIND LOAD (EIA Std. 80 MPH): 364.45 lbs.
- ASSEMBLED WEIGHT: Approx. 139 lbs.
- SHIPPING WEIGHT: Approx. 145 lbs. via truck.



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*"One Package" 100 Watt Mobile/Base SSB Transceiver  
The "In" Equipment with all of the Built-ins*



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THE GLOBAL  
COMMUNICATIONS  
COMMUNITY  
WITH A  
HALLCRAFTERS*

Compact, sturdy, powerful SBT-100 stands on its own or meshes its 100-watt P.E.P. output effectively into existing Hallcrafters area-coverage communications systems. Base or mobile operations of the new SBT-100 are fully compatible with Hallcrafters' famous SBT-22, use the RU-6A repeater to talk into FM systems using Hallcrafters' FM-5. Covers 2.0—18.0 MHz. Six high stability oven crystal controlled channels. Choice of: USB, LSB, AM, CW/external FSK.

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**Small**—14 1/4" x 14" x 5 1/4" —Weight 28 lbs.

#### **Bugged**

Heavy-duty steel and extruded aluminum case is dust and weather resistant. Vibration and shock tested.

#### **Thoroughly Complemented**

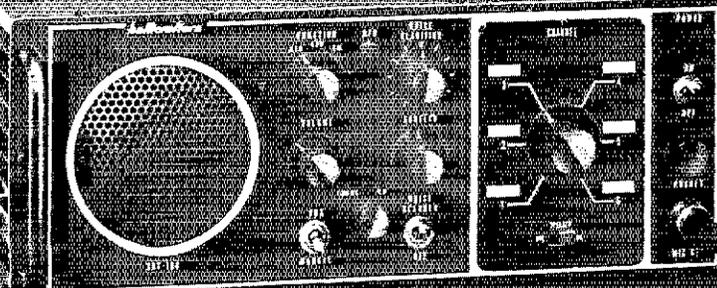
Full line of accessories including remote control, tuners, antennas, test sets and repeater.

#### **Advanced Circuit Design**

All solid state except P.A. section.

#### **Easy-to-Operate**

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**OUR COVER**

Compact, efficient tuned circuits can be built with toroid cores. Visible here is the pi-network output tank for the Skinnier Linear described on page 32.

# QST

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# The **HAMMARLUND** Manufacturing Company Incorporated

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February 24, 1970

The Technical Radio Corporation  
100 Main Street  
New York, New York

Attn: B.F. Woods

Ref: SP-600JX21A

Dear Bill:

It is most pleasant to hear from old friends and to be able to say, "Yes, an old mutual friend is still very much alive!"

The SP-600JX series is still being manufactured at Hammarlund, although it has seen many changes since it was introduced. Like the "Bug", the many changes are "under the hood" as we constantly improve our products.

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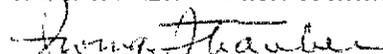
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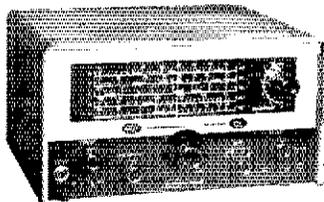
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# Just Getting Started In Ham Radio?

If your interest in ham radio has only recently developed you already know by now that there are hundreds of brands of equipment from which to choose, some costly . . . some not too costly. For years, Ameco equipment has appealed to the beginner because of its modest cost, yet with engineering and manufacturing quality you would expect to find in really expensive gear. Read about our All-Wave Receiver and Novice Transmitter below, then write for our new Ameco catalog to get complete specifications on these and other moderately priced items.

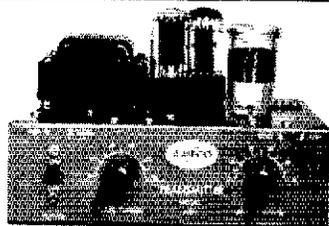
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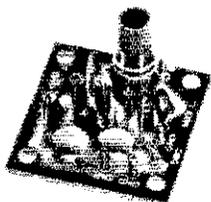
P. O. Box 6527 Raleigh, North Carolina 27608 Tel: 516-692-4760

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**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 GRS, OVS, UPS, OU and OBS. Technicians may be appointed OVS, OBS or V.H.F. PAM. Novices may be appointed OVS. SCMs desire application leadership posts of SEC, EC, RM and PAM where vacancies exist.

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RF Mixer \$3.50**

A single tuned circuit intended for signal conversion in the 3 to 170 MHz range. Harmonics of the OX oscillator are used for injection in the 60 to 170 MHz range.

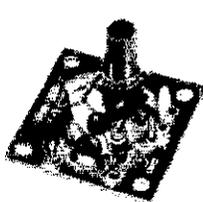
Lo Kit 3 to 20 MHz  
Hi Kit 20 to 170 MHz  
(Specify when ordering)



**SAX-1 Transistor  
RF Amplifier \$3.50**

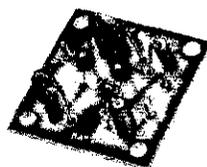
A small signal amplifier to drive MXX-1 mixer. Single tuned input and link output.

Lo Kit 3 to 20 MHz  
Hi Kit 20 to 170 MHz  
(Specify when ordering)



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A single tuned output amplifier designed to follow the OX oscillator. Outputs up to 200 mw, depending on the frequency and voltage. Amplifier can be amplitude modulated. Frequency 3,000 to 30,000 KHz.



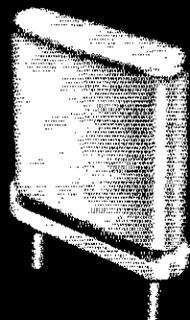
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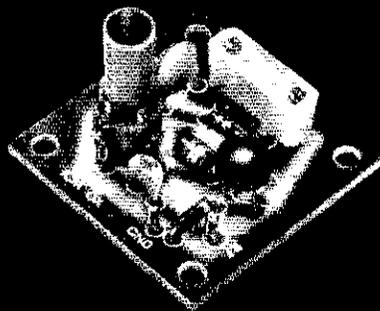
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Available from 3,000 to 60,000 KHz. Supplied only in HC 6/U holder. Calibration is  $\pm .02\%$  when operated in International OX circuit or its equivalent. (Specify frequency)

**\$3.95**



### OX Oscillator

Crystal controlled transistor type. Lo Kit 3,000 to 19,999 KHz  
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(Specify when ordering)

**\$2.95**

Write for complete catalog.



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

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

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

All general correspondence should be addressed to the administrative headquarters at Newington, Connecticut 06111.



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\*Member Executive Committee

## "It Seems to Us..."



### CAN IT GET ANY WORSE?

AS WE write this page the month of March has just arrived with its traditional bluster. (Two inches of snow are on the ground, and five more forecast.) But the howling winds of March are nothing to the howls of anguish that we're sure to get in a few weeks - if the pattern of the past several months continues. It's nothing unusual (lately), mind you, because those howls will come from good and loyal members who would like to know where in the heck is their March (or January, or February - you name it) issue of *QST*?

For some forty years *QST* has been printed at the same plant and mailed in the same fashion. In all that time there has been a minimum of complaints about late- or non-delivery of the journal. Mailing nearly 100,000 copies each month, it is to be expected that a few copies will go astray, be damaged in transit, or be considerably delayed. But in the past year the situation has become nearly chaotic. Despite the fact that *QST* continues to be mailed from the same location at Concord, New Hampshire, on the same 20th of the month (give or take a day or two, depending on how the weekend falls), we are literally - being inundated with letters from rightfully-angry members about weeks-late *QST* deliveries.

Most members blame us. We almost wish it were our fault, or the printer's, because then it would be a comparatively-simple problem to tackle.

But what has happened is a deterioration in the quality of the U. S. postal service, and at the moment we - like hundreds of others producing magazines - are powerless to remedy it.

There are approximately 90,000 members of ARRL to whom an individual copy of *QST* is mailed each month. Our membership files are maintained on Addressograph plates which, in accordance with postal regulation, are in Zip code sequence. Each month, just before mailing time, the printer is supplied with a complete set of address labels, which his machinery glues to the magazine wrappers. It requires about 2 days for the printer

to wrap, label and ship the first 90,000 copies. West coast copies are mailed first, then the central part of the country, and last of all to us Easterners. The intent is that all copies nationwide will arrive at about the same time (!). In addition, for many years we have delayed for two days the shipment of copies of *QST* bound for radio stores so that League members would receive preferential service.

For years, the system worked fine, with only minor disruptions. Today, two hams living on opposite sides of the same street in a New York suburb may receive their copies days or weeks apart, despite the fact they were mailed from New Hampshire on the same date. Out on the west coast, it may take as much as three weeks for all of the copies to be delivered in the Southwestern Division. Another instance? The February issue was delivered in at least parts of the Bay Area (California) on February 2nd (wonder of wonders!), yet on the 20th of that month Director Albright was plagued with phone calls from members in major Texas cities who still were awaiting their copies. Director Michel had to go to the superintendent in Cincinnati to blast loose weeks-late copies for local hams, after members in nearby rural areas had 'em a week or so earlier. One more? G3XPM received his March copy on March 5, which offhand sounds like mighty fast service. But it happens that he is /W1 with a QTH in the same town as the magazine was mailed on February 20th - *Newington, Connecticut*.

We had intended to provide you more details on this problem, and on request through our printer the United States Post Office in Boston kindly agreed to provide some factual background material on the general transportation and rail/truck/(dog-sled?) routings, etc. But we've had to come to a grinding halt. The material was mailed by the Postmaster's office in Boston on Monday afternoon, March 2, addressed to Concord, New Hampshire, 75 miles away. Late Thursday night, when we had to close this issue and go to press, the material had still not arrived.

Maybe by next month we can continue our story!

**QST**

## League Lines . . .

Though not quite of the scope of incentive licensing, in the proposal stage are a couple of FCC dockets which would have marked impact on ham radio. See "Haps" this month for info on plans to recoup the entire FCC \$24 million budget through license fees. And see subsequent pages for another major development -- FCC-proposed new rules for repeater operation (plus some other items). Also you will find the report of our VHF Repeater Advisory Committee, which we assume will form the basis of the official League comment when the Board makes its decisions May 1.

Our film, "Ham's Wide (or is it 'Wild'?) World" is still booked heavily to school groups and other non-amateur audiences throughout the country. In addition to many showings arranged by the director family (see next item) and Hq., in the first two months of this year the film had been shown 282 times in 38 different states, through the facilities of Modern Talking Picture Service.

Effective dedication -- Rocky Mountain Division Asst. Director W5JQH made good and fast use of a loan print of the new film. In 16 days he personally conducted 21 showings to high school and Boy Scout audiences, with an oral presentation and question-and-answer session to boot. Moreover, he got full cooperation from the Mesilla Valley Radio Club, which backed him by supplying the ARRL "How to Become" series for each school library!

The summer tourist season is almost upon us. If you're going abroad (or if you are DX coming to North America) and would like to do some operating in those areas where reciprocal agreements are in effect, get your applications in early. Several weeks minimum is required for processing, so don't postpone too long. A list of the countries with which Canada and the U. S. have reciprocal agreements is on page 66 of March QST. If you have additional questions, try us.

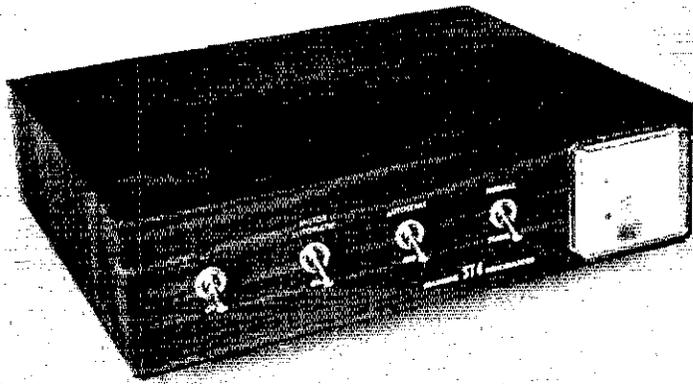
Looked closely at your license recently? Not expired, we hope! Right address? We've come across a high percentage of Callbook "errors" mostly attributable to failure of licensees to keep FCC informed. Keep us informed, too -- tell us directly of changes of address as soon as you know. Our manual system of records takes almost the same 60 days a modern computer requires to make address changes effective.

Coming East? Hq. is open Monday through Friday, 8:30 in the morning to 4 P.M. and we welcome visitors on a "drop-in" basis. Other times and days by advance appointment, which can be arranged especially for groups. We'll be closed on May 29, July 3 and September 7 to make up for regular holidays falling on weekends. The WIAW visiting hours, somewhat more extensive, are outlined in the "Operating News" section of this issue.

Hamfest coming? Register your date with Hq. and avoid possibly-costly conflict with major activities of nearby clubs.

Quote-of-the-month from a rush/special delivery/urgent release issued by a professional society (best left unidentified) announcing an awards banquet: "To the WIAW News Room -- we would appreciate your placing this on your several news notices at once."

# The Mainline ST-3 RTTY Demodulator



and the ST-4 for 170-Hz Shift

The author's ST-4 demodulator, built exclusively for copying 170-Hz shift RTTY signals. The ST-3 demodulator is similar, but primarily covers 850-Hz shift signals. Being completely solid state, the device can be housed in a relatively small enclosure. Only four switches are required on the front panel. The meter is optional, and provides a tuning indication for use in the hf amateur bands. An aluminum chassis is used for a cabinet. A decorative self-adhesive paper provides the grained-wood appearance.

BY IRVIN M. HOFF,\* W6FFC

WHAT are the minimum RTTY demodulator requirements for reception of both vhf and hf? When receiving RTTY signals on vhf, many of the problems associated with the hf bands just do not occur. Such things as selective fading, adjacent-channel QRM, static due to thunderstorms, and so forth, are rarely encountered. In addition, fm is often used together with repeaters, where fluctuations in signal strength are not a problem. Squelch is normally available to lock the receiver into standby if there is no signal present. CW interference is rarely encountered, and so few stations are present that crystal operation is frequently used, keeping adjacent-channel interference to a minimum.

As a consequence, the most elementary TU or demodulator is often quite enough, and many of the unique problems of the hf bands are of no concern to the vhf enthusiast. The schematic of the typical vhf RTTY TU amply demonstrates the simplicity possible. On the other hand, almost none of the units designed for vhf are really much more than barely adequate when used in the hf bands.

At hf we get into problems which are rarely experienced on higher frequencies. Probably the worst problem of all is cw interference, and next is adjacent-channel interference (other stations close by). Static, high noise levels, selective fading, improper shift, and drift all contribute to the "nightmare" of hf RTTY. To minimize cw interference (probably the toughest of all the problems), you can turn the receiver avc off and go to limiterless copy with sharp filters. This takes a rather advanced demodulator de-

sign, such as the Mainline TT/L<sup>1</sup> or TT/L-2<sup>2</sup> with the sophisticated threshold computer and narrow Butterworth filters.<sup>3</sup> This is also the answer for selective fading and adjacent-channel interference. Not much can be done to eliminate static and high-noise-level problems.

What are the minimum requirements for both vhf and hf? This is a somewhat difficult question to answer because it depends so much upon your own experience. First of all, you need a good limiter. (Let's not bring "limiterless" demodulators into the minimum-requirements discussion.) Few demodulators have offered a really decent limiter in the past, other than the TT/L or TT/L-2, which limit to around -60 dB.<sup>4</sup>

You will also need well balanced filters to develop similar voltages for both mark and space tones, and to obtain good noise cancellation when there is no signal. You should have a high-voltage loop supply of at least 120 volts and preferably more, 150 to 250 volts. Although the RTTY machine itself can work on voltages as low as 24 volts and even less, immense amounts of distortion are added. A paper by Ron Quentzler<sup>5</sup> shows that printers operated in a

<sup>1</sup> Hoff, "The Mainline TT/L F.S.K. Demodulator," *QST*, August, 1965.

<sup>2</sup> Petersen, "The Mainline TT/L-2 F.S.K. Demodulator," Parts 1 and II, *QST*, May and June, 1969.

<sup>3</sup> Hoff, "High-Performance RTTY Filters," *QST*, September, 1966.

<sup>4</sup> Zero dB is defined as 0.774 volt across a 600-ohm load, a condition producing 1 mW of power in the load. However, the author's dB reference is made to the voltage level rather than the power level, because the impedance throughout the circuit is not necessarily 600 ohms. The -60 dB refers to the minimum input signal level at which the sine wave starts becoming limited. — Editor.

<sup>5</sup> Quentzler, "More About Telegraph Loops," *RTTY Journal*, January, 1968.

\* 12130 Foothill Lane, Los Altos Hills, CA 94022.

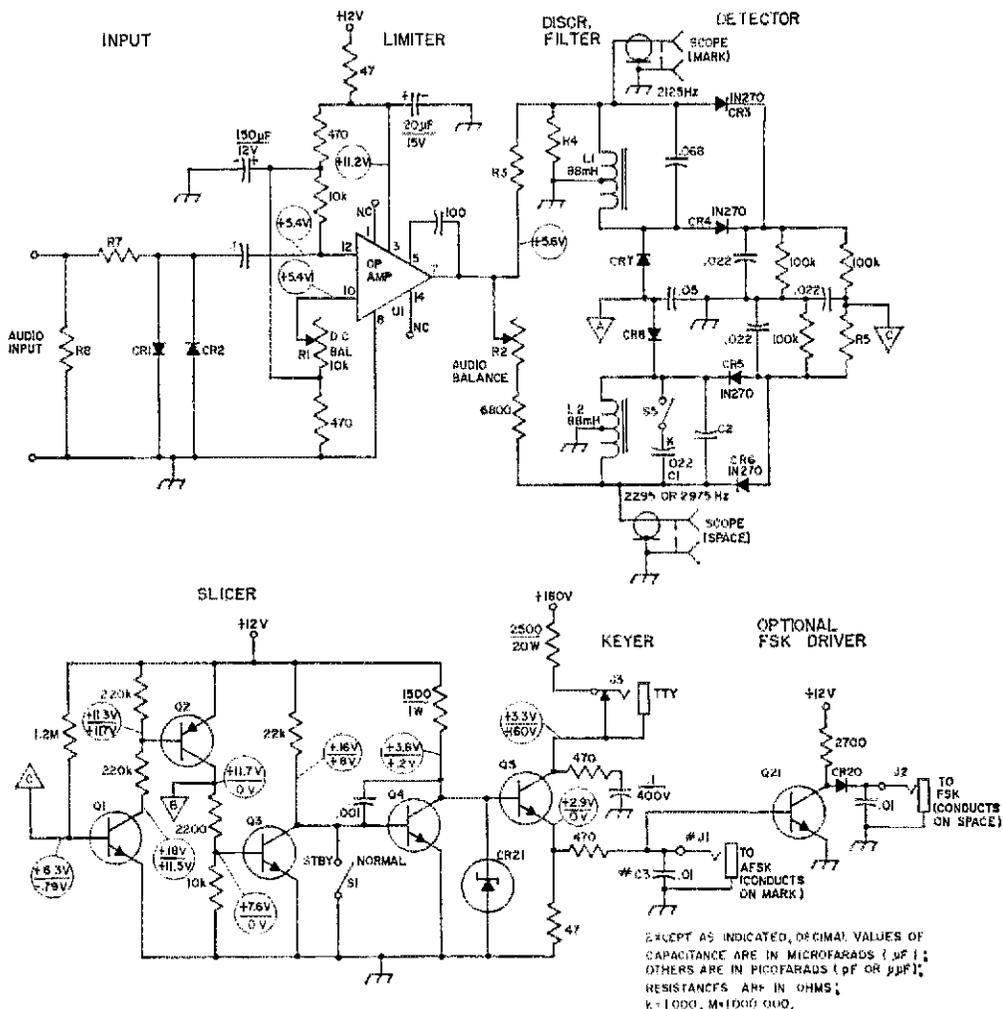


Fig. 1—The Mainline ST-3 or ST-4 RTTY demodulator. Unless otherwise indicated, resistors are 1/4-watt 10% tolerance. Capacitors with polarity indicated are electrolytic. The ST-3 covers primarily 850-Hz shift fsk or afsk signals, while the ST-4 covers only 170-Hz or less shift. Although the basic circuit is the same, component values for the two demodulators differ in some instances, as indicated in the parts list below. Dc operating voltages are indicated in the limiter, slicer, keyer, and autoprnt and motor delay circuits. All voltages are measured with respect to chassis ground with a VTVM. In the slicer and keyer stages, voltage values above the line should appear with a mark tone present at the demodulator input, while values below the line appear with a space tone present. In the autoprnt and motor delay circuit, voltage values above the line occur with a mark or space tone present while those values below the line are present with only receiver noise applied at the demodulator input. Transistor Q-number identification conforms to information contained in the circuit-board pattern.

C<sub>1</sub>—Optional for ST-3 only. Not applicable to ST-4.  
 C<sub>2</sub>—0.033  $\mu$ F for ST-3; 0.56  $\mu$ F for ST-4; paper or mylar, 75- or 100-volt rating.

C<sub>3</sub>—0.01  $\mu$ F mylar or disk, 600 volt. Omit if af keying output is not used.

CR<sub>1</sub>, CR<sub>2</sub>, CR<sub>7</sub>, CR<sub>8</sub>, CR<sub>9</sub>, CR<sub>15</sub>—CR<sub>18</sub> incl., CR<sub>20</sub>—Silicon diode, PIV 50 or greater (1N4816 or equiv.).

12-volt loop can easily exceed 60 percent spacing bias. This amount is essentially intolerable. Raising the loop potential to 36 volts can still result in as much as 30 to 33 percent spacing bias. If the incoming signal is also distorted, this can create an immense number of printing errors at times when others may copy perfectly. With a 150-volt loop, the bias can be reduced to 2 percent or less, an insignificant amount.

### Use of 170-Hz Shift

Unfortunately, not many fellows seem inclined to try narrow or 170-Hz shift (as opposed to 850-Hz or normal shift). It would be a "natural" for vhf where audio tones are fed into the mic. input and, as a result, such things as drift are no problem.

On 3- to 30-MHz frequencies, one is able to use the narrow if position on the receiver.



so that it takes 4 or 5 seconds of steady mark to turn the unit on, and either no signal at all (squench, again) or a steady space for 6 or 8 seconds to turn it off. This system suffers from problems, though. It requires a special "turn-on" signal, and the turn-off method is not always satisfactory, particularly if a voice signal comes on the frequency immediately after the tone signal has stopped.

On 3 to 30 MHz, automatic printer control is just as desirable. But here, cw signals are the main problem. You now need a system that will turn on without any special procedure, a system that does not respond to cw, and preferably a delay system that will keep the motor running for at least a half-minute or so while the other station is identifying by cw. (This keeps the motor from turning on and off after each RTTY transmission.)

The term "autostart" has been used in the past to mean fixed-frequency monitoring, such as on net frequencies. But automatic printer control and autostart need not be considered in equal terms at all. If you have an RTTY printer, you will have a use for automatic printer control.

Fully automatic printer control (autoprint) is useful for *any* frequency, because the operator need not be present. The machine will respond to an RTTY signal, and return itself to standby if the signal ceases. Soon afterward, the printer motor will also turn off. If you walk out to the kitchen for a moment during a QSO and the other station turns it back to you unexpectedly, without some automatic feature you may get back to find the machine running "wild," printing only random garble and turning up the paper like a child in the bathroom. Autoprint would have locked the unit in standby when the signal stopped.

If you want to monitor an interesting QSO and still leave the room to eat dinner, mow the lawn, watch television, or even go to the office, you can do so with autoprint, knowing full well the machine will go back to mark (standby) when the stations have stopped transmitting. I even leave my equipment running when I am out of town for several days at a time.

You can find this feature to be extremely useful for MARS participation, also. Tune in the frequency using autoprint, and come back an hour or two later to see what went on. Only on RTTY can such a simple but fully automatic arrangement be set up.

#### *Development of the ST-3 and ST-4*

The Mainline ST-3 is an indirect result of a super-deluxe state-of-the-art demodulator that the author has been developing since the fall of 1967. As it turned out, a rather simple but quite effective little demodulator could be constructed that should be far superior to what most vhf fellows have been using, and probably superior to the run-of-the-mill 3- to 30-MHz demodulator as well.

The ST-1 was an attempt to use an inexpensive RCA linear integrated circuit which was not an

operational amplifier. About this time the low-cost GE PA238 operational amplifier became available, so the ST-2 was designed for vhf use. This was identical to the ST-3, but without motor delay, and used a set of relay contacts to mute the keyer stage for standby. The unit worked so well that motor delay was added, and the ST-3 became exceptionally versatile for any use, on 3 to 30 MHz as well as vhf. The ST-4 was then designed exclusively for 170-Hz shift. The "super-deluxe" job using 14 high-performance operational amplifiers will eventually be called the SST, and portions of the ST-3 circuit will be used, such as for autoprint. The "ST" stands for semiconductor type.

The ST-4 was developed for those interested only in 170-Hz shift, and is particularly useful for autostart purposes. It is basically an ST-3 to which a special bandpass input filter and discriminator for 170-Hz shift have been substituted. It is perhaps the first demodulator intended solely for narrow shift reception ever offered the RTTY enthusiast.

The particularly outstanding features of the ST-3 and ST-4 are the autoprint section, the high-voltage loop, and the extraordinary limiting available with the new integrated-circuit front end. The overall features are as follows: The demodulator

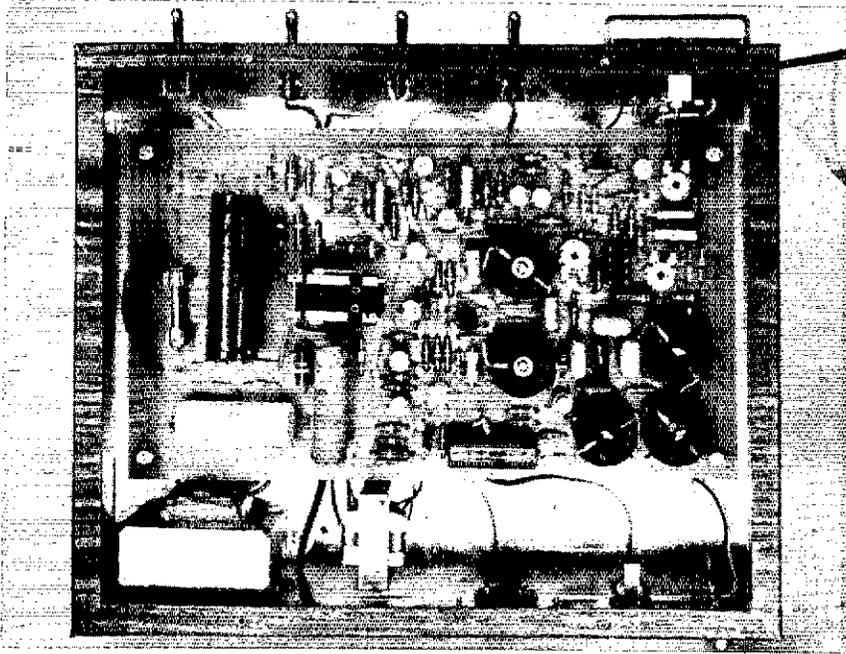
- 1) Adapts to a variety of audio input schemes.
- 2) Has a low-cost linear integrated operational amplifier (op amp) — the first such circuit presented to RTTY enthusiasts.
- 3) Has at least -60 dB of limiting.
- 4) Has a well-balanced filter design with excellent noise cancellation.
- 5) Has a simple but effective low-pass filter (RC type).
- 6) Has very high gain in the "slicer" section, allowing reception of shifts under 20 Hz with the ST-3, under 5 Hz with the ST-4.
- 7) Uses an inexpensive 300-volt loop-keyer transistor.
- 8) Has a most unique automatic printer control (autoprint) that ignores cw and voice.
- 9) Has motor delay to keep the motor from needlessly turning on and off.
- 10) Is dc coupled from input to printer for minimum distortion.
- 11) Uses a high-voltage loop (160 volts) for minimum distortion.
- 12) May be used easily for repeating (retransmitting).
- 13) Uses only parts available from any general distributor.
- 14) Is low in cost. Total cost of all parts is about \$50.

#### *Circuit Description*

The schematic diagram of the basic ST-3/ST-4 demodulator is shown in Fig. 1.

#### AUDIO INPUT

Although intended to be operated from a 500-ohm input, the demodulator's dynamic range is so great that you can run the unit directly



The bottom cover removed for a look inside the demodulator. On the lower right corner of the etched circuit board are the three toroidal inductors associated with the bandpass input filter; nearer the center of the board are the two toroids associated with the discriminator. The 12-volt and 160-volt power supply transformers are located off the board, in the lower portion of this photo.

from a 3.2-ohm speaker tap, if desired. However, this will automatically toss out a fair amount of signal, and, in this case, we recommend that you make a habit of running the receiver at a pretty high audio level. Then, if the speaker bothers you, use either a volume control "pad" or else a fixed resistor in series with the speaker. If you wish, you can change  $R_8$  at the audio input to a 4.7-ohm value to terminate the speaker tap.

A small voice-coil-to-500- or 1000-ohm transformer may be added between the speaker and the input to the ST-3, in which case you can then pretty much disregard the receiver audio output level, as long as it's something you can hear in the speaker. Such transformers can be purchased for as low as 49¢ at stores specializing in imported products.

The audio input is held to a maximum of 0.6 volt by  $CR_1$  and  $CR_2$ . These are not limiters in the usual sense, but instead are added only to protect the integrated circuit. Some receivers, when run wide open, can deliver as much as 30 volts across a 500-ohm load. The integrated circuit can handle only about 1.5 volts peak without internal damage. Normal speaker level on RTTY would be about a -3 dB level, which is approximately 0.4 volt. Fades will radically reduce that level, so a good limiter is required to keep signal levels constant.

#### THE LIMITER

The GE PA238 IC was the first authentic operational amplifier selling for substantially

less than \$8. It has an open-loop gain of around 75 dB. It normally requires plus-and-minus 6 volts, but by using it as we have here, only +12 volts is needed. The output will be +6 volts dc with no signal input, and will be a 10-volt peak-to-peak square wave, swinging from about +1 to +11 volts, when an input signal is being fully limited. (This waveform is shown in one of the photographs.) Because we extract the audio component with the filter section, the dc level is of no consequence. (It would be, however, if this scheme were used for a slicer, for instance, where dc input signals are amplified.)

#### THE DISCRIMINATOR FILTER

The 10-volt signal from the limiter is more than adequate to drive the simple discriminator filter section. Although the output impedance of the op-amp limiter is quite low, the isolating resistors provide a predetermined filter bandwidth for the ST-3 of about 180 Hz at the -3 dB points or 290 Hz at the -6 dB points.

In the ST-3, the mark-frequency filter is tuned to 2125 Hz and the space frequency to 2975 Hz. This is standard practice for both vhf and hf. In the ST-4, the mark-frequency filter is tuned to 2125 and the space to 2295 Hz.

The ST-3 was intended principally for 850-Hz shift reception, although "as is" it will copy to less than 20 Hz shift by "straddle tuning." If you occasionally copy 170-Hz shift, you may add the .022- $\mu$ F capacitor,  $C_1$ , and toggle switch  $S_6$  shown in Fig. 1. Closing the switch retunes

the space filter from 2975 to 2295 Hz, effectively switching from 850- to 170-Hz shift. However, the autostart system may not work properly in this "170" position, as the discriminator balance is not maintained. If the unit is to be used solely for 170-Hz shift reception, consideration should be given to building the ST-4.

#### THE DETECTOR SECTION

Full-wave detection is offered in the detector section by grounding the centers of the toroids. This makes filtering of the signal much easier and allows reception of very small shifts when followed by high-gain amplifiers. Germanium diodes are used for  $CR_3$  through  $CR_6$  because of their very low forward voltage drop at low voltages. The output of the detector stage is approximately 1.5 volts dc, positive on mark and negative on space.

Diodes  $CR_7$  and  $CR_8$  are silicon, arranged in a manner to give an equal negative voltage at point A for both mark and space tones when the input signal is correctly tuned. This voltage is used for the autoprint control system.

#### THE SLICER SECTION

If the term "slicer" has been troubling you, you can call it a switch, if you prefer. It should turn ON or turn OFF, as the signal alternates between mark and space. This is all it does.

On narrow shift, signals will have very small voltages at the detector output. The slicer has several transistors cascaded to amplify the detector output voltage sufficiently to operate the 60-milliampere loop, even for narrow-shift signals with the ST-3. At 85-Hz shift in the ST-3, the input current to  $Q_1$  is only around two microamperes, so you can see the need for several high-gain amplifier stages.

The "crossover point" on the ST-4 discriminator is 2210 Hz. The unit has so much gain in the slicer stage that a 1- to 2-Hz change in audio frequency around 2210 Hz will cause the keyer to swing from complete conduction to complete cutoff.

The impedance at the input of the standby stage;  $Q_1$ , is about 310 ohms, so no need to worry about lead lengths, etc. However some consideration must be given to rf, so the 0.001- $\mu$ F capacitor effectively prevents any stray rf from affecting the keyer circuit.

#### AN OPTIONAL NORMAL-REVERSE SWITCH

In normal RTTY operation, the audio tone of 2125 Hz for mark is shifted higher in pitch for space — to 2975 Hz for 850-Hz shift, or to 2295 Hz for 170-Hz shift. In the hf bands, this will occur only when the signal is tuned as if it were a "lower sideband" transmission. On rare occasion, a station will be transmitting backwards from normal, or "upside down." This happens so infrequently that no normal-reverse switch was added to the basic diagram. After all, one can go to upper sideband to copy the fellow, or ask him to invert his shift. If you feel you must have an upside-down switch, use

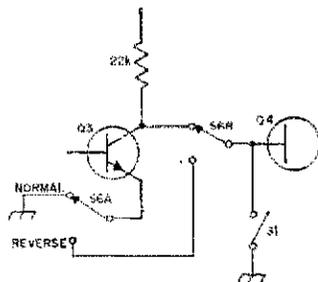


Fig. 2—Normal-reverse switch.  $S_1$ ,  $Q_3$ ,  $Q_4$ , and the 22-k $\Omega$  resistor appear in Fig. 1, and are shown here only to indicate the points in the circuit which are switched by  $S_1$ .  $S_1$ —Dpdt toggle.

that shown in Fig. 2. This involves only an additional dpdt switch mounted on the front panel. However, such a switch is almost superfluous and hence was not placed on the basic schematic.

#### THE KEYSER STAGE

The keyer stage uses a low-cost 300-volt transistor. The loop supply provides about 190 volts when the keyer transistor,  $Q_5$ , is cut off. This provides negligible distortion to the printer. Several machines may be run in series in this configuration. The circuit is arranged for 60-mA loop operation, so check your printer selector magnets to make sure they are wired in parallel. (Put an ohmmeter across the plug hooked to the magnets and you should get around a 66-ohm indication; if the windings are in series you'll read around 260 ohms, which you don't want.)

A back-emf voltage is created by the magnets when they open for space. This voltage was measured on an oscilloscope to be 75 volts, so a voltage-absorbing network has been added to the collector of  $Q_5$ . This network does not eliminate the back-emf voltage, but reduces it to where it is not a problem. If you tried to eliminate the voltage completely, you would create other problems by adding distortion to the pulses for the printer.  $Q_5$  draws only 0.012 watt on mark, so no heat sink is required.

#### THE AFSK AND FSK OUTPUTS

Most afsk units need a conduct-on-mark input, so it was convenient to supply an afsk output from the emitter of  $Q_5$ . This network will supply about 4 or 5 mA of current to a germanium diode.

If your transmitter needs a conduct-on-space input for use on 3 to 30 MHz (most transmitters do) you can add the optional fsk driver stage shown in Fig. 1. This stage will also provide about 4 or 5 mA current to a germanium diode, such as the 1N270 — which is ideal for use in fsk circuits for 3- to 30-MHz transmitters.

If either keying output is used, be sure to bypass the output with a 0.01- $\mu$ F capacitor, where the output leaves the chassis.

On Morse cw, the average key-down time is probably less than 50%, unless the operator runs all his dots and dashes together. On voice, the average "key-down" time is probably under 30%. RTTY, however, is unique in that it is really 100% key down, because the carrier is on continuously at hf or a tone is continuously present when afsk is used, but the frequency shifts from mark to space. One of the two frequencies is *always* present, unless the signal has faded momentarily. Thus, if we sample both mark and space channels, there should always be a voltage to operate the printer control system. Diodes  $CR_7$  and  $CR_8$  do this sampling. Now, if we devise a system that requires an average of 75% key down or more, it should ignore cw and voice, and yet respond to RTTY with no special call-up procedures. Well, 75% is about a 3:1 ratio of attack-to-discharge time, so we make our system such that it takes three or four seconds to turn on, and about one second to release. The 1-second period allows enough time so that an occasional loss of signal due to static or fades will not put you out of business until the attack time can again let the printer operate. The 3- or 4-second value, on the other hand, allows the system to integrate over a sufficiently long time that momentary noise spikes, fades, etc., will not affect the output by an appreciable amount.

To consider the operation, let's first take a look at the situation when there is no signal present. The voltage from the minus-minus line at point A will not be enough to overcome the forward bias on the base of  $Q_6$  as provided by the 120-k $\Omega$  resistor; hence,  $Q_6$  will conduct. This puts a 15- $\mu$ A current through its collector resistor and allows  $Q_7$  to conduct, as  $Q_7$  now has a voltage drop across its base-emitter junction. The collector-emitter junction of  $Q_7$  is now effectively short-circuited, so the 150- $\mu$ F capacitor is kept charged to near the supply voltage of +3 volts. This allows  $Q_8$  to conduct, which in turn puts  $Q_9$  into conduction, causing  $Q_{10}$  to conduct as well. The collector of  $Q_{10}$  is connected to the collector of  $Q_2$ , and this situation causes the printer to be locked in mark (60 mA of loop current flowing). At the same time, the voltage at the collector of  $Q_9$  is only about 0.2 volt, so diode  $CR_9$  does not conduct. Thus,  $Q_{11}$  does not conduct, nor does  $Q_{12}$ , so the motor control relay is open and the motor is off.

Now when a signal comes along, enough negative voltage appears at the base of  $Q_6$  to turn it off. Thus, it "opens," and there is no voltage drop across its collector resistor, so the base-emitter voltage of  $Q_7$  drops.  $Q_7$  cannot conduct, and there is zero voltage on its collector. The charge on the 150- $\mu$ F capacitor now slowly bleeds off, mostly through the 27-k $\Omega$  resistor ( $S_2$  is open for autoprnt operation). The input impedance of  $Q_8$  is about 1.8 megohms, so  $Q_8$  has very little effect on the discharge rate.

As the 150- $\mu$ F capacitor discharges,  $Q_8$  stops

conducting when the voltage at its base falls to about 1.7 volts. This causes  $Q_9$  to stop conducting, as well as  $Q_{10}$ . At this time there is no voltage at point B from  $Q_{10}$ , and the printer is free to do whatever the detector output voltage dictates. At the same time,  $CR_9$  conducts, and the 20- $\mu$ F capacitor becomes charged to near the supply voltage. This, in turn, causes  $Q_{11}$  to conduct, which turns  $Q_{12}$  on and closes the relay with about 11 mA of current.

The third and last situation occurs when the motor is running (a signal has been present), and then the signal ends. Now  $Q_6$  again conducts,  $Q_7$  conducts, and the 150- $\mu$ F capacitor is quickly charged, raising the voltage on the base of  $Q_8$ . As the voltage passes about 1.7 volts,  $Q_8$  conducts. This takes about one second. When  $Q_8$  conducts,  $Q_9$  conducts, as does  $Q_{10}$ , again putting the printer into standby (mark). Diode  $CR_9$  no longer conducts due to the 0.2-volt saturation voltage of  $Q_9$ . However, the 20- $\mu$ F capacitor still has a charge, which now slowly bleeds away through the parallel discharge path of the 1-megohm resistor and  $Q_{11}$ . (The input impedance of  $Q_{11}$  is around 1 megohm.) In about 25 or 30 seconds, the voltage falls to where  $Q_{11}$  no longer conducts sufficiently to keep the relay closed, and it opens, turning off the motor.

You may increase the value of the 20- $\mu$ F capacitor if you want a motor delay longer than 25 or 30 seconds, or you may change the 1-megohm resistor to a larger value, or both.

#### BANDPASS INPUT FILTER

A bandpass input filter is always beneficial, particularly on the 3- to 30-MHz bands. One such as that shown in Fig. 3 may be added. This filter may be driven directly from either a 500-ohm receiver output or with a transformer. You can also wind about thirty turns of small wire around the input toroid and drive the filter from a 3.2-ohm source. Other filters may also be used, such as the one described in April 1968 *QST*,<sup>6</sup> or that shown in May 1968 *QST*.<sup>7</sup>

#### A TUNING INDICATOR

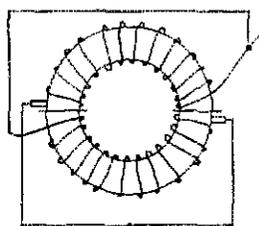
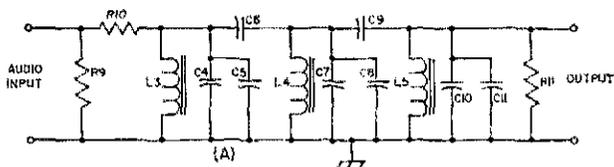
On vhf with afsk, a tuning meter is relatively unimportant, as fixed audio tones are used. If you plan to use the ST-3 primarily on the 3- to 30-MHz frequencies, a tuning indicator is nice to have. You can use an oscilloscope connected to the points shown in the detector circuit, and the display will be something like that pictured on page 13 of December 1968 *QST*.<sup>8</sup>

A VTVM can be hooked to point A of Fig. 1 and used as a tuning indicator, or you may add the meter circuit shown in Fig. 4. When the mark and space signals are equally tuned the meter will not flicker, but will stand still while the sending operator types. You can also copy less than 850-Hz shift for the ST-3 or 170-Hz shift

<sup>6</sup> Wetherhold, "An RTTY Bandpass Filter for 2125-2975 c.p.s.," *QST*, April, 1968.

<sup>7</sup> Buttschardt and Olson, "An RTTY Terminal Unit of Wide Dynamic Range," *QST*, May, 1968.

<sup>8</sup> Hall, "What is RTTY?," *QST*, December, 1968.



TOROID CONNECTIONS FOR  
22-MH INDUCTANCE

(B)

#### Component values for ST-3 filter:

$C_4, C_5, C_{10}, C_{11}$ —0.018  $\mu$ F.

$C_6, C_8, C_9$ —0.015  $\mu$ F.

$C_7$ —0.01  $\mu$ F.

$L_3, L_4, L_5$ —88 mH toroid. (See footnote 11.)

$R_9$ —560 ohms.

$R_{10}$ —2700 ohms.

$R_{11}$ —3300 ohms.

No adjustment of the ST-3 filter is required if 5% tolerance capacitors are used. Otherwise, adjust the filter by adding or removing toroid turns as necessary for resonant frequencies indicated:

$L_3$  with  $C_4 + C_5 + C_6$ —2400 Hz.

$L_4$  with  $C_6 + C_7 + C_8 + C_9$ —2300 Hz.

$L_5$  with  $C_9 + C_{10} + C_{11}$ —2400 Hz.

#### Component values for ST-4 filter:

$C_4, C_{10}$ —0.22  $\mu$ F.

$C_6, C_8, C_{11}$ —Not applicable to ST-4; omit.

$C_5, C_9$ —0.022  $\mu$ F.

$C_7$ —0.18  $\mu$ F.

$L_3, L_4, L_5$ —22 mH toroid; made from usual "88 mH" toroid (see footnote 11) except windings are parallel-connected as shown in B above, rather than series-connected.

$R_9$ —560 ohms.

$R_{10}$ —1600 ohms

$R_{11}$ —Not applicable to ST-4; omit. Adjust ST-4 filter sections listed below for resonance at 2195 Hz; it will be necessary to remove turns from the toroids. One turn off each winding simultaneously will raise the resonant frequency about 6 Hz.

$L_3$  with  $C_4 + C_6$ .

$L_4$  with  $C_5 + C_7 + C_9$ .

$L_5$  with  $C_8 + C_{10}$ .

for the ST-4 by tuning in this manner, although now the unflickering meter will read somewhat less than for full shift. With the ST-3 set to copy 850-Hz shift, the meter reading on 170-Hz shift signals will be only about one fourth as much as for 850-Hz shift signals.

#### What's Missing in the ST-3?

The most deluxe demodulators these days, such as the TT/L or TT/L-2, following the detector have three-pole Butterworth minimum-bandwidth low-pass filters and complicated threshold computers for limiterless operation. But when the limiter is used, these items could be eliminated for all but the most marginal receiving conditions, at a great saving in cost and complexity. Consequently, the ST-3 has a simple but effective RC low-pass filter, and relies on the superior limiter to set the correct threshold level. The unit does not work on limiterless or mark-only copy.

#### Construction and Adjustments

An etched circuit board is available,<sup>9</sup> which provides for all parts including the bandpass

<sup>9</sup> Write to Truman Boerkoel, K8JUG (ST-3), Newark Electronics Corp., 2114 S. Division Ave., Grand Rapids, Mich. 49507. In addition to the undrilled etched board alone he offers two parts "packages"—one including the etched board and the unusual parts, and the other including everything needed (he does not supply the toroidal inductors).

Fig. 3—Bandpass input filter for ST-3 and ST-4. Filter output should be connected directly to audio input shown in Fig. 1;  $R_7$  of Fig. 1 should be 4700-ohm value and  $R_8$  should be omitted. All capacitors are mylar, 75- or 100-volt rating.

input filter, optional fsk driver, and the optional tuning meter circuit. The circuit board also provides for the mounting of all power-supply components, with the exception of the two transformers. Thus, the entire project can become practically a one-day fun-type job to complete. Any or all of the parts may be ordered from the same source.<sup>10</sup> Cost of all parts purchased new is about \$50, excluding the chassis, etched circuit board, and ac line cord.

You may, if you wish, completely eliminate the entire autoprnt and motor delay section. (If you buy the printed circuit board, you can always add this section later.) Without the autoprnt or motor control features, the total cost would run only about \$35. You will find it hard to build something remotely decent for much less money.

You can utilize the junk box to a great extent on this unit. Diodes  $CR_3$  through  $CR_6$  are germanium, type 1N270, and here we suggest you do not substitute other types. The 88-mH toroids will cost about 50¢ each and may be purchased from various advertisers in the Ham-Ads section of QST.<sup>11</sup>

The etched circuit board which is available was not constructed to handle the current of the printer motor directly. The relay,  $K_1$ , and an external plug for the printer motor should

<sup>10</sup> Ibid.

<sup>11</sup> Toroids may be purchased from L. S. Van't Slot, W2DLT, 302 Passaic Ave., Stirling, NJ 07980.

be wired directly to 120 V ac. The 1½-A fuse in the power supply section of Fig. 1 (and on the etched board) is only for the actual demodulator itself; the printer should already have a fused motor circuit.

If you orient the switches correctly, you can place them all "up" for fully automatic operation. This is convenient, since you can merely glance at the unit to be sure it is set for auto-print, and then leave the room.

$S_1$  (NORMAL-STANDBY) should be open when up (NORMAL).

$S_2$  (AUTOPRINT ON-OFF) should be open when up (ON).

$S_3$  (MANUAL MOTOR CONTROL) should be open when up (AUTOMATIC).

$S_4$  (POWER) should be closed when up (ON).

Keep the leads to  $S_2$  as short as possible, because this switch is in a very high-impedance circuit.

When you connect the high-voltage power supply, the voltage on standby (mark) may not be 160 volts, depending upon the power transformer used. Measure the current through the printer magnets, and if it is not between 50 and 70 mA, change the 2500-ohm current limiting resistor in the collector lead of  $Q_5$  to a value giving the proper current. (No meter is needed permanently at this position.) At the same time, check the current to the winding of  $K_1$ . You may need to change the 4700-ohm resistor to another value if you do not read within about 1 or 2 mA of the 11 mA current the relay needs for optimum operation.

Then measure the current through the Zener diode in the low-voltage supply ( $CR_{19}$ ). If necessary, change the value of the 56-ohm 1-watt resistor until the Zener diode conducts between 10 and 25 mA current.

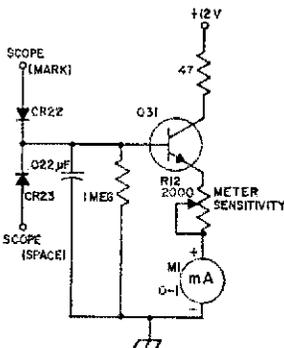


Fig. 4—Optional meter tuning-indicator circuit.  
 $CR_{22}$ ,  $CR_{23}$ —Silicon diode, PIV 50 or greater (1N4816 or equiv.).

$M_1$ —0-1 mA dc meter (Shurite 8336 or equiv.).

$Q_{31}$ —Audio transistor, pnp silicon (Motorola MPS3394 or equiv.).

$R_{12}$ —2000-ohm linear-taper control, subminiature, for horizontal circuit-board mounting (Mallory MTC-2314 or equiv.).

Adjust the discriminator filters for resonance at the frequencies shown in Fig. 1. Because of manufacturing tolerances, most 0.068- $\mu$ F capacitors will be a little too large in actual value for resonance at 2125 Hz, so remove turns from the 88-mH toroid to raise the frequency of the mark filter. Take an equal number of turns off each of the two half-windings before permanently joining the two sections of the toroid together. Similarly, most 0.056- $\mu$ F capacitors will be too large in value for resonance at 2295 Hz for the space frequency in the ST-4. Again, remove an equal number of turns off each winding of the toroid.

Some 0.033- $\mu$ F capacitors will be a little small in value, so select one having a value large enough that allows you to take a few turns off the toroid to reach resonance at 2975 Hz, the space frequency for the ST-3. As before, take an equal number of turns off each winding.

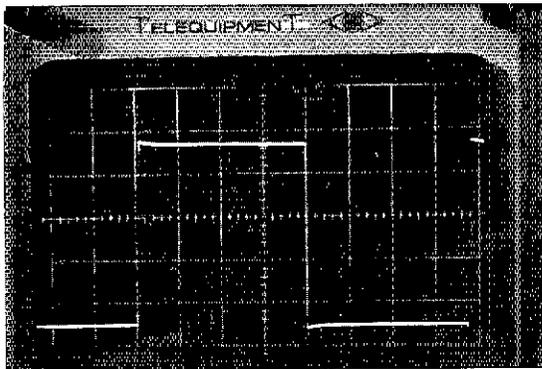
The "correct" capacitance would be 0.0637  $\mu$ F for 2125-Hz resonance, 0.0547  $\mu$ F for 2295 Hz, and 0.0325  $\mu$ F for 2975 Hz.

In the limiter stage is a 10-k $\Omega$  dc balance control,  $R_1$ . This could just as well be a fixed resistor. Measure the voltage at pin 3 of the integrated circuit; it should be approximately 11.2 volts. Set the control so that the output voltage with the input grounded will be one half that at pin 3, or about 5.6 volts. (Actually, anything between 4 and 7 volts gives about the same results.) This control balances the "offset input voltage" to the IC, allowing it to amplify the signal a maximum amount, for maximum dynamic range.

There is one other adjustment to be made. Attach a VTVM to point A in the detector circuit. Tune for maximum reading on a mark tone, and note the reading, around -2.5 volts. Then tune for maximum reading on a space tone and note the reading, again around -2.5 volts. If these two voltages are not equal, adjust  $R_2$ , the audio balance control at the output of the limiter circuit, until the voltages are equal.

The 2000-ohm control in the optional meter circuit, Fig. 4, lets you set the meter to some desired reading when mark is tuned in to maximum. I have mine adjusted to read about 80% full scale at that time.

It normally takes about 0.6 volt to cause a silicon transistor to conduct. The 1.2-megohm resistor at the base of  $Q_1$  causes  $Q_1$  to conduct. A very tiny amount of negative voltage will cause the stage to be cut off, and a very tiny positive amount will cause it to saturate. By hand-selecting an appropriate-value resistor, you can cause the printer to go to mark for all input signals lower in frequency than 2550 Hz for the ST-3 (2210 Hz for the ST-4), and to go to space for all frequencies higher. However, the 1.2-megohm value should be an excellent choice, depending upon how carefully and accurately you were able to tune the discriminator filters to the mark and space frequencies. If you lack some fairly accurate means of determining the necessary frequencies, disable



The output of the op-amp limiter is a near-perfect square wave with a sine-wave input. Pictured here is a 2125-Hz signal after limiting. The input to the demodulator for this photo was a sine wave at a -20 dB input level.

the autoprnt stage by closing switch  $S_2$  (auto-print off), and select a resistor value that causes the printer to print garble on receiver noise.

The network at the base of  $Q_6$  in the autoprnt stage does the same thing. Here, you select a value for  $R_6$  to determine the sensitivity of the autoprnt stage. With a 100-k $\Omega$  value in the ST-3, I measured about a  $\pm 150$ -Hz bandwidth before the printer went into standby, and with a 110-k $\Omega$  value in the ST-4, about  $\pm 50$ -Hz bandwidth. These values should give adequate tolerance for signals that drift or have improper shift, or both. By increasing the value, toward 120 k $\Omega$ , you can decrease the bandwidth, and by going the other direction, toward 82 k $\Omega$ , you can increase the bandwidth, but then you run into the problem of more frequent accidental turn-ons.

### Use as a Repeater

If an audio signal is fed into the demodulator, it will soon activate the autoprnt section, as well as the relay. Thus, a signal on one band can be used to activate a transmitter on another frequency or band. This is called "retransmitting" or "repeating," and is used frequently on vhf at remote sites. The relay can control the push-to-talk circuit on the transmitter, or if it is used infrequently, can control the 120-V ac power to the transmitter instead. Retransmit is occasionally used by some hams from 80 meters to 20 meters and back again.

In summary, the Mainline ST-3 RTTY demodulator was designed primarily to serve as a low-cost outstanding vhf unit. It adapts quite well to normal 3- to 30-MHz use as well, although it lacks a few of the "super-deluxe" features such as limiterless operation and a threshold computer. The limiter section will rival that of any published demodulator, the slicer and keyer stages allow copy of shifts as low as 20 Hz or less, and the 160-volt loop supply gives negligible distortion to received signals. An excellent "autoprnt" section, including a 30-second motor delay, is included for fully automatic printer control. The total cost is about \$50, less chassis or etched circuit board. The ST-4 demodulator contains all the features of the ST-3, except that it is designed exclusively for narrow or 170-Hz shift, and will allow copy of shifts as low as 5 Hz or less.

I must particularly thank Jon Schmidt, W3DZK, for calling the GE PA238 IC to my attention, as I had been struggling to make integrated linear amplifiers do the job before then. Also my appreciation goes to Vic Poor, K3NIO, without whose help this unit would not have been possible. QST

## Strays

### HEADQUARTERS VISITS

The League Headquarters building is open to visitors Monday through Friday, 8:30 to 4:30, on a "drop-in" basis, and at other times by appointment. The headquarters is on Main Street (Conn. Route 176 and 176-A) about a mile north of the center of town, and about 3 miles west of Conn. 15-D, S. 5, the Wilbur Cross Highway. (For WIAW visiting hours, see the schedule in the "Operating News" column.

The Canadian Amateur Radio Teletype Group recently awarded their 1969 Merit Award to W6AEE, noting that practicing teletypers regardless of where they live find Merrill Swan, W6AEE, and RTTY synonymous. From left to right are WB6QFE, K6DDQ, WA6LBU, W6AEE, W6LDF and WA6WGL doing the honors for the CARTG.



# A Receiver Matcher and Preamplifier

HOW TO IMPROVE  
RECEIVER PERFORMANCE

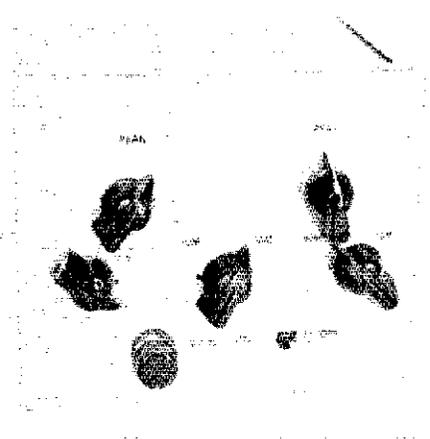
BY LEWIS G. McCOY, \* W1ICP

MANY amateurs use transmatches to couple the transmitter output to the antenna or feed line but few give any thought to matching the antenna to the input of their receivers. When a transceiver is used with a Transmatch, or if the Transmatch is connected in the receiver line, it will sometimes help match the receiver input to the antenna feed line. However, a Transmatch is normally adjusted to match a 50- or 70-ohm impedance, and this load is not necessarily the same as the receiver input impedance. It is true that many receivers are designed for a more or less 50-ohm figure, but not all of them are. The main point is that it can be just as important to match the antenna to the receiver as it is to the transmitter.

A receiver coupler will provide several advantages. First, because the coupler is made up of high-Q circuits, it will add some selectivity to the front end of the receiver. Second, it will help eliminate any images in the receiver. Also, it can actually improve the sensitivity of some receivers by providing a better match between the antenna system and the receiver. Many amateurs who live close to a commercial broadcast station have a problem with that station overloading their communications receiver, which can cause cross-modulation of the amateur signals. A coupler will prevent or greatly reduce such cross-modulation.

\* Novice Editor

*Here is a method for improving your receiver's performance. This system is particularly recommended for getting more life into older receivers.*



This shows the completed coupler and preamplifier. The two variable capacitor controls are at the top. The three switches are, from left to right,  $S_3$ ,  $S_2$ , and  $S_1$ .

Many of the lower-cost, or second-hand receivers, commonly used by Novices, will have adequate sensitivity on 80 and 40 meters, but the performance may leave much to be desired on 20, 15, and 10. While the coupler by itself will help improve performance on the higher bands, a preamplifier will really improve reception. In the unit shown in this article, a coupler and preamplifier are combined to provide a very worthwhile addition to the station.

The preamplifier consists of a grounded-gate FET amplifier followed by a source-follower, also an FFT-type transistor. The circuit diagram, Fig. 1, shows the circuit details of the complete unit. A series-tuned circuit,  $L_1$ ,  $C_1$ , provides the input circuit, and this is followed by a parallel-tuned circuit which is coupled into the preamplifier. Each of the circuits can be band switched to cover 80 through 10 meters. The source of  $Q_1$  is connected to the arm of  $S_3$  so that it can be tapped down on  $L_2$  to provide the proper impedance match to the transistor.

## Construction Details

The coupler-preamplifier is built into a 4 X 5 X 6-inch aluminum Minibox. However, any metal enclosure of adequate size can be used. The tricky part of construction is tapping the Miniductor coil. With 32 turns per inch, the wires are very close together. In order to keep the tap from shorting to the adjacent turns, the turns next to the tap point should be carefully bent in toward the axis of the coil. Use a small screwdriver blade, placing the end of the blade on the turn to be pushed in, then gradually apply pressure on the screwdriver until the turn bends in. Use a soldering iron with a small tip, and No. 28 tinned wire for the tap leads. The leads can be made about four inches long, and then

Fig. 3—Etched-circuit template. The darker lines show the component connections.

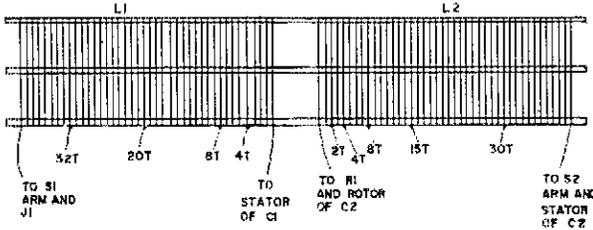
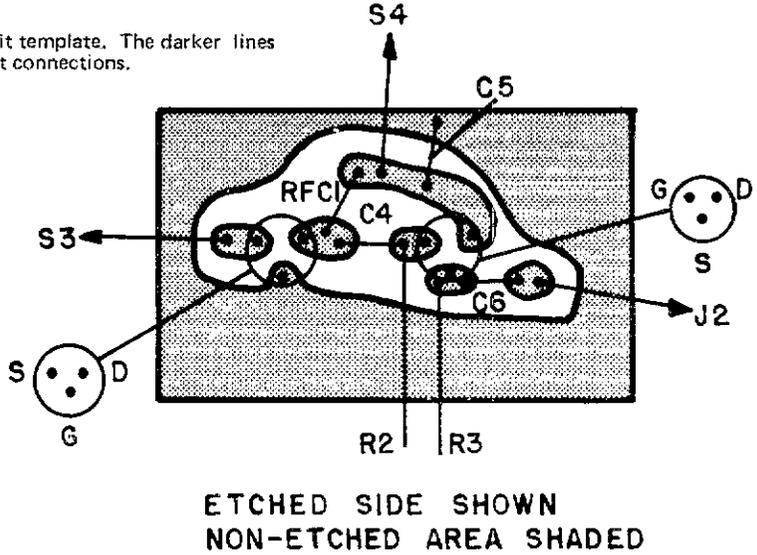


Fig. 2—Drawing of the coil assembly, L1 and L2.

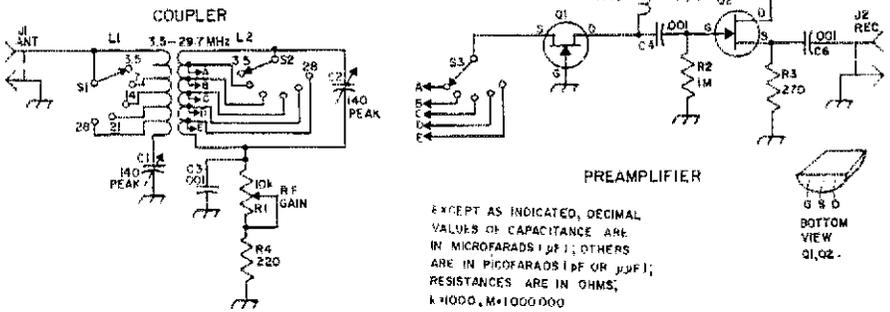


Fig. 1—Circuit diagram of the coupler/preamplifier. Resistors are 1/2-watt composition. Unless indicated otherwise capacitors are disk ceramic.

C1, C2—140 pF variable (Hammarlund type APC-140B, or similar Lafayette No. 40 E 28569).

C3, C4, C5, C6—0.001-μF disk ceramic.

BT1—9-volt transistor radio battery.

J1, J2—Phono jacks.

L1, L2—See text and Fig. 2 Each coil is 46 turns, 32 turns-per-inch, 3/4-inch diam. (B&W Mini-inductor type 3012, Lafayette No. 40 E 16218).

Q1, Q2—Motorola HEP-801 or MPF-102 (Lafayette No. 19 E 54221, HEP 801).

R1—10,000-ohm control (Lafayette No. 33 E 11255).

R2—1-megohm, 1/2-watt.

R3—270-ohm, 1/2-watt.

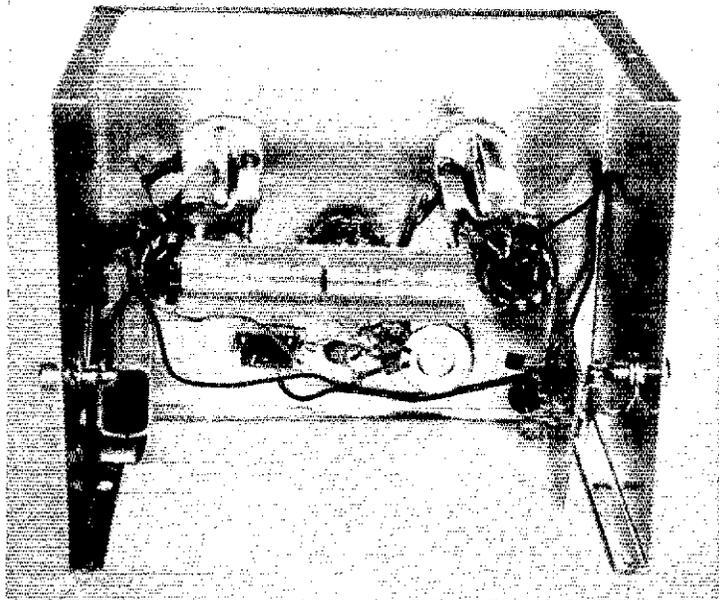
R4—220-ohm, 1/2-watt.

RFC1—100-μH rf choke (Lafayette No. 30 E 40144).

S1, S2, S3—Single-pole, 12 position rotary switch, 5 positions used, (Lafayette No. 30 E 440144).

S4—Single-pole, single-throw switch.

Here is the inside of the unit. The etched circuit board is at the lower right hand corner. As pointed out in the text, the coils  $L_1$  and  $L_2$  are supported by the tap leads.



trimmed to a shorter length when they are connected to the appropriate switch terminals.

Fig. 2 is a detailed drawing of the coil stock used for  $L_1$  and  $L_2$ . Each portion of the coil consists of 46 turns. Carefully cut the wire at the exact center of the coil stock and unwind two turns. The correct tap points are shown in Fig. 2. Before mounting the coil on the switch contacts, it is a good idea to first connect the leads from the appropriate switch contacts on  $S_2$  to those on  $S_3$ . When this is done, the coil stock can be mounted in places.

### The Circuit Board Preamplifier

Fig. 3 shows a template of the printed-circuit board for the preamplifier. The unit can be built on an ordinary piece of insulated board if one doesn't want to use the printed-circuit method. The important point in constructing the preamplifier is in soldering the transistor leads; be sure to use a heat sink on the lead being soldered. *Too much heat can ruin a transistor.*

### Adjusting The Unit

Using the unit is quite simple. Connect your antenna to  $J_1$  and use a short lead of coax to connect  $J_2$  to your receiver antenna terminal. By short, we mean no more than a couple of feet of coax. With your receiver tuned to the 80-meter band, switch  $S_1$  and  $S_2$  so that the entire coils are in the circuit—no turns shorted out. Tune in a signal, then adjust  $C_1$  and  $C_2$  for a peak response. Next, switch  $S_3$  through its range, and find a setting that gives the loudest signal. Then, try another switch position on  $S_1$  and repeat the two variable capacitors. You should find a condition that will give the loudest signal.  $R_1$  should be

adjusted for the loudest setting, which will probably be with most of the resistance shorted out.  $R_1$  can be used as a gain control, particularly if a very strong signal is present. Once the correct settings are found for 80 meters they can be noted and then a similar procedure followed in setting up on other bands.

### Getting Parts

As any ham who has been around for awhile can tell you, trying to locate the necessary parts can be discouraging. To help the would-be builder we are trying something different in this article. If you notice in Fig. 1 in the parts list, we have included *all* the catalog numbers for the required parts from one of the larger mail order houses. This may save you some headaches. QST

### Fifty Years of ARRL

A bound 152-page reprint of the gold-edged historical articles which appeared in the 1964 issues of QST is available from the ARRL for one dollar postpaid. Titled *Fifty Years of ARRL*, the book covers the highlights of ARRL and amateur radio history during the fifty years from 1914 to 1964, and will make a companion piece to the classic *200 Meters and Down*, a reprint of which is also available from the ARRL for one dollar.

# Improved 75-Meter Portable Performance for a Mobile Station

BY HERMAN LUKOFF,\* W3HTF

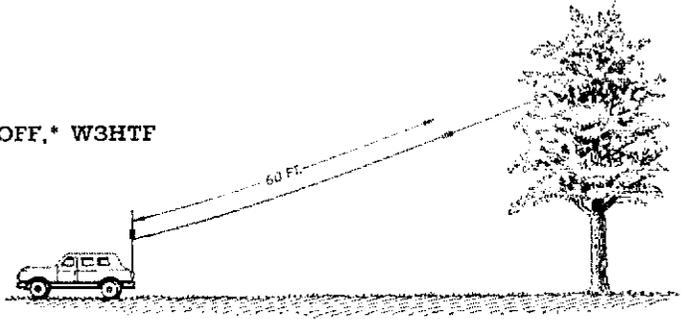


Fig. 1—W3HTF's 75-meter portable antenna.

IMAGINE that you are off for a week's vacation to the seashore, to the mountains, or for a few days to a business convention. You have your mobile rig along with you in the car and it's only natural that you would like to keep in touch with your buddies in your home town one or two hundred miles away. The band with the right skip conditions for consistently covering that distance is 75 meters, but there is one catch — the signal radiated by the mobile whip antenna may just be too marginal. Maybe your friend will hear you through all of those thunderous home stations and maybe he won't. A more effective antenna is required.

Some of the boys carry along a  $\frac{1}{2}$ -wavelength coax-fed dipole antenna for portable operation, but as anyone can attest who has ever put one up, it's no snap to put up a 120-foot dipole. Just having that space available may be a problem (witness the number of city-dwelling hams who aren't on 75) and finding two trees or buildings that are at least 120 feet apart may be another problem. Who has the fortitude to put up a mast for a one night's stand? Fortunately, there is a very simple and effective answer that will make your mobile/portable sound more like a home station. The answer is simply the application of the venerable  $\frac{1}{4}$ -wave wire operated against the car body as ground.

The antenna itself is just a 60-foot piece of wire with a 50-foot piece of plastic clothesline (or thin nylon cord if you prefer) tied to one end. The light-duty usage of this antenna permits the utilization of lightweight components in its construction. No. 18 stranded wire is recommended for the antenna element. The rolled-up antenna is so small that it can easily slip into your glove compartment. No coax cable is needed for the  $\frac{1}{4}$ -wave antenna except that which is already built into the mobile installation. One end of the 60-foot wire is clamped under the existing mobile whip loading coil by screwing the coil down on it. The clothesline end of the antenna is thrown over any tree, house, or other available object, as shown in Fig. 1. The attrac-

tive part of the system is that one end support for the antenna (the mobile whip) is already built in, and by moving the car this anchorage readily can be just the right distance from any object which will support the other end.

The  $\frac{1}{4}$ -wavelength system can be literally thrown up in 5 or 10 minutes and removed in half that time. If the car has to be used, it takes just seconds to disconnect the wire at the loading coil and reconnect it again when the vehicle returns to the portable site. The end of the antenna left hanging in a tree need not be disturbed.

## Performance

One of the benefits of the  $\frac{1}{4}$ -wave wire over the mobile whip is the much greater bandwidth. The bandwidth limitations of the whip on 75 meters are well known — perhaps 30 to 40 kHz. Actual SWR curves of the "Hustler" vs. the  $\frac{1}{4}$ -wave wire are shown in Fig. 2. The  $\frac{1}{4}$ -wave wire loads my transceiver over the entire 75-meter phone band with no problems.

The question arises as to whether the top section of the whip has any effect when using the  $\frac{1}{4}$ -wave wire. It certainly does, as can be seen from the SWR curves. By itself, or with loading coils for any other band, the SWR of the  $\frac{1}{4}$ -wave antenna is 1.6 to 1. With a 75-meter loading coil the SWR drops to 1.2 to 1. As a result, I recommend that the loading coil be used in conjunction with the  $\frac{1}{4}$ -wave wire.

The  $\frac{1}{4}$ -wave doesn't work quite as well as the  $\frac{1}{2}$ -wave dipole but it is much superior to the mobile whip antenna. It radiates a signal that is of "home station" caliber. To fully evaluate the antenna, a 120-foot dipole was erected at the same height and in the same direction as the 60-foot wire and comparative on-the-air tests were performed. The results on one occasion are shown in the box. The stations contacted were cautioned to average their S-meter readings over a sufficient period of time to allow for the usual QSB conditions. The results on this occasion and on many previous trials indicate that

\* 506 Dreshertown Road, Fort Washington, Pa. 19034.

the  $\frac{1}{4}$ -wave antenna is no more than 1 to 2 S units lower in performance than the  $\frac{1}{2}$ -wave dipole, but is 4 S units or so better than the mobile whip.

The improvement in performance over the mobile whip is amazing. On a number of occasions when I couldn't be copied on the mobile whip, solid contacts resulted with the  $\frac{1}{4}$ -wave wire. In the 1969 Field Day, a  $\frac{1}{4}$ -wave wire was strung up on a 42-foot yacht operating in Chesapeake Bay and used over both the cw and phone portions of the 80-meter band. Getting a good ground on the wooden boat was a problem; nevertheless, performance was good. On a pre-contest check, an S5 was received compared to S1 on the whip. On the 80-meter band alone, 118 contacts were made in the single-transmitter group

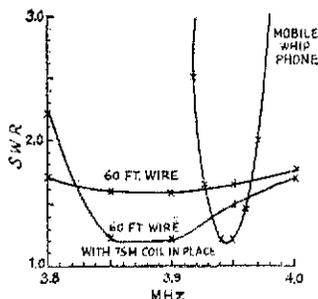


Fig. 2—SWR readings of the mobile whip alone, with 60 feet of wire attached as shown in Fig. 1, and with the wire attached but loading coil and whip top section removed.

How high should the wire be placed? Ideally as high and as in the clear as possible, but practical limitations usually provide the answer — as high as you can throw a rock with a line attached, or as high as there are available branches on a tree. I have found that even low heights like 10 or 15 feet provide good radiation.

You might wonder how well the  $\frac{1}{4}$ -wave wire works on the higher frequency bands. I didn't try it. I would expect to find less dramatic improvement than on 75 meters because the

Station	Time GMT	S-Meter Reports Received		
		Mobile Whip	Wire	Dipole
WBHPB	1430	1	7	7/8
W1MWR	2053	4/5	8/9	9
W3RFN	1310	6	9+5 dB	9+10 dB

mobile antenna has less loading and more closely approximates the length of a full  $\frac{1}{4}$ -wave antenna as the frequency gets higher. The wire does provide an aspect of interest, as its horizontal polarization should provide greater signal strengths in contacts with closer-in stations because of its higher angle of radiation. Finding the benefits of higher frequency use of the  $\frac{1}{4}$ -wave wire is left to others to try.

If you plan portable operation for more than one or two days, it is a good idea to take along a 100-foot extension power cable and a battery charger, if commercial power will be available. That way you can operate for extended periods without worrying about dead batteries, over-heated engines, or ignition noise.

Incidentally, use of the  $\frac{1}{4}$ -wave antenna for a land mobile station on Field Day would change that station's category from mobile to portable. The only loophole that I can envision is to tie the end of the  $\frac{1}{4}$ -wave wire to a swivel at the top of a flagpole and drive around in circles, which should reestablish the station in the mobile category.<sup>1</sup> Don't forget the swivel or you will travel in ever-decreasing circles and wind up Field Day sooner than expected!

Nothing really new is claimed in this article. It's just a reminder that the old-fashioned  $\frac{1}{4}$ -wave antenna can be put to good use in a new application. I hope no one interprets my statements as discrediting mobile whips. They can make fine contacts for you when there is no alternative.

QST

<sup>1</sup> The Contest Committee advises they are for flag waving on Field Day, but not with a mobile! — Editor.

## Strays

QST congratulates . . .

. . . Alex Duda, WB2Y0I, on receiving a plaque from the crew of aircraft carrier U.S.S. Princeton, prime recovery vessel for the Apollo 10 mission. Al spent many hours running phone patches for crew members and news media representatives.

. . . William B. Bridges, W6GEB, elevated to the grade of Fellow of the Institute of Electrical and Electronic Engineers for contributions to the theory and development of gas lasers and for studies of space-charge instabilities in diodes.

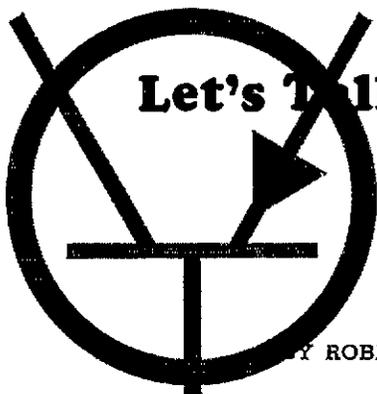
. . . Edna Marie Thorson, WA0RRR, named to the Outstanding Young Women of America list.

. . . Ray E. Meyers, W6MLZ, presented a special Mayor's Award for outstanding community service as San Gabriel's civil service commissioner, civil defense director and communications chief.

Ted Crosby, W6TC

On February 12 death claimed Ted Crosby, W6TC, at the age of 70. Known to thousands of QST readers through his articles on the popular HBR series of amateur-band receivers, he was not only untiring in experimenting with ideas for making a good receiver better, but was equally meticulous in helping individual builders, as the many who wrote him about their HBR problems will readily attest. He exemplified to a remarkable degree the real ham spirit of helpfulness, although by nature rather shy — he shunned personal publicity, seldom went to ham meetings, and even avoided public presentation of a well-deserved Cover Plaque that the A.R.R.L. Board of directors awarded him some years ago.

We shall miss him, but not forget him.



# Let's Talk Transistors

## Part 6—Transistor Circuit Operation

BY ROBERT E. STOFFELS\*

**I**n Part 5 our discussion centered around the operation of a transistor in a d.c.-circuit. We learned that the emitter-base portion of a transistor is nothing more than a forward-biased diode, and that the base-collector portion of the transistor is little more than a reverse-biased diode. We further learned that the action we performed on the base lead was very similar, in principle, to the placing of one's foot on the brake pedal of an automobile with power brakes. That is, an interruption of a small current in the base circuit (like the application of a light pressure on the brake pedal) caused a much larger current to be interrupted in the collector circuit of the transistor (or a much larger pressure to be applied to the brake shoes of the automobile).

It must be emphasized that in neither case did we create energy, or get something for nothing. Rather we *amplified a signal*. In the case of the automobile, we drew power from the engine, and in the case of the transistor, we drew power from the collector battery.

We continued with a discussion of the manufacture of a transistor. We learned that one way of purifying germanium (and there are certainly other ways) was the zone-refining process. We also saw that one manner of manufacturing a transistor (and, once again, there are certainly other ways) was by the grown-junction method. No matter what the manufacturing method used, however, it is always necessary to have a pn junction and an np junction for a pnp transistor, and an np junction and a pu junction for an npn transistor.

Although most of our discussion has centered about the pnp transistor, there is no difference between its operation and the operation of an npn transistor. For the purpose of discussion,

\* Director, FAX Operations, Automatic Electric Laboratories, Inc. Northlake, Ill. 60164. This series is reprinted from *Telephone Engineer & Management*, Brookhill Publishing Company, Wheaton, Illinois 60187.

*How the transistor is used in communications applications with a.c. signals; amplification; the transistor as a variable resistor.*

it is better to stick with one or the other—should the reader wish to investigate the other, it is only necessary to switch the terms and the relative direction of electrons and holes.

Now it is certainly evident to anyone who has given the subject any thought that a transistor is good for more than just dc operation. Certainly transistor radios, transistorized telephone repeaters, transistorized tape recorders, etc., employ transistors in an ac mode of operation. Therefore we shall discuss, this month, the application of a transistor in a circuit carrying alternating-current signals. Such an application contains both dc and ac simultaneously. Strangely enough, this is exactly the way a transistor must be operated. For a transistor is not a bidirectional device; it permits current to pass in only one direction. (Remember our discussion of the semiconductor diode, and the complete blocking of current when we applied a reverse voltage, or bias.)

### Alternating Current

As is well known, ac, or alternating current, is the motion of electrons in a conductor in one direction for a short period of time, and then the motion of these electrons in the opposite direction for a short period of time. The number of round trips these electrons make in a second is called the frequency of the current, and is measured in hertz, or cycles per second. The frequency of this current can vary from very few cycles per second (one or two Hz in low-frequency oscillators) to 60 Hz in the electrical systems of our homes, to many millions of cycles per second in the case of microwave systems. Likewise, the amplitude of this current can vary from a minimum of millionths of an ampere (microamperes) to many thousands of amperes.

One other characteristic of this alternating current might be mentioned; that is the relative velocity of the electrons from moment to moment. Since the electrons themselves are extremely small and light in weight (refer back to Part 1 of this series), they essentially have no inertia and, consequently, their direction and velocity can be changed almost instantaneously. For instance, these electrons can be made to move in one direction (call it the positive direction) with a constant velocity, and then at a specific

instant be caused to change their motion to the negative direction with the same velocity. If we were to draw a picture of this action we would have something resembling Fig. 6-1. This is what is known as a square wave; the name is used because the picture is obviously just that.

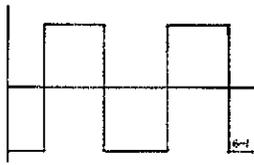


Fig. 6-1—Square wave.

On the other hand, the electrons can be made to accelerate in one direction for a short period of time, and then to decelerate in that direction, until they are eventually at rest. Then they can be made to accelerate in the reverse direction for awhile, and once again decelerate in that direction. In such an operation there is no abrupt change at all; it is a "natural" sort of operation, and the resultant wave is called a sine wave (after the trigonometric sine function of a rotating vector). Such a picture is shown in Fig. 6-2.

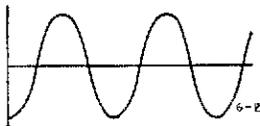


Fig. 6-2—Sine wave.

Now there is one device which has particular value in ac circuits, and that is a capacitor. Very briefly, a capacitor will not permit the passage of dc, but rather will store up an electrical charge of given polarity on one plate when an electrical potential is applied in the proper direction. Consequently, since ac is nothing more than a constantly reversing electrical potential, a capacitor can be said to conduct ac or, at least, to build up and cut down the charge as the ac changes direction.

### Combined AC and DC

A means whereby we can effectively combine ac and dc can be seen by studying Figs. 6-3 and 6-4. In Fig. 6-3 you will note that the left-hand meter will indicate a current of 1 mA in one direction, and then 1 mA in the opposite direction. This, of course, is true ac. The right-hand meter will indicate values of 2 mA and 0 mA as the extremes. This is pulsating dc. Notice that the peak-to-peak values were in both cases 2 mA.

Fig. 6-4 shows the same circuit as in Fig. 6-3, except that in this case we have added a transistor. Now the current in the right-hand mesh becomes the transistor base current, and we may apply the same reasoning to this transistor that

we did in previous issues. That is, when the current in the base of the transistor is 0 mA, then the current in the collector of the transistor is likewise 0 mA. To put it another way, the transistor is turned off.

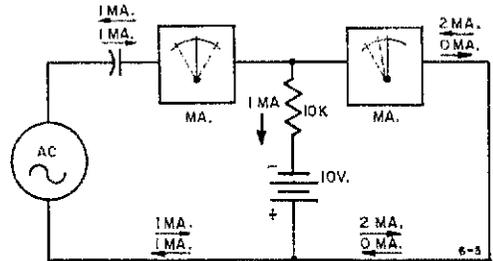


Fig. 6-3—Closed electric system depicting a.c. and d.c.

### Amplification

When the current in the base lead is 2 mA, then the current in the collector lead is really quite appreciable. If we use the figures of Part 4—that is, that two per cent of the emitter current will flow in the base and 98 per cent of the emitter current will flow in the collector—then we will have 98 mA in the collector of the transistor as a peak value. This collector current is, of course, derived from the 10-volt battery which we have been using to apply a dc bias to the base of the transistor.

Notice that in this circuit we have a true amplifier. The input alternating signal was a mere 1 mA in both directions, or a peak-to-peak value of 2 mA. The output collector current, on the other hand, followed exactly the frequency of the input signal, but produced a current with a peak-to-peak value of 98 mA. Not bad, for a single-stage transistor amplifier!

You will note that a basic difference between operation in an ac circuit of this sort and operation in a dc circuit such as described in Part 5 was that in the ac condition the current in the transistor did not change abruptly. That is, it was not necessary to use the transistor simply as a switch, but rather it amounted almost to a variable resistor. If the incoming signal had been a square wave, then the operation would

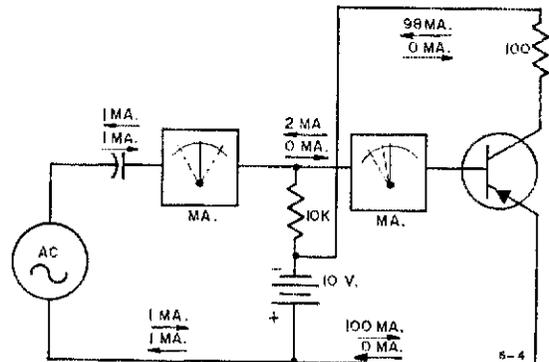


Fig. 6-4—Closed electric system with transistor added.

have resembled that of a switch. But if the incoming signal is a sine wave (as it usually is) then the transistor would of necessity pass current values other than the extremes of 0 mA and 98 mA. It would, in fact, have to pass all current values between these extremes: the only criterion being that the collector is exactly 98 per cent of the emitter current, and the base current is exactly two per cent of the emitter current. A little later we shall plot graphs showing this "variable resistor" characteristic of the transistor.

We have repeatedly, in this chapter and in previous chapters, discussed the fact that about two per cent of the current will flow in the base and 98 per cent of the current will flow in the collector. Although these are typical values, they are by no means universal. In fact, they vary so much that a particular term is applied to the ratio of the two numbers. *This term is "beta", and it is defined as the ratio of the collector current to the base current.* In the example cited above, beta would have been  $98/2$  equals 49. The betas of various transistors vary from about 20 to several hundred; and this variation presents one of the great problems to circuit designers.

Hereafter, we shall no longer say that such and so percentage of current flows in the base or collector, but rather that the beta of a transistor is such and so. Then if the base current of a transistor is known, the collector current can be found by multiplying by this number (beta); if the collector current is known, the base current can be found by dividing by this number. The emitter current is, of course, the sum of the collector and base currents.

### *The Transistor as a Variable Resistor*

Please notice that there is essentially no difference between alternating current and direct current. If I were to have dc flowing in a resistor in a particular direction, and were to connect a double-pole, double-throw toggle switch to this circuit, I could *create* alternating current by throwing this toggle switch back and forth. That is, I would be reversing the flow of the current in the load resistor just as fast as I could throw the switch. The resultant wave form, if we may use the term, would be truly a square wave.

Now certainly I could add a transistor to this circuit, add a little bit of dc bias current so that the current would never really turn around, and thus have an ac amplifier operating on a square wave. The only difference between this circuit and a circuit carrying ac with a sine-wave form, would be that with the square wave there are only two conditions: on and off.

With an amplifier operating on a sine wave there must be an infinite number of conditions in order to faithfully reproduce the waveform of the input signal. This indicates that a transistor is more than a two-condition switch, but rather that it has an infinite number of "conditions". We shall now see that these "conditions" are nothing more than different resistances — that is,

a transistor is nothing more than a variable resistor. The actual resistance of the emitter-collector circuit is varied by drawing more or less current through the emitter-base junction.

Please let me repeat — because if you can grasp this concept everything else falls into place very neatly: *A transistor is a variable resistor.* Its resistance can vary, depending upon the base current, from close to zero ohms to infinite ohms. This resistance can vary just about as fast as you wish it to — that is, with exactly the frequency of the input signal. (It will operate at megahertz but perhaps not at mega-mega hertz.)

When we use the transistor as a switch we change the resistance from zero ohms to infinite ohms in one step — and isn't that exactly what takes place in any switch?

When we use the transistor in ac circuit, we change the resistance more gradually, rather than in one abrupt step.

While we are on the subject of this "variable resistor", let us briefly consider the power dissipation in a transistor (power dissipation is just a fancy way of saying "heat generation"). Since a transistor is a variable resistor, of course it will generate heat. And this heat, or power, may be found by using exactly the same formulas used in basic electricity courses — namely,  $E \times I$ , or voltage times current. This, of course, may be converted to  $I^2R$ , or  $E^2/R$ . No matter how you calculate it, it still represents heat.

Now, if a transistor is turned completely off — that is, if there is no current being drawn out of the base, and thus no current in the emitter-collector circuit (infinite resistance) then there is zero heat-generation (an open switch doesn't generate heat, does it?).

On the other hand, if the transistor is turned completely on (theoretically, zero resistance between emitter and collector) then there is no voltage drop across the transistor, and once again there is no power dissipation, or heat generation, in the transistor (there is no heat generated in a closed switch with good contacts, is there?). It is only in the in-between areas where there is trouble — where the resistance of the transistor is somewhere between zero and infinite ohms.

But, we are straying somewhat from our subject. What we want to do is study in more detail the changing of the resistance of the transistor.

We often tend to become so engrossed with the so-called "amplifying" characteristics of a transistor that we tend to forget its basic — and simple — variable-resistance characteristics.

### *Load Line*

Did you ever try to plot the characteristics of a variable resistor? Not much to plot, you say — but let's try it. Assume we have the circuit of Fig. 6-5.  $R_1$  is a fixed 100 ohms, and  $R_2$  is a variable resistor whose resistance can be varied anywhere between zero and infinite ohms. The series combination of these two resistors is connected to 10 volts.

Fig. 6-6 shows a plot of the characteristics of resistor  $R_2$ . It shows that when its resistance is set to infinite ohms, and thus when there is zero current in the circuit, then there is 10 volts across it. This is point *A*. Likewise, when its resistance is set to zero ohms, then there will be zero volts across it ( $V = I \times R$ , and  $R = \text{zero}$ ) and the current in the circuit will be 0.1 A. This is shown at point *B*.

Let's take a third point; if the resistance of this  $R_2$  is set at 100 ohms, then there will be a total of 200 ohms in the circuit, and we will get .05 A. This will result in 5 volts dropped across resistor  $R_2$  (and, incidentally, five volts across  $R_1$ ); this point is shown plotted as point *C*. Now, if we are very astute, we will notice that these three points are on a straight line. Furthermore, if we choose other points, we will likewise find that these points depicting the current in, and the voltage across, resistor  $R_2$  will all fall on the same straight line. This line is called the load line of the resistor  $R_2$ . Not very difficult, is it, nor very profound, but oh, how helpful it can be!



Fig. 6-5—Fixed and variable resistors in series connected to 10 volts.

Notice that what we have plotted are the characteristics (voltage across and current in) of the variable resistor  $R_2$ , as it changes its resistance from zero to infinite ohms. We cannot, by any means whatsoever, make the resistance of this resistor less than zero ohms, nor more than infinite ohms; nor can we do it to a counterpart transistor. These limits are imposed by nature, but you would be surprised how many designers

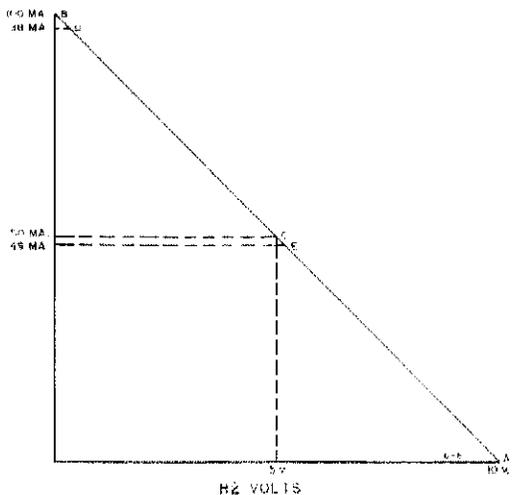


Fig. 6-6—Characteristics of resistor  $R_2$  in circuit of Fig. 6-5.

try to get a transistor to assume a resistance less than zero ohms.

### Transistor Load Line

Now let us do the same thing to the transistor circuit of Fig. 6-7. You will note that this is the same circuit as shown in Fig. 6-5, except that we have substituted a transistor for the variable resistor  $R_2$ , and have added the biasing circuit. Furthermore, if you will look back to Fig. 6-4 you will see that this is the circuit which we used to demonstrate ac in a transistor, even the values have remained the same.

You will note that the dc bias current is 1 mA, and that the a.c. signal current is 1 mA in one

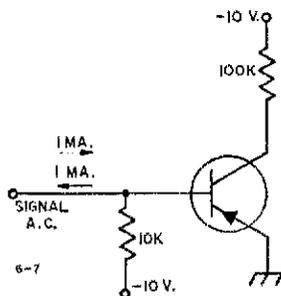


Fig. 6-7—Same circuit as Fig. 6-5 but with transistor substituted for variable resistor  $R_2$ .

direction, or 1 mA in the opposite direction. Consequently, base current of the transistor will either be 2 mA or zero mA. We stated (and admittedly we brushed over it rather quickly — it would have been getting ahead of our story to do otherwise) that since the "beta" (remember — ratio of collector current to base current) was about 49, the 2 mA base current would result in a collector current of 98 mA, and the zero mA base current would result in a zero mA collector current.

Let's plot the characteristics of this transistor in this circuit, and see what we really have. Actually, we have already done so, in Fig. 6-6, since this circuit is identical to that of Fig. 6-5. Notice from the straight load line of Fig. 6-6 that the maximum possible current which can result in this circuit is 0.1 A, or 100 mA. This condition exists when the resistance of the transistor is zero ohms. As mentioned above, there is no possible means of getting more current out of this circuit.

By the same token, when the transistor is "turned off", that is, when its resistance is infinite, the current in the circuit is of course dropped to zero mA. This was point *A* of Fig. 6-6.

So our circuit of Fig. 6-7 is perfectly valid. We can, if the transistor has a beta of at least 49, and if the supply voltage is 10 volts and the collector fixed load resistor is 100 ohms, obtain a current in the collector of 98 mA. This point is shown in Fig. 6-6 as point *D*. If the resistance of the 100-ohm collector resistor had been as high

as 103 ohms we never would have been able to squeeze 98 mA, out of the circuit.

So let's briefly review the load line. Point *A* (Fig. 6-6) is at the lower end of the load line, and indicates that when the resistance of the transistor is infinite, then the current in the transistor is zero mA, and the voltage across the transistor is equal to the supply voltage.

Likewise, point *B* is at the upper end of the load line, and indicates that when the resistance of the transistor is zero ohms, then the current in the transistor is equal to the supply voltage divided by the fixed resistor in the circuit, and that the voltage across the transistor is zero volts.

When a transistor is operating at point *A*, it is said to be cut off (an obvious description). When a transistor is operating at point *B*, it is said to be in saturation (its resistance has been lowered to zero ohms, and it can by no means at its disposal cause more current to flow). When no alternating-current signal is applied to the transistor — i.e., when only the dc bias is applied, the resultant collector current can be represented by point *E*. This is known as the operating point, since it is that point about which we make excursions, depending upon the wave form of the incoming ac signal.

Therefore we have the load line of a transistor — a line which is determined at one end by the supply voltage, and at the other end by the supply voltage divided by the fixed collector resistor.

Next we have an operating point on this load line — normally about midway down the line. This operating point is determined by the beta of the transistor, and by the bias current in the base.

Finally, the excursions on this load line of the ac signal are determined by the beta of the transistor, and by the amplitude of the input signal.

In Part 7 we shall focus our attention on the methods of biasing a transistor, and determine the merits of these methods as the beta of a transistor varies.

### Questions:

1. Which of the following does a transistor most resemble — a capacitor, an inductor, a resistor, a battery?
2. If a transistor resembles a resistor, what are the limits of this resistance?
3. How fast can a transistor change its resistance?
4. Why do we always have to add bias current to a transistor?
5. How much heat is generated in a transistor when it is in cutoff?
6. How much heat is generated in a transistor when it is in saturation?
7. Is it possible to have a curved load line?
8. If the battery voltage of Fig. 6-7 had been only five volts, could we still have managed to get a saturation current of 98 mA?
9. What are the three most important points on a load line called?

10. In a transistor circuit designed to amplify ac why must there be dc present?
11. In the transistor circuit of Fig. 6-4, won't some of the alternating current actually pass through the 10k $\Omega$  resistor?
12. Define "beta", as applied to transistors.

### Answers:

1. It most resembles a resistor, although in specialized applications its characteristics of inductance and capacitance must be taken into account. The transistor does not resemble a battery.
2. The same limits that are imposed on any resistor, namely, zero to infinite ohms.
3. So fast that you can almost ignore this switching time. It can certainly change its condition in less than a millionth of a second. Switching transistors are a good deal faster.
4. Because a transistor is a unidirectional device. You might say that it is a variable resistor in series with a diode.
5. Zero heat, or watts. (No current, no power)
6. Theoretically, zero. (No resistance, no voltage drop, no power dissipation)
7. Not if the external resistor and the battery remain constant.
8. No. The maximum current we could have obtained then is  $5/100 = .05A = 50$  mA.
9. Cutoff (lower right), Saturation (upper left), and Operating Point (somewhere in the middle).
10. Because a transistor will conduct current in only one direction, a "bias" current must be added to the circuit.
11. Yes, indeed. Every shunt path will bleed away some of the precious alternating current. It is for this reason that we keep these resistors as large as possible.
12. "Beta" may be defined generally as the ratio of collector current to base current.

QST

## Strays

### Feedback

The 9th World-Wide RTTY DX Medallion SS report, appearing on page 51 of the March issue, shows DL8VX with a score of 42,054 points. The CARRFQ has since corrected the error and indicates that he should be recorded as twelfth-high scorer with 252,324 points. An interesting sidelight of that test was a copy of the fully computerized readout of results furnished ARRL by VE3GK.

In part 4 of Mr. Stoffel's series the polarity of the collector battery for the upn transistor (February, QST, page 40, Fig. 4-5) somehow got reversed. The positive end should go to the collector, not the base.

In Fig. 4, page 18 of January, QST, (Gillett "Transistor Module") the common connection between stages should have had a chassis symbol to indicate interconnection with the other modules.

# A Practical Solution to an Impractical Problem

BY MARION D. REDLINGSHAFFER,\* W5LQH

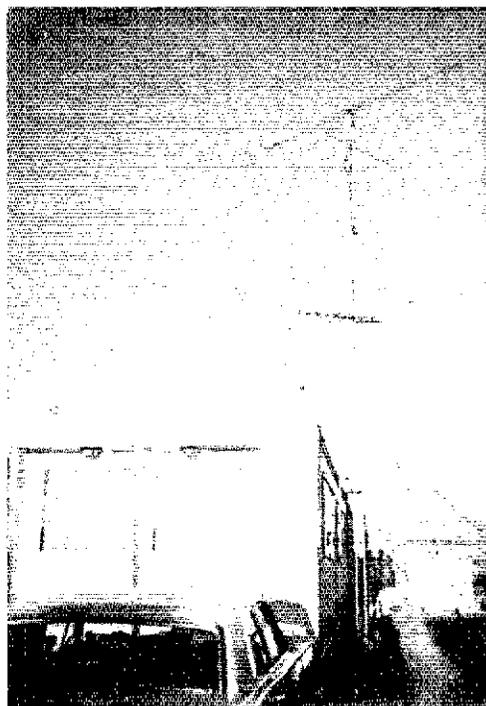
THE author, W5LQH, lives in a mobile home in an average mobile home park and, of course, has only enough ground space to stand up and turn around twice, which is of his choosing and not to be fretted about. Last June a severe hailstorm nearly tore the side off the mobile home; the insurance company agreed to replace the damaged side. Since most trailer repairmen are not too radio-minded, or even attempt to be so, the particular repairman sent out loosened the 30-foot antenna mast from the damaged side, along with the cantilever boom guys, and "down came the Cliff Dweller antenna," breaking off both tuneable sections as well as bending the mast to an unuseable condition.

A new tower was planned for replacement but how to erect a 40-foot tower in a 3-foot ground space became a matter for great and lengthy discussions. Suggestions considered, a plan was finally devised to solve not only the erection but to gain some previously unplanned benefits. Considerable high- and low-level engineering talent was gathered for the undertaking. It was decided all assembly tuning, etc., would be done on the ground since everyone wanted to use the one available screwdriver and wrench. The Cliff Dweller tuning sections were shortened and replaced on their flanges, the motor driven tuning rods were epoxied together, bent elements straightened, a 40-foot tower was purchased and all was in readiness for the erection.

A hole 30-inches wide and 36-feet deep was dug at the selected location. These dimensions are plus or minus 10 percent or 2 cups of coffee. Next, a 50-gallon oil drum was obtained from the local service station to which the tower base was attached. The drum and base were then started into the hole and tower sections were hoisted in place. All work was done at ground level.

Succeeding tower sections were added as the assembled tower was lowered. The rotator, 2-meter beam and Cliff Dweller were assembled into the top section and all was ready for the rf and control cabling. These were properly connected to the antennas and the process of erection was begun.

Water from the city mains was fed into the hole and with a hydraulic ram effect the assembled tower started out of the hole. A great cheer arose from the confident, and a gasp of "a-a-h" from the skeptics. Up she came and only slight holding was required to keep it upright. The rf and control cabling was fished down the inside of the tower and attached with tape to one of the legs. A bracket attached to the top of the trailer also steadied the tower as it rose out of the ground, or grew, as it were. Now the base of the tower was at ground level and the final operation was required.



The author's 40-foot tower. All of the work in assembling and erecting the tower was done at ground level.

The water from the hose was diminished and the sand previously dug from the hole was replaced along with a shovel of cement every 4 or 5 shovels of sand. With the replacement of all the sand and cement in the hole, the antenna and its oil-drum hydraulic-ram base was free standing at ground level, the top 40 feet in the air. All work had been done at ground level.

"Who said it couldn't be done?"

**QST**

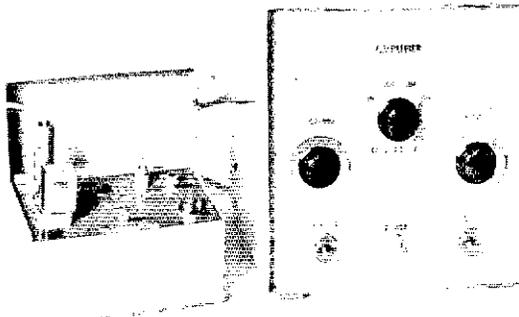
**Strays**

Radio amateurs who are also Indiana University alumni may participate in the celebration of the University's sesquicentennial in a special manner. During 1970, K9IU operating in the bands from 80 to 6 meters, will issue a special certificate to any alumnaus who contacts the campus amateur radio station. In addition, other stations will receive a commemorative QSL for contacting the station.

