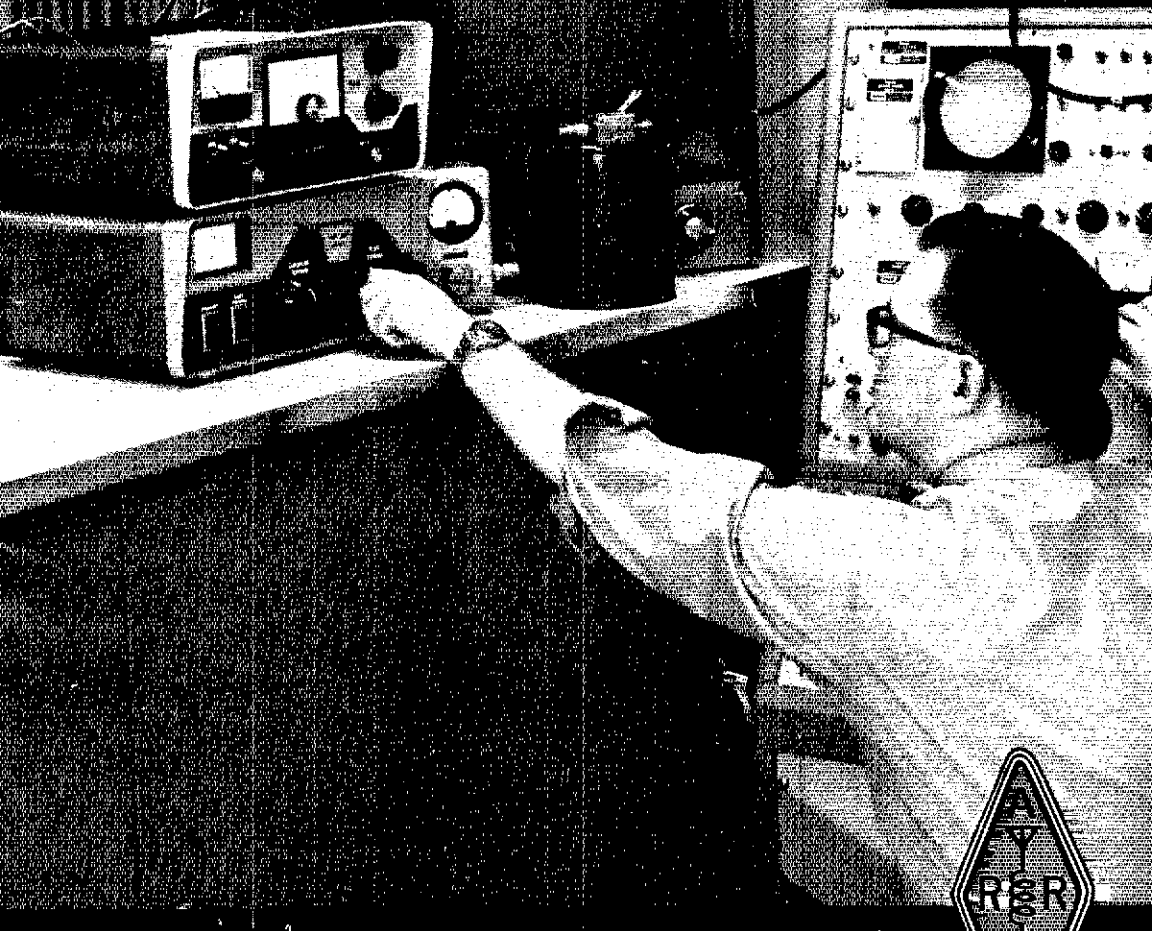


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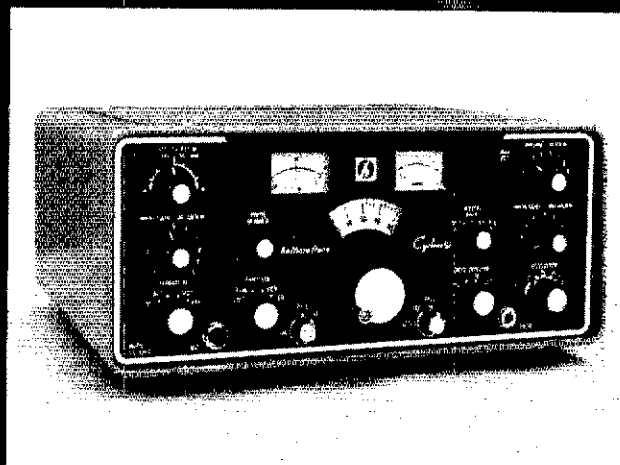
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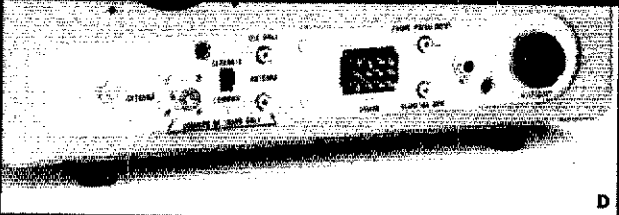
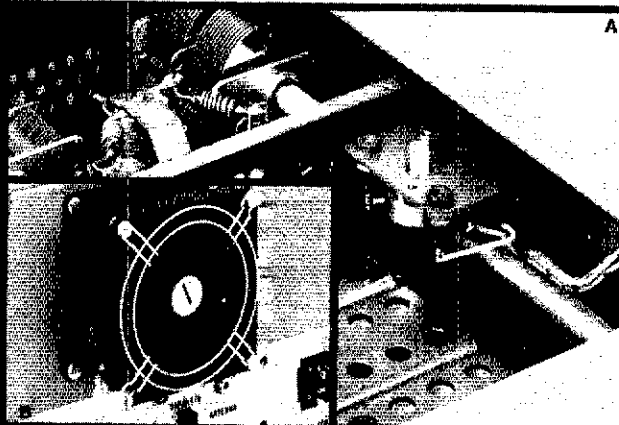
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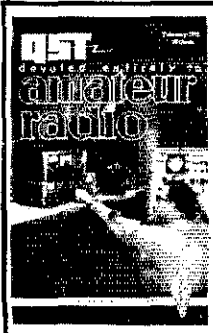
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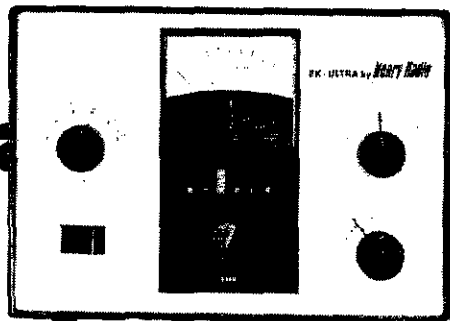


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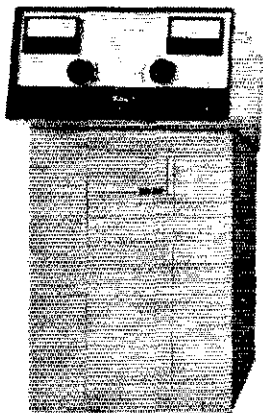
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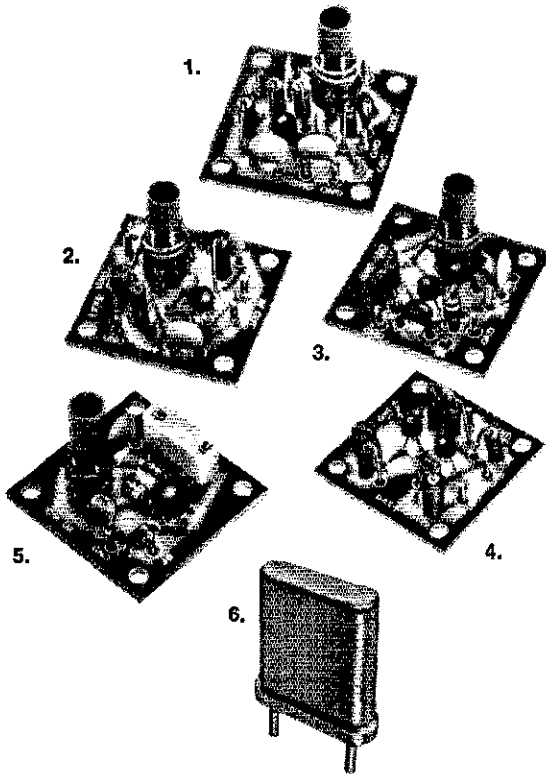
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Vice-Director: Albert F. Gaetano W6VZI
115 Old Adobe Road, Los Gatos, CA 95030
Roanoke Division
VICTOR C. CLARK* W4KFC
12927 Popes Head Road, Clifton, VA 22024
Vice-Director: L. Phil Wicker W4ACY
4821 Hill Top Road, Greensboro, NC 27407
Rocky Mountain Division
CHARLES M. COTTRELL WØSIN
430 S. Swadley St., Lakewood, CO 80228
Vice-Director: Allen C. Aulen WØECN
2575 South Dahlia St., Denver, CO 80222
Southeastern Division
H. DALE STRIETER W4DQS
928 Trinidad, Cocoa Beach, FL 32931
Vice-Director: Larry E. Price W4DQD
P.O. Box 2067, Georgia Southern Branch
Statesboro, GA 30458
Southwestern Division
JOHN K. GRIGGS W6KW
1278 13th St., Baywood Park, San Luis Obispo
CA 93401
Vice-Director: Arnold Dahman W6UEI
14940 Hartland St., Van Nuys, CA 91405
West Gulf Division
ROY L. ALBRIGHT W5FYR
107 Rosemary, San Antonio, TX 78209
Vice-Director: Leou Vio W5VCE/W5OBC
26524 Campbell, Houston, TX 77055
* Member Executive Committee

"It Seems to Us..."



TIS, OM!

MOST OF US, at one time or another in our amateur activities, have faced a knotty technical problem. In 99% of the cases, we're able to come up with the answer — either from our own experience, reference to the *Handbook*, or maybe help from another amateur. But there are times when the answer evades us, completely.

Where can one turn? Among the many functions of your League headquarters is a Technical Information Service. This is part of the job of our technical crew — the same guys whose articles you see in *QST* each month. Many members take advantage of this valuable service, with inquiries ranging from requests on how to fix an ailing rig, to questions on circuit theory, etc.

Some questions asked of the TIS are answered by referring inquiries to specific articles in *QST* or to specific pages in the *Handbook*, particularly when the subject is involved. For example, someone might write us saying that he wants to build a 4-element quad; what should he use for dimensions, and what sort of results could he expect? The reply of our TIS crew would probably directly refer him to such an article as the classic by Lee Bergren, W0AIW (now W0AR) in the May 1963 issue of *QST*.


Now, sometimes such a response upsets our correspondent; an article *that* old? But our philosophy is that the *QST* article was written only after extensive experimentation, is still quite sound, and goes into the theory and mechanics and practice of building a quad antenna in far more detail than we can ever hope to achieve in an individual response to one of our members. In other words, it is an authoritative, comprehensive discussion of the problem raised by the member, and is likely the best advice he can obtain anywhere.

But a 1963 *QST*?! You don't have that issue? No problem, since back copies are available at 75 cents each. Even if they weren't, we'd provide photocopies of the article at 25 cents per page. In either case, you'd get the info you're looking for, more promptly than possible if the Hq. staffer had to re-write the info into his letter to you.

Another type of letter quite often received indicates that the writer has, let's say, a couple of spare 6146s and a 6C4 and a few other parts that he has picked up somewhere — and would we please design an amateur transmitter using these components? It should be sideband, of course, and cover 160 through 10. Wow! We would like to help. But to tackle this sort of project could involve a good many days' work on somebody's part, designing, constructing, and debugging. Since we must serve all members more or less impartially, the only fair response is reference to a similar design in past issues of *QST* or the *Handbook*.

Another point, having to do with speed of service: we try to stay current in all departments, and answer each question in a few days or a week at the most. Please remember, however, that with another week or more involved in the mails going and coming, two weeks from your writing to your receipt of our answer should be about the norm. If it takes a bit longer . . . well, Hq. types also occasionally get sick or go on vacation or go travelling on League business, so sometimes there will be delays.

When writing, please be sure to share with us whatever experience you have had with the problem in question. This will avoid our reply covering ground you've already been over and will help in getting to the point. Also, avoid asking unrelated questions in the same letter, especially if the additional queries deal with membership, licensing, contests, or some other area not handled by the Technical Information Service. Multiple questions in a single letter mean that your answers will be delayed as routing around Hq. of your letter takes place. If you've got several different questions, even if on divergent technical topics, put each on a separate piece of paper with your name and address on each; no limit to the number of pieces per envelope.

Want more details on TIS? See the bottom of page 26 of this issue. 

League Lines . . .

Our Communications Department is studying the possibility of an ARRL-sponsored daytime traffic-handling system to supplement the present National Traffic System (normally evening operation). Likely on twenty or forty meters, probably sideband, with a late-afternoon or early-evening link with the existing NTS. No attempt to compete with or detract from existing daytime facilities; the objective is simply to provide an opportunity for daytime operators to be a part of the ARRL-sponsored NTS. See January QST, pages 71-72 for further details.

Fifty prints of "This is Ham Radio," the Dave Bell/ARRL film for youngsters, have been placed with Association-Sterling film distributors around the U.S. and Canada. To ensure maximum availability for schools and youth groups, the agency has been asked not to book this film for adult groups (who should get "Ham's Wide World" from Modern Talking Picture offices.) Hq. has info on both films and on the agency office addresses; if your yellow pages don't help; an s.a.s.e. would be appreciated with your request.

Guess which publication recently encountered serious mailing problems, attributable to computerization -- the "Memo to Mailers" from the Postmaster General!

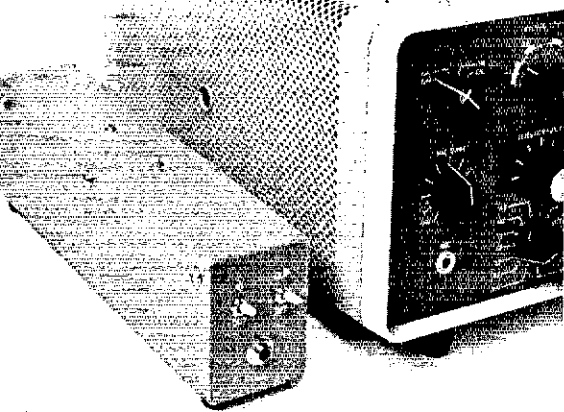
Though the FCC docket on amateur repeaters is still under study, we think it pertinent that the new Chief of the Amateur Division, W4BW, offered some personal views during his talk at Saroc in early January: Linking should be permitted; repeaters should not be assigned a channel by FCC (that's our responsibility, W4BW says that there be no reduced power limit; that logging be simplified; that transmitter i.d. can be automatic. (All of which, we are happy to say, seem to jibe with ARRL recommendations as formulated largely by the VRAC.)

Got troubles? Hq. has a "Legal Kit" for people facing zoning or building code problems in connection with antennas; TVI kit for club committees assisting with interference problems; list of manufacturers supplying high-pass filters to their TV customers; and a QST reprint on electrical line noise problems. Postage costs for each of the first two items run around 80¢ first class; a business-sized (#10) s.a.s.e. will handle the second two.

Conditional-Class licensees who are handicapped (and thus unable to visit an FCC office) are now eligible for Advanced and Extra-Class examinations at home under the supervision of another amateur holding at least the same class of license. As with other by-mail tests, the FCC Form 610 is sent to FCC, Gettysburg, PA 17325. In the case of Extra, the code test should be administered first and the appropriate notation entered on the reverse of the Form 610.

Looked at your license lately? Expiration dates have a way of sneaking up on you! You may apply 90 to 30 days in advance of expiration on FCC Form 610 (or you can renew at any time you have to modify your license, if you answer the renewal questions). The fee is \$9 for straight renewal, renewal-and-modification, and renewal-and-upgrading of license class. If you've gone past your expiration date, you have a one year grace period in which to renew without taking the exams, but you must be able to certify (and may be called on to document!) that you had two hours operating time in the last three months or five hours operating time in the last year of the license term, and also that you can still copy code, at five words per minute for Technicians, 13 w.p.m. for Conditionals, Generals and Advanced, or 20 w.p.m. for Extras.

QST is available -- all the way back to 1915 -- on microfilm. Write University Microfilms, Ann Arbor, Michigan 48106 for prices and details.



Many audio filters have been shown in *QST* over the years. Most of these filters have a design center frequency of approximately 1 kHz. In this frequency range, a very sharp response can be obtained easily with surplus toroidal inductors. While these filters can (and do) eliminate *CRUD*, they may also have "super" selectivity leading to a monotone and even ringing performance. What is needed is a band-pass filter which will eliminate the *CRUD* but not be ringing sharp. The *CRUD-O-Ject* has these characteristics.

The Circuit

The schematic diagram of the *CRUD-O-Ject* is given in Fig. 1. The heart of the circuit is a 3-pole large-percentage band-pass filter having a Butterworth response. It is designed for an input and output impedance of 600 ohms, with 600 Hz as its center frequency. The impedance value of 600 ohms was chosen to match the output which is available on many receivers. Most ardent cw operators, when receiving, prefer to hear a tone lower than the 800- to 1000-Hz range of the many filters previously published. The center frequency of 600 Hz was picked in preference to the higher tones. The filter design also makes use of six surplus 88-mH toroidal inductors for L1, rather than a single inductor which would not be readily available on the surplus market and would cost 8 or 9 dollars new. L2 and L3 are also made from surplus 88-mH toroids.¹

The theoretical 3-dB bandwidth of the filter is 362 Hz, and the 30-dB bandwidth is 1160 Hz, for a ratio of 3.2 to 1. As was explained earlier, a narrow bandwidth with steep skirts was *not* the objective when designing this filter. The theoretical response of the filter is shown in Fig. 2A, and the measured response is pictured in Fig. 2B. The attenuation of 120-Hz power supply hum is in excess of 50 dB, and the same is true for frequencies above 2600 Hz. Hum resulting from 60-Hz pickup in the receiver audio system is attenuated by more than 70 dB.

Silicon diodes CR1 and CR2, connected across the input when S2 is closed, limit the amplitude of signals reaching the output of the *CRUD-O-Ject* to approximately 1.2 volts pk-pk, no matter what the input level may be. Thus, the audio power-output level is limited to approximately 24 milliwatts. This is a comfortable listening level for most operators who use sensitive headphones. With S1 and S2, selection of filtering or clipping may be

¹ These toroids are available from M. Weinschenker, K3DPJ, Box 353, Irwin, PA 15642, and from Fred G. Schmidt, W4NYF, Typetronics, Box 8873, Ft. Lauderdale, FL 33310, as well as other suppliers. See *QST* Ham-Ads.

The CRUD-O-Ject

An Audio Filter for Hum and
Squeal Rejection

BY JERRY HALL,* KI1LP, and
ROBERT M. MYERS,* W1FBY

MANY AMATEURS, in their search for a good headset, find the comfort and sensitivity of hi-fi "cans" very desirable. Since these phones are available within almost any price range and from many local dealers, they are quite popular. Although the typical headset designed for hi-fi use is comfortable and sensitive, it has certain characteristics which are *undesirable* from an amateur standpoint. The most undesirable feature is the frequency response. Hi-fi enthusiasts are interested in hearing not only very low frequencies, but very high-pitched tones, too. For amateur cw communications, the high and low frequencies can be classed as *CRUD* (Continuous Random Unwanted Disturbances), because they do not contribute to communications effectiveness. Most hi-fi phones are of low impedance, and it is usually desirable to connect the headset to the receiver speaker terminals. This allows a good match for the headset, but it also provides a higher hum level than is heard with limited-frequency-range earphones.

* Asst. Technical Editor, *QST*.

Described here is an audio filter designed to pass only the band of frequencies needed for good cw copy. The purpose is to reject receiver hum and high-pitched i-f filter leak-through signals. While the CRUD-O-Ject is not really a highly selective device, it will be of some benefit to anyone using a receiver with an ssb filter system. For truly outstanding results, the CRUD-O-Ject should be used in conjunction with a good cw i-f filter, not in place of it.

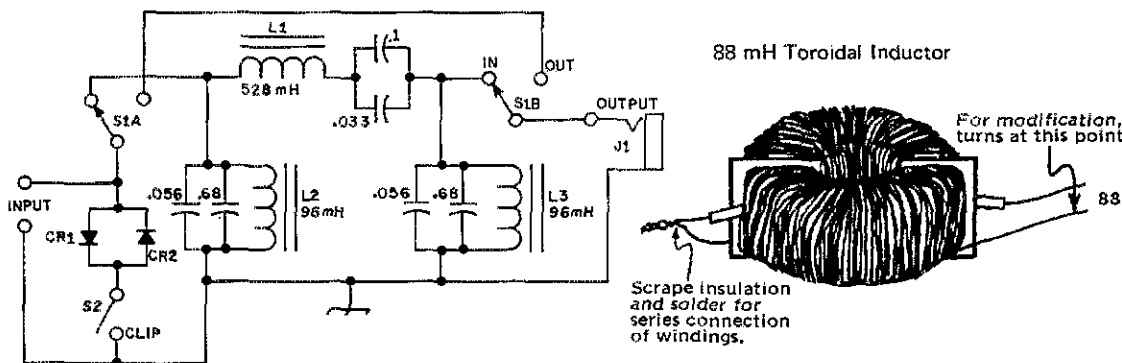


Fig. 1 - Schematic diagram of the CRUD-O-Ject. All capacitances are in microfarads (μF), and all capacitors should be of high quality paper or polyester dielectric with 75-V or higher ratings. (Sprague type 225P "orange drop" capacitors were used in the unit photographed.) Parallel capacitor combinations of stock values are shown in the filter section, but other values of individual components may be used to obtain the desired total capacitance.

CR1, CR2 - Silicon rectifier, Mallory M2.5A, 1N4001, or similar. Avoid using small-signal diodes.

J1 - Phone jack.

L1 - 528 mH, made by connecting six 88-mH toroids in series.

L2, L3 - Modified 88-mH toroid; add 40 turns No. 30 enam. wire, wound in same direction as original windings.

S1 - Dpdt toggle.

S2 - Spst toggle.

made independently, or both may be used simultaneously. The insertion loss of the filter is approximately 2 dB, so when switching the filter in or out, the change in volume is just barely noticeable in the headset.

Construction

A circuit board was fabricated to allow convenient mounting of the toroids with commercially available plastic retainers.² The homemade box measures 11 X 2 X 3 inches. Unlike some projects, the container was made to fit the circuit board, but almost any packaging arrangement can be used.

There are several techniques which are suitable for mounting a string of toroids. Probably the most popular is to stack them and run a long bolt through the center. Then the various pigtail leads can be attached to terminal strips running beside the stacked coils. If stacked toroids are mounted in a metal box, one end of the long bolt must be insulated from the box; or it and the box will act as a shorted turn around all the inductors. There are no special precautions to be taken with the wiring of the CRUD-O-Ject except that any long runs of wire (over 3 inches) should be shielded to

² Delbert Blinn Electronic Specialties, Box 2007, Pomona, CA 91166; part No. 1068753.

prevent leakage around the filter. See the pictorial drawing in Fig. 1 for details on connections of the 88-mH toroids.

Operation

Connecting the filter to the station receiver is simple if the receiver has a 600-ohm output terminal. The anti-VOX system in most transmitter-receiver systems is of this value. If a 600-ohm source is not available, an audio line transformer may be used to transform the speaker 4- or 8-ohm output to 600 ohms. Likewise, the same kind of transformer may be used to match the output of the filter to a low-impedance headset (or the station speaker) if 600-ohm "cans" are not available. The important point here is that the filter *must* be terminated in 600 ohms at both the input and output if proper performance is to be realized.

This filter is one of the few station accessories which does not require "operator technique." On cw it is turned on; on phone it is turned off. The two front-panel switches are used for disabling the clipper and bypassing the filter. There are occasions when the operator may want to listen to a low-frequency beat note, such as when tuning the receiver to zero the calibrator. In order to hear the

Inside view of the CRUD-O-Ject. The inductors are mounted with special retaining hardware, as mentioned in the text. This model uses a combination of three capacitors across L2 and L3 to make up the required capacitance. The circuit board is mounted using a two-inch section of angle aluminum bolted to the top of the cover.



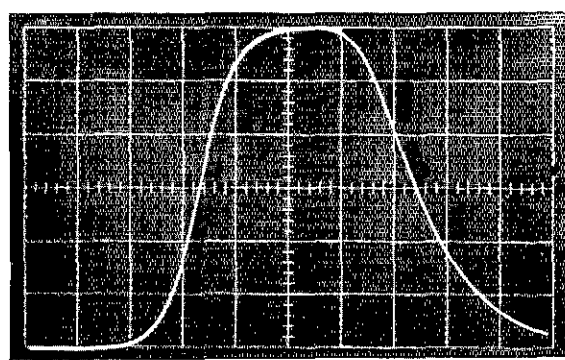
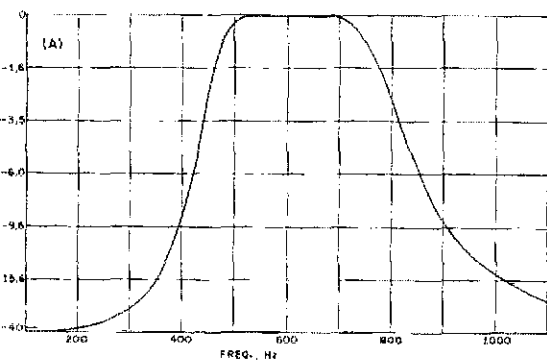


Fig. 2 - At A is shown the theoretical response of the filter portion of the CRUD-O-Ject, and at B is the measured response obtained with a swept-frequency audio generator, detector, and oscilloscope. The scale values of A also apply to B, with both the voltage and frequency axes being linear. (Sweep time for the photograph was approximately four seconds.) Stock-value capacitors, selected at random, were used in the circuit, with no "pruning" done to optimize the tuning of the three individual filter sections at 600 Hz.

low-pitched tone near zero beat, it is necessary to switch out the filter. The clipper should be left in; otherwise, the operator takes the chance of getting his ears thumped *severely* by an unusually loud signal.

The clipper is a desirable feature to include in the circuit, as it limits the input signal to a comfortable level. Static crashes, 80-dB over S-9 locals, and S-2 DX stations are all the same volume. The output of the audio clipper is rich in harmonic content, however, and the inherent distortion products give an odd sound to relatively strong signals when the filter is not used. By placing the filter after the clipper, the audio distortion is reduced to a point where it is undetectable. In actual operation, a 600-Hz square wave applied to the input of the filter appears as a near-sine wave at the output.

The clipping and filtering feature is ideally suited to a break-in cw setup. The station transmitter, when heard through the receiver, sounds "clean" and is equal in amplitude to other signals on the band. There is a hidden problem here, however. When transmitting with QRM on the operating frequency (such as in a DX pileup) an inexperienced operator may have difficulty picking

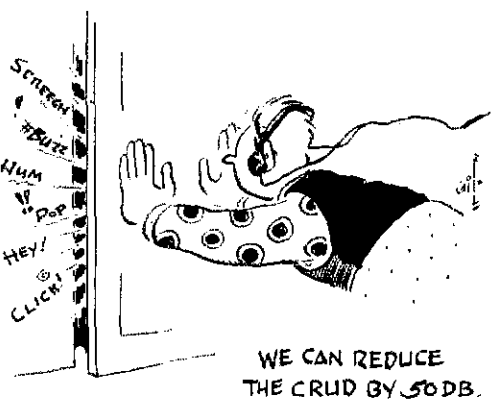
his own signal out of the group. This may be overcome by reducing the setting of the receiver rf gain control, lowering the incoming signals to just below the clipping level. The transmitted signal will be the same volume as before (because it is still fully clipped), but will be a bit louder than the interference. Of course, if the receiver avc is activated, the gain of the receiver will be automatically reduced by the large local signal. Any apparent thumping, clicks, or other noises created in the receiver are virtually eliminated with both the clipper and filter in use. In short, the *CRUD-O-Ject* is a most useful station accessory, and it can be built for less than a ten-dollar bill. QST

Strays WOW

"I recently worked a 6DI. It isn't on the ARRL Countries List so don't know what it is. Can you help?" Any time you hear an unusual prefix in use, you can determine the country by consulting the Internationally Assigned Prefix List in your ARRL *Handbook*. You'll see at a glance, for example, that this prefix is valid for Mexico.

Phone men probably missed a secret message sent as part of a story on an underwater adventure (which had nothing to do with ham radio) on the NBC-TV network show "Primus." Several bursts of cw at about 20 wpm were sent and, according to WAZFUI and W00AQ, who told us about it, the message said, "American Radio Relay League" plus "Can you amateurs read this?"

Robert W. Gunderson, W2J10, editor and publisher of the Braille Technical Press, is planning to publish an up-to-date listing of all blind amateur operators. If you wish to be included in this list send a postcard with your call and name and address to: The Braille Technical Press, 980 Waring Avenue, Bronx, New York 10469. (taken from the RARC & HHS Flyer, Dec., 1971)



Some Notes on a 7-MHz Linear-Loaded Quad

BY DAVID L. COURTIER-DUTTON,* G3FPQ

MOST AMATEURS who have a serious interest in working DX in the 3.5- to 28-MHz bands would like to have antennas providing them with forward gain on all of these bands. Today a triband trap Yagi or cubical quad may be employed to achieve this objective on 14, 21, and 28 MHz. Rotary beams are, for all practical purposes, out of the question for 3.5 MHz, but it is possible to achieve some gain with a 7-MHz rotary beam without having to pay a fortune for a supporting structure.

The Hy-Gain linear-loaded two-element Yagi or the Mosley inductively loaded beam for 7 MHz can achieve this objective. The writer, however, prefers quads to Yagis, based on his own experience. Difficulties often arise when one seeks to mount beams for several different bands on the same tower without marked loss of performance on any band. The primary problem is, of course, that a full-sized cubical quad for 7 MHz is a monstrous structure. Such antennas have been erected, but they are not suited for the average amateur with a limited budget.

The first step in building a 7-MHz quad is, therefore, to design a single 7-MHz quad loop of reasonable size which is mechanically strong enough to survive most weather conditions.

Linear Loading

As a general rule, a reduction in antenna size to two thirds of full size can be effected without a noticeable drop in performance, providing care is taken to limit the losses introduced by the loading devices. This means that one can think in terms of a loop for 7 MHz with 24 feet on a side instead of 36 feet on a side. An additional factor in choosing a 24-foot-per-side length was that the longest bamboo spreaders that the writer could obtain were 18 feet. Attempts were made to lengthen these spreaders, but results were not satisfactory mechanically.

If a 24-foot loop is to be used, the next questions are where to put the loading and what

* Markham Oak Cottage, Bucks Horn Oak (near Farnam), Surrey, England.

If you like to experiment with antennas, here are enough new ideas about the construction of quad antennas to keep you going all spring and most of the summer.

form of loading to use. A full-sized quad loop has symmetrical current distribution. The current maxima occur in the middle of the horizontal sections, and the current minima develop in the middle of the vertical sections. The current distribution in the vertical elements is such that most vertical radiation is canceled out. It is desirable to retain this current distribution in the shortened loop. It is also desirable not to put the loading in the center of the horizontal elements, since maximum radiation occurs at the current maxima, and it does not make sense to cut out the portion of an antenna that does the most effective work. The writer, therefore, chose to put the loading in the vertical sides.

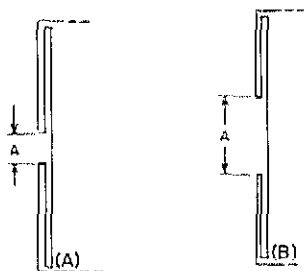


Fig. 1 — A method for linear-loading of one side of a quad element.

There are two popular methods of loading, stubs or coils. The writer dislikes coils for loading since, if they are wound with a heavy-gauge wire (desirable in order to avoid undue losses), they are bulky and difficult to weatherproof. The choice was therefore stub loading. It would have been possible to insert a stub at each corner of the loop, tied back to the spreaders. But, the current flowing in such stubs would be unbalanced, and radiation in unwanted directions would take place from the stubs themselves. There is also the consideration that if the same spreaders are used for 14-, 21-, and 28-MHz loops, stubs at the corners of the 7-MHz loop would have to be mounted well clear of the loops for the other bands.

The original linear-loaded 7-MHz quad element was tried by the writer in a four-band quad some years ago. A single stub in the center of each vertical side was used. The loading stubs were made 14 feet long and were tied on to a point near the center of the boom. Performance of this quad on 7

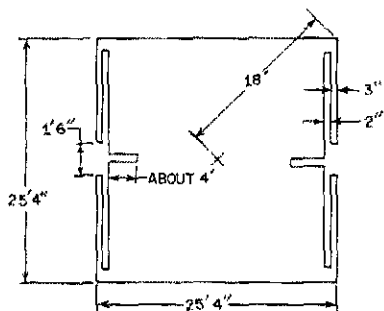


Fig. 2 — Dimensions used for the 7-MHz quad elements when the loop has been cut for resonance at the low end of the band. Depending on the height above ground and the particular portion of the band to be operated, the amount of center loading at the vertical sides may have to be varied slightly.

MHz was excellent, but the 21-MHz quad mounted on the same boom was almost useless, probably due to pickup at 21 MHz by the 7-MHz loop with subsequent reradiation. An attempt was made to find an efficient method of loading which did not involve long stubs "floating around." The next step was to try folding the wires in the vertical sections back on themselves as shown in Fig. 1A. Current distribution either side of the center part of the vertical elements is symmetrical, as desired. This change resulted in a loop that was resonant near 7 MHz, although its resonant frequency was slightly high. Shortening of the stubs slightly, as shown in Fig. 1B, was tried. This had virtually no effect on resonant frequency. This is no doubt because the increased end-loading effect of the portion A almost equalled the reduction in stub length. Short stubs (about 4 feet long) were then inserted at the center of the vertical sides, at right angles to the vertical sides as shown in Fig. 2, and resonance at 7 MHz was achieved.

A four-band quad for 7, 14, 21, and 28 MHz was then constructed. Much to the writer's delight, there appeared to be no noticeable interference with the pattern of the 21-MHz quad by the 7-MHz elements. The loading effect of the stubs would be different at 21 MHz since they would include current maxima; the result is to give a loop which, while resonant at 7 MHz, does not appear to have a third-harmonic resonance in or near the 21-MHz band.

Yagi-Type Directors

The reader can probably see from the photograph that the directors for 14, 21, and 28 MHz

G3FPO's compact 4-band quad has 2 elements for 7 MHz, 3 elements for 14 MHz, and 4 elements for 21 and 28 MHz. Pairs of Yagi-type directors are used in place of the usual loop director for the three higher frequency bands.

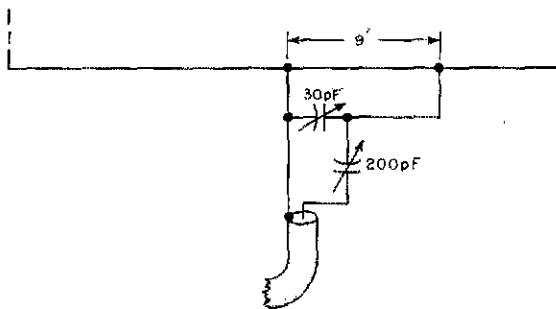
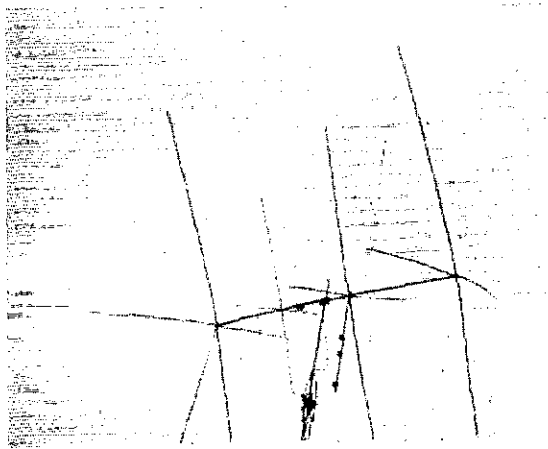


Fig. 3 — Diagram of the matching section used on the 40-meter driven element. The gamma capacitor employs a 100-pF air variable and a 100-pF high-voltage silver mica connected in parallel.

consist of pairs of stacked Yagi-type elements level with the driven elements. There are two pairs of Yagi directors for the 10- and 15-meter elements at approximately 6-foot, 6-inch spacing, and one pair of Yagi directors for 20 meters at approximately 13-foot spacing. The overall length of the directors is 31 feet, 3 inches on 20 meters; 20 feet, 10 inches on 15 meters; and 15 feet, 2 1/2 inches on 10 meters. Performance of the author's array on 10, 15, and 20 meters at the moment is little, if any, better than an ordinary two-element quad. The writer has only recently had an opportunity to start checking out the directors to see what adjustment they need. Current indications are that they require lengthening, but there is a good deal more experimental work to be done. Anyone who wants to try this system must be prepared to do a good deal of cut and try to tune the directors, if any real increase in performance over a standard two-element quad is to be achieved.

One also has to bear in mind that when dealing with multiband quads the resonant frequency of Yagi-type directors is likely to be affected to a far greater extent by the proximity of other elements than would be the case for a quad-loop director. This is because a Yagi director is a comparatively high-Q element. From the theoretical point of view, the drawback to quad-loop directors is that the reactances involved are such that there is a

(Continued on page 40)



High-Frequency Atmospheric Noise

BY CALVIN R. GRAF,* W5LFM, AND MARVIN R. CLINCH,** K2BYM

Part II — Some Simple HF Atmospheric Noise Experiments †

IN PART I of this article, the authors discussed high-frequency atmospheric noise and the general distribution of noise sources (thunderstorms) across the surface of the earth. In this part, we will describe some simple experiments which the amateur radio operator or experimenter can conduct at home so he can learn more about atmospheric noise, weather fronts, seasonal effects on thunderstorms, nearby storm effects on radio reception, and the like.

Thunderstorms, Lightning, and Radio Noise

Recent data, gathered by the Orbiting Solar Observatory, (OSO-B), in a global survey of night-time thunderstorms, showed that there were ten times as many lightning storms seen over land as are seen over the oceans. The weather about the equator is more severe than in the temperate regions, both more frequent and over longer seasons. It is to be noted from any globe or map of the earth (Fig. 1) that the landmass concentration on the surface of the earth is such that there are only three areas of land of any size which lie on the equator. These areas are located along the equator from Central America to South America, Central Africa to South Africa, and Southeast Asia to Northern Australia. The annual rainfall throughout the world also follows this landmass rule, with the three areas along the equator receiving over 80 inches of average rainfall per year. These three areas are the source of numerous thunderstorms which produce great concentrations of atmospherics that are received in some magnitude throughout the world.

These noise sources travel back and forth from the northern area (10 to 15 degrees north latitude) in the summer months to the southern area (10 to 15 degrees south latitude) in the winter months. In other words, the noise is always generated in the area where it is summer. The majority of these thunderstorms moves along a line inclined about 30 degrees west of a north-south line. As can be seen from Figs. 1 and 2, the difference between noise generated over land and the noise generated over water (both near the equator) is about 40 dB (100 dB vs. 60 dB above $KT B^1$ at 1 MHz).

If you live in a part of the U.S. which has frequent thunderstorms, such as the Gulf Coast from Texas to Florida, you are well aware of them

* 207 Zornia, San Antonio, TX 78213.

** 4500 Skenandoah Dr., R. D. 2, Oneida, NY 13421.

† Part I of this article appeared in *QST* for October, 1971.

¹ k = Boltzmann's constant, 1.38×10^{-23} joules per degree Kelvin, T = temperature in degrees Kelvin, and B = the receiver bandwidth in hertz.

and think nothing of their occurrence. However, if you live in a part of the U.S. where thunderstorm occurrence is rare, such as the West Coast, you may not fully appreciate the fury of a violent thunderstorm. These storms are important to man, as it is during the lightning-stroke process that nitrogen, so vital to the life cycle on earth, is returned to the ground. To give you an idea of its awesome power, a thunderstorm has up to 50 times more potential energy than an atomic bomb.

There are an estimated 1800 thunderstorms in progress over the earth's surface at any given moment throughout the year. On the average, lightning strikes the earth 100 times each second, generating a tremendous amount of radio-frequency energy.

Many Unknowns About Sferics

In spite of the fact that radio noises from lightning, or sferics, were the first "radio" signals heard by man, very little is known about some of the specifics of sferics. In fact, there are probably more unknowns than knowns. Much more is known about coherent radio signals than atmospheric radio noise. This is mainly because vast amounts of time and money have been spent on propagation research relating to radio signals, but not radio noise. Because of the tremendous amount of work required, the existing observations on atmospheric noise have been necessarily limited in scope. Virtually all reported sferic data have been obtained using vertically polarized, omnidirectional whip antennas (with the exception of some work in Europe and India). A whip antenna integrates the noise coming from all azimuthal directions and virtually all vertical directions except from overhead, where there is a null. Strictly speaking, if one is to obtain noise data, at a particular site, which agree closely with the published data in CCIR Report 322,² an ARN-2 atmospheric noise receiver must be used with a 200-Hz *f-f* bandwidth, and an integration time of 100 seconds. The receiver must be fed with an antenna 6.6 meters high, a whip placed in the center of an elevated radial system containing ninety radial wires which are thirty meters long. The noise data shown in Figs. 1 and 2 were taken with this type of equipment in many locations throughout the world. Thus it can be seen that there is much yet to be learned about atmospheric noise in the hf band. Many of the unknowns about sferics are described below.

Azimuthal Distribution of Sferics Sources — Figs. 1 and 2 show the three main noise-source areas on the earth. The figures show data taken with the ARN-2 at 1 MHz by the Institute for Telecom-

² See references listed at the end of this article.

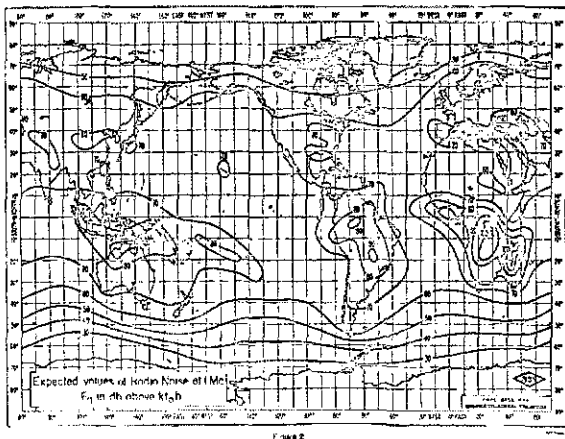
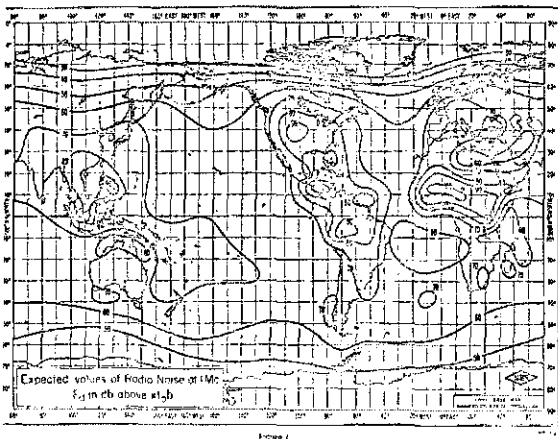


Fig. 1 — Noise distribution chart for June, July, and August, 0000 to 0400 and 2000 to 2400.

Fig. 2 — Noise distribution chart for December, January, and February, 0000 to 0400 and 2000 to 2400.

munications Sciences (formerly the CRPL). These sources subtend different angles and different azimuths and have different intensities at any given receiver site. There exists no published, comprehensive azimuthal hf sferic data taken with high gain, low sidelobe antennas. The authors have observed that from 2 to 5 MHz, the noise level can vary 30 dB or so with an azimuthal change of 20 to 30 degrees.

Vertical Angle of Arrival of Sferics — Little is known about the vertical angle of arrival of sferics. Antenna pattern and height above ground materially affect the amount of sferics received. Beam steering (or stepping) in the vertical plane would permit an operator to separate a signal from sferics if the two were not originating from the same general area, thus improving the received signal-to-noise ratio.

Polarization of Sferics — Since almost all sferic data taken to date have been obtained with vertically polarized whip antennas, little is known about the polarization characteristics of atmospheric noise. Lightning occurs both from sky to ground and from cloud to cloud, and thus the polarization could be either horizontal or vertical, or both. The ionospheric propagation effects would probably play a large part here.

Sunspot Number and Sferics — Very little is known about the variations of atmospheric noise over a sunspot cycle. One would, in theory, have to take data for about 11 years to observe sunspot influence. Of the 70 years or so that the ionosphere has been used for radio communication, radio-noise samples have been taken for only a few of these years. Since radio propagation is influenced by the sunspot number, noise propagation should also be so influenced. There have been speculations that solar flares and sun disturbances also cause changes in the atmospheric weather, and thus might change the generation of sferics with changes of sunspot numbers. This has yet to be investigated.

Symmetry of Radiation from a Lightning Flash — There are scattered reports that lightning radiates

more energy in one direction than another. If this is other than a random occurrence, the radiation from a thunderstorm cell would be greater in one azimuthal direction than another, assuming a uniform cause for the asymmetry. The authors have observed that in south Texas during the passage of certain storm cells (0 to 20 miles distant), much more interference is caused to signal reception than during the passage of other storms. Perhaps this is caused by the asymmetry.

Recent Thunderstorm Findings — Although lightning has been crashing about for over 4 billion years, some recent findings concerning the effects of the moon on the earth's weather are most interesting. Meteorological data for the past 25 years from 108 weather stations in the U.S. have been closely examined to determine if there was any influence of the moon on the earth's weather. Statistical analysis of these data showed a peak in thunderstorm frequency on the second day after a full moon. An earlier study showed that an analysis of 62 years of rainfall records measured at a network of U.S. stations indicates that increased rainfall can be expected three days after a new moon or three days after a full moon.

Both of these studies showed a connection between the phases of the moon and increased thunderstorm and rain activity. A natural conclusion would be to say that there would be increased sferic activity 2 to 3 days after a full moon. It is precisely in a study such as this that radio amateurs can contribute.

Earthquake Lightning and Sferics — In some parts of the world, earthquakes are frequently accompanied by various forms of lightning. The exact cause of this lightning is not certain, but it is believed to be caused by a piezo-electric effect in the earth's crust. This would occur in the crust which contains a high concentration of a crystalline material, such as quartz. Researchers suggest that it may be possible to predict earthquakes by observing this clear-sky lightning. Perhaps what one would do is to observe a sudden increase in sferics activity or intensity in a particular band of

frequencies and correlate this with real-time weather and rain probability. If no rain was observed within a certain radius of the reporting station, one might suggest the possibility of an earthquake causing the increase in the seismo-electricity. (For the hearty individuals interested in this form of activity we might suggest you build a 'quakeproof shack.)

Some Simple Sferics Experiments

The experiments described below are meant to be basically simple, so that one can implement them with the addition of fairly simple antennas or equipment. Many of the experiments can be performed, and very meaningful and worthwhile data gathered and analyzed, by the simple means of good monitoring and log keeping, without the addition of any equipment to the ham shack. The experiments are not arranged in any particular order of ease of performance or value of return of data. Different ideas will appeal to different operators because of equipment availability, real estate available for antenna installation, amount of time to dedicate to listening, and the like.

General Comments for Observers — Obviously, the most important piece of equipment needed in any sferics observation program is the receiver. It is not necessary that the receiver have "full house" capabilities; even the less expensive receivers will be adequate for many of the experiments. It is, however, quite important that the receiver noise figure not be the limiting factor for good noise data. Our suggestion is that the receiver have a noise figure of around 10 dB or less. If the receiver itself does not have this, a transistor preamplifier or preselector of low noise and high gain can greatly improve the overall noise figure. We are not looking for absolute noise measurements in the following experiments but neither do we want to mask the "wanted" noise in the unwanted receiver noise.

Experience can be gained quickly in observing individual sferics and general noise background levels, but to listen to noise, we must first be sure that there is no coherent signal in the passband of the receiver. The receiver i-f bandwidth should be at its sharpest. The tuning should be very carefully adjusted to a signal-free frequency. (The authors have found that the frequencies very close to those of WWV and WWVH — the U.S. government standard stations at 2.5 MHz and multiples of 5 MHz — are usually free of signals.) To be sure, turn on the receiver BFO and listen for any faint tones. If there are any, you are either too close to WWV, or another signal is contaminating your frequency, and any noise data may be suspect.

S Meter — In all likelihood, the calibration on your receiver S meter is not very accurate, but for all but the most precise measurements it will be good enough. Set the rf gain control for some comfortable level (usually full on), and mark it so that it can be reset if moved. Now you can read the relative levels from the S meter. The purist might put a calibrated step attenuator in the rf line to obtain a more precise measurement of the noise data by adding or subtracting attenuation to read

the same S-meter reading, and recording the attenuation factors.

AGC — If the agc pick-off point in the signal chain is anywhere but after the final narrow i-f filter, then use great care to make sure that any signal near the "noise" frequency is not suppressing the noise. Adjust the agc to its fastest decay time and individual sferic spikes may be heard, and also seen on the S meter. If the agc is turned off, most S meters are also turned off. It would be quite useful to be able to read the level of the noise without agc being turned on, so an "outboard" meter would be useful for the most precise measurements.

Sound of Sferics to the Ear — Most means of communication are dependent on what the signal sounds like to the human ear. Morse code, ssb, a-m, and fm are received by the ear and processed by the brain. In some cases mechanical devices (pen recorders for Morse code, printers for RTTY) are used to record the intelligence, or the eye (television, oscilloscope) is used. But in most cases, it is the ear which is most often used. Sferics present different sounds to the ear depending on radio frequency, distance from the receiving station, whether the BFO is on or off, receiver i-f bandwidth, audio acuity of the operator, and the like.

In general, if one listens to very-low frequencies (vlf) on a whistler receiver (an audio amplifier tied to a large loop antenna³) covering a nominal 1 to 20 kHz, pops, clicks, and tweaks will be heard. Over this frequency range the sounds are rather musical. In the 2- to 8-MHz frequency range the ear must be sharper and trained a bit more to recognize the various sounds of the different sferics. One can often assess the distance of the source by the sound — a nearby lightning flash gives rise to a very clean, powerful click. Distant ones, because of multipath, sound like a "tweak," several impulses in rapid succession. Tweaks often have a musical sound and have been likened to the sound of bursting bubbles of fat when food is frying.

If one connects an oscilloscope to the i-f output of the receiver, individual sferics are observable. If the scope is set to be triggered by the first sferic to arrive, 2-hop and 3-hop sferics can be observed as they follow the first 1-hop sferic by a nominal 1 to 5 milliseconds (too close together to be discerned by the ear as separate events). But they will sound more like a short tweak the more distant they are.

When a strong nearby thunderstorm is raging, the sferics will be bursting at such a terrific rate that at 2 MHz they will sound like a random hiss, just as a receiver output usually sounds at 30 MHz. This is really unusual to hear at 2 MHz but when it occurs, frequencies from the low end of the broadcast band to the low TV channels will be affected.

Two Horizontal Dipoles at Right Angles

This experiment is perhaps simplest of all the experiments that one can perform to obtain meaningful data about hf sferics. A switch or relay is used to change the antennas to the receiver so

³ See Johnson, "Amateur V.L.F. Observation — How to Listen for Whistlers," *QST*, March, 1960.

that one can compare the noise level received on one horizontal antenna to that of the other horizontal antenna. The orientation of the antennas is not too important, just so they are positioned essentially at right angles to each other. Both antennas should be dipoles cut to the same frequency band, such as 160, 80, or 40 meters. (Use of the clear frequencies near the WWV frequencies would require antennas for the 120-, 60-, or 30-meter bands for the 2.5-, 5-, and 10-MHz frequencies.) The sferic level is rather low above about 10 MHz (day or night) so that the dipoles for 20, 15, and 10 meters would not be as useful (except when thunderstorms are acting up in the local 0- to 100-mile area. For most practical antenna heights available to an amateur, a half-wave dipole, center fed with coax, is acceptable. Proximity of the ground minimizes most of the unbalanced effects arising from the coax feed. The typical figure-eight pattern of a horizontal dipole located a half-wave above ground is well preserved, and there are nulls in the horizontal plane off the ends of the antenna which are 20 to 30 dB down. Off the ends of a horizontal dipole, however, the vertical polarization pickup is maximum. Record the S-meter difference between the antennas by observing the fluctuating meter and estimating some average value. Record, also, a short narrative relating to receiving conditions such as "no sferics," "bursts of sferics," "occasional sferic," "local rain," "lightning in the area," "thunder heard," and so on. Observe and record the sferic level every half hour or hour during the listening period. Compare the radio noise observed with the evening TV weather forecasts to see where the thunderstorms are located in comparison with the interference caused by them in your area. Your observations can also be compared with the daily ESSA weather forecasts in your local newspaper.

Vertical Antenna and Horizontal Dipole

This experiment compares the noise picked up by a 2-, 5-, or 10-MHz quarter-wavelength vertical antenna to that picked up by a half-wave horizontal dipole for the same band. A large difference will ordinarily be observed in the experiment because of the difference in the two antenna patterns in both the horizontal and vertical planes. Storms at

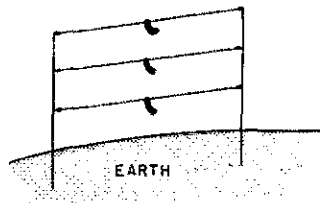


Fig. 3 - Horizontal dipoles placed at different heights on the same supports. The highest dipole has the lowest take-off angle.

different distances will affect one antenna or the other as a thunderstorm moves through the antenna "beam." One must also account for the difference in any power-line noise pickup.

Two or Three Dipoles at Different Heights

Horizontal dipoles placed at different heights above ground (Fig. 3) will have different vertical take-off angles. Table 1 shows the approximate height required for take-off angles of 10, 30, 60, and 80 degrees for frequencies from 2 to 28 MHz. Two or three of these antennas can be installed at the desired heights to provide coverage out to 2200 km, 1000 km, 350 km, and 105 km, respectively, when propagation is via the F_2 layer. (This is generally the case at night for all frequencies and in the daytime for frequencies above 14 MHz.) The dipoles should be installed in such a manner as to provide maximum coverage in the general direction of the noise sources. In the U.S., this would be in the general direction of the Gulf Coast or Central American area. Compare the sferics heard on different bands to weather forecasts on TV. Plot locations of thunderstorms compared to the general antenna pattern. Determine on what bands signals can be heard during severe local lightning storms. In the latter case, determine if cloud-to-cloud or cloud-to-ground (horizontal or vertical) lightning flashes cause most sferic noise.

Hf Beverage Antennas for Receiving

This method of operation employs directional reception (Fig. 4). The Beverage antennas are used

Table 1

Lobe Maximum Distance via F_2 layer	10°	30°	60°	80°
Distance via F_2 layer	2200 km	1000 km	350 km	105 km
Antenna height	1.43λ	0.5λ	0.306λ	0.256λ
2 MHz	700 ft	256 ft	150 ft	126 ft
4 MHz	360 ft	123 ft	75 ft	63 ft
7 MHz	201 ft	71 ft	43 ft	36 ft
14 MHz	101 ft	35 ft	22 ft	18 ft
21 MHz	67 ft	24 ft	14 ft	12 ft
28 MHz	50 ft	18 ft	11 ft	9 ft

Table 1 - Vertical take-off angles for different horizontal antenna heights above ground. The 10-degree vertical take-off angle would provide best long-distance coverage. The 80-degree take-off angle would be best for coverage of thunderstorms from 0 to 60 miles from the receiving station.

at hf for receiving only, to reduce interference from undesired signals and sferics. This is especially worthwhile to implement on 3.5 or 7 MHz if sufficient real estate is available. The Beverage antenna is well known for its use at very-low frequencies, but it is not so well known for use at the higher frequencies (2-30 MHz). The Beverage is only about 12 percent efficient when used at hf but it has the advantage of about 13 dB of directive gain at 2 MHz when each leg is 100 meters long. The directivity will allow a better indication of the directionality of sferic sources and will provide a means for separating the sources. Fig. 4 represents a typical array made up of a number of legs, each 100 meters long. Each leg can be just a foot or two above the earth. The spacing between adjacent legs is 2 degrees. The center small-diameter end of the beverage legs can be connected together. Coax cable would then be used to feed a receiver. The distant end of each leg is terminated with a 470-ohm carbon resistor. The ground end of the terminating resistor can be connected to a metal stake driven into the ground a few feet. Reception of signals is from sources off the terminated end of the wires. These antennas have the advantage of ease of construction; they have even been known to work while on or very close to the ground.

Sferics Received on a High-Fi Set

Connect a 5- or 10-turn square loop, two or three feet on a side, to the microphone input of a high-fidelity or audio tape recorder amplifier. When a nearby storm is present, clicks, pops, and tweaks can be heard with the audio gain turned full on. This can be done even when the loop antenna is inside a brick house or garage. You actually hear the audio-frequency components of the lightning-stroke energy.

Sferics Lightning-Flash Counter

Fig. 5 shows how a neon bulb can be very easily connected to the audio output of a receiver so that lightning flashes of a given intensity may be counted. This means of counting sferics is especially useful when thunderstorms are occurring nearby. Because a neon bulb ionizes at the same fixed voltage each time, it will act as a gate and will ignite only when a given level is exceeded. Plot the number of flashes observed within each 10- or 15-second period during the passage of a local storm. The audio gain control is set at a comfortable audio level so that only the stronger flashes register. Make observations at 2, 4, 8, 16, and 32 MHz. The number of neon bulb flashes will decrease at a roughly linear rate as you go up in frequency.

Radio Noise Data at 5 MHz

As one moves away from the equator, radio noise decreases. As one moves up in frequency from 1 MHz, radio noise decreases. Fig. 6 shows the amount of noise received in northern New York State at 5 MHz using the ARN-2 omnidirectional noise receiving system. The curve shows

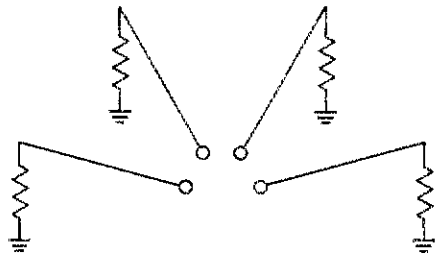


Fig. 4 -- Directional receiving through the use of a Beverage antenna.

the median noise obtained when 30 days of data are averaged for September. It is during September that the sun travels south for the winter, and is over the equator on September 23. The days and nights are almost the same length (12 hours). It can be seen from Fig. 6 that the noise is very strong for about 12 hours (nighttime) and the rest of the time (daytime) it decreases to a point where it is 30 dB weaker at local noon. As the sun comes up, D-layer absorption reduces the sferics signal level by about 9 or 10 dB per hour until maximum absorption occurs at high noon. As nighttime approaches, the sferics level increases at the rate of 6 to 8 dB per hour. During nighttime hours, with the D and E layers gone, noise is propagated by the F_2 layer. The nighttime intensity is fairly constant and remains the same within 7 dB for the 30 days of September. However, in the event of a local thunderstorm, the daytime level can increase by more than 50 dB in just a few hours as the storm approaches and then recedes from the receiving site. The nighttime noise level can increase by about 15 dB or more during a local storm.

It should be remembered that this curve was obtained by using an omnidirectional vertical antenna. As such, the antenna integrates noise from all directions. That is, as the sun sets in the west, stations to the east start to come in as propagation from that direction improves. However, the noise level has not yet risen very high as only the noise from the sources to the east are received. That is why, shortly after sunset, signals in the 2- to 7-MHz band are received best from the east with good signal-to-noise ratios. Then around sunrise, signals to the west are received best as there is now no noise being received from the east. The above example is the usual condition when simple receiving antennas are used (whips, verticals, horizontal dipoles).

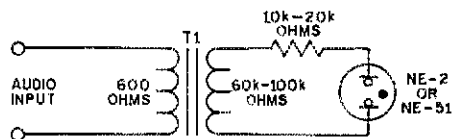


Fig. 5 -- Sferic lightning-flash counter using a small neon lamp. The lamp is connected across the receiver's audio output through T1, a small line-to-grid transformer.

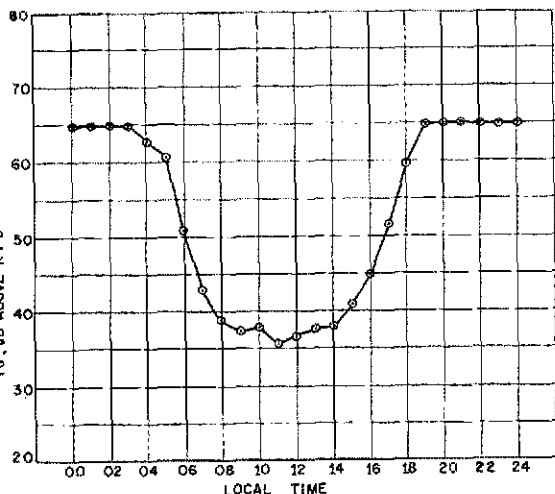


Fig. 6 - Radio noise data taken at 5 MHz in northern New York with an ARN-2 omni receiver system. Plot shows power measurement of median noise for 30 days in September, 1968.

SEAT Noise

This type of radio noise is caused by the discharge of static electricity by arising from a chair which has been charged. The charge is generated by the normal movement of the person sitting in it, and can be quite dramatic if the chair has a plastic cover. Almost everyone has noticed this when getting out of a car with plastic seat covers. Under dry conditions, (Texas in the summer or upstate New York in the winter), the arc drawn from a chair can be 1/16 to 1/8 inch long. This spark produces radio noise which can be heard above the normal spheric background level from 0.55 to 55 MHz with a dipole connected to the receiver. This type of noise is not radiated more than several hundred feet from the spark. However, it might be a nuisance to a receiver in an apartment complex where several hundred people could be charging and discharging chairs, walking across rugs, or stroking cats and the like, any activity which might produce static electricity. SEAT (noise) is an acronym for Sudden Enhancement of Atmospheric Threshold.

The study of sferics is enlightening (no pun intended). However, one should not get too engrossed in the subject matter and fail to observe the approach of a local electrical storm, or he could receive a large charge (pun intended) from the source of his enlightenment. When nearby lightning is occurring, be sure to use a good ground on the big antennas, and a small antenna on your receiver for the measurements, to avoid terminating the equipment or the operator before terminating the tests.

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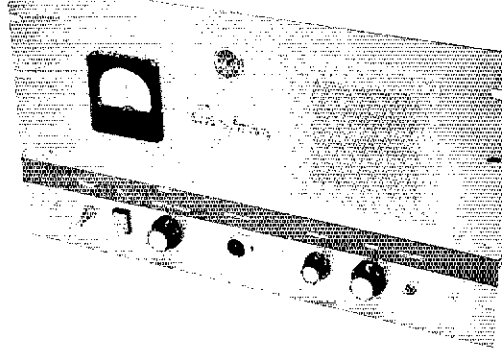
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The RCA Carfone fm base station is shown here with its new face. A 10 1/2 x 19-inch aluminum rack panel is used to contain the controls, meter, and speaker. All of the important operating functions are controlled at the front panel. The microphone jack is located at the lower center of the panel. A two-channel frequency selector switch is mounted at the lower right, near the af gain and squelch controls. The meter switch, on-off switch, and pilot lamp are seen at the far left.



A New Face for the Carfone FM Rig

BY DOUG DeMAW,* WICER

WITH DUE CREDIT to the equipment designers, the RCA Carfone base station is not the prettiest piece of fm gear in amateur service. Additionally, some of the convenience features that base stations should have are not present in the unconverted unit. Therefore, this writer decided to make some modifications which would provide better service from the transceiver, plus spruce up the outward appearance. The resultant product is described herein.

Some Circuit Changes

The Carfone shown here is the 10-watt species which was packaged as a base station. Similar units are available as surplus which provide greater power output, but the circuit modifications discussed here will be pretty much the same for the various models.

In the transmitter setup (Fig. 1), the tuned circuit in the plate of the second doubler (6CL6, designated 2V/X4) does not tune down to 146 MHz without adding some fixed-value capacitance. Proper tuning resulted after adding a 3-pF silver mica in parallel with 2L7, the slug-tuned plate coil. This inductor, in combination with the grid coil of the following stage (2V/X5, a 5763) forms a bandpass coupler. The grid coil, 2L8, required the addition of a 5-pF silver mica from its high-Z end to ground.

* Technical Editor, QST.

Tuned circuit 2L10, the plate inductor for the 5763 third doubler, requires a 5-pF silver mica from its high-impedance side to ground. No other changes are required in this part of the circuit.