\*900 E. Madrid, Las Cruces, NM.

# Building A "Skinnier Linear"

BY DOUG DEMAW, W1CER



A NEW king-size color-TV sweep tube was recently developed by Amperex — a 6LF6. Natural curiosity caused the writer to try one in a simple linear-amplifier circuit. The "Skinnier Linear" is the result of the tests made on that huskier-than-average tube.

The 6LF6 has a maximum plate dissipation rating of 40 watts. Earlier sweep tubes were rated at less than 30 watts until such tubes as the 6KD6 appeared on the market. The 6KD6 has a 33-watt rating, and functions very well as a grounded-grid amplifier in the 3- to 30-MHz range.<sup>1</sup> Of course, the extra plate-dissipation allowance of the 6LF6 means that the tube can be socked a little bit harder to provide more output power than the smaller types can safely provide. Maximum plate voltage for the 6LF6 is 990. During the temporary overloads the plate dissipation is rated at 200 watts. Specifications and curves for this tube are given in the Amperex file, *Publication 1, 509/6LF6*.

\*Acting Technical Editor.

<sup>1</sup> "A Sweep-Tube Linear Amplifier," *The Radio Amateur's Handbook*, 46th Edition, page 197.

*There are times when adverse band conditions can spell doom for the QRP operator. Whether the mode is cw or ssb, a few extra watts can often assure a "solid" QSO when the going gets a bit rough. This amplifier is designed for the low-power operator, and it will enable him to boost the output power of his QRP transmitter to as much as 175 watts. It can be driven by any solid-state or tube rig whose power output is from one to twenty-five watts. It operates from 3.5 to 21 MHz, and can be used on 28 MHz if one is willing to accept a sacrifice in efficiency.*

Front view of the one-tube amplifier showing solid-state QRP cw transmitter as an exciter. A homemade aluminum cabinet houses the amplifier. Vent holes are located above the tube, on the top of the enclosure, and the rear opening of the case permits air to enter through perforated-aluminum screening.

The tube has an unusually thick envelope, and this feature is intended to prevent the glass from cracking or being sucked in at high temperatures — a problem with some sweep tubes. Amperex states that the glass material is a special heat-resistant variety, and one gets the impression that it is similar to Pyrex when tapping the envelope with a solid object. Additional heat protection is offered by a large anode fin, inside the envelope, and between the main anode structure and the plate cap. The filament requirements are 6.3 volts at 2 amperes.

Using the circuit of Fig. 1, a cw power output of 175 watts was obtained with 25 watts of driving power. Similarly, 175 watts peak output was obtained during ssb tests. The third- and fifth-order distortion products were down 27 dB below PEP level at 120-watts PEP output. At 175 watts PEP output the distortion products were some 25 dB below PEP level. These figures compare favorably with those obtained while testing other sweep-tube amplifiers. At 80 watts PEP output the IMD was somewhat better — approximately 31 dB below PEP value. Efficiency checks of the amplifier turned up a figure of approximately 60 percent.

The tank circuit is designed for a  $Q$  of 10 at 250 watts peak input. No provision was made for 10-meter operation, mainly because of the high output capacitance of the 6LF6 — 18.5 pF. Doubtless, one could tap the 15-meter coil for 10-meter operation, but the total  $C$  in the circuit (taking into account the minimum capacitance of the plate tuning capacitor) would be incorrect for the desired tank  $L-C$  ratio. The amplifier efficiency would be somewhat less than for the other bands. It is on the order of 50 percent at 15 meters with the present circuit. The 60-percent figure applies at 3.5, 7, and 14 MHz.

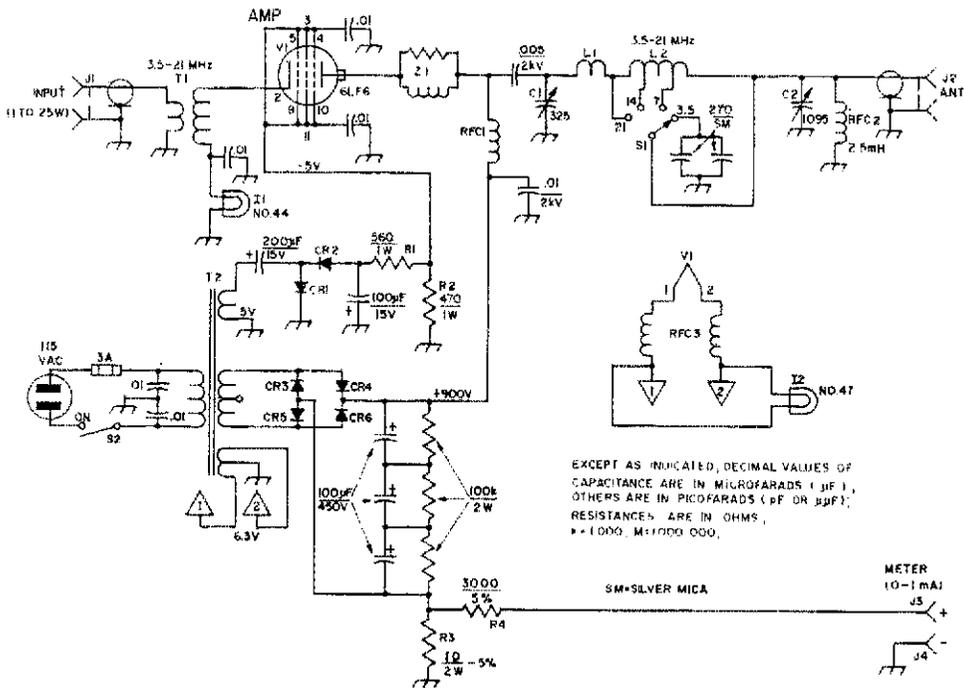


Fig. 1 — Schematic diagram of the linear amplifier. Fixed-value resistors are composition. Fixed-value capacitors are disk ceramic, 600 volts, unless otherwise indicated. Polarized capacitors are electrolytic.

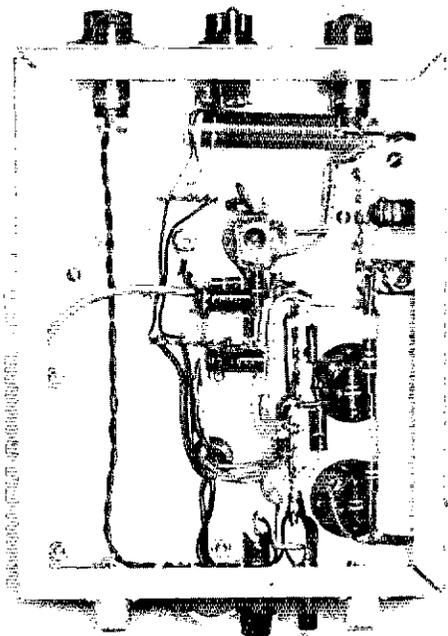
- C1—339-pF variable (Millen 19335 or equiv.).
- C2—Three-section broadcast variable, 365 pF per section, all sections in parallel (J.W. Miller 2113 or similar. Remove trimmers from side).
- CR1 CR2—50-PRV, 1 ampere silicon diode (Motorola HEP-154 or equiv.).
- CR3—CR6 incl.—1000-PRV, 1-ampere, silicon diode (Motorola HEP-160, or equiv.).
- I1—No. 44 panel lamp (Fuse and total cathode-current indicator; See text).
- I2—No. 42 pilot lamp.
- J1 J2—Chassis connector, SO-239 style.
- J3, J4—Nylon binding post, one red, one black (Johnson 111-102 and 111-103 used here).
- L1—5½ turns No. 12 tinned copper wire, 1-inch diameter, 1¼ inches long.
- L2—26 turns No. 12 enam. wire, space-wound to occupy entire area of Amidon T-200 toroid core (Amidon Assoc., 12033 Otsego St., N. Hollywood, Calif. 91607). Tap 13 turns from C2 end for 7 MHz. Tap 22 turns from C2 end for 14 MHz.
- R1—R4 incl. — See text.

- RFC1—Transmitting-type rf choke (Johnson 102-752).
- RFC2—2.5-mH, 100-mA rf choke.
- RFC3—Bifilar-wound filament choke; 50 turns No. 20 enam. on 4-inch length of 0.5-inch diameter ferrite rod (Indiana General CF-503 rod, available from Newark Electronics Corp.). Alternatively, 75 turns No. 20 enam. wire on length of ¾-inch diameter wooden dowel.
- S1—Single-pole, 5-position, single-section, ceramic rotary switch (Centralab PS-101 or equiv., 6 positions unused, see text).
- S2—Spst toggle.
- T1—Toroidal input transformer; Primary — 17 turns No. 26 enam. wire wound to cover two T-68-2 Amidon cores (see text); Secondary — 35 turns No. 24 enam. wire, wound over primary winding.
- T2—Power transformer; 800 volts, center tapped, 200 mA; 6.3 volts at 5 amperes; and 5 volts at 3 amperes (Allied/Knight 54D1414 or equiv.).
- Z1—Parasitic suppressor; 6 turns No. 20 wire in parallel with 56-ohm, 2-watt carbon resistor.

### The Circuit

Referring to Fig. 1, a toroidal input transformer,  $T_1$ , couples the exciter to the cathode of the tube. It is not a true broad-band transformer because the tube presents a shunt capacitance of 37 pF across the secondary of  $T_1$ . This, plus roughly 10 pF of stray circuit capacitance, prevents the transformer from being broad enough for a low SWR on all of the bands. The design center for  $T_1$  is 6 MHz, and it provides an impedance

transformation of approximately 4:1. The SWR, as measured at  $J_1$ , is less than 2.5 to 1 at 80 and 40 meters. It is 3 to 1 at 15 meters, and a rather high 5 to 1 at 14 MHz. The actual SWR depends upon the operating conditions of the tube at a given power level, and changes with the driving power applied at  $J_1$ . Tests were made with an rf choke from cathode to ground, and with a .001-µF coupling capacitor between  $J_1$  and the cathode. The SWR on all of the bands was greater than 3.5



Looking into the bottom of the amplifier chassis, the bifilar filament choke is at the far left.  $T_1$ , the input transformer, is above the filament choke, and just to the right. A ceramic feedthrough bushing carries the high voltage to the 6LF6 plate. Another bushing is used to route the rf output from  $C_2$  to  $J_2$ .

to 1. It is for this reason that the toroidal transformer was used. If a 1-to-1 SWR is desired on the various bands, a pi-section matching network can be installed externally and band-switched. Examples of this technique are given in the transmitting chapter of *The Radio Amateur's Handbook*.<sup>2</sup> However, for all practical purposes, the amplifier performs quite well with  $T_1$  at the input, and only slightly more driving power is needed at 14 MHz for a given dc input power than is required on the remaining three bands.

A No. 44 pilot lamp,  $I_1$ , serves a two-fold purpose: It is used as a ½-ampere fuse to protect the 6LF6, and it provides a visual tuning indicator for adjusting the amplifier. External metering provisions are available at  $J_3$  and  $J_4$ . A 0-to-1-mA meter serves as a voltmeter across the jacks, and provides a full-scale reading equivalent to 300 mA. The meter reads the voltage drop across  $R_3$ , which increases as the plate current of the tube becomes higher. Resistor  $R_4$  enables the meter to read 3 volts, full scale. Lamp  $I_1$  indicates total cathode current, while the external meter reads only plate current.

A toroidal inductor is used for  $L_2$ , and it covers 3.5 through 14 MHz. A separate air-wound in-

<sup>2</sup> "A Tuned Input Circuit for Grounded-Grid Amplifiers," *QST*, May 1968, page 34.

ductor,  $L_1$ , is used for 15-meter operation, and is a part of the total inductance for the three lower bands. An attempt was made to use a few turns of the toroid coil for 21 MHz, but the  $Q$  was too low for good results.

The power supply is connected for full-wave bridge rectification. This provides a dc operating voltage of 900 under load. The power supply regulation is approximately 10 percent with 33- $\mu$ F of capacitance across the dc line. Three 100- $\mu$ F capacitors are used in series to provide the voltage rating needed. Equalizing resistors are bridged across the capacitors to assure their safety, and to bleed the supply when it is turned off. Bias is provided by connecting a voltage-doubler circuit across the 5-volt winding of  $T_2$ .  $R_1$  and  $R_2$  form a voltage divider that sets the bias to the 6LF6 at -5 volts. This value established a resting plate current at 15 mA.

This amplifier can be operated with 500 volts on the plate, and will deliver up to 75 watts output under that condition. The lower plate voltage may be preferred if the amplifier is to be used for novice-band operation. The bias is lowered to -1 volt for 500 volt operation.

By using filament choke  $RFC_4$  which is bifilar-wound on a ferrite rod, less driving power is needed than if the filament leads were bypassed for rf. The choke can be omitted if ample driving power is available.

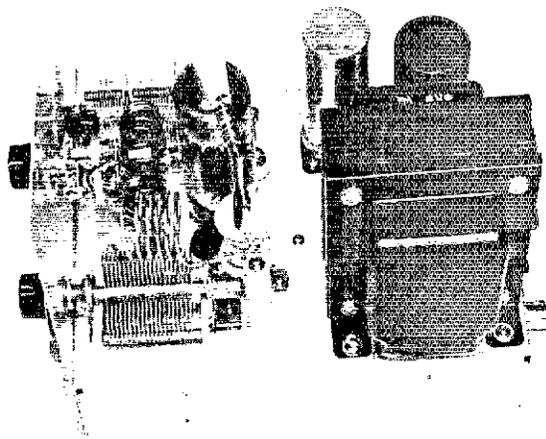
### Construction Details

The amplifier and power supply are built on a 7 X 9 X 2-inch aluminum chassis. The cabinet consists of two U-shaped channels which are attached to the sides of the chassis by means of No. 6 sheet-metal screws. The cabinet is 7½ inches high, and is 7 inches wide. The panel is recessed ½ inch, making the cabinet depth 9½ inches. Two vent holes, each 2½ inches in diameter, are centered on a line four inches back from the front edge of the cabinet. Perforated aluminum serves as TVI shielding, but permits the heat to escape from the cabinet. The rear opening of the cabinet is enclosed with perforated aluminum as an aid to TVI prevention. Self-adhesive rubber feet are used on the bottom of the cabinet.

The aluminum for the cabinet was abraded with coarse emery cloth to give it a grained appearance. It was then immersed in a lye bath (*caution used here against physical contact with the bath*) to obtain the satin finish. A coating of clear spray lacquer was then added as a protective finish. The front panel was sprayed with French gray, and black decals were added for identifying the controls.

Referring to Fig. 1, the top 100- $\mu$ F filter capacitor in the power supply is a tubular type with a cardboard case. It is mounted under the chassis on terminal strips (see photo) and is safe with regard to physical contact. The center 100- $\mu$ F filter capacitor is a twist-lock type, and is mounted above the chassis. It has a cardboard outer cover to prevent physical contact with its metal case. If this were not done the operator could get a severe shock if the capacitor case was touched while some

Inside view of the amplifier. The power supply is at the right of the photo, and the rf section is assembled near the front panel. It is suggested that the 6LF6 tube be moved farther away from the toroidal inductor when duplicating this amplifier. In this model the tube transfers considerable heat to the coil, an undesirable condition.



other part of his body was in contact with the ground. The bottom capacitor has only a few volts between its case and ground, so it need not be covered. The two top-chassis electrolytics are mounted on phenolic insulating bases to isolate them from the chassis. Make sure that all three capacitors are of the same value if substitutions are made. If not, the voltage division across them will be unequal, and one may be damaged by excessive potential.

Toroidal coil  $L_2$  is wound with No. 12 enameled wire. Care should be taken to minimize the stress on the core when winding  $L_2$ . Too much tension can break the core, but if it does break it can be repaired with epoxy cement, and it will perform as well as before being broken. The insulation should be scraped off the wire where the taps are placed, and each spot tinned with solder. This can be done as the coil is being wound. The toroid is mounted directly on  $S_1$  by its tap leads, which should be fairly stiff bus wire, No. 14 or larger. The switch has several unused terminals, and these serve as tie points for mounting the toroid. Wires can then be run from the tie points to the appropriate switch lugs for proper indexing. A 4-inch-long ceramic pillar serves as a mounting point for the plate blocking capacitor, and for one end of  $L_1$ .

The input transformer,  $T_1$ , uses two small Amidon toroid cores, stacked. Before winding the transformer place a narrow strip of masking tape around the outer perimeter of the cores to hold them together. Alternatively, the cores can be cemented together with epoxy glue. Two cores were used for  $T_1$  to assure adequate power-handling capability.

### Using the Amplifier

Table I shows the amount of power output that can be expected with several values of driving power. No more than 25 watts of drive should be used if damage to the tube is to be prevented. It can be seen that even a small exciter of 1.5 watts output will drive this amplifier. Tests were made with the QRP 80-40 solid-state rig<sup>3</sup> as an exciter. Power output from the linear amplifier was 22 watts, a worthwhile increase indeed.

With drive applied at  $J_1$  tune  $C_1$  for a dip in lamp brilliance at  $I_1$ . Adjust  $C_2$  for the desired amount of loading. Best efficiency will occur with moderate coupling to the load. During cw operation the amplifier can be tuned for maximum power output as indicated on an SWR meter or rf ammeter. For ssb use, couple the amplifier rather tightly to the load for best signal quality.  $C_2$  should be adjusted until the dip in plate current is no greater than 10 or 15 mA.

QST

TABLE I

Driving Power (watts)	Output Power (3.5-14 MHz.)	(21 MHz)
1.5	22	19
2	25	22.5
5	42	37
8	60	54
15	70	63
20	90	80
22	130	115
25	175	157

This chart shows the rf output power obtained from the linear amplifier at various driving-power levels. The tank circuit was tuned for maximum output. Part of the driving power is represented in the power-output figures given here.

## Strays



Pacific Division Director W6ZRJ explains Oscar circuits to Fremont High School Bandjammers president WA6BXH and WB6DSV. The club has been active with all Oscars, helping at Oscar HQ, and operating their own tracking station.



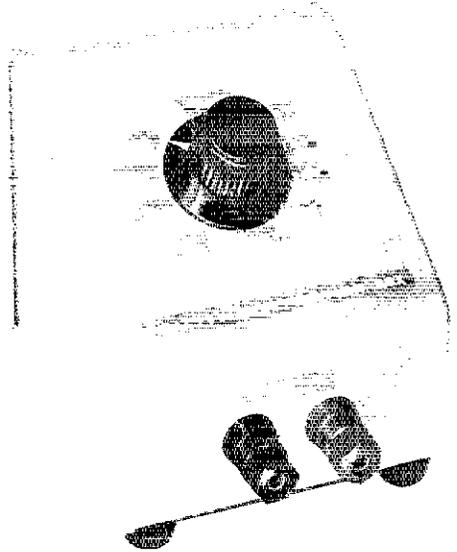
# Gimmicks and Gadgets

## A High-C Substitution Box For The Experimenter's Workbench

In transistor circuit experiments high values of capacitance are often used for coupling, filtering and bypassing. To determine the proper capacitance values it has been necessary to solder and unsolder test capacitors because of the unavailability of an inexpensive capacitor substitution box having the proper range. A solution to this problem is a simple homemade substitution box, such as the one shown in the photographs and in Fig. 1.

Building the substitution box is a good project for those with a junk box, since purchasing all-new capacitors is a bit expensive. If you are missing any popular values, a visit to a friend, who has a well-stocked junk box, is in order. The capacitors chosen were what the author had on hand; the number and values of the capacitors may be varied to suit individual requirements. Obviously, the voltage rating of the capacitor with the lowest maximum voltage rating determines the maximum voltage rating of the completed unit. The author chose values of capacitors with ratings of 25 volts or more, as transistor circuits seldom have voltages above this value.

A Bud sloping-panel cabinet (AC-1610) is used to house the capacitors and switch. Although the switch used was a junk-box item, a Centralab PA-1001 will do the job. Note, however, that the Centralab switch has only one section, whereas the original unit has two sections. Although the two-section switch was used because it was the only switch available, the second section does provide a convenient set of tie points for the negative leads of the capacitors. A length of heavy tinned wire can be used as a common tie point for the negative leads when a single-section switch is used. — *WTKK*



The High-C Substitution Box

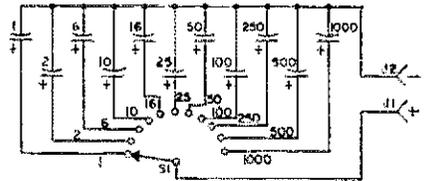


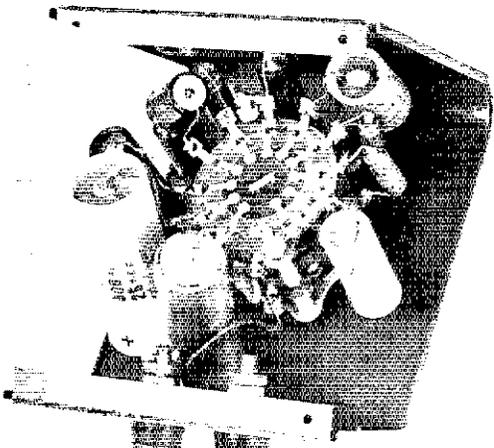
Fig. 1—Schematic diagram of the capacitor substitution box. Capacitance values are in  $\mu\text{F}$ . All capacitors are electrolytics with voltage ratings of 25 volts or more.

$J_1$ —Red binding post (Johnson 111-102).

$J_2$ —Black binding post (Johnson 111-103).

$S_1$ —Phenolic rotary, 1 section, 1 pole, 11 positions (Centralab PA-1001).

Interior view of the capacitor substitution box. Although a one-section switch can be used in place of the two-section unit shown, the two-section switch offers the wiring convenience of providing a tie point for the negative lead of each capacitor.



# Clamping Diodes for CW Break-In

BY K. S. STONE,\* W7BZ, ex-W7BMF

**I**n spite of the advantages of break-in cw operation, many amateurs are still using a manual system to change from transmit to receive. While most transmitters are quite easily adapted to simple QSK keying systems, many receivers are a different story.

It is the purpose of this article to outline a full break-in approach that has been used by the author with both tube-type and solid-state home-brew receivers for some years. Some points of interest are:

1) No relays are required and there are no interconnections between the transmitter and receiver. All of the required circuitry is contained inside the receiver itself.

2) Modifications to the receiver are of the "no hole" type and can be installed and removed easily without lowering the resale value of the receiver.

3) Monitoring of keying is done by listening to the transmitter signal instead of a monotonous side tone from some sort of audio oscillator. This assures that you are sending on the same frequency that you are receiving on, and is less tiring.

It must be pointed out that with the many different types of receivers in use, the author must deal in generalities but the principles outlined should work with nearly any receiver.

Let's consider what happens when you key your transmitter with your receiver set up for a normal signal of a few microvolts. The detector circuit suddenly sees a signal voltage many times larger than normal, and the BFO voltage with which it is supposed to beat to produce an audio note is no longer in proper proportion. As a result, the receiver usually just goes dead, or blocks. Even with AVC, the gain of the receiver probably cannot be reduced enough to keep the audio output at a reasonable level. However if we can limit the input to the detector circuit at about one volt peak-to-peak, the detector will be able to handle this amount of signal without blocking and a normal audio beat note will be heard.

The accompanying circuit diagrams will show how this can be done. Fig. 1A shows four silicon diodes connected to the antenna coil. These diodes conduct very little in the forward direction until the voltage across them reaches about one-half volt. Then they conduct very heavily and amount to a short circuit for that part of the signal cycle where the voltage exceeds a half volt.

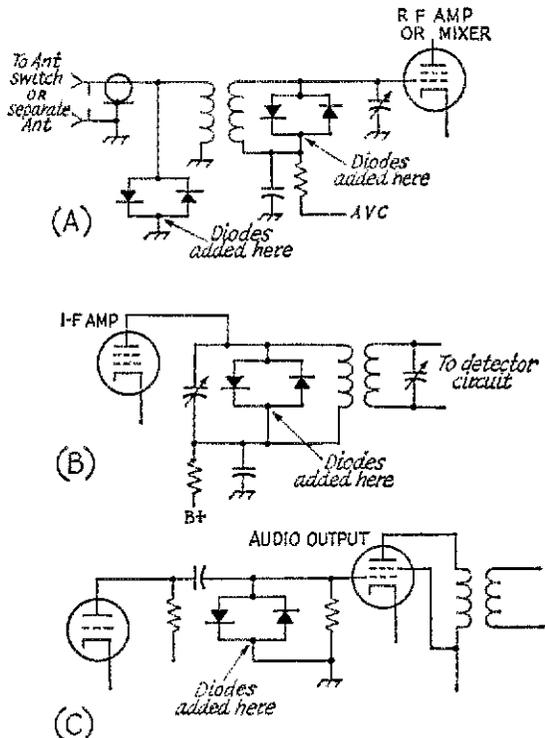


Fig. 1—Diodes added to the receiver to limit the signal level during transmission. See text.

On normal signals they can be considered to be open circuits. This then limits the signal amplitude applied to the first mixer in the receiver to about one volt peak-to-peak.

Fig. 1B shows a similar pair of diodes connected to the last i-f amplifier stage. These diodes limit the amount of i-f signal to the detector stage to about one volt peak-to-peak. Possibly other points in the i-f amplifier stages should be similarly treated depending on the particular receiver.

Because of all the clipping and shaping of the rf envelope going through the receiver, the audio amplifier will pass a lot of clicks and thumps. Fig. 1C shows a simple audio limiter that will clip these off. This also helps to keep the audio signal from the transmitter very nearly the same level as the received signal. If a higher

\* 641 Grant Ave., Twin Falls, ID 83301.

(Continued on page 43)

# Relay Switching for Increasing Receiver Sensitivity and Transmitter Output from the HW-17A

BY EDWARD P. TILTON,\* WHDQ

As stated in the *QST* report on the HW-17A,<sup>1</sup> building this Heathkit gives you a lot of 2-meter transceiver for the money. The transmitter works very well and its power output is well above that of most a-m transceivers used in 2-meter mobile service. Unfortunately the receiver leaves quite a bit to be desired, due in part to use of diode switching for the send-receive functions.

Design changes mentioned in the last paragraph of the "Recent Equipment" writeup make some improvement in the HW-17A receiver, but they still leave it considerably below what is likely to satisfy the discriminating 2-meter enthusiast. These changes were assumed to be an available modification for previously-delivered kits, but it turned out that they are included only in HW-17As shipped after about the middle of 1969. For this reason, and because the changes effect only a partial cure, it was decided to see what could be done with conventional switching of the antenna circuits.

If you want to see how much improvement you can realize, without actually following through the procedure to be given later in detail, simply unsolder the coaxial lead from capacitor  $C_{214}$ , at the tuner input, and substitute a coaxial connector temporarily at this point. Connect the coaxial line from your 2-meter antenna to this connector, and see the difference. You may have to repeat the tuner front end a bit, preferably on a weak signal. If your receiver is like ours, this should net an improvement of at least 6 dB in signal-to-noise ratio. You may even hear signals you missed before, if your transceiver is an HW-17 or early HW-17A. If you like the results, here is how to assure them permanently.

## The Send-Receive Circuitry

In the HW-17A the following functions are performed by the microphone switch,  $SW_5$ .

**Receiving.** Terminal 2 on  $SW_5$  (white lead) is normally closed to Terminal 1, grounding the base of  $Q_{11}$  through  $RFC_5$ , disabling this stage, a microphone preamplifier. Terminal 5 (black lead) is closed to Terminal 4 (red lead) grounding the low side of the output transformer and completing the circuit feeding the phones and speaker voice coil. These functions are retained as described when we make our modifications, and the associated circuits continue as shown in the HW-17A Manual.

\* VHF Editor, *QST*.

<sup>1</sup> Recent Equipment, *QST*, July, 1969, page 49.

**Transmitting.** Pressing the microphones witch connects Terminal 2 of  $SW_5$  to the hot side of the microphone. It also connects Terminal 5 (always grounded inside the microphone case) to the black microphone lead, Terminal 6. Connections to Terminals 1, 2, 3 and 4 of  $SW_5$  remain unchanged. Only Terminal 6 is affected by the procedure outlined below.

## What the Modifications Do

It will be seen from the kit manual that Terminal 6 of  $SW_5$  is connected to many components. To clarify what is to be done, look at the bottom of the rig with the panel toward the front. We will work on the terminal strip AP, which is along the left side of the receiver circuit board. From now on, terminal numbers referred to will be those on the strip, unless otherwise stated. The black lead from the microphone goes to Terminal 5, along with several other leads. Only the black lead will be moved. The grounding function formerly handled by the microphone switch, through the black lead, will be taken care of by a relay.

The grounding of the black lead will be used to close the coil circuits of the relays,  $K_1$  and  $K_2$  in Fig. 1, which shows the complete modified circuit. Two relays are shown, but a single coaxial relay with two sets of auxiliary terminals could be used. We used two relays of unknown vintage, picked up as surplus and kept for years for just such an application. (Surplus scrounging *does* pay off, now and then!) The relays should have 12-volt low-current coils, preferably with a resistance of 150 ohms or more.

Relay  $K_1$  is a small coaxial job, used to switch the antenna lead from the receiver to the transmitter. Duplicates are still available. See reference under Fig. 1. It does this without measurable power or signal loss, which is more than can be said for the diode switching system it replaces. Relay  $K_2$  performs two grounding operations. The transmitter cathode circuits and the diode circuits retained in the receiver are grounded when  $SW_5$  is in the TRANSMIT and RECEIVE positions, respectively.

## Modification Procedure

For the kit-oriented worker, here is the step-by-step procedure, à la Heathkit.

1) Unsolder the coil end of all parts connected to the transmitter output-coupling coil,  $L_{12}$ . These are  $RFC_3$ ,  $L_{14}$ ,  $D_{101}$ , and  $C_{125}$ . Leave the other ends of these parts in place.



# Using the Yaesu Musen FTV 650 Six-Meter Transverter with the S/Line

BY KATASHI NOSE,\* KH6IJ

THE Yaesu Musen (Japanese) FTV 650 transverter enables one to get on six meters with minimum cost and effort. This transverter is designed to be used with the Yaesu F Line, but it can be used with the Collins S/Line without modification, other than a little filament rewiring. Attractive features of this equipment are its low cost and the physical size of the cabinet, which matches the S/Line power-supply cabinet.

## Circuit of the FTV 650

Referring to the block diagram, Fig. 1, a mixer and driver combination drives a 6146 to about 50 watts. Ten-meter input is supplied from the 32S3 through  $J_{18}$  provided for this purpose.

In the receiving position, 6CB6s in rf and mixer stages convert 50 to 54 MHz to 28 to 30 MHz by means of a local oscillator operating on either 22 or 24 MHz, selectable through a switch. Yaesu also makes an FET converter, if you are interested in transistors.

## Adapter Plug

The unit comes equipped with plugs and cables which merely need to be plugged into the associated Yaesu units. However, to use it with the S/Line, one either has to make up a separate power supply or tap off correct voltages from the S/Line power supply. Several approaches were considered, including making up an external power supply. However, the simplest and cheapest method is to construct an adapter box to tap off the power from the S/Line supply.

Referring to Fig. 2, a 1 by 2 by 3-inch Minibox was drilled to accept the FTV 650 cable. An 11-pin Amphenol female plug and a male plug were

attached to the box so that the adapter could be plugged directly into the power supply and be supported upright by the female plug. An OA2 (150-volt) regulator tube and 5000-ohm 10-watt dropping resistor are also mounted on the box. This enables all voltages to be tapped off the cable without mutilating either cable or equipment.

## Voltage Requirements of the FTV 650

Referring to Fig. 3, the male pin numbers correspond to the respective pin numbers on the power supply of the S/Line. The female pin numbers correspond to the respective numbers on the 32S3. The control cable numbers from the FTV 650 are color coded and correspond to the markings supplied with the instruction manual. These are in Japanese, but with key terminology in English.

The transverter requires the following voltages: Pin 2, 6.3 volts at 3.5 A; Pin 3, 150 volts at 30 mA for the receiver, oscillator, and screen of the driver; Pin 4, 300 volts at 50 mA for the screen of the 6146 and plates of the mixer and driver. The S/Line power supply gives only 250 volts, but no deterioration is noted. Pin 5 requires 600 volts at 150 mA for the plates of the 6146s. Pin 6 requires 100 volts at 20 mA negative bias. Pin 7 is a/c input, which can be connected to  $J_{15}$  of the 32S3 if desired. Pin 9 is the control circuit and Pins 1 and 2 are filament terminals. These voltages all exist in the S/Line power supply, with the exception of 150 volts, which is furnished through a 5000-ohm 10-watt resistor and an OA2 (150-volt) regulator tube from the 275-volt line.

## Transfer Function

The Collins scheme to disable the final stage in the exciter is to cut off the screen supply

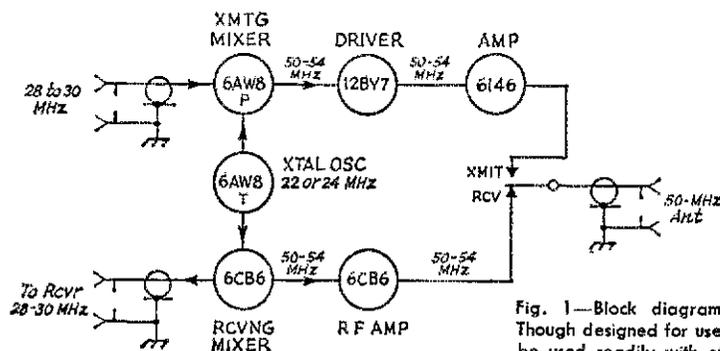


Fig. 1—Block diagram of the FTV 650 Transverter. Though designed for use with the Yaesu equipment, it can be used readily with other transceivers capable of 10-meter operation.

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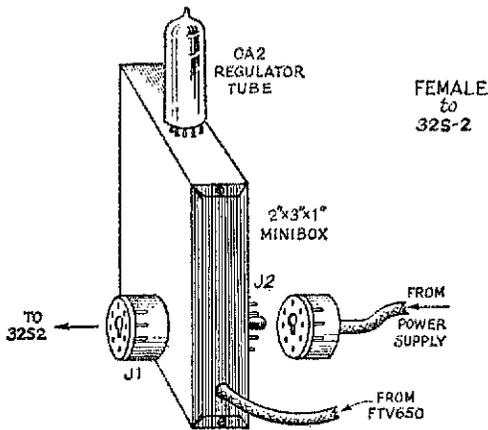


Fig. 2—Plug-on adaptor for using the FTV 650 with the Collins S/Line. No changes in the equipment are needed.

by removing the internally-wired jumper between  $J_9$  and  $J_{15}$ . The Ynesu method is to switch off the heater of the final tube. The latter scheme was adopted because of several advantages.

### S/Line Modifications

The final tubes ( $V_8$  and  $V_9$ ) and driver ( $V_7$ ) and  $V_{301}$  (VFO, 6AU6) are all wired from one string in the 32S3. Only  $V_8$  and  $V_9$  (6146s) must be switched. Cut off the filament lead (Pin 5) to  $V_7$  (6CL6) and supply with 6.3 volts from another source,  $V_3$ , which is nearby. Also cut off the filament lead to  $V_{301}$  (VFO) at the terminal anchor, and supply with 6.3 from the same source. This means that the 32S3 will not work with 12-volt or 23-volt power supplies, neither of which you are likely to use.

The transverter requires a 3-volt rms signal, which is easily supplied through  $J_{13}$  on the rear apron of the 32S3 labeled "converter output," which is intended for use with the Collins 62S1.

Coupling capacitor  $C_{134}$  should be paralleled with a 3-pF capacitor to provide greater drive. Removal of  $R_{103}$  (47 ohms) does not seem to make any difference in the drive. A larger value of capacitance should not be used, since it will detune the grid circuit.

### Transverter Modification and Use

Bias requirement is 100 volts, supplied through network  $R_{21}$  and  $VR_1$ . With the 60 volts or so supplied by tapping the power supply, the resting current is about 50 mA. For longer tube life, the resting current should be reduced to 30 or 25 mA. To effect this, the role of  $VR_1$  and  $R_{21}$  should be reversed so that higher bias voltage is supplied. However, this is not an absolute necessity.

The 50-MHz antenna can be connected to the converter and left on. The only manual switching required is to hook the 75S3 receiver either to the output of the transverter or directly to the vhf antenna. Even this operation can be eliminated if a 12-volt dc relay is paralleled with the FTV

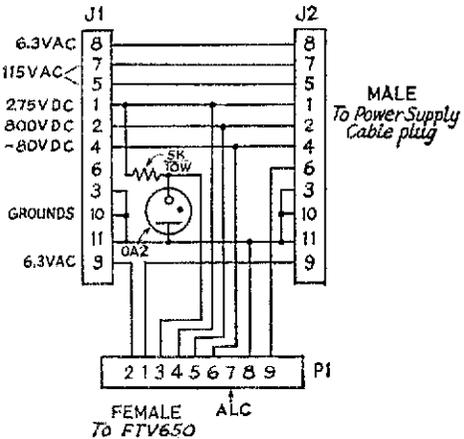


Fig. 3—Connections for the adaptor shown in Fig. 2.  $J_1$  and  $J_2$  are the female and male plugs mounted on the box.  $P_1$  is on the end of the cable that runs to the transverter.

650 antenna relay, so that it is energized when the filaments are lighted.

The OA2 regulator tube can be left in the line at all times, except when shutting down six-meter operation for long periods, since the drain is well within the capabilities of the power supply.

This transverter has enabled the writer to participate in the 50-MHz DX of the current sunspot peak, with minimum cost and maximum satisfaction, since all the excellent features of the S/Line are retained.

The actual conversion is much simpler than this word description. The performance is a far cry from the homemade coils the writer used with a National FB7 to get down to the five-meter band in the prewar sunspot-cycle peak! **QST**

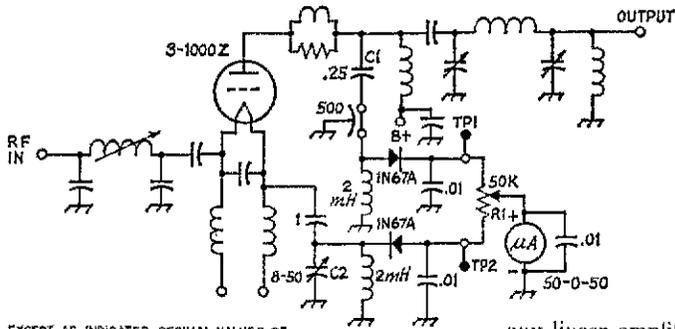
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EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS ( $\mu\text{F}$ ); OTHERS ARE IN PICOFARADS (pF OR  $\mu\text{pF}$ ); RESISTANCES ARE IN OHMS;  $k=1000$ .

Fig. 2—The tuning-loading indicator.  $C_1$ , a modified JFD VO-4G glass trimmer, is discussed in the text.  $C_2$  is a ceramic trimmer and  $R_1$ , a linear composition control.

it lacks the advantage of tune-up at reduced input. This circuit was chosen for the *Handbook* linear.

This type of indicator samples and rectifies the rf voltages present in the cathode and plate circuits. These voltages are fed to a zero-center meter. When the optimum operating condition of the tube has been established, the meter circuit is adjusted by means of  $R_4$  for a zero reading. Any other setting of the amplifier's tuning and loading controls will move the meter off zero.

The only problem in building a practical tuning-loading indicator is capacitor  $C_1$  which is a very low value that must be stable under rf current. It must also have high-voltage insulation, as it is connected directly to the amplifier's plate circuit. We modified a commercial glass trimmer by removing the piston assembly and soldering wire leads to either end. The modified unit measured 0.25 pF and is rated at 5000 volts. Other possible approaches would be to use a short piece of coax or two small plates with ceramic or air insulation to form this capacitor. The other half of the plate capacitive divider is a 500-pF feedthrough which works out well mechanically, as the lead must be brought through the chassis.

Adjusting the indicator is a simple procedure, but it can be dangerous if proper safety precautions are not taken. You have to make measurements and adjustments on the amplifier while it is running full tilt! The amplifier should be tuned up to its normal PEP operating level into a 50-ohm dummy load. A dc voltmeter should be connected to  $TP_1$  and the voltage at this point noted. It will typically be about 1.5 volts. The meter should be changed to  $TP_2$  and  $C_2$  adjusted for 1.5 volts. Note that the polarity will be the opposite of that found on  $TP_1$ . The amplifier should be rechecked to insure that it is operating in the most-linear manner, or at least at maximum output. Then control  $R_1$  is adjusted for a zero meter reading at this optimum operating condition. The metering circuit is a help to return to this optimum point quickly.

There is a variation of the tuning-loading indicator that will give only an indication of the loading. It will work at reduced drive levels. This loading indicator is shown in Fig. 1B. For

any linear amplifier, the ratio of rf voltages on the grid and plate is constant. By sampling both voltages and feeding them to a meter which can be set to zero at the proper ratio of input to output voltage, the best loading condition is indicated by a zero reading on the meter, regardless of the drive level.

Obviously, both the tuning-loading and loading indicators are only as good as the initial zero adjustments, so these should be made carefully using a good dummy load, a monitor scope, and a spectrum analyzer, if available. Any one of the three circuits is a good tune-up aid and insures that your amplifier is doing the best job that it is capable of.

QST

## Clamping Diodes for CW Break-In

(Continued from page 37)

audio-signal level is desired, series-connected diodes or Zener diodes may be used. This will permit phone reception without distortion.

Nearly any of the small high-speed switching diodes should work. They do add shunting capacity to the tuned circuits however, and these should be repeaked. The author has used 1N564, and 1N457 diodes with good results on frequencies as high as 21 MHz, and no particular problems were encountered. Perhaps some of the more expensive low noise, low capacitance diodes would be a better choice for the diodes used in the front end, such as 1N914s.

A word of caution should be added concerning cross modulation as a result of adding the diodes to the receiver. Strong broadcast stations and strong local signals may be a problem. The thing to keep in mind is that the diodes should do nothing to the receiver with ordinary receiving conditions. Clipping should occur only during the time the transmitter is keyed. It may be necessary to put more diodes in series, or use Zener diodes to increase the clipping level. A good high-pass filter should help with the broadcast station interference.

The author's present receiver is an all-solid-state home-brew job with an audio-derived avc system. A tube-type T-R switch is used in the antenna circuit similar to the one described in the *ARRL Handbook*. The transmitter runs 400 watts input. With the treatment described, full break-in operation is possible with any signal that is a reasonable amount above the noise level.

QST



# Hints and Kinks

## For the Experimenter



### DESIGN OF PRINTED-CIRCUIT COILS

THE fabrication of printed-circuit components results in essentially fixed device characteristics. Considerable variation in the inductance value of coils occurs as a result of spacing, plating thickness, and the physical relationship of the component placement and the location of the circuit ground plane. The fixed printed coil must be trimmed in order to obtain the desired inductance value.

One solution to this problem is shown in Fig. 1. A spiral-like coil is printed with several extra turns which increase the realizable coil inductance; shorting connections are also included to reduce the inductance. The shorting connections not only short the extra turns, but also short out several turns of the main body. Coil tuning is accomplished with relative ease by removing the shorts until the desired inductance is obtained.

Approximate printed-coil lengths and fabrication characteristics are obtained by calculation from circuit models or experimentally-determined design curves. After the approximate coil dimensions are obtained, the printed-coil layout is constructed with the several extra turns and shorting bars. Shorting connections are then removed from the coil until the exact value of inductance is obtained. This procedure calibrates the layout and subsequent photoetching process.

Once the exact coil geometry is obtained, the designer has several options. If there are a limited number of active devices in the circuit, the existing printed-circuit art work may be modified by removing the appropriate shorting connections. On the other hand, if the circuit contains a large number of active devices, individual coils may be trimmed to account for differences in active device characteristics. The former approach was used in a phased-array receiver. Nineteen coils of values from 0.05 to 0.1  $\mu\text{H}$

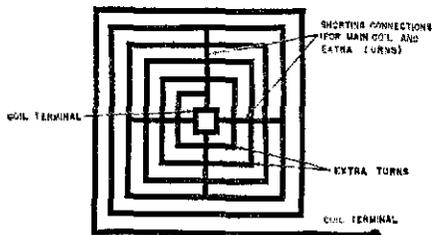


Fig. 1—An example of a printed-circuit coil. A precise value of inductance can be obtained by removing an appropriate number of shorts.

were used in a variety of circuits such as delay lines, hybrids and amplifiers. For the larger coils a tolerance of plus-or-minus 2 percent was obtained, and a tolerance of plus-or-minus 1 percent was obtained for the smaller coils. The cost per coil was very competitive with commercially available fixed or tuned devices. In addition, the other advantages of the printed wiring approach were obtained at marginal cost. — NASA Tech Brief 69-10865

### WIRING COAXIAL PLUGS

MANY hams find it difficult to make neat connections when soldering coax braid to the inner shell of a coaxial fitting. One solution to this problem is shown in Fig. 2. The soldering tip is removed from a soldering gun which, as shown in the drawing, is held tightly against the shell of the coaxial fitting, which, in essence, replaces the soldering tip. The fitting becomes uniformly hot and melts the solder rapidly.

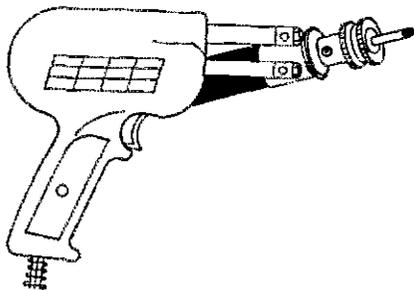


Fig. 2—By using a soldering gun as shown, a neat and uniform connection can be made between coax braid and the inner shell of a coaxial fitting.

Paste solder, which is obtainable from most hardware stores, works quite well and is non-corrosive. Prior to soldering the coax braid to the connector shell, solder the center conductor of the coax to the tip of the plug and place the plug tip in a bench vise so that the fitting will not move while it is being worked on.

Removing old coaxial cable from fittings via this heating method is simple and expedient.

This same procedure works exceptionally well when soldering copper tubing fittings such as butt joints and elbows. With this method, joints can be soldered in place without the fire hazard of a torch or the inconvenience of handling or purchasing a heavy-duty soldering iron. As with coax removal, copper joints can be unsoldered easily and quickly. — Charles A. Hudson, W9SCD



Fig. 3—An assembled adaptor for coax to a single wire is shown on the right. The three parts on the left are used to build the adaptor.

### SIMPLE ADAPTOR FOR COAX TO SINGLE WIRE

It is sometimes convenient and necessary to adapt a coaxial connector to one that will accommodate a single wire, thus preventing makeshift connections from coming apart or shorting out while the equipment is being used. As shown in Fig. 3, an inexpensive adaptor can be built by installing an E. F. Johnson type 111-1 binding post (30 cents) in a PL-259 coaxial connector. The shoulder of the Johnson binding post should be filed or ground down so that it fits snugly into the threaded section of the main body of the PL-259. The fit should be tight enough to permit the binding post to be screwed into the coaxial fitting at least two or three turns. This will anchor the two components tightly together. If additional security is desired, a few drops of epoxy cement can be placed on the shoulder of the binding post before it is screwed into the PL-259. A single piece of insulated hookup wire is used to connect the tip of the binding post to the center pin of the coaxial plug.

The Johnson 111-1 fitting will handle 8000 volts dc, and can carry up to 15 amperes of current. — *WICER*

### OPERATING 12-VOLT EQUIPMENT FROM THE CAR BATTERY

SOME manufactured amateur radio equipment is designed for operation at 12 volts dc, *maximum*. At operating voltages higher than 12 volts, damage can occur to some of the components, especially the transistors and ICs, and circuit performance can be degraded significantly.

Since most fully-charged automobile batteries provide something in excess of 12 volts — usually 13 volts or more — some means should be employed to lower the potential to 12 volts, thus protecting the equipment from possible damage. A case in point is the popular Motorola P33BAM fm transceiver, whose driver tubes will exhibit very short life if their filaments are operated at more than 12 volts for a period of time.

Recent tests with a commercially-built solid-state cw transceiver showed that severe chirp

resulted when the unit was operated (VFO activated) at any voltage higher than 12 volts. The circuit of Fig. 4 shows a simple way to lower the operating voltage by taking advantage of the forward voltage drops of one or more silicon diodes. Usually the voltage drop is between 0.4 to 0.7 volt per diode. The more diodes used, the greater the voltage drop across the series string. The diode current rating is chosen according to the total current drain of the equipment: the diodes should be rated at twice the current taken by the equipment, or greater, to provide a margin of safety for the diodes. Diodes with a 50-PRV rating are fine for this application.

The diodes offer an added benefit — protection against circuit damage should the supply leads mistakenly become reversed! — *WICER*

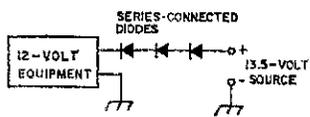


Fig. 4—Equipment that is designed to be operated at a maximum of 12 volts dc can be safely operated from a fully-charged car battery (13 volts or more), if a suitable number of diodes is connected as shown. See the text for diode specifications.

### TOWER PROBLEM

MY commercial crank-up tower has rather crude guides. Surprisingly, it goes up easily. Getting the tower down is the problem. The tower sections usually stick several times while the tower is being lowered, and someone usually gets hurt before we get the tower down.

The manufacturer suggested that the guides be lubricated. We tried this measure, but it was of no help. The last time we succeeded in lowering the tower and the usual injury occurred, the solution came to mind.

The force of gravity is depended on to lower the upper tower section. Evidently, sometimes the friction between tower sections is greater than the force of gravity. To supplement the force of gravity on the upper section, which is normally out of reach from the ground, I tied a light line to the top of the upper section while the tower was down. When the tower was raised, I let the rope hang down alongside the structure. Now, when we attempt to lower the tower and it sticks, a light tug on the line by an assistant helps to get the tower down with the greatest of ease. — *Samuel Ansel, WB2M01*

### A SOURCE OF TOROID CORES

SMALL toroid cores are useful in all sorts of solid-state projects, but they are not easy to get on short notice, as local radio stores don't stock them. If you have any of the ARC-5 Command transmitters around, you have a ready supply. The cylindrical slug in the tank coil can be cut with a fine-tooth saw to produce several toroids. — *A. de Smet, ON4CC*

Further investigation of inverted-V radiation patterns, extending the author's earlier work reported in QST some five years ago. An improved mathematical approach leads to results that are confirmed by measurements on a professional antenna range.

# Radiation Patterns of V Dipoles Over Perfect Ground

BY DALE W. COVINGTON\*, K4GSX

IT is very tempting when stringing up some form of half-wave dipole to contemplate the best antenna orientation for certain favored broadside directions. Of course the mental picture here is the familiar figure-8 pattern of the isolated dipole. A mild surprise arises when the antenna performs well off the ends where the nulls should be. Actually most dipoles in the lower part of the hf region are located within small fractions of a wavelength from a conducting ground plane. Consequently some modification of the isolated antenna pattern is inevitable. The following note describes the radiation patterns for various V-shaped dipoles erected over a perfectly conducting ground.

The vertical-plane patterns for horizontal dipoles at various heights above ground have been well documented.<sup>1</sup> Frequently the available

space and supports will dictate a physical dipole which resembles a V in either the inverted or erect form. The latter case might correspond to a sagging antenna. Previous analysis of the vertical plane patterns of the inverted V over ground<sup>2</sup> borrowed the mathematical procedure used to compute the horizontal dipole patterns. Specifically, the isolated antenna pattern was multiplied by a height factor for point sources located at the apex of the V and its image. The same procedure was used to obtain the vertical-plane patterns of horizontal Vs.<sup>3</sup> Both of these approaches must be considered to be rough approximations, since there is no assurance that the phase center remains at the center insulator<sup>4</sup> as the antenna legs are bent into the V shape. An alternate mathematical model conveniently resolves this theoretical dilemma.

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<sup>1</sup> A. R. R. L., *Antenna Book*.

<sup>2</sup> Covington, *QST*, May 1965.

<sup>3</sup> Wells, *J. Inst. Elec. Engrs.*, 81 Pt III, 182 (1944).

<sup>4</sup> Kraus, *Antennas*, McGraw Hill, New York, 67 (1950).

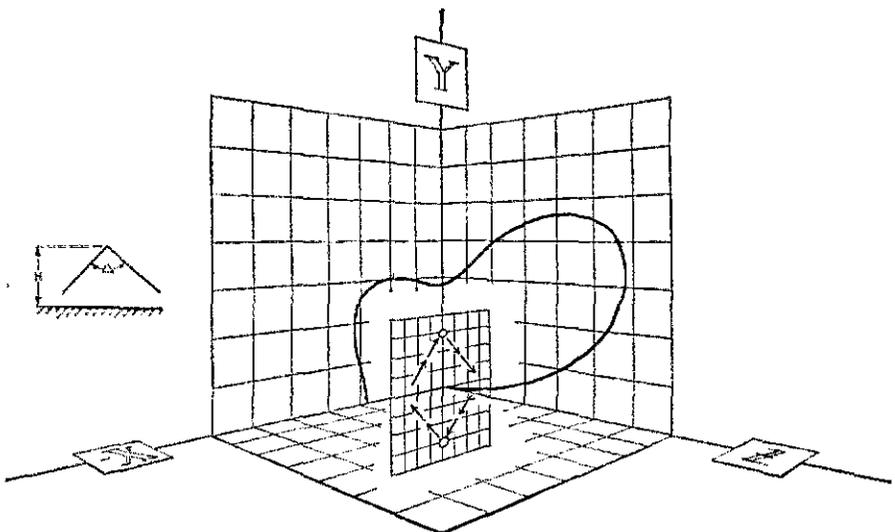


Fig. 1—Perspective of the mathematical model used for far field calculations. A series of current elements represents the general V antenna and its image replacing perfectly conducting ground. The field pattern corresponds to a 90° inverted V with the apex  $\frac{1}{2}$  wavelength above ground.

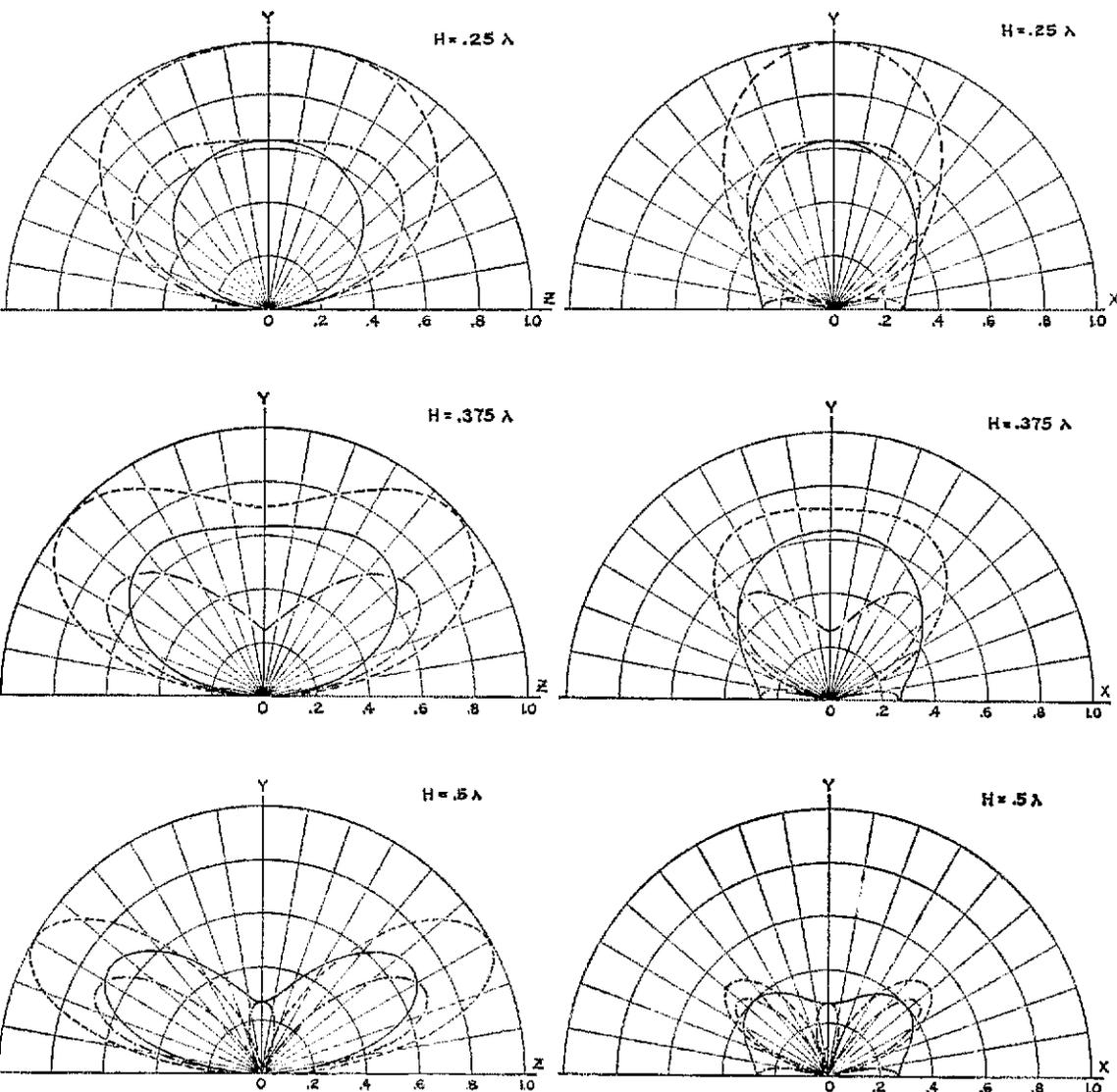


Fig. 2—Vertical-plane E-field patterns broadside to and off the end of V antennas as a function of center height above ground. The axes labels define the corresponding planes. Patterns are calculated for the same peak current in all cases; they are useful for comparison of pattern shapes but do not purport to show relative gains of the three patterns. The following line code is followed in each figure:

Solid:  $90^\circ$  V (inverted V)

Dotted:  $180^\circ$  V (horizontal dipole)

Dot-dash:  $270^\circ$  (erect V)

### Mathematical Approach

Certain mathematical simplifications of the unlimited number of possible antenna configurations are in order. They include a perfect ground plane that can be removed by using an image antenna, sinusoidal currents flowing on a thin  $\frac{1}{2}$ -wave antenna and its image, and no feed-line effects. Also, only the far-field patterns of antennas symmetrically arranged in a plane normal to the earth are considered. Finally, it is assumed that the field from a continuous wire antenna can be described as the cumulative field radiated

by a finely-divided series of correctly-weighted current elements.<sup>5</sup>

Fig. 1 shows the inverted-V form of the model incorporating the above assumptions. The angle delta defines the separation angle between the antenna legs. A delta smaller than 180 degrees denotes an inverted-V form of antenna. Computer calculations consisted of summing the E fields from 36 current elements representing the antenna and its image. The program allowed

<sup>5</sup> Ramo and Whinnery, *Fields and Waves in Modern Radio*, 2nd ed., John Wiley and Sons, New York, 505 (1964).

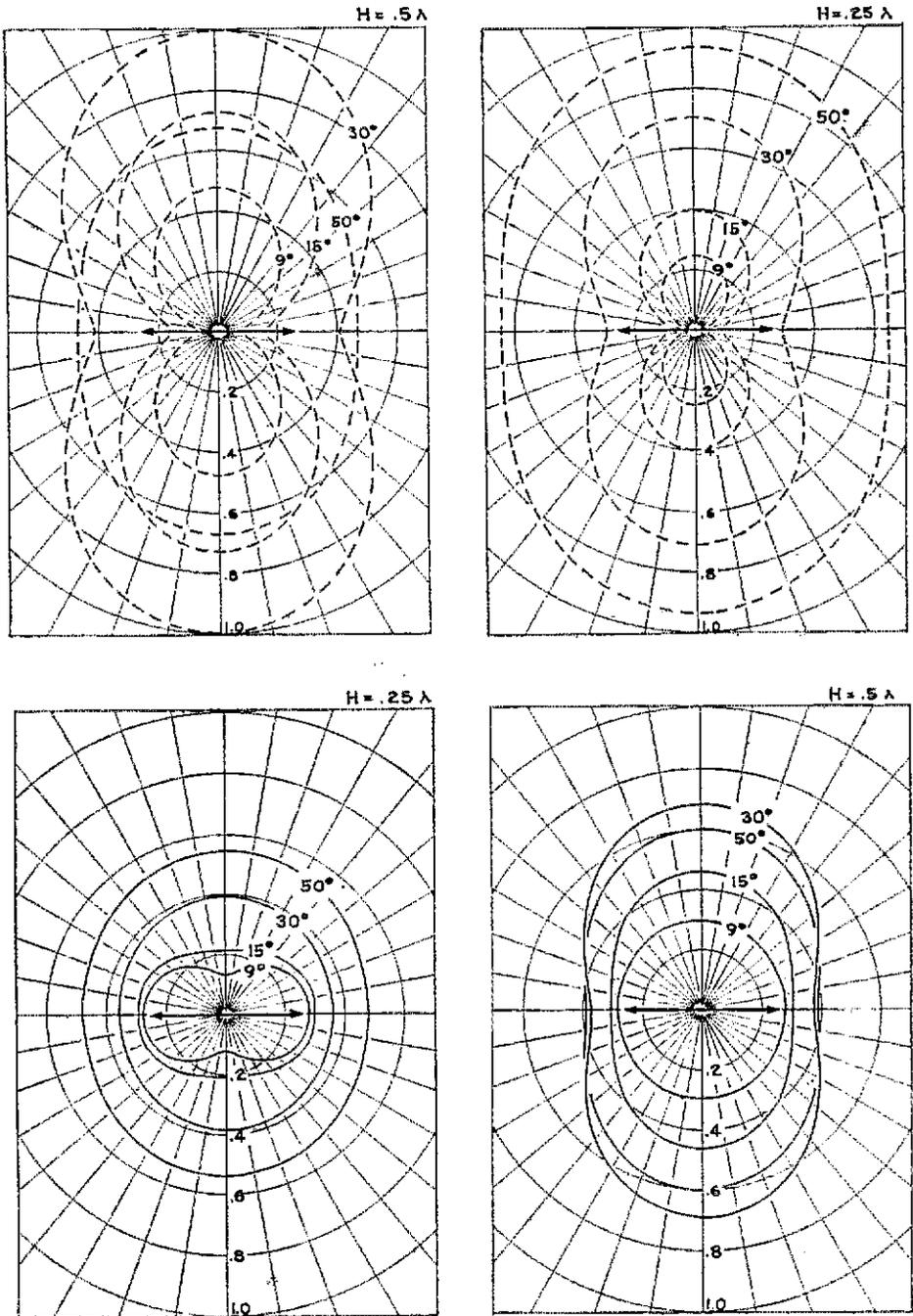
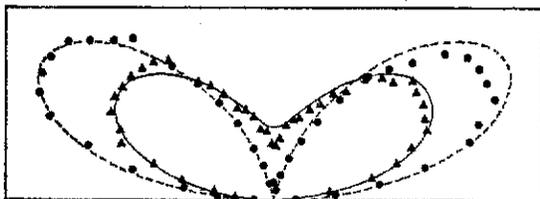


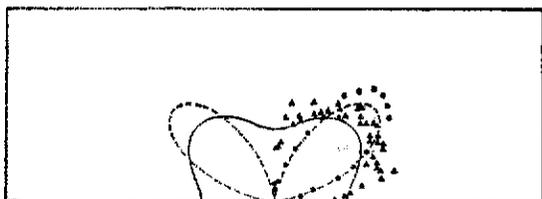
Fig. 3—Azimuthal E-field patterns for angles of elevation of 9, 15, 30, and 50 degrees where  $H$  is 0.25 and 0.5 wavelength above ground. Antenna legs are denoted by arrows. Patterns should be used to compare pattern shapes; not relative gains; see Fig. 2. The same line code for Fig. 2 applies above.

$\delta$  and  $H$ , the center insulator height above ground, to vary in value. At each  $H$  and  $\delta$  the far-field patterns were found for the two vertical planes  $YZ$  and  $XY$  — the broadside and

off-end planes respectively. In addition, azimuthal plots were calculated for angles of elevation measured upward from the  $XZ$  plane of 9, 15, 30, and 50 degrees.



BROADSIDE,  $H = 0.5 \lambda$



OFF END,  $H = 0.5 \lambda$

Fig. 4—Vertical-plane experimental data for horizontal and  $90^\circ$  V antennas with center height  $\frac{1}{2}$  wavelength above ground. Circles denote the horizontal results while the V results are given by triangles. Measurements were normalized to the theoretical patterns for shape comparison only. The theoretical curves for both cases are taken directly from Fig. 2.

### Vertical Plane Patterns

Fig. 2 summarizes the computed  $E$ -field radiation results in the vertical planes broadside and off the ends of V antennas located 0.25, 0.375, and 0.5 wavelength from ground. Just patterns for deltas of  $90^\circ$ ,  $180^\circ$ , and  $270^\circ$  are portrayed for simplicity. A useful estimate of patterns for deltas of  $120^\circ$  and  $240^\circ$  can be formed by connecting field points that lie halfway between the patterns for  $90^\circ$  and  $180^\circ$  and  $180^\circ$  and  $270^\circ$ . On this basis it may be concluded that a slight droop or sag for an almost-horizontal dipole will have negligible effect on the original horizontal dipole patterns. Major pattern changes occur for decidedly V-shaped antennas.

It is evident from the broadside patterns of Fig. 2 that adjusting delta is rather like a change in the height of the antenna, although there is no large steering of the vertical-plane beam as delta varies for  $\frac{1}{2}$ -wave dipoles. When delta is smaller than  $180^\circ$ , the inverted V resembles a horizontal antenna at a lower height. The reverse is true for an erect V.

To a limited extent the same remarks are valid off the ends of the V. However, there are some novel low-angle effects. For example, at a height of  $\frac{1}{2}$  wavelength, the  $90^\circ$  V is not equalled by the horizontal dipole until the elevation angle reaches approximately  $32^\circ$ . The low-angle null that develops for the  $270^\circ$  V suggests a poor DX performance in this plane.

Another surprise of the XY plane was that the pattern for a given delta always originated at the same point on the X axis regardless of the antenna height. This is a mathematical result of the far-field assumption. For a fixed delta there is no change in the phase distance between a far-field observation point on the X axis and the various radiator points moving in perpendicular  $H$  displacements in the Y direction. On the other hand, the phase difference between a radiator point and an observation point on the Y axis is directly influenced by different  $H$  magnitudes.

### Azimuthal Patterns

The XY and YZ plane patterns shown in Fig. 2 are but slices from the total three-dimensional radiation pattern. A better appreciation of the transition from one plane to another is contained in azimuthal patterns plotted for constant

angles of elevation. Such patterns for a horizontal dipole and a  $90^\circ$ -degree V at heights of 0.25 and 0.5 wavelength are presented in Fig. 3. While both antennas exhibit omnidirectional characteristics at the higher elevation angles, the V tends to preserve this characteristic for low radiation angles. Even at the lower height the  $E$  field off the end is only about one S unit stronger than the field broadside. The horizontal dipole shows more directivity at low angles. Fields broadside are roughly 3 S units stronger than off the end. In both cases an increase in height causes a decrease in high-angle radiation.

### Additional Pattern Observations

Some observations at this point are necessary for completeness. The patterns show the angular multiplying factor of the radiated  $E$  field. It is possible to compare the total fields radiated from two antennas having the same input power but different delta and  $H$  values. The approach is to multiply the respective angular factors by the inverse square root of the radiation resistance, which also has a delta and  $H$  dependence.<sup>6</sup>

Actual ground is not perfect, and thus the patterns of an antenna over real earth will show little radiation at the extreme low angles of elevation.<sup>4</sup> This effect is especially severe for vertical polarization in the higher part of the hf bands. Over poor ground at 20 meters, therefore, part of that nice DX gain in the XY plane of a  $90^\circ$ -degree V will actually be illusory. Generally speaking, however, the patterns should give a reasonable picture of the radiation from a real antenna.

Finally, a comparison of the overall performance of V dipoles should recognize that the field strength of signals propagating via ionospheric paths is affected by both the vertical radiation angle and the polarization. First consider the radiation angle. As the frequency goes up the elevation angle useful for communication goes down. Furthermore, experimental data suggest that on the average the best DX results will be obtained with the antenna that has the lowest radiation angle. An exception arises for certain seasons of minimum sporadic  $E$ . Daytime DX propagation by the  $F_2$  layer could then be described by a large number of  $F_2$  hops, and low radiation angle antennas would become inferior

<sup>6</sup> Covington, QST, October 1968.

to antennas exciting higher-angle modes.<sup>7</sup>

Antenna polarization is the second important factor. Calculations for single-hop waves show that only on short range paths in regions where the Earth's magnetic field lines are nearly vertical does the selection of the best receiver-transmitter antenna polarization become arbitrary. There will generally be an optimum polarization choice for any given path range, latitude region, time of operation, and direction of propagation.<sup>8</sup>

### Measured Patterns

Some confirmation of the general features of the mathematical model was desired. Unfortunately, with the exception of the early qualitative analyses, little experimental work appears to have been published on the radiation patterns of Vs over ground. Therefore a model antenna was designed for use on a microwave antenna test range similar to one described by Wallingford.<sup>9</sup> X-band horizontal and 90° V dipoles were constructed, and the center of each antenna was positioned  $\frac{1}{2}$  wavelength above ground. The brass image planes had diameters of 13.8 wavelengths. The receiving antenna was a horn located 15 wavelengths from the coordinate origin of the model transmitting antenna.

The experimentally-measured *E* field as the horn traversed the broadside and off-end vertical planes is plotted in Fig. 4. The theoretical curves in the figure are taken directly from Fig. 2. It can be seen that the horizontal dipole data points agree fairly closely with the predicted patterns. Part of the mode structure superimposed on the main beam of all the measured patterns is believed to result from the large but finite brass image planes.<sup>10</sup> Finite planes also lead to anomalous results along the X and Y axes. The broadside 90° V data do show an increase in high-angle radiation. For both antennas radiation in the XY plane was somewhat stronger than expected. Considerable structure is present off the end of the 90° V but the experimental points conform to the shape of the theoretical curve. It is interesting to note that the V model indeed exhibited better low-angle radiation off the ends than observed for the horizontal dipole.

### Conclusions

The variations in the vertical plane and azimuthal *E* field patterns for a general class of V antennas have been examined as a function of V angle and center height above perfect ground. The conventional horizontal  $\frac{1}{2}$ -wave resonant dipole is a special member of this V classification. Generally speaking, as the antenna elements approach ground more radiation occurs at higher elevation angles. However, in some cases important low-angle effects are observed off the ends of a V form. Orientation of the general V antenna is not particularly important for high-angle local

contacts if polarization effects are neglected. On bands where most of the contacts will be made by low-angle radiation, then best performance of the horizontal dipole and erect V should be obtained broadside to the antenna. The inverted V is more omnidirectional at all useful elevation angles, and thus it performs well as a contest antenna, especially on the lower frequency bands.<sup>11</sup>

The author appreciates the cooperation of Ed Joy and Scientific Atlanta in providing the opportunity to make the microwave measurements on their antenna test range.

QST

## Strays

I would like to get in touch with . . .

- . . . a call letter license plate collector who would like Wyoming plates. W7KE.
- . . . hams or would-be hams needing help solving their technical problems. WB9ADF.
- . . . doctors, nurses or missionaries in remote areas who would like to have medical consultations by radio. WB2NIN.
- . . . Eastern U.S. amateurs interested in joining an established Novice training net on 80 meters. WA3JSU/1, 200 Washington St., Middletown, Connecticut 06457.
- . . . anyone interested in a 450-MHz fm repeater in the Chicago area. WA9EXP.
- . . . amateurs having information on the availability of Taylor T-40 tubes. W6BIL.
- . . . someone interested in donating a Connecticut call letter license plate for eventual presentation to the Fort Hartsuff museum. K0ZIO.
- . . . hams of Maltese ancestry. VE3GNM.
- . . . other amateurs who will be in Israel this summer. WA2FDG.



Recently W2VX was in contact with teachers at the Parkview School, Westville, N. J. who were presenting a unit on communications to 5th and 6th grades. As shown above, Charlie helped out by inviting the students in groups to visit his amateur station for a demonstration of ham radio. It worked out so well that now about 124 students have seen W2VX in operation. Charlie suggests that other retired hams might enjoy demonstrating amateur radio for schools in their areas, too. (W2OGZ photo.)

<sup>7</sup> Utlaut, *Journal of Research of NBS*, 65, 187 (1961).

<sup>8</sup> Bradley, *Proc. IEE*, 115, 777 (1968).

<sup>9</sup> Wallingford, *IEEE Trans. on Education*, E-6, 27 (1963).

<sup>10</sup> Storer, *J. Appl. Phys.*, 33, 588 (1952).

<sup>11</sup> Kleinman, *QST*, October 1969, p. 57.

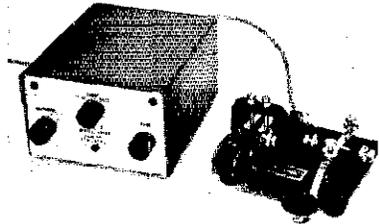


# Recent Equipment



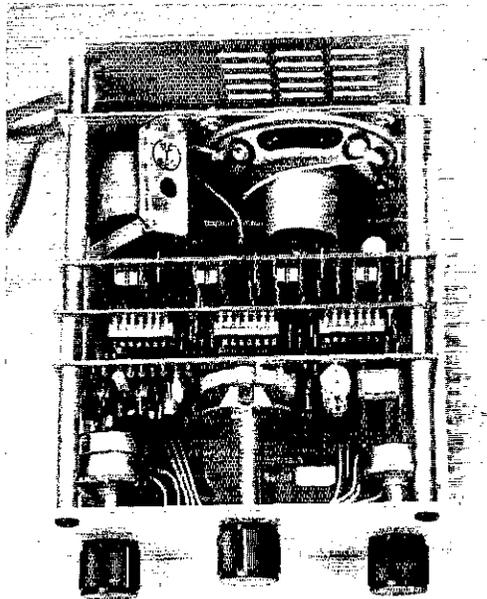
To acquaint you with the technical features of current amateur gear.

## ORD DK-1 Digital Keyer



EVERY once in a while a new piece of amateur equipment is introduced that seems to be an excellent balance between operating features, electrical design, mechanical construction, and cost. The ORD DK-1 electronic keyer is such an item. Manufactured by ORD, Inc. of Fort Worth, Texas, the all solid-state keyer will send perfect code with input from an only nearly-perfect operator. The keying can be entered in several different ways, depending on how an individual operator wants to send code. An external paddle is required, as no keys are supplied with the DK-1. The paddle must have independent dot and dash levers if the "squeeze" keying technique is going to be used.

The ORD keyer is a sophisticated machine, and it does a number of things that were practically impossible in a commercial unit, until low-cost

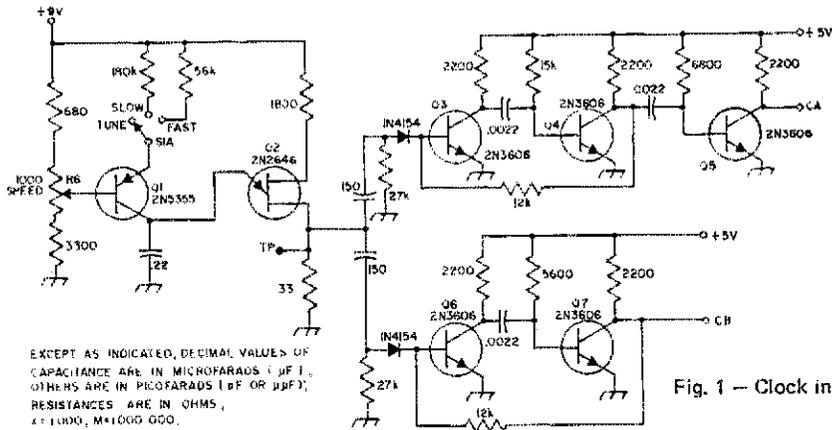


Top view of the ORD keyer. The clock-relay board is closest to the front panel, followed by the two logic boards. The pins extending from the boards are test points.

digital integrated circuits were introduced. It can be operated with a straight key for manual operation (a useful feature if another ham comes for a visit, or if you have a Novice in the family). Or, you can use the keyer in the normal manner to produce one or more dots or dashes with a touch on the appropriate paddle. A free-running clock, which is set with the panel SPEED control and SLOW-FAST switch to produce any desired keying rate between 7 and 60 wpm, is used. The clock and code generator establish a fixed ratio of 1 to 3 between dots and dashes, plus timing a space after each code element. The clock will continue to time the spaces when neither paddle is depressed, and a new element can only start at the end of a single space, or at some multiple thereof. Thus the operator is electronically encouraged and helped to get his spacing, as well as the elements, timed correctly.

The DK-1 also contains a dot memory, dash memory, and interchange logic which allow the squeeze-keying method to be used. (Interchange logic is a fancy name for circuitry which will allow both dot and dash paddles to be depressed simultaneously, sending the character originated by the last-pressed key. The unit can differentiate between closures of 50 nanoseconds or less.) Squeeze keying can significantly reduce hand motion when sending high-speed cw.<sup>1</sup> As an example, if both paddles are pressed, the dot paddle just slightly before the dash, the keyer will form a dot, a single space, a dash, and a second single space — a perfectly-timed letter, A, formed with a single hand motion. With the exception of the letter C, all letters and numerals can be generated with a single press and release (in proper order, of course) on the paddle keys. The action of the interchange logic and memories can best be demonstrated in a simple test. The keyer is set at about 30 wpm, and the dash lever is held down to produce a continuous string of dots. Then the dot lever is hit momentarily. A single dot, followed by a single space, will be inserted into the string of dashes.

<sup>1</sup>An upcoming QST article by W2IMU will discuss the amount of hand motion required for different types of keying.



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS ( $\mu$ F), OTHERS ARE IN PICOFARADS (pF OR  $\mu$ PF); RESISTANCES ARE IN OHMS,  $\times = 1000, M = 1000000$ .

Fig. 1 — Clock in the DK-1.

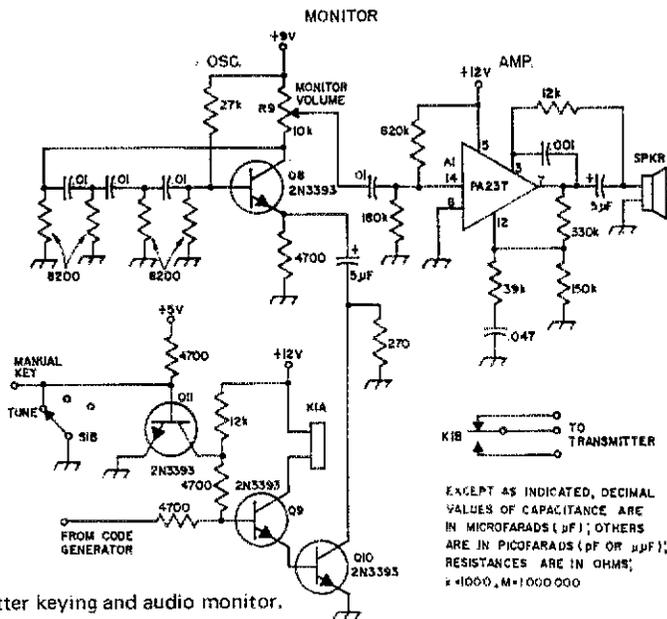


Fig. 2 — Transmitter keying and audio monitor.

TABLE I

Volts	mA	VA	Capac.	Res.
100	50	5	.00022	820
100	100	10	.001	330
100	500	50	.022	27
100	1000	100	.1	10
250	50	12.5	.00022	680
250	100	25	.001	330
250	400	100	.015	68
500	50	25	.0022	1200
500	100	50	.001	560
500	200	100	.004	270

Resistor and capacitor combinations to be connected in parallel across the relay contacts for spark suppression. R-C combinations are chosen to fit the voltage and current to be keyed.

### Circuits

The heart of the keyer is its clock — sometimes called a time-base generator. Fig. 1 shows the ORD clock, which is different from other popular keyer circuits in that a unijunction transistor, Q2, and its associated RC network set the pulse repetition rate. Q1 is a constant-current source establishing a steady recharge for the .22-uF timing capacitor. The rate of recharging is determined by 56,000- and 180,000-ohm resistors which are selected by the SLOW-FAST switch, S1 and the setting of R6, the speed control. When the charge on capacitor builds up to the breakdown voltage of the UJT (unijunction transistor), the capacitor will discharge through the Q2 emitter-base junction, producing a 2-volt pulse at the test point.

The timing pulse is fed to monostable multivibrators Q6-Q7 and Q3-Q4. The output of Q6, Q7 is a 10 millisecond pulse for each input

trigger from the UJT. *Q3* and *Q4* produce a 20-millisecond pulse which *Q5* shortens to an output pulse length of 10 milliseconds. These two pulses, plus a third that is produced in the clock logic (the difference between the two clock pulses which is used to clear the memories) are the basic drive for the keyer.

There are fifty-five logic elements (17 IC packages) that make up the code generator, memories, sequence control, and interchange logic. The use of the digital logic in electronic keying has been extensively covered recently, so it will not be repeated here. 2,3,4

The output of the final logic element drives the keying relay, a mercury-wetted reed type. The use of a relay, rather than direct transistor keying, insures that the keyer can be used with virtually any transmitter. The relay is rated for operation up to 500 volts, and it will switch up to two amperes. The maximum contact load is 100 volt-amperes. The double-throw contact arrangement allows muting of a receiver, and provides for keying the transmitter.

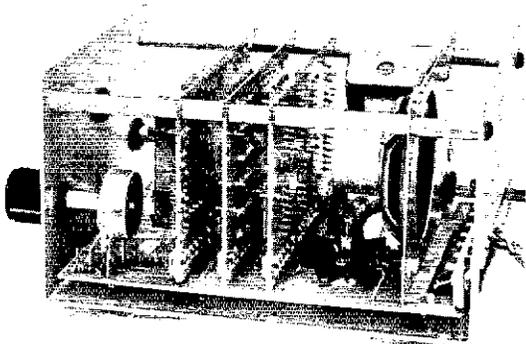
To protect the relay an RC spark suppressor circuit should be used across the contacts, if this can be done without affecting the keyed waveshape of the transmitter. This important point, often overlooked by amateurs, should be followed or there is likely to be premature failure of the keying relays. A chart from the ORD instruction manual is reproduced in Table I. It gives the correct suppressor component value for different voltage-current combinations.

Transistor *Q9* keys the relay on and off, while *Q10*, following *Q9* keys the monitor oscillator. See

<sup>2</sup>Opal, "Micro-TO," *QST*, August, 1967.

<sup>3</sup>VanCleaf, "ICKEY -- An Integrated-Circuit Electronic Keyer," *QST*, November, 1968.

<sup>4</sup>Jahn, "Microcircuit Electronic Key," *QST*, September, 1969.



Side view showing the "wireless" construction used. One large board provides all interconnections and also contains the power supply. The transistor with the heat sink is the regulator in the power supply.

## ORD DK-1 Keyer

Height: 3 7/16 inches.

Width: 5 inches.

Depth: 6 3/8 inches.

Weight: 2 1/4 pounds.

Power Requirements: 115 volts ac, ±10 percent.

Price Calls: \$130

Manufacturer: ORD, Inc., 3201 Handley Eder-ville Rd., Fort Worth, Texas 76118

Fig. 2. *Q11* provides a separate input for the manual key, and a TUNE position through *S1* for continuous key-down, a position used while tuning and adjusting a transmitter. The monitor circuit is of interest because it is capable of generating an excellent note, unlike the "squeakers" found on some ham keyers. *Q8*, a phase-shift oscillator, produces sine wave output at a frequency of about 800 Hz. This signal is amplified by a PA-237 GE integrated circuit. Volume is controlled by *R8*, the MONITOR gain. A 2½-inch Quam speaker completes the monitor. The use of a good speaker insures a pleasant tone and sufficient volume.

### Assembly

If you're off on a DXpedition, the DK-1 would be a good keyer to take along. By any measure it is a rugged unit built with a care and precision not often found in amateur equipment. Four double-sided glass epoxy circuit boards are used: two for the logic elements, one for the clock and monitor, and one in the power supply. The logic and clock boards mount on to the power supply board, interconnections being made by this board. There are only two interconnecting wires in the unit — the two that go to the monitor speaker. The three standing boards are supported at both top edges by spacers that run from the front to the back panels. This prevents physical shock from damaging or loosening the boards.

All small discrete components are mounted on the boards, including the switch and controls. The power transformer and speaker are mounted separately on a metal plate next to the rear panel. Test points are sprinkled throughout. Although, with a mean-time-between failure rating that a unit like this must have, it is doubtful that they would ever be needed. The keying relay, often a weak sister, is rated for one billion operations if used as specified in the instruction manual. Should trouble ever develop, the manual has a good trouble-shooting guide, and factory service is available.

The keyer, as tested, meets all manufacturer's specifications. It is capable of sending excellent code — the objective with any keyer. It takes more than a few hours to learn squeeze keying, but while you are studying you can use the keyer in the regular manner and learn the squeeze technique as you go along. A keyer like the ORD DK-1 will make a worthwhile addition to any cw operator's shack. — W1KLL



signal is obtained by having an impedance match. However, if the impedance is mismatched in the optimum manner, signal decreases less rapidly than noise, and the signal-to-noise ratio improves. The favorable direction for making a mismatch is with the coupling between primary and secondary of a double-tuned circuit tighter than for maximum signal. — *Yardley Beers, W0JF, 740 Willowbrook Rd., Boulder, CO 80302.*

## MORE ON ANTENNA NOISE TEMPERATURES

Technical Editor, *QST*:

Dr. Taylor's Technical Correspondence letter in January 1970 *QST* about my article on atmospheric noise<sup>4</sup> brings up an interesting point concerning antenna temperatures for microwave frequencies. I did not elaborate on this point because the article dealt specifically with frequencies below 30 MHz. At these frequencies the earth is very much in the field of view of all practical antennas, and the point raised by Dr. Taylor is of no practical importance.

A reference antenna temperature of 290°K is universally used in terrestrial communications calculations. The temperature is increased, of course, by galactic and atmospheric noise, as explained in the earlier article. — *Harry R. Hyder, W7IV, 2523 N. 57th St., Scottsdale, AZ 85257.*

## TRANSMITTING WITH FETS

Technical Editor, *QST*:

As solid-state technology evolves, the power-handling capabilities of junction field-effect transistors is continuously increasing. In the future, small transmitters using JFETs exclusively will be quite practical. FETs have several distinct advantages over bipolar devices for transmitter applications: (1) As the temperature of a JFET increases, the zero bias current decreases<sup>5</sup>. Hence, thermal runaway, which is typical of bipolar transistors, is avoided; (2) The high input impedance of JFETs should greatly facilitate the construction of hand-switched transmitters; (3) Since the output port of a JFET amplifier does not involve a pn junction, the generation of high-order harmonics resulting from parasitic-capacitance effects in bipolar transistors should not be present.

While several FET oscillators have been described<sup>6</sup> little has been done with FETs as frequency multipliers or power amplifiers. The frequency-multiplier capabilities of a typical JFET were measured with the circuit shown in Fig. 2. The output tank was tuned to approximately 25 MHz and the frequency of the signal generator was changed to vary the order of multiplication. A Tektronix type 647 oscilloscope was used to measure the output voltage while a Tektronix type 191 signal generator was used as the driving source. Shown in Fig. 3 is the peak-to-peak output voltage vs. input drive voltage for several orders of multiplication. In these experiments a Fairchild FT-0655C ( $V_p = 2.5$  volts,  $I_{DSS} = 5.0$  mA) n-channel JFET was used although similar results

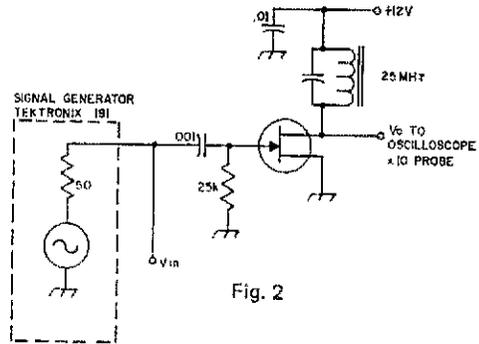


Fig. 2

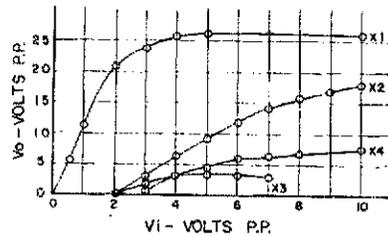


Fig. 3

have been realized with some of the popular plastic devices available (MPF102, etc.). The output waveform of the multiplier often contains significant modulation at the driving frequency. The data presented in Fig. 3 are representative only of the 25 MHz component of the output. In a practical application a double-tuned circuit would be desirable, especially if the multiplier is to be used to drive a bipolar power amplifier. It should be noted that poor multiplier performance was realized with JFETs with larger pinch-off voltages, since higher drive levels are required to establish the low conduction angle needed for frequency multiplication. Further, it is interesting to note the predominance of even-order multiplication which results from the square-law characteristic of the JFETs.

If an output link is added to the tank circuit of Fig. 1, the stage may be loaded and evaluated as a power amplifier. The behavior is essentially identical to that expected from a pentode vacuum tube. Since the peak current which may flow in the FET drain is  $I_{DSS}$ , the maximum dc input current which one can realize is one-half  $I_{DSS}$ . Using a Fairchild FT0655A ( $I_{DSS} = 50$  mA) with a 25-volt drain supply, the amplifier was loaded to 25-mA drain current. Slightly more than 1/4-watt output was achieved for a drain efficiency of about 50 percent. The 10 Vpk-pk drive was probably not enough to establish deep class-C conditions. Using a different transistor with  $I_{DSS}$  more than 1/2-watt output was achieved with 60 percent efficiency. A heat sink is, of course, necessary. The output was spectrally much cleaner than that typically obtained with a similar bipolar power amplifier with a loaded tank circuit  $Q$  of 10.

While high-power FETs are not yet available, in the future they probably will be. In the interim, FETs are extremely useful as frequency multipliers and drivers in solid-state transmitters and excitors.

The writer gratefully acknowledges the assistance of WA6RDZ. — *Wes Hayward, W7ZOI, 7700 S.W. Danielle Ave., Beaverton, OR 97005.*

<sup>4</sup>Hyder, "Atmospheric Noise and Receiver Sensitivity" *QST* November, 1969

<sup>5</sup>H. Wu, "Designing Power Supplies with FETs" *EEF*, December, 1968.

<sup>6</sup>For example, see Hanchett, "The Field-Effect Transistor as a Stable VFO Element," *QST*, December, 1966.

# 1.6 Contacts Per Square Foot of Real Estate

BY KATASHI NOSE,\* KH6IJ

HAVING access to the well-known "antenna farm" is a great help in attaining top scores in a DX contest, but even if one is confined to a small-city lot, one can come up with a respectable score using antennas consonant with the decor of the neighborhood. So, take heart city dwellers.

The enigmatic title of this story stems from the fact that the author made almost 9000 contacts during the 1968 ARRL DX Contest from a 5500-square foot city lot which is occupied mostly by the house. The 5200 phone contacts represents the largest number that has been made to date for single operators in the 34 years that the ARRL Contest has been in existence.

## Past Performance

Let me back up a few years to provide the proper rationale for this story. I was not always confined to a 5000-square foot city lot. For a period of 25 years, I had access to nearly 25 acres (1,100,000 square feet) of real estate for

Dept. of Physics and Astronomy, The Mall 2565, University of Hawaii, Honolulu, Hawaii 96822.

erection of antenna systems. Among antennas available at various times were 800-foot rhombics, 90-foot telephone poles with a track running up the side, stacked beams, wide-spaced beams, and curtain arrays.

A regulation-size football field plus additional turf was available for antenna experiments and measurements, some of which have appeared in *QST* and the *ARRL Antenna Book*. The station itself was located on a 200-foot high plateau overlooking the Pacific. Three-phase power was available as well as a quarter mile of remote-control lines.

I moved from this idyllic rural location to a city (population 650,000) residential area replete with shavers, mixers, and neighbors so close that I have to use a close-talking microphone to prevent them from eavesdropping on my conversation. Many of my DX friends thought that this move was the end of my DXing and I thought so too, but experience through one sunspot cycle has proved otherwise.

## Proof of Performance

Signal reports are of limited value, but performance in DX contests over a *period of years* is a good measure of the overall worth of one's location and equipment. You are pitted against others in your locality or, if you wish, you may compare your performance with the rest of the world.

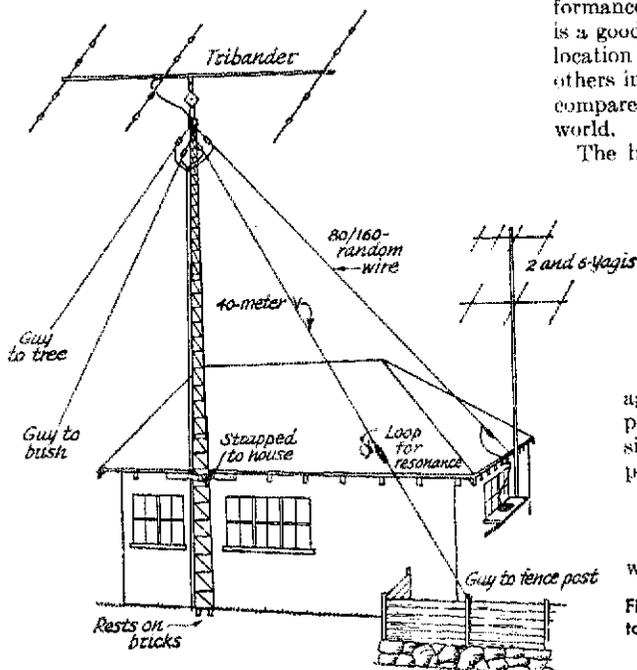
The best performance in two sunspot cycles from the rural location was during the 1958 peak when 6563 contacts were made on both modes in the ARRL DX Contest. This was a world high on both modes. 160 meters through six meters was utilized.

After moving into a city lot, in the peak year 1968, nearly 9000 contacts were made in the ARRL DX Contest, again representing a world high on the phone mode of 5200 QSOs. There was no six-meter opening during the contest period.

## Antenna Systems For City Lots

I have nothing new to offer in the way of antennas for those saddled with

Fig. 1—The author's 37-foot four-section crank-up tower is guyed with one set of guys at the top. These guy wires also serve as low-frequency antennas.



a city lot, but I do urge you to try the well-known principles of limited-space antennas for contest operation. You can make up for the lack of that rhombic or 100-foot tower by a little more determination and by straining a little more for that weak one.

You cannot go much higher than 40 feet above the surrounding terrain on a 5000-square foot lot without attracting attention. I settled for a 37-foot four-section crank-up tower guyed with one set of guys at the top as shown in Fig. 1. This tower is strapped to the eaves of the house and the base rests on the earth on two bricks. One guy wire is tied to a small bush, another to a fence post, another to a tree trunk, and the fourth to a nail driven into the side of the house. These guy wires serve as low-frequency antennas. A simple guying system is sufficient for a low tower provided you don't let them undergo isometric-exercise-like stresses. We must remind ourselves that a crank-up tower enables us to lower the antenna before a high wind and is not for the purpose of conducting wind-tunnel tests of antennas.

### High-Frequency Antennas

A conventional tri-band Yagi is mounted on the guyed tower. A Yagi was chosen in preference to a quad since the layman is used to seeing a television antenna. More than one neighbor has commented on the "huge TV antenna" around the corner. It takes one can of smoke-gray Krylon spray to camouflage the tri-bander and another can to make the tower blend with gray skies.

It would have been an easy matter to stack the six-and two-meter Yagis above the tri-bander but, for appearance sake, I use a 20-foot television "push-up" mast strapped to the side of the house as a temporary structure for the contest (Fig. 2).

### Low-Frequency Antennas

A 40-meter beam was out of the question, so I settled for an inverted "V" using the two guy wires as radiating elements. The guy wire is lightweight 7-strand hard-drawn copper wire.

Each drooping end of the inverted "V" is coiled into a loose 6-inch diameter loop and serves as a convenient means of pruning to resonance from the ground with a ladder (Fig. 2). This antenna was good for 1000 contacts which is within sight of the performance of Z8SJ and 15-operator XE1PTBC who have time difference advantages.

A dipole for 80 and 160 meters was out of the question not only because of length limitations but because of the bandwidth to be covered. The remaining guy wire is used as an end-fed random wire through a pi and L network. This arrangement is not new but the novelty of this system lies in the way the tuning house is mounted on a window box just outside the

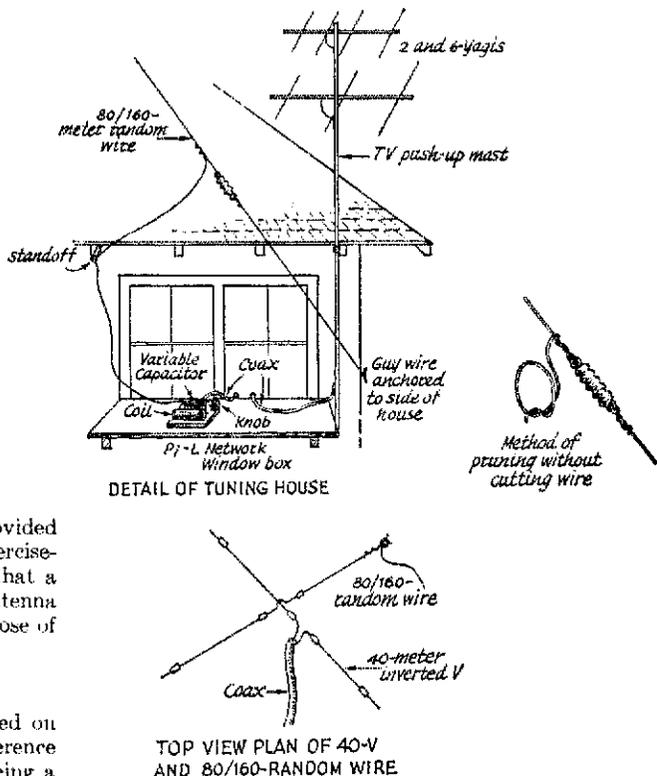


Fig. 2—This sketch shows the details of the tuning unit, low-frequency antennas and a method of pruning without cutting the antenna wire.

window which can be reached for easy adjustment and rearrangement of the configuration desired. Alligator clips are used to hook up any kind of tuning arrangement desired. The tuning unit is exposed to the weather. This arrangement as shown in Fig. 2 is not the best but it was good for working into W1 from Hawaii on 160 meters. A method of gamma-matching a tower for 160-meter operation has been described by the author in one of the antenna handbooks.

### Conclusion

You too can be in big-time contesting and still keep peace with your neighbors appearance-wise. If you have lived through competition from pre-war XE1A and post-war XE1A, KV4AA, and H8XAL through four sunspot cycles you have been in big time contesting. You too can do it from a city lot. QST

### ARE YOU LICENSED?

• When joining the League or renewing your membership, it is important that you show if you have an amateur operator license. Please state your call and/or the class of operator license held, that we may verify your classification.

# Down to the Sea in Ships (Via Radio)

Activity on the V. L. F.

BY WILLIAM R. HOLLY,\* WA1HDP

**A**MATEUR RADIO is not the only two-way communication service in existence. However, in listening to the ham bands for any length of time you might begin to believe it was. Many hams have amateur-band-only equipment and of those hams that do have a general coverage receiver in the shack, how many tune it outside of the ham bands to see what else is happening in the world of communications? John Fishback's converter<sup>1</sup> is a good example. The author presents an economical means of copying the world's biggest code practice oscillators, NAA and NSS. These stations put out an almost continuous flow of five-letter cipher group messages which provide excellent code practice but yield nothing in the way of informative listening. Yet within the tuning range of this converter is another band of frequencies, not even mentioned by the author, which can provide the amateur not only with a variety of code practice but some very interesting listening as a bonus. I'm speaking of the medium frequency, 405-535 kHz, maritime mobile service band.

What does the maritime mobile service band offer the amateur? There are numerous taped cw broadcasts to be heard ranging from routine coastal weather forecasts to hurricane warnings and warnings of hazards to navigation. The speed of these broadcasts vary over a wide range and, as they are in plain language, give one a good indication of how accurate his copy is. For the amateur traffic man, monitoring this band, which is the primary ship-shore communications link for ocean-going vessels, provides him with an excellent opportunity to observe professional radio operators at work. Listening to a merchant ship file a TR (Travel Report) listing some exotic ports of call may inspire some youngster to a career as a merchant marine radio officer. Probably the most exciting possibility is that of hearing a distress case in progress. Communications for most of the maritime distress cases involving large merchant ships are conducted on 500 kHz, the international distress and calling frequency.

## Commercial Procedures

Although most transmissions are in plain language and the procedure employed is not too dissimilar to that used in amateur communications, commercial procedures do contain some elements that require a little explanation before you can fully appreciate what is going on.

The principle of calling and answering on one frequency and then moving off frequency to handle traffic once communications have been established is strictly adhered to. All commercial

\*42 Mobile Manor, Kittery Maine 03904.

<sup>1</sup>Fishback, "Receiver for 600 to 20,000 Meters," *QST*, Sept. 1968, page 18.

telegraph stations and U. S. Coast Guard primary radio stations maintain a continuous watch on 500 kHz. Any mobile station desiring to communicate with a particular station calls that station on 500 kHz and announces his traffic and his working frequency. The shore station will acknowledge, giving his working frequency, and they will immediately shift to the working frequencies to handle the traffic. An example might go something like this:

The liner *S. S. France*/FNRR has a telegram for an addressee in New York City and calls the commercial shore station WSL (Long Island, N.Y.).

WSL WSL DE FNRR FNRR QTC QSW 425 K  
WSL replies: DE WSL R UP<sup>2</sup>/418  
FNRR replies: R UP<sup>2</sup>

In this case FNRR is going to transmit on 425 kHz, one of the frequencies allotted to mobile units and WSL is going to transmit on 418 kHz, his permanently-assigned working frequency. Often, when the stations are familiar with each other's preferred or assigned frequencies, no mention of frequency will be made. The call would simply be:

FNRR: WSL WSL DE FNRR FNRR QTC UP  
WSL: DE WSL R UP

While the shore station has a specific frequency permanently assigned to it, the mobile unit may use any one of a block of frequencies assigned for mobile stations. Generally the mobile station will use an assigned frequency as close to the shore station's working frequency as possible. If, in the second example above, you wanted to listen to the traffic being passed, you would refer to the list of shore stations' frequencies in the adjacent table, then compare it with the list of mobile frequencies at the bottom of the table; you will probably find the mobile station transmitting on the nearest frequency. Listening to both sides of the conversation requires some nimble dial twisting but is not at all impossible with a little practice.

## Distress Signals

The most universally known distress signal is SOS. It means that a ship, aircraft, or other vehicle is in grave and imminent danger and requests immediate assistance. Not so well known perhaps are the auto alarm and DDD SOS signals. The auto alarm consists of 12 four-second dashes sent in one minute with a one-second interval between each dash. It may be sent by hand or automatic equipment. The auto alarm is sent by a unit in distress prior to sending the actual distress message.

<sup>2</sup>The word 'up' to denote a frequency shift is technically wrong here as the stations are going down in frequency. However, the term is a hangover from the days when frequency was measured in meters rather than cycles per second and is still universally used by commercial operators.

The purpose is quite simple. Many ships carry only one or two radio operators and cannot maintain a continuous watch. During off-watch periods an auto alarm receiving device attached to the 500 kHz receiver is switched on. Upon receiving a minimum of four perfect four-second dashes at exactly one-second intervals, the device will trip a relay which in turn triggers an alarm bell in the radio officer's stateroom or on the bridge. In this manner the operator is alerted that a distress is in progress and mans the radio room. Ideally the sending station waits two minutes after sending the auto alarm to commence sending the actual distress message in order to allow off-watch operators to get to their posts.

When a station, itself not in distress, learns of another station in distress the station not in distress may send out the following: DDD SOS SOS SOS DDD DE the call of the station transmitting and the distress message. He may do so for a number of reasons. He may have heard a ship send a distress message and not be close enough himself to render aid so he sends the DDD SOS signal to alert stations capable of rendering aid. Often in the case of an aircraft ditching at sea, the aircraft will not have medium frequency transmitters aboard. In order to alert ships in the area who can give aid to the aircraft, the shore station receiving the aircraft's MAYDAY call on voice will relay the message to the U. S. Coast Guard and other shore telegraph stations who in turn will broadcast the MAYDAY on the 500 kHz distress and calling frequency as a DDD SOS.

### *Urgent and Safety Signals*

Two other types of signals which may be classed as emergency signals, though not distress signals, are the Urgent (XXX) and Safety (TTT) signals. The Urgent signal means that the station calling has an urgent message regarding the safety of a mobile station, or a person. It is usually sent in its entirety on 500 kHz. The Urgent signal is used frequently to report a man overboard or the sighting of an iceberg or other large hazard to navigation which, if struck, could cause serious damage to a vessel. It's also used to give hurricane warnings.

The Safety signal means an important message concerning navigational hazards or meteorological warnings will follow. It's used to report outages of harbor buoys and for small craft and storm warnings. The Safety signal is usually sent on a working frequency after a preliminary announcement on 500 kHz. The Urgent signal may be addressed to a single station or to all stations (CQ). The Safety signal is normally addressed to all stations (CQ). A sample call would go like this: XXX XXX XXX CQ DE the station calling and the message; TTT TTT TTT CQ DE the station calling and announcement of working frequency.

### *Scheduled Broadcasts*

As was stated earlier, shore stations broadcast a variety of information at regularly-scheduled intervals. These broadcasts contain weather forecasts, navigational warnings, and traffic lists. Some stations even put out sports scores and short news broadcasts. The weather forecasts and navigational

**TABLE I**

List of shore radio station calls, frequencies and times. The commercial stations broadcast weather. The Coast Guard stations listed broadcast current Notice to Mariners in addition to the weather forecasts. All times are GMT.

Call	QTH	Time	Freq. kHz
WSC	Chatham, Mass.	0050 & 1230	436
WSL	Amagansett LI NY	0500, 1100, 1350 & 1700	418
WSC	Tuckerton, NJ	1318 & 2318	460
WOE	Lantana, Fla.	0105 & 1605	472
WAX	Miami, Fla.	0135 & 1335	488
WPD	Tampa, Fla.	1800	420
WPA	Port Arthur, Tex.	1748	416
KLC	Galveston, Tex.	0400	486
<b>Coast Guard Radio Stations</b>			
NMR	San Juan, P.R.	0020 & 1620	466
NMG	New Orleans, La.	0020 & 1720	428
NMF	Boston, Mass.	0050 & 1650	472
NMY	New York, N.Y.	0100 & 1700	486
NMA	Miami, Fla.	0100 & 1600	440
NMN	Portsmouth, Va.	0120 & 1620	466
NMV	Jacksonville, Fla.	0125 & 1625	430
NMC	San Francisco, Cal.	0400 & 1700	420
NMQ	Long Beach, Cal.	0420 & 1700	472
NMW	West Port, Wash.	0430 & 1700	440
NMJ	Ketchikan, Alaska	0530 & 1730	466
NMO	Honolulu, Hawaii	0530 & 2000	440

### *Ship's Working Frequencies*

**425, 454, 468, 480 and 512 kHz.**

warnings usually apply to the local area of the transmitting station although some stations also broadcast off-shore weather forecasts. The table shows the calls, time, frequency and broadcast contents of some of the more active U. S. commercial and Coast Guard stations. Few of these stations are assigned more than one working frequency in the medium frequency band, so the frequency listed for each station for broadcasts is also its working frequency when in two-way communications with ships. Most of these stations also have some capability on the 2, 4, 6, 8, 12 and 16 MHz maritime mobile bands and may be making the same broadcast simultaneously on any or all of these bands. Many of the Coast Guard stations also make voice broadcasts in the 2-MHz band. A list of the high-frequency working frequencies and schedules is too lengthy to be included in this article but if you do run across the maritime mobile bands on your general coverage receiver the same general procedures and operating techniques prevail. The Urgent and Safety signals are not employed on the higher bands, however, and distress calls are rare compared to the medium frequency band.

While RTTY may be practical for the military or other users with a continuous high volume of traffic, the small volume of traffic generated by the individual merchant ship just doesn't justify the installation and maintenance of expensive and complicated RTTY gear. So, the next time you hear someone say, "Cw is dead," invite him to tune up to 500 kHz. Not only will he find that cw is not dead; he will find it flourishing.

**REPLY**

# AUSTRALIS-OSCAR 5

THE LAUNCH STORY

BY WILLIAM I. DUNKERLEY, JR. \*, WA2INB

"Oscar's aloft," was the good news among radio amateurs on Friday, January 23, 1970. The NASA rocket carrying a Tiros meteorological satellite had successfully achieved its intended orbit and Australis-Oscar, the fifth radio amateur satellite left its hitchhiking seat in the rocket's second stage engine compartment to begin transmitting *Hf* to the amateur fraternity.

THE launch of Australis-Oscar 5 was followed by radio amateurs all over the world. This was possible through a very unique communications system assembled for the purpose. W3DWF, K3JTE and K8VTR occupied positions at the operations control center at Goddard Space Flight Center, Md. Telephone links provided contact with W1AW, W3ASK, and Project Australis. In turn, W1AW operated on its normal phone bulletin frequencies for dissemination of launch information, W3ASK maintained hf liaison with several amateur stations, and Project Australis relayed information for distribution in Australia. In addition, W1AW maintained a vhf link with tracking station WA1IOX.

Ignition was the word at 11:31:02 GMT, as Delta 76 began unleashing its some 325,000 pounds of thrust. The vehicle left the pad at NASA's Western Test Range, California and began climbing to orbital altitude — a 65 minute journey during which the vehicle's velocity will exceed 18,000 miles per hour. Meanwhile, a tenseness came across hamdom as the moment of AO-5's orbital birth approached.

At 12:37:16 NASA's telemetry indicated separation of Australis-Oscar 5 from the launch vehicle. Now came the real test of the ham satellite. Are the transmitters functioning? Did 10 meters turn on? Did anything go wrong? The suspense was happily broken when 5R8AS reported hearing the 2-meter beacon loud-and-clear at 12:38, and Oscar's telemetry indicated that the 10-meter transmitter was functioning normally.

G2BVN first reported actual reception of the 10-meter signal at 1252 GMT. The satellite was now in full view of Europe and the signals were copied by numerous amateurs. W3ASK relayed reports from European Oscar coordinator G2AOX and from DJ4ZCA of Euro-Oscar fame. At 1302 VE1AFB became one of the first North Americans to receive Australis-Oscar 5, followed by WA1IOX at 1304. All evidence indicated that Oscar was indeed functioning; the launch was extremely nominal; Australis was doing its thing.

While everything looked good for AO-5, two problems did arise. During orbit no. 3, K2SS reported hearing the modulation of the 10-meter signal drop to a low level. And, as telemetry data

came in, it appeared that the spacecraft's temperature was higher than desirable for the predicted battery life.

## W1AW Bulletins

During the active life-time of Australis-Oscar 5, W1AW transmitted orbital predictions to tell amateurs when to listen for the satellite. The info was carried on the normal bulletin schedule and in addition on cw bulletins at 1345 and 1900 GMT. W6OWP augmented this coverage with bulletins from his station on the West Coast.

The information content of these bulletins was supplied by the Talcott Mountain UHF Society (WA1IOX) working under the direction of WA1UO, Amsat's manager of tracking and orbit determination. Actual equator crossing data were computer produced by K2LME of the East Coast VHF Society and relayed by 2 meters to WA1IOX.

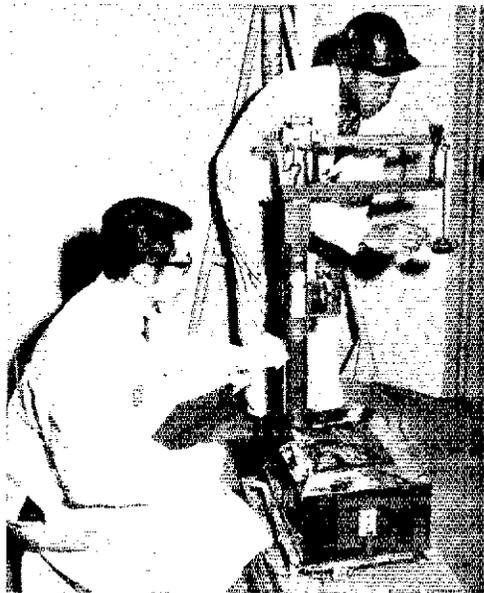
## Ground Command

Australis-Oscar 5 was the first amateur satellite to be actively controlled by ground command. The 29.450 MHz beacon was turned off during weekdays in an effort to conserve battery power.



Here is part of the Project Australis group responsible for the design and construction of Australis-Oscar 5. Shown from left are (back row) John Monro, VK3ZGY; Paul Dunn, VK3ZPD; Richard Tonkin; Geoff Thomson; (front row) Owen Mace; Peter Hammer, VK3ZPI; and Stephen Howard. Not shown are David Bellair, VK3QO; John Amod, VK3ZAU; and Les Jenkins, VK3ZBJ.

\* Assistant Secretary, A.R.R.L.



K8VTR (left) weighs in Australis-Oscar 5 at NASA's Western Test Range, Lompoc, California. (NASA photo.)

The satellite was launched with the 10-meter transmitter in an on state. On January 28, Talcott Mountain UHF Society members operating command station "Tango," provided AO-5 with the first off command. From then until the batteries supplying power to the 2-meter beacon failed, Project Australis turned the 10-meter transmitter on and off for weekend operation like clock work! Once two-meters became silent the remaining beacon was left on continuously until its battery power was depleted.

#### Launch Ceremonies

The launch of AO-5 was commemorated by post-launch ceremonies held at the Talcott Mountain Science Center, Avon, Connecticut, on January 31. Among those present were Amsat officials K8VTR, W3KMV, and W3AWN, E. G. Hayman, Defense Research and Development Attache to the Australian Embassy, Representatives of Senator Dodd and Congressman Daddario, W6OLO, WA2-QMC, K3GKB, and WA2SVG from Nastar, K1HXG, WA1IUO and Donald LaSalle of the Science Center, W3DWF representing NASA, W1QV, W1YYM, WA2INB and W1LVO from Hq., and KITZD and several other Talcott Mountain UHF Society members. The progress of the launch was reviewed for the attendees and a complete description of the satellite's performance was presented by Amsat AO-5 project manager K8VTR. Finally, the group had an opportunity to inspect the WA1IOX tracking station during a pass of the satellite.

#### Reports

The Australis-Oscar 5 experiment does not end with the termination of transmissions from the

satellite. Collection of data from the many amateurs who heard the signals continues. Eventually, a comprehensive report on the performance of the satellite will be presented.

You can materially aid this effort by sending Amsat (address below) your report of reception. Reports received thus far vary from a simple "I heard it," to detailed propagation and telemetry examinations. All are helpful and will be acknowledged with an attractive QSL.

#### What Next?

Plans are already underway for Oscar 6. Its too early to know what features the next amateur satellite will contain. But, Amsat pledges to aim for a repeater satellite to have an active life-time of perhaps one year! Such a satellite would be useful to large numbers of amateurs for everyday DX communications.

If Australis-Oscar 5 caught your fancy, or if you're intrigued by future Amsat plans, maybe you'd like to take a more active role in amateur space communications efforts. How? By joining Amsat. Dues are \$5.00 per year and each member receives the Amsat newsletter with all the latest info on ham space activities. For full details, send stamped addressed envelope to Amsat, PO Box 27 Washington, D.C. 20044. 

#### RULES FOR LIFE MEMBERSHIP

1. Life Membership is granted only by the Executive Committee, upon proper application from a Full (U. S. or Canadian licensed) Member.
2. The Life Membership fee is twenty times the annual dues rate, or currently \$130.
3. An applicant may choose an alternative time-payment plan of 8 quarterly instalments, \$16.25 each. In such instance he will provided an interim two-year Full Membership certificate. Upon completion of the payments, Life Membership will be granted.
4. Life Memberships are non-transferable, and dues payments are non-refundable. In the event an applicant is unable to complete payments on the instalment plan, he will be given a term of membership, at the annual dues rate, commensurate with payments received.
5. Other licensed amateurs in the same family, and at the same address, of a Life Member may retain or obtain Family Membership upon payment of the annual dues of \$1, but without receipt of QST. The dues of the Family Member may be prepaid for any number of years in advance, but there is no special rate.
6. Application forms are available upon request from the Secretary, ARRL Newington, Conn. 06111.

BY ALBERT KAHN,\* K4FW ex-W8DUS

**H**AROLD was an active ham while still in high school, on the air occasionally while in college. During his early adult years, he maintained a casual interest in amateur radio, but spent most of his leisure hours with girls or playing golf.

After he married Helen and established a home his old interest in ham radio returned. Babies arrived and he began to move up within his company. In a few years he had become a division manager, moved to the suburbs, bought a second car, joined a country club and installed a set of beams including a full-size Yagi for 40.

Then something seemed to snap. Harold would slip away to the shack right after dinner, emerging long after the household was asleep. Although his alarm would ring at 6:00 A.M., he left the house later and later.

Harold began to have a dazed, faraway look. He rarely read anything except ham publications. His golf clubs gathered dust. Once a stimulating conversationalist, he became an intellectual blank. Helen and he rarely entertained and when they did, he would quietly slip away without a word of explanation.

For a long time his XYL bravely made excuses to their friends. "Harold is under such pressure at the office," she would say. No one believed her, especially his business associates.

Things at the office were not going too well. He was passed over several times when promotions were in order. A vice-president took him to lunch to attempt to find the cause of his decline. When he fell asleep at an important meeting the president called him in and gave him a stern warning.

Helen was distraught at the threatened break-up of their home. She could visualize Harold - a derelict on skid-row and herself with her two children on relief. Finally she persuaded Harold to visit a psychiatrist and to resolve to kick this dreadful habit. He agreed.

The next morning Harold called a psychiatrist, a fellow ham whom he had met at the ham club. Because of the urgency he was invited to drop in that afternoon.

"Just relax on the couch, OM," said the doctor, "and tell me what is wrong."

"I'm hooked on DX," said Harold. "It is driving me nuts. Was going to quit at 300 countries, then I thought I'd go for 320, and so it went. Now I am trying to be the first with 400 confirmed."

"Why don't you try traffic, rag-chewing or vhf?" suggested the doctor. He continued, "DX is just a game. To enjoy it fully, you must put it in perspective and certainly not put it ahead of your family and job. No one should ever neglect his responsibilities for a hobby. What about rtty?"

Harold sobbed, "I've tried them all and just as I think I have a new hold on myself I run into something as I did this morning and just didn't go to work."

"Tell me about it."

"Well, BF0AA was calling CQ."

"BF0AA? What frequency?"

"14030 - - - where are you going?"

The doctor was already out of the room. He returned with his hat and coat.

"See me again sometime," he shouted as he opened the outer door. "Got to go home for a while." [QST]

## NEW BOOKS

Electronic Communication, second edition by Robert I. Shrader. Published by McGraw-Hill Book Company, 330 West 42nd St., New York, N. Y. 10036. 7 1/2 by 10 1/4 inches. 682 pages, including index. Cloth cover.

If you are on the study trail to an advanced-level amateur license, this book will be an excellent traveling companion. The text is arranged as a self-study program for amateur and commercial licenses, with questions at the end of each chapter to test the reader's understanding of the material presented, followed by a second set of questions similar to those found on an FCC exam. Using clear, concise language, a minimum of mathematics, and lots of drawings and illustrations, the author presents the practical side of the radio art. The book's thirty-four chapters cover all phases of the theory and applications of electronics in communications and navigation.

The first nine chapters are devoted to electronic theory, followed by ten chapters covering basic transmitters and receivers for cw, fm, a-m, and ssb. Sample circuits are given throughout, using both tubes and transistors. The remaining sections cover specialized systems and current practice in radio broadcasting, television, microwave, radar, ship-to-shore, and loran systems. The FCC rules for the amateur and commercial services, plus a chapter on the Morse code, finish the book.

It's a big book, packed with information that is well arranged and indexed. As such, it is an excellent reference text as well as study guide.

- W1K1K

\*Ten-Tec, Inc., Sevierville, Tenn. 37862

# The \$22,000,000.00 Ham Shack

BY HARRY W. LEWIS,\* W7JWJ and ROBERT F. BROWN,\*\* WA7IBL.

ONE day during the Spring of 1969 a strange monstrous sight was seen in the sky of the Pacific Northwest. Some rain-soaked residents of Seattle first thought they saw a gigantic winged and pregnant "Guppy." The sound and sight of jet aircraft overhead will seldom cause the lifting of an eyeball in the country known as Boeing. But on this day all eyes strained to see the maiden flight of the super super-jet, the 747. Look into the Western sunset. Soon it will be flying your way.

## Plane Facts

One cannot describe the 747. One sees it like one first sees an ocean, or the moon in the midnight sky. A plumb line dropped from the tip of the massive tail structure will resonate on 80 meters with some 63 feet of vertical height. From the tail, looking far forward somewhere toward the nose can be strung a 160-meter dipole of nearly 230 feet. The wing span is as tall as your local broadcast tower, or it will stretch from your house to the one down in the next block some 196 feet away. Within the concert hall interior can be held a complete hamfest, of 450 net members, three net controls in the cockpit, and a dozen very pretty YLs in mini-skirts to hand out QSL cards. Certified by the FAA just before Christmas, the 747 is now being delivered to the commercial airlines where it will begin the age of travel for the 1970s.

Not only did the 747 make history by lifting its tremendous mass and size from the earth and into the air that day, but it also made history for all radio amateurs on the day it called CQ!

## The First CQ

On Wednesday, November 26, 1969, the first amateur QSO was made from the Boeing 747. Robert Brown, WA7IBL, operating one of the ship's hf rigs at 27,000 feet over eastern Washington contacted Irv, W9DFJ, and Milt, W9THH,

\* 10352 Sand Point Way N.E., Seattle, Wash. 98125.

\*\* 4605 150th Ave., S.E., Bellevue, Wash. 98004.



both in Wisconsin. The pile-up started pretty fast and Bill, K7SSU, was next. Ernie Campbell, W7CHW, was aboard and took over when Bob had to get back to work. (This was not a joyride, but a working test-flight schedule) Ernie contacted K7SSU again and WØPUP, W2GM; WB6AOC/6, WB6UXR, and W6LEO. This was a pretty good list for 20 minutes work, but as one fellow said, "with an antenna 27,000 feet high you can get everywhere." These contacts were all made on 14.308 MHz between 1607 and 1626 GMT.

A little later the 747 formatted with a 720 for some in-flight photo work, and Bob had a chance to get on the rig again. This time he contacted W7EFS, WØPPV, WA6WRA/7, WB6UXR, K7SYE, W3USS, K2QWJ, and K7ZCW. There were several more fellows left hanging when Bob and Ernie reluctantly had to QRT for the day. The public relations photographer for Boeing, who most conveniently was aboard the 720 this day, was Byron Wingett, WA7BIY.

## Ham Equipment

The rig used one of the two hf rigs installed on the 747. The ship has a total of five communication radios, two hf and three vhf rigs. Vhf is used for the normal airways communication on domestic flights and hf for long-range work on overseas flights. Since most all of the test flights are domestic, the radio group was happy to have the hf rigs used once in awhile and getting permission of the test pilots was no chore. They kind of got a kick out of it.

The rigs are Collins 618T-2s, a standard aircraft-hf set, running 400 watts PEP. The antennas are two 15-foot booms fixed to the trailing edge of each wing tip and pointing backwards. There is an automatic antenna coupler that keeps the SWR below 1.2:1 for all frequencies from 2 MHz to 30 MHz. The rig is tuned with a frequency synthesizer to each even kHz.

Since that first day Bob has made many more contacts, including another air-mobile. Bob's main reaction to the whole thing was, "It sure was fun being on the other end of a pile-up for a change."

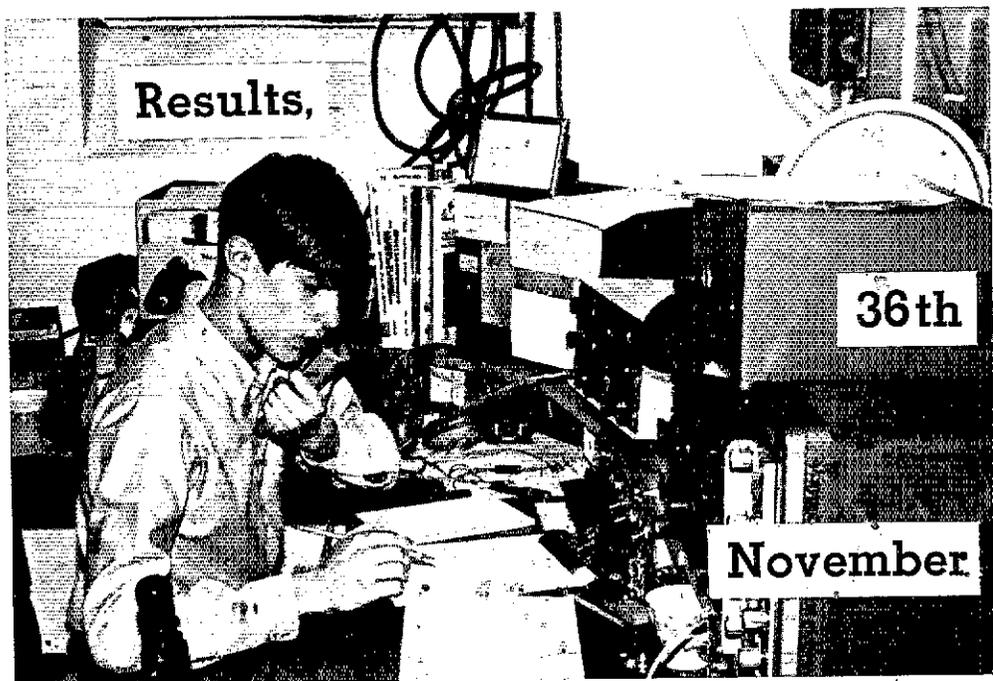
The airplane is the fourth 747 built, tail number N731PA, and will be refurbished and delivered to Pan-Am when the test program is completed. Bob is the Test Operation Engineer on the airplane, and Ernie is one of the Boeing-Instructor Pilots. Bob is a member of ARRL and the BEARS, the amateur radio club at Boeing.

On January 5, 1970, Bob Brown wrote this note. "Today we had our last flight on the airplane. We landed at Renton (successfully) and the plane will now be refurbished. I had time for a short 3-way with two California stations and one in Maple Valley. I guess this ends it . . . I don't know when, or if . . . I will get another chance at a 747 rig."

One day soon the big bird will lumber out of the West towards your home town. When you see it overhead and wonder what kind of people put it there, remember fellas - we also had a ham up there!

QST

Here's Bob, WA7IBL, hamming at his regular crew station in the 747's cockpit. On normal flights there is little time for ham operating.



WØYC (WAØTWZ, at mike)

REPORTED BY

**I**n a year sparked with controversy, the November Sweepstakes was not entirely without exception. October, 1969, *QST* carried the surprising news that the low power multiplier was being dropped on a trial basis on the recommendation of the ARRL Contest Advisory Committee.

Shortly thereafter, comments began being received from the field. Membership reaction, as one might logically assume, ranged from enthusiasm to outrage. Suggestions for improvement followed the same pattern, some very well thought out, others completely unreasonable. They were, in all cases, noted and passed to the CAC for their consideration.

Elsewhere in this issue you will find a detailed report by the ARRL Contest Advisory Committee regarding the 1969 Sweepstakes. I join you in hoping they will arrive at what will be an equitable solution for all.

Getting back to the business on hand, I'm sure you're all wondering how you placed in this year's Sweepstakes. If so, the pages to follow should be of considerable interest.

The 36th ARRL November Sweepstakes saw a total of 1750 entrants, down somewhat from the previous year. Of these, 970 chose cw while 780 entered the phone section. Awards are scheduled for an April 15th mailing.

The next major event on the activities calendar is Field Day. All set? If not, now's the time to give it some serious thought. Rules will appear next month. C U then!

\*Communications Assistant, ARRL.

### TOP TEN

Each year there are a number of outstanding signals to be heard in the November Sweepstakes. This year's elite include:

**C.W. Single operator:** W6RW (W6DQX,opr.) 121,525; W8SH (K1ZND,opr.) 118,675; K2KIR 118,457; K6EBB (W6CUF,opr.) 118,144; K4GSU 118,104; K6AHV (K9ZMS,opr.) 116,950; K2KTK 116,194; WA7KUW 113,176; W7DI 112,470; W4KFC 110,950. **Multioperator:** K5LZO 152,550; WA7IFD 109,770; KØGX R 81,918.

**Phone. Single operator:** K9LBQ/7 156,252; W5RUB 142,672; K6UYC (K9ZMS,opr.) 142,266; W5QQQ/7 140,503; W5JAW 137,048; W8SH (K1ZND,opr.) 136,150; WAØEMS 135,712; K4BAI 132,202; W3AZD 130,600; K8DØC (WA8LEO,opr.) 128,908. **Multioperator:** K5LZO 183,076; KØUKN 147,448; WA7IFD 121,984.

Special congratulations are in order for K9LBQ/7 and W6RW (W6DQX,opr.), Top Ops on phone and cw, respectively. A word of praise also for K1ZND, K9LBQ/7 (also WA7KUW) and K9ZMS whose outstanding efforts placed them in the Top Ten both modes.

It should also be noted that K5LZO, leading Multioperator entries both modes, managed over 1200 QSOs on phone in a truly outstanding effort.

### Novice News

Each year the increased operating abilities of our newcomers become more and more evident. Leading some 100 entrants in 1969 was WN9AJ, Jeffrey, with a score of 23,520-208 QSOs-60



AL NOONE,\* WAIKQM/WB6SAZ

VE2BVY

sections in 16 hours of operation from the Wisconsin section. Thirty-two additional section awards are scheduled for mailing to Novice winners as follows: WN1s KRX/1, LJD; WN2s DRS, EPT, JAM and LJS; WN3s MDY, MHF; WN4s LHO, LKC, LZK/4, NRL, NVM; WN5s WKV, YLM, ZRB; WN6s CAD, CEI, EIM, HSJ, NYT; WN7s IWU, MEO; WN8s DGH, EQH, EUN; WN9s AIO, ZKL; WN0s AAZ, VFJ, YJW, YLQ.

#### SOAPBOX — Phone

Where did the linears suddenly come from? — W3ZNF, Del. Happened to call CQ on a New England Net and mentioned I needed Vermont. Sure enough, there was WA1GKS - Vt.! — K3LWR/3, EPa. The SS exchange is too long and useless for this type of contest work. — W3AZD, MDC. We finished a brand-new antenna farm 5 minutes before contest began, then lost time because we were so exhausted we slept in. — WB2DRG, SNJ. Operation was intermittent due to E. Murphy. — WB2HUA, WNY. TVI is nothing . . . 40 fraternity brothers complaining about CQ SS on their stereo systems . . . that's something. — WA3COJ/3, WPA. Great SS, had a lot of fun. Where was Hawaii and W.I.? — WA9WPO, Ill. Sure wish we could have gotten one of our 75 meter antennas to work. — WA9QEI, Ind. Had more trouble working W6s than KZ5. — WA9ZCP, Wisc. The CQ wheel really helped save my voice for Sunday morning. — W0AIH, Minn. One WA5 got hysterical when I answered his CQ South Dakota for SS. — K0ZTV, SDak. We need to make check sheets larger. — WA5RTG, Ark. My first SS ever and it was great. Also confusing, hectic and noisy. — WB4KTR/5, La. Keep up the great contests, they

get better all the time. — WB4OQR, Tenn. First clean sweep in 21 years of hamming. — W8DQL, Mich. Gave up trying to hold a frequency with my peanut whistle. — WA8TKM, Ohio. Disaster struck as the beam stopped working, the final went and the audio was a fraction of what it should have been. Murphy, why now? — W1BGD/2, ENY. With a venerable check year of '34, I guess you have to get used to people calling you "sir" in the SS. — W2LEJ, NLI. Operating competency of participants outstanding. — W2MB, NNJ. Knew I was "Qed" up when I worked W0QQQ, WA5QQQ and W5QQQ/7 — three of four QSOs in a row. — K1KPQ, Conn. Look for me next year from KZ5 — WA9NSR/1, EMass. Recommend additional points for KH6, KL7, KZ5 and VE8 QSOs — WIIXL, NH. How about that, I was a pile-up — WAIJFG, RI. Your contest message getting to be a ridiculous length. — W7GKF, Mont. Last SS for the next 4 years, leaving for the Navy. — WA7JOG, Oreg. Would like to be able to QSO same station on different bands. — K7INE, Wash. See you next year, if my wife doesn't shoot me first. — K9VER/7, Nev. Where were the W1s, didn't hear anybody north of Connecticut. — WA6CPP, SJV. Made last minute phone call to K1GAX in Maine but found out next morning we had worked it for the Clean Sweep. — WA6CRI, SCV. I thought my ears were playing tricks on me when I worked KH6GMP and KH6GPM on successive contacts on the same frequency. — W0BWJ, Colo. Since Wyoming is no longer a rare one, thinking of packing up and moving to Idaho next year. — WA7EWC, Wyo. How ironic that I couldn't hear anyone in my own section. — W4KMG, EFla. My first attempt at SS, had lots of fun. — WB6FRD, L.A. A great contest, wish I could have given it full time. —

K6YNB, Org. First attempt at the SS, but believe I did make a few happy with the Maritime section. — VOIAW, Mar. First SS, looking forward to next year. — VE5LA, Sask. First SS since 1949, sure nice to get in the swing again but sure need practice. — VE6FK, Alta. Operated out of our Centennial Club Station. Condx poor, just turned good when had to go to work. — VE8NWT, NWT.

### SOAPBOX — C. W.

I know I can do better if I had 40-meter operation! I really enjoyed the contest. CU next year! — WA3HOM, EPA. Never did hear Me, Vt, cw or phone. Must have all come to DC for the Moratorium. — WA3LKH, MD. O, where O, where is SNJ? — K2QPV, SNJ. Everything in the world went wrong with the rig. — WA2CU/2, WNY. Great fun, but hard on the seat of the pants. — W3QEI, WPA. Fifty miles from Vt — no Vt in log! Early skiing? — W2KJ, ENY. My new XYL (3 months) got her first taste of hamming. Still haven't figured out whether it was good or bad. — W1DYF/2, NLL. My first SS as Clergyman coincided with my first wedding as a Clergyman. — WA2LDX, NNJ. First SS I ever worked all sections, a real thrill. — W9LKK, ILL. Enjoyed the contest very much and will be back next year. Many thanks to ARRL for taking care of amateur radio. — WA9WMT, IND. How about a QST article some time describing the job of tabulating and checking contest results? Believe all participants in contests would enjoy hearing about your job. — W9UE, WISC. Very wild contest. — WA5SOG, ARK. A real great contest and what a way to improve your code. — W8IHE/5, MISS. Enjoyed the grind — be back next year but don't ask me why, hi! — K4SYD, FENN. Second time in the contest, enjoyed it immensely. Surprised how broad a 400 Hz filter could seem. — K7BOY/0, MINN. My first SS contest. Not bad. — WN0WYX, SDAK. I was generally pleased with the SS. Most operators were very courteous! — K4CRB, KY. That dumb alarm clock didn't go off again so missed a few hours. — WA8ZDT, MICH. Now I know why Murphy is the most feared name in contesting. — W8WPC, Ohio. I was disappointed that I couldn't work at least 68 sections this year with my 8 watt 20 meter rig. Maybe next year I'll put the antenna outside. — W0Q/R, IOWA. Where were VE1 and W.I.?? —

K0BWT, KANS. I'll trade you three VE8s and a VT for an ARK!! WA0EMS, MO. Heard on the bands: "What's going on in Conant? Everyone I hear has over 400 QSOs" — attributable to a WB2. — K1GUD, CT.

### LFD SECTION BOTH MODES

(Boldface = over 100K each mode)

W2PAU	W5JAW	W8SH
K3HKK	W5RUB	W9YB
W3NRI**	WA6IVN	K0ZTV
WA3KDO**	WA61.XN/6**	W0SOE**
K4BAI	WB6TOJ**	WA0CVS
W4KFC	K7WWR	WA0EMS
W4UHI	WA7IFD**	KL7JDO
K5LZO**	WA7KUW*	VE3UOW**
	VE5AA**	VE5US
	*K9LBQ/7 -Phone	
	**Multioperator	

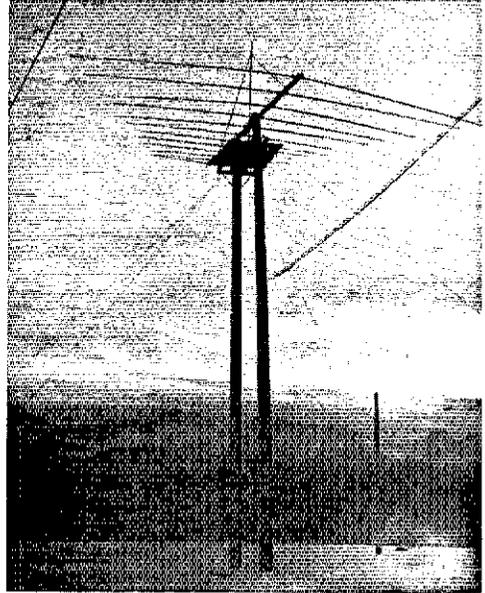
### Affiliated Club Competition

Each year an engraved coco-holo gavel is awarded to the ARRL-affiliated club whose members amass the largest aggregate scores. For the 5th consecutive year, the *Potomac Valley Radio Club* has successfully outclassed all who sought to dethrone them. This year's big guns were W4KFC on cw and W3AZD on phone. Victory was not easily attained, however, as close on their heels was Connecticut's *Murphy's Marmuders* finishing a strong second; an exceptional feat considering this was their second SS entry. Taking honors were W1BGD/2 on cw and K1THQ on phone. Third place goes to the *Indian Hills Radio Club* of Ohio with W8QXQ taking Club Awards for both modes. The only other score over a million was that of the *Minnesota Wireless Association*. Their Club Champs were K0ORK on cw and W0AIIH on phone.

### DIVISION LEADERS

C.W.			Phone	
Single Operator	Multi Operator		Single Operator	Multi Operator
K2KIR	W3NKI	Atlantic	W3AZD	W3GN
W9RQM	W9YB	Central	W9YT	W9YB
K0ORK	W0HSC	Dakota	W0AIIH	WA0DGV
K4PUZ	W5YM	Delta	W5RUB	WA4UCE
W8SH	WA8LVT	Great Lakes	W8SH	K8RMK
W1BGD/2	W2SZ	Hudson	W2MB	WA2PXB
WA0EMS	K0GXR	Midwest	WA0EMS	K0UKN
W1BPW	W1MX	New England	K1PKQ	WA1JUY
K7WWR	WA7LFP	Northwestern	W5QQQ/7	WA7BKW
K6EBB	W6BIP	Pacific	WA6IVN	WB6TOJ
W4KFC	WB4KPD	Roanoke	W4KFC	WB4FDT
WA7KUW	WA0VPQ	Rocky Mtn.	K9LBQ/7	W7OHR
K4BAI	WB4IQD	Southeastern	K4BAI	WA4EYQ
W6RW	WA7IFD	Southwestern	K6UYC	WA7IFD
K5YAA	K5LZO	West Gulf	W5JAW	K5LZO
VE7BDJ	VE5AA	Canadian	VE5US	VE5AA

Our 49th and largest state was ably represented by KL7AIR, the Elmendorf AFB club station. Shown operating is KL7GCV, Kramer, with WL7GQD, Ron (now KL7) assisting. Their QTH, a rare compromise of natural beauty and a highly desirable radiating system.



#### AFFILIATED CLUB SCORES

Club	Score	Entries	C.W. Winner	Phone Winner
Potomac Valley Radio Club	2,610,413	81	W4KFC	W3AZD
Murphy's Marauders (Conn.)	2,798,913	64	W1BG0/2	K1THO
Indian Hills Radio Club (Ohio)	1,299,337	24	W8OXQ	W8OXQ
Minnesota Wireless Association	1,037,218	27	K8ORX	W8ATH
Central Michigan Amateur Radio Club	824,899	73	W8SH (K1ZND,opr.)	W8SH (K1ZND,opr.)
128 Contest Club (Mass.)	656,385	13	W1BPW	R1KDP
South Jersey Radio Association	547,094	26	W2PAU	W2PAU
Radio Club of Tacoma (Wash.)	542,599	24	K7VPE	W8QQQ/7
West Valley Amateur Radio Club	381,973	16	WA6CSN	W8SUHF
Columbus Amateur Radio Association (Ohio)	352,095	10	W8BAKW	W8BAKU
Nittany Amateur Radio Club (Pa.)	346,549	14	K3HKK	K3HKK
Suffolk County Radio Club (N.Y.)	325,346	10	K2AU	W8ZUZU
Connecticut Wireless Association	293,156	8	W1BIH	
Ozaukee Radio Club (Wisc.)	232,823	12	W8NYJ	W8YBM
West Park Radiops (Ohio)	221,042	11	W8AJW	K8CFH
Miami Valley Amateur Radio Contest Soc.(Ohio)	206,140	13	W8WPC (K8BPX,opr.)	K8BPX
Boeing Employees Amateur Radio Society (Wash.)	199,346	14	WA7JCB	WA7JCB
Westside Amateur Radio Club (La.)	193,378	6	W5EKV	W6MO
Massillon Amateur Radio Club (Ohio)	185,035	6	W8VYU	K8EKG
Oak Park Amateur Radio Club (Mich.)	170,608	8	W8ZDT	W8ZDT
Hamfester's Radio Club (Ill.)	146,957	5		W9AA/9 (WA9YZ,opr.)
Richmond Amateur Radio Club (Va.)	142,200	12	K4JM	W4ZSH
Aspenhoe Radio Club (Colo.)	133,178	4		W0LRN
South Hills Brasspounders & Modulators (Pa.)	83,539	3		
Walton Radio Association (N.Y.)	78,793	8	W82FWG	
Northern Chautauqua Amateur Radio Club (N.Y.)	78,617	4		K2RIP
Penn Hills Amateur Radio Club (Pa.)	71,301	3		
Queen City Emergency Net (Ohio)	69,107	3		
Louisville's Active Radio Operators (Ky.)	67,047	3		K4FU
Denver Radio Club (Colo.)	63,680	3		
Johnson County Radio Amateur's Club (Kan.)	60,738	6	K0PFV	K0BHM
St. Joseph High School Amateur Radio Club (Ohio)	57,352	4	W88ZK	
Lake Success Radio Club (N.Y.)	40,687	9	W2MN	W2MN
Bronx High School of Science Radio Club	39,808	5		W82ZDY
Chicago Radio Traffic Association	38,942	3	W9REC	
Villanova University Amateur Radio Club (Pa.)	17,468	4		

**THIRTY-SIXTH SWEEPSTAKES CONTEST**

Scores are grouped by Divisions and Sections. . . . The operator of the station first-listed in each Section is the award winner for that Section unless otherwise indicated. . . . A indicates de input power up to and including 150 watts, B over 150 watts. . . . The total operating time to the nearest hour, when given for each station, is the last figure following the score. . . . Example of listings: W3GAU 65,400 461-70 B17 or final score of 65,400 number of contacts 461, number of sections 70, de input power B, total operating time 17 hours. . . . An asterisk denotes a Novice certificate winner; double asterisk indicates a Hq. staff member, ineligible for award. Multi-operator stations are grouped in each section score following single-operator station listings in each section tabulation.

**C.W. SCORES**

**ATLANTIC DIVISION**

*Delaware*  
 W3C4U 65,400 461-70 B17  
 WA3KDQ (6 ops.)  
 18,963 195-49 A24

*Eastern Pennsylvania*

WA3DSZ 101,492 679-74 A22  
 K3HJZ 73,072 502-72 B23  
 E3LWJ/D 65,616 448-71 A24  
 WA3R1D 44,354 311-67 B24  
 WA3H0M 43,056 312-69 B24  
 K3HPN 39,012 280-68 B16  
 WA3BL1 (WA3GV, opr.)  
 73,385 314-55 B18  
 W3ARK 73,800 200-59 B11  
 WA3AEX 22,572 168-67 B12  
 W3ACNS 17,876 320-41 A14  
 WA3LMO 14,050 146-48 A11  
 WA3HVR 13,632 213-32 B15  
 WA3FJG 13,200 132-50 A09  
 WA3LYC 10,304 161-32 A15  
 K3RIE 8,492 84-44 B10  
 WA3ADE 5,800 100-29 A11  
 W3HMR 5,440 89-34 B07  
 W3RHH\* 4,884 71-37 A20  
 WA3R3V 3,828 68-29 A06  
 W3GRS 3,700 50-37 A  
 W3CEI 2,736 57-24 A08  
 WA3JMR 2,548 51-26 A07  
 W3M3RE 1,960 42-28 A16  
 W3N3LUA 1,176 28-21 A1  
 W3MPX 1,120 28-20 B04  
 WA3AEB 198 11-09 A04  
 K3ADM 121 1-01 A  
 W3YF (K3RDM, opr.)  
 1-01 B

W3BIP (+WA3YB) 1-01 B  
 K3HAM (+K3HJL) 407-71 B22  
 WA3GAP/3 (4 ops.) 36,716 274-67 A24  
 WA3LAK/3 (+W3N3L) 7,416 103-36 A21  
 4,026 64-34 A20

*Maryland-D.C.*

W3URE 103,784 704-73 B23  
 W3MN 93,176 688-72 B24  
 W3GN 87,625 579-75 B24  
 W3GRE 71,890 515-70 B15  
 WA3EL 61,200 450 68 B  
 K3NPV 60,714 409-73 A  
 W3MFD 57,936 426-68 B20  
 W3E2T 57,736 395-72 B18  
 W3KZH 57,408 417-64 B19  
 W3MVB 49,500 375-66 B15  
 W3DVO 47,360 370-64 B23  
 W3EAX (WA3JAC, opr.)  
 47,002 457-71 A22  
 W3FA 43,900 325-66 B18  
 WA3LKH 42,840 318-68 B15  
 WA3GU1 41,544 364-56 B14  
 WA3GYH 38,619 307-63 B23  
 E3LPL/3 36,722 301-61 B08  
 W3CSZ 31,885 248-65 A12  
 K3CKT 24,676 199-62 B10  
 WA3BK 21,412 203-83 B17  
 K3JY 19,200 180-64 B07  
 E3EVB 16,319 167-49 A13  
 W3AWM 15,800 158-60 B15  
 WA3XL 15,600 150-61 A21  
 W3ARW 14,725 154-65 B07  
 WA3EOQ 11,664 162-36 A14  
 WA3GLQ 10,455 128-41 A15  
 W3IN 9,245 119-35 A15  
 WA3CGF 9,084 93-43 B05  
 WA3LIO 7,800 110-30 A18  
 WA3LEH 6,220 75-36 A09  
 K3IEZ/3 4,016 88-76 B12  
 K3KMA 3,900 68-30 B10  
 W3PBE (W4TFE, opr.)  
 25,229 A06  
 W3O10 3,102 47-41 A04  
 W3FSN 2,838 31-78 B04  
 WA3LJ1 2,376 55-22 A17  
 W3HH 2,016 36-28 B06  
 K3ANV/3 1,002 1-01 A

*Southern New Jersey*

W2PAU 59,086 465-63 B22  
 W3YAU 35,778 267-67 A18  
 W3ZZB 30,600 210-73 A14  
 K2OPN 23,275 204-55 B14  
 K2PZF 23,200 200-58 A09  
 W3ZUVB 13,992 132-53 A10  
 W2LA 9,880 130-38 B11  
 W2PU (K3J1, opr.)  
 7,700 88-44 A03  
 K2YU 6,108 27-32 B07  
 WA3HPL 1,002 1-01 B01  
 W3BZVL 936 26-18 B08  
 W3QJH 560 21-14 A07  
 K2ZOM/2 3 1-01 B01  
 W2REB (+K2PWF)  
 31,300 303-50 B19  
 K2AAZ/2 (K2ZUM, WA3ZVU,  
 W3ZWR) 15,096 148-51 B16

*Western New York*

K2KIR 118,457 805-73 B24  
 K2KIK 116,194 789-73 B24  
 WA2CPO 58,280 462-64 B24  
 WA2CAL 50,028 379-66 A24  
 W2DQI 41,984 300-64 A23  
 W2ADHS 37,120 262-70 B18  
 W2B5F 35,380 406-58 B20  
 W2TFL 30,807 246-63 B15  
 W2BHI 27,136 198-66 B17  
 WA2BCK 22,018 170-62 B13  
 E3LUB 20,853 168-63 A21  
 W2ZJOW 17,546 177-09 A13  
 W2ER 16,296 121-64 B09  
 WA2ICU/2 16,840 160-47 A15  
 W2MFA 14,464 102-66 A13  
 W2DIZ 10,395 117-45 B08  
 WA2GXN 10,037 136-37 A  
 W2BZU 9,928 146-34 A10  
 W2LIS\* 6,600 489-40 A23  
 W2BFI 4,968 73-36 A32  
 K2KRI 4,760 85-28 A06  
 WA2HEX 3,120 54-20 B02  
 K2FKZ 2,800 50-28 B05  
 K2ZHM 2,280 60-19 A07  
 W2LRE 1,660 45-20 A06  
 W2DXW 1,558 41-19 A10  
 K2IAN 1,515 81-15 B08  
 W2NLCC 986 32-19 A22  
 K2IMG 812 24-14 A05  
 WA2IOH 576 34-12 B04  
 W2NLEZ 432 31-21 A14  
 W2VNB 396 18-11 A08  
 W2NLNB 161 14-07 A09  
 K2ZWI (W2B2s DNN VG6,  
 W3MWF) 56,616 437-64 B24  
 W2BIT (-WA2EQA) 11,664 122-48 A15

*Western Pennsylvania*

K3HKK (K3AHT, opr.)  
 96,040 667-72 B24  
 WA3LX 86,536 597-72 B24  
 W3UT 80,872 467-68 B24  
 E3YKV 44,980 346-65 A18  
 WA3KOS 42,840 315-68 A15  
 WA3IQU 42,273 340-63 A24  
 WA3JG 34,306 277-61 B20  
 WA3IIZ 31,464 238-64 B20  
 W3NEM 16,812 134-59 A09  
 WA3GU1 13,260 170-39 B04  
 K3EXE 12,360 208-30 A14  
 WA3KQA 8,686 101-43 A13  
 W3QET 8,400 100-42 B11  
 WA3WJ2 6,460 85-38 A09  
 W3SMDY\* 4,332 38-38 A  
 W3CN 4,168 50-32 A06  
 W3NKMV 1,240 6-27 A14  
 WA3BSR 2,808 84-26 A06

W3CZ/3 2,461 54-23 A05  
 WA3ISE 1,318 31-18 A06  
 WA3HN 1,560 21-14 B02  
 WA3INO 756 28-14 A04  
 K3AKR 630 23-14 B03  
 W3MPP 261 17-9 A05  
 W3NJKI (WA3K VXP,  
 WA3PKXJ)  
 64,158 437-74 B24  
 WA3MO1 (4 ops.)  
 44,948 333-68 A24

**CENTRAL DIVISION**

*Illinois*  
 W9LEKJ 100,300 664-75 B24  
 WA9QBM 100,016 669-74 B24  
 W9LHD 74,803 507-73 B22  
 W9LNO 67,800 444-75 A20  
 WA9SOE 62,307 506-63 B19  
 W9EVI 38,576 291-68 A20  
 K9DIA 28,203 277-71 B17  
 K9IHI 23,970 235-41 A16  
 WA9VYI 21,546 200-84 B19  
 W9RRC 19,908 158-63 B15  
 W9VIV 15,936 149-51 B07  
 WA9OMB 14,684 156-47 B17  
 W9LQOT 14,382 155-47 A13  
 W9IAFV 14,872 146-48 B15  
 W9HPG 14,238 106-58 A11  
 W9VZXE 12,461 138-47 A20  
 W9RCJ 10,922 147-74 A11  
 W9EY 8,840 112-35 A05  
 W9KXN 8,487 112-41 A16  
 WA9YAI 8,200 100-41 B17  
 W9YAJ 6,360 95-34 A13  
 W9WV 5,796 63-46 B12  
 W9W72 5,772 78-47 B08  
 W9N4IO\* 4,418 71-33 A20  
 W9KXV 4,805 75-27 A11  
 W9YYG 4,032 63-32 B02  
 WA9ZFO 2,856 74-21 A18  
 WA9ZDO 2,772 51-28 A10  
 W9N9FL 2,250 42-30 A11  
 W9ZFV 1,620 45-18 A09  
 K9RFF 1,364 31-22 A09  
 WA9WYI 1,200 30-20 A04  
 WA9ZPL 1,084-07 B17  
 W9W4S 1,026 29-18 A03  
 W9ZPC 800 28-16 A06  
 W9N9AE 594 32-11 A20  
 WA9FGX (5 ops.) 24,476 218-58 B24  
 WA9SIP (5 ops.) 11,137 134-43 A24  
 W9B9PW 14 ops. 1,672 39-32 A18

*Indiana*

K9CUI 74,692 539-71 B24  
 K9CJL 34,938 466-59 B15  
 K9DVK 33,735 260-65 A18  
 W9FC 33,000 (50-50 A06)  
 W9OLW 10,400 100-52 B09  
 WA9YVI 10,340 118-44 A14  
 W9DRN/9 9,750 125-19 B06  
 K9KRN 6,606 102-33 A09  
 WA9WMT 5,480 85-26 B08  
 W9N9ZK\* 3,132 52-29 A15  
 WA9LFO 1,924 40-26 A08  
 W9YR (5 ops.) 50,116 386-67 B24

*Wisconsin*

W9RQ 105,171 715-73 B24  
 W9YI (WA9PV, opr.) 97,944 608-71 B24  
 K9CAN 79,950 533-78 B22  
 W9HO1 72,277 520-69 B22  
 W9NYI 64,716 469-68 A24

W9HFE 53,760 384-70 A21  
 K9RLL 37,808 278-68 B16  
 WA9OMU 34,068 253-68 B14  
 W9N9JP\* 24,220 208-60 A16  
 W9LMO 20,126 174-58 A14  
 WA9TPO 15,882 159-49 A15  
 WA9R1U 13,000 128-52 A07  
 W9GHI 10,164 77-66 B  
 WA9YU7 9,476 103-46 A30  
 WA9YBM 8,800 110-40 B15  
 W9EWC (W9AQU, opr.)  
 8,858 111-39 B04  
 7,626 95-41 A14  
 W9N9IR 3,172 63-26 A23  
 W9N9GL 2,400 49-25 A19  
 W9LMO 1,600 26-20 A07  
 WA9TJU 900 33-15 B05  
 W9JAF/9 900 33-15 A04  
 WA9WJK (WA9OMU, opr.)  
 50 5-05 B01  
 W9N9WP 4 9-07 A11  
 WA9UHM (+K9YU, WA9AWG)  
 31,800 258-60 B15  
 W9KTL (+W9N9A QO1 CD)  
 19,890 234-48 A23  
 W9N9BC (+W9N9J)  
 812 31-12 A17

**DAKOTA DIVISION**

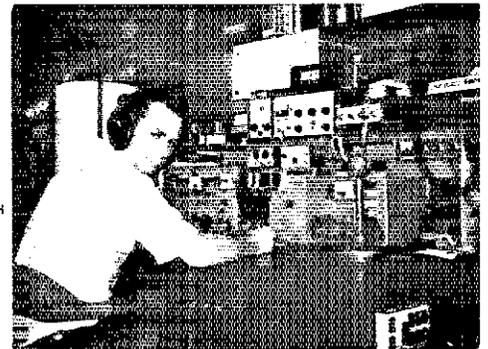
*Minnesota*  
 K9ORK 106,150 701-75 B24  
 K9JIL 79,767 544-73 B24  
 K9ZXF 72,854 486-74 B24  
 W9PVI 53,724 410-66 B18  
 W9DIAW 52,819 377-63 A16  
 K9QAC 51,054 381-67 B13  
 WA9KDS 44,380 318-70 A21  
 WA9QUU 33,855 254-71 A21  
 WA9QOT 35,612 314-58 B16  
 W9QXZ 25,024 215-56 B13  
 W9QXA 23,512 201-56 B13  
 WA9WBG 19,544 175-56 A14  
 WA9QNT 18,867 170-57 A15  
 WA9RKM 17,480 191-46 B13  
 W9JIV 13,420 172-55 B08  
 WA9PZH 13,607 110-53 A14  
 WA9QAS 10,710 120-45 A15  
 WA9VDC 10,710 115-45 A14  
 W9PAN 9,712 100-44 B08  
 WA9TGM 8,000 100-40 A06  
 K9TPE 7,839 101-39 B10  
 WA9QEK 6,615 95-15 B11  
 WA9WOV 6,006 72-42 B06  
 W9QYLO\* 5,735 58-17 A13  
 W9N9ZT 2,652 51-26 A18  
 W9A4A (W9BE, opr.)  
 1,908 43-28 A  
 K9BFT 1,402 44-24 A07  
 WA9VIS (+WA9QVPR)  
 53,088 384-65 A24  
 K7BOY/O (+WA9 ISW)  
 44,800 361-64 B23  
 W9FC (4 ops.) 40,872 318-64 B21  
 WA9VFN (+W9N9 ZED)  
 6,800 101-33 A22

*North Dakota*

WA9BSR 5,184 74-36 B14  
 W9HSC (WA9HY, M11 SVW)  
 60,233 455-67 A24

*South Dakota*

K9ZTV 53,298 423-63 A21  
 K9WNV/O 32,949 266-63 B24  
 WA9LYO 14,880 159-48 B15  
 WA9UM 5,439 79-37 B21  
 W9SHVX 1,311 38-23 A08  
 WA9SHA 1,040 5-04 A02



Bruce, K8VAK, working operating cw to the tune of 189 QSOs in 35 sections. Not bad considering all that fierce Ohio competition.

**QRP CHAMPS**

*(150 Watts or Less at All Times)*

C.W. Phone

WA3DSZ ... 101,492	K4WAR ... 119,550
K5RHZ ... 96,986	K5RHZ ... 116,640
K0AZJ ... 74,292	K4LPW ... 112,050
W8OYI ... 74,000	WA4UPW ... 107,821
WA7FHD/6 ... 69,860	WA5QXD ... 103,740
W1DAL ... 68,575	W9RQM ... 92,519
W6GEB ... 67,669	K3HKK ... 91,437
W9LNO ... 67,600	WB4IAE ... 84,490
WA4UPW ... 66,198	K1NWE ... 82,584
W8VYU ... 65,824	W1YK ... 82,056

**DELTA DIVISION**

Arkansas

WA5SOQ	16,968	153-56 B10
W5RFG	12,136	149-41 B05
W5ZRKE	3,320	46-40 A18
K2UMC/5	2,436	42-29 B03
W5N5YW	1,121	30-19 A06
WASVRE	656	21-16 A04
W5YM (11 ops.)	58,960	420-70 B24

Louisiana

W5EKP	75,344	536-68 B20
W5RTX	55,029	422-69 A24
W5OB	54,332	400-68 B19
W5MQ	28,121	21-61 B18
WA5QPA	26,718	21-61 B12
WASVOE	8,360	103-44 A13
WASWEO	615	22-15 A06

Mississippi

W5RUB	100,344	680-74 B24
K5AFI	90,484	639-71 B24
W5HFL/S	8,496	121-36 B20

Tennessee

K4PUZ	101,368	703-72 B24
K4KAM	93,880	651-72 B24
WA4ICE (WR4FU, opr.)	89,250	601-75 B24
K4SDX	86,400	600-72 B24
K4JCD	84,024	585-72 B24
K4LFW	73,875	497-75 B16
K4HW	71,102	494-73 B23
W4SQE	60,279	428-71 B21
W44FN	17,150	175-49 B10
WA4ZUH	7,392	85-44 A23
W44LF0*	5,472	72-39 A18
W44UET	1,464	84-26 A04
W44LHV	2,666	46-29 A10
W44LHK	1,759	43-21 A23
W44NHX	1,015	3-03 A03
W44NFO	403	16-13 A17
W44LUR	198	12-09 A05
WB4HSS (6 ops.)	2,075	42-25 A13

**GREAT LAKES DIVISION**

Kentucky

K4GSH	118,104	803-74 B24
K4FU	61,517	416-73 A21
K4BAM/4	23,718	202-59 A19
K4RCB	20,247	173-59 A13
K4AVX	7,888	86-41 B07

Michigan

W8SH (K1ZND, opr.)	118,675	786-75 B24
K8UD1 (K7NHV, opr.)	104,650	691-75 B24
W8DQI	73,769	428-71 B20
W8PUW	70,280	513-70 B24
W8ZDT	69,480	484-72 B23
W8MFD	58,410	406-69 B24
W8VFC	48,824	359-68 B15
W8BVH	42,676	302-63 A23
W8WVU	39,537	287-69 A14
W8WGU	36,096	284-64 B19
W8MNL	34,397	100-59 B20
W8VVB	33,664	263-64 A24
W8WWS	31,218	237-66 B21
W8BC1Y	30,500	251-61 B22
W8DM	29,748	222-67 A17
W8AZV	28,080	260-54 B21
K8NSN	23,055	221-53 B13
W8BRTU	20,700	207-50 A16
W8OFR	17,215	166-55 B12
W8FGI	16,618	137-57 B10
W8SS	16,348	134-61 B13

W8BCJ	15,440	132-59 B18
K8QO	13,789	131-49 B13
W8DQI	13,672	132-48 B09
W8YTL	11,352	132-43 A12
W8NML	10,528	112-47 A11
K8QKI	9,202	107-43 A14
W8AMOA	7,304	84-44 A12
W8RAAX	6,300	75-42 A13
W8ANDS	3,960	66-30 A06
W8MSK	3,952	52-38 A06
W8ZJM	3,600	60-30 A12
W8KFN*	3,592	57-27 A21
W8MCO	3,380	85-20 A08
W8BAZY	2,232	47-24 B06
K8E1U	1,330	35-19 B10
W8NUR	1,020	36-17 A13
W8SVZK	697	21-17 B05
W8NDZ1	232	15-08 A20
W8NBN	176	11-08 A04
W8NZZ	98	7-07 B01
W8NQR (9 ops.)	28,500	256-56 A24
W8VWY (+K8UD1, opr.)	22,525	225-57 B14
W8VJR (2 ops.)	15,705	155-52 B20
W8VJF (+W8RDOF)	13,905	153-45 A11

Ohio

W8OJG	109,046	741-73 B24
K8RBM	86,910	611-71 B23
K8IDU	80,046	589-68 B24
W8WAK	78,840	556-70 B22
K8EHU	78,603	547-71 B24
W8AEB	75,036	507-74 B20
W8BOY1	74,000	500-74 A20
W8BOY2	73,008	507-72 B21
W8VJH	65,824	484-68 A24
K8EKG	60,248	445-68 A17
W8WPC (K8BFX, opr.)	58,826	439-67 B16
W8WSH	57,540	411-70 A23
W8TFZ (W8BQ, opr.)	53,000	446-65 B23
W8LLE	50,954	349-73 A23
W8DB	47,475	318-75 A16
W8AJW	43,404	334-64 A16
W8JH	35,840	280-64 A21
W8BALU	34,300	283-60 B21
W8BALM	33,824	303-56 B13
W8BAP1	33,280	259-65 B19
W8ATYF	32,886	262-63 B12
W8RSW	31,743	217-71 B17
W8MGO	30,736	236-63 A17
W8VQI	26,780	206-65 B18
K8CUI	25,500	210-55 A08
W8BZR	25,016	213-59 A21
K8MLO	22,572	199-57 B14
W8PMJ	20,384	196-52 A21
W8WTK1	16,264	160-48 B12
W8WTK2	15,300	154-50 A24
W8WNS	14,542	152-48 A12
W8UPH	14,344	163-44 B07
K8VAK	13,240	189-35 A08
W8WAK	12,954	139-43 A18
W8ZTV	11,918	103-53 B08
W8WCS	9,970	115-34 A11
W8VCL	9,800	76-70 B08
W8VCL	9,730	149-70 A14
K8BHM	9,200	100-46 B07
W8GMK	8,350	75-44 B09
W8DZG	7,676	101-38 A15
W8ZG	7,360	80-46 B08
W8WGU	6,436	77-36 B07
W8MGT	5,700	76-38 B16
W8CHT	4,973	69-29 A04
W8WTK	4,898	79-31 B03
W8WTK	4,484	69-26 A11
W8WTK	4,464	62-27 A03
W8WTK	4,370	62-29 A21
W8ZG	2,716	39-22 B01
W8WGD	2,440	36-20 A22
W8WCR	2,160	40-27 B03

W8RLO	1,932	50-23 A16
W8RCC1	1,580	41-24 A21
W8RLWH	1,672	24-14 B02
W8RYTU	1,628	34-25 A07
K8BFA	1,480	37-20 B01
W8RCHP	1,470	40-21 A12
W8RFL	1,134	27-21 A14
W8NDEA	748	22-17 A13
W8VUV	736	33-16 A06
K8MMH	220	11-10 A02
W8NCFN	162	17-06 A17

W8LVT (+W8KI WH)	80,424	544-73 B24
W8FDU (WA3HGE, WA9MOC)	72,001	517-69 B19
W8AVGK (+W8RSLV)	43,684	326-67 A23

**HUDSON DIVISION**

Eastern New York

W1BGU/Z	103,000	680-75 B14
K2SHL	33,902	253-67 A21
W2EY	28,984	232-56 A18
WA2HAI	19,551	206-49 A20
W2JAM*	6,374	95-38 A22
WA2JF1	6,438	87-37 A08
W2JKJ	6,370	92-35 A08
W2HUP	4,030	80-16 A12
W2EFP	3,880	60-24 A04
W2RSH	2,269	42-15 B02
W2RDX	2,248	55-22 A20
W2BFW	2,197	20-21 A03
W2JEL	324	14-12 A04
W2S2 (W2BDRW OBU)	72,608	433-72 B24

New York City - Long Island

K2AU	84,075	563-75 B24
W2AJR (WA2UWA, opr.)	71,994	507-71 B24
W2DKM	68,791	477-69 B22
K2KQ	35,330	266-70 A21
W2EY2	2,235	75-65 A14
W2APU	30,240	272-56 A12
W2AVDA	18,054	177-51 B13
W2UAL	17,204	197-44 B11
W2UZU	16,992	174-48 B09
W2FCJ	15,953	188-43 A18
W2WXR	14,248	137-52 A11
W2EER	12,190	135-46 B15
W2ZCS	12,168	156-39 A16
W2DMZ	11,648	112-52 A14
W2JZZ	7,460	100-57 A08
K2PHF	7,100	142-25 A08
W2ZGUL	4,910	58-34 A06
W2DSU (W2BTUL, opr.)	4,774	77-41 A03
W2BFP	4,324	95-23 A23
W2MN	4,321	78-29 B04
W2ZHP	2,565	68-19 A17
W2DRS*	2,040	46-24 A12
W2IDL	1,816	26-16 A01
W2BZL	1,732	41-21 A17
W2VLA	1,460	37-20 A03
W2JHR	663	27-13 A21
W2ZEP	473	22-11 A04
W2DMF	216	12-09 A01
W2ZHW	160	10-08 A05
W2TUK	60	6-05 B01
W2ZPG	60	6-05 A01
W2TNI	30	5-03 A02
W2ZKMA	12	3-03 A01
W2ZLY	2	1-01 A1
W2MDM (+W2AZEB)	33,600	280-60 B19
W2ZBP (+W2BHM)	17,664	276-32 A24
W2ZYH (+W2AZEB)	11,046	148-42 A22

**Northern New Jersey**

W3YI	74,834	527-71 B24
W3LIX	39,906	402-74 B18
K2OQJ	38,000	384-75 B23
W3FYT	34,000	401-70 A21
W3RJJ	47,150	358-63 B19
W3VPR	37,792	292-63 B22
W3EJX	30,104	255-53 A24
W3DQX	28,140	230-59 B15
W3DRV	27,390	228-58 A14
W3JAL	20,474	179-58 A20
W3FEC	19,440	126-45 A18
W3VJ	18,305	176-55 A15
W3FEN	18,480	154-60 A11
W3FEO	16,197	176-46 B14
W3ZLI	9,331	109-43 A10
W3BHW	9,312	97-48 A14
W3EHL	6,184	85-38 A13
W3HR	3,864	81-24 A06
W3EPT*	2,850	70-25 A20
W3NSV	2,812	74-19 A08
W3VJW	2,736	73-19 A06
W3COB	2,660	67-20 A03
W3HJS	2,520	53-24 A14
W3YWR	2,403	46-27 B01
W3ZAN	126	9-07 B04
W3ZQF	40	5-04 B01
W3VPP (+W3BHS)	87,609	478-70 B24
W3HAD (+W3NLE)	38,316	309-62 B22
W3ZFH (+W3ZDRG)	30,420	254-60 A18
W3ZLC (+W3ZGJ)	18,750	177-50 A24
W3EJW (+W3ZHL)	15,356	175-44 AB21
W3JND (+W3ZJL)	4,205	84-29 A17

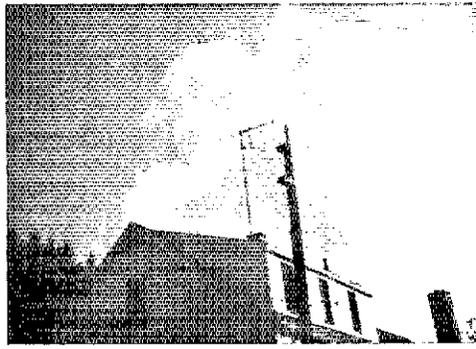
**MIDWEST DIVISION**

Iowa

K0AZJ	74,292	502-73 A21
W0ZK	58,270	415-69 B24
W0VID	29,638	262-58 B1
W0BSY	21,056	188-56 A14
W0LR	13,442	143-47 A11
W0QZR	11,178	93-63 A17
W0VHM	8,630	109-35 A08
W0UCF	6,548	73-38 A03
W0VYV*	6,364	87-36 A22
W		

1.00JD	48,880	376-65 B15	W3YUW/I	98,642	668-74 B24	NORTHWESTERN DIVISION		WN6LHD	1,610	35-23 A15	
K3E1U/D	36,224	283-64 B10	W1WAI	93,096	647-72 B24	Alaska		W6BYZ	70	8-05 A02	
W3PZNE	25,806	256-31 B17	W1DAL	68,875	451-75 A23	KL7IDQ	40,400	309-67 B09	W6BCJ (4 ops.)	62,020	443-70 B24
W0KCC	72,805	181-68 A18	W1FEU	66,868	459-23 B24	KL7WAH (K7XT, opr.)	32,984	269-62 B12	W6KG (+W6DDU)	2,300	200-87 B15
W0DLJ	18,528	157-56 B20	W1BFW	52,336	357-72 B22	KL7GCV	6,734	91-37 B10	riawa		
W0BV	14,034	133-49 A12	W1FNW	47,360	322-74 A24	KL7GJY	5,811	75-39 B06	KH6RS (K2SL, opr.)	91,834	632-73 B21
W0AVN	10,768	133-37 A07	W1JMR	44,792	322-68 B21	W7ERU	49,980	370-68 B17	KH6H	71,540	511-70 B21
WN0YBV	578	18-17 A15	W1JON	41,267	301-67 A21	W47KSA	11,776	139-46 A20	RH6HAM	20,088	17,958 A21
Nebraska			W1DYD	40,458	318-66 B21	Montana		W3BLE/KC6	8	3-02 B03	
W0WLO	76,812	520-74 B23	K7IRE/I	32,720	260-81 A20	W7YR (W7R, Opr.)	6,2784	452-73 A23	W6VCH		
K0DLK/D	49,560	360-70 A20	W1KAC	31,440	262-60 A19	KTWBR	25,880	520-72 B24	K7KHA	21,260	514-70 B23
W0AVN	48,298	361-62 B18	W1EJN	31,192	222-68 B10	K7BRK	60,865	462-65 B22	W49CWM	20,552	189-86 A13
W0ADXR	19,372	168-58 A14	K1UCA	28,700	211-70 B18	W47KWS	17,901	173-81 A21	W49KRW	5,448	100-44 A14
NEW ENGLAND DIVISION			K1OME	21,112	204-82 A18	W7LTI	17,240	140-58 B17	W6B0GG/7	4,104	57-36 A14
Connecticut			W49NSR/I	20,572	139-74 B16	W7RIB	11,850	127-50 A12	K7YLR/7	901	27-17 B04
W1TBY**			W1JYY	16,006	184-41 A19	W47WC	10,608	111-48 A15	Sacramento Valley		
K1JHX	94,744	651-72 B24	W1FUD	12,650	128-50 B21	W7WU*	5,697	91-37 A19	W6NKK	68,524	463-74 B21
K1VTM	87,400	603-72 B24	W1TRY	11,458	125-42 B13	W49WIF/7	4,884	58-37 A12	W6VUC	23,870	217-55 B18
W1VTV**			W1LZY	7,140	104-35 A15	W7RFX	3,780	34-15 A11	W6BYA	1,680	27-15 A04
K1IHO	85,607	580-73 B24	W1LJL	5,850	75-39 B09	W47KRH	3,210	34-26 A08	W4A1ZT	1,323	32-21 A09
W1BIB	78,210	583-70 B24	W1KX/I*	5,040	63-40 B22	W7WLN	624	24-16 B07	San Francisco		
W1FLM	68,965	495-69 B24	W1KRF	3,054	40-26 A03	W7MLM (7 ops.)	2,120	36-20 A23	K61VL	50,140	393-63 B18
W1ADG	64,963	465-69 B19	W1KSF	3,024	37-28 A12	Washington			W6LWE	46,410	333-70 B18
K1GUD	63,480	460-69 B22	W1KWA	2,430	47-27 A13	W47GWI	36,420	411-68 B24	W6WLY	24,115	187-65 A17
W1YYM**			W1KME	1,512	36-31 A10	K7VPE	53,440	381-69 A19	W4900Z	441	26-09 A06
W1PI	58,388	422-68 B15	W1LJL	1,459	35-10 A24	VE72ZFW7	52,602	352-66 A23	W6BIP (W4BD1)	69,580	490-71 B23
W1CWW**	58,200	442-63 B23	W1LW	1,216	31-18 A03	W5UQ/7	52,336	378-69 A22	San Joaquin Valley		
K1ASI	54,198	397-67 B15	W1WMH	648	18-18 B02	W7NP	50,813	370-67 B19	W49VN	105,080	720-74 R
W1LVQ**	53,526	408-66 B24	W1KOT	520	20-13 A02	W47JCB	48,892	360-68 B20	W6H7	32,808	259-66 A14
W49HHH/I**	48,600	380-68 A18	W1KJP	430	15-10 A11	W47KUB	21,952	197-54 A21	W49DB	9,800	100-49 A11
W1HOL	46,632	373-62 B17	W1KZE	341	17-11 A05	W47KJ	18,444	150-57 B11	Santa Clara Valley		
W1JQJ**	46,428	329-66 B18	W1JKA	333	16-09 A09	W47HFG	16,132	148-82 A24	K6HBB (W6CUE, opr.)	118,144	838-72 B24
W1JLD	42,880	380-60 R	W1MX (K4QD, W44TIG)	27,400	540-72 B24	W47HPK	15,120	140-54 B10	K61CF	65,107	460-71 B18
W1JPH	42,316	313-66 A20	W1JYU (W1JGF, W1JYU)	73,207	509-71 B24	W47HJ	14,400	144-50 B18	W6GJV	32,227	241-67 B20
K1DPH	42,088	325-64 B24	W1JYU (W1JGF, W1JYU)			W47GRN/7	6,632	79-43 B08	W6BYV	26,820	224-60 A15
W1FTX	38,741	259-73 A16	W1JYU (W1JGF, W1JYU)			W47AWB	6,318	85-39 B16	W30VU	2,300	181-83 A23
W1DIT	37,060	273-68 B	W1JYU (W1JGF, W1JYU)			W47GNG	4,299	70-33 A08	W6BDW	13,032	134-47 A14
K1LWC	32,610	275-88 B22	W1JYU (W1JGF, W1JYU)			W7G9V	3,900	50-29 A02	W60KK	10,464	110-48 A12
W1JZC	30,323	249-59 A22	W1JYU (W1JGF, W1JYU)			W47ACD	3,800	50-28 B05	W6A9HD	6,560	80-41 A17
W1JHJ	20,824	177-56 B06	W1JYU (W1JGF, W1JYU)			W7MFO*	3,306	62-29 A14	W61U	5,408	52-54 A11
W1HNR	19,941	163-67 A11	W1JYU (W1JGF, W1JYU)			W7BIU	1,972	27-18 B04	W6H8J*	3,840	61-32 A20
W1JLK	15,540	185-42 A16	W1JYU (W1JGF, W1JYU)			W47IFX	1,539	25-11 A03	W6AKMV	1,116	32-18 A16
W1KRE**			W1JYU (W1JGF, W1JYU)			K7CZM	1,136	9-08 A01	W6HAD	56	7-04 A12
W1JZJ	15,400	150-48 B08	W1JYU (W1JGF, W1JYU)			W47GVR	1,050	5-05 A	ROANOKE DIVISION		
W1BDJ	14,921	174-43 A16	W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A	North Carolina		
W1DGL	11,152	166-34 A09	W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A	K4MPE	81,366	373-71 B24
W1KQM/I**			W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A	W49FW	68,941	486-71 B24
K1OQJ	10,240	110-42 B07	W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A	K4CAX	59,080	440-66 A24
W1NLD*	9,087	117-39 B14	W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A	W4WXZ	11,100	150-37 A11
W1EFP	4,726	72-34 A17	W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A	K4KH	5,358	71-38 ABB
W1EJF	3,596	62-29 B02	W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A	W44KRZ	2,886	57-26 B13
W1EJH	3,336	71-24 A16	W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A	W49VM*	2,133	44-27 A2C
W1NIM**	2,832	59-24 B02	W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A	W49MWA	720	20-13 A10
W1JYU	2,408	32-22 A02	W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A	W49UDK	494	19-13 A09
W1LLB	1,564	47-17 A10	W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A	W49KPD (4 ops.)	3,245	112-43 A24
W49JSI/I	1,092	6-01 A	W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A	South Carolina		
W1JAD/I	624	26-12 B03	W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A	K4CSZ	44,162	313-71 A11
K1PKO	308	14-11 B01	W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A			
W1HGU	300	15-12 515	W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A			
K1MYF (4 ops.)			W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A			
W1AW** (W1WPR, W49HHI)	13,708	149-46 A15	W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A			
W1W00	6,160	90-35 B04	W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A			
Eastern Massachusetts			W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A			
W1BPW	106,950	71-475 B24	W1JYU (W1JGF, W1JYU)			W47GYS	1,050	5-05 A			

KIPKO, Dave, one of Uncle Sam's finest and a PVCer to boot, dropped by home for a visit, set up his station, threw up a quad and assorted wires and calmly walked off with New England Division leadership on phone. Sure surprised a few of the Connecticut locals.



WH4GGA 15,496 150-82 B10  
W4PED 3,422 59-29 A13

Virginia

W4KFC 110,950 736-75 B22  
K4PQL 88,075 583-75 B24  
W4CWO 81,734 547-74 B22  
K3WUW/4 40,920 556-72 B24  
K4CEB/4 75,024 521-72 B24  
W4NW 66,503 463-73 B16  
W4DUQ 57,270 418-69 B34  
K4JM 57,166 407-69 A16  
W4YZC/4 49,960 340-72 B15  
W4WRM 49,856 391-64 B20  
W4DM 48,088 341-69 B14  
W4JK 47,996 338-71 B22  
W4ZM 48,886 347-69 B14  
W4TKN 47,736 332-72 A B21  
W4KXV 42,368 331-64 B15  
W4FTDT 39,438 311-63 B19  
W4NH 38,656 302-64 B14  
K4LEF 29,848 267-56 B21  
K3OUJ/4 27,552 246-56 B24  
W4G4S 22,217 217-49 B08  
W4AQOC 21,736 210-52 A19  
W4EZ 20,048 179-86 B08  
W4NM 16,892 137-88 A17  
W4OBE 16,146 150-84 B23  
W4MYA 15,540 185-42 A10  
K4T5W 13,550 144-50 A15  
W4B4L/A 3,157 85-39 B34  
K4ORQ 12,800 130-50 B06  
K4OPF/4 12,760 145-44 A08  
W4N4D 11,222 153-38 A24  
W4BRLO 10,397 142-37 B  
W4JHK 10,336 137-38 B04  
W4WBC 9,612 89-54 B07  
W4VNE 9,200 100-46 B  
W4KP 7,304 55-44 B10  
K4EJG 7,238 77-47 A18  
W4PI 7,064 77-46 A19  
W4PQ 6,535 120-29 A B17  
K4IKF 6,240 65-48 A05  
W4GHW 4,420 67-34 A09  
W4J4FC 4,366 70-33 B11  
W4ZV 3,632 47-28 B04  
W4BLM/J 2,992 68-22 A18  
W4GAH 1,875 38-25 A05  
K4BTO 1,772 38-22 B03  
W4JUJ 1,099 7-07 B01  
W4HM 1,002 1-01 A01  
W4M4M 418 21-11 A15

West Virginia

W4HRQ 56,550 435-65 B19  
W4BBBG 39,619 310-63 A22  
W3YF/R 28,826 203-71 A18  
W4NEOH\* 2,376 55-22 A15  
W4RWX 2,254 33-19 A04  
W4REDE 1,560 39-20 A11

ROCKY MOUNTAIN DIVISION

Colorado

W4OCVS 100,962 713-71 B24  
W4GLO 40,535 305-67 B21  
W4ELRW 33,110 248-65 A13  
K4BDD 33,416 227-67 A20  
K4GVA 11,520 120-48 A07  
W4GAZ\* 1,704 32-16 A14  
W4ATA 1,040 26-20 A02  
W4NSND 988 26-19 B02  
W4GZB/4 650 28-13 A12  
W4OYSK 230 13-10 A23  
W4OVPO (+W4OUAV) 31,494 271-58 A19

New Mexico

W4SQH 83,640 617-68 B22  
W4QNH 56,097 410-69 B24  
W4SKY 31,380 267-60 A17  
W4ZVW/5 15,264 144-53 A06  
K4STJ 14,758 157-47 B05  
W4SROU 3,861 59-33 B12  
W4NSYK 3,456 66-32 A17  
W4SPBP 2,962 54-27 A

Utah

W47KUW 113,176 780-72 B24  
W47HQV (K7FOEZ) 8 2-02 A01  
W47SM 57,660 419-70 B21  
W47HRM 11,520 120-48 B09  
W47PSO 3,780 54-35 B07

SOUTHEASTERN DIVISION

Alabama

W4CUE (W4B4HJ, opr.) 14,300 144-50 B10  
W4BLNM 13,960 136-48 A12  
W4AWED 8,112 104-39 B23  
W4B4L/A 7,965 100-35 A06  
W4B4FOW 7,098 92-34 A12  
W4BKSL 6,513 84-39 A09  
W4OR 3,973 74-29 B  
W4BEKJ 1,864 27-16 B04  
W4B4MH 240 12-10 B05

Canal Zone

KZ5W1 82,524 611-69 B24  
KZ5A1 49,704 383-64 B23

Eastern Florida

W4BZY/4 69,402 487-71 B23  
W4A4UEW 65,198 510-66 A24  
W4KFT 62,267 445-71 B24  
W4YUW 50,247 399-63 A17  
W4DUQ 40,734 334-62 A23  
W4B4HJ 38,178 328-58 A20  
W4B4L/A 26,733 236-57 A10  
W44HDH 11,934 117-51 B10  
W4B4OGW 10,792 142-38 B14  
W4N4K/C\* 8,604 120-36 A14  
W4N4QNC 1,260 40-21 A23  
W4N4DZ 1,176 12-08 A12  
W4B4IQD (+W4N4QOC) 3,441 56-31 A05

Georgia

K4BAI 105,250 696-75 B24  
K4EZ 34,580 265-65 B13  
K4CRY 27,494 238-59 B16  
W4K4VE 26,775 270-51 B18  
W4A/CZM/4 24,644 203-61 A21  
W4N4ZK/4\* 3,100 69-25 A15  
W4N4MBN 1,886 42-23 A23  
W4A/CZM/4 24,644 203-61 A21  
W4N4LZK/4\* 3,100 69-25 A15  
W4N4MBN 1,886 42-23 A23

Western Florida

W4UHI 78,144 534-74 B24  
W44SSR 25,920 240-54 A15

SOUTHWESTERN DIVISION

Arizona

W4DI 11,470 785-71 B24  
W4FCD 8,600 100-43 A05  
W47FD (+W47S ISP MA7) 109,770 747-73 B24  
W47YV (W4S2BB, W47S FIR, RW) 15,910 187-43 A13

Los Angeles

W4RW (W4DQK, opr.) 121,525 805-75 B24  
K4MP 75,047 531-71 B20  
K4BEP 65,380 475-70 B24  
W4GCSN 39,260 302-65 B22  
W4NCFE 28,200 237-60 B11  
W4BEPM 23,302 192-61 B08  
W4JDS 20,010 171-58 B13  
W4B6VZ 19,921 181-53 A20  
W4HOQ 19,760 191-52 B18  
W46FXZ 17,952 184-51 A19  
W46KPN 12,768 133-48 A06  
W4BWMN 9,988 155-44 A11  
K5MHG/6 5,928 78-38 B16  
W4PJH 4,990 67-35 B03  
W4NCFE 4,544 71-42 A14  
W46EIM\* 3,784 67-29 A17  
W46PVY 2,376 50-27 A13  
K4EYZ 1,058 23-23 B04  
W4VP7 (K4K, opr.) 520 20-13 B03  
W4NJU 126 9-07 H01  
W46LXN/6 (W46DPP, W46HUF) 45,474 348-66 B24  
W46WZD (+W46WOY) 38,704 350-59 B18  
W46QVB (+W46HFO) 30,000 253-60 A17  
W46PY (+W46TQS) 19,448 193-52 B20

Orange

W47FHD/6 69,860 494-70 A24  
K6OVI 60,314 469-71 B21  
W46YLE 42,568 313-68 A22  
W46YBL 36,600 300-61 A24  
W46JOC 23,305 198-59 A20  
W46JZ 18,603 176-53 A22  
W46NCF\* 4,970 73-35 A15  
W46ZEC 3,632 47-28 A05  
W46JZU 2,522 51-26 A18

San Diego

W46TBY (K5YUR, opr.) 49,379 369-67 A20  
W46VKV 13,988 135-52 B15  
W46NYT\* 5,254 31-37 A18  
W46LE 1,044 31-18 A20

Santa Barbara

W46GE 67,069 470-71 A24  
W46VKN 54,315 385-71 B22  
W46LA 43,282 323-67 B17  
W46KPI 33,807 297-59 B24  
W46WEP 23,456 216-55 A17  
W46HOM 10,105 18-43 A09  
W46R1U (W46DPV, opr.) 7,872 100-41 B05

WEST GULF DIVISION

QSO LEADERS (Single Operator) C.W. Phone K6EBB 838 K9LBQ/7 1053 K2KIR 805 W5RUB 970 W6RW 805 K6UYC 962 K4GSU 803 W5QQQ/7 961 K2KTK 789 W5GEMS 946 W8SH 786 W6JAW 928 W7DI 785 W8SH 903 W47KUW 780 K4BAI 887 K6AHV 778 K8DCO 871 K5YAA 766 W3AZD\* 864 \*tied with W461VN

Northern Texas Yukon - A.R.T.

K5YAA 109,062 766-73 B24  
K5KHZ 96,986 683-71 A  
W5DQZ 55,806 409-67 A20  
W5ONL 49,075 380-65 A17  
W5VSL 48,240 335-72 B16  
W5OXD 33,480 274-62 A12  
K5HXV 19,027 182-53 A20  
W5VQM 10,250 126-41 B10  
K5YRK 6,668 74-44 A16  
W5NHH 4,864 76-32 A09  
W5NZK\* 2,275 55-25 A18  
W5VOT 1,100 25-22 B02  
W4EYJ/5 8 2-02 A01  
W5VSK (4 ops.) 7,072 108-34 A24  
K5OKX 95,032 658-72 B24  
W5DS 61,716 445-74 A24  
W5WCK 14,476 156-47 B20  
W5WVKY\* 13,018 149-46 A17

Okahoma

W5JAW 107,250 718-75 B24  
K5KRW 97,966 675-73 B23  
W3JXS/5 47,360 371-64 A19  
K5KPK 44,604 362-63 H22  
K5HTE 31,826 251-61 B11  
W5HDT 28,562 231-67 B24  
W5AGLY 26,992 222-61 B18  
W5ASUJ 16,641 140-59 B10  
W5NZR\* 3,600 63-30 A17  
W5NSZY 832 33-16 A16  
K5LZO (4 ops.) 152,550 134-75 A22  
W5ACU (4 ops.) 78,408 549-72 B24

Southern Texas Eastern Pennsylvania

W3GHM 102,816 714-72 B21  
W3DQG 90,150 601-74 H24  
W4BLYI 87,000 880-75 B21  
K3TUE 81,600 651-75 H24  
W3HTE 70,810 486-73 H24  
K3MNI 56,800 409-71 B15  
K3LWR/3 54,288 377-72 A21  
W3JUH (W4SEUL, opr.) 29,992 306-48 B  
W3JXF 20,996 181-58 B19  
W3CNS 14,256 132-54 A12  
W4SKK 13,272 158-42 A07  
W4BEMO 9,200 92-50 A09  
K3DPQ 6,900 150-23 A09  
W4BHR 6,400 80-40 A08  
W4BJRV 5,488 100-28 A09  
W4ZBCN/3 3,264 48-34 B04  
W4BJP 2,346 53-23 A05  
W4JJA 1,886 41-23 B04  
W3FTG 1,638 39-21 A03  
W3GQC 1,248 26-24 A05  
W4BDSZ 1,116 31-18 A01  
W4GZP 700 25-14 A02  
W4AKX 700 25-14 B05  
W4BDEQ (W4JCS QW DBP) 92,584 660-71 B24  
W3YR (W4S36 EIA) 80,577 114-31 B

CANADIAN DIVISION

Quebec VE2AQ 20,740 170-61 A16  
VE2RJI 18,762 179-53 A13  
VE2BV 17,490 165-53 A08  
Ontario VE2ER 52,935 399-65 A21  
VE2EW 33,150 255-65 A15  
VE2JA 28,520 230-62 A15  
VE2AYR 19,470 165-59 B14  
VE2GCE 15,930 177 45 A11  
VE2DH 11,664 122 48 A08  
VE2GHO 7,789 113-31 A06  
VE2KQ 7,569 30-13 A04  
VE2UOW (5 ops.) 11,952 74 74 A24  
VE2BZP (+VE2CIZ) 6,075 127-25 A16  
Saskatchewan VE2UN (VE2UL, opr.) 98,761 702-71 H24  
VE2ST 10,090 103-45 A19  
VE2AA (VE2S PL PK) 37,744 343-56 A22

Alberta

VE2FN 29,768 250-61 A14  
VE6VY 22,605 206-55 B  
VE6MA 16,100 175-46 A18

British Columbia

VE7BDJ 106,485 726-73 H24  
VE7GG 44,408 386-64 B23  
VE7AN 26,291 219-61 A18  
VE7AC 7,396 86-43 A05  
VE7BZA 7,052 98-41 A20  
VE7RZ 3,060 50-30 B

Delaware

VE8NW (VE8HB, opr.) 61,560 432-72 B24  
VE8ZZ 39,656 306-64 B20  
VE8CE 15,000 125-53 B15

PHONE SCORES ATLANTIC DIVISION

W3CKH 30,150 305-50 B17  
W3SHGV 28,512 199-72 A10  
W3GAI 23,208 175-64 B06  
W3ZNE 10,080 168-30 B19  
K3NYG 784 28-14 B02  
W4JKD (6 ops.) 6,438 113-29 A24

WAGYT 11,172 99-57 B12  
 W3M1 8600 100-44 B05  
 W3H11 48388 62-37 A08  
 W3HH 3500 50-35 B06  
 W3HVM 1800 50-28 B06  
 W3Z01/3 2820 60-21 B07

**CENTRAL DIVISION**

*Illinois*  
 WAVE (ID) 57,381 600-73 B24  
 W3KVF 84,774 597-71 B23  
 W3W01/HZ 77,384 569-68 B20  
 W3W0X 37,804 352-68 B21  
 W3W0M7 39,460 428-60 B24  
 W3W3P 37,694 309-61 B15  
 W3W3R 26,055 310-57 H11  
 W3W3R 31,978 271-59 A16  
 W3W3R 30,080 213-64 A20  
 W3W3R 31,012 248-61 A16  
 W3W3R 27,358 237-58 B11  
 W3W3R 23,425 164-68 A15  
 W3W3R 23,256 171-68 A23  
 W3W3R 20,700 150-69 B16  
 W3W3R 19,695 152-65 B13  
 W3W3R 17,576 169-52 B04  
 W3W3R 16,080 120-67 B12  
 W3W3R 15,042 164-66 A15  
 W3W3R 14,433 143-51 A10  
 W3W3R 10,000 111-50 B13  
 W3W3R 9,546 114-37 B04

W3RFX 12,952 176-51 B12  
 W3RFL 17,160 156-55 B11  
 W3RWC (+W3R0W) 14,852 158-47 B04  
 W3R0YJ 14,739 145-51 A11  
 W3R0KJ 13,220 131-52 B09  
 W3R0H 12,384 86-52 B  
 W3R0H 11,224 104-55 B  
 W3R0H 10,240 128-40 B14  
 W3R0H 7600 100-38 A09  
 W3R0H 6084 78-39 A15  
 W3R0H 5360 67-40 A08  
 W3R0H 4680 65-36 A06  
 W3R0H 4032 63-32 A06  
 W3R0H 3348 51-21 B04  
 W3R0H 1680 40-21 A02  
 W3R0H 1380 30-18 A04  
 W3R0H (+W3R0H) 336 21-5 A05  
 W3R0H (+W3R0H) 8 2-2 B01  
 W3R0H (S ops.) 23,269 589-63 B24  
 W3R0H (+W3R0H) 49,770 264-70 B22  
 W3R0H (+W3R0H) 23,220 203-55 A23  
 W3R0H (+W3R0H) 10,062 129-39 B  
 W3R0H (multi-op.) 6084 85-36 A

*South Dakota*  
 W3R0V 57,084 402-71 A20  
 W3R0V 21,240 181-58 A12  
 W3R0HA 18,810 171-55 A15  
 W3R0ML 12,600 127-50 B07

W3R0R1K1ANV (opr.) 2428 34-21 B01  
 W3R0S 2156 40-27 A05  
 W3R0H 1319 15-11 B01  
 W3R0V (+W3R0V) 1190 15-17 A04  
 W3R0N (+K1K1S, W3R0YX) 96,286 665-72 B24  
 W3R0O (10 ops.) 93,328 621-75 B24  
 W3R0O (4 ops.) 24,184 707-56 A14  
 W3R0W (+W3R0YV) 9696 101-48 A08

*Illinois*  
 W3R0X 77,384 569-68 B20  
 W3R0M7 39,460 428-60 B24  
 W3R3P 37,694 309-61 B15  
 W3R3R 26,055 310-57 H11  
 W3R3R 31,978 271-59 A16  
 W3R3R 30,080 213-64 A20  
 W3R3R 31,012 248-61 A16  
 W3R3R 27,358 237-58 B11  
 W3R3R 23,425 164-68 A15  
 W3R3R 23,256 171-68 A23  
 W3R3R 20,700 150-69 B16  
 W3R3R 19,695 152-65 B13  
 W3R3R 17,576 169-52 B04  
 W3R3R 16,080 120-67 B12  
 W3R3R 15,042 164-66 A15  
 W3R3R 14,433 143-51 A10  
 W3R3R 10,000 111-50 B13  
 W3R3R 9,546 114-37 B04

*South Dakota*  
 W3R0V 57,084 402-71 A20  
 W3R0V 21,240 181-58 A12  
 W3R0HA 18,810 171-55 A15  
 W3R0ML 12,600 127-50 B07

**DELTA DIVISION**

*Arkansas*  
 W3R0G 96,141 608-73 B24  
 W3R0V 63,920 471-68 B24  
 W3R0S 63,475 417-75 B19  
 W3R0R 42,318 400-71 B14  
 W3R0W 20,736 194-53 B15  
 W3R0W 11,650 118-50 B06  
 W3R0W 6,552 84-39 A13

*Southern New Jersey*  
 W3R0A 60,214 419-71 B19  
 W3R0V 42,780 345-62 B15  
 W3R0V 37,084 255-73 B19  
 W3R0V 34,456 246-68 A23  
 W3R0V 29,250 227-65 B17  
 W3R0V 24,320 185-68 A16  
 W3R0V 21,530 164-65 A14  
 W3R0V 17,580 147-60 B  
 W3R0A 14,560 112-65 A16  
 W3R0V 14,200 150-44 B09  
 W3R0V 7267 85-43 A05  
 W3R0V 5400 100-22 B09  
 W3R0V 3760 40-22 A10  
 W3R0V 35,545 407-69 B12  
 W3R0V (+W3R0V) 19,650 308-65 A09  
 W3R0V (+K3P3V) 40,200 292-50 A20  
 W3R0V (+W3R0V) 22,656 236-48 B15  
 W3R0V (S ops.) 22,336 191-56 A19  
 W3R0V (S ops.) 22,306 201-53 A22

*Illinois*  
 W3R0X 77,384 569-68 B20  
 W3R0M7 39,460 428-60 B24  
 W3R3P 37,694 309-61 B15  
 W3R3R 26,055 310-57 H11  
 W3R3R 31,978 271-59 A16  
 W3R3R 30,080 213-64 A20  
 W3R3R 31,012 248-61 A16  
 W3R3R 27,358 237-58 B11  
 W3R3R 23,425 164-68 A15  
 W3R3R 23,256 171-68 A23  
 W3R3R 20,700 150-69 B16  
 W3R3R 19,695 152-65 B13  
 W3R3R 17,576 169-52 B04  
 W3R3R 16,080 120-67 B12  
 W3R3R 15,042 164-66 A15  
 W3R3R 14,433 143-51 A10  
 W3R3R 10,000 111-50 B13  
 W3R3R 9,546 114-37 B04

*South Dakota*  
 W3R0V 57,084 402-71 A20  
 W3R0V 21,240 181-58 A12  
 W3R0HA 18,810 171-55 A15  
 W3R0ML 12,600 127-50 B07

**Louisiana**

W3R0V 44,512 428-52 A21  
 W3R0V 39,905 232-64 B13  
 W3R0V 3480 82-35 A23  
 W3R0V 3968 64-41 B05  
 W3R0V 1818 35-22 B03  
 W3R0V 810 27-15 B02

**Western New York**

W3R0V 66,397 503-67 A24  
 W3R0V 53,480 463-69 B23  
 W3R0V (+W3R0V) 45,724 322-71 A20  
 W3R0V 43,875 293-75 B23  
 W3R0V 33,168 305-55 B20  
 W3R0V 21,600 300-51 A21  
 W3R0V 24,976 224-56 A17  
 W3R0V 21,920 289-40 B13  
 W3R0V 22,760 215-53 B10  
 W3R0V 19,344 186-52 A13  
 W3R0V 11,856 115-52 A12  
 W3R0V 7357 84-39 A10  
 W3R0V 6100 86-35 B09  
 W3R0V 5032 68-37 A15  
 W3R0V 4712 62-38 A04  
 W3R0V 3776 42-39 A11  
 W3R0V 3066 73-21 B02  
 W3R0V 1297 14-11 A04  
 W3R0V 1152 36-16 A04  
 W3R0V 1132 11-6 A05  
 W3R0V (+W3R0V) 84,630 605-70 B24  
 W3R0V (S ops.) 83,724 562-74 B23  
 W3R0V (+W3R0V) 20,088 186-54 B20  
 W3R0V (+W3R0V) 52,567 433-61 B22  
 W3R0V (+W3R0V) 21,228 174-61 A17  
 W3R0V (+W3R0V) 15,184 146-52 A17

**GREENSBAY**

Phone: 818-0101

W3R0V (+W3R0V) 84,630 605-70 B24  
 W3R0V (S ops.) 83,724 562-74 B23  
 W3R0V (+W3R0V) 20,088 186-54 B20  
 W3R0V (+W3R0V) 52,567 433-61 B22  
 W3R0V (+W3R0V) 21,228 174-61 A17  
 W3R0V (+W3R0V) 15,184 146-52 A17

**Both Modes**  
 W3R0V (+W3R0V) 84,630 605-70 B24  
 W3R0V (S ops.) 83,724 562-74 B23

**W3R0V (+W3R0V)** 84,630 605-70 B24  
**W3R0V (S ops.)** 83,724 562-74 B23

**W3R0V (+W3R0V)** 20,088 186-54 B20  
**W3R0V (S ops.)** 20,088 186-54 B20

**W3R0V (+W3R0V)** 52,567 433-61 B22  
**W3R0V (S ops.)** 52,567 433-61 B22

**W3R0V (+W3R0V)** 21,228 174-61 A17  
**W3R0V (S ops.)** 21,228 174-61 A17

**W3R0V (+W3R0V)** 15,184 146-52 A17  
**W3R0V (S ops.)** 15,184 146-52 A17

**Mississippi**

W3R0V 142,672 970-74 B24  
 W3R0V 101,025 679-75 B23  
 W3R0V 45,493 440-67 B19  
 W3R0V 25,296 204-62 A20

**Tennessee**  
 W3R0V 112,050 750-75 A21  
 W3R0V 104,240 703-74 B24  
 W3R0V 78,610 574-70 B24  
 W3R0V 70,140 501-70 B  
 W3R0V 63,360 446-72 B18  
 W3R0V 44,200 400-72 B21  
 W3R0V 40,257 372-64 B20  
 W3R0V 31,088 232-67 A24  
 W3R0V 18,676 162-58 A18  
 W3R0V 17,800 164-60 B17  
 W3R0V (+W3R0V) 10,712 104-52 B06  
 W3R0V 10,682 110-38 A10  
 W3R0V 9960 80-31 B04  
 W3R0V 3288 44-76 B18  
 W3R0V (S ops.) 74,370 503-74 B24

**Western Pennsylvania**

W3R0V 81,247 572-71 A23  
 W3R0V 45,738 347-66 B20  
 W3R0V (+W3R0V) 45,124 389-58 A23  
 W3R0V 36,772 317-58 A14  
 W3R0V 19,470 165-59 B09  
 W3R0V 18,584 157-56 A11  
 W3R0V 17,160 156-58 B11  
 W3R0V 15,146 207-39 A20  
 W3R0V 13,768 146-54 A18  
 W3R0V 13,300 105-59 A10  
 W3R0V 13,180 145-42 A12  
 W3R0V 11,328 114-48 A16  
 W3R0V 7875 11-35 A15  
 W3R0V 6880 82-43 A16  
 W3R0V 6840 90-58 B08  
 W3R0V 5548 73-38 B  
 W3R0V 3927 60-31 A03  
 W3R0V 873 26-16 A03  
 W3R0V 279 16-9 A03  
 W3R0V (+W3R0V) 21,328 402-64 B24  
 W3R0V (+W3R0V) 16,284 178-46 B22

**Indiana**

W3R0V 85,707 592-73 B24  
 W3R0V 21,874 213-49 A13  
 W3R0V 19,908 163-58 A15  
 W3R0V 10,726 158-34 A  
 W3R0V 5940 66-45 B13  
 W3R0V 3452 5-42 B06  
 W3R0V 336 14-12 A01  
 W3R0V (S ops.) 75,210 548-69 B22  
 W3R0V (+W3R0V) 67,068 487-69 B23  
 W3R0V (+W3R0V) 55,616 440-64 B21  
 W3R0V (7 ops.) 21,840 210-52 B24

**W3R0V (+W3R0V)** 85,707 592-73 B24  
**W3R0V (S ops.)** 75,210 548-69 B22

**W3R0V (+W3R0V)** 21,840 210-52 B24  
**W3R0V (S ops.)** 21,840 210-52 B24

**W3R0V (+W3R0V)** 55,616 440-64 B21  
**W3R0V (S ops.)** 55,616 440-64 B21

**Ohio**

W3R0V 62,974 409-65 B20  
 W3R0V 47,396 350-68 A24  
 W3R0V 47,265 344-69 A22  
 W3R0V 33,998 264-65 A18  
 W3R0V 22,624 202-56 A17  
 W3R0V 21,024 219-48 B16  
 W3R0V 14,360 120-53 A07  
 W3R0V 18,868 178-51 A17  
 W3R0V 15,410 131-55 A10  
 W3R0V 14,196 169-42 B12  
 W3R0V 13,904 158-44 B05  
 W3R0V 5760 110-40 B  
 W3R0V 8416 116-36 B03  
 W3R0V 7138 85-43 B15  
 W3R0V 6162 70-39 B11  
 W3R0V 6084 119-26 A11  
 W3R0V 2475 51-23 A05  
 W3R0V 1576 44-16 A02  
 W3R0V 330 15-11 B02  
 W3R0V 324 18-9 A02  
 W3R0V 112-4 B01  
 W3R0V (+W3R0V) 66,662 534-63 B24  
 W3R0V (+W3R0V) 49,572 375-68 N  
 W3R0V (+W3R0V) 18,868 178-51 A17  
 W3R0V (+W3R0V) 15,410 131-55 A10  
 W3R0V (+W3R0V) 14,196 169-42 B12  
 W3R0V (+W3R0V) 13,904 158-44 B05  
 W3R0V (+W3R0V) 5760 110-40 B  
 W3R0V (+W3R0V) 8416 116-36 B03  
 W3R0V (+W3R0V) 7138 85-43 B15  
 W3R0V (+W3R0V) 6162 70-39 B11  
 W3R0V (+W3R0V) 6084 119-26 A11  
 W3R0V (+W3R0V) 2475 51-23 A05  
 W3R0V (+W3R0V) 1576 44-16 A02  
 W3R0V (+W3R0V) 330 15-11 B02  
 W3R0V (+W3R0V) 324 18-9 A02  
 W3R0V (+W3R0V) 112-4 B01  
 W3R0V (+W3R0V) 66,662 534-63 B24  
 W3R0V (+W3R0V) 49,572 375-68 N  
 W3R0V (+W3R0V) 18,868 178-51 A17  
 W3R0V (+W3R0V) 15,410 131-55 A10  
 W3R0V (+W3R0V) 14,196 169-42 B12  
 W3R0V (+W3R0V) 13,904 158-44 B05  
 W3R0V (+W3R0V) 5760 110-40 B  
 W3R0V (+W3R0V) 8416 116-36 B03  
 W3R0V (+W3R0V) 7138 85-43 B15  
 W3R0V (+W3R0V) 6162 70-39 B11  
 W3R0V (+W3R0V) 6084 119-26 A11  
 W3R0V (+W3R0V) 2475 51-23 A05  
 W3R0V (+W3R0V) 1576 44-16 A02  
 W3R0V (+W3R0V) 330 15-11 B02  
 W3R0V (+W3R0V) 324 18-9 A02  
 W3R0V (+W3R0V) 112-4 B01

**Great Lakes Division**

**Emmery**  
 W3R0V 61,825 405-75 A20  
 W3R0V 4092 62-33 A04  
 W3R0V 3184 40-28 A06  
 W3R0V 1430 33-22 B02  
 W3R0V (4 ops.) 98,500 651-75 B24

**Michigan**  
 W3R0V (+W3R0V) 136,150 903-75 B22  
 W3R0V 115,800 785-75 B22  
 W3R0V (+W3R0V) 97,150 641-75 B24  
 W3R0V 73,038 494-74 B24  
 W3R0V 52,207 511-71 B24  
 W3R0V 52,394 407-66 B24  
 W3R0V 33,040 431-65 B22  
 W3R0V 52,095 379-69 B19  
 W3R0V 50,694 362-71 B22  
 W3R0V 34,800 360-65 A20  
 W3R0V 33,844 242-68 A21  
 W3R0V 28,008 211-64 A20  
 W3R0V 26,220 221-60 B15  
 W3R0V 24,480 191-68 A13  
 W3R0V 23,176 176-57 B07  
 W3R0V 22,000 176-60 B06  
 W3R0V 20,552 168-52 B10  
 W3R0V 19,872 169-56 B13  
 W3R0V 19,470 165-59 A15  
 W3R0V 13,512 139-48 A20  
 W3R0V 11,764 175-34 B06  
 W3R0V 10,669 123-44 B09  
 W3R0V 10,584 126-42 B15  
 W3R0V 8100 96-45 B08  
 W3R0V 7392 73-52 B08  
 W3R0V 7417 109-34 A10  
 W3R0V 7004 104-34 A  
 W3R0V 6320 70-38 B07

**Ohio**  
 W3R0V 4808 60-32 B09  
 W3R0V 4045 54-29 A03  
 W3R0V 3753 20-27 B07  
 W3R0V 2680 42-20 A05  
 W3R0V 1564 34-23 B06  
 W3R0V 1560 94-70 B24  
 W3R0V 1450 25-40 A02  
 W3R0V 1070 7-53 B01  
 W3R0V 1008 4-11 A01  
 W3R0V 840 2-11 B02  
 W3R0V 2-11 A01  
 W3R0V (+W3R0V) 86,800 620-70 B24  
 W3R0V (+W3R0V) 14,910 294-49 B18

WB8CIY (+WA 37B1)	28,094	721-62 A13	W2MOB	6970	85-41 B10
WA8COR (7 ops.)	27,759	287-57 A24	W2N1I	6887	100-33 A10
WA8VIE (+WB8KQ)	18,550	225-49 A20	W2ZRG	5922	64-39 B05
			WB2HTW	5888	93-32 B08
			WB2ZIN	4960	78-32 A08
			W2UAL	4448	70-32 B07
			W2DSC (WB2TUL, ops.)	4140	69-30 A04
<i>Ohio</i>			WA2DZH	3978	77-26 A11
K8DOU (WA8LEO, ops.)	128,908	871-74 B24	W2TUK	2184	42-26 B01
W8QJQ	109,375	725-75 B23	WA2OVC	2056	33-16 A04
W3BOQ/R	95,100	637-75 B24	WB2VIA	1248	39-16 A03
WA8USP	82,180	587-70 B24	W2NBI	1240	31-20 A03
K8CFH	75,480	510-74 B17	W2YKQ (W2TNI, ops.)	780	30-13 B03
WA8LB	64,584	468-69 B20	WA2EVB	714	1-4
WA8VW	62,016	456-68 B19	WA2PKB (WB2S DNV DNV)	53,444	443-62 B24
WB8AKU	60,400	453-66 B19	W2AFI (WA2LNU, WB8SNT)	35,244	286-60 B20
WA8TKW	60,208	427-71 A19	WA2EHJ (+W2MDM)	21,675	215-51 B11
WA8LKM	45,850	345-65 A21	WA2GUL (4 ops.)	16,400	166-50 A20
WA8ZBU	44,640	310-72 B19	WA2DEF (+WB2WXR)	16,006	151-63 A15
WB8APJ	44,132	325-68 B24	WB2HKM (+WB2IEM)	15,608	106-44 A24
WB8CKI	40,330	286-69 B20	W2JTZ (WB2EUG, WN2S DSD) KVS)	13,500	150-45 A19
WB8H	36,030	283-62 A10			
WB8ALM	33,960	283-60 B13			
WA8EYF	31,248	249-63 B09			
WB8OI	29,832	226-66 B18			
WB8PA	29,404	207-71 B14			
WB8KD	27,554	187-71 A13			
WB8BX	24,624	216-57 B09			
K8EKG	23,940	194-63 A09			
W8DH	22,680	159-73 A11			

*Northern New Jersey*

WB8AVH	22,562	195-58 A17	W2MB	107,500	754-71 B24
WA8SLV	22,458	197-57 A09	K2OJQ (WA2DMF, ops.)	83,344	564-73 B23
WA8MCR	17,400	150-58 B05	WA2IYT	73,000	500-73 B24
WA8YXI	15,456	162-48 B11	K2KHR	72,489	503-73 B22
WA8ZNC	15,132	146-52 A12	WA2BHI	69,040	490-70 B72
WA8SGV	14,616	116-63 B17	WB2IQP	32,542	303-56 B21
WB8AJW	14,416	136-53 A08	WB2VFK	30,276	261-58 B18
WA8FTW	13,442	143-47 B09	W2ZEP	26,832	312-43 B20
WB8KJ	13,384	129-48 B12	WB2FVW	11,663	136-43 B06
WA8REN	12,087	119-51 A10	WA2CKU	11,520	145-40 A10
W8SDV	9,620	130-37 A12	W2TDH	5976	83-36 07
WA8VEV	7371	95-39 B17	WB2ZLI	5115	78-33 A07
W8DZG	7200	100-36 A12	WA2EKX	2275	46-25 B05
W8GMK	6360	67-40 B08	WB2VFX	2080	52-20 B04
WA8CZ	6162	79-34 B07	WA2EUX	1002	1-1 A07
WB8AYC	5920	83-37 A14	WA2BAN	242	11-1 B01
WB8PH	5720	110-26 A05	WA2GLY	112	8-7 A01
WB8FH	6,698	77-37 A06	WA2BAN/2	40	5-4 B01
K8MFT	5,960	87-31 A05	WB2FCA (+WA2WHZ)	49,292	390-64 B22
K8BSM	5,320	70-38 B04	WA2BLE (+WA2LW, WB2IHL)	33,152	265-64 A22
WB8VZ	3850	55-35 A04	WA2FCC (+WA2HAI)	5768	103-28 A10
WB8WU	3700	45-30 B			
WB8PC	3451	60-29 B			
WA8VBS	2040	53-20 B02			
W8OYI	1920	40-24 B04			
WA8YKS	1800	50-18 A06			
W8EOG	1488	31-24 A12			
WA8ZGC	1008	3-2 B01			
WA8LVT	1002	1-1 B01			
WB8EIK	972	27-18 A02			
L8RMR (+WA4IR)	106,552	734-72 B24			

**MIDWEST DIVISION**

*Iowa*

WB8DU (4 ops.)	93,304	644-72 B24	WA8QDC (WA8HVR, ops.)	106,000	700-75 B24
WA8YXE (+WA8ZZ)	59,854	425-71 B23	WA8QNE	17,334	162-54 A15
WA8LWH (+WA8LV)	39,340	320-60 B17	WA8QRY	11,055	168-33 B06
W8K (+W8, IC'S USP)	33,567	251-61 A23	K8YVU (+WA8QCF)	99,437	667-73 B24
WB8UD (+WA8S NXS PLR, WB8VW)	32,670	303-54 B15	WA8QRF (4 ops.)	38,999	331-59 A24
WB8EXZ (5 ops.)	21,416	181-58 A23	WA8QVJ (+WA8S SIU VLU)	23,248	211-54 A24
WA8YLU (+WA8YTV)	11,260	131-51 B18			

*Kansas*

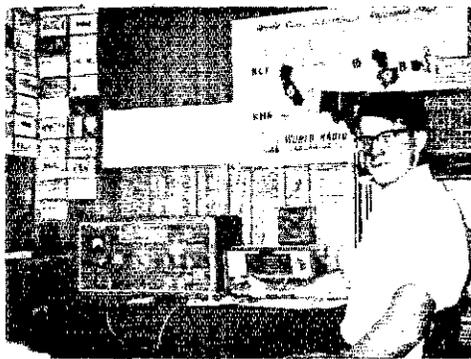
W8SFA	101,512	698-72 B24	W8IYA	70,560	504-70 B22
WA2HSP/0	16,800	168-50 B11	K8BHM	15,010	199-38 B04
K8PEV	10,166	112-46 A09	W8SPF	8084	94-43 A09
W8VDO	884	26-17 A04	W8SOE (7 ops.)	79,190	586-67 B24

*Missouri*

WA8EMS	135,712	946-72 B24	K2ELU/9	63,600	425-75 B15
W8GJN	80,853	254-61 A12	K8DIB	40,983	254-61 A12
K8GJD	26,784	186-72 B10	K8EYI	20,800	201-52 B08
W8QYCN	20,298	199-51 A11	W8PKM	14,063	144-49 B14
W8PKM	14,063	144-49 B14	K8YZI	8502	109-39 B05
K8YZI	8502	109-39 B05	WA2ZNF	8040	102-40 B12
WA2ZNF	8040	102-40 B12			

*Nebraska*

W8URN (K9RHN, ops.)	80,250	611-71 B24	W8WLO	56,250	426-65 B20
W8WLO	56,250	426-65 B20	W8RRQ	40,235	310-65 B20
W8RRQ	40,235	310-65 B20	W8KK	20,126	174-55 B11
W8KK	20,126	174-55 B11	W8IGS	18,054	153-59 A08
W8IGS	18,054	153-59 A08	W8RRK	11,088	116-48 A12
W8RRK	11,088	116-48 A12	W8QJK	3840	103-32 B06
W8QJK	3840	103-32 B06	K8URN (6 ops.)	147,448	1119-72 B24
K8URN (6 ops.)	147,448	1119-72 B24			



Above are but a sampling of the many Novice entrants that could be found in the November '69 SS. They are (from top to bottom): WN2JAM, Peter; WN4NRL, David; WN6NYT, Gary, and WN0ZOF, Jeff.