The output link from the PA stage, 2L13, needs additional inductance in order to tune the 2-meter band. Since there was insufficient room for a larger link, a new inductor of the same size was made from No. 10 tinned copper wire. However, in one leg of the new link a 2-turn coil was included to increase the inductance. The two turns are a part of the U-shaped link, and are wound near the end of the link nearest chassis ground. The diameter of the turns is 3/16 in. i.d.

In the model treated here only one crystal channel was wired in. A duplicate of the existing oscillator was wired into the blank space on the chassis, and a double-pole two-position toggle switch was mounted on the panel to allow switching the channels. The cathode circuit of each oscillator is routed to the panel switch so that the desired oscillator can be activated by grounding its cathode.

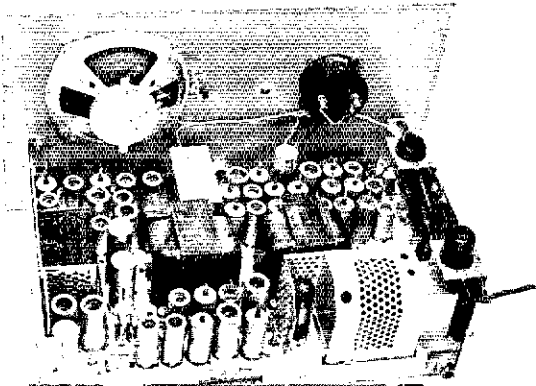
A microphone connector was wired in parallel with the microphone terminal strip on the back of the chassis. The new microphone jack is mounted on the front panel of the converted unit.

Maximum rf power output from the transmitter was 4 watts prior to modification of the circuit. After the changes were made an output of 13 watts resulted. The operating frequency was 146.34 MHz.

Modifying the Receiver

As was done with the transmitter, an additional oscillator was built into the blank space on the receiver chassis. Channel selection is carried out in

The original three-chassis assembly is attached to the new panel by means of the original chassis brackets. A metal shield plate is used to enclose the bottom of the chassis. The terminal strip on the rear apron of the transmitter was used originally for the mike connections.



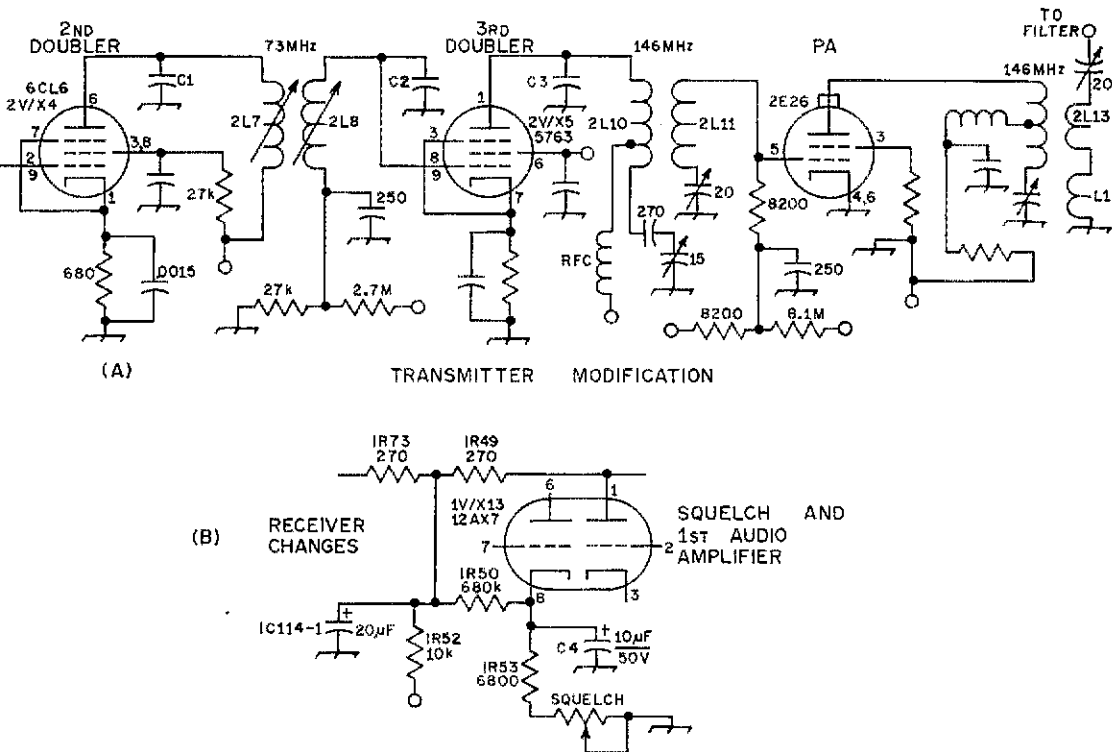


Fig. 1 — Changes to the transmitter circuit are shown at A. C1, C2, and C3 are, respectively, 3 pF, 5 pF, and 5 pF. Coil 2L13 is remade (see text) to include additional inductance L1. In the circuit at B the squelch portion of the receiver is modified to include C4, which is a 10- μ F electrolytic. Resistor IR50 is changed from a value of 270,000 ohms to 680,000 ohms as shown.

the same manner as with the transmitter, and by means of the extra set of contacts on the same switch.

A case-history problem in the receiver was solved by adding a 10- μ F electrolytic capacitor (50-volt rating) from pin 8 of the squelch tube (12AX7, 1V/X13) to ground. This circuit addition cured an annoying ac hum heard in the audio output of the receiver.

An improvement in the squelch range was effected by changing resistor IR50 (connected to pin 8 of the squelch tube) from a 270,000-ohm unit to one whose value is 680,000 ohms.

The remainder of the changes in the receiver entail moving the squelch and af gain controls to the new front panel. Also, a panel control was added to switch a zero-center 50- μ A meter between terminal 2 of jack IJ2 (first-limiter current) and pin 5 of the same jack (discriminator). A surplus Motorola meter was used in this modification, but any zero-center 50- μ A meter will work satisfactorily.

The original speaker was mounted on the new front panel, and is protected from damage by an aluminum grille made from perforated sheeting.

Other Changes

The power on-off switch and a new indicator lamp are mounted on the front panel. A single-pole two-position switch is panel mounted to select the metering function desired. The new panel is a gray hammertone aluminum unit which measures 10 1/2 x 19 inches. The trim strip on which the press-on white decal lettering is placed consists of a 19 x 1-inch strip of masking tape which has been painted red. Krylon spray paint was used for the coloring job.

The original RCA emblem and carfone strip was added to the new panel as shown in the photo. The new panel is attached to the same brackets as was the original sloping panel.

Closing Comments

Some dealers sell used Carfones at reasonable prices. Keep a sharp eye out for bargains.¹ The 10-watt units are ideal for use as exciters for high-power amplifiers, but serve nicely as 10-watt base stations when used independently. It is suggested that a thorough check be made of the tubes to assure that they are in good condition. Several "softies" were found in the author's model.

The receiver required very little tweaking to acquire good performance. The final sensitivity was 0.3 μ V for 20 dB of quieting . . . not bad for a piece of well-used surplus!

QST

¹ Surplus two-way fm gear can be purchased from such suppliers as Gregory Electronics Corp., 249 Route 46, Saddle Brook, NJ 07662. Also check with Spectronics, Inc., 1009 Garfield St., Oak Park, IL 60304.

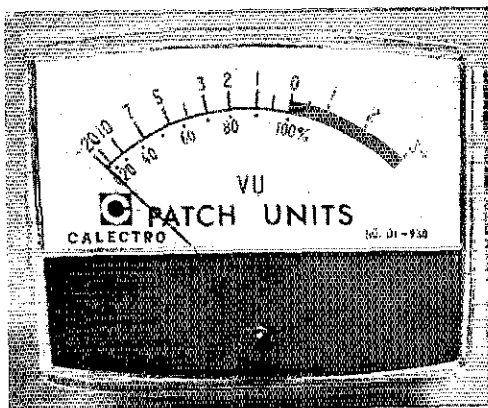
Measuring Phone-Patch Levels Accurately

BY GEORGE P. SCHLEICHER,* W9NLT

PHONE PATCHING became a legitimate activity the first of January, 1969, for most areas of the country. Soon afterwards, the first telephone interface specification was published; it covered the voice coupler, and defined the signal limitations to be allowed at the electrical interface device in rather clear terms. On one point, however, the specifications were a puzzle to many amateurs. The maximum in-band voice level was originally specified as being so many dB below a volt, *averaged over a three-second interval*. Such averaging is unfamiliar to most amateurs, and the test equipment listed in the specification is usually found only at the telephone company and in commercial laboratories. More recently, interface specifications have been issued to cover unattended (automatic) interconnection arrangements of the types that might be used for a amateur repeater. When these devices are used, different voice-level specifications apply because different circuit impedances and signal losses are encountered. Some confusion has resulted because later interface specifications define maximum voice levels in terms of power, related to one milliwatt, with three-second averaging.

Some amateurs are using VU (Volume Unit) meters for setting telephone-line levels, bridging the meter directly across the input leads to the voice coupler. If the meter indicates an averaged peak voice level of -5.3 VU (a reasonable interpretation of the interface specification) an amateur certainly won't exceed the voice-power limit allowed, but he will risk supplying an unnecessarily low level to the party at the far end of some long-distance calls. Clearly, there is a need for a level-measuring device specially designed for telephone interconnection work. Until one comes along, the author will present a way to build a

* 1535 Dartmouth Lane, Deerfield, IL 60015.



The Calectro VU meter has been modified to respond in a manner similar to the Western Electric test set specified as a standard in the telephone company interface specifications. A new calibration scale has been added using dry-transfer letters.

close approximation with materials that are available now. The approach described here involves selecting a VU meter of modest cost. The meter is modified to respond in a fashion that is nearly identical to that of the *modified* Western Electric Co. (W. E. Co.) No. 3 Noise Set described in the interface specification.

What Is a VU Meter?

A VU meter was selected because such an instrument is basically an ac voltmeter which has dynamic characteristics that are carefully controlled. For example, the reference or zero-level point of the meter must be between $2/3$ and $3/4$ of the full-scale value. When a sine-wave voltage of the reference level is applied to the meter, the pointer must swing to at least 99 percent of the zero level within 0.3 second, with at least 1 percent but not more than 1.5 percent overswing. Many additional characteristics are described for VU meters in the American Standards Association specification No. C16.5-1954. The W. E. Co. test set specified in Bell's technical references also has a fast-acting meter of controlled dynamic characteristics. So, a VU meter is the best choice to be damped to match the characteristics of the modified No. 3-A Noise Set.

The VU meter normally has a higher impedance than the circuit on which it is to be used. For circuits employing a 600-ohm source and a 600-ohm load, the meter impedance should be at least 7500 ohms. When such a meter is bridged across a working circuit, its shunting effect can cause up to 0.4-dB loss. For this reason there are two common methods of calibrating a VU meter. In the first method, the meter is adjusted to show the power that will be delivered to the load *after the meter is disconnected*. In the second method, the adjustment is made so as to show the power delivered to the load *while the meter is connected* to the

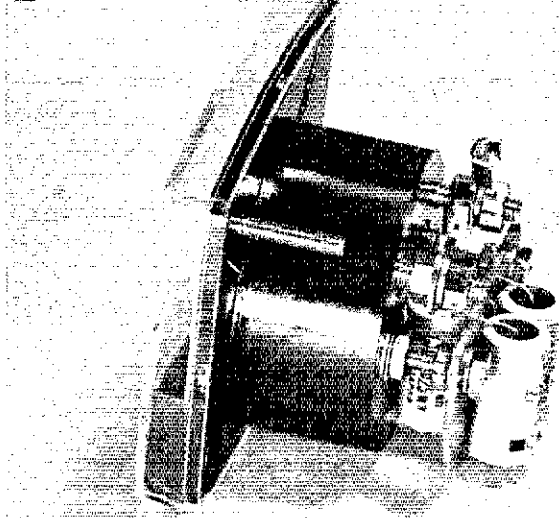
The electrolytic capacitors which provide 3-second averaging are mounted on an etched circuit board which is bolted to the rear of the meter case.

circuit. The second method represents the situation that would prevail in phone-patch work, as the meter would normally remain connected to the input of a voice coupler while a patch was in progress, to permit level adjustments to be made as required during the call. Be careful, when comparing meter readings, not to be misled by the two different calibration methods mentioned above. More importantly, you should be aware that "bare" VU meters are usually intended to become a part of a control console, test set, or other equipment assembly, and that the markings on the meter scale are relative and may not translate directly to line or load levels. For example, the Calctro meter used in this project requires about 1.03 V rms, for an indication of zero on its scale. One model of the Calrad brand is specified as indicating zero when 1.22 V rms is applied to the meter terminals. Such levels would be equivalent to +2.5 and +4 dBm, respectively, if applied to a 600-ohm load. In other words, you cannot simply buy a VU meter, connect it to your patch (or anything else) and be assured of meaningful measurements. You must know the rms voltage to which the meter is calibrated.

The Modification

A VU meter can be modified to indicate the maximum permissible voice-signal voltages for patching. Two operations are involved. The first is changing the multiplier resistor in the meter, which changes the range of the meter to a more suitable one. The second modification is to add damping capacitance so that the meter integrates speech signals over a 3-second interval. These changes will make the meter respond more slowly than the typical VU meter. As a precaution against misinterpretation, the builder may want to add a special legend to the meter scale.

A Calctro model DI-930 meter was selected for conversion because it met the general requirements given earlier and, in addition, appeared to be



more sensitive than the competitive models that were available. It should be emphasized that the component values listed below apply to only this make and model of meter; others require different values that would have to be determined, as these were, by direct comparison with a modified W. E. Co. No. 3-A Noise Set.

The meter is opened by unsnapping the clear-plastic front cover. Loosening the two screws in the back of the case will permit the movement to be lifted out. It should be handled by the sides of the scale card to avoid damage to the movement or pointer. Unsoldering the two wires that connect to the movement will permit separating it from the case. Remove the 7000-ohm resistor which is connected between one terminal on the case and the bridge rectifier. Two 7/64-inch holes should be drilled in the case at this time to accommodate the No. 4 screws which will be used to connect the external capacitors to the meter coil. Wires should be soldered to the screw heads before they are installed in the case. There are plus and minus signs molded on the back of the case. They can be used to indicate the polarity of the external electrolytic capacitors. Remember to wire the meter accordingly! The rear (insulated) coil contact is negative. A

Power in Load in dBm (1 mV reference)	Rms Voltage Across a 600-ohm Load
+10	2.44949
+4	1.22765
+3	1.09415
+2	0.97516
+1	0.86911
0	0.77460
-1	0.69036
-2	0.61528
-3	0.54837
-4	0.48314
-5	0.43559
-6	0.38822
-10	0.24495
-20	0.07746

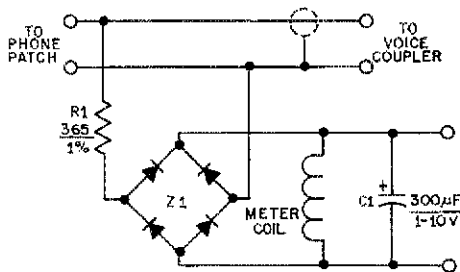
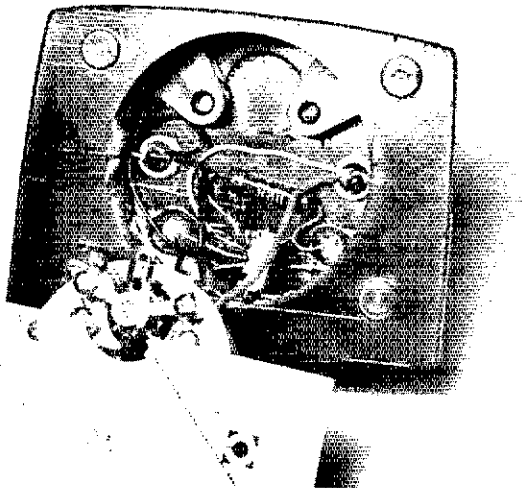


Fig. 1 — Schematic diagram of the meter modifications. R1 is a 1-percent-tolerance, wire-wound resistor; Z1 is part of the original circuit in the Calctro DI-930 meter. C1 consists of three 100- μ F, 6-volt electrolytic capacitors connected in parallel.



An inside view of the modified meter. The two mounting bolts and the precision resistor have been added.

365-ohm, 1-percent resistor replaces the 7000-ohm multiplier resistor originally furnished; the new resistor may be connected in the same place and in the same way as the old unit. A damping capacitance of 300 μF is required. Two or three individual capacitors may have to be wired in parallel to obtain the required value. They can have a very low voltage rating as they are connected across the meter coil where a maximum of only a fraction of a volt is present. If the capacitors chosen are small enough, they can be mounted directly on the back of the meter case. For ease in handling, leave the scale card attached to the movement until the components have been re-assembled in the case. The scale card can then be removed for the addition of any special legend. Transfer letters of the kind used by draftsmen and artists work very well.

The values given above have been chosen so that stock-value components can be used. A small margin has been provided to allow for manufacturing tolerances. The modified meter should respond to speech signals below 3 kHz in a way that compares very closely with the measuring sets mentioned in the Bell interface specifications. Error should be less than 1 dB and should be found to be on the safe (low) side. The meter will have a 1-kHz impedance of about 6500 ohms. It should be mounted only on a nonferrous panel.

Using the Modified Meter

In use, the meter should be left connected to the input of the voice coupler whenever a patch is in progress. The speech level should never be permitted to exceed the zero or 100-percent point on the meter scale. When the telephone connection is made to a nearby location (such as a line served out of the same telephone exchange that serves you) the distant listener will receive a more comfortable listening level if the maximum signal is held to about -7 on the meter scale. Remember, too, that if the distant telephone user is not talking loud enough for good modulation of your transmitter, he can often be made to speak loudly if you *reduce* the level of the signal sent to him.

The modified meter can also be used to set levels at repeaters or other installations that use

one of the unattended interconnection arrangements. In such cases, disconnect the patch from the interface and terminate it in a 600-ohm load. Adjust the audio level so that the maximum speech level does not exceed an indication of -5 on the meter scale when it is connected to the 600-ohm load resistor. In this situation, the modified meter should not be connected when telephone calls are in progress. QST

ARRL Technical Information Service

Any member of the League is welcome to appropriate help from the Hq. technical staff in connection with equipment problems he may encounter. We ask that you observe the following guidelines so that we may provide the best possible service to the greatest number.

1. Before writing for technical assistance, search your files of *QST* and other ARRL publications. The answer you need is probably there. Consult the annual index of articles in each December issue.

2. All inquiries must relate to amateur radio. (We cannot respond to questions about CB, marine radio, hi-fi, etc., unless they concern TVI or RFI caused by amateur gear.) Please be reasonable in the number and kind of questions you ask. Limit the number of questions to three per letter.

3. Use a typewriter if possible; otherwise, write or print clearly, on one side of each sheet. Circuit diagrams should be on separate sheets. Put your name and address (including zip code) on each sheet, not just the call. Staple or clip the pages together. Include a self-addressed, stamped *business-size* envelope. (No stamp required for foreign inquiries.)

4. For practical reasons there are certain things we cannot do. Please do not ask for comparisons between commercial products, or ask for advice on repairing in-warranty commercial equipment (write the manufacturer for assistance). Do not ask for advice or information on articles published in other magazines; write to the magazine editor or author of that article. Do not request custom designs for amateur gear.

5. We may refer you to a back issue of *QST*. If so, and if that issue is still available, you may purchase it. If not, photocopies of a particular article are available at 25 cents per page. Include payment with your order.

6. Address all technical questions to: Technical Information Service, American Radio Relay League, 225 Main Street, Newington, CT 06111.

A Hybrid Quacker Box



The ssb transmitter uses a minimum number of panel controls. Push-button switches activate the power supply and the output-metering function. A J. W. Miller MD-4 dial, LMB CO-1 cabinet and Simpson Wide-Vue meter lend a modern appearance to the unit.

A 90-Watt SSB Transmitter for 14 MHz

BY DOUGLAS A. BLAKESLEE,* WIKLK, AND PETER ZILLIOX,** WA3EQK/1

VERY FEW of the amateurs operating ssb today belong to that exclusive club comprised of those who have homemade transmitters. Yet, a custom-designed rig that is tailored to an individual's operating requirements can be such a pleasure to use. Solid-state components and circuit-board assembly techniques have simplified the construction task to the point where any amateur with kit-building experience can successfully complete an ssb rig . . . and join the club.

Circuit Details

The transmitter circuit shown in Fig. 1 is designed for the 14-MHz band and for use with a vhf transmitting converter or transverter. All stages employ solid-state devices, except for the driver and final amplifier, which use tubes. Power output is approximately 50 watts PEP. If the tuned circuits from the mixer onward are modified to resonate at 3.8 to 4 MHz, the transmitter may be used on the 75-meter band without any other changes. The sideband generator is constructed on a single etched circuit board. The generator may be used as the basis of a transmitter design for other amateur bands, if desired.

* Assistant Technical Editor, *QST*.

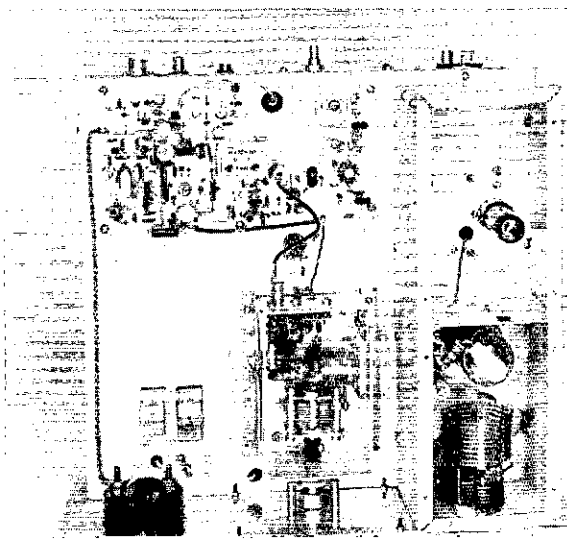
** 21 Long Lane Road, West Hartford, CT 06117.

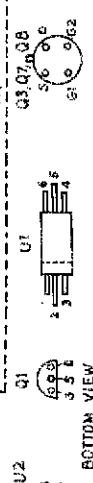
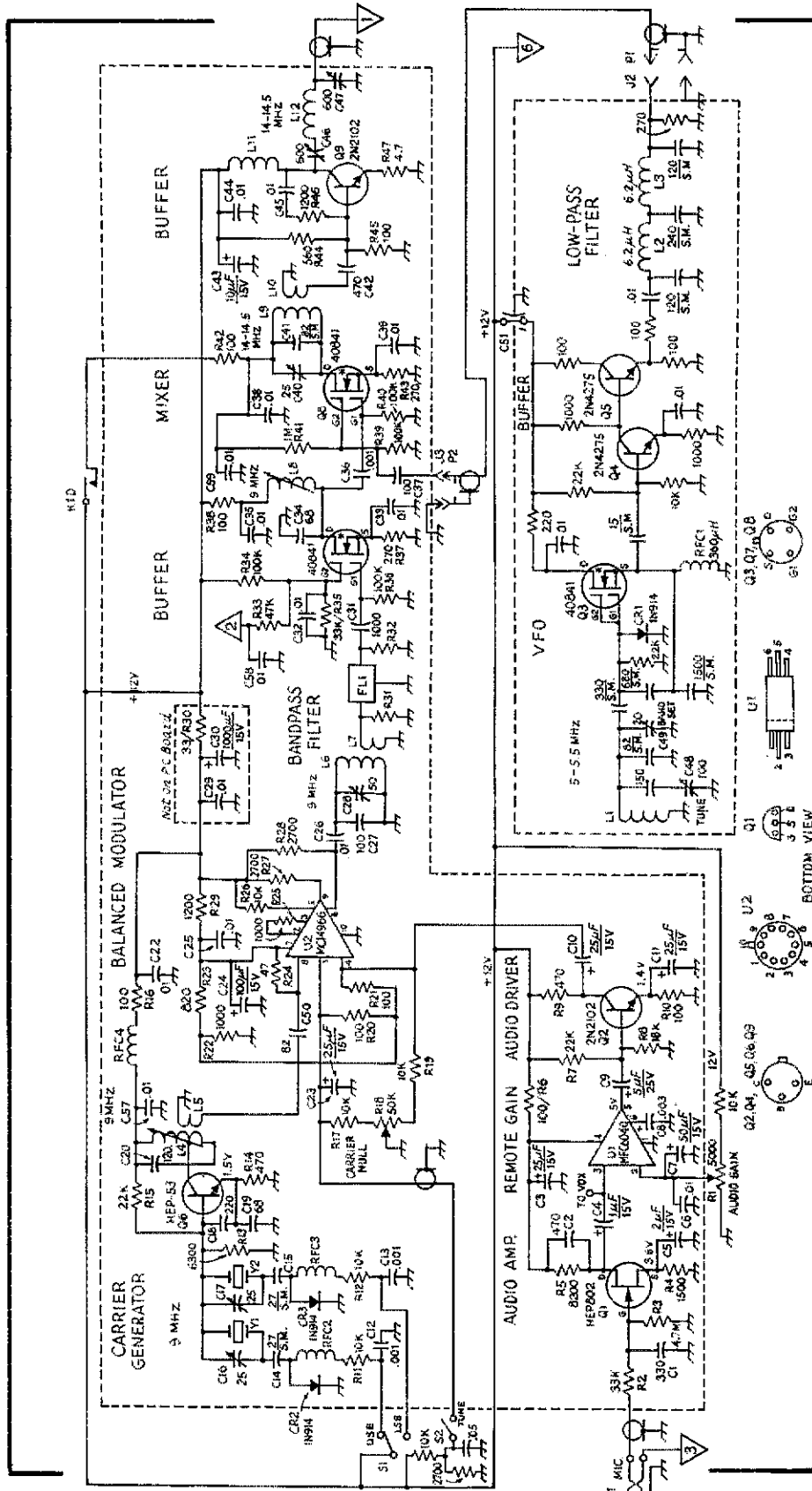
The interior view reveals the shielded compartments used for the driver and final stages. At the center is the VFO. The small air-variable capacitor mounted within the VFO enclosure is the calibration adjustment. The ssb generator is constructed on an etched circuit board which is mounted over a 3 7/8 X 7 1/2-inch cut out in the chassis. A shield was tried between the sections of the ssb generator, but little additional carrier suppression was achieved.

The 14-MHz transmitter consists of three sections: a VFO, an ssb generator, and a power amplifier. The generator was developed from a circuit published in *QST*.¹ Carrier energy at 9 MHz is produced by Q6. Diode switching is employed to select a suitable crystal for upper or lower sideband. The balanced modulator uses an MC1496G integrated circuit which provides up to 50 dB of carrier suppression. For tune-up purposes, a positive voltage applied to pin 1 of the '1496 provides full carrier output.

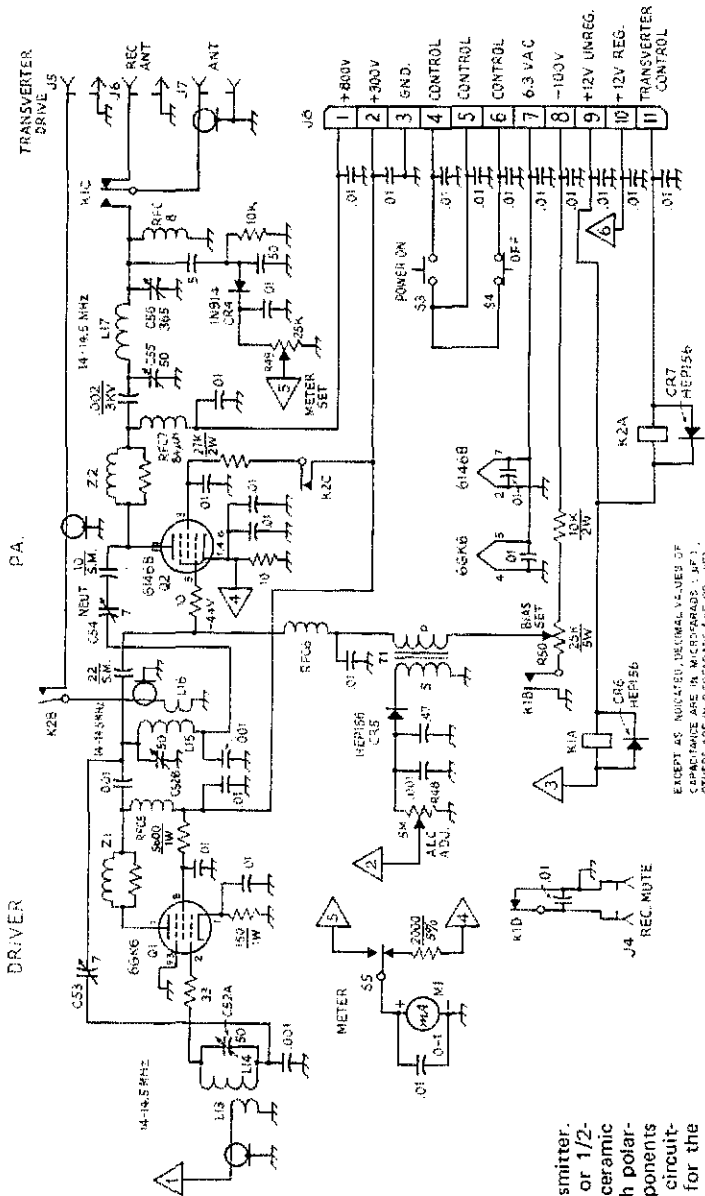
The audio-input signal is amplified by a JFET, Q1. The high input impedance of this device allows a dynamic, ceramic, or crystal microphone to be used. A Motorola MFC6040 functional circuit provides audio gain control by means of a dc voltage, eliminating the need for long leads carrying low-level audio to a panel-mounted control. The resistive loading of the balanced-modulator

¹ Blakeslee, "A Second Look at Linear Integrated Circuits," *QST*, July, 1971.





BOTTOM VIEW



EXCEPT AS NOTATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (. μ F). OTHERS ARE IN PICOFARADS (PF OR μ PFT). RESISTANCES ARE IN OHMS.
 60K6 - SILVER MICA
 6146B - 5000 MFD 50V
 * = SAFE PROTECTED

Fig. 1 - Schematic diagram of the ssb transmitter. Unless otherwise noted resistors are 1/4- or 1/2-watt composition. Capacitors are disk ceramic unless marked otherwise, except those with polarity indicated, which are electrolytic. Components not listed below are given designators for circuit-board location purposes. A circuit board for the ssb generator is available from Spectrum Research Labs., 3208 E. President Street, Phoenix, AZ 85714, price: \$7.50. A circuit-board template is available from ARRL for 50 cents and a large self-addressed, stamped envelope.
 (Continued on page 3(i))

(Continued from page 29)

- C16, C17, C40 — Air variable, pc mount (E. F. Johnson 189-0509-005).
- C28 — Ceramic trimmer, pc mount (Centralab 825-GN).
- C46, C47 — Mica-insulated trimmer (J. W. Miller 160-C).
- C48 — Air variable (J. W. Miller 2101).
- C49 — Air variable, panel mount (E. F. Johnson 160-0110-001).
- C51 — Feedthrough type.
- C52 — Dual-section air variable, 50 pF per section (Cardwell HFD-50).
- C53 — Miniature air variable (E. F. Johnson 189-0502-004).
- C54 — Ceramic trimmer (Centralab 822EZ).
- C55 — Air variable, panel mount (E. F. Johnson 167-3).
- C56 — Air variable, broadcast type (J. W. Miller 2111).
- CR1-CR4, incl. — High-speed silicon switching diode, 1N914 or similar.
- CR5-CR7, incl. — Silicon diode, 100 PIV or more, 500 mA.
- FL1 — Crystal filter, 9-MHz center frequency, 2- to 3-kHz bandwidth; KVG XF-9A or XF-9B, Wheatlands WF-4 or WF-8, ESEL M9A suitable. (Wheatlands Electronics, P.O. Box 343, Arkansas City, KS 67005; ESEL, P.O. Box 434, Excelsior Springs, MO 64024; Spectrum International, Box 87, Topsfield, MA 01983.)
- J1-J6, incl. — Phono type, panel mount.
- J7 — Coaxial connector, panel mount.
- J8 — 12-circuit power connector, panel mount.
- K1 — Miniature relay, 4pdt 2-A contacts, 12-V dc coil (Potter and Brumfield R10-E1-Y4-V185 or equiv.).
- K2 — Miniature relay, 2pdt 2-A contacts, 12-V dc coil (Potter and Brumfield R10-E1-Y4-V185 or equiv.).
- L1 — 12 turns, No. 20 tinned wire, 16 tpi, 1-inch dia (B&W 3015 Miniductor).
- L2, L3 — Solenoid-wound rf choke used as an inductor (J. W. Miller 70F686A1 with 4 turns removed).
- L4 — 2.9- to 3.6- μ H slug-tuned inductor, pc mount (J. W. Miller 46A336CPC).
- L5 — 2 turns No. 28 enam. wire over L4.
- L6 — 20 turns No. 22 enam. on Amidon T-50-2 core (Amidon Associates, 12033 Otsego Street, North Hollywood, CA 91607).
- L7 — 9 turns No. 28 enam. over L6.
- L8 — 4.2- to 5.2- μ H slug-tuned inductor, pc mount (J. W. Miller 46A476CPC).
- L9 — Approx. 1.2 μ H, 14 turns No. 22 enam. wire on Amidon T-50-2 core.
- L10 — 3 turns No. 22 enam. over L9.
- L11 — 7 turns No. 22 enam. wire on Amidon T-37-2 core.
- L12 — 8 turns No. 22 enam. wire on Amidon T-37-2 core.
- L13, L16 — 2 turns No. 22 enam. over L14 and L15 respectively.
- L14, L15 — 2.4- to 5.8- μ H slug-tuned inductor (J. W. Miller 42A476CB1).
- L17 — 10 turns No. 14 tinned wire, 8 tpi, 2-inch dia (B&W 3026 Miniductor).
- M1 — Milliammeter, panel mount (Simpson 1222-15420).
- P1, P2 — Phono type, cable mount.
- Q1, Q4-Q6, incl. — Motorola transistor.
- Q2, Q3, Q7-Q9, incl. — RCA transistor.
- R1, R48-R50, incl. — Linear-taper composition, panel mount.
- R18 — Linear-taper composition, pc mount.
- R31, R32 — For KVG filters, 560 ohms; for Wheatlands WF-4, 270 ohms, WF-8, 320 ohms; ESEL M9A, 220 ohms.
- S1, S2 — Dpdt toggle.
- S3 — Spst momentary push-button type (Switchcraft BX-01-6).
- S4 — Spdt momentary push-button type (Switchcraft BX-03-3).
- S5 — Dpdt momentary push-button type (Switchcraft BX-03-6).
- T1 — Audio type, primary 600 ohms; secondary 2000 ohms (Triad T-35X or equiv.).
- U1 — Motorola functional circuit.
- U2 — 1496 IC (Motorola MC1496G or MC1596G, Signetics S5596K, or Fairchild μ A796, or equiv.).
- Y1 — 8.9985 MHz, or frequency specified by filter manufacturer.
- Y2 — 9.0015 MHz, or frequency specified by filter manufacturer.
- Z1 — 5 turns No. 22 enam. over a 33-ohm, 1/2-watt composition resistor.
- Z2 — 5 turns No. 20 tinned wire over a 47-ohm, 1-watt composition resistor.

input terminals must be kept below 200 ohms if good carrier suppression is to be achieved. Thus, some power is required from the audio section. A 2N2102 transistor provides the required 0.5-volt rms audio signal across R21.

The output from the balanced modulator is fed directly to the 9-MHz crystal filter, FL1. (Several different firms manufacture filters suitable for use in this transmitter; five models are listed in Fig. 1.) After the unwanted sideband has been removed by the crystal filter, the level of the ssb signal is increased by a 40841 MOSFET voltage amplifier. This stage makes up for losses in the filter and provides a convenient a/c control point.

A second 40841 transistor, Q8, functions as a mixer, combining the 9-MHz ssb signal with 5-MHz energy from the VFO to provide output on 14 MHz (or 3.5 MHz if a suitable value is chosen for

L9). A buffer stage, using a 2N2102 power transistor, provides additional amplification and a 50-ohm output impedance for the ssb generator. A short length of RG-174/U subminiature coaxial cable carries the ssb signal to the input of the driver tube, V1.

The VFO uses a dual-gate MOSFET, Q3, with both gates tied together. A J. W. Miller low-friction-drive variable capacitor allows frequency variation between 4.95 and 5.55 MHz. Two low-gain bipolar transistors isolate the variable-frequency oscillator from the mixer. A low-pass filter is included at the output of the second buffer to suppress harmonic energy generated by the VFO. Frequency stability of the VFO is excellent. Drift is less than 10 Hz over any 15-minute period, after a 10-minute warm-up.

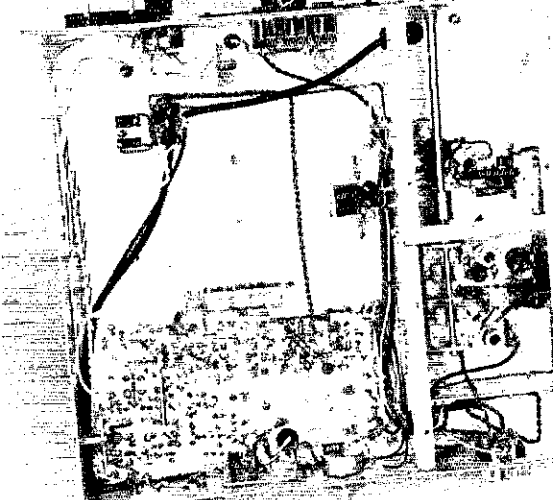
C30 is held in place, just above the sideband generator, by one of the pc-board mounting bolts. To assure a good ground connection, a star lock washer should be used between the circuit board and the chassis when each of the mounting bolts is installed. Note that the leads from the power-supply jack are isolated from the final amplifier by a shield.

Power amplification is accomplished by two tubes, a 6GK6 and a 6146B. Input to the final stage measures approximately 90 watts PEP. A pi-section output network is employed to match 52- or 75-ohm loads. An all-solid-state circuit can be built for this power level. However, the cost of suitable transistors is so high that the hybrid approach is best for cost-conscious amateurs, at least for a while longer.

Relay switching is included to perform the PTT function and to disable the final-amplifier tube when an external transmitting converter is used. Push-button switches control a remote power supply, using a control circuit similar to that previously described in *QST*.² The supply is patterned after the "economy" design given in recent editions of *The Radio Amateur's Handbook*, to which a 12-V, 1-A regulated supply (design taken from *QST*³) has been added to power the solid-state devices in the transmitter.

² Blakeslee, "Some Notes on the Design and Construction of Grounded-Grid Linear Amplifiers," *QST*, December, 1970.

³ Blakeslee, "Ac-Operated Regulated Dc Supplies for Transistorized Rigs," *QST*, November, 1971.



A VOX Accessory

If VOX operation is desired, the circuit shown in Fig. 2 may be included in the transmitter. This design is a modified version of the VOX unit described in the Sideband Chapter of *The Radio Amateur's Handbook*. Here, a single IC replaces four of the discrete transistors employed in the original circuit. The GAIN, ANTIVOX, and DELAY controls are mounted directly on a pc board. Q10, an MPS-A55 transistor, must be selected for low leakage if the delay circuit is to function properly. Excessive leakage will cause the relay, K1, to remain closed, even though no input signal is applied.

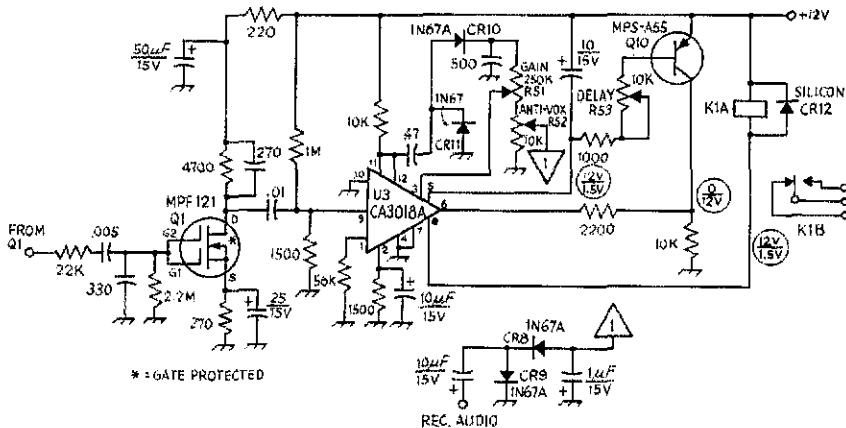
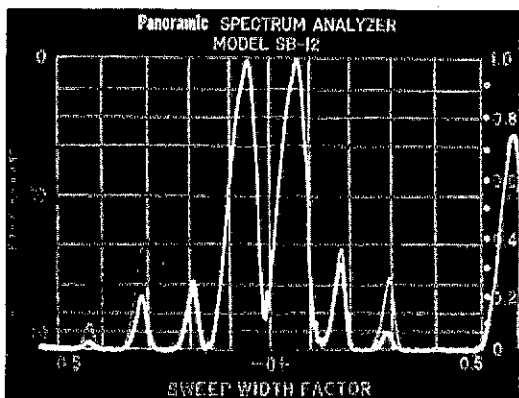


Fig. 2 - Diagram of the VOX. Unless otherwise noted, resistors are 1/4-watt composition and capacitors are disk ceramic, except those with polarity marked, which are electrolytic.

- CR8-CR11, incl. - Germanium diode, 1N34A, 1N67A, or similar.
- CR12 - Silicon diode, 100 PRV or more, 500 mA.
- K1 - See Fig. 1.

- Q10, Q11 - Motorola transistor.
- R51-R53, incl. - Linear-taper composition, pc mount.
- U3 - RCA integrated circuit.



Construction

The transmitter is built in a 14 1/2 X 6 1/2 X 13 1/2-inch LMB CO-1 cabinet which provides sufficient left-over room for a built-in power supply or several accessories. The VFO is constructed in a 3 X 4 3/4 X 2 1/4-inch box made from 3/16-inch-thick aluminum stock. Mechanical rigidity is vital to assure frequency stability. The coil used as part of the VFO tuned circuit is cut from B&W 3015 Miniductor stock and glued to a 1 1/2 X 1 1/2-inch piece of Plexiglas, which is, in turn, bolted to the wall of the VFO enclosure. The VFO, huffer, and output stages may be assembled using point-to-point wiring or using an etched circuit board. The output filter must be located within the VFO enclosure to assure that harmonic energy is "bottled up."

The ssb generator is constructed on a 4 1/4 X 8-inch etched circuit board. Suitable mounting holes are provided on the board for the five types of crystal filters specified in Fig. 1. Either the generator or the driver/final amplifier must be completely enclosed so that high-level 14-MHz rf does not leak back into the solid-state stages. The power-amplifier section is the logical choice to be shielded, as it is the one that most often causes TVI problems. Both the 6GK6 and 6146B tubes must be neutralized to prevent self-oscillation.

Testing and Alignment

Remove V1 and V2 from their sockets during initial testing. Assure that the carrier oscillator and VFO are operating properly by monitoring their outputs with a general-coverage receiver. Place an rf probe (a length of coaxial line with a one-turn link on one end and the other end connected to a receiver) over L6. Tune in the dsb signal at 9 MHz and adjust R18 and L4 for minimum carrier output. The level of carrier injection has a marked effect on the amount of suppression that can be obtained; some experimentation with the value of C50 may be necessary. Connect a microphone to H1 and speak into it while listening to the output from the balanced modulator on the receiver (use headphones to prevent feedback). The signal should be clean and crisp. Switch S2 to TUNE, and check to see that full carrier output occurs.

Spectral analysis of the transmitter output under two-tone test conditions. Distortion products are down 30 dB below a reference single-tone test.

Move the test link to L8 and tune the receiver across the 9-MHz dsb signal. The unwanted sideband should be suppressed 40 dB or more. Next, with the link around L9, monitor the 20-meter output with the receiver. Adjust L8 for maximum signal, as indicated by a peak S-meter reading. Move the link to L12 and peak C40, C46, and C47.

Plug in V1. Remove the screen voltage from the 6GK6 by unsoldering the lead to pin 8. With the test probe placed near L15, adjust C52 for maximum indication on the receiver S meter and C53 for minimum. Reconnect the screen voltage to V1 and insert V2 in its socket. Repeat the neutralizing procedure for the 6146B, monitoring the output signal at L17. Remove the screen voltage from pin 3 and set C54 for minimum feedthrough signal. Reinstall the screen-voltage lead, and connect an rf wattmeter in the line between J7 and a 50-ohm dummy load. With S2 set for TUNE, an output of at least 50 watts should be indicated on the power meter. Depress S5 and set R49 so that M1 reads nearly full scale.

Proper adjustment of the alc circuit can be accomplished only with the aid of an oscilloscope. While monitoring the rf output on the scope, inject a two-tone test signal, advancing R1 until the test pattern shows mild flattening of the wave-form peaks. Then, adjust R48 until the peak distortion disappears.

The best final check of any ssb transmitter is to use an ssb receiver to monitor the output of the rig, while it is operated into a dummy load. Distortion, excessive bandwidth, noise, or popping are all indications of trouble that should be corrected before the transmitter is used on the air.

The first contact with a homemade transmitter rivals one's first amateur contact for excitement. When one of the authors first "fired up" the unit described in this article, a CQ call brought a response from VP7CQ with a report of "excellent signal with outstanding audio quality." Somehow, in an instant, every moment of three months of bolting and soldering was proved worthwhile. **QST**

Strays

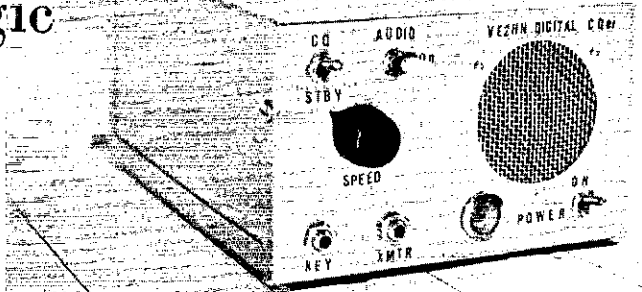
Although few amateurs may ever have the opportunity to visit Pitcairn Island, refuge of the "Mutiny on the Bounty" crew, all can now enjoy a tour of that picturesque tropical isle through the camera and words of Tom Christian, VR6TC. Tom has prepared a collection of 30 slides showing views of the island, the people, their boats, and the radio station. The collection, with an 8-page typed commentary, is sold for \$8 plus \$1 for postage. For an additional \$1, he will supply a 1 7/8 ips taped commentary. Orders should be sent to Tom Christian, VR6TC, Box 1, Pitcairn Island.

The VE2HN Digital CQer Using NAND Logic

in two parts

Part I – Basic Design Principles

BY H. H. RUGG,* VE2HN



AFTER DABBLING with automatic CQers since the late 1930s and constructing a variety of motor-driven models with assorted tapes, mechanical contactors, and opto-electronic sensors, this writer finally realized that, with the arrival of integrated logic circuits, the automatic CQer could now come of age. A working breadboard version was operating in 1968, and a properly packaged unit was well underway when K1PLP "scooped" me with his June, 1970, *QST* article.¹ However, this device uses a quite different approach from his to form the coded message.

The Digital CQer as described here is not a "universal design" with full details to accommodate all possible call signs, but it is hoped to inspire others to continue their own ideas. Furthermore, it is fabricated with 8-pin RTL logic elements, which are now commercially obsolete, although still available as surplus. The principles, however, are certainly convertible to any of the currently popular IC logic families (such as DTL and TTL), with due regard to be given to logic conventions, pin assignments, and power-supply requirements. Construction details are not provided.

In some ways this instrument is similar to K1PLP's design, but there are four major differences in concept:

1) The message is fitted into a preprogrammed grid (or matrix) system, with separate X and Y axes. The CQer steps through all positions in sequence. This considerably simplifies the programming of any particular message, such that no knowledge of Karnaugh maps is needed. (However, the cost may exceed that of a pure binary system.)

2) Advantage is taken of repeated portions of the message, so that the detailed dot-dash format of, for example, CQ is programmed only once, although it is sent three times.

3) The dot-dash configuration of particular Morse-code characters is broken up into "long" (2-bit) and "short" (1-bit) pulses, with each being programmed separately. This also is a factor in

The Digital CQer is housed in a metal box measuring 7 X 5 X 3 inches (the grid squares in the background are two inches on a side). The instrument is self contained, including monitor and ac-operated power supply.

simplifying the programming, since it effectively cuts in half the number of bits to be selected.

4) Detailed dot-dash encoding is done with IC NAND gates instead of diodes. Both methods have "pros" and "cons," and neither is a clear-cut winner, in the writer's opinion. However, with diodes priced at a few cents each, diode encoding may be somewhat cheaper.

Message Generation

This CQer sends the following message: CQ CQ CQ DE VE2HN VE2HN. The Morse-code characters are shown in Fig. 1, laid out more or less as programmed. It is arranged in this way in order to take advantage of the repetition of CQ and the call sign.

At first it appears that 32 intervals are required in each sequence. The method of operation will first be described this way, although later it will be shown how the actual count is reduced to 16. For programming, visualize having an X (horizontal) axis for the above message, along which we can move in single steps, 32 total, as shown.² For each step, we may want the output to be either ON or OFF. Also visualize a Y (vertical) axis, corresponding to the different horizontal rows; in this example there are eight Y positions. Each time we step to the end of an X count, we advance Y one step to the next value of Y, and start X over again at zero.

With the code pattern set up as in Fig. 1, we can imagine starting with Y = 0, and stepping across the 32 X positions, each step giving a low or a high output, as the CQ code pattern requires. After the final X value (31) is reached, we advance

* 16 Lakebreeze Ave., Pointe Claire, PQ, Canada.

¹ Hall, "A Digital Morse-Code Message Generator," *QST*, June, 1970.

² As in most logic work, we count from 0 to 31, instead of 1 to 32, but there are, nevertheless, 32 positions in total. Similarly, the Y counts are designated 0 to 7, a total of 8 steps.

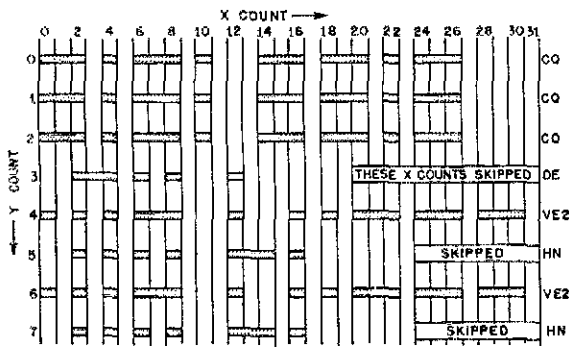


Fig. 1 - 32-count message format.

to $Y = 1$, reset X to zero, and repeat the second CQ. Again for $Y = 2$ the same process is used for the third CQ. When $Y = 3$, however, we want the DE code pattern, which is completed after an X count of 19. In order to take advantage of the repetitive message pattern, we skip X counts 20 through 31, and advance immediately to $Y = 4$, $X = 0$ for the first HN sequence. Now the HN pattern is completed when $X = 23$, and we skip X counts 24 through 31, advancing directly to $Y = 6$, $X = 0$ for the second VE2 sequence, which is identical to the $Y = 4$ pattern. Likewise, the next Y step ($Y = 7$) calls for the same HN pattern as for $Y = 5$. After $Y = 7$ is reached, we start again at $Y = 0$ and the entire message repeats.

By now the advantage of this programming method should be apparent. By setting up the repetitive parts of the message always in the same X positions, each one needs to be programmed only once, although CQ is sent three times, and VE2 and HN twice each. To accomplish this, a method of skipping X counts is needed, and a means of identifying those Y values having the same message format. These features are provided in this CQer. The Y counter can, of course, be built to go to higher values, and this would be necessary for the more popular 3 by 3 CQ sequence, and for longer call signs (W0JQY, as an extreme example). Extending the Y counter from a 3-bit (8 count) to a 4-bit (16 count) version would probably handle most cases.

With the message as shown, generated with 32 counts for X and 8 counts for Y , the total message length is 256 bits. Approximately 28 counts are lost, however, due to skipping some X positions when $Y = 3, 5, \text{ or } 7$. As stated earlier, however, the actual X count used is only 16, reducing the message to 128 bits, by a technique now to be described.

The same message as in Fig. 1 is redrawn in Fig. 2 but with X intervals twice as long, and only 16 of them. Inspection of the wave form in various X slots shows that three types of signals may be encountered for a particular X position; (1) the slot is blank (signal off); (2) the slot is on for the full length (first 2/3 of a dash, 2 bits); and (3) the signal is on for only half of the X slot (a dot, or final 1/3 of a dash, 1 bit).

An important point concerns condition No. 3, which requires one bit in length, i.e., a dot. The point is this - the signal occurs only in the first half of the X interval, and never in the second half. This is a natural consequence of the spacings used between characters, letters, and words (1, 3, and 7 bits) in Morse code. (See Table I of K1PLP's article giving code character durations in bits, and note that every listing is an even number.³)

With the above message characteristic recognized, we can now see how an X count of 16 can suffice, so long as we are prepared to program two different types of characters: "long pulses," occupying a full X interval, and "short pulses," occupying the first half of an X interval. This is the technique used in this NAND CQer. The programming is described in more detail later, but a couple of points will be mentioned now. In programming, the short pulses are originally selected as long pulses, but just before being combined with true long pulses, they are gated with a "short-pulse square wave" from the clock generator, so that they appear only in the first half of the X time-slot interval. The fact that long and short pulses must be decoded separately is not a major drawback. Programming can select either the spaces in the message (signal OFF) by inhibiting keying, or the active mark characters (signal ON), by enabling keying. The VE2HN message programming uses a combination of both.

Actually, certain rules regarding code spacing are not followed strictly in this particular CQer. To fit CQ into a 16-count repetitive pattern, the space between CQs is 5 bits, not the ideal 7. It appears in practice that 5, 6, or 7 all sound acceptable. (A 6-bit space cannot be provided with this type of programming.) A 7-bit space is used between CQ and DE; listening tests indicate that this particular spacing is a matter of individual preference; it could equally well have been programmed for a 5-bit space.

³ See footnote 1.

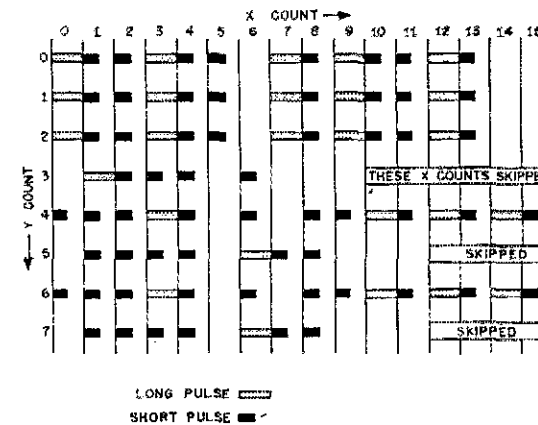


Fig. 2 - 16-count message format used in the VE2HN Digital CQer.

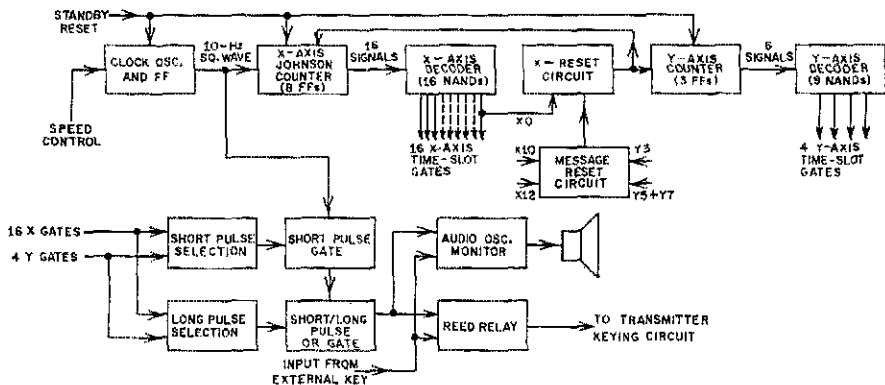


Fig. 3 — Block diagram of the Digital CQer.

System Operation

In the following discussion, refer to the block diagram, Fig. 3, and the timing diagram, Fig. 4. Code speed is set by a variable-frequency uni-junction-transistor oscillator, followed by a J-K flip-flop. This combination generates a square wave. A frequency range of approximately 4 to 12 Hz covers code speeds from 10 to 30 wpm. This clock square wave drives an 8-stage Johnson counter (comprised of 8 flip-flops). The count status is decoded by 16 NAND gates to generate 16 X time slots. These X time slots are energized in sequence, one at a time. A 4-bit binary counter could have been used, requiring only four flip-flops, but the Johnson counter requires fewer inputs to the X-decoding NAND gates and was considered preferable.

As is indicated in the timing diagram, Fig. 4, each of 16 X lines is energized, in succession, for 100 milliseconds (assuming 10-Hz, 24-wpm operation). At the end of the 16th X time slot, the X counter starts again from 0 and the Y counter is advanced one step. The Y counter is a 3-bit binary counter, of 8-count capability. The 8 Y time slots are never individually decoded, but four more-complex time slots are derived directly from the Y-counter flip-flops.

Time slot

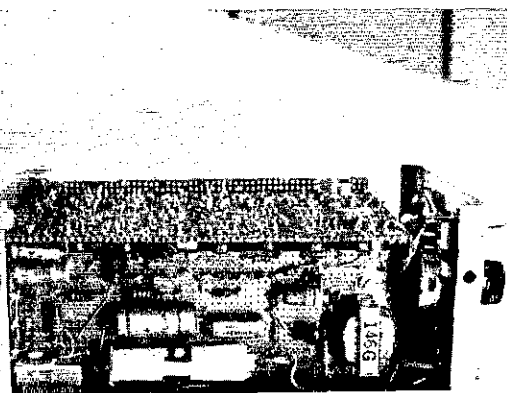
Y0 or Y1 or Y2	CQ	3 Y-counts
Y3	DE	1 Y-count
Y4 or Y6	VE2	2 Y-counts (alternating)
Y5 or Y7	HN	2 Y-counts (alternating)

We now have 16 X time slots and 4 Y time slots or gates suitable for being combined to generate the message, and we must perform 3 functions with them: select all long pulses that occur in the message; select all short pulses (either the actual short pulses, or the missing short pulses); and cause the X counter to skip certain counts. This is called the "message-reset" function.

Another signal is used, designated X-reset. This is a pulse generated each time the X counter starts over at zero. It is used to assure that the Johnson counter starts off with the correct bit pattern for each X cycle, and it is also the Y-counter trigger signal. X-reset also detects the two positions where X counts are skipped (X10, Y3 in the DE sequence, and X12, Y5 or 7 in the HN sequence), and advances X to zero immediately. Both the X-reset and message-reset functions are shown in the block diagram.

A group of NAND gates combines the X and Y values required for all long pulses. Another group selects X and Y combinations for missing (or active) short pulses. Initially, as mentioned earlier, these, too, are selected as 100-millisecond pulses, but all are AND-gated with the original clock square wave to convert them to 50-millisecond short pulses. After long and short pulses have all been generated, they are combined in an OR circuit, the output of which is the wave form of the actual final message. This wave form drives a reed relay for external transmitter keying, and a monitor audio oscillator. Control circuits are provided so that an external key can also feed the reed

Here is the Digital CQer with the top cover removed. Most components are mounted on three perforated circuit boards which are joined together and mounted over the power transformer in the form of an inverted U. The board which is most prominent in the photograph contains the power supply components and the keying and monitor circuits.



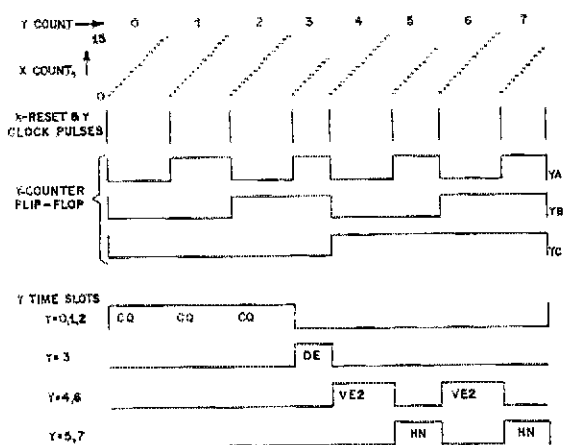


Fig. 4 — Timing diagram for the message CQ CQ CQ CQ DE VE2HN VE2HN.

relay and audio oscillator, and to assure that the message always starts at the beginning when the CQer is turned on.

The Circuit

The following remarks apply to all circuit details. Two power supplies are used, a positive 3.6-volt regulated supply for all logic, and a nonregulated negative 12-volt supply for various non-IC circuits. All ICs are identified in the text by a location symbol such as "B7." The ICs were installed in 6 rows (A to F), each row consisting of 8 ICs. Thus, B7 is located at position 7 in row B. Rows A to D are on circuit board No. 1 (Figs. 5 and 6), and include all X- and Y-axis gating; rows E and F are on circuit board No. 2, devoted primarily to coding the particular CQ VE2HN message. Board No. 3 contains the power supply and output-keying circuits, Fig. 7.

Clock Oscillator

A unijunction-transistor relaxation oscillator (Q1; Fig. 5) is used to determine the keying frequency. Other oscillator types could equally well be used. The main requirement is that the frequency be adjustable over a range of approximately 3:1 by a single variable resistor, and that a steep negative wave-form edge be generated.

The G.E. D5K1 complementary unijunction transistor has a p-type base, being reversed in polarity from conventional UJTs, and therefore the capacitor on its emitter is charged from the negative 12-volt supply. Front-panel SPEED CONTROL pot R0 varies the frequency over the required 3:1 ratio. When the UJT fires, a negative pulse appears across R3, which is used to clock flip-flop B2. The output of B2 is a square wave of frequency 10 Hz (at a midspeed setting). One complete cycle is 100 milliseconds in duration, corresponding to the duration of each X-axis gate or long pulse. Each half cycle is 50 milliseconds

long, corresponding to a short pulse. (The UJT actually fires at twice the square-wave frequency, i.e., every 50 milliseconds.)

For convenience in troubleshooting, the main timing capacitor, C1, can be disconnected by a metal link, leaving only C2 in the circuit. This increases the frequency fiftyfold and allows a conventional oscilloscope to be used. Otherwise, a storage scope is almost a necessity because of the very low frequencies involved. (The output reed relay and audio oscillator, of course, may not follow this higher frequency.)

Output huffer-inverter B3 is provided following flip-flop B2 because of the heavy loading by the clock inputs of 8 flip-flops in the X-axis Johnson counter. B3 is a type 900 IC, the only one of this type in the unit. Its function could probably be performed by a small number of 914 NAND gates.

Johnson Counter

This circuit, locations C1 through C8, Fig. 5, uses eight flip-flops connected in sequence much like a shift register (sharing a common clock pulse), but with the output/input loop closed via "cross-over" connections. Each clock pulse advances the counter by one count. Assume that the counter is initially forced to contain all zeros. Then, on the next clock pulse, the input flip-flop will change to a 1 state, because of the output/input crossover. See Table 1. On successive clock pulses the 1 will shift along and fill the counter. After 8 pulses, the counter will contain all ones. On the 9th pulse, the input flip-flop will change to a 0 (again because of the crossover between output and input), and this 0 will move through the counter until, after 16 pulses, all stages contain 0, as at the start of the sequence. It may be seen from Table 1 that each state can be identified without ambiguity by only 2 digits, as shown underlined. Most of these are at the 0-1 or 1-0 change-over points; however, count No. 0 uses two logic 0s, and No. 8 two logic 1s.