**NEW ENGLAND DIVISION**

*Connecticut*

KIPKO	109,075	723-75	B14
N11HO	107,361	745-75	B24
W1EVB**			
	106,480	703-75	B24
K1VTM	99,494	668-74	B24
K1JHX	87,100	615-70	B20
W1CW**			
	79,480	545-72	B23
K1GDD	71,720	520-68	B23
W1ETU**			
	60,280	487-65	B14
K1DPB	55,128	401-68	B14
W1BIB	47,212	320-74	B12
W1TCI	47,020	384-60	B21
W1ALLD	38,818	287-66	A19
K1ASJ	34,048	305-56	B24
W1LVQ**			
	32,200	240-65	A16
K1OOD	31,906	303-51	B14
W1AIQJ**			
	27,660	311-43	A20
W1YYM**			
	23,440	221-51	B06
K1LWC	22,848	231-51	B22
W1AQRHDI**			
	19,027	180-53	B08
W1HCP**			
	16,640	128-65	B19
W1AIJU	14,064	141-52	A09
W1AKQM/1**			
	14,630	145-47	B08
W1AJCX	13,563	207-33	B21
W1DEP	9,428	139-34	B15
W1AHNR	9,025	181-25	A06
W1AZJ/1	9,256	98-42	A17
W1AIDG	8,300	100-41	A03
W1AHOL	6,180	74-35	B08
K1JQA	2,875	55-25	B15
W1KGF	616	29-11	A02
W1KJ**			

*Maine*

K1GAX	33,020	255-65	B12
W1JFX	6040	131-20	A24

*New Hampshire*

W1IKL	82,524	598-69	B21
W1PYM	38,780	277-70	B17
W1BUT	36,600	301-61	B14
W1JFM	3430	45-27	B02
K1CTQ (6 ops.)			
	25,023	221-57	B24

*Rhode Island*

W1VPU (WA2LBI, opr.)			
W1JPG	26,180	239-55	A17
W1BFB	23,085	203-57	B11
W1FLN	20,708	167-59	A19
W1JKZU	12,700	129-50	A15

*Vermont*

W1MRW	5120	70-30	A10
W1FES	2nd	15-10	A01
W1DU/1 (K1KNI, WA1DRO EIH)			
	34,425	490-75	A24

*Western Massachusetts*

K1KDP	101,326	730-69	B14
K1RWE	82,584	858-74	A23
W1YK (WA1ABW, opr.)			
	82,056	596-68	A24
W1AIZS	29,140	315-47	B19
W1AHEF	28,608	300-48	A23
W1EZZ	20,808	153-68	B12
W1EFB	7360	92-40	A09
W1AABW/1			
	1002	1-1	A01

*Eastern Massachusetts*

K1LLU	79,631	562-72	B19
W1A9NR/S/1			
	61,050	407-75	B21
W1JMR	57,576	316-65	B24
W1BHV	43,267	370-73	B21
W1EOT	41,032	278-72	A21
K1KTH	36,000	300-60	B06
W1AHOS	27,450	225-61	A13
W1AX	19,200	150-64	B
W1DUY	12,172	161-54	B14
W1AFRC	15,729	167-49	B14
W1QPI	15,070	137-55	B15
W1JLE	12,692	167-40	B23
W1KKBZ	12,508	116-53	B19
W1JYY	9126	117-39	A16
W1KAG	8186	128-33	A10
W1AFCD	7000	101-55	A17
W1PLJ	5082	78-43	B07
W1AHAA	2808	60-24	B04
K1CHY	2625	53-25	A07
W1AFNM	1110	57-15	B09

W1WMH 18 3-3 B01

W1AJUY (4 ops.)			
	82,784	824-72	B24
W1AKYJ (+WA1S HQB LGE)			
	35,000	308-58	B23
W1AKYK (4 ops.)			
	23,500	236-50	A20
K1LPB (+W1NKSE)			
	8151	105-39	B10
W1AKDL/1 (+W1TOP)			
	7161	118-31	A24

*Maine*

K1GAX	33,020	255-65	B12
W1JFX	6040	131-20	A24

*New Hampshire*

W1IKL	82,524	598-69	B21
W1PYM	38,780	277-70	B17
W1BUT	36,600	301-61	B14
W1JFM	3430	45-27	B02
K1CTQ (6 ops.)			
	25,023	221-57	B24

*Rhode Island*

W1VPU (WA2LBI, opr.)			
W1JPG	26,180	239-55	A17
W1BFB	23,085	203-57	B11
W1FLN	20,708	167-59	A19
W1JKZU	12,700	129-50	A15

*Vermont*

W1MRW	5120	70-30	A10
W1FES	2nd	15-10	A01
W1DU/1 (K1KNI, WA1DRO EIH)			
	34,425	490-75	A24

*Western Massachusetts*

K1KDP	101,326	730-69	B14
K1RWE	82,584	858-74	A23
W1YK (WA1ABW, opr.)			
	82,056	596-68	A24
W1AIZS	29,140	315-47	B19
W1AHEF	28,608	300-48	A23
W1EZZ	20,808	153-68	B12
W1EFB	7360	92-40	A09
W1AABW/1			
	1002	1-1	A01

*Eastern Massachusetts*

K1LLU	79,631	562-72	B19
W1A9NR/S/1			
	61,050	407-75	B21
W1JMR	57,576	316-65	B24
W1BHV	43,267	370-73	B21
W1EOT	41,032	278-72	A21
K1KTH	36,000	300-60	B06
W1AHOS	27,450	225-61	A13
W1AX	19,200	150-64	B
W1DUY	12,172	161-54	B14
W1AFRC	15,729	167-49	B14
W1QPI	15,070	137-55	B15
W1JLE	12,692	167-40	B23
W1KKBZ	12,508	116-53	B19
W1JYY	9126	117-39	A16
W1KAG	8186	128-33	A10
W1AFCD	7000	101-55	A17
W1PLJ	5082	78-43	B07
W1AHAA	2808	60-24	B04
K1CHY	2625	53-25	A07
W1AFNM	1110	57-15	B09

W1TVX	20,584	166-62	B14
W1JOG	17,671	218-41	A07
W1KWS	14,335	158-47	A14
W1HIL	10,293	111-47	A06
W1BFX	5550	77-37	A10
W1JPE	5254	72-37	B10
W1LDZ (FWN7MUH)			
	51,888	415-69	B24

*Washington*

W5QQQ/7			
	140,503	961-73	B24
W7BUN	78,720	580-67	B23
W17GW	57,580	416-69	B23
W17JB	50,048	492-64	B21
W17PK	33,654	237-71	A15
W17PC	30,848	241-64	B17
W7NP	30,586	264-58	B17
W17MX	19,836	174-57	A20
K7AWB	18,825	165-87	H21
W17UL	16,018	143-56	A16
W17FHG	15,738	129-61	A19
K7VPE	15,229	141-61	A12
W17BSQ	9744	102-48	A15
W17GYR	8932	102-44	A10
W7NG	8500	100-44	B05
W17LFG	8693	106-41	A11
K7INE	8160	91-40	A04
W17IR	7956	102-39	A20
W17ACQ	7400	100-37	B06
W77WY	6280	80-40	A08
K7CZM	4920	56-35	A
K7IND	4552	56-32	A09
W17RY	1400	50-34	A
W17GSE	1986	29-17	B07
W17KVV	1816	26-17	A07
W17HFG	240	12-10	B
W7OS	234	13-9	B03
K7CZP	98	7-7	B02
W17BL	40	5-4	A02
W17LQ	10	5-1	A01
W17AZ1 (+W7WLX)			
	3860	55-26	A10
W7WLX (+W7AZ1)			
	1520	20-13	A04

*PACIFIC DIVISION*

*East Bay*

W16CPY	41,790	306-70	B20
W16MB	36,272	300-67	A24
W16RZ	6086	78-39	B
W16HMT	4592	56-41	A06
W16IOI (W16BS BID HDH QID)			
	108,432	753-72	B24
W16DOD (+W16KGI)			
	81,760	584-70	B24
W16APW (+W16ABT)			
	19,494	171-57	A21

*Hawaii*

KH6D	95,282	671-71	B20
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*Nevada*

W7HWL	33,792	264-64	B17
K7TLB	19,360	245-40	B13
K9VER/7			
	12,624	133-48	B18

*Sacramento Valley*

W16AVH	87,746	601-73	B20
W16MZX	48,990	346-71	B16
K1SOP/6			
	45,962	343-67	B15

W1664UH	10,492	122-43	A17
W16VU	9917	106-47	B
W16VSC	4000	80-25	B06
W16KYA	2088	32-17	A03
W16NKR	987	24-21	B03

*San Francisco*

W16RIP	71,394	489-73	B19
K1TVL	22,410	208-54	B08
W16VYW	17,374	142-61	B19
W16KWE	4521	68-33	B04
W16DZL	2641	70-19	A07

*San Joaquin Valley*

W16IVN	128,025	864-75	B
W16QVQ	38,985	286-69	B18
W16CPP	12,565	129-45	A16

*Santa Clara Valley*

K16VW	65,412	482-69	B23
W16ZHD	68,800	176-48	B11
W16JLV	9522	104-46	B13
W16IGU	6458	57-57	A10
W16AMH	1080	30-18	A12
W16CRI (4 ops.)			
	60,325	403-75	B15
W16EJD (5 ops.)			
	33,660	298-60	AB

*ROANOKE DIVISION*

*North Carolina*

W14FEW	108,332	743-74	B22
W14IC (W14IOI, opr.)			
	41,907	345-61	B22
W14ILO	9045	101-45	A07

*South Carolina*

W14GGA	42,296	316-68	A17
K14CSZ	2350	48-25	A02

*Virginia*

W14KFC	111,250	738-75	B18
K14JWU (opr.)			
	108,025	717-75	B24
W14DM	77,275	512-75	B20
K14PQ	76,650	534-75	B24
W14ZL	62,707	430-73	B19
K14PL	52,080	373-70	B22
W14JQU	45,061	309-73	B21
W14JLZ	40,689	280-71	B21
W14JY	40,368	311-65	B08
W14HOL	38,280	339-58	B16
W14TKN	37,128	274-68	AR24

W14JK	35,028	278-63	H22
W14ZM	26,556	202-64	B09
W14QJP/4			
	22,491	179-63	B14
W14BVV	21,041	196-63	B05
W14MZH	15,750	113-70	B11
W14ZSH			

WAWHC' 552 23-12 B01 K4ADU/4  
 W4PHL2 1-1 B01 8673 90-40 A11  
 WB4FDT (4 oprs.) WA4SSB 8652 103-42 A12  
 21,717 191-87 B16 WA4ECY (6 oprs.)  
 West Virginia 80,850 579-70 B24  
 W4NN (WA2ZKT, K8WAH)  
 KRQYG 850 23-17 B02 37,824 297-64 B18

**ROCKY MOUNTAIN DIVISION SOUTHWESTERN DIVISION**

*Colorado*  
 WA0CVS 74,480 535-70 B18  
 WA8WEL/0 62,208 517-64 B18  
 W0LRN 53,728 514-52 A21  
 W0LRW 46,322 366-62 A17  
 W4UDS/0 44,184 397-56 B15  
 W0BWB 29,672 230-64 B13  
 W0GWF 8977 70-43 B09  
 K0L0G 2600 50-28 A05  
 W0IZV 782 23-17 B03  
 WA0KQK (8 3-3 A01  
 K0MIC (4 oprs.) 20,094 197-51 A17  
 W0YQ (multi-op.) 19,350 218-45 B17

*New Mexico*  
 W5QNY 60,444 439-69 A23  
 W5QLC 37,448 309-62 A17  
 WASLUO 28,673 274-53 B17  
 WASRVO 30,400 188-85 A24  
 WASVAL 17,700 150-60 A17  
 WASPBP 16,141 157-49 A  
 W5QNO 4725 68-35 A04  
 W5RSZ 4488 68-33 A02  
 K5FHL (5 oprs.) 91,323 648-73 B24

*Utah*  
 K9L BQ/7 156,252 1053-74 B24  
 W7GXC 44,781 385-59 B21  
 K7AQB 26,593 216-61 A21  
 W7OHR (3 oprs.) 109,890 751-74 B23  
 WA7HQV (+K7QEZ) 64,464 475-68 A24

*Wyoming*  
 WA7EWC 69,862 501-69 B23  
 WA7KQV 14,768 144-52 A20

**SOUTHEASTERN DIVISION**  
*Alabama*  
 W4CBG 37,468 276-68 B16  
 W4FKG 34,160 245-70  
 AB17  
 W4DS 24,570 189-65 B19  
 K4MG 23,628 179-66 B09  
 W4BNCT 8022 97-42 B12  
 WB4HRJ/4 3664 57-24 A06  
 WB4JMH 1680 40-21 B04  
 WB4FEW 18 3-3 A04  
 WB4KSL/4 (3 oprs.) 29,438 241-59 A21

*Canal Zone*  
 K2S AT 126,100 837-75 B24  
 K2S II 55,224 386-72 A15  
 K2SWJ 44,516 368-62 B09  
 K2SNG (3 oprs.) 14,994 148-51 B06

*Eastern Florida*  
 WA4UFW 107,821 742-73 A24  
 W4PZV (WA4SVO, opr.) 94,225 629-75 B24  
 84,490 596-71 A23  
 WB4IAE 73,150 485-75 B24  
 WB4CAP/4 44,702 364-62 B17  
 WA4HO 41,548 306-68 B14  
 WB4IRV 25,422 223-57 B11  
 W4KMG 17,766 141-63 B16  
 W4WVB 4200 60-35 A05  
 WA1GZV/4 (+WA4ABY) 36,432 280-66 B17

*Georgia*  
 K4BA1 132,202 887-74 B24  
 K4WAR (K8QQA, opr.) 119,550 797-75 A24  
 K4VUD/4 59,429 451-67 A24  
 K4HAV 44,421 332-67 B17  
 K4EZ 1863 41-23 B02

*West Indies*  
 KP4DCR 15,860 153-52 AB17

*Western Florida*  
 W4UHI 99,086 672-74 B24  
 WA4VIV 93,586 642-73 B23  
 W4FDJ 11,284 109-52 A12



Remember KSLZO and second op WA5LES? Well, they were back as promised in '69 with scores of over 183K/152K on phone/cw respectively. They comment that operators over the last 12 years have become much more efficient, making it a real pleasure to operate.

WA5VQK 7298 90-41 A03  
 WA5GLY 1276 30-22 A03  
 KSLZO (4 oprs.) 183,076 1264-74 B23  
 WSAC (4 oprs.) 112,554 768-74 B24  
 WA5UHR (+WA5WCF) 52,455 406-65 B24

**CANADIAN DIVISION**  
*Maritime*  
 VO1AW 7052 86-41 A06  
 VE2DIN 918 27 18 A04

*Ontario*  
 W8IKD/VE3 15,704 151-52 B17  
 VE3AYR 3360 60-28 B06  
 VE3FHQ 2820 47-30 B10  
 VE3CFE 2494 44-28 A04  
 VE3UIS 2152 32-18 B02  
 VE3GHO 2020 30-17 A04  
 VE3CSF 1776 37-24 A05

*Manitoba*  
 VE3UOW (VE3s FJQ GMM) 26,842 222-59 A24

*Saskatchewan*  
 VE4ZP 28,674 252-59 A13  
 VE4SD 5180 75-35 B03

*Alberta*  
 VE6AGV 32,538 282-58 A13  
 VE6FK 19,480 165-56 B12

*British Columbia*  
 VE7IQ 28,820 264-55 B18  
 VE7RN 13,275 149-45 B08  
 VE7AZG 3024 54-28 A07

*Yukon-N.W.T.*  
 VE8YB 33,664 265-64 B24  
 VE8NWT (VE8BB, opr.) 21,546 190-57 B16

**Check Logs**  
 The call signs listed below are entered as check logs on a non-competitive basis for one or more of the following reasons: (1) Failure to submit a dupe sheet for logs with over 200 QSOs (the majority fall into this category), (2) Failure to submit Summary Sheet, (3) Request to be listed as a Check Log.

**Phone**  
 K1KNQ, W1ILV, K2FO, WA2EBW, WB2TYR, W3DDQ, K7UPJ/4, W4KP, W4UQ, WA4TWO, WB4HYV, WA5VPL, K7YUJ, W7FO/7, W7HBM, WA7FID, WA7HQ, K8GVK, K8MMH, WA8JUY, WB8BQG, WA9AQZ, WA9YLD, WA9YXG, WA0-CJU, WA0JNF, WA0UME, W8LH/VE6.

**C.W.**  
 WIAX, W2HBO, W2VL, WA2EGT, WA2EXZ, W3DQG, W3GHM, W3YQ, WA3JQO, K4BN, W4GF, W4JUK, W5QE, WA5VDH, W7IV, W7QYA, KL7MF, W9PVI, WA8JUY, WB8RPD, W0MKH, W0YSE, WA0CJU, WA0PRS, WA0YGS, WN0YSU, VE2DIN, VE3AWE, VE3FHQ, VE3-RMC.



# AMATEUR RADIO PUBLIC SERVICE

## NTS RACES AREC

*In the Public Interest, Convenience, Necessity* NRH

CONDUCTED BY GEORGE HART,\* WINJM

### PSHR RE-EVALUATIONS

THERE we go again, throwing initials around. PSHR stands for Public Service Honor Roll. You will find it on page 78. After a few months, the initials PSHR will start becoming as common and well known as the BPL. It seems to have "taken hold" and is probably here to stay.

This is not to say that everybody agrees with the way it is handled, or even that all are agreed it should have been set up in the first place; but generally speaking the response has been about as expected and the listing is attracting many service-oriented amateurs who perform their service in ways other than running up large traffic totals.

The first PSHR listing was in February QST, reflecting November activities. The second was in March QST, reflecting December activities. You'll notice it was somewhat more extensive, with type size reduced to keep it to a half a page. Of course December activities are usually the peak for the year; nevertheless, the column still comes out larger than the BPL, and so the decision has been made to require 30 points, instead of 25, as a minimum for listing. As this is the first listing since announcement of such a change, those making between 25 and 29 points will continue to be listed, but without a breakdown. Starting with the July issue, only those getting 30 points per month or higher will be listed in the PSHR.

\* Communications Manager, ARRL.



Aside from the complaints arising from a mistake made clerically here and there, either by the SCM or the minions here at headquarters, the amount of general acceptance of the PSHR is encouraging. Those asking questions for the most part seem to be satisfied with the answers. Nevertheless, we are only beginning. We still have to evaluate the equity of points for the various functions, establish a routine for reporting and listing, settle on a cut-off for listing which makes the honor possible with reasonable effort but not so easy that it can be achieved without enough effort to make it worthwhile. It will be perhaps six months or a year before the PSHR will be settled down as a permanent part of the ARRL operating structure, similar to the BPL. Meanwhile, your suggestions for making it more meaningful are always welcome.

### Repeaters

We have said before and we'll say it again, that no new operating technique has offered such potential for amateur radio public service as that of vhf fm repeaters. Any kind of repeaters, for that matter, but fm seems to be the accepted mode best suited for the purpose.

Trouble is, there seems to be a tendency on the part of some repeater groups to be selfish about who uses their repeater and for what purpose. Indeed, some groups set up their repeaters for strictly selfish purposes having no remotest connection with public service and then take steps to see that it is used only by their little group and only for the purpose.

In a way, you can't blame them. An enterprising group of amateurs gets together and decides to operate a repeater on some mountain top or atop some tall building. They expend a lot of time and effort, and perhaps some money too, in locating a suitable site and acquiring permission to use it. They muster their technical brains to provide a suitable transmitter and receiver, to solve the always-present problems of in-and-out frequencies and identification and separation between transmit

VE3CYR reports that this is a photo of the "policy committee" of the Ontario-Quebec net, but goes on to say there really is no such entity and this was just a nice, friendly get-together. Left to right are VE3s FAX DBG ATI LK EBH CYR and an unidentified SWL.

and receive antennas. They climb mountains, towers or make like steeple jacks crawling around the tops of skyscrapers to erect the antennas and install the repeater gear.

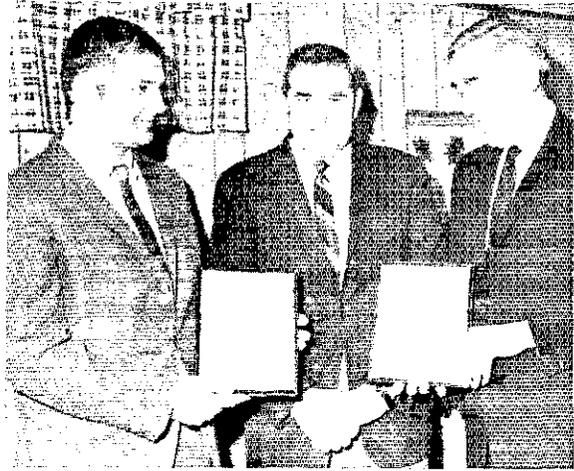
Finally the big day comes. The husky repeater is activated by a low power signal miles away and relays the spoken word to another point many miles in the opposite direction and far below line-of-sight from the originating point. Vast new horizons are opened up.

But what's this? Suddenly a strange voice appears on the repeater frequency—someone who did not participate in all the planning and who shed no sweat and spent no money on the installation. Right away there is trouble. This is *our* repeater, we built it, installed it, and by golly no one but *us* operates it! So beat it, bum! But the interloper replies that the amateur bands are free for all to use and nobody, whether a manned station or a repeater, pre-empts the use of any frequency. The repeater group then finds ways to prevent the repeater from being activated by anyone but the members. The interloper slaps on a carrier, interferes deliberately with repeater operation. More trouble, threats of legal action, or maybe just nose-punchings. In any case, the situation deteriorates and amateurs fight among themselves. A fictitious exaggeration, but similar incidents are not unknown.

Perhaps what is needed is a code of ethics for repeater operation. There already is a directory of repeater frequencies, although probably not complete and very changeable. ARRL will include public service repeater frequencies in its net directory, issued once annually. Meanwhile, shall we give some consideration to a code of ethics to which all dedicated repeater groups can subscribe? For example, to begin with, a rule that any repeater may be used at any time for a public service purpose; then perhaps rules regarding interference with repeaters, intentional or otherwise, priority of use, conduct and language. We might even set up voluntary sub-bands to be used exclusively for repeater transmitters. Worth thinking about? Your Repeater Advisory Committee *has* thought about it, but needs your assistance, so keep it advised. Committee members are W0CXW (chairman), W2ODC, W4GCE, W5VPO, W6GDO, W6MEP, W7FHZ, W9BUB and VE3ADO. Let's start a new slogan: "Repeaters for public service!" WINJM.

### Public Service Diary

On Nov. 13, amateurs were called upon to aid in the search for two women and two pre-school-age children who had become lost in a large area of virtually unmapped sand hills in Washington County, Florida. The ladies had left early in the afternoon and had not returned by dark. Although the darkness hindered the searchers, most of the area had been covered but there was still no sign of the party. At dawn, a private aircraft equipped with 2-meter fm equipment joined the search, but just as it began flying a grid pattern over the search area, word was received that the lost persons had been located. All were well, but had spent a cold night on the sand dunes. Participating in the search



Wisconsin SEC W9NGT was presented with an award recently by the U.S. Weather Bureau for his work in establishing and operating a severe weather reporting network in that section. Left to right are W9KWQ, a meteorologist with the Milwaukee office, W9NGT and R. W. Harms, Director of the Milwaukee Weather Bureau, who presented the certificate which was signed by the director of the Environmental Science Services Administration.

were W4LXK, WA4SRR, WA4TUU and W4IKB. — W4IKB, SEC W. Fla.

At 0715Z on Jan. 2, VE2APT was returning to his place of employment in Dorval, Que., when he discovered a collision involving a car and truck. Using the VE2RM repeater, VE2AKM was contacted and the police were notified of the mishap that was severely hampering the normal flow of traffic. — VE2ALE, SEC Que.

Beginning in the early hours of Jan. 18, the Hood River Valley of Oregon was stricken by an extremely severe ice storm. Temperatures had been below freezing for several days and more than a foot of snow was on the ground; to complicate the problem, warmer air from the Pacific moved in causing a two-day deluge of freezing rain. Ice collecting on power and telephone lines eventually caused ninety per cent of the valley to be without necessary utilities.

On Jan. 20, WA7KIU left for Parkdale in the hardest hit part of the valley to set up a 75-meter station at the fire station in that city, while W7JAB alerted other local amateurs to begin monitoring the state RACES frequency. A number of priority messages were handled by WA7s EX1 EZJ NHN and KL7GFR/7 during the several days of the operation. — WA7KIU, EC Hood River County, Ore.

While mobilizing at 1400Z on Jan. 30, VE2BPF came upon an accident at the intersection of the Decarie Expressway and the Trans-Canada Highway in Montreal in which three vehicles were involved and several persons were injured. VE2DFE replied to the call put forth on the VE2MT repeater and the police were summoned. — VE2ALE, SEC Que.

Public Service Honor Roll

January 1970

This listing is available to amateurs whose public service performance during the month indicated qualifies for 25 points or more total in the nine categories below. Use form QD-188 or submit equivalent information through your NCM. See page 78, Nov. 1969 QST for details. Please note maximum points for each category.

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Max. Pts.	10	5	16	12	12	20	3	5	Totals
WAKLOW	10	5	4	12	12	20		5	68
WAZBAN	10	5	16	12	12	1	3	5	64
KQJVE	10	5		12	12	20		5	64
WR2FEH	10	5	16	12	12		3	5	64
WOBNA	10		16		12	20		5	64
WAFEX	10	5	16	12	12	3	3		61
W88BBG	10	5	16	12	12			5	60
WABIAW	10	5	16	12	12			5	60
WAZFRZ	10	5	16	12	12		3		58
WAZCAL	10	5	16	10	12	1	3		57
W70CX	10	5	12	12	12			5	56
WALHOL	10	5	16	9	12		3		55
W40GG	10	5	16	12	12				55
WASIRO	10	5	16	12	12				55
W4JYS	10	5	16	3	12		3	5	54
W7RO	10	5	16	6	12			5	54
W40EL	10	5	16	12	6			5	54
W5QGZ	10	5	16	12	12				53
N1ESG	10	5	16	6	12		3		52
K4ZNP	10	5	8	12	12			5	52
W4AROB	10	5	16	9		12			52
W4MPX	10	5	16		12		3	5	51
WB4FDT	10	5	16	6	12				51
W8IMI	10	5	16	3	12			5	51
W0LX	10	5	16	6	12		3		51
W2MTA	10	5	16		12			1	49
W4JVAS		5		12	9	18	3		5
W4ZAKH	10	5	16		12			5	48
W4LCP	10	5	16		12			5	48
W4GROF	10	5	16		12			5	48
W0(W)	10	5		12	6	10			5
K7NHL	10	5	16		12			5	48
W4RVND	10	5	16		12			5	48
W2FR	10		16		12		2		5
K2KIR		5	16		12			5	39
W1HRJ	10		16		12				34
W2QC	10		16		12				34
W43PU	10		16		12				34
W4KUN	10		16		12				34
E51ZA	6	5		12		10		5	
W6LRU	10		12		12				31
W7JFY	10		16		12				31
K7JREH	10		16		12				31
W4BDUL	10		16		12				31
W4SZI	10		16		12				31
VE1IT	10		16		12				31
VE1RO	10		16		12				31
W4ZDHS	10	5	16			6			37
K2KDO	10	5		12	12		3	5	37
W43FMI	10	5	12			7	3		37

W70SO	10	5	16			6			37
W4TIG	10		16			6			37
W4ZY5	10	5	16						37
W4ARRA	10	5	4	12					36
W4SSC	10		16		3	2			36
W4FVL	10		16		9				35
W4EAD	10		16		12		3		36
W4JSM	10	5	16		12		3		36
W4QMJ	10	3	16		12				36
W7AX1	10		16		12			3	36
W4SRRH	10	4	8	12	6				35
8R1Y/W4	10	5	16		12		2		35
W4JKB	5	5		12	12				34
W4HJW	10	1	16		12				34
W4EFW	10		16		12				33
W4JHW	10		16		12				33
W2RUF	10		16		12				33
W3CES	10		16		12				33
W4APBG	10	5	16	12					43
W4PFD	10	5	16		12				43
W7DZX	10	2	16		12		3		43
W4TKOB	10	2	16		12				43
W8BALU	10	5	16		12				43
VE1AMR	10		16		12			5	43
W4JBJ	10	5	8	12	12		3		42
W4ZBH	1	5	8	4	12			3	42
W4TIO	10	2	16		12				40
W4TIRY	10	1	16		12				39
K1SXF	5	5		12	12				34
W4ZDQE	10	5	16		3				34
W4ZBS	10	5		12	12				34
W3NNL	6		16		12				34
W3MEX	4	5	16	3					33
W9PAN	10	5	4	12			2		33
K2DEI	5	5		12	12			3	32
W4QHRM	10	5	12						32
K2SIN	5	5	6	20					31
W6E1	5	5	6	20					31
W70H	6	5		20					31
W4JLB	10	5		12			3		30
W2ZT	10	5		12	3				30
W3EZZ	10	5		12	3				30
W4HYC	2	5	16		12				30
W4TBM	2	5		12	11				30
W7LBB	10	5	5	12					30
W4MHD	3	5	4	6			7		30

The following stations had points totals between 25 and 24 points. Beginning with the July issue of QST, only those PSNR claimants with totals 30 and above will be listed: 29: 08 W4ZDRH, K2KTK, K70W, K7WFG, W4SPH, W4QV5; 28: K1H1H, W4JY5, W4ZLP, K6YEV, W4AAU; 27: 38 W4TKL, W4ZBH, W200J, W4ZVY, W4Q10, W4Q1T, 38 W4QYV; 26: W1RUF, W4ZLDX, W4P7C, K4HEK, 38 W4ZCL, W4KR00; 25: W3CN, W6EOT, W7CAL, W4N1K. Category Key: (1) Checking into aw nets; (2) Checking into phone/RITY nets; (3) NCS aw nets; (4) NCS phone/RITY nets; (5) performing liaison; (6) legal phone patches; (7) making BPL; (8) handling emergency traffic; (9) serving as net manager.

On Feb. 7 while traveling five miles northwest of Billings, Mont., W7MBV discovered an accident involving a car and a truck. Using his mobile rig, W7MBV called for any Billings stations on frequency. K7CHA and W7RZY answered the call and although they were also mobile, they were able to stop at a telephone to contact police. After the police were advised, W7RZY and K7CHA continued on their way eventually arriving at the accident scene where they helped to direct traffic until the highway patrol arrived. K7CHA, who had heard the original transmission but was unable to answer immediately because his transmitter was turned off, stood guard on the frequency for any further messages. - W7RZY, SEC Montana.

After an outbreak of German Measles in the southwest corner of the state, Oklahoma officials decided on a state-wide inoculation in an effort to stem the outbreak which was reaching epidemic

proportions. It was soon realized, however, that communications for such a large operation would be difficult and amateurs were asked to lend assistance. At noon on Feb. 1, the Oklahoma Phone Emergency Net was activated with W4SESN acting as net control. W4SKFT was operating a station that had been installed in the state's department of health headquarters and many messages concerning distribution of the vaccine were handled. In some areas supplies of the vaccine were short while in others there were surpluses; amateurs were used to transport supplies and alleviate the shortages.

While the state-wide net operated, local nets in each of the three largest urban areas of the state were also doing their part. In Grant, Garfield and Kay Counties, the Enid Amateur Radio Club handled communications for the county health offices with more than fifteen amateurs taking part. The Enid repeater was used to great advan-

tage with WA5OWO carrying out liaison between this group and the net.

In Oklahoma City, more than thirty-seven members of the Oklahoma City VHF Club turned out for the operation using both the 6 and 2-meter bands. WA5EQW acted as liaison for the two meter net while W5GGB served the same function on six meters.

In Tulsa County at least sixteen amateurs took part, most of them using WA5LYT, the local repeater. W5OK, the Electron Benders ARC, was used as control station and also carried out liaison duty to OPEN. Operation in this area was directed by EC W5DFQ and his assistant K5ZCJ.

Nearly 200,000 children between the ages of one and eleven received inoculations during the campaign. Telephone lines serving as the normal communications medium for the department of health were soon overloaded and were all but useless. In some cases the state director spoke by phone patch to local authorities to expedite procedures. Eventually nearly all details of the operation were being carried out through amateur-supplied communications. — *WA5FSN, SEC Okla.*

During the month of December, forty-six SEC reports were received at headquarters, encompassing activity by 16,307 AREC members. This is a decrease of one report but an increase of 174 members from the same month last year. Sections reporting were: Ala, Alta, Ariz, Ark, Colo, Conn, Del, EFla, EMass, EPa, Ind, Iowa, Kans, Ky, La, La, Mar, Mich, Mo, Mont, Nebr, Nev, NMex, NLI, NNJ, NTex, Ohio, Okla, Ont, Org, Que, SDgo, SF, SCV, Sask, SC, SDak, SNJ, SFlax, Tenn, Utah, Wash, WVa, WFla, WNY, WPa.

A total of 515 SEC reports reached headquarters during 1969, a decrease of three from the previous year. More startling than the decrease in total reports, however, is the fact that reports were received from only 53 different sections during 1969 as compared with 55 in 1968 and 57 in 1967. This means, of course, that fewer SECs are reporting more often. This says a lot for a few people, but doesn't do much for you other guys. It's getting so it is nearly possible to do this report each month without bothering to keep a tabulation — the same sections are always represented. This is not to say we don't like having some SECs report all the time. We'd just like to hear from the rest of ya at least once in a while. Sections having records of twelve reports during 1969 are (figures in parenthesis are the number of consecutive years the section has had 10 percent reporting): EFla (18); SDak (10); Alta (8); Mo (6); Sask (5); Colo (4); EMass (4); Mont (4); Ark (3); Mar (3); Nebr (3); Que (3); SNJ (3); Utah (3); Nev (2); SCV (2); Tenn (2); WFla (2); Ariz, EPa, Ind, Iowa, Mich,

Members of the Marion (Ohio) ARC set up a message booth at the Southland Mall shopping center on December 13 and 20. A number of messages were handled but it was felt a larger number would have resulted had there been better publicity for the operation. Seated at the operating position, left to right, are WN8EGJ, WN8ECY, WA8QIX and W8TV, while WN8ECX, WA8POA and W8TSV look on from the rear.

### In Emergency . . .

Monitor your local emergency net frequency.

Make contact with your local EC or RO. Take immediate steps to follow any pre-arranged plans.

Stay off the air unless or until you are sure you can be of assistance.

In widespread emergencies, monitor WIAW for latest bulletins and news.

NMex, NLI, Ohio, SF, and SFlax. Those sections missing only one report during the year were: Ala, Conn, KKy and NTex.

### Traffic Talk

WB4GTS points out that ARL texts with non-existent numbers are still occasionally coming through, and can cause a lot of confusion. Case in point: messages containing ARL FIFTY ONE and ARL FIFTY FIVE. They are not on the current CD Form 3. What do they mean? What does a poor unsuspecting operator do when, having been asked ARL? and responded ARL, knowing that his trusty CD-3 is in his desk drawer, he finds that the ARL text given him is not on the form?

Well, this is what we get for fooling around with a more or less "fixed" list of texts. But everything changes and obsolete material can't be carried in the literature forever just because occasionally someone uses an obsolete form. What happened was that many years ago (must be at least five) form CD-3 was revised to eliminate eighteen of the numbered texts then on the list which were never or seldom used or which were just a different way of saying the same things said by other numbers. For example, how much difference is there between "Merry Christmas and Happy New Year" (ARL FIFTY FIVE) and "Wishing you a very Merry Christmas and a Happy New Year" (ARL FIFTY EIGHT)? So the former number was eliminated. Others were eliminated because the translation was hardly any longer than the text number — for example, "Wish you happiness" isn't much longer and a great deal easier, to send than "ARL THIRTY SEVEN." Altogether, 18 numbers were eliminated from the list, in order to make



room for the addition of 12 new numbers. *None of the old numbers was reassigned to a new meaning.* All the new texts were given new numbers, not previously assigned, to make sure nobody could deliver a wrong text. The new CD-3 also listed, at the bottom, numbers that had been eliminated, along with existing texts that could be substituted.

Then along came the military MTX numbers, which were adopted as standard ARL texts by agreement with the three MARS services. CD-3 had to be revised again, to add 12 meanings. Consequently, the cross-reference list was dropped.

The newest CD-3 was released in Sept. '69. Since it does not contain the cross-reference, and since what happened to WB4GTS could happen to you, we print the cross-reference list herewith. Clip it out and post it at your operating position — or, if you don't want to deface your QST, make a copy of it.

<i>Deleted ARL number</i>	<i>Substitute ARL number</i>
FIVE	THREE
EIGHT	SIX
TEN	ELEVEN
FOURTEEN	TWELVE OR SIXTEEN
SEVENTEEN	EIGHTEEN
THIRTY THREE	THIRTY TWO
FORTY FOUR	
FORTY FIVE or FORTY SEVEN	FORTY SIX
FIFTY ONE	FIFTY TWO
FIFTY FIVE	FIFTYEIGHT
FIFTY SEVEN	FIFTY SIX
SIXTY FOUR	SIXTY THREE
SIXTY FIVE	SIXTY THREE
SIXTY SIX	SIXTY ONE

*New subject:* Nice letter from S.C. SEC WA4ECJ talks about "shotgun" techniques in handling traffic. "The sending operator first transcribes his message on audio tape at a given standard speed, then plays it back at double speed. The receiving operator reverses the process, copying at the higher speed with playback at his leisure at the slower." Using this method, sez Dick, speeds of 240 wpm are easily attained.

He's speaking of voice transmission, no doubt. A few years back we handled traffic by this method with K6EWY, and later with WISMU, by cw. (What ever happened to those fellows, anyway?) It worked just fine. However, it doesn't really save anything but on-the-air time (it actually requires *more* operator time on cw), because the operator has to make the recording before he goes on the air, then send it on air, and the other operator has to receive it on the air and play it back later. If has the disadvantages of not being able to get "fills" if any part of the message is lost, but WA4ECJ says that reception is actually enhanced in the playback because the audio frequencies of interfering signals and QRN are cut in half. One other factor might be considered a drawback: both ends must have tape recorders and prearrange both the transmission and reception. On voice more on-the-air time can be saved than on cw, since the message may be transmitted at reading speed instead of writing speed.

Another procedure that might be useful on cw by using recording is to record relayed messages directly from the sending station and then relaying over your transmitter *using his fist*. Interesting? All you do is record the message on cw as it is being sent to you. When you relay it, you play the recording into a rectifying circuit that, either by

relay or electronically, keys your transmitter. Steady signals are required for 100% success in this, and often QRM or atmospheric or other electrostatic crashes will blot out something, but it's still a device which lazy (or glass-armed!) operators might occasionally use. — WTNJM.

BRASS POUNDERS LEAGUE					
Winners of RPT Certificates for January Traffic					
<i>Call</i>	<i>Qrg.</i>	<i>Dist.</i>	<i>Kct.</i>	<i>Del.</i>	<i>Total</i>
K0PPI	6074	1058	843	215	8190
W3DU	301	1446	1409	102	3258
W4HJAN	13	1907	1293	37	3740
W3ZBZ	1000	1022	963	3	2588
W7HA	7	981	915	59	1960
K6ONK	314	719	598	27	1768
W0YU	254	647	646	1	1548
W0ICX	12	768	657	23	1470
K3IFY	0	735	728	0	1463
K9EVA	0	691	800	12	1421
K8BHH	0	672	875	12	1317
W4GDXL	177	472	389	282	1260
K2KDJ	104	547	352	72	1175
W3MSY	47	502	306	120	1095
W3BFR	47	560	451	2	1009
W4MLX	114	399	497	27	1007
W3BML	15	457	479	2	1003
W4VNO	18	498	466	1	984
W4BPI	68	154	108	15	973
W4ZHM	154	374	360	12	900
W4DPH	3	493	441	75	850
W4VYS	177	329	302	19	807
W4BHH	15	388	483	0	790
K8JNE	3	375	317	20	720
W4VYAN	110	255	185	100	690
W4GFM	0	325	325	0	650
W4HLL	16	314	301	13	644
W4KXV	30	302	302	0	634
W4R01/4	94	281	273	2	620
L1ESG	22	277	277	41	617
W4B00	55	284	275	2	616
W4DLM	64	276	270	3	613
W4BRQ	37	294	257	25	605
W4KMKR	288	177	75	58	601
W4AVQ	7	489	395	10	601
W4MPX	114	303	162	14	594
W4ZAL	10	290	280	10	590
W4HOL	23	281	170	160	584
W7DVA	15	274	267	2	558
W4SCK	19	264	256	5	534
W4G0L	23	294	199	56	552
K6FSQ	3	281	19	290	552
K6QZ	27	254	241	27	529
W4BHO	22	267	240	3	532
W4PR	19	264	238	4	522
W4SHKR	3	260	227	19	511
W4R04	18	248	240	23	519
W4BHL	206	160	135	24	515
K0PPI	1	256	252	0	514
W7K7	18	251	238	2	514
W4S2I	19	251	243	2	513
W4FOU	0	251	250	1	508
W4EYV	50	225	178	45	507

More-Than-One Operator Station					
K3DEL	62	396	151	51	850
RPT for 100 or more stations plus delivery					
W4AVZ	206	W4BHT	141	W4ZGP	108
W4BHZ	205	W4LY	141	W40F	108
K0RS	199	W4BWI	137	W4ZFH	107
W4MMV	194	W4ZGW	137	W4YU	107
W4LBR	181	W4JN	137	W4JZC	108
W4ZHU	170	K7ITH	129	K8KMO	104
W4GMI	156	W4VYA	129	K5MA1	102
W4AMX	155	W4SPP	126	W4MKQ	100
W4B0L	158	K40MA	120	W4GMA	100
W4AN	155	W4SDW	119	Late Reports:	
W4H0U	153	W4JRE	116	W40PKA	(Dec) 111
K8ZD	151	W40C	111	W40ZP	(Dec) 110
W400D	144	W4MVV	110	W4DRH	(Dec) 100
		W4LEY	108		

More-Than-One Operator Station					
K4USH	240	K4HY	218	K200F	156
RPT. Millions (see July 1968 QST p.99) have been awarded to the following amateurs since last month's listing:					
W4P0L K0JMH					
The RPT is open to all amateurs in the United States, Canada and U.S. Possessions who report to their SCM a message total of 500 or a station originator 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 ARL form.					

National Traffic System W2FR reports things going very well on 2RN, at least representation wise. W9HRY says several people on 9RN are due for certificates but he is switching to a new method of issuing wallpaper and requests that operators be patient.

January reports

Net	Sessions	Traffic	Rate	Avg. Rep (%)
EAN	43	3292	1.590	76.6
CAN	43	2194	1.074	51.7
PAN	41	2258	1.255	53.7
IRN	74	1224	.720	16.5
2RN1	58	546	.744	9.4
3RN1	62	544	.435	8.8
4RN1	37	429	.414	9.5
RN5	76	1381	.531	18.6
RN6	80	1253	.507	15.7
RN7	62	741	.340	10.9
8RN1	58	501	.354	8.6
9RN	80	810	.464	10.1
TEN1	62	933	.586	15.0
TWN1	53	311	.306	5.9
Sections <sup>2</sup>	2178	16896		7.8
ICU Eastern	1913	1450		
ICU Central	1233	1022		
ICU Pacific	1603	1566		
Summary	3217	37348	EAN 15.8	
Record	3665	33538	1535 13.6	

11970 SET information not included.

2Sessions and local nets reporting (63%) QCEN, OSSB, BN, USN, Franklin Co., Central Ohio (Ohio)WMN (Mass.); CN, CPN (Conn.); PPTN, EPA, EPAEPTN (Pa.); NCN (Cal.); CN (N.C. and S.C.); MTN (Man.); WMN, WSSB (Mich.); PVTEN (N.J.); VSBN, VN, VFN (Va.); WIN, WSSN, WBSN, BWN, BEN (Wisc.); FCATN, KYN, KTN (Ky.); CGN (Colo.); ILN (Ill.); NLLPN, NYS (N.Y.); QKS (Kans.); TTN (Tex.); SSZ, OLZ (Okla.); BSN (Ore.); BUN (Utah); W, Que, VHP, MDCN (Md., D.C.); WSN (Wash.); OZK (Ark.); QIN (Ind.); GN, VEN, FMTN, FAST, FPTN, QFN, TPTN (Fla.); PTN (Me.); GSN (Ga.); GBN (Ont.); MSN, MSPN (Minn.); MSBN (Mass.); RISEN (R.I.); AENB, AENH, AENO, AER, AENT (Ala.)

3TCC functions not counted as net sessions.

Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Eastern	191	95.0	3993	1450
Central	123	92.9	2154	1022
Pacific	160	96.2	3132	1566
Summary	474	94.7	9289	4038

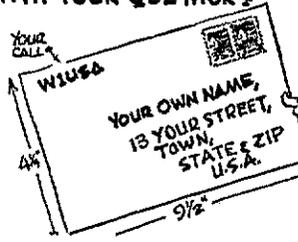
The TCC Roster: Eastern Area (W3EML, Dir.) - W1s BIG, NJM, WCG, YKQ, K1ESG, WA1JTM, W2s FR, GKZ, PU, QC, K2s KIR, RYH, WA2s CAL, HMO, ICU, UWA, W3EML, K3MVO, W4s NLC, SQQ, UQ, W7WST/4, W8s IXJ, UM, K8MKQ, W8SPOS, Central Area (W4LCC, Dir.) - W4OGG, K4AT, W5MI, W9s CY, VAY, WA9s RAK, VZM, W9s HI, INH, LCX, UCL, ZHN, K4AEM, WA6s DOU, IAW, MLE, RVR, Pacific Area (W6VNO, Dir.) - W6s HGF, HNX, EOT, IPW, VNO, VZT, WA6s LFA, ROF, WB6HVA, W7s DZX, KZ, GHT, WA7CLF, K0JSP.

Independent Net Reports

Net	Sessions	Check-ins	Traffic
Northeast Traffic	31	385	315
Clearing House	27	412	314
Mike Farad E&T	27	480	338
Eastern US	29	115	125
7290	41	1995	1063
Hit & Bounce	31	440	514
ECTTN	21	252	50
20 Meter SSB	21	447	4006



IS YOURS ON FILE WITH YOUR QSL MGR?



A. R. R. L. QSL Bureau

The function of the ARRL QSL Bureau is to facilitate delivery to amateurs in the United States, its possessions and Canada, of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped, self-addressed envelope, about 4 1/2 by 9 1/2 inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

Cards for stations in the United States and Canada should be sent to the proper call area bureau listed below. Recent changes are in bold face.

- W1, K1, WA1, WN1<sup>1</sup> - Hampden County Radio Association, Box 216, Forest Park Station, Springfield, Mass. 01108.
- W2, K2, WA2, WB2, WN2 - North Jersey DX Assn., PO Box 505, Ridgewood, New Jersey 07451.
- W3, K3, WA3, WN3 - Jesse Heberman, W3K1, RD 1, Valley Hill Rd., Malvern, Pennsylvania 19355.
- W4, K4 - H. L. Parrish, K4HX1, RD 5, Box 804, Hickory, North Carolina 28601.
- WA4, WB4, WN4<sup>1</sup> - J. R. Baker, W4LR, 1402 Orange St., Melbourne Beach, Florida 32951.
- W5, K5, WA5, WN5 - Kenneth F. Isbell, W5QMJ, 306 Kesterfield Blvd., Enid, Oklahoma 73701.
- W6, K6, WA6, WB6, WN6<sup>1</sup> - No. California DX Club, Box 11, Los Altos, California 94022.
- W7, K7, WA7, WN7 - Williamette Valley DX Club, Inc., PO Box 555, Portland, Oregon 97207.
- W8, K8, WA8, WN8 - Paul R. Hubbard, W8CXY, 921 Market St., Zanesville, Ohio 43701.
- W9, K9, WA9, WN9 - Ray P. Birren, W9MSG, Box 519, Elmhurst, Illinois 60126.
- W0, K0, WA0, WN0<sup>1</sup> - Des Moines Radio Amateur Association, PO Box 88, Des Moines, Iowa.
- KP4 - Alicia Rodriguez, KP4CL, PO Box 1061, San Juan, P.R. 00902.
- KZ5 - Gloria M. Spears, KZ5GS, Box 407, Balboa, Canal Zone.
- KH6, WB6 - John H. Uka, KH6DQ, PO Box 101, Aiea, Oahu, Hawaii 96701.
- KL7, WL7 - Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.
- VE1 - L. J. Fader, VE1FQ, PO Box 663, Halifax, N.S.
- VE2 - John Ravenscroft, VE2NV, 353 Thorncrest Ave., Montreal 780, Quebec.
- VE3 - R. H. Buckley, VE3UW, 20 Almont Road, Downview, Ontario.
- VE4 - D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.
- VE5 - A. Lloyd Jones, VE5JI, 2328 Grant Rd., Regina, Saskatchewan.
- VE6 - Karel Tetelaar, VE6AAV, Sub. PO 55, N. Edmonton, Alberta.
- VE7 - H. R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.
- VE8 - George E. Kondo, VE8 ARRL QSL Bureau of Department of Transport, Norman Wells, N.W.T.
- VO1 - Ernest Ash, VO1AA, PO Box 6, St. John's Newfoundland.
- VO2 - Goose Bay Amateur Radio Club, PO Box 232, Goose Bay, Labrador.
- SWL - Leroy Waite, 39 Hannum St., Ballston Spa, New York 12020.

<sup>1</sup>These bureaus prefer 5 x 8 inch or 750 manila envelopes.

QSL Bureaus for other U.S. Possessions and for other countries appeared on page 83, December 1969 QST, and will be repeated in the June issue.



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

SWITCH TO SAFETY!



# Happenings of the Month

## FCC PROPOSES NEW FEES

The Federal Communications Commission has issued a Notice of Proposed Rulemaking, Docket 18802, in which it seeks to raise application and license fees so as to recover the entire cost of its annual budget — some \$24,500,000 — from its licensees. The move (about which League Lines warned amateurs in November *QST*) was urged by both the Bureau of the Budget and the House Appropriations Subcommittee.

The Commission proposes these fees for amateurs:

Application	Present	Proposed
New, renewed, upgraded operator licenses	\$4	\$9
Modified-and-renewed	\$4	\$9
Modified only	\$2	\$4
Special calls under Section 97.51	\$20	\$25
Novices, RACES, Military recreation stations	no fee	no fee

There is a proposed general charge in the Safety and Special Radio Services of \$6 for duplicate licenses, but, at deadline, it is not entirely clear whether this charge is to be levied against the amateur service or not; at present, application for a duplicate license is made informally by letter, for which no fee is charged.

Fees in the Citizens Radio Service will be, if the new schedule is adopted, the same as the new fees for the business radio service, taxicab radio, etc.: \$19. Commercial radio operators in general, however, fare better than the rest of the services: no increases are proposed for first, second or third-class licenses. The lifetime Restricted Radiotelephone Operator permit will be raised from \$2 to a new rate of \$10, and \$2 fees have been added for verification cards (Form 758F) and for posting statement (Form 759).

On the other hand, under the proposed schedule, a construction permit for a new vhf television station in the "Top 50" market could cost \$5,000 for the filing fee and an additional \$45,000 if the permit is granted! Annual fees in the broadcast services would be based on the stations' own advertising rate cards — for radio, 24 times the highest 1-minute spot; for television, 12 times the highest 30-second spot rate. Minimum annual fee for radio would be \$52; for television, \$144. Other applications in the broadcast services would range from \$50 to \$250. Transfer of a license would start with a \$1,000 filing fee, followed by 2% of the sales price if the deal is permitted to go through.

Deadline for initial comments by any interested party is April 20, and replies to the comments of others must be filed by May 11, 1970. In an unusual move, the Docket states in advance that no extensions of the time for filing will be granted. The normal "original and 14 copies" procedure is specified, but in the past FCC has accepted comments of private individuals on a less-formal basis.

ARRL members wishing to express a view toward this docket should get in touch with their respective directors (see page 8) immediately.

## VIRGIL TALBOTT, W6GTE

We regret to report the sudden death on February 22 of Virgil Talbott, W6GTE, of Monterey Park, Calif., at the age of 57. Virgil was vice director from the ARRL Southwestern Division from 1957 through 1960 and 1963-1964; since then he has been assistant director. He has served as secretary of a great many radio clubs, and was secretary of the Federation of Radio Clubs of the Southwest in Los Angeles about 1934, when the Southwestern Division was created. Licensed since 1932, W6GTE was Extra Class and a member of the Los Angeles County Disaster Communications organization. He worked in the Los Angeles County Treasurer's office in charge of accounting, banking and investment functions. He'll be greatly missed in League affairs.

## GULFSTREAM SOCIETY OF AMATEUR RADIO OPERATORS, INC.



The South Florida Fair and Exposition at West Palm Beach was venue for this attention-getting exhibit by the Gulfstream Society of Amateur Radio Operators, Inc., January 24 - February 1. Left to right, Al Suhr, WB4AID, club president; James Johnson, W4JBZ, engineer-trustee; Tom Lindberg, WB4OPL, youngest General Class amateur in the club. Has your club tackled a project like this?

This issue of *QST* contains a report by the ARRL VHF Repeater Advisory Committee. It is complete with recommendations to the Board of Directors for proposals which might be made for modification of FCC rules specifically to authorize repeater operation. The purpose of publication is, by order of the Board, to seek comment prior to the annual meeting on May 1, at which time League policy will be established.

Then, as we started to press, the Commission issued its own proposals for modification of the rules for repeater purposes, and by some last-minute revision of the magazine makeup we carry that text also, as background against which to express your views.

### FOREIGN TIME COUNTS TOWARD EXTRA

The Federal Communications Commission has adopted two modifications to our rules which it proposed in Docket 18540 last May. Effective March 23, 1970, a citizen who can prove that he earlier held for two years or more the equivalent of a General Class license issued by another country is eligible to take the Extra Class exam. Up to now, only FCC-licensed time has counted toward the "apprenticeship" for Extra; even those who held U.S. Department of Commerce licenses prior to the formation of FCC in 1934 were not eligible until they had two years' time under an FCC ticket.

In a parallel move, amateurs holding FCC Extra Class licenses who can prove that they were first licensed by either the U.S. or a foreign government more than twenty-five years ago are now eligible (upon payment of the \$20 fee) for a two-letter call under Section 97.51(a)(5) of the rules as amended.

ARRL supported the rulemaking, and in addition, had asked that FCC broaden the docket to include reduction in the waiting period for Extra from two years to one; "grandfathering" the old Amateur Extra First Grade licensees to the present Amateur Extra; and at least "1 x 3" calls for any and all Amateur Extra Class licensees, regardless of tenure. In respect to these added requests by the League and some similar comments from individual respondents, the Commission said simply, "The foregoing suggestions are all beyond the scope of this proceeding and would require consideration in a separate rule making proceeding."

Accordingly, Section 97.9(a)(1) is amended to read:

(1) at any time prior to receipt of his application by the Commission has held for at least two years an amateur operator license of other than the Novice or Technician Class, issued by any agency of the United States government, or submits proof that he held for a period of two years an amateur operator license at least equivalent to a General Class license issued by a foreign government, or

and Section 97.51(a) to read:

(5) One unassigned two-letter call sign (a call sign having two letters following the numeral) may be assigned to a previous holder of a two-letter call sign, the prefix of which consisted of not more than a single letter. Additionally, a two-letter call sign may be assigned to an Amateur Extra Class licensee who submits evidence that he held any amateur radio operator or station license, issued by any agency of the United States government or by any foreign government, 25 years or more prior to the receipt date of an application for such assignment. Applicants for two-letter call signs are not permitted to select a specific assignment except in accordance with subparagraphs (1) and (2) of this paragraph.

Incidentally, credit for starting this ball rolling goes to D. R. Hearsom, W8LUZ, who made the original request in RM-1311 filed in May, 1968.

### THE ROUTE TO RULEMAKING

There has been much interest recently in the way the rules of the Federal Communications Commission are changed. Here's a brief summary, with a list of requests in the amateur field which await FCC action.

A rules change can be requested by any individual or group. The format is not necessarily important, but at the top there should be a statement that what follows is a request for rulemaking. FCC asks for an original and fourteen copies, but where requests are filed by individuals, this is not usually enforced to the letter.

The request should clearly state the exact rule or rules to be changed, and should offer language for the new version. Then the petitioner should give reasons for making the change.

Upon receipt of a request for rulemaking, FCC will assign an RM number; at this point the document "goes public" and may be supported or opposed by anyone. Technically, there's a time limit to these initial reactions, but in practice one may comment at any stage of the proceeding up to the deadline stated in the formal docket described below.

If the Commission finds merit in the idea, it may issue a "Notice of Proposed Rulemaking" carrying a docket number. The docket always states the date by which comments should be filed. If someone wants to react to someone else's filing he may do so within an additional time period allowed for "reply comments."

Alternatively, the Commission may consider a request with another RM already on file, or even dismiss it out of hand. The latter is most likely when a request for rulemaking comes within a year or so of a prior decision by the Commission to contrary effect.

The following RMs are on file with the FCC, and as of February 20 had not been acted upon (RM number, month filed, by whom, and the substance in a nutshell):

388 - 12/62 - K5JKX - providing amended rules for repeaters.

968 - 3/66 - San Diego County - Use of other than 220 MHz. to remotely control RACES stations.



Several years ago, George Grammer, W1DF, was asked by engineer friends at RCA what hams would like to have in the way of a new tube. His specs later emerged in the famous 6146. The five millionth 6146 was pulled off the assembly line a few months ago, plated with gold, and mounted on a plaque as a retirement gift for GG. Here, making the presentation on behalf of all the hams in RCA, is George Hanchett, W2YM (left).

- 1087 - 11/66 - Texas CD - mobile relay on 144, 220, 420 MHz.
- 1116 - 3/67 - Calif CD - RACES rules, control of non-amateur licensees.
- 1209 - 10/67 - W2EAP *et al* - "Buffalo" repeater petition.
- 1306 - 5/68 - K2UTC - expand 10-, 15-, and 20-meter phone.
- 1346 - 8/68 - K3MGO/K3MNI - senior citizens license.
- 1349 - 9/68 - Radio Club of Puerto Rico - expand phone privileges for KP4 licensees.
- 1363 - 10/68 - K2ZRO - "Advanced" Technician license.
- 1392 - 12/68 - W8SDZ - higher RTTY speeds, of 60, 75 and 100 wpm.
- 1429 - 3/69 - WA8DCE - permit F-4 at 144 MHz.
- 1454 - 5/69 - K1KTB - allow Techs to use cw 80 through 10 meters.
- 1455 - 5/69 - W2NSD - counterpart call signs.
- 1456 - 5/69 - W2NSD - permit Techs to have same cw privileges as Novices.
- 1477 - 9/68 - W2CNO - expand phone bands for DX QSOs only.
- 1478 - 4/69 - W6PQH - permit 40F2 (for afsk) on 144 & 220 MHz. in RACES rules.
- 1497 - 5/69 - W3JM - expand phone bands.
- 1512 - 9/69 - W5JGV - 800 watts output above 420 MHz.
- 1516 - 10/69 - WA6FNR - Techs to have privileges on 21 MHz. Novice band.
- 1520 - 9/69 - W3KMV - divide restricted portion of the 6-meter band into cw and phone segments.
- 1521 - 10/69 - K1KRL - Cw privileges for Techs in the hf bands.
- 1526 - 10/69 - W3BWU - privileges for Techs in the cw portion of 10 meters.
- 1535 - 11/69 - ARRL - Tech privileges in 29.5-29.7 and 144-148 MHz; dual holding of Novice and Tech licenses.

- 1536 - 11/69 - ARRL - counterpart call signs.
- 1538 - 11/69 - WB2LRS - permit teleprinter speeds of 60, 67 or 100 wpm.
- 1542 - 12/69 - K6MVH - new repeater rules.
- 1544 - 11/69 - W9HIF - restrict 7200-7225 and 14200-14250kHz to Extras or permit phone at 14150-14200 only by Extras.
- 1550 - 1/70 - WA1LJJ - expand phone 80 thru 15 meters by 50 kHz, half for Extras, half for Advanced.
- 1568 - 2/70 - W8WEF - Techs get privileges of Novice in hf bands.

#### BOARD MEETING ON MAY 1

The Board of Directors of The American Radio Relay League, Inc., will hold its annual meeting on May 1, 1970, at Hartford, Conn. One subject will be the election of a president, first vice-president, additional vice presidents, secretary and treasurer for the coming two years. Proposals for changes in FCC rules and the setting of League policy in many areas of interest may be topics for the meeting.

The directors will start arriving at Hartford as early as Tuesday, April 28, for informal consultations with Hq. staff and other directors, inspection of the premises and financial records, and the like.

Do you have ideas you'd like presented at this meeting? Get in touch with your own director (see page 8 of this and every issue of *QST* for name and address) before he heads east for the meeting.

#### GEORGE GRAMMER RETIRES

George Grammer, W1DF, Technical Editor of *QST* since 1939, retired on January 31, 1970, but took with him a briefcase full of special projects to be done without the pressures of the alarm clock and the telephone hell.

George was first licensed as a youngster in Philadelphia, with the call 3A1H. He graduated from Drexel Institute in 1926, and three years later took over the ARRL Technical Information Service. On the strength of such articles as "A Single Control Transmitter" in the December 1929 issue, GG became assistant technical editor in May 1930.

War-time years were spent in classified technical work. Back on the job at ARRL, George was called to testify at an FCC hearing on television: channel 1 vs. channel 2, the potential for TVI and so on, receiving the rare accolade of applause from other technical people waiting to testify in the decorous atmosphere of a hearing chamber.

About this time under W1DF's perceptive direction, *QST* began exploration of such relatively-new techniques as fm and ssb. In recognition particularly of the ssb work under his direction, the Institute of Radio Engineers (now the IEEE) elected him a Fellow in 1959. Just recently, George became a Life Member of IEEE.

In addition to his work as technical editor of *QST*, GG is author of *A Course in Radio Fundamentals* and *Understanding Amateur Radio*, and wrote the *QST* series, "Those Higher Class Examinations" which ran from March through August 1968.

Radio astronomy and music are among his outside interests, for which he'll hopefully have more time in retirement. We wish him all the best!

## DOUG DE MAW, WICER, ACTING T.E.

M. F. "Doug" De Maw, WICER/W8HHS, has been appointed Acting Technical Editor of *QST*. He's been an assistant t.e. since 1965, but probably has gained more recognition as editor of *The Radio Amateur's Handbook* for the 1968 and later editions. Doug received a BSEE degree from Lawrence Institute of Technology, Michigan, in 1949, and got his amateur license in 1950, using all bands from 1.8 through 432 MHz. A builder right from the start, Doug spent three years as editor and publisher of the *VHFer*. He's been the author of some 45 *QST* articles ranging all over the lot from hand-held QRP rigs to kilowatts to direct-conversion receivers to noise-blankers to attenuators to helical beams to you name it.

Doug shares the hobby with wife Jean, W1CKK, and son Douglas, WN1LZQ.



WICER

## LICENSE PLATES IN FLORIDA

From George Thurston, W4MLE, and *Florida Skip* comes word that a bill, HR-1121, has been introduced into the Florida legislature which would make call sign license plates available to licensees in the Citizens Radio Service as well as the amateur, at a charge of \$5 extra for either service (as opposed to the \$1 extra fee now charged hams). The framers predict that 100,000 to 150,000 tags will be issued to CBers as a result! (There are about 860,000 CB licensees in the whole country; our guess is between 30,000 and 35,000 in Florida, of which perhaps a quarter to a third would seek the plates.) The Department of Motor Vehicles estimates that 17 employees would have to be added and the program would cost \$86,000 the first year!

Needless to say, Florida amateurs should get in touch with their state legislators to express their views on the fee increase.

## WS BUREAU CHANGES HANDS

Hurley O. Saxon, K5QVH, of El Paso, Texas, has resigned as ARRL QSL Manager for the 5th call area, a post he has filled with high efficiency since 1966. The QSL Bureau will now be operated

by Kenneth F. Isbell, W5QMJ, 306 Kesterfield Blvd., Enid, Oklahoma 73701. Amateurs in the 5th call area should be sure they have business-size envelopes on file with their *current* address in the center, *current* call signs in the upper left hand corner, and one to three 6-cent stamps in the upper right.

## MINUTES OF EXECUTIVE COMMITTEE MEETING

No. 329

February 18, 1970

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met in the Executive House, Washington, D.C., at 9:30 A.M. February 18, 1970. Present: President Robert W. Denniston, W0DX, in the chair; Directors Victor C. Clark, W4KFC, Charles G. Compton, W0BUO, Harry J. Dannels, W2TUK, and Noel B. Eaton, VE3CJ; and General Manager John Huntoon, W1LVQ. Also present were West Gulf Division Director Roy L. Albright, W5EYB, New England Division Director Robert York Chapman, W1QV, Atlantic Division Director Harry A. McConaghy, W3EPC, and General Counsel Robert M. Booth, jr., W3PS.

On motion of Mr. Eaton, affiliation was unanimously GRANTED to the following societies: Aviation Radio Club, Columbus, Ohio; Benton County Amateur Radio Club, Keystone, Iowa; Carteret High School Amateur Radio Club, Carteret, N.J.; Chico High Communications Club, Chico, Calif.; Clearwater Valley Amateur Radio Club, Orofino, Idaho; Cloquet Senior High Amateur Radio Club, Cloquet, Minn.; Explorer Post 6 Amateur Radio Society, Norristown, Pa.; F. D. Roosevelt High School Amateur Radio Club, Hyde Park, N.Y.; Hackensack High School Amateur Radio Club, Hackensack, N.J.; JYC Amateur Radio Association, Philadelphia, Pa.; Lawrence Central High School Amateur Radio Club, Lawrence, Ind.; Livingston High School Amateur Radio Club, Livingston, N.J.; Madera County Amateur Radio Club, Madera, Calif.; Northwest Florida FM Association, Inc., Fort Walton Beach, Fla.; Pioneer Amateur Radio Club (H.S.), Normal, Ill.; Port Byron Central School Amateur Radio Club, Port Byron, N.Y.; Redwood High School Amateur Radio Club, Larkspur, Calif.; Southeast College Radio Club, Chicago, Ill.; Stu Rockafellow Amateur Radio Society, Plymouth, Mich.; Tri-State Amateur Radio Club, Keokuk, Iowa; Twin State Amateur Radio Club, West Lebanon, N.H.; West Virginia Wesleyan College Amateur Radio Club, Buckhannon, W.Va.; Yadkin Valley Amateur Radio Club, Albemarle, N.C.

On motion of Mr. Eaton, after discussion, unanimously VOTED that the question of the status of affiliation of high school and college radio clubs be considered by the Membership & Publications Committee and a report made to the 1970 annual meeting of the Board of Directors.

On motion of Mr. Dannels, unanimously VOTED to grant approval for the holding of a Rocky Mountain Division Convention at Estes Park, Colo., on June 13-14, 1970; a West Virginia State Convention at Jackson's Mill on July 4-5, 1970; and a West Gulf Division Convention at Orange, Texas, on July 18-19, 1970.

On motion of Mr. Compton, unanimously VOTED to confer Life Membership upon the following:

George H. Abbott, W1UBH; John Adel, W5RR; Asa W. Adkins, jr., K4KV; John A. Attaway, K4IIF; Leland W. Aurick, K3QAX/W2QEX; Everett E. Ballard, WA4AGJ; Albert J. Balusek, W5SAH; C. Terry Beeler, W4FUI; Charles R. Bender, W1WPR; Walter P. Bernadyn, W2FPM; A. Douglas Berry, K7SMW; William S. S. Braithwaite, VE3-FWM; William G. Buckner, W0VZK; Wiley C. Bunn, W4WWF; Edgar A. Cantelon, W8CV; J. I. Carlton, W4JHC; Vincent M. Chinn, K6KQN; James S. Clagett, K0OTH; Robert A. Coburn,

WIJO; Bruce I. Coggins, K1ISJ; Zachary Cohen, WA6OHN; John T. Conniff, K5GDU/6; Allan B. Culbert, K0YVU; Roy C. Dolley, WB6VGA; Bonnie Blake Drucker, WB2HOK; Redford C. Fleming, W8CA; Donald K. Galbraith, WB6YVW; Kenneth G. Garner, WA2ZXU; Sheldon J. Gath, WB6GGS; Michael K. Gauthier, K6ICS; William A. Gianoukos, W1AZH; R. L. Hauser, W7KDP; Paul Ralph Herndon, jr., K5KDL; James R. Hill, K6OZL; Ronald L. Holt, K3RHA; Jay H. Howell, W7PSW; Robert H. Johnson, WA6PVW; Philip M. Kane, W6VQM/K2ASP; Jonathan L. Kirkman, W4WDH; Charles O. Klawitter, W9VZR; James K. Landers, WB2DIA; Richard P. Lane, III, W4QQG; Francis LeBaron, jr., W1TQZ; Frank I. Lester, W2AMJ; Ben Letson, W4BGO; Thomas F. Lindsley, K2DPG; Howard O. Lorenzen, W3BLC; George F. Marts, W0TDH; George F. McIntosh, W9FXK; J. T. Miller, WB6VZW; Harry H. Minehart, III, WA1-HWS; Henry W. Moddison, K6DOW; Arthur M. Monsees, W4EXM; Joseph I. Moran, W4GLW; Charles P. Nadler, WB4GWN; Stanley F. Niedermeier, W8YIQ; Richard J. Ostrowski, K2QDN; George E. Perrine, W9K0I; John S. Phillips, KL7FSY; Alexander M. Pontus, W2FCR; A. D. Prickett, W4CKS; Michael M. Raskin, K4KUZ; Arthur G. Reterstoff, W7PRA; Robert M. Richardson, W4UCH; George A. Ross, WB2UOD; Gerald LeRoy Sacks, WA3EJR; James K. Sattgast, WAD-PSG; William E. Scholtz, jr., W3HXF; E. E. Scott, K5PVT; R. Dean Sever, K8RXD; Roy T. Shelo, W0TWZ; Saul N. Silbert, WB2GWP/TKL; John J. Slough, K4ZLE; Tony P. Smaker, jr., KL7JDO; Robert H. Strid, WB4GFD/W1RUU; Joseph J. Sundra, W3ZLP; James M. Talens, K3MNNJ; Eugene T. Turney, jr., WN4OSZ; William L. Twining, K1KFP; Marshall D. Welch, jr., W3BJJ; John M. Wells, W1ZD; Louis A. Williams, jr., W8INL; Donald M. Williams, sr., K5JLV; Theodore A.

Winkel, WB9AHJ; Allen M. Hagen, W7HDD; Melvin M. Schwartz, WA4BVX; Joan H. Middleton, W4WFD.

The Committee recessed at 12:10 P.M. for luncheon and for informal discussions with Messrs. Henry and Grenfell (W3BG and W4GF) of the Amateur & Citizens Radio Division of the Federal Communications Commission, reconvening at 3:50 P.M.

The Committee next examined a draft of a pamphlet of background information to be provided candidates for elective office in the League (director, vice director, SCM) and, after discussion and minor editorial revisions, on motion of Mr. Clark, unanimously VOTED to proceed with its preparation.

Mr. Chapman reported briefly on the progress of his special committee drafting Articles & By-Laws for the ARRL Foundation; on motion of Mr. Eaton, unanimously VOTED to authorize the expenditure of up to \$1000 for further activities of the committee, including legal consultations.

Mr. Chapman also reported briefly on the progress of plans for the 1970 ARRL National Convention in Boston, Mass., September 25-27.

The Committee, at the request of the President, next undertook an examination of procedures at meetings of the Board of Directors, for the purpose of carrying out the action of Minute 21 of the 1969 special meeting.

In the course of its meeting the Committee discussed, without formal action, the progress of incentive licensing, a possible increase in FCC license fees, and distinctive QSL cards for directors.

There being no further business, the Committee adjourned, at 5:50 P.M.

JOHN HUNTOON  
W1LVQ Secretary



April 1945



April 1920

... The cover picture is of the AAF information center on Bougainville in the South Pacific. The walls are of sandbags — and a lot of people stripped to the waist, are hard at work around huge tables of charts. Of considerable interest is a sign which says, "Think before you transmit." I think that this is applicable today.

... Editor Warner talks about Tropospheric DX, commenting on the experiments of Ross Hull and others on five meters. He notes the lack of this sort of DX on 112 Mc but attributes this to poorer equipment rather than to propagation effects. He predicts that when technology catches up with that on 56 Mc, the 112-Mc boys will do better than those on 56. We will see.

... Quite a few advanced amateurs are fiddling around with TV these days and Elliot B. Henry, W9FEN, has a comprehensive piece on "Practical Design" of Video Amplifiers." bridging the gap between basic theory and practical circuitry. Enough math is included so that the reader can find out how it really works. This is Part I.

... The Mallory Company announces a new type dry cell, using mercury. It is compact and requires no "breathing space." 72 cells give 94 V.

... Clinton B. Desoto, W1CBD, Editor of QST, starts a new series on radar techniques. For those of you who don't quite know how this works, even now, you might profitably read this fine article.

— W1ANA

... L. M. Clement was largely concerned with the development of the vacuum tube at Western Electric Company during the war and here presents an authoritative paper on the subject, complete with diagrams, circuits and discussions. Real basic information, first presented to the Radio Club of America.

... S. Kruse, an assistant Engineer with the Bureau of Standards, later to become Technical Editor of QST writes entertainingly on Radio Lighthouse Keeping. This a very good yarn, indeed.

... E.V. Duvall describes a motor generator for supplying plate voltage to an audion. It is low power, but does away with the need for troublesome batteries. The set-up includes a ripple filter.

... M.B. West, 8AEZ, has some Notes on Improving Transmission. He is talking spark, of course, and tells just how he adjusts his set. His results bear out his technique. For highest output, with given input power, one must have a coordinated set of components.

... For those of you who are "Old Man" fans, here is another "rotten" story, this time about relays. He is in good form. He is already talking about "old timers"—even in 1920. "Radical" is brought in, but not "Final Authority." We'll hear more about them, I'm sure.

... The Editor now urges all amateurs to experiment with cw and get going on it. He thinks it's the coming thing. So right.

W1ANA

# FCC's Repeater Rules Proposals

Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554  
In the Matter of

Amendment of Part 97 of the Commission's Rules concerning the licensing and operation of Repeater stations in the Amateur Radio Service	)	DOCKET.
	)	No. 18803
	)	RM-388
	)	RM-1087
	)	RM-1209

## NOTICE OF PROPOSED RULE MAKING

By the Commission; Commissioner Cox concurring in the result.

1. The Commission has under consideration a joint petition filed by James W. Kyle, Jr., Robert B. Cooper, Jr., and Russell L. Miller, (Kyle) (RM-388) and petitions filed by the State of Texas, Division of Defense and Disaster Relief, (Texas) (RM-1087), and the Buffalo Amateur Radio Repeater Association (BARRA), (RM-1209), for rule making in the above-entitled matter. All petitioners proposed that the Commission amend its rules to specifically provide for the operation of amateur stations which would automatically repeat the transmissions of other amateur stations. Comments supporting the Kyle petition were filed by Arizona Amateur Radio Society. Comments supporting the BARRA petition were filed by Electronics Industries Association; Tulsa Repeater Organizations, Inc., and Rocky Mountain VHF Society, Inc.

2. A repeater station, as the term is used herein, is an amateur station which receives and automatically retransmits radio signals primarily for the purpose of extending the communication range of mobile units. Repeater stations are particularly useful on VHF bands where reliable communication is generally over relatively short distances. Although the present rules do not specifically refer to repeater stations, under policies that have been developed, amateur stations licensed to persons holding a Technician or higher class licenses have been permitted to operate as repeater stations consistent with the rule permitting remote control and other rules applicable to all amateur stations. The present rules require, among other things, that the licensee be present at the transmitter or at an authorized control point when the station is in operation; that remote control points must be at fixed locations designated on the station license; that all emissions of the remote transmitter must be monitored by the licensee; and that the operation of the station must be under the positive supervisory control of the licensee, i.e., it must be possible for him to suspend the radiation of the transmitter regardless of any control signals transmitter by another user station for the purpose of gaining access to the repeater. The station licensee is also required to comply with the logging and station identification requirements applicable to the usual amateur station. In response to the petitioners requests, the Commission proposes to amend its rules to specifically provide for the operation of amateur repeaters.

3. Since the operator of each station using a repeater is required to maintain a log of his transmissions, and the duplication of the

information in the repeater log would serve no useful purpose, it is proposed that the repeater log include only the time and date of the periods the repeater is available for service, and entries indicating the technical and operational condition of the repeater. It is also proposed to amend the present identification rule to permit automatic identification of repeaters by telegraphy at intervals not to exceed three minutes.

**FLASH!** — Just at press time the Federal Communications Commission issued a Notice of Proposed Rulemaking to govern amateur repeater operation. The action would amend Part 97 of the rules to liberalize some aspects of current repeater activity and tighten others. Relaxation of logging requirements to only day and time period of operation is proposed, plus the basic data on technical and operation conditions. Automatic identification at intervals of 3 minutes or less is to be permitted. Requests for unattended transmitter operation, however, are denied; the Commission wants supervisory control by the licensee over repeater operation, with control and monitoring directly or by radio. FCC proposes to limit repeater operation to above 50 MHz, 600 watts maximum, no cross band, no "chain" repeaters or multiple outputs, and activity restricted to subbands for input (52.5-52.7, 146.3-146.6, 223.1-223.3 and 447.7-448.9) and for output (53.0-53.2, 146.9-147.2, 224.1-224.3, 449.1-449.3) and anything above 1215 Megs. "Whistle-on" or other coded access is to be required. Comment deadline is May 15.

There are some separate yet quite important changes proposed in other aspects of our rules, almost as if they were purposely buried to escape notice. There is a redefinition of power limits, particularly as concerns sideband and grounded-grid amplifier aspects. FCC proposes to put an end to the which-call-to-sign hassle by writing into the regulations the 180° switch in interpretation they surprised us all with several years ago. The striking of language from Section 97.89 which currently and specifically authorizes experimental one-way transmissions for technical investigations would seem, on first reading, to outlaw beacon stations (including Oscars), radio control of model aircraft, etc. But the text is extensive and deserves careful evaluation by all active amateurs.

Please, prior to May 1, express your conclusions to your League director (address page 8) so he may be fully equipped to represent you at the annual meeting.

4. With respect to the operator and monitoring requirements, BARRA proposed that an amateur repeater station be permitted to operate without an operator in attendance at the transmitter or at an authorized control point. In support of its proposal, BARRA stated that since a repeater does not originate communications, the responsibility for communication content should be placed solely on the licensee of the station using the repeater, because he is responsible for the propriety and content of any signals transmitted by his station. The licensee of the repeater would then be responsible only for the technical operation of his station. Section 310(b) of the Communications Act requires, in effect, that the licensee of a station maintain supervision and control of both the technical and operational performance of his station. Accordingly, it is proposed herein to continue to require the licensee of a repeater station to be in attendance at the transmitter or at an authorized fixed control point, and to monitor all transmissions of the station.

5. Because of the shared use of amateur frequencies, equipment limitations which may preclude monitoring the repeater input frequency, and the inability of repeater users to observe activity on the repeater output frequency throughout the area served by the repeater, consideration must be given to the interference potential of repeaters to amateurs operating on the same and adjacent frequencies. The proposals set forth below should tend to minimize interference between stations, but not unduly inhibit the growth of a useful repeater system.

6. The propagation characteristics of the amateur bands below 50 Mc/s are such that mobile stations and stations at fixed locations can communicate over short, medium, and long distances on those frequencies without recourse to repeaters. In view of this, there is no apparent need for retransmission on frequencies below 50 Mc/s or for multi-hop repeater systems on frequencies above 50 Mc/s. Accordingly, it is proposed to permit the operation of repeaters only on frequencies above 50 Mc/s and limit the automatic relaying of communications to a single retransmission. It is also proposed to adopt the recommendations of Kyle and BARRA that a repeater be so designed and installed that it will normally be activated only by means of a coded signal or such other means as will effectively exclude transmissions by stations not desiring to work through the repeater, thus minimizing unnecessary transmissions and the possible resulting interference. The required coded signal may consist of a single audio tone so that the repeater can be easily "whistled on."

7. To further minimize interference, and in the absence of any apparent need, the simultaneous retransmission by a repeater in two or more bands of the same received signal will not be permitted, nor will cross-band operation, that is receiving in one band and transmitting in another, be permitted. It is also proposed to specify frequency subbands in the 50, 144, 220, and 450 MHz bands, for repeater input and output. It is believed that by restricting repeater operation to specific portions of the amateur bands a more useful and uniform system will result, and interference to the operation of stations not transmitting through repeaters will be minimized. The proposed frequency subbands are tentative in that they may be adjusted within the band if comments received indicate a need for such adjustment.

8. It is proposed to limit the power input to repeaters to 600 watts. This is consistent with the maximum power permitted in the land mobile services and is believed sufficient to provide reliable communications within the range of mobile units. Also, the rule sections relating to operator requirements and station identification have been revised to codify present Commission requirements.

9. The specific rule changes proposed herein are set forth in the attached Appendix. Authority for these proposed amendments is contained in Sections 4(i) and 303 of the Communications Act of 1934, as amended.

10. Pursuant to applicable procedures set forth in Section 1.415 of the Commission's Rules, interested persons may file comments on or before May 15, 1970, and reply comments on or before June 1, 1970. In accordance with the provisions of Section 1.419(b) of the Commission's Rules, an original and fourteen copies of all statements, briefs, and comments filed shall be furnished the Commission. All relevant and timely comments and reply comments will be considered by the Commission before final action is taken. The Commission may also take into account other relevant information before it, in addition to specific comments invited by this notice.

FEDERAL COMMUNICATIONS COMMISSION.  
Ben F. Waple, Secretary

#### APPENDIX

1. In 97.3, a new paragraph (i) is added to read as follows:

##### 97.3 Definitions

\* \* \* \* \*

(i) *Amateur Repeater Station.* An amateur station at a specified fixed location used to automatically retransmit signals of other amateur stations.

2. Section 97.41 is amended by adding a new paragraph (b) as set forth below, and redesignating former paragraphs (b) and (c) as (c) and (d).

97.41 Application for station license.

\* \* \* \* \*

(b) Each application for a remotely controlled station shall be filed on FCC Form 610 or FCC Form 610-B, as appropriate, and must include a supplementary statement giving the address of the remote control point and indicating whether control will be by wire or radio. If remote control is by radio, complete information must be furnished showing how the transmitter is controlled and what means will be used to prevent unauthorized operation of the transmitter. Data on control frequencies, the function of all relays, timing devices used for control, directional transmitting and receiving antennas in the control system, and other pertinent details must be included.

\* \* \* \* \*

3. A new 97.42 is added to read as follows:

97.42 Station location.

Every station must have a fixed transmitter location. Only one fixed transmitter location, which will be designated on the station license, will be authorized unless the station is authorized to be operated by remote control.

4. Present 97.43 is deleted and new 97.43 is added to read as follows:

97.43 Remote Control of an Amateur Station.

(a) Remote control of an amateur station other than an Amateur Repeater Station from a point or

points specified on the station license may be authorized provided:

(1) The remote transmitter is so installed and protected that it is inaccessible to unauthorized persons.

(2) That in addition to complying with 97.85, a photocopy of the Amateur Station license is posted in a conspicuous place at the remote transmitter location.

(3) The emissions of the transmitter are continuously monitored at the control point.

(4) The radiation from the transmitter can be immediately suspended from the control point when there is any deviation from the terms of the station license or the requirements of this part.

(5) The station is so designed and installed that the transmitter can be activated only from the authorized fixed control point.

(6) That if remote control is by radio, the control link is direct, without intermediate relay.

(7) That if remote control is by radio, the control transmitters operate on frequencies within a band above 220 Mc/s.

(8) That if remote control is by radio, a timer is provided to automatically limit transmission to a period of three minutes in the event of failure of the radio control link, capture of the control receiver by an undesired signal, or other technical malfunction.

(b) Remote control of an Amateur Repeater Station may be authorized provided:

(1) The installation and operation of the station complies with paragraph (a) of this section.

(2) The station is provided with an automatic timer to limit a single uninterrupted transmission to a period of not more than three minutes. This circuit may be so designed that it will automatically reset but will not permit use of the transmitter until receipt of a properly coded signal.

(3) The station is so designed and installed that overriding control of the station is maintained from an authorized remote control point.

(4) The station is so designed and installed that the transmitter can be used only upon receipt of a coded tone signal after the transmitter has been activated from the control point.

(5) The station is so designed and installed that the transmitter will be silenced within five seconds after cessation of the output of its associated receiver.

5. In 97.61, the introductory text of paragraph (a) is amended, and a new paragraph (c) is added to read as follows:

97.61 Authorized frequencies and types of emissions.

(a) Following are the frequency bands and associated emissions available to amateur stations, other than Amateur Repeater Stations, subject to the limitations stated in paragraph (b) of this section and 97.65. Frequency bands available to Amateur Repeater Stations are shown in paragraph (c) of this section.  
\* \* \* \* \*

(c) Amateur Repeater Stations must receive and transmit in the same frequency band. Simultaneous transmission in two or more frequency bands is not permitted. The following frequency bands and the emissions authorized in those bands in paragraph (a) of this section are available for Amateur Repeater Stations:

<i>Input (Receiving)</i> <i>Mc/s</i>	<i>Output (Transmitting)</i> <i>Mc/s</i>
52.50 - 52.70	53.00 - 53.20

146.30 - 146.60	146.90 - 147.20
223.10 - 223.30	224.10 - 224.30
447.70 - 448.90	449.10 - 449.30

Any amateur frequency above 1215 Mc/s

6. Section 97.67 is revised to read as follows:

97.67 Maximum authorized transmitter power.

(a) Transmitter power is the d.c. power input to the final r.f. amplifier. If the final amplifier is of the r.f. grounded-grid or r.f. grounded-base type, the transmitter power also shall include the d.c. power input to the stage which immediately precedes the final r.f. amplifier.

(b) Except as limited by 97.61(b) transmitter power shall not exceed:

(1) 600 watts for transmitters used at Amateur Repeater Stations;

(2) Two kilowatts for single sideband radiotelephone transmitters and other amplitude modulated radiotelephone transmitters using reduced, suppressed, or controlled carrier when measured during maximum peaks of modulation;

(3) One kilowatt for all transmitters other than those covered by subparagraphs (1) and (2) of this paragraph.

(c) Equipment capable of operation with transmitter power in excess of 90 percent of any applicable power limitation shall have installed a means for accurately measuring transmitter power.

7. Section 97.79 is revised to read as follows:

97.79 Operator Requirements.

(a) An amateur station may be operated only by a person holding a valid amateur operator license issued by the Federal Communications Commission and only in the manner and to the extent provided by the class of license held by the operator or the station licensee, including the trustee of a club station, whichever is the lesser.

(b) The licensed operator required by paragraph (a) of this section must be on duty at the transmitter location or at an authorized control point.

(c) An amateur station licensed as a military recreational station may be operated only in the manner and to the extent provided by the class of amateur license held by the person operating the station.

(d) When an amateur station is used for telephony or radioprinter transmissions, any person may transmit by voice or teleprinter, provided a licensed amateur operator is present at the operating position, continuously monitoring the transmissions and maintaining supervisory control of the station, including turning the carrier on and off for each transmission and signing the station off after communication with each station has been completed.

8. In 97.87, new paragraphs (e) through (h) are added to read as follows:

97.87 Station identification.

\* \* \* \* \*

(e) In lieu of the requirements of paragraph (a) of this section, an Amateur Repeater Station may be automatically identified by radiotelegraphy at intervals not to exceed three minutes by keying on audio tone superimposed on the voice transmissions. The code speed shall not exceed 20 words per minute, and the modulation level shall be sufficient to be readable through the voice transmissions.

(f) A station licensed to an individual may be identified by its assigned call only when operated by or under the immediate supervision of the station licensee. If the station licensee, who is the

(continued on page 112)

# ADVISORY COMMITTEE PROPOSES FCC RULES CHANGES

IN the slightly more than a year of its existence, the ARRL Advisory Committee on VHF Repeaters has been hard at work on recommendations for changes in the FCC rules, to clarify amateur radio repeater licensing and control. Such operation is presently licensed and administered under FCC rules governing remote control, in which there is no specific mention of repeater stations. This has led to much confusion on the part of amateurs interested in setting up repeater systems.

The suggested rules changes in the following report can be understood completely only if studied in conjunction with relevant excerpts from FCC's amateur radio regulations. The necessary information is given in every edition of *The Radio Amateur's License Manual*, an ARRL publication available everywhere. In the current (63rd) edition, the required excerpts begin on page 74, under Part 97.3, "Definitions."

The Advisory Committee is your channel to ARRL on repeater matters. The committee roster, with biographical data on each member, is given in *QST* for February, page 62. Comment from the repeater fraternity is solicited, and may be sent to any committee member, to your ARRL Director, or to League headquarters. — *WIHDQ*.

## Report of the V.H.F. REPEATER ADVISORY COMMITTEE

The VHF Repeater Advisory Committee selected as its first task the creation of a proposed set of FCC rules changes. The committee used several existing rule change proposals as a starting point, added first-hand knowledge and experience of its members, solicited and obtained recommendations from many existing repeater groups and users, and digested voluminous information about existing and proposed repeater and remote station systems. In reaching its decision, documents were prepared which, if put into FCC rule form, would be what was considered by some to be the most restrictive rules that repeaters could exist under; also, a similar set of rules was prepared that attempted to best represent the most relaxed set of rules that amateur radio in general could accept for repeaters.

After examining and debating both extremes, a compromise was unanimously accepted by the committee.

### PROPOSED RULES CHANGES

Add to Part 97 of the FCC Rules and Regulations:  
97.3 Definitions

(j) *Amateur Unattended Station*. An amateur station authorized to operate without a controlling operator on duty.

(k) *Amateur Repeater Station*. An amateur station which retransmits signals from one or more amateur stations.

Change Part 97 of the FCC Rules and Regulations:  
97.43 Location of Station

(a) . . . unless unattended operation or remote control of the transmitting apparatus is authorized, such apparatus shall be operated only by a duly licensed amateur radio operator present at the location of such apparatus.

(b) \* \* \* \* \*

(4) . . . and it shall be continuously monitored when in operation, except when used as an amateur repeater station above 50 MHz.

Add to Part 97 of the FCC Rules and Regulations:

### 97.43 Location of Station

\* \* \* \* \*

(d) Authority for operation of an Amateur Station as an Amateur Unattended station without a licensed operator on duty may be granted upon filing an application for a modified station license on FCC Form 610, providing that the following conditions are met:

(1) The Unattended Station shall be so installed and protected that it is inaccessible to other than duly authorized persons.

(2) In addition to the requirements of Sec. 97.85, a photocopy of the amateur station license shall be posted in a conspicuous place at the location of the unattended station.

(3) The licensee shall provide means for suspending radiation of the unattended station in the event of any deviation from the terms of the station license or from the Amateur Radio Service rules.

(4) In the event that operation of an Amateur Transmitter as an unattended station is desired, an application for a modified station license should be submitted requesting such authority, stating that there will be full compliance with subparagraphs (1) thru (3) of this paragraph. Supplemental statements should accompany the application and show what means will be employed to comply with subparagraph (3) of this paragraph.

(5) In the event that the means for suspending radiation of the unattended station is to be by radio or wire line remote control, specific authority for remote control must be obtained in accordance with paragraph (b) of this section. Remote control authorization also authorizes unattended operation.

### 97.87 Station Identification

(a) An amateur station other than an amateur repeater station shall be identified by the transmission of its call sign at the beginning and end of each . . .

(1) Amateur repeater stations shall be identified by the transmission of the repeater call by manual or automatic means at least every ten minutes during repeater operation.

(2) Amateur stations using amateur repeater stations shall identify in accordance with subparagraph (a) of this paragraph.

(3) Amateur unattended stations or amateur repeater stations need not be identified when transmitting on frequencies above 220 MHz provided that notification of said operation is filed with the Engineer in Charge of the district having jurisdiction of the transmitter location. This notification shall include call sign of transmitter, expected frequency of operation and station location.

### 97.103 Station Log Requirements

\* \* \* \* \*

(i) Amateur repeater stations and amateur unattended stations are not required to log the items detailed in subparagraphs (a), (b), (c), (g) and (h) of this paragraph. Amateur repeater stations and amateur unattended stations are required to log the items detailed in subparagraphs (d), (e) and (f) of this paragraph, in addition to the following:

(1) Date and time of initial transmission from the repeater location.

(2) Date and time of any change of items required to be logged.

(3) Signature of each licensed operator making adjustments or repairs to the station transmitter.

(End of proposed rule changes)

### Explanation

97.3 Two definitions are added. An amateur unattended station is a station licensed to operate

without a controlling operator on duty, either at the transmitter site or at a remote control site if authorized. The unattended station, as proposed, must have some stated method of control, such as: "The engineer on duty at the TV transmitter two miles away will be called on the telephone. He will go to the Amateur Unattended Station location and disable the transmitter. This procedure is expected to take less than two hours after notification of improper operation," or it may be controlled by radio if radio control is also authorized.

97.43 (a) Adds two words, "unattended operation" to the existing paragraph. This is necessary to allow later distinction between the presently permitted "remote control" and the newly proposed "unattended station."

97.43 (b)(4) Would allow unmonitored operation of amateur remote controlled transmitters when they are being used as repeaters above 50 MHz.

97.43 (d) This is an added paragraph, which is in effect a copy of 97.43(b) reworded to specifically authorized unattended operation.

97.87 (a) Specifically states that the repeater transmitter must be identified by the transmission of its call sign, and at intervals not to exceed ten minutes. This will eliminate the present inferred requirement to transmit the call sign of the station with whom the repeater is communicating. This paragraph also provides a means for permitting remote control and repeater transmitters operating above 220 MHz, such as inter-site links, to operate without transmission of station identification. This will permit simplified operation of multi-hop interconnecting system and remotely controlled stations.

97.103 (i) Is added to specifically detail the logging requirements for repeater and unattended stations. Such a log would be *required* to contain only the following entries:

1. Power input.
2. Frequency band used.
3. Type of emission used.
4. Date and time of initial transmission from repeater location.
5. Date and time of any change of items required to be logged.
6. Signature of each licensed operator making adjustments or repairs to the transmitter.

#### Comments Requested

These proposed rule changes are the result of the VHF Repeater Advisory Committee's deliberations and will be submitted to the May Board of Directors' Meeting for approval. If approved, they will be prepared for commission submission by the League's legal counsel, and then sent to the FCC for their consideration and action. Comments, suggestions, and criticisms should be sent to the VHF Repeater Advisory Committee, whose names and addresses are printed on page 62 of February 1970 *QST*.

Prepared by direction of the  
VHF Repeater Advisory Committee  
Jon J. O'Brien  
Committee Member

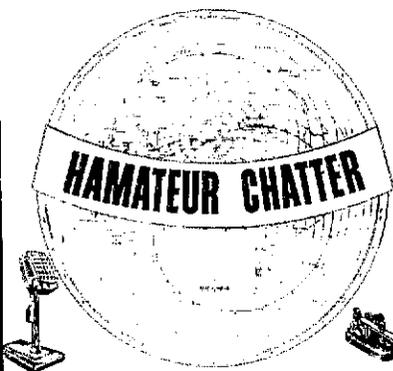
**SWITCH  
TO SAFETY!**



## Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

- K1AN, Clarence W. Thyberg, North Berwick, Me.  
W1DNT, Alvin J. Bock, Southwick, Mass.  
W1DWR, Arthur L. Granger, Rutland, Vt.  
W1FZD, Albert Cassidy, Manset, Me.  
W1MRR, Louis G. Kulhay, Danbury, Conn.  
K1QFN, Joseph N. Birenbaum, New London, Conn.  
W1SCL, Edward G. Venner, Falmouth, Me.  
ex-W1ZR, Edith Rotch, Boxton, Mass.  
W1ZSI, Roland F. Russell, Braintree, Mass.  
W2AX, Howard Blower, Roosevelt, N.Y.  
W2DSQ, Frederick Francis, Jersey City, N.J.  
W2NVB, Otis Trowbridge, Pelham Manor, N.Y.  
W2PTT, Stanley E. Meslar, Morristown, N.J.  
W2RAF, Raymond P. Mayer, Hopewell, N.J.  
K3CSX/K3MMU, Ralph W. Robb, Thompsonstown, Pa.  
W3FNG, Gene H. Melton, Washington, D.C.  
K3GCZ, Julius Shatas, King of Prussia, Pa.  
K3KYF, David R. Sample, Preston, Md.  
ex-W3TUY, Charles Baldesberger, Pittsburgh, Pa.  
K4BOY, Sidney J. Malie, Winton, N.C.  
W4CNE, Stuart H. Gates, Louisville, Ky.  
W4DJW, Howard B. Stephens, Savannah, Ga.  
WA4DRQ, Arnold Tooley, Owensboro, Ky.  
W4GO, John A. Russ, Falls Church, Va.  
W4GTJ, Joseph B. Alderman, Panama City, Fla.  
W4GZY, Harold Lyon, Homestead, Fla.  
W4JFN, Barnett H. Baskin, Port Orange, Fla.  
W4KPM, Evers Mick, Marion, Ky.  
W4TEM, Jess M. Sargent, Neptune Beach, Fla.  
K4WA/ex-W8WA, Albert A. Allen, Tarpon Springs, Fla.  
W4WDY, John M. Shepherd, Sr., Hampton, Va.  
W5EJK, Elbert B. "Chief" Breshears, Muskogee, Okla.  
W5FMB, Roy E. Eakins, Enid, Okla.  
K6BBF, Andy H. Forness, Palo Alto, Calif.  
W6C0U, Howard Smith, Carmichael, Calif.  
K6DO, John B. Kilpatrick, Santa Monica, Calif.  
K6LXU, William A. Kaiser, Sacramento, Calif.  
ex-WN6PWD, Edward M. Chauvaud, Walnut Creek, Calif.  
WB6VQE, John C. Koning, Norco, Calif.  
WA6ZOL, Archie G. Clark, Carmel, Calif.  
W8CFZ, George A. Wilkinson, Wilmington, Ohio.  
K8DHT, Thomas S. Kloos, Hickley Ridge, Ohio.  
W8NZA, John C. Mundorff, North Canton, Ohio.  
W8PD, Elmer E. Priebe, Parma, Ohio.  
W8ZRV, Leslie C. Currier, Middletown, Ohio.  
W9DTK, Fred Catel, Milwaukee, Wisc.  
W9GES, Paul H. Davis, Glenview, Ill.  
W9HLI, Shirle D. "Tiny" Styles, Westmont, Ill.  
W9HZS, Hayward B. Cameron, Madison, Wisc.  
WA91PO, John E. Holderried, Kenosha, Wisc.  
K9JAL, Fenton V. Stearns, Berwyn, Ill.  
K9JCS, William E. Dragoon, Washington, Ill.  
WA9JIX, James N. Freland, Shelburn, Ind.  
WA0AXU, Eugene De Penaloza, Clayton, Mo.  
W0BT, Toivo E. Kangas, St. Paul, Minn.  
W0DHR, Bruce A. Kindig, Medicine Lodge, Kans.  
W0DUA, Robert W. Davis, Denison, Iowa.  
K0FSL, Rex M. Stuart, Brookfield, Mo.  
K0ILO, Caryl C. McIntyre, Waterloo, Iowa.  
W0LZG, Richard Stevenson, Kirksville, Mo.  
K0YJY, Byron S. Malchow, Wilder, Minn.  
W0KLT, Lewis Harvey, Aurora, Colo.  
W0LZG, Richard Stevenson, Kirksville, Mo.  
W0SL, Jay N. Edmondson, Boulder, Colo.  
KH6RU, John R. Sanders, Waimanalo, Hawaii.  
KP4JA, Ulises Marin, Santurce, Puerto Rico.  
VE2KW, Donald S. Slater, Montreal West, Quebec.  
VE3DMC, Christian Westhouse, Toronto, Ontario.  
VE6AAQ, Norman McBean, Edmonton, Alberta.  
ex-VE6AK, Wilfred R. Small, Edmonton, Alberta.  
VE6AOH/ex-VE6RS, George F. Hearn, Calgary, Alberta.  
VE6LL, Laurence Loughton, Edmonton, Alberta.  
VE6MP, Maude D. Phillips, Calgary, Alberta.



CAMBRIDGE, MASSACHUSETTS  
 MASSACHUSETTS INSTITUTE  
 OF TECHNOLOGY

**W1MX**

AMERICA'S OLDEST COLLEGE AMATEUR STATION—ESTABLISHED

our communication with \_\_\_\_\_ at \_\_\_\_\_

\_\_\_\_\_ 19\_\_\_\_ Year \_\_\_\_\_ mo \_\_\_\_\_ sigs. were R

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Remarks \_\_\_\_\_

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HAMS AROUND THE WORLD **QSL**,

## Three Clubs Mark Half-Century of League Affiliation

TO AN archaeologist, a half century is a very brief period of time, but it represents virtually the entire span of organized amateur radio. The League itself was founded only 56 years ago and it was in the year or two right after World War I that Hiram Percy Maxim, W1AW, Charles Stewart, W3ZS, and other early League leaders successfully fought to reestablish amateur radio's right to existence, never seriously questioned since then. Concurrently, amateurs were organizing themselves both nationally and locally to launch a period of growth that has continued unabated to the present time. Among these early local amateur clubs were the Milwaukee Radio Amateurs Club, Inc., the South Jersey Radio Association and the Massachusetts Institute of Technology Radio Society. These pioneering organizations have founding members still active in amateur radio today, and the three groups are each celebrating fifty years of affiliation with the American Radio Relay League, marking a new milestone in the history of our hobby.

Affiliation is an official relationship that has been a cornerstone of the League organization and which has proved to be one of the great strengths of amateur radio. It is primarily through affiliation that amateurs have developed their public service effectiveness and at the same time advanced their own operational and technical capabilities. So it is with great pride that we salute the first fifty year clubs.

### Milwaukee Radio Amateurs Club

MRAC was founded in January, 1917 by Dr. L.S. Hillegas-Baird, ex-9HO, who became its first president. Other charter members included Cornelius Prinslow, ex-9OV, Charles Polachek, ex-9CMP, Clarence Crapo, W9VD, and Herbert Waring, W9NY, the latter two still active members. The club was ARRL-affiliated in December, 1919.

Among the notable activities over the years: operation of code classes at the Shorewood Opportunity School during World War 2, with the late John G. Doyle, W9GPI, John Scarvaci, W9GIL, and Herb Parish in charge; initiation and operation of the War Emergency Radio Service (WERS) in the Milwaukee area, around the same time; and sponsorship of the 1948 ARRL National Convention, one of the two or three most outstanding in League history. Current activities include sponsoring the Amateur Radio Emergency Corps locally (both the Wisconsin SEC and Milwaukee EC are MRAC members); Halloween watch; parade coordination; concerted participation in Sweepstakes and Field Day — the club even provided "intercom" service to the east which staged "Aida" in Milwaukee recently!

The club currently numbers about 150 members, publishes *Hamateur Chatter*, and holds station license W9HRM; its president is Richard Oberholtzer, W9ZPV.

### WS2JRA

To help celebrate 50 years of ARRL affiliation and Amateur Radio Week in New Jersey (no accident that they coincide!), the

South Jersey Radio Association will operate a special events radio station, WS2JRA, on 1.8 through 432 MHz April 4 through 12, 1970, on ssb, am (on vhf) and cw. QSL with self-addressed stamped envelope to:

South Jersey Radio Association  
 P. O. Box 316  
 Haddonfield, New Jersey 08033

There'll be special recognition for stations working WS2JRA on more than one band.

## M.I.T. Radio Society

This has to be about the oldest radio club still functioning — though it doesn't lay claim to an unbroken record — since it was organized in 1909 by F. B. Moore, ex-1AVG, also its first president. MITRS affiliated with the League in April, 1920. Its first license was as 1LC in 1916, followed by 1AN in 1920 and 1XM, also in 1920, under which call much of the fame of the club was earned. In the 1921 TransAtlantic receiving tests, for instance, 1XM was among the 18 to be heard by Paul Godley in Scotland on the first day of the test. The station kept in touch with Admiral Byrd's Antarctic Expedition in 1930, and even ran a crude version of a phone patch for the skipper and his wife. They sponsored a number of banquets in the

*The OLD ...*



Left, an early meeting, perhaps about 1924, of the South Jersey Radio Association in the basement of the Collingswood Library. Right, past, present and future — Charter member Gordon Kressel, W2BQ; current president Tony Slapkowski, WB2MTU, and Elliot Levin, WA2BPL, youngest member of the club.

early 20s, the third of which amounted to a New England Convention with such notables as Alexander as speakers. It was one of the League's Standard Frequency Stations and during World War II it was active in WERS and in conducting training courses.

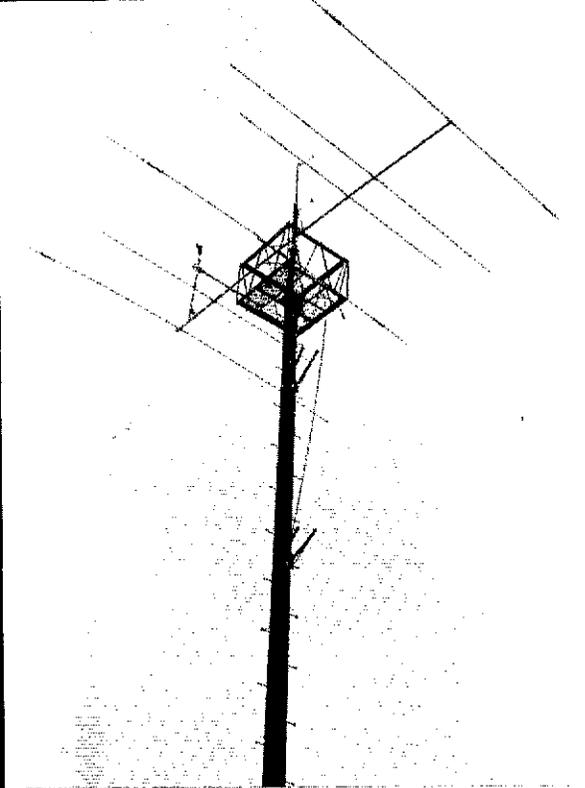
Among its members have been James Clapp, W1OD, inventor of the Clapp oscillator; J. A. Stratton, who later became president of Massachusetts Institute of Technology; and K. V. R. Lansingh, ex-W6QX, of the old *R-9* and *Radio Magazines*.

Currently, the station is active on all bands from 3.5 to 432 MHz, using ssb, cw and RTTY, for such diverse activities as moonbounce, DX chasing and contests. The president now is Paul S. Silinsky, K3ZDR and the membership is about 50.

*... and the NEW*



The Milwaukee Radio Amateurs Club in 1920 and again in 1970. Clarence Crapo, W9VD, is in the front row, third from left, in both pictures.



The antenna structure at W1MX . . .

. . . the uhf layout . . .

. . . and the hf station.

### South Jersey Radio Association

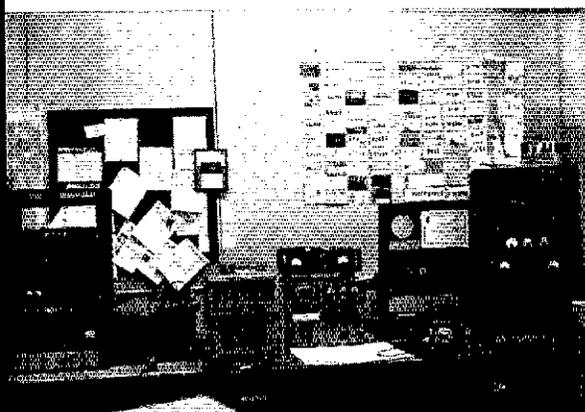
Of these three "Golden Oldies," SJRA gets highest marks for historical conscientiousness — they know precisely for instance that the club was formed on June 12, 1916 by Leon W. Ashton, W3HO, Roger W. Barrington, W2LY, Gordon Kressel, W2BQ, H. W. Densham, K3FH, William G. Phillips, ex-3AFD; George Haldeman, W. A. F. Pyle, W3WR, William Kirby, Edward B. Patterson, W2YR, Henry Wetzel, ex-3IQ, Henry Byam, Taylor Stokes, ex-3ACM and C. Waldo Batchelor (who was elected president). The club affiliated with ARRL in April, 1920.

Like the other two clubs it conducted training classes during World War II — but it had done the same thing a war earlier, in 1917! The first know QSO between North and South America involved an SJRA member, Norman R. Weible, 3BWX — it took 70 watts to a pair of UV-202s on 120 meters. About the same time, the club noticed on the air a very active and skilled amateur in nearby Philadelphia, sought him out and persuaded him to join SJRA. This man held the call 3AIIH then but he's much better known now as George Grammer, W1DF, who just retired as technical director of ARRL and technical editor of *QST*!

Over the years, the club has had many fine speakers and one "near miss" — only a last-minute jam in-scheduling prevented Marconi from speaking to the club in the 30s! Among those who did make it: Major Edwin H. Armstrong, father of fm and inventor of the superhet, regen and superregen receivers; Clarence Tuska, ex-1WD, cofounder and first secretary of ARRL; Charles Stewart, W3ZS, vice president of ARRL 1922-1936 and watchdog of radio legislation even earlier; Kenneth B. Warner, W1EH, Managing Secretary of ARRL 1919-1948; and John L. Reinartz, K6BJ, holder of the Hiram Percy Maxim Gold Medal for his early technical leadership.

SJRA today, some 200 strong, publishes *Harmonics* and holds station license K2AA. Under the leadership of Tony Slapkowski, WB2MTU, 1970 president, it's active in MARS, Civil Defense, vhf parties, Field Day, and the DX contest, and holds a picnic/hamfest, one of the largest on the East Coast, each year. Their special activities for the fiftieth anniversary of their affiliation are outlined in a box within these pages.

To these three clubs (and the dozens with records approaching these) our hearty congratulations, and thanks for the inspiration you supply to all amateurs!



**NEW DIMENSIONS FOR VIETNAM  
MAILBAG**

Senator Barry Goldwater, K7UGA, visited Vietnam in December, bringing along some slow-scan television gear which will remain in Southeast Asia, making possible transmission of photos of servicemen to their wives, and vice versa.

The first transmission was between Cam Ranh Bay and AFA7UGA in Phoenix on December 7 with William S. Franklin, W7DOZ, operating from the Senator's ranch, on a MARS frequency of 19.2 MHz. The trick was repeated the next day, with the Senator transmitting from Tuy Hoa.

The TV monitors at both ends were Dumont 304 oscilloscopes with front-end SSTV converters designed by William H. Briles, W7ABW — watch for his forthcoming *QST* story on the technical side of these converters.

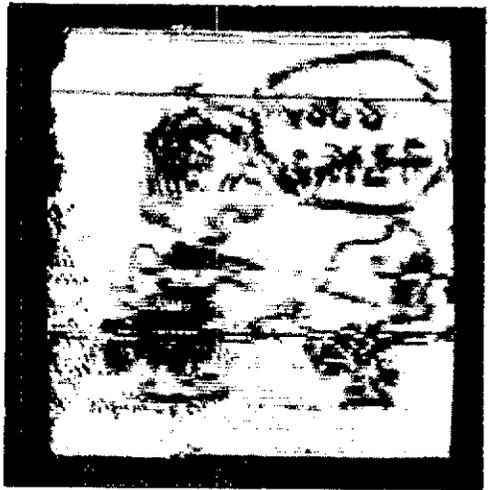
Meanwhile, here's some pictures of the operation.



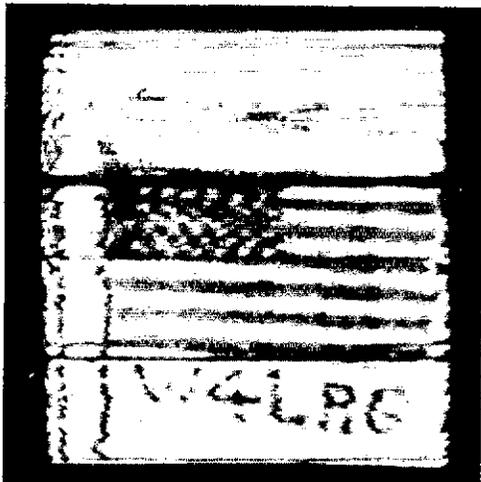
The Senator covers the fine points of SSTV for A1/c Frank E. Garcia of El Dorado, Kan.



Barry Goldwater, transmitting from the MARS station in Tuy Hoa, checks in with AFA7UGA, his own MARS station in Phoenix, operated by William S. Franklin, W7DOX/AF7DOZ.



Charlie Brown and Snoopy, transmitted from Arizona, looked like this in Vietnam.



Cam Ranh Bay sent this photo of our flag by SSTV to Barry's home station.



And here is the season's most unique Christmas card, as seen in Asia.

# I.A.R.U. News



INTERNATIONAL AMATEUR RADIO UNION, THE GLOBAL FEDERATION OF NATIONAL NON-COMMERCIAL AMATEUR RADIO SOCIETIES FOR THE PROMOTION AND CO-ORDINATION OF TWO-WAY AMATEUR RADIO COMMUNICATION

## ZEs OFF 6 METERS

The Radio Society of Rhodesia has been advised by the Ministry of Posts that the 50-54 MHz band is withdrawn from amateur use. The Rhodesia Broadcasting Corporation will be using the allocation of TV channel E2 Band 1 for a television transmitter at Gewlo. Amateur activity on the 6-meter band was required to cease after December 31, 1969. (Region 1 News.)

## DARC PLANS NEW HEADQUARTERS

The General Assembly of the *Deutscher Amateur Radio Club* has decided to build a new society headquarters at a central place in the Federal Republic of Germany. At present, the main office of DARC is located in Kiel (northern Germany) and the QSL Bureau in Munich (southern Germany) — some distance apart.

A plot of land has been chosen in Baunatal near Kassel. DARC hopes that this location will become a focal point both for German and visiting foreign radio amateurs. The new building to be ready in 1971 will contain facilities for administration of the society, the QSL Bureau, meetings, conferences and training courses.

## WORLD AMATEUR BEACON NET PROJECT

A propagation study by Region 1 (Europe & Africa) amateurs is now in progress. The following beacon stations are now operative: DLØAR on



On a recent visit to the Soviet Union, W6HUS met with members of the Leningrad Radio Club. Vic (in the light overcoat) is shown with UA1CK, UA1KBR, UA1KA1, and UA1AL.

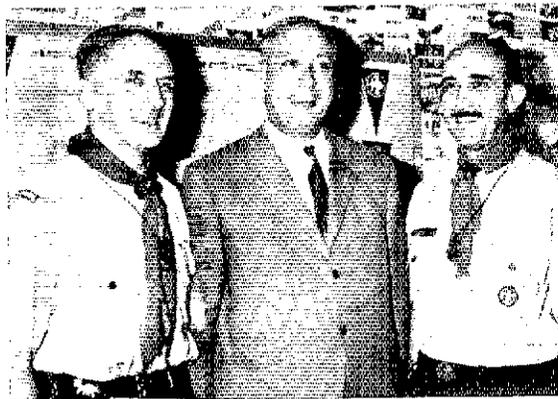
29.000 MHz, DLØIGI on 28.200 and 28.195 MHz, and GB3SX on 28.200 and 28.185 MHz. Reception reports on these stations are solicited. Those for the two West German stations go to Renate Seidler, DJ6IN, D 4812 Bethel near Bielefeld, Bindenstr. 14, West Germany. Reports of GB3SX go to Alan Taylor, "Altagena," South View Road, Crowborough, Sussex, England.

## NOTES

The Partners of the Alliance announce sponsorship of an amateur radio contest to further friendly relationships between the Americas. The contest period is from 0000 GMT April 1, to 2400 GMT, December 31, 1970. Details are available from Ernest L. Bracy, W1BFA, PO Box 88, Readfield, Maine 04355.

Many amateurs will be saddened to learn of the passing of ZLIATS, Ivan, operating during the early 1920s as Z2AC, was a pioneer amateur and provided many stations with a New Zealand contact.

QST



On the occasion of the 12th Boy Scout Jamboree-on-the-air, Mohammed Mili, Secretary General of the International Telecommunication Union, visited station 4U1ITU. Shown are HB9AMS, Boy Scouts World Bureau Director of Administration, Mr. Mili, and Salvador Fernandez.

# SWITCH TO SAFETY!

# Hamfest Calendar



S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

**Alabama**— The Birminghamfest will be held this year on May 3 at the Armory on Oporto Avenue (just off U.S. 78 East, near Eastwood Mall). For entertainment, contests, net meetings, eyeball QSOs and fun for the entire family, plan to attend. For further information contact the Birmingham ARC, W4CUE, P.O. Box 603, Birmingham, Alabama 35201.

**Georgia**— The annual Columbus, Georgia Hamfest will be held on April 5 at the Fine Arts Building behind the Municipal Auditorium at the Fairgrounds. For information write John Laney, K4RAL, 1905 Iris Drive, Columbus, Georgia 31906.

**Illinois**— The Kishwaukee ARC, De Kalb, Illinois, will hold their Hamfest May 3. For more information write K9BAG.

**Louisiana**— The Baton Rouge ARC will hold their annual Hamfest May 2 and 3 in Baton Rouge. On Saturday, May 2, activities will begin in the Hospitality Room at the Holiday Inn South, from 12:00 to 5:00 P.M. The banquet will be at 7:30 at the Holiday Inn South. The picnic will be Sunday, May 3 at the UCT park, starting at 9:00 A.M. Talk-in on 146.94 and 3.91U MHz. The Baton Rouge repeater is on 146.34 "in" and 146.94 MHz "out." Write Bill Mixon, K5NVD, for more information.

**Maryland**— The B & O Banquet is all set for May 2 at the American Legion Hall in Arbutus.

**Massachusetts**— The South Shore ARC is having an auction on April 16 at the Viking Club.

**Michigan**— The South Eastern Michigan ARA will hold its annual Swap & Shop on April 12 from 10:00 A.M. to 4:00 P.M. at the Cannon Memorial Recreation Center on the corners of Cadieux and E. Warren, Detroit, Michigan. Write W4SSX for more details.

**New York**— The eleventh annual New York State Southern Tier Hamfest sponsored by the IBM ARC, QCWA, AREC, and Binghamton ARC will be held on April 18 at St. John's Memorial Center in Johnson City, N.Y., starting at 2:00 P.M. Adult tickets are \$4.75 and student tickets are \$2.50. Advance sale only. Closing date on ticket sales is April 15. Afternoon activities include speeches, displays and contests. Surprise events throughout the day. Banquet and dinner promptly at 7:00 P.M. Tickets and full particulars may be obtained from Frank Gydlik, K2CWD, 509 Torrance Ave., Vestal, N.Y. 13850. Telephone 785-6220. Don't miss it!

**New York**— The 1970 R.A.G.S. Hamfest will be held on Saturday April 11 at the Song Mountain ski resort in Tully, N.Y., just 18 miles south of Syracuse on Interstate 81. Starting time is 12:00 noon.

**Ohio**— The 19th consecutive Dayton Hamvention, sponsored by the Dayton Amateur Radio Association, will be held at Wampler's Arena Center on April 25 in Dayton, Ohio. Outstanding technical sessions, unusually large exhibit of the latest equipment, hidden transmitter hunt and flea market. An interesting program for the NYL. For information write Dayton Hamvention, Box 44, Dayton, Ohio 45401.

**Pennsylvania**— Don't forget the F-PA Spring Dinner Meeting at the Frankford Arsenal, Saturday, April 11 at 6:00 P.M. Advanced reservations are a must. Contact K3WEU or W3HK.

**Vermont**— The BARC and CVARC are planning a joint supper meeting April 18 in Montpelier.

**Washington**— The Skagit Hamfest will be held at Brayant Grange Hall near Arlington, Washington April 11. Activities include a tour of million-watt radio station in area. Contact Norman Ray, W7LFA, 14005 132 Ave. N.E., Kirkland, Washington 98033.

**West Virginia**— The Wheeling Radio Club will hold their annual YL-OM Dinner on May 2 at Oglebay Park.

**Wisconsin**— The Neenah-Menasha Amateur Radio Club is planning a social meeting and dinner for men and women on April 25.

## PACIFIC-SOUTHWESTERN DIVISION CONVENTION

Fresno, California

May 15-17

The combined Pacific-Southwestern Division ARRL convention will be held on May 15-17, at the Hacienda Motel, 99 Hiway at Clinton in Fresno.

The Convention will begin with a California Champagne reception on Friday night, May 15 at 7 P.M. and will continue on Saturday with swap tables, mobile hunts, mobile equipment judging, homebrew contest (schematics required), a coil-capacitor contest, code proficiency tests, MARS program and lunch, ladies lunch and wig demonstration, ARRL Forum chaired by Directors Jean Gmelin, W6ZRJ, and John Griggs, W6KW, YLRL Forum, and many other events.

The Western Public Service System will monitor 3.952 MHz. from the convention on Friday night and the West Coast Amateur Radio Service will monitor 7.255 MHz. on Saturday. Both services will assist arriving mobiles.

Commercial exhibits and the ARRL Booth, manned by SCM Ralph Saroyan, W6JPU, will be open throughout the day Saturday. There will be technical talks starting at 9:30 A.M. on Saturday with Ham Radio and the Law, Stuart Home, WB6VRJ; Amplifiers, George Grammer, W1DF; FM, Bill Doyle, WB6SVY; DX, Bob White, W1CW; Emergency Operation, Contests and General Operating Activities, Ellen White, W1YYM and Maintenance and Repair of Ham Radio Equipment, Herb Lion, W6OWL.

At 7 P.M. the delegates will dine on prime rib at the banquet where awards will be made for the competitive events. At midnight, Wouff Hong ceremonies will be held.

Theda Nail, W6BSW, President of the Western Public Service System, will hold open house in her suite Sunday morning for all members of the WPSS. Sunday morning breakfasts will be held by WesCARS, QCWA and the Trowel Radio Club.

General registration, including the banquet and the champagne reception is \$9.50 until May 12 and \$11.50 after that. All lunches and breakfasts are optional and tickets will be available at the convention registration desk.

For further information, registration forms, and motel reservation cards write ARRL Convention, P. O. Box 783, Fresno, CA 93712.

### COMING A.R.R.L. CONVENTIONS

- May 15-17 — Pacific/Southwestern Division, Fresno, Calif.
- June 13-14 — Rocky Mountain Division, Estes Park, Colorado.
- June 19-21 — Oregon State, Bend.
- July 4-5 — West Virginia State, Jackson's Mill.
- July 18-19 — West Gulf Division, Orange, Texas.
- September 25-27 — NATIONAL, Boston, Mass.
- October 17-18 — Hudson Division, Tarrytown, N.Y.
- Oct. 31/Nov. 1 — Roanoke Division, Raleigh, N.C.



# Correspondence From Members-

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

## AUSTRALIS-OSCAR 5

- I listened around 20 and 40 last night, and I reckon every amateur in Australia must have been on the air expressing justifiable pride in their American cousins who succeeded in orbiting their "Kangaroo Special." — *Bruce H. Rowlings, ZL1WB, Northland, New Zealand.*
- On behalf of the East Coast VHF Society, WA2WEB, I wish to congratulate everyone who contributed toward the success of Australis-Oscar 5. The many hours of dedicated work which went into the satellite are surely appreciated by amateurs everywhere. — *Jack Tompkins, K2HHS, Lodi, NJ.*
- I wish ARRL the best of luck with the A-O 5 satellite. We are all following it with great interest. — *R. B. Marsten, Director, Communications Programs, Office of Space Science & Applications, NASA, Washington, DC.*
- . . . much success in this worthwhile project. It is good to know that members of your League are striving to keep abreast of the latest satellite technology and I am sure that they will make their rightful contribution in the satellite field. — *Jean d'Arcy, Director, Radio & Visual Services Division, United Nations, NY.*

## OSL QUIZ

- Take a gummed blank envelope (thicker the gum the better), fold it into two, put it inside another envelope and send it airmail to a tropical country with a temperature of say 30° C and a relative humidity of not less than 90%. Forty eight hours after landing in the new country, what will be the condition of the inner envelope?  
I bet 90% of the W-hams who send me OSLs direct don't know the answer! — *R. Jayaraman, FU2JN, Trivandrum, India.*

## ARRL - MILITARY

- Re the letter from WB2BCI and WB2ZXX in February QST, I have heard and read some feeble and ridiculous reasons for dropping out of, or not joining, the ARRL; but I think these two gentlemen, using the Amateur's Code out of context, have reached a new low. . . . — *J. H. Bowen, Jr., WB2SPJ, Haddonfield, NJ.*
- I wish to join in attacking the League for cooperation with the military. It is important that, in the name of humanity, not to mention justice, the largest organization of U.S. amateurs renounce all ties with the oppressive and murderous Military-Industrial complex. . . . — *Daniel Reiner, WB2DSK, Pleasantville, NY.*
- . . . Just how do these idealists propose to maintain peace, freedom and justice? With whose power? Perhaps flower power? — *Ernest C. Farkas, K3CBW, Catonsville, MD.*

- . . . There is no doubt that the armed forces are trained to take measures to safeguard our country. To have waded ashore at Tarawa carrying flowers or to have scaled Mount Surabachi crying "peace" would not have gotten the job done. I hold no brief with the gentlemen who wrote you, but I admit to a certain amount of consternation at your publishing it. I feel that your decision to publish this letter constitutes an affront to those whose sense of dedication to duty caused them to lay down their lives to assure our continued freedom. I can find nothing in the declaration of objectives of the ARRL that would be promoted by the publication of such letters. — *Floyd M. Thomason, Lt. Col., U.S. Marine Corps Reserve, Whitehaven, TN.*
- It is encouraging to see the League's journal again demonstrating it has the courage to be objective in its outlook on today's problems, by publishing such tripe as the letter from the two disaffectionate, ill-willed and bitter members who are not renewing for the coming year. — *C. G. Schaat, WA6EI, Tavares, FL.*
- Delighted to see that WB2BCI and WB2ZXX decided to quit the League. Jerks like that we don't need. At least now I can say I have heard everything. — *C. Harold Campbell, W2IP, Mt. Vernon, NY.* [EDITOR'S NOTE: We've received a couple dozen other expressions in the same vein.]

## THANKS OM

- As in past years, I am very happy to renew my membership in our ARRL. You'll get no crying and damning from this member.  
Nothing on earth can be all things to all people but ARRL surely approaches being all things to all amateurs in these United States and other parts of the world.  
Certainly, I may disagree with some ARRL policies and activities but I also occasionally disagree with certain policies of the Governor of Kentucky, the President of the United States and society in general but I do not propose to noisily walk out on any of these because of such disagreements. One has the right to disagree with anything he so desires but not to destruct because of disagreement.  
The ARRL holds a priority in my list of memberships and affiliations and I shall support it to the best of my ability.  
I dislike the phrase "keep up the good work" because it sounds like something one would say if one had nothing better to say. I have stated, above, how I feel: You have my complete support, day to day, year to year, whether or not I agree with all you do.  
Don't "keep up the good work" . . . push diligently ahead for improvement and advancement! — *Walter R. Yeary, K4ABI/K5HZG, Louisville, KY.*

## 9N1LEG

● If I show as much leg as 9N1RA (Feb. *QST*), can I get my picture in the same issue twice?

I have tentatively decided that you are most definitely not an Old Man. Leaves me wondering who it is in this case that's the sharp operator. — *Francis K. Williams, WB4GTS, Washington, DC.*

● I have recently decided to become a deaf child and move to Nepal. — *Greg LaRocque, WA1JHW, Pawtucket, RI.*

## URBAN PROBLEM

● I have agreed with the ARRL's position on many issues including the controversial incentive licensing system. However, I am most displeased to see the Board of Directors, in their November meeting, turn down three motions (items #22, 23, 26) that would have aided the urban ham against the growing flood of cheap, unshielded, solid state electronic items that are making urban area hamming even more difficult than before.

Maybe our directors live in plush suburban surroundings where this is not a problem. But most Americans live in cities and the urban ham is being overwhelmed by TVI, BCI, Taperecorder Interference, Hi-Fi Interference, Intercom Interference, etc., etc. If the League wants Ham Radio to grow, you had better do something for the urban ham. — *Nickolaus Leggett, WB9BVI/3, Baltimore, MD.*

## MIKES AND KEYS

● You say, "December, *QST* carries ads from seven different manufacturers of electronic keys, but as it happens, none in this issue on microphones. Some kind of message here?"

Yes, there is. It comes in, 40 over 9. Surprised you didn't copy. Perhaps you had QSB. The message is that since incentive licensing, folks are defecting the fone bands, ordering electronic keyers, taking them from the shipping package and learning to use them on the air. What comes out doesn't even sound like Kata Kana. Old Sam'l Morse must be spinning over in his grave when he hears that stuff.

Kke it easy when ur NSTing ur new Ptenna pd dont give ur rite nag. Sappy new year. — *Manuel "Pete" Fernandez, W4SM, Greenville, SC.*

● League Lines states there are no ads for microphones in this issue. If you check pages 1, 136 and 144 you will see three ads for microphones. Electro-Voice has a full page ad! Before you use the words "none in this issue" you better check with your Advertising Manager.

I believe there is a place for both cw and phone work, but don't try to influence the amateur radio fraternity with false information. . . — *Milo Moucha, WAT1J, Alexandria, VA.* [EDITOR'S NOTE: By "this" issue we meant the one being discussed in the item, i.e., December.]

## QST DELAY

● I sure wish my *QST* would come before the middle of the month! On the average, since I moved to my new QTH, it has come several days after the first every month. And this month I didn't get it until the 10th. So please check and pull my address out of the back of the file. If it's not your fault, then let it ride, because the Post Office has enough problems without me nagging them about efficiency. . . — *Curt Holsopple, WB9CAF, Goshen, IN.*

● As a subscriber of several years, as a League member of a similar time, and as a defender of the League's policies (it is amazing the amount of defending those policies are requiring nowadays), I feel I am entitled to receive my copy of *QST* long before the newsstands receive theirs. This time they beat me by a good three weeks.

I don't know if the fault lies with the dog sled operator or the Indian runner but I would appreciate it if you would tell them to mush it up or step it off a little more quickly and get my copy to me before this late date. — *Carl Greene, WA5QY/15, Houston, TX.* [EDITOR'S NOTE: The February issue was received by members in some areas of California on the 2nd; in some parts of Texas it had not been received by the 20th — this despite the fact copies for all areas were put in the mail the same time, Jan. 20-21!]

## GREAT HOBBY

● Today is my fifteenth birthday; as I count my blessings, I consider my amateur radio license one of my most cherished possessions. I have been a ham for a year next month. During this time I have had QSOs with over 1,200 hams, all over the country and the world.

Not many things are more thrilling than the first "CQ" and the resulting contact — except perhaps the first DX QSO.

Ham radio is the best thing that has happened to my life. It has opened my career possibilities to most applications of electronics. The Great Will Rogers once said, "I never met a man I didn't like." In the short time I've had a ticket, I never met a ham I didn't like. Hams are a great bunch of guys. — *Dave Bushong, WB4ODN, Fairfax, VA.*

## INCENTIVE?

● I was shocked to find that less than half of the *QST* staff, as listed in the January, 1970 issue, hold Extra Class licenses. According to the fall 1969 Amateur Radio Call Book Magazine, seven (7) members hold Amateur Extra, seven (7) General or Conditional, and four (4) Advanced Class licenses. — *(Name withheld by request).*

● Congratulations on the fine showing of the HQ Staff on incentive licensing! In checking the list on page 77 of January *QST* against the Fall 1969 Callbook, I note that about half of the staff have obtained the coveted top of the line amateur license! In the Callbook there are 257,931 amateurs (excluding Novices, club and military stations) and a total of 9,953 Amateur Extra Class licenses are given. This is a 3.7 percentage for the entire U. S. in Extra status. — *D. Ross Webster, W6CZP, Pomona, CA.*

● I would like to suggest the name — Invective Licensing. — *John E. Ball, Sr., W5REL, Slidell, La.*

● Ever since incentive licensing has taken effect, I have read or heard about how unfair it is. Well I am sick of it.

Where were these so-called hams before it began? Crying over spilt milk won't do any good. If we are going to take a passive viewpoint and continue bickering on and off the air, we will loose ham radio. — *Robert Lepelletier, Jr., WB4KCM, Alexandria, VA.*

— . . . —

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

# How's DX?

CONDUCTED BY ROD NEWKIRK,\* W9BRD

**How:**

And now in response to irrepressible demand (our own) we close out the DX Test questionnaire series instigated by reminiscences of W2GP. Having already covered subject matter of forty years ago, then some suggested material for contemporary use, we now provide samples of interrogatory transmissions for forty years hence, ARRL's International/Intergalactic DX Competition in the year 2010. . . .

- D-14. What is your QSOs-per-second DX contest average?
- M-4. Are your front feet higher than your back feet?
- E-32. Do you like the new mint-flavored QSO tapes?
- B-24. Does your joy light blink red or green when you hook a new one?
- H-7. How do you keep people from fiddling with your feedback loops?
- Z-2. Do magnetic storms ever give you colds and fever?
- R-9. Are chrome sideburns the style in your country?
- N-18. Do you have any painfully tight knobs?
- D-23. Have you ever been (a) scratched, or (b) dented?
- G-8. Do you know any three-footed transceivers?
- I-35. How would you avoid collecting fungus in the tropics?
- Y-17. Do you rather enjoy your trips to the factory?
- R-14. Does your present owner keep you dusted and well polished?
- C-20. Do you eject QSLs during or after QSOs?
- Y-19. How many operators can you test consecutively?
- M-15. What type of lid really turns you off?

Whoops — we're slipping into a technical rut again. Better turn the topic to a more diverse category before we lose some CB types. How about something along this line? . . .

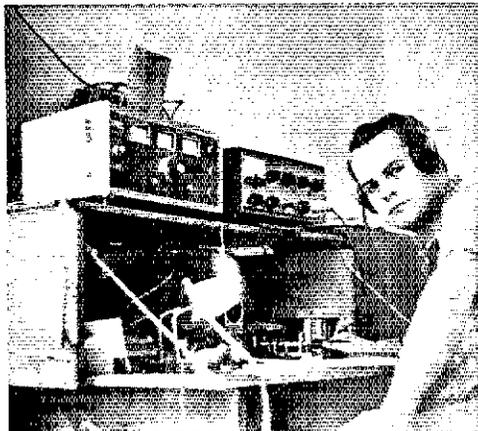
- F-6. Are you a member of the American Radio Readout League?
- X-17. What do you think of Incentive Programming?
- A-13. Have you helped and encouraged any Novice transceivers lately?
- B-8. Do you ever get static from Big Daddy, the FCC computer?
- D-39. What's the resale value of a '98 DX found in fair condition?
- K-2. Did you have trouble financing your present owner?

Kooky queries? Not at all, merely fruition of current automation trends unchecked, friends. You see, self-operating/logging/QSLing computer transceivers will frolic in DX Tests of the future. What happened to all the ex-operators? Oh, they're QRL discussing sex, religion and politics down at what used to be radio club meetings.

**Who:**

Those W/Ks who feared ARRL's Five-Band DX Century Club offering was some sort of DXclusive Extra Class plot may rest easier now. As such it doesn't work. W1WQC, with an ordinary Advanced ticket, writes: "Worked HK0BKW on 75-meter ssb February 9th to complete the required 500 contacts. Still a long way from collecting the QSLs to prove it but I suspect I may be the first non-Extra to make this claim." Ham found it necessary to use cw only on 7 MHz. Hey, any Generals out there nearing 5B-DXCC payoff?

\* 7862-B West Lawrence Ave., Chicago, Ill. 60656.

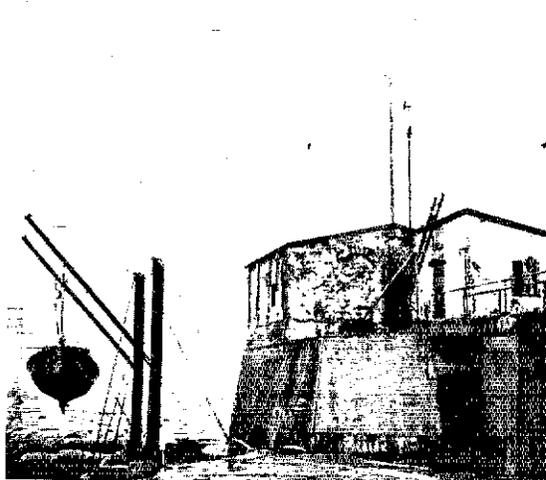


5H31V, whose impressive premises served as your February QTH of the Month, is the most active of several available Tanzania tempters. Garth enjoys code or voice sport on frequencies high or low. (Photo via WATKQM)

**What:**

**15 meters**, that vast DX melting pot, regales all comers. Novice through Extra alike. It's time we spun your "How's" dial across 21-MHz phone frequencies, remembering that numerals in parentheses are kiloHertzies above the low band edge, and that digits outside parens are Greenwich Mean Time whole hours. The band is jammed so we'll squirt the beam by continent. . . .

**ASIA** — HL9s UT (379) 10, UY 10, UZ, HS1s HD (300)  
 A 2-3, LG (295) 1L, JA 1AA 1BA 1CX 1CBL  
 1CY 1DEY 1DWM 1GGW 1HIE 1HM 1HNO 1JXU  
 1KSO 1ODC 1CDT 1OMV 1RGM 1RJW 1RNI 1RTU  
 1RUZ 1SBI 1TXE 1UIO 1VUI 1WAP 1W8K 1WZV  
 1YNX 1ZAA 1ZNX 2ELS 2BOY 2EQ 2FSC 2GPC 2HOA  
 2HUM 2HZA 2IKK 2IKX 2IVJ 2JCW 2KMX 2MBL  
 2NOW 2NPC 2NWK 2OTP 2OXP 2PDQ 2PH 2QBA  
 2QWT 2RCQ 2YFT 3AYX 3RLC 3COX 3CYI 3CZH  
 3CZY 3DJL 3EMU 3FVJ 3GAV 3GZN 3IG 3JFW 3JFH  
 3JGB 3KVT 3LUK 3MZ8 3PNE 3QGI 3QXT 3RTU  
 3STY 3SVI 3TGO 3THL 3TVQ 3UBA 3UTN 3YBF  
 3YCT 4BPF 4BYB 4EHE 4FAN 4PET 4FK 4GJK  
 4GLZ 4BLE 5CMO 5DMX 5DRX 6ACE 6DSG 6DUK  
 6DZA 6ERR 6HKC 6HLL 6H8K 6HZN 6IFX 6JNJ  
 6JWC 6KCY 6LUL 7ARD 7BSV 7BWV 7DFE 7DZL  
 7JZN 7EVT 7GKP 7YAG 7YFV 7YT 8BAX 8BIO 8BQJ  
 8CAO 8DGG 8DLI 8DNZ 8DQQ 8EAT 8EDU 8EL  
 8GCG 8GLP 8GXU 8OW 8TL 9APS 9AVA 9CFZ 9CNG  
 9YAO 9BUA 9CVZ 9CXJ 9DAI 9DEL 9FMB 9YAC  
 JHLs ACH BJR BLX BRP CUB CXQ DUL DWM



Market Reef's name is now secure in DX annals thanks to OH2s BW KK (left and right) plus other enterprising Finnish DXpeditioners who scored almost ten kiloQSOs from the Baltic lighthouse island in December and January. About five thousand Stateside QSOs and 140 countries were bagged. SRAL president OH2NB warns of more OJØ action ahead. (Photos via WA6AUD, West Coast DX Bulletin)

EHO FUE HCN HSN HUM JTA KCP KRC NNS NVE  
 OUM QOJ QPT TLN, JRIs BBE DTCP, KAs 2KS 9MF,  
 KR8 6GH (380) 1, 6LD 6PU 6JV (325) 9-10, 6MB 6M1D  
 6UBA (320) 3, 6VK (380) 1, 6ZB 8GA, MP4s 811V (308)  
 14, MBB 1AF 1CFE (275) 15, 3CN TCOZ TDA (380) 11,  
 TOD 18, OD5s BZ (310) 13, EP 17, UAs 9FU 9TT (365)  
 15, 9IM, UJ8s AJ (304) 13, 1J (270) 11, UV9PP 14, VSs  
 6AA 6AL 6AL (341) 15, 6BE (360) 2, 9MB (360) 15,  
 VU2s 8EO DK (290) 0, KV (258) 16, XW8s AL (295) 12,  
 CS (300) 14, YAl8 EXZ GNT HD SG, Z04AK (360) 15,  
 4S7PB (270) 23, 4X4s BL (320) 21, FQ GB (319) 21, GT  
 GV LX (310), JY HQ 21, RW SO (306) 21, VB WN (290)  
 16, 4ZAs 1JX (255) 15-16, DZ HF (327) 20, 7Z3AB (305)  
 7-8, 9K2BG, 9M2DQ, 9N1RA (310) 9-10, 9VIs PA  
 (375) 15, PB PD and PL 15.

AFRICA — AZCAF (316) 17, CN8s 4S HD (311) 22,  
 A HL (366) 15, PI (310) 6, CRs 4BB (225) 10, 4BI 6CX  
 (286) 18, 6FA (285) 21, 6GA (309) 21, 6HK 6IV (202)  
 18, 6JH 6JW 21, 6KT (308) 20, 6LC (293) 20, 6LG 6LV  
 (295) 22, 6LX (302) 19, 6TP (277) 0, 7AC 7RO 7DS 7IZ  
 (230) 15, 7PH 15, EAs 8BK (227) 14, 8DH 8EF 8EZ (252)  
 18, 8FF (252) 17, 8GK (329) 21, 8GZ (202) 18, 9AL (286)  
 8, 9AQ (293) 17, 9EJ (240) 19, 9ER (250) 23, 9Ls (and  
 5Ls) 2AS (335) 19, 2AY 2BE 2BJ (310) 19, 2BV (310) 13,  
 2F 7B (372) 22, 8C 8RL 9B (268) 21, 9C (315) 17, ET3s FS  
 (385) 19, REL URA (341) 16, FL8s AO 11, MB 19, FRZW  
 (276) 11, TJI8 AR AT (290) 8-9, AU 11, UN8BK (280) 22,  
 TR8s AD DG, TU2s AS 17-18, AZ 14, RR 5Q (260) 19,  
 VQ8s AC (300) 19, CR GW (190) 15-16, XT2AA 21, ZD8s  
 3D (410) 18-21, 3K 5R (231) 18, 8KP (399) 21, 9BN (370)  
 15, ZEs 1CX (290) 20, LJE (290), 2KL 5JC (350) 19, 4J8  
 4JW 6JL, ZSs 1GD 1JL 1PF 2PX 2RM 3AVA 18, 3C  
 3CJ (276) 21, 3JJ (288) 22, 3LU (265) 23, 3R (300) 19,  
 3S 3WF 18, 3XQ (316) 20, 4MZ 4NJ 5FF 5OE 5TK 6A1D  
 6AO 6APU 6AR 6AWR 6BDO 6BDV 6BEY 6BLK 6J  
 6TL 6VE, 3V8s AG (348) 17, MCL (305) 21, 5As 1TN  
 (330) 21, 3TX (310) 18, 5H3s JL (290) 19, JR (344) 20,  
 KG (294) 21, LV (315) 11, MB (300) 21, 5N2s AAF 15-16,  
 ABB ABH (358) 16-22, 5RA8 (270) 21, 5T5AD (255) 11,  
 5U7AR (150) 11, 5V4J8, 5ZAs KK (340) 21, KL (300) 20,  
 KM (300) 21, LS (332) 20, LW (351) 23, LX, 6W8s AL  
 (320) 8-9, BM DF (343) 17, DY (243) 14, XX, 7PR8B  
 (257) 20, 7Q7s AM BPQ (315) 21, RM WW (340) 17-19,  
 9E3USA, 9F315A, 9G1s GS (316) 17-18, 8C, 9J2s HE  
 (303) 18, WR (221) 18, WS (295) 20, 9Q5s BJ (373) 19-20,  
 9M CP 18, DQ (300) 19, EA (390) 20, PF (380) 19, CJ  
 (345) 20, NW QL SN (308) 18-19, YL, 9U8s CB (302) 23,  
 SK (315) 20, 9X5s AA (298) 18, AB (300) 10, EL (285) 19  
 and 8P 13.

OCEANIA — DU8 5WS (298) 0, 7ER (307) 17, KC6CP,  
 KG6s AGQ (323) 10, AQV SC, KH6s AH AX (290),  
 21, CD GKI 23, GMP 23, LI 1, NR 8R (302) 2, SP (320) 3,  
 KM6BI, KL7DTH/KG6 10, KS6s CG CZ 0, KW6s EA  
 (331) 11, GJ (298) 1, KX6BK (298) 0, VKs (and AXs)  
 2APK 0, 2BMA (321) 3, 2KM 2WC 3APU 3SM 3TG 4PH  
 4HR 4ZV 5BB 5FM 6MS 7CK 7DK 7EK 7JK 7RM 9KY  
 (350) 15, 9LB (380) 2, 9US (305) 2-3, 9RY (373) 11, 9X1  
 (324) 4, VR6TC (335) 23-0, YB8 1AK 1AN (227) 13-14,  
 1BM 8AAC 1B, 8AAR (251) 14, ZLs (and ZMs) 1AWL  
 1BL 1DP 1HQ 1QW 2AFT 2AVY 2BF 3CD 3JO 3QN  
 3RB 3UM 3VX 4ML, 9MRs FME and FME (355) 1-2.  
 Fancy that — Oceania appears to have taken title as  
 rarest 21-MHz continent on voice. Where have all the  
 VK/ZLs gone?

EUROPE — CTs 1BF 1BH (299) 23, GD (297) 17, 1JH  
 L (310) 15, 1OE 1OF (313) 20, 1UD 1UE (315) 20, 1UW  
 (295) 19, 2AK (343) 17-21, DM6MAO, EAs 11Y 4GT  
 (305) 19, 6AR (300) 19, 6BG 6BH 6BM 6BN (275) 15,  
 EIs 2BL (304) 19, 3BF 19, 3H (282) 19, Fs 2YS 5OE 5RV  
 5WY 5ZW 6ALX 8NH 9EW, a few dozen Gs, GCs 2FMV  
 2LU (282) 16, 3XOJ (290), 5AET (374) 17, GDs 3FXN  
 (324) 18, 6IA, G14RY, GM8s CSM (280) 14, KEZ 19,  
 LNA PCH (365) 21, WZU YDA 19, GWs 3EQH 3ERY  
 18, 3NNF (250) 16, 8NP, HABVK (265) 15, HB8 9AIC  
 (310) 16-17, 9AMO (298) 15, 9AMZ 9NU 9AG, HV3BJ  
 (324) 15, 1Is DFI GIU GMG INF JX LLZ MD NAL  
 ROQ RSD YV ZPK, ISIs LIO (385) 16-17, LAIN (299)  
 15, KUA SCB (325) 20, IT18PI (364) 21, JW8 3XK (334)  
 15, 7UH (336) 14, JXs 3DH (310) 15, 3P (280) 14, 4YM  
 (322) 14, LAs 1UH 6AF (300) 14, LXs 1BW 1AF 1FT 11,  
 J8A (319) 17, 18K (282) 10, 2CQ (317) 17, 9DD, LZs 1M7  
 2EE 2KKZ, MID (342) 17, OEs 2WSL (330) 16, 6FWG  
 (339) 21, OHs 1VR (280) 19, 2XP 19, 5TY (295) 16, 6NI  
 (307) 17, OKs IUS (305) 17, 3ABU, ONs 4FJ (339) 16,  
 4WA 5J8 8NM 8Y8, OZs ILO 19, 2WO 5GB, PA8s HTR  
 SLR AKJ XPQ, PI1KMA, SKs 5AJ (295) 16, 6XC 19,  
 SMs 5AJ 5WJ 6CEL 6CKU 6COH 7AAH 7AT 7DK/1,  
 SP8AAT 14, SVs 1AK 1AR 1JL 9WIL (255) 15, 9VN  
 16-20, 9WT 16, TFFs WKP WLM (315) 19, WIs (243)  
 14, UAs 1DZ (265) 15, 2AO (285) 16, 2KB1 (340) 14,  
 2WJ 3FF 3KAG 3KND (340) 19, 3WJ (310) 15, 4KZZ  
 16, 4QL (312) 15, UB8s FG (305) 19-20, OD (317) 15,  
 WE WJ (318) 16, URFCA (300) 19, UQ2KA (340) 1,  
 UT5OZ (280) 22, UV3FD, UW8s EH 1N 16, YQ8CN,  
 YUs (and YTs) 1BCD (359) 0, 1HTU (277) 15, 2ACD  
 2CB 2REO 17, 3EY (314) 22, 3OV 17-21, 3TCB, ZB2s  
 AB BX, 3As AN (300) 17, CL (311) 15, 4UITU (336) 21,  
 9HIs BL BP (340) 13, I (235) 14 and K.

SOUTH AMERICA — CFs 1IN 8AD 8ADX 8IF 3PY  
 3TR 3TT 3UH 3VQ 3XY 5ID 6DP 6GB 6GW 8AA  
 8AN (323) 17, CPs 1GN 1HW 5AK 5DB (370) 11, 5DM/6  
 19, 5EE 5FB 6H (305) 2, CXs (and CWs) 1AK 1JM  
 (336) 22, 2CO 3BH 4PY (280) 10-11, 7BBS (376) 0, 7BF  
 (350) 21-22, 8AA (300) 21, FY7s YQ (308) 17, YR (365)  
 20, HC8 1JL (380) 15, 1MG 1TH 2GE 2GG/1 19, 2HM  
 2OA 2OM 2RZ 2WM 3MK 5EJ 5LG 6FJ 8GS (305) 21,  
 HKs 1BY 3AKR 3RED 4BNC 8AI (347) 16, 6BKX  
 (340) 16-21, KK4s AAF (300) 17-0, USM (310) 0, USP  
 UX, LU8 1DAB 1BFK 2AC 2DG 2DZ 2H 2V 2JAV  
 2QC 2AEF 3AIM 3MZ 6FE 6MV 8HCA 8KAE 9DAC,  
 OAs 1BT 1CO 4AS 4BA 4F 4JO 4D8 4LM 4SO 6BW 6BY  
 7BA 7BW 8V, PZs 1BF (285) 20, 1CU 23-0, 1DH (261) 0,  
 1DH 8AA (323) 20, PJs 1AA (280) 16, 2CQ 2CW 13, 3As  
 9GB (313) 12, Pys 1CZG 1DAQ 1HT 1LC INK ITP  
 2BFF 2EFP 2ELs 2FE 3REW 3B8H 3BYC 7IM 7VN  
 8YZ, VPs 8J KC, YVs 1ABQ 1WH 2KO 4WT 5BOF  
 5C11, ZPs 3CW (353) 21, 5BL 5DV (349) 1, 5DY 11,  
 5PM 2, 5GJ 5GS 5JR 5KU 5MO (345) 23, 7BF, 4MIA  
 (276) 15-16, 8RIU (336) 20, 9Y4s AA CR DS (296) 23,  
 DX and VT.

HEREABOUTS — GOs 2CX 2DC (248) 20, SRA,  
 PG7s TD (245) 12, TI XX (311) 20, FM7WQ (239)  
 14, HIs 8GS 14, XRA XBK XXX 15, Hps 1EM 1CA  
 1JC (336) 0, 1XAK 1XGL (382) 22, 9FC/MP (350) 13,  
 HRs 1EMM (200) 15, 1JZ 1KAS (293) 18, 1KS (356) 23-0,  
 2WTA, KG4s AA (365) 18, AN (205) 12, DO (320), DS



FB8ZZ, amateur installation at the Amsterdam south Indian Ocean weather station is temporary home of successive French radiomen on DX assignment. Operator Gilbert, shown here, was recently relieved by fresh custodian Georges



(370), KL7s AZZ CBG GCT (334) 1, GMA/mm, JDO (266) 23, KP4s AQC (277) 21, ATQ (365), DCL (264) 21, DCR 12, DGE ZC, KV4s AD (371) 14, EU EY FC 19, GP (382) 11, KZ5s AA (300), AG (440) 15, AM (335) 0-1, RO DH EQ LI (300) 0, IS (340) 2, LD (280) 23, MS 14, NO PA PM RI SF (335) 0, SW 21-22, TGs 4(F 9C)D 9(F 9R)N 9(R 9U)P (235) 16, TIs 2AAC 2BH (390) 19, 2PCD (311) 23, 2HP 2CA, 2USA 23, 2WEL (390) 20, 6HO (337) 0, VESRCS 15, VO1s 1GN 2KR, VP1s 2AA (249) 0, 2AC (224) 17, 2AL (315) 15, 2EQ 2GBD 2GR, 2GSM 2LA (275) 18, 2MA (301) 2, 2MK (303) 23, 2SY (319) 20, 2VI 2VP 22, 5AA (300) 20, 5GM (378) 13, 7CG (232) 19, 7DL 19, 7NN (283) 19, 7NQ (280) 19, 9AT (244) 16, 9MI, WA2GQ1/VP2A (276) 21, XEs 1BDZ 1BN 1CF 1FU 1GGW 1JP 185Y 1TX 1UA 1XE 2IG 3AF (360) 19, 3JD, YNs 1DC 1HP 1HSM (282) 13, 1MA (313) 21, 1RR 18V (366) 21, 1USA 2IM (300), 4LGE 4RWV (328) 0 also displaying their HT tags, YSs 1FH (320) 19, 1JL (342) 2, 1JNL 1JSL 1NCT (248) 23, 1OEA 1RFF 1XBE (305) 0, 2ACB 3FH (300), 6Ys ET (238) 19, GA (185) 13, 8P6s DD (280) 23 and DG.

The preceding documentary spot-check is the work of WA 1ARR 1VRK 21Y 2FMX 3HNK 4YOK 6YRA 8YGR 9BF 9LNQ, Ks 4TWJ 7BFL, WAs 1FHU 1JHJ 1JKZ 2BCT 2BHJ 2DFD 2FOS 2YWR 3GVP 6EQW 9SQY, WBs 2DZZ 2GVE 4KZG 4LIL 8ABN and the clubs press. Soon your "How's" Bandwagon will tour other sites with the guidance of (10 phone) Ws 1DAL 3HNK 4YOK 6YRA 8YGR 9LNQ, K4TWJ, WAs 1FHU 1JMR 2BHJ 2FOS 3GVP 4ZU 6EQW 9SQY, WBs 2BCT 2DRR 21ZZ 4KZG; (10 cw) Ws 1DTY 3HNK 3JZJ/5 4YOK 8YGR, Ks 3CUI 4TWJ 5MHG/6, WAs 1FHU 2BCT 2BHJ 2YWR 3GVP 9SQY, WBs 21ZZ 4EPJ 4KZG; (20 phone) Ws 3HNK 4YOK 6YRA 8YGR 9LNQ, Ks 6RF 4TWJ, WAs 1FHU 1HAA 1JMR 2BCT 2BHJ 3GVP 4ZU 6EQW, WBs 4YB KZG; (20 cw) Ws 1DAL 4YOK 4ZYT 7YTN 8YGR 9DY 9LNQ, Ks 5MHG/6 8TRF 688V, WAs 1FHU 1JMR 2BHJ 2FOS 2HDZ 2YWR 3GVP 4CZM 5UAX 9SQY, WBs 6AH JYB, VE7BAF; (40 phone) WAs 1KZ 1JMR; (40 cw) Ws 4YOK 7YTN 9EY, K8TRF, WAs 1FHU 1JKZ 1JMR 2BCT 2HDZ 2YWR 3GVP 5UAX 9SQY WB4GAH; (75 phone) W1WQC, WAlJMR; (80 cw) Ws 18WX 9EY, WAlFHU; and (160 cw) W1BB. More 21-MHz cw due eventually, too, thanks to Ws 4ZYT 5BZK, WAs 1FHU 1JKZ 1JMR 2BCT 2BHJ 2DFD 2HDZ 3GVP 5UAX 9SQY, WBs 2DRR 9CJ8, WNs 2KBA 5YMW and VE7BAF. Recaptured from the '70 ARRL DX Test yet? *Reminder:* Your Contest results, large or small, are needed at League desks on or before the 10th of this month. K, gang!

**Where:**

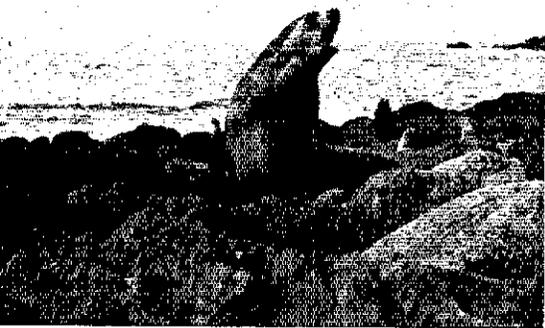
**ASIA** — K4EPI, still managing TAIAM's QSLs, points out that TAs 1RT and 2SC now have their cards handled by WA3HUP. . . . . *Neer* give up! W9EB just received bureau delivery of an 81AB QSL confirming QSO in August, 1960.

**AFRICA** — LRAA QSL chief EL2BI announces, "QSLs for all Liberian stations now can be sent via Liberian Radio Amateur Association QSL Bureau, P.O. Box 1477, Monrovia. This notice is necessary because EL1s and EL2s received cards via different addresses in the past." . . . . . "Just received EL3C logs for October, 1968, to December 31, 1969," advises W3EY. "We'll QSL 100 per cent via bureau, or promptly direct in response to s.a.s.e. (self-addressed stamped envelopes)." . . . . . ON5TO is busy confirming the 4808 QSOs with 185 countries racked up by 915RH, now back in Belgium. . . . . "Let the Stateside

fellows who await QSLs from me know that I have been inactive by doctor's orders," SU1IM tells Ws 3ECW and 5QPX. "I am hoping to be fit by June." Ibrahim has a heart problem. W5QPX, by the way, now tends ZS8ME pastebords as of January 16, 1970. . . . . W4LF handles QSLs for the North and South America QSOs of 9J2WS. . . . . VE1ACU comments, "Receipt of logs is quite slow from some of VE1ASJ's remote operations, ZD9RI" being one of the latest. We check carefully to make sure each QSO claim is valid before we send the card." . . . . . "I'm hoping VQ9RK and I can work out something so we won't have to depend only on the mails for logs," states Bob's QSL aide, W9VNG. "Cards began arriving in early January but no QSO data as yet." . . . . . Geoff Watt's *DX News-Sheet* hears that Azuleja stations may soon sign 3B6 calls. St. Brandon 3B7, Mauritius 3B8 and Rodrigues 3B9, VQ8CFB, for example, would become 3B7CF.

**EUROPE** — CT2AT says the best address for W/Ks to use is C. Wartes, U.S. Navy, A1O, New York, N.Y., 09406. Others may do better using C. Wartes, Barrio Americano E-156 BAA, Lajes Field, Terceira, Azores. "In July I'll no longer be active here. Cards can then be sent with s.a.s.e. to K70WT." . . . . . Vhf in Russia begins with the 10-meter band. Hence *DX News-Sheet* points out that you may encounter 28-MHz stations signing U.S.B.R. "R" vhf prefixes; e.g., RB51CC would be 1B5, RA9CBK is UA9, etc. Hungarian HG prefixes are similarly found on ten. . . . . West Coast *DX Bulletin* says CT1UE, out for NCDXC's coveted California Award, is still shy plenty of QSLs from the 600 Sixes he has worked. Cough up!

**HEREABOUTS** — 8P6s AY and CC have assumed responsibility for their own QSLing, according to W40PM who keeps busy enough pushing pastebords for FM7s WF WQ and WS. . . . . "As of December 1, 1969, I'm QSL manager for H1K8S," records WA4WKW. . . . . WB4RYX's arrangement to handle 6Y5ET's confirmations dates from January 17, 1970. . . . . "My New Orleans address will get quicker results," hints WA9RA1 concerning his HZ2HP emanations. . . . . "Found out how to confirm 102 out of only 110 countries worked," reveals WA6EQW. "Write the biggars every two months. Also, God bless our QSL managers." . . . . . VESBWWY discloses, "As VP2MA's QSL manager I hold logs beginning May 16, 1969." . . . . . Say, unless they expressly agree to the routing, don't count on QSL managers to accept cards for clients via bureaus. For example, don't ship a card for TTRAW to QSL rep W1BPM via the latter's local bureau. QSL managers shouldn't be expected to foot the bill for resulting redundant reshipments. . . . . West Coast *DX Bulletin* has it that International Reply Coupons are declared by the U.S.P.O. to be okay in every country though many will have varying conversion difficulties. And remember IRC fundamentals: don't ship 'em back to their countries of origin. . . . . KP4BJM, despite QSLs indicating otherwise, wasn't on the air from December, 1967, to April of '69. In similar goings-on, K6MOO disclaims any FP3 QSL manageria connections, and K8BB is not associated with 3Z QSLing. . . . . For amazingly fast QSL footwork "How's" correspondents Ws 1RWX 1WQC 4JUK, Ws 2BCT 6EQW 9SQY and WB4LIL nominate prompt comers-back DL4JS, EI9HV, EL2BE, FB8X, GM3CSM, HA3ML, HB3AMO, HL9VF, HR1-RSP, I1BVP, KH6s L5 RS, KP4DFA, KR6TA, K86DH, KZ51I, LX1AF, PZ1AK, SV6WO, TR8MC, UM8FM, VP8JT, ZM1BN/A and ZQ7AM, plus Ws 2YV 6CUI, K3ERT, WA6ALP, WB3ABN, K2MO and ZL2AFZ in the proprietorial department, as this month's "QSLers of the Month." Candidates in your mind. . . . . Al! The following italicized brethren desire suggestions on landing wallpaper from holdouts mentioned: W2LX, EL2s AG



who now does his part to spread DXCC cheer. The volcanic island's scientific party of about 40 is heavily outnumbered by a snobbish sea elephant colony. (Photos via VE1KG)

J '68; W5BYY, MP4BBA, SRIG, 9H1AV, W6KRG, TTSAC '65, ZA1a AA D '67; W6GSL, VE1AED/SU '66, V89ARS '67, 3C8FJZ/SU '67; W4ZKZ, IS1ZUI '65, KC4USM '67, KJ6HZ '68, KR6UL '66, LA5CL/p '65, VP2LS '66, Y11DL '67, TZ3AB '67, 9V1NY '68; W43GVP, 5ASTW; W438 HML HMM, 9Y4LQ; and W22LIG, 5A3PY '67. Any tips? ... QSL manager volunteers for overseas ops in need: WAs 2CZE 2F1J 5UHR STDY, WBs 4LLL and 8BTU.

**SOUTH AMERICA** — PJ2PS affirms through WA3-HMM that the Netherlands Antilles QSL bureau address is Box 383, Curacao. ... L1DXA's *DX Bulletin* relays W42WUV's assertion that HC8FN works now despite QSL receipts to the contrary. ... HK7UL wants to handle QSLs for DX ops in Asia, Africa or Oceania who savvy Spanish. ... YV7AV, dispensing noddes of 4M7AV QSOs in this year's ARRL Test, promises thorough QSLing from his Carupano QTH. ... Let's check the month's input of individual specifications now, keeping mindful that each recommendation is necessarily neither "official", complete nor accurate. ...

AX9XI (via W2GHK or VK6RU)  
 G3IAH, G. Martinet, Encamp, Andorra  
 GE1KZ, Betty Hart, Casilla 197, Antofagasta, Chile  
 GE2OX, E. Gonzalez, Box 3016, Valparaiso, Chile  
 EP1DX, Capt. R. Harris (WA5VKJ), Sig. Branch Box 1000, APO, New York, N.Y., 09205  
 es-1FL8A (to DL5RS via REF)  
 FM7WG, Legrand, Box 79, Port-de-France, Martinique  
 G3PAC/W9, A. Brindley, 2901 S. King dr., Apt. 605, Chicago, Ill., 60616  
 H1SDAF, Box 951, Santo Domingo, D.R. (or via K3EST)  
 HK3VA, Box 6080, Bogota, Colombia  
 HL9VF, R. Largent, HHD 122 Sig. Bn., APO, San Francisco, Calif., 96224  
 HP1HJ, Box 241, Panama 1, R.F.  
 HPLXGL, APO, New York, N.Y., 09825 (or via K1ZMQ)  
 HR1KS (via WA8WKW; see text)  
 HR2HHP, P.O. Box 1191, LAUNO, New Orleans, La. 70122 (or to WA9RAT)  
 HT2DX, Box 75, Granada, Nicaragua  
 HT4LGS, Padre Leopold, Siuna, Nicaragua  
 KG6SY, Box 209L, Capital Hill, Saipan, Marianas  
 KS6DH, G. Johnson, Dept. of Education, Pago Pago, U.S. Samoa, 96920  
 M14TCZ, P.O. Box 176, Sharjah, Trucial States  
 OP3s KN QA (to OH3s KN QA)  
 PY7AWD/p, c/o J. Filho, P.O. Box 842, Recife, Pernambuco, Brazil  
 PZ1AK, Box 2029, Paramaribo, Surinam  
 ST2SA, Dr. S. Ibrahim, Box 125, Madani, Sudan  
 SU1MA, A. Attaya, P.O. Box 840, Cairo, Egypt  
 SV6WI/JY (via WA3HUP)  
 TA5 IRT 2SC (via WA3HUP)  
 TG9UZ, J. Carnett (W9UZC), Av. Las Americas 20-30, Zona 13, Guatemala City, Guatemala  
 T12AP, D. Motschenbacher, WA6WTD/8, 2624 Rochester, Apt. 8, Royal Oak, Mich., 48073  
 T12PCD, Box 4523, San Jose, C.R.  
 TU2GJ, R.P. 1752, Abidjan, I.C.R.  
 UV9PP, A. Kurjov, P.O. Box 81, Novosibirsk, U.S.S.R. (or via JA9CHH)  
 ex-VE3ADV, F. Devenish, VE7BBD, 3755 Crestview rd., Victoria, B.C., Canada  
 VP2MA (via VE3BWY; see text)  
 VP9GJ, J. Rogers, Alta Vista, Harrington Hundreds, Bermuda  
 W7DZW/KL7, Capt. K. Thurber, CMR No. 5, Box 1924, APO, Seattle, Wassa., 98737

WA3MGA/KP4 (to WA3MGA)  
 WA9RAT/HR2 (to HR2HHP or WA9RAT)  
 WC7ARS, Box 73, Boulder, Nev., 89005  
 XE2BZ, Elida Jiminez, Box 8, Nuevo, Guerrero, Tamps., Mexico  
 ZK1AJ, Box 90, Harotonga, Cook Is. (or via KH6GLU)  
 ZP5O1, c/o U.S. Embassy, APO, New York, N.Y., 09881  
 5T5HG, Box 538, Nouakchott, Mauritania  
 6Y5ET (via WB4EYX; see text)  
 7Q7CZ, P.O. Box 5656, Limbe, Mali  
 7X2LOU, Box 2, Alger, Algeria  
 8P6s AY CG (see text)  
 9J2NC, N. Chapman, Box 124, Lusaka, Zambia

AX6KW (via VK7KJ) PJ8KH (to W2DV)  
 GR3KD (via WA4PXP) PJ8PM (to W2IVP)  
 GR6GO (see text) PJ9BB (to W2VIA)  
 GT2AT (see text) SK6GC (via SM5BXP)  
 ex-DL4LF (to H12CB) TF2WLW (via K3EST)  
 DL5RS (via REF) TF5TP (via DL7PT)  
 E18BB (via DJ8OT) VE0MA (via VE1ANJ)  
 EL2CB (via W2CTN) VK9MS (via K7BFL)  
 EL3C (via W8YY) VP2LX (to G3FGP)  
 F0MS (via PJ2CL) VP2MT (via W2GQN)  
 GB2DX (via G3JOC) VP5GM (to G3WOV)  
 HB0NI (to HB9NL) VP5TH (via WA5GFS)  
 HC8GS (via HK3WO) VQ8CPB (via VQ8AD)  
 HK1BOR (via WA5GHR) VQ9RK (via W9VNG)  
 HL9UU (to W2SRQ) YU2TU (via 4U1TU)  
 HS1ABQ (via K5QJH) W2VDV/KV4 (to W2VDV)  
 HS1ACH (to H81LG) W4BRB/VP7 (to W4BRB)  
 HS4ABF (via W7FNY) YN1AV (via WA9TSG)  
 HS4ABJ (via K4WHK) Y07NA/8 (to Y07NA)  
 HS4ABV (via W5PJR) YT4TN (via YU2AFB)  
 HS4ADJ (via WA2VTI) ZB2BX (via GW3P8M)  
 HS5ABD (via W6DQX) ZB2BY (via GW3DIX)  
 IR0PFP (via AR1) ZD9BP (via VE1ASJ)  
 JA3LUK (via WA9TSG) ZS6ME (via W5QPX)  
 JW3XK (via I46RI) 3B7CF (see text)  
 K6KII/KG6 (to K6KIT) 4M7AV (to YV7AV)  
 KC6EJ (via WA6AHF) 6W8XX (to F2XX)  
 KL7GPV (to WA1JVA) 9H1AZ (via G3LQP)  
 KZ5NR (via WA9PZU) 9H1GB (via G3RFH)  
 LA1OA (via WB8TTU) 9J2WS (see text)  
 MP4TJK (via DL7TJK) 9MSFM (via W1YRC)  
 OX3WO (via OZ6Z) 9Y4US (via K8NSA)  
 PJ8AA (to W2BBK)

The preceding are generously contributed from the logs, QSLs and correspondence of Ws ILVQ INJM 18W X WQC 3HNK 4JUK 40PM 6C8V 9DY 9EY 9JVV 9LNQ, Ks 4EPL 6IEG 6KII 68NN, WAs IHAA 1JKZ 2BCT 3GVP 4CZM 98QY, WBs 4G4H 4JYB and 9CJ8, plus newsworthy Columbus Amateur Radio Association *CARA* scope (W8ZCCQ), DARC's *DX-ME* (DL3BK), *DX News-Sheet* (G. Watts, 62 Bellmore rd., Norwich, Nor72 T, England), Far East Auxiliary Radio League (AM) *News* (K2L1), Florida DX Club *DX Report* (W4PRO), International Short Wave League *Monitor* (A. Miller, 62 Ward In., Selly Oak, Birmingham 20, England), Japan DX Radio Club *Bulletin* (JA3TU), Long Island DX Association *DX Bulletin* (W2GKZ), Newark News Radio Club *Bulletin* (J. Heisen, 3822 Marshall ct., Bellwood, Ill., 60104), North Eastern DX Association *DX Bulletin* (K1IMP), Northern California DX Club *DXer* (Box 608, Menlo Park, Calif., 94025), Southern California DX Club *Bulletin* (W6AGLD), UBA's *On the Air* (ONs 4AD 5VA), Utah DX Association *Bulletin* (K7DEQ), VERON's *DX press* (PA/s FX LOU to VDV WVP) and West Coast *DX Bulletin* (W6A6AU). Good haul this trip. More, more!

## Whence:

**EUROPE**—From 1200 GMT April 25th to 1800 the 126th you can choose phone and/or cw weapons for battle in the 1970 PA431 Contest, sponsored by Holland's VEIRON wherein non-Netherlanders will work as many PA/PE/PI people as possible, each once per band, 1.8 through 30 MHz, using the customary RS- or RST001, RST002, etc., serial swap. You earn three points per two-way exchange, total points to be multiplied for final score by the number of Dutch band-provinces contacted (province abbreviations to be used are DE FR GLD GR LB NB OV UT ZH and ZL). Each log, postmarked on or before June 15, 1970, should be sent to contest manager PA4ABM, 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 certification of performance. At the same time you might request specifications on VEIRON's various worthy DX diplomas. . . . On those same dates from 0000 to 2400 GMT you can test your radioteletype gadgetry in the 2nd RTTY WA8 DX Contest sponsored by DARC (Germany) on 3.5 through 28 MHz. Participation rules are patterned after that society's annual WA8DC blast. Zip airmail a.s.s.e. to DL9XB for full particulars. And don't forget the cw-only International SP DX Contest coming off the first week end of this month as detailed in our March pages. . . . "The Malta Independence Day Award is annually presented to the ham who makes the largest number of 9MI contacts on our Independence Day, September 21st," writes Mrs. M. Swire, MARS secretary. OH2BBR was the 1969 champion. Other certification notes: The Geneva diploma, based on six QSOs with Geneva canton (province) HBs during or after 1970, is offered through USKA, P.O. Box 524, CH-1211 Geneva. . . . The Jubilee award, based for non-European stations on contacts with 25 U.S.S.R. stations in UA/IV/UW/1-2-3-4-9-6 regions during 1970-75, is issued via OKC, Box 88, Moscow. . . . The 25-Kosice award for 25 points worth of QSOs with certain OKs comes out of Kosice Radio Club, Sverjovova 5/B, Czechoslovakia. . . . The Prince of Wales award for sufficient GW contacts has had its qualification cutoff date extended through June, 1970, according to G3WET. For complete details on these sheepskins rush a.s.s.e. to the sources indicated. . . . G3XNK tells W4BJ that GB3BS will be a multiband DX attraction at the May 10th Bedfordshire Boy Scout Jamboree. . . . K1IRF notes that OZ3Y, Danish *Amateur Magazine* DX editor, enjoys radiating 5B-DXCC QSOs on 80's low cw edge with his 301-L, neighbor OZ2BA likewise with 100 watts and an indoor wire. . . . E7BR tells W4LKD that Eric novices are automatically elevated to general status after a year's probationary operation. . . . WA1QO finds DL6ULM with 200 countries and 49 states on a car-mounted 350. Utah cludes Eric. . . . More from the Continent via club newshawks: DL7PT plans Albanian action this month or next. . . . SV10M radiates from historic Corfu Isle. . . . G3ALP (ex-PX1PA) has quit a following on 14,240-kHz and 7-MHz sideband as Andorra's only active year-round DXer. . . . OK5FIS should be audible from the Tatra mountains till May with a 1W on 15 through 80, cw and carrier a-m. . . . VEION's annual spring radio equipment meet will have PA6AA back with us in mid-May.

**AFRICA**—Gough's ZD9BN wants to work more A/WK/VFs, according to KB6F. Paul hits 14,250-14,300 or 21,250-21,300 kHz nightly at 2300-0100 GMT, also 1500-1800 on Mondays, Wednesdays and Fridays. ZD9BN is available Saturdays at 1545-0100, and Sundays at 1545-1800. He can run 50-band teletype, too. VE1ACU says HP9FC/mm stopped off on near-by Tristan da Cunha in January as ZD9BP. . . . EL2GB (W6MNN) comments, "Primarily cw here with dipoles on 80 and 40, ground-planes on 10, 15 and 20 (no 160 in Liberia). A TA-33 and 40-ft tower are in the works." . . . "My departure left just 3V8s AB and AL active in Tunisia," assays W6JVG who closed his 3V8AC books in January. "3V8AB is ex-FR3CE-TRAC, and 3V8AL is W4KIL, also licensed in other African countries." . . . W2DKM says CR4BC tries his 5B-DXCC lark on 3805 kHz or so around 1500 GMT. . . . 9L1RP (G3MTL) resides a 150-wattier and beau for possible 7G1, XT2, etc., shenanigans. . . . "VQ8RK came on 15 and 20 cw and sideband from Mahe in January," affirms W9VNG. Bob is ex-ZD8RK. . . . Further Africa dispatches courtesy literature of clubs and groups: 5H3s KJ and LV expect to stir up more latham iste DX-entement. . . . 5UTAL eyes possible 7G1 and Dahomey DXursions. . . . 5Z4KL may try his luck as an F1H this month, an 8T2 later. . . . 6W8XX knocks off for F2XX. . . . F1BNAM claims operating credentials for a possible Annabon call in the fall. . . . F8SWW and F8ZZZ staffers may collaborate for further Crozet doings. . . . 5T5BG, popular on 20 cw, is ex-F1N8G-5R8G1-FK8AO-FQ8AE and signs F2DE when home. . . . VQ8CFB hopes to keep St. Brandon workable through next month near 14,025, 14,130, 14,230 or 14,330 kHz. Ex-VQ8CDD awaits a VQ9 ticket for code fun on Diego Garcia. . . . Chshunters oil your beam! W4BPD is due for more multi-country merriment at any time. . . . CR6GO ASK QSL via Box 10408, Luanda. Not via CR6 Bureau.

**OCEANIA**—9M8FMF (K6FMF) declares, "OKing remains good down here and I've been working hundreds of stations all over the world, mostly on 15 around 0100 GMT." . . . Research triggered by K9VQK turns up the fact that W4JCN, though not using that call, was working a Honolulu Kb on cw when bombs began to fall on Pearl Harbor. We wonder who the Hawaiian operator was. W4JCN has forgotten and holds to record. . . . "KH6SP is on the air about twenty hours a day," informs station manager K5LTH. "We use 5-line and 2K-3 with dipoles on 80 and 40, a 100-ft-high 4-element wide-spaced quad on 20, 15 and 10 RTTY, cw and ssb. We're out after 5B-DXCC and enjoy giving guys their 50th state." Les lists WA5NNE and GRNF 7LFD 8LAP and VE000 as regular ops and says that W47LFD will become an HL9 shortly. KH6SP made 20,000 QSOs with some 200 countries in '69. . . . ZL1WB, an Australia Qear coordinator, visited YL K9JIG in December. Bruce is WAC on RTTY and is regularly workable around 14,090 kHz. . . . W1HIN and other Yank friends were saddened by the passing of VK3CX in February. "Alan gave hundreds of budding DXers their first Australian QSOs," recalls Chuck. . . . Pacific pointers pinched from aforementioned periodicals: Mamihi's ZK1AIN, lately on 3580 kHz, intends 14-MHz activity. . . . AX9KY may sign off for the VK mainland this month after 2500 Cocos contacts. . . . VQ9HM's time on Heard is running out after much 14-MHz fun with linear and beam.

**HEREABOUTS**—WB2YQH comes through with "DXCC-squared" No. 62, the fourth from Twoland, a photo of QSLs confirming QSOs with at least 100 ARRL DX Century Club members in 100 countries. "Conditions down here are just great," enthuses K25NR (WA9NRH), an Army type. "I'm on 80 through 10 with a V-MK-3, inverted V's and rotas, especially 40 and 80 for 5B-DXCC fun." Gary expects a two- or three-car C2, tour. . . . Consult VE7SV for data on the Pacific West Coast DX Convention slated for Vancouver on August 1-2, 1970. VE7IG's British Columbia DX Club boys plan a bank-up program. . . . K8NSA and WA1HA welcome 9Y408 to the air in January. Jack's NB-301-401 and 3-element spinner are especially potent on 20. . . . K136AM jumps back in with a quad and 200 watts after a two-year DX layoff. . . . "H72GK finished college and should be back on for the next four years," learns VE1ACU whose quad crumbled under winter's onslaught. . . . WNB5M clinched WAC and WAS before becoming WB5YMW. . . . G3PAC/W9 visits WA9YR for chats with home. . . . "DX conditions in Fairbanks are erratic to say the least," laments W1Z2W/K17. . . . "Where is the challenge of DXing under such arrangements?" protests VE1KG concerning QSO-manage "list" procedures. W8SZ agrees, "I'd rather herd-dog my own DX." W3HNK's Gripe of the Month is herd at big guns who crash pile-ups to say thanks for QSLs. . . . Localism via club organs: Pres. WB1YN, veep WA8SGV and associates. WA6WKW lead Denver DX Club to the hunt. . . . YP8KO quits South Orkneys for the U.K. possibly via Sixland. . . . VE1FR came Stateside for treatment of accident injuries. . . . F8PA8 intersperses 14,018-kHz eye sport with 3798-kHz sab sorties. . . . P12VD, available on six bands, enjoys working PAPS on 1807 and 1826.5 kHz with a Viking and 75A-4. . . . CARAscope DXcribe W8ZCQ observes that new-breed hydrocine-VFO rigs easily spray superfluous signals when improperly adjusted. Heretofore this merely annoyed other colleagues but now it can cause FCC, scanning for Extra-Advanced suballocation interlopers, to issue troublesome greetings. [SET]

## Stays

### Stolen Equipment

The following equipment was stolen on the evening of November 18, 1969, from my car: Heath HW-12A transceiver, Serial Number 830-1210A; Heath microphone; and a speaker. The serial number is engraved into the back of the chassis along with the date it was built. Anyone having information about this equipment is requested to contact VE7BRO, 5989 Sprott St., Burnaby, B. C., Canada, Telephone 298-6244, or contact the Burnaby RCMP.

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

# YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,\* WB6BBO

## HELP WANTED!

EVERY single one of us, from OOTC members, to those with an FCC license still warm from the postman's fingers, have been novices despite the fact we have never held an Amateur Radio Novice Class License. The word novice, according to the Dictionary, is defined as "a beginner." Remember how it was to be a beginner and those first faltering steps into the wonderful world on the air? Remember the excitement of the first station and the log half full of fruitless calls until someone finally answered? Remember the first one, and the delicious agony of hearing our own call coming back that knocked every bit of code down the drain? Remember the night that a General Class came down into the Novice Band and the thrill of working someone without an N in the call? The realization that there was somebody who wasn't another beginner actually wanted to work us?

The amateur radio ranks are very much like a family in that we are willing to help each other and really enjoy doing it. And we provide all sorts of assistance. There are books and manuals by the score that tell us how to improve in our choice of activity. There are many aids for learning the code

\*YL Editor QST. Please send all news notes to WB6BBO's home address; 1036 East Boston St., Altadena, Calif. 91001.



YL members of the Monterey Park, California Radio Club acting as hostesses at the club's annual Valentine party. Left to right: Ona Starck, K6IFZ; Eva Tronske, K6IGA; "Gene" Sheetz, W6QVK.

that run from on-the-air code practice sessions to mechanical devices for private use, as well as the many classes sponsored by radio clubs. The theory is described and explained in innumerable publications, while, again, club sponsored groups have teachers to break down the baffling language of electronics and communications law. Once we are on the air there are ARRL Official Observers to spot trouble and warn us before we receive a black mark from the authorities.

So what else is needed? Interest. With the very crowded frequencies allotted to them we might think that the last thing they need is someone to work a Novice, but that time can be, and is, a lonely time and our help and interest can mean a lot. Our concern doesn't take much or very long. It doesn't require that we be there just to encourage them, for no Novice needs that, they are full of zeal and enthusiasm. What they need is what a great many gals like WB6PCQ, VO2AK, K8LGA, or WA2GPT are found doing, working them on the air. As one gal put it: "My log looked like a one-track mind for a while, but it worked. We broke through that 10 wpm barrier and I have another General to my credit." It is not only working with Novices, and helping them over the various "humps" that crop up as speed increases, but at the same time using the correct procedures that are in all manuals, but are far easier to learn during an actual contact.

The Novice time of amateur radio, whether self-taught as Sister Mary Cletus, WA0JIE, or as a part of a class in code and theory, is really "when a feller needs a friend." When no matter how the code comes stuttering back, a compliment will do wonders. When hearing a call that isn't another WN, and who actually wants to chat, is worth more than half a dozen of the "rig hr is, name and QTH" contacts.

What is in it for the General, or Advanced, or Extra Class operator? It really isn't tangible. It's returning the favor that we once received from someone like ourselves who was interested. Someone who took the time and the trouble to talk to us and say, "From the way you are handling that key you sound like you are about ready for the test." Remember when all that was needed was that little extra lift? We've all been through it; that's why we aren't Novices now.

## 1969 Trillium Memorial Award Results

VE3FSA, 41.25; WB2JLW, 33.75; VF4ZX, 16.; VE3BNV, 12.5; W4JUJ, 12.; VK3KS, 11.25; K9HSK, 7.; VK3XB, 6.25.



Louise La France, K1EQE, busy NCS in Rhode Island Nets.

The Ontario Trilliums were in there too, but no member of the club is eligible for this award. It is sponsored by the club so the gals are there simply to give points for contact. But don't think they weren't active.

Bubbles Timlick, VE4ST, sends her thanks to all who participated, and her regrets to those who were prohibited from getting into the contest by the frequency changes in the American phone bands. Congratulations to VE3FSA, 1969 winner.

### YLRL

There have been a number of inquiries to this column about membership in YLRL. Any YL who holds a current Amateur Radio Operator's License, of any class, is eligible for membership. Dues are \$3.00 per year. Any gal who is interested in becoming affiliated with this oldest of world-wide amateur radio clubs for women operators, may write to the membership chairman, Marge Campbell, K4RNS, 1700 Nova Road, Ormond Beach, Florida, 32074, for the eastern half of the United States; or to Beth Taylor, W7NJS, 14637 S.E. Fair Oaks Avenue, Milwaukie, Oregon, 97222. The International Membership Correspondent, for the DX YLs, is Verda Siebenthaler, K7JBC, 905 Hastings Avenue, Coeur d'Alene, Idaho, 83814.

### Mid-West YL Convention

In just three months the curtain will be going up on the Mid-West YL Convention. The dates again are June 19, 20, 21, 1970, in Flint, Michigan. It is impossible to describe this annual YL convention. It has to be experienced, and like the potato chip advertisement, one is never enough, for the gals keep coming back for more and more. The only comparison in both size and quality is the quadrennial International YLRL Convention. If you have never been to Flint, Michigan, now is the time to go. If you want to have the pleasure of meeting other YLs from across the country, plan to be there.

The Flint YLs have planned a special program of interest for those long suffering OMs who accompany their ladies so that they will be entertained while the gals are "doing their thing."

Registration will be \$2.00, the Saturday luncheon, \$2.75, and the Banquet, \$4.75 per person. Send your registrations to Marion Bees, W8UAP, 2039 East Whittemore, Flint, Michigan, 48507.

### Plan Ahead

Joint Pacific-Southwestern Divisions' Convention, May 15, 16, 17, 1970, at the Hacienda Motel, Fresno, California. Plans now call for a YL meeting and forum on Saturday, May 16 for the YL operators. Additional entertainment is planned for those very tolerant wives who accompany their OMs to these affairs. It will be in the charge of the Fresno women. See you in Fresno.

The Convention Calendar is shifting into overdrive for the months ahead. All the ARRL Division conventions, the ARRL National Convention, as well as the majority of the Hamfests, feature special meetings for the ladies of amateur radio. So when you are thinking of attending these affairs, plan to join with the other gals who will be attending. It is the best place in the world to put faces on voices and fists.

### K1EQE and K1FGK, Rhode Island's Busy YLs

We're all busy, but both Louise, K1EQE, and Emma, K1FGK, really personify the word when it comes to radio operating. For example, K1EQE is a member of YLRL, WRONE, the Roger Williams VHF Society, which in turn is affiliated with the Providence Chapter of the American Red Cross, and that keeps her AREC participation very active indeed. She is a member of RIPON, handling traffic daily in that group, and to add spice to the operating, just in case things get a little dull, she is also a member of RISPIN, assigned as a net control two days a week officially, but fills in for other NCS as well. Louise, and OM, Dell, K1VYC, handle the traffic for northern Rhode Island.

When she isn't handling traffic, acting as NCS, or busy as the only Rhode Island member of WQCCD, "Grandma Lou's Cowbells," or possibly all tied up with her family, Louise's other love is playing bridge.

The First District Chairman of YLRL, has said "The day is really made when you go into the shack and hear the voice of either K1EQE, or K1FGK saying "Calling the Rhode Island State Phone Net." Despite her busy life with two children, and four grandchildren, plus being a crossword puzzle addict, Emma, K1FGK, is active in RIPON, the Roger Williams VHF Society, as well as in RISPIN. Emma acts regularly as NCS four nights a week on the net as well as serving as a substitute when needed. She has been active on the net since she first received her license seven years ago.

All the YLs and OMs who check into the Rhode Island nets agree that a large vote of thanks is due these women for their constant and capable operation over the years.

### Phyllis Hoffman, K1QFD

When the amateur radio virus hits it is an incurable disease even if the OM isn't licensed.

That is Phyllis Hoffman, who is YLRL First District Chairman for 1970. All she did was mention to a friend that she had heard him on her son's shortwave receiver. An invitation to visit the shack followed and Phyllis was "just plain hooked," before she left. Thanks to the help of interested friends she received her license in 1960, and has been keeping the tubes warm in the shack ever since.