The various outputs of the Johnson counter are designated as M0, M0, M1, M1, etc., defined as follows: M0 refers to the left-hand column of Table 1, M1 the next column and so forth, through M7, the right-hand column. The "true" signal, M, is present on pin 5, because this pin is set to logic 0 (negative logic) when the flip-flop is zeroed by a reset pulse. Therefore, the pin-7 output is designated as the inverted or "false" output, M. It is, of course, necessary to set the Johnson counter to all zeros in order to obtain correct operation. This is done directly on standby by applying a dc reset voltage to all flip-flops, setting them to zero. As "insurance," an additional reset function is provided through U29A and U30, Fig. 6. The X0 signal, a positive gate, is inverted in U29A, and differentiated before being fed to U30. U30 functions as an inverter/driver, delivering a short positive pulse to all X-counter flip-flop reset pins at the beginning of gate X0. From Table 1 it may be seen that gate X0 is generated whenever X-counter stages M0 and M7 are both zeros, and that all other stages should also be zero at this time. Therefore, the counter is reset correctly once per cycle. Even if a false state should develop in one stage (from

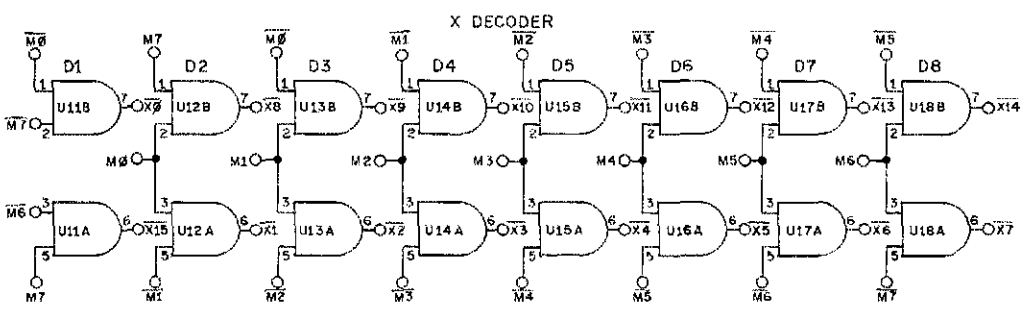
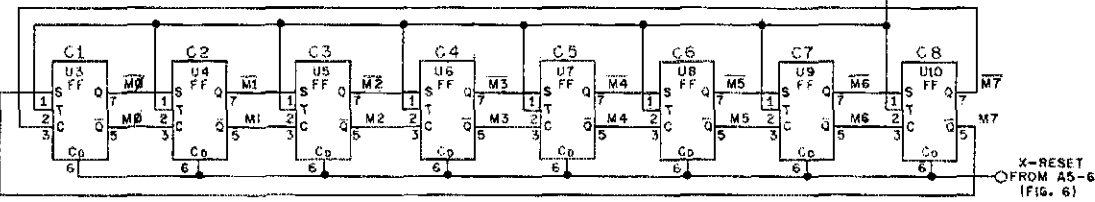
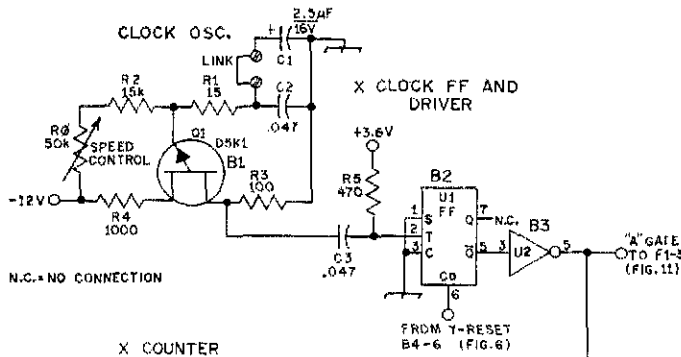
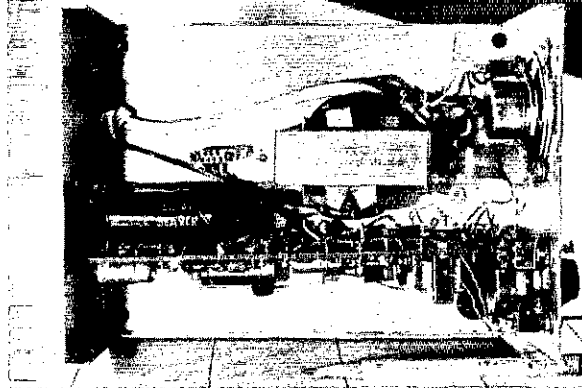


Fig. 5 - Digital CQer clock, X-counter, and X-decoder schematic diagram. Resistances are in ohms; k = 1000. All fixed resistors are 1/4- or 1/2-watt composition. Capacitances are in μF . In the author's CQer, all parts shown in this schematic and in Fig. 6 are located on a single board (designated board No. 1) with the exception of R0, the front-panel speed control. Alphanumeric designations, such as B3, refer to semiconductor component locations on the board; see text. Components not listed below are identified for text reference. Q1 - Unijunction transistor, G.E. D5K1. R0 - Linear taper. U1, U3-U10, incl. - RTL J-K flip-flop (Fairchild 923 or 9923 or equiv.). U2 - RTL buffer-inverter (Fairchild 900 or 9900 or equiv.). U11-U18, incl. - RTL dual 2-input gate (Fairchild 914 or 9914 or equiv.).

X Count	M ₀	M ₁	M ₂	M ₃	M ₄	M ₅	M ₆	M ₇
0	0	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0	0
2	1	1	0	0	0	0	0	0
3	1	1	1	0	0	0	0	0
4	1	1	1	1	0	0	0	0
5	1	1	1	1	1	0	0	0
6	1	1	1	1	1	1	0	0
7	1	1	1	1	1	1	1	0
8	1	1	1	1	1	1	1	1
9	0	1	1	1	1	1	1	1
10	0	0	1	1	1	1	1	1
11	0	0	0	1	1	1	1	1
12	0	0	0	0	1	1	1	1
13	0	0	0	0	0	1	1	1
14	0	0	0	0	0	0	1	1
15	0	0	0	0	0	0	0	1
0	0	0	0	0	0	0	0	0

Table I - X-Axis Johnson Counter Sequence

Looking into the top of the CQer with two of the three circuit boards removed. The power transformer may be seen at the center of the chassis, and the power-supply circuit board is shown edgewise. Just to the left of the transformer is a connector through which power and signals flow when the two circuit boards are reinstalled.



noise, etc.), it will be corrected within one cycle. Also, if the unit is turned on without first being at standby, a random pattern may at first appear in the counter, but as soon as flip-flops M0 and M7 both contain zeros, the entire counter will be correctly set. Thus the Johnson counter is forced into correct operation under normal use of the standby switch and is protected against transients, as well as from starting up without the standby function.

X-Axis Gate Decoding

The 16 X-axis time slots or gates are generated by 8 type 914 dual NAND gates in locations D1 through D8 (Fig. 5). The input signals from the 8 flip-flops of the Johnson counter follow the Table 1 designations exactly. If a logic 1 is required, the true or M output (pin 5) of the flip-flop is used; for a logic 0, the M output (pin 7) is selected. For example, Table 1 shows that X-gate No. 3 requires a 1 from M2 and a 0 from M3. NAND gate D4 therefore receives M2 on one pin (3) and M3 on another pin (5), thus generating X-gate No. 3 at pin 6. Because the NAND gate inverts, the actual X gate is inverted (in negative logic terms a 0, but actually a positive voltage). Therefore, all these 16 X gates are designated as inverted, e.g., X3.

Y-Axis Counter

Three flip-flops (B4, B5, and B6, Fig. 5) are connected as a true binary counter with an 8-count capability. The input flip-flop (B4) receives as a clock pulse the X-reset pulse from NAND gate A4 (explained in more detail later). Thus, the Y counter advances one count each time that the X counter starts again from zero. These Y flip-flops are, themselves, reset (zeroed) via pin 6 only when the front-panel switch is at STANDBY; therefore the entire CQ message starts correctly from the beginning.

The flip-flop output signals are designated Y_A , Y_B , Y_C , and Y_C , similar to the X-counter designations. The 8 counts give a standard binary

Y Count	Y_A	Y_B	Y_C
0	0	0	0
1	1	0	0
2	0	1	0
3	1	1	0
4	0	0	1
5	1	0	1
6	0	1	1
7	1	1	1

Table II - Y-Counter Logic

pattern for Y_A , Y_B , and Y_C as shown in Table 2. (Y_A , Y_B , Y_C are, of course complementary.) Because of the way in which the message has been laid out, we do not require 8 separate Y-gate time slots, but only 4, for CQ, DE, VE2, and HN as already described (Fig. 4). To agree with the above Y-count values, these 4 gates are designated as follows, where + means OR:

Logic Requirement	Message	Actual Logic Connection
$Y_0 + Y_1 + Y_2$	CQ CQ CQ	$\overline{Y_C} \cdot \overline{Y_3}$
Y_3	DE	$Y_A \cdot Y_B \cdot \overline{Y_C}$
$Y_4 + Y_6$	VE2 VE2	$Y_A \cdot Y_C$
$Y_5 + Y_7$	HN HN	$Y_A \cdot Y_C$

These 4 Y gates are generated in NAND gates A6, A7, A8, B7, and B8 (Fig. 6). Y decoding details will vary depending on the particular message required, but the CQ VE2HN Y decoding is representative. A Karnaugh map could be used, but the logic in most cases is so simple that it can usually be deduced simply by inspection of Table 2.

Reset Decoding

As described earlier, an X-reset signal is required at the following times to set the Johnson counter to zero:

1) Whenever M0 and M7 are zero. This corresponds to the beginning X-axis gate X0. This zeroing is to force the correct pattern into the Johnson counter once per X sequence, particularly when first turned on, but also as an added precaution against faulty signals developing.

2) After the DE (Y = 3) sequence, to skip X counts X10 to X15, and after the HN sequence (Y5 + Y7) to skip X12 to X15 (see Fig. 2).

3) On standby, so that the message will start from the beginning when turned on. (This also applies to the Y counter.)

Reset signals 1 and 2 are generated as short pulses, while 3 is a dc control voltage.

From Fig. 6 it may be seen that the four sections of NAND gates A2 and A3 generate gates X10-Y3 and X12-(Y5 + Y7), where the dots mean AND. These gates are fed to A4, along with gate X0. Because all inputs are inverted, both sections of A4 function as an OR circuit, and we obtain a

pulse at any of these 3 times. At the output of A4, the function generated is the true OR function:

$$X\bar{0} + (X10 \cdot Y3) + X12 \cdot (Y5 + Y7)$$

We actually require the inverted version; hence A5 (2 sections in parallel to provide for heavy loading) is used as an inverter. The reset pulses are R-C coupled to A5 through C5. Under operating conditions (*not* standby), the NAND gate (A8, pin 6) output transistor is off; hence its collector resistor and A5 input resistors provide the resistance necessary for the R-C coupling from A4 to A5.

On standby, a positive dc (logic 0) voltage is applied to A8 (pins 3 and 5). Since both A8 and A5 invert, the latter gives a positive dc voltage output, holding the X counter flip-flops at zero, ready to start the message from the beginning.

Output Circuit

This circuit, constituting the output reed-keying relay and monitoring audio oscillator, is built up from discrete components on board No. 3 (Fig. 7). Q2 is the heart of this circuit, as it energizes the reed relay, K1, and the audio oscillator, Q3. Requirements for this circuit are that the external key should activate the output under all conditions. As designed, closing the key will cause an output even in the CQ mode, although this is probably of little value. In addition, on standby, the CQ output should not function, but all flip-flops should be zeroed (reset) and the external key should cause an output. On CQ, the flip-flop reset should be removed, and the CQ output activated.

Q2, a pnp transistor, has its emitter connected to the +3.6-V supply through R6, practically a negligible resistance. When Q2 is turned on, by applying an approximate 0-volt level to its base resistor, it energizes relay K1 and audio oscillator Q3, which are fed from the -12-V supply. Closing the external key brings Q2 on, by grounding the base through R7. In standby, S2 is closed, applying +3.6-V to the flip-flop reset inputs via CR8; also the junction of CR6-CR7-R8 is pulled to approximately +3.6 V, which prevents the logic signal from activating Q2. Thus, in standby, only the external key can energize the output circuit.

In the CQ mode, S2 is open, removing the flip-flop reset voltage, permitting the flip-flops to be triggered and generating the message. The logic signal can now drive the base of Q2 to zero volts (logic 1) via R8 and CR6, energizing Q2. Diodes CR7 and CR8 isolate the reset line from the logic signal. The external key still will activate the output in this mode; because of the presence of CR6, it overrides an OFF (positive voltage) logic signal from the message generator.

The particular relay used for K1 has a 600-ohm coil, drawing 20 mA at rated 12 volts. In the range 10 to 13 volts, with transient suppressor CR9, the make and release times are about equal at 2.5 milliseconds. R12 was provided to drop the coil voltage to approximately 11 volts in the actual circuit.

Q3 is the audio oscillator stage. It has no volume control, which some users might consider a

disadvantage. The filter consisting of R9 and C7 suppresses 120-Hz ripple, while R9 and R10 give some current-limiting protection in case Q3 should not oscillate. Diode CR10 prevents K1 reverse-voltage transients from being applied to Q3. Each user may have his own preference for an audio monitor; a keyed oscillator plus power-output stage may be preferable, since less current would be keyed, and a volume control could be added.

Power Supply

The simple power supply shown in Fig. 7 has proved adequate for this unit, although other users may prefer more sophisticated designs with short-circuit protection and better regulation. The +3.6-V supply delivers approximately 530 mA to the logic circuits and approximately 50 mA to the output circuits. Q1 is an emitter-follower regulator, deriving its reference from a 4.3-V Zener diode, VR1. Since the unregulated voltage is approximately 11 V, there is a substantial voltage drop across Q1, and it dissipates approximately 4 watts. Q1 is therefore mounted on a small piece of aluminum channel, used as a heat sink, which in turn is mounted directly on the chassis. Since the Q1 collector is connected to its case, a mica spacer is required. Although Q1 is operated well within rating, use of silicone thermally conductive grease is recommended.

Because of the rf speed capabilities of the logic ICs used, some power-supply high-frequency bypassing is required close to the logic circuits. Two 0.33- μ F capacitors were provided on the larger No. 1 circuit board, and one on the No. 2 board. These are shown as C1, C6, and C7 in Fig. 6.

Part II of this article, with information on programming, construction, and testing of the digital CQer will appear in a subsequent issue of **QST**.

7-MHz Linear-Loaded Quad

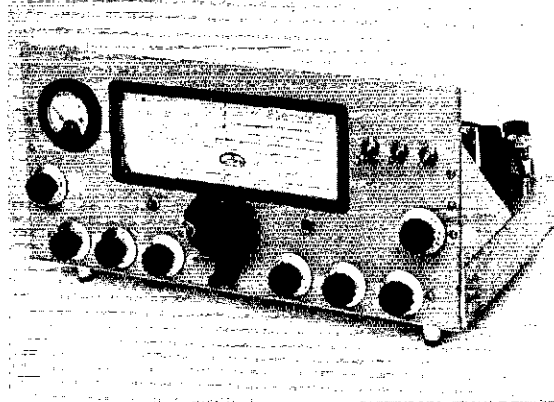
(Continued from page 15)

comparatively low degree of mutual coupling between the quad-driven element and the quad-loop director. This, of course, reduces the efficiency of the loop as a director. This problem should not apply to the same extent with Yagi-type directors, and, in theory at least, they should prove to be more efficient than quad-loop directors. The question now is whether practice follows theory or not. This writer won't have an opportunity to conduct any detailed experiments until the summer. When deciding the original length for the Yagi directors, allowance was made for a rise in frequency of approximately 100 kHz. But, the only way to cope with the effects on the director resonant frequency of the proximity of other elements is by field-strength measurements, coupled with a good deal of cut and try. As in any multiband quad, separate feed lines should be used for each band to minimize interaction between bands.

The author's quad has been up for six months now, and final tuning remains to be done to the 7-MHz reflector loop to achieve maximum front-to-back ratio. But the results, even on a cut-and-try basis, are well worth the work that went into the array.

An Experimental Receiver for 75-Meter DX Work

BY DOUGLAS A. BLAKESLEE,* W1KLL



SEVERAL YEARS ago the author developed a taste for working ssb DX on 75 meters, a pastime that requires an excellent receiver. All of the popular top-of-the-line receivers were tried. Some were found to be lacking in the ability to handle strong signals. Poor skirt selectivity was noted in others, and the ability to reject out-of-band signals was noted in many receivers tried.

What was obviously needed was a "better mouse trap," and the only apparent way to get it was to start building! A good deal of discussion with master receiver builders W2PUL, G3FPQ, and W1DX, convinced the author there were no magic circuits available to produce the desired results.¹ The design that evolved came from their suggestions, and superior performance is the result. The receiver is shown in the photographs. It was built to see what could be accomplished, and the ideas used, rather than the finished product, will be of interest to those contemplating a receiver project. Many of the parts are junk box items which may not be available at local radio shops.

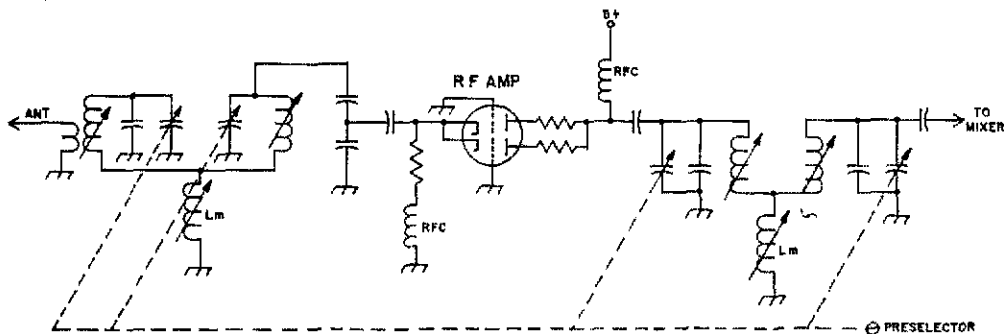
* Assistant Technical Editor, QST

¹ The front-end concept used here is based on work done by W2PUL shortly before his death. The research effort at Squires-Sanders was supported by a Government contract.

Selectivity

The DX portion of the 75-meter band has always seemed to be covered with teletype, cw, and other assorted signals when listening on various commercial receivers. These signals are not too strong — just strong enough to cover up the really-weak DX. If you use a good antenna system — something more than a dipole — you can appreciate the problem. The writer had gone along, cursing the "rotten QRM," and had assumed that most of the junk was originating on 75 meters. Some of it was. However, a little investigation with a signal generator and a general-coverage receiver proved that many of these signals were strong commercial stations from outside the band. Front-end selectivity, or the lack of it, was obviously the problem.

Fig. 1 — Receiver front end. All four tuned circuits are resonated with the preselector control. L_m provides adjustment of the amount of coupling.



Most of the construction articles in QST for 1971 used solid-state components, which brought a few bleats from those who like to experiment using devices in glass envelopes. For the tube fans, here is a receiver design with special emphasis on front-end selectivity and ability to handle strong signals without overload.

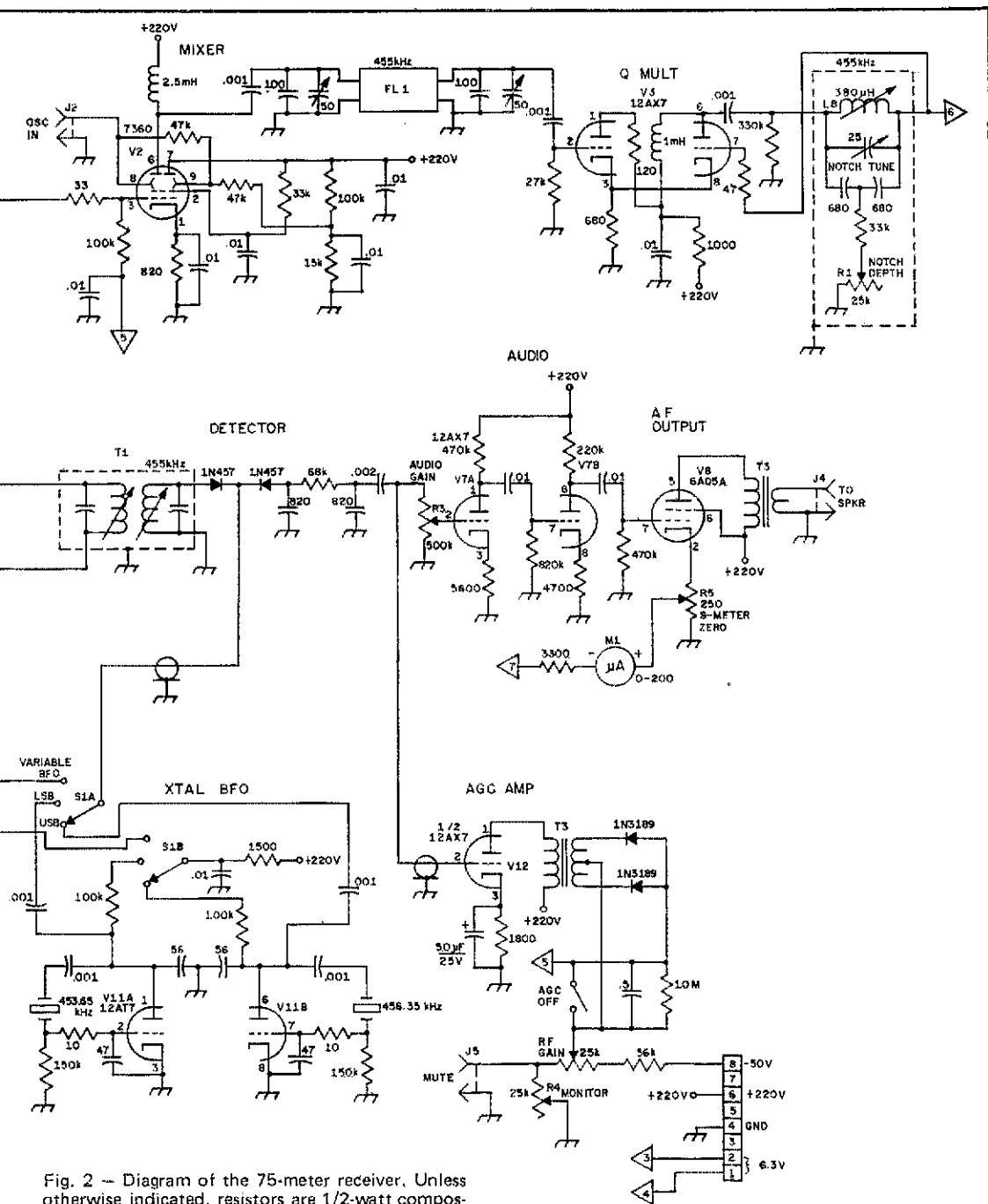
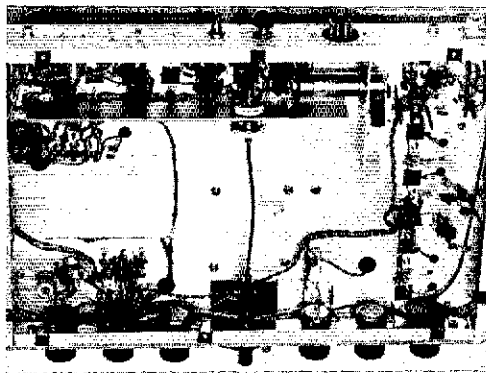


Fig. 2 - Diagram of the 75-meter receiver. Unless otherwise indicated, resistors are 1/2-watt composition and capacitors are disk ceramic.

- FL1 - Collins mechanical filter, F455-N20.
- J1 - Chassis-mount connector.
- J2-J5, incl. - Phono-type connector.
- L1 - 5 turns, no. 26 enam. wire close-wound on the bottom end of L₂.
- L2-L5, incl. - 35 µH (Miller 42A335CB1).
- L6, L7 - 0.3 µH (Millen 69054-0.33).
- L8-L10, incl. - 380 µH (Miller 42A334CB1).

- L11 - 580 µH (Miller 42A474CB1).
- L12 - 31 turns, No. 24 enam. wire close-wound on 1/2-inch slug-tuned ceramic form.
- R1-R5, incl. - Linear taper composition.
- S1 - Rotary, 2 pole, 3 position, single section.
- T1 - I-f transformer, 15,000-ohm primary 95,000-ohm secondary, center tapped (UTC 0-7).
- T3 - Audio output transformer, 5000-ohm primary, 3.2-ohm secondary (Knight 54 F 2064).



The basic purpose of a receiver's front end is to protect the mixer from signals that lie outside the desired tuning range, and to provide sufficient sensitivity. Some tube and transistor mixers of commercial origin had high noise levels, so a high-gain rf stage was used up front. This arrangement usually provided too much gain and not enough selectivity (causing mixer overload on moderately-strong in-band signals.) As tubes and transistors became available with better sensitivity and lower noise figures, the rf stage was found to be unnecessary. However, if a lot of selectivity was used in front of the mixer, to admit only signals in the desired tuning range, the losses in these circuits were often high enough that the sensitivity of the receiver was impaired.

The problem boils down to getting a sufficiently selective filter in front of the mixer while not introducing so much insertion loss that the sensitivity is reduced. The boys with computers available, no doubt can come up with such a filter, but the author took the other approach — simple tuned circuits plus a low-gain, hard-to-overload rf stage. Having the input circuits tuned, rather than using the bandpass approach, has the advantage of attenuating strong 75-meter signals that are off the frequency to which the preselector is tuned. This is a particularly desirable feature if you have hams who operate 75 or 80 meters in your neighborhood.

The circuit shown in Fig. 1 was chosen. Four tuned circuits, each with high Q are used before the mixer. They are gang-tuned and are sharp enough so that the preselector control must be repeated each 25 kHz or so. It is not the sort of system for idle band scanning, but it provides the selectivity needed to do the job. The tuned circuits are bottom-coupled with a small variable inductor, L_m . This type of coupling is easy to use, and the slug-tuned coil provides a simple adjustment of the preselector bandpass characteristic.

To obtain all the selectivity that the front end is capable of, it is necessary that there be only one signal path through the front end; all possible stray paths must be eliminated. Simple shielding plus component spacing is the easiest approach for the home-built-gear fan. Extensive shielding (beyond home workshop capability) would be required if the front end was to be made compact.

The front end is located on the far right, with the i-f strip running across the rear. The VFO is braced for mechanical stability. Rear panel controls are the S-meter zero adjustment and i-f gain control.

In the crowded 75-meter band one needs good i-f selectivity — an i-f filter with deep, steep-sided skirts. The author used a Collins F455-N20, which is better than the less expensive ham models.² Some exotic crystal filters are available that can do a good job. No tricks here — you get what you pay for. Once you have a good filter in hand, assure that you take advantage of the skirt selectivity. This means proper impedance matching at the filters, input and output, plus preventing signal paths around the filter. The filter in this receiver was mounted through a shield, with 3 inches of separation between the input and output. No wires were "run by." Measurements indicate that the filter provides all the selectivity claimed by the manufacturer.

A notch filter (similar to the one in the current Collins receiver) was included to help knock down heterodynes within the i-f bandpass.

Overload

There are plenty of loud signals on 75 meters here in Megalopolis. The author has four neighborhood hams who operate the band, so strong-signal-handling performance is obviously an important criterion. This is where most commercial receivers really fall flat. All it took was one neighbor on the air, and all the weak signals were covered.

For years there has been a joke circulating in this area about using an 807 (or even an 813) for a receiver front-end tube — something with plenty of plate dissipation! So, with this in mind, the RCA 7044 computer tube was chosen. It doesn't have as much dissipation as the 807, but it does provide a better noise figure. It has low gain, which is fine. You are only trying to make up the losses in the tuned circuits. It is connected in grounded grid, with both its sections paralleled. The signal input to the cathode is fed through a capacitive divider so that the low input impedance does not load down the second tuned circuit. The mixer is the ever-popular 7360 with age applied. The circuit has been discussed before,³ so it will not be repeated here.

It is one thing to get strong signals through the mixer without overloading anything, but you also need enough age to handle the range of signals that are likely to be applied to the i-f section. At best, most tube i-f stages will provide 40 dB of age per stage, so you will need at least 3 stages. Commercial designs may use only one or two stages for cost reasons, but that is why they are often short on age range.

² The F455-N20 is a filter used in the military R-390A receiver. They have been offered for sale in QST Ham Ads from time to time, and are priced around \$30.

³ Squires, "New Approach to Receiver Front-End Design," QST, September, 1963, and Goodman, "Some Thoughts on Home Receiver Design," QST, May, 1965.

AGC applied to a mixer often leads to unsatisfactory results, but this did not seem to be the case with the 7360. Some experimenters have reported the best cross-modulation performance is obtained with a fixed bias for the 7360 from a separate supply, rather than from a cathode resistor. The writer hasn't tried this, though.

AGC can be a hindrance rather than a help under certain band conditions, so an AGC OFF switch is provided. The simple audio-derived agc system used has some defects of its own, too. A more-sophisticated agc system would be necessary if it weren't that DX hunting is often best done without agc.

The receiver proved difficult to test. A standard hf signal generator has some limitations that make evaluation and optimization of a high-performance receiver difficult. The author uses a Measurements Corp. Model 80 which was always fine for amateur work — up until now, anyway. This generator has a maximum output in excess of 100,000 microvolts, which isn't enough to overload the receiver. If you can't produce overload it is difficult to optimize circuits for best strong-signal performance. Another problem is caused by the noise sideband produced by signal generators. This noise extends out on either side of the carrier, making it difficult to determine the effect of a very strong signal only a few kHz outside the bandpass.

Trying to use a transmitter VFO as a strong-signal source leads to so many difficulties that the attempt was abandoned. It appears that one would have to build a better signal generator before attempting to build a better receiver. Tests did indicate that the mixer would overload before the rf stage did, so further work on the mixer would be indicated.

Most commercial receivers tried were overloaded with a signal input somewhere between 200 to 50,000 microvolts. The original price of the receiver was no indicator of strong-signal performance. These tests showed that a substantial improvement was obtained in the 75-meter receiver over others tried. However, it is difficult to put numbers on the results. One further check was made. The generator, set for maximum output, was slowly tuned from 2 to 30 MHz. Only one response was found in the receiver — when the generator crossed the frequency the receiver was tuned to.

The rear end of the receiver has a collection of favorite circuits. The first two i-f stages use single-tuned tank circuits. The receiver selectivity is set by the filter. The i-f stages should be broadly tuned so that they do not upset the shape of the i-f response. A control in the cathode of the first i-f amplifier sets the gain of the i-f strip. There is a lot of gain in this section, so care is required in layout and wiring to insure stable operation.

Goodman's two-diode product detector is used, which is fed injection voltage from either of the

two crystal-controlled BFOs, or from the variable oscillator. The crystal oscillator for upper sideband could be eliminated if the receiver is only to be used on 75 meters. It was included to permit the use of converters in front of the receiver for 20- and 15-meter reception.

Construction

A large chassis was used to provide room for future expansion, allow isolation between sections, and for ease of construction. Slug-tuned coils are used in the front end and i-f sections. They are mounted in shield cans. Air-wound coils would produce better results, but are larger, and are harder to work with and align. The VFO is built in a separate box and is reinforced with 1/8-inch aluminum panels for stiffening the box. A U-shaped plate was added under the VFO box to strengthen the chassis, which had too much give in the center for good mechanical stability. An Eddystone dial, and a Miller low-torque capacitor, provide easy tuning without backlash. Several extra switches and controls were added to the front panel so that future additions and modifications could be accomplished without more metal bending.

To assure that no problems with ac hum showed up in the audio, as is so common today in some receivers, the power supply was built as a separate unit, a balanced filament string was used, and the audio ground returns were controlled.

It took two years of tinkering to produce the receiver, and this is one of those projects that will probably never be finished. The results from an operating standpoint have been outstanding. A good proof of performance came when a neighbor, WN1GRB (whose antenna runs within 5 feet of the author's) asked to borrow the receiver for use in the ARRL Novice Roundup. Later that evening, using a \$700 commercial receiver, the writer found that every time "GRB" would key his 75 watter, the receiver would be desensitized to the point where only the very loudest signal could be copied. Giving up, and walking across the way to see how he was doing in the contest, the author was amazed to learn that while he had been on the air, using a full kilowatt for more than an hour, the neighbor didn't even know that the kW had been operating. Further use confirms that the writer only knows the neighbors are on if he happens to tune across the frequency they are using.

The exciting advances in solid state indicate that some time soon one will be able to build an all-transistor receiver with performance equaling tube designs. So keep the soldering iron warm, and keep experimenting!

QST

Bottom view of the receiver. Shields isolate the filter, i-f section, and the oscillators. A flexible coupling is used on the notch-filter tuning control so that it may be brought out just below the main tuning knob for operating convenience.



• *Beginner and Novice*

Converting the Pip-Squeak to 220 MHz

BY LEWIS G. McCOY,* WHCP

A VERY POPULAR transmitter was described in a recent issue of *QST* - "The Pip-Squeak."¹ This rig was designed for 2-meter fm operation and was capable of approximately 2 watts output. With more and more stations getting on 2-meter fm, the band has become very crowded in some areas of the country. This has led to increased interest in 220-MHz operation, with the promise of more repeaters showing up on this band. This article treats the conversion of the Pip-Squeak to 220 MHz. Modifying an existing Pip-Squeak requires only a few hours' time. Or, it will make a very interesting project if the complete unit is built from scratch.

Circuit Details

An 18-MHz fundamental-type crystal is used in the oscillator circuit. The collector circuit of the oscillator is tuned to three times the crystal frequency, or 55 MHz. Q2 works as a doubler to

* Novice Editor

¹ DeMaw, "An FM Pip-Squeak for 2 Meters," *QST*, March, 1971.

There is increased interest in 220-MHz operation. Here is a simple way to give the band a try. The Pip-Squeak for 2-meter fm was one of the most popular rigs ever described in QST. This article shows how to put the Pip-Squeak on 220.

110 MHz and its output is fed to Q3 which also serves as a doubler with its output at 220 MHz. It was found that the original Q3, a 40637, did not provide adequate drive on 220 MHz to the final amplifier. Q3 was changed to a 2N3866 which does provide ample drive. The power output from Q4 is between one and two watts, depending upon the supply voltage.

In this modification, C27 is changed to a 25-pF variable. The coils, L1 through L4, are eliminated and one terminal of each crystal is connected directly to the appropriate switch terminal of S1. The crystal frequency can be changed by adjusting C27.

Modifications

Table I shows the component changes necessary to put the Pip-Squeak on 220 MHz. The changes are, for the most part, coil modifications. Also, to provide more exact impedance matching with the C11-L7 combination, C11 is changed to a variable capacitor, a 15-pF unit. Also, C18 is changed to a 25-pF variable, which can be adjusted for matching the base impedance of Q4 to provide more drive. The same component layout is used in this unit as in the original Pip-Squeak. Full-size templates for the etched circuit board and component placement are still available from ARRL.² The only change in the etched circuit board is to jumper the coil holes for L1 through L4, to provide a direct connection, as mentioned earlier.

² Circuit board templates for the transmitter and modulator are available from ARRL for 50 cents and a large self-addressed, stamped envelope. While these templates are the same as used for the original Pip-Squeak, we would appreciate it if the prospective builder specified his order was for the 220-MHz modification. This will provide us some idea of the interest in 220-MHz operation.

A comparison of this photograph of the modified Pip-Squeak with that of the original model will show few differences. However, note that only one crystal has been installed. The blank area near the crystal is for additional channels.



Construction Notes

If this happens to be your first project using very small components, a few construction tips are in order. Use a pencil-type soldering iron when making connections on printed circuit boards. Do not apply more heat than is necessary. Wherever possible use a heat sink between the solder point and the body of the component. It is very easy to ruin a transistor or diode by letting too much heat reach its body.

Tune-Up Procedures

Connect a No. 47 dial lamp as a dummy load at the transmitter output. The transmitter should *never* be operated without a load on the final amplifier. Otherwise, the PA transistor may burn out. Connect a 300-mA dc meter in series with the B+ and apply voltages. Using a wavemeter or a grid-dip meter as an indicator, adjust C5 for output in the 55-MHz region. Next, adjust the first doubler output to 110 MHz by tuning C9 and C11. The second doubler, Q3, has its output at 220 MHz, so adjust C17 and C18 at this frequency. Next, adjust C23 and C24 for best loading, observing the brilliance in the dial-lamp load. It should be possible to obtain nearly full brilliance of the No. 47 dial lamp.

The modulator is identical with the unit used in the original Pip-Squeak. For receiving on 220 MHz

TABLE I

C11, C18	— 15-pF variable (E. F. Johnson 189-505-5, or equiv.).
C27	— 25-pF variable (E. F. Johnson 189-509-5, or equiv.).
L5	— 8 turns No. 16 bus wire, 5/16-in. ID X 5/8-in. long. Tap 1 1/2 turns from C5 end.
L6	— 4 turns No. 16 bus wire, 5/16-in. ID X 1/2-in. long.
L7	— 9 turns No. 22 enam., close-wound, 1/4-in. OD.
L8	— 5 turns No. 22 enam., close-wound, 1/4-in. OD.
L10	— 2 turns No. 16 bus wire, 5/16-in. ID X 1/2-in. long.
L11	— 10 turns No. 22 enam., close-wound, 1/4-in. OD.
L12	— 4 1/2 turns No. 16 bus wire, 5/16-in. ID X 1/2-in. long.
RFC3	— 8.2- μ H molded rf choke (Millen J302-8.2).
RFC5	— 3.3- μ H molded rf choke (Millen J302-3.3).
RFC7, RFC8	— 10- μ H molded rf choke (Millen J302-10).

it is suggested that one of the converters described in the *VHF Manual* be used. As mentioned, this is a fairly simple way to try out the 220-MHz band.



February 1922

... This issue contains the complete story of the now famous Transatlantic test. History was really made. The cover depicts the antenna used at IBCG. In the March issue, there will be a photo of the antenna used at 2BML/2EH, Riverhead, Long Island. It will be interesting to compare them! (I'd better not pursue this one any further.) There is also a complete description of IBCG, Greenwich, Conn. At Ardrossan, Godley used two receivers. One was a "special" regenerative receiver which looks more like a Paragon RD5 than anything. It had a DA2 detector and amplifier. For the superheterodyne setup, this receiver was used ahead of the resistance coupled i.f. amplifier. These receivers, together with the Beverage antenna, did the job.

... Traffic Manager Schnell announces the details of the upcoming Governors'-President's Relay. This is to test the efficacy of our established relay networks.

... K. B. Warner editorially explains why this particular issue has allotted so much space to a full official report on the Transatlantics to the exclusion of some regular departments. Of course, the tests were so important and history making that this had to be done. He also comments on the recently announced Hoover Cup. It will be awarded to a ham selected by a special committee.

... There is a wild rumor floating around that Armstrong has a new receiver using one tube which is 100,000 times more sensitive than a regenerative detector. Super-regeneration!



February 1947

... A World Telecommunications Conference is in the offing, and we will have to await its outcome before pressing the FCC for more phone frequencies in the 7 and 14 Mc bands.

... One of the nifty pieces of surplus gear is the BC-645. This is an IFF (identification - friend or foe) rig and the boys have found how to operate it on 420 Mc. John T. Ralph and H. M. Wood, W3JYA, tell how to do this, using wiring diagrams and photos. On-the-air tests showed that good communication could be had for ten or fifteen miles, line of sight.

... Here's a tabulation of transmitting ratings of receiving tubes. The popular 6L6 seems to be by far the best of those listed.

... Richard M. Smith, WIFTX, describes his stabilized 813 amplifier. Neutralization is accomplished with a single adjustment. Plenty of hams today still using these popular tubes, mostly as sbb amplifiers.

... Byron Goodman, WIDX, writes about "S-Meters, So What?" His comments equally apply today. Of course S-meters *are* useful if they are used properly, but they do not indicate how "loud" a signal is. Quite a number of factors enter into this.

... The first 3-Cm amateur work by James A. McGregor, W2RJM, is quite interesting. The photo shows him and Charley Atwater, W2JN, standing by the rig set up in the open air. Antenna is a 2-foot dish. — *WIANA*



Hints and Kinks

For the Experimenter



A SIMPLE METHOD FOR KEYING TONE-ACCESS REPEATERS

Many vhf repeaters today have a tone-access or whistle-up control. A simple means of keying such a repeater, if the tone is in the audio range, is to use a toy harmonica that has metal reeds. Often, the frequency of a single reed will coincide with the required access tone. If not, the frequency of a harmonica reed can be raised considerably by trimming the reed. Most metal harmonicas have excellent stability and fidelity of sound and are therefore highly reliable. — *Marc Pressman, WB4DRB*

NONINDUCTIVE GUY LINES

For me nylon guy lines are a thing of the past. I find that the line stretches, weathers badly, and is quite expensive. In its stead I recommend using 100-percent Olefin-multifilament polypropylene line. I have found it does not stretch, and it weathers without changing color. An added advantage is that its cost is about one half that of nylon. 100 feet, 7/32 No. 7, sells for \$2 in many wholesale and hardware stores. — *Gay E. Milius, Jr., W4NJF*

ANOTHER WAY TO MOUNT A 2-METER ANTENNA ON A VW

Hints and Kinks for January, 1971, *QST* showed a method of mounting an antenna on a VW Squareback sedan. The "bug" does not lend itself well to that mounting bracket, so a different method was devised. The photograph shows a way of mounting a homemade quarter-wavelength antenna without drilling holes in the car body.

A 1/2-inch-thick piece of Plexiglas, 2 x 3 1/2 inches, has a 1/4-inch-diameter hole drilled through one end. At a right angle to this hole are two other holes which are tapped for No. 6 machine screws. A 1/4-inch-diameter aluminum rod, 19 1/2 inches long, is inserted in the vertical hole and secured with two setscrews. The bottom setscrew has a solder lug attached to it for cable connection.

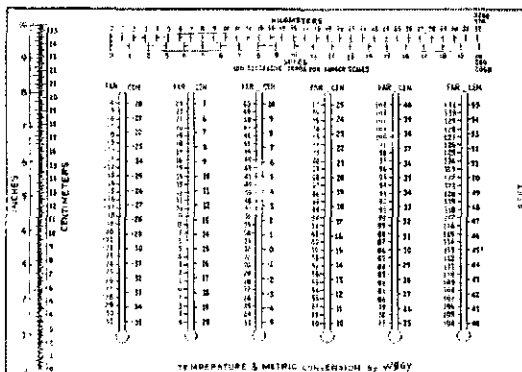
The Plexiglas assembly is fastened to a small piece of 1-inch angle aluminum with two No. 8

screws. The bracket is attached to the parking lamp using the existing self-tapping screws. A few metal washers and a grommet are placed under the rear end of the aluminum angle to position the antenna upright. — *WIFBY*

MEASUREMENT CONVERSION CHART

At one time or other, everyone talks about the weather, amounts of rainfall, snowfall, distance between cities, and the heights of antennas. While we in the U.S. think in terms of inches, feet, and Fahrenheit, the rest of the world uses the metric scale for measuring these values. This makes it difficult to understand the true meaning in a QSO with amateurs in foreign countries.

I have prepared a chart which benefits me in all international contacts and at the same time helps me to think in metric terms, which we will adopt some day in this country. It is now necessary only to look up the measurement given and find the term that I am more familiar with next to that value. — *Donald G. Thibault, W0GY*



The chart designed and used by W0GY for temperature and metric conversion.

A SIMPLE TWO-TONE GENERATOR FOR TUNE-UP AND TEST PURPOSES

My inability to monitor or accurately control the output from a solid-state two-tone audio generator was overcome by putting to use a stereo tape recorder. The output from an rf signal generator is fed into a receiver and beat against the BFO, producing the source of audio for recording on each of the two channels. The VU meters on the tape recorder permit an accurate recording and playback level which can be finely adjusted by comparing the two readings.

Use of the tape player also permits one to listen to his own voice while making checks and repairs to equipment by simultaneously speaking into the microphone and looking for the trouble. — *H. S. Williams, Jr., W4KJV*



SEMICONDUCTOR CIRCUIT REPAIR HINT

When a diode or transistor "blows," knowing why is a help in order to eliminate the cause and to prevent further occurrences. If the failure was caused by too high a current, the semiconductor would be open because of the overheating and melting of the pn junction. If a voltage spike or high voltage was the cause, the device will be shorted inasmuch as holes will be punctured in the pn junction. This hint has proven helpful and reliable for me in troubleshooting transistor and diode circuitry. — *Rick Liftig, WA1ISD*

MOBILE-ANTENNA-TUNING TRICK

When matching a mobile antenna there is a simple trick to use in determining whether the antenna is resonant higher or lower than the desired frequency. With an SWR bridge in the line, tie 10 feet or so of fish line or twine to the top of the antenna. Switch the SWR bridge to read reflected power and then pull the whip over toward the body of the automobile. This effectively increases the capacitance across the whip. If the reflected power reading drops, it indicates the antenna is too high in frequency. Pulling the antenna away from the body, and having the reflected reading drop, indicates the antenna is too low in frequency, because the capacitance across the whip is reduced. If the reflected reading increases with the whip bent in either position it indicates the antenna is matched.

If a tapped coil is used in the antenna, the tap can be changed to raise or lower the resonant frequency as required. Many of the commercially made whips are adjusted by raising or lowering the top section, above the loading coil. Lengthening the top portion *lowers* the resonant frequency and shortening the top length *raises* the point of resonance. — *WHICP*

AN INEXPENSIVE SCANNER RECEIVER FOR 146 MHz

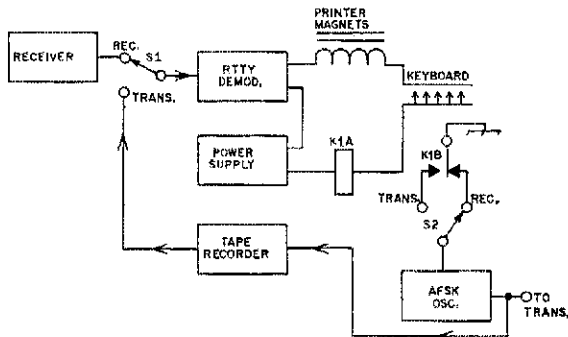
The cost of a scanner receiver, to which must be added a number of crystals, has held many amateurs from the pleasure of a unit which will monitor 2-meter fm channels. My approach was to use the receiver deck out of a Motorola P-33, a nifty solid-state unit available from many fm surplus dealers. The Permakay 455-kHz filter was removed and replaced with a Signetics NE567 phased-locked loop.¹ Following the manufacturer's instructions, the loop was set for maximum bandwidth (see March 1971 *QST* for a sample NE567 circuit). The phase-locked loop (PLL) locks onto the first signal that appears within the passband, and provides additional limiting and demodulation. Audio output is available at the loop-filter terminal, which is fed to the receiver audio section.

Using a first-conversion oscillator crystal for reception of 146.85 MHz, any signal from about 146.70 to 147.00 MHz can be copied. The PLL will stay locked to the first input signal. When that signal goes off, the PLL will lock on the next one that appears in the passband. — *Art Furry, WA6JLJ*

¹ Signetics Corporation, 811 E. Argus Ave., Sunnyvale, CA 95286.

RECORDING RTTY ON MAGNETIC TAPE

For years, I have been using an ordinary tape recorder to prerecord information in RTTY for later transmission. If you're interested in RTTY, sooner or later you are going to be faced with the desire and problem of recording some oft-repeated information about your QTH, equipment, and antennas. Using the customary tape equipment involves the expense of the tape-cutting gear itself plus the cost of the paper tape.



In order to overcome this problem, I make tape recordings generated from an afsk oscillator or the tones from my receiver. Using this system, I am able to switch this audio into the input of the tuning unit, using it to key the local loop. If you prefer, the audio from the recorder can be patched directly into the microphone jack of the transmitter and transmitted using the ssb mode. — *Don Kinney, WA7JRT*

VOLTAGE-REGULATING CIRCUIT

I use the circuit shown for voltage regulation on a transistor audio oscillator for interpolation when measuring frequency. The input voltage may be varied over a range from 9 to 18 volts and the output remains at 7 volts.

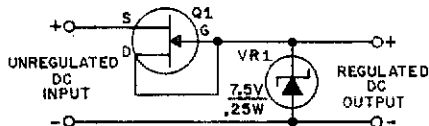


Diagram showing an FET used in place of a resistor in a voltage-regulating circuit.

CR1 — 1/4-watt, 7.5-volt Zener diode.

Q1 — Motorola MPF102 or similar JFET.

With the oscillator set at 2500 Hz, there is no noticeable change in frequency, within 1/10 Hz. I estimated the improvement in regulation by using the FET instead of a dropping resistor is about 10 to 1.

I claim no originality for this design. I saw it somewhere several years ago. However, it seems to me something so effective should be more widely used. — *Paul E. Smay, W9TZN*

[EDITOR'S NOTE: This circuit is suitable as long as one does not exceed the current rating of the FET.]



Recent Equipment



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

The Antec Universal Transmatch Model UT-1

THE ANTEC UT-1 is a versatile Transmatch which provides a 50- to 70-ohm resistive load for the transmitter, while matching impedances from 25 to 4500 ohms. Open-wire line, coaxial cable, or single-wire feed systems may be used with the unit. The UT-1 is rated at 2 kW PEP.

The Transmatch case is constructed entirely from black Plexiglas which provides no shielding. This may raise some eyebrows. However, if the transmitter is well shielded and is used in conjunction with a low-pass filter, there is really no point in shielding a Transmatch. (For nine years this writer has used an unshielded Transmatch in a residential neighborhood without a single TVI complaint.) The manufacturer recommends that the unit not be placed on top of a transmitter or amplifier since heat may distort the Plexiglas.

Attenuation of the transmitter harmonics and increased selectivity for the receiver front end are two advantages of using a Transmatch. Antec rates the UT-1 as having at least 25 dB harmonic attenuation. One of the older receivers used at WIAW is subject to severe cross modulation from a local broadcast station. With the UT-1 in the line between the receiver and antenna, the broadcast overloading disappeared.

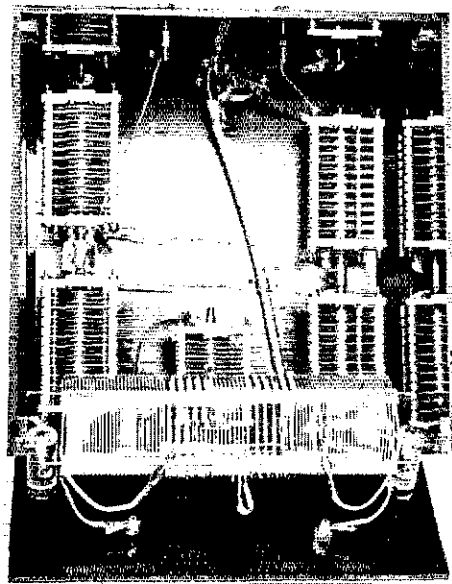
The circuitry in this "black box" is very similar to that of a Transmatch described by McCoy in June, 1964, *QST*. Band changing is accomplished



by tilting out the upper part of the front panel and moving small shorting clips to the appropriate taps on the secondary coil. The link is also tapped in this manner. The author had serious doubts about the use of small alligator clips, but with 1 kW of power applied to the unit for 30 seconds, the clips (and coil) become only slightly warm. Care must be taken when tilting the panel into the unit to assure that the four interlocks (which disconnect the secondary coil and link) engage correctly.

Antec recommends the use of low power when tuning the coupler. In fact, it is advisable to find a peak in received-signal strength before applying power to the Transmatch. With most antennas, tune-up is relatively easy. With some antennas, however, a great deal of patience is required. A satisfactory match was obtained with all of the antennas tried. The author's 80-meter dipole (which is fed with 450-ohm open-wire line) is usable on 80 through 10 meters. Also, a 100-foot-long random wire was matched successfully on all five hf bands.

It is a good idea to mark the position of the taps on the coil so that time spent in changing bands can be kept to a minimum. A chart showing the MATCHING, TUNING, and LINK capacitor settings for each band is helpful. On the higher



A view into the UT-1 with the front panel tilted out. The series-matching capacitor is on the left. The small capacitor under the coil is for tuning the link. On the right is the parallel-tuning capacitor. Its image is reflected by the shiny black Plexiglas side. Both sets of shorting clips are used for ten-meter operation.

frequency bands it is necessary to adjust these capacitors approximately every 50 kHz. On 80 meters, the unit needs to be "touched up" every 25 kHz.

The instruction book is straightforward and covers many of the problems encountered in getting a Transmatch to work. This is particularly important to those amateurs who have had little experience with a Transmatch. — *W0DRE/1*

Antec Universal Transmatch Model UT-1

Dimensions (HWD) and Weight: 10 × 13 × 13 1/2 inches, 15 1/2 pounds.

Price Class: \$95.

Manufacturer: Antec Company, Inc., Buffalo, NY 14225.

QST ————— QST ————— QST

Heath Model IB-102 Frequency Scaler

HEATH CO. recently introduced a low-priced scaler to be used with any low-frequency counter to extend its range to 175 MHz. The Heath IB-102 is intended as a companion unit to the IB-101¹ but the 102 will work with the majority of other EPUT (events-per-unit-time) devices. Accuracy of measurements is dependent upon the time-base generator of the basic counter, since the scaler is only a dividing unit. The IB-102 comes in kit form, is much less complicated than the IB-101, and is one half its cost. The kit goes together without difficulty. The scaler is an attractive item for vhf enthusiasts, or others who need to make hf or vhf measurements.

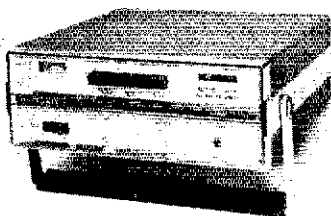
Circuit Information

Fig. 1 shows a block diagram of the scaler. The unit uses 8 ICs, 8 diodes, 6 bipolar transistors, 3 Zener diodes, and 1 JFET to accomplish its task.

Fig. 2 shows the input circuit, using Q1, which amplifies the input signal, provides a 50-ohm input impedance for the applied energy, and isolates the trigger circuit, IC1, from the input source. IC1 is a Motorola MC1023P connected as two OR gates, the function of which is to square the input wave form through positive and negative limiting action, and to shift the reference level of the wave form to provide proper bias for the divider circuits that follow.

The SENSITIVITY control is located on the front panel, along with a TEST switch which connects a test circuit to the input of the trigger section. Sensitivity is adjusted for a reading in the green area on the meter face. Then the test switch

¹ "Recent Equipment," *QST*, May, 1971.



is pushed; if there is no increase in meter reading there is sufficient input to the scaler for accurate division.

A sensitivity-versus-frequency chart, shown in Fig. 3, indicates that a level of 40 mV or less is required for satisfactory output from 2 to 100 MHz, and up to 100 mV is required from 100 to 175 MHz. The unit we tested proved to be within these tolerances.

The first step of the dividing or scaling down is by a factor of 10. The square wave from the trigger circuit is divided by two in IC2, which is connected as a flip-flop or multivibrator circuit. That is, for every two positive pulses applied, one positive pulse appears at the output. The frequency-divided pulses are further processed in a divide-by-5 circuit, which consists of J-K flip-flop circuits. A feedback connection from the output of IC5 changes the output count to a division of 5 rather than an even number such as 4 or 6. The combined effect of the division of the input source by 2 and then 5, is 10.

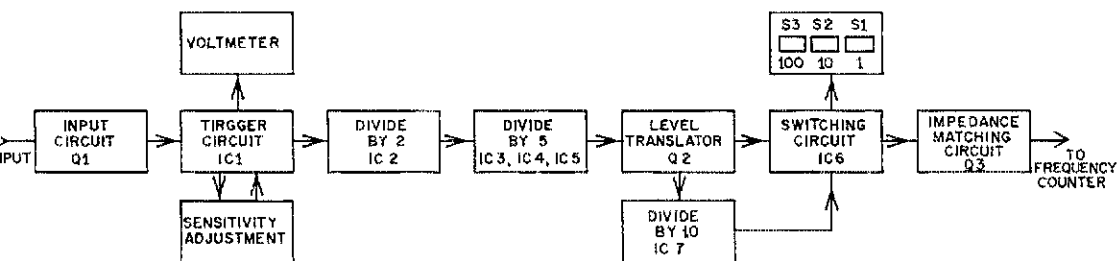
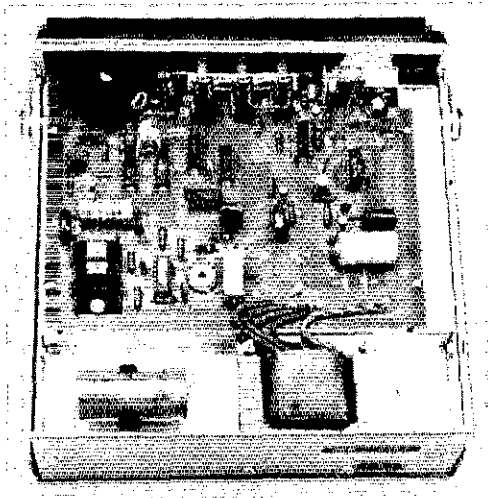


Fig. 1 Block diagram of the IB-102. The power-supply section is not shown.



The output from this first divider is passed to Q2, a level translator, where the reference level of the pulses is brought to a near-zero voltage. Q2 passes the signal to either the IC switching circuit, IC6, or to IC7, a decade divider, for further processing, depending upon which division switch is pushed. IC7 will further divide the signal by 10, making the output equal to 1 pulse for every 100 pulses applied.

An impedance-matching circuit, Q3, prevents IC6 from being loaded down, while at the same time matching the impedance of the connecting coaxial cable.

Power Supply

A constant-current power supply which is well filtered maintains regulation of both voltage and current. This prevents ripple or stray inputs from entering the scaler via the ac line and flowing into the counting chain, an occurrence that would produce errors in the frequency count.

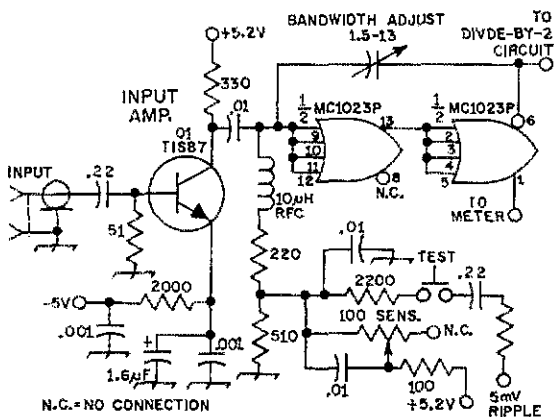


Fig. 2 - The input amplifier and trigger circuits, showing connections for the test switch and the sensitivity control.

Most parts of the scaler are located on an uncluttered printed-circuit board, making building and adjusting the unit an easy task. The power supply is mounted on the rear panel with primary voltage leads and fuse located on the bottom side.

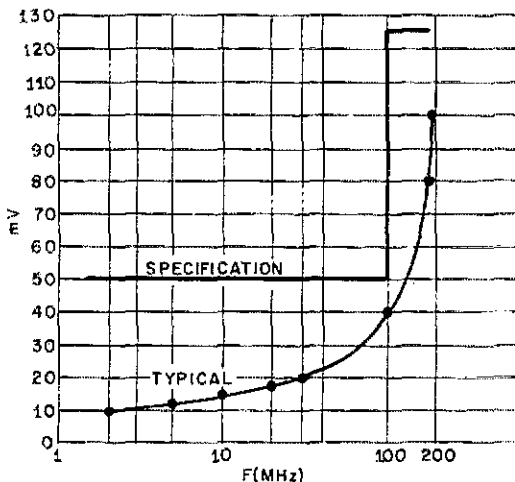


Fig. 3 - Sensitivity-versus-frequency chart which shows usable voltage levels for sufficient output to a frequency counter.

Frequency	1-ms time base	1-s time base
144.0 MHz ± 10	14.40 ± 10 kHz	14.40 ± 10 Hz
$\div 100$	1.44 ± 100 kHz	1.44 ± 100 Hz

Fig. 4 - Accuracy of the readout when used with a counter having a 1-ms and 1-s time base.

Specifications

The output from the scaler is a minimum of 1 V across 1 megohm shunted by a 20-pF load. Rise time of the output is 20 nanoseconds. Fall time is 10 nanoseconds. Input voltage should be limited to a maximum of 600 V rms in the divide-by-1 selection and 3 V rms in divide by 10 or 100. The chart in Fig. 4 gives an example of the resolution or accuracy that may be obtained when used with a counter having 1-ms or 1-second time base. -- WINTH

Heath Model IB-102 Frequency Scaler

Dimensions (HWD) and Weight:
3 3/8 x 8 1/4 x 9 inches, 7 pounds.
Power requirements: 105 to 130 or 220 to 260 volts ac, 50/60 Hz, 5 watts.
Price Class: \$100.
Manufacturer: Heath Company, Benton Harbor, MI 49022.

Technical Correspondence

MORE ON DIGITAL LOGIC ICs

Technical Editor, *QST*:

In my work, teaching digital logic, I must be conversant with both positive and negative logic symbology. I have just finished reading Hall's article, "Digital ICs - A Family Portrait," in the November, 1971, issue of *QST*. The article was interesting, but it contained some misleading information which I feel should be corrected.

Fig. 1 of that article shows the most common symbols used in digital logic diagrams, but the explanation of these symbols was not entirely correct. Fig. 1A was described as a "nonamplifying inverter," but the triangle symbol is used to denote an amplifier in common logic symbology. Therefore, it would have been better to describe it simply as an "inverter." Fig. 1G is referred to as an "exclusive OR circuit, noninverting." An exclusive OR circuit cannot be referred to as "inverting" or "noninverting," simply because it requires unlike inputs to get a high output (high referring to the more positive of the voltages in use). A typical exclusive OR circuit, showing the gates which form it, is shown here in Fig. 1.

The "small circle" at the output of the gates in Figs. 1A, 1E, and 1F of the November article is commonly referred to as a "state indicator," and is used at the input or output of a gate. When placed at the input, it means that when the gate's input(s) are satisfied, the output is a low. There are actually eight ways in which gates can be drawn schematically, and these represent four possible logic circuits. See Fig. 2.

The reference in the earlier article to NOT functions is an area in which most people have difficulty when the time comes to make the transition from positive logic to negative logic. To many, the word *not* indicates the absence of something, while in negative logic a bar over a signal identifier on a logic diagram means that the voltage level is a high. There is considerable confusion created by these apparently conflicting facts when you try to satisfy the inputs to gates which are drawn functionally. I have found it less confusing to insist that the NOT function be referred to as a BAR function when explaining logic diagrams. Additionally, the use of the terms "1" and "0" is discouraged because of the change in voltage levels associated with these terms when changing from positive to negative logic.

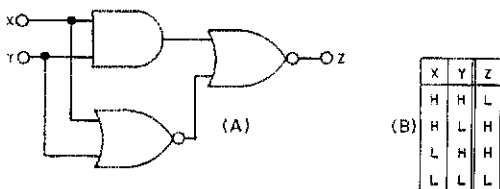


Fig. 1 - Typical exclusive OR circuit (A) and its truth table (B).

The Boolean equation used in the article to explain the operation of the circuit in Fig. 2A makes use of "v" for an OR operation symbol. While this may be a valid symbol, the way the article is written leads one to assume that the plus sign is a little-used sign (symbol). In truth, the v is a symbol which I have never seen used in a Boolean equation.

In Fig. 2B, the same circuit is represented with digital logic symbology in two different ways. The one labeled NAND GATE (NEGATIVE LOGIC) is not correct. The symbology should have shown the gate with state indicators on its input lines, instead of on the output. See Fig. 2.

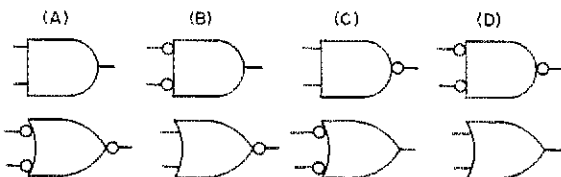


Fig. 2 - Digital-logic gate symbology. At A, all high in yields a high out, and any low in yields a low out. At B, all low in yields a high out, and any high in yields a low out. At C, all high in yields a low out, and any low in yields a high out. At D, all low in yields a low out, and any high in yields a high out.

In the explanation of flip-flops it was stated that situations sometimes occur when the Q and \bar{Q} outputs are both alike. This is a situation which would only occur if the flip-flop were defective. Basically, a flip-flop is a bistable multivibrator. When one side is high, the other side is low. It would be pointless to design a flip-flop so that both outputs were at the same level - an exclusive AND or exclusive OR circuit would be a much more realistic approach.

I would also like to take issue with the statement that the J input of a $J-K$ flip-flop is called the "set" input, and the K input the "clear" input. This terminology is fine with positive logic, but with negative logic the situation reverses. When a $J-K$ flip-flop has a high output on its \bar{Q} side, this is a positive-logic CLEAR condition, but a negative-logic SET condition. In order to get a high on the \bar{Q} side, the K input must be high, and a clock must be applied to the toggle input (or a high applied to the clear-direct side). It's a matter of semantics, really, but if your mind is "locked up" with positive-logic terminology, the transition to negative logic is a nightmare.

I have heard various explanations for the preference of one type of logic to the other, positive vs. negative, none of which seem to have much validity. Basically, both positive and negative logic work the same way. An AND gate is always an AND gate, and a $J-K$ flip-flop is a $J-K$ flip-flop forever, regardless of the type of logic used. If a gate symbology says it requires highs to satisfy the inputs, it must always be the higher of the two voltage levels in use to satisfy them. In order to get a high from the \bar{Q} output side of a $J-K$ flip-flop, there must be a high on the J input and a clock (or a high to the set-direct input). You could call the higher voltage a "1" or a "0" or a "cat." The lower voltage could be a "0" or a "1" or a "dog." The circuit *must* react to the voltage levels, regardless

interesting stuff, albeit rather specialized. My tests refer to signal amplitude only . . . what was going on in the "phase angle" department is something else again. — Gene Pearson, W3QY, 448 W. Clapier St., Philadelphia, PA 19144.

MORE ON THE TTL OSCILLATOR

Technical Editor, *QST*:

I have built the TTL crystal oscillator described by WA3NVP² and have had an opportunity to make several tests. While my interest is a unit with a 1-MHz crystal, several others were tried, namely 100 kHz and 500 kHz, all of which oscillated nicely. The unit produced rich harmonics up through 148 MHz with the 1-MHz crystal.

However, it has been found that the unit will not "ignite" unless the proper voltage is applied. This was found to be 3.1 to 3.3 volts. Upon "ignition" the voltage could then be increased to 5 volts. This was accomplished by employing a delay circuit to cause the voltage to rise gradually. The delay circuit consists of a 1000-ohm resistor and a 100- μ F 25-volt capacitor, in the +5-volt line to pin 14.

² Pollock, "TTL Crystal Oscillator," Technical Correspondence, *QST*, October, 1971. Also see Feedbacks, *QST*, December, 1971, p. 47.

The unit is now in service as a station tool. Its frequency can be zero beat with WWV on 15 MHz and it will stay in zero beat for several minutes. There is sufficient stability to make useful measurements through 148 MHz. — Ellery E. Estes, W1AY, 624 High St., Hanson, MA 02341.

FEEDBACK

Ned Raub, W1RAN, reports that the Ferro-cube toroidal cores used in K4VOW's solid-state linear amplifier (*QST*, December, 1971, p. 11) can be obtained from Elna Ferrite Labs, Inc., 9 Pine Grove St., Woodstock, NY 12498. Total cost for the package, plus shipping, is \$6.90.

In the article "Transistors and ICs In a Phase-Locked Local Oscillator," *QST* for January, 1972, two errors in Fig. 2, page 44, should be corrected. A 470-ohm resistor should be added in the lead from the 12-V bus to pin 14 of U1, and pin 14 should be bypassed by a 0.1- μ F disk ceramic capacitor and a 100- μ F electrolytic capacitor. The VCO output connection should be from the collector of Q3, not the gate of Q2 as shown.

NEW BOOKS

The Truth About CB Antennas, by William S. Orr, W6SAI (KCK 3201), and Stuart D. Cowan, W2LX (KCZ 1102), published by Radio Publications, Inc., Wilton, CT 06897. Paperback, 8 1/4 x 5 3/8 inches, 240 pages including index, \$4.95.

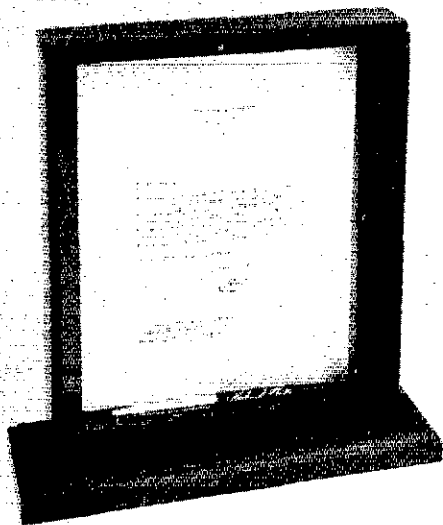
Before you readers get "up tight" about the ARRL reviewing a book on CB antennas — read on. First, while the book is basically about CB antennas, there is plenty of useful data for the radio amateur. The authors even make a strong pitch for the CBER to get into ham radio.

More important, this is an excellent text book for the newcomer who is interested in antennas. It goes a long way in clearing away some of the mumbo jumbo that CBERs (and hams) are fed by some advertisers of antennas. One would expect that such a book would only treat vertical whips, but not so. Wire antennas, Yagis, quads, Delta loops are just a few of the antennas covered. Not only are they described but there is plenty of dope on building your own.

We cannot help but admire the authors' frankness. For example, Chapter 7 is entitled "The Truth About Antenna Gain (P.T. Barnum is alive and well and writing advertisements for CB antennas)." Chapter 17 of the book is devoted entirely to amateur radio and points out in simple language how easy it is to become a ham. Actually, any CBER who would read and try to learn the material in this book would make an excellent candidate for ham radio.

Just one more point we can't resist making — the authors have written an excellent book, but maybe we are old fashioned when it comes to pricing. The cost of this 240-page book is \$4.95, just about twice the cost of the 330-page *ARRL Antenna Book*. There! We had to say it! — *WIICP*

From the Museum of Amateur Radio



Here we have the pen used by President Nixon to sign legislation amending the Communications Act to permit certain aliens to operate ham stations in the United States. The letter from President Nixon to Senator Goldwater (K7UGA) is also shown. — *W1ANA*

Deluxe Code Reception--VU2 Style!

BY R. JAYARAMAN,* VU2JN

SOME OF my good W/K ham-friends have remarked: "Jayaram! The Fu QRM is so bad today, you must be having a tough time copying me through the QRM with your S-40A!" I am tired of that remark and I have finally decided to let all hams know the "secret" of my receiving technique.

Hams in the U.S.A. are probably unaware of the fact that the biggest stumbling block to the growth of amateur radio in India is the non-availability of amateur communication receivers. There are several hams in India who are working DX with a domestic receiver and an outboard BFO. I know some hams in the U.S.A. are willing to donate old receivers to Indian hams, but unfortunately our customs regulations are very, very stiff.

As soon as I got my ticket in 1964, I began the customary frantic search for a receiver. I thought I had stumbled into good luck and felt elated when I was able to buy, for 150 rupees, an S-40A with burned-out power transformer from a U.S.-returned engineer. (Although we are told that 1 U.S. dollar = 7.50 Indian rupees, readers can take it that 1 rupee is as dear in India as 1 dollar in the U.S.A.). The transformer was quickly rewound and I was the happiest man on earth when I worked a W-station on 14 MHz.

The Problem

Only after I started working W/K stations did I slowly realize the primitiveness of my set-up. There were more images than signals on 14 MHz., and stations which I could hardly copy were giving me reports of 579 or so. For a while I timidly resorted to the Novice's tactics of delaying my reporting to the second over! (This is known in VU2-land as the (n+1)-system of reporting to W-hams.)

With a self-oscillating mixer and no VR-tube, my receiver just could not cope with DXing on 14

* Professor in Civil Engineering, College of Engineering, Trivandrum-16, now on deputation as Research Scholar, Dept. of Civil Engineering, Indian Institute of Tech., Madras-36, India.

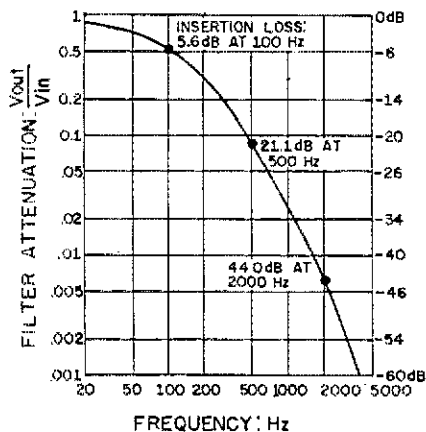


Fig. 1

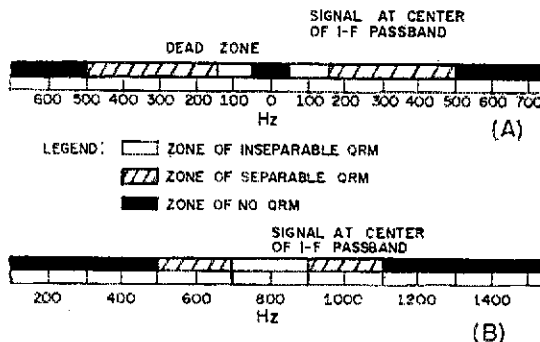


Fig. 2

MHz. An added problem was, and still is, voltage fluctuation and poor regulation in the line. Although the shack was fed from a separate fuse-point, when the XYL switched on our 1500-W cooking oven in the kitchen, the line voltage dropped by 18 volts and the receiver drifted by several kHz. I added a VR-150 and provided regulated voltage to the screen of the mixer and the plate of the BFO, but somehow that did not improve matters much. With no other solution in sight, I had to keep my fingers permanently on the tuning knob of the receiver, always alert to match the maneuvers of the XYL in the kitchen.

I never suspected any fraud in this until one day, leaving the receiver on, I came downstairs to get a cup of coffee and overheard the following conversation between the XYL and our little son:

"Mummy! Please let me hear the siren again. Won't you, please!"

"Only if you promise to be quiet, Ram! . . . Now listen carefully to the noise coming from upstairs."

Click . . . and sure as heck, the tone of the UA9 station (which was already not too stable) started rising steadily, and believe me, in less than a minute the station had disappeared completely! As a new station came up, I mused: "The old station drifteth, yielding place to new . . ."

The Solution

I took stock of the situation. A better receiver was badly needed, but after weighing the pros and cons for nearly a week, the idea was reluctantly given up. For one thing, good receivers were hard to get; and even if the elusive AR-88 or HRO could be located, they cost an awful lot, around 600 rupees! So the only alternative was to add some receiver accessory to improve the stability of my receiver — and of course the sensitivity and selectivity, too! I made a dash to the nearby USIS library and plunged into back issues of QST. (Excuse me for the digression, but American readers should know that the Vietnam war is affecting us too — we no longer find QST in the

local USIS library!¹ I followed up the issue, but it seems the matter needs some push in Washington D.C.!

Ambition knows no bounds and first in the order of priorities emerged a deluxe 7360 converter. But how to manage the 7360 and a 17.5 MHz crystal? The former is just not available in India, while the latter, made to order by a private company, costs as much as 60 rupees! The only way open was to work a lot of Ws and hope for the best! Well, W/K hams didn't let me down, and in course of time the 7360 and the crystal did arrive. I was keeping the chassis and other parts ready for the past several months, so the converter was built in a single hectic evening.

The converter was hooked up to the receiver, and . . . my goodness! What a difference did it make! For the first time, I could take my hands off the knob and relax in the chair while copying a DX station in the head! Even my S-40A was quite steady when receiving the 3.5 MHz tunable output of the converter.

With my worst problem solved, I turned my attention to improving the selectivity of the receiver. Install a mechanical filter? . . . Ugh . . . There is no point in yearning for impossible things! Taking clue from the *Handbook*, I ran a piece of stiff wire from the plate of each i-f amplifier to near its grid terminal. Then I made a special tool to adjust it from outside the cabinet. By midnight I had succeeded in adjusting the two wires such that, with no signal and full rf gain, both i-f stages were on the verge of oscillation. That brought down the bandwidth by a few kHz, but the receiver was still "wide open."

It was at this stage that I hit upon a new idea. By nature I prefer to listen to cw at a low beat-note. I gradually developed this ability and in a few months I was able to copy code comfortably at 100 Hz. Copying code at a low note has some remarkable advantages which, unfortunately, are not generally appreciated. At very low notes, the human ear, properly trained, can act as a highly selective discriminator which no super-duper mechanical filter can ever equal. Although it is true that an unwanted signal about 200 Hz away on the other side of zero-beat can come through with the same pitch, this difficulty can often be eliminated by a very slight rotation of the BFO pitch control, throwing the interfering signal into the "dead zone" (see Fig. 1).

Then all that is needed for deluxe code reception is to cut out all but the very low audio frequencies with a low-pass cascaded filter, and copy the cw signal at a note of 100 Hz. I honestly believe that this method of cw reception is not only simpler but far superior to the use of an 800-Hz toroidal filter, and almost as effective as the use of a mechanical filter. It sums up to this: When you get QRM 50 Hz off the signal frequency, even the best mechanical or crystal filter won't help you a wee bit if you are listening to the signal at a pitch of 800 Hz. On the other hand, if you are copying the same signal at a pitch of 100 Hz, you don't need a filter at all to discriminate against the QRM 50 Hz off! I know many readers are raising their eyebrows; but please take a good look at the chart in Fig. 2 which compares the "passband characteristics" of my 50-cent cw filter (A) and a \$25 mechanical filter used in the conventional way

¹ [EDITOR'S NOTE: The author reports that the USIS library at Trivandrum has since been wound up due to other reasons, much to the regret of the local hams.]

EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μ F); OTHERS ARE IN PICOFARADS (pF OR μ pF); RESISTANCES ARE IN OHMS; k=1000.

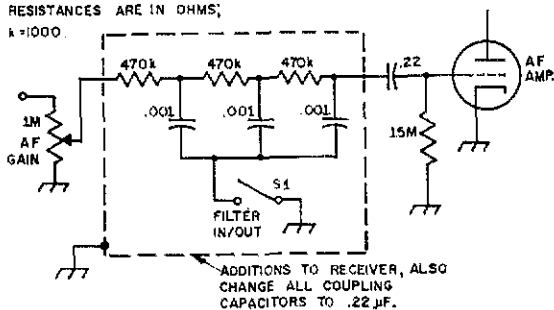


Fig. 3

(B). If you are still skeptical, won't you spare an evening and give it a fair trial!

The next Sunday morning I pulled out the receiver chassis, changed the coupling capacitors in the audio stages to 0.22 μ F, installed a brand-new 35-rupee hi-fi loudspeaker, and added the low-pass filter shown in Fig. 3. The receiver was switched on, and . . . gosh! It was now as "hot" and as quiet as the 75S-3 which W3AU proudly showed us when he was operating from Trivandrum. No background noise, no QRM, no QRN . . . just the dull thump of the signal. Although the signal sounded a bit monotonous in the beginning, I soon got accustomed to it. Last but not least, the XY1 is happier and agrees that the shack is now quieter. (I have a strong suspicion that YIs can't hear very low frequencies as well as OMs.)

Now that this filter is giving me excellent performance for the past year and is likely to become popular with other hams, I humbly submit that the filter be referred to as the "VU2JN CW Filter!" [957-]

Strays

The Southern California ATV Club is starting a new "news letter." If interested, contact WB6FXL, 21709 Reynolds Dr., Torrance, CA 90503.

WITH and W9CP had an enjoyable QSO in December. What's so unusual about that? It was, to the day, the 50th anniversary of their first QSO back in 1921!

We hate to report sad news, but we do it in the hope that it will prevent similar accidents. Fifteen-year-old WNØFCD was electrocuted in December while helping a friend erect an antenna. Somehow the wire came in contact with a 7000-volt power line. Think "switch to safety!"

Another coincidence QSO . . . K2FB worked K4FB. K4FB's last name is Watkins and he is located in Lost Creek. K2FB's last name is Filkins and he is located in Fly Creek!

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



The Ham in Hamlet

BY FRED E. EBEL,* W9PXA

UNTIL RECENTLY I did not believe in the expression, "There's nothing new under the sun." I have always thought that new ideas and products are created every day — especially in the area of radio.

But now I wonder. I strongly suspect that ham radio existed in Shakespeare's day! My change of mind occurred in the attic where I stumbled over a box containing old high school textbooks, mostly the plays by William Shakespeare.

I never did understand the bard. But now with the passing of years and the accumulation of experience. I hoped the passages would make more sense.

I blew the dust off the books and read. What I saw in those books positively astounded me. How could I have missed those beautiful lines the first time around?

For example, here's what I found in *Much Ado About Nothing*, (I,i,406). This line reads, "I will tell you my drift." I find it difficult to believe that hams existed in Shakespeare's day. Yet, there it is: "I will tell you my drift."

Equally amazing is the honesty of the fellow. Here's a ham who's actually volunteering to tell about his drift. I'd keep my mouth shut. I prefer to think my signal is rock-steady in frequency.

The reference to drift piqued my curiosity. Hands trembling, I searched for more references to ham radio. My heart almost stopped as I spotted a beauty in *Henry IV*. I read, "The end of life cancels all bands," (III,ii,157).

What a beautiful thought! And what an epitaph for a ham who has worked all bands and passed on

*3770 N. 88th Street, Milwaukee, WI 53222.

beyond the ionosphere. I can see it now, beautifully inscribed on a monument: "The end of life cancels all bands."

So far I had seen no reference to the boggy of ham radio — QRM. But that was before I scanned the pages of *The Tragedy of Coriolanus*. There it was: "Splitting the air with noise," (V,vi,52).

I wondered, too, whether the ham existed with the "final-final syndrome," that is, the ham who has to make one more final before signing out. I found a reference to him — of all places! — in *Romeo and Juliet*. Act II tells the grim story, "A thousand times good night," (II,ii,154).

I never thought of Shakespeare as an insult comic, but there's a line in *2 Henry VI* that sounds like a barb directed to the ham who goes on and on with seldom a mention of his call letters. It reads, "He dies and makes no sign," (III,iii,29).

Even in those early days, Shakespeare had good operating practice in mind. And where else would you find it than in *Hamlet*? (Is it just coincidence that the great tragic hero's name begins with Ham?) Shakespeare's advice on operating courtesy applies especially to the ham who calls CQ before checking the band. He says, "Give every man thine ear, but few thy voice," (I,iii,67).

The great bard is not credited with the invention of wireless, yet he displayed great foresight when in *The Comedy of Errors*, he wrote, "There is something in the wind," (III,i).

I was amazed, too, that they had nets in those pioneering days. Here's what the bard wrote in *A Midsummer Night's Dream*: "I'll put a girdle round the earth in forty minutes," (II,i,175).

No analysis of Shakespeare's works is complete without a discussion of the brilliant "To be, or not to be" speech made by Hamlet, (III,i). At first, this speech may appear to be without ham radio connotation. But I prefer to think that Shakespeare was a poor speller.

What he really meant to write was, "Tube, or not tube: that is the question." I base my reasoning on the dilemma that plagues every ham: that is, whether to go the tube route or the solid state route.

Shakespeare revisited has been an exciting experience. But I do have one regret. Why didn't my English teacher, Miss Frizzbie, tell me that Shakespeare was full of ham radio? QST

Strays FROM

Stolen Equipment

A Regency HR-2A fm transceiver, SN 04-05896, was stolen from my car on December 8 in Atlanta, Georgia. Anyone with information should contact me at 4041 Compton Circle, Powder Springs, GA 30073. John Crosby, K4GBL.

The following equipment was stolen from my vehicle on November 30 at Woodbridge, Virginia. Heathkit SB-102, SN 132-128107; Heathkit Mobile Mike. Contact Warren A. Singer, 13721 Lynn St., Apt. 8, Woodbridge, VA 22191 (tel. 703-491-2257).

How to Catch 5BWAS

BY JOE RATKIEWICZ,* W0IS

MANY OF us have little trouble working all states, but to do it on 5 bands is quite a chore! Here are a few tips which, hopefully, will save you some time and grief.

THE STATION

The rig should be capable of at least 100 watts on all bands and with rapid band switching. Both cw and ssb should be used. Your antenna system should also be capable of being band switched with no involved tap changing.

PRIORITY OF BANDS

Ten meters should *always* be checked first. This was a mistake I made while working cw. Many times no cw was heard while 10-meter fone was jumping. As you contact states you need, you can "walk them" up the bands. Don't hesitate to ask a station in a state you need, to QSY to another band. The "spots" in the band where WAS hunters hide out is about 50 kHz "in." When you first start out you can sit in one spot and call CQ WAS. This usually results in a gang of W6s.

QSLs

After you have a card from a state on a particular band, you can quit working that state and only then, W/K hams are bad news when QSLs are at stake. The system I used for getting QSLs was as follows: I sent a card to a station. I then waited 2 weeks and if no reply was received I sent the following: a QSL card as before, and also a blank QSL stamped, addressed and all filled out. This was stapled to the regular card with its stamp side inside. The other station need only sign and drop it in the mail. (Some fellows didn't even do that.)

THE ROUGH ONES

The missing states can be found by reading *QST* and looking for state QSO parties, Field Day events, CD parties and 80-meter nets. These nets

*2622 Avalon Drive, Bettendorf, IA 52722.

The author, holder of 5BWAS No. 20, was the third W0 and first Iowa station to qualify. He furnishes those just starting the chase a useful modus operandi.



are fantastic. The boys are helpful and will go to great lengths to give you their state. *A word of caution*, avoid QRMing the net operation. I usually was on frequency before the net started and called a quick CQ ND and if no result I waited until the net was closed. Keep your *Callbook* handy and well marked. Since most states have active 40-meter ops, you can also do all your looking on 40 when you need a state on another band! Once you QSO them you can ask them to QSY or set up a sked for 10 at another time. Weekends are best for 10 meters.

RECORDS

Keep good up-to-date records so you can know at a glance whom you need. It's really a heart breaker to wait 40 minutes for a state you already have confirmed.

As you address the first QSL card to a state, copy the address on a 3 x 5 card. This will save you from looking it up again when you have to send a second card. I have found that more than two never paid off. Some people just won't play the game. You also need a neat and clean copy of the states/band¹ for submission to ARRL.

Good Hunting!

QST

15BWAS application forms carry a \$10 processing fee (and an ARRL membership requirement for W/VEs) which includes return of the cards by registered mail and a handsome personalized plaque. This form must be used when applying.

Strays

WA3GUL (left), 5BWAS No. 38 and WA3FGS, 5BWAS No. 28 congratulate each other as winners of their own personal 5BWAS race. Prior to that time they were mainly 20-meter DXers. After considerable antenna work, they discovered low-frequency DXing and are now well on the way to their race No. 2 - 5BDXCC!



ARRL International DX Competition '27-'71

"A Brief Look Back"

COMPILED BY ELLEN WHITE,* W1YL

JUST RECENTLY, a talk on the history of the League's International DX Competition was compiled (for a New England DXCC program and for the ARRL Contest Advisory Committee). Comments following the talk indicated that a number of relatively recent contest DXers are unaware of the pattern of evolution of this classic over the years. The brief details in the main column of this tabulation are in themselves, a record of rules mutation, sunspot cycles, world turmoil, domestic changes and advancing phone techniques.

COLUMNS IN ORDER: TEST NUMBER, DATES, COMMENTS, ISSUE CONTAINING RESULTS, REPORTS RECEIVED.

1	May 9-23, 1927	W/VE against the world, advance registration by W/VEs, test messages of 8 words. Well-known early participants 8GZ 4HZ 6AM 2TP 1BDI.	Oct. 250
2	Feb. 6-19, 1928	Test messages increased to 10 words, point system of 1 for W/VE and 2 for DX.	Aug. 240
3	Feb. 15-28, 1930	Awards on a section basis; experimental scoring system giving special multipliers to different parts of the country in an attempt to equalize scoring. US/VE call areas to be the DX multiplier. Mailing deadline just 3 days after the end of the test! Results included 23 entries from Australia, 3 from China. Results appeared by call areas and countries.	Aug. 270
4	Mar. 8-21, 1931		Aug. 532
5	Mar. 11-19, 1933	Did not require advance entry. Use of a self-assigned 3-numeral serial. Engraved bronze charms for winners. Phone awards made available. W/VE to use a country instead of a continent multiplier; 37 G entries, 25 JA, 34 VK, 20 ZL.	Oct. 1000
6	Mar. 10-18, 1934	Certificates for awards. Adoption of club participation, as yet no gavel. ¹ Club winner was the Amateur Radio Research Club of New London. W1QV. Approximately 80 countries active.	Sept. 1302
7	Mar. 9-17, 1935	Introduction of limited operating period of 90 hours. Bonus points if DX worked on more than one band. Club winner, the Radio Operators of New Bedford, Mass.	Sept. 1490
8	Mar. 14-22, 1936	A quota plan for W/VEs, 3 per country. Multiplier was the total of countries/call areas all bands. Club winner the No. Nassau Wireless Assn. First big showing by Juan Lobo y Lobo, then XE2N - famous later as XE1A/XF1A. With 150 watts he worked 1370 stations.	Sept. 1521
9	Mar. 6-14 and 20-28, 1937	First separation of modes (cw held first), both to be run in March for similar propagation conditions. Rules did not provide for a phone quota but the cw quota remained. Club winner the Tri-County Radio Assn. of N.J.	Oct. 1767
10	Mar. 5-13 and 19-27, 1938	Again, cw first. Medallions with Maxim's portrait authorized for winners plus a gavel for the top club. ²	Nov. 1911
11	Mar. 4-12 and 18-26, 1939	Entry breakdown. 1298 cw, 803 phone.	Oct. 2101
12	Mar. 15-17 and 22-24, 1940	Phone and cw run concurrently over the 2 weekends. Use of a report plus serial number starting with 001, plus state/province/country. For the first time the test was limited to weekend periods. With the war growing in Europe, participation dropped off. W0s took the limelight with 6 of the top 10 phone and cw scores from California.	Sept. 1100
13	1947 ³	Two separate weekends per mode, postwar. Global medallions offered. A distinctive 3-numeral serial adopted. Multipliers were countries for W/VE and W/VE call areas for DX. XE1A led the entire field establishing new records both modes.	Nov. 1826
14	1948	Rules stated "operator arrangements involving assistance by local radio intercommunication warranted a multihop classification" - first mention of spotting nets. Top DX both modes, N1TA.	Nov. 1596
15	1949	Quota raised to 5 for cw VEs. Results appeared in 2 separate Fall issues. SCDXC, NCDXC and the PVRC in a hot gavel race, won by ERC.	Sept. 1792 Oct. 1792
16	1950	Cw quota for Ws raised to 4, for VEs to 6. Serial number replaced by input power. Classic QST covers in Feb./Mar. depicting VQ7AA before/after the test. Big DX cw scores posted by X11A and KH6LJ.	Sept. 1600
17	1951	Another first - VO grouped with VE making Canada 9 call areas for DX to work. Conditions punk.	Oct. 847
18	1952	An interesting switch was holding both phone weekends in February, to take advantage of what was left of 10 meters. A new award category for multiops., when 3 or more competing within a section.	Oct. 888
19	1953	Again, both phone weekends in Feb. Conditions extremely poor.	Oct. 921
20	1954	Cw and phone weekends in each of the Feb./Mar. periods. The W cw quota raised to 6, 8 for VE cw ops. Top DX cw KV4AA. The top 3 phone DX scores from Hawaii - KH6LJ KH6MG KH6AWM.	Oct. 1113
21	1955	For the fourth straight year, entries were up. In lieu of input power, W/VEs now sent state/province.	Oct. 1242
22	1956	Entries up a third, reflecting continuing increases in sunspot numbers.	Sept. 1647
23	1957	Good conditions. W4KFC the top W/VE cw with close to a million points. XF1A back with a QSO total of 3757. KH6LJ top DX phone.	Nov. 1647

- 24 1958 Severe winter storm clobbered northeast, leaving the battlefield to the dipoles. Top DX both modes, KH6J. Oct. 1672
- 25 1959 A good year with the biggest totals to date. Drops anticipated in the following years with 10 and 15 on the way out. Oct. 1960
- 26 1960 New state-status for Hawaii and Alaska who wished to be grouped with W/VE against the world. New cw high by VP1JH (now W0DX). For the first time, two W-entries topped the million mark, both multiops., W3s AOH and MSK. Oct. 1440
- 27 1961 Sunspots down. Phone activity showing increased trends towards ssb. In an effort to counteract poor conditions, special announcements sent in Spanish. Oct. 1069
- 28 1962 Good score increase in spite of continuing sunspot decline. Oct. 1332
- 29 1963 Conditions beginning to improve. Oct. 1383
- 30 1964 Conditions superb. Reports now show high multipliers per band. Oct. 1474
- 31 1965 Big year for phone. Oct. 1700
- 32 1966 Entries up again, with 121 countries reported in the results. VE2NV top domestic cw QRP. Indications of major rules changes for 1967. Oct. 1811
- 33 1967 KH6/KL7 now back to DX status, elimination of all cw W/VE quotas, change of multiplier for DX stations from call areas/provinces to states/VE call areas. Plaques for DX continental highs. Fine reception to new rules plus good conditions led to a record number of entries. Oct. 2427
- 34 1968 Another good year. First time an overall DX cw high from Africa - Z8BJ. Oct. 2225
- 35 1969 Most stunning feature of the test was no. 1-2-3 national cw also no. 1-2-3 E. Mass.! A new club (Murphy's Marauders) closing in on the top club ranks. Oct. 2468
- 36 1970 The record year to date. Phone operation continuing to increase. MM now no. 3 club. Oct. 2822
- 37 1971 A new category for listing multiops.; multi-single (transmitter) and multioperator-multi-transmitter. Ten meters died the 2nd cw weekend, a taste of conditions to come. The cw W/VLs now led by W1BGD/2. This makes 15 DX Competition gavels for the Frankford Radio Club. Sept. 2646
- 38 1972 Rules call for awards to the top multits. in each category within a call area (or country) regardless of any minimum number of entries. No partial contacts will be permitted - a straight 3 points per complete QSO. Scores will be shown as sections with call areas (rather than sections within divisions). Condition? We'll all soon know. QST

*Deputy Communications Mgr., ARRL.

¹ Club participation started with the 1934 tests, although gavels were not awarded until the 1938 event.

² The South Bay Amateur Association of Long Beach, California, won the gavel in 1938, 1939 and 1940. The Frankford Radio Club of Philadelphia took gavels in 1947 1948 1949 1951 1952 1953 1954 1955 1959 1960 1961 1963 1964 1966 and 1971. The Potomac Valley Radio Club (Washington, D.C. area) took the gavel in 1957 1958 1962 1965 1967 1968 1969 and 1970. The Southern California DX Club took gavels in 1950 and 1956.

³ From 1947 until the present, 2 separate weekends per mode in each of the months of Feb./Mar. have been part of the contest pattern. In all except 1952 and 1953, a phone and cw session were held in each of the months.

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				

Florida - The 2nd Annual Florida Boondocks Swapfest, March 19, sponsored by the Playground ARC at Fort Walton Beach at the Community Center located on Highway 98. Hours 8 A.M. to 5 P.M. Tickets and details from Playground ARC, P.O. Box 873, Fort Walton Beach, FL 32548.

Illinois - The Sterling-Rock Falls ARS Hamfest is March 12, 8 A.M. to 4 P.M. at the Sterling Coliseum, 212 3rd Ave., Sterling. Bring your gear to sell or trade. 1st table free; 2nd and 3rd tables \$5 each. Plenty of food and parking. Advance tickets \$1, \$1.50 at the door. Sterling-Rock Falls ARS, P.O. Box 11, Sterling, IL 61081.

Iowa - The Davenport RAC will sponsor its first Hamfest February 27 at the Danceland Ballroom, 4th and Scott St., in Davenport. Plenty of parking. Free coffee and donuts 9 to 9:30 A.M. Talk-in on 146.94 and 3.975 MHz. Advance registration \$1.50, \$2 at the gate. For more information write K. Caldwell, 1412 14th St., Davenport, IA 52804.

Michigan - The Livonia ARC presents its Annual Swap-N-Shop Sunday, February 27, at the

Franklin High School, Joy Road near Merriman, Livonia. Plenty of free parking and good food. Tickets \$1, tables \$1.

Michigan - The Blossomland ARA presents its annual Ham Auction, Sunday, March 12, at the Shadowland Ballroom, St. Joseph. Doors open at 7 A.M. Admission \$2. Auctioning is free. Display tables available; plenty of room in our 1/2-acre roofed space. For additional information write BARA, P.O. Box 175, St. Joseph, MI 49085.

Ohio - The Intercity RC Annual Ham Auction at the U.S. Naval Reserve Training Center, 170 Ashland Rd., Mansfield, Friday, February 4. Doors open 6 P.M. Look, swap, and buy at 7:30 P.M. Auction at 8:00 P.M. Eats. Donation \$1.

Texas - VHF-FM Society Midwinter Technical Meeting, Corpus Christi, February 26-27, including a session on the Texas Intercity Repeater System.

Wisconsin - The Tri-County ARC Mid-Winter Swap Fest is 5 March (snow date 12 March), 9 A.M. to 6 P.M. at the Whitewater, Wis., Army. \$1 advance ticket, \$1.50 at the door. For more information write WA9VYL or WB9DWG.

COMING A.R.R.L. CONVENTIONS

March 17-18 - Great Lakes Division, Muskegon, Michigan

July 1-2 - West Virginia State, Jackson's Mill

NOTE: Sponsors of large ham gatherings should check with League headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.

1971 ARRL

Sweepstakes - High-Claimed Scores

The following high-claimed SS scores are those received at Hq. by December 22. From left to right are shown the call, claimed score, number of contacts, number of multipliers. Full results will appear in a later issue. -WA/KQM.

CW		W4DMS	113,072-766-74
W7RM (K7VPF, opr.)	164,775-1100-75	W3MVB (WA3IAQ, opr.)	112,858-775-73
W7NQ (W7CF3, opr.)	164,550-1097-75	VE7ZZ/W7	112,274-801-73
W6MAR	156,140-1061-74	W3ABT (WA5KX, opr.)	112,274-801-73
KH6RS (K2SIL, opr.)	151,552-1039-74	WB9AWY	111,962-759-74
W6HX (WB6OLD, opr.)	150,072-1018-74	WA8ZDF (WA8RWU, opr.)	110,925-743-75
K6EHB (W6NUT, opr.)	148,814-1007-74	W7GKI	110,704-753-74
K1LPL/3	146,292-1002-73	W3YUW/3	110,303-758-73
W1FBY	145,928-986-74	W2BQF	110,230-755-73
W9YT (K9KGA, opr.)	145,780-1000-74	W3AZD (WA3GUL, opr.)	110,084-754-73
W8SH (K7NHV, opr.)	145,200-968-75	WA2HSP/0	109,624-742-73
W1BGG/2	144,750-965-75	WB6ABK/6	109,340-781-74
VE7BDJ	141,600-944-75	K0JLL	109,298-742-74
K1ZND	141,150-942-75	K4CG (WA4KJR, opr.)	109,000-742-75
K5RLW	140,230-948-74	W7TML/1	108,706-736-74
W5WU/5	139,575-948-75	W3EZF	108,300-722-75
K4PUZ	139,050-931-75	K11FX	108,186-741-74
W2FCZ	138,972-939-74	WA0BWM/0	107,300-725-74
W8WPC (K8BPX, opr.)	138,600-924-75	WA3DSZ	107,152-724-74
K1VTM	137,566-930-74	K0LIZ	107,074-747-71
W8QXQ	136,752-924-74	WA8IBO	107,004-723-74
W3URE	135,926-931-73	W1YNP	106,470-785-70
W5DHH	135,050-933-73	W9LVT	106,416-750-72
WA6LKF	134,400-898-75	K8EHU	106,288-728-73
WB9VIX	133,050-900-75	K5PFL	106,069-733-73
W4KIC	130,725-872-75	W2YT	105,790-768-71
WA3HTQ	130,536-882-74	W4NQA/4	105,435-743-71
K60VJ	129,291-912-71	K4VEY	103,808-711-73
WA1LLD	129,150-861-75	W4DQS	103,650-691-75
K5TSR	128,160-890-72	W0YVP	103,530-744-70
W1MX (WA8WNU, opr.)	126,984-858-74	K4CAX	103,180-737-70
WA6IVN	125,060-859-74	W3GN	102,784-704-73
K5ALU	124,986-848-74	W0YCR	101,033-731-71
W3BN	124,538-853-73	WA1JUY	100,440-699-92
K8RMK	124,662-850-73	K3NPV	100,368-704-72
E2AU	123,100-818-75	W1DAL	100,350-669-75
WA8ZDT	122,120-860-71	K3UW	100,122-677-74
K4POL	121,824-848-72	WA9LQG (WA9AUM BWY)	111,328-784-71
VE5US (VE5UE, opr.)	121,804-824-74	W2SZ (4 oprs.)	108,558-734-74
WA1ABW/2	121,399-833-73	W8UM (3 oprs.)	104,244-718-73
W1CP (WA1PD, opr.)	120,132-846-71	W9YB (3 oprs.)	100,788-684-74
W7CYH	119,280-840-71	PHONE	
W8KIC	119,209-817-73	W7RM (K7VPE, opr.)	250,275-1677-75
K5RHZ	118,992-804-74	W6HX (WB6OLD, opr.)	210,600-1515-75
W1FLM	118,875-769-75	W9YT (K9LBO, opr.)	197,400-1316-75
W5KL	118,433-811-73	W3MJK	195,000-1300-75
K4GSO	117,330-805-73	WA5MV (K3FST, opr.)	181,200-1210-75
W1FLG	117,000-780-75	W3GRF (K1ANV, opr.)	180,075-1202-75
K1EUF	116,920-795-74	W5WU/5	179,175-1200-75
VA2UN (WA3HRV, opr.)	115,200-802-72	KG4FQ (WA9SXQ, opr.)	176,550-1187-75
W8FDU (WA3BGE, opr.)	115,128-800-72	K5RIW	175,972-1192-74
K5OXC	114,975-800-73	W17R	173,700-1166-75
K4BA1/4	114,330-773-74	K1VTM	172,800-1152-75
K48XD	113,813-804-71	W1BGG/2	172,650-1151-75
		W3CRE	172,200-1148-75
		WA1JLD	170,644-1153-74
		VESTIS (VE5UH, opr.)	168,900-1164-75
		K6EHB (WA6DK, opr.)	168,825-1128-75
		WA1JHQ	168,000-1120-75
		WA6IVN	167,684-1140-74
		WB2SQN	166,500-1125-74
		K1LPL/3	162,790-1115-73
		K5RHZ	162,652-1099-74
		K5ALU	161,775-1093-75
		WB8ZDT	161,184-1104-73
		W8SH (K7NHV, opr.)	160,200-1068-75
		W5RSZ	158,629-1004-73
		K2SZZ	157,950-1053-75
		W3AZD	157,950-1053-75
		VE7BDJ	156,600-1046-75
		WA8ZDF	156,150-1045-75
		W3ZKH/3	154,350-1029-75
		K4WCC (K4POL, opr.)	153,900-1045-75
		W8KIC	153,600-1026-75
		K5TSR	152,250-1016-75
		K1EUF	152,144-1028-74
		W1EFG	151,050-1007-75
		WA0YKP	150,300-1010-75
		WA4FEW	150,150-1006-75
		V32UN (WA3HRV, opr.)	148,296-1002-74
		WA2EAL	146,816-995-74
		WA1PD/1	145,875-974-75
		WA1ABW/2	145,562-1001-73
		WA8UN	144,900-966-75
		W11RG/4	142,800-956-75
		WB6RKK	141,450-951-75
		K4CQ (WA4KJR, opr.)	141,305-943-75
		K3UW	141,300-944-75
		WA3EKJ (WA3IAQ, opr.)	140,250-936-75
		K8EHU	138,825-926-75
		WA8VHV	138,750-925-75
		K6BHP	138,150-923-75
		W0NQQ	136,200-932-75
		W8QXQ	135,675-905-75
		WA2CPQ	135,600-910-75
		W2MB	135,075-901-75
		W3GZ (WA3HTQ, opr.)	135,000-900-75
		K8UNG	134,925-907-75
		K1ZND	134,612-923-73
		W9LVT	133,435-974-75
		WB6VJ/6	133,152-912-73
		K1JHX	133,100-894-75
		W1EFT	130,725-879-75
		W9EUN (WA9UAG, opr.)	129,450-864-75
		WA5RTG	125,250-835-75
		K0LUE	125,100-834-75
		W1ALXE	124,284-852-74
		W8WPC	122,988-831-74
		W0PAN	122,988-831-74
		WB6YFX (WB6ULK, opr.)	122,901-870-71
		K1AGH/7	122,600-824-75
		W3JN	122,100-814-75
		K1OME	121,464-847-72
		WA1KZF	121,275-812-75
		K3MNI	121,200-808-75
		W4KFC	121,050-807-75
		W3KMW	120,150-804-75
		WB6VZI	118,350-790-78
		K7LTV	117,975-801-75
		W7BUN	117,150-781-75
		K9CUIY	116,775-781-75
		W6NOS	116,496-809-72
		K4BA1/4	116,475-779-75
		WA3GJU	116,025-772-75
		W1IXL	115,736-782-74
		WA3OIV	115,500-770-75
		WBRKU	115,200-804-72
		K0JLL	115,200-805-72
		WA9LUD	114,600-766-75
		W0CFL	114,300-763-75
		WA8RWU	111,300-742-75
		WA8TBO	111,075-741-75
		W7GKE	110,250-791-70
		W4WSF	110,100-737-75
		WA7JBM	109,950-759-75
		K4LDR	109,800-736-75
		K8WUW	108,843-748-73
		W9ZRX	108,300-722-75
		WA6WEZ	107,364-780-69
		W8XYWX	106,726-731-73
		WA3NNA	106,358-753-71
		W8UIM (WA7EWC, opr.)	105,975-711-75
		K2AU	105,900-710-75
		WA1JBY	105,600-704-75
		WA1JZC	105,222-745-71
		WB4MKB	104,688-727-72
		WA0YAK	104,112-726-72
		VF3BUV	103,748-703-74
		K6AUD	102,711-705-73
		K1THQ	102,340-720-71
		WB6HDG	101,762-701-73
		W6UJA (W6HOH, opr.)	101,528-704-74
		WB9DXW	101,489-754-73
		W8OQH	101,454-686-74
		W4UDS/0	101,324-728-73
		K0YVU	100,950-674-75
		W4DM	100,640-688-74
		W7NP	100,520-719-70
		K7PXY	100,251-694-73
		W1VPI (WA2LBT, opr.)	100,240-716-70
		WB4MR1	100,239-700-73
		WA9ORM (K7IC'A)	195,525-1313-75
		K8RMK (+WA3BGE, WA8PZA)	182,325-1216-75
		W7SFA (+VE7ZZ)	181,875-1213-75
		W1FBY (+W1ARR)	164,700-1098-75
		WB6OOL (+WB66 LPK ZUO)	159,026-1110-74
		WB4PKP (+WB46 OPL OUB)	155,884-783-74
		WB2OLEU/2 (+WA2RAL)	153,750-1121-75
		W5MYA (+K5IHD)	151,200-1010-75
		K5IYP (7 oprs.)	147,750-985-75
		WA9UCE (+W9MKA)	134,625-902-75
		WA5VWH (+WA555 SOG TAF)	134,550-900-75
		WA8GUF (+K8HFR)	131,128-889-74
		W2SZ (3 oprs.)	129,000-860-75
		WA3DEQ/2 (+WA3COW)	128,925-865-75
		WB4BFS/7 (+WA1GZV)	128,250-855-75
		WB8DU (5 oprs.)	127,725-894-75
		W6KG (+W6DOD)	124,992-868-72
		K3HZI (+WA3BI F)	112,275-782-75
		WA1GBA (+WA1DWF)	112,128-768-73
		K3MTK (5 oprs.)	110,250-738-75
		WB6NSI (+WB66 LFL I FN)	110,084-756-73
		W5YG (8 oprs.)	108,928-738-74
		K9IU (5 oprs.)	104,475-715-75
		WA8VHV (+WB8CKI)	103,008-696-74
		WB6SWY (3 oprs.)	100,594-691-73
		W0SUE (8 oprs.)	100,465-709-71
		WA2BAN (+WA28 DMF UOU)	100,368-697-72

AMATEUR RADIO PUBLIC SERVICE

NTS RACES AREC

In the Public Interest, Convenience, Necessity HR.H

CONDUCTED BY GEORGE HART,* WINJMJ

EMERGENCY CHECKLIST

THERE CONTINUES to be sporadic talk going the rounds to the effect that amateurs and amateur radio as such are useless for anything but the most rudimentary kinds of emergency communication, that the CBers are taking over the local scene, that amateurs, to be useful at all, need close supervision by representatives of served agencies (preferably under RACES or some other quasi-amateur designation), or else be relegated to doing what they can with inQuiry or other "health & welfare" traffic.

This is the most inimical and degrading kind of nonsense, and nobody with a grain of national perspective or knowledge really believes it for a moment. True, in some places amateurs are in bad odor and CBers are in high esteem, but in other places just the opposite situation exists. The place of the amateur in public service as a *representative of the Amateur Service* is still high, his preparedness on a higher plane than most, his dedication and willingness to the cause of public service as great or greater than ever. All the degrading talk you hear is a kind of pollution — pollution of spirit by the faint-of-heart, pollution of amateur dedication by those who are amateurs in name only.

Now, with repeaters all over the place and commercial availability of gear for 2-meter fm widespread, mobiling is on the upswing and amateur potential for versatile emergency communications is greater than ever. Before long, the 225-MHz band is going to open up, too; already extensive plans are being made. Low-power fm rigs capable of tripping repeaters and extending coverage tenfold or a hundredfold are already commonplace and will be even more so. Portable repeaters are being used in places, and have tremendous potential in emergency use, whereby a one-watt hand-carried transceiver can communicate with ease not just over limited line-of-sight as heretofore, but over tens or hundreds of miles. Some of the repeater installations are unbelievably sophisticated: touchtone dialing, repeaters in cascade, etc. The possibilities, if only FCC will permit them, are nearly endless.

* Communications Manager, ARRL.

Two meters and 225 MHz are not the only bands useful for emergency purposes, of course; emergency nets on 75, 40, 10 and 6 meters continue to operate, for those who have superior facilities there. There has been no letdown in overall amateur radio preparedness for emergencies, and don't let anyone tell you otherwise.

But meanwhile, how is *your* preparedness? EC W6INI of the San Diego section has prepared a little test by means of which you can "rate" your emergency preparedness, and an extensive check list of supplies you should have on hand for such an eventuality. Want to rate yourself? Here is how Art tests his AREC people:

1. Do you have a 3-day supply of food and water *ready to go*?
2. Do you keep your car's gas tank at least half full at all times?
3. Have you arranged for care of your family in case you are called out?
4. Do you have a supply of operating materials ready to go (message blanks, pencils, log, scratch or memo paper, etc.)?
5. Do you have a battery-operated transistor BC radio with spare batteries?
6. Do you have a gas-engine generator capable of supplying emergency power at a moment's notice?
7. Do you have *portable* antenna plans and materials available?
8. Do you have a completely portable rig that can operate independent of your car?
9. Do you have identification both on your car and on your person that will help you get to where you can do the most good?
10. Are you informed on assembly points or frequencies or other emergency plans in effect locally?

Apologies to W6INI, we have modified some of his wording to make the questions apply nationally, and in some cases have just plain second-guessed him. But most of us, allowing ten points credit for an affirmative answer to each question

At the annual picnic-business meeting of the Michigan QMN Traffic Net, a plaque was presented to W8FX in appreciation for having served as Secretary-Treasurer of the net for thirty years. W8IZ (left) is shown making the presentation.





This group of League Officials gathered for this photograph during a League Officials meeting at ARRL Headquarters last September.

and 70 as a passing grade, will flunk this test. Yes, flunk it! Some of the questions apply to mobile operation, some to away-from-home operation, some to home station operation, and some can apply to a number of situations; but all are obviously right down the alley in terms of emergency preparedness and are things we often don't even consider — yet things that would hit us right in the face with disastrous unpreparedness when the chips are down and it is too late. If you flunked the test, how about doing something about it?

Here's a list of emergency supplies Art thinks any well-prepared amateur should have on hand, ready to go:

Station log	Water purifier kit
Message blanks	Toilet articles
Carbon paper	Towels, wash cloths
Scratch pads	Wash basin
Pens, pencils, eraser	Mirror & shaving gear
Electric lantern	Soap, hand & laundry
Headphones, junction box	Can & bottle openers
Candles	Toilet paper
Matches in waterproof container	Medicines as needed
Maps (especially local)	Alarm clock
Battery b.c. radio	Extra gas & oil
Extra batteries	Tow cable
Test equipment	Syphon
Tools! (all kinds)	Jumper cables
12 v. & 120 v. soldering irons	Shovel & pick
Spare tubes	Hatchet, ax, saw
Spare fuses	First aid kit
Food (for 3 days max.)	Flashlights
Water	Sleeping bag/blankets
Eating utensils	Foul weather gear

Anything else needed? Yes, probably many things, some of them peculiar to your own person. Quite a list, and it probably makes quite a careful. What happens is that once you have collected all this stuff and packed it lovingly in a large wooden box that will fit in your trunk or in the back of your wagon or camper, there it stays and is never used — like the emergency generators at WIAW and in the writer's own home that sit there unused 99.99% of the time. In fact, it seems that once you have gone to all the trouble and expense of being prepared, this is good assurance that nothing will happen to justify it. But look at it this way — it's less expensive than most insurance and, unlike insurance, is available *during* the emergency, not just afterward. And there are no recurring premiums; once you have made the investment, nearly all the materials (yes, even the food if you stock

the right kind) will last indefinitely until or unless a need for them arises.

Are you prepared for emergency service? — WINJM.

Traffic Talk

Quite a few subjects in the file. Let's see how many we can cover before we run out of space.

Item: At the recommendation of the Eastern Area Staff of NTS, your Communications Manager contacted the MARS chiefs relative to possible improvement of arrangements for the handling of traffic in NTS destined for or coming from military personnel serving overseas, particularly Europe and Southeast Asia. Subsequently, a letter received from Maj. Jan Huggins, WB4ONK, AF-MARS chief and at that time chairman of the Joint MARS Panel, indicated that a review of the MARS traffic files for May, June and July revealed very few messages in this category — in AF-MARS less than 20 such messages at both east coast and west coast gateway facilities combined. "Unfortunately," the letter goes on, "we have no convenient method of checking down to the individual MARS station level to determine if there is more amateur traffic getting into the system than is getting to our gateway stations. As you know, handling personal third party traffic is only an adjunct of the primary mission of MARS, which is to provide an in-being emergency communications system for the services. This does not mean we do not do our best to deliver all personal messages. Deliveries are, however, subject to the capabilities of the program, and this should be kept in mind by amateurs re-filing traffic into MARS."

That MARS is devoting more and more of its facilities to handling of phone patches and less and less to record traffic is evident from two more recent developments. First, a MARS-Army bulletin which reads as follows: "Since trend indicates overwhelming popularity of phone patching over less efficient MARSgram deliveries overseas, many MARS stations overseas in the interest of economy no longer maintain MARSgram handling capabilities. Accordingly, re-emphasis is made on standing policy that solicitation of MARSgrams is discouraged and stations are cautioned to give thoughtful consideration not to accept MARSgrams in excessive volume or when ultimate delivery is dubious. In lieu of MARSgrams, families and friends of overseas personnel should be informed that it is to their advantage to write overseas personnel encouraging them to take the initiative and place direct phone patch calls to them over the MARS phone patch system."

Further discussion with the Army MARS chief (W4DJN) reveals that there is no aversion to the handling of written messages; it is simply a matter of utilizing facilities available to best advantage.

Since there are insufficient facilities and personnel to handle the demand for both phone patches and "MARSgrams," it is a case of one or the other. The demand for phone patches is simply overwhelming, leaving facilities lacking for MARSgrams.

Second, word came from FCC that during the period Dec. 22 through Jan. 3 only, "phone patch traffic" was permitted with Korea, principally to exchange holiday morale traffic between U.S. armed forces personnel and their families. No mention is made of record traffic, and presumably this was not permitted, whether by oversight or purposely is not known.

Get the message? Don't solicit overseas message traffic. Originate it only with the understanding that there is a very good chance that it won't get there, and urge instead that the serviceman at the other end contact his nearest MARS station for a phone patch.

Item: We suppose there will always be confusion about "book" messages, although this method has been discussed many times, and is fully explained in the booklet *Operating an Amateur Radio Station*, free to ARRL members. We very seldom hear one sent properly. Remember that a "book" message is sent as a single message, no matter how many parts it has to it. The parts of a message are separated from each other by a "break" sign (BT on cw). The "end of message" sign (AR on cw) is used *only* at the end of the message or book. Usually, at the end of a "book," one transmits "end of book" instead of "end of message," and on cw it's AR END BUK AR. You don't transmit the "end of message" sign until the END of that message or book.

If the difference between the "break" ending transmission of one of the variable parts of a book and other "breaks" separating parts of a message bothers you, why not use a "double break" (BBT on cw)? For example, you finish the preamble and text, but the numbers, addresses and signatures are variable. Okay, you send the number and address of the first variable, a "break" (BT), the signature, and that's the end of that variable part of the book, so you send a "double break" (BBT) to so indicate, then proceed with the next variable. In all cases where each variable part has to itself be separated, use a single break; a double break is then used to signify the end of a variable part. The "end of message" or "end of book" sign doesn't come until the end, however.

Sorry, that's all for this time. More next month.
— WINJM.

National Traffic System. The month of Nov. saw a substantial increase in traffic and its efficient handling contributed to the setting of some new NTS records. EAN set a new record with a rate of 1,571. K2K1R reports that EAN beat the previous high Nov. traffic total by 30%. WA0MLE also reports a good month for traffic, the second best Nov. in CAN's history. W2FR issued 2RN certificates to the following: W2s BU FEB RUF, K2JBX, WA2s ELD BAN, WB2s LGA VEJ, W9HRY issued a 9RN certificate to W9ILS. All in all, Nov. was one of the best months that NTS has had in some time.

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for Nov. Traffic

Call	Orig.	Recd.	Ret.	Del.	Total
W3CUL	253	1522	1321	165	3261
K8ONK	193	692	676	12	1573
K0ZSO	4	519	—	518	1037
WA2NPI	472	277	185	87	1021
W7BA	17	472	425	41	955
WA0VAS	107	372	31	341	851
WB4AW	24	356	312	38	730
W6RSY	24	335	313	13	684
WA1JTM	42	308	298	4	652
W4FML	45	367	227	3	642
W0LCX	27	339	260	14	640
KANSN	266	208	114	42	630
W0INH	125	276	224	—	625
W4VR	182	227	196	12	617
W1UYY	27	294	282	11	614
W6VNO	6	320	262	1	589
W4TAVI	143	219	172	47	581
W4SQQ	21	286	266	5	578
K5LEY	3	282	261	—	566
W4NFTX	30	264	254	6	554
W9RFBG	431	112	—	1	544
W6INH	32	249	202	47	530
W9CXY	5	262	261	1	529
W0ZHN	34	260	225	9	528
WA3JGM	103	239	171	13	526
WB4FLK	94	215	163	34	506
W4EFV	42	270	183	9	504
K0ZSG(Oct.)	1	422	—	422	845
WA0VANS(Oct.)	118	344	32	312	806

BPL for 100 or more originations-plus deliveries

W6AVK	354	K0CSL	121	W3MPX	109
WA2NP	303	W4WRQ	119	W2SZ	106
K8ONA	262	W2CVY	118	WA7ORC	106
K8ODJ	185	WB4SVY	114	WA1EYV	104
W1UN	182	WB4SDI	112	WA1GOM	102
WB4SHD	146	W44SON	112	WB4KSG	102
K6DYK	129	W8QCU	112	WB1DVR(Oct.)	134
WB4HKP	127	W2OE	111	K9FJ(Oct.)	115
W48BY	126	WA0SUF	111	W46RYZ(Oct.)	105

More-Than-One Operator Station

VA2UN 168, WA0CIQ 150
W4RYZ 40(Oct.) 143

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.



Visitors to headquarters in June included K3KMO, former Western Pa. SEC and always active in traffic nets. (WINJM photo.)

November Reports

Net	Sessions	Traffic	Rate	Avg.	Rep%
FAN	30	2423	1.571	77.4	98.9
CAN	30	1417	1.131	47.2	100.0
PAN	30	1341	1.012	44.6	100.0
FRN	60	894	.470	14.9	93.1
ERN	60	873	.929	12.9	97.0
JRN	60	450	.414	7.5	97.2
4RN	57	737	.453	12.9	92.5
RN5	60	737	.437	14.6	87.0
RN6	60	891	.408	16.5	100.0
RN7	60	303	.297	5.1	56.0
8RN	57	543	.414	9.5	83.9
9RN	50	442	.308	8.8	92.3
TEN	60	800	.687	13.3	84.3
ECN	56	157	.254	2.8	80.0
TWN	42	261	.268	6.2	44.0
TCC Eastern	120 ¹	894			
TCC Central	90 ¹	737			
Sections ²	2699	14865			
Summary	3471	27805	EAN	18.4	
Record	3211	30541	L.315	17.8	

¹TCC functions, not counted as net sessions.

²Section nets reporting (87): AENB, AEND, AENM, AENR, AENT (Ala.); OZK (Ark.); SUN, NCARCC (Cal.); CCN, CN, CHN (Colo.); NVHETN, CPN (Conn.); QFIN, GN, WEPN, FMTN, VEN, EAST (Fla.); GIN, GSN (Ga.); TPSCN, QUN (Ind.); TLGN (Iowa); QKS (Kan.); KTN, KYN (Ky.); LTN, LAN (La.); SGN (Me.); PAW, MJN, MSN (Minn.); MTN (Miss.); MSN, WEN (Mo.); MCVHEP/N, PVTE/N, NJEPTN, LUTTN, NJN (N.J.); NMRIN (N.M.); NYS, NLI (N.Y.); CNL (N.C. & S.C.); BN, SSEN, BNR, OSSBN, SC2EM, AMN (Ohio); OPEN (Orla.); WPA, EPA, RSSN, PTTN, GCRN (Pa.); KISPN (R.I.); PARN, TTN, LEX (Tex.); BUN (Utah); VN (Va.); NSN, PSFN, WSN (Wash.); WVC75, WVN, WYNN (W.Va.); WSBN, WSSN, SW2RN, REN, V5BN (Wis.); AFSN (Alta.); M/N (Man.); APN (Mari.); WOUVH (Que.); GBN (Ont.); SATN (Sask.).

Transcontinental Corps. W3EM sez: "High traffic totals and percentage of successful functions made this month the best Nov. in Eastern TCC's history. A big switch and with several new stations inquiring about working in TCC, things are looking up for a change." TCC Central also had a highly successful month with only two failures reported.

Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Eastern	120	98.6	2677	894
Central	90	97.7	1530	737

The TCC roster: Eastern Area (W3EM), Dir. I - W18 BIG EJJ, NJC QYY YNE, E1SSH, W4JFM, W25 FR GKE, K2KTR, W428 IGU UWA, W3JML, E3MVO, W48 SQU UQ, E4KNP, W44NO, W88 PMT RYP, E8KMO, W4NPIM, Central Area (W4LX), Dir. I - W48 OGU ZJY, W44KPE, W88 QUM ZBN, W98 CXY DND YB, W49VZM, W68 HH INH LEX ZHM, W49JAW, K9AEM, Pacific Area (W6VNO), Dir. I - W8RE, E5MAT, K6DYX, W68 BGE EOI IPW MLE MNY VNO VZT, W468 DEL LFA, W75 BQ EM KZ PI DZX LKB GUT, K4QSP.

Independent Net Reports (Nov.)

Net	Sessions	Traffic	Check-ins
30 Meter IASB	20	4333	426
North American Traffic	26	359	502
Clearing House	27	420	552
7290 Traffic Net	42	703	1889
Eastern Area Novice Net	9	3	29
Inter-State SSB	30	312	1381
Early Eighty Free	29	102	193
Ht & Bounce	30	1007	359
N.E. Traffic	30	254	404
Forty Meter CW Traffic & Emergency	25	81	123

Public Service Diary

On Oct. 10, WA9NSO was in communications with W9HOQ via a two-meter fm repeater when he noticed flames coming out of the second floor of a house in N. Chicago, Ill. He requested W9HOQ to notify the fire department. Upon doing so, W9HOQ learned that the fire had already been reported but than an incorrect address had originally been given and that the fire department was

Public Service Honor Roll November, 1971

This listing is available to amateurs whose public service performance during the month indicated qualities for 30 or more total points in the nine categories below. A delineation of the points awarded for each function is given in the category key at the end of the Honor Roll listing. Please note maximum points for each category. Those making fewer than 45 points are listed with total totals only.

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	Totals
Max. Pts.	10	10	12	12	12	20	3	5	5	
W3EZT	10	7	12	6	12	20		1	5	73
W3FCS	10	10	12	12	12	7		5		68
W4QV45	10	10	12	12	20	3				67
W4KDI	10	10	12	12	12			3	5	64
W8BBMV	10	10	12	12	12	3				64
W2AEH	10	10	12	12	12					61
W0LRW	10	10	12	12	12				5	61
W84SD	10	10	12	12	12			3		59
W47JOS	10	10	12	12	20				5	59
K0BAD/4	10	10	12	12	12					56
W4QVYV	10	10	12	12	12					56
W7BO	16	7	12	12	9					55
K3ZNP	10	10	12	9	12	1				54
W2OE	10	10	12	12				3		52
W84SK	10	5	12	12	12					51
W421CU	10	10	12	6	12					50
W84DJ	10	10	12	12					5	49
W84OKT	10	10	12	12						49
W85BM	10	10	12	12						49
W89ANT	10	10	12	12				3		49
K8MRJ	10	10	12	12						49
W48VX	10	10	12	12				3		47
W85DK	10	10	12	12						47
W84MG	10	7	12	12						46
W84PBG	10	7	12	12						46
W6LH	10	10	12	6	20					46
W1BFY	44	W2RUF	39	W3JDN	34					34
W2BU	44	W4APH	39	K4KAC	34					34
W4CVS	44	W41PS	39	K4KRP	34					34
W4AMH	44	W4NBL	39	W84KSL	34					34
W84SVH	44	W5BHH	39	W4ZLY	34					34
W5D4	44	W7LBR	39	W6QAW	34					34
K8KOZ	44	W8HH	39	W6YHV	34					34
W7AKT	44	W4MLR	39	W7GHT	34					34
W70CA	44	W84NJ	38	W9QLW	34					34
W4HRY	44	K4UNW	38	W4JAW	34					34
W4JFC	44	W46AAW	38	W4KYR	34					34
W4SRS	44	W4JIM	37	W4JDU	34					34
W4HDZ	44	W4UQ	37	W4HFI	34					34
W4FA	44	W46YA	37	W4GFN	34					34
W4JNA7	43	W4ZAL	36	W6LTY	33					33
W6NH	42	W4QVY	36	W6CY	32					32
W5SVW	41	W45WV	35	W6MKM	32					32
W7PI	41	W8QBY	35	W2TPV#	31					31
W4NOG	40	K1SKF	34	W43YA	31					31
W6MNY	40	W2CU	34	W86KA	31					31
W4J6AN	39	W4ZLD	34	W4ZMTA	30					30
W7BR	39	K2KTK	34	W84VOS	30					30

*Denotes multipointer station.

Category Key: (1) Checking into cw nets, 1 point each; (2) Checking into phone/RTTY nets, 1 point each; (3) NCS cw nets, 3 points each; (4) NCS phone/RTTY nets, 3 points each; (5) Performing liaison, 5 points each; (6) Legal phone patches, 1 point each; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly via a disaster area, 1 point each message; (9) Serving as net announcer for entire month, 5 points.

unable to locate the blaze. W9HOQ relayed the correct address to the fire department and within minutes they were on the scene and had the situation under control. - WA9WEN.

On Nov. 12, W3EZT heard an urgent call from YV5DSL on twenty meters. Due to a language barrier, W3EZT was only able to understand a few words of the transmission. He then called the State Dept. in Washington, D.C. and explained the situation and requested a Spanish interpreter. Within minutes it was learned that a baby in Venezuela had recently undergone surgery and was in need of a rare drug in large quantities. A supply of the needed drug was located in New York and was rushed to a New York City airport where the Venezuelan Ambassador to the U.S. was about to depart for a visit in Caracas. Less than twenty-one hours after the call was originated, the medicine was delivered to the hospital and the infant began the long road to recovery. W3EZT.