She likes to build equipment from kits, as well as from scratch and the junk box. K1QFD acts as Rhode Island representative to IRN two nights a week, for, while she enjoys every facet of radio, cw is her particular pleasure. She also participates in RISPIN, RIPON, YL-ISSB, County Hunters, YL nets, and is active with the local RACES group. Her activity has resulted in about 100 certificates as tangible evidence of what she has been doing. You will find Phyllis on cw on all bands, on am on six meters and on ssb on 20 and 75.

At present she is all wrapped up in tracking Australis-Oscar 5, in partnership with K1CSQ, with two and ten meter tracking stations set up in her basement. Right now she has several successful tapes in the process of analysis. Phyllis says that the project is time-consuming, but is also fascinating, and so far is the highlight of her amateur activity.

### Meet the Club -- WAYLARC

The Washington Area Young Ladies' Amateur Radio Club had its beginning at the Washington Area Hamfest in October 1955, when Ethel Smith, K4LMB, arrived armed with a list of possible club members, and a written note asking who would like to form a club in the Washington, D. C. area. This resulted in an organizational meeting in November in the Capital. A second meeting in December resulted in nominations for offices and a constitution was studied. The election of officers took place at the first formal meeting in January 1956. Those elected were President, Ethel, K4LMB (she was then W3MSU); Vice president, Liz, W3CDQ; Secretary, Camille, W3TSC (now WB2PYD); and Treasurer, Mary, W4ETR. Beulah,



### WAYLARC Certificate

W4DEE, was in charge of drafting the constitution.

The original members of WAYLARC were: W3AKB, Frances Darne; W3CDQ, Liz Zandonini; WN3CNC, Norma Forbes; W3CZT, Carol Louise John; W3DHL, Mildred Olson; W3MSU, Ethel Smith; W3QOG, Emma McDonald; W3RXJ, Irene Akers; W3TSC, Camille Hedges; W3UXU, Betty Whitaker; W3VHF, June Woodside; W4AHN, Merle McBain; K4BUN, Florence Robinson; W4DEE, Beulah Barrick; KN4ENC, Melva Ruth Smith; W4ENG, Joan Giles; and W4ETR, Mary Sturkey.

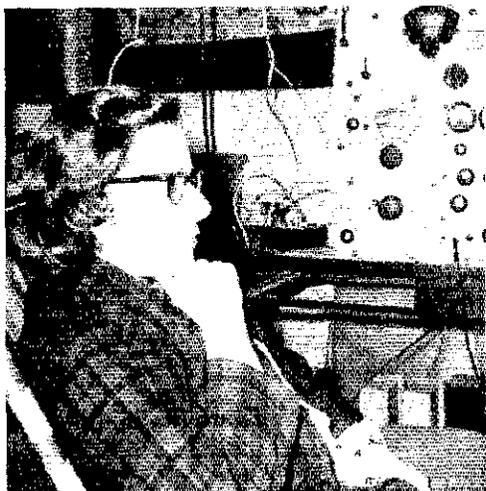
In 1960 WAYLARC voted to have a club certificate, and Ethel, K4LMB, was the designer. The certificate is available upon receipt of proof that a licensed operator has worked 5 WAYLARCs on any band, using any mode. Certificate custodian is WA4FEY.

The club meets the third Saturday of each month, at present at the homes of the members. Any interested YL is welcome to attend. Meeting time is usually at 1:00 P.M. local time.

### Feedback

There was an error regarding the Penn-Jersey YL net meeting in the December QST. YL News and Views. The Penn-Jersey YL Club has a weekly net which meets on 3.790 MHz, at 2200 GMT on Thursdays with WA2FGS acting as net control.

K4EPI advises that the language barrier was indeed a problem in the search for the first YL in Turkey. The first Turkish YL to be licensed is TA1RT, Reyhan, licensed in 1968, and she is, according to report, very active. QST



K1QFD, Phyllis Hoffman, between orbits of Australis-Oscar 5, in the subterranean monitoring station in her home.

### First-Day Covers Still Available

When the Amateur Radio First-Day Covers were processed in Anchorage on December 15, 1964, we gambled and had a few extra unaddressed covers prepared, because orders for the first-day covers were still coming in and we didn't want anyone to be disappointed. We still have some of these left. They are all singles, unaddressed but carrying the stamp and the official first-day cancellation, and they will be mailed to you in an envelope. Prices are 35c each, three for a dollar. Send your orders to ARRL Hq., 225 Main Street, Newington, Conn., 06111.

# The World Above 50 Mc.

1215-1368 2300-2450 3345-3460 3545-3760 4545-4745 10,000-10,500 21,000-22,000 30,000-7

CONDUCTED BY BILL SMITH,\* KØCER

## Six-Year 50-MHz. E<sub>s</sub> Study

EACH summer there are lengthy discussions on how the present E<sub>s</sub> season compares to previous years. Pat Dyer, W5IYX, has kept detailed six-meter E<sub>s</sub> records since 1964. He has spent thousands of hours monitoring the six-meter band, using modest equipment, from locations in Austin and San Antonio, Texas. The results of his study are summarized here.

Month	Days Open	No. of Openings	Minutes Open	Multihop Openings
1964				
Jan.	1	1	120	0
Feb.	No observation			
Mar.	"	"		
April	2	2	45	0
May	13	19	2550	1
June	26	45	6235	4
July	24	34	3680	2
Aug.	11	14	1155	0
Sept.	3	3	120	0
Oct.	3	4	145	0
Nov.	6	7	380	0
Dec.	7	11	400	0
<b>Totals</b>	<b>96</b>	<b>140</b>	<b>14,830</b>	<b>7</b>

1965				
Jan.	No observation			
Feb.	3	3	130	0
March	3	3	220	0
April	5	9	795	1
May	24	34	5490	2
June	29	77	10,020	9
July	31	77	6925	8
Aug.	14	18	1175	1
Sept.	8	14	510	0
Oct.	7	10	1125	0
Nov.	8	10	615	0
Dec.	11	12	1150	1
<b>Totals</b>	<b>153</b>	<b>267</b>	<b>28,155</b>	<b>22</b>

1966				
Jan.	10	14	845	0
Feb.	5	7	295	0
March	1	1	20	0
April	5	5	280	0
May	16	34	2610	0

June	24	62	7430	5
July	24	42	4085	3
Aug.	15	22	1635	1
Sept.	No observation			
Oct.	"	"		
Nov.	"	"		
Dec.	11	14	1305	0
<b>Totals</b>	<b>111</b>	<b>201</b>	<b>18,505</b>	<b>9</b>

## 1967

Jan.	9	14	505	0
Feb.	1	1	100	0
March	0	0	0	0
April	4	4	420	0
May	17	32	2595	0
June	27	51	5390	4
July	29	64	7785	8
Aug.	23	46	2775	2
Sept.	8	13	470	0
Oct.	8	13	470	0
Nov.	4	4	85	0
Dec.	13	19	1245	0
<b>Totals</b>	<b>243</b>	<b>263</b>	<b>21,875</b>	<b>14</b>

## 1968

Jan.	7	10	860	1
Feb.	9	14	1070	0
March	2	2	40	0
April	10	16	1635	0



This is Fred Honnold, W6YKM, one of the West Coast 50-MHz scatter gang. Fred runs a kilowatt and 11-element Yagi on six, and 300 watts and 11-element Yagi on 144.

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

May	23	53	4445	4
June	26	55	6485	3
July	27	57	5445	5
Aug.	13	23	1620	1
Sept.	6	9	525	1
Oct.	5	5	350	1
Nov.	14	19	1265	3
Dec.	11	17	1030	1
Totals	153	280	24,770	19

1969

Jan.	3	5	425	0
Feb.	6	9	535	0
March	5	6	380	0
April	0	0	0	0
May	16	25	2760	2
June	22	37	3280	4
July	20	31	2310	3
Aug.	11	12	625	1
Sept.	2	2	200	0
Oct.	4	6	380	0
Nov.	0	0	0	0
Dec.	12	16	1430	0
Totals	101	149	12,325	10

WAS1YX calls attention to certain variations in pattern in the summary above. There was exceptionally high activity in June, 1965, with a greater than average drop in August. Multihop propagation was pronounced in the period June 18 - 22. October also showed unusual  $E_s$ . The minor skip season of December, 1966, was above average. The summer season of 1967 was late, peaking in July. One session ran from 0900 CST July 21 to 0100 the 22nd. 1968 produced high  $E_s$  activity in April, linked to F layer on April 20 - 21, June and July, 1968, both had periods of extremely short skip. (Editor's note: June 20 - 21 produced the outstanding example of this in vhf history, with the longest 144-MHz skip opening on record. See August, 1968, *QST*, pages 83 and 84 for details.) Again in July, skip as short as 280 miles indicated high nuF. November brought multihop openings to the Caribbean. The 1969 summer season was late starting, and generally poor, except for June 15. December's minor season showed an  $E_s$  comeback.

Pat also uses low-band TV channels as  $E_s$  indicators. He has logged many hours of  $E_s$  from Texas to Mexico, El Salvador, Wyoming and the Dakotas when no amateur signals were heard. These openings are not included in the tabulations. There are some observations period variances, but on a yearly month-to-month basis these may be considered so minor as to not influence the overall results.

During the six years of the study, there are large yearly differences in the amount of time the band was open, but the number of states heard each year is nearly constant: 1964 39, 1965 45, 1966 41 - 1967 43, 1968 41, 1969 41. Indiana, Illinois, Ohio and Tennessee were the most often logged, the New England states the least often, due mainly to skip zones. Thanks, Pat, for sharing the results of your study.

Long Island (N.Y.)  
Repeater Steering Committee

Feeling that the repeater situation on Long Island was headed for chaos, if not already there, fm enthusiasts within the Long Island Mobile Amateur Radio Club (LIMARC) and the Suffolk County Radio Club have organized a repeater steering committee. Interested amateurs were invited to the first meeting, held January 15 at the home of Ed Piller, W2KPK. The objective is a mobile integrated communications system for Long Island (LIMICS) that will serve amateur communications needs, and operate in the public interest. Participants were area ARRL officials and representatives of LIMARC, the Hudson Amateur Radio Council, and the Suffolk County Radio Club.

It is proposed that 146.34 and 146.76 MHz be used for repeater operations, with consideration being given to a 450-MHz system later. A deviation of plus and minus 5 kHz will be used, with open access and 24-hour availability. Tone access may be adopted later. A design goal is to meet all standards of good engineering practice, and to use the minimum power that will cover the intended service area effectively. This will include Nassau County, western Suffolk County and eastern Queens County. Contact will be made with repeater groups in adjacent areas, with a view to minimizing cochannel interference problems. Tentative sites are under consideration, and suggestions are solicited.

It is acknowledged that hardware problems are minimal compared to that of good channel control in the utilization of repeaters in areas of high population density. Short transmissions are mandatory, and an order of priority for channel usage is important. This should be:

- 1) Emergency communication.
- 2) Mobile-to-mobile.
- 3) Mobile-to-base.
- 4) Base-to-base (to be discouraged except in periods of minimal channel occupancy)

Control points for the various repeaters incorporated within LIMICS will be stations designated by elected officials of the sponsoring clubs. Participation of all interested parties is invited. Contact with the steering committee should be by way of Ed Piller, W2KPK, 80 Birchwood Park Drive, Syosset, N.Y. 11791. Phone 516 938 5926. It is intended that LIMICS will be an evolving system, to be modified to accommodate occupancy and the future requirements of the sponsoring groups.

OVS and Operating News

50-MHz DXers were treated to a fine winter minor  $E_s$  season, but South American F-layer DX was a rarity. Perhaps March and April will be more productive, but at this late February writing, prospects do not look promising.

The lone South American opening report comes from WAS1YX. Pat noted XHY-TV, channel 3, Meridan, Yucatan, Mexico at 0155 GMT, February 12. Pat suspected an  $E_s$  to TE possibility and began calling CQ. At 0230 WAS1YX began to hear

OA4C's beacon in Peru. They made contact at 0237. OA4C was heard at WA51YX until 0320 during which time Pat heard Heinz work K5AKY, W5FJD, a WA4 and possibly a K7, most likely in Arizona. Pat says the opening caught many DXers unaware, because frequent CQs by OA4C went unanswered. The remainder of six-meter DX worked in January and February was mostly E-layer. Here's a sampling by call area.

WA1DFL, Mass., logged openings January 5 and 13. Steven worked Indiana to Iowa on the 5th and into Florida the 13th. He also worked 4s and 8s on meteor scatter during the January 3 Quadrantids shower peak. WA1DPX, Mass., noted the same January 5th opening, working 4s, 5s, 8s, 9s and 0. Ray worked several 4s on the 7th, but says conditions were generally poor. WA1FFE, also Mass., worked 0s on the 5th.

WA3KQX, Pa., worked the January 5 opening to Louisiana and comments about the January 3 "opening" saying, "signals didn't stay in long enough to work." Was it meteor scatter you were hearing, Ken?

At San Antonio, WA51YX found the winter  $E_s$  quite productive. Pat notes openings January 5, 6, 12, 13, 22 and 29, and February 2, 4, 5, 8, 10 and 11. Especially noteworthy are these: January 6, 1800 to 1940 CST, Ohio south to Florida while also hearing very short skip into Louisiana. A nearly 4-hour opening the evening of January 12 from Missouri to Ohio to Florida during which WASTTH, Louisiana, worked ZF1AA on Grand Cayman. XEW-TV, channel 2, in Mexico City was logged at 1500 CST with a good color picture on January 22, and the previously reported South American opening. Pat suggests organizing six-meter DXpeditions to several Central American countries during the  $E_s$  seasons. He says during the last four years he has logged dozens of openings to El Salvador on Channel 2 television, but there is no six-meter activity there, or in other suitably-located Central American countries. Such DXpeditions are fun and rewarding, but expensive, to satisfy the hungers of the few really dedicated six-meter DXers.



This OM, Bunky Botts, K4EJQ, has been the fellow most responsible for Tennessee contacts for 144 and 432 DXers.

In California, WB6NMT at Vallejo works his DX on meteor scatter. Louis had 16 such contacts with W7FN, and 22 with W7CNK, during January. The path distances are around 1000 miles. Several reports were received from WA6HXM. Pete says K6ODV is in Sidney, Australia, operating as VK2ZHR, transmitting on 52.08 MHz ssb, and listening for U.S. stations near 50.75. VK2ZHR's operating hours are 2200 to 0200 GMT, Saturday and Sunday. VK2ZHR tells Pete there is much Australian fm activity on 52.78. WA6HXM reports several January and February  $E_s$  openings, the most exciting January 5 and February 2, with multi-hop to Florida. Pete also mentions the fine scatter signal of WA7NGK in Arizona, from a pair of 6-element Yagis. WA6WKF, near Los Angeles, reports openings January 12 and 17 to Oklahoma and Washington. He also worked W3DCD Dec. 27, on multi-hop. W6YKM, near San Francisco, is one of the West Coast scatter gang. A picture of Fred and his station appears elsewhere in this column. He reports scatter contacts with several Washington and Oregon stations and notes a good scatter signal from WA7CGS's TR-6 and 11-element Yagi.

Commenting on the January 3 meteors, K7ICW, Las Vegas, says the meteor-induced  $E_s$  from 1630 to 1930 GMT was nearly identical to that of November 16, 1968 during the fantastic peak of the Leonids shower. Al reports signals from Salt Lake City, east to Clovis, New Mexico, south to Phoenix and from throughout California. Al heard no other January activity.

W0MTK, Colorado, continues very active. Bill reports many scatter and  $E_s$  contacts, but prefers the former on Sunday mornings. January 11th Bill worked from Tennessee to California including W4OQG, W0PPP, K5WVX, K61BY, K6PYH, WA6-AKM, WB6SIY plus other 5s and 6s. Nearly identical contacts have been made each Sunday morning, since using a sideband transceiver and four 4-element Yagis. VE6AHE is completing a 4-1000A amplifier to feed 10 elements at 125 feet. Randy has recently completed a kW for 144 MHz. John, who provided much DX excitement at KH6GHC a year or so ago, is busy traveling for Motorola. He says he is sending PJ3AL in Aruba a six-meter transceiver in hopes of encouraging some operation from there this spring and summer. John also says his sidekick in Hawaii, Bert, KH6GRU, is working on a tone system remote control for the Hawaii beacon, so that it may be operated though a telephone hookup.

K8CLA/0 has left North Dakota to return to Ohio. Tom worked 46 states on 50 MHz. during 1969 but was disappointed in QSL returns. Those needing Vermont on 50 through 432 should look for WA2YJF/1 during the June VHF Party. WA2-YJF and WA2FUZ will be operating from Mt. Equinox.

144 MHz suffered through the usual late-winter doldrums, offering little in the way of DX, but allowing time to monitor Oscar 5 and so some building for the upcoming tropo and meteor scatter seasons. Here's a sampling of what's been doing around the country.

K1HTV, Conn., tracked Oscar 5 on both 2 and 10 meters, hearing the 144.5 signal only when the satellite was within line-of-sight, up to about 2450 miles, but the 10-meter signal has been heard when the satellite was over Asia. K4GGI/1 sends a clipping from the magazine *Wireless World* telling of exceptional mid-October tropo openings in Europe. Many 1000-mile contacts were made on 144 and 432, and English station G3LTF report-

edly raised his *countries* totals to 28 worked on 144 and 19 on 432. The openings extended from Sweden to Germany and were within a few days of the exceptional early-October tropo DX in this country. WA3GPL, who signs WA1JXN while schooling in Vermont, says he has worked six Vermont stations on 144 ssb and thinks that they are the only ones active, though many are on fm.

K3AKR and WA3JWL report good success collecting data from Oscar 5. K3AKR says the Nittany Amateur Radio Club is nearing completion of its 2-meter repeater. WB4CJB says the Carolina Repeater Society has received the call WB4PLN for their 6 and 2-meter repeaters near Columbia, South Carolina. No frequencies were given. Pete, K1FJM/4, writes of logging Oscar 5 but hearing little else at Milton, Florida. There is 2-meter activity in Florida, Pete, from several DXers and another group of fellows in the Tampa area. K4EJQ, Tenn., is finding band occupancy this winter disappointing, but Bunky has spent time logging Oscar 5 and building amplifiers for 144 and 432. I'd guess even he doesn't know how many he has built. What do you do with them all, Bunky?

K6AEP sends an interesting report on California 2-meter happenings. Clay says there is much activity on Monday, Wednesday and Friday nights at 9 o'clock, California time, around 144.02. In the San Francisco area, K6s AEP, BDK, HCP, KLY, MYC and PXT and W6GHV are working the 400-mile mountainous path to Los Angeles, where they find K6s IBY and JYO and W6s DOJ, KD and QED. Clay invites other stations to participate, and says 200 watts and moderate antennas will span the path. At Fresno, W6DPD is finishing a 3CX1000A7 amplifier -- that should reach L.A., Chuck -- and says W6JUK has a kW on the air. Chuck says all stations are welcome to the Central Valley group which meets Monday, Wednesday and Friday on 145.35 at 9 P.M.

K7VTM, Wyoming, is planning to increase his power to 500 watts by June, hoping to boost his states-worked totals by the meteor scatter route. W7ZC, Springdale, Utah, says he has worked three states and the W5LT, exWSRFF, will soon be active from New Mexico. In Oregon, WA7GFP says WA7GCS has been successful logging data from Oscar 5.

W8DGF, Ohio, reports a February 6th tropo opening, when he worked several stations in Illinois and K9MQS, Iowa. W9YYF raised his 2-meter standings with Geminid and Quadrantid contacts, but says other than that, conditions have been poor. W9KQX writes WHDQ of his breakfast schedules with W0LFE. They began in September, 1958, and since have completed 2450 contacts. That is a lot of talking! W9ZTK says WN9CCR is contemplating some cw activity if he can find someone to work (?). At Springfield, Illinois, W9NFO says there is much fm activity on 146.94. W0MTK says there are two 2-meter repeaters in the Grand Junction, Colorado, area. One is atop a 7000 foot mountain and the other is at the home of W0PXX. Both are 145.32 to 146.94 operations.

Moonbounce activity has been light the past several months. VE7BQH has been scheduling K6MYC, while looking for another dB or two in his system. KH6NS is trying to locate antenna difficulties. VK3ATN says he is building another 2-meter EME array, this one a 280-element collinear. Ray is going to apply for permission to run one kilowatt input instead of the normal Australian 150-watt maximum. Ray is searching for 432, 1296 and microwave gear for himself and some of the fellows in New Zealand. If you have

something of interest to Ray, look for him on the weekly moonbounce net Sundays at 0100 GMT on 21.415.

220-MHz moonbounce activity continues on the West Coast, where WB6NMT and W7CNK are hard at work. Louis, WB6NMT, has had problems with the plastic SK-760 socket and 4CX300As in his 220 kW. He finally decided upon using the more conventional 250-series tubes and sockets but sent a detailed report of his problems with the former. It is probably of limited interest to any except users of the 4CX300A tubes. Let me know if you want a copy and I'll mail you one. Please include SASE. Both WBSNMT and VE7BQH report W7CNK now getting excellent echoes from his own transmissions, and the first 220 EME contact does not appear far away.

432-MHz activity will be increasing soon as more favorable tropo weather arrives. Both K8DEO and K4GL report an interesting contact made January 17. K8DEO and K4GL had been scheduling nightly for several weeks. K8DEO noticed a 30-second enhancement of K4GL's signal every night between 9:37 and 9:41 P.M. during the 15-minute schedule, which began at 9:30. On January 17 they switched to 15-second calling sequences and were successful in exchanging contact information during that evening's 30-second enhancement period. Quite likely the signals are propagated by aircraft reflection, but K8DEO says such a pronounced 30-second-only period is unusual. Signals increased 35 to 40 dB during the period.

W4FJ, Virginia, says 432 has been slow and that scatter schedules with W0DRL, Kansas, were interrupted when a ice storm damaged Al's array. W4EJ and WA2EMB have been scheduling for about two years. In early February they completed contact number 400 and Ted says that since WA2EMB began using four Tilton Yagis in November, his signals have been consistently two S-units stronger than last winter when Bill was using a collinear array.

In Tennessee, K4EJQ continues to look for schedules in Georgia, Mississippi, Alabama and West Virginia. Bunky says he'll even donate gear to someone in these states who has had previous vhf experience. WB2NDI, Brooklyn, wants ATV schedules. K3CFA has successful weekend schedules with W3RUE, and has recently increased his power output from 5 to 100 watts. Joe is running a 6283 in grounded-grid, with a half-wave tank circuit.

W3GKP, whose 2300-MHz work with W4HHK has been reported in detail in these pages, says that this publicity has brought inquiries from several fellows in this country and in Europe. Bill has been receiving his own 2300-MHz signals back from the moon regularly since last fall, and W4HHK has heard them identifiably, as well.

Since Dec. 20, W3GKP has been running receiving tests with W4HHK, and on many occasions has picked up a signal definitely moon-reflected, but too weak for positive identification by aural methods. Setting his own transmitter so that his echo was on the same frequency as that of the signal, he was able to observe the doppler shift on both. Libration spreading of the signal produces a "gurgle" that make readability on such a weak signal very difficult. On

On Feb. 17, Bill first picked up his own echo at 0129. Peaking all adjustments, he then started to look for W4HHK, on schedule, picking up what he assumed was W4HHK at 0151. By 0215 the signal was showing a 2-dB upward swing on the VU meter at W3GKP, in a 200-Hz passband. At 0217, he had

Mrs. Smith call W4HHK by telephone to request 5-second-on, 5-second-off transmission. This type of reception began at 0220, and was heard continuously until 0242. W3GKP's own echoes disappeared at 0247.

The W4HHK signal was audible in passbands of 200, 500 and 2100 kHz, but was judged best in the 200-kHz bandwidth. The gurgle is a real handicap to cw operation with such low signal levels. It is not changed by going to circular polarization, and is worst with the moon overhead. This last point Bill sees as a good argument for putting an EME antenna high enough to see the horizon. W4HHK's can do this, but the W3GKP dish is capable of only limited movement.

Getting even thus far has been an incredibly long and difficult process for both participants. Tests continue and it would seem that actual two-way communication on 2300 MHz is now only a matter of time — and effort!

QST

### FCC Repeater Proposals

(continued from page 89)

owner of the equipment, is not present, the operator must identify his transmissions by using his own call sign with the appropriate portable indicator.

(g) A club station may be identified by its assigned call only when operated under the supervision of the trustee or an authorized club member.

(h) A military recreation station may be identified by its assigned call only when operated by a member of the Armed Forces of the United States who holds a valid amateur operator license. 9. Section 97.89 is amended to read as follows: 97.89 Points of communication.

(a) Amateur stations may communicate with:

(1) Other amateur stations.

(2) In emergencies or for test purposes, and on a temporary basis, with stations in other services licensed by the Commission and with United States government stations.

(3) Any station, other than an amateur station, which has been authorized to communicate with amateur stations.

(b) Notwithstanding the provisions of paragraph (a) of this section, an Amateur Repeater Station shall not repeat the transmissions of another Amateur Repeater Station.

10. Section 97.103 is revised to read as follows: 97.103 Station log.

(a) Each licensee of a station other than an Amateur Repeater Station shall keep a log of station operation which shall include the following:

(1) Except when operating mobile, the date and time of each transmission or the beginning and end of a series of transmissions.

(2) When operating mobile, the date and time station operation commences and ends.

(3) Call sign of the station called.

(4) If the transmissions are made through a repeater station, the call sign of the repeater.

(5) The signature of each licensed operator who operates the transmitter from the transmitter location or control point and the date and time of such operation.

(6) The name of any person other than the operator who directly or by recording transmits by voice or transmits by radio teleprinter.

(7) The input power to the transmitter.

(8) The frequency band or subband used.

(9) The type of emission used.

(10) The station location.

(11) If record messages are handled, a copy of each message sent and received shall be entered in the station log or retained on file for at least one year.

(b) The licensee of an Amateur Repeater Station shall keep a log of operation which shall include the following:

(1) The date and time station operation commences and ends.

(2) The entries specified in subparagraphs (5), (7), (8), (9), and (10) of paragraph (a) of this section.

(3) A record of all installation, service or maintenance work performed which may affect the proper operation of the station.

(4) The entry required by subparagraph (3) of this paragraph shall be made, signed, and dated by the licensed amateur operator who supervised or performed the work.

(c) The entries required by subparagraphs (5), (7), (8), (9), and (10) of paragraph (a) of this section need only be entered once until there is a change in the required entry.

11. In 97.193, the introductory text of paragraph (a) is amended, and a new paragraph (e) is added to read as follows:

97.193 Frequencies available.

(a) Except as provided in paragraph (e) of this section, the following frequencies and frequency bands and associated emissions are available on a non-exclusive basis to the indicated classes of stations or units of such stations in the Radio Amateur Civil Emergency Service.

\*\*\*\*\*

(e) A repeater in the Radio Amateur Civil Emergency Service may operate on any frequency and associated emission above 50 Mc/s listed in paragraph (a) of this section.

## Strays



5BWAS Nr. 1

The starting date was Jan. 1, 1970, and W1AX wasted no time working and confirming this brand-new award. In fact, Feb. 4 was the official date of qualification. Here's Rog with his "matched set," 5BWAS Nr. 1 and 5BDXCC Nr. 7. Only two qualifiers to date of both groups, W1AX and W41C — quite an exclusive 5-Band Club! (Photo by John Corey)

# Operating News

GEORGE HART, WINJM  
Communications Manager

ELLEN WHITE, W1YYM,  
Deputy Comms. Mgr.

Administration: LILLIAN M. SALTER, W1ZJE

DXCC: ROBERT L. WHITE, W1CW

Training Aids: GERALD PINARD

Contests: ALBERT M. NOONE, W1KQM

Public Service: WILLIAM O. REICHERT, W9HHH

**5BWAS First!** The effective date of the new ARRL 5BWAS award was January 1, 1970; that is, no contacts made prior to that date counted toward the award. Lo and behold, early in February W1AX came traipsing into Headquarters with an armful of confirmations, claiming his 5BWAS credit. They checked out flawlessly (as did his SBDXCC, number 7, earlier) and we had ourselves a "first." Congratulations to Roger on a superlative achievement in a miraculously short time!

Interestingly enough, 34 of the cards were "five banders"; that is, 34 of the states were confirmed by the same station on each of five separate bands. Some Philadelphia lawyers reading the rules might give you the wrong impression. The intent is to require all 50 states to be worked and confirmed on each of five bands. You can't combine confirmations on two or more bands to make up a unit of 50. For example, you couldn't submit 50 confirmations for 15, 50 for 20, 50 for 40, 50 for 80, and then 49 for 10 and 1 for 160 to make up your fiftieth "band." You gotta have fifty in each band.

**Where's the BPL?** Some of you may remember that a year or so ago we conducted a CD Bulletin poll on, among other things, the question of whether or not a new Public Service Honor Roll should replace the BPL. The vote was heavily in the affirmative. Much consideration of how to do it was resolved in May 1969, when the Board of Directors decided we should have a PSHR *in addition to the BPL.*

Lest you are now preparing to write your director to say the headquarters isn't following orders, please look in the Amateur Radio Public Service column of this issue and you will find the usual BPL, along with the PSHR. The BPLers are essentially public service people, and this is where they belong.

**Straight Key Nite.** K4MD proposes an ARRL-sponsored "party" on the low end of 80 cw which any but only operators using straight keys are eligible. "Strictly in formal attire," he says. "No bugs, no keyers." If it clicks (oooh!) it can be made an annual affair, with some kind of honor bestowed on the operator voted to be best straight key operator.

Does the novelty of the idea tickle your fancy? K4MD proposes it for New Year's Eve, but that's still quite a ways off; perhaps we don't want to wait quite so long. Not too often do you hear a good old-fashioned pump-handle in operation any more. Let us know if you like the idea and if so, when you would like to see it conducted.

**QRX.** Once in a while a standard Q signal becomes so imbedded with us amateurs that its old meaning continues to be used long after the new meaning has been in effect. Such is the case with QRX, which since 1947 has not meant "stand by." At the Atlantic City international allocations conference of that year, its meaning was changed to "When will you call me again? I will call you again at . . ." Thus, for over 20 years many of us have been using this Q signal incorrectly.

## OPERATING EVENTS (Dates in GMT) — ARRL-IARU-SCM-Affiliated Club — Operating Events

April

May

Mar. 28 —

- Apr. 19 IARC DX Contest, phone, p. 78 January  
4-5 New Mexico QSO Party, p. 114 March  
Florida QSO Party, p. 118 March  
SP DX Contest, p. 81 March  
8 Qualifying Run, W6OWP  
11 Qualifying Run, W1AW  
11-12 CD Party, cw (League officials and  
18-19 CD Party, phone (appointees only)  
25-26 WAE RTTY DX Contest (How's DX, this issue)  
Arizona QSO Party (Station Activities, this issue)  
PACC Contest (How's DX, this issue)  
Nebraska QSO Party (Station Activities, this issue)  
26 VE2 Contest phone (Station Activities, this issue)

- 3 VE2 Contest cw  
(Sta. Activities, this issue)  
7 Qualifying Run, W6OWP  
9 Frequency Measuring Test  
9-11 Georgia QSO Party  
(Sta. Activities, this issue)  
12 Qualifying Run, W1AW  
16-17 Michigan QSO Party  
June  
3 Qualifying Run, W6OWP  
6 Minnesota QSO Party  
10 Qualifying Run, W1AW  
13-14 VHF QSO Party  
27-28 Field Day

## W1AW SCHEDULE, APRIL 1970

The ARRL Maxia Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 p.m.-1 a.m. EST, Saturday 7 p.m.-1:00 a.m. EST and Sunday 3 p.m.-11:00 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. If you wish to operate, you must have your original operator's license with you. The station will be closed March 27, in observance of Good Friday.

GMT*	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000					RTTY OBS <sup>2</sup>		
0030	←-----CODE PRACTICE DAILY <sup>1</sup> 10-13-15 wpm-----→						
0100					CW OBS <sup>1</sup>		
0120-0130 <sup>4</sup>			3,700 <sup>6</sup>	7,020	3,520	7,150 <sup>6</sup>	7,020
0130			3,700 <sup>6</sup>	7,080	3,555	7,150 <sup>6</sup>	7,080
0200	←-----PHONE OBS <sup>2</sup> -----→						
0205-0230 <sup>4</sup>			3,820	50,120	145,600	1,820	3,820
0230	←-----CODE PRACTICE DAILY <sup>1</sup> (35-15 wpm TThSat), (5-25 wpm MWFSa)-----→						
0330-0400 <sup>4</sup>			3,555		1,805		3,555
0400	RTTY OBS <sup>2</sup>				RTTY OBS <sup>2</sup>		
0410-0430 <sup>4</sup>			3,625	14,095	7,095	14,095	3,625
0430	PHONE OBS <sup>2</sup>				PHONE OBS <sup>2</sup>		
0435-0500 <sup>4</sup>			7,220	3,820	7,220	3,820	7,220
0500	←-----CW OBS <sup>1</sup> -----→						
0520-0530 <sup>4</sup>			3,700 <sup>6</sup>	7,020	3,945	7,150 <sup>6</sup>	3,520
0530-0600			3,700 <sup>6</sup>	7,080	3,945	7,150 <sup>6</sup>	3,555
1400	←-----CODE PRACTICE <sup>1</sup> (5-25 wpm MWF), (35-15 wpm TTh)-----→						
1800-1900	21,288 <sup>7</sup>	21,288 <sup>7</sup>	21,288 <sup>7</sup>	21,288 <sup>7</sup>	21,288 <sup>7</sup>	21,288 <sup>7</sup>	
1900-2000	14,280	7,255	14,280	14,280	7,255	14,280	
2000-2100	14,280	21,288 <sup>7</sup>	14,095	21,288 <sup>7</sup>	7,080		
2130-2230	14,100	14,280	14,100	14,280	14,100	14,100	
2230-2330	7,255	21,288 <sup>7</sup>	21,116	21,288 <sup>7</sup>	7,255		

<sup>1</sup> CW OBS (bulletins, 18 wpm) and the code practice on 1,805, 3,52, 7,02, 14,02, 21,02, 28,02, 50,02, and 145.6 MHz.

<sup>2</sup> Phone OBS (bulletins) 1,82, 3,82, 7,22, 14,22, 21,22, 28,52, 50,12, and 145.6 MHz.

<sup>3</sup> RTTY OBS (bulletins) 3,625, 7,095, 14,095, 21,095 and 29,015 MHz.

<sup>4</sup> Starting time approximate. Operating period follows conclusion of bulletin or code practice.

<sup>5</sup> Operation will be on one of the following frequencies: 21.02, 21.08, 21.27, 21.41, 28.02 or 28.52 MHz.

<sup>6</sup> W1AW will listen in the Novice segments for Novices, on the band indicated, transmitting on the frequency shown.

<sup>7</sup> Bulletins sent with 170-Hertz shift, repeated with 850-Hertz shift.

Maintenance Staff; W1s Q18 WPR. \* Times-days in GMT. Operating frequencies are approximate.

\* May QST will carry the W1AW Spring-Summer schedule, which will become effective April 26, 1970.

What Q signal means stand by? None that we know of. What's wrong with good old AS? Instead of saying "QRX one" on phone, say "stand by one." We shouldn't be using Q signals on voice anyway.

February FMT Readout. We like that word "readout" - it sounds real modern and it's nice to have an excuse to use it. Like "circuitry" and "configuration," it puts us in the "now" group lingo-wise.

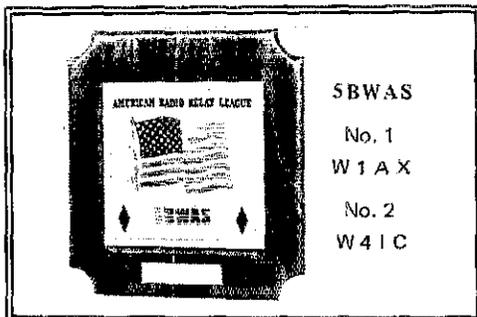
Anyway, starting with this issue the results of each quarterly FMT will be printed as received from the official measuring agency, commonly referred to as the "umpire." This will permit those who measured the W1AW FMT transmissions on Feb. 14 and who missed the special W1AW bulletin announcing the readings and who are now ARRL Official Observers, to check their measurements. The early run measurements were 3528.196, 7039.101 and 14048.832 kHz. Late run measurements came out at 3566.434, 7046.923 and 14072.296 kHz.

As usual, an early summer QST will note those making the FMT Honor Roll. All Official Observers who reported their results to headquarters by Feb. 25 should have received individual reports on results of accuracy of submitted readings.

Code Practice Schedules Needed. We are now in the process of updating our printed list of stations maintaining regular code practice schedules. If you run a daily or weekly schedule that will run for a period of at least six months, please submit your

schedule for this listing. Either send for Form CD-62 or supply the following details: call, name, mailing address, exact frequency, days, times, speeds, start and conclusion of schedule. Any additional information pertaining to your schedule (or others that you have heard and feel we may have missed) would be welcomed.

Spring Is Here. In most parts of our field organization, those reading this will be in the midst of the annual awakening of nature, heralding the returning of birds, the awakening of animals and the turning green of the countryside from its winter mantle of brown or dirty white. Now at least we can get at those antenna repairs and get that mobile rig back into operation. Happy spring-time, gang! It's wonderful to be alive. W1NJA.



## ARRL CODE PROFICIENCY PROGRAM

### Qualifying Runs

Any person can apply for an ARRL code proficiency award. Neither League membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted (10-35 wpm) you will receive a certificate. If your initial qualification is for a speed below 35 wpm, you may try later for endorsement stickers. Each month the ARRL Activities Calendar notes the qualifying run dates for WIAW and W6OWP (W6ZRJ, alternate) for the coming 3-month period. WIAW will transmit a qualifying run on all listed cw frequencies 0230 GMT April 11. (In converting, 0230 GMT April 11 becomes 2130 EST April 10.) W6OWP (W6ZRJ, alternate) will transmit a qualifying run on 590 and 7129 kHz 0800 GMT April 8 (becomes 2100 PST April 7.)

### Code Practice

WIAW transmits daily code practice according to the following schedule. For practice purposes, the order of words in each message may be reversed during the 5-13 wpm transmissions. (Each message carries a checking reference.)

Speeds	Local times/days	GMT times/days
9, 13, 15	7:30 PM EST daily 4:30 PM PST	0030 daily
7, 10	9:30 PM EST (Su Th)	0230 MWFSu
3, 20, 25	6:30 PM PST (Sat)	
"	9:00 AM EST MWF	1400 MWF
"	6:00 AM PST	
5, 30, 25	9:30 PM EST MWF	0230 ThSat
6, 15	6:30 PM PST	
"	9:00 AM EST Th	1400 Th
"	6:00 AM PST	

The 0230 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are made in his period. To permit improving your fist by sending in step with WIAW (but not over the air), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and texts to be sent in the 0230 GMT practice on the following dates:

Date	Subject of practice text from February QST.
Apr. 13:	It Seems to Us, p. 9
Apr. 21:	Equipment Modification for the Blind, p. 11
Apr. 24:	How to Wind Your Own Power Transformer, p. 26
Date	Subject of practice text from <i>Understanding Amateur Radio</i> , First Edition.
May 4:	About Components, p. 126
May 8:	Component Values and Substitutions, p. 128

### 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

### Statement by the

### CONTEST ADVISORY COMMITTEE

The 69 Sweepstakes contest was conducted, on a trial basis, without a low power multiplier. This trial was carried out on the recommendation of the ARRL Contest Advisory Committee (See page 62, February QST), with the concurrence of the Headquarters Contest and Awards Committee.

The suggestion that the power multiplier be eliminated in SS is not new. Such a rule change has been considered many times in the past, and a multitude of arguments exist to support each side of the question. However, the argument which was most influential in convincing the CAC that a multiplier might be eliminated on trial is simply that the power at a station is only one of the many things that go into the making of a good SS score. The same reasoning that supports a power handicap, for example, if carried to its logical end, suggests also that an antenna multiplier, a receiver multiplier, or even a power leak multiplier should be written into the rules. Lacking such an extensive

standing, are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must meet the following requirements prior to deadline date listed below: (1) Holder of amateur Conditional Class license or higher. (2) A licensed amateur for at least two years immediately prior to nomination. (3) An ARRL full member for at least two years immediately prior to nomination. Petitions must be received on or before 4:30 PM on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, Zip code and station call of the candidate and signers should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, with no time to return invalid petitions for additions, a petition may be found invalid by reasons of expiring memberships, individual signers uncertain or ignorant of the membership status, etc.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence names of all eligible candidates.

The following nominating form is suggested. (Signers should be sure to give city, street address and zip code.)

Communications Manager, ARRL (Place and date  
225 Main St., Newington, Conn. 06111)

We, the undersigned full members of the . . . . . ARRL Section of the . . . . . Division, hereby nominate . . . . . as candidate for Section Communications Manager for this Section for the next two-year term of office.

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

George Hart, WINJM, Communications Manager

Section	Closing Date	SCM	Term Ends
Louisiana	4-10-70	J. Allen Swanson Jr.	6-10-70
Eastern N.Y.	4-10-70	Graham G. Berry	6-10-70
Quebec	4-10-70	James Ikey	6-11-70
Eastern Mass.	4-10-70	Frank L. Baker Jr.	6-15-70
Wyoming	4-10-70	Wayne M. Moore	6-25-70
So. Carolina	4-10-70	Charles N. Wright	6-26-70
Canal Zone	5-11-70	R. L. Oberholtzer	11-10-69
Ontario	5-11-70	Roy A. White	12-12-69
Maritime	5-11-70	William J. Gillis	3-11-70
Saskatchewan	5-11-70	Gordon C. Pearce	4-11-70
Alaska	5-11-70	Albert F. Weber	7-10-70
Utah	5-11-70	Thomas H. Miller	7-15-70
Arizona	6-10-70	Gary M. Hartman	8-9-70
Western N.Y.	6-10-70	R. M. Ritzerus	8-17-70
Iowa	6-10-70	Wayne L. Johnson	8-17-70
Idaho	6-10-70	Donald A. Crisp	8-17-70
S. Joquim Valley	6-10-70	Ralph Saroyan	8-20-70
Montana	7-10-70	Joseph A. D'Arcy	9-4-70
Northern Texas	7-10-70	L. E. Harrison	9-12-70

### 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.

Southern New Jersey Charles E. Travers, W2YPZ Mar. 4, 1970  
Georgia A. J. Garrison, WA4WQU Mar. 26, 1970

multiplier structure (which would, in the opinion of the CAC, complicate the SS rules beyond reason), the CAC believed that the power multiplier is, in a sense, arbitrary and ineffective at equalizing the competitive chances of various stations.

Reaction to the 1969 SS trial has been mixed. Many participants, either by choice or other reasons, simply do not care to use higher power in SS under any circumstances, while many others hold the opposite view with equal conviction. The CAC feels that it is important to be responsive to the majority opinion, yet at the same time it is important to find a solution which will not adversely effect the enjoyment that all contestants derive from participation in SS.

Comments are still being received and evaluated by the Committee. If you have not already expressed your opinion, please do so at an early date, as the Committee recommendation will soon be made to Hq.

JAMES A. MAXWELL, W6CUF  
Chairman.

# DX CENTURY CLUB AWARDS

From January 1, 1970, through January 31, 1970, DXCC certificates based on contacts with 100-or-more countries have been issued by the ARRL Headquarters to the amateurs listed. The three columns at the right show issuances for radiotelephone operation.

## New Members

W2FR 245	K1CSB 111	W46FAR 102
W6CJ 242	K8AQS 108	W49BZD 102
W1HFBN 228	VE2DHF/YV 108	R6JMV 101
W7VU 188	DJ8FI 07	W1CTU 101
WB2BBW 183	I1B1BN 06	W3RCW 101
W7DLY 164	W2NVA 06	W4JIA 101
G5CP 181	66GKU 105	W46FIT 101
SM7CGY 151	K6SSN 105	W48SGR 101
W8DHI 142	D1711 104	E2HW 100
DK3PO 140	K8RCT 104	K1TKS 100
W01YE 139	LA4YF 104	K8HWW 100
W01A 120	OK3KC 104	W6V7Z 100
DK2XX 119	W49WXL 103	W45YTC 100
PA0JWA 113	E43PI 102	W9WUD 100
DL2OB 112	VF7HQ 102	W40CJO 100
WA0KGD 112	W6PNO 102	W40VY 100
DJ3KD 111		ZP5CE 100

## Endorsements

Endorsements issued for confirmations credited from January 1, 1970, through January 31, 1970 are listed below. Endorsement listings from the 120 through 240 level are in increments of 20, from 250 through 300, increments of 10, and above 300, of 5. Totals shown do not necessarily represent the exact credits but only that the endorsement level has been reached. Four columns on the right cover radiotelephone.

280	240	200	W4RLZ
11FD0	IJ1WN	K7R1S	W4WSF
VE3MR	K1ZSJ	P4BXPO	WB4GTC
	611AR	W1PCD	W9PIIY
270	VE3QD	W4ZHSX	YV5CMQ
HP1IC	Y56DR	W2GHK/4	
	W6CJ1	W40BX	
260	W4LBB	W5WRP	
8SK	YNTRTS		
C3NLY		180	
11YRK		W1MZB	
W2R1K		W42VEG	
	W1AA	W648AP	
250	D10PN	W848B	
D14PT	K4WMB	W8VCVM	
K1LHT	K61L		
PF2DSQ	W92CGW	160	
54R11	W44GQM	D11AR	
W7DQM	W2Y1L	VE3DNR	
W9D1	W49IVL	VE3IR	
KE1YG		E2HTO	
		K3JLK	
		W61OZ	

## JANUARY CD PARTIES

The following are high claimed scores; they read, from left to right: appointee, total score, number of QSOs, number of sections and number of hours of operation. Final adjusted scores will appear in the April CD Bulletin. - W1KJQM.

W1BDJ/2	345,960-954-72-20	W88AKW	197,278-603-65-20
W7CEJ	294,000-833-70-19	W1AX	194,970-878-67-14
K2KTR	288,750-818-70-17	W6B1P	194,820-566-68-20
K9ZMS/6	278,655-792-69-17	K48KD	190,450-580-65-18
VE7BDJ	272,650-773-70-20	W7WWR	188,005-587-67-18
W9VNE (W9AQR, op.)	270,010-806-67-20	W6K1H	179,724-555-65-19
K4PUZ	255,675-780-65-20	W1E1J	169,000-524-64-12
W5SRUB	255,270-788-67-20	W4EUF	167,050-507-65-12
W4GLU	250,800-783-66-16	W42CAL	165,825-488-67-19
W2CKM (W43HRV, op.)	244,800-720-68-20	W4W6X	165,490-487-67-17
K4BA1	244,550-723-67-14	W4RE	160,209-502-64-15
W6INO	234,140-661-71-18	K3HNP	148,680-467-63-17
W3IN	228,480-708-64-19	W2S21 (W2FA1, op.)	141,700-430-65-10
W32UWA	225,420-663-68-20	K4IEE	138,720-401-68-10
W41UJ	223,560-641-69-19	W5FCX	137,780-433-62-10
VE2PCW	216,165-700-67-19	R6H1J	136,280-422-66-19
K2MME	211,385-624-67-19	W4BEE	132,000-400-66-11
K4AZ1	208,325-637-65-19	W4ZDQ	129,900-428-60-17
W9UCF	207,400-603-68-16	W1EUF	126,000-420-60-13
W5QVZ	205,690-607-67-19	W1FTU	126,000-400-63-11
W47SP	201,800-617-66-18	W42BCY	119,350-380-62-11
K9CNC	201,960-612-66-14	K1QFD	118,720-367-64-18
W6DOX	201,400-604-66-16	W6ZSH	117,160-400-58-10
K1VTM	199,650-600-66-17	K8H1D	114,680-371-61-15

335	W1YQH	200	W6YWO
W1HZ	W6EHV	K6PZ	W5KFN
	W49IVL	K7R1S	W7ETZ
330		K8RWL	W8M1A
W41OR		SM7ANE	W9CWS
W9NVZ	8SK		140
	K8UD1	W2GK/4	W40YG
325	K91FL	W84ZG	K91G
G4FA	W8DX	W9PVA	W2MU
G35IM	W91NQ		W41ED
		180	W45KR/4
320	W4BOY	K1N1E	D17LV
		K4WMB	56PTI
310	F3A1	076M1	W8KZU
	W9HJ	W45ES	W48PN
		W4E1W	W4N2Y
		K4JNK	W4QOU
305	W9D1	K6DYQ	
W2BKO	W7DOM	W41UK	120
W9RQM	W9EUF	W4WSF	VE3CP
		W6C1	W6C1
300	SM0AJU	W49A9	W49A9
		W3FU	W49VZ
280			
K4ZCP		160	
W9CN	J31DZ	K2SHU	
W9LBB	PA0XPO	K3H1C	W84HN
	W1AA	K3CYD	W6MPZ
270	W4W6X	VE3DNR	W66VA
	W82CGW	VE3AQ	W71KM
K1ZSI	W82PGM	VE3AL	W89XK
PA0VO	W44GQM	W21PM	W9CY
SM5AM	W9NVZ		W49TVC
W1DFP	W9NTC		
W2LNB	Z14GA		

K8HKM	113,100-372-60-08	W1BUT	55,290-194-57-06
W5QNY	111,600-360-62-11	W6B1P	55,005-186-57-08
W8SH (K7NHV, op.)	111,745-336-65-06	W91MG	54,300-177-60-10
		W4G1Q	53,940-193-54-05
KH6GPO	110,050-348-62-10	W84HS	53,680-174-61-13
W1DA1	107,085-336-59-13	K7WWR	53,010-180-57-08
K50XK	107,010-365-58-10	K6YNE	51,870-179-57-04
W4KFC	106,140-341-61-04	W9BXX	51,220-197-52-12
W6DGH	104,160-329-62-06	W41UK	50,600-180-55-09
K2KNV	101,370-321-62-06	K2CNC	47,100-151-60
W23R	100,955-324-61-11	W9G1L	46,905-170-53-06
W43GCK (W48LV, op.)	262,140-766-68-18	W6C1	44,745-150-57-04
		W9EUF	43,725-152-55-09
W9YT (KJ0AL, W4917P, op.)	106,880-334-64-04	W5KCO/3	42,590-152-54
		W41OP/3	40,500-130-54-10
		W4FLX	37,200-124-53-07
		K6YR1	32,250-125-50-09
W49FMS	119,460-388-66-17	VE3AYR	32,250-123-50-03
K9YVU	110,720-342-64-15	W4GSDC	32,240-117-52-03
W5RUB	109,308-336-59-10	W4K1C	31,900-120-52-05
W1AX	84,600-278-60-10	W6JEP	31,250-120-50-05
K4E1J	79,040-240-64-08	K6OPH/4	28,320-114-48-06
W5QZG	76,110-251-59-12	VE4FK	27,440-104-49
W4DQD	75,780-255-62-13	W43G/L8	27,280-104-50-04
K4BSS/4	66,120-232-57-09	R4MS/6	25,725-108-45-06
E5HZL	66,120-232-57-09	W80TG	25,725-108-45-06
W61OX	64,625-229-55-08	E1HJ/5	25,725-108-45-06
W5RE	64,125-218-57-08	W1AW (W1LTH, WPR)	
W4SKIT	63,555-220-57-11	W4CYT	23,760-108-46
K2E1U/6	61,480-205-58-11		
E5HZL	60,770-201-68-12		
W0CY	60,135-207-57-14		
W49LYO	58,995-200-87-08		
K1GAX	58,995-200-87-08		
W5QNY	56,700-210-54-09		

SCM — AREC — ORS — CP — SEC — OBS — TCC — OO — NTS — WAG

# Station Activities

OVS — AIOPR — EC — DXCC — CLUBS — RM — OPS — RCC

•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.

MARYLAND-DISTRICT OF COLUMBIA — SCM, John Munholland, K3LFD — SEC: W3LDD.

Net	Freq.	GMT-Days	Ses.	QTC	QNI Avg.	Mgr.
MDD	3643	0000 Dy	37	430	11.8	K3JYZ/RM
MDDS	3643	0130 Dy	29	51	4.7	W3CBG/RM
MDCNTN	3920	2300 STTS	16	65	16.3	WA3GXN/PAM
MEPN	3920	2300 MWF	22	91	26.1	K3LAG
		1800 SS				
MTMTN	145.2	0200 T-S	23	19	9.0	W3IFW

### ATLANTIC DIVISION

**DELAWARE** — SCM, John L. Penrod, K3NYG — SEC/PAM: W3DKX. RM: W3EFB. Thanks to the SEC, the County ECs, the MDD reps and all participating members for making the Jan. SET such a success, W3EEB still is learning how to run his new keyer. WA3DUM is working at WTUX as a DJ. WA3HGV won the Delaware QSO Party in Kent and N.C. Counties. W3YAH hopes to have a Novice class going in Sussex County soon. W3MK is tracking Oscar 5 with the gang at W3ZH. Don gives progress reports on the DEPN each Sat. WA3CDV lectured the Del. ARC on TVI and antennas. W3HKS participated in the Jan. CD Party. WA3GSM will be attending Georgetown College this semester. Many have reported working W3FEG while he was in Arizona. A welcome back to Delaware to W3GAB. WA3HWC is home recovering from his hospital visit. KCEPN reports QNI 40. Traffic: W3FEB 99, W3DKX 92, W3TRC 70, WA3GSM 45, K3NYG 20, WA3DUM 18, W3HZW 10, W3SL 10, K3OCE 5, WA3COV 3, WA3KGV 3.

**EASTERN PENNSYLVANIA** — SCM, George S. Van Dyke, JL, W3HK — SEC: W3UCM. RMS: W3EML, K3MVO, W3MPX. PAMs: K3PSO, WA3GLL, VHF PAM: W3FGQ. OO reports were received from K3RDT, K3FNP, WA3EFC, W3AKEK; OBS reports from WA3AFI, W3CBH, WA3JKO, WA3JKB, WA3JEC, K3WEU, WA3FMI; OVS reports from WA3JWL, W3ZRR, WA3IAZ, WA3NVO, WA3FEC, WA3BJQ, WA3FMI, K3VAX, W3PST, W3CL, K3WEU. BPLers: W3CUH, W3VR, W3EML, W3MPX, WA3FMI, WA3HBT, WA3MKQ. PSHR: W3EML, WA3JKB, WA3JYC, WA3FMI, W3NNL, W3MPX.

Net	Freq	Operates	QNI	QTC	RM/PAM
EPA	3610	6:45 P-Dy	308	331	W3MPX
PTTN	3610	6:00P Dy	248	197	W3MPX
PEN	3960	5:30P M.-F.	547	308	K3PSO
EPAEP&I	3817	6:00P Dy	448	255	WA3GLL
VHF(6)	50.64	7:00P M-F			W3FGQ
VHF(2)	145.35	8:00P M-F			W3FGQ

New officers: Reading ARC — W3WJC, pres.; K3CBE, vice-pres.; W3UQC, secy.; K3MGO, treas. Warminster ARC — WN3JGQ, pres.; WA3HMW, vice-pres.; WA3MDP, secy.; Barry (no call yet) treas. R.F. Hill ARC — K3ALV, pres.; WA3JQB, vice-pres.; WA3JKE, secy.; K3HTZ, treas. Drexel Electronic Society. WB2YYQ, pres.; WB2APX, vice-pres. AK HIC — WN3NMH, pres.; WA3JYC, vice-pres.; WN3NRO, secy.; WA3BCE, treas. Frankford Radio Club — W3WPG, pres.; W3WJD, vice pres.; K3JLI, secy.; WA2BLV, treas. WN3LEI is trying to reorganize the 7171 Novice Net daily at 2100Z. W3CUL and W3VR are back in sunny Florida. W3EML is still groggy from the SET. W3MPX has a BC-221 going. K3MVO hit first CD for a long time. WA3ATQ got high score 3rd district YLAP Contest. K3OIQ reports Drexel has new antennas and is back in full operation. WA3GEL was operated by students of Upper Bucks Tech. High School during open house. W3CL reports hearing OSCAR 5 on 2 meters. W3FUI is enjoying himself on Intruder Watch. W3PST now has his 6 and 2 gear working. WA3LJG is a new station at Lehigh U. W3YYO got his big A ticket. The 1970 SET is over and from all indications it was a big success. Don't forget the EPA Spring Dinner Meeting at the Frankford Arsenal Sat., Apr. 11, 1970, 6 P.M. Advanced reservations are a "must." Contact K3WFO or W3HK ASAP. Traffic: (Jan.) W3CUL 3258, W3VR 1009, W3EML 1003, W3MPX 593, K3MVO 407, WA3LVR 296, WA3MKQ 243, WA3LAK 237, WA3FMI 208, WA3FXW 202, WA3HBT 175, W3NQL 153, W3HK 110, WA3GLI 108, WA3LVC 103, WA3ATQ 99, WA3JZB 91, WA3JHV 71, W3VAP 70, WA3NVO 59, K3PSO 57, K3WJ 56, K3JOI 48, WA3JKO 45, WA3JYC 40, WA3JWL 40, WA3JWF 36, W3BUR 34, WA3JKB 32, WA3AEI 31, WA3LMO 30, WA3JCKA 29, K3VBA 29, K3WJ 29, WA3FEC 22, K3KTH 19, K3YVG 17, W3KCM 16, W3VA 15, W3BNR 13, W3FPC 13, WA3JXN 13, W3OY 13, W3CBH 12, W3JR 11, WA3FPM 9, W3EDU 8, WA3JX 7, WA3JEB 4, W3MGF 4, K3OEN 4, WA3IAZ 3, W3PVE 3, WA3BJQ 2, W3CL 2, WA3CXP 1, W3EU 1, K3JLI 1, K3WKE 1, WA3LJG 1, W3PST 1, K3VAX 1. (Dec.) WA3EKW 186, W3HNK 65, WA3JKO 6, W3ID 1, WA3JUV 1, W3YFF, W3ADE 12.

PSHR claimants: W3TN, WA3JYS. Appointments: W3EZE as ORS, WA3GVP as OBS, W3EAX as ORS. Endorsements: W3CRE as ORS, W3PRC as ORS, W3GKP as OVS, W3CDQ as OBS, MDCNTN and MEPN pooled operators as MEPTN in the 1970 SET and passed 266 messages with 59 operates QNI. QRM on the phone bands and loaded traffic boards at regional and area levels on the cw bands created an "SET hangover" for the better part of the following week. From this corner, it looks like it's time for a new way to work the emergency communications problem. W3FA says the "Dempster Dumpster" stations worked FB on MDD during SET but we need more of them to pick up and hold traffic for the likes of W3LDD, K3GZK, W3LQY and K3LFD. Hi! W3GKP continues his Moonbounce operations on 2304 MHz. WA3GXN and his MDCNTN gang are proud of a handling score of 100% for traffic listed on the net in Jan. K3JFQ has a new QTH in Kensington. W3ZSR is ORL rebuilding his station. W3EZE's Trishander went up in smoke. W3CSZ/00 gave the cw boys a clean bill of health during his Jan. check-ups. Navy's W3AD0 planned to fire up transmitters on all bands for the DX Test. Trafficman WA3LWT is expanding operations to CD Parties and DX. WA3GVP got his Extra Class ticket. W3FI has a Novice code-and-theory class going for 12 BARC candidates. W3TN and WA3IYS scored again for BPL. Recent Silent Keys are W3APY, W3UWX and K3RFR. Codemaster K3WRH is conducting new classes on 2 meters at 8:30 P.M., Wed. and Thurs. The B&O Banquet is set for May 2, 1970, at the American Legion Hall in Arbutus. Traffic: WA3IYS 807, W3TN 339, WA3LJR 253, W3EZE 250, K3GZK 247, W3CBG 182, K3LFD 177, W3LQY 162, WA3IAQ 146, WA3HEN 143, K3JOM 133, WA3LWT 96, K3TBD 89, W3CEW 74, W3AD0 67, WA3EOP 62, K3JORW 58, W3ECP 51, WA3GXN 45, W3EVO 42, K3JYZ 29, WA3ERL 35, WA3HTQ 36, WA3JHW 29, K3LFN 28, W3FA 23, W3ZNV 23, K3FOF 21, WA3FCK 14, WA3LKI 12, K3QDC 12, WA3GVP 5, W3EAX 2, W3ZSR 2.

**SOUTHERN NEW JERSEY** — SCM, Charles E. Travers, W2YPZ — SEC: W2LVW. RMS: WA2KIP, WA2BLV. PAMs: WA2UVB, W2ZL. The 1970 SET was an excellent accomplishment. WB2FJE was sure in there, assisted by K2POD, who is now the newly-appointed EC for Gloucester County. It is very pleasant news to report that WA2KAP is now at home following a session in the hospital. K3CPE, who is the OPS and Radio Director for the Delaware Valley Radio Assn., is back and well after recent surgery. Activities on Wireless Hill are resuming with the regular Sun. morning spot on the NJEPTN at 9 A.M. The DVRA announces officers for 1970 are K2SNK, pres.; WB2UIM, vice-pres.; K2AAR, treas.; W2VU, secy.; W2HX, director of contm. The SJRA reports the following officers and directors for 1970. WB2MTU, pres.; W3CXO, vice-pres.; WA2EMB, treas.; W2BAY, corr. secy.; W2FGY, rec. secy.; W2SOB, K2PWW, W2FYS, K2M2P, WB2BNE, WA2KRX, W2KF, directors. Recent appointment renewals: W2BAY as ORS and OVS. W2DNF and XYI. made a recent trip to Puerto Rico with W2PSE and his XYI. Bill came from Connecticut and has been a great help in radio in the N.J. fraternity. He completed an SB-200 linear recently and is working on a Delta Loop antenna shown in a very recent issue of QST. Traffic: (Jan.) WB2DRG 217, WB2VEJ 156, W2PU 107, W2YPZ 67, WB2FJE 62, K2RXB 40, W2DNF 34, W2ORS 4, W2IU 3, W2ZI 3, W2ZQ 2. (Dec.) WA2KIP 8.

**WESTERN NEW YORK** — SCM, Richard M. Pitzeruse, K2KTK — Assl. SCM: Rudy W. Ehrhardt, W2PVI. SEC: W2RUF. PAMs: WB2RHJ, WA2CAL. RMS: W2MTA, W2FR, W2RUF, K2KJR. Sorry to have to report the passing of W2SB and Aina Ringler, XYI of W2SAW. Appointment renewals: W2KUF as SEC, K2SSX as ORS, WB2NZA as OPS. Of the gobs of messages I received during the SET, the cake goes to WA2BHI for the most unique. His message told of a large crystalline monster terrorizing Essex County. WB2YEE has had rig and antenna troubles. W2MTA has a new Advanced Class license. K2DWL, with two feet of water in his shack basement, wonders if maritime mobile is appropriate. WA2GSX has an FB homebrew gallon. RAWNY meets daily at 9:30 A.M. on 3895

KHZ. K2KQC has a new Swan 500C. Extra Class exams are now given every Fri. at 9 A.M. in Buffalo. WB2FHS transmits Official Bulletins on 145.35 Wed. at 0115 GMT. W2S OSS, FCC, FFB, HYM, MIA, OF, PNSW, RUT, K2S DNN, JBX, KFK and WA2PZD received NYSW recognition for five consecutive years of activity. W2SSS received the award for most consistent check-in. W2RUF still needs help with the ARPSK program. NYS cleared 650 messages with 940 check-ins in Jan. WB2ZDP got his 2nd-class radiotelephone license and reports activity on the vhf bands rather limited in his area. New officers for the Walton Radio Assn. are W2TF1, pres.; WB2FWR, vice-pres.; W2OSL, secy.; W2FMU, treas.; WB2YND, act. mgr.; W2FMU, trustee. The Rome Radio Club reports W2MSM board chairman; Al Martin, pres.; W2IXR, vice pres.; WA2TU, secy.; WA2FLX, treas.; K2IXN and K2ABX, board members at large. WB2NZA is the Wed. night NCS of NYSFEN. W2AFB received an SWL card from Latvia while on 7 MHz. K2PYN remains very active on 2-meter fm and on RTTY on the hf bands. The RAGS Hamfest will be held Apr. 11. Tickets and info from WB2VHK. The RARA WNY Hamfest date is May 16. Info from Box 1388, Rochester 14603. BFLers are W2OLE, W2ER and WA2CAL; ARPSK Honor Rollers W2FR, W2MLA, W2PKY, W2QC, W2RUF, K2KIR, K2KIK, WA2CAL and WA2DHS. Traffic: (Jan.) WA2CAL 590, W2IR 522, W2OE 365, W2MTA 345, W2RUF 267, W2QC 265, WA2ICU 253, K2RYH 184, W2HYM 119, W2FEB 117, K2KIR 104, WA2DHS 103, K2KTK 101, WB2HLI 61, K2DNN 59, W2RQE 46, WB2ZDK 41, W2MSM 39, WA2ILE 24, K2OEV 23, W2PKY 23, K2UIR 21, WB2NZA 18, K2SPO 17, WA2PZD 16, W2CFP 15, WB2YND 15, W2PZL 12, WA2GLA 11, K2IMI 11, W2AFB 10, W2PND 8, W2IDU 6, WB2YEM 6, WB2FHS 4, W2RUF 4, W2PVI 3, WA2CKT 1, WB2YEE 1. (Dec.) K2RYH 65. Total traffic 3885; last year 4944.

**WESTERN PENNSYLVANIA** - Acting SCM, George R. Stoneburner, WA3AKH - SEC: W3KPI, PAMS: W3WER, K3ZNP. RMs: WA3AKH, W3KUN, W3LOS, W3NEM. Traffic nets: KSSN, 2330 GMT; WPA, 0000 GMT 3585 kHz; WPP 0300 GMT 3955 kHz. Penn State ARC announces that it now has a phone patch and a GSB-101 linear. Newly-elected officers of the Indiana County ARC are W3KQZ, pres.; W3MYY, vice-pres.; K3ZQZ, secy. treas.; W3IYL, W3CF, K3VDF, W3M7D, dir. K3OTY is on 80-meter RTTY using an HI-32 and homebrew TL. We welcome W3NKH, of Beaver Falls, to the amateur ranks. A testimonial dinner in honor of W3OC, who has been a member of ARRL for fifty years, was held by the Two Rivers ARC on Feb. 21. Congrats to K3PY1/WA1KPE, who was married Dec. 31. The Skyview Radio Society held its tenth anniversary banquet at the Plaza Lounge Feb. 6. The Foothills RC announces the appointment of WA3IPU as chairman of its Third Annual Hamfest slated for June 14 at Wendel, Pa. The Western Pennsylvania Mobiles' 1970 officers are W3DGG, pres.; W3OFI, vice-pres.; W3ALD, secy.; W3MII, treas.; K3SDI, act. mgr.; K3JHD, K3MTX, K3GKH, dir. The Mothers Net meets each Wed. at 9 P.M. local time on 29.0 MHz. The Westmoreland-Allegheny County AREC meets at 8 P.M. local time each Wed., also on 29.0 MHz. Check-ins are welcomed by both nets. K3AKR reports recording of data from Australis Oscar V on 21 orbits during Jan. The Nittany AREC is pushing completion of the WA3JKW 2-meter repeater. Appointment: WA3EXX as ORS. Endorsement: K3AKR as OVS.

Net	Freq.	Times	Days	Tfc.
WPA	31	356	228	
WPP	24	83	23	
KSSN	22	140	43	

Traffic (Jan.) WA3IPU 367, W3LOS 228, WA3AKH 189, W3KUN 166, K3ZNP 117, W3SN 88, K3SMB 65, WA3JBN 51, K3HCT 45, WA3LXX 27, W3IDO 10, K3SN 9, W3UHN 9. (Dec.) W3SN 5, WA3BLE 4.

### CENTRAL DIVISION

**ILLINOIS** - SCM, Edmond A. Metzger, W9PRN - SEC: W9RYU. PAMS: WA9CCP and WA9PDI (vhf). RM: WA9ZUE. Cook County EC: W9HPG.

Net	Freq.	Times	Days	Tfc.
LEN	3940 kc.	1400Z	Sun	16
ILN	3760 kc.	0000Z	Daily	215
NCPN	3915 kc.	1300Z	Mon-Sat	115
NCPN	3915 kc.	1800Z	Mon-Sat	
III PON	3915 kc.	2245Z	Mon-Fri	875
III PON	3915 kc.	1430Z	Mon-Fri	
III PON	145.5 Mc	0200Z	M.W.F.	31
III PON	50.28 Mc	0200Z	Mon.	0
Great Lakes	3932 kc	0230Z	Daily	103

Emergency  
W9DOQ is recuperating from a hospital siege in Springfield. W9LEY reports that 40-meter DX is the best in his 40 years of operating. New officers of the Northwest Amateur Radio Club

are W9KSZ, WA9ENA, WA9ZAV and W9PEL. The Dupage County Fairgrounds was the site of the 3rd successful Wheaton Radio Amateurs Midwinter Hamfest. W9BRZX is a new Novice heard in the Chester area. WA9LCC is a new Official Relay Station. The recent SET had quite a turnout for their FB reports, which have been forwarded to Headquarters. Southeastern Illinois Ham Society's new officers include K9CNX, K9CVL, K9KNK and K9CVL. W9GEL spoke at a recent meeting of the York Radio Club. WA9ZLN, W9ZGO and W9KUJ are the incoming officers of the Chicago Amateur Radio Club. Our sympathy to the friends and family of WA9VCW, who passed away on Jan. 10. WA9ZLN passed the Advanced Class exam. K9IFE is recovering from his recent illness. The traffic count for the Ninth Region Net for Jan. was 812, according to Manager W9HRY. K9CPR is now the proud owner of Global Research in Lombard. K9IFB and XYL have a new ir. operator, Kathy Ann. New Net Midwest is on 6-meter 658 with a frequency of 50.150 Wed. evening. W9NLE, WA9ZV, K9GYO, WA9JW, K9ORS and WA9ZK are the officers for the coming year of Hamfesters Radio Club (Chicago). The Starved Rock Radio Club has resumed publication of its club paper, STA IIC. K9JDI and W9NWK are now Advanced Class licensees. W9YQJ is awaiting his General ticket. K9FGA demonstrated a PDP-8L computer at the Feb. 6 get-together of the Wheaton Community Radio Amateur Club. W9HPG received a trophy for his long and meritorious service in the interest of amateur radio and the League from the members of the Big Thunders Amateur Radio Club at Belvidere. W9AQC's new QTH is Midlothian, Ill. The Sterling Rock Falls staged its hamfest Mar. 8 at the Sterling Coliseum. K9AVO is the only RPE award recipient this month. Traffic: (Jan.) K9AVO 601, W9NKG 345, WA9WNH/9 305, W9EVI 215, W9HOT 133, W9ZTF 129, W9IKV 124, W9YH 107, WA9SFB 49, WA9ZPL 49, WA9NZI 48, WA9IB 38, W9HII 32, WA9BRQ 20, W9PRN 24, WA9TCC 24, WA9OBP 23, W9FLE 22, W9LDU 16, K9HKS 14, WA9QFI 12, W9ABJ 5, W9M1 3, WA9DBT 3, W9DY 2, W9QQG 1. (Dec.) WA9BRQ 24.

**INDIANA** - SCM, William C. Johnson, W9BUQ - Ast. SCM: Mrs. Roberta Kroulik, K9IVG. SEC: W9IC.

Net	Freq.	Time	Jan. 1fc.	Mgr.	
IFN	3910	1330Z Dy	2300 M-F	213	K9IVG
ISN	3910	0000Z Hy	2130 M-S	587	K9CRS
		2300Z Sat-Sun			
QIN	3656	0100Z Dy		238	WA9FDQ
PON	3910	1245Z Sun		27	WA9YXA
PON VHF	50.7	0200Z M-Th.		212	WB9AMB
Housier VHF				110	W9PMT

At this time I want to acknowledge more than 70 radiograms I received during the SET from all call areas. W9FC, Clifford C. McGuyer, 2900 East Oak St. Evansville, Ind. 47714, is SEC for Indiana. All EC reports should be made to him. Allen County Amateur Radio Technical Society VHF Repeater Station WA9YJV is able to cover nine counties in the NE section of Indiana. All nine counties reported during the SET operation, thanks to K9LSB, W9RGY, of Tippecanoe County, set up with the Red Cross. K9IVG is off the air temporarily because of conditions beyond her control. W9IYD and K9EZX are the top traffic-handlers for Ind. WA9LQD showed the film, The Hams Wide World, at the Kwanin Club, Mt. Vernon, Ind. Indiana University is celebrating its Sesquicentennial. Any contact with its station, K9IH, will receive a QSL. QIN Honor Roll: W9BDP 26, K9VHY 24, K9HYV 23, W9QRF 20, WA9KAG 16, WA9WMT 16, WA9FKX 16, WIDRN/9 15, WA9UMI 15, WA9VZM 15, W9EPZ 15. Amateur radio exists because of the service it renders. BPL certificates went to W9IYO, K9EZX, WA9QOO, W9JBO, W9ICU and WA9YXA. Traffic: (Jan.) W9IYO 1548, K9EZX 1321, WA9QOO 616, W9JBO 605, W9EQ 509, W9HRY 499, WA9VZM 423, W9ICU 344, K9HYV 293, WA9YXA 244, W9HFM 198, WA9NYU 176, W9VWH 159, W9VAY 117, WB9AMB 107, WA9TIS 103, W9RUQ 100, WA9WMT 100, WA9WJA 97, K9VHY 93, WA9IMI 87, K9HYZ 82, W9CB 68, K9CRS 56, K9YBM 56, WA9QHX 46, K9IJK 31, W9YYX 24, W9DZC 23, K9RWQ 20, W9HWR 18, WA9QAD 18, W9HJ 16, WA9QCF 15, WA9WSX 14, WA9VBG 13, WA3HPS/9 12, WA9BHG 12, K9EJ 12, K9GHR 12, K9JQY 12, K9LZN 12, W9BDD 10, W9CMT 9, WA9KOM 9, W9SNO 9, WA9AXE 7, W9PMT 7, W9CUC 6, W9UCHY 4, WA9HVL 1. (Dec.) WA9KOH 12, WIDRN/9 5. (Nov.) W9QLW 59, WIDRN/9 1. PSHR: W9HRY 48, W9RUQ 17.

**WISCONSIN** - SCM, S.M. Pokorny, W9NRP - SEC: W9NGT. PAMS: WA9ZL, WA9ZK, WA9QAY, WA9OKP, WA9QNI. RMs: K9SKA, WA9TXN. Dec. net report for BEN: QNI 946, QTC 196.

Net	Freq.	GMT-Days	QNI	QTC	Mgr.
BWN	3985	1245 M-Sat.	331	199	WA9QAY
BEN	3985	1800 Dy	910	142	WA9QKP



Here's the exciting new Heath SB-220 2 kW Linear Amplifier. Running maximum legal power on amateur bands between 80 and 10 meters, this compact powerhouse features two rugged EIMAC 3-500Z zero bias triodes in proven grounded grid circuitry. Note the modern desktop styling and the heavy duty components. And note the use of the reliable 3-500Zs. Heath chose EIMAC because these dependable tubes are ideal for heavy-duty operation, around the clock, around the world. And the two tubes have a total plate dissipation rating of 1000 watts.

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The new Y-503 planar for uhf pulse service was custom designed to meet an application program of high urgency.

The 8847 was created for DME and CAS (Collision Avoidance System) broadband amplifiers covering 125 MHz near 1.1 GHz. It delivers up to 4 kW peak power with a gain of better than 8 decibels.

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## So we moved ahead of them.

PON 3952 1801 M.-F. W9VCM  
 WBSN 3985 2300 Dy 1477 232 WA9QNI  
 WIN 3662 0115 Dy 397 154 WA9TXN  
 WSSN 3780 0030Z TTSat 102 15 K9KSA  
 WRN 3620 0130 Sun RTTY K9GSC  
 SW6RN 50.4 0300 Sat 148 2 WA9EZZ  
 SW2RN 145.35 0230Z Dy 204 22 WA91ZK  
 WRACES 3993 1400 Sun 56 ANCS--W9NRP

Net certificates went to W9LPU, WA9WST (WIN); WB9ABF (BEN); WA9OAY, WB9ABF (WSBN). New ORS: K3OAE/9, K9DKU, W9OMT made Advanced Class. New officers of the Four Lakes ARC are W9BG, pres.; WA9YRH, vice-pres.; WA9KGO, secy.; WA9SZH, treas.; W9EZ, K9KSA, WN9ZJE, dir. The Czaja family team, WA9OIF, WA9TZD, WA9WNI and WB9BBH, are brothers and sisters, age 14 to 19. W9ODD will operate at Marquette U. open house in March. WA9NBU is back on with SB-301 and 401. After 18 years as Wis. Deputy RO for RACES, W9NRP resigned effective Feb. 7. Milwaukee stations are needed on both cw and phone nets. BPL for Jan.: W9CXY. Send your activity reports and certificates for endorsement to your SCM. Traffic: (Jan.) W9CXY 634, K9CPM 451, WA9RAK 371, WA9QKP 172, WA0VKI/9 155, W9ESJ 128, W9DND 100, W9YT 99, WA9QNI 87, WA9TXN 72, K9FHI 66, W9NRP 63, WA9WGT 49, W9OMT 47, W9KRO 40, K9TBY 38, W9IHW 34, K9JPS 31, K9KSA 30, W9RTP 30, K9UTQ 30, WB9ABF 24, WA9ZTY 23, W9BCH 21, WA9SAB 18, WA9PKM 17, W9ODD 14, K3OAE/9 13, W9AVX 12, W9DXV 12, WA9NBU 11, WB9BRF 6, WA9GYF 2, K9LGU 1. (Dec.) WB9ABF 22, WA9QVT 21, WA9EDZ 9.

### DAKOTA DIVISION

MINNESOTA - SCM, Larry J. Shima, W0PAN - SEC: WA0MZW. RMs: WA0IAW, WA0RRA. PAMs: WA0MMV, WA0OEJ, WA0HRM, K0GYO. VHF PAM: WA0DWM.

Section Net	Freq. (MHz)	Time	Days
MSPN (noon)	3.945	1805Z	Mon.-Sat.
MSPN (noon)	3.945	1500Z	Sun. & Hol.
MSPN (eve)	3.940	2345Z	Daily
MSN	3.685	0030Z	Daily
MJN	3.685	0100Z	Tue-Sun
MSTN	50.400	0430Z	Daily
MINN RTTY	3.620	0200Z	Sun.
MINN AREC	3.912	2300Z	Sun.
PICONET	3.925	1900Z	Sun.
MPON	3.910	1830Z	Sun.
MINN 40 CW	7.060	2300Z	M-W-F

All section nets listed above will remain at the same local time when we shift to CDT. The GMT time will then be one hour earlier than the above. The following appointments were earlier on in Jan.: WA0YAS-OPS' WA0EJ-PAM MSPN noon session, W0WAS-OO Class 3 and 4, K0IUC-EC Brown County, K0ZRD -OPS, WA0GYQ-OO Class 3 and 4. The following Minnesota amateurs have been selected by the Minneapolis Radio Club to serve as the selection committee for the recipient of the Minnesota Amateur of the Year Award: W0AIH, W0BE, W0BUO (chairman), W0GYH, W0MBD, WA0QWD and WA0UAH. Nominations can be sent in writing to any one of the committee. They must be received no later than May 10, 1970. The nomination is open to any licensed Minnesota amateur who has significantly contributed to amateur radio. The SCM recently awarded Certificates of Merit for "Outstanding Contributions to Amateur Radio" to W0BUC, WA0IAW, K0MVF, WA0MZW, WA0RRA, WA0OEJ and WA0VAS. The recent SET was a resounding success with over 200 Minnesotans taking part. Traffic: (Jan.) WA0MMV 332, WA0IAW 279, K0ZRD 241, W0ZHN 213, WA0YYV 205, WA0WEZ 170, W0PAN 167, WA0TQT 167, WA0OEJ 151, K0MVF 150, W0AAU 110, WA0RRA 108, WA0EPX 103, WA0TGM 93, WA0RKF 71, WA0VIS 69, WA0VTZ 66, WA0RKY 62, WA0URV 62, WA0UAH 61, W0BUC 56, K0SRK 54, WA0VGD 53, W0YC 50, W0FHH 45, WA0GRX 42, WA0QIT 41, WA0CJU 36, WA0HRM 36, WA0EBZ/0 33, K0FLT 31, W0ATO 30, W0RJO 28, WA0WDX 24, WA0DOT 23, W0EQO 22, WA0JPR 22, WA0RKE 19, WN0YAH 18, WA0YMU 17, W0BE 16, W0QXA 16, W0AZR 14, WA0ZND 14, WA0LAC 13, W0IYP 11, WA0TFC 11, K0ZBI 11, W0OPX 10, K0JTA 9, W0KLG 9, K0ORK 9, WA0UTJ 9, W0FDK 8, W0KNR 8, WA0NHQ 7, WN0YWA/0 7, K0JLL 6, WA0TLN 6, K0ZWG 6, W0RIO 5, W0SZJ 5, K0IKU 3, WA0MNE 3, W0ISJ 2, W0QXF 1, WA0RAG 1. (Dec.) WA0TGM 116, WA0TQT 88, K0JLL 5.

NORTH DAKOTA - SCM, Harold L. Sheets, W0DM - SEC: WA0AYL OBS: K0SPH. PAM: WA0CAQ. RM: WA0RSR. OO: W0BF. The Red River Radio Amateur Club, Inc., elected W0RRW, pres.; W0KZZ, vice-pres./station trustee, W0CAQ, secy.; W0SPA, treas. The YL Weather Net was activated during the Feb. surprise blizzard. W0DNJ is enjoying that new Drake TR-4. WA8ARB/0 has been transferred to Grisham AFB in Ind.

and K0JVE has been sent to Ariz. WA0RWL survived the Eagle Board of Review. W0GFE and W0DM had a bout with the flu. WA0SDQ's XYL received her Master's Degree at the mid-term graduation at UND. WA0NZO has a new SB-301 and K0GGJ a new HW-100. WA0SJB has been busy stirring up interest on the Bottineau State School campus for traffic. The ND CW Net is getting some new recruits. Tune down on 3640 and give them a hand. WA0HUD continues to lead the traffic count on TEN and other nets; W0NMV is right behind him. W0SDQ covered The International 500 Snow Mobile Race from Winnipeg to St. Paul. WA0GRX and W0GB, with about 20 other hams, stood by and relayed to the news media and radio-TV stations. The Bismarck Radio Club Station, W0ZRT, had to be dismantled at the YMCA as the building was sold and the Y moved to temporary quarters. Radio classes conducted by WA0RSR, WA0OVT and WA0MSJ are still held there. W0BF, WA0MSJ and K0HDA manned the CD RACES station during the SET. WA0RSR has a twelve-element 2-meter beam up. He has W0BF, WA0MSJ, WA0OVT and W0DXC for company on that band. K0SPH is the first to send in a report qualifying for the PSHR. PSHR: K0SPH 29.

Net	Freq.	CST/Days	Sess.	Ck-in	Tjc	
Goose R.	1990	0900 S	4	49		W0CDO
NDN CW	3640	2100 M-F	26	113	48	W0RSR
YL WX	3995	0730 M-Sun.	31	740	40	WA0MND
YL WX	3995	0730 M-Su	31	740	40	WA0MND
RACES	3996	1730 M-F	44	1187	186	W0NMV K0SPH
PON	3996	1730 S	13	357	108	WA0HUD
		0900 Sun.				
		1730				

Traffic: (Jan.) WA0HUD 300, W0NMV 115, W0BF 93, WA0SJB 74, K0SPH 60, WA0GRX 33, WA0RWM 31, W0DM 30, WA0IKS 30, W0 WA0TBR 21, WA0MND 13, W0WVW 13, WA0JPT 12, WA0UKD 10, W0CDO 5. (Dec.) W0WVW 7.

SOUTH DAKOTA - SCM, Ed Gray, WA0CPX - SEC: WA0FUZ. PAM: WA0CWW. RM: W0IPF. Net Managers: W0ZWL/0 WA0LLG, WA0PNB, WA0MWN, WA0THG is now Advanced Class. K0TXW recently became Advanced Class along with W0NAE. K0ZTV has received his Extra Class license. W0NAE has moved to Calif. WA0LYO is nearing completion of his college work at Spearfish. W0ZWL has received a certificate for 30 years continuous membership in YLRL. WA0CPY has a pair of 1/2-wave phased verticals on 40 meters. WA0SHA has been named a competitive nominee for the U.S. Military Academy at West Point. Net reports: Morning WX Net, 541 QNI and QTC 219; NJQ Net, QNI 570 and QTC 55; Early Evening, 815 QNI and QTC 49; Late Evening, QNI 1459 and QTC 80; AREC Net, QNI 61 and QTC 5. Traffic: W0ZWL/0 371, WA0SKA 186, WA0PNB 146, W0HOJ 105, WA0FUZ/0, W0IG 51, W0CAS 32, WA0PDE 28, K0AIE 26, WA0LLG 25, WA0SHA 13, WA0LYO 9.

### DELTA DIVISION

ARKANSAS - SCM, Robert D. Schaefer, WA5IIS - SEC: W5PBZ. RM: W5NND. PAM: WA5KJT. Congratulations to WA5LIO, who passed the Extra exam, and to WA5WTZ, WA5ZCR and W5OHR, who passed the Advanced. WNSVSV passed the General. WASSFA has a 1st-class commercial ticket and just got married to WASAVO's daughter. The Simulated Emergency Test was a success. Thanks to all who participated. WA5TAF is now manager of a Radio Shack store in Oklahoma. K5IPL has a new R4B and T4X; K5YCM has a new SB-220. A new radio club is being formed in Forrest City. Net reports for Jan.:

Net	Time	Freq.	Tjc.	QNI	Mins.	Mgr.
OZK	0100Z	3790	100	309		WASTLS
RN	0030Z	3995	83	812	906	WASKJT
APN	1200Z	3937	11	483	1385	W5VFW
Teenage	2330Z	3995	10	192	367	WASQMO
PON	2130Z	3925	114	534	783	WASTJB
DX Info	0045Z	3860	(Mon)			WASEFL
EC Net	0000Z	3995	(Sun)			W5PBZ

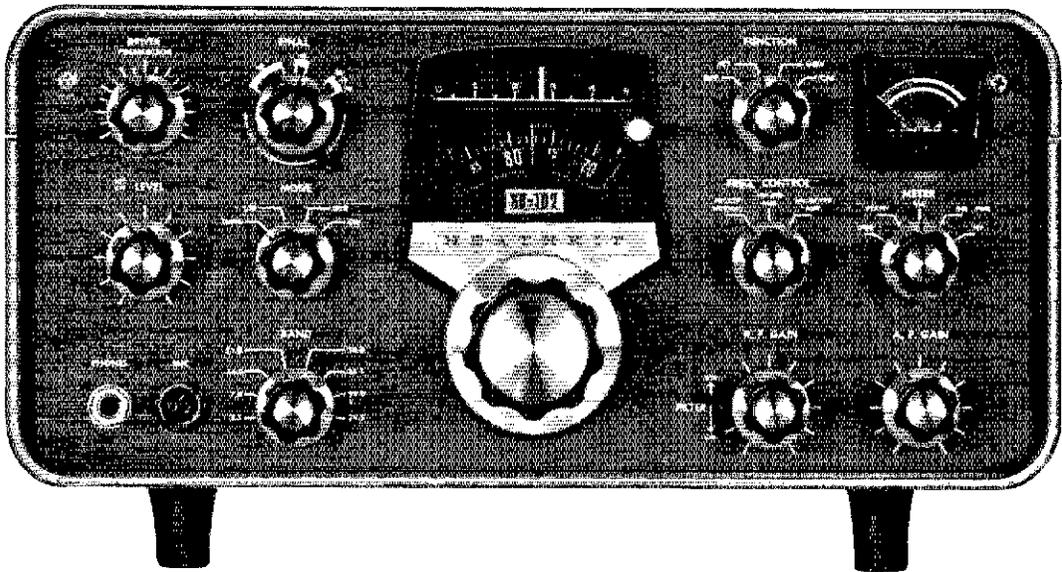
Traffic: (Jan.) WASTLS 126, WASKJT 106, W5VFW 67, W5YM 50, WASTJB 46, K5FMO 22. (Dec.) W5YM 28.

LOUISIANA - SCM, J. Allen Swanson, Jr., W5PM - SEC: W5OB. RM: K5ANS. VHF PAMs: W5SDXA, W5UQR. The Jefferson Radio Club has a new set of officers: W5RIO, pres.; W5AJE, vice-pres.; W5WZE, secy.; K5HEK, treas. W5NLJ is the latest to join the Extra ranks. W5EA still is working to get on RTTY. CENLA ARC also has a new set of officers: W5EVU,

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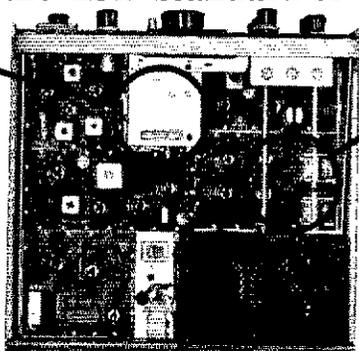
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**SB-102 SPECIFICATIONS — RECEIVER SECTION:** Sensitivity: Better than 0.35 microvolt for 10 dB signal-plus-noise to noise ratio for SSB operation. **SSB selectivity:** 2.1 kHz minimum at 6 dB down, 5 kHz maximum at 60 dB down — 2:1 nominal shape factor — 6:60 dB. **CW Selectivity:** (With optional CW filter SBA-301-2 installed) 400 Hz minimum at 6 dB down, 2.0 kHz maximum at 60 dB down. **Input impedance:** Low impedance for unbalanced coaxial input. **Output impedance:** Unbalanced 8 and 600 ohm speaker, and high impedance headphone. **Power output:** 2 watts with less than 10% distortion. **Spurious response:** Image and IF rejection better than 50 dB. Internal spurious signals below equivalent antenna input of 1 microvolt. **TRANSMITTER SECTION:** **DC power input:** **SSB:** 180 watts P.E.P. continuous voice. **CW:** 170 watts — 50% duty cycle. **RF power output:** 100 watts on 80 through 15 meters; 80 watts on 10 meters (50 ohm non-reactive load). **Output impedance:** 50 ohms to 75 ohms with less than 2:1 SWR. **Oscillator feedthrough or mixer products:** 55 dB below rated output. **Harmonic radiation:** 45 dB below rated output. **Transmit-receive operation:** **SSB:** Push-to-talk or VOX. **CW:** Provided by operating VOX from a keyed tone, using grid-block keying. **CW side-tone:** Internally switched to speaker in CW mode. Approx. 1000 Hz tone. **Microphone input impedance:** High impedance. **Carrier suppression:** 50 dB down from single-tone output. **Unwanted sideband suppression:** 55 dB down from single-tone output at 1000 Hz reference. **Third order distortion:** 30 dB down from two-tone output. **Noise level:** At least 40 dB below single-tone carrier. **RF compression**

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SBA-100-1, Mobile Mounting Kit, 6 lbs. . . . . \$14.95\*

(TALC): 10 dB or greater at 1 ma final grid current. **GENERAL:** Frequency coverage: 3.5 to 4.0; 7.0 to 7.3; 14.0 to 14.5; 21.0 to 21.5; 28.0 to 28.5; 28.5 to 29.0; 29.0 to 29.5; 29.5 to 30.0 (megahertz). Frequency stability: Less than 100 Hz per hour after 10 minutes warm-up from normal ambient conditions. Less than 100 Hz for  $\pm 10\%$  line voltage variations. Modes of operation: Selectable upper or lower sideband (suppressed carrier) and CW. **Visual Dial Accuracy — "resetability":** Within 200 Hz on all bands. **Electrical dial accuracy:** Within 400 Hz after calibration or nearest 100 kHz point. **Dial mechanism backlash:** Less than 50 Hz. **Calibration:** 100 kHz crystal. **Audio frequency response:** 350 to 2450 Hz  $\pm 3$  dB. **Phone patch impedance:** 8 ohm receiver output to phone patch; high impedance phone patch input to transmitter. **Front panel controls:** Main (LMO) tuning dial; Driver tuning and Preselector; Final tuning; Final loading; Mic and CW Level Control; Mode switch; Band switch; Function switch; Freq. Control switch; Meter switch; RF gain control; SSB-CW filter switch, Audio Gain control. **Internal controls:** VOX Sensitivity; VOX Delay; Anti-Trip; Carrier Null (control and capacitor); Meter Zero control; CW Side-Tone Gain control; Relative Power Meter Adjust control; P.A. — Bias; Phone Vol (headphone volume); Neutralizing. **Rear Apron Connections:** CW Key jack; 8 ohm output; Spare A; Spare B; Phone patch input; ALC input; Power and accessory plug; RF output; Antenna switch; Receiver Antenna. **Power requirements:** 700 to 800 volts at 250 ma; 300 volts at 150 ma; —115 volts at 10 ma; 12 volts at 4.7a amps. **Cabinet dimensions:** 14 $\frac{1}{8}$ " W x 6 $\frac{3}{8}$ " H x 13 $\frac{3}{8}$ " D.



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pres.; W5HMW, vice-pres.; WA5IPQ, secy. treas. The Study lessons put on by Cenla ARC was successful with seven new Novices licensed. WA5WBZ is putting up a quad. WA5WXQ is the new editor of the LARK. W5CEZ said it would have been a slim month traffic-wise without SET. Incidentally, there was more activity by various groups during SET than has been held in this state for many years. The GNOARC recently welcomed eleven new members, including two YLs. The Baton Rouge ARC elected K5WMT, pres.; WA5VMW, vice-pres.; Janice Prescott, secy.; W5DPM, treas. W5ASNUK spent many hours on LAN and in the La. QSO Party. W5AQVN and the gang up Monroe way are busy putting up their 6-meter fm repeater. W5MBC has again assumed duties as net mgr. for LAN. The Westside ARC and the Southwest Louisiana ARC have submitted very complete and comprehensive reports on their participation in SET. Again I remind all that Apr. 10 is the deadline for submitting your choice of candidates for SCM. Traffic: W5CEZ 189, W5MBC 116, W5PM 98, WA5WBZ 76, WA5QVN 30, WA5NLJ 22, W5FA 14.

**MISSISSIPPI** - SCM, Clifton C. Comfort, WASKEY - K4RIN/5 is changing his OO appointment to W5RUB. K5MDX has a new Henry 2K on the air. WA5MLW has moved to Laurel. We welcome W8FXX/5 and his XYL, W8LFG/5, to Miss. They worked hard during "Camille." WASWJP and others, have been tracking AUSTRALIUS 5. WASUBQ, MSBN mgr., doesn't have too many volunteers for 3-month tours as NCS one night a week. The value of this trained NCS program paved off during "Camille." Don't be bashful, take a couple of tours of duty! W3CID/5 has qualified for Public Service Honor Roll for three months with Nov. '69 27 points, Dec. '69 28 points and Jan. '70 27 points. Anyone else? Let me know. This year started off like last with tornadoes in Jan. We sincerely hope the weather doesn't try to outdo itself. Check into our nets -- any or all of them.

MSBN	3990 kc.	6:15 P.M. CST	Daily
GCSBN	3925 kc.	6:30 P.M. CST	Daily
GCHSN	3935 kc.	7:00 P.M. CST	Daily

Traffic: W3CID/5 191, WA5KEY 31.

**TENNESSEE** - SCM Harry A. Phillips, K4RCT - SEC: W4WJH, PAMs: W4PEP, K4MOI, WA4EWW, WB4HH. RM: K4AMO.

Net	Freq	Time	Ses.	QNI	QTC	Mgr.
TSSH	3980	0030 Tu-Su	27	1181	152	K4MOI
FPN	3980	1245 M-Sa 1400 Sun.	31	1443	78	W4PEP
FTPN	3980	1140 M-F	22	618	28	WA4EWW
TPON	3980	0030 Mon.				K4RTA
ITN	7270	2200 Dy	25	146	28	WB4HH
TN	3635	0100 Dy	30	149	113	K4AMC
ETVHF	145.3	0000 T-T	9	97		WB4JOB
6MSN	50.1	1h&Su	6	88	4	K4LQO
ETVHF	50.4	0000 MWF	13	180	2	WB4JOB
ETTMM	28.8	0230 W&F	8	100	6	WA4YON

WA4JTI, of Greenville, is ncs on 75-meter Interstate Net. K4IOP reports that a letter was sent to Senator Baker strongly disapproving his efforts to push through passage of a bill increasing the cost of amateur radio license plates to ten dollars. Big signals are now heard on 6 from the top of K4LQO's hill in Knoxville. I would like to have information about any 10-meter repeaters in or near Tenn. The SFT went very well in Tenn. On the same week end there were several mobile and fixed station amateurs that participated in dragging operations taking place at Percy Priest Lake near Nashville. Traffic: K4AT 352, WA4ITI 318, WA4UAZ 295, W4OQG 240, K4AMC 138, W4OQG 81, WA4YFC 68, WB4DYI 68, WA4WBK 60, WA4NLC 59, K4SXD 57, WB4ANK 55, K4LQO 34, WB4GXU 33, K4MOA 31, WB4OBY 31, WA4CGK 22, K4LTA 20, WN4OEL 19, W4PFP 18, WA4YON 18, WA4YEM 16, WA4GLS 14, WB4HMA 14, WB4IMS 14, WB4NDX 14, WB4CQL 13, WA4WVW 13, WB4HLH 12, WB4JTS 11, WA4EWW 10, WB4LIE 9, WA4YV 8, WB4FEC 4, K4RUC 4, W4VJ 4, WA4ZXZ.

### GREAT LAKES DIVISION

**KENTUCKY** - SCM, George Wilson, W4OYI - SEC: W4VYS. Appointed: WB4FDK as EC; K4UNW as ORS. Endorsed: K4MAN as OPS. RPL: WA4MEX, WA4VZ7, WA4GMA, plus multiop stations K4HY and K4CSH. We regret to report the sudden and untimely loss of WA4GMA (BPL, NCS, OPS, EC); also K4LOA, who made a real impact.

KRN	416* QNI	36 QIC	KYN	421 QNI	788 QTC
MKPN	624*	112	FCATN	205*	258*
KTN	1024	546			

The annual appointees meeting was well attended considering the ice and snow. Owensboro Club's barbecue was Feb. 17. W4OTP says 6-meter transmitter hunts are great in Louisville area. WA4OMH finds 5th DX when no one else even tries. W41BU, K4DWD and W4YOK upgraded to Extra. Kyana RC has a fine group of officers: WB4HFN, K4DMU, K4CVV and K4BAM with directors K4GOU, W4WQC and K4FXN. Set I went off well indeed with increased scores in most areas. Traffic: (Jan.) K4HY 415, WA4VZ7 405, WB4KVF 130, K4CSH 305, WA4GHQ 230, WA4MEX 225, WA4VUE 215, W4CJD 148, WB4HQW 145, W4QYI 141, WA4GMA 133, W4BAZ 112, W4BTA 107, WA4AGH 104, W4UK 93, W4OTP 86, K4YZU 81, K4MAN 79, WB4LKP 76, WB4HFN 69, K4DZM 64, W4VYS 61, K4IRT 57, WB4EOR 50, WB4HLY 50, WB4LH 46, W4NBZ 46, K4UMN 46, WB4EQY 42, WB4LFZ 39, WB4IOU 37, W4SZB 36, WB4KER 33, WB4HUS 31, WA4WVA 30, W4ADO 29, K4VD0 29, WB4OPN 27, WA4BZS 25, K4HOF 25, WB4HFU 24, K4AVX 23, WA4MXD 23, K4OAE 23, K4FPW 20, WB4GCV 20, K4YCB 19, K4UNW 13, W4GSH 8, W4WJP 6, WA4OMH 5. (Dec.): K4YZU 184, W4NBZ 35, K4FPW 18, WA4W5W 12, W4BTA 4. Total reports 56; traffic 4739.

**MICHIGAN** - SCM, Joseph L. Pontek, K8HKM - Asst. SCMs: Howard A. Walker, W8ITQ; Rodger C. Phillips, WA8LWK. SEC: W8MPD. RMs: W8WPM, W8RTN, W8WVI, K8KMQ, W8BDDT. PAMs: K8GOU, W8ZBT, VHF PAMs: W8VCV, K8AEM. Asst. Directors in Mich.: W8AP, W8COU, W8DPE, W8EGI, W8GJH, W8ITQ, K8PVC, W8QFO, W8SPE.