On Nov. 16, the Boeing Employees AREC group was requested to provide communications for the search of a lost hunter near Cougar, Wash. W7RJW was dispatched to the scene and set up a communications network on eighty meters. During the hours of the search a number of messages were handed into the Seattle and Tacoma area. The search was finally terminated after several days of unsuccessful efforts. Other amateurs participating in this exercise included W7s DFL HLP K7UWT and WA7HKD. - *W7RJW, E.C. BEARS, King Co., Wash.*

Coming upon a one-car accident about seventy miles south of Casper, Wyo., on Nov. 28, K7TAL made contact with WA7GOV on the Casper fm repeater and instructed him to notify the proper authorities. If it had not been for the timely arrival of K7TAL the accident victim could have been stranded for quite a while, and possibly injured by exposure to the extreme cold. - *K7TAL.*

On Dec. 11, the North Canton, Ohio, AREC was requested to provide assistance to the local police department during a search for a missing person. A number of mobile units led by W8KBR provided communications for the search. The operations were secured a few hours later when the woman was located near her home. The following amateurs participated in the search: W8KBR, K8s DHJ DJF IZN, WA8s GSV VEV, WN8KEO. - *K8DHJ, EC Stark Co., Ohio*

The Hansford Co., Texas, Weather Watchers were called to duty on June 9 to follow and report on a number of tornadoes in the area. Four mobile units were dispatched to follow the storms and report on their patch of destruction. This information was reported to a local fm radio station and to a CATV station who in turn broadcast the information to the general public. The participants in this exercise were recently honored by Hansford Co. officials for their public service work. - *WA5YPA.*

The Barstow Amateur Radio Club of Barstow, Calif., provided communications for the second annual running of the "Pony Express Race" on Oct. 10. The forty-mile race had seven relay stations with fresh horses at each station. Two-meter mobiles at each station transmitted arrival and departure times of the riders to W6ZGC in a plane flown by W6DSL. W6ZGC relayed the information to W5LLU/6 who passed it to the crowd and to a local radio station. W6JXZ, WA6FLB and WA6CMZ manned the relay stations and the broadcast station announcer was W6FRW.

On Oct. 30, members of the Bloomington Civil Defense Communications Group assisted police in

On Sept. 26, these members of the Valley Radio Club of Eugene, Ore. provided communications for the Eugene Cycling Championships held in Skinner's Butte Park. Pictured left to right are: WA7DVJ, K7CIY, K7QKD, WA7GGD, and W7LVN.

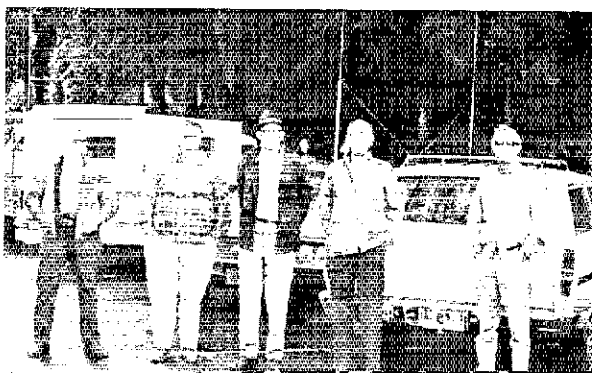


Pictured here is Mac, W6TMY, who recently completed over 400 consecutive check-ins to the Orange Co. forty-meter AREC Sunday morning net. A pretty good record, we think.

a Halloween patrol. Each member was equipped with two-meter fm gear and was accompanied by a member of the police reserve. The use of amateur communications coupled with the police reserve doubled the number of units on patrol for the evening. The amateurs served strictly as communicators for the police reserve officers. The following amateurs participated in this event: W0s HZR PAN, K0s PIZ PVH SHO, WA0s DUN OWG RJX.

Another very successful "Spook Patrol" took place on Oct. 30, in Dundee, Mich. Four mobile units were dispatched to patrol the streets and report any unusual occurrences to the police. The amateurs' participation in this event allowed the police to concentrate on more serious incidents. Amateurs participating in this exercise included W8TZZ, K8LYY, WA8s FFK YMB Y7B WB8JK. - *W8EFK, E.C. Dundee, Mich.*

Thirty seven SEC reports were received for the month of November representing a total of 10,703 AREC members. Both of these totals are down considerably from November 1971. Again we urge the SECs to report to Headquarters. We can't get an accurate picture of the AREC if we don't hear from you. Sections Reporting: Ala, Alta, Ariz, Colo, Conn, EFla, EMass, ENY, INd, Iowa, Kan, Ky, Mari, Mich, Minn, Mont, Neb, Nev, NC, ND, NNJ, NTex, Ohio, Okla, Ont, SV, SDgo, Sask, SD, SNJ, Tenn, Utah, Wash, WFla, WMass, WPa, WVva.



Happenings of the Month

EXAMINATION SCHEDULE

For the convenience of those planning to take an FCC examination for General, Advanced, or Extra Class license, we present below a tentative schedule of dates and places. (Applicants for Novice, Technician, or Conditional Class licenses should follow procedures outlined in Chapter 5 of the *Radio Amateur's License Manual*.)

No advance notice is required of the applicant, except as noted. Of course, no tests are administered on national holidays. Additional examination points are listed after the office schedule in most districts; at such places, appointments should be made during the month previous through the district engineer. He will probably ask that the completed form 610 and check or money order for \$9 be filed in advance. An applicant may appear at any FCC examination point regardless of where he lives.

Recent changes are in boldface.

1 Boston, Mass. 02109; India & State Streets; Thurs.-Fri., 9-11 A.M. Exams with code test, Friday only. Also conducts examinations at Bangor, Me. in May; Hartford, Conn. in March and Sept.; Portland, Me. in Apr. and Oct.

2 New York, N.Y. 10014; 641 Washington Street; Tues.-Thurs., 9-12 A.M. Also conducts examinations at Albany, N.Y. in Mar., June, Sept., and Dec.

3 Philadelphia, Penn. 19106; 2nd & Chestnut Streets; without code test, Mon.-Wed., 10-12 A.M.; with code test, Tues.-Wed., 8-9 A.M.

Sumner H. Foster, W0GQ, who has just finished his third term as director from the ARRL Midwest Division, recently retired as a vice president of Penick and Ford, Ltd (Karo syrup, etc.). Before he left Cedar Rapids for the Denver area, the Cedar Valley Amateur Radio Club, Inc., awarded him a life membership in the club in recognition of — among other things — his five terms as its president. Offering congratulations at the testimonial is Cedar Rapids Civil Defense Director Bill Bjorenson (left). (Photo by Doug Horner, W0KD)

4 Baltimore, Md. 21201; 819 Geo. M. Fallon Federal Bldg., 31 Hopkins Plaza; Mon. and Fri., 8:30 A.M.

5 Norfolk, Va. 23502; Military Circle, 870 North Military Highway; with code, Thurs., 9 A.M.; others, Wed. and Fri., 9 A.M. to 12 noon. Also conducts examinations at Salem, Va. in Apr. & Oct.; Wilmington, N.C. in June & Dec.; Winston-Salem, N.C. in Feb., May, Aug., and Nov.

6 Atlanta, Ga. 30303; 1602 Gas Light Tower, 235 Peachtree Street, N.E.; Tues. and Fri., 8:30 A.M. Also conducts examinations at Nashville, Tenn. in Feb., May, Aug., and Nov.; Memphis, Tenn. in Jan., Apr., July, and Oct.; Knoxville, Tenn. in Mar., June, Sept., and Dec.; Birmingham, Ala. in Mar., June, Sept., and Dec.

6S Savannah, Ga. 31402; Bull Street, P.O. Box 8004, 2nd and 4th Mon. by appointment only.

7 Miami, Fla. 33130; 51 S. W. First Avenue, Thurs., 9 A.M. Also conducts examinations at Jacksonville, Fla. in Apr. and Oct.

7T Tampa, Fla. 33606; 500 Zack Street; Tues.-Fri., 8:15 A.M. by appointment only.

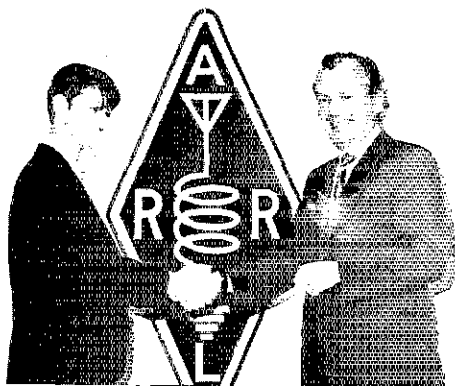
8 New Orleans, La. 70130; 600 South Street; with code, Tues., 8:30 A.M., others, Tues.-Wed., 8:30-12 A.M. Also conducts examinations at Jackson, Miss. in June and Dec.; Little Rock, Ark. in Feb., May, Aug., and Nov.

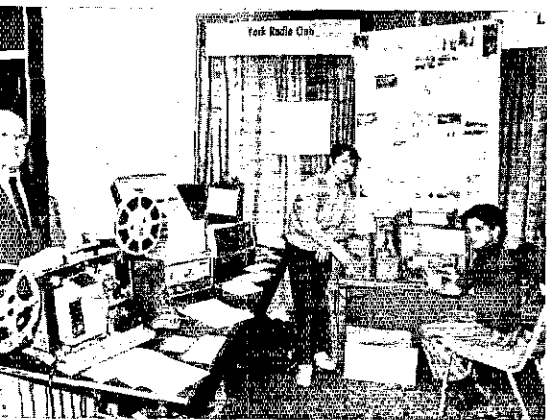
8M Mobile, Ala. 36602; 113 St. Joseph Street; Wed. 8 A.M. by appointment only.

9 Houston, Texas 77002; 515 Rusk Avenue; without code, Fri. 8 A.M. to noon; with code, Thurs., 8-10 A.M. Also conducts examinations at San Antonio, Texas in Feb., May, Aug., and Nov.; at Corpus Christi, Texas in Mar., June, Sept., and Dec.

9B Beaumont, Texas 77701; 300 Willow Street; Tues. by appointment only.

During the November Executive Committee meeting, James Arlen White, WA1NNC, son of Ellen, W1YL, and Bob, W1CW, was congratulated by ARRL President Robert W. Denniston, W0DX, both for making General Class and for being elected a Life Member of ARRL. The Whites thus became the only all-Life-Member family in ARRL; we have five "Mr. and Mrs." Life Member teams, though. (Sorry — no cut rates for quantity!)





The York Radio Club of Elmhurst, Illinois manned a booth at Elmhurst Expo '71, courtesy of realtor Larry Reedy, an ex-amateur of the '30s. On view was a current hf transceiver; a Novice station; a 1931 5-meter transceiver by W9NNE; a Model 19 teleprinter set-up and the ARRL youth film, "This Is Ham Radio," which was shown about once each hour. Manning the station when this picture was taken: Carl Zaruba, WA9NRI, club PR chairman, and David Ciciora, WN9IGT, with visitor Scott Staggs (standing, center). Others involved: "prexy" Jordan Kaplan, W9QKE; Jim McDonald, WB9ADQ; Susan McDonald, WN9HVO; Alex Ciciora, W9NXX; Cliff Strain, W9KBU; Larry Shaw; W9OKI; Ray Norberg, W9PYG; Kim Tusov, WA9LFR, and Rich Mirdas, WA9LRC. (Photo by Dave Nyström)

10 Dallas, Texas 75202; Rm 13E7, Federal Bldg., 1100 Commerce St. Tues., 8-12 A.M. Also conducts examinations at El Paso, Texas, in Feb. and Aug.; Lubbock, Texas in Feb. and Aug., Oklahoma City and Tulsa, Okla. in Jan., Apr., July, and Oct.

11 Los Angeles, Calif. 90012; Rm 1754; 312 N. Spring St.; Wed. 9 A.M. and 1 P.M. Also conducts examinations at Bakersfield, Calif. in May; Las Vegas, Nev. in Jan. and July; Phoenix, Ariz. in Jan., Apr., July, and Oct.; Tucson, Ariz. in Apr. and Oct.

11SD San Diego, Calif. 92101; 1245 Seventh Avenue; by appointment only; with code, 1st & 3rd Fri.; without code, Wed.

12 San Francisco, Calif. 94111; 555 Battery Street; Fri., Extra & Advanced, (no code) 8:30 A.M.; General and Advanced (with code) 10 A.M. Also conducts examinations at Fresno, Calif. in Mar., June, Sept., and Dec.

13 Portland, Ore. 97204; 319 S.W. Pine St.; Fri. 8:45 A.M. Also conducts examinations at Boise, Idaho in Apr. and Oct.; Klamath Falls, Ore. in May.

14 Seattle, Wash. 98104; 909 1st Avenue; Fri. 8:45 A.M. Also conducts examinations at Billings, Mont. in May; Missoula, Mont. in Aug.; Great Falls, Mont. in Oct.; Spokane, Wash. in Apr. and Oct.

A September *QST* article, "Custom Design and Construction Techniques for Linear Amplifiers," has won the Cover Plaque Award for its author, Merle B. Parten, K6DC. Making the presentation is ARRL Pacific Division Director "Doc" Gmelin, W6ZRJ (right).



Col. Edwin S. Van Deusen, W3ECP, assistant director and former vice director of the ARRL Atlantic Division, received the Outstanding Civilian Service Medal in recognition of 20 years' leadership of Army MARS in Maryland and the District of Columbia. While his wife Cornelia observes, Van accepts the citation from Lt. Gen. Claire E. Hutchin, Jr., commander of the First Army.

15 Denver, Colo. 80202; 19th Street between California and Stout Streets; 1st and 2nd Thurs. 8 A.M. Also conducts examinations at Albuquerque, N. Mex. in Apr. and Oct.; Rapid City, S. Dak. in May; Salt Lake City, Utah in Mar., June, Sept., and Dec.

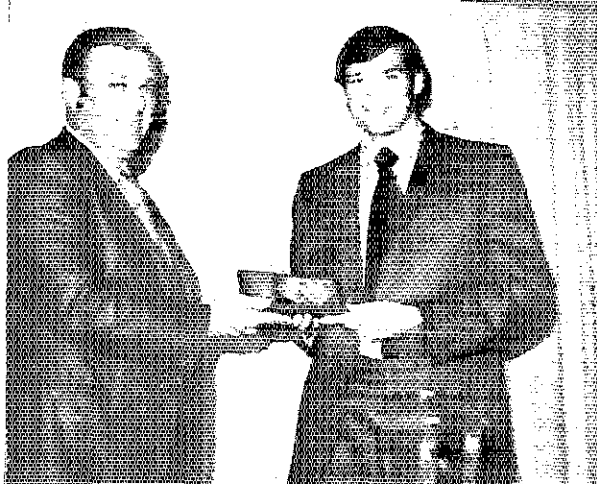
16 St. Paul, Minn. 55101; 4th and Robert Streets; Fri., 8:45 A.M. Also conducts examinations at Jamestown, N. Dak. in Oct.; Marquette, Mich. in May; Sioux Falls, S. Dak. in Mar., June, Sept., and Dec.

17 Kansas City, Mo. 64106; 601 E. 12th St.; Thurs., 1 P.M. Also conducts examinations at Des Moines, Iowa in Mar., June, Sept., and Dec.; Omaha, Nebr. in Jan., Apr., July, and Oct.; St. Louis, Mo. in Feb., May, Aug., and Nov.; Wichita, Kans. in Mar. and Sept.

18 Chicago, Ill. 60604; 219 South Dearborn Street; Fri., 9 A.M. Also conducts examinations at Davenport, Iowa in Jan., Apr., July, and Oct.; Fort Wayne, Ind. in Feb., May, Aug., and Nov.; Indianapolis, Ind. in Feb., May, Aug., and Nov.; Louisville, Ky. in Feb., May, Aug., and Nov.; Milwaukee, Wis. in Jan., Apr., July, and Oct.

19 Detroit, Mich. 48226; Washington Blvd. & Lafayette Street; Wed. and Fri., 9 A.M. Also





The Delta Amateur Radio Club's "1971 Ham of the Year" was Jimmy H. McLean, WA4FDR, of Memphis, Tennessee. Making the award is Joe Hutchison, WB4LMU (left). (Photo by Tom Christian, K4CGL)

conducts examinations at Charleston, W. Va. in Mar., June, Sept., and Dec.; Cincinnati, Ohio in Feb., May, Aug., and Nov.; Cleveland, Ohio in Mar., June, Sept., and Dec.; Columbus, Ohio in Jan., Apr., July, and Oct.; Grand Rapids, Mich., in Jan., Apr., July, and Oct.

20 Buffalo, N.Y. 14203: 905 Federal Bldg., 111 West Huron St.; Fri., 9 A.M.; for groups of 8 or more, by appointment. Also conducts examinations at Pittsburgh, Penna. in Feb., May, Aug., and Nov.; Syracuse, N.Y. in Jan., Apr., July, and Oct.; Williamsport, Penna. in Mar., June, Sept., and Dec.

21 Honolulu, Hawaii 96808; 502 Federal Building; Tues. and Wed., 8 A.M. and by appointment. Also conducts examinations at Hilo in Sept., Hobe, Kauai in Oct.; Waituka, Maui in Sept.

22 San Juan, P.R. 00903; 322 U.S. Post Office and Courthouse, P.O. Box 2987; Fri., 9 A.M.

23 Anchorage, Alaska 99501; Rm G-63, U.S. Post Office Bldg., 4th & G Streets; P.O. Box 644; Mon-Fri., by appointment only. Also conducts examinations at Fairbanks, Juneau, and Ketchikan in Apr. and Oct.

24 Washington, D.C. 20554; 1919 M Street, N.W.; Fri. 9:00 A.M. and 10:30 A.M.

Gettysburg, Penna. 17325; 334 York Street; Exams are no longer offered at this office.

SPECIAL-EVENTS CALLS

The FCC reports issuance of the following call signs under "special temporary authorizations":

WC4BCC - W. W. McLeod for Birmingham's Centennial Celebration; Birmingham, Alabama; Dec. 16, 1971, to Feb. 29, 1972

WY3MCA - Samuel A. Guccione for National YMCA Week, Severna Park, Maryland; Jan. 23-30, 1972

WMNSA - Harvey F. Morse for Nu Sigma Alpha Week, Framingham, Massachusetts; December 6-13, 1971

Amateurs and organizations should apply at least 120 days prior to the desired date of authorization for such calls as may be granted in accordance with Section 97.51 (a)(4).

QST

ARRL 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 1/4 by 9 1/2 inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

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, WN1¹ - Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.

W2, K2, WA2, WB2, WN2 - North Jersey DX Assn., P.O. Box 805, Ridgewood, NJ 07451.

W3, K3, WA3, WN3 - Jesse Bieberman, W3KT, RD 1, Box 68, Valley Hill Rd., Malvern, PA 19355.

W4, K4 - North Alabama DX Club, P.O. Box 2035, Huntsville, AL 35804.

WA4, WB4, WN4¹ - J. R. Baker, W4LR, P.O. Box 1989, Melbourne, FL 32901.

W5, K5, WA5, WB5, WN5 - Kenneth F. Isbell, W5QMJ, 306 Westervid Blvd., Enid, OK 73701.

W6, K6, WA6, WB6, WN6¹ - No. California DX Club, Box 11, Los Altos, CA 94022.

W7, K7, WA7, WN7 - Willamette Valley DX Club, Inc., P.O. Box 555, Portland, OR 97207.

W8, K8, WA8, WB8, WN8¹ - Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.

W9, K9, WA9, WB9, WN9 - Northern Illinois DX Assn., Box 519, Elmhurst, IL 60126.

W0¹ - Reggie Hoare, W0DYP, P.O. Box 115, Mitchellville, IA 50169.

WA0¹ - Lloyd Jones, W0QGI, P.O. Box 7, Attica, IA 50024. K0, WB0, WN0¹ - Dr. Philip D. Rowley, K0ZPL, Route 1, Box 452, Alamosa, CO 81101.

KP4 - Alicia Rodriguez, KP4CL, P.O. Box 1061, San Juan, PR 00902.

KZ5 - Canal Zone Amateur Radio Association, Box 407, Balboa, C.Z.

KH6, WH6 - John H. Oka, KH6DQ, P.O. Box 101, Alea, Oahu, HI 96701.

KL7, WL7 - Alaska QSL Bureau, Star Route Box 65, Wasilla, AK 99687.

VE1 - L. J. Eader, VE1EQ, P.O. Box 663, Halifax, NS.

VE2 - A. G. Daemen, VE2IL, 2960 Douglas Avenue, Montreal 301, PQ.

VE3 - R. H. Buckley, VF3OW, 20 Almont Road, Downview, ON.

VE4 - D. F. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, MB.

VE5 - A. Lloyd Jones, VE5II, 2328 Grant Road, Regina, SK.

VE6 - Karel Jettelaar, VE6AAV, Sub. Po 55, N. Edmonton, AB.

VE7 - H. R. Hough, VE7HR, 1291 McKenzie Rd., Victoria, BC.

VE8 - Yellowknife Centennial Radio Club, P.O. Box 1944, Yellowknife, NWT, Canada.

VO1 - Ernest Ash, VO1AA, P.O. Box 6, St. John's, NF.

VO2 - Goose Bay Amateur Radio Club, P.O. Box 212, Goose Bay, LB.

SWL - Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

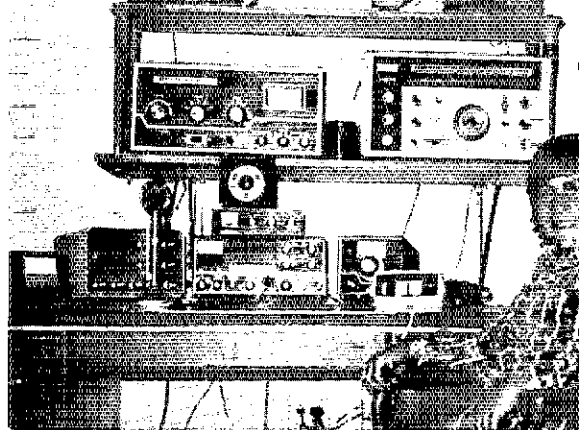
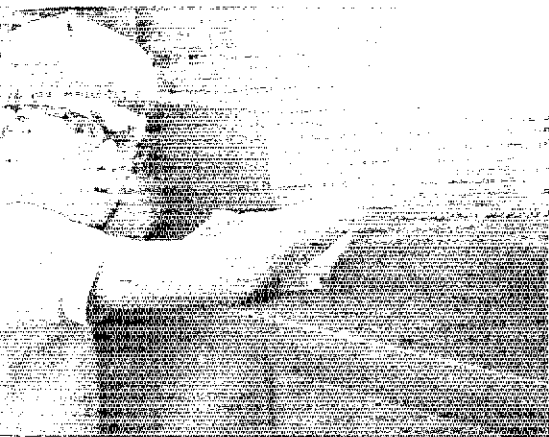
¹ These bureaus prefer 5 x 8 inch or No. 50 manila envelopes.

QSL Bureaus for other U.S. Possessions and for other countries appear in the June and December issues of QST.

Note: First Class mail in the U.S. is now 8¢ an ounce. QSL Bureau users should send their manager enough two-cent stamps to cover the envelopes on file.

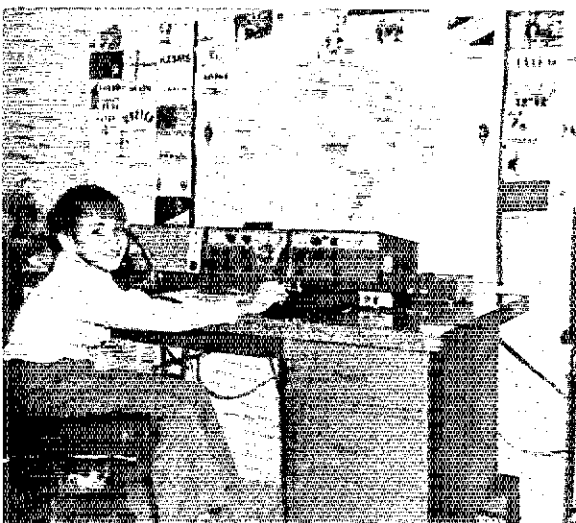
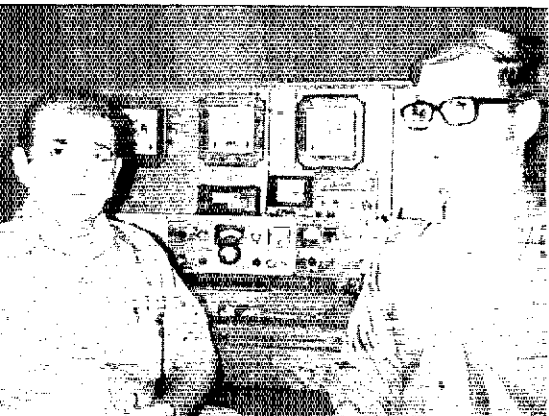
IS YOURS ON FILE WITH YOUR QSL MGR?

Strays



Rick Wagner, WA2IKG, now 12, got his first ticket at 10 years of age. Rick is in the eighth grade at Old Field Jr. High (Huntington, N.Y.) where he was founder and past president of the Old Field Amateur Radio Club. The station shown here is shared with dad, W2VRW.

Another 10-year-old at the key, Douglas Coan, WN4WKF. Doug operates mostly on 40 and 15 meters but is getting ready to plunge onto 80. He got his license with the help of a neighbor ham, K4TXJ. Doug has got his code speed up to 13 so his "N" will be missing someday soon.



Meet 10-year-old Sam Gonzalez. Newly licensed, Sam is a pretty good cw man according to OM WB2NVU. Together, dad and son constructed his transmitter from the ARRL *Handbook*.

Here's the first family 5BDXCC to date! On the left is dad W2FXA, 5BDXCC 88, with son WB2YQH, 6BDXCC 110. Oneupsmanship shows, however; that's dad's 5BWAS no. 36 on the wall.

One of the most popular programs on the air carries no music, no commercials, and only a limited number of announcements. But just about every second it transmits a "tick," which is a short dot. We mean of course WWV and WWVH, well known to U.S. amateurs for their standard frequency and time transmissions from 2.5 to 25 MHz. WWV has a male voice announcer, WWVH a female voice. This past year, WWVH moved into new facilities on the island of Kauai. Present at the opening ceremonies were (l. to r.) Charles L. Trembleth, Engineer-in-Charge; Hawaii ARRL SCM Lee Wical, KH6BZF; retiring Engineer-in-Charge Sadami Katahara, KH6DK; and Mrs. Katahara.

February 1972



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

NEW MEMBERS

Membership in IARU grew to 85 recently with the admission to membership of the *Singapore Amateur Radio Society (SARTS)* and the *Society of Thai Amateur Radio (STAR)*. *SARTS* and *STAR* will now have the opportunity for participation in IARU activities and will bear the responsibilities for representation on amateur matters to their respective governments.

ERNST KRENKEL, RAEM

With deep regret we record the passing of Ernst Krenkel, RAEM, long-time president of the *Radio Sports Federation of the USSR*.



Krenkel was a noted Soviet Polar explorer and was made a Hero of the Soviet Union for his work. He established the first shortwave radio station on Novaya Zemlya in 1927, and was chief operator aboard the *SS Cheluskín* which was smashed by polar ice in 1934. RAEM, the callsign of this ship was later assigned to Krenkel as his personal amateur call.

Ernst was active in IARU affairs, having attended many Region I conferences. He was director of the Soviet Union's research institute for the design of meteorological instruments and served as chairman of the Philatelic Society of the USSR.

ADDITIONAL 3rd PARTY AGREEMENT

An agreement providing for the exchange of third-party traffic between amateurs in the United States and Trinidad and Tobago was concluded on November 18, 1971, becoming effective on Decem-

ber 18. Third-party traffic is any communication by or on the part of anyone other than the two licensed operators in contact. Phone patches, written messages, etc. are examples of such. International amateur regulations forbid the exchange of third-party traffic except between countries having specific permissive agreements on the subject. In all cases except emergencies, the messages and other communications can be carried on only if not important enough to justify use of the regular international communications facilities.

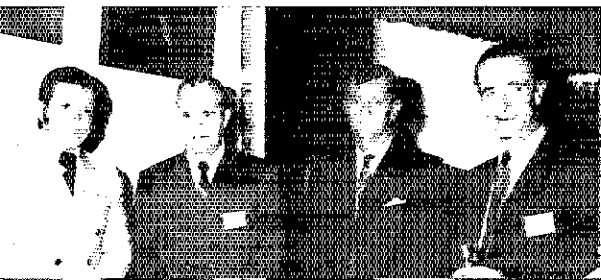
The following are lists of countries having third-party agreements with the U.S. and Canada: *U.S.**: Argentina, Barbados (only U.S. stations /8P), Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Greenland (XP calls only), Haiti, Honduras, Israel, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela. Permissible prefixes: CE CM CO CP CX EL HC HH HI HK HP HR LU OA PY TI VE VO W or K/8P XE XP YN YS YV ZP 4X and 4Z. *Canada*: Bolivia, Chile, Costa Rica, Dominican Republic, El Salvador, Honduras, Israel, Mexico, Peru, U.S., and Venezuela. Permissible prefixes are: CE CP HI HR K OA TI W XE YS YV 4X and 4Z.

NEW STUDY GROUP

An official U.S. study group to deal in part with amateur satellites has been formed and a group of amateurs nominated by *ARRL/IARU* Secretary W1RW has been selected to serve as members. "Study Group 2E, Space Operations and Amateur" was recently created as a part of the U.S. National CCIR Organization. The CCIRC International Radio Consultative Committee) is the International Telecommunication Union's mechanism for studying technical radio matters.

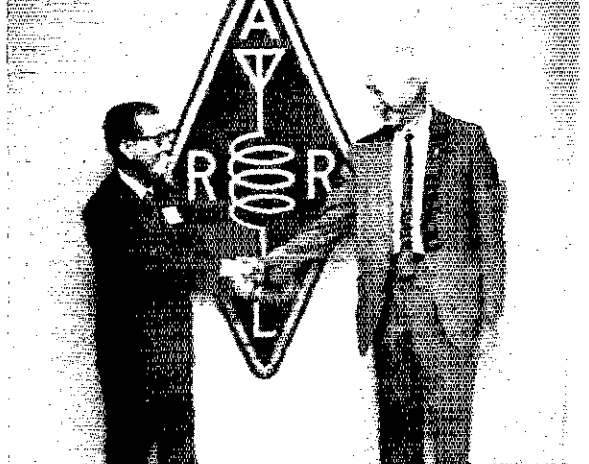
Fred. J. Friel, Jr., W3FU, is the chairman of group 2E. Members representing *ARRL/IARU* are K3JTE, W3MR, W4ZC, W4TRJ, W3JPT, and WA2-1NB. The Study Group will examine such subjects as frequency sharing between amateur satellites

* By special agreements, third-party traffic is also permissible with Australian amateurs for traffic regarding amateur satellites, and with 4U1TU.



At the National Assembly of Colombian Radio Amateurs are (from left) Juan B. Fernandez, Minister of Communications; HK7UL; Carlos Vargas of Civil Defense; HK3BMX, medical chief of the emergency net of the *Liga Colombiana de Radioaficionados*.

Coming a *long* way to meet each other at ARRL/IARU headquarters are BV2A (left) and VK2GW.



and other radio services, and technical characteristics and benefits of amateur satellites.

During 1971, the amateur service for the first time became a subject of study by the CCIR. At a Special Joint Meeting in Geneva, a paper "Use of Space Techniques by the Amateur Service" was approved. This was the culmination of an Amsat study made in preparation for the World Administrative Radio Conference on Space Telecommunication which was held in June-July, 1971. The reports dealt with the use of space techniques by amateurs in bands shared with other services.

WAC SSTV

A Worked All Continents award for contacts made via slow-scan television is now available. All confirmations submitted for this specially endorsed certificate must clearly indicate that communication was on SSTV, both ways. Applications from U.S. and Canadian amateurs go to ARRL Hq.; an application form is available on request. Amateurs from other countries should apply to their respective IARU-member societies. Endorsements are already available for RTTY, 160 Meters, 80 Meters, and 50 MHz. QST



H. Walcott Benjamin, EL2BA, is the newly elected president of the *Liberian Radio Amateurs Association*, IARU society in Liberia. Under his leadership the Association intends to continue its vigorous program of encouraging the growth of amateur radio.

Strays

Colonel G. P. Bartholomew (I.) commander of the 27th Combat Support Group at Cannon AFB, New Mexico, congratulates members of the amateur radio operators class from Clovis New Mexico High School who received their FCC "tickets" through the MARS Youth Program at the high school. The boys were guests of the Cannon AFB MARS station personnel at a recognition dinner.



▲ The Sylvan High School ARC operated this ham station during a local community Halloween Carnival in Atlanta, Georgia. Shown is Charles Chapman, WB4UIH.





Correspondence From Members -

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

RIGHT ON!

● I want to congratulate you and the author, WASEQQ, on the fine story, "Amateur Radio - Serving and Being Served," in November *QST*. It really showed what the spirit of ham radio is all about. I'm not a ham, but as a person interested in public service and as a semi-regular reader of *QST*, I say "bravo!" -- and let's see more of this sort of material. — *Kim Nagle, Temple, TX*

MANNERS OR MUSCLE?

● Without wishing to seem vain, I would like to say that I agree with WA3PMS (Correspondence, December *QST*) when he says that Novices are the best operators.

I feel, though, that this fact can be directly traced to the power level involved. Because Novice power is restricted to 75 watts, one must learn to rely on operating skill and habits, rather than raw power, to net those QSOs, both Stateside and DX.

It seems to me that FCC is headed in the wrong direction. In many countries, maximum permitted power is far below the "full gallon" most U.S. hams use. The operators in those places seem to follow the procedures outlined in ARRL publications regarding courtesy and use of power. In short, they make many U.S. ops look like a bunch of lids!

Seriously, rather than petitioning for still higher power, I think a power reduction may be in order. Bringing the maximum down to, say, 500 watts would start many hams on the way to improving their on-the-air practices, not to mention bringing about some relief from the "kilowatt QRM" situation as it now stands.

I realize there are a lot of flaws in this idea, but with a little work and some serious thought, a reduction in the legal power limit may prove to be a practical solution to many of Mr. Roth's complaints and those of many other hams.

Granted, a lower power level may prove to be tough for some ops to get used to, but wouldn't it make the bands a more enjoyable place to work for all involved? I should think so. — *Sol B. Marcus, WN9HHC, Park Forest, IL*

● Hooray for S. C. Roth, WA3PMS. A little common sense goes a heck of a long way. — *Rick V. Phillips, W2PCZ, Lincoln Park, NJ*

● WA3PMS apparently has failed to notice that in order not to be out-splattered by non-U.S. phone patches inside the U.S. phone bands, we quite frequently *have* to resort to high power in self-defense.

The same thing happens in the 7000-7100 kHz cw segment where a full gallon is necessary to overcome non-U.S. amateur a-m carriers and very poor ssb signals that show up on the frequency regardless of any QSOs in progress.

In addition, having only a short time ago felt that 250 watts should be all the power ever needed

for solid QSOs, I quickly realized that we would then have even more non-amateur intruders on the bands than we have now.

And hasn't WA3PMS heard the gallon and multi-gallon stations from the southern hemisphere?

Thus there are many more sides to this problem!

Also, why does he think that only non-U.S. hams are against phone band expansion?

Far too many of our stateside ssb signals are lousy and occupy several times more spectrum than they should. These signals must be cleaned up first, to make room for more QSOs, instead of giving them more frequencies to pollute.

A properly operated kilowatt causes less QRM than many operators generate with their overstrained 180 watts! — *Ulo Films, K4OV, Warner Robins, GA*

STILL BUBBLING!

● You have done it! Talk about nostalgia — your reference to the 1921 Transatlantic Tests really woke up this old, old timer. That was *the*, or one of the, great crossroads of my life. When it happened 50 years ago it fused for me several ideas culminating in:

1. throwing out the old spark rig and replacing with that quiet and innocent looking "bottle."
2. getting a government license to ham.
3. deciding my life work would be in electronics (then called radio).

With the above decided, I threw myself into getting ready for the second Transatlantic Tests (1922). It was the most rewarding of any effort in all my years of radio. You see I'm still bubbling over it. If my memory serves me rightly, about 75 of us got across the pond in 1922. This, coupled with 1921, made about 100 of us that got over there on 200 meters — more or less. Now, what I'd like to ask *QST* is if there is some way to find out how many of those 100 of us are still around and maybe active. I am, and hope there are many others. — *P. F. Hadlock, K2IK, ex-2CKR, Miami, FL*

● Having taken issue with the League on many matters in the past, it is a genuine pleasure to extend kudos on the material concerning Paul Gouley in the December *QST*. The memories induced by Paul's article, and by Royal Mumford's, are priceless. I hope that you receive much approbation from others who can recall the days when we were probing and learning about hf communication.

It was my good fortune to live in Montclair when Paul was with Adams-Morgan. Matter of fact, I had a sort of after school job of sweeping out the shop — when I showed up. I found the refuse heap to be a great source of material from which to create vintage electronic equipment. Of course, the

target was to achieve a "Paragon RA-10" receiver, which I am sure that Paul will remember.

One of the fringe benefits was the fact that the Adams-Morgan shop abutted upon something called "Commonwealth Field," where one of the better local baseball teams performed fairly regularly. This gave a few of us baseball buffs a very fine opportunity to find work on the antennas on the roof when a game was in progress.

Amateur radio does indeed have a history that is not without glamour. The names of such as Godley, Armstrong, De Forest, Vermilya, and others, are really part of our history — just as are HPM, Hebert, and Mix.

As one who suffered with chemical rectifiers, Amrad "S" tubes, and quenched gaps, I thank you for printing the Godley story. I suspect that I speak for many others. — *Al Smith, WIGAA/K3ZMS, Temple, NH*

"EYEBANK" DOCKET

● The ARRL presentation to FCC on page 79 of November *QST* (ARRL Comments on "Eyebank" Docket) is outstanding and worth my dues for many years. I hope it does the job. — *Theodore E. Sharp, K6UYK, North Hollywood, CA*

PROTEST

● I wish to express deep regret, and at the same time my vehement protest against the elimination of Morse Code from WWV transmissions. As a user of WWV services for many years, in both commercial and amateur capacities, I see the elimination of Morse to be not in the public interest, perhaps even as a disservice to the world.

At times when propagation conditions have been marginal, and WWV/WWVH reception poor, the voice announcements would be unintelligible — but the modulated cw time announcements would be readable! Also worthy of mention are the international implications; how many non-English-speaking people around the world have in the past used NBS time broadcast services, using only their Morse-copying abilities? In addition, from an esthetic viewpoint, the WWV cw transmissions have always been considered in most circles to be actually beautiful — the epitome of good sending, of a good "fist."

I sincerely hope that NBS will reconsider the changes put into effect last July; indeed, I eagerly anticipate the reinstatement of Morse transmissions. — *O. R. Heinz III, K7KHA, Reno, NV*

TEMPTED

● Bob Myers' "S9er" (A CW Man's Kilowatt, Part II, December *QST*) looked really tempting until I saw the advertisement on the back cover of the issue . . . — *Ken Voelker, WB6KBI/?, ex-WA2BCT, Portland, OR*

UNDERSIZED QSLs

● I have just had a batch of QSL cards returned by the Post Office because they do not meet size requirements for foreign mailing. I had always thought that mine were standard QSL size; however, the postmaster showed me the Directory of International Mail, paragraph 222.2, effective 1 July 1971, which states minimum postcard size is 3 1/2" X 5 1/2". Mine were 3 1/4" X 5". I thought this might be of interest to those who are about to purchase QSL cards and especially to those who print them. — *Albert R. Olsen, K6PO, San Diego, CA*

A YEAR IN ENGLAND?

● I teach electrical/electronic/radio & TV/mathematics subjects at various levels at the County Technical College, King's Lynn, Norfolk, and I am seeking a one-year teacher exchange with an American teacher (and family) desirous of working and living in England (but retaining U.S. salary) for a year from August 1972. If any of your teacher readers (perhaps, but not necessarily a ham) would be interested in an inexpensive "holiday" in England I invite them to write to me or contact my "exchange manager," WB2FBF, who would answer any local query. Official details and application forms in the U.S. are obtainable from the Office of Education, Washington, DC 20202. — *David Lake, G3ZCA, County Technical College, Tennyson Avenue, King's Lynn, Norfolk, England*

NNGT OM?

● Can someone please tell me what the Morse signal NNGT means?

Some hams must understand it because I hear one occasionally answering and engaging in what sounds like a QSO. I can usually understand the man who answers, but I can never read the man who originally sent NNGT.

Can someone help? — *Frank Gue, VE3DPC, Burlington, Ont., Canada*

[EDITOR'S NOTE: And what is the word "Teee" which usually follows NNGT?]

ASSIGNED FREQUENCIES

● VHF repeaters bring about a situation which is rather uncommon in amateur radio: i.e., round the clock occupancy of a frequency by the repeater, precluding the use of that frequency for other communications within the range of the repeater. As long as much spectrum space is available outside the repeater frequencies, possible disadvantages through the existence of such "assigned" frequencies seem outweighed by the public service rendered by the repeater.

My reaction is different to the existence within the ham bands of "closed assigned" frequencies — those occupied by repeaters with coded access for members only. The occupancy of those frequencies is more permanent and less generally useful than similar frequency use for satellites or vhf beacons. How far should repeater groups go in removing frequencies from general use? — *Max Blumer, WA1MKP, Woods Hole, MA*

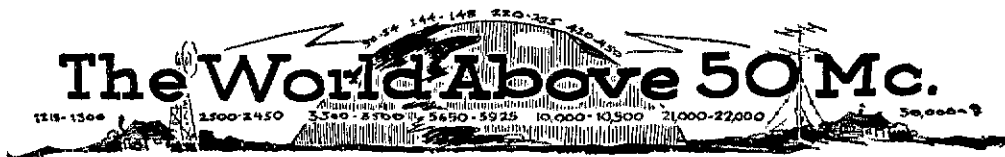
RISING COSTS

● Recently I ordered 3 pads of ARRL message forms from you at a cost of 35 cents per pad for a total of \$1.05. Imagine my surprise when I noticed the cost of postage \$1.20!

It is not surprising that ARRL is being caught in the cost-price squeeze and is considering having to increase the cost of its services and raise the price of memberships. No organization can remain above water very long if they are going to have to subsidize the services they provide. — *William W. Flynn, VE5WF, Regina, Sask., Canada*

[EDITOR'S NOTE: We set prices of such things as message blanks at a bare minimum to cover costs and handling. On pads to east coast U.S. points we make a nickel or two; we lose several times that on those going to the west coast.]

● I know you are trying to save money because of increased costs — postage and the like. Why not do as *RTTY Journal* and others are — combining the July and August issues? — *Bill Karraker, W9AVE, Hinsdale, IL*



CONDUCTED BY BILL SMITH,* KØCER

*Using TV Station Video Carriers
As Propagation Indicators*

BEACON TRANSMITTERS have long been popular as propagation condition indicators, particularly in the United Kingdom where there is an extensive network of amateur beacons. In the United States and Canada there is a similar but little-used network available, in the hundreds of television broadcast stations. Many vhf operators have used TV sets as tropo, E, aurora, and meteor monitors for years, but amateur signals are frequently propagated under very different conditions from those inherent in reception of visible TV pictures. Identifiable TV pictures may, therefore, provide only indications of good conditions already in progress. There is a better method of utilizing the TV channels: monitoring their video carrier frequencies and thereby noting favorable conditions before they may be usable at amateur power levels and antenna heights.

Each vhf and uhf TV channel has a video carrier frequency located 1.25 MHz above the bottom end of the allocated channel. The channel 2 (54-60 MHz) video carrier frequency is 55.25 MHz and so on, see Table I. An offset of -10 kHz, 0 kHz, or +10 kHz is assigned each video carrier frequency, depending on the station's geographic location. A list of channel allocations and offsets can be found in the *TV Factbook* or *Broadcasting Yearbook*, either of which may likely be in your local library, or an old issue obtained from a local broadcast station.

What channel you select to monitor will depend upon your location. Obviously you won't select a local channel and it is preferable to select other than an adjacent channel, although additional selectivity will eliminate adjacent-channel interference in metropolitan areas.

The monitor consists of an especially built or modified converter fed into the station receiver. A six-meter converter with a new crystal and pruned coils will work for channels 2 through 6, a two-meter or 220-MHz converter for channels 7 through 13, but the uhf channels will likely require building a converter. (Ordinary uhf TV converters may not be stable enough for narrow-band reception.) Several sources of antennas are available. Commercial single-channel TV antennas may be purchased at reasonable cost. A six-meter Yagi can be reworked for any channel, 2 through 6. An inexpensive wood-boom Yagi can be built for the higher channels, using the design information in the *ARRL Handbook* or *Vhf Manual*. If a regular 300-ohm TV antenna is used, it should be equip-

ped with a suitable balun and fed with coax, to minimize feedline losses common with improperly installed 300-ohm lines.

Apparently only a handful of vhf operators use this propagation monitoring method. Dick Allen, W5SXD, who supplied most of this information, monitored Channel 6 from his former northern-Virginia location. Richmond's Channel 6 83.260 MHz video carrier (+10 kHz offset) was typically 80 dB over the noise, on a commercial single-channel Yagi. Philadelphia, about 150 miles, on 83.240 MHz (-10 kHz offset) was 50 to 60 dB, and several other stations within 300 miles were heard under normal tropo conditions. By noting night-to-night signal levels, developing tropo conditions were easily determined.

Dick says the most spectacular phenomenon on the video carriers is the many meteor pings and bursts. Listening on 83.250 MHz (0 kHz offset) with the antenna west to null a central Pennsylvania TV tropo signal, the early evening no-shower meteor ping count is normally 10 to 12 per minute. Signal levels average 15 dB, but because there are so many stations on each offset allocation (about 20 on 83.250 MHz alone) and their allowed frequency tolerance is 1 kHz, when the meteor counts rise to one ping per second in the morning, the resultant pings sound like Oriental chimes! (Random meteor counts peak at 0600 and are at minimum at 1800, local time.) During a meteor shower pings and bursts are nearly continuous, with levels to 60 dB.

Signals from several stations can be sometimes heard on what is likely the same meteor. A slight time difference between the signals is apparent as the meteor travels through the ionosphere, varying

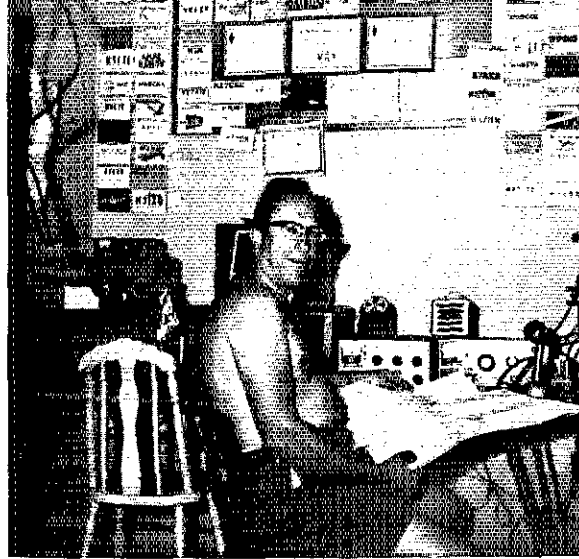
Table I - TV Channel Frequency Allocation

Channel	2	54 - 60 MHz
	3	60 - 66
	4	66 - 72
	5	76 - 82
	6	82 - 88
	7	174 - 180
	8	180 - 186
	9	186 - 192
	10	192 - 198
	11	198 - 204
	12	204 - 210
	13	210 - 216

Each of the 70 uhf TV channels is 6 MHz wide, progressing consecutively from Channel 14, 470-476 MHz, through Channel 83, 884-890 MHz. The 0-kHz offset video carrier frequency for each channel is 1.25 MHz above the bottom end of the channel, minus 10 kHz offset is 1.24 MHz above the channel edge, and plus 10 kHz offset is 1.26 MHz above.

*Send reports and correspondence to Bill Smith, KØCER, ARRL, 225 Main St., Newington, CT 06111.

K7ZOK, Las Vegas, needs only New Hampshire to complete his second 50-MHz WAS. His first was certificate number 49 as W0FKY, Grand Junction, Colorado. (W7PBV photo)



the reflecting point from the ionized trail. Simultaneous monitoring of a Channel 6 video carrier frequency and running a 144-MHz meteor scatter schedule was interesting. Dick says some pings were heard only on 144 MHz, some only on the video carrier frequency and some simultaneously from apparently the same meteor.

Dick detected aurora on Channel 6 an estimated 20 to 30 dB before aurora on 2 meters. This probably was due in part to frequency and power-level differences. (The same may be true for differences in meteor detection.) The effects of sporadic *E* are especially evident on video carriers.

Using such a system provides the vhf/uhf DX enthusiast an economical and efficient means of propagation monitoring, utilizing a readily available source of signals throughout the country. Our thanks to Dick Allen, W5SXD (ex K4FKD), for suggesting it to us.

220-MHz Band Planning

In December *QST* we commented on the need of a "gentlemen's agreement" for best utilization of the 420-MHz band. Similar problems exist in the 220-MHz band, particularly in areas where fm operators are looking to 220 for relief from crowding in the 144- and 420-MHz bands.

There are several proposals on paper which would divide the entire 220-MHz band into fm channels, with various channel spacings. Before any proposal gains wide acceptance in fm circles, it appears that we should explore a 220 band plan that takes other uses into account.

Narrow-band modes such as a-m, nfm, cw, and ssh obviously do not need the spectrum space required by channeled fm. Most narrow-band activity is presently near 220 and 222 MHz, and for good reason. In Channel 7 television localities, radiation from TV receivers, while illegal by FCC regulation, does exist, and it is a problem on the low end of 220. In other areas having Channel 13 television, the proximity of the 210-216 MHz TV signals to 220 MHz likewise causes an interference problem. 220-MHz band operators in these locations mostly use a narrow segment of the band beginning at 222 MHz. Elsewhere narrow-band operation is near 220.

As a beginning place for consideration, we would suggest that a "gentlemen's agreement" be reached whereby the segments 220.0 to 220.5 and 222.0 to 222.5 be set aside for narrow-band use and the remainder of the band, totalling 4 MHz, be channeled for fm use.

As in the case of the 420-MHz band, there is no need for a running disagreement to develop over who uses which frequencies, and it is desirable we settle the problem quickly and quietly between ourselves. ARRL remains the logical vehicle for

agreement and Headquarters is asking for your suggestions on a 220-MHz band plan. Send your comments to ARRL 220 Band Plan, 225 Main Street, Newington, CT 06111.

WA9HUV 12-Foot Dish Addendum

In the June, 1971, edition of this column, page 100, Norm Foot, WA9HUV, described a 12-foot dish for use on 432 and higher. That article has enjoyed a high degree of popularity. Since then Norm has done additional experimenting with the reflector covering. He has covered the dish surface with Sears *Gutter-Guard* which is intended to cover house gutters preventing leaf clogging. The expanded aluminum product is marketed in strips 6 inches wide and 25 feet long, making it ideal for dish covering.

Such a covering is desirable to prevent reflector surface losses. While WA9HUV says the surface as described in the original article is more than adequate at 432, he did achieve noticeable improvement on 1296 with the new covering. In tests with W9JIV, Norm estimates a 2-dB improvement. He says also he suspects the original design would work poorly at 2300 MHz. Norm is running additional tests and may have a further report.

Full constructional details of the original WA9HUV 12-foot dish are still available for \$1.00 from ARRL Headquarters, Newington, CT 06111.

K4PKV - WA4JVE Preamplifier

An article in April, 1971, *QST*, page 92, by Dick Hattaway, K4PKV, and Don Belcher, WA4JVE, describing a 2 meter and higher preamp brought considerable comment. And for the authors many queries on where the MS-175 bipolar device could be purchased. K4PKV says the MS-175 is available for \$20 from Bob Phillips, Kieruff Electronics, 3969 East Bay Shore Drive, Palo Alto, CA 94303. Manufacturer specifications say the MS-175 noise figure is less than 2 dB, typical, at 500 MHz, and less than 3.5 dB at 1 GHz.

OVS and Operating News

50-MHz DXers were treated to the usual winter *E* in December and January. There were several good openings, like December 14, but at this writing it was too early to determine how this season compared with those past. W1U, N.H., worked Florida December 10. WB4BND, Miami,

worked E December 3 and 4. The third was "the usual type opening to 5s, 8s, 9s, and 0s," says Hoppy. On the fourth he worked Los Angeles. WB4JHQ reports no openings, but says he, WB4PKW, and K4BKV are experimenting with facsimile.

WB6NMT worked 5s during a lengthy December 5 opening. WA6HXM says that opening lasted 1 1/2 hours as he worked Florida on multi-hop plus 5s, 7s, and 0s. Pete says also that WB6WAX was recently in Jamaica and has sent parts there to encourage 6Y5 50-MHz activity. K7ICW, Las Vegas, reports not much doing, but worked 5s in November. K8UNV, Ohio, had December 14 E contacts with VE1KO at Saint John, N.B., and W5QZR, Clovis, N.M. W4s and 0s were also worked.

WB9EDP, Chicago, continues to work WA1NGR and K8MMM on scatter. Harry wants scatter schedules with New England and Canada. W0PFP, Iowa, traveled to Puerto Rico in November where he visited Sam and Helen Harris. Jim wants information on the Collins 40K1 oscillator. WA0QPA, Minneapolis, reported a November 10 aurora, E on the 29th to the east coast and December 5 to W5. John also says the Dec. 14 opening was excellent to W5.

W6FJM, who signs FO8BW in Tahiti, says Rene Delamare, FO8DR, is active at Papeete with a Swan 250 and 3-element twirler around 50.1 between 2200 and 2300 GMT daily. Monty, VE3EYV, is again wintering on Montserrat in the Caribbean signing VP2MJ until April.

144-MHz meteor DXers found the usually reliable December Geminids not up to par in 1971. W0LER, Minneapolis, says the shower was the poorest in ten years. John, using a Channel 2 monitor, found the SW-NE path peak on December 13 between 1300-1500 GMT. The next day the E-W path peaked at 0130-0400 and N-S at 0400-0700 GMT. The following contacts were reported by deadline. W0LER worked W5SSXD, Houston. W0RLI, Minneapolis, worked K2HLA, N.J., and W5SSXD. W9JDP, Wisc., worked WA2UDT, N.Y., and WASHNK, Texas. K0WLU, S.D., trying his first meteor scatter, worked W5SSXD and heard bursts from WA2UDT. Bill was running only 40 watts output to stacked 11-element Yagis which reconfirms what we've said before: low power will work meteor scatter!

Going back to the November Leonids, it too wasn't too productive, although there were several long bursts reported. W1AA1, Mass., was disappointed in schedules with WA4PZP and W5HFV. WA2UDT heard bursts from W5HFV, W91VI,

W9JDJ, and W0MJS, but had no contacts. K5BXG, Tulsa, is nearing a box listing after working K0AWU, N.D., on a Leonid burst. W5WAX, Muskogee, gave WA7BBM, Tucson, his first m.s. contact. The QSO was made on a 40-second burst and was W5WAX's 36th state. W5RCL, Miss., worked VE2DFO. K7ICW says "nil" from Nevada, but K7BBO, Tacoma says, "Leonids good. I worked W6UOV four times on bursts over one minute long and K0AWU." Dave heard pings off KL7GLL, Sitka. Probably the longest 1971 Leonid burst, and the Leonids is noted for sustained bursts, was noted by W0MJS. The nearly 3-minute burst began about 1613 GMT, Nov. 17. Ron and W9JDP worked W5SSXD while it lasted.

We have the following tropo reports to conclude the fall season which produced some excellent long-haul contacts, including a new 432 record. By call area, K4NTD, Florida, worked W5WAX and K5BXG, Okla., Nov. 14. Jack says several other Florida stations worked 1000-mile paths into Texas. Jack also worked W4VHH, S.C., and W5LDV, Texas, on 432, but an attempt with W5LDV on 1296 produced nothing. That across-the-Gulf path could likely produce a 1296 long-haul tropo contact given two stations at the proper locations and time. K5BXG, W5WAX, and W5HFV, all Okla., reported the same tropo. W5HFV says the opening began Nov. 11 and lasted until the 17th. He worked or heard all states between Oklahoma and Florida. This major tropo developed as a high pressure area drifted around Alabama and eastern Tennessee, leading to an emergency smog alert in Birmingham. W5SSXD, Houston, worked, among others, W4VHH on 144 and K4NTD on 432.

K7BBO, Tacoma, says there was tropo in the Northwest Nov. 19. Seldom do we get tropo reports from this area of the country. Is it that rare, or a lack of activity? Whatever the case, Dave says the opening extended from Spokane to Eugene east to Idaho and Utah. One report has it that a Eugene station worked Canton, Ohio(?). Along these lines, "we was had" by a report in the November column of a tropo opening between 2s and Mississippi. Turns out that the Mississippi call was faked by some disillusioned soul. Thankfully there is little of this activity on the vhf bands — and pins through the coax of those who get their kicks this way!

K6MYC says all is well on the moonbounce scene. During November Mike had EME contacts with K0MQS, SM7BAE, and VE7BQH. In fact, K6MYC, SM7BAE, and VE7BQH work one another regularly via the moon! Schedules with VE2DFO, F8DO, and VK3ATN were unsuccessful. Mike says W6UOV expects to be active soon with a 160-element collinear array and that ZL1AZR has his wife's permission to build whatever array he wants for EME. Will New Zealand sink? K6MYC has not heard recently from HL9WI, JA6OR, PY2CSS, or ZS5RE who had all previously indicated EME interest. At Minneapolis, W0LER will likely be EME operational by now. His Yagi array was scheduled for completion some January day when the temperature stood at -20. Midwest

K2YCO, Rochester, N.Y., has built many antennas for 1296 including this 32-element extended expanded collinear. Chuck shares the 350-mile home-station 1296-MHz DX record with several other operators.

William Smith, K4RJ (ex W3GKP), is hearing 2304-MHz moonbounce echoes at his new Franklin, N.C. location. Bill is ready for schedules; write to him at Route 7, Box 315.

antennas work best with hide frozen to them. He and KØMQS have a not-too-private battle going for the first 144-MHz WAS.

K9KQR has a hint for cleaning dirty parts. Dick soaked a number of variable capacitors in an *Axion* solution for several minutes. After rinsing and drying, some lubricant was applied, and Dick says the capacitors were like new.

220-MHz reporting was disappointing this past month. W6RME, Los Gatos, has two transmitters on the air, 15 watts at home and 18 watts at the television transmitter site where he works. Jim works into Fresno consistently from both locations, over the 3600-foot Santa Cruz mountains and a 140-mile path. WB6NMT continues his 400-mile schedules with K7HSJ, Oregon, and is making progress on an EME array. Louis has sent us details of his weak-signal preamp which will be published soon.

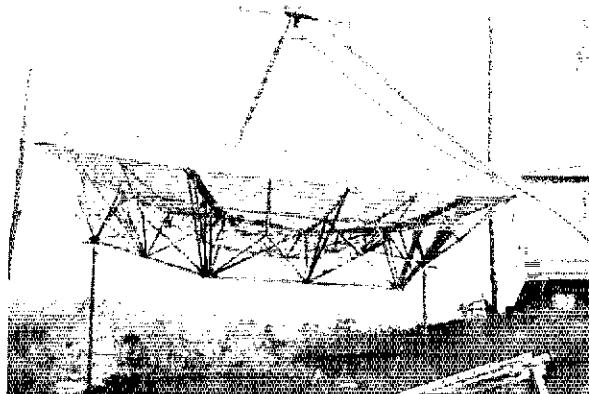
K7BBO, Tacoma, is building a 4CX250R cavity amplifier and recently added a 40-element collinear for 222 to go with a similar array on 220. Dave says WA7EHE is new on 222 at Edmonds, Wash., and that several others are building equipment. Dave reports working W7TYR and K7GZB, both Oregon.

420-MHz workers this time of year are quiet, building gear for the next tropo season. Last month we presented details of the WØEYE Yagi and that antenna is apparently working well for those having the information prior to publication. W4FJ, Richmond, is one who has an array of four using the Tilton method of open-wire phasing. Ted says the array works well. W4FJ, by the way, has completed nearly 300 contacts with WA2EMB in a series of schedules dating back some four years.

WA6EXV seeks schedules to add to existing ones with W6FZJ, WA6HXW, W6DQJ, and K7ICW. During a Nov. 16 schedule with W6FZJ, Chuck heard bursts and pings. Apparently they were Leonid meteors, the first heard on 432 at WA6EXV. W7JRG, Billings, Montana, has been working with WØDRL, Topeka, looking for that first 432 m.s. contact. Apparently they have a good path because results to date have been encouraging. Short bursts were logged during the Leonids and Geminids. K7ICW, who is busy on at least three bands, runs successful weekend schedules with WA6EXV, WA6HXW, and W6DQJ over a difficult path. Al and a number of W6s are experimenting with horizontal versus vertical polarization. Seems that question has been around 40 years with no one yet determining that one is definitely better than the other.

KØCER, S.D., is on 432 with a Tilton array and is scheduling WØDRL over a 315-mile path. Even under the worst of tropo conditions, Al's signal is heard in Sioux Falls. VE4MA, Winnipeg, schedules WØIT, Watertown, S.D., KØAWU, N.D., and WØPHD, Minn.

A beautiful example of home construction is this 1296-MHz amplifier built by K2YCO. The amplifier produces 100 watts output from a pair of 7289s.




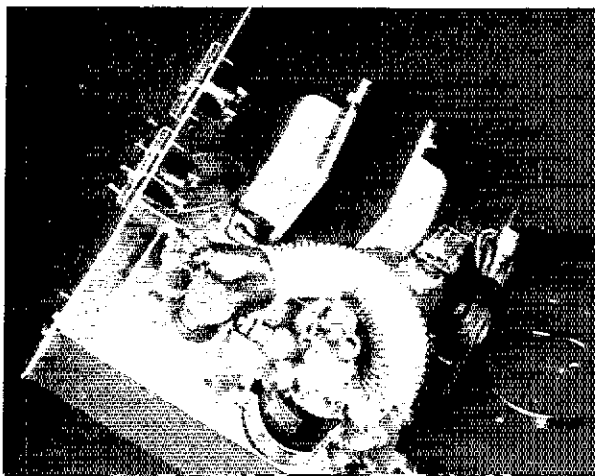
1215 MHz and Up interest lately frankly surprises me. In the past several months more such activity has been reported to this editor, and the published results have brought much favorable comment. Previously there had been little interest indicated. Dolph Vilardi, WA2VTR, and his corps of 1296 workers promise more information, including constructional, which we'll publish upon receipt.

Lew Collins, K4GGI/1, says the microwave frequencies are the frontiers of ham radio today and that hams can make some real contributions in the areas of propagation and techniques in the centimeter bands. Lew would like to have the bands, 420 and above, referred to by wavelength such as 70 cm (420), 23 cm (1296), and so forth. This practice is used by our European counterparts.

K8MWA/6, a recent new member of the San Bernardino Microwave Society, is working at several 1296-and-up projects. Included is a 2300-MHz kilowatt amplifier which he and K6HU are building. Ed promises further information when the amplifier is completed. W8YIO telephoned one evening to add his "hooray" for more 1296-and-up material in this column. Lew wants a 1296 WAS box — which we announced last month. He gets 50 watts from a 2C39 amplifier which feeds a 7-foot dish. Lew has worked K2YCO at 350 miles and can work WA9HUV at 230 miles any evening.

WA9HUV is building preamps for 1296 and 2300 using the Fairchild MT-2500. Norm will detail these at a later date.

And finally, be sure to mail your 1296 WAS score. See last month's column for details. 



YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

"First Ladies," 1910-1970

SEVERAL YEARS AGO there was a question as to who was amateur radio's first YL. The only way to be certain was to research into records before government licensing. We find that the YL picture begins in 1909, when Miss Lillian Todd became adviser and honorary president of the Junior Wireless Club, now the Radio Club of America. Whether Miss Todd actually operated is not known, but she is the first recorded evidence of YL interest. The following year, according to the Gernsback *Blue Book* of 1910, we find a Miss Glass, "FN," in San Jose, California, and Olive Heartberg, "OHK," in New York. By the time government licensing was required, six women were on the air in this country, and the number steadily increased, broken only by World War I.

The first year for DX YL operation is 1913, when the call IXI was issued to a Mrs. Ingram, in England, for a transmitting license. She remains the only YL on the DX lists until 1922, when Australia's first lady received the call VK2FV, to add a third continent. Two years later a YL in Canada received the call 3QI in 1924. In 1925, Mrs. Madeline Kreuger of Sweden was licensed as SMTA. Brazil opened South America in 1926 to the future WAC-YL dream when BZ7AB was assigned to Odette Chavez, and from then on the women began to appear in country after country.

*YL Editor, QST. Please send all news notes to WB6BBO's home address: 1036 East Boston St., Altadena, CA 91001.



In 1927, the ITU officially assigned groups of letters to each country to be used for amateur radio identification, and the prefixes changed from the IARU "intermediates" to the forms with which we are more familiar. And 1927 was the year when the gals, like "June" in the popular song, began "bustin' out all over," with OA4CM in Peru, CA6EV in Cuba, and two gals in Italy (not Ireland): E11HD and E11RD. There was OP1CJ in the Territory of the Philippines, and in 1927, England's second YL, Barbara Dunn, was licensed. Far better known than Mrs. Ingram, G6YL is popularly called "England's First Lady of Amateur Radio."

France opened the door to women operators in 1928, when Mme. Schotte was assigned F8YL. In that year, Portugal's CT1BE and CT1BP shared first lady honors, while three women, SP3HB, SP3KYL, and SP3YL, were licensed in Poland. Switzerland's Madeline Moret, HB9F, is the only DX YL who was licensed in 1928, who is still listed in the *Call Book Magazine* with her original call.

In 1929, K7AIU, Elizabeth Forest, and K7ANQ, Lily Osterback, were the first YL operators in the Territory of Alaska. And the change to the 1927 ITU prefixes made VE3AYL Canada's first woman to receive a VE in her call.

In 1933, OK2YL and LU7BAD added Czechoslovakia and Argentina to the DX YL map. In 1934, there was J2IX in Japan (she is now active with the call JH1WKS). The year 1934 increased operation by YLs in the Pacific and Asia, when China granted AC3HNB to Mrs. C. Honans, and AC3DS to Mrs. Dorothy Steen; in the Territory of Hawaii, Ethel Ihori received the call K6IUT. In Europe there was EA6AL in Spain and LA4YL in Norway. Mexico added X2AZ. The next year, 1935, brought Equador's first YL, HC1AY.

When Iris Hayes received ZS2AA in 1937, there were YLs on all continents, although it would be some years before the certificate was awarded. In 1939, the first ladies of their countries were: CE1AM, Chile; OZ4YL, Denmark; K4EZR (KP4EZR, now) Puerto Rico; YR5DX, YR5OW, and YR5YL, Romania; and HH2EA, in Haiti.

After World War II, many more appear: Panama, KZ5PC; Korea, HM1AM; Turkey, TA1RT. And 1970 opened the last continent when Evelyn Scott, W6NZP, operated from Antarctica at KC4USP.

Japan's first YL, originally licensed J2IX, then J1DN, Suzi now holds the call JH1WKS. KGCL submitted this recent photo of Suzi that she sent him to mark a period of 32 years between her first and her most recent contact with him.



EABGZ, Christine Gonzales, whose photograph was incorrectly identified in the October "YL News and Views."

The picture remains incomplete. "YL News and Views" is very grateful to the many IARU representatives who have assisted in the search, and to ARRL Hq. for the use of the library. Perhaps some day we can have a fully documented list of all the YLs who were the first to enjoy amateur radio in their countries.

ARNS Awards to *YL Harmonics*

The 1970 *YL Harmonics*, edited by the GAYLARCS, was again honored by the Amateur Radio News Service with one first-place, two second-, and two third-place awards, among 20 other amateur radio publications entered in the Class A-1 category. *YL Harmonics* received a first in Club Activity Coverage, second in Photographic Process, second in Cover, third in General Format, and third in Member Contributions. This magazine, the official publication of YLRL, was the only YL publication by a YL editor in the Class A-1 group.

Congratulations to Harriet, K5BJU, and the hard-working GAYLARC members for the accomplishment during the year 1970. This was the first time that an entire club acted as editor of this publication.

Parlez-vous Francais?

If you do, and if you are a VE and a YL, you are most cordially invited to participate in either or both Thursday evening nets that are becoming very popular among the Canadian YLs — "Le Reseau des Couche-Tards" on 3.780 MHz at 0300 GMT, and the earlier "YL Discussion" directed net at 0200 GMT on 3.780 MHz.

The "Couche-Tards" is a net for gals who are night owls and like a short chat with friends on the air before they turn out the light. The subjects discussed are all of a light nature, and everyone is welcome.

The second net is different in that a mastery of French is necessary to participate in some of the very serious discussions. Also, the net requirements are rigid; not only is a good command of French necessary, but only YL and XYL operators are permitted to join. OMs are politely, but firmly, excused by the net director.

Le Reseau des Couche-Tards offers a certificate to the membership. Requirements are that the YL

must remain on the net for three transmissions and must participate in 20 sessions in the year. A star will be issued for each succeeding year under the same rules.

Lili Leclerc, VE2BBL, president of the XYL Committee of the Radio Amateurs of Quebec, Inc., is Director of the two nets. So if you are a VE, and a YL or XYL, and speak French, the second language of Canada, you are most welcome.

1972 YLRL DX Correspondent

Gretna Longware, WA2WHE, has been appointed as the new International Correspondent of YLRL. She succeeds Verda Siebenthaler, K7UBC, who has held this office for the past four years. Prior to her present appointment, Gretna was YLRL Property Custodian during the year 1971.

The position, as the name implies, serves the YLRL membership abroad, meeting and exchanging correspondence with the DX membership, maintaining the list of women amateur radio operators for the YLRL Adoptee program, and reporting the DX News column in *YL Harmonics*.

YLRL Convention Committee Chairmen

Roxanna Griggs, K6ELO, General Chairman for the 6th International YLRL Convention this year, has announced the following committee memberships: Hostesses: YLRC-LA membership; Planning Committee: K6ELO, WA6UBU, WB6DFN, W6JCA, WN6LRW, WA6ZTW; Program Printing: WA6AOE; Prizes: WA6ISY, Chairman, W6MWU, WN6FUT, WN6FIUU; Table Decorations: W6PJU; Transportation: W6UHA.



W6YKU, Jackie van de Kamp, YLRL Receiving Treasurer, 1972.

W6YKU, Jackie van de Kamp

Every year we mail our dues to her, and back comes the signed membership card, but Jackie is more than a signature and a set of call letters. Not only a wife, mother, "household engineer," and Receiving Treasurer of YLRL, in 1970, Jackie became a full-time college student (incidentally she is on the Dean's List) studying to be a Librarian.

A member of YLRL since 1958, former 6th District Chairman, and YLRL Publicity Chairman before becoming Receiving Treasurer. Jackie is a member of BAYLARC, belonged to the now inactive Camilla Capitol Chirps, ARRL, Golden Empire ARS, formerly a Secretary and then Treasurer of G.E.A.R.S.

As with so many of us, she caught the radio bug because the OM was active and received her call in 1957. The OM insisted she build her own Novice transmitter and when she tried it for the first time it worked. In fact, it worked so well that after she became a General, a speech stage was added and the rig was used as their mobile station for 12 years.

Jackie prefers net operation, the Ironing Board Net in particular, and to her the fun of amateur radio is mobiling.

Ceylon's YL Twins, Susima and Srma


In a country that boasts of having had the first woman prime minister in the world, feminine amateur radio operation has been limited to just one YL until this past year when Susima, 4S7SU, and Srma, 4S7SI, joined with 4S7YL to increase the YL population to three in that country.

In just six months on the air, they have logged Australia, Southeast Asia, the Far East, the Middle East, Europe, and South Africa; but so far, says Susima, "we have not had the courage to make a call to an American station."

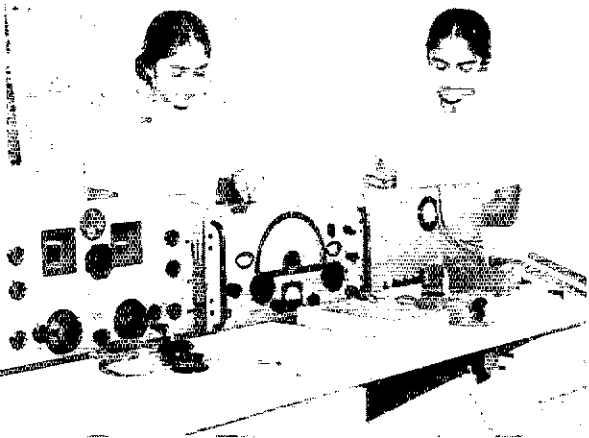
These twin YLs are research workers in the Physical Chemistry Division of the Ceylon Institute of Scientific and Industrial Research. Some of their work is with electronic equipment and they have built some of the units that they use. Both are graduates of the University of Ceylon and earned their Master of Science Degrees at the University of Hawaii.

Astronomy and photography are other interests, and they are members of the Ceylon Astronomical Association, as well as the Radio Society of Ceylon. They are both active tennis players and have participated in tournaments.

Srma and Susima are planning to build an ssb transmitter and have additional plans for modification of their receiver.

The twins can be found most evenings between 0530 and 0930 GMT on 20 meters. If you have worked Soma, 4S7YL, a QSO with the twin operators will complete contacts with all the YLs in Ceylon. 

Susima, 4S7SU, and Srma, 4S7SI, Ceylon's Twin YL operators.



Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

- ex-1BC G, Minton Cronkhitte, Rancho Santa Fe, CA
- W1BGH, Robert W. Kingman, Brighton, MA
- W1EVZ, James W. King, Holyoke, MA
- W1MGX, Arthur J. Riley, Wilton, CT
- W1AURO/Ex-W1CKZ, Joseph S. Ferland, East Hartford, CT
- W2ASP, James W. Singleton, Rome, NY
- W2EWZ, Harry H. Bowers, Roselle, NJ
- W2H1U, Otis R. Dickinson, Delmar, NY
- W2HWA, Sidney C. F. Belcher, East Orange, NJ
- WB2NA1, Bruce H. Mead, Forestport, NY
- W2NTY, Lawrence G. Kobza, Saddle Brook, NJ
- W2WAV, Joseph M. Mijon, Centereach, NY
- W3AX, Thomas Appleby, Washington, DC
- W3JCO, Ralph F. Moyer, Franklin, PA
- K4FC, Roger M. Spicer, Leesburg, FL
- W4KMU, LeRoy R. Cohen, Jr., Richmond, VA
- W4POU, Bob R. Freeman, Memphis, TN
- W4PTT/W1UA, Harold T. Hargraves, St. Cloud, FL
- K4ZOR, Carl F. Wieler, Madisonville, KY
- W5AME, Daniel M. Strahan, Hazlehurst, MS
- W5DZP, David P. Crowell, Ada, OK
- W5OJB, Paul B. Morris, San Antonio, TX
- K5ONV, Harold U. Jolly, El Paso, TX
- W6GFYB, Joseph Czerwinski, Pasadena, CA
- W6FF, John P. Duncan, Campbell, CA
- W6LQG, Norman L. Rice, Mountain Center, CA
- WB6FF, Archie F. Smith, Alhambra, CA
- W6JEN, Wyllys P. Smith, La Jolla, CA
- W6LZA, Albert H. Danielson, Daly City, CA
- W6MPE, Warren E. Dunwoody, Alturas, CA
- W6PRM, Jay C. Boyd, Van Nuys, CA
- W6SC, Thomas C. Hall, Sr., San Carlos, CA
- W6TLW, Denton B. Titus, Riverside, CA
- W47BDX, Michael L. Garrett, Seattle, WA
- W7G0B, Fred A. Dreibelbis, Renton, WA
- K7HRV, Jean P. Conner, Phoenix, AZ
- W7KWP, Bim E. Pylant, Sierra Vista, AZ
- K7NNX, Clarence O. Ross, Kamiah, ID
- W7PQS, Haakon K. Berger, Marysville, WA
- WB8COV, Albert C. Eisele, Cleveland, OH
- WB8GJA, Byron D. Loofbourrow, Dayton, OH
- EX-W8IOK, Hayden G. Davis, Cleveland Heights, OH
- WB9NWZ, Donald A. Kuhl, Honor, MI
- EX-W8SA, Ross Jones, Marine City, MI
- W9BJO/W8GLS, Glenn M. Munro, Naperville, IL
- W9RPF, Vernon A. Henry, Arlington, IL
- W9FIW, Frank M. Fitch, Indianapolis, IN
- W9LIDJ/Ex-W1PHP, Raymond L. Whannel, Oakdale, UT
- K9RLJ, John G. Montague, Wauwata, WI
- WA9JUR, Peter Erk, Park Falls, WI
- W0BBM, Robert M. Fisher, Omaha, NE
- W0KWO, Charles M. Hayes, North Platte, NE
- W0NCG, Raymond P. Barnes, St. Louis, MO
- W0VNE, Alfred V. Johnson, Cuba, MO
- V1AWS, A. Wilburn Mulligan, Rosser, MB
- VF5PV, Basil F. King, Lloydminster, SK
- VE6JG, John C. Gerrie, Edmonton, AB
- VE6OC, George W. Hodson, Edmonton, AB
- VE7AEV, G. F. Galavan, Victoria, BC
- G2IV, William Barraclough, Liverpool, Lancashire, England
- G3DD, William H. Baker, Torquay, Devon, England
- G8IG, C. G. "Hert" Allen, Kdston, Kent, England
- G8RB, Thomas A. Fachtor, Newcastle-upon-Tyne, Northumberland, England
- ZL1AW, W. G. C. Ashbridge, Bayswater, Auckland, New Zealand

Feedback:

Our apologies to Fred W. Htner, W6MMW, incorrectly listed in the Silent Keys column in December QST, but, happily, very much alive.

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How :

*To thine own log be true, and thou canst
not then be false to any ham.*

— W.S. (revised)

Grommethead Schultz excused himself to answer the landwire. We sipped our tea and inspected QSLs on his wall (the three rare ones were front and center) but couldn't avoid catching snips of conversation. "Well, just keep busy, busy, busy. . . Try the old workbench routine. . . No, not on *that* power supply. . . Aw, let go the B-plus, man, and get hold of yourself. . . Listen to police calls or the airplane band. . . Read some old QSTs. . . Well, backward then. . . Oh, all right, come on over and we'll drag it out, knock it down, and stomp on it. CU." Grom returned looking grim, shook his head sadly, and resumed his seat with a sigh.

"That was my cousin Stu. Has a problem. Just joined KA. We're pulling him through. Rough at first, real rough."

Problem? we thought. Hah, Stu has it made. All the bread he can chew and he wastes it only on himself. Stu Pidfid grabs the biggest of everything — twelve-cylinder Lotus Special, 300-foot tower, 62-inch 3-D TV, triple-breasted suits. We should have such a problem.

"He's a kiloholic," confessed Grom. "Slipped over the line in the '71 DX Test. Inherited a floor-sagging light-dimmer in some goofy deal and 'intended to run it cool.' Soon he weirdly rationalized he could save the gang a lot of lengthy QRM by briefly peaking ten or fifteen kW in dogfights,

*7862-V West Lawrence Ave., Chicago, IL 60656.

real nice of him. Unlike some other sickies he was lucky enough to realize he had lost touch with reality, admitted his warp and joined Kiloholics Anonymous. How he's beginning to enjoy real ham radio again. But he still occasionally panics with the old urge."

"How'd he get rid of that big diathermy?"

"Oh, KA doesn't recommend complete removal of temptation," explained Grommethead. "He turns on the filaments sometimes. Victorious confrontation, you know. Got to stare it down and turn it off when it tries to turn you on. Simply running away isn't enough."

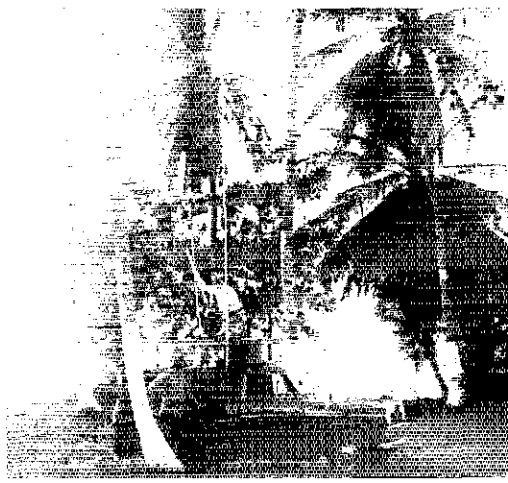
Schultz sounded a little too confident. We would have counseled hauling that oversized junk to the city dump where it belongs. You can't boozie without booze. Anyway, half an hour went by and the watt-freak didn't show. He lives just down the street so Grom got a little fidgety and began scanning 20 on his homespun sniffer. He had the 'phones on but we could clearly make out the bedlam of a massive pile-up centered near 14.202. Then we noticed the overheads blinking and our host wasn't even near his mike! Astounded, we leaped up just as Grom, still wincing, turned off the receiver.

"Well," he mused, rubbing his ears, "guess I just worked that new bunch on Clipperton."

"The heck you did," we retorted. "Who you kidding? Your rig is ice cold."

"We're making progress with poor Stu," continued Grommethead Schultz. "He's still plenty sick but he's got back some pride. Off the wagon again but using *my* call."

VP2s LK (left) and LAW check the bands in their mobile hamshack which works phone or code on 80 through 20 meters. At right Lee and John, having selected their QTH of the Moment, erect a fourteen-section 7-MHz vertical among graceful St. Lucia flora. Photos of their home stations appeared in December's "How's." Now could we interest them in an amphibian outfit for Clipperton?





What :

Another imminent batch of Five-Band DX Century Club awards and your annual ARRL International DX Competition have our 3.5-4.0-MHz slot on the DX spot. Sure, we hate to see sunspots deserting 28 MHz but old 75/80 is really smilin' through. What a band! Here's a sampling of stuff the lads and clubs are telling us about since last we looked. Firstly on

80 CW where Ws 1PL 1SWX 8IBX 9EY, Ks 2DNW 5MHG, WAs 2KWB 8VRB, WB4KZG and the collective DX press are delighted by CP6FG, CTs 1LN 2BC 3AS, CXs 1AA 9BT, DF0AFZ, DJs 1FF 2YE 4MJ 5DT 6OP 7YE, DKs 1BP 1JU 1PG 2ID 3GL 3SL, DLs 1FF 1LZ 1RK 3BJ 0LW, DM2s AND AWI ZVL, EAs 2BC 9EO, EI9J, EL2CB, Fs 2NB 3YF 5CT 8IH 8KA 8OB 8ZF 9LT, FM7s AJ WU, FP0CA, Gs 2DC 3ESF 3IAD 3LP 3RP 3SIX 3VQQ 3WTJ 3XZX 3YDX 3YUK 3ZEN 4MU 4QD 5PO 5WP 5ANV 6TW 8AX 8BD 8RL, GB3FCS, GCs 2FMV 2LU 5AWO, GIs 3SKH 5UR, GMs 2FHH 3EFP 3HGA 3JI 3MBL 3XO 6NX, HAs 1KSA 3GF 3GO 3YGC SKAP 5KDQ 6JVC 0YHC, HBs 9AOU 9AQA 9CM 9KB 0NL, HC2GG/1, HIs 3PC 8DX 8LC, HKs 2DP 0AA, HL9VK, PHIs IE XHG, HV3SJ, IIs IZ YT, IT1NL, JAs 1NEC 1QJC 4BJO 5BJO 6BJT, JX2s HF HK, K4BZB/VP7, KC6BK, KG6s ALV 1BD, KH6s AQ GRU HAM 1J, KL7s GDU H CZ, KP4BCL, KR6AY, KS4DX, KV4CI, LAs 1OA 6U 7Y 8SJ 9HC, LUs 3EX 4ECO 8AHW, OA4MS, OD5LX, OHs 1SH 2BGD 3NY 3YI 0AA 0MA 0NL, OKs 1DGM 1DIM 1HAF 1KGI 1NR 1WC 1WT 2BFN 2BME 2BMF 2HI 2OD 2RW 2RZ 3DG 3IR 3KGT 3LO 3RKB 3SK, ONs 4DY 4VO 5GK, OX3YY, OY1R, OZs 1LO 1W 2LW 3Y 5CV 5DX 9FO, PA0s HHV MSM RTR, PJs 2MI 6AA 8AA 9JT, PYs 1DVG 1TBX 2FIQ 5OF 7BMR, PZIs ACA AH, SK6AB, SMs 4BBH 4DJE 6CAO 6DKO 6EPN 7BIC 7EQL 0AJU, PSs 1AGE 3AKR 3BHG 3CMX 5PWU 5YV 6AEW 6ASD 6SA 7KA 8BAJ 9CTW 9DOV, TG9CD, TIs 2CF 9CF 9CR, T1J1AW, TU2BD, UAs 1ZX 2CD 6MD 9SAA 9SAX 0SY 0ZAI, UB5s HQ XX WAB, UC2s CK LB, UD6CN, UF6LA, UKs 2PAF 5UAR 5WAZ 6LAZ 9ABA, UL7s HD OA OF GWQH, UM8FG, UO5PK, UP2s CT NK OX, UQ2As, UT5SY, UW0FB, UY5s MV XH, USARTEK, VKs 2AMB 2BKJ 2NS 2QL 2VN 2XJ 3I 3MR 3OP 6CT 6HD 6SD 7HD 9LV, VO1HT, VPs 2AAA 2ES 2MT 2MK 2SBG 5RF 7CQ 7HD 8LK 9BK, VR1AA, VS6DO, XE11J, YN1CW, YO7DL, YUs 1BCD 1MV 1OAU 3JS 3TGB, YV5s AHN CKR, ZB2AV, ZC4CB, ZDs 8AY 8CW 9BE, ZE1DC, ZF1RH, ZLs 1AXX 1BHQ 1BN 1DI 3PO/C 4IE 4OL/a, ZP5GS, ZSs 3XO 6AK 6ARS 6FE, 4X4NJ, 4Z4HF, 5Z4LW,

KP4CL, famed controller of Caribbean voice nets, is the proud possessor of the first ARRL Five-Band DX Century Club trophy won by a YL. W6KTE dropped in to congratulate Alicia while on a recent islands tour.

6D1AA, 6Y5SR, 7P8AB, 7X2BD, 8R1J, 9F3USA, 9H1s BL CG and 9Y4VU. Even non-Extras are makin' it.

75 PHONE is just as jumpy, mostly just below 3800 kHz, with Ws 2HAE 3HNK, WAs 2KWB 8VRB, WB4KZG and DX periodicals mentioning CE6DP, C21AA, CM2s AA AJ RX, CN8s HD HM, CoS 2AA 2FA 8RCB, CRs 4BC 7FM, CTs 2AK 2BC 3AS, CXs 1AA 7AP, DU s 1FH 6RG, EAs 4LH 6BN 8HA, EL2s BA CB CC, EP2s CC WB, F9KL, FG7XT, FP8s AP CT, G3KFT, GC3s GS YIZ, GD3MBC, GW3YGH, HBs 9AHA 0XHH 0XIC 0XUA, HC1RF, HI8s LC SAV, KHs 3AVK 3BQM 0AA 0BKX, HRs 1KAS 2AS 2GK, HSs 1ABE 3AFB 5ABD 5AFJ, HV1CN, IS0VSG, JX1AK, JY1, JY9DX, K3WEU/6Y, KC6RM, KGs 4CS 4EQ 6ALV 6JBD 6SI, KH6s BZF 1J RS, KL7s HEE RU, KP4s AF AN BCL CL DKX, KV4s AB FZ, KS6s DH DY, KX6s BQ BU ID IO IY, KZ5s MU WH, LUBAJ, LX1R, LZ1KAA, MP4s MPA TDL, OARV, OD5s BA HB, OH0NJ, OK1AWO, ON4DY, OXs 3WX 4CT, OY7JD, PJs 1AA 2CW 2MI 9VR, PY2PE, PZ1s AK AX CU, SMs 3BIU 7BIC, SP2KFY, TA3GB, TF5TP, TG9ND, TIs 2GI 9CF, TL8GL, UC2AI, UG6AW, UK5UAR, UO5BS, UQ2LM, UR2EGG, VE8RX, VKs 7JV 9XX, VO1BE, VPs 1BH 2AZ 2GAL 2GBG 2LAJ 2LO 2MY 2SAM 5CC 7DL 7NA 7NH 8ME 9BK 9DL 9GE 9GR, VRs 1AA 1AB 4BS, VS6DO, WA4OVP/8R, WB0FFG/TF, XEs 1KB 1KS 2MX, YA1OS, YB1AY, YI8s BL BW, YNs 1SN 3AAA 9MQ, YO2s BB FP, YVs 1KZ 5BTS, ZB2CC, ZC4s BJ 1K RS, ZD3Q, ZE1DC, ZF2s GC WF, ZLs 1AQ 2VI 2BT 3GQ 3JU 3LE 3PO/C 4IF/a 5AX, ZM7AG, ZSs 1MH 5LB 6DW, 3A0s FN FW, 3V8AB, 4M1A, 4U1ITU, 4X4YM, 4Z4s GV HF, 5B4IS, 5U7AR, 5W1AU, 5Z4LW, 5X5NK, 8P6s AH AJ BIC CX DR, 8R1G, 9E3UA, 9G1DY, 9H1CD, 9K2AL, 9M2s DQ DW, 9Q5PF, 9Y4s MM and VU. Oh, getting too easy? See you on 160!

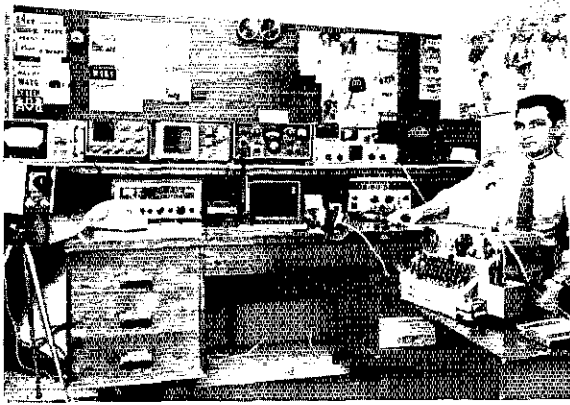
† † †

Where :

ASIA - Cards from Japan's JARL are very slow, some taking a year or more to reach California. (WA6TMQ) . . . The dock strike has slowed receipts at our ARRL QSL Bureau branches. Patience, please. (W1YL) . . . I do not manage 9V1QG's QSLs although I did briefly operate that station. (W7HVB) . . . Ex-XW8CS, with 300 blanks remaining, offers to QSL 1967-70 Laos QSOs from his W3DBT address. (WA1KQM) . . . I have a heavy backlog of QSOs to confirm and I hope to clear it soon. QSLs with International Reply Coupons to my new address will be answered promptly. (VU2JN) . . . As QSL manager for VU2AAA I request self-addressed stamped envelopes from W/Ks, bureau shipments from others. (W3FDU)

AFRICA - After returning cards to senders A because of overdue logs I finally received records from TU2CH. Those still needing Henry's cards are invited to try me again. (W7VRO) . . . We hold TU2CY logs only for QSOs of September 14 through October 24, 1970. No word from Dan and Andree since the latter date. (WA6OET) . . . My 9Q5HP QSL management commenced November 1, 1971, s.a.s.e. required. (K5HWO) . . . W/Ks should QSL 3D6AF via R6KII, others via JA0CUV/1. (WCDXB) . . . New FB8XX operators F6s APG and BPS will retain F2MO as QSL aide. (DXNS) . . . CR5XX intended to have voice contacts confirmed through WA3HUP, code QSOs via CR6NN. (VERON)

9Q5BG helps represent the Zaire Republic on slow-scan TV, radioteletype, voice, or what have you with a fine assortment of apparatus. Guy is found almost daily at 1600-1730 GMT on 21,225-kHz sideband, also 2000-2100 on 14,120, with printer available on 21,090 at 1730-1800 and 14,090 at 2100-2200. On Mondays, Wednesdays, and Fridays you may encounter this Kinshasa installation around 7085 kHz between 2200 and 2300 GMT.



... VQ9WF plans to QSL from home after leaving the Chagos this month. (WCDXB)

OCEANIA - Awaiters of VKØKW QSLs for 1970 QSOs take cheer. Much trouble keeping in touch with Karl since his return but he is now settled on Thursday Island as VK4CAW. All cards I've been holding for him have been forwarded to his new address. As of now all further QSL inquiries should go to VK4CAW direct, and I am sure that replies eventually will be 100 percent. (VK7KJ) . . . Upon assuming duties of custodian for KJ6BZ, a station with tarnished QSLing reputation, I instituted a policy which I feel will greatly improve the situation. Each KJ6BZ operator will be responsible for his own QSLing with my nudging if necessary. Since our personnel turnover is quite rapid this means applicants must QSL direct by air immediately with s.a.s.e., or s.a.e. plus IRCs. Cards via slower bureau routes most likely will never catch up with the operators concerned. (W9ONG at KJ6BZ) . . . KG6ALV is another club station operated by itinerant personnel and the QSL situation is not centrally controlled, each operator tending his own. At least this was true during my sporadic 1968-'70 operation there, and my own contacts were QSLd 100 percent. If any cards went astray I still have my log transcript and some cards for anyone interested, but I cannot confirm KG6ALV QSOs by other operators. Some fifty QSLs with s.a.s.e. erroneously sent to me for 1971 KG6ALV contacts have been forwarded to GUAM. Incidentally, QSL inquiries for my K5MWZ/KH6 activity are welcomed. (K5MWZ)

EUROPE - I've answered all QSLs for my Liechtenstein and Germany operation as HBØs XGR XVO and DL4CE but those whose cards for some reason did not arrive can reapply to my new North Carolina QTH. (W4CJD) . . . U.S. contacts should send s.a.s.e. to my WA4WME address for their 3AØFN QSLs. Others should apply via DL4VA. No cards via bureau, please. (WA4WME) . . . QSOs with HV3SI on December 23-28, 1971, may be confirmed through DLICU. Incidentally, more than half of the many stations contacted by ZA2RPS have not yet QSLd to DL7FT. (WCDXB) . . . Crete operation by SVØs WII and WJJ in late '71 can be confirmed through WA1HAA. By the way, our new VERON Hq. address is Postbox 1166, Arnhem. (VERON) . . . DXers in Europe, Africa, and Asia can QSL HBØXHS via DK3SF, others via KØIQM. (DXNS)

HEREABOUTS - Couldn't find info on prefixes OB XX 6D, etc. (WA5YLM and others) . . . The Little Orphan Annie secret decoder lies just ahead of the Tube Tables section in your latest ARRL *Radio Amateur's Handbook*, a listing of International Telecommunications Union prefix blocks by country. (W9BRD) . . . Reminder: W2SAW turned his foreign mint postage supply service over to W2AZX. (NJDXA) . . . H8LC, frequently found on 75, manages the Dominican Republic QSL bureau. (WCDXB) . . . New Radio Club of Panama has a QSL bureau run by HP1AC at P.O. Box 10745, Panama 4. (DXNS) . . . WA1ARE/KS4 logs for June 22 through July 21, 1971, were locked in a trunk when he departed for PJ-land. Should have caught up with Bob by now. (WA6MWG) . . . Mystery! FCC tells me I'm the first holder of my new call and yet there were 1969-'70 DX contest QSLs waiting for such a station at the Fourland ARRL Bureau. (K4SF) . . . I'm shipping QSLs from a new address, 101 Rita Blanca trail, Amarillo, Texas, 79108. (WSQPX) . . . That PP with the Australian QSL manager didn't pan out. (WA6CJL) . . . I hold 9Y4OT logs as of November 5, 1971, and request the usual s.a.s.e. from W/Ks, s.a.e. plus IRCs from others. (K2PSK) . . . For sparking-swift QSL comebacks "How's" correspondents Ws 1PL 2ABL 3CTE, Ks 4SD 8PYD, WAs 6TMQ 9DYV, WB2ZHM and VE7BAF applaud QSLers of the Month CRs 5AJ 7FR, DLs 1RB 7MX, EAs 6BJ 8GZ, HA4YO, HSs 3AFB 4AFT, 11RBJ, IS1DFO, IV1, K3WEU/6Y, KC4USV, KS6CY, UX1LE, M1B, OHØNI, OZ2X, PJ8AA, PF3YL, VK3s AIF UV/9, VP2s AAK AZ KF VV/FS, VR1AA, VU2HLU, W6FGL/TE, XT6AC, XW8DO, ZF2JE, ZD1CD, 4X4YI, 4Z4HF, 5R8AP, 5U7AS, 5Z4KE, 7Q7AA and 9G1WW, plus QSL tenders Ws 2GHR SWJQ 7VRO ØPAH, Ks 2BPP 4RHG, WAs 3HUP 5UHR, VE6AKV, DJ6QJ, and F6AEV. Any paste-board promptitude you'd like to see acknowledged here? . . . Help! Assistance is needed to run down CEØAE operators Ken or Pete of 1968

HR1WSG closes down this Tegucigalpa layout for QSY to Washington, D.C., after a three-year Honduras stay. Bill collected 5466 QSOs with 163 countries and received some 1500 QSLs. In typically snappy voice contest sessions HR1WSG's log shows 156 contacts in a 150-minute stretch on 10, 176 QSOs in 145 minutes on 75. Are you all set for such strenuous DXercise in the 38th ARRL International DX Competition this month and next?





XU1AA, multioperated by hams of good will on 15 and 20 phone at the Technical College, Phnom Penh, Khmer Republic, makes available the first Cambodian DXCC credits in many a year. This photo, taken by visitor 9M2AA during the station's first day of operation, September 20, 1971, shows VE7IR (9M2IR, YB0AAH, etc.) at the dials while Khmer communications chief XU1VS looks on.

{K4TXJ and WA3HUP inquiring}; TL8SW of '66 (WB2AMO); ZM7AA (W3CTF); IS1MUA, KR6OF, SV0WJJ (HP1JJ); FR8XX '68, MP4BEU '69, VQ9AR '67, YS1s DHE LA MS RFE, SR8s AB and Ag of '63 (WA2ZEZ). Any 'alp? . . . Please add my call to the roster of Statesiders willing to help overseas Stations with QSL headaches. (WA6FWG) . . . Now to specifics but remember that each suggestion is necessarily neither accurate, complete, nor "official" . . .

- A2CAY, Box 90, Madinara, Botswana
 C08RCB, P.O. Box 5, Santiago, Cuba
 DJ6OT/5T/5U (to DJ6QT)
 ex-DL4CE, V. Smith, W4CJD, Ft. 1, Box 201A, Alexis, NC 28006
 EL2DE, P.O. Box 857, Monrovia, Liberia
 ex-HB0s XGR XVO (to ex-DL4CE)
 HM1AQ, Park Sung-kun, Mang Wong Dong 321-17, Mapo, Seoul, Korea
 HP9s APV/mm AVQ/mm AXP/mm, Radio Nordsee c/o P.O. Box 1136, Zurich 8047, Switzerland
 HS4ACN, R. Hyneman, Box 52, Air America, Box 081, APO, San Francisco, CA 96237
 JYs 4IA 6MSM, Box 2353, Amman, Jordan
 K2LQO/TF, C. Wise, Box 10, Naval Stn., FPO, New York, NY 09571
 KB6DB, P.O. Box 1187, APO, San Francisco, CA 96401
 KC6BK, Box C, Ponape, E. Carolines, 96941
 SV0s WII WJJ (see text)
 SV0WS, Box 1067, 6931st Security Gp., APO, New York, NY 09291
 TR8DG, G. Delas, P.O. Box 2282, Libreville, Gabon
 VK6KV, K. Pledger, c/o TV Stn., Koolan Is., W.A., Australia, 6733
 VK4CAW, Box 132, Thursday Island, Queensland, Australia
 VK9DM, D. Martin, Post Office, Kerema, Papua
 VP2GI, P.O. Box 421, St. Georges, Grenada, W.I.
 VP2VAG, P.O. Box 440, Tortola, B.V.I. (or via VE3GMT)
 VP8MH, M. Hinchcliffe, 40 Elmwood Dr., Thornton-leveleys, Lancs., England

- VU2JN, R. Jayaraman, Dept. of Civil Engineering, Indian Institute of Technology, Madras 36, India
 WA4KPH/HK0, E. Duncan, P.O. Box 160, Sau Andres Is., Colombia
 WB4RJK/TF (via WA4ZSB)
 WB0CUB/KC4 (via K0YKJ)
 YA2AG, A. Baron, Kabul (ID), c/o Dept. of State, Washington, DC 20521
 ZD3D, C. Wiltshire, P.O. Box 10, Bathurst, Gambia (or via VE2DCY)
 4J0HM, Central Radio Club, Box 88, Moscow, U.S.S.R.
 5B4OH, FinCon, Nicosia, Cyprus
 8P6IC, Box 814E, Bridgetown, Barbados, W.I.
 9J2RC, Box 401, Ndola, Zambia
 9M2AA, I. Lyman, 5 Jalan Kenny Tengah, Kenny Hill, Kuala Lumpur, Malaysia
 9M8s OEA SPD, C. Schaub, RRF, APO, San Francisco, CA 96274
 9Q5BG, G. Baron, B.P. 5202, Kinshasa, Zaire
 Republic
 DL0EM (via DK3JQ) TU2CY (see text)
 FT3DS (via VE2DCY) TU4AA (via VE7BWG)
 FK8KAA (via REF) VK9CH (via WA6MRG)
 FO0GO (to W6HUP) VK9HB (to HB9XJ)
 FP0RT (to K2RTH) VK0KA (via WIA)
 G61W/LX (to G6UW) ex-VK0KW (see text)
 HB0XIC (via VE6AKV) VP2KF (via VE2DCY)
 HL9VO (via W611D) VP2VAM (via VE3GMT)
 HP1AC (see text) VP2VV/ES (to F6AFV)
 ex-HS3BA (to HS4ACN) ex-VP7BQ (to HS4ACN)
 HS9AFW (via VE7BWG) VQ9WF (via W4NJC)
 HV3SJ (see text) VR5FX (via ZL2AFZ)
 IC8KAW (via ITNR) VU2AAA (via W3FDU)
 IH9RS (to ITIRIS) XT6AC (to DL6QT)
 IL7XAK (to ILXAK) ex-XW8CS (to W3DBT)
 IX1AK (via LA1FH) ZE1DX (via WA9UES)
 K5MWZ/KH6 (to K5MWZ) ZF1RC (to WA0RSF)
 KG6ALV (see text) ZK2AJ (via NZART)
 KJ6BZ (see text) 3A0FX (to K9KRZ)
 KS4CJ (to KV4AM) 4M0LM (via YV1LA)
 MP4MBN (to G8DXE) 5H3LZ (via G3USY)
 OD5HB (via LA5FH) 5H3MT (via LA9PF)
 OE6ZEG (to K9KRZ) 6W8BD (via WASUHR)
 OX3BX (via GZ8KW) 7X2SW (via AKA)
 PJ4HT (to PJ2HT) 9Q5HP (via KSHWO)
 IG9YN (via DL8DF) 9V1QG (see text)
 TI2AP (via WB8FTC) 9Y401 (via K2PSK)

A low "How's" bow to QTH contributors Ws ICW 1YL 2ABL 3HNK 48QO 5BZK 6AM 9GX, Ks 2HYM 3RDI 4SD 8PYD, Was IGGN IKOM 6TMO, WB9CS, WN9GGD, VE7BAE, Columbus Amateur Radio Association *CARAscope* (WBZCO), *DX News-Sheet* (G. Watts, 62 Bellmore Rd., Norwich, N.72 T., England), Bar East Auxiliary Radio League (M) *News* (KA21L), Florida DX Club *DX Report* (W4FRO), Japan DX Radio Club *Bulletin* (K2KGB), Newark News Radio Club *Bulletin* (J. Heien, 3822 Marshall Ct., Bellwood, IL 60104), Nigerian Amateur Radio Society *News* (N2ABG), North Texas DX Association *Bulletin* (W5S2), Northern California DX Club *DXer* (Box 608, Menlo Park, CA 94025), Southern California DX Club *Bulletin* (W6EJJ), UBA's *On the Air* (ONS 4AH SVA), VERON's *DXpress* P40s FX LOU TO YDV WWP XPS), and West Coast *DX Bulletin* (WA6AUD). Y'all come back, now.

† † †

W h e n c e :

ASIA - Now using cw on 40 through 10 meters A with 150 watts and a 14AVQ. Because of my studies I had better not raise my 4-element Yagi and get too bogged down with DX! (VU2JN) . . . My HL9VO operation commenced Novem-

ber 26th. (K6VOQ) . . . Nice four-day visit from OD5LX in November. (K4TSJ) . . . I'm active on 20 ssb almost daily from 1100 to 1500 GMT. Previously signed HS3BA, VP7BQ, and W8UYX. (HS4ACN) . . . Sikkim, Bhutan, and Iraq DXpeditionary possibilities are under study by Signal ONE staffers. JA3GZN threatens more Ogasawara output in next month's ARRL Test sessions and we hear that AC5TY may have some hams-to-be lined up out his way. (WCDXB) . . . MP4BHR went silent awaiting spare rig parts from the U.S.A. and says MP4BJG has left Bahrain. (5N2ABG, NARS) . . . YK1AA sometimes can be found near 14,282 kHz around 0800 GMT. (VERON)

AFRICA - ZS3CJ, vacationing from DX for a few months, hopes to bring a new tribander back to Rosh Pinah. Friend EL2CB chases his own 5B-DXCC on 40 and 80 sideband. (W3HNK) . . . Having worked so many Pennsylvania stations 3B8DA is very interested in hearing about certifications issued in that state. (K3RDT) . . . Around mid-April XYL WA2BAV and I intend DXpeditioning in central west Africa. We'll start in Senegal and finish in Cameroon, making as many stops in between as circumstances allow. Then we'll visit our native Roumania briefly. (WB2AQC) . . . CR5AJ, active on several 20-cw spots at 1900-2400 GMT with his 723, expects a five-year Sao Thome stay. (NTDXA) . . . 3V8AH's planned departure will leave Tunisia scarcely tunable. (WCDXB) . . . TR8DG hunts Utah to complete his fancy fifty, 21,300 kHz around 1900-2000 GMT. (LIDXA) . . . ZD9BM is among several rarities eyeing the 160-meter band for winter DX fun. (NTDXA)

OCEANIA - KJ6BZ is again operational on 20, 15, and occasionally 10 meters. Look for us Monday through Friday at 2130-2300 GMT on 14,215, 21,280, or 21,435 kHz. On Saturdays, after 1735 GMT traffic schedules with W9s BG and OW, we watch for callers near 14,215 kHz until QSYing to 15 meters at 2200 or so. Sundays find us on 14,215 at 1800-1930, then 21 MHz from 2230 till the band folds. (W9ONG at KJ6BZ) . . . Poor conditions on 10 through 20 limit my activity there but a new 5/8-wavelength vertical really gets out on 7 MHz. (VK7KJ) . . . New Haven's Register reported the recent passing of VR6TC's mother Flora. She was a direct descendant of Fletcher Christian. (WA1CUN) . . . Hello from ex-G2AH/W4! I retired from my Washington post with the U.K. Scientific Mission and I now look for DX friends on cw and ssb from my new home in Auckland. (ZL1OI) . . . After his first four thousand QSOs VR1AA is hitting 3502-, 7006-, and 21,031-kHz cw more often. VR1s AB and AC, with help from VR1W, satisfy sidebanders on 20. (DXNS) . . . Australian Antarctic bases have been well represented by VK0s CC and MX from Mawson on 14,155-14,175 kHz at 1700 GMT, also JM at Davis, and PF from Casey base. (VERON)

EUROPE - Cambridge U. Wireless Society will be DXpeditioning to Luxembourg as G6UW/LX from the 11th through 25th of next month. We hope to include 160 in the repertoire. (G3ZHL) . . . CT1UA is QRL with a new junior operator. (W3HNK) . . . Managed to spread 750 QSOs among 107 countries while operating 3A0FX from Chateau Perigord, the highest available loca-

tion in Monaco. An HT-37, HQ-129X, portable dipole and balcony-mounted ground-plane proved that QRP still works DX! (K9KRZ) . . . Forty-eight hours of phone contest work from 3A0FN produced 800 contacts. (WA4WME) . . . IICME tied the nuptial knot with Maria, HIOCS, in December, and W7OYA scheduled a visit to Russia before year's end. (W9BRD) . . . After completing a four-year DL4CE tour I retired from the Air Force. (W4CJD) . . . LA7ZO, a pilot for SAS, visited my station soon after QSO. (WB2AQC) . . . Ten meters came to DX life rapidly in late September and peaked by late October. (G3DME, QUAX) . . . ON4BX claims a hundred countries confirmed on two-way RTTY. (UBA) . . . Ex-PJ2PS, now PA0XPS, joins our DXpress editorial staff. (VERON) . . . LA0AD completed 5B-DXCC just before transfer to Argentina. (WCDXB)

HEREABOUTS - New 95-foot vertical works fine on 160! The December ARRL top-hand test gave me 422 QSOs with 67 League sections and sixteen countries including CO2QR, FT9I, G3RKJ, GM3YCB, HB9NL, K5CIT/KH6, KG4CS, KH6s HCM II RS, MP4BCL, PA0PN, PY1DVG, VE8OK, VP9BO, YN1CW, ZD8AY, and 8P6DR. (W3IN) . . . An Adventurer and HQ-110 hooked me up with KC4USB of Antarctica on 40 meters in November. (WN7RQP) . . . Creeps from the higher DX bands bring bad habits down to 40 and 80. (W9EY) . . . I for one certainly appreciate the DX net control efforts of KP4AN on 75. (WA2KWB) . . . More pro and con comments are needed from the Nine gang regarding proposed changes in ARRL's DX Century Club. (W9NN) . . . DX Nets, a necessary economical use of limited frequencies, seem to suffer increased QRM lately, some apparently intentional. (K6SE) . . . Twenty carries the bulk of my DX activity at present but I hear that 80 is getting hot around 0400. (VE7BAF) . . . Whew - how about a three-band DXCC award? (WB2ZHM) . . . My Tennessee location is good enough for 117/68 quick countries worked/confirmed with modest power and dipoles. (K4PR) . . . Many years have passed since I worked DX from KA1s AC HQ HR and KG6DI. Also signed XU1U. (K6IBI) . . . After finishing sideband WAC and WAS I'll be heading back to the key. (W5BZK) . . . DXing QRM on 3805 kHz, even in summer months, makes me wonder if we could spread out a little more. (W3TV) . . . K7ZJA and I offer Utah to the 160-meter cw gang around 1805 kHz. (WA7EML) . . . My brother KP4DIS, attending college in the States, now has little time for DX. (KP4DIW) . . . Wintering in Florida as W4MOX now, watching for friends and DX around 7010 kHz. (W3AXI) . . . I'll celebrate fifty years of amateur radio and DX this spring. (W2SAW) □



FM0IX, a top-flight '71 Martinique DXpeditionary venture by (left to right) W7s EKM VRO and WA7BAY, is shown here with W7VRO at the helm. The lads also signed VP2s GBG LAJ LAM and 8P6DM for an over-all three-week collection of some five thousand contacts.

Operating News

GEORGE HART, WINJM
Communications Manager
ELLEN WHITE, W1YL
Deputy Communications Mgr.
ROBERT L. WHITE, W1CW; DXCC
GERALD PINARD, *Training Aids*
ALBERT M. NOONE, WA1KOM; *Contests*

New WAS Goals. The "Worked All States" award can be endorsed for just about anything, provided the applicant can submit 50 confirmations proving his claims for any particular endorsement. In the past, WAS endorsements have been added to existing certificates for bands, modes, YLs, two-letter calls, and you-name-it, we-endorse-it. All you have to do is prove it in writing.

But other than the Five-Band WAS (5BWAS), the League does not at present offer any special WAS certificates. If you make WAS all on sideband (and all the confirmations show this), we'll issue your WAS to show it was done by sideband, but this is a WAS endorsed for sideband, not a "Sideband WAS." Later, you may get it endorsed for cw, for six meters, for operating with your left foot while standing on your head — and we'll even provide separate certificates for each of these endorsements, if you wish. But they are standard WAS certificates, not a different kind of WAS certificate for each endorsement.

What brings on all this explanation is a telephone call we had not long ago from an old friend who proceeded to explain the great difficulties he was having qualifying for a certificate for working two-letter-call stations in all states in the extra-class portion of 75 meter sideband. We allowed that this was middling interesting, and who issued such an award? You do, he said. Well, it sort of took us by surprise, as you can imagine.

Come to find out, what happened was that a group of sidebanders in the extra class portion of the 75 meter band (3800-3825 kHz) got together one fine evening and decided to make a try for this kind of a WAS endorsement. The principal instigators were K2DS and W0NL, back in Sept. of 1971, but W3ZM grabbed the ball and popularized the activity, which soon became widespread.

We repeat, ARRL will endorse WAS for practically anything that can be proved by written confirmation, but the rules for this particular endorsement, as promulgated by W3ZM and the

crew, are as follows: (1) Any station authorized to operate on 3800-3825 kHz may participate, and all contacts must be within this segment. (2) Contacts must be made with stations with "one by two" U.S. (two-by-two for KH6 and KI7) calls in each of the 50 states, after 0000Z, Sept. 27, 1971. (3) Only ssb two-way contacts. (4) Call signs, signal report and location must be exchanged. (5) All confirmations must plainly show the above and all other rules for WAS award (see ARRL Op. Aid 8) apply.

Almost makes a man want to give up a good old one-by-three call that no one else ever owned to buy an old used one-by-two that may have been held by half a dozen other people!

Repeater Operating Practices. In the Dec. '71 issue of the *LIMARC Log*, publication of the Long Island Mobile Amateur Radio Club, there appears a set of operating procedures for the use of the two LIMARC repeaters, WA2PDJ and WA2UZE. We think that if all repeater users followed a similar set of rules, repeater operation would be so much more enjoyable for everybody. For what they are worth (and we think they are worth a great deal), here they are with some liberties in the original wording to broaden the application.

1) Learn what the logging requirements are for the repeater that you are using. Give on and off times, if necessary. If the repeater does not have an automatic identifier, give the call of the repeater as well as your own.

2) Don't bust into a QSO in progress unless you really have something to say. Then state your call sign only and quickly, during a switchover in progress of the monitored QSO.

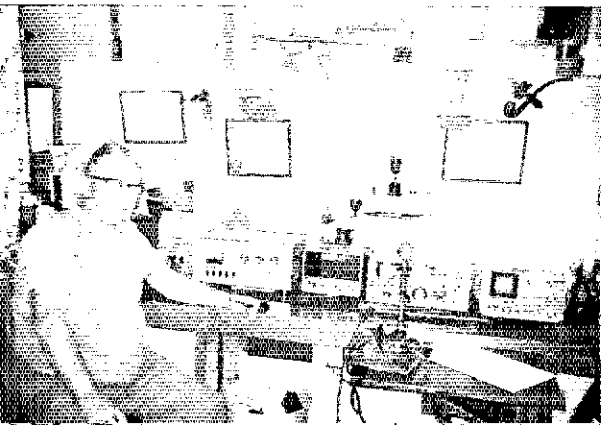
3) Always pause momentarily before coming back during a QSO, to allow a new station to enter.

4) Use the single word "break" only when your desired entry into an ongoing QSO is time-critical. (E.g., you need directions as you approach an

Meet Your SCM

VE7FB has been in this SCM business for a long time, serving as B.C. SCM back in 1950 as well as continuously since 1961. Ernie's interest in ham radio goes back to 1920 and his first license to 1936. He previously held the call VE5FB and is now a member of the Vancouver Amateur Radio Club, The North and West Amateur Radio Club and QCWA. This is an all-around ham with special activity in traffic and emergency work. When time from his work at the Shaughnessy Hospital in Vancouver permits (he's a supervisor, steam-fitter), Ernie can often be found camping and fishing. (Photo by VE7BG1.)

QST for



WIAW FALL-WINTER SCHEDULE (Oct. 31, 1971-April 30, 1972)

The Maxim 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.A.L. 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 on Nov. 25, Dec. 24-25, Dec. 31, 1971; Jan. 1, Feb. 21, Mar. 31, 1972. Please note that all times-days are in GMT. Specific operating frequencies are approximate and indicate general operating periods.

GMT	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000							
0030							
0100							
0120-0130 ⁴							
0130-0200							
0200							
0205-0230 ⁴							
0230							
0330-0400 ⁴							
0430							
0430							
0435-0500 ⁴							
0500							
0520-0530 ⁴							
0530-0600							
1400							
1800-1900							
1900-2000							
2000-2100							
2100-2130							
2130							
2200-2230							
2230							
2300							
2345							

¹ CW Bulletins (18 wpm) and code practice on 1.805 3.52 7.02 14.02 21.02 28.02 50.02 and 145.588 MHz.
² Phone Bulletins on 1.82 3.82 7.22 14.22 21.27 28.52 50.12 and 145.588MHz.
³ RTTY Bulletins sent at 850-Hertz shift, repeated with 170-Hertz shift; frequencies 3.625 7.095 14.095 21.095 and 28.095 MHz.
⁴ Starting time approximate. Operating period follows conclusion of bulletin or code practice.
⁵ WIAW will tune the indicated bands for novice calls, returning the call on the frequency on which called.
⁶ Participation in section traffic nets.
⁷ Operation will be on one of the following frequencies: 21.02, 21.08, 28.02 MHz.
⁸ Operation will be on one of the following frequencies: 21.270, 21.410, 28.520 MHz.
 Maintenance Staff: Wis QIS WPR NYC.

WIAW CODE PRACTICE

WIAW transmits code practice according to the following schedule. Approximate frequencies are 1.805 3.52 7.02 14.02 21.02 28.02 50.02 and 145.588 MHz. For practice purposes the order of words in each line may be reversed during the 5-13 wpm transmissions. Each tape carries checking references.

Speeds	Local Times/Days	GMT
10-13-15	7:30 PM EST dy	0030 dy
	4:30 PM PST	
5-7½-10-	9:30 PM EST SnTThS	0230 MWFsn
13-20-25	6:30 PM PST	
5-7½-10-	9:00 AM EST MWF	1400 MWF
13-20-25	6:00 AM PST	
35-30-25-	9:30 PM EST MWF	0230 TThS
20-15	6:30 PM PST	
35-30-25-	9:00 AM EST TTh	1400 TTh
20-15	6:00 AM PST	

The 0230 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are sent in this 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 QST practice text (from the issue 2 months previous) to be sent in the 0230 GMT practice on the following dates.

Feb. 11: It Seems to Us
 Feb. 17: Correspondence
 Feb. 23: League Lines
 Feb. 29: ARPS

The subject of practice text for the following sessions is *Understanding Amateur Radio*, First Edition.

Mar. 6: Applying Plate Modulation, p. 246
 Mar. 8: Checking Your Modulation, p. 251

intersection.) Use a double break (break! break!) only in case of emergency (e.g., an auto accident requiring police notification), and a triple break only for a most grave disaster situation.

Further procedure is spelled out on the use of "breaks." On a single break, stations using the repeater may finish the sentence or thought before turning it over to the breaker. On a double-break, the repeater is immediately turned over to the breaking station, and the base station nearest the

scene where assistance is required will assume NCS and render the assistance required (or direct others to render it, as appropriate), returning the frequency to normal only when the emergency has been resolved. For a triple-break the same procedure is followed and in addition all stations should stand by to render assistance as required and as many other stations as possible should be notified (not on repeater freq.) to stand by.

(Continued on page 91)

DX CENTURY CLUB AWARDS

Radiotelephone listings follow the general type "New Member" and "Endorsement" listings.

November 1-30, 1971

New Members

K2RRK	316	K5YRK	160	DHJQZ	110	WØDRT	105	JA1QJH	101	KG4CS	100
OE1UW	284	JH1MTR	151	SM8BH	110	K4APH	104	WB5AAR	101	5P9TW	100
JA2AAQ	271	W6NPY	145	OK1ALG	109	W8BFH	104	W6PBU	101	VF1RO	100
JA2PIC	271	DJ9RP	124	G3TYQ	108	W3MGF	103	WB6JY	101	WA2HJM	100
JA2KLT	251	WA2VYA	124	W4ZVX	106	W6HFD	103	WA8OMP	101	W6JYY	100
W3NL	188	WA4PUD	121	K9GSG	106	SM6PE	102	F9HV	100	WA7PIZ	100
E46BN	182	JA8JO	116	DK3KG	105	W3JMW	102	JATNV	100	WA9HMY	100
OK2AOP	181	N1LBR	116	DL1XY	105	WA3AQX	102	K3ACG	100	W9SO	100
DK3FD	172			W1CYB	105	WB5FZC	102	K9MXT	100	SH3MB	100

K2RRK	314	K4QPR	180	W3NL	123	DHJQZ	110	K5CPLB	103	TJ1AZ	101
JA2AAQ	250	KP4DKY	173	F8DP	118	H81ACH	110	W8BFH	103	E6AJQ	100
JA2PIC	235	JA1FNA	169	K1OQX	117	WA3NAV	105	K4PKK	102	K61VL	100
JA2KLT	209	OE3RHA	169	K2TKR	113	W7BSE	108	K6R6H	102	K7TR	100
QA4W	198	W91UQ	151	W6GWY	111	W1CYB	104	WA5YSC	102	W4SLD	100
E46BN	182	CPIFW	129					W91GV	102	W38MNE	100

Endorsements

In the endorsement listings shown, totals from 120 through the 249 level are given in increments of 20, from 250 through 300 in increments of 10, and above 300 in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

W1GKK	550	SM7OY	320	JA1KI	300	W2GJK/4	260	WA9VOL	220	H1RL	160
W1HX	345	W1BPW	320	W3BWZ	300	WA5VDH	260	JA1FNA	200	KØKLLH	160
W3MMK	345	W5HTF	320	W6DOD	300	W6GDN	260	K1GXU	200	OH2LU	160
W3WGH	340	W5OB	320	W61FL	300	K2KGB	250	K2OHT	200	VF8ZZ	160
W4QCW	340	W9QJD	320	W6BWO	300	WA1ABW	250	K2VUJ	200	W82GDN	160
W7ADS	340	OE1FT	315	W8DX	300	W6HON	250	OH2BCV	200	WA3JSSQ	160
W9FKC	340	W1DEP	315	W8RCM	300	W9VCQ	250	OH3MI	200	WA3JHB	160
W9GHI	340	WA2LQO	315	F1YRK	290	DKCYK	240	W1SWX	200	WA4LDM	160
WØPGI	340	W4BRB	315	K6AGH	290	D19JT	240	D16CT/W2	200	W5RY	160
W5DHS	335	W44WP	315	K6GAK	290	K4PVZ	240	WA2BCK	200	W46TAX	160
W8OK	335	W6LUF	315	WA311V	290	K4YXJ	240	WA2ZEZ	200	W7TF	160
W9RKP	335	WA6MWW	315	W8GHN	290	SM6CAW	240	WB2PEF	200	WA9V1Y	160
K11XG	330	W7CSW	315	YU2NFG	290	W2GA	240	W3BRB	200	VU1AHJ	160
W4BOY	330	W8YGR	315	K2AGZ	280	W4YUJ	240	W3WWD	200	G2AYG	160
W5NUT	330	K4ET	310	K3AIO	280	W6VD	240	W4WWG	200	HZGA	160
W7BA	330	K6KA	310	K4GSS	280	W7JWE	240	W61ID	200	K2KSW	160
W7JG	330	K8WOT	310	W3ALB	280	W8QBG	240	W86WAV	200	K3YVN	160
W8CJT	330	W91LR	310	WA3HGV	280	W81ND	240	W8DM	200	K46AG	160
W8KPI	330	WØCPM	310	W4HHN	280	CT3AN	220	DK1PH	180	K7EQM	160
W9MOK	330	K4IKR	305	W4UF	280	JA2TH	220	G3GNM	180	W1DMD	160
K4KJ	325	K9WTH	305	WØTDR	280	K7NHG	220	K4PKK	180	W4UPJ	160
W1IAS	325	OE1FT	305	D16KG	270	KP4DKZ	220	K6CU	180	W8ME	160
W1QJR	325	WA3A1P	305	PY1BTX	270	OK3HM	220	K6LCA	180	W9FVD	160
WA2RAU	325	WA4MUB	305	W8GAX	270	SM7ANT	220	K66AB	180	KH6HF	120
W5LTI	325	W66YVW	305	WA9JDT	270	WB2GOK	220	K66AB	180	K78MV	120
W5HJA	325	W81C	305	K4MG	260	W82HNO	220	W2RK	180	K78QW	120
W5LCI	325	WA8MCR	305	K41IA	260	W3MDO	220	W4DCW	180	SM6BZF	120
W6BAR	325	W92QD	305	K5ZJK	260	WA5ATB	220	W4LXA	180	VO1IX	120
W8DA	325	K4ADU	300	K6PZ	260	WA5UCT	220	WB4MKB	180	VO1IX	120
IT1ZGY	320	K4HP	300	OH2SL	260	W66WIM	220	W6PTE	180	WA3NAV	120
JA1ADN	320	K4OCF	300	VK5KO	260	W71LZ	220	WB6PGK	180	WA5YSC	120
K2CPR	320	K6FXO	300	WB2PWU	260	WB8EUN	220	W7KI	180	W6GBY	120
K9BGM	320	K8HF	300	W3RK	260	WA9UCL	220	W8YMB	180		

IT2HP	345	JA1ADN	300	W8GHN	290	W2GJK/4	260	WA4YVO	220	K6JWQ	180
W1JFG	340	K4IKR	300	W81FD	290	WA4WIG	260	WA5AB	220	W3A1B	180
K11XG	330	W7FXD	300	W8LUZ	290	W81C	260	W66WHM	220	WB81UN	180
W3WGH	330	W1SFB	300	W91QD	290	K41FA	250	W8QBG	220	WAØVZJ	180
W7ADS	330	WB2VAE	300	W91LR	290	KP4COB	250	W3GKW	220	JY1	180
WA2RAU	325	WA3A1P	300	F3JA	280	WB2FMK	250	W91AA	220	K1HXF	160
W9HB	325	WA5LQB	300	W31CO	280	W4ASW	250	W9MOK	220	K5YRK	160
W4UWC	320	W8VHY	300	W6MWW	280	W4UL	250	W9VCQ	220	K66BK	160
W5NMA	320	W8ZOK	300	W7TPA	280	W8YFK	250	CF3OI	200	W3JHB	160
WØMX	320	WA8OJ	300	W91C1	280	W8YGR	250	F47FM	200	W6TTS	160
K4KJ	315	W9Q1D	300	WØYDB	280	1SRV	240	K2OHT	200	WA6TAX	160
W3WD	315	WØSFU	300	K41EP	270	K2KGB	240	KP4DKZ	200	W7JF	160
WA4WIP	315	K3GKU	290	K9WEH	270	K5ZJK	240	K6PZ	200	K6PO	160
W6EUU	315	K4ET	290	W21QO	270	W4BOY	240	WA1R1Y	200	W82GDN	160
W6RGG	310	K6EAO	290	WA310V	270	W4LX1	240	WA21LA	200	W4G1W	160
WØPGI	310	K9LKA	290	WA3R1V	270	B6FTT	240	WB2GOK	200	W7GXC	160
EA4JL	305	OE1FT	290	C11MW	260	W47DRP	240	W3BE	200	W8PA	160
K2JMY	305	W4QAW	290	D16KG	260	DK1YK	240	WA5VDH	200	FL2CH	160
WA4MUB	305	W6ABA	290	K4MG	260	K4OCF	220	W7JW	200	W3MDO	160
W9DNE	305	W6FZJ	290	K6TKR	260	W2BHK	220	W9YRM	200	WAØQ1L	120
WØCPM	305			W41UM	260			K4LSP	180		

6) During heavy traffic time (7-9 a.m., 4:30-6 p.m.) keep contacts short.

7) Be careful of your language and possible use of "off color" or derogatory words. Repeater channels are monitored by a lot of people.

8) Always identify when testing.

9) Avoid phonetics unless requested.

Thanks to Sheldon Schwartz, WA2MBF, chairman of the Monitoring Committee of LIMARC, for providing these procedure suggestions.

Ending Signals. ARRL-recommended ending signals take a beating during contests — yes, even ARRL-sponsored contests. Why can't we standardize? The purpose of ending signals is to tell someone who just catches the tail end of a transmission what the status of the QSO is — that is, whether it is just beginning, is ending, or hasn't really started yet. They (ending signals, that is) are useful in any kind of QSOing, but especially so in contests, where QSOs are rapid. Properly used and observed, they would reduce much of the unnecessary QRM caused by stations calling other stations in the middle of a QSO. Here are a few observations on this subject:

1) When you are standing by during an exchange, and use "over," or "go," or AR or K on cw, it's your own fault if someone calls you on top of the QSO. The ARRL-recommended ending signal is "go only" on phone, KN on cw.

2) The cw ending signal AR K means, literally, "I am calling a specific station hoping to QSO him, any station please answer." Use AR only ("over" on phone) when calling, before QSO is established. Use K ("go") after a CQ, or at the end of a QSO (SK or "clear") if you want anybody to call.

3) Don't call a station who stands by with "over" (AR) or "go only" (KN). If he is using the signals properly, you'll just be causing him QRM.

4) Don't sit endlessly calling CQ if you aren't getting answers. You are just causing QRM, not doing yourself any good and doing others some harm. Generally, low or medium powered stations are much better advised to listen and make calls. Let the "big boys" do the CQing.

5) Above all, be familiar with the standard ending signals and use them right. You may not like them, they may not be the ones you have always used, but someone has to set a standard and the League is it. Get a copy of Op Aid No. 14 (free from headquarters). — WINJM.