Net	Freq.	Time	QNI	QTC	Ses.	Mgr.
QMN	3663	2000 Dy	1116	148	93	WA8PIM
WSSB	3935	0000 Dy	905	155	31	K8WRJ
IIPEN	3920	2230 Dy	302	37	11	WA8LHC
PON-DAY	3950	1600 Dy	879	302	31	K8LNE
GLEIN	3932	0230 Dy	703	103	30	K8HLI
PON-CW	3645	2400 M-Sa	192	53	27	VE3DPO
M6MTN	50.4	2400 M-Sa	249	33	25	WA8LRC
BR/MEN	3930	2230 M-F	952	104	26	K8LJS

Silent Key: W8HOX. W8OGR and K8RCT are DXCC members. K8AVR is very active on RTTY. W8PSV worked E88XX and Z99BM for a birthday present. W8BBK is back in Mich. after a spell as K3UOW. W8RFT is looking for fellow-builders of the "Omniverter" to compare notes. PON-DAY is having better luck on 3950 kHz. 160-Meter W.W. CW Contest saw some tough competition in Mich. W8JTO was hospitalized with a severe heart attack. W8KLO with a stroke and W8COU with a serious operation. W8IUT made PON-DAY Amateur of the Month Award. W8VCV heard Oscar 5 on 2 and 10 meters. K8MFO is back from XV-5-Land. Michigan Council of Clubs held a meeting in Lansing Feb. 15. Did your club have a delegate there? Southeastern Mich. ARA is having a Swap and Shop April 12 at the Cannon Memorial Recreation Center in Detroit, Cadillac Swap and Shop April 18 at the National Guard Armory, Hazel Park ARC a Swap and Shop at the Hazel Park H.S. May 17. Oak Park ARC Swap and Shop was very successful. W8CUP had 37 countries on 80 this winter with 100 watts and a "slant dipole." W8MPD had to use emergency power during SET because of a power failure that was for real. K8LNE and W8WZF made HPI 100% in '69. BFLers: K8LNE, W8WZF, K8ZJU, K8KMO. Traffic: K8LNE 720, W8WZF 513, K8ZJU 494, W8YVY 318, K8KMQ 316, W8NOH 292, W8BENW 244, W8BPM 228, W8SQC 227, W8REZ 134, W8MPD 133, W8BONZ 113, W8LKY 106, W8FZ 103, W8RTN 101, W8BUGI 90, W8ZAV 77, W8DDT 73, K8HKM 73, W8HR 70, W8UC 68, W8CUP 62, W8MO 61, W8WCFZ 57, W8WVL 53, K8MEG 52, W8TDA 40, K8GOU 36, W8AGQ 27, W8ZPH 26, W8DC 25, K8LTY 23, W8FX 18, K8AEM 17, W8RANR 14, K8FED 14, W8MDD 12, W8TFB 12, K8CKD 9, W8BYB 7, W8DCT 5, W8LKC 4, K8QLL 4, K8NHV 1.

**OHIO** - SCM, Richard A. Egbert, W8ETU - SEC: W8OJU. RM: W8IML. PAM: K8UBK. VHF PAM: W8ADU. Jan. net reports:

Net	QNI	QTC	Ses.	Freq.	GMT	Mgr.
OSSBN	2548	1459	67	3972	1530, 2345	K8UBK
BN	968	882	83	3580	0000, 0300	W8IMI
ObMtrN	627	96	78	50.61	0000	W8ADU
				50.16	0200	
OSN	223	73	29	3580	2325	W8VNU

January BPL was earned by W8ETX, W8UPH, W8DWT, K8ONA and W8COU. RM W8IMI reports the following SET activity for BN: 25 sessions, 275 QNI, 231 QTC with 50 participants. OSSBN Mgr. K8UBK submits the following SET statistics: 336 QNI, 628 QTC, 1488 minutes of session time. SEC W8OJU has not yet waded through the pile of radiograms he received during the SET. Are you a member of your local ARC, or of one of our section traffic nets? You should be. K8QYR was appointed OPS in Jan. OBS W8GDQ reports

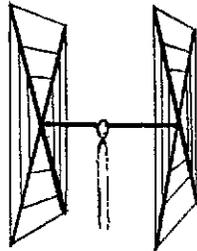
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—these two element beams have a full wavelength driven element and a reflector (the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete 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!



### 10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16' square

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10' x 1 1/4" OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Aluminum wire, tempered and plated, .064" diameter.

X Frameworks: Two 12' x 1" OD aluminum 'hi-strength' alloy tubing, with telescoping 7/8" OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

Now check these startling prices — note that they are much lower than even the bamboo-type:

10-15-20 CUBICAL QUAD . . . . .	\$35.00
10-15 CUBICAL QUAD . . . . .	30.00
15-20 CUBICAL QUAD . . . . .	32.00
TWENTY METER CUBICAL QUAD . . . . .	25.00
FIFTEEN METER CUBICAL QUAD . . . . .	24.00
TEN METER CUBICAL QUAD . . . . .	23.00

(all use single coax feedline)

How to order: Send check or money order. We ship immediately upon receipt of order by railway express, shipping charges collect. **DEALERS WRITE!**

## BEAMS

"Just a note to let you know that as a Novice, your 3-EI. 15 Beam got me RI Section Winner and New England Division Leader in Novice Round-up. See June QST, p. 57 for picture of ant. (below). Tnx for a fine working piece of gear. 73s, Jay, WAIJFG"

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; 3/4" and 1" aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 EI 20 . . . . .	\$19	4 EI 10 . . . . .	\$18
3 EI 20 . . . . .	25*	7 EI 10 . . . . .	32*
4 EI 20 . . . . .	32*	4 EI 6 . . . . .	18
2 EI 15 . . . . .	15	8 EI 6 . . . . .	28*
3 EI 15 . . . . .	19	12 EI 2 . . . . .	25*
4 EI 15 . . . . .	25*		
5 EI 15 . . . . .	28*		

\*20' boom

## ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, T12FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHIL, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2OJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWI, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ51KN, KZ5OWN, HC1-LG, PY5ASN, FG7XT, XE2I, KP4-AQL, SM5BGK, G2AQB, YV5CLK, OZ4H, and over a thousand other stations!

V40 vertical for 40, 20, 15,	
10, 6 meters . . . . .	\$14.95
V80 vertical for 80, 75, 40,	
20, 15, 10, 6 meters . . . . .	\$16.95
V160 vertical for 160, 80, 75,	
40, 20, 15, 10, 6 meters . . . . .	\$18.95

**GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139**

working GW3UPK for country No. 59 on 160 meters, W8AJ departed for Florida in early Feb. Dayton ARA started another Novice training class in Feb. with over 40 students. W8ZRV, W8HYB and K8DHI joined Silent Keys, ORS/QPS WA8EX writes of a need for cw on chf. He suggests the regular transmission of Official Bulletins on m/w. We agree that vhf could use some of this. Any volunteers? The combination of counties under our new EC jurisdictions has led to the creation of some area names that are more manageable than a list of five or six counties. For example, K8LEI presides over "Northwest Ohio AREC" rather than the long list of six counties. Likewise W8LRD is EC of "Central Ohio AREC," and W8OE heads up "Trucomah," consisting of Trumbull, Columbiana and Mahoning Counties. WA8YIB believes in starting them young. He gave a talk on ham radio to a group of second graders. New officers of the Tri-County ARC are WA8EIX, pres.; WA8DEG, vice pres.; W8UEA, secy.; WA8LIE, treas. EC WA8FQW was the subject of a feature article in the firestone (tire) *Non-Skid*. Article was remarkably accurate and stressed ham's AREC activity. Central Ohio AREC EC W8LRD announced that the group's emergency operating center will be assigned the call K8DDG and will be known as the Roger Barnett Memorial Station. I visited the Tri-County RA during Jan. A large part of this fine club is active in both AREC and NIS. I was treated to a tour of the Alliance c.d. emergency operating center, the Stark Co. c.d. operating center and the Marlinton H.S. club station. Traffic: (Jan.) WA8EIX 1007, W8UPH 850, WA8FW 408, W8AUP 363, W8OUU 323, WA8WLD 272, W8BAAL 259, K8ONA 222, W8RYP 222, W8IMI 219, W8OCU 206, W8ARDU 181, W8GXY 171, W8ACXY 166, W8GRT 165, K8LEI 159, W8AULF 152, W8AIFY 150, W8ASLD 137, W8WSU 136, W8VNU 134, K8URK 116, W8AWAK 111, K8DHI 109, W8BRZX 105, W8AZTV 105, W8JD 104, W8AYLW 103, W8CKI 101, W8OCQG 98, K8LGA 95, W8OE 75, W8ARRD 75, W8RBLI 71, W8A5GQ 70, W8BJP 69, W8GNI 68, W8GRI 66, W8ADU 65, W8BAKW 62, W8WV 62, W8RHZ 61, W8VND 61, W8RFGD 59, W8BAKW 57, W8AFSX 51, W8MCR 51, W8LKM 50, W8AMHO 49, W8LAM 47, W8CKG 44, W8FRD 43, W8ARNO 43, W8GCF 39, W8DAE 34, W8ELU 33, W8LZE 31, K8QYR 30, W8BVWH 30, W8AKL 28, W8ANZC 28, W8ABOR 27, K8LKA 25, W8ATRE 25, W8AIEH 23, W8UPD 22, W8MOK 21, W8AQFK 21, W8EOU 18, K8ONY 18, W8BSGT 16, W8IO 15, K8PFE 15, W8APCI 15, W8BAJC 14, W8AKSI 14, K8CKY 13, W8UX 13, W8LAG 12, W8ACXY 11, W8EFC 10, W8AJSW 10, W8B8PB 8, W8BDHY 8, W8QW 7, K8UOZ 7, W8AVVN 7, W8WEG 7, W8BYHN 7, W8ARW 6, W8AFCJ 6, W8BAKU 5, K8PFX 5, W8AKHR 5, K8BYR 4, W8EUD 4, K8EHU 4, K8MCG 4, W8AFC 3, W8SHP 3, W8AWJR 3, W8RQCQ 2, W8RHH 2, W8ELI 2, W8GQD 2, W8XQ 1. (Dec.) K8PBE 25.

### HUDSON DIVISION

EASTERN NEW YORK - SCM, Graham G. Berry, K2SJM - Asst. SCM/RM: Ruth E. Rice, WA2VYS. SEC: W2KGC. PAM: WB2VJB. VHF PAM: W2YQU. Section nets: NYS nightly 3678 at 2300Z; ESS nightly 3590 at 2300Z; NYSPT XEN nightly 3925 at 2300Z. Appointments and renewals: W2HGB and K2UTV/WBGB as ORS; K2YCY as QVS. Area officers for 1970 Hudson Council include K2SJO, pres.; WB2BAH, board. NYSPT&EN Manager WB2VJB forwards 1969 report: 17,308 QNT during 556 hours of operation and a total of 4049 formal traffic. 25 net members received Certificates of Merit. Club news for Jan.: Schenectady heard K2LEI on "Solid State Construction Techniques" and New Rochelle heard K2LVL re "Receivers, 1970 and Beyond." Schenectady ARA is moving its meeting place to the Edison Club, Rexford. Regret to report W2NVB (W1DV) as a Silent Key. W2RUE reports ENY holders of 5-year County Net certificates include W2ANV, W2HUM and W2THE - gold seal for Charter Net membership for all three. Individual activities: WA2FYE now is 6-meter asst. coordinator and net mgr. for Navy MARS and running liaison with AFMARS for cross-over of traffic. WA2VLS and K4GXV72, were awarded Net certificates by ESS. New Generals in Delmar area are WA2JXI and WA2JXR. WB2VJB is now Advanced Class. Welcome to new Novice W2M2JM. Schenectady Co. EC W2URP now has ssb and is ready for RTTY. Jan. SEI found much activity in Albany, Schenectady and Westchester Counties with traffic from all over area to SEC and SCM. Thanks to all participants and congrats to W2URP, WA2JWL and WA2BAH on their fine leadership jobs. January PS Honor Roll: WA21B1, WA2VYS and WA2VYT. K2UYK is back on 75 ssb with HW-72. YK1ZAR/2 was active in Jan. VHF Contest. All section members should read again QST editorial in Feb. We have one ENY op who's been laid up for 2 months after a tower accident! SEC W2KGC participated in Fiber Optics seminar in Texas in Jan. Traffic: W2EAF 388, WA21B1 176, W2VYT 146, WA2VYS 124, K2SJM 103, W2IHE 88, W2BMWZ 74, K2UYK 57, WB2FUV 53, W2AR1Z 19, WA2VJB 19, K2HNW 15, W2URP 10, W2ANV 8, WA2GQW 8, WB2BXL 5, WA2FYE 5.

NEW YORK CITY AND LONG ISLAND - SCM, Fred J. Bennjes, K2DGI - SEC: K2OVN. RM: K2UAT. PAMS: W2LW, WB2RQF.

NLI*	3630 kHz	1949 Nightly	K2UAT RM
NLI VHF*	145.8 mHz	1930 MTWTF	WB2ROF PAM
NLI Phone*	3932 kHz	1600 Daily	WA2UWA PAM
Clear House	3925 kHz	1100 Daily	WA2QPI Mgr.
Mic Farad	3925 kHz	1300 Fr. Sun.	K2UBG Mgr.
East US	3683 kHz	0900 Nightly	K2UBG Mgr.
All Svc	3925 kHz	1300 Sun.	K2AAS Mgr.
NYSPTEN	3925 kHz	1800 Daily	K2SPO Mgr.

\*Section nets. All times above are local. Congratulations go to W2BCB! What for? Well, 50 years as a radio amateur, 1920 to 1970, that's what! The best for 50 more! Hey! Here's another: WA2KEA moved up to General Class in Jan. Best of luck! New club pres. of Staten Island Radio Club - K2IUX. W2BII dusted 6 months of dust off the rig and worked a ZS6. Some dust! K2AAS returns from his annual trek to SAROC in Las Vegas. I suspect it is more than the convention that gets him there every year! W2HMO reports retiring his earplugs; says muting system finally working. O'Murphy really socked it to WA2GPI when she decided to change rigs; started out with a complete rig, and ended up with a kit. Yep, you heard right! Glad to have W2HPN up and around again, also retired to ham radio. The grapevine has it that K2IHG is sporting a new piece of gear. Seems he S05ed Massachusetts (that almost a local) from the mobile to home OPH. Listen! W2EW and WB2ROF are looking for stations to help out in the NLI/VHF Net, particularly in Nassau and Suffolk County townships. You don't have to be a regular, just let them know you are around and can help out if needed. While we're at it, WA2GPT would like some relief help during the daytime with the Clearing House Net, particularly in greater NYC area. Surprise her and check in! Sounds like there was a "fire sale" in Brooklyn, what with the gang at the Flatbush Radio Club putting all those TV-2's on the air. My thanks to all who participated in Jan. SEI. Your efforts were much appreciated by all, and have contributed towards making this section "look good." My thanks also to all the well-wishers regarding the SCM post. From time to time as space permits, this column will supply information regarding radio club meeting places and dates for this section, i.e. Rockaway ARC meets 2nd Tue. of each month at 8:00 PM in the Social Hall of the Church of Epiphany, 103-10 104th St., Ozone Park, N.Y. Long Island Mobile ARC meets 1st Tue. at 8:30 PM Administration Bldg., Eisenhower Park, south entrance, East Meadow, N.Y. If your club desires members, let me know the particulars. (This feature is designed to help the clubs and those looking for clubs, so keep those cards and letters comin' in. In the future I will try to squeeze in OBS schedules, so that you might find one that meets your need. Traffic: (Jan.) WA2HMC 900, WA2GPT 326, K2IHG 159, WA2BRF 107, K2AAS 488, WA2DFD 22, K2DGI 16, WB2RZF 13, W2BCB 12, W2EC 12, W2LKG 11, W2PI 10, W2DBQ 9, W2ALL 8, WA2LJS 8, WB2UQP 4, WA2HBZ 3, WA2BIT 1.

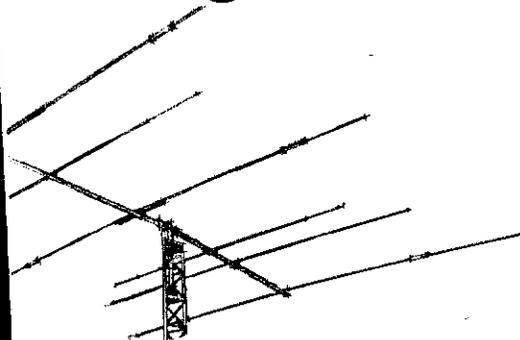
NORTHERN NEW JERSEY - SCM, Louis J. Amoroso, W2ZZ - SEC: K2KQD. RMS: WA2TAF and WB2RKK. PAMS: W2PEV, K2KDO, WA2KZF and WA2TBS.

### ARPSO Section Net Schedules

Net	Freq.	Time	Ses.	QNT	Tfe.	Mgr.
NITTYN	3635	7:30P MWT	13	34	6	WA2TAL
NJN	3695	7:00P, Dy	31	505	412	WA2BL
NJN	3695	10:00P, Dy	51	250	102	WA2BL
NJNS	3740	8:00P, Dy	15	54	18	WB2E1E
NJEPIN	3950	6:00P, M-Sa.	37	851	1034	W2PEV
NJIFON	3930	6:00P, Sun.	4	95	59	WA2TB
NIAN	50425	8:00P, M-F	22	220	51	WA2KZ
PVEIN	148710	7:30P, Dy	37	477	530	K1KDO
ECIN	145800	8:30P, M-Sa.	29	150	122	WA2TB
	146700	8:30P, Sun				

Please note the change in both the frequency and the time for the ECTN. New appointments: WA2HEL as QRS and WB2JYJ as QVS. WB2IYX is now Advanced Class and W2LQA is a new ham in North Brunswick. New officers of W2FCL group are WB2RUM, pres.; WA2UD, vice-pres.; W2BVE, secy.; WA2FG, treas. The Belleville ARC call is W2IOY with W2IYW as trustee. K2DQT as pres.; WB2NSV, vice-pres.; W2IYW secy. Newly elected officers at K2MFP are WA2E0L, pres.; WA2JAO, vice-pres.; WA2MTI, secy.; WB2JYM treas. WB2IQF has a new 80-watt (duple) rig. WB2YXJ joined the Navy. WA2HUS and WB2ALZ are on 2 with the HW-17A. WB2BCA is mobile on 6-meters. W2DNU is on 2-meter RTTY. W2HEO has a 15-watt linear. WB2VLC is at NY. K2DQT, W2JLX and WA2WY joined Navy MARS. Hell Jan worked moved W2YHE to N.J. K2KDO TU for RTTY went up in smoke. W2DRH has a new G1-850 with remote yfo and a phone patch. WA2WYR has new 500-watt linear. The Passaic High School RC, WA2YXO.

# "Talk it up" with these great antennas from *Mosley*



## Classic 36

Full power rated, (2 KW P.E.P.) for 10, 15 and 20 meters. Patented\* broad band capacitive matching. Frequency stability assured by waterproof metal encased traps. 6 elements, 69 lbs. assembled. S.W.R. 1.5 to 1 or better. 52 ohm feed.

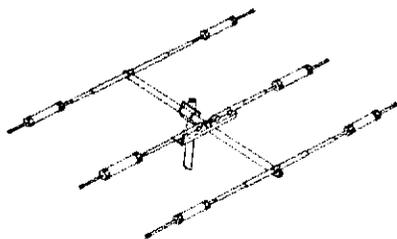
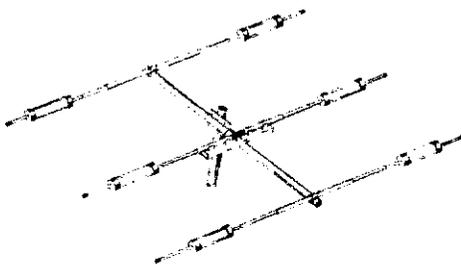
\* Pat. No. 3419872 **\$171.92**

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- MAF-40 Raising fixture \$59.95
- MA-660 66' Magna Mast \$799.95
- MARB Rotor base \$199.95 (rotor not included)
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on with a DX-100. WA2HDS joined Navy MARS. WB2ZJQ has a new ssb rig. WB2AY7 is putting up a new 6-meter beam. WA2RIN is now Advanced Class and on with a SX-117 and HT-44; he also has SR-42 for 2 meters. The Ridgewood ARC presented W2MQP with a plaque for over 20 years membership. WB2RKK passed the Extra. WB2MAZ is a new Tech. in Clifton. WN2MID and WN2MIB are new hams in Maywood. Congratulations to all the net mers. and KCS on a great SET. Anyone interested in OO work or an EC appointment, drop us a line. WA2TAF is looking for RTTY net members. Traffic: (Jan.) WA2BAN 3230, WA2HRZ 2888, K2KDO 1175, WA2EPI 973, K2DEL 830, WA2HEL 644, WA2BHI 515, WB2FEH 460, K2OQJ 353, WB2WID 324, WR2VPR 252, WN2JHT 220, WB2DDQ 189, WN2GWV 154, WR2BWJ 144, WB2BKK 137, WA2FBS 117, W2ZZ 97, WB2BCS 83, WB2YPO 81, WA2FII 77, WA2HSJ 74, WA2DOF 69, W2PEV 65, WA2DRH 58, WA2CCF 57, WA2LDX 57, WA2EUX 53, WA2TAF 52, WA2ACP 46, K2ZII 45, W2UJ 39, WA2GLI 39, WA2NJB 30, K2DQT 28, WA2BCT 27, W2DRV 25, WA2JXE 24, W2FWZ 19, WB2WNZ 17, WB2OJ 10, W2TFM 8, K2MFX 5, WA2ZF 4, WB2RKK J, WA2WYR 1. (Dec.) WA2DRH 147, WA2LDX 129, WB2BCS 34, W2UJ 29, WA2GLI 27, WB2RUM 15, WA2KZE 14.

### MIDWEST DIVISION

IOWA - SCM, Wayne L. Johnson, K0MHX - Asst. SCM; Alvin B. Culbert, K0YVU; SEC: K0LYB, PAM: K0QKD, RM: W0LGG, DBS: W0LCX, W0JAO, W0LR, W0AMT. New appointees: K0YVU as Asst. SCM, K0QKD as PAM, W0POE as OPS. New tickets: W0WYGA Adv., W0QZVH, W0N0AJ, W0N0AKA, W0N0AHE, W0N0ALC, W0N0ALD. Al Culbert, P.O. Box 306, Charles City, 50616, has accepted the Asst. SCM appointment. Al is active in DX, contest work and local nets. The many friends of W0PZO extend sympathy in the recent loss of his wife. Joe has moved to Calif. K0QKD has volunteered to fill the PAM position for the remainder of Joe's term. W0YVR plans to tour Germany and Italy during his summer vacation from his language courses at U. of I. K0LKH demonstrated amateur radio at the Ames Toastmasters Club. W0LGG reports TEN cleared 277 messages in one 20-minute session during SET. K0YVU scored 110,720 in the Jan. CD Party. Al has a new SB-220. W0RUS needs Hawaii and a couple more for 160-meter WAS. W0PEN reports 10 mobiles and 26 hams active in Clinton County during SET. New officers of the Central Iowa ARC are K0LYB, pres.; W0QCD, vice-pres.; W0AVW, secy.-treas. Recent League affiliation was granted to Coe College ARC with WR4OH, pres.; W0RFA, act. mgr.; W0TON, coordinator. Public Service Honor Roll: W0LCX 51, W0LGG 37, W0DJD 27.

Traffic: (Jan.) W0LCX 1470, K0JGI 149, K0AZJ 111, W0OTO 70, W0LGG 62, W0VZH 58, W0JJP 53, W0MLL/9 41, W0POE 38, W0KB 36, W0RIZ 28, K0LKH 25, W0VBG 24, W0PEN 20, W0QZL 19, W0UVH 16, W0RBU 13, K0KQ 12, K0CNM 8, W0DAG 8, W0GVI 8, W0ROM 8, W0MOO 6, K0ISA 4, W0DMX 3, W0PDI 3, W0YFO 2, W0YVR 2, K0YVU 1.

KANSAS - SCM, Robert M. Summers, K0BXX - SEC: K0EMB, PAM: K0MRE, RM: K0MRI, VHF PAM: W0CCW. All of Kansas expresses deepest sympathy to the family of W0BUL, SEC Mo. Chuck joined the list of Silent Keys Jan. 5. (KARC) Salina, elected W0NKD, pres.; W0JFC, vice-pres.; W0NYML, secy.-treas.; W0AFO, hamfest chairman; W0NTC, act. chairman. Two more of Hawatha's finest, W0UQA and W0QZF, were involved in the communications hook-up between National Guard and Airport when Guardsmen returned. W0SQN formerly of K.C. area, now is residing in Topeka. The Jayhawk ARS in KCS, started its annual Novice code class Feb. 6, with over 60 students. W0MCH and W0ASH are instructors. New officers of the Honthill ARC, Dodge City, are K0JID, pres.; W0JFY, secy.; W0RXS, treas. BHARC also announces date of Hamfest 1970 as Aug. 16. Zone 1 AREC 75-meters reports QNI 67, QIC 22; 2 meters QNI 63, QIC 6. Zone 15 AREC Net reports QNI 76, QIC 6. KPN, QNI 1526, QIC 771, Mgr. W0LXA; KSNB, QNI 746, QIC 92, mgr. K0JME; KPN, QNI 196, QIC 26, mgr. K0JME; HBN, QNI 687, QIC 173, mgr. K0LPE; QKS, QNI 632, QIC 303, mgr. K0MRI; KWN, QNI 737, QIC 29, mgr. W0LLC; Ks EC, QNI 40, QIC 17, mgr. K0EMB. Traffic: (Jan.) W0NH 790, W0HI 313, K0BXX 230, K0MRI 143, K0JME 124, W0MA 119, W0LLC 116, W0QZP 91, W0TZK 87, W0GCJ 82, W0CH 78, W0SOE 76, K0EMB 68, W0BGX 65, K0LPI 56, K0UVH 43, W0TAS 37, W0LEB 34, W0DUTT 32, W0VWV 25, W0QOWH 25, W0JEC 23, W0QSV 18, W0JDI 15, W0LYC 10, W0AUF 10, W0ASHN/0 9, W0QRC 9, W0JOG 6, K0JID 5, K0KED 4. (Dec.) W0PTU 41, W0RI 29, W0RBO 14, W0JFC 12.

MISSOURI - SCM, Robert J. Peavler, W0BV - SEC: W0RTH. Appointment renewed: W0OUD as ORS. PHD certificate went to W0AAI; MWN certificate to W0YVR; MOSSB certificate to

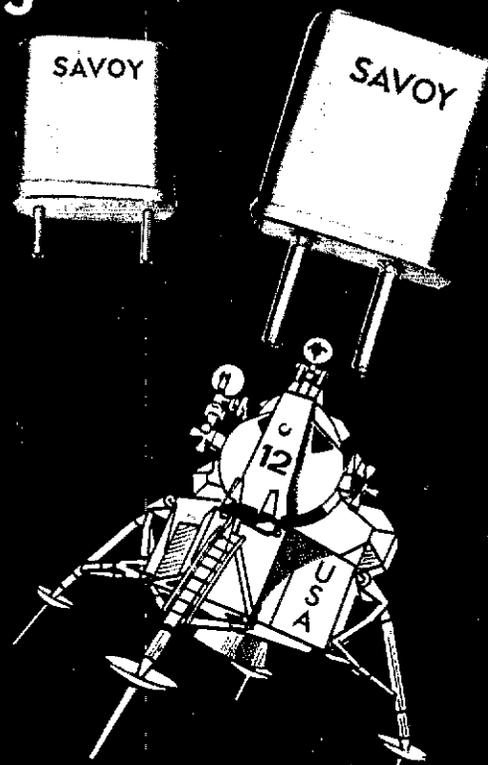
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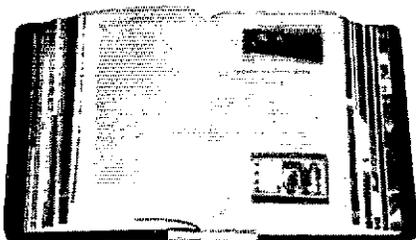


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KØBDI, WØHHG, WAØHM, WØBUL, WØCBV, KØDQV, WØIXU, KØFNH, WØGWF, KØHOW, WØHTL, WØNYT, WAØQA, KØRPH, WØRPH, WØRTO, KØRWL, WAØSKR, WAØTAA, WAØTLI, WØVZT.

Correction: Harris wishing to affiliate with RACES should see KØRPH or WAØIII; KØONU is not associated with RACES. WØUDU was the subject of a large feature story in a Springfield newspaper. The Tri-State Radio Club has obtained the call WØDE, with WØRUL as trustee, WØWAIQ, son of WØGLO, is now in the Navy and is in Hawaii. KØOIG has worked 500 counties. License classes conducted by the PHDARA are well attended, with 57 in Novice class and 20 in General and Advanced. We are glad to see KØJPI back home after spending most of Dec. in the hospital; he is spending most of his time writing answers to responses to OO notices. Congratulations to: WAØUB on 40 years in ahm radio; WØGZLP on making HPL as a Novice; KØQJK and WAØTAA on Advanced Class. Traffic: (Jan.) KØONK 1768, WAØRYR 304, KØAEM 236, WAØHTN 133, WØRV 123, KØRPH 101, WØUD 80, WAØVIN 79, WAØVRI 56, WAØWOA 42, WAØQIA 33, WØRTO 27, WAØFMD 21, WAØYYR 15, WØBVL 10, WØKEI 10, WAØKUH 10, WAØWFN 9, KØJPI 3, WAØZLU 3, WØGBJ 2, WAØYCN 2. (Dec.) WAØUPA 215, WØQZP 125, KØWTZ 10. (Nov. WAØOIZ 15.

NEBRASKA — SGM, V.A. Cashon, KØQAL — SEC: KØODF. Congratulations to WAØUJZ and WAØRET on passing Advanced Class. All Nebraska amateurs are urged to participate in Nebraska QSO Party Apr. 25-26, Neb. C.W. Net showing promise and requests further support. Ak-Sar-Ben ARC elected WAØDGA, pres.; WØYCP, vice-pres. KØWPH reports for Boy Butte Co. 2-Mtr ARCC Net (Jan.) QNI 32, QTC 4. Renewed appointments: WAØGHZ, WØNIK, WAØJUF, WAØLOY as PAMS; WAØELI, KØJFN, WØIRZ, WAØYRL, WØVOP, WAØLLO, KØEZA, WØCXH, WAØEUM, WØIFE as TCs; WAØOCW as OPS. New OPS, WAØJHH. Because of a change of equipment OHS WØBM has temporarily suspended his schedule. Jan. net reports:

Ver	Freq	GMT/Day	QNI	QTC	Mgr
NSN I	3982	0030 Day	1295	87	WAØLOY
NSN II	3982	0130 Dy	1028	67	WAØLOY
Neb 160	1995	0130 Dy	878	18	WAØCBI
NEB	3590	0400 Dy	162	54	WAØHWR
EBNN	3982	1230 1st M	12	0	WAØSOP
MMN	3982	1330 Dy	1000	43	WAØJUE
WNN	3950	1400 M-Sa	632	47	WØNIK
ARLC	3982	1400 Sun	176	12	WØIRZ
CHN	3982	1830 Dy	1380	198	WAØGHZ

Traffic: (Jan.) WØLOD 376, WAØDOU 220, WAØZOR 153, WAØGHZ 96, KØODE 90, KØUWK 85, KØJFN 82, KØITW 62, KØQAL 43, WØAGK 40, WØBEV 39, KØFRU 35, WAØBOK 34, WAØCBI 31, WAØHWR 31, WAØJUE 26, WAØJGV 25, WAØIBB 25, WØVEA 25, WAØITM 22, WØJFN 21, WØNIK 19, WAØSOP 17, WØZLU 17, KØJFI 15, WAØIXE 15, WØIQB 12, KØMUF 12, WAØJAV 11, WAØJUF 11, WAØLOY 11, WAØDX 10, KØHNI 10, WAØIMG 8, WØGEQ 7, WØHTA 7, WAØQOX 7, WØYFR 7, WAØELI 6, WAØKC 6, WØRAM 6, WAØVJ 6, WØATU 5, KØJPP 5, WAØRPT 5, WAØJFN 4, WØHOP 4, WAØRAK 4, WAØLEI 4, WØHQZ 1, WAØIBL 2, WAØLRP 2, WØNYM 2, WØPHJ 2, WAØRE 2, WAØQEI 2, WAØGGB 2, WAØQLE 2, WØRJA 2, WAØRPB 2, KØSEA 2, WØDOV 2, WØEWF 1, WAØPSN 1, WAØREI 1. (Dec.) WAØDOU269 WAØVH8.

## NEBRASKA QSO PARTY

This contest, sponsored by the Lincoln Amateur R.C., will take place from 1600 GMT April 25 to 2200 GMT April 26. It is open to all amateurs and Nebraska stations may work other Nebraska stations (for points only). Stations may be worked and counted for QSO points on each band and each mode. The exchange will be QSO nr., RS(T), county for Nebraska stations and ARRL section for non-Nebraska stations. Logging information: date/time in GMT, exchanges, band, mode and points. Log must include a summary sheet with scoring and name and address in block letters. Suggested frequencies: 1815 16900 3982 7100 7260 14060 14300 21070 21360 28050 28600. Scoring system: Out-of-state stations total Nebraska contacts X 3 points X Nebraska counties. Nebraska stations will multiply ARRL sections worked plus a maximum of ten foreign countries by the total number of contacts made. Awards will be made to the top station in each Nebraska county, the top scorer in each ARRL section and country. Additional certificates will be issued where deemed appropriate. The mailing deadline is May 31. Send your log to Lincoln ARC, c/o Michael Nickolaus, WAØKGD, 3921 Tipperary Trail, Lincoln, Nebraska 68512.

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CONNECTICUT - SCM, John McNassor, W1GVT - SEC; W1HHR, RM; WA1HSN, PAM; K1YGS, VHF PAM; K1SKF, January rept.

Net	Freq	Time/Days	Sex	QNI	QTC
CN	3640	1845 Daily	62	526	556
CPN	3965	1800 M-S	31	482	286
VHF 2	145.98	2200 M-S	22	98	8
VHF 6	50.6	2100 M-S	22	144	5

High QNI: CN - WA1HOL, WA1HSN, W1EJL, CPN - W1DQJ, W1GVT, K1YGS 29; WA1ELB 28; WA1HOL 25; W1MPW, K1SKF 24; W1HHR 23; WA1KMR 22. SEC W1HHR appreciated the work-out during SEI and extends sincere thanks to all who participated. EOs are asked to send him a monthly report - he is on CPN most every night. SET again proved the value of nets - CN used this as a pattern to follow in any emergency. SET also indicated traffic can be "generated" by active amateurs. Keep this in mind to increase your monthly total as well as that of your net. Our hard-working Director, W1QV, would appreciate clubs exerting every effort to help increase ARRL membership. Submit your club and personal views on amateur matters to him now for action at next Board Meeting. Danbury CARRA was active during SEI and busy with Conn. QSO Party results. W1BKI reports Middlesex ARA active in Set. K1YGS provided CPN members with new net roster. ORS applicants should check in CN when possible. K1ZY1 now is stationed in Germany. Congratulations to WA1KMR, WA1HOL, WA1LLB, WA1JZC and WA1JQC for Jan. BPL: WN1MDT and WN1LWT new Novices. Thanks to all who send reports for the new Public Service Honor Roll listing. FLASH: QRM is banned from all net frequencies for April First! Traffic: WA1KMR 601, WA1HOL 584, W1EJL 454, WA1LLB 408, W1EJL 314, WA1JZC 258, WA1HSN 251, WA1JQC 152, WA1HK 114, W1AW 112, W1KUO 91, K1EHR 89, W1CPI 86, W1GVT 84, WA3SUJ 78, WA1GH 74, W1HHR 67, W1WCG 64, WBCWL 64, K1YGS 59, W1JVV 52, K1EJC 49, W1MPW 35, W1YBH 29, WA1EG 26, W1QV 25, W1DQJ 23, W1BDI 22, WA1JGA 21, WA1GWS 9, W1BNB 6, WA1EAS 5, W1CHR 4, W1CUH 4, WA1JMO 4.

EASTERN MASSACHUSETTS - SCM, Frank L. Baker, W1ALP - W1AOG, our SEC, is in Fla. WA1DNB is new SEC for Western Mass. Silent Keys are W1ZST and W1OPT, father of W1RRP, WA1DEL and WA1HE worked into middlewest on 6. W1DKD is editor of Bay State Static newsletter of Mass. NAHC, WA1s BL, IFF, CJK, FME have new NCC 500s. WA1HE has HQ-110A, Waltham RC has a net on 50.4 MHz Wed. nights. W1LES is in Washington. K1MON married WN1MER. W1EHT reports N1EFP had 4 sessions, 78 QNIs, 10 traffic. K1PNB reports EMN had 48 sessions, 291 traffic. South Shore ARC will hold an auction Apr. 16 at the Viking Club. W1ZLX's wife is waiting her Novice call. WA1MOC is a new YL. WN1MOCY is working DX on 15. W1NCK retired and moved to Marshfield. K1YGW won an HQ-100 at Massachusetts ARA. W1BB gave a talk on 160 Dxing at South Shore ARC. WA1DKI had a heart attack. W1DOM was in the hospital for a short visit. New officers of Massachusetts ARA: W1OFK, pres.; K1DLW, vice-pres.; W1FH, secy.; WA1GAJ, treas. W1ALP attended the dinner meeting of Cape-wash ARC. New officers of Sharon ARA: WA1RY, pres.; WA1JVL, vice-pres.; WN1JXL, secy.; WN1LXD, treas., K1s KJ, GJK, exec. board. W1PZ is back on 10. K1AMP has a tower, K1QV and W1CUP are on 2. WB2VIA is at N.E. So. Eastern Mass. ARA holding classes. WA1KDL has a coke can vertical for 40. T9 Club met at W1MVQ's. WA1MHN is the Somerville ARC call. J1XKOD visited W1BGW. WA1RY has his 35 wpm. EM2MN had 22 sessions, 172 QNIs, 158 traffic. K1RAN and WA1KOH are checking in. WA1s IRY and JVL are new ORSs. K1NFW is new Melrose FC. Appointments endorsed: K1ESG, W1AX, W4YAC/1, WA1DGH as ORSs; W1s RPE, BHD, UJF as EOs; W1BHD, WA1DPX as ORSs; W1AX, WA1EYY as OPSs; W1BHD as OVS. W4YAC/1 is back at MIT for his Masters degree. W1PO is quite active. W1JKR reports the Barn Yard Net had 27 sessions, \$29 QNIs, 27 traffic. W1MPH, Milton Academy RC is on the air. WA1LGB is pres.; WN1LHF, secy.; WA1LGB has an NCC-500 and is on ECARS on 40. New officers of Chelmsford ARA: W1MWM, pres.; WA1GSE, vice-pres.; K1MGP, secy. treas. The Robert Cameron Memorial Award was presented to WA1EMN. WA1LWQ has WAS and WAC. W1BHD has K1TY on 75. KH6GPQ and W1UPL visited W1AX. W1LE reports the Greater New Bedford Area took part in S.F.L. Yaverian Bros. HS RC elected WA1KUW, pres.; WA1KVV, vice-pres./treas.; WA1MPH, treas.; WN1MGI, secy. WA1JKJ is in FCITN on 7290 and ECARS on 7255. WA1FNM lost his beam and rotor in a storm. WN1s MGI and MGU are on 40-15 cw. Massachusetts ARA had a lecture on "Transistors" by W1EFL. Quannapowitt RA had a talk by W1CT on "Radio Wave

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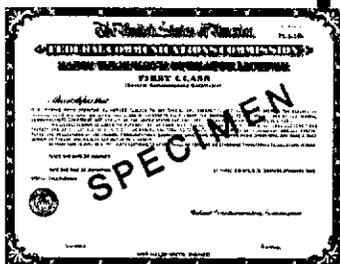
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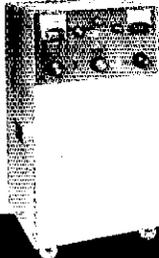
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Propagation." K7JRE/L, Wis BOP, HKJ, WA1S JVL, IRY, JKL and K1ESG made PSHR, Central N.E. Net had 1425 QNLs, 98 traffic in Dec; 1428 QNLs, 86 traffic in Jan. W1NF monitored Oscar 5 on 2.6. The Cross Band Net had 17 sessions, 60 QNLs, 3 traffic, Framingham RC had two films by WA1GL on "Wave Behavior & Propagation." Whitman ARC is on 6. K1WYS is in Denver, Colo. WA1DDC is in the hospital. FMN had 32 sessions, 230 QNLs, 213 traffic. FMNN had 9 sessions, 33 QNLs, 13 traffic. Traffic: (Jan.) W1QIM 656, K1ESG 617, WA1EY 507, W1QYY 370, W1PKX 352, WA1FAD 230, WA1EY 198, WA1YY 143, W1BUE 116, K7JRE/L 93, WA1JVL 83, W1LMO 78, W1ABC 5, WA1LL 61, W1HKJ 60, W1CTR 50, WA1TE 48, W1AEC 46, W1UX 43, K1PRB 40, WA1JK 39, WA1PHD 38, WA1DPX 26, W1DOM 16, W1LE 12, W1ALP 8, W1DDP 8, K1OKE 6, WA1LGH 4, K1CLM 3, WA1FNM 3. (Dec.) W1QYY 188, W1BKD 33, WA1DEC 4, WA1ELD 4, W1AKN 2.

MAINE - SCM, Peter E. Sterling, K1TEV - SEC: K1CLE, PAM: WA1ELG. RM: W1BJG. WA9DJB/J is a new ham in the Limestone area. WA3HDP/J will be operating from Loring Air Force Base soon. WA0KGS/J will be leaving for Gunn soon and will be operating with a KGB call. WA7BHE/J and WA1HD are leaving for Oregon in May. WA1AIM/VO2 is leaving Gous Bay and is going to South Carolina to be an instructor. WA1KLO is building a new linear using a 4-1000A, K1TFX, in Presque Isle has been promoted to Senior Chief Petty Officer and is leaving for reassignment in June. WA1HUU is stationed in Germany and using the call DL4MP; he is building an HW-100. New hams in the State of Maine are W1MGR, WA1MIM, W1MIMY, W1MIMJA and W1MIMKO. Me.-N.H.-Vt. Net meets on 3085 a 2330Z. Sea Gull net meets on 3940 Mon. through Sat. at 1700. The PIN has been reactivated and meets on 3596 Mon. through Sun. We are looking for people who would like to be NCS on the net. It is on at 1900. WA1JTT is now on 2-meter RTTY. Traffic: W1BJG 480, WA1FCM 214, W1GU 115, K1WQJ/L 61, WA1ELD 60, W1NND 53, WA1JFX 48, W1OTQ 12.

NEW HAMPSHIRE - SCM, Donald Morgan, K1QES - SEC: K1RSC. RM: K1BSC. PAM: K1APQ. Welcome to club station WA1MGI, of Franklin Pierce College, and new hams WA1MCG, WA1MHR and WA1MHS. W1ALE had his QVS endorsed. W1LUD, of Littleton, is the new LU for Grafton County, taking the place of K1SHC who, after three years, finds his work load too heavy. One OO report was received from W1EEF. K1AC is proud of his new 25-wpm Code Proficiency award and rightly so. Not bad for 73 years. K1BSC is busily engaged in message handling and Red Cross work. Bow Radio Assn. lists new officer headed by Mill Bruse, pres.; Walt Peters, vice-pres.; Matt Caldwell, treas.; Steve Vanni, secy. These officers are all Novices. The GSPN reports 875 check-ins and 151 traffic. The MNV reports QNS 163, QTC 311, 29 sessions. Traffic-handling remains difficult on plume in the evening. W1RCC is busy setting up the club station for Explorer Post 256 in Nashua. Novice Net now is an operation in Manchester. Traffic: (Jan.) WA1JTM 61, K1BSC 418, WA1EY 235, K1PQV 166, W1MHX 80, K1FM 63, K1QES 41, W1RCC 3. (Dec.) W1MHX 16. (Nov.) W1MHX 50.

RHODE ISLAND - SCM, John E. Johnson, K1AAV - RM: W1BTV. PAM: W1TXL. VHF PAM: K1TPK. K1SPN report: 33 sessions, 645 QNL, 55 traffic. The Fidelity ARC, K1NQC reports that the program for the current year is the upgrading of the licenses of members. To date W1QLD and K1FAV have passed the Extra Class exam, WA1JEP the Advanced Class exam, W1N1WS the General Class exam, Mike Garatano the Novice Class exam, Lou Teatreauff and Bernard Quarterelli the Novice code test. The club's cw net is active again and meets Thurs. at 2030 EST on 3.710 MHz. The call is CQ FARC. WA1ICQ has received an honorary membership in the Society of South Pole for all his work with phone patches for the Navy on the South Pole. WA1JXD is now using a DX-100 and a three-element Yagi, working lots of DX on 20, 15 and 10 meters. WA1IQH has left for Miami, Fla. for the rest of the winter and will be missed on 1RN. He will be taking some of his gear with him hoping to contact his ham friends from Florida. Traffic: W1TXL 21, W1YKQ 150, K1YVC 68, K1QED 37, WA1JST 7, WA1IQH 1.

VERMONT - SCM, E. Reginald Murray, K1MPN -

Net	Freq.	Time/Days	QNI	QTC	N.Mg.
Gr. Mt.	39.12	2230Z M-S	355	16	WA1JU
Vt. Fone	39.55	1400Z Sun.	93	1	WA1EY
MNV	36.85	2330Z M-F	163	311	
Carrner	39.45	1400Z M-F	510	46	W1KX
VTCD	39.90 1/2	1500Z Sun.	43	5	W1
VTPO	39.09	2300Z Sun.	50	12	K1BC
VTSH	39.09	2230Z M-S (1330Z Sun.	715	127	WA1HS

Welcome to new Novice W1MHR (Winouski) and to Gener. WA1MHP (St. Albans). Hope you enjoyed the Vt. QSO Party. Logs should be in by Mar. 31. BARC and CVARC are planning

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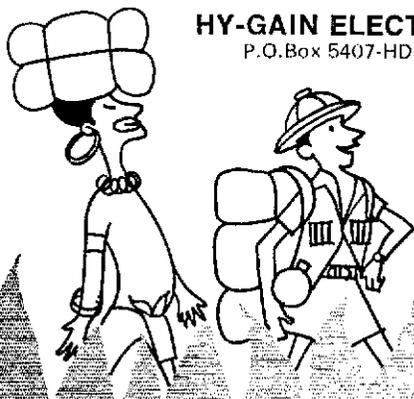
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joint supper meeting, Apr. 18 in Montpelier, Apr. 11 is "Close Up Day" in VT, and we need communications to State H Monitor 3990 1/2 kHz. Traffic: KL7QB 276, W1FR 11, WA1GKS 72, K1MPN 68, W1MRW 9, K1YGI 6, W1FS 3.

**WESTERN MASSACHUSETTS** SCM, Percy C. Noble, WBVR - SEC; WA1DNB, CW RM; W1DWV, PAM: - With the promotion once again of WA1DNB we now have an SEC, with W1QFB taking over WA1DNB's former position as Hampshire County EC. WA1DVE is the new Berkshire County EC. WA1BQX is a new OD. Mt. Hermon School has given W1ZEH whole family a European Travel grant this coming summer. WA1JNF has a new SB-220. W1HRC is putting up a tower at tri-band come spring. W1FGI has a new NCK-500. WB2DVW now WA1MCM in Longmeadow. CW RM W1DWV reports the WMN had 185 QNLs, handled 154 messages, with 18 different stations checking in. Top 7 in order of attendance were W1BV, W1DWV, K11IV, W1ZPB, W1EGJ, W1PUO and K1WZY. WA1JCI reports that his 3915-cc. sbb net is going quite well (\$3. daily). Mr. Jim Pusk, editor of Ham Radio, was Jan. ques speaker at the HCRA. K1PKZ is the new editor of HCRA's Zen Beat. Your SCM believes that every net member should be member of the Amateur Radio Emergency Corps. Contact either SEC WA1DNB, Hampden County EC WA1IC or Hampshire County EC W1QFB. From the Valley Club Oscillator we learn that W1LGD has passed her General. WA1HMF now has 75A4. WA1CXD and W1NPL are active on 2. K1AGL is doing his bedroom in Japanese motif, first item of decor a Yaesu FT1X560. From the Montachusett Club the following: W1G1U teaching code classes. Correction to a misunderstanding: CB was proposed in Leominster as a supplement in civil defense 6-meter ham. The Citizen Band effort has now been terminate Traffic (Jan.) W1ZPB 240, W1BVK 110, K11IV 92, W1DV 56, W1HRC 51, W1FGI 42, W1KK 37, W1PUO 24, K1WZY 2, WA1LZS 18, WA1JNF 10, W1IC 9, WA1JCT 9, W1HRC WA1ABW 1 (Nov.) W1IC 10.

### NORTHWESTERN DIVISION

**ALASKA** - SCM, Albert E. Weber, KL7AFQ. - KL7BJW back on the air but this time with a pole instead of a tower. The Rabbit Creek wind finally made a believer out of him. KL7EK is trying his damndest to get out from the side of "First Hill" down Juneau way, but having his troubles. KL7IR is the most consistent Alaskan on the 160 band, and from his location of salt water does a much better job of working stateside than we do up here in the interior. Since KL7EVO started the code practice sessions on 3735, the frequency has become literally jammed with stations, and not just Novices either. New two-letter call in the Fairbanks area is KL7AM. KL7FC is back down Juneau way with the legislature, and informs us that the ham antennas have been installed on the state ferries, for the use of any ham with mobile gear and a yen for a bit of operation at sea. Traffic: KL7CAH 132.

**IDAHO** - SCM, Donald A. Crisp, W7ZNN. - The FARM Net convenes each day at 0200 GMT on 3935 kHz. The Idaho RACES Net meets each week day at 1515 GMT on 3991 kHz. The annual Northwest Weather Net Banquet was held at Coeur d'Alene. The Boise EC had a simulated flood during the SF. The FARM Net and the Idaho RACES Net handled record amounts of traffic during the SF. WA7FIC is recovering from pneumonia. WA7FEZ was re-elected president of the Lewiston-Clarkston Club. Other officers are: WA7ETO, vice-pres; WN7JHZ, secy treas.; W7AOG, K7THX, WA7FWV, W7VIC, WN7LRP, directors. WA7ETO won the Lewiston club's hidden transmitter hunt. The transmitter was a miniature transistorized rig. FARM Net report: 22 sessions, 776 check-ins, 113 traffic handled. Traffic: K7KBB 403, W7GH1 177, WA7BDD 157, W7ZNN 25, K7CST 12, W7FIS 6.

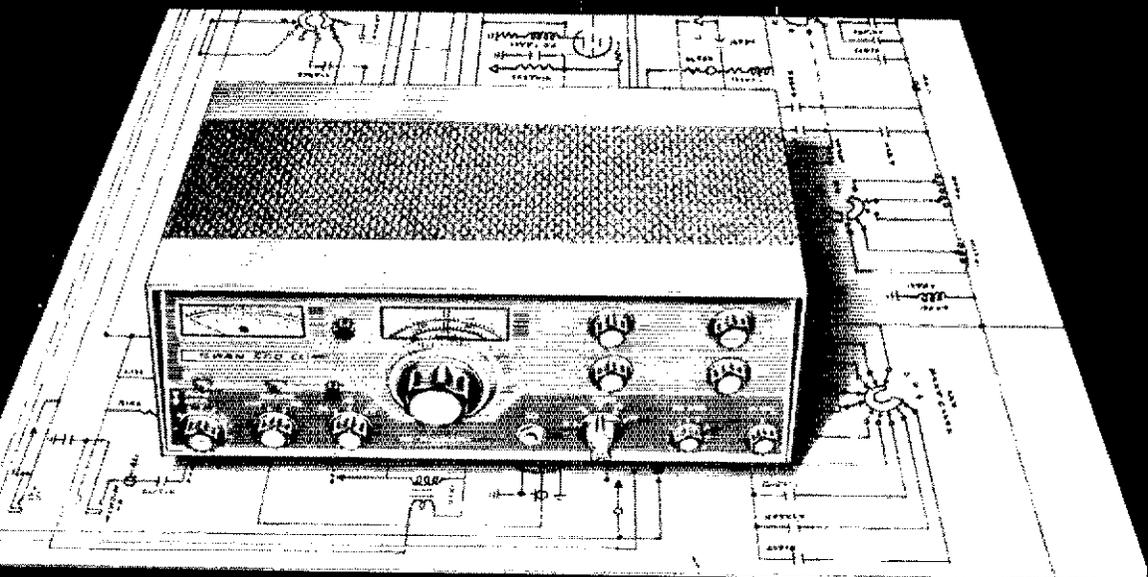
**MONTANA** - SCM, Joseph A. D'Arrey, W7TYN. - SEC: W7RZY, PAM: W7ROC. Montana traffic Net - 3910 kHz 0100. Montana PON 3950 kHz 0245 daily. Appointments: K7CVA, EC. W7JPD, W7DVK, W7HO, W7GVV, W7TYN, K7OCK and W7TCK were on for the RACES Montdex-70 exercise. 1F Billings 2-meter fm repeater will be 146.34 input, 146.9 output. There was a lot of activity in the section during the SF. Over 200 pieces of traffic were handled on the state net. W7FK was the RN7 liaison station for the exercise. WA7IZR and W7LKB have been submitting PSHR reports. We still need more ECs throughout the state. Traffic: WA7IZR 46, W7TYN 4, K7FGJ 15, W7OIO 6.

**OREGON** - SCM, Dale I. Justice, K7WWR, SEC: W7H1, RM: K7GGQ, PAM: K7RQZ. Section nets:

Net	Modes	Freq.	QNI	QTC	Mg.
BSN	0130-2000Z	3908	1476	198	K7YQ, W7ATHK
OSN	0300Z 1u-Sa	3585	139	27	K7GG
ARCO	0300Z	3918	608	32	K7YQ

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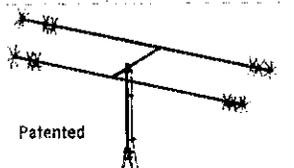
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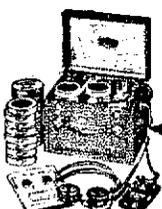
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New appointments: K7GGQ as Route Manager and EC for Clackamas County. K7QEG as GRS and WA7JRI as OBS. I SEI was a success with more participation than ever. V reports of emergencies were received this month. One involved the ice storm in Hood River, the other a pair of unaccounted-skiers. The Northwest Slow Speed Net (NSN) has its manager and two directors in Oregon and will be listed in this report. Remember that all nets except the 2 meter nets will stay on same local times and shift to one hour earlier GMT during summer. WA7JTN handled 890 phone patches to SE 3 during January. Traffic: K7RQZ 539, WA7JFS 395, WA7HD 272, WA7KIU 135, WA7ICX 124, W7ZB 122, K7NTS 13, K7GGQ 118, WA7KDI 68, K7OUE 64, K7WWR 59, K7YU 35, W7JFM 21, W7BXX 17, WA7KRH 17, W7BNS, WA7JAW 15, W7MLJ 11, W7JTX 8, WA7JMD 1, WA7JRC 1.

WASHINGTON — SUM. Harry W. Lewis, W7JWL — The Clallam County Amateur Radio Club of Vancouver, Wash., held its annual hamfest and banquet during January with over 125 in attendance at dinner. The Northwest Single Sideband Net held annual get-together at the Holiday Inn near Tacoma. The Skagit County Amateur Radio Club sponsored the Arlington Hamfest in April. Coming up, the Bremerton Hamfest during Armed Forces Day and the State Hamfest the 2nd weekend in July. Co-sponsors of the convention will be the Radio Club of Tacoma, WARTS Net, the Noontime Net, and others. W7JEU is transmitting official bulletins on 3698 at 0230Z. WA7KOB made W this spring, after 13 years of trying. New officers of the Clallam County Amateur Radio Club for 1970 are WA7LDM, pres. WA7AB, vice pres.; WA7KMX, secy. This club in the Port Angeles area now has an active membership of over 50. The ARCC Puget Sound Emergency Net meets at 0400Z on 50.85 MHz. W7C has been heard on 220 MHz F.M.E. by WB6NMT/6. W7C now has 85 watts out on 220 MHz with a 6252 in the final. It is now constructing a final with 9CX300. Skeds are being attempted now with WB6NMI for 210-MHz contact. Trf: K7RA 1960, W7DZX 558, WA7HRK 521, W7KZ 514, W 460, WA7KOB 366, W7ANT 287, W7JWJ 205, W7BO 1, W7GYC 185, W7UWI 171, WA7LOL 141, WA7GYT 1, W7APS 91, K7KPC 68, K7LRD 53, W7JEF 52, W7USO WA7ACD 46, K7WTG 45, W7RIN 43, W7RTR 38, WA7JPC 1, W7BRO 28, W7JEU 25, WA7JEP 19, W7RKH 18, WA7BBI WA7DXI 10, WA7HGB 10, WA7AB 7, W7JHZ 6, WA7BDI WA7KRM/7 4, W7JOF 4, K7OKC 3.

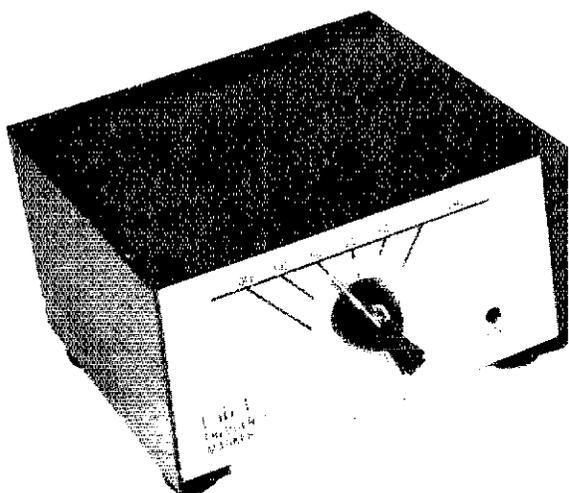
### PACIFIC DIVISION

FAST BAY — SUM. Paul J. Barker, WB6DHH — W reports that he was active in the recent CU party and reported total of 9520. WA6DII reports that this year's SFT helped make the BPL. WB6PW is still pounding away at the trans business. We have a new member in the section, WA9JUD Dick lives up in Napa and is quite active on the North California Net. K6PJ had such a good time during the CU party and got so excited that his transmitter blew. WB6NMI/6 has been quite active these last few months doing some propagation tests. K6DML reports that he is still plugging away toward his Extra Class. It seems there was not much activity in this section during the SFT this year. Wonder if people as aware of the need for this as they were a few years ago. One of the things that has helped us to maintain our status as amateur radio operators is the fact that we are supposed to be involved and prove that we can and do support this country in time of communications need. Another point that should be brought up is that there is a need in this section for such officers as SEC, PAM and others that could help me carry the burden. I would appreciate it if anyone interested in the above-mentioned positions would get in touch with me. I am sure that we can get you started. Traffic: WA6DU 552, WA6PW 301, WA9JUD 100, WB6DHH 13, K6DML 5, K6PJ 2, WB6NMI/1.

HAWAII — SUM. Lee R. Wical, KH6BZF, SEC: KH6G RM: KH6AD. PAM: Vacant. QSL Mgr.: KH6DQ. FCS: K6GQ. GLEU: BAS/GKY/KR6, K6GTF, K66J and W7UZH/G. RACES nets coordinate with KH6AIN, radio officer.

Net	Freq./MHz	GMT	Days
Friendly Net	7.290	2030Z	M-F
Boy Scout Net	21.360	1800Z	Sa
Pacific Interisland	14.330	0830Z	6-W
S. E. Asia Net	14.320	1200Z	All
Pacific Typhoon Net	14.265	During typhoon alerts	All
Confusion Net	21.400	0130Z	All
(Phone patches)			
Gecko Net	14.315	1000Z	Thurs.
(K66 islands)			

I wish to take this opportunity to thank those of you



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helped or called to offer aid and assistance after the violent storm packing hurricane winds ripped my roof off, pulling it tower down and smashing all five antennas. Remember: the 1970 combined Pacific-Southwestern Divisions convention will be held in Fresno at the Hacienda Motel (Fresno Travel Host) a 99 Freeway at Clinton, on May 15-17. More information can be obtained by writing Chairman Berge Bulbulian, WB6OSHI, PO Box 783, Fresno CA 93712. Just off the sick list: KH6EZC and KH6HP. KH6CKF recently returned from Indonesia and gave an interesting talk to the Honolulu ARC. He's back in YR-land. Seen in the Ala Wai Canal was KH6AIN. Seems an auto accident. Henry with Auto there. He's safe and sound but some gear got wet. Some guys will do anything to sign/MM? SET '70 won't be better this year than in the past. Kudos to KH6GQW and his ECs. Traffic: KH6HCM 68, KH6GQW 39, KH6BAS 27, KH6BZF 27, KH6GRG 24, KH6LP 24, KH6HNO/KH6S 27, W7UZH/KG6 I.

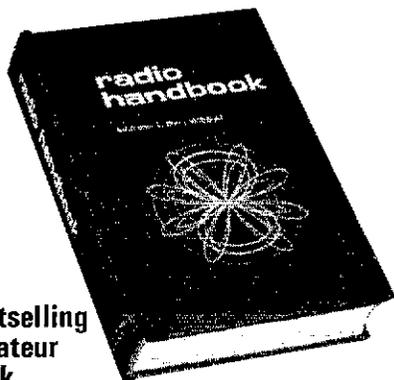
**NEVADA** - SCM, Leonard M. Norman, W7PRV. NFO WA7BEU has a new Drake linear to boost his RTTY. Considerable more fm units are on the air now that two fm repeaters are operating. W7AKF/W7DDB fm repeater input 147.18 and 53.73 output 147.84 and 52.523, located on Angle Peak, and KT7D fm repeater input is 146.34, output 146.94, located on Los Potosi. K7PPE, K7USR, W7PBV, WA7GIV, W7FIN, W7RBV, W7VYC and W7YAL assisted in providing point-to-point and ground-to-air communications for one of the largest helicopter conventions in Las Vegas. K7USR is qualified to explain how to fly a helicopter. Joint Pacific and Southwestern Division ARRL Convention will be held in Fresno in May. Sierra hamlet at Bower's Mansion on August 22. K7ZAU is chairman, assisted by his XYL, K7VYN.

**SACRAMENTO VALLEY** - SCM, John F. Minke II, K6KYA. The office of SEC in Sacramento Valley has been vacant for a couple of years. Now it has been filled by Ted Ras, W6SMJ, Sacramento County EC. Let's give him a hand. How about some of you amateurs up north taking on a job as EC for your county and organizing an emergency net? Another high light for Sacramento Valley during January was the awarding of cover plaques to W6FEE and W6GDO for their winning article on fm repeaters in October QST. Our director, W6ZRJ, flew to make the presentation. Also attending, including a dinner at Posey's in Sacramento, were W6PHQ, K6HHH, W6ERE and XYL, WA6ESA and W6KYA and XYL. Don't forget to plan for the Pacific-Southwestern Division Convention in Fresno on May 15-17. Details from the Fresno ARC, Box 783, Fresno 93711. New officers of the Oroville ARS are WN6GKY, pres; WB6YKQ, vice-pres.; WB6WQC, secy (YL type); W6DHL, tres; WB6VLI is trustee of the club station W6AB, which has belonged to Anus Fuller, an OBS for many years. W6VUZ, Lus Molinos was hit with the January flood, which caused damage to his home in addition to his quad coming down. How about you clubs - how about inviting your SCM to one of your meetings? I'll even bring Doc W6ZRJ along. Traffic: (Jan) K6YBV 92, W8VDA/6 64, K6YZU 36, W6KYA 32, W6VUZ 27 (Dec.) W8VDA/6 231, K6YBV 101, WB6ZJV 6. (Nov.) WB6ZJV 3.

**SAN FRANCISCO** - SCM, Hugh Cassidy, WA6AUD. SEI W6WLV. New OP5s in the section are W6OLR and W6JJJ, but members of the Mission Trail Net. "Ham's Wide World" was shown at the January Marin Club meeting and received the usual enthusiastic approval for this ARRL public relations film. WA6BYZ made BPL again in January, keeping Joe's consecutive BPL string unbroken. He made BPL every month in 1967. W6KWE, a transplant from 3-land was active in the CD part, joining W6RQ, WA6JUV, W6BHP and WA6DII. WB6JQP handled considerable traffic in the January SET and W6KVQ acted as Pacific Division control station for the combined operation. W6SG was on the air from the Marin Club in the SET, handling one actual emergency with power lines down, then lost antenna in the storm raging. WA6AMH, in the Eureka area, moved up to the Advanced Class license. WB6JQP is again at SET. The Sonoma County SEI preparations found some actual emergency conditions and two mobile units were sent to the lower Russian River for handling emergency communications with flood conditions existing. Sonoma County SEI used boats 144 and 420 NHZ for traffic work. W6GVI, home from the Navy, is using Link gear for 2 meter fm. K6OJO, W6PL, WB6LUJ and WA6AD were at the Fresno DX meeting held in Jan. The Tamalpais Radio Club held their annual dinner and installation of officers in Jan. WA6IVM is looking for 75-me DX for the 5BDXCC effort. Seen at the SAROC were K6MH, K6UFT and K6OJO. WB6IMO is holding Novice classes in Marin. Traffic: WA6BYZ 465, W6KVQ 96, W6WLV 95, W6BWW 7, WB6JQP 52, W6FAX 14, W6PZF 13, WA6AUD 11, WB6GVI (Dec.) WB6JQP 23, W6PZE 1.

**SAN JOAQUIN VALLEY** - SCM, Ralph Saroyan, W6JLJ. The Delta Amateur Radio Club held its installation dinner meeting Jan. 17 with 68 in attendance. The club meets the

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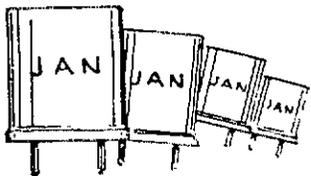
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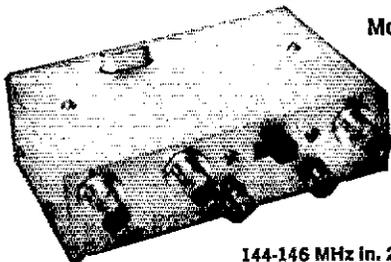


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Fri. of each month at 7:30 PM at the Dan Webster Jr. High School. The Northern-Southern California DX convention was held in Fresno Jan. 31 with 223 in attendance, a new record. Among those attending were W6HYG, WA6WXP, W6JPU, WA6JRL, K6RPH, K6PKO, K6ZNI and W6TUI. W6kZK is looking for some 420-MHz contacts. W6RRN is on 2 meters. W6HJP is on 75-20. W6COB is active with the Stockton 2 meter repeater. W6OHCH received the "Super-Novice" award. IAJDF is visiting in Stockton. K6AYA is on 20 cw. W6JPU received 23 messages from SEI exercises. W667BX has a new final amplifier. WN6EYH has an HW-16. W6B1-U attended the SAROC. W6KWT chased DX during the DX contest. If you are planning to attend the Pacific Division Convention, to be held here in Fresno, it is time to send in your reservations. Address all communications to FARC, Box 783, Fresno, Calif. Traffic: W66HVA 344, K6KOL 140, WA6SCF 113, W66ZBX 92, WA6JDB 52, W6B9XB 12.

SANTA CLARA VALLEY - SCM, Albert F. Gaetano, W6V7T, SEC: W6VZE, RM: WA6LFA. It is a real pleasure to see NCN activity picking up again, as is evident by a QNI of 6-4 for the month of Jan. W6BFI is now active on RTTY and hopes to get some traffic there for NCN. A large number here were active in the SEI. In general all did a great job and the SEI went well. W6BVB has been very active on NCN and is liaison to RN6 Wed. night. W6YX has been very busy with five antennas tracking Oscar-5. W6OII plans to handle the communications for the Powder Puff Derby that will start from Monterey in July. Looks like W6ZLO is going to get back on the air after a long absence. W6D1WX is the new pres. of SCARRA. W6WGI has moved to Aptos and is on the air with a vertical from his mobile home. W66ZSE has built a new keyer that seems to work well but can't get up enough nerve to try it on the air. The West Valley Radio Club has started its spring course for Novices and General applicants in Feb. This sure is a good way to get new and higher-grade hams. W6YHM is rebuilding his 30-K final amplifier around a pair of 4-250As. Don't forget to start your plans for Field Day as early as possible. The better prepared you are the better you will do as I'm sure past experience has shown. Traffic: WA6OXE 1260, W6RSY 1095, W6YBV 346, WA6LFA 237, W6BVB 146, W6NW 138, W6VZT 102, W6D1E 72, WA6GLE 50, W6ADC 48, W6BPI 22, W6OII 21, K6PJW 8, W6ZLO 1.

## ROANOKE DIVISION

NORTH CAROLINA - SCM, Calvin M. Dempsey, WA4UQC Asst. SCM: James O. Pullman, W4VTR, SEC: W4LVN, RM: W4IRL, PAM: W4AJI, VHF PAM: W4HJZ. The N.C. Fone Net has changed its name to Carolinas Fone Net. It still meets at 3865 kHz at 0130Z daily. K4CIA was active in the Jan. CD party. W4ZCC, EC for Bladen County, reports two emergency generators. W0AVS/4 will be operating from Wright-Patterson AFB. The annual Roanoke Division LO Conference will be held at the Sheraton Motor Inn in Greensboro, N.C. during the week end of Apr. 18. Special interest groups and ECs and their assistants are urged to be present. These meetings are very helpful and I am sure you will get a lot out of them. SEI was real good this year. We now have the Carolinas C.W. Net, an early and late net which meets on 3573 at 2345Z and 0300Z. Net schedules (all daily):

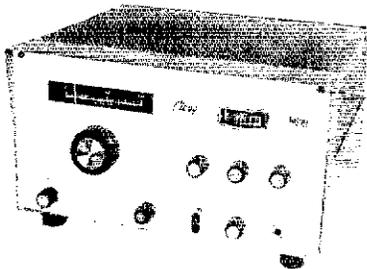
Net	Freq	Time	QTC	Manager
N.C.SSB	3938	0030Z	37	WA4KWC
NCN(LI)(Dec.)	3573	0300Z	66	WB4GHK
CN(E)	3573	2345Z	99	W4IRL
CN(L)	3573	0300Z	63	WB4GHK
THEN	3923	0030Z	70	WA4VNV

Traffic: WB4ICE 304, W4EVN 286, WB4MLI 80, WA4VNV 67, K4MC 60, WA4UQC 48, W4WXZ/4 40, WA4KWC 33, WA4GMC 32, W0AVS/4 31, WB4HGT 30, K4ITN 30, WB4GHK 24, K4VBG 22, W4AJI 21, WB4ILO 13, WB4HGS 12, W4ACY 12, K4CAX 5, W4LEI 2.

SOUTH CAROLINA - SCM, Charles N. Wright, W4PEI - SEC: W4ECJ, PAM: W4VED, RM: W46OWY. CN: 3573 kHz Dy 2345Z and 0300Z

SCPN: 3930 kHz Dy 12 Noon; Sun 0830 and 1530 EST  
SCSSBN: 3918 kHz Dy 0600Z January Tfc: 139  
In Spartanburg, W4NTO reports K4HDH is taking his home brew plant; LNO has his antenna on poles but still is inactive; NJS is rebuilding workbench and Dan Oonovan homebrewing his first rig while awaiting his Novice ticket. WB4CBJ reports Carolina Repeater Society planning to move to 2 meter repeaters to newly-acquired sites. Repeater now licensed as WB4PIN. The annual Roanoke Division League Officials Conference will be held in Greensboro, N.C. Apr. 18/19. Anyone interested in League activities is invited to attend. Details are

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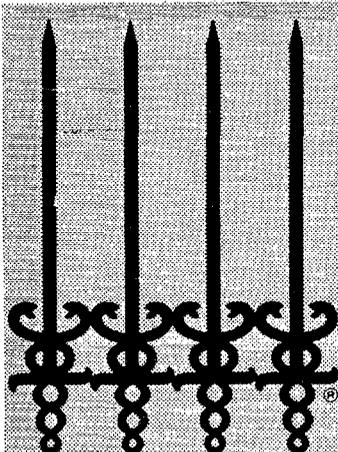
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available from W4PED, WA4EFP or WA4ECJ. If you can't attend and have ideas or suggestions which you would like submitted to the group, let us know. Closing date for receipt of SCM nominating petitions is Apr.10; details page 87 Feb.QST. Traffic: W4PED 82, W4NTO 39, WB4CJ 9.

**VIRGINIA** - SCM, Robert J. Slagle, K4GR - Asst.SCM: Albert E. Martin Jr., W4THV. SEC: WA4PBG. Asst. SEC: WB4CVY. RMs: WA4EUL, K4MLC, W4SHJ. PAM: W4OKN. I regret the necessity of again starting the monthly column by announcing the passing on Jan.16 of W4GO. WB4DRB is on the air at college in Williamsburg. Mark your calendars for the League Officers Roanoke Division Conference at Greensboro the weekend of Apr.18. WA4PBG is chairing. Virginia SET participation best ever under our SEC WA4PBG, and Asst.SEC. WB4CVY. WA4YXK active as OBS on vhf and reports a 6-meter opening into New Orleans on Jan.18. OO W4HU reported twenty out-of-band 2nd harmonics in Jan. When did you last check yours? K4CGY, net mgr of VFN, reports an average of 27 checkins with some going over 35! WA4FGC has a new SB-101 on air and is operating two stations. VFN meeting planned for Apr.5 in Richmond. WB4GTS building an SB-220. W4KFC and WB4DRB both report copying the satellite. W4YZC is up from the flu; he has the W. T. Woodson High School (Fairfax) Radio Club going. K4BVE passed Advanced. W4VZR reports regular RTTY OBSing with K4OHW, K4KXC, K4GCM, W4CSR and W4CTT as regular audience. K4TJS firing up from new QTH. Pleased to report W4KAO back after hospital sojourn. W4JUJ received Trillium Award. WB4GDO also passed Advanced. W8JM, SCM W.Va., has been active lately in VSBN. W4YZT made BPL with over 100 origis plus deliveries! Traffic: (Jan.) W4UQ 464, WB4CVY 357, K4KNP 298, W7WST/4 260, K4POL 258, W4NLC 240, W4YZT 231, WA4PBG 213, WB4FDT 176, WB4GTS 121, W4SHJ 109, WA4JFF 103, WB4DRB 99, WA4EUL 93, W4TE 89, WB4ODN 87, K4GR 85, W4OKN 59, W4TJF/3 55, W4BUW 52, W4THV 33, W4KFC 23, W4OBE 23, WA4WOG 23, W4YZC 20, W4GEQ 19, K4JM 16, WA4NJG 14, K4LMB 13, WB4IRA 9, W4MK 8, K4VCY 8, K4SDS 6, WA4YRH 5, WB4HJ 4, W4KX 4, W4VZR 2, W4KAO 1, K4TJS 1. (Dec.) W4OKN 35, K4FSS 33, WA4YRH 5, WB4GDO 2.

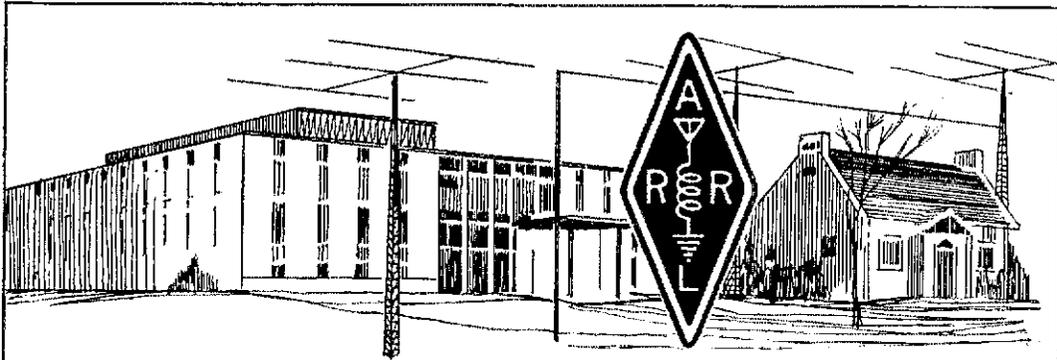
**WEST VIRGINIA** - SCM, Donald B. Morris, W8JM - SEC: W8EV. RM: WB8BBG. PAMS: W8IYD, K8CHW. Phone Net Mgr. WB8AQE. Buckhannon ARC officers: W8WVM, pres.; K8YOD, secy-treas. I regret to report the passing of WA8JCC of Martinsburg. WA8ZZI, WA8RQB and WB8BBG sent PSHR reports. WVN Phone net reports 33 sessions, 474 stations and 105 messages. W8HZA worked South Dakota, No.33, on 160. W8CKX, W8HZA, W8JWX, W8NDY, W8SHT, WA8ZZI and WB8BBG received WVN Net certificates. WVN cw net reports 45 sessions, 286 stations and 122 messages. During SET WVN nets passed 111 messages. WN8FQB, Bridgeport, is a new Novice. WN8CPK is operating portable from Florida. W8NDY holds a RACES Training net Sun. at 8 AM on 3996. K8BCF and K8LSN visiting state amateurs promoting the State ARRL Convention at Jackson Mills July 4 and 5. K8VAI and W8JM trying to close gap between Fairmont, Parkersburg and Huntington on 145 fm. Mountain State Emergency Net reports 8 sessions, 42 stations handling 42 messages. Wheeling Radio Club will hold annual YL-OM Dinner May 2 at Oglebay Park. WA8PFB built an ssb transmitter. Traffic: WB8BBG 276, W8HZA 116, W8NDY 67, WA8ZZI 57, W8CKX 48, W8EV 42, WA8RQB 38, WA8LFW 25, W8JM 12, WA8WCK 11, WA8POS 5, K8QEW 4, WB8AQE 3, K8BCF 3, W8TGF 2, K8TPF 2, W8WEJ 1, WA8UNP 1, W8FZP 1, W8FZP 1, K8CHW 1, WB8AKR 1, K8CFT 1, W8FRO 1, WA8WIX 1, WA8ZNH 1.

### ROCKY MOUNTAIN DIVISION

**COLORADO** - SCM, Charles M. Cotterell, W0SIN. Asst. SCM: Neal Morris, K0TIV. SEC: WA0HLQ. RM: W0LRN. PAMS: W0CXW and K0IGA. WA0LIK has moved to California. Many stations throughout Colorado participated in SET with

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*Chances are, one or more of the League's varied programs is appealing to you — or you wouldn't be reading QST this month. Statistically, 90% of you are already members and so don't personally need the envelope attached to this page. But why not contribute a bit of yourself to our joint effort by being a League salesman? You like QST, or the Technical Information Service, or the code practice from WIAW, or League liaison with Government offices in Washington, or representation at the world radio conferences in Geneva, or League support of public service work — or all of them! A friend of yours will, too — hand him the envelope so he may join the League and be a part of all this.*

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The Denver, Englewood-Littleton, Loveland and Colorado Springs areas put the local organizations thru their paces in the SET. OO W0GIL has been active. OVS W0MOX reports gud sigs from Oscar 5. KIWAYS sent very extensive SET report dx vhf. WA0RLQ has been keeping other Oscar watchers informed. The Denver Radio Club has a new Colorado Ham Directory available. Denver ARRL LCs met after SET and made plans to improve; also a 160 meter section net was discussed. Will run tests. Anyone interested contact SCM or RM. DRC will have a new repeater set up on 444.35 and 449.35 on Bear Mtn. W0LRW took in the 160 meter contest; all states west of Mississippi River except Wyo and Ark. W0OWP reports little chance of changing ham license plate fees this session. Election this fall. K0IGA is the new PAM for Hi-Noon net. Net reports: CUN total QNI, 235 (SET 70), QTC 250 (1091 1071 minutes for 48 sessions (396 20 sessions) 1WN liaison. K0JSP, K0FDH, K0ECR, K0MNO, W0MNL, W0LG and W0PRL. CFPN, 1/25/70 QNI 37, QTC 45. (SET) Hi-Noon, QNI 944, QTC 180, time 1132, 31 sessions. Columbine, QNI 1142, QTC 140 plus phone calls, patches of 201, time 1888. Traffic: K0ZSP 552, W0VYX 239, W0MNL 178 (NCS, CCM & 1WN for SE1), K0DCW 161, W0LG 89, K0MNO 88, K0EFH 85, W0UAT 66, W0LRN 37, K0TIV 29, K0IGA 20, W0KFFH 19, W0SIN 19, K0FLQ 18, W0PGM 15, W0LKH 9, W0LCH 6, W0LRW 5, W0CHJ 5, W0OWP 4, KIWAYS/0 1

NEW MEXICO - SCM, James R. Prine, W5NUI. A hearty welcome to the New Year appointment of W5UJY as Route Manager and the addition of W5ONY to the QO corps. A correction is in order: The Jan. QST listing for New Mexico Net should be 3750 kHz, 9230 GMT, Tu-Sat. Congratulations and a job well done to those stations that participated in the Simulated Emergency Test. W5LQH has added a new antenna tower to improve station. Welcome to K5FTH, Cannon AFB, whose participation in the traffic nets provides a valuable link with the local amateurs. Do any of the other military club stations participate in on-the-air amateur affairs of their area? K5MAT has 40 states confirmed on 160 meters. Traffic: K5MAT 309, W5RE 139, W5UJY 90, W51WA 35, W5DMG 32, K5ISJ 26, W5NUI 23, W5JJK 16, W5OHH 10, W5MIY 9, W5JNC 5.

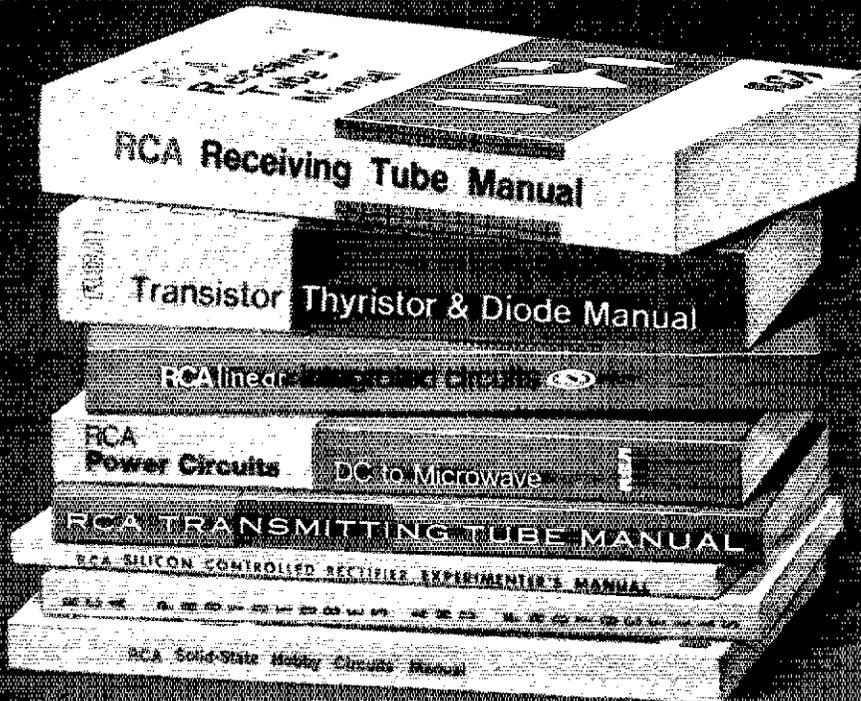
UTAH - SCM, Thomas H. Miller, W7QWH. SEC: W7WKF. RM: W7OXC. BUN report: QNI 856, QTC 187, sessions 4.3, time 826 minutes. The SET was considered successful. This year the exercise was conducted from the Utah State Civil Defense Communications Center under direction of W7WKF. Utah SEC Representatives from state civil defense, board of health, medical association and ambulance association supplied the messages and problems to support the exercise. It is estimated that 70 amateurs participated on 75, 40 and 2 meters. The SEC and State CD Communications Officer W7NET were quite pleased with the overall results. BUN held forth each hour during the exercise, providing liaison to TWN and PAN for the long-haul traffic. W7MEL is now active on 160 meters. K7ZIS will be QRT until May. K7BPH finally made the grade with the S/line he's been working for, for so long. Traffic: WTEM 267, W7OXC 140, K7SOI 61, W7QWH 31, K7CLO 12, W7NHA 2.

WYOMING - SCM, Wayne M. Moore, W7COL. SEC: K7NOX. RM: K7KSA. PAMS: W7TZK, K7SIL. OBS: K7SIL, K7NOX, W7SDA, K7TAQ, W7FHA. Nets: Pony Express, Sun. at 0800 on 3920; YO, daily at 1830 on 3610; Jackalope, Mon. thru Sat. at 1215 on 7260; WY Net, Mon. thru Sat. at 0630 on 3920; PG Net, 1900 Mon. thru Fri. on 3950. We all regret the passing of Hal Mapes, W7DXV, on Jan. 21. A long-time radio operator, he served in the merchant marine in WW1, WW2 and the Korean War. Wyoming had a very successful SET. K7ZFW was appointed state communications officer for civil defense the first of the year and is doing a good job in organizing the RAUCS. The Rocky Mountain Division Convention will be held in Estes Park June 12-13-14. Traffic: K7NOX 425, W7CLF 305, W7MNL 220, K7ITH 176, K7KSA 162, W7SDA 114, W7TZK 53, W7HLA 38, W7YVW 32, W7VJH 28, K7YVA 27, W7GYO 26, K7WRS 14, K7TWE 8, K7QJW 7, W7AUV 4, K7JED 3, K7BKH 2.

### SOUTHEASTERN DIVISION

ALABAMA - SCM, Donald W. Bunner, W4WLG. SEC: K4KJD. PAM: W4HDO. RM: W4HPU. This year's SET, which was the contest designed to train us for emergency preparedness, was a whopping success - I think. At least it boog all the nets down with handling traffic, the extent to which it was successful will depend solely upon how much we have learned from all the traffic, long hours, QRM, QRN and even some confusion. If you have any ideas how we can streamline our emergency plans within the section (or even between sections) please let your RM, SEC or PAM hear from you. The 105th orbit of Oscar 5 was received by WB4LNM. HH9AOE/4 is a new YL active from Jacksonville State University. It was quite a thrill working the

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\*Optional Price (Domestic)

CD Party this past time. Alabama seems to be "lame." It's just like being a DX station. If you have an ARRL appointment get in there and work the next one. Recent NADXA election results: K4MG, pres.; K4AFB, secy. K4HFJ has a new SB-220. Traffic: (Jan.) W4FVY 231, WB4LAL 217, W4HFU 200, WB4EKJ 193, WB4KDI 193, WB4LAO 189, WA4VEK 144, K4KJD 142, WB4JMH 126, WB4HJN 112, WA4JSM 106, WA4GGD 88, WB4IEY 71, WB4KSI 68, K4VHW 57, WB4NCT 56, K4AOZ 52, WA4ROP 51, WB4LCU 45, WB4LNM 31, WA4EYO 30, WA4NJG 30, WN4OJG 23, W4WLG 21, WB4BLX 13, W4DGH 13, WA4TMY 11, K4UMD 7, WB4KSM 3, K4WUG 2.

**EASTERN FLORIDA** - SCM, John F. Porter, W4KJG - Asst. SCM: Albert Hamel, K4SJH, SEC: W4LYT, Asst. SEC: W4SMK. RMs: W4ILE, K4EHY (cw), W4RWM (RTTY). PAM 75: W4OGX, PAM 40: W4SDK. PAM VHF: WA4BMC. The Tropical Hamfest was a big success this year. Bob and Ellen White from Hq. were the welcomed guests. W4DQS, our new Director was put through the wringer at the question-and-answer session. Now let's all mark our calendars for May 23 and 24 for the big Orlando Hamfest/EM Convention. The 1970 SET appears to be a success for our section. Another first in the SET was RTTY circuit established between W4AKB in Miami, K4SJH in Pompano Beach and W4IKK in Chipley. We welcome Mae and Al Burke back for the season. Mae made BPL for just part of the month. WBZ1/K4UF is also back for the season. Welcome also to W2OIH/4, who plans to stay. New officers of Vero Beach ARC are W4KEF, pres.; W4DGG, vice-pres.; WA4YFY, secy.; WB4ABX, treas. New hams are WN4PIA, WN4PDP and WB4OOV. New ECs are WB4CBP (Dade), W4BLZ (Highlands), WA4BWE (Brevard) and WA4QUD (Monroe). New RM is W4ILE. Reg will gather and disseminate news regarding our section cw nets. The Novice Hurricane Net needs support Sat. and Sun. at 2 P.M. EST on 7165 kHz. Here is a chance to learn cw net procedure for the Ole Timers also. The 7265 Net is going strong on Sun. W4DUG/4, at Tampa fair, again racks up a mountain of traffic. Our nets welcomed the challenge. K4SJH has been appointed Asst. SCM. Ham needs no introduction: his support of this section through the years is known to all. W4LEP has new 2-meter rig on now along with the antennas to match. Much concern was generated over License Plate Bill HR1121. We certainly hope this bill is defeated again this year. Traffic: W3CUL/4 620, WA4SCK 554, W4ILE 421, W4FPC 367, 8R1v/W4 287, WB4AIW 281, WA4JH 249, WA4HDH 244, WB4HJW 234, W4TJM 163, W4LYT 156, WA4ESH 135, W4SDR

133, W4SMK 132, WA50UB/4 119, WH4GHD 116, K4JW 111, W4EHW 99, WA3HD 92, WA4NJA 87, W4AKB 86, W4LEP 83, K4SJH 83, W8BZY/4 81, WB4HJY 78, W4FP 77, K4GJ 69, WB4IFR 67, WA3WZZ 62, WB4HTJ 61, W4KRC 57, K4EBF 51, K4DAX 46, W4KGI 46, K4IEK 45, W4BNE 44, W4YFX 43, W4DVO 41, W4NGR 40, W4ZAK 40, K4YLE 39, W4NYL 31, WB4HNL 29, WB4LRY 25, K4JIS 24, K4LPS 24, WB4KPK 19, WA4LIW 18, W4IA 16, W4LK 13, K4OER 11, WA4EYH 11, W4VPO 11, WB4OOD 10, W4SCY 10, W4SUD 10, W4BCZ 6, WB4JH L. (Dec.) WA4JH 117, WB4FY 23, W4GDK 19, W4ROA 19, WA3WZZ 15, W4VPQ 11, W4SOM 4, K4EBF 4.

### NINTH GEORGIA QSO PARTY

This contest, sponsored by the Columbus Amateur Radio Club Inc., W4CVY, will take place from 2000 GMT May 9 to 0200 GMT May 11, with no time or power restrictions. It is open to all amateurs and Ga.-to-Ga. contacts are permitted. Stations may be worked once on phone and once on cw on each band. The exchange will be QSO nr., RS(T) and QTH (county for Ga. station and state, province or country for others). Logging information—time/zone to GMT, station worked, exchanges, bands, emission, multipliers claimed. Suggested frequencies: cw 1810 3590 7060 14060 21060 28060; sb 3975 7260 14290 21410 28600; Novices 3725 7175 21110. Scoring system: A complete QSO counts 2 points. Ga. stations multiply points by the nr. of different states and Canadian provinces worked. (DX stations may be worked for points, but do not count as multipliers.) Non-Ga. stations use the nr. of Ga. counties for the multiplier (a possible total of 159). Awards: Certificates to the highest scoring station in each state, province, country, Georgia county. Second and third place awards where warranted. A plaque to the top Georgia station, top out-of-state entry, to the Ga. club with the highest aggregate score, top portable or mobile from a station operating outside his home county. The mailing deadline is June 8. Send your log to Columbus ARC, Inc., c/o John T. Laney III, K4BAL, 1950 Iris Drive, Columbus, Ga. 31906. Include a signed declaration that all contest rules and operating regulations have been observed. A large s.a.a.e. would be appreciated.

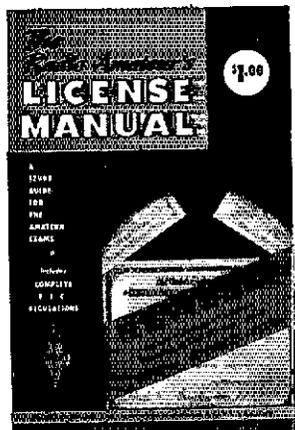
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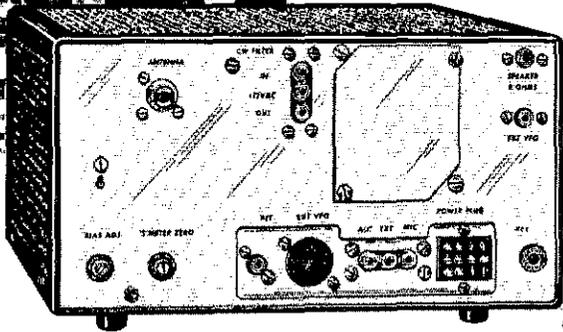
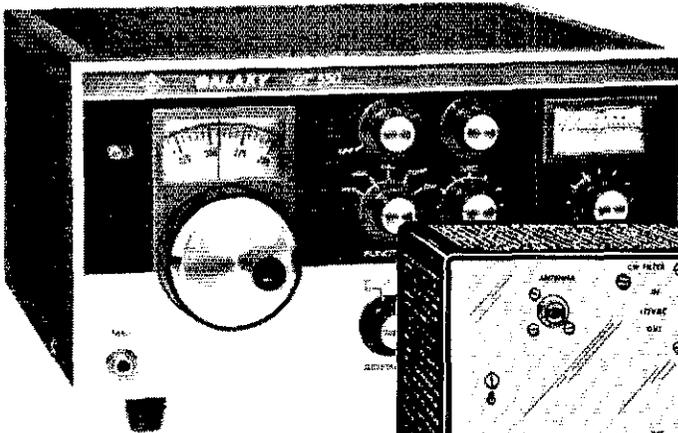
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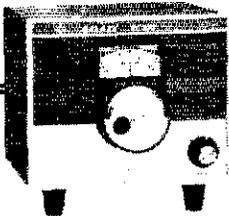
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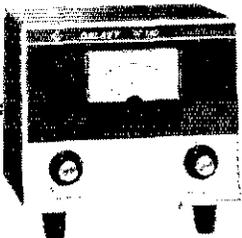
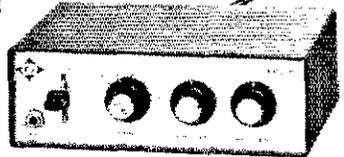


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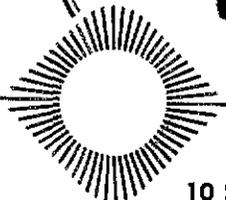
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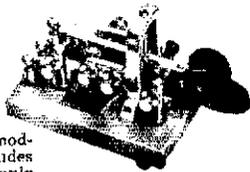
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GEORGIA - SCM, Howard L. Schonher, W4RZL - SEC; WA4WAU. RM: K4BAL. PAMS: K4HJ, W4LRR. W4HYW, active in Louisiana QSO Party and CD Party, would like to reactivate GIN. Any suggestions or help offered? WA4ARS has a Twuer, WA4HYW a new Drake line. W4TYE added a new operator Dec. 31. K4HJ is back on RTTY. W4LRR hasn't heard new Oscar yet. W4DQD has been appointed asst. director. He took part in Jan. CD Party. Georgia Single Sideband Net, 3975 kc. daily at 0100 GMT reports QNI 1009 with 120 messages and 29 patches. Georgia State Net, 3595 daily at 0000 and 0300, reports QNI 713 and QTC 469. Our sympathy to W4FDN on the severe illness of his mother. George has asked for replacement as RM but is looking forward to return to activity on GSN as soon as his mother improves. Many thanks to K4BAI for picking up the responsibilities of the net and accepting the RM appointment. W4DDY was very active on 4KN and LAN during SET. WB4KVE is looking forward to DX and county-hunting activity. W4OHA is beginning his 21st year of tammung with new tm equipment. Traffic: W4RZL 378, W4DV 312, K4BAI 300, WA4RAV 190, WA4WQU 165, W4DDY 156, W4PIM 134, W4UVP 110, W4NSO 108, WB4NOA 84, W4CZM 65, WB4KVE 32, WB4DMO 31, W4TYE 16, K4PIK 9, WA4LLI 7, WB6UIC 7, W4OHA 6, W4REI 6, W4ISS 3.

WEST INDIES - SCM, Jose Medina-Hernandez, KP4CO. We are saddened at their repairable loss of KP4JA, Ulises Mann, an initiator of radio communications activity and one who started, guided and inspired many of us into the gallant and excellent hobby of amateur radio; He was a real old-timer who lived during every occasion to the highest standard of organized radio amateur life. Let us all improve all our standars, moral, ethical and technical, as a sincere memorial to his dedication and friendship. KP4DIS operates the club station at Sagrado Corazon and is third-generation amateur. KP4s WD, Y. T. RK, A5T talk DX, antennas and ARRL. DXCC on 7 MHz. Sat. Listen in for a graduate course on DX-chasing; also included science, literature and philosophy, plus amateur radio. All KP4s wish KP4AVD a prompt recovery and comeback on the air. Run-Pineda of El Diario de N.Y. reported on Dec. 17 QST (ARRL) West Indies section notices and offers space for KP4 information. Traffic: KP4WT 103.

WESTERN FLORIDA - SCM, Frank M. Butler, Jr., W4RKH - SEC: W4IKB. PAM: W4MOQ. RM-RTTY: W4WEB. Nets:

Net	Freq.	Time/Dy	Sess.	QNI	QTC
W4PN	3957	2300Z Dy	31	---	---
QFN	3651	0600/0300Z Dy	55	487	28
NW Fla FM	146.94	6.00Z Dy	---	---	---

A bill introduced in the Fla. Legislature would up the cost of call-letter license tags from \$1.00 to \$5.00. Make your protest known! Tallahassee: K4GRD was appointed OU, Ham's Wide World was shown on Ch. 6 TV. W4MOQ, WB4LOQ, WA4YPC and WB4GTJ demonstrated ham radio at a boys juvenile home. FP2DM is a grad. student at FSU. Bonifay: WN4PJT is a graduate of W4IKB's class at Chipola Jr. College. Panama City: W4GTJ joined Silent Keys. WB4GAO and WA4VIY are active on 220-MHz. am, as well as 2-meter fm. Crestview: A 2-meter fm rig was permanently installed at the Sheriff's Office open to local hams 24 hours a day. Fort Walton/Fgin AFR: A very successful local SET was held by EC WB4LQU. WA4LBM is now OIS. W4NN, EAKS station, got its hf beam and rotator repaired thanks to W4FDJ. Playground ARC is sponsoring a code class; instructors are W4BVE, K4UBR, W4UXW and WB4NHH. New hams in the area are WB4CDR and K6OPH/4. Pensacola: WA4BYI suffered a severe heart attack, but is recovering. The FFARA obtained a 10kw. generator through efforts of K4FKV. New hams include WN4PGC and WB4PKR. Traffic: (Jan. K4VEY 296, W4IKB 258, WB4DVM 53, WB4IXK 45, W4WEI 43, W4FDJ 38, W4RKH 30, W4BVE 28. (Dec.) K4VEY 463, RR1Y/W4 157, WB4IXK 7.

### SOUTHWESTERN DIVISION

ARIZONA - SCM, Gary M. Hamman, W7CAF - SEC; K7GPZ. RM: K7NH. PAM: W7UXZ. The Annual ARCA Winter Hamfest was held at Estrella Mountain Park Feb. 1 with about sixty amateurs plus their families attending. WA7LPR, K7GHS and K7VOR made the arrangements and K7REA had a swap table as usual. The next hamfest in Arizona is at Ft. Luthi near Flagstaff July 24, 25 and 26. The Arizona QSO Party sponsored by Saguaro High School ARC, is April 25 and 26. Contact WA7ISP for rules. The SET was very successful with about 90 amateurs participating in either a local or the state exercise. Ariz. Repeater Assn. officers are K7YFR, pres. WA7HZO, vice-pres.; K7REA, rec. secy.; WA7DSW, cur. secy. treas.; W7UXZ, custodian. Cochine Amateur Radio FM Assn. officers: W7ACL, pres.; W7GLN, vice-pres.; W7ELQ, secy. treas.

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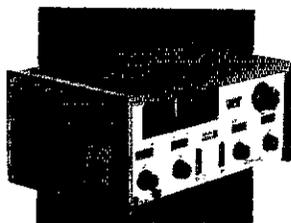
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SPECIFICATIONS	PM 3 / PM 3A	PM 2 / PM 1
Frequency range	(Band) 40 meters (Range) 7.0-7.4 MHz 20 meters 14.0-14.8 MHz	(Band) 40 meters (Range) 7.0-7.3 MHz 80 meters 3.5-4.0 MHz
Finish	Baked enamel. End panels, walnut wood grain.	(same)
Power Required	12 volts DC 30 ma. to receive 450 ma. to transmit	12 V. DC. 20 ma. to receive 200 ma. to transmit
Semi-conductor Devices	1 dual-gate MOSFET, 1 integrated circuit, 8 silicon transistors	1 dual-gate MOSFET, 1 integrated circuit, 4 silicon transistors
Types of Reception	CW-SSB-AM	CW-SSB-AM
Selectivity	2 KHz at 6 db down points	(same)
Sensitivity	Less than 1 uv	(same)
Antenna output impedance	Pi Network	50-75 ohms, Fixed Link
Audio	Output impedance 1000 ohms. Frequency response $\pm 3$ db 200-2500 Hz	(same)
Frequency Stability	Less than 100 Hz drift. No warm up	(same)
Power Input	Approximately 5 watts	Approximately 2 watts.
Front panel controls	On-off, 40-20 band switches (3), transmit-receive, volume, receiver peak, tune-operate, tune, load. Metered amplifier. Head phone tip jacks.	On-off, 40-80 band switches (3), transmit-receive, volume, VFO/crystal, receiver peak, oscillator tuning and amplifier tuning. Metered amplifier. Head phone tip jacks.
Tuning	Slide-rule dial. Flywheel tuning	(same)
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**FOURTH ARIZONA QSO PARTY**

This contest, sponsored by the Saguaro H. S. Amateur Radio Society, will take place from 2100 GMT April 25 to 2100 GMT April 26. It is open to all amateurs. Stations may be worked twice per band, once on cw and once on phone. Call CQ Arizona or CQ Test de — Ariz. The exchange will be QSO nr., RST(I) and county for Arizona stations and ARRL section or country for non-Arizona stations. Logging information includes date/time in GMT, stations worked, bands, modes and exchanges. Suggested frequencies: cw 3575 7075 14075 21075; phone 3950 7275 14285 21375 28600; Novice 3735 7175 21110. Scoring system: Arizona stations score 2 points per QSO times the number of ARRL sections. All others score 5 points per QSO times the number of Arizona counties worked (maximum of 14). Certificates will be awarded to the top scorer in each section with a second place award if 4 or more logs are received from one section. The mailing deadline is May 25. Send your log to Bob Wright, WA7ISP, 4725 North 70th Street, Scottsdale, Arizona 85251. All stations must submit a statement that all regulations have been followed and that decisions of the contest committee will be accepted as final. For a copy of results, enclose a s.a.s.e.