SCM 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 are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been both the holder of amateur Conditional Class license (Canadian Advanced Amateur Certificate) or higher and an ARRL full member for at least two years immediately prior to receipt of petition of headquarters. Petitions must be received on or before 4:30 PM Eastern local time 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 of the candidate and signers should be included with the petition. It is advisable that a few extra full-member signatures be obtained, to assure a valid petition.

Elections will take place as soon after the closing dates specified as full information on the candidates can be obtained. Candidates' names will be listed on the ballot in alphabetical order.

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	Current SCM	Present Term Ends
Conn.	2/10/72	I. J. McNassar, W1GVT	4/11/72
W.I.	3/10/72	Jose Medina-Hernandez, KP4C051/71	5/11/72
Ont.	3/10/72	H.H. Shepherd, VE1DV	5/11/72
Neb.	3/10/72	V.A. Cashon, K9QAI	5/29/72
E.N.Y.	4/10/72	G.C. Berry, Sr., K2SJM	6/10/72
Iowa	4/10/72	A. Culbert, K9YVU	6/10/72
La.	4/10/72	J.A. Swanson, W5PM	6/10/72
W. Pa.	4/10/72	F.L. Gawryla, W3NEM	6/11/72
E. Mass.	4/10/72	F.L. Baker, Jr., W1A1P	6/15/72
Wyo.	4/10/72	W.M. Moore, W7CQL	6/25/72
S.C.	4/10/72	E.Y. Miller, WA4LP	6/26/72
SCV	4/10/72	A.P. Gaetano, W6VZT	3/10/73
Que.	5/10/72	J. Onsworth, VE2ALE	7/10/72

SCM ELECTION RESULTS

Valid petitions nominating a single candidate were filed by members in the following sections, completing their election in accordance with applicable rules, each term of office starting on the date given.

F. Bay	P.J. Parker, WB6DHH	11/10/71
F. Pa.	G.S. Van Dyke, W3HK	11/10/71
Ore.	D.L. Justice, R7WWR	11/10/71
S.N.J.	C.E. Travers, W2YFZ	3/4/72

Balloting results. In the Western Florida Section of the South-eastern Division, Mr. Frank M. Butler, Jr., W4RKH and Mr. Thomas H. Goldsmith, WB4FQU were nominated. Mr. Butler received 110 votes and Mr. Goldsmith received 34 votes. Mr. Butler's term of office began December 15, 1971. In the Wisconsin Section of the Central Division, Mr. Joseph A. Taylor, W0OMT and Mr. William H. Kimble, WA9QAY were nominated. Mr. Taylor received 346 votes and Mr. Kimble received 269 votes. Mr. Taylor's term of office began December 10, 1971.

QST

5-Band Awards

(Updating the November 1971 listing.)

5BDXCC: (Starting with number 121),
OK1MP W6DZZ W3WPG VK6HD W3WJD
W2LWI W6MAR W3MWC G3TXF.,

The first to achieve 5BDXCC in his respective country/call area: CT1BH DL7AA
EA4JL EP2BQ F9RM G3HCT HB9J
HK3WO HP1JC I1AMU KP4CL KV4FZ
LA7Y LX1BW OE1NY OH2YV OK1ADM
OZ1LO PA0XPQ SM0AJU VE2NV VE7ZM
VK6HD VO1FB XE1KS YU3EY YV4UA
ZL3GQ 6W8DY W1EVT K2BZT W3MFW
W4QCW W5WZQ K6KA W7MB W8GZ
W9HUZ.

5BWAS: (Starting with number 72),
WA5YMW W6ITD K0AYO WA6CPP
K1OME W0NQ W4WSF W2PDB WA8VWK
WA9NYA WA4FDR XE1J WA0JZF KG4CS.

The first to achieve 5BWAS in his respective country/call area: CE0AE W5KPL/HR1
KH6SP LA0AD PJ2VD VE3ACL XE1WS
W1AX W2PV W3WGH W4IC W5RUB
W61SQ K9LBQ/7 W8YEK WA9WJE
K0GJD KG4CS.

Operating Events

de W1YL

FEBRUARY

- 2** **W6OWP Qualifying Run** (W6ZRI, alternate) at 0500 GMT on 3590/7129 kHz, 10-35 wpm. This is 2100 PSI the night of Feb. 1. Underline correct minute of highest speed copied, certify copy made without aid and send to ARRL for grading.
- 5-6** **DX Competition** phone, p. 65 Dec.
- 5-13** **Notice Roundup**, p. 69 Jan.
- 10** **WIAW Qualifying Run** 10-35 wpm, at 0230 GMT on 1.805, 3.52, 7.02, 14.02, 21.02, 28.02, 50.02 and 145.588 MHz. This is 2130 EST the night of Feb. 9. Underline one minute of top speed copied, state no aids used (typewriters OK), sign and mail to ARRL with your full name, call (if any) and complete mailing address.
- 11-13** **QCWA QSO Party**, p. 108 Jan.
- 12** **WA2DNR "Operation's Day,"** p. 108 Jan.
- 13** **FMT, Tennessee QSO Party**, p. 108 Jan.
- 19-20** **DX Competition** cw, p. 65 Dec.

20-27 **YL/OM Contest** phone, p. 88 Dec. **French Contest** phone, p. 91 Dec. **Vermont QSO Party**, sponsored by the Central VT. ARC, from 2300 GMT Feb. 26 to 0300 GMT Feb. 28. YL stations score 1 point per QSO times total no. of ARRL sections and countries. Outside stations score 5 points per Vt. station worked times the sum of Vt. counties worked on all bands. No power multipliers and repeat contacts permitted on different bands/modes. Exchange QSO no., RST(1) and county (Vt.) or section/country (outside Vt.). Suggested freqs.: 3685, 3909, 3932, 7060, 7265, 7290, 14060, 14290, 14325, 21060, 21375, 28100, 28600, 50, 360, 50, 360, 144-144.5, 145.8 and Novice frequencies. Logs must be postmarked by March 31 and sent to the CVARC c/o Ansel R. Carnahan, K1ZKW, P. O. Box 3, Montpelier, VT 05602. Stations sending an s.a.s.e. will receive a copy of the contest results.

MARCH

- 3** **W6OWP Qualifying Run**.
- 4-5** **DX Competition**, phone.
- 10** **WIAW Qualifying Run**.
- 11-12** **YL/OM Contest** cw, p. 88 Dec. **Virginia QSO Party**, 1800 GMT Mar. 11 to 0200 GMT Mar. 13, no power or time limits. The same station may be worked on different bands. Va. amateurs in independent cities will use a neighboring county in the contest exchange and will keep that designation throughout the contest. Maximum counties, 96. Phone/cw, rtfy and vhf (2 meters and above) are separate contests requiring separate logs. Novice is also separate. Log must state mode. Send QSO no., RST(1) and county (Va.) or state/province/country. Va. stations may work other Va. stations. One point per QSO times Va. counties for out-of-Va. stations. Va. stations multiply QSOs by the number of states/provinces/countries/Va. counties. (Do not count Va. as a state or Canada as a country.) Freqs.: 3560, 3600, 14060, 21060, 28060, 4930, 7260, 14285, 21375, 28750. Full logs by April 28 (please print clearly!) plus stamped and addressed 4 X 9 1/2 inch envelope to the Roanoke Valley ARC, c/o Charles B. Towles, K4BJM, 3007 Pebble Dr., Roanoke, VA 24014. **Worldwide VHF Activity**, sponsored by the Ithycow Park VHF AR Soc., starts 1900 GMT Mar. 11 and ends 0300 GMT Mar. 13. Exchange call and state/province/country on any band 6 meters or above. A station may be worked on additional bands for QSO and multiplier credit. Score one point per QSO times the sum of multipliers on all vhf bands. Recognition certificate to hams with 50 QSOs on 6 or 25 QSOs on 2 or 10 contacts on any band above 2. Special endorsements to the certificate of the top stations in each call area or country. Certifications for each band where a station has met the minimum requirements. Logs to show time, date, band, state (multiplier) and call. Only 2-way contacts acceptable. Logs must be postmarked by April 15 and sent to W43NUL, Ithycow Park VHF ARS, Box 1062, Hagerstown, MD 21740. Club reserves the right to disqualify those not abiding by far practices. Postage aid appreciated although not required.

14-16 **Old Old Times QSO Party**, starts/ends 2300 GMT, open to members only. Suggested freqs.: cw, 3530, 7030, 14030, 21030, 28030; phone, 3940, 7265, 14285, 21360, 28560, all plus or minus 5 kHz. Logs no later than April 20 to G. G. MacConomy, W6BUK, Space 45, 36770 Florida Ave., Hemet, CA 92343.

18-19 **DX Competition**, phone.

20 **High Speed Code Test**, sponsored by the Connecticut Wireless Assn., and transmitted over W1FIA simultaneously on 3637 and 1120 kHz (approx.) along with a number of volunteer stations whose identity and frequencies will be given during the call-up starting at 0115 GMT (this is Sunday evening, Mar. 19, local time). Probable other frequencies: 3525, 3640, 3653, 3665, 3690, 7025, 7070, 14025, 14070 kHz. Very important instructions start at 0130Z. First

test transmission at 0150Z, 60 wpm, followed at ten-minute intervals by transmissions at 55, 50, 45 and 40 wpm in that order.

25-26 **Rocky Mt. QSO Party**, sponsored by the Denver RC and the Radio Clubs of New Mexico and Wyoming; party includes the states of Colorado, New Mexico and Wyoming (each state having a separate QSO Party). Periods from 2200 GMT on Mar. 25 to 0100 GMT Mar. 26, 0200-0600 and 1800-2200 GMT Mar. 26. Frequencies cw up to 65 kHz from the bottom, phone near the edge between general and advanced, novice near the middle of each band. Stations outside Rocky Mt. area please do not call CQ Contest near these frequencies. Exchange serial no., RST(1), state and county (for Rocky Mt. stations); those outside the area may omit their county. Stations may be contacted on each band (and again if a county has changed). Both cw and phone are NOT permitted. Intra-region and intra-state QSOs valid. One point per QSO. For Rocky Mt. region stations the mult. is the sum of states, Vt. provinces, countries and Rocky Mt. region counties. Outside station use the no. of counties worked in the state in whose party he is participating. There will be 3 different multipliers, one for each state, for those that enter all 3 contests. Appropriate awards. Full log date, including exchanges, no later than May 1 to Bill Wageman, K5MAT, 35 San Juan, Los Alamos, NM 87544. At least one extra stamp should be inserted in your s.a.s.e. for use if necessary. Unneeded stamps will be returned.

25-27 **BARTG Spring RTTY Contest**, 0200 GMT Mar. 25 to 0200 GMT Mar. 27, no more than 36 hours operation permitted. Listening counts as operating time. The 12-hour non-operating period can not be less than 2 hours at a time. The contest is also open to SWL RTTYers. 40-10 meter operation with repeat contacts permitted on different bands. Exchange time in GMT, QSO no. and RST. Only 2 way RTTY contacts permitted. Within own country, QSOs earn 2 points, outside your country contacts earn 10 points plus a bonus of 200 points per country worked (including your own). The same country may be counted again on another band, but continents count once only. Scoring: points times total countries; add to this country points times the no. of continents. One log per band, indicate rest periods, show band, GMT, message, and RST. Logs must be received by May 31 to qualify. Appropriate awards. Send to Ted Double, G8CDW, 89, Linden Gardens, Entfield, Middlesex, England.

27 **WIAW Morning Qualifying Run**.

APRIL

- | | |
|--|---|
| 5 W6OWP Qualifying Run . | |
| 11 WIAW Qualifying Run . | |
| 15-16 CD Party , cw. | 9-10 VHF QSO Party . |
| 22-23 CD Party , phone. | |
| | NOVEMBER |
| 10-11 VHF QSO Party . | 11-12 SS , phone. |
| 24-25 Field Day . | 18-19 SS , cw. OST |



Antique QSL collectors will be glad to know that the greatest DX of two outstanding spark stations of 50 years ago is safely chronicled and copies of the QSL are available. At 5 A.M. on January 15, 1922, 5XB, College Station, Texas, and 7ZI, Vancouver, Washington, covered nearly 2000 miles overland and across the Rocky Mountains in what might have been heralded as an amateur world's record QSO between two spark stations. But nobody paid much attention to it because the exploits of cw far overshadowed the best that King Spark could do. Copies of the 5XB confirming QSL will be furnished all who send an s.a.s.e. to: The Mumford Brothers, W2CU/W3CU/W6CU, Rt. 1, Box 397, Annapolis, MD 21401.

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

SCM — AREC — ORS — CP — SEC — OBS — TCC — OO

Station Activities

OBS — AIOPR — EC — DXCG — CLUBS — RW — 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.

ATLANTIC DIVISION

DELAWARE — SCM/SEC, Roger E. Cole, W3DKX PAM; WA3GSM, RM; W3EEB, Retiring pres. K3JRX of the First State ARC installed K3NCL as pres.; K3YBW, secy-treas.; WA3PCC, act. chmn.; K3VWP, pub. chmn. at their Ladies' Night Banquet. W3HKS has a good idea for reducing QRM. He is supplementing his 75-watt "High Power" Ranger with a 2-watt Ten-Tec. W3PCZ and WA3FRV were among those losing antennas during the Thanksgiving Eve wind storm. We hope that W3FFB's long awaited Yaesu has survived the dock strikes, surtax problem and other gremlins and is on the air. WA3OYA logged SW Michigan, Northern Ohio and Ontario on 2-meter Tropo using his new Teraft Criterion converter. WA3GAY should be increasing activity after the exam doldrums. Traffic: WA3QUU 78, W3EEB 57, WA3GAY 50, W3DKX 27, WA3DUM 17, WA3FRV 11, WA3GSM 10.

EASTERN PENNSYLVANIA — SCM, George S. Van Dyke, Jr., W3HK — SEC; W3FBF, RMs: W3EML, W3MPX, K3MVO, WA3AFI, K3PLE, W3CDB. PAMs: K3BHU, WA3PLP. OO reports were received from W3BFF, K3RDT, OVS reports from WA3MCK, W3ZRR. OBS reports from K3BHU, WA3AFI, W3CBH.

Net	KHz	Operates	QNT	QTC	R/M/PAM
EPA	3610	6:45 P Dy	375	410	W3MPX
EASN	371A	6:30 P Dy	214	86	WA3OGM
EPF&TN	3917	6:00 P Dy	234	81	WA3PLP
PEN	3960	5:30 P M-F	730	607	K3BHU
PTTN	3610	6:00 P Dy	168	112	WA3AFI

PSHR: K3OJO, WA3OGM, W3MPX, BPLs: W3CLU, W3VR, W3EML, K3NSN, WA3OGM, W3MPX, W3CUL and W3VR will be 4 until the warm weather returns. W3EML reports TCC up with best Nov. total ever! W3MPX still needs help on the late FPA session 10 P.M. WA3OOZ used Christmas vacation to go for A ticket. WA3ATQ busy with phone patch traffic. K3MVO just returned from Ky., reports not all traffic on EPA some on the highways! W3AXA's TV antenna came down on top of his ham antenna. W3ADE went QRT for a trip to Fla. WA2IUR keeping W3YR active at Lafayette College. W3EU now on 160 activity is good! The SEC needs ECs for several counties; how about contacting him and give it a try for your county. With CD having problems the AREC should be organized and ready. If you are an early bird remember 3733 6:15 A.M. net. WA3RCA put up a beam antenna and now they can work the world. New officers for South Chester County ARC: WA3NOG, pres.; WA3OGM, vice-pres.; WA3LMK, secy.; W3TWW, treas. Warminster ARC paper feed back won first place in its class. If your activity is down because you feel you are rusty on cw, check into FASN or PTTN, they send at your speed. Keep me posted on what you or your club is doing. Traffic: W3UUL 3261, W3EML 642, K3NSN 630, W3VR 617, WA3OGM 526, W3MPX 407, K3OJO 167, K3BHU 166, WA3KXW 122, WA3LWR 114, WA3OOZ 105, WA3ATQ 78, W3HK 72, K3PJE 70, K3MVO 66, WA3AFI 55, WA3MQP 54, WA3POA 49, WA3JYC 48, W3VA 40, WA3PLC 36, W3AXA 32, W3AJZ 30, W3VAP 27, WA3LVC 22, WA3CKA 20, W3CBH 19, W3CL 19, W3HMK 19, W3ADL 18, W3OYJ 11, W3HNR 12, K3KTH 10, WA3RJC 10, W3BUR 9, WA3HT 9, W3ZR 6, W3YR 4, WA3BJQ 2, W3OML 2, W3UO 1, K3FOB 1, W3GMK 1, W3KFK 1.

MARYLAND-DISTRICT OF COLUMBIA — SCM, Karl R. Medrow, W3FA — SEC; K3KMO, RM; W3FZT, PAM; W3CNC, W3TN made BPL in Nov. W3FZT, W3CNC, W3OKN lead the pack in PSHR. MDD is now operating twice nightly with 55 sessions and QNT average of 7.6, traffic 217. The MDCNT met 17 times QNT average of 14.2, traffic 34. MFPN is now active in NTS and in 22 sessions a QNT average of 22.3 with 54 messages. K3KMO has decided an outdoor antenna is better, just in time for his new job as

SFC. W3TN reports he was NCS for 25% of MDD net sessions. Halp! WA3IYS and WA3KOQ have big plans now that they have relocated the school station to better quarters. W3CDO maintains one firm schedule and much rag chewing. WA3MLI keeps schedules with home friends while at Ohio U. W3I DD is nearing the top as county hunter. W3BHF is concentrating on Md. with a good leg on the rest. W3ABC makes his OO job effective in on-the-air contacts. WA6IDN/3 has permission to change from an in-visible antenna to one that can be seen and heard. W3ECP has the sad duty to report the passing of W3AX and W3BL. W3FOV has his phone patch working on all hands. K3LFD has his new vertical working. W3ZNV stirs up RACES in St. Marys. WA3MSW is plugging away despite the school load. W3OU opens one session on EAN can age you quick. K3BA is ubiquitous on all modes. WA3EOP is back with schemes involving everybody. W3FZY had a ball in the SS. W3GRM had a good workout with his secret weapon on 15. WA3GXN is settling down for the winter. K3GZK shows up with regularity for NCS jobs. Traffic: W3TN 355, W3QU 143, W3EZF 93, W3OKN 90, K3BA 71, K3LFD 59, W3FA 57, W3FZY 56, W3FCS 53, K3GZK 42, WA3MSW 28, W3ECP 16, W3GRM 16, W3EOP 9, W3BHE 8, WA3MLI 6, WA3GXN 5, W3ABC 3, WA6IDN/3 3, W3ZNV 3, WA3EOP 1, K3QDC 1.

SOUTHERN NEW JERSEY — SCM, Charles L. Travers, W2YPZ — SEC; W2LVW, PAMs: W2FJF, W2YPZ, W2ZHMU, RM: W2JL

Net	Freq.	Time(PM)	QNT	Sess.	Tfc.	Mgr.
NIPON	3925	Su 6	93	4	28	WB2FJE
ECTTN	7290	M-F 5	181	24	43	WB2HMMU

McOVHE
EPTN 148.9 1 5 8 3 0 W2YPZ

The great fall and winter build-up is under way. Net Mgr. W2HMMU is doing a fine job with the ECTTN 40-meter net. Net members are commended for an I-B initial report. In the making is a slow net (6-8 wpm) being organized by WN2ALN; frequency 7160 kHz at 6:30 P.M. Sat. The net designation is I-SNN (Eastern States Novice Net). This is an excellent opportunity for operators to brush up on the code. K2ARY reports transmitting 5 bulletins during the past month. W2ORS had a rather busy month with 5 stations having difficulties on frequency. Cooperation was excellent. Five Mercer County N.J. stations are now operative on 2-meter Im — W2HX, WA2TNS, W2FDE, W2YPZ and W2QLP, CD as well as ragchew and repeater activity make up their objectives. The newly elected officers of the Delaware Valley Radio Assn. are K3CPS, pres.; W2ZPJ, vice-pres.; W2VU, treas. Best wishes to the officers for a good year. Traffic: (Nov.) W2ZVU 278, W2IIVB 148, W2JH 116, W2ZQ 60, WA2BLV 57, W2HMMU 41, W2ORS 37, WA2NZJ 19, W2YPZ 11, W2NFX 9, W2FJE 8, WA2KWB 7. (Oct.) W2IIVB 348.

WESTERN NEW YORK — SCM, Richard M. Pirzenise, K2RTK — Asst. SCM; Rudy M. Ehrhardt, W2PVI. SEC: W2RUF. Section Nets appear in Apr. QST. Please send me information on nets you would like listed in this column, deadline for Apr. QST is Feb. 10. The following Novices earned an NYSNC certificate: WN2AOC, WN2OMN, WN2OPU, WN2OXH, WN2NCK, WN2PUU, WN2PUS/2, WN2RKB, WN2SIR, WN2SMM, WN2SMQ, WN2PKE who now is WA2PKE. The Novice NYSNC meets Sat. at 10 A.M. local time. NCS is on 3730 kHz and looks over the entire Novice band for check-ins. There are nightly training sessions at 5 P.M. local time. W2RUF is recuperating after a short stay in the hospital. Oh, I'll list data on open repeaters in that same Apr. QST if you will get me the information needed on your favorite echo machine. ARRL Hq. insists that ALL appointments meet annual endorsements. Please check your certificate and if you wish to keep it in effect, either get it to me for endorsement, or let me know you want it endorsed so I may complete the necessary paperwork. WA3IRV/2 operated from VP2DAI and LU1AZO over the Christmas Holidays. W2CXM at Cornell has a new Drake line. W2RQI appointed WA2VLS as asst. mgr. of the NYPO-CWN. K2VFA now operated by remote control. K2FXB has worked 29 states on 2 meters. WA2LCC is a new Advanced. Sorry to report the passing of K2MPK. K2KOC transmits ARRL bulletins each Fri at 2245 GMT on 3925 kHz. In the Net dept. we have the following: Mike Farad — 26 sessions, 306 QTC with 355 QNT; All Service — 5 sessions, 48 QTC with 55 QNT; NYS — 60 sessions, 441 QTC with 691 QNT. W2OE made BPL. W2SIR reports the Jamesville-Dewitt High School Amateur Radio

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Team the
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 and **SB-200 Linear**
 for top watt-per-dollar value

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 Transceiver... **\$249⁹⁵***

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- Image & IF rejection better than 50 dB
- Rock-solid tuning 80 through 10 meters

The HW-101 is a further refinement of the widely acclaimed HW-100 Transceiver... with improved receiver circuitry and dial drive and added front-panel SSB/CW filter selection. Sensitivity better than 0.35 μ V for 10 dB S + N/N has been obtained by refinements in the receiver circuit. Image and IF rejection are better than 50 dB. 36 - 1 knob to dial ratio in a new ball bearing drive mechanism delivers 34 smooth revolutions per 500 kHz band segment. This feature, coupled with new preselector circuitry and thermal stabilized FET VFO with 5 kHz readout, gives you rock-solid drift-free tuning from 80 through 10 meters. Built-in 100 kHz crystal calibrated and zero reset button provide accurate, stable calibration. Front-panel crystal filter selection lets you convert the HW-101 to CW reception at the flick of a switch. The optional SBA-301-2 crystal filter installs in minutes, giving you the same remarkable two-way capability provided by its big brother, the Heathkit SB-102. CW filter offers razor sharp 400 Hz selectivity to carve a QSO out of the QRM. Built-in SSB crystal filter delivers 2.1 kHz selectivity at 6 dB down for superior SSB copy.

Kit HW-101, 21 lbs. **249.95***
 Kit HP-23A, AC power supply, 19 lbs. **51.95***
 Kit HP-13A, DC power supply, 7 lbs. **69.95***
 SBA-301-2, 400 Hz crystal filter, 1 lb. **21.95***

Heathkit SB-200
 1 kW Amplifier... **\$220⁰⁰***

- 1200 watts PEP input SSB; 1000 watt CW
- 80 through 10 meter band coverage
- Built-in SWR meter; ALC

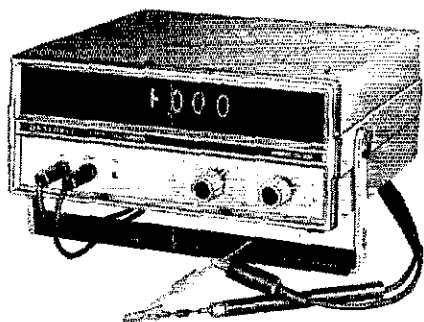
Brawny partner of the "Economy Kilowatt" pair, the SB-200 is a completely self-contained, compact desktop rig with built-in solid-state power supply that sets you up with 1200 watts SSB, 1 kW CW with 80 through 10 meter hand coverage. And since it requires only 100 watts PEP drive, it's the ideal mate for the Heathkit HW-101 and almost all other popular transmitters and transceivers. A pair of 572B/T-160-L are used for amplification, fan cooled and shielded for maximum TVI protection. Other noteworthy features include a pretuned cathode input circuit for efficiency, low distortion; ALC output for automatic exciter control; circuit breaker protection; built-in SWR meter and antenna relay that automatically switches to the exciter when the linear is off; 120/240 VAC operation.

Sturdy, lightweight construction is another plus feature. The SB-200 is designed around a heavy-gauge, one-piece aluminum chassis, partitioned for extra strength and proper isolation of components and circuitry. Well planned circuit design, coupled with clear, concise assembly instructions means you can have your SB-200 on the air 15 to 20 hours after you start the kit. Normal bench tools, a VOM for alignment, and the coupon at right are all you need to get started.

Kit SB-200, 50 lbs. **220.00***

and new economy test gear to take its measure

Keep your "Economy Kilowatt" operating at peak performance with these new Heathkit budget-minders.

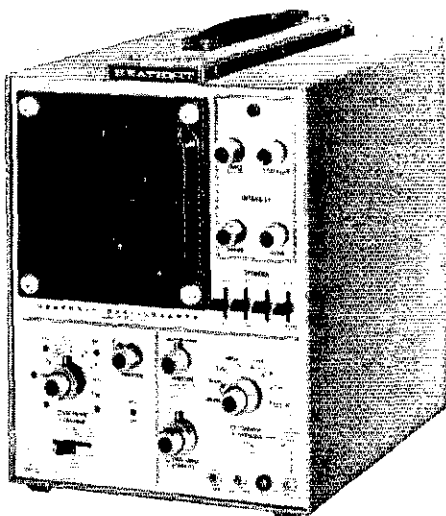


New Heathkit Digital Multimeter... \$229.95*

- 3½ digits for 100 uV resolution on 200 mV range, 1 V on 1000V
- Furnished DC calibrator gives 0.2% accuracy VDC (can be lab calibrated to 0.1%)

Here's a true digital multimeter (circuitry and read-out) at far less than you'd pay for comparable wired units... and accuracy that's better than many wired DMMs. The IM-102 accurately measures AC & DC voltages, currents, and resistance with no need to change probes or switch meter for changes in DC polarity. Five overlapping ranges measure voltage from 100 uV to 1000V on DC (either polarity); 5 ranges cover 100 uV to 500 V on AC; 10 ranges measure 100 nA to 2A on AC or DC; and 6 ranges measure resistance from 0.1 ohm to 20 megohms. Input impedance is approx. 1000 megohms on 2V range, 10 megs on higher ranges, with overload protection built-in. Decimal point automatically placed with range selection. Front panel light indicates overrange. DC calibrator furnished. An internal circuit and unique transfer method allow accurate ACV calibration. Solid-state design with cold cathode readout tubes and memory circuit assure stable, non-blinking operation. Kit includes standard banana jack connectors complete with test leads. Put it together in about 15 hours for a lifetime of precision performance.

Kit IM-102, 9 lbs. 229.95*



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- 50 ns sweep rate with magnification
- AC-DC coupling

Maximum flexibility in a general purpose scope, at a price to fit any budget... the new Heathkit IO-103 is a radio amateur's dream come true! Big 6x10 cm screen with lighted graticule for easy, accurate measurements. DC-10 MHz ± 3 dB response with less than 50 ns rise time on vertical channel. Horizontal expansion gives x2 magnification $\pm 5\%$ for a 50 ns/cm sweep rate. Triggered sweep, too, with selection of either normal or automatic modes. Other features are switch controlled AC-DC coupling; provision for external triggering signals and horizontal deflection signal; front-mounted connectors for vertical inputs and 1V peak-to-peak signal for checking calibration; 120/240 VAC operation. Put this budget-minder to work in your ham shack... now.

Kit IO-103, 37 lbs. 229.95*

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Club about to swing into operation. A new traffic training and weather net is the Early Eighty Free Net, meets daily at 1115 GMT and on Sat. and Sun. at 1215 GMT, frequency 3733 kHz. RAKA promises another big WNY Hamfest bash May 13 at the Monroe County Fairgrounds. RAGS reports plans in full swing for their annual hamfest. Date Oct. 7, place not yet decided, a full array of name speakers at both events. Mark 'em down on your calendar. Traffic with * indicating PSHR: (Nov.) WA2ICU* 412, W2OE* 397, W2FR* 343, WA2ELD* 326, K2IBX 145, W2RUF* 130, W2FEW 119, K2KQC 100, W2ROF 96, W2BU* 89, WB2VND 79, K2QIW 75, W2MSM 69, WB2IKL* 66, W2MTA* 65, K2KTK* 52, W2HYM 51, W2DBU 44, WA2ITJ 34, K2OFV 28, W2EAF 24, WN2PUU 23, K2UIR 22, W2MF 21, K2DNN 20, K2BWK 10, WN2SIR 10, W2PVI 8, K2IMI 7, WA2NPO 7, WA2NE 6, WB2FFG 5, WA2QCY 5, WN2AOG 4, WA2KAT 4, WA2LCC 4, W2CFL 1, W2GLA 1, (Oct.) WA2KAT 11.

WESTERN PENNSYLVANIA SCM, Robert E. Gawryla, W3NEM - SEC: W3KPI. PAM: K3ZNP. RM: W3LOS, W3KUN, WA3IPU. The WPA CW net meets daily 3585 kHz at 7:00 P.M. KSSN meets Mon. through Fri. at 6:30 P.M. on 3585 kHz. All times local. W3TOC, W3OFI and WA3AKH are new RACES deputy ROs in the Allegheny County area. WA3NAZ is the new RO for Greene County. WA3PCR is a new General Class licensee in the Pittsburgh area. WN3RTD is a new Novice in the Indiana area. WN3PZT, ex-W3ZMU, recently passed his Advanced Class exam. WA3OOT also is a new Advanced Class operator. I hear K3CHD is getting some good results with amateur TV broadcasts. W3HTD was named Ham of the Month by the Radio Assn. of Erie. W3AKG was named Steel City ARC's member of the month. K3AFU and W3BRB are new holders of Advanced Class licenses and WN3PUI is now WA3PUI. Congrats to all licensees who have upgraded their license. Check your license for renewal date. Upgrade and renew at the same time. Good luck. PSHR: K3ZNP 54, WA3NAZ 43, W3LOS 39, W3NEM 39, WA3IPU 39, W3YA 31. KSSN traffic report for Nov.: 17 sessions, 96 QNI, 31 messages. WPA: 30 sessions, 393 QNI, 248 messages. Traffic: WA3IPU 187, W3NEM 186, W3KUN 141, W3LOS 111, W3YA 107, WA3NAZ 99, K3ZNP 68, WA3MDY 66, W3MJ 56, K3VOV 24, K3HCT 22, W3ATQ 18, K3SN 17, W3SN 4, W3IDO 2. Total 1108.

CENTRAL DIVISION

ILLINOIS - SCM, Edmond A. Metzger, W9PRN - SEC: W9RYU. PAM: WA9CCP and WA9PDI (vnt), RM: WA9ZUE. Cook County EC: W9HPG.

Net	Freq.	GMT/Days	17c.
IEN	3940	1400 Su	3
ILN	3690	0030 Dy	206
NCPN	3915	1300 M-S 1800	84
Ill PON	3915	2245 M-F 1430	336
Ill PON	145.5	0200 MWF	21
Ill PON	50.28	0200 M	8

WB9FDP has a new Drake TR-6 and is now on 2-meter ssb and looking for new skeds. New officers of the Central Illinois Radio Club (Bloomington) are WA9MFP, pres.; K9GRO, vice-pres.; WB9AIA, secy-treas.; K9UCD, dir. Correction to Dec. column, WN9HBD is mother of WN9HXX and not as reported. W9LMJ is portable in KH6-Land on 21400. WB9BAC, K9ERG, WA9JEZ and WB9RDP have given technical talks at the last meeting of the Chicago Amateur Radio Club. W9FJP and WA9THM have a new harmonic. The Rho Epsilon Amateur Radio Assn. of I.L.T. has been declared a duly affiliated society of the League by the League's Executive Committee. WN9BWC is recovering from injuries received in a motorcycle accident. K9FYL's new QTH is Robinson, Ill. K9THJ is now 2-metering on 147.30 fm, W9HRY, net mgr., reports that the Ninth Region Net had a traffic count of 359 for the month. W9KBU gave a talk on "The Inside Story of The Crystal in Your Rig" at the last meeting of the York Radio Club. Don Drake won a Model 19 teletype printer at the Nov. meeting of the Illiana Teletypewriter Society. WB9FBZ, WB9DBN, WN9GRQ and W9HWG are the new officers of the Northwest Amateur Radio Club. WA9GXR is now K0CHE. The CENOIS (Decatur) CD unit helped the Salvation Army Marathon. The Decatur repeater station WA9TEC will be back in operation shortly. New appointment as OBS is W9TAL. The Northwest Amateur Radio Club held their annual dinner with a fine turnout. K9TXJ is a BPL recipient for Oct. Traffic. (Nov.) W9NKG 269, WA9UE 192, W9FHV 101, W9FLF 100, K9AVO 87, WB9AWY 85, W9YH 80, W9JXV 76, WA9RTB 47, W9LNO 36, WB9BXX/4 24, WA9LDC 24, W9PRN 20, WA9NZF 12, W9LFX 7, WB9FLP 4, W9LIDU 4, (Oct.) K9TXJ 167, K9KOR 2.

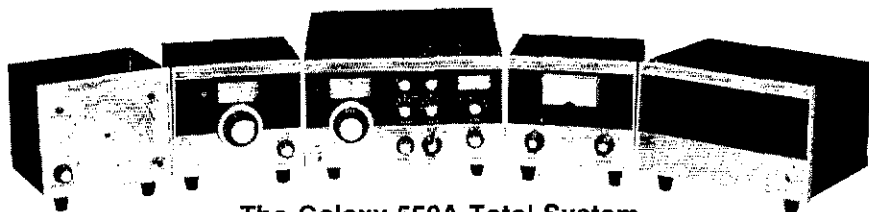
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RF550A contains high accuracy watt meter; calibrated in 400 and 4,000 watt scales; switch for forward or selected power; switch to select 5 antennas or dummy load. Order No. 857 Ham Net \$75.00

RV550A is a solid state VFO. Function switch selects the remote unit to control Receive-Transceive-Transmit frequency independently. Order No. 856 Ham Net \$95.00

SC550A Speaker Console with headphone jack. AC400 power supply will mount inside. Order No. 858 Ham Net \$29.95

AC400 Power Supply is heavy duty solid state to operate GT-550A at full power, on SSB or CW, and with switch selection of 115/230 VAC, 50/60 Hz input voltages. Order No. 801 Ham Net \$99.95

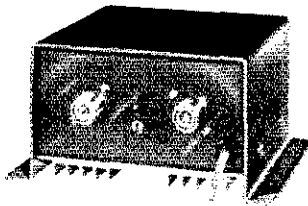


The FM-210 2 Meter Transceiver

Capability...That's what you purchase from Hy-Gain/Galaxy. Top performance from the first mass produced 2 meter transceiver. Fixed or mobile, the FM-210 will provide maximum pleasure with minimum investment. There's a full 10 watts. And all American made, too! No parts problems and backed by Hy-Gain's famous Customer Service!

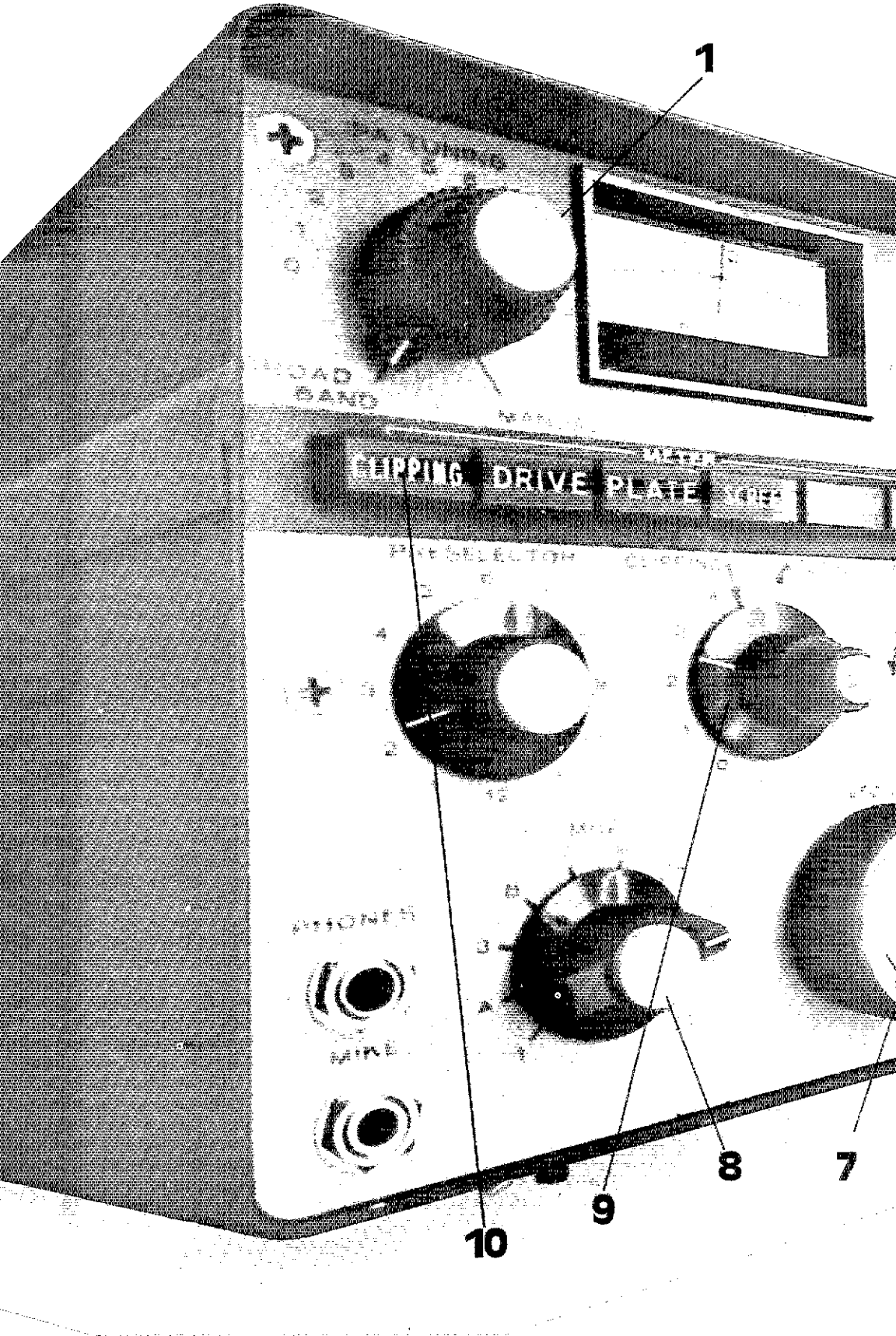
The PA-210 2 Meter 35 Watt Mobile Amplifier

This all new ruggedized solid state two meter mobile amplifier provides 35 watts output to greatly increase your communication range. The PA-210 is a must for areas where no repeater is available. The PA-210 is designed as a companion for the FM-210. (When used as a system, the AC-210 power booster is not required.) A unique circuit protects the output transistor from voltage spikes and surges. All change-over relay functions are internal and controlled by FM-210 circuitry through a connecting cable.

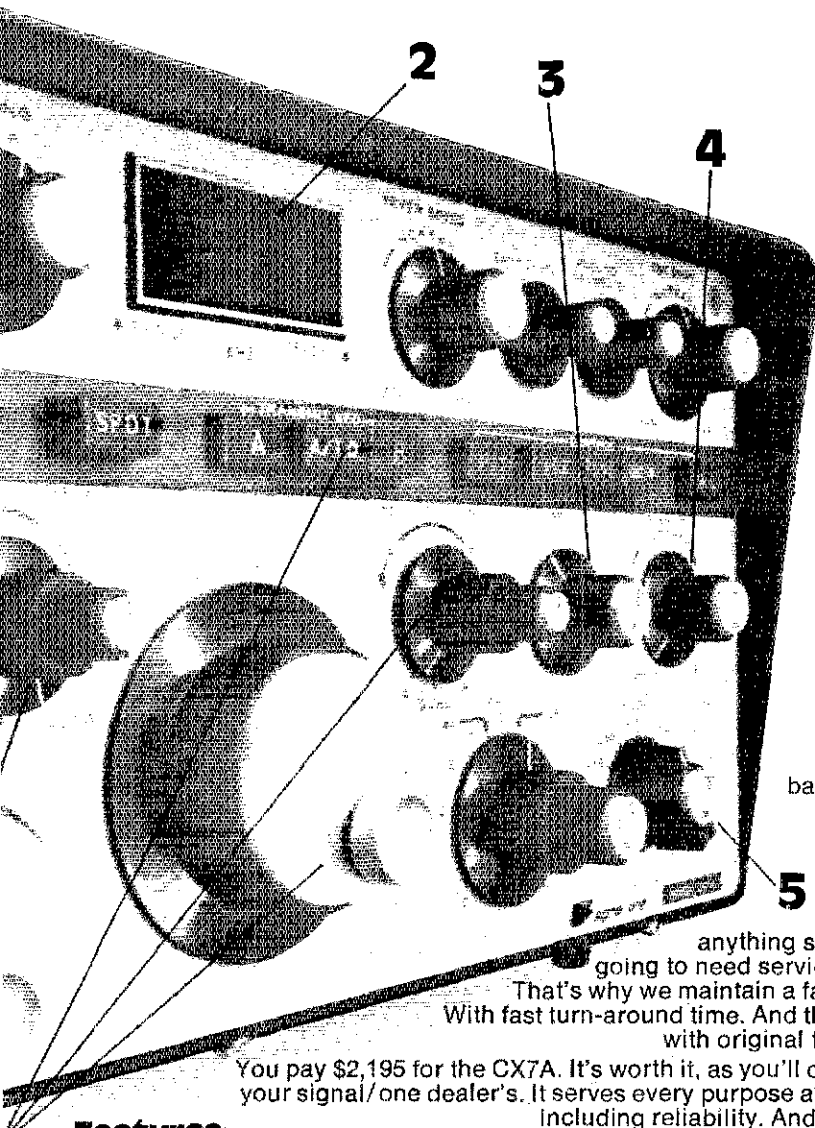


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When signal/one engineers set out to design the most advanced ham rig ever, they knew they were getting into trouble. Because they wanted to build a rig that incorporated every feature the serious amateur would want. They knew that would take a lot of circuitry and a lot of innovation. With that comes bugs. And they had their share of them. We're not ashamed to tell you some of the earlier models literally went up in smoke. But... live and learn. We went back in and got the bugs out. What we've ended up with is the world's most sophisticated rig. And it works! Fantastically so.

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You pay \$2,195 for the CX7A. It's worth it, as you'll discover when you see it at your signal/one dealer's. It serves every purpose an amateur could dream of. Including reliability. And service you can count on.

Features:

1. Instant band change without tuneup.
2. Instantaneous digital frequency readout.
3. IF shift control.
4. Built-in pre-IF noise blanker.
5. All popular modes of operation.
6. Transceiver-plus-receiver operation.
7. Hang AGC levels out wide swings in signal strength.
8. All ham bands from 160 through 10 meters.
9. RF envelope clipping provides matchless talk power.
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Reception

the moment of truth for all systems TRI-EX W-51

W-51 by TRI-EX . . . free standing . . . self supporting. Gets the MOST from your antennae. Rigid, torque resistant, built of high strength tubular steel with solid rod "W" bracing. No guys or house brackets required. Extended height 51', nests down to 21'. Telescopic cable extends sections uniformly. Hot Dipped Galvanized After Fabrication. Available for immediate delivery.

\$413.¹⁰

Send for complete information to:



7182 Rasmussen Avenue
Visalia, California 93277



INDIANA - SCM, William C. Johnson, W9BUQ - SEC: W9IC. RMs: W9ANT, W9OC, W9HRY, W9AZKX. PAMS: K9CRS, W9OHH, (VHF) W9PMJ.

Net	Freq.	Time (Z)/Days	rtc.	Mgr.
TTC	3910	1330 Dy	392	W9OHH
		2130 M-S		
		2300 Dy		
QIN	3656	0000 Dy	(190)	W9ANT
		0400 Dy		
IPON	3910	1245 Su	20	W9DMH
		1830 S-S		
IPON VHF	50.2	0200-0400 Dy		K9APH
Hoosier VHF			26	W9PMT

With deep regret I report K9EOM, W9VKN and WN91OK as Silent Keys. The Indianapolis Radio Club youngest member is WN9EKA, 13 years old, waiting for his General. Muncie Area ARC new officers are WA9ZFS, pres.; WA9VEL, vice-pres.; K9QWP, secy.; WA9POW, treas.; WA9UKP, alt. chmn.; WN9GNB, asst. treas. Navy MARS held the fall meeting for Ind. at the Navy Avionic in Indianapolis, Nov. 11. New dir. for the 9th Navy District is N0ASG/N0FIS. The Indianapolis Radio Club annual Award Dinner was held Nov. 13 with W9FI receiving the award for outstanding work for the club. Speaker was Carl Dean, a member of the Peace Corps in Ethiopia for two years. New ICS: WA9ZLS Delaware, K9LOG Tippecanoe, W9LXA Posey, WA9YGD White Counties and WA9YXA, Clark, Scott, Switzerland, Harrison, Ohio and Floyd Counties. It is reported that the Indiana phone net now known as Ind. Traffic Net was started Jan. 19, 1947, by W9KJ on 3910 kHz. WA9RMT is back in ham radio after a long absence. WA9MAI lost the repeater because of a fire. Don't forget the annual Lake County Banquet in Feb. Contact W9HGG, QIN Honor Roll: W9ANT 70, W9FI 56, W9BAY 47, W9HJW 39. Amateur radio exists because of the service it renders. Traffic: (Nov.) WA9WJA 333, WB9EAY 224, W9ANT 205, WA9VZM 142, W9QLW 126, W9OHH 111, W9AZKX 91, W9HRY 90, W9HUQ 60, W9FI 59, W9FWH 41, K9CBB 33, K9DJY 31, K9RPZ 26, K9YBM 26, WA9CHY 23, W9KWB 18, WA9AXE 17, W9DZJ 17, W9UEU 17, WA9GJZ 15, K9HK 15, WA9RY 9, W9HWR 9, K9DIY 7, K9EY 7, K9RWQ 7, W9IG 6, W9YXX 6, K9QVT 5, W9RDP 4, W9RHH 4, WA9ZLS 4, WA9OAD 1.

WISCONSIN - SCM, E.M. Pokorny, W9NRP - Asst. SCM: Joseph A. Taylor, W9DMT, SEC: W9NGT, PAMS: W9CKE, K9THI, WA9OAY, WA9PKM, WA9OKP, RMs: W9NJR, K9KSA.

Net	Freq.	Time/Days	QNI	QTC	Mgr.
WIN	3662	0115 Dy	362	123	W9BHR
WSSN	3662	0200 11S	15	1	K9KSA
SW2RN	145.15	0230 Dy	148	7	WA9PKM
SW6RN	50.4	0300 M-S			W9BCKE
BWN	3985	1245 M-S	474	296	WA9OAY
W-RACES	3993.5	1400 Su	51		W9NRP-ANC
W-OCWA	3987	1500 Su	43		W9NRP-ANC
BEN	3985	1800 Dy	779	104	WA9OKP
W-IPON	3925	1801 M-F	556	31	W9EMC
WSBN	3985	2300 Dy	1348	173	K9THI

Certificates renewed: EC: W9SDM; PAM: K9THI; OPS: W9KXK; ORS: W9APB, WA9RAK, W9DND; SEC: W9NGT. New Novice at Ellsworth is WN91WI. WB9ENK now Advanced Class and cycling the Extra. The Tri-County ARC still hold a swap-fest from 9 A.M. to 6 P.M. Mar. 8, 1972 at the Armory, Whitewater. For details contact WA9VEL or W9DWC, W9UCY and WN91BG made RPL Traffic: WN91BG 544, W9CXY 529, W9DND 302, K9CPM 287, K9THI 96, W9ESI 84, W9DXX 77, W9ABE 71, W9UCR 47, W9DMT 46, K9KSA 43, K9KRO 37, W9CHL 33, K9PS 33, W9NRP 31, W9IHW 30, WA9OAY 30, WA9BZW 20, W9DXV 19, WA9LRW 15, W9RFP 13, WA9PKM 12, K9UTO 9, W9KXK 5, W9DAN 3.

DAKOTA DIVISION

MINNESOTA - SCM, John H. Halstead, K0MVE - SEC: K0IAV - RMs: W0ZIN, W0DYAH, PAMS: K0FLL, W0HRL. WN0DCA became a Silent Key in Nov. Orvin is survived by his wife W0IRJ, an active MSPN member and Hands-Ham. W0TOP also became a Silent Key in Nov. W0ETGM is back on the air with a 4-watt transistor rig. The twins, W0QXA and W0QXI recently visited K0BJH in Washington, D.C. W0YC, Gopher Radio Club station at the Univ. of Minn., has been active on the higher bands handling traffic with PY2RZ in Brazil. W0YC is also very active on MSPN with W0QVYB at the controls. Many of the state college radio clubs are also active on the phone nets. This can be a great chance for service to students if advertised a bit more as well as building traffic counts. RM WA0YAU, RID 1, Box 198, Belle Plaine, Minn. No011, would like any interested novice to drop him a card with call, name and crystal frequency, 3700 to 3750, to be

Everything you always wanted in keyers and QRP equipment.

■ POWER-MITES



MODEL PM2B

MODEL PM2B. Popular two watt CW transceiver. Operates on 80-40-20 meters. Side-tone. Lantern battery or 12 VDC power source. Size 10 $\frac{1}{2}$ " W \times 4 $\frac{1}{2}$ " H \times 6 $\frac{1}{2}$ " D. Weight 2 $\frac{3}{4}$ lbs.

Price \$64.95.

MODEL PM3A. Advanced 5 watt CW transceiver. Operates on 40-20 meters. Side-tone. Push pull final. Pi Network. Break-in keying. Size 10 $\frac{1}{2}$ " W \times 4 $\frac{1}{2}$ " H \times 6 $\frac{1}{2}$ " D. Weight 3 lbs.

Price \$79.95.

■ ANTENNA TUNER

MODEL AC5. Matches 52 ohm output of Power-Mites to open wire on random length antennas. Maximum power 10 watts. Size 4" W \times 2" H \times 4" D. Weight 1 lb. 4 oz.

Price \$8.95.

■ SWR BRIDGE

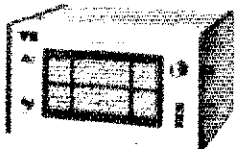


AC4

MODEL AC4. Favorite for QRP. Measures from $\frac{1}{4}$ watt to 200 watts. Size 4" W \times 2" H \times 4" D. Weight 1 lb. 4 oz.

Price \$14.95.

■ SIGNALIZER



S20

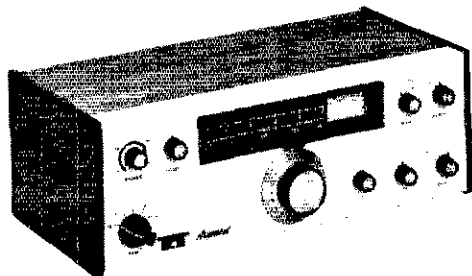
MODEL S20. Complete audio and speaker system for receivers/transceivers. Plugs into headphone jack. Provides maximum AGC to keep all signals constant level. Front panel headphone jack. Size 8 $\frac{1}{4}$ " W \times 4 $\frac{1}{2}$ " H \times 6 $\frac{1}{2}$ " D. Weight 3 $\frac{1}{2}$ lbs.

Price \$39.95.

MODEL S30. Similar to S20 but has built in FR4 CW filter; switchable. Size 8 $\frac{1}{4}$ " W \times 4 $\frac{1}{2}$ " H \times 6 $\frac{1}{2}$ " D. Weight 4 lbs.

Price \$49.95.

Argonaut



The Argonaut is for every ham.

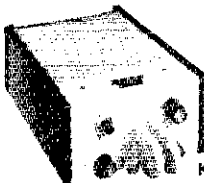
A transceiver that operates on an AC pack or lantern battery.

Covers Amateur bands 80-10, SSB and CW.

Completely solid state. Permeability tuning. Less than 100 Hz drift. $\frac{1}{2}$ uv sensitivity. 9 MHz crystal filter. 2.5 kHz bandwidth, 1.7 shape factor. Amateur bands 3-30 MHz. AGC. Speaker, SWR bridge, S-meter built-in. Instant CW break-in. Side-tone. Plug-in circuit boards. Selects normal side band, reversible. One control tune-up. 50-75 ohm push-pull output. Direct frequency read out.

Argonaut price	\$288.00
Power supply	\$24.95
Microphone	\$17.00

■ KEYERS AND KEYSER PADDLES



KR40

MODEL KR40. Squeeze keyer. Iambic sequence. Full memories. Variable weighting. With dual paddles. Speeds from 6-60 wpm. 115 volt AC operation. Side tone. Size 4 $\frac{3}{4}$ " W \times 2 $\frac{1}{2}$ " H \times 8" D. Weight 4 lbs.

Price \$89.95.

MODEL KR20. Keyer. Self-completing. On/off weighting. With dual paddles. Speed 6-60 wpm. Monitor side tone. 115 V AC operation. Size 4 $\frac{3}{4}$ " W \times 2 $\frac{1}{2}$ " H \times 8" D. Weight 4 lbs.

Price \$59.95.



KR5

MODEL KR5. Keyer. Self-completing. Optimum weighting. Single paddle. Speed 6-60 wpm. Operates from 6 or 12 volts DC. Size 4" W \times 2" H \times 6" D. Weight 1 lb. 6 oz.

Price \$34.95.

MODEL KR1. Paddles as used in KR40 and KR20. Mounted in formed aluminum case. Size 4 $\frac{1}{4}$ " W \times 2" H \times 6" D. Weight 1 lb.

Price \$18.95.

MODEL KR2. Paddle as used in KR5. Mounted in formed aluminum case. Size 4 $\frac{1}{4}$ " W \times 2" H \times 6" D. Weight 1 $\frac{1}{2}$ lbs.

Price \$12.95.

Ask your TEN-TEC dealer to show you our complete line. If there is no dealer in your area, send your order direct. Include \$2.00 shipping for each Argonaut, all other items shipped postpaid.

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placed on the roll for Minn. Junior Net (MJN). KØVPM reporting on Minn. RTTY notes a severe drop in QNI. Let's get those rigs back on the air and check-in with Mac on Sun. 3.620 MHz at 8:00 P.M. Traffic: (Nov.) WAØVAS 851, WØZHN 528, WAØIAW 280, KØCSE 250, WAØGRX 173, WAØYVT 161, WAØFBZ 137, WBØCGT 109, WBØBRG 104, WAØVYV 84, WØPET 78, WØDZA 77, WØWFA 76, KØMVF 70, WAØYWA 69, WAØTFC 56, WAØYAH 56, KØFLT 54, WAØVYB 46, WBØDYZ 40, WØKNR 39, WØISJ 33, KØPIZ 26, WØWAS 24, WAØHRM 23, KØJLE 22, KØZBI 21, KØICG 20, KØZRD 17, WAØJPR 16, WAØUWT 16, KØZKE 16, WAØRKT 14, WAØRKV 13, WBØATR 6, KØJTA 5, WAØMMV 5, KØSSO 3, WØKYG 2, WAØYER 2. (Oct.) WAØVAS 806, KØZRD 16, KØJLE 7.

NORTH DAKOTA - SCM, Harold L. Sheets, WØDM - SEC: WAØAYL. OBS: WBØATB. RM: WAØRSR. OO: WØBF, WBØCTR and WBØDGY are new calls in New Salem. KØAWU took advantage of some scatter on 2 meters and worked into Wash., Tex. and Okla. The repeater station for 2 meters sponsored by the Forx ARC is slowly getting under way. The receiving antenna is on a 280-ft. tower. The input frequency will be 146.34 MHz and output 146.94. WASWDB/Ø reports reorganization of the GFAFB Turtle River ARC with WØLIR, pres.; WA5QVH/Ø vice-pres.; WA5WDB/Ø secy.-treas.; K4FPH/Ø act. mgr. WAØWLP reports a new addition to the family. Congrats. WAØAAD had a high score in the SS. WAØREW reports activity with some State Historical Society work concerning excavations near his QTH. WØGB and XYL WAØGRX attended the Handilham gathering at Fairbault. KØIAB is back on the air and active again. WØBF reports the Radio Club is sponsoring radio classes for Novice and General. KØFRP is in the far east on sea duty. When conditions are right KØPYZ can be heard at times on the RACES Net. The Forx Amateur Radio Club has the following new officers: WAØAYL, pres.; WNØELC, vice-pres.; KØOSL, secy.-treas.; WNØAUA, act. mgr. WØMLA is in the hospital. WAØELO is active on TEN. We need cw operators.

Net	Freq	CDT/Days	Sess	QNI	QTC	Mgr.
Goose R	1990	0900 Su	4	61	3	WØCDO
PON	3996.5	0900 Su	12	177	37	WAØSJB
		1830 S-S				
YL WX	3945	0730 M-F	20	317	295	WAØGRX WØLEJ
RACES	3996.5	1730 M-F	44	1001	125	WBØATJ
		1830 M-F				

Traffic: WAØELO 242, WAØSUF 218, WØDM 35, WASWDB/Ø 28, WØWWL 26, WBØAUM 25, WAØREW 23, WAØSJB 23, WØCDO 19, WBØBIN 15, WB4AYN/Ø 5, WBØBUF 5, WØUSC 4, WBØFTH 3, WAØJPT 3.

SOUTH DAKOTA - SCM, Ed Gray, WAØCPX - SEC: WAØOVR. PAM: WAØYAK. RM: WAØTNN. The Brookings repeater WØBXO requires a short tone of 2100 Hz to gain access to it. The Sioux Falls repeater WAØVVG requires an 1800 Hz tone. The South Dakota cw net frequency is 3.650 MHz. A new call in Sioux Falls is WNØFZY. WAØWMT and WAØYAK have received their Extra Class license. Net reports - Morning Wx Net, average of 20 check-ins per day; NJQ - 537 QNI and 7 formal; Early Evening - 600 QNI and 20 formal; Late Evening - 1481 QNI and 35 formal; SUN CW - 177 QNI and 64 formal. Traffic: WØZWL 532, WØMZI 225, WAØTNN 123, WØHOJ 91, WAØYAK 45, WØDVB 27, WAØBZD 22, WAØJEN 18, WAØN2J 15.

DETA DIVISION

ARKANSAS - SCM, Jimmie N. Lowrey, WA5VWH - SEC: WSRXU. RM: WASTLS. PAM: WA5QMO. WSKL has twenty-two elements on 2 meters that works fine into Little Rock, Fort Smith and Springfield. WASPGV and WASEJH are working on a repeater system they hope will be incorporated in several of the state's repeaters. WASZKE received a new L4-B for his birthday. WB5COK is now operating from Mountainburg with a Swan-350. K5BOC now has an SB-102 which he is running mobile since his SB-101 was stolen from his mobile earlier. W5PNZ and W5DTP are working on homebrew four-element tri-band quads.

Net	Time(Z)/Days	Freq	Mgr.
Razorback	0030 Dy	3995	WA5QMO
OZK	0100 Dy	3790	WASTLS
Air Phone	1200 M-S	3937	W5VFW
Ark PON	2130 M-F	3925	W5OEO
Ozark	2330 Dy	3995	WASZKE
CAREN	0100 Th	146.34/94	W5DPE
LX Info	0045 M	3945	W5OYH

Repeaters: Little Rock W5DI 146.34/94; Fort Smith WA5YUT 146.34/94; Fayetteville WASSNO 52.550/53.020. Traffic: W5NND 144, WASTLS 29, WSKL 4.

MISSISSIPPI - SCM, Walker J. Coffey, W5NCB - SEC: WA5JWD. RMs: WASTMC, WA5YZW. PAMs: W5JHS, WASKEY,

AHA! YOU THOUGHT GOTHAM

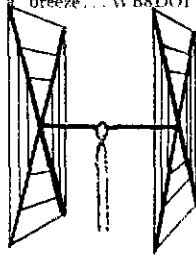
made ordinary, everyday, run-of-the-mill antennas. No, no, no. We make winners through superior materials and design. WAIJFG won the New England Round-Up championship with our 3-element 15-meter beam by a margin of 5,982 points! In QST since '53.

QUADS

Totally satisfied with quad. Worked DK4VJ, SM7DLH, XE1AB, DM4SEE, PL8SK, F6AUM, HK7YB in few hours. Instructions breeze...WB8DOJ

CUBICAL QUAD ANTENNAS

— these two element beams have a full wavelength driven element and a reflector (the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a fool-proof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!



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.	\$37.00
10-15 CUBICAL QUAD.	32.00
15-20 CUBICAL QUAD.	34.00
TWENTY METER CUBICAL QUAD	27.00
FIFTEEN METER CUBICAL QUAD	26.00
TEN METER CUBICAL QUAD.	25.00

(all use single coax feedline)

How to order: Send money order only (bank, store, or United States) in full.

We ship immediately by REA Express, 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). Tux 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; 3/8" and 1" aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 EI 20.	\$21	4 EI 10.	\$20
3 EI 20.	27*	7 EI 10.	34*
4 EI 20.	34*	4 EI 6.	20
2 EI 15.	17	8 EI 6.	30*
3 EI 15.	21	12 EI 2.	27*
4 EI 15.	27*		*20-ft. boom
5 EI 15.	30*		

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, TI2FGS, W5KYJ, WIWOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4WJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, P5ASN, FG7XT, XE2I, KP4-AQL, SM5BGK, G2A0B, YV5CLK, OZAH, 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

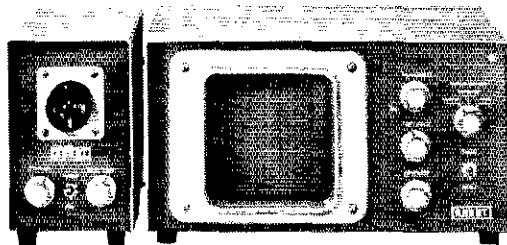
GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139

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- ROBOT MODEL 70 MONITOR. . \$495
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- 25mm, f1.9 lens. \$ 30
- 25mm, f1.4 lens. \$ 40
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I am interested in the following new equipment:

I have the following to trade: (what's your deal?)

Ship me:

I Enclose \$ _____ I will pay balance (if any):

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- Master Charge* BankAmericard American Express

Account Number: _____

Expiration DATE _____ *Master Charge Interbank number _____ (4 digits)

Name: _____

Address: _____

City & State: _____

- Send used gear list Send Robot literature

K5MDX. PSHR regulars include W5SBM, W5ED1, W5D1K and W51MC. Congrats to W5CG1. Advanced and W5CAV. Extra Class licensees, Miss. Coast ARA officers are W4SSUP, pres.; W5AHL, vice-pres.; W5AKN, secy.; W5SDCV, treas.; K8YUW1, act. mgr. Appointments: K3WUX, W5LOB as FC's; W5CQU, W5BW, ORS; K3TYP, W5RUB, W5CUL, W5BW, K5PPL, OPS; W5BW, K5PPL, K3TYP, W5RUB, ORS; K3TYP, OVS. Endorsements: W4SUW, K5MOH, W4NOQT, FCs: K5K1R, OPS; W5RUB, CO.

Net	Freq.	Time/2Days	Nov	QVI	QTC	Mer.
MTN	3665	0045 Dy	144	26	W4SYZW	
MNN	3733	0000 MW	50	15	W4G1MC	
GCSBN	3925	0030 Dy			W51HS	
CGTCH	3935	0100 Dy	1474	73	K5MOT	
MSBN	3990	0015 Dy	1105	172	W4STWT	

Please encourage Novices in your area to check into the Novice Net. We need more check-ins on the cw net. Let's get those new countries that we need during the DX tests in Feb. and Mar. Traffic: W5SBM 443, W4SYZW 25R, W5BDEF 169, W5ED1 8R, W5WZ 3R, W5NCR 76, W4SBNH 2R, W5NEIN 21, W4SKLY 19, K8YUW15 19, W5BKM 11, K5YTA 7.