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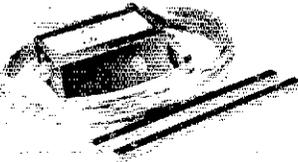
**LOS ANGELES** — SCM, Harvey D. D. Hetland, WA6KZI — Asst. SCM: Donald R. Etheridge, K0UMV. SEC: WA6QZY. WN6LSB passed the Advanced Class exam while K6QUQ, W6INH and W6WIT became Extra Class. WB6MCW is preparing an APS-13 for ATV and plans code sessions with WN6HHI and WA6ELI. W6NAA logged 18 hours with L.A. County RACES and Pasadena C.D. during the Rose Parade. WA6IGU is building a code generating typewriter. K6NA has figured out how to cure KWM-2 key clicks. WB6OLD is now in the Navy. W6DGH now is running on new 866 filament transformer. WA6JHD has the TRW club station back on. WA6PXY and WN6LSB finished 2 meter converters. W6YRA operated 5 bands /7 in Nev. for the ARRL DX Test. W6SRE now is mobile. WA6QAM is active on 10 meters. WB6TQS has SB301/WB401 combo. K6AWO is preparing 7 Boy Scouts for their radio merit badges. WB6VZI plans for new tower. W7GAQ was elected secy. of Dr. Lee de Forest's Ch. III of the Soc. of Wireless Pioneers. W6LUSY missed his first SET in many years. W6TXJ copies Oscar V. K6ASK is back on hf bands. WA6G5V has a new Heath SB-610 monitor scope and bum troubles in phone patch. WB6PKA has a 4-1000 rig. WA6PXY has new Drake K4B. K6NA is building a new station control unit. W6YRC is trying RTTY. WA6TWS suggests amateur radio displays for hobby shows. WB6PAV advocates stronger RCC membership requirements. WB6OLD has HT-37. W6MLZ is recovering well from a minor auto accident. W6LS completed another 18-week licensing course. For info on the W6LS course write LERC Amateur Radio Club, 2814 Empire Ave., Burbank. San Gabriel Valley RC Dinner Meet will be held June 5 at Ricky's in Alhambra. WB6BBO presented a Valentine program for the Monterey Park RC. W6ZLN treated Atm. Int'l Rocketdyne RC to a talk on transmission line measurements. K6BEP took 1st for L.A. County in the Calif. QSO Party. RACES in the section has been reorganized under the L.A. County. New officers of the TRW ARC are WA6JHD, pres.; W6FXZ, vice-pres.; W6PMV, secy.; K6AWO, treas. New L.A. Council of RC officers are W6JEL, chair; W6XVZ, vice-chair; K6OMU, secy. K6EPS treated San Fernando Valley RC members to a talk on "Ham Applications of Transistors." Through Fire Dept. Comm. Officer, W6RULU, the Palisades RC got the inside tour of the Culver City communications facility. New So. Calif. VHF Club officers are WA6ZNP, pres.; WB6RIV, vice-pres.; WB6FSE, treas. Net activity reports:

Net	Freq. (MHz)	Time (local)	QNI	QTC	Mgr.	Month
Metro	50.4	8:00 PM	313	143	WB6ZLP	Jan.
Novice	7.18	10:00 AM Sat.	21	2	WA6KZI	Jan.

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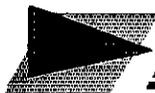
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WB6UHF and WB6ZVC have started the So. Calif. Novice Net on 3725 kHz at 5 P.M. Sat. and Sun. The SCM's address will be found on page 6 of QST. (BPL/PSHR): (Jan.) WA6ABP 15/10, K6ASK 2/0, WB6BBO 532/3, W6BHG 30/0, WN6BIP 0/2, K6CC 20/0, W6DGH 8/0, W6DOX 37/0, W6FD 20/0, K6CDW 212/0, K6EA 41/0, WN6EJB 0/2, WA6FJJ 34/8, W6INH 176/0, W6IVC 2/0, WB6KGG 22/17, K6KUQ 0/8, WN6LSB 2/2, WB6KXI 13/4, WB6MHI 54/9, W6MLF 489/3, W6MLZ 15/0, W6NAA 3/0, W6OEO 12/10, W6OLD 5/0, WB6PKA 33/0, W6QAE 208/0, W6RCV 0/8, W6TN 9/0, WA6TWS 1/0, W6TXJ 0/5, WB6UHF 153/0, W6USY 8/0, WB6WDS 15/14, WB6WIT 4/10, WB6ZLP 0/28. (Dec.) W6FD 20/0, W6MLZ 77/0, WB6PKA 141/3, W6IN 6/0, WA6TWS 10/0, WB6UHF 19/0.

ORANGE - SCM, Jerry L. Ver Duff, WA6ROF - Asst. SCM: Richard W. Birbeck, K6CID. SEC: WB6CQR. RMs: W6LCP, W6BNX. PAM: WB6RVM. New officers of the Anaheim ARA, K6SYI, are WB6CGG, pres.; W6GPR, vice-pres.; WA6LGG, rec. sec.; WB6IQX, corr. sec.; WB6GWZ, treas.; K6GSX, W6IKP, WA6ENZ, WA6ZNM, WA6HKW, dir. The club has nets on Wed. (PST) at 1930 on 145.61 MHz, 2030 on 50.304 MHz, 2100 on 7.275 MHz. The Orange County ARC, W6ZE, has also started a net on 21375 kHz Thurs. at 2000 PST. New OBSs are WA6ELF and K6GGS. W6GPR is a new OO. An Orange Section League Officials Net now meets the first Sun. of each month at 1000 PST on 3965 kHz ssb. Dick Baldwin, W1KLF, Asst. Gen. Mgr. of ARRL, was guest speaker at a special meeting in Riverside Feb. 3. "The Ham's Wide World" PR film was shown twice in Jan. on CBS television in Los Angeles. OO W6VOZ is busy reconstructing his inverted "V" antennas after a 70-mph wind blew them down. WA6FOQ has received his WAC award and was very QRL during SEF. As usual, this section was very active during the SET and WB6CQR is quite happy with the results. OVS K6YNB scored 12,300 points in the VHS SS, which he says is the highest score ever recorded by a West Coast station. WA6YWS has a new tri-band beam and is providing Inyo County outlet on SCN. W6JFX is the Asst. EC for the Victorville area and was presented his certificate by SEC WB6CQR at the Victor Valley ARC Dinner Meeting. Send your reports and news to the SCM by the fifth of the month. Support your local club and section ARRL and NTN nets. Traffic: (Jan.) W6LCP 333, WA6FOQ 241, WA6ROF 179, W6BNX 142, WA6FIT 24, W6WRJ 23, WB6TYZ 22, WB6ZEC 22, K6OF 4, WA6YWS 4. (Dec.) K6OT, 5.

SAN DIEGO - SCM, Richard F. Leffler, WA6COE - Asst. SCM: Art Smith, W6INI. We welcome to AREC leadership WB6IQI, EC for the So. District. AREC organization continues to add new members almost daily. Registration forms are available from WA6COE, W6INI, ECs and at Western Radio. ARPSC activities included running communications hookup for the SD Marathon Race at Mission Beach area in Jan. using 2 meters. The 75-meter ARPSC group covered the 100-mile Borrego Dune Buggy Race in Jan., also. Feb. saw both 2 and 75-meter coverage of the 24th Annual Glider Meet. Remember: AREC net now meets Sun. at 0900 on 3905 and an alternate session is on Mon. at 1900 on 3905. Join us? Clubs: El Cajon heard W6ZOM in Jan. and George May from Western Standard Lab in Feb. Palomar Club was invaded by members of El Cajon and North Shores in Jan. SOBARS seems to be going now. SD DX Club met in Dec. at WB6OLR's, and at W6BZE's in Jan. New pres. is K6CS. WB6BOX was elected pres. of VHF Club. Section News: WN6DAR now is WB6DAR; W6LRU was appointed RM to RN6. K6EC monitored Oscar during Jan. WA6OFE is mobiling with SB-34. W6APG is now a Silent Key. WA6HGU finished his linear SB-200. WB6SQZ transferred to Riverside area. K6PM has new blue license plates. Don't forget to plan on the Fresno Convention in May. Traffic: (Jan.) K6BP 8190, W6VNO 983, W6BGF 519, W6EOT 514, W6LRU 248, K6HAV 59, WB6SEZ 40, WA6COE 29, WA6KZN 8, WA6IGU 6, K9ZMS/6 5. (Dec.) W6YKF 87, WA6FXM 4. (Nov.) WA6FXM 2. PSRR earned by W6LRU, W6EOT.

SANTA BARBARA - SCM, Cecil D. Hinson, WA6OKN - SEC: K6GV. RM: W6UJ. Elected officers of the Satellite ARC, W6AB, Vandenberg Air Force Base, for 1970 are WB6UAX, pres.; WN6LBO, vice-pres.; WA6CQL, secy.; W6QMV, treas. The club is sponsored by the Lockheed Company with membership open to all hams, military and civilian, in the Vandenberg area. WA6MGG has moved to Atascadero from Northern California, and works with the microwave division of Western Union. WA6DEL, of San Luis Obispo, has qualified for the Public Service Honor Role. WA6CPM/WA6QRA continues to be a very active OO for the Lompoc area. The Mike and Key ARC of Camarillo hosted other Ventura County Radio Clubs for a joint

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meeting. Guest speaker was Dick Baldwin, from Headquarters, and the ARRL movie. The Hams Wide World, was shown to those 125 hams who were present. Thousand Oaks is forming an amateur radio club and those interested should contact George McCarthy, whose telephone number is #2620. WA6DEL has a new four-element homebrew beam up and working DX as well as spitting together a new SR-401. Traffic: WA6DEL 338.

**WEST GULF DIVISION**

**NORTHERN TEXAS** - SCM, L.E. Harrison, W5LR - Asst. SCM: Gene Pool, W5NFO. SEC: W5JSM. PAM: W5BOG. RM: W5QGZ. Asst. SEC: Elex/VHF PAM: W5AKHE. During May '69 Board Meeting W9HPG moved we have "open" CD Party. It was passed to Contest Advisory Committee for study. Members are W5CUE, chairman, W1AX, K2CPR, W3GRE, W5DB, W9RQM, VE2NN, liaison W4KFC, Hq. rep. W1YYM. Write 'em what you think. Arlington RC Annual Banquet was held Dec. '69 with 75 attending, including W5EYB, W5BNG, W5LR and XYLs. W5SRK is a new EC. Richardson RC's new officers are W5ZSX, pres.; W55GD, vice-pres. The club meets 2nd Mon. monthly at 8 P.M. in the IPL Bldg. K5AFX says "hello." W5RID did not have time for the OO job. W5LR is not SEC. that's W5JSM of Hereford. K5LZA, EC Dallas County, mailed letters to 600 ARRL members in Dallas County and received 10%-plus returns. Garland ARC, 11th & Austin Sts., meets 4th Tue. monthly. Pres. now is Carl Ivey, vice-pres.; Jim Burney; secy. Jim Wood. Asst. SCM W5NFO, Brownfield, reports the SEC was FB and new stations are W5NADG, W5NAMG, W5NANV. Our ham film made KRLL Channel 4, Dallas. WA5ALT joined AREC. W5JSM ran up 23.4K points in the Jan. CD Party. W5RHF moved back to Tennessee. SEC lost his quad in an ceestorm but SET exceeded all hopes. He needs assistance with his SEC job. Any volunteers? Recap of SFT shows some 100 messages received and 40 sent. Nets actively heard included Tex Fone 3962, 3970, 3940, 7290; 10 Meters Dallas, ETex Emcy Net. K5QKM reports full attendance. WASTVN is EC for Lipscomb County. K5ILL, Henderson, failed to make SEL. W5PD wants in AREC. Delta SSB Net meets M-S 6 P.M. CST 3905 kHz. W5HMR is net mgr. 3930 kHz crowd has scheduled picnic for Koehler Pavilion, Brackenridge Park, and the North Texas Emergency Net. 3930 kHz scheduled its picnic for May in Gatesville. W5MKV is net mgr. OO W5KYD reports, as does W5PBN and W5GWF. The Dallas 2-meter repeater group will meet Mon. at 7:30 P.M. in the Telephone Auditorium with W5EYB as guest speaker. New Dallas Amateur Radio Club officers are W5YAS, pres.; K5GOO, vice-pres.; W5STR, secy.-treas.; W5SXXG, program dir. RM W5QGZ chaired a staff meeting at his home Jan. 26, with W5DDP and W5LR in attendance and reviewed deficiencies of NTX year's operations. W5UPE wants AREC appointment. W5EVS forgot SEL. (Hr.) Traffic: (Jan.) K5BNH 1317, W5PPE 416, W5JSM 184, W5GU 87, K5BDC 50, K5LZA 49, W5LR 47, W5HVP 24, W5PBN 18, W5QQY 9, W5SGNT 8, W5RID 8, W5EVS 6, K5MOT 5, W5QWA 2. (Dec.) W5EVS 11.

**OKLAHOMA** - SCM, Cecil C. Cash, W5PML - Asst. SCM: W.L. "Smoky" Stover, K5GOV. SEC: W5NSN. RM: W5QMJ. PAMS: W5MFX, K5TFY, W5IGU and K5LJL. Two big exercises during Jan. proved very successful. First was the SET, and second the Rubella Emergency Net. The SEC has made a separate report on each of these. W5ZVI has finished a 20-watt driver for 432 MHz. W5LWD is proud owner of a new Ugnert 370. W5WRA says he should make Advanced Class this trip. W5SZAI was recently on TDY in San Antonio where he held nightly schedules with his wife, W5SZWA, in Mid West City. New officers of the OVHF Club are W5JGU, pres.; W5TRS, vice-pres.; W5PDH, secy.; W5VIL, treas. New officers of the Wheat Straw Amateur Radio Club are W5PFK, pres.; W5KBI, vice-pres.; K5GBN, secy.-treas. New officers of the Tulsa ARC are W5HRV, pres.; W5PYA, vice-pres.; W5NOO, secy. New officers of the ACARC are W5HXL, pres.; W5FF, vice-pres.; W5DV, asst. to pres.; W5KE, secy.-treas. The above officers of the ACARC are all Extra Class. Net roster and net reports:

Net	Freq.(kHz)	Time(Z)	Sets.	QNT	QVC
OPEN	3915	1400 Sun.	4	177	19
OPON	3913	2300 M-F	21	293	49
STN 1	3850	2330 M-S	26	370	49
STN 2	3913	2330 M-S	26	480	28
OWXN	3913	0001 T-Sun.	26	---	---
QLZ	3682.5	0100 T-Sun	20	---	51
SSZ	3682.5	0345 T-Sun	14	---	27

Traffic: K5TEY 1463, W5YRO 244, W5E5N 104, W5QMJ 74, W5MFX 67, W5PML 51, W5KRR 45, W5ZOO 45, W5FIR/5 35, K5WPP 30, W5FKL 29, W5WRA 14, W5LWD 13, K5ZDB 13, W5UEJ 4, K5OXC 3.

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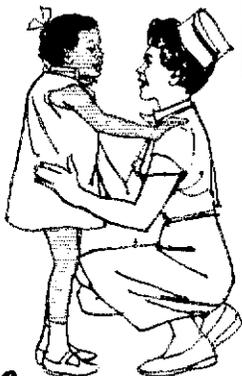
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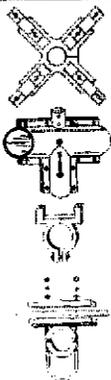
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**SOUTHERN TEXAS** - SCM, G.D. Jerry Sears, W5AIR - SEC: W5QQG, PAM: W5KLV, RM: W5EZY. New Nueces County EC is WASTPY, Corpus Christi, following resignation of W5AOK. Congratulations to Holland on excellent communication leadership as EC through many hurricanes and other emergencies during the past years. SET created a beehive of activity in South Texas. TEX and RNS were loaded. W5KWU, Red Cross Houston, passed traffic to mobile bus W5FJJ near Los Angeles on 75 meters, West Gulf Emergency Net. Traffic: W5QJA 237, W5EZY 178, K5GDH 140, W5KWU 124, K5ROZ 116, K5HZR 92, W7WAH/5 91, W5ABQ 88, W5SQKE 56, K5EDN 38, W5AIR 37, W5TEW 31, W5AXI 13, K5WYN 8, K1PKO/5 5, W5AC 2, W5KLV 2. Total 1800.

### CANADIAN DIVISION

**ALBERTA** - SCM, Don Sutherland, VE6FK - PAM: VE6ADS, VHF PAM Calgary: VE6AWV. The SET did not tax the APSN enough. As usual there were some weak points, but most of the net operations were well handled. The NC stations did a fine job. VE6AP reports that 20-meter traffic moved easier than former years. Calgary EC VE6AER was disappointed in the Calgary participation. However, the station at Simpson did a fine PR job. VE6XC did a fine job of moving traffic. VE6HN and I enjoyed a visit to the very hospitable Vulcan Radio Club. VE6AHE has been doing some extensive vhf rebuilding. He is looking for some serious competition in the June VHF Contest. VE6MX on Jan. 21 was heard on 2-meter fm Simplex by K7DIV, Sweetgrass, and VE6ASL. Foremost. The Calgary vhf group has been working with the Southern Area vhfers regarding repeater frequencies. Red Deer is also progressing with its repeater. Sounds like a 2-meter provincial net may soon be possible. I deeply regret to report the loss of VE6AOH, ex-VE6KS, in a skiing accident. He will be greatly missed by the Bishop Grandin HS Radio Club. Traffic: VE6XC 73, VE6AP 54, VE6FK 53, VE6SS 13, VE6VE 10, VE6TY 7, VE6EV 4, VE6HN 4, VE6BL 3, VE6HD 3, VE6XO 3, VE6YW 3, VE6ES 2, VE6MA 1.

**BRITISH COLUMBIA** - SCM, H. E. Savage, VE7FB - British Columbia Amateur Radio Public Service Corps Net meets on 3755 kHz at 0200Z seven days a week now and nightly check-ins are over the fifty mark. We have a large number in sick bay: VE7DU, VE7KY, VE7QC, VE7BJ, VE7QT. B.C.-E.M. Communications Assn. held a successful meeting and large display and talk on new equipment. Membership now is 125, the third newsletter had some very good 2-meter hints. VE7BFQ has a jr. operator, VE7BB also has a jr. operator. VE7BAZ has been entertaining skunks under his shack; operates a senior hony transmitter on 2-meters. VE7BS is now VE7OR. VE7QQ reports a haul on 160 DX contest. Richmond ARC is donating power supply. North and West Vancouver ARC, an identifier for the .94 repeater for the B.C.-E.M. Communication Assn. HB9AIE, formerly VE7UBC member, reports Zurich has a repeater on 432 and uses taxi rigs. VE7BO's mother, VE7TH, has now joined QCWA. Beaver Valley ARC's paper *Checks* is a fine effort. North and West ARC Ham of the Year Award went to VE7HVI. Traffic: VE7KZ 88, VE7BLU 66, VE7ROA 49, VE7QQ 46, VE7AC 28, VE7BZA 19, VE7LL 18, VE7SE 14, VE7GG 9.

**MANITOBA** - SCM, Keith Witney, VE4EI - As of Feb. the only regular bulletin is the *Manitoba Amateur* which absorbed *SPARKS* and *QUA*. Present plans call for a bi-monthly publication with hopes of increasing this to a monthly one. The Winnipeg Repeater Society has acquired a repeater station to go with its new site. Oscar 5 is being tracked by the 4UM gang in all weather - needed, one armstrong rotator. Our SEC pulled a successful SET out of his hat for those who participated. There are two hamfests this year. Mid-Continent at the Peace Gardens and the centennial one in Winnipeg. Watch for details. WARC had an interesting talk on the early days of spark. VE4RW reports that linear ICs are being toyed with in Brandon on several projects. VE4S CN, FO, EJ, MB, EI are working on slow scan with good results being reported. Remember MTN is now on 3660. Traffic: VE4EQ 136, VE4RO 71, VE4KE 30, VE4YC 25, VE4XN 12, VE4NE 10, VE4RL 10, VE4QJ 9, VE4IA 8, VE4SW 7, VE4LQ 4, VE4RC 3, VE4K 3, VE4YQ 3, VE4MB 2, VE4PA 2, VE4RB 2, VE4TE 2, VE4EU 1, VE4WT 1.

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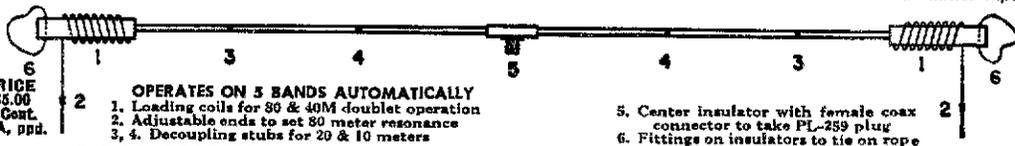
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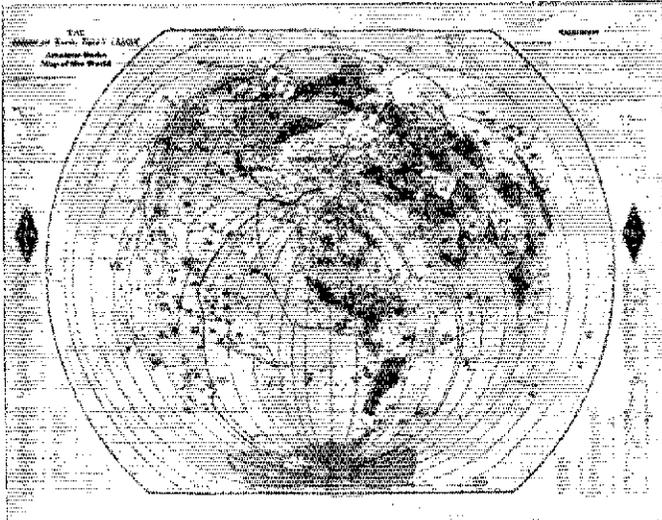
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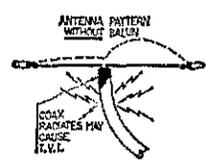
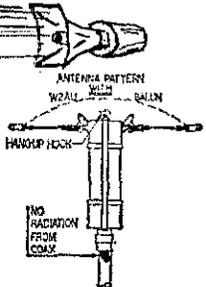
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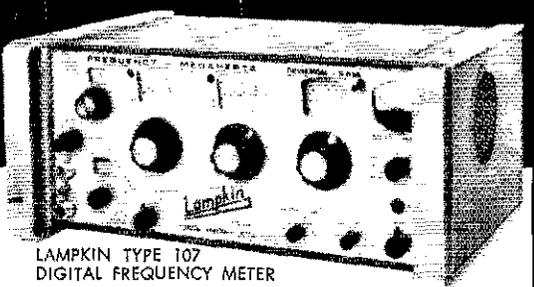
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**MARITIME** — SCM, William J. Gillis, VE1NR — SEC: VE1HJ. On Feb. 4 the town of Marysville, N. B., was cut off from all road access and telephone communication was cut because of flooding on the Nashwaak River. An emergency net was immediately set up with VE1TC as the anchor station. VE1BM handled numerous phone patches with VE1S AOB, AIM, AGK, APB, VD, AMJ, AQU, and many others, all contributing to the handling of the traffic. Much of the traffic was from police and municipal authorities regarding the safety of citizens, etc. Also through the efforts of VE1HE and VE1XG, the Maritime Net frequency, 3750, was cleared for all but emergency traffic. This is certainly a commendable effort by all concerned and, in addition to rendering a valuable service, gave much favorable publicity to amateur radio. Congrats to VE1AH on successfully passing the exam. VE1PI has been appointed net coordinator for new Moncton Area 2-meter mobile net. VE1AOH reports new linear under construction. Traffic: VE1RO 203, VE1AMR 120, VE1AMB 15.

**ONTARIO** — SCM, Roy A. White, VE3BUX — Our Feb. QST column (p. 130) credited sponsorship of the RSO Convention in Toronto to the Scarborough Amateur Radio Club. This should have been the Skyward Amateur Radio Club. Traffic: VE3BRE 289, VE3BUX 229, VE3DV 216, VE3GRO 213, VE3ERU 180, VE3GI 169, VE3DPO 138, VE3EWD 129, VE3FBC 90, VE3-EHL 75, VE3EXI 74, VE3CBL 43, VE3DD 35, VE3VD 9, VE3AYR 3, (Dec.) VE3CYR 100, VE3AWI 44, VE3EYN 40.

**QUEBEC** — SCM, I. W. They, VE2OJ — Many 2E2s participated in the 1970 DX contest. One observation, the amount of deliberate jamming on the 75-meter band is appalling. VE2KF, technical director for MARC, has created a very interesting technical net on 7153 kHz Sun. at 11 A.M. Such things as Oscar 5, DX antennas and solid state devices have been discussed, freezing rain has taken its toll of antennas, VE2FC and VE2CFR being among the losers. VE2AJU is welcomed to the traffic nets. One more repeater station, VE2MT, has a weekly net — Tue. at 7:30 P.M. The Annual RAQI Convention will be held in Quebec City July 10-11-12. Il est temps de penser a vos vacances! Il est temps de faire des projets pour les mois d'ete. Les plus belles vacances commencent par votre presence et celle de votre épouse au Congres Provincial de RAQI a Quebec, les 10, 11 et 12 Juillet. Venez vous amuser! Venez rencontrer vos amis amateurs! Tous les gens du monde a Quebec le 10 Juillet. Le Congres provincial de cette annee vous reserve de surprises et un programme bien prepare. Traffic: VE2BVY 173, VE2BRD 165, VE2ALL 128, VE2DR 82, VE2OJ 63, VE2CF 24, VE2APT 13, VE2DCW 6, VE2EC 4.

### SECOND VE2 CONTEST

This contest, sponsored by the Radio Amateurs of Quebec, RAQI, will take place from 1300 to 0100 GMT Sunday April 26 (phone) and 1300 to 0100 GMT Sunday May 3 (ew). Only 8 hours of each 12-hour period may be used. Time spent operating must be clearly marked in log. It is open to VE2 or portable VE2 stations only. Stations may be worked once on each band. Cross-band contacts are not valid. Call CQ VE2. (the exchange will be RST), year licensed and country. Logging information: Preceding information plus usual details. Scoring system: 3 station may be worked once on each band for 1 point, with the exception of the 16 RAQI directors. Each of the 108 Quebec counties counts as a multiplier. That multiplier may be counted only once regardless of the bands used. Each of the 16 RAQI directors will be issued a special 2-letter identifier in place of his county. This will count 5 points for the contact and gives one more multiplier for each of the directors worked. Awards will be presented to the winners in July at the RAQI Convention in Quebec City. Send your log to RAQI Contest Committee, C.P. 124, Mont-Joli, Quebec, Canada.

**SASKATCHEWAN** Gordon Pearce, VE5HP — SEC: VE5CU, PAM: VE5HZ, ODS: VE5HO and VE5KE, OBS: VE5HQ, OVEA: VE5CU and VE5US, OPS: VE5US, ORS: VE5GL and VE5SC, RM: VE5GI, FCS: VE5DO, VE5RJ, VE5HO, VE5NX, VE5L, Regina Hamfest, July 3, 4 and 5. The SET was one of the best yet. The 1969 total points were 516. This year (1970) we recorded 880 points, a 70% increase. All sections took part and all sections reported. Most significant of all, there was an increase of 40% in individual participation over last year. Well done, Saskatchewan! We expect to be able to announce a new Saskatchewan QSO Party soon. We also are contemplating a gala Event for 1971, Saskatchewan's Homecoming Year. Watch for details later. Traffic: VE5GI 439, VE5VO 253, VE5SC 86, VE5KZ 58, VE5BO (9), VE5HZ 12, VE5SN 10, VE5MX 4, VE5FO 6, VE5RE 4, VE5KE 4, VE5KI 4, VE5IA 2, VE5XG 2, VE5YK 2.

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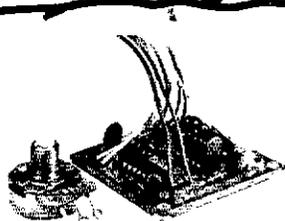
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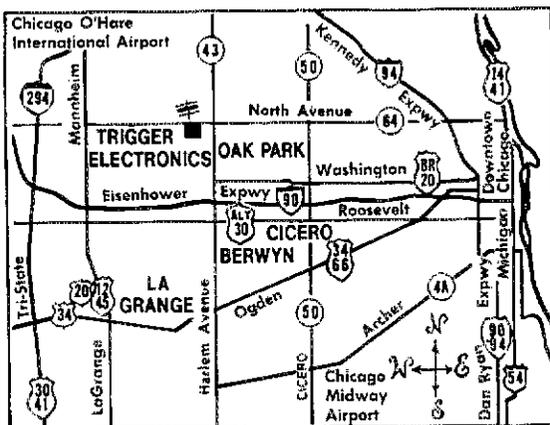
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## HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters, be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a post office box or telephone number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 50 cents 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 15 cents per word will apply to advertising which, in our judgment, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 15-cent rate. Address and signatures are charged for, except there is no charge for zipcode, which is essential for furnish. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 50-cent rate. Provisions of paragraphs (1), (2) and (5) apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking copies can be supplied.

(8) No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.

(9) Due to the tightness of production schedules, cancellation of a Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

*Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.*

**AUCTION**, North Jersey, really different. New equipment booths, food and drink and bargains galore. Sunday afternoon April 19 from 1 PM 'til dark, at The Arbor Inn, Rock Ave. and 7th Piscataway, NJ. Easy to reach from Rte. 22. Turn south on Rock Avenue 1/4 miles. Sponsored by Tri-County Radio Club. Bob Higgins, Pres., TCRA 104 Maple Place, Cranford NJ 07016

If you have operated amateur radio 40 years ago you are eligible for the exclusive Old Old Timers Club, Inc. Write Ray Meyers, W6MLZ, Box B, San Gabriel, CA 91778 for details.

**SOUTHERN California Amateur Network** 14.325 MHz Monday through Friday, 0500 GMT, E6YCM.

**ROCHESTER NY** is again Hamfest, VHF Meet and Flea Market Headquarters for largest event in Northeast, May 16, 1970. Write WNY Hamfest, Box 1388, Rochester NY 14603 for program and information.

**AN invitation:** NYC area Hams and SWLs are invited to attend NY Radio Club Meetings - 2nd Monday of every month, George Washington Hotel, 23rd St. and Lexington Ave. at 8 PM.

**ANTIQUUE Wireless Association** 1970 Historical Radio Conference, Ford Science Museum, Dearborn, Michigan, Weekend Aug. 8th and 9th. Write W2QY for full information.

**RAGS Hamfest** Syracuse New York, April 11, 1970 at Song Mountain Box 88, Liverpool NY 13088.

**FREE sample copy** Long Island DX Assn. Bulletin. Latest DX news, Business size s.a.s.e. to K2AFY, Box 74, Massapequa Park, LI NY 11762.

**JUNE 7, 1970:** Save this date for the Starved Rock Radio Club Hamfest. Same place as last year. Details on request after Apr. 1, 1970. Write SRRC/W9MKS, G. E. Keith, Secy/Treas., RFD 1, Box 171, Oglesby, IL 61348.

**QCWA - Quarter Century Wireless Association** is a non-profit organization founded 1947. Any amateur radio operator licensed 25 or more years is eligible for membership. Write for information, A. J. Gronda, W2JE, Box 394, Mamaroneck, NY 10543.

**INDIANA'S** Most progressive Hamfest Sunday May 24, rain or shine. Sponsored by Wabash Co. Amateur Radio Club. \$1 donation for admission. For information write to Bob Mitting, 700 Centennial St., Wabash IN 46992.

**QSL Cards??** America's finest. Personalized made-to-order. Samples 25c. Deluxe, 35c. Religious, 25c. (Refunded). Rus Sakkers, W8DEF, P. O. Box 218, Holland, MI, 49423.

**C. FRITZ** QSLs bring greater return! Samples 25c. deductible. Box 1684, Scottsdale, AZ 85252.

**QSLs "Brownie"** W3CJL, 3111 Lehigh, Allentown, Pa. 18103. Samples 10c. Catalog 25c.

**QSLs. All types.** Attractive designs, quick return, free samples. W7IHZ Press, Box 2387, Eugene, OR 97402.

**QSL PRINT.** Samples .25. P.O. Box 33, Melrose, MA. 02177. **SAMPLES** 10c. Harry Sims, 3227 Missouri Ave., St. Louis MO. 63118.

**NEW QSL catalog!** Hundreds of cuts, stock and ink samples, nine report forms, plus ten sample QSLs 25c. Corneilson's Quality QSLs, 321 Warren St., North Babylon, NY 11704.

**QSLs, finest YLRL's, OM's** samples 10c. W2DJH Press, Warrensburg, NY 12885.

**QSLs-100** 3-color glossy \$3.50; silver globe on front; report form on back. Free samples. Rusprint, Box 7576, Kansas City, MO. 64116.

**PICTURE QSL** cards of your shack, etc. from your photograph. 500. \$12. 1,000. \$15.25. Also unusual non-picture designs. Generous sample pack. 25c. Half pound of samples 50c. Baum's, 1154 Fifth St., Philadelphia, Pa. 19140.

**QSLs, SWLs, WPE.** Samples 15c in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix, Ariz. 85017.

**QSLs.** Free samples and estimates. S. E. Cohen, Special Printing, Drawer Q, Pittsford, NY 14534.

**QSLs-SWLs.** Hundred, \$2. Samples dime. Willow Press, 223 N. Udricks Dr., Battle Creek MI 49017.

**LOW Priced QSLs** (25c deductible) KLI Press, P.O. Box 258, Martinsville, NJ 08836.

**QSLs, samples** 10c. Fred Leyden, WINZJ, 454 Proctor Ave., Revere, Mass. 02151.

**QSLs** Free samples, attractive designs. Fast return. W7IHZ Press, Box 2387, Eugene, Oregon 97402.

**QSLs** 3-color glossy 100, \$4.50. Rutgers Vari-Typing Service. Free samples. Thomas St., Riegel Ridge, Milford, NJ 08848.

**3-D QSLs** - The modern concept that makes all others old-fashioned. Samples 25c (refundable). 3-D QSL, Co., Monson 2, Mass. 01057.

**QSLs** 300 for \$4.50, samples 10c. W9SKH, George Vesely, Rte. #1, 100 Wilson Rd., Ingleside, Ill. 60041.

**3-LINE** Engraved badges, any color, \$1.25. Special rates to clubs. Fallert's Engravings, 121 N.C. St., Hamilton OH. 45013.

**RUBBER stamps** \$1.25 includes tax and postage. Clint's Radio, W2UDO, 32 Cumberland Ave., Verona, NJ 07044.

**DELUXE QSLs** Betty, W2HAZ, P.O. Box 5237, Trenton, NJ 08638. Samples 10c.

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**QSLs.** Second to none. Same day service. Samples armored, 25c. Rav, K7HLR, Box 331, Clearfield UT 84015.

**GORGEOUS QSLs, Rainbows, etc.** Top quality! Low priced! Samples, 10c. Refundable. Joe Harms, W4BLQ, Box 158, Edgewater Fla. 32032.

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**QSLs:** 100, \$1.40 and up, postpaid. Samples, dime. Holland, R3, Box 649, Duluth, MN 55803.

**SELLING** Entire station! Hammarlund HQ-110AC VHF receiver (mint condx); new unused Eico 720 xmt., Hy-Gain 5BDQ 80-10 m. double, coax and key, all for \$248 or first best offer. Also: Hiwa TP-602 tape-recorder, six months old, \$60. Box of valuable new parts, including 14 Miller R.F. transformers, Miller vector dial and McCoy X-tal-filter package. Worth way over \$100. Yours for \$45. Paul Raether, 2072 James St., Paul, MN 55105.

**SR-2000-P-2000.** immaculate, new-like condx, no bugs, original cartn, manual, trade or sell; \$895. Don Payne, K4DD, Box 525, Springfield, TN 37172. Tel. Nites 615-384-5643.

**WE'RE** trying to complete our collection for Callbooks at Headquarters. Anyone have extra copies of Government Callbooks 1922-25 and Radio Amateur Callbooks 1928-1934. ARRL, 225 Main St., Newington, Conn. 06111.

**FOR Sale:** NR-400, excellent condition, \$240. WA8DVX, 619 N. Sugar St., Colona, OH 45822.

**TELETYPE** - 15, [9, etc. Below U.S. prices. Also Deskfax transceivers, Harry Lang, VE3AD0, 12 Orchard Dr., Port Colborne, Ont. Canada.

**QSTs** 1932-1968. All gud condx, 95% xmt. \$200. Express collect. No offers. VO1BH. Any callbook.

**WANTED:** One or two 6L-172 tubes for an HP-33 Hallcrafters linear. D. Warner, W7ASY, RR #4, Crawford Rd., Kelowna, BC, Canada.

**WANTED:** AR-88 revr. Write, giving location, condx, price. R. Maskell, 383 Douglas Ave., Oakville, Ont. P., Canada.

EDITING a club paper? Need public relations help? You should belong to Amateur Radio News Service. For info, contact Al Marcy, WA4D, Sec'y., 461 Third Ave., Eau Gallie, Fla. 32937.

RG-8/U coax low-loss foam Appenloeh 10c per foot. P.O. Box 83-U 24c a foot. PL 239-50239. 40c each. 15/85. P.O. Box Monte Southward, Rte. 1E, Upper Sandusky, OH 44851.

SB-200 sell for \$200, in mint condx. Pick up. Now built SB-220, W2TOP, 182-41 80th Road, Jamaica, LI NY 11423.

SELL: Gonset Communicator 4 (6-meter) w/crystals, in exc. condx. \$200. WA1HND, 7415, 1312 W. Main, Peoria IL 61606.

BEVETT-PACKARD 524C counter and Tektronix 545A scope. Collins 51S-1 and 51J4 receivers. URR/388, 290 and 290A receivers. Cash or trade equal value for Collins ham gear. Write or ions, W2ADD, #M11 and FRR-33 manuals wanted. Your preposterous price paid.

HAM ticket, The Amateur Radio License Course for Novice, General, Advanced, Extra Class. FCC makes it difficult to get a ham license. Let Ham Ticket make it easy! Packaged course for each class license. Courses leased, not sold. Copyright 1970. Write for brochure. Clayton Radio Co., 220 Mira Mar Ave., Long Beach, CA 90802.

QSTs Wanted: December 1916 to December 1916. 1913 IRE Proceedings. Any unreasonable price! Ted Dames, W2KJW, 308 Hickory St., Arlington, N.J.

FOR Sale: SB-101 and SB-200. Wanted kits to wire. Heath preferred. 12% of cost, some in stock, professionally wired. Ian Richter, K3SUN, 131 Florence Drive, Harrisburg, Penna 17112.

WE buy all types of tubes for cash, especially Firmac, subject to our test. Maritime International Co. Box 516, Hempstead, NY 11551.

CASH Paid for your unused Tubes and good ham and commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, NY 10012, Tel. 212-925-7000.

WANTED. Tubes and all aircraft and ground radios. Units like 17L, 51X, 618T or S. R348, R390, GRC. Any 51 series Collins unit. Test equipment, everything URM, ARM, GRM, etc. Best offer paid, 22 years of fair dealing. Ted Dames Co. 308 Hickory St., Arlington NJ 07032.

INTERESTING sample copy free. Write: "The Ham Trader," Sycamore, Ill. 60178.

TTY gear for sale. List issued monthly. 88 or 44 MHz toroids free for \$2.50 postpaid. Elliott Richman & Assoc., Inc., Buck, W6VPC, 1067 Mandana Blvd., Oakland, Calif. 94601.

WORLD QSL Bureau. See ad page 159

COUNTER, 100 kc. Berkeley, epot, model 7150BDK, excellent condition, \$200. Safety belts for climbing, new nylon body belt, \$15. John Junk, 1081 Aron St., Cocoa, Fla. 32922.

TOROID Coils 88 mh uncased postpaid, 5/82. La Von Zachry, P.O. Box 846, Apple Valley, Calif. 92307.

GOVERNMENT surplus electronics bargain catalog, 96 pictured pages. Send 25c. Meshna, Nahant, Mass. 01908.

NOVICE crystals: 40-15M \$1.33, 80 M. \$1.83. Free flyer. Nat Stinnette, Electronics, Umatilla, Fla. 32784.

SELL swap and buy ancient radio set and parts magazines. Lavery, 118 N. Wycomb, Lansdowne, Pa. 19050.

TELETYPE parts. Fast service. Machines to M.35. Buy, too. S.A.S. Typetronics, Box 8875, Ft. Lauderdale, Fla. 33310.

TOROIDS, uncased 88 or 44 mh, 5 for \$1.50 ppd. M. Weinschenker, Box 353, Irwin, PA 15642.

REPAIR and calibration service. Write before shipping. Pan Tronics, Inc., 6608 Edsall Road, Alexandria, VA. 22312.

WANTED: Military, commercial, surplus, airborne, ground, transmitters, receivers, test sets, especially Collins Airborne. We pay cash and freight. Ritco Electronics, Box 156-Q567, Annandale, VA. Tel. 703-560-5480 Collect.

WANTED: 2 to 12 304TL tubes, Callanan, W9AU, 625 West Jackson Blvd., Chicago, Ill. 60606.

WANTED: For personal collection: The Radio Amateur's License Manual, Edition 12, ARRL "Map of Member Stations," 1914, WIGUT, 18 Mohawk Drive, Unionville, CT. 06085.

WANTED: HP524A freq. converter and any plug-in accessory for HP524B or Northeastern Enggr., Inc. 14-20C counters. Need 10-18 over and assembly for 14-20C counter, prefer working one, and manual for 14-20C. Pepos S. Dousson, 314 W. Mistletoe Ave., San Antonio TX 78201. Tel. 512-735-5654.

SELL: Heath DX-60B 80-10 meter transmitter. Never used and in perf. condx. Must sell \$75. Postpaid. Mike Wilke, WB4AQL, 3607 Cambridge Road, Montgomery, AL 36111.

NOTICES: Need help for General ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License, Box 6015, Norfolk, Va. 23508.

SALE: Clegg Zeus, \$300 and Interceptor, \$325. Drake TR-4 with power supply, \$500 and R-488, \$325. Olson "6" with Lafayette 6 and 2 VFO, \$100. All in mint condx., factory manuals and cartons. Any reasonable offer considered. Barney School, 1855 Kimberly Road, Sharon, PA. 16146. Tel. 412-324-4462.

JOHNSON Inverter 2000, 2 KW SSB, 1 KW cw, 80-10 meters. \$465. Gonset G66R RX with ac/dc power, \$50. TFF-30 lightweight TTY. S/R, 120 a.c. motor, brand new, \$75. All with manuals. W6ME, 4178 Chasin St., Oceanside, CA 92054.

COLLINS 51S-1, the finest receiver. With manuals, excellent. Current Collins item rarely available used. Certified check \$1125. Air prepaid. W. Kay, Box 487, Fairbanks, ALASKA 99701.

APRIL showers may bring May flowers, but they also bring thoughts of the Hudson Division Convention, October 17-18, Hilton Motor Inn, Tarrytown, N.Y. Exhibits, lectures, contests galore! Get all the facts from Hudson Amateur Radio Council, Box 58, Central Islip, NY 11732.

DX Awards log. 150-page book lists contacts for over 100 major worldwide awards. Individual log for each award for record of contacts and confirmations. Required over two years to prepare. \$3.95 (\$4.95 foreign). McMahon Company, 1055 So. Oak Knoll, Pasadena, CA 91106.

HAM's Spanish-English Manual. \$3. Ppd. Gabriel, K4RZY, 1329 N.E. 4th Ave., Fort Lauderdale, Fla. 33304.

DAI-DITTEK Keyer, integrated circuit electronic keyer. Fully self-omitting on both D11 and D12 with automatic spacing. Built-in ac pwr. supply, send relay output, with side-tone monitor and speaker. Completely assembled and tested. Only \$34.95. Dealer inquiries invited. Send your order to M & M Electronics, 6835 Sunnybrook, N.E., Atlanta, Georgia 30238.

WIRELESS shop. New and reconditioned equipment. Write, call or stop for free estimates. 1305 Tennessee, Vallejo CA 94590. Tel. 707-643-2797.

V-E-R-Y In-ter-est-ing sample sent free. W@ Bargains galore, 1949 Van Reek Lane, St. Louis MO 63131.

PHONE Patch, with 2.5 kc filter, for Telo coupler or direct if not required; no transformer. Kit, \$6.95; wired, add \$4. Ham Kits, P.O. Box 175, Cranford NJ 07016.

FOR SALE: BC-610 transmitters, modified for commercial use. \$35 each. Offshore Raydits, Inc., P.O. Box 23503, New Orleans, LA 70123.

WE buy electron tubes, diodes, transistors, integrated circuits, semiconductor and resistors. Astral Electronics, 150 Miller St., Elizabeth, NJ 07207. Tel. 201-354-3141.

COLLINS 75A-4 3 kc. and 2.1 kc. filters, in perf condx. \$390. John Morn, 4145 Sonnet Ave., Osceola MI 48750.

WANTED: Electronics instructor. General, Theory and Workshops. Science Camp, Lake Placid, NY. Write Epstein, Apt. 4B, 440 Westend Ave., NYC 10024.

WANT early issues of Pioneer Wireless Magazines for W4AA Historical Library. Wayne Nelson, Concord NC 28025.

NEMS-CLARKE, GEL, DEL and other special purpose receivers wanted. Send accurate description of what you have to Tucker Electronics, P.O. Box 1069, Garland, TX 75040.

TELETYPE wanted: Models 28, 32, 33, 35, Rdcovers R-390A, R-388. Cash or trade for amateur equipment. Alltronics-Howard Co., Box 19, Boston, Mass. 02101. Tel. 617-742-0148.

SPIDERS for countless quads. Hehara welded aluminum. A's Antenna Accessories, 1339 So. Washington St., Kennewick, Wash. 99336.

R389, R390, R390A, 1J4, 75A4, 75B3A, NC101X, HR507T1, HR507T1, SP600, KWM-1, KWM-2, 6281, 312B5, HA-2, and others. List for SASE. W2ADD.

SELL: Trade or buy Cull Books, Handbooks, magazines, and old radio sets and parts. Erv Hasmusser, 164 Lowell, Redwood City, Calif. 94062.

WANTED: An opportunity to quote your ham needs, 30 years a ham gear dealer. Collins, signal/One, Drake, Swan and all others. Also \$25,000.00 inventory used gear. Request list, Chuck, W8UGC, Electronic Distributors, 1960 Peck, Muskegon, Mich. 49441.

TRANSFORMERS rewound. Jess W4CJL, 411 Gunby, Orland, Fla. 32801.

GREENE - Center of dipole insulator with or without balun. Free flyer. O. Watson Greene, Box 423, Wakefield, RI 02880. See December QST, p. 150.

MICHIGAN hams! Amateur supplies, standard brands. Store hours 9:30 to 1:30 Monday through Saturday. Roy J. Purchase, W8RP, Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Mich. 48104. Tel. Normandy 8-8262.

TOROIDS, 88 mh uncased, 5/82.50. Postpaid Humphrey, WA6FKN, Box 34, Dixon, Calif.

SAVE. On all makes of new and used equipment. Write or call Bob Grimes, 69 Aspen Road, Swampscott, Mass. 017-598-2530 for the gear you want at the prices you want to pay.

WANTED: All types of tubes. Top prices paid for Varian and Eimac. Jaro Electronics Corp., 150 Chambers St., New York, NY 10007.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, NY 13902.

DUMMY loads 1 kw. all-band. \$7.95; wired, \$12.95. Ham Kits, P.O. Box 175, Cranford, NJ 07016.

1000 PIV @ 1.5 amp. epoxy diodes includes disc bypass caps & bridging resistors. 10/\$3.95, 100/\$30. Postpaid USA. Dealers inquiries invited. East Coast Electronics, 123 St. Bonifare Rd., Chieftownga NY 14225.

SATELLITE Amateur Radio Equipment Co. New and Used Ham Gear. Repair service. Ham antennas - supplies. 426 Boston Post Road, Waterford, Ct. 06385. Tel. 203-443-4841.

COLLINS 75A4, ser. No. 20326, 2 filters, \$350. 301-J, \$335. Swan 350 and 117XC p.s. \$275. All mint condx. M. G. Klapp, 25 Gladwin Rd., Delmar, NY 12054. Tel. 518-439-9531.

RECEIVING and industrial tubes, transistors, all brands. Biggest discounts. Technicians, hobbyists, experimenters. Request free giant catalog and save. Zalytron, 469 Jericho Tpk., Mineola LI NY 11501.

HELP! Hawaii, Alaska where are you? What GMT and band do you hear Germany? Need for WAS. Set schedule. Vandegriff, DL4VA, MATCOMLSMO, APO, NY 09042.

CHRISTIAN Ham Fellowship is now organized for Christian fellowship and witness among licensed amateurs. Free gospel tract sample and details on the organization on request. Christian Ham Callbooks, listing members, \$1 on donation. Christian Ham Fellowship, 5857 Lakeshore Drive, Holland, Michigan 49423.

SELL: EICO 758/751 supply FW and carton works #145. W4YPT Route 3 Box 236 Charlottesville, Va. 22901.

SWAN 500C, 117XC, mike, All mint. Best offer, 371 Jackson Ave., West Hempstead, NY, 516-481-2021.

KWM-1 with 516E-1, ac supply, 138E-1 noise blanker, mobile mount, \$250. D.R. Clayton, K6DFF/4, Rt.3, Box 159, Warrenton, VA, 22186.

WANTED - Copy of "Practical Wireless Telegraphy" written by Elmer E. Bucher published by Wireless Press in New York - subsidiary of American Marconi Company - about 1919. Reasonable price - John F. Allen, W5PZ, PO Box 777, Port Isabel, TX 78758.

CLEANING House - selling Hammarlund SP600-JX receiver, excellent condition - new, never used Central sideband slicer, Model B - Johnson Viking 1 Transmitter, TVC, new AD32 Heath AM2 bridge, Collins 35C LP filter - FM VFO with speech encoder - powerstat 2KVA, Type 1126 - Meissner EE signal shifter and FMX - RME VHF converter, 10/6/2 meters - will consider fair offers. Write David Adlerblum, W2QAL, 14 Caryl Ave., Yonkers NY 10705.

FOR Sale: Heathkit HW-12, transceiver w/cab \$80. Heathkit HW-22, \$70. Globe King 500A, \$125. Gonset 913A 500w linear, \$200. Gonset 2m 100w linear w/spare finals, \$75. Gonset Comin III, \$115. Eico F20 90w cw rig, \$80. Knight R-100A receiver, \$55. Heathkit V-1 VFO (10-60m), \$15. Swan Mark VI 6m linear 2 kw input, \$395. All equipment is in mint condition. Have manuals for everything. You pay shipping. Marilyn D. Drieh, 605 Kroad St., Endicott, NY 13760. Tel. 607-764-4101 before 2:30 PM.

BEING transferred to Philadelphia area - looking for proven radio location? Attractive colonial house aluminum sheathed, fully modernized, six bedrooms, two baths, two lavatories, full attic, basement. Fireplaces - living, dining & library. New elementary, Jr. & Sr. high schools nearby. Dipole antennas for 160 thru 40 meters plus beam on towers for 10, 6, 2 and 1 1/2 meters included. Luxurious 22 acre driveway of the highway, less than 30 minutes from urban centers. Ed Braddock, W2BAY, P.O. Box 305, Haddonfield, NJ 08033.

FOR Sale: IRR35C 200-400 Mc. receiver, stat and tunable control, \$150. 7500 with 500 Mc. crystal, \$240. 2 meter kw linear pair of ACX300A as per Feb. 1960 QST, complete with tubes less power supply \$100. NCX3 with matching speaker power supply \$150. RME DB22A pre-selector \$20. Jennings UC5L1000 with motor \$20. Miller 27-32 Mc. pre-amp \$15. Super 12 converter \$25. Gonset superreceiver \$15. Terevif CC-50 6 meter converter \$35. Hallicrafters BA-45 kw power supply (new) \$50. Send s.a.s.c. for list of other junk. James M. Long, P.O. Box 6742, Birmingham, Ala. 35210. 205-392-9998.

NEED HRO-5TA1 receiver with coils, speaker, power supply. I am 19 years old and will use this receiver to get my code speed up and get my license. Any reasonable price ok. I will have it used if you are more than 200 miles from me. Bobby Heckler, Jr. Box 216, Fort Myers, Fla.

SB-101 - Excellent, EICO 751 p/s, All \$350. Tom Schnabel, 38 W. Mountain, W. Simsbury, CT. 06092. WA1JGB.

DRAKE TR3, AC3, MS3, DC3. Excellent condition, \$450. KW matchbox, \$90. WA8CKY/4, R. Dixon, #425F, 201 Harbour City Parkway, Indian Harbour Beach, Fla. 32935.

SELLING: Model 26 Teletype, \$50. Model 28 KSR, best offer. Super-Pro receiver, (250 kw to 40 Mc. with p/s, \$50. ARC-2 transceiver, \$30. Navy RBM3 reverts #1 and #2, 200 kw to 20 Mc. with pwr supply, \$60. 2S 34/AP, scope, \$25. Fwr supply, RA-62C, \$20. Tel. 212-452-6473. Write: K2CUP, Leo W. Schubert, 75 Jefferson St., Brooklyn 6, NY, 11206.

WANT Viking VFO and matchbox for Viking II. Albert Ayling, DAC, USA Eng. Comd, Const. Dir, APO New York 09757.

CLEGG 99er \$50, Knight V107 VFO \$20. Both in excellent condition. D. Reese, M.D. 747 Madison Ave., Charlottesville, VA, 22903.

SWANS: Excellent condition no scratches, 400 \$197.50, 406 VFO \$37.50, 420 VFO \$60, 412 DC \$55, 117B AC \$37.50, combination 400, 406 and 415 \$275, or 400, 420 and 117B \$275. Price includes shipping. W2QJF, 630 Highland Road, Ithaca, NY 14850. Tel. 607-273-0311.

HEATH SB-630 station console well wired, \$69 postpaid. Crystals, 80-10 meter, free list, \$1. Steve, WA2FKE, 12 Sanderson, W. Caldwell, NJ 07006.

KEYBOARD for code/typer, electronic RTTY, etc. 50 low pressure switches in frame, typewriter format, \$30. Ampex VR7000 VTR, \$1000 (pickup only). Xtal time marker generator for scopes, \$30. Rick Factor, WA2IKL, 40 West 60th St., New York, NY 10023.

FOR the finest in amateur gear, write for a free catalog. Amateur Radio Headquarters, 514 Yellowstone, Billings, Mont. 59102.

HAM - counselor, over 18, to instruct at a children's camp in the Pocono Mountains of Penna. Own equipment required. Explain type equipment and further qualifications to Pocono Highland Camps, 6528 Caston Ave., Phila, Pa. 19139.

WORLD RADIO has used gear with trial-terms-guarantee! \$4344C \$129.95; HW32 \$89.95; Swan 250 \$199.95; 500C \$379.95; DuoGander 84 \$99.95; 753 \$119.95; SB33 \$189.95; Galaxy 5mk2 \$279.95; 75A3 \$209.95; 75S3B \$499.95;

5X101mk3 \$159.95; Drake 2A \$159.95; 2B \$179.95; NC300 \$149.95; Free "blue-book" list for more. Write: 3415 West Broadway, Council Bluffs, Iowa 51501.

SELL or trade Xmttr Globe Chief deluxe 80-15 m, 90 watts \$25. 6 m cw xmttr & p/supply, has VFO \$15. B&K model 500 mutual cond. tube tstr \$20. Want g.d.o. 6m converter of 6m xcvr. Gene WA0KXE, 1002 Concert Keokuk Ia. 52632, 319-524-7569.

MOSLEY CM-1, hamband double conversion receiver and Globe Scout 680-A transmitter, 80-6 meters, \$110. Shipping extra. Thomas Ledoux, 710 Haines Blvd., Champaign, Ill. 61820.

SWAP only. Have near new 7583B/32S3/312B4. Want KWM-2 62S1, J. Thacker. RR 18, Box 131, Indianapolis, Ind. 46224. 317-852-3832.

R-392/URR receiver (24vdc R-390) \$300. Collins 180 S-1 kw antenna tuner \$50. Collins 180 T-2 3-30 Mcs. vertical antenna system \$200. Heath HA-14 linear \$100. WA6GZZ, 4133 Stonercenter Way, North Highlands, CA 95660.

FOR Sale: Galaxy 5MK3 500 watt with speaker in mint condition, \$275. Also model 19 teleprinter with table and tape reader \$75. John Willis, Apt.27B, 2449 Union Blvd., Islip, NY 11751.

WANTED: 2 meter linear with a.c. power supply. WA7JYQ, Wallace Luther, Colfax, WA, 99111.

JOHNSON Invader 2000 with cables, manual, \$495. Excellent condx. HQ170C with matching spk, manual, \$175. Excellent condx. Don Schwartz, W5QV1, 1013 Gorgas Circle, San Antonio, Tex. 78234.

COUNSELLOR for ham radio program. Top NY state brother-sister camp, 100 miles N. of NY City. Camp Seatico, 25 Penimore Rd., New Rochelle, NY 10804.

MOBILE bi-band ten watt transceiver \$15. Thirty watt \$25. No shipping. W2QDC, Pleasantville, NY. Call 914-769-9331.

NOVICE Station. Heath SW-16 transceiver, factory aligned & new tubes; HG-10 VFO; SB-600 speaker; Knight SWR meter; Newtronics 4BTU antenna with 80 meter resonator; Hygain 5BDQ trap doublet. All perfect, \$185 cash & carry. Seymour F. Goodman, WN4LEU, 110 Huntington Place, Danville, Va. 24541. 703-793-9980.

COMPLETE Station: HA-350 receiver w/speaker, \$95. T-150 160-watt AM-CW transmitter w/VFO, key, microphone, crystals, \$70. Electronic keyer, \$30. Plus Lr-switch/preamp, cw filter, antennas, cables, connectors. Peter Samick, 206 Walden St., W.Hartford, Conn. 06107.

FOR Sale: Swan 500C, 117XC, equipment in mint condition, \$450. Drake TV-1000 low pass filter, \$10. K9LWA Robert White, 2540 Birch Drive, Richmond, Ind. 47374.

COMPLETE 80m mobile rig. HW-12 SSB xcvr, HP-13 dc pw.sp., HS-24 spkr, G1-12 mike, huster whtp MO-1, RM-76 resonator. \$110 takes. Cash pay. You ship, WB4MGA, 4307 Wynchiff Dr., Richmond, VA, 23235.

SELL. SR400 transceiver and PS500AC power supply \$595. Will consider trade for S-line equipment. Like new condition. K2AC, exK2GDP, Wheeler Ave., Fayetteville, NY 13066.

HR-10B xcvr, like new condx. \$65. A. E. Wilson, Box 392, East Brewster, Mass. 02640.

DRAKE T4XR with AC-4 power supply. Both brand new. \$375. for both. W9QMP, 445 Julia St., Lemont, Ill. 60439.

SWAN 350, cw sidetone, selectable sideband, calibrator, mike, hug, 117XC supply, \$295. WB2KDB/5, 2401 Taxco, #241, Fort Worth, Texas 76116.

SALE or Trade: Retina Mark IV camera EK serial number completely recomended by Kodak f 2.8 lens. Cash \$140 or trade comparable stereo tape recorder. A. H. Davis, 1508 Gawan, Borger, TX 79007.

WANTED: Collins 3253 or 3281 with PS, mint condition. WA3FXQ, Ed, 561 Charles Drive, King of Prussia, Penna. 19406.

NATIONAL VX-501 VFO console \$125. Cumled speaker processor \$100. Both mint condition. WA9FHK, 703 N. Garfield, Lombard, Ill. 60148.

SELL: Swan 240 transceiver, Galaxy dc power supply. Huster mobile antenna, Heath 6 meter transceiver, Cecil Enlow, 3127 Brackenwoods Lane, Cincinnati, Ohio 45211.

WANTED: RME 69 in working condition with tubes. State price in first letter. Jack Swanson, W5PM, Covington, La. 70433.

DRAKE T4X. Late factory, updated with PET PTO. AC supply. MS4, RB, MN4, SC2, CG8, C81, and approximately \$100 worth of short-wave crystals and misc. items. All immaculate with very few hours. All for \$900. Will consider some items separate. Reason is other interests. Calvert Blacketer, WA9UGG, PO Box 515, Princeton, Ind. 47570.

WHO is prepared to help? A German Ham would like to work as an operator with an American firm which is engaged with seismic or checking pipelines by means of using ultrasonic- and X-ray- equipments. Many years of experience abroad. Who knows an OM in oil-business or who knows somebody I can contact? Please do write to me. Paul Soeldner, DJ1MH, Box 1551, Cologne/Germany.

WANTED: HW32A, no p/s. W4UR, PO Box 10, Falls Church, Va. 22046.

SELL: One two thousand volt five hundred mil power supply with extra seventy dollars. Edmund Giogliotti, W3APE, Bangor, Penna. 18013.

WANTED: Used Drake TR-4 blnker preferred, AC-4 and DC-4. Perfect operating condition wanted. State price. W1FTE Skip Colton, 222 North St, Windsor Locks, Conn. 06096.

GALAXY V Mk2 \$320. AC supply \$55. Deluxe Galaxy accessory console \$75. Vox, calibrator, and P3 cv filter. Price for \$55. Heath HDP-21 A mike \$20. The package \$500. K3HTO, Tankhannock, Pa. 18657.

COLLINS 75S-3B with 10 m. xtal and 5 kc. filter—32S-3-312B4 and home brew power supply. Lots models with factory packs \$975. Drake 84B - MS4 - TX4B & H.B.P.S. late models. \$625. Drake TR4 & H.B.P.S. \$380. Lab test equip @ HP - G.R. prd etc. \$55 C & D. 430-C. 200 CD. 400H, 415B, 412A, 410B, etc. Too numerous to list. Send SASE for list. Equip in excellent cond. Shipping costs extra. Prefer local deals. Del Crowell, W7GV1, 134 S. Ridge, Mesa Ariz. 85204, 964-0712.

WANTED: ok or ng. Eico 753 ssb transceiver, state tube or semiconductor vfo, or HW 100 SB33. Cheap linear Hunter Bandit LA400C, Warrior, Miniproducts B24-2k beam. Lennart Larsson, Vulcanusg, 8:11, Stockholm, Sweden.

WANTED: Transcription records 16" Armed Forces Radio Service. Theasaurus, Standard, RCA-NBC W4ML, 5041 Jakeman St., Va. Beach, Va. 23455.

GROUNDRED grid filament chokes 30 amps, \$4.50. Plate chokes 800 ma. \$2.50. 3-30 Mc. PPU5A 4B William Deane, 8851 Sovereign Rd., San Diego, Calif. 92123.

SELL: NX-8R \$80. FT-200B 10-80m filter SSR Tx 240 w PEP 6th Mic. \$120. Johnson 275w match box with SWR \$50. Omega G noise bridge T67-01 New \$10. Heath kw dummy load new \$10. B&W balun coil set \$5. Bud kw low pass filter 50/75 ohms. \$10. Carter Dynamometers 12v input 600V @ 400 ma & 300v @ 100ma. both for \$10. 14AVQ vert new \$25. W. H. Wiley, P.O. Box 659, El Granada, CA. 94018, 415-726-2805.

MANUALS - R-390/URR. R-390A/URR, OS-8C/U. \$8.50 each. Many others. List 20c. S. Consalvo, 4905 Roanne Drive, Washington, DC 20021.

HEATH Shawnee six meter transceiver with nuvistor preamp, like new conditions \$100. Hallicrafter HA5 VFO \$25. Mike Bloom, WA2RAT, 834-43 Street, Brooklyn, NY 11232. Tel. 212-438-7188.

STEAL: NCX-5, nak-11, NCX-A and VX-501 vfo console. Complete matching station for \$395. Contact WA1MBG, Belvuna Circle, Pelham, N.H. 03076. Phone 603-835-2608.

DRAKE L4 linear, new condition, will deliver 200 miles. \$500 or trade for TR4, MS4, AC4, E. Heubach, W9A0, 216 Edgewood, Morton, Ill. 61550.

SS-101-A receiver excellent condition, stable, manual, speaker. \$150 or best offer. WASZML Jim Grafty, 11225 Tecumseh, LaGrange, Ill. 60525.

HEATHKIT HW32A 20m transceiver, power supply 120-240v. Perfect. \$130. Jim Hirschberger, Goshen College, Goshen, Ind. 46526.

HT32, \$100. Eico 720, \$30. Eico VFO, \$15. Eico 730 modulator, \$30. Kent Farlow, 202 Silverside, Wilmington, Del. 19809.

LINEAR amplifier, homebrew, 4-811As, \$80. 12AVQ vertical \$15. 6v coak relay \$5. Johnson TR switch \$15. W2NGX/3, 7727B Nelson Loop, Ft. Meade, Md. 20765.

SBE-34 mint condition, used very little \$280. Conrad Welch K3BRH, 1647 Dogwood Circle, State College, Pa. 16801. 814-237-3264.

75A-4 good condition low serial number \$350. Hallicrafter HU-37 good condition \$175. We pay shipping. Write RPI Radio Club, W2SZ, EE Dept., Troy, NY 12181 or call 518-273-5150.

WANTED to buy for private museum. Spark sets, old receiver IP500, Marconi, Paragon, Amrad, Murdock, Grebe, Kennedy, Federal, DeForest, Audion control boxes, Atwater Kent Breadboards, Haddam Wireless Museum, Ernest A. Woods, Beaver Meadow Road, Higganum, Conn. 06441. 203-345-20-44.

MARCONI instruments; 2002 AM Generator, 10kHz-72mhz with fundamentals, all transmitter; TF 100/33 DHF generator 470-960 mhz; TF 2701 in-situ bridge, 104°C VTVM, all brand new except VTVM, slight use, 50% off. L. Perez, KP4AKV, 247 So. 11th Ave., Highland Park, NJ 08904. 201-572-0369 evenings.

T-150 6 thru 80 meters VFO \$50. \$400 covr \$50. Robert H. Cushing, 12 Carter St., Plymouth, Mass. 02560.

SALE Hammarlund HQ170A receiver 160 meters thru to 6 meters with 24 hour clock like new condition will deliver 100 mile radius \$160. K2BFX I Lenoir Ave., Freehold, NJ 07728.

SELL: NCX5 all bulletins \$150. NCXA AC supply \$60. SR200 mint \$200. two extra Citron 572B \$12 each. Heath NP13 DC supply \$40. W90EQ, RR2, Mokena, Ill. 60448.

SELL: Collins 75S-3B unused perfect \$490. W. Kinghorn, 5924 11th Ave., S. Minneapolis, Minn. 55417.

SX-111 in excellent condition \$115. Will ship. Rick Rosen, WA2TR0, 6252 Northwood, St. Louis, Mo. 63105.

AUTOMATIC antenna tuner, Hoffman hi-pwr Navy unit, never used. Complete manual sheets. \$295. FOB Atlantic City, O. Horn, 527 N. Mass. Avenue, 08401.

CRTS WANTED: looking for 7AQPT and SC2799P1. Advise Wayne WRTGL RFD2, Box 305 Fairmont, W.Va. 26554.

COLLINS 75A-4 3 kc and 2.1 kc filters. In perfect condition. \$390. John Morn, 4145 Sunset Ave., Oscoda, Mich. 48750.

COLLINS S-line latest models exceptional fine condx 75SRB with cv filter \$525. 32S3 with 516F2 \$810. David Talley, W2PF, 40 East 8th St, New York 10003. Tel. 212-982-2420.

CAMP instructor. First phone. Advanced amateur, retired USAF officer will donate instruction to a summer camp. W7BIF.

COLLINS: To settle estate. KWM2 \$695, 30L1 \$275, 516F2 \$80, 516E1 \$165, T10 \$125, \$1100 takes all. Also Swan 240 \$165. Mrs. J. B. Frye, 36 Bugette Dr., Homer NY 13077. Tel. 607-749-3192.

QSLs Fast service. Fine samples. Rolles, W50WC, Box 9848 Austin, Texas 78757.

TRADE: CV-89 TTY converter. Hallicrafter ISB rec-2-30 MHz Northern Master Osc. 2-30 MHz, for scuba gear. Ray Lyon W1FCY, 15251 Crest St., Woodbridge, Va. 22191.

FOR Sale: NCX-3, HP-13, \$150. 75 and 20 meter bumper mount Hustler, Motorola Mic. Vespu scooter (trade). E. F. Rokeit, 1166 Ridge Road East, Rochester, NY 14621.

WANT to buy: Apr-Jul-Aug-Sep-Oct 1968 Ham Radio Magazine. J. Demler, 5930 N. Hutchinsburg St., Philadelphia, Pa. 19141.

FOR Sale: SB-401, SB-301, SB-200 plus many extras! All p excel. condx. Will consider trade on lightning class sailboat or deal on boat in the Cal-21 category. K8MPF, 10109 Woodlawn, Kalamazoo, Mich. 49002. Phone 616-327-4517.

SELL SB-200 linear! Going SB-220. Absolute mint condition. Used little. New, professionally wired. Best price over \$215. Sam Brown, WA4JUM, 2166 Allendale Drive, Clarksville, Tenn. 37040.

WANTED: Drake P4X, W9H1, 5464 Olympia Dr., Greendale Wis. 53129.

DX-60 \$85. V-44 VFO \$10. TH-108 \$85. All in extra fine shape. WA9BYR, 827 Dundee Ave., Barrington, Ill. 60010.

QST - set from Feb. 1931 to Jan. 1968. Make offer. Write Bill Moon, Rt. #1, Box 17, McRae, Ark. 72101.

CENTRAL Electronics 10A & VFO \$60. NC200 recvr \$60. RT19 ARC4 \$30. R. Legg, 0-114 Blue Hill Ave., Fairlawn, N. 07410.

SB-300, just reconditioned, 2000, T-60, \$25. Eico 722 VFO \$25. D-104 with G stand, \$25. Lightn' Bug, \$15. Gutham V-8 vertical with roof stand, \$12. Instructograph with tapes, \$22. Chris Bagby, 792 Techwood Drive, Atlanta, Ga. 30313.

WANTED: Good used Heath HW100 with AC supply also Heath linear prefer HA 14 or etc also want Galaxy 5 with AC supply. E. R. Arms, 214 Ward St., Senatobia, Miss. 38668.

FOR Sale: Heath HW100 \$220. Heath RF Lab generator \$50. Both fully guaranteed and purchased this year. HT44 kmitic best offer. K4NDX, 4724 S. Court, Montgomery, Ala. 36101. 212-288-0268.

XMTR - Collins TCS-12, 160-40m VFO xtal, SCR522, ARC55, 1.3-9.1 Mc. Rect. Rev. BC453A-45R, Gonset GR211, with S-meter and ANL, commercial converters 3-5.5 Mc. National 50 modulator. R. Beck, K2JUR, 13 Georgetown, Parlin, N. 08859.

FOR Sale: Johnson Viking 500. Excellent condition \$200. Mr. Russell E. Freed, Ridge Road, R.D.#1, Pottstown, Pa. 19361. Phone 215-469-6004.

FOR Sale: Drake TR-4, RV-4, A-4. Mint condx. Has Thompson, K9KRN, Winslow, Ind. 47398. Phone 812-789-3377.

FOR Sale: CE20A/QT-1. 458VFO, 600L & 5K96 all manual best offer. G. M. Schartz, Rt.4, Box 1737, Huntsville, Ala. 35803.

SB-200 Absolute mint condx. Best offer over \$175. R. Jansen 100 St. Mary's Blvd., Green Bay, Wis. 54301.

COLLEGE-Bound, must sell Hammarlund HQ-110AC-VHII excellent condition, \$185 T-60 transmitter, \$12. Rob Walde W4KWX, 263 Wrenway, Medina, Ohio 42256.

COLLINS KWM-2 transceiver with Waters rejection notch filter and 516F-2 ac power supply for sale. \$950. Contact De Cromeyer, W2DQL, 211 Barnes St., Ossining, NY 10562. Tel. 914-941-4840.

AMECO 6 & 2 xmitter. Walters Nuyster converter for 6 & Bill Miller, WA4JAY, 6251 S.W. 34 St., Miami, Fla. 33155.

WRITE phone or visit us for the best deal on new reconditioned Collins, Drake, Swan, Galaxy, Hallicrafter, Hammarlund, Hy-Gain, Mosley, Waters, Henry linear, 871 line towers, rotators, other equipment. We meet any advertised cash price on most equipment. We try to give you the best service, best price, best terms, best trade-in. Write for price lists. Your inquiries invited. Henry Radio, Butler, Missouri 64730.

VASU Fldx 2000 I kw PEP linear. \$175 or best offer. R. Foraker, WB6P0H, 4259 Governor Dr., San Diego, CA. 92112.

MUST sell Vahant I. A little work on pi network tuning, but good condition. \$75. WA2VWR, Sparta Methodist Church Sparta, NJ 07871. 201-729-3660.

COLLINS. Never on air. 32S-3 \$495. 75S-3B \$415. 62S-1 VFO converter \$495. 516F-2 \$90. 30L-1 \$295. All for \$165. WA8VFK, 314 So. Western Ave., Springfield, Ohio 45506.

SB-300 receiver - SSB/CW/AM filters included. Condition excellent. Need cash \$175. WR3CGW, J. Yearsley, 142 Walworth Park, Cherry Hill, NJ 08034.

CHICAGO area 2 meter fm 12vdc scvcer with vibrator p 146.44 crystals complete. Make an offer! WA9BYR, 57 Dundee Ave., Barrington, Ill. 60010.

SWAN 500 + AC power supply for sale \$300. Medical store has used very little. Steve, K9YTL, 3055 N. Mendota S. Apt. 78, Indianapolis Ind. 46208.

WANT: 270 Deluxe Cymnet, or SR 400 or NCX-5 complete. Have to trade: slate 8' pool table, \$995 value. Consider less 5-bander and cash. Can deliver in southern California. Phone write final to Gene, WA6WCH, 1698 Swift Ave., Ventura, Cal. 93003. 805-642-9624.

VENEZOLANOS - se vende maquina de teletype (Teletype Corp.) model 15 con convertidor Northern Radio 152, ambos en perfectas condiciones. WASHXR/YV5, Tel 61-80-67 Caracas.

VENEZUELANOS - Selling teletype model 15 with automatic carriage return and line feed, and Northern Radio 152 converter, both in excellent condition. WASHXR/YV5, Tel 61-80-67 Caracas.

HEATHKIT HR-20 mobile receiver. Completely assembled. Includes also power supply and speaker. Covers bands 80, 100, 20, 15, and 10. Designed to receive SSB, AM and CW. Excellent condition and beautiful reception. \$100. Write or call Stuart Sutker, 22 Chandler Rd., Edison, NJ. Phone 649-8494.

DRAKE R-4 receiver with MS-4 speaker, new condition, with manual in original carton, \$200. Central Electronics 200V transmitter, the Cadillac of all transmitters, also like new, \$340. Both of above for \$500. Gonset 6 meter communicator IV, AC & DC supply, excellent condition. 125, L. G. Russell, K5ZCU, 11714 East 17th Place, Tulsa, Okla. 74128. GE 7-1244.

HEATH HW-100 receiver with ac, dc p.s. perf. condx. Plus IC keyer, tuner, SWR meter, mobile ant, and 100 ft. coax. Best offer over \$330. WA0VNH, 1002 Linden, Laverne, Minn. 56156.

SELL: Transistor transformer Heath HP 13 power supply \$11. W6BHH.

WANTED: Clegg 22'er. Williams, 9655 Murkirk, Laurel, Maryland 20810.

COLLINS 75S-3B receiver \$395. J2S-3 transmitter with 516F2 supply \$495. W2HU, 37 Rodney Lane, Westbury, NY 11590. Tel. 516-333-7312.

HT-44, PS 150, SR 117 - \$415. SBE-34 plus mike, calibrator, mobile mount - \$195. Skylane quad (fiberglass) \$30. Cushcraft adjustable dipole (10-15-20) \$12. SB-200 amplifier \$135. Dr. Crosby W1QP, Chatham, Mass. 02633. 432-1157.

FOR SALE: Gonset Comm II and 8 El Telrex \$100. NCX-3 w ac supply \$200. HA-5 VFO \$40. Eico 723 \$30. All in good condition. Alec Steingart, WB2MZE, 3356 Frederick St., Oceanside, NY 11572. 516-678-5080.

COLLINS KWS-1 SN 1591, D104 Mike, Ant Relay. 75A4 SN 5417 with 6, 3.1 and 0.8 mc filters. Both \$1000. Also Tapatone converters XC144 two meter with p.s. XC 50 C4 six meter with p.s. Globe Electronics VHF 6-2 fifty watt xmitr. Central Electronics Multiphase RF analyzer. R. L. Drake Piome Patch. Excellent condition. Write offer. H. S. Burns, W1KVV, 38 Greengate Rd., Falmouth, Mass. 02540.

WANTED: RME 69 in working condition with tubes. State price in first letter. Jack Swanson, W6PM, Covington, La. 70433.

SELL Swan Cygnat 270 operated only 4 hours \$475 or best offer. W6PFP, 111 So. Crescent Dr. Rome NY 13440. Tel 315-336-0452.

TRADE TR-4 (mint - 6 mo. old) for R4a and 14x or will sell it for \$495. Wanted Drake 2NT: T4XB. Walt Gass 515-233-1895.

DRAKE 2C, 2CQ and xtal calibrator - excellent condition \$205 FOB. Ken Bauer, 6358 Lyric Lane, Falls Church VA 22044.

LINEAR buildings - Send s.a.s.e. for amplifier and power supply parts low price list. Marc - 8500 Skyline Dr. Los Angeles 90046.

WANTED: HAL HA-5 VFO in vry gud condx. Jesse Rausch RR2 Gettysburg So. Dak. 57442.

SALE: GSB-100 xmitr. Good condition. \$95. K4TQK Bill Boone, 305 Cross Timbers, Nashville Tenn 37221. Phone 352-6885.

SB-200 in unusually excellent condition, new finals, \$185; Model 14 repeformer, overhauled, w/o print, \$35. Prefer local interest. K3MNU, 8361 Langdon, Philadelphia PA 19152.

SELL: 20A with QT-1 and CE458VFO, \$85; Globe LA-1 linear, \$50; Mint Drake 2B, \$175. Manuals. FOB. R. McCullie, 139 Denmore Ave., Buffalo NY 14220.

FOR SALE: Swan 400 receiver, 408 tuner, 12 v. mobile p.s., \$275. WA5WKR, 2708 NW 120th St, Oklahoma City OK 73120.

TRADE - My complete Collins S-line for light plane. 30S-1, 32S-1, 76S-3 and 120 crankup tower never used. Jim Lundy WA6BMM derving NME88030.

SELL: Hallcrafters SX-117 receiver latest model Exclpt condx \$200; Heathkit DX-40 transmitter gud condx \$30; Vibroplex excite origina bug mint condx \$25. You pay shipping! WN9ZP, 2227 Taylor, Joliet, Ill. 60435. Tel: 725-3893.

HQ-180C w/speaker, mint, \$250; HQ-145C w/speaker, \$145; DX-601 & WGT-111 FQ mint, \$30; RME DR33 signal booster \$15; Astatic 10C mike w/stand, \$10; will ship. K3JHG 215-EL6-0822 (eve); L2U60 (days).

QSLs, free samples and estimates. Cohen, Drawer Q, Pittsford NY 14534.

HAMMARLUND HQ-170A-VHF with noise immunizer, 160 thru 2 meters; excellent condition; \$295 or RO; FOB Conn; Stewart C. Davis, K1KTB, 34 Cornwall Dr. Manchester, CT 06040. 203-644-2334.

SELL: Complete station, R-9A/2B/2BQ, TX62/621VFO - Swan 250/117XC - HO 10 - D-104 D10C - Vibroplex - Polymor 2B - Model 19 RTTY - Mod 14 RTTY-AM/SGC1A - Rec30 P/S - TD-6L Beam 6M - 11L beam 2B - AR22 - Entire station \$1200. All cond. WB2PEF 2536 Hyacinth St. Westbury NY 11590. 516-333-4202.

RETRING to smaller quarters. Sell: HT-44 with PS-150-20 power supply excellent condition \$250; 2B, 2BQ, part #175; AN-144w converter #2-32 with PS-1 power supply, like new \$85; +15 teletype, recently serviced \$50. Don Fox, WB2QYF, 10 Amy Utica NY 1302.

FULL, 2 Kw professional built Heath "Chippewa" KI-1 linear. Unit is in excellent condition and can provide full 24 hour key down operation. Will consider all offers. H. Korn, 35 Charlotte Dr., Spring Valley NY 10977.

TOROID! Lowest price anywhere. 40/810 postpaid, 88 or 44 Toroid water taped 542. RKX110 typing repeformer with PD on same base \$25 (send for description). Mime printer \$160. Perf lat 11/16" \$10/case/40. Lorenz German page printer \$100 (all 60 speed), HQ140X \$90. Drake 2B \$150. Johnson 6N2 \$70. Stamp for list. Wanted: model 28 teletype equipment. Van W2DLT 3022 Passaic Av. Stirling NJ 07980.

R-4B Drake mint cond. Bestoffer. WN4KJC/9, Ph. 283-3028. Clarksville Ind. 47130.

HAMMARLUND HQ-145C w/speaker and xtal calibrator. Mint cond. Used for WAS and 70 countries. \$130. Write Timothy Hardin, 64-20 E 194th Lane, Flushing NY 11365 or call eyes 212-454-9468.

HEAT Rust-corrosion! Indoors-outdoors! Stainless, other, bolts, machine-wound screws, hex-specialty-nuts, rods, washers, rable clamps, Guying, antenna, accessories. Lists 15cl W8BLR, 29716 Briarbank, Southfield, Mich. 48075.

SELL: DX60A xmitr \$55. 18AVQ vertical \$25. Walt Edge WA2ICN, 104 Forest Av., West Caldwell NJ 07006.

SELL - the late WA1EX's Swan 500C & 117XC, little used, perfect. Best offer over \$450. Turner +2 mike with preamp \$20. Hamkey \$3. Cashiers check or M.O. Ship collect. Mrs. L. D. Warner, Bote Acres, Greenwich CT 06832.

FOR SALE: Hy-Gain log periodic LP-1007 (13-30 Mcs, 5kw) \$350. Squires-Sanders SS-1R SS-1S SS-1S (factory reconditioned Feb '70) \$600. 32S-1, 316F-2, \$450. 75A-1, Collins vernier knob C. E. "B" slider \$200. A. R. Varney, WA1HNV, 27 Summer St., East Rochester NH 03867. 603-332-5340.

VARIAC General Radio 20 amp 240 volt, 8 amp 240 volt like new \$25 each. 100 ft 80 ohm aluminum coax with connectors \$30. K6ZUT Byron 613 S. Lambert Fullerton, Calif. 92633.

SELL out: Knight T-150 xmitr perfect condition, perfect audio, 100 VFO, 80-6 meters, professionally wired \$50; HQ-100C perfect, like new, \$85; Antique 1925 teletype code machine (similar to Instructograph) like new \$25; Handbook Nuvistor 6 meter converter (professionally wired, perfect) \$20; command ARC-5 xmitr; Globe Scout 680-A xmitr. Ken Johnson WA5NQE, 701 Carolyn, Austin Texas 78705.

SWAN 500, PS, VOX - mint conditions college expenses, take best offer WA0QGS, 609 Lower Johnson, St. Peter, Minn. 56082.

SALE: HQ170 with clock \$160. Viking Variant \$100. HF46A with Saturn Halo \$55. Johnson Challenger \$60. W2SUO 44 Morris Ave, Edison NJ 08817.

WANTED Drake RV-1, RV-3. Will trade Drake DC-4 mobile supply. Will buy or sell if can't trade. Sell very early EWM-2 with AC power supply. W4DYE, 1223 Fenwick, Lynchburg VA 24502.

CE30A, Matching BC458 VFO, 600L linear \$250. Will separate 20A VFO \$110, 600L, \$160. WB6SHO, 8210 Dierks Rd., Sacramento, Calif. 95823. Tel. 916-363-4048.

CANADIANS - Collins 75S-3, 2.1kc and 200 cps filters. Excellent condition. Gordon Stewart, VE4GS, 26 Dominion Bay, Thompson, Man.

SELL: Homebrew 813 xmitr AM/CW \$50. Spare 813 \$10. No shipping. K2MGR, "Kurt" 203 9th St. Hicksville NY 11801. WE1-6035.

WANTED: Johnson kw matchbox. PA0KGS/W2, 17 Windingway, Madison NJ 07940. 201-377 3366.

NOVICE: Heath HW-16, HS-24, both \$80. Like new, operates beautifully. Cecil Schriver, CMR Box 1322, APO New York 09023.

HALLCRAFTER HT-44 transmitter, PS-120 power supply \$200. Drake R-4A receiver \$290. FOB Atlanta, Ga. Jim Davidson, WA4GPH, 3177 Saybrook Dr. NE, Atlanta GA 30319.

HQ180AC: AM, CW, SSB, RTTY, latest model, perfectly mint, only 3 weeks old, \$375. Mike Match, jr. 11001 Ewing Av. Chicago Ill. 60617. 312-768-3099.

SELL: Knight T-150A \$50; Mosley CM-2 with Heath Q-multiplier \$100; Viking matchbox 25B-23 \$50. All vry gud cond. Lloyd A. Cedarquist, WA7IWP, 9706 SW 54th, Portland, Ore. 97219.

MUST sell - NC-200, AC200, calibrator, VOX parts, excellent condition \$300. FOB. Dave Naatz, LLC, West Grover Rd. Eau Claire, Wis. 54701.

DRAKE R-4 \$210, Tom McGeorge 1521-2 H St, Davis CA 95616.

MOTOROLA PT-300 FM Walkie-Talkie 136-151 MHz, 5 watts, uld, transistor, two channel, good condition, \$210. Conrac CKB-14, 10 MHz 14 inch portable monitors \$110. Miratel K21V 21 inch monitor \$95. Boonton 170A Q meter \$75. TS-186C w/bench \$75. PRD 650-B power meter \$65. 6N2 transmitter \$65. K4GYO, 430 Island Beach Blvd, Merritt Island, Fla. 32952.

SELL SB200 mint condition \$195. MO or cashiers check. W2CHM Ross Macaluso, 1716 Rue Mirador, Pt. Pleasant NJ 08742. 201-889-5064.

SELL or trade Drake 2B receiver with Q-multiplier good condx \$185 or trade for 10-80m linear amp using 4-400s, 1000A or 3-400Z. WA2RLQ 716-544-5088, Richard Berg 201 Pemberton Rd, Rochester NY 14622.

CLEGG 46er excellent condx, manual \$125, ship collect. WB2PVB, 2107 Orchard Dr. So. Plainfield NJ 07080. Phone 201-757-5412.

WANT: Manual for 20B and BC458 conversion for same. Will buy or copy and return. S. Olson, K1JJDY, c/o Archer, 109 W. State, Media, Pa. 19063.

WANTED: Johnson Navigator transmitter. W1QCO.

HOT carrier diodes: HP2800, 12/10. IC's: New Fairchild micrologic (epoxy TO-5) 900, 914, 606; 923 90c, Motorola (MCP) MC7901, \$1.90, (10/8/18) MC7989, MC7240, \$1.08, 10/18/80, 10/20/80, 10/21/80, MC7209N (DIP) \$2.6/10. All guaranteed. Add postage. Write for list. HAL devices, Box 365A, Urbana, Ill. 61801.

SWAN 500-C transceiver pwr supply & spkr in cabinet, little used, \$400. J. Edie KME, Rm 210, 270 Madison Av. New York 10016, Tel. 212-685-2345.

FOR SALE: Drake TR-4RV-4 and a.c. supply \$450. Heathkit SB200 never used \$200. Gen coverage receiver \$75. VTMV \$20. Signal gen \$15. Lafayette HA-460 \$75. All in excellent condition. K1CJW Lowell Mass. Tel. 617-458-1892.

VHF Clegg Venus, AC PS and Apollo amplifier \$425 takes all, mint cond, orig cartons Heath Mohawk RX1 receiver with XC6 B meter converter \$120 you pay shipping. Wanted: Hiband Motorola Motorola or GE maker. Also have Collins 758-1 for sale or trade. Jerry Peuple 5136 Riviera Dr, Fort Wayne, Ind. 46803, 219-748-0871.

CRYSTALS Airmailed: Novice 03% all bands, all frequencies \$1.50. Fast service from mid-America. AARS, 888, CT. Crystals that not. Custom finished etch stabilized FT-243, 01% any kilocycle or fraction, 3500 to 8600 \$1.90. (five or more this range \$1.75). (nets, ten same frequency \$1.45). 1700-3499 and 8601-30,000 \$2.95, overtones above 10,000, 10,000 to 13,500 fundamentals \$2.95. Add 50c each for 005%. Add 75c for HC-6 to hermetic miniature above 2000. Singles and groups for QSP. Handbook — other construction articles. Be specific. Free order-bulletin. Crystals, since 1933. Airmailing 10c/crystal surface 6c. G-W Crystals, Marshfield, Mo. 65706.

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HALICRAFTERS SR42-A with HA-26 VFO and Shure 420 mike \$160; Limpander LE-3 high intelligibility audio limiter \$125; all like new. D. B. Daniel, 18350 San Jose, Northridge, Calif. 91324.

WANTED: Rohm model tower sections, 18 inch on side, ladder configuration, to extend present tower. G. Black, 12317 Hanger Rd. Fairfax VA 22030.

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COMPACT FTA-2 220 MHz xmt, pwr 4X150A \$55; Bendix 3W \$15; Collins 51J3R388 w/SSB product detector \$395; paramp components, UHF/VHF lst. s.a.s.e. W4API, Box 4095, Arlington, VA 22204.

WANTED: "Q"-meter: Boonton 160-A Alpha 16Z or Heath kit. Also Collins 30S-1 amplifier and 35C-2 low pass filter. For Sale: Vibroplex \$14.50 postpaid. W4BKN, 603 Bunkers Cove Road, Panama City, Fla. 32401.

DRAKE TR-3, AC-3 power supply, matching Heathkit SWR and phone patch, Collins SM-1 mike (All above items contained in console unit — picture of station sent upon request) 1000' coax, 20' telescoping pole, Topaz DC-300XL power supply, Webster Bandspanner — complete package with manuals \$595. W4TKC, Sittner Hall Annex, College Place, Washington 99324, 509-525-0950. All excellent condition, one owner.

FOR SALE: Collins S-line 32S-1 (+10021), 75S-3 (+12764), 516P-2 (+13414), 312B-4 station control, Di-1 dummy load, SM-1 mike complete station \$950. All excellent condition; HQ-11U-\$85. SX-99/spkr-\$55. SX-111/spkr-\$115. HT-37-186L, Swan 350 (late) with 117XC & DC module \$350. All New Hygain Hy-tower-\$95. W. R. Johnson, K4BJ, 403 E. College St., Griffin GA 30223, 404-228-8700.

TEKTRONIX 5140 scope, DC to 10 Mc, time base of .1 to 1000ns. Also 5k magifier, voltage calibrator, and delay to allow viewing of triggering waveform. \$250. BC-221 freq meter with power supply. \$45. Type J-36 Bug. \$6. You pay shipping. R. Bartel, RD-2, Box 31, Kingston, NY 12401, Tel. 914-331-9019 after 10 PM.

SELL at bargain prices. 3-400Z condition good \$16. High voltage components low resistance for stiff power supply, Amertran plate transformer 2 kVA \$200 center tapped 110 AC Spec 26579 \$85. Thoradron choke one anpette 15KV T47470 \$30. Bendix choke xny Henry 1.5 ampere 20 KV \$32. Variac General Radio type 2KVA 110AC \$28. Variety melchs including precision laboratory and transmitting tubes write for needs. Oil filled liquid condensers one to ten mfd 600 to 5000 working voltage. IRE proceedings complete 1958, 1959, Jan to July 1960 lot \$14. B&W kilowatt linear 11001A with matching supply 1PS-1 \$195. TR switch 380-B \$8. Dumont 31 164E scope \$28. Wanted Drake TR-4 and modern GM tube checker. D. E. White, Rt 2, Box 17, 36 Masterton Rd., Bronxville, NY 10708. Phone 914-337-1059.

CENTRAL Oregon Community College Electronics Club needs ham gear. Use complete Swan station was stolen. Donations only, please. Central Oregon Community College Electronics Club, K7OTZ, Bend, Ore. 97701.

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Moving to England sacrifice mint 30L1 with manual and cable serial 26899 also TA43, EZway tower RB540G, EZway motor winch and CD rotor Ham-75-80T. Best offer takes both. K2GLG, 212-753-9516.

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COLLINS 706A-1 F5C. Wilcox 132mc xmt. SB200 linear SB401. Sola voltage regulators. Rack rails, cabinets tubes, meters, SASE. Make offer. W4QO, 2298 Gen Valley Dr. College Park, GA. 30337, 404-766-6585.

WANTED: Collins filter for 75A4, 500 cps (F-455J-03). Write Richard Elliott, Village Green, Norfolk, Mass. 02090.

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SELL: Drake 2C, Plus 2CS, \$160. Heathkit HW-16 3 xtals \$90. Both in excellent condition. Philip Dole, W1NKZR, 25 Kingston St., Reading, Mass. 01867.

CLEGG 22er, new \$149. SX-43, mint \$50. Hygain 3el 2-meter \$7. Big wheel, new \$9. Kellersman, Apt.304, 30 Nutmeg Lane East Hartford, Conn.

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TRANSCEIVER, Lafayette HE20C, 1.65 MHz IF converted to 10 meters, 3 watts, 3 channels, 115A-C-12DC, Internal PS, with crystals and mobile brkt. \$65. W6EYB, 789 Garland, Palo Alto, CA 94303.

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NEEDED: NC-303 converter cabinet and National NC-300C1 NC-300C2, NC-300C5A (14, 26 meter) converters. Write John Hampton, 224 2nd St., Keyport, NJ 07735.

SELL: Elco 753 HB P/S new solid VFO finals manuals \$150 or less. You can have you good standby rig. WA3RKL Dick Cornell, 9771 Woodland Rd., Pittsburgh, Pa. 15237.

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SELL: Heath SB301 and SB600 mint condition \$235 REA prep. Dale Melone, K0VVY, 5022 38th Place, Des Moines, Iowa 50310.

MUST sell Heath HW-22 with xtal calibrator less mike. \$70. K5LAR, 226 S. Ann Arbor St., Saline, Mich. 49176.

SELLING to get married. SB-33 \$175. Homebrew 1 Kw linear 2/3 finished \$30, 20 m, 80 m Hustler, Mast \$15. Knight GDM \$15. CPU \$5. WA3BMD/1, 36 Pine, Exeter, N.H. 03833.

HQ-110, 150-6 meters, 100 kc calibrator, Q multiplier, good selectivity, stability for CW/SSB. Still \$250 new. Used, excellent condition with manual \$125. C. Counselman, 140 Magazine St., Cambridge, Mass. 02139.

WANTED: Heath LV power Xfr 54-31 or DX100 for parts. Also Ranger 1 or 11 for parts. Power transformers, meter and VFO must be good. Advise cost. W2GNJ, 37 Vista Dr., Little Silver NJ 07739.

JOHNSON Inverter 2000 w/PS, cables, and manual 2 Kw PEP. All cond. not a scratch, \$455. Drake R-4A w/MS4, mint in orig. carton. \$299. Panaramic scanner PG 32T-200, gud cond. clean. \$45. WR2ZBM, Roger Batista, 1219 Taylor Ave., Bronx NYC 10472, 597-7425.

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HY-GAIN 203BA beam \$65. Also Hy-Gain 2RDQ doublet \$20. Both excellent condition and set for phone band. FOB. W8VFM, 641 College Av., Columbus, Ohio 43209.

DISCOUNTS! Antenna packages, 20% off on combo: Tower, beam & rotor. We have the best prices anywhere! Send s.a.s.c. for quote on any new ham gear. L. A. Amateur Radio Sales, 24214 Crenshaw Blvd., Torrance, Calif. 90503.

WANT early issues of Pioneer Wireless Magazines for W4AA Historical Library, Wayne Nelson, Concord, NC 28025.

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NCX-5 MkII and NCX-A P/S with XCV-27 calibrator w/manual, factory cartons \$375. R. Wetzel, 419 Union Ave., Rutherford, NJ 07070.

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DRAKE Wanted 1.4B and MN-2000. Have for sale NC-300, two and six meter converters. Jerome Emdur K3ECF, 3801 Conshohocken Ave., Philadelphia PA 19131, 215-GR3-7877 or HO7-2411.

CLEANOUT: 10 meters mobile, ST-203A xmtr complete, PE-103 dynamotor, Gonset converter, Triplet tube tester; 220 MHz tube type converter; novice xmtr power supply. Make offer! W3TEF, Roy Goshorn, 521-Belview Ave., Bellwood, PA 16617.

NCX-500, SB-34 in stock. Will soon have Varitronics two meter FM equipment and Mosley antennas. Low prices for cash with no trade-in. Jackalope Engineering, Box 1054, Laramie, Wyo. 82070.

BTI LK-2000, late model, serial †3290, good condx. \$499. WB6UVH 916-878-0193.

HEATH Apache and SB-10, \$125. W1AZT PO Box 697, New Britain CT 06050.



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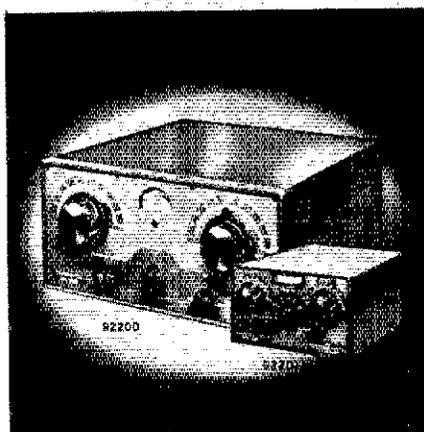
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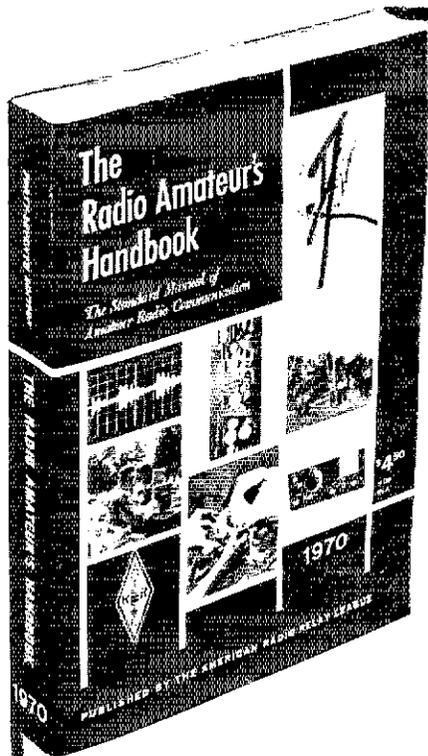
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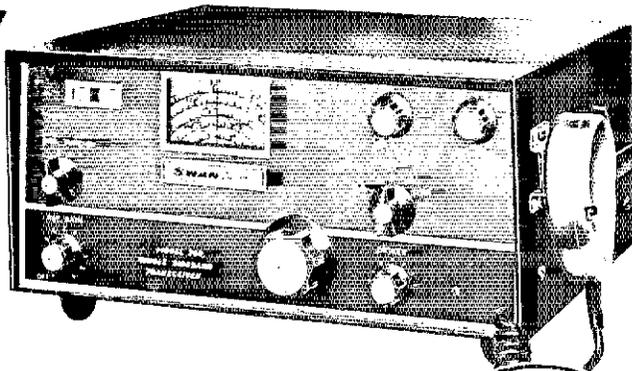
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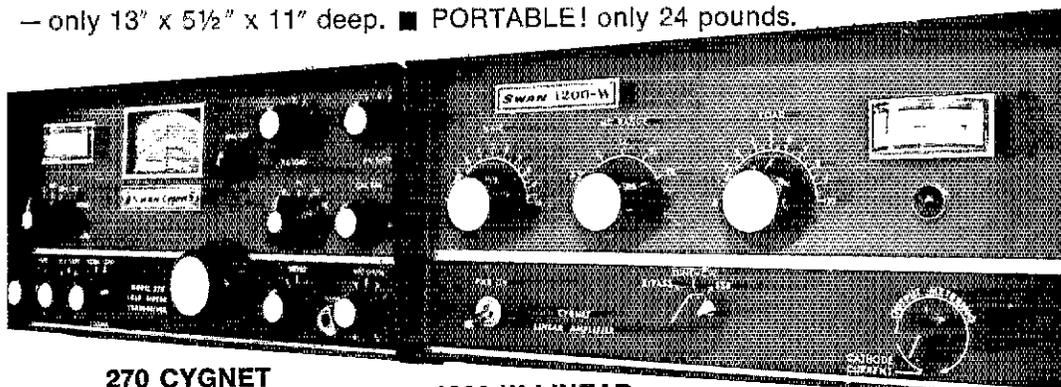
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