TENNESSEE - SUM, O.D. Keaton, WA4GLS SEC; W44ANX, PAM; W4PPP, K4MOH, WA4EWW, RM; W4BDAJ.

Net	Freq.	Time/2Days	Nov	QVI	QTC	Mer.
1PN	3980	1245 M-F	30	1674	64	W4PLP
		1400 Sat				
EUPN	3980	1140 M-F	22	531	18	W44EWW
1UN	3980	0200 Th	4	51	0	W44MPJ
TN	3635	0100 Dy	30	178	68	W4BDAJ
KVHEN	50.7	0200 T	8	33		W44MPL
1PON	3980	0030 M	4	162	10	W44BHZ
MTTMN	28.8	0200 T&F	8	95		W44GLS
ETFMN	28.7	0200 W&F				W44JRC
1HARCN	7268	0130 W&F	9	146	4	W44QNK
TNN	3720	0000 Dy	14	50	16	W44RTX
1TVHEN	50.4	0100 TTh&S	11	89		W44QOB
1LVN	145.2	0100 W&F	9	27		W44QOB
1SSBN	3980	0030 M-S	26	1416	114	E4MOJ

I want to urge all of you to participate in the Novice net now in operation. The Tenn. Council of Radio Clubs is sponsoring a QSO Party Feb. 13. The NARC nominated the following officers for 1977: W4WXY, pres.; W44KOC, vice-pres.; W44JHP, secy.-treas. New officers of the Delta ARC are: W44WDU, pres.; W44PPP, vice-pres.; W44V57, secy.; W44VFP, treas.; W44EAB, K4AAK, K4B8I and K4ZCZ, board of dir. The club's repeater W4BS is on 146.22/146.76. Traffic: W4BDAJ 186, K4CNY 124, W4ZJY 108, W4RUW 63, W4WBK 46, W44ANX 23, W44MYZ 21, W44GLS 20, W44YU 16, W44HSS 15, W44RZC 13, W44PP 13, W44VYM 11, W44MPL 11, W44JSG 10, W44YL 9, K4UMW 7, W44GW 4, K4SJV 3, W44SG 2.

GREAT LAKES DIVISION

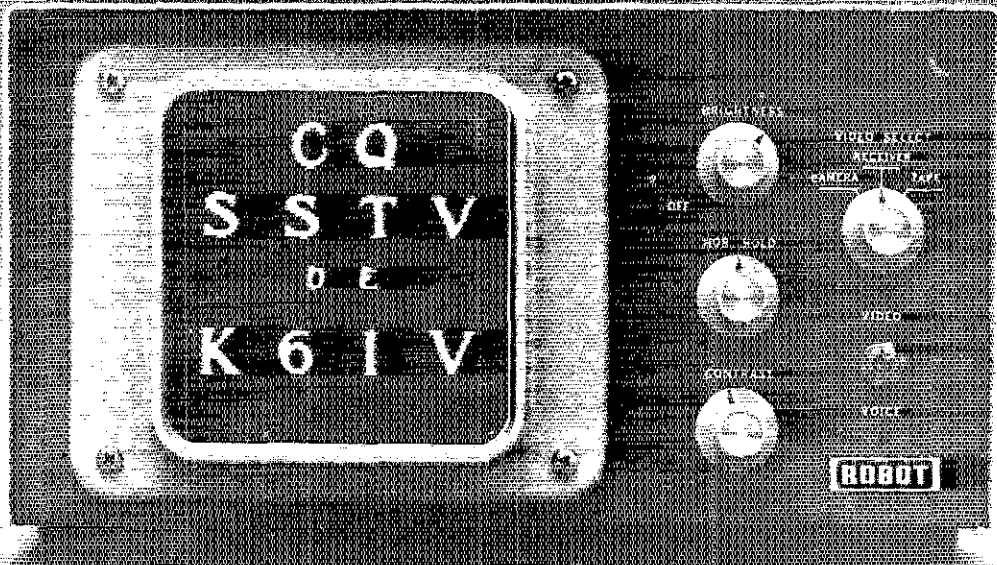
KENTUCKY - SUM, Ted H. Huddle, W4CID - SEC. K4YZU. New appointments: W4CDA as ORS; W44TFF OPS; W44RCD and W4YOK ODS. Endorsements: W4CID and K4DYM as ORS; W44CVY and W44LE OPS; W4BAZ RM; W4OIP OVS; W4TOY OVS and OO; W44TV EC.

Net	QVI	QTC	Net	QVI	QTC
KRN	406	22	K5N	551	284
MKPN	555	23	K4PN	51	23
KCN	1844	01	ECATN	80	0
KNTN	277	151			

The Owensboro gang was busy assisting in directing a local parade and helping the sheriff's dept. search for evidence using their metal detectors. W4CID and W44QMC traded Quad antennas. W44MFX and W44JOS have new homebrews while W45XP has a new 5B-700. K4CKJ has over 100 countries worked on 80-meter cw. W44PSP passed his General K41XJ now has WAS and CP-45. He also conducts code and theory classes for Novices in Louisville. W44LLK and W44RLI have a new HW-100. W44QXM nobles on 3960. W44PSP wants to start a teenage net. Anyone interested? Traffic: W4BAZ 173, W44PYC 111, K4PW 104, W44TFF 93, W44KPL 85, K4UNW 85, W44VZ 85, W4CID 71, W44UGD 69, W4OY1 65, K4MAN 49, W4NBZ 37, K4TRT 37, W44AUN 25, W44PSP 34, W44ENH 26, W44WCM 23, K4TXJ 22, K4AVX 19, W44FOR 19, W44QX 18, W44OY1 16, W44QX 15, W44MXD 15, W44GBO 14, W44AVV 13, W44AGH 12, K4VAI 12, K4HOE 11, W44MEX 10, W44PFW 10, W44FAE 9, K4LOL 9, W44HLW 8, K4OHz 2. Total reports 35, traffic 1416.

MICHIGAN - SUM, Ivory J. Olinghouse, W4ZBT - Asst. SUM; B. Peter Irem, W8KBZ, SEC; W8MPD, RMs; W8JYA, W8WVL, W8R1N, K8KMQ, W4BDU, PAMs; W4BTAN, K8MK, K8PVC, VHF PAMs; K8APM, W4WVY.

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Net	Freq.	Time/Days	QNI	QTC	Sess.	Mgr.
QMN	366.3	2300 Dv	1061	449	90	W8JYA
WSSB	34.35	0000 Dy	946	103	30	K8PVC
BR/MEN	39.30	22.30 S-F	904	95	26	W8ATN
UPEN	39.20	22.30 Dy	385	45	30	K8MJK
GLETN	39.32	02.30 Dy	549	61	28	W8KHK
PON	39.55	1600 Dy	823	248	30	K8LNL
PO/NCW	364.5	2400 M-S	223	34	26	VF3DPO
MI.6M	50.7	0000 M-S	307	36	23	W8LRC

Oakland Co. AREC Net held 4 sessions with QNI 49 and QTC 6. Calhoun Co. reports 4 drills. SW Mich. Weather Net held 5 drills. ONI 86. SW Mich. 2-Meter Net held 9 sessions. ONI 150 and QTC 5. Silent Keys are W8OQN and W8DF. Genesee Co. ARC officers for 1972 are W8LNL, pres.; W8WGK, W8ANPV, K8BPO, K8WLN, vice-pres.; K8KMQ, treas.; W88CNW, secy. K8IWP and W8FEZ operated a demonstration station for the Boy Scouts Tall Pine Council during the Scoutcampades. The QMN slow speed net meets daily at 2300 GMT on 366.3 kHz offering a chance for newcomers to become familiar with net procedures in traffic handling and emergency operation. W8ULG, W8MCD, K8YYE and K8ALEM are now on 432 MHz. K8PSI is now an Extra Class licensee with new call W8OII, W8HIO and W8WMT are new General Class at Plymouth. W8BLI is new at Sturgis. W8VLEN had an early Christmas - TR4 and Tri-Beam, W8VWF moved to Ann Arbor and will soon be back on 146.94 and 432 MHz. W8PIL and W8JYA will start a class on traffic handling, net procedures and emergency operation on cw, ssb, am and fm for Oakland County AREC. W8JAX is Amateur of the Month for the PON. Traffic: (Nov.) W8WZF 424, K8KMO 318, W8APIM 208, K8LNL 116, W8ZJU 112, W8BHPY 108, W8ADU 104, W8SCQ 101, W8ZBT 87, K8DYI 66, K8PVC 66, W8LXY 65, W8MO 58, W8IBX 55, W8JYA 54, W8RTN 54, W8FU 47, W8FEZ 45, W8JMI 37, W8VXE 37, W8WYL 36, W8RONZ 35, W8JOH 33, W8FXR 31, K8MJK 31, W8EZ 30, W8BJJ 29, W8BVB 29, W8FELU 28, W88NW 26, W8DCN 21, W8EZL 20, W8UC 20, K8JED 20, K8WRJ 18, W8NOH 17, K8MXC 16, W8ACW 14, W8BDO 14, W8BIB 13, K8GOU 13, W8RHPZ 13, W8FX 12, W8XVM 12, K8CPW 10, W8MDK 10, W8UFS 10, W8TBP 9, W8WVV 9, K8JHA 8, K8ALEM 6, W8KANR 5, W8SCW 5, W8ACUP 4, W8BLNE 2. (Oct.) W8JYA 64, W8VBY 31, W8TBP 5, W8ZJU 6.

OHIO - SCM, Richard A. Egbert, W8ETU - Asst. SCM/RM; William E. Clausen, W8IM, SEC; W8OUU, PAM; K8UBK, VHF PAM; W8ADU.

Net	QNI	QTC	Sess.	Freq.	Time(Z)	Mgr.
OSSBN	2645	1006	60	3472.5	1530/2345	K8UBK
BN	743	496	60	3580	0000/0300	W8IM
06MtrN	486	87	60	50.61	0000	W8ADU
				50.16	0200	
QSN	230	59	30	3580	7325	W8WAK
BN RTTY	225	146	30	3605	2300	W8YUB

BPL recipients this month are W8BETX, K8ONA, W8WPO and W8QCT. RM W8IML, long an asset in this office, has been appointed asst. SCM to help me out with the extra load until the end of my term as SCM. Scioto Valley ARC's new novice class began in Jan. and is conducted three nights a week. Don't forget the Great Lakes Division Convention Mar. 17 and 18 in Muskegon, Mich. Details from W8CVK. We report with regret that W8KLU (coined Silent Keys. The Steubenville ARC repeater is now in operation on 3476 and is open to all. Plans are to use the repeater in the local ARC/RACES activity. Greater Cincinnati ARA sponsored an Amateur Radio Booth at a Hobby Craft show, originating message traffic for attendees. Those who worked W8HIO and have not yet received QSLs are asked to be patient. Cards were very late in being printed, but the log jam is over. Westpark Radios new officers are W8SCV, pres., W8MELM, vice-pres.; W8REYV, secy. and W8WMP, treas. W8RII related his 1921 transatlantic test experiences to G3UML during a QSO on 20 meters. G3UML taped it for use in a BBC radio program on amateur radio. Columbus ARA elected the following new leaders: W8OSE, pres.; K8TNW, vice-pres.; W8ACK, secy. and W8KJM, treas. W8RZM and W8RZN turn over the helm of Toledo's Ham Shack Gossip to W8JHP and his XYL after eight years as editors. Goudyear ARC completed its novice class with instructor W8OQH administering the exams. Dayton ARA's RF Carrier tells of a new "Novice Magazine" 1240 21st St., Hermosa Beach, Cal. 90254. Subscription is \$3.00 per year. YI-trailfucker W8RIOK was appointed ORS. Certificates for participation in the Ohio Six Meter Net went to W8ENI, W8RGLW, K8JLW, W8KJW, W8KND, K8UOZ, K8MPR, W8BLG, K8QIK and W8JRZ. W8IAM received a certificate for Ohio Slow Net participation. W8ASMB is a new OO. Traffic: (Nov.) W8BIB 276, K8ONA 359, W88GD 337, W8PJM 291, W8BHI 276, W8WPO 269, W8BALU 234, W8CUT 205, W8JMD 204, W8IMI 203, W8OCU 195, W8KZV 173, W8BDL 170, W8UDG 165, W8MOR 163, W8VXB 159, W8RYP 137, W8GVX 129, W8WAK

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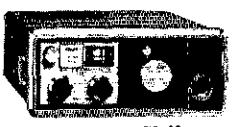
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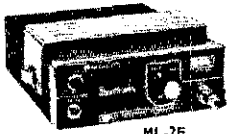
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- Resale Value

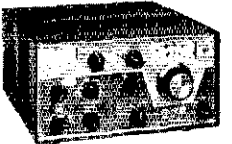
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MN-2000 Antenna Match Network	195.00
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SC-6 Receiving Converter for 6m	71.00
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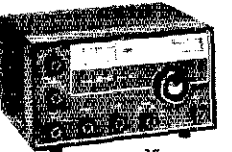
TR-22



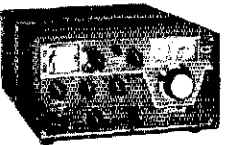
ML-2F



R-4B



2C



TR-4

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127. WBNCWD 134, WANZUK 122, WBRJEL 115, WBLT 112, WA8SFD 100, WABHGH 92, WBUX 82, K8UBK 79, KRMLD 67, WA8VWH 65, WA8AJZ 64, WAOQK 64, W8JID 63, W8UFI 60, W8PRS 58, W8CIT 52, W8OZK 52. WA8ETW 48, WA8COA 45, W8BIOK 41, W8OE 41, K8BYR 39, W8RYB 29, W8YFF 26, W8BHL 24, K8FTG 24, WA8ADU 22, W8RAJC 22, K8OYR 21, W8GOL 20, W8FXD 19, K8MPR 18, W8ETU 17, W8GRT 17, W8NAKU 15, K8DHJ 15, K8RPX 14, W8SSI 14, W8GRL 12, W8GRG 12, K8LRL 12, W8AMH 12, K8LGA 11, W8STX 11, W8JISW 10, W8AKPN 10, W8ASLU 10, W8JEL 9, W8LAM 9, W8I 9, W8NAL 9, W8BLEZ 7, W8XRD 7, W8BAZN 6, W8DYF 6, W8FNU 4, W8MCR 4, K8QNW 4, W8BAYC 3, W8EBS 2, W8OUD 2, W8WKE 2, (Oct.) W8AUF 8.

HUDSON DIVISION

EASTERN NEW YORK - SCM, Graham G. Berry, K2SNJ - Asst. SCM/PAM: Kenneth Kroth, WB2YB SEC: W2URP, RM: WA2VYS, VHF PAM: WB2YUJ. Additional net: ECJ/AREC Wed. 8:00 P.M. local on 1487 (Westchester Co) AREC open to all comers. Other nets see last column for details. Regret to report K2MPK as a Silent Key. On the club circuit: Overlook Mt. ARC new officers are WB2CCY, pres.; WB2RXL, vice-pres.; WA2SVH, treas.; W32FN, secy. Harmonic Hills Rt. heard W1GEY on Quads versus Beams: Job operations on 2-meter fm via repeater will be in progress by the time you read these words. The Communications Club of New Rochelle heard Dr. George Erbe of Litton Industries on Capacitors at regular meeting. Fraivie Traviesas of NBC, VP Broadcast Standards spoke at annual dinner featuring going away award of special plaque to ex-Director VK1ZAR/W2 returning to Australia after 3-year stateside tour of duty. Schenectady ARA heard in depth discussion of fm equipment and operations by W2ODC, also welcomed 12 new members. Officers for '71-'72 are WA2WFL, pres.; WB2VJC, vice-pres.; WB2HNW, treas. Individual station activities: WA2ROL spearheaded mobile exercise No. 1 for E2AVP repeater units operating in ecological clean-up program for Bronx River along with N.Y. Zoological Society, boy and girl scouts and other community groups. W2URP reports building gadgets and gimmicks for shack. WA2LUX reports "sporadic temporary in-lorm station" at RPL, K2UR now acting mgr. FNS on temporary assignment from mgr. WA2VYS. Reminder: if you hold appointment to ENY, your renewal application is already overdue - want to get 'em all effective Jan. each year so please forward now if you haven't already done so. Club secretaries: don't forget to report new officers, planned winter classes, etc. for column listing. Thanks. K2JQB, W2DPV, WB2NOY, WA2VEQ, W2JB and WB2LXW all active conducting Thanksgiving Day parade for City of New Rochelle via fm - a first for the mode but 13th year of activity. WA2RAU postponed Africa trip to Spring of '72 (traffic: WA2VLS 147, W2SZ 108, K2SNJ 42, WB2YB 37, W2URP 28, WB2LXW 24, WB2LXZ 24, WA2WGS 16, WB2LXK 14, WA2AH 13, WA2LXI 10, WA2FAJ 8, WA2BBI 6, WA2LUX 2).

NEW YORK CITY AND LONG ISLAND - SCM, Fred J. Brunjes, K2JGJ SEC: K2OVN, RM: K2UAT, HF PAM: WA2UWA, VHF PAM: WB2ROE.

NLI*	3630 kHz	1915/2200 Nightly	WB2TUL Mgr.
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NLI Phone*	3925 kHz	(600 Dy	WA2UWA PAM
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Fast U.S.	3685 kHz	0001 Nightly	
All Swe.	3925 kHz	1300 Dy	W7GE Mgr.
NYSP1FN	3925 kHz	1800 Dy	WB2HIV Mgr.

*Section nets: All times are local. With all of us starting a new year, our local radio clubs are naturally starting with new officers: Massapequa RC - WN2AXE, pres.; WA2ROY, vice-pres.; WA2PUS, treas.; WA2LWX, secy. Tu-Roro RC - WA2MXB, pres.; WB2OLM, vice-pres.; W2VZO, treas.; WB2HWI, secy. L.I. Mobile RC - K2ASQ, pres.; WA2ITS, vice-pres.; W2LHK, treas.; K2VWZ, secy. Brooklyn College ARS - WR2MQJ, pres.; WB2ZHM, vice-pres.; WA2IZO, secy.-treas. The Brooklyn College RC will have a "kick-off membership drive" meeting on Feb. 7 at the college at 12 noon. A showing of "Hams Wide World" will be part of the program. Club information should go to WB2MQJ 1561 E. 102 St., Brooklyn, N.Y. 11236. W2PI ventured forth again to the SAROC festivities in Las Vegas this year. Not to be outdone, WB2AQC and KYL WA2BAV will be *DXpeditioning to Central West Africa* this spring. K2DDK reports enjoying cw and sbs on 6 meters with a newly acquired HA-6. WA2LXZ reports being QSL mgr. for WA2PQX/TF. W2DBO reports being "repeater happy" with his new 2-meter fm transceiver. WB2OYV reports taking time out from NLI traffic activity to do a little DXing. W2LW reports not only does he have 1V1 on 2 meters, but he is in living color yet! My thanks again this year to those who were able to donate a few minutes of their time at the message



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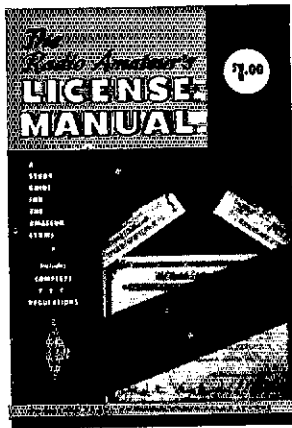
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booth in Roosevelt Field Shopping Center. My thanks to WB2THI, our "Jersey" way for holding down the fort as Net Mgr. of NLI. Dan had a tough job and his efforts were much appreciated. The Hall of Science of the City of New York, will be conducting Novice classes during 1972. For those interested, contact the Center at Hall of Science, P.O. Box 1032, Flushing, N.Y. 11352. Congratulations to the Massapequa RC for their producing a Newsletter. It's refreshing to see Radio Clubs produce some form of Newsletter or Bulletin. They give a little "class" to a club along with keeping members informed. Congratulations to the Adams School ARC of Manhattan for their affiliation with ARRL. The American Red Cross ARC, Queens, is holding Novice and General Class programs at the club hall, American Red Cross Building, 167th St., Jamaica, Queens, every Thurs. at 7:30 P.M. Those wishing to report on their activities for inclusion in this column, I and I hope you will find my address in QST page 6. Traffic: WB2LZN 434, W2LC 1R3, WB2JGA 178, WB2QYV 110, K2JPE 25, W2TUK 20, W2DBO 20, WA2PLI 14, W2LW 9, W2PF 9, WA2LJS 8, WA2BYY 3.

NORTHHERN NEW JERSEY - SCM, Louis J. Amoroso, W2ZZ
SEC: K2KDO. RMs: WA2TAF and WA2BAN. PAMs: WA2TAF and K2KDO.

Net	AirTime	(PM)Days	Secs	QNT	T/c.	Mgr.
NJN	3695	7:00 Dy	30	526	490	WA2BAN
NJN	3695	10:00 Dy	30	250	125	WA2BAN
NJN	3740	8:00 Dy				WA2FVH
NJEPN	3950	6:00 Dy	30	519	394	WA2TAF
PVFTN	145710	7:30 Dy	19	60	35	WA2JIM
EC1N	145800	8:30 Dy	35	125	50	WB2LTW

(endorsements: WB2WNZ as OPS, WB2DLP and WB2DGM are new hams in Clifton. New officers for the Knight Riders VIII Club are WA2NLP, trustee; WB2NTP, pres.; WA2CXS, vice-pres.; WA2AYZ, secy.; K2KDO, treas. The group is planning an auction in Mar. Contact club officers for details. The Fairlawn Radio Club continues to conduct code classes every Fri. night. Their club Novice station includes the DX-60B and SR-30E. W2TJW is working on a new 2-meter converter. W2NPT gave up his bug for a new HA-1 keyer. WA2OKR has modified his SR-160 and runs 400 watts. W2CU reports that the Morris Radio Club is conducting classes for Novices. W2ZEP is back on 160 meters. W2TUK spoke at the Nov. meeting of the Garden State ARA. New officers for the Cresskill High ARC are WB2BK, pres.; WB2DAO, secy.; WN2RNV, treas. W2CJC reports that officers for the Bell Lab RC at Holmdel are W2FDN, chmn.; WA2IQR, secy.; WB2KOT, station mgr.; W2WO, trustee. Their club station is set up for RTTY, ssb and cw on 80 through 10. WB2LTW is having trouble keeping his beats up. WA2ABL moved to W4-Land. The Carteret High School ARC is using a Drake 2-NT. WB2GDZ is the new CAC member for the second call area. He has expressed a desire to receive any and all comments on ARRL contests from the NNI gang. Your SCM has started his sixth year in office. We have enjoyed it but will not be available for another term and suggest you begin looking around our section for candidates. Request for nominations will probably be announced in the Aug. issue. Traffic: WA2EPI 1021, WA2BAN 39K, K2RXO 363, WA2HOO 340, WA2NPP 403, WB2DDO 293, WB2ALH 242, W2CVW 124, WB2CDE 119, WA2ATL 105, W2CU 91, WB2LTW 86, WB2KNS 75, W2ZEP 60, WA2CCF 58, WA2NLP 49, WB2WNZ 42, WA2FVH 27, WA2JNQ 23, WA2CAK 18, WB2NOM 15, K2LOP 11, WA2FUI 10, WA2ABL 7, WA2JHM 6, WB2TFT 5, W2CJC 3, W2FK 3, WA2ONT 2, K2ZH 2, W2ZZ 2.

MIDWEST DIVISION

IOWA - SCM, Al Culbert, K0YVU - SI C: K0LVB, W0PFP and family spent the Thanksgiving vacation in KP4-Land, where he visited W1FZJ. Jim also is looking for dope on a Collins 40-K1 oscillator, any help? Our congratulations to the Univ. of Iowa ARC and the Poweshiek Radio Club on recently becoming ARRL affiliated clubs. The Des Moines Radio Amateur Assn. has ordered a new Dycorn repeater. The Cedar Valley ARC at Cedar Rapids had a very successful "Operation Witch Watch" on Halloween, with 50 hams including 18 mobile rigs participating. A very successful CDLX 71 (an Iowa Civil Defense version of SUT) was held Nov. 3 and 4, with K0QDD doing a very commendable job as NCS. Congratulations to WA0NGZ on his promotion, but very sorry to see him move from the NE Iowa area. K0MST is on SSTV. I thought these old timers were supposed to be tough, the first snow and W0JPI, K0JTP, W0KJN and W0RWY head south for warmer weather. Two-meter activity is picking up in the Fort Dodge area, with W0NGS, K0ARA and W0BW also on. Speaking of two meters, both Cedar Rapids and Des Moines have been having transmitter hunts this fall. A new baby girl has come to the WB0AAM household. Nets: I1CN - QNT 134, QTC 114, Iowa Phone - (noon) QNT 1473, QTC 134; (even) QNT 1349, QTC 64. Traffic:

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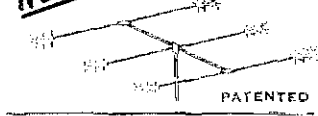
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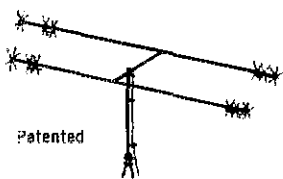
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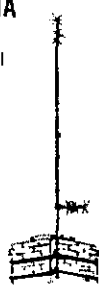
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(Nov.) W0LCX 640, K0OOD 420, WA0C10 254, K0DDA 168, K0AZJ 115, W0M00 94, WA0AUX 77, WA0VZB 29, W0B0AM 22, W0WSV 17, K0YVU 15, WA0YV 8, W0BW 7, K0JG1 6, WA0QNZ 4, WA0EEN 2, WA0DOB 2 (Oct.) K0OOD 60, W0B0AM 6, W0WSV 3.

KANSAS - SCM, Robert M. Summers, K0BXP - SEC: K0LPI, PAMS: K0JMF, K0ENO, RM: K0MRI, VHF PAM: WA0TR0. WN0LCD and K0OKN have joined the list of Silent Keys. Our most sincere sympathy to their families. Congrats to WA0WOB on working all 3079 counties in the U.S.A.; WA0VJE and WN0CT0 for their efforts in the Sept. VHF QSO Party; WA2HSP0 on his first place in Kans. in the C.W.S.S. K0LPI reports ARCC membership is now at 541 as of Nov. All ARCC Zone acts are doing fine and reporting this month with the exception of Zone 2, b, 8 and 15B. Kansas weather man of the month is K0ZHO. Several new club newsletters are now appearing: Pilot Knob "ORZ," W0NYG, editor; "KVCRC Monitor," published by Topeka ARC. K0JMI a good contact and "Quantum's Radersgram" by the Douglas Co. ARC, W0B0IV, editor. Unless I miss my guess they would like to exchange with a few clubs. Time is near for a lot of club elections and next month will be devoted to the new officers for 1972. Net reports for Nov. KWN: QNT 693, QTC 25, sessions 30. QKS: S34/237/59. KSBN: 1305/87/26. KPN: 247/18/13. Midstates Mobile Monitor Watch 1517/21 QTC/40 patches or phone calls, 78 mobiles aided during the month. Traffic: (Nov.) W0MNI 625, W0HI 526, K0MRI 240, WA0LBB 120, W0NEE 107, K0HFX 76, K0JMF 73, WA0JIC 49, W0CHD 42, W0B0Y 31, WA0ZTW 31, W0PBT 27, W0GJL 26, W0B0CZ 25, K0GDI 25, K0LPE 24, WA0LLC 22, K0DDD 20, W0MA 20, K0UVH 19, WA0SRQ 18, W0B0GX 14, W0B0C1 12, W0ICL 12, WA0YXK 12, W0GUR 8, W0FDI 6, W0MCH 6, W0NYG 5, K0ZHO 5, WA0DWH 4, WA0OZP 3, WA0SXR 3, K0FPC 1, WA0UIT 1 (Oct.) W0B0C1 12.

MISSOURI - SCM, Robert J. Peavler, W0BV - SEC: W0ENW. New appointment: W0CKC as OPS. Appointments renewed: WA0KUH as OBS, PAM. I am sorry to report the death of W0IHA, Chillicothe.

Net	Freq.	Time/21 Days	Sess.	QNT	QTC	Mgr.
HBN	7280	1805 M-F	22	638	51	WA0IPA
M0PON	3963	2300 M-S	26	647	48	WA0TAA
MFN	3963	2330 MWF	13	294	24	K0KUD
M0SSB	3963	2400 M-S	26	1070	86	K0RPH
WEN	3980	0130 M	4	12	0	K0BIX
PHD	5045	0130 T	5	126	11	WA0KUH
MON	3585	0130 Dy	30	209	83	W0HH
MON 2	3585	0345 Dy	30	160	92	W0HH
MSN	3705	2200 Su	4	20	5	K0BIX

W0UD reports a visit from K9AAM, a retired broadcast engineer who was in her husband's scout troop years ago. WA0PS is recovering after surgery. The Heart of America 10-metro net has not missed a schedule since it started in 1947; the net meets on 29.093 MHz at 2000 local time on Wed. New officers of the Heart of America Radio Club are WA0PFS, pres.; K0SLI, exec. vice-pres.; WA0ZIE, vice-pres.; WA0ZNL, secy.; W0MGE, treas.; WA0FOL, Sgt.-at-Arms. Congratulations to K0LIO and XYL who celebrated their 63rd wedding anniversary; W0B0BT, who passed Second Class phone; WA0JX, who won a scholarship to the Electronics Institute and WN0ARI and K0HMM, who passed both General and Advanced Class exams. Traffic: K0ONK 1573, K0AEM 264, W0HH 141, WA0HIN 109, W0BV 82, K0YBD 57, W0UD 34, K0BIX 29, WA0KUH 20, W0MKJ 18, WA0ZLU 14, WA0KDE 12, W0B0AW 9, W0GBJ 8.

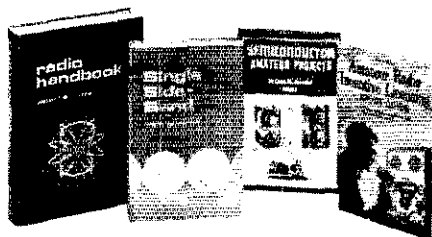
NFRASKA - SCM, V.A. Cashon, K0CAL - Asst. SCM: Velma Sayer, WA0GHZ. SEC: K0ODE. Appointments: WA0YGI as OPS. Renewed appointments: WA0CGI as PAM; K0PJT, W0FWE, WA0CB, WA0BHM, W0ACK and K0WPT as ECs; W0VEA and W0AGK as OBS and K0PTK as OPS.

Net	Freq.	GMT/21 Days	QNT	QTC	Mgr.
NSN I	3982	0030 Dy	1412	36	WA0LOY
NSN II	3982	0130 Dy	1074	72	WA0LOY
NEB 160	1995	0130 Dy	490	184	WA0CJ
NEB	3591	0400 Dy	104	24	W0TQD
NMN	3950	1400 M-S	628	11	W0NIE
AREC	3982	1430 Su	180	2	W0HRZ
CHN	3980	1830 Dy	1181	85	WA0GHZ
VEN	3980	2100 M-F	312	5	WA0AUX

The Bethany Lutheran ARC, W0FMX is a new club in Omaha. Officers of the Pine Ridge ARC for 1972 are W0HQZ, pres.; K0ODH, vice-pres.; W0BCAU, secy. treas.; WA0BBS, act. mgr. K0NL was elected as Midwest Division Dir. and WA0LLC as Vice-Dir. A radiogram consisting of 135 Amateur Radio Husker boosters was sent to the Huskers prior to the Neb./OKla. football game. Sincere thanks to PAMS and NCS for the FB work done, A speedy recovery to W0NGZ. Traffic: (Nov.) WA0SCP 83, W0UD

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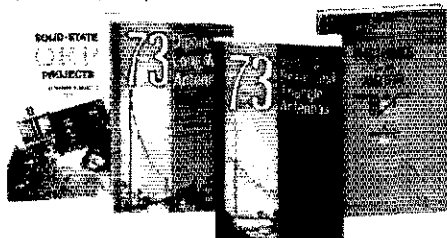
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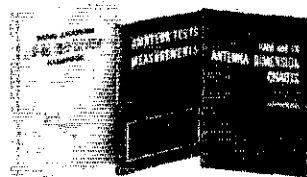
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NEW ENGLAND DIVISION

CONNECTICUT - SCM, John McNassor, WIGVT - SEC: W1EHR, RM: K1EIR, PAM: K1YGS, VHF PAM: K1SXF.

Net	Freq.	Time/Days	Sess.	QNT	QTC
CN	3640	1900 Dv	60	618	528
CPN	3665	1800 M-S	30	457	185
VHF 2	145.98	2200 M-S	22	109	42
VHF 6	50.6	2100 M-S	22	96	12

High QNT: CN - WA1GFH, K1EIR, W1KW, W1MPW and W1CII. CPN - W1GVT, W1MPW, WA1OPB and K1SXF, SEC W1EHR working AREC on limited time basis. He operates mobile between home, work and hospital visits to XYE. Director W1QV active on CPN and OCWA when time permits - please submit comments and club activity reports by mail. With regret we add W1PHB to the list of Silent Keys. Club activity is at mid-winter lull. An exchange of club newsletters could be rewarding. Murphy's Marauders now accepting new members - contact K1VTM or W1FLM. Bloomfield ARC now reactivated and helping local CD with communications plan. K1CSB will carry on the work as editor of Danbury CARA Newsletter. Several Club Christmas parties reported and much enjoyed. Please be sure your club has traffic operators active to cover your area. Congratulations to: W1EWF Nov. BPL the hard way; WA1GGN Nov. BPL; W1MPW High QNT on both CN and CPN; To all NCS operators who do such a fine job on the nets - we need more so please volunteer! If you are not interested in CQ DX, now is the time to try CQ Cupid - and a Happy Valentines Day to all! Traffic: (Nov.) W1EWF 504, W1BY 237, WA1GGN 188, W1MPW 171, W1CTI 154, WA1GFH 153, K1SXF 111, W1AW 78, WA7GWL/I 72, K1YGS 61, WA1KVI 57, W1GVT 56, W1KW 53, WA3JSU/I 48, WA1OPB 16, W1BBI 14, W1QV 12, W1CUH 9, WA1PHF 5, W1YBH 2, W1EHR 1, W1EWF 1. (Oct.) WA1OPF 20.

EASTERN MASSACHUSETTS - SCM, Frank L. Baker, W1ALP - SEC: W1AOG received reports from W1S LE, HKG, K1S NFW, ZUP, DZG, WA1S DMC, DXI, W1BGH, W1LS, W1FY, WA1ICK, W1FDN are Silent Keys. WA1PT is on 2 and 6; K1EWS on 2, W1AKC is in Fla. WA1GZQ on 75/2/6; WB6DME/I on 75, W1POL/VEI on a trip. W1ALP spoke at the Waltham and Framingham clubs. W1MWN has a TX-62. The T-9 RC met at WA1ZF's. W1NCK, W1BIO, W1LYK and W1DVV are in hospitals. W1KOW now in Amesbury. W1ANNL, W1EIE are in EMN. W1S DPD, GAH spoke about the W1AINR repeater station at the South Shore ARC. WA1MGO's antenna fell down. WA1MPP in Pa. for Navy for 2 weeks, operated K3NAP. W1AINRV phone DXing, has new quad and tower. K1GNW has 2-meter tm rig and is in EMN. K1UAF is on 10, K1JLF/I in EMN. K1EPL reports NFFPN had 4 sessions, 107 QNTs, 4 traffic. Ex-W1BUV at W1NF's. W1LL active in Navy MARS. W1UX has tower and TA-35 up, WA1MHJ went to the Gaithersburg Hamfest. W1NLY has KR-40 keyer. New appointments: WA1MPP as OPS and EC for Bellingham; W1N10MM as OPS; WA1LAK as OPS. Endorsements: WA1IFE as OPS, OVS; W1BCW as OO; W1QYY as OVS. EM2MN had 22 sessions, 164 QNTs, 133 traffic. Northeast VHF Assn. Net meets at 8 P.M. Sun, on 144.120 MHz. Tue. night 220 activity: W1S YTW, OXX, OOP, MX; K1S COX, SRZ, K9AQP/L, WB2GLO/L. The 001C group met in Wakefield, W1D-S. (hmn.); W1KJ vice-hmn.; K1SAY, sec. treas. W1CIP spoke at the Middlesex ARC, pres. is WA1GFM. Whitman ARC held their annual Christmas covered dish supper. WA1DDN has a new tower. WA1PTY has new five-element beam for 6. Somerset ARC, WA1OXW has a 6-meter am repeater. Massavot ARA held their annual banquet with 65 present; W2CXX/I and K0UK/L also attending. W1WSN spoke at the Massachusetts ARC on Repeater Operations. Ex-K1HWB spoke at the Ouananpowit RA. W1NN received an award from W1ZE. W1KSB has a new baby. The Capeway RC met at W1AINX's QTH - he has a new HW-12. How many of you fellows belong to the AARP? WA1LXE, WA1LOE has DXCC. K1JNQ ARA back on the air. DL2AA/W1 moved to Medway. New calls are WA1S PKJ, PKE, PKG, PKZ, PLO, PLW, PMB, PMC; W1S PKW, PKT, PLK, PLI, PLM, PLL, PLN, PLT.

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EMN had 444 QNLs, 416 traffic. WIOYY made BPL. WAIMYK had an HW-101. WAIMRV is a General Class licensee. K1BOX talked on Quads at the Framingham RC. K1PRB endorsed as ORS. WAIOWO active in PON and EMN, also Weymouth CD. K1BGK gets on 6 in the A.M. 6MBCBN in 17 sessions had 69 QNLs, 4 traffic. WAIBZ, K1GUG on 2. Wis DFS, OXR, IVZ, CDJ, ELL, ISK, PGN: Kis NEW and WAILEK helped the Melrose Police on Halloween. WAIGUN on 2. WICKW retired as CD dir. and RD. WAINRV's quad broke down during cw SS. K1DJG received citation from USCG Hamilton for patches. Traffic: (Nov.) WIOYY 614. WIOHM 441. WAIFYY 384. WICE 271. WIPIX 250. WAIFE 104. WAIMSK 80. WIDOM 79. WIPL 60. K1GNW 56. WAIOWO 56. WIAEQ 54. WAIMYK 49. K1DJG 46. WIUX 34. WAIMWN 32. WIAFX 21. WIMNK 18. K1UAL 18. WIAOG 17. K8JLI/1 10. K1PRB 10. WAFENM 5. K1OKE 5. K1E-PL 4. WNIPOM 3. WIFE 2. WINF 2. (Oct.) WIDX 14. WN1OMM 11. WAIMHU 3. WNINLY 1.

MAINE SCM, Peter F. Sterling SEC: K1CLE. PAM: WAIPCM. RM: W1BGJ The Yankee Repeater Assn. WAIKGG, has finally received their license. Located in Buckfield, it will operate on 146.34 transmit 146.94 receive. Northeast Area Barnyard Net reports 786 check-ins and 6 traffic for Nov. WN1OIT has finally dropped the N and now is active on 15 meters cw. WIAE has left for his winter home in Fla. I am very sorry to report the passing of W1CPT. He will be sadly missed on the bands. New hams in Maine are WAIPKO, WN1PKR, WN1PKV, WN1PID Congratulations fellows, welcome to the fraternity. E1DAP now has the 5-line and very active on 75. W1VYA is active on 2 meters from his new QTH on Casco. W1VBY and XYL K1GUK are back in Maine, living in Cape Elizabeth. W1CTR and W1BHA, W1SF5 are updating records of the Barnyard Net. 1 traffic: WAIPCM 359. W1CTR 35. K1TEV 10. W1GTO 7.

NEW HAMPSHIRE SCM, Robert C. Mitchell, W1SWX - RM: W1UBG. Welcome to new hams WAIPKO, WAIPLA, WAIPLF and WAIPLU. Please note that your new RM is W1UBG. Bob has been doing a terrific job on NHVTN. W1EVN is roaming around in winter climates. Rumors have it that W1CTW, the vhf/uhf WBF-man, has been on air on 40, 75 and 160. W1EVN gave SWL Max Silver the exam and now he is WN1PLC. W1UBG reports 173 check-ins and 265 traffic for NHVTN. W1A10 is having antenna problems. W1WYC has ignition noise from his new snowmobile. WN1NH1 is trying to complete his DXCC on 15 meters. 1 traffic: WAIJIM 652, K1YMH 183, W1UBG 182, WAIMXT 133, DJ10S/W1 128, K1GMW 88, W1DXB 28, W1EVN 6, W1SWX 4.

RHODE ISLAND - SCM, John E. Johnson, K1AAV - SEC: W1YNE. PAM: W1TXL, VHF-PAM: K1YK. RM: W1YKQ. R1SPN reports 30 sessions, 534 QNL, 54 traffic. The Fidelity RC, K1NOG, visited the New England Museum of Wireless and Steam and the ARRL Hq. on recent field trips. The club is putting last minute touches on their exhibit for the showing at Warwick Mall. The Club Net has been moved to 21.171 MHz at 2030 Thurs. Several members are building antenna tuners and are getting FB reports on random length antennas. The W1OP Club is continuing with the experimentation of 3-meter fm equipment and has many members building their own 2-meter stations. Some of their members visited the Newport County RC to talk about the increased interest in fm. The W1AQ Club is rebuilding their 6-meter station and have installed a new antenna to encourage Technicians to advance and train while they are on the air. Traffic: K1QFD 19, K1VYC 5, K1CFP 2, WAIH2W 2.

WESTERN MASSACHUSETTS - SCM, Percy C. Noble, W1BVR - SEC: W1DNB. CW RM: W1DVG, PAM: WAIWFB, VHF-PAM: W1KZ5 (Berkshire Co.). W1DNB reports the ARCC nets are doing quite well with a total QNL of 54 and a message total of 13. W1KZ5 is the new IC for Berkshire Co. With RM W1DVG in the hospital, W1BVR took over as acting RM. W1MN had a very active month with a QNL of 162 and traffic total of 105. Top 3 in attendance were W1BVR, WAIWFB, WAIWNE, tied for 4th place WAIILL and W1TM. W1YK, WAIWFB reports that W1FN held 22 sessions with QNL of 80 and a traffic total of 57. K1ZMP/1 is a new ORS in Belchertown. W1YK now has a new five-element beam. WAIWWS, chief op at YK, left Tech. in Jan. to join the Navy. From CMARA: WAIKRI was the Nov. speaker at the club, discussing am vs. fm. From HCRA: Nov. speaker was DJ4BZ/W1 who gave a first-hand account of amateur radio in Germany. I join the HCRA in expressing sympathy at the passing of W1EVLZ. From VARC: WAIIGU was the month's speaker presenting slides of her 14,000 mile summer trip. She also has received five 1st-place awards from the ARNS for last year's club bulletin. From Mt. Tom ARA: W1CSE gave a talk on his Mt. Lincoln AREC system.

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NORTHWESTERN DIVISION

IDAHO - SCM, Donald A. Crisp, W7ZNN - SEC: WA7EWW. New officers of the Thuna Club at Moscow are W7GHY, pres.; K7YLD, vice-pres.; W7FIQ, secy.; W7GGH, treas.; WA7MIK and WA4UWZ, dir. The University of Idaho, W7UQ racked up 400 contacts in the SS using a Swan transceiver. It is with regret that I report the passing of W7JHY. W7PI points out that many amateurs are improperly identifying when checking into the I-ARK Net. It is permissible to check-in by simply giving your own call providing you give the call letters of at least one other station followed by your own call at the end of net or before ceasing transmissions on that frequency. FARM Net report: 30 sessions, 922 check-ins, 39 traffic handled. Idaho Post Office Net: 13 sessions, 75 check-ins, 6 traffic. Traffic: W7GHT 192, WA7BDD 76, W7IY 27, W7ZNN 21.

MONTANA - SCM, Harry A. Roylance, W7RZY - Asst. SCM; Bertha A. Roylance, K7CHA, SEC: W7TYN. PAM: WA7IZR. WA7OBH has his phone patch working and is active on AF MARS. W7EKB was operating extra sessions on TCC during Christmas rush. W7LNU's son is WN7SMT in Portland and looking for Butte contacts. Montana RACES had 2 sessions, 64 check-ins. Post Office Net had 29 sessions with 511 check-ins, 78 traffic. Montana Traffic Net had 985 check-ins and 94 formal traffic. W7LBK has been reappointed OO, EC and ORS. New officers of the Butte Amateur Radio Club are WA7MUU, pres.; WA7PZO, vice-pres.; W7ROI, secy.; WA7OZD, treas. Glad to hear W7DMW is recovering from recent illness. Traffic: WA7IQS 210, W7EKB 134, W7IBK 43, WA7OBH 14, WA7IZR 8.

WASHINGTON - SCM, Arthur Henning, W7PI - SEC: W7UWT. RM: W7GYF. PAMs: W7GVC, W7MCW, VHF PAMs: K7BBO, K7LRD. New appointee: K7PFR as OVS. Regret to report WA7BDX and W7VVO as Silent Keys. W7YTN passed Extra Class exam.

Net	Freq.	Time(Z)	QNI	QTC	Sess.	Mgr.
WSN	3590	0245	284	137	30	W7GYF
NSN	3700	0300	267	72	30	WA7OCV
NWSSB	3960	0230	1088	41	30	K7KPC
NTN	3970	1930	1523	180	30	WA7HKR

AREC 2-meter am net meeting Mon. at 1900 PST on 145.35 MHz had 72 QNI and QTC 16 and is followed by Swap and Shop. VHF PAM K7BBO reports 220 MHz activity picking up and may get an AREC Net started soon on this band. WA7NYX wants XYLs to contact her about starting a 6-meter XYL net. New officers Boeing Bears are WA7HKD, pres.; WA7JBM, vice-pres.; WA7BSQ, secy.; W7QCV, treas. OO K7JRE working Calif. station having severe key clicks reports station was using bootlegged call and call holder was in Wise, at the time. W7PGY attended ARRL Executive meeting in Hartford and officiated as one of three tellers in recent Division Director elections. Island County EC K4ZDK/7 says Oak Harbor Hospital obtained a list of active local stations and requested their help in case of emergency. The Boeing fire emergency group was active in providing communications for Seattle Explorer Search and Rescue group in a search for lost 15-year-old boy hunter near Cougar, Wash. Our popular hardworking Noon Time Net (NTN) Mgr. WA7HKR is relinquishing the post. The Spokane Dial Twisters Club Bulletin "Harmonics" is tops. Traffic: W7BA 955, WA7AVI 581, W7PI 374, W7KZ 247, WA7HKR 192, WA7OHC 186, W7BQ 164, W7AXT 118, W7JEY 115, W7GYF 85, W7MCW 81, W7QCV 69, K7OZA 58, K7OXL 52, K7CTP 44, W7APS 31, W7IEU 25, W7BUN 24, K7VAS 24, WA7LMO 20, K7WGT 20, W7GVC 15, WA7LOO 14, W7PGY 14, K7JRE 13, WA7HCL 12, K7OKC 11, W7QCV 11, W7AIB 9, K7BBO 7, WA7ELI 7, WA7GVB 4, WA7LOV 4, K7NZV 4, K4ZDK/7 1.

PACIFIC DIVISION

EAST BAY - SCM, Paul J. Parker, WB6DHH - RMs: WA6DIL, W6IPW. Many clubs in area holding elections - MDARC, WA6PUG, pres.; K6UOO, vice-pres.; W6CJ, secy.; WA6GCS, treas.; WA6JCD, board and WA6ANE, EC. In SARO, W6DSV, pres.; W6ZF, vice-pres.; WA6OLA, secy.; W6CMZ, treas.; W6RCE, comm. mgr. East Bay Radio Club, WA6CCM, pres.; WA6QCH, vice-pres.; WB6MRA, secy.; WN6DTN, treas. WB6PYJ and WB6EMF have new equipment around the shack. W6AKB is putting League bulletins on 40 and 80 meters. W6TTS has one more state for 5BWAS. K6TX is

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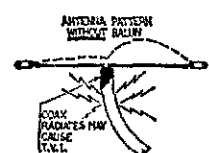
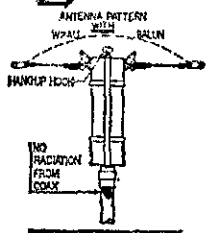
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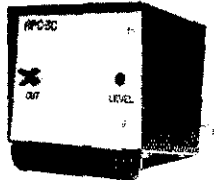
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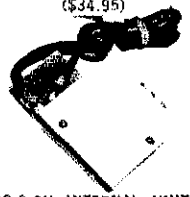
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enjoying new squeeze keyer. W6IPW says TCC is tough — poor hand conditions. W6BNT reporting hand at work on new 16 ten-element Yagi antenna plus 8877 amplifier for 220 MHz. Traffic: W6IPW 299, W6VEW 26, W6AKR 8, K6TX 3, W6BNT 1.

HAWAII — SCM, Lee R. Wical, KH6BZF - SPC: KH6BZF, RM: KH6AD, PAM: KH6GJN, VHF PAM: KH6GRU, USL Mgr.: KH6DQ, PC's: KH6s GPO, HAS, GKD, GLD and BZF. RACES Nets: Coordinate with Dick Hamada, RO. How are you best serving the League?

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S.E. Asia	14.320	1200 All
Islander (cw)	21.111	0600 M-W-S
PACDXNET	14.265	0600 T&F
Pacific Typhoon	14.265	

*During typhoon alerts, Kudos to W4YJK/KH16 as a new OBS. Heard on 160-meter tests KH16s AX, GRN, GJY, HCM, JJ, RS and K5CTTKH6. Congratulations to KH6DZ granted Life Membership. WB4QKR/KH16 now KH6HOW. WA2KDJ/KH16 now KH6HOG. WB0RJT/KH16 now KH6HOV and KH6ABQ/6 now W6NHD. KH6 call plates: Contact Mr. Hong (phone 531-4122) at Oahu Civil Defense, 2nd floor 629 Pohokaina St., Honolulu with a copy of your FCC license (Tech and above classes) and \$2.10 in cash to make out an application. When a group of ten applications are collected Oahu C.D. forwards order for plates. Then in about 60 days they will call you to come in for your plates. Be sure to drive the car that you want the plates to be put on as an exchange of the car's plates and call plates takes place then! Hope you all had a Happy New Year. Till next month, Aloha.

NEVADA — SCM, Leonard M. Norman, W7PBV - SEC: L.L. Mike Blain, WA7BEU, 560 Cherry St., Boulder City, NV 89005. W7IEV, ex-W3ANP is a Silent Key. Radio amateur call letter plates are available to Nev. hams for only \$3.00 additional throughout the year now that we are on the new vehicle registration program. W7DNX reports WA7OZS, WA7RTY, WA7RZV and WA7MOC are experts painting im sign posts with water paint in the rain. WA7MOC, K7ZAU, K7YVN and WA7FBU have new wheels for their mobile units. K7YVH recovering from a bucking duno-buggy accident. W7ILX looking for cw traffic. W7TVF looking for DX with a transceiver into four-element gear. W7IDV looking for more Nev. radio amateurs interested in ed communications. K7RBM has returned from his second visit to KLLI-land. W7OQ reports first known two-way SSTV from Nev. with W4MS and W8YIK. K7ZOK report good DX with new lower and beam. Mobilizing in Western States try WCARS-7235 or WPSS-1952, plus 34/94 1m in Nev. around the clock. Traffic: W7ILX 30.

SACRAMENTO VALLEY — SCM, John F. Minke, W6KYA - SEC: W6SMU reports that we have 113 ARRLC members and five emergency nets. Most of these members are in Sacramento County. How about you members (and non-members of ARRL) up north joining up? For those of you interested in leadership posts, there are EC positions open. Any one or group interested in a Pacific Division ARRL convention for 1973 contact W6KYA. K6KWN has moved from the LA area to the north shore of Lake Almanor and interested in traffic handling. A new repeater directory is available from ARRL HQ. Send an SASE with 24 cents postage for your copy. W6TEE and WB6PHQ produced another harmonic. Congratulations. Speaking of repeaters, a directory for northern Calif. and Nev. is available from W6GOK for an SASE. W6VUZ should be finished with his SSTV flying spot scanner by the time you read this. Reports to me are still scarce. I received information from the RAMS, GEARS, W6LNZ, W6VUZ, W6QZZ, K6GG, K6KWN and W2HAE from Long Island. Don't forget the ARRL DX competition. Join in the fun. Traffic: (Nov.) W6LNZ 10, K6KWN 5, W6VUZ 5, (Oct.) W6LNZ 131, W6QZZ 36.

SAN FRANCISCO — SCM, Kenneth S. McTaggart, K6SRM - W6RNL checks into the PCN (cw) net 1200 local on 7120 kHz. WA6JUV is active again. W6GGR rebuilt a beam for 10-15-20 meters. W6BIP has been DXing from VQ9B. W6SLX was in KH6-Land for a brief visit. NCN meets at 1900/2030 local on 3630 kHz each day. W6BWW reports the Humboldt ARC now meets only on the 1st Tue. of each month. WA6AHD new editor of "Moon-Beam" Valley of the Moon Club paper. I regret that I have resigned my post as SCM, effective Jan. 1, 1972. W6SLX checks into the Calif. Weather Net on 3943 kHz. He made 22 reports on the net in Nov. W6GGR is finished with a term as secy. for WPSS. W6RNL is now an ORS. W6RO came up with 0.14 ppm in the Nov. QMT. He also reports that K6XS5 is a Silent Key. W6KVO checks

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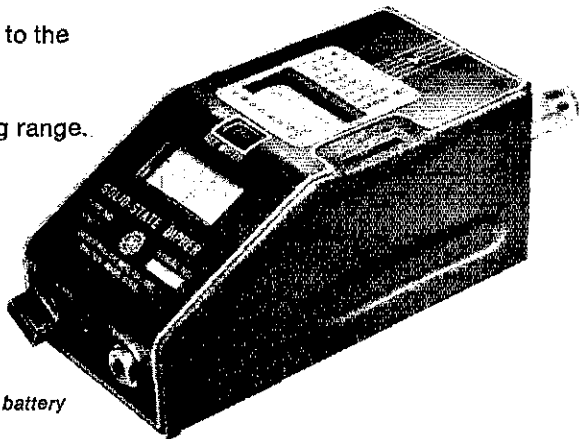
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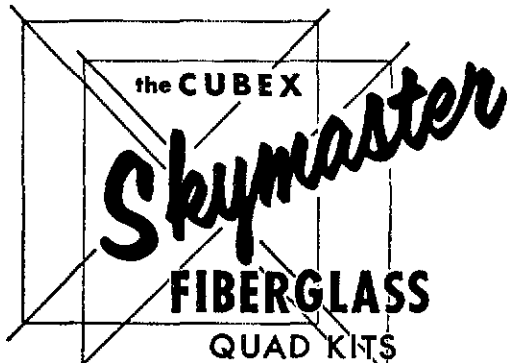
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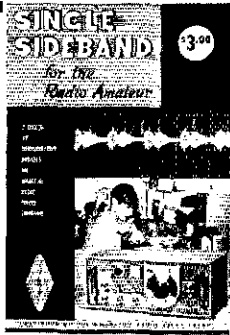
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into the San Joaquin Net (0200Z-3915 kHz) and the Mission Trail Net (0300Z-3928 kHz) regularly. W6FAJ, of 160-meter gang, has added a 2-meter fm capability. W6FAX and WA6BYZ continue to be active on NCN from S.F. W6WLW reports hitting 70 sections in the SS. The best possible wishes to all members in the San Francisco section - and thank you for your reports the past two years. Please continue to keep the fellow in the SCM post informed of activities in the section. Traffic: (Nov.) WA6BYZ 311, W6KVQ 146, W6WLW 19, W6BWV 15, W6RNL 8, W6FAX 6, (Oct.) WA6BYZ 175, W6KVQ 86, W6WLW 21, W6JQP 10, W6BWV 9, W6RNL 8.

SAN JOAQUIN VALLEY - SUM, Ralph Saroyan, W6JPU - The Trowel Radio Club held their Annual Christmas Dinner, Dec. 3, 1971 with 23 in attendance. The Fresno Amateur Radio Club held their Christmas Dinner Dec. 3, 1971 with 43 in attendance. W6NRO is active on 220 MHz. K6PKO is the vhf editor in "Skip." K6PKO is also active on 220 MHz, 144, and 50 MHz., ssb, fm and am. The Fresno Amateur Radio Club will hold their annual Hamfest again in May 1972 at the New Fresno Hilton Hotel. Better make plans to attend. WB6TDF is the general chmn. of the Hamfest. K6QPF attended the Mexican Road Races and helped in communications. W6YFP and XYL also attended the Mexican road races and spent 2 weeks there. WA6CFF has worked all counties in Calif., Alaska and Rhode Island. WA6FXV is active on 432 MHz. Anyone interested in 432 activities, contact Chuck. W6FSQ has a GT-550. W6JUK is mobilizing with a TR-22 transceiver. W6SVM has a GT-550A. WB6PUS was heard active in the SS contest; WA6BUH active in Navy MARS; W6LUBK active in Navy MARS repeater. Traffic: WA6JDB 16, WA6CPP 4.

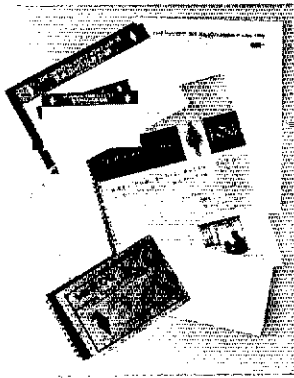
SANTA CLARA VALLEY - SCM, Albert F. Gaetano, W6VZT - SEC: WA6RXB, RM: WA6LEA. As you will note we finally have an SEC in this section. WA6RXB has kindly offered to till the job. He has a lot of management experience in organizing and will be a real asset to us. Your cooperation with him will be appreciated. W6RFF has just completed a new homebrew receiver and is back on the air. W6ASH with the help of WA6NLL, W6HDO, W6JKJ, W6NBI, W6BZUO, W66OML, K6RIU and WA6MLY has completed a permanent cd installation at both the Mt. View and El Camino Hospital. I attended the fifteenth anniversary dinner for the Santa Clara County Amateur Radio Club. A good time was had by all. There were three charter members at the dinner who described movies taken at a hamfest in the mid-twenties. W6BPT spent a week in the hospital getting his new Pacemaker installed and adjusted and now is home and back on the air. That's real electronics. Traffic: W6RSY 684, W6BVB 340, W6YBV 273, W6NW 192, WA6LEA 167, W6DEF 67, W6VZT 53, W6AUC 45, W6OH 14, W6ZRJ 10, W6IOU 7, W6NLG 4, W6RFF 4.

ROANOKE DIVISION

NORTH CAROLINA - SCM, Chuck Brydges, W4WXZ - SEC: W4EVN, Pam; WB4JMG, RM: WB4PNY. Hearty congrats to WB4PNY on RM appointment. K4RJ is getting echoes from the Moon with a 28-ft. dish on 2.3 GHz. Contact for the NC FM Repeater Assn. (ARRL affiliated) membership is K4GHR. The board consists of K4RUQ, K4AZA, K4GHR, W4BUZ, K4WQS, W4URS and WA4JZX. Wilson County bc: WB4NXS has 13 on 2-meter fm plus 2-meter mobiles; AREC net to begin soon. OBS W4CQJ has bulletins on vhf. The Governor sent greetings nationwide through many RARS members. Thanks to all who participated. WB4KPD a new OVS, reports 6 meters has lots of space. K4VBG is setting a check-in record for THEN and JFKN. K4GQS is new (O) and running DX patches. K4BE missed by one Hertz in FMT, how close can you get? Raleigh ARS officers are WA4ZNA, pres.; K4CQJ, vice-pres.; W4RUH, secy. RARS now has 75 members. The Tar Heel Emergency Net was activated Dec. 2, 3 because of an ice storm warning, assistance given mobiles. Brightleaf ARC, WB4TFU, officers are K4MI, pres.; K4LI, vice-pres.; K4BPF, secy.-treas. K4SK1 has a nine-element 20-meter twirler on a 120-foot boom. Wow, must hear DXCC all at once with that thing! Congrats to K4HFP on new boy-type harmonic. Traffic: (Nov.) WB4PNY 255, W4EVN 196, W4PCN 118, K4MC 105, WB4OZL 53, W4WXZ 32, WB4PWZ 24, WB4NRZ 23, K4VBG 23, WB4HDS 18, K4OFK 17, W4TYE 14, WB4JMG 12, W4CQJ 9, K4EZH 6, WB4TNC 5. (Oct.) K4COG 20, K4EZH 17.

VIRGINIA - SCM, Robert J. Sagle, K4GR - Asst. SCM: A.E. Martin, Jr., W4THV, SEC: WA4PBG, Asst. SECs: WA4JJE, WB4CVY, PAMs: WA4FGC, WA4YXK, RMs: WA4EUL, WB4NNO, W4SHI. WB4FDT on 2 fm in dormitory at VCU. W4DM bitten by 2-meter bug. W4YZC visited by W1CIP and W1YNP. W8VDA/4's new exciter taking work out of contest operating. WB4DRB has new 30 watter on 2 fm. Repeater WB4QEP doing well to 50 miles. Hot competition between WB4FKJ and WB4KSG in Winchester for

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traffic. W4LOO reports improved signal reports with new inverted "V." KØPIV/4 went from Conditional to Extra in one sitting! WB4RNT wants help in putting up his three towers! Director W4KFC at Executive Committee meeting in Newington, and active in SS. W4KAO working more and fixing antenna in spare time. W4JUJ slowing down on counties; has 2438 to WA4WQC's 2901 - WA4WQC still worrying us with his recalcitrant heart problem. W4KK's QTC suffering from out of town commitments. Note PAVHHS hamfest plans for Apr. K4JM had a conflict of interest between flu bug and SS - he is OK now. Note new asst. SEC for phone. WA4JJP. WB4FJK made RPI double in Nov. with over 100 originations and deliveries plus the usual 500 plus total; also BPLs: WB4KSG, W4SQQ.

VSBN	3935 kHz	1600/2200 Dy
VSN	3860 kHz	1830 Dy
VN	3860 kHz	1900 Dy
VFN	3947 kHz	1930 Dy

Traffic: (Nov.) W4SQQ 57K, WB4FJK 506, K4KNP 388, WB4KSG 241, W4UQ 235, WB4SJK 190, WB4RNT 184, W4TE 166, W8VDA/4 115, KØPIV/4 98, K4FSS 76, K4KA 75, WA4FGC 72, WB4KIT 69, WA4JJP 55, WB4KBJ 41, WA4PBG 35, W4KRY 29, W4KFC 28, W4GEQ 24, W4YZC 20, W4THV 18, WA4WQC 18, WB9BXX/4 17, WB4FDT 16, W4OKN 16, WB4RDV 15, WB4QAO 12, WA2BEX/4 11, K4GR 11, WB4DRB 8, K4JM 6, W4LOO 6, K4CGY 5, W4MK 5, W4DM 4, W4KX 2, WB4DRC 1. (Oct.) W4SQQ 380, W4GEQ 30, W4OKN 20, WB4QAO 5, WB4FDT 3.

WEST VIRGINIA - SCM, Donald B. Morris, WR1M - SEC: WA8NDY. RM: W8BBG, PAMS: W81YD, W8DUW, K8CHW. Phone Net Mgr.: WA8POS. CW Net Mgr.: W88CYB. WVN CW Net - 3570 at 0000Z and 0300Z daily. WVN Phone Net - 3995 at 2300Z daily. State RACES Net - every Sun., 3996.5 at 1300Z and 1800Z. W8BBMV had 68K and all sections in SS. W8BAOF moved from Bridgeport to Glendale and has a new HW-101. Kanawha, MARA and Welton ARC held code and theory classes and W88DMS reports good progress with the Novice class at Greenbrier Valley ARC. W8HZA needs Ore., Idaho, Utah and Wyo. for 160 WAS. OCWA Chapter of West Va. invites amateurs licensed since 1946 to join. For details write W8FSQ. Elkins. K8BC+ and K8LSN husband and wife team, enjoys snow-mobiling. WVN Phone Net with 451 stations and 30 sessions, handled 95 messages. WVN CW Net in 30 sessions with 133 stations, handled 69 messages. Kanawha ARC held officer's installation banquet in Jan. Congratulations to WA8FB for 50 years ARRL membership. W8DFC has new hilltop location. Traffic: W8BBMV 241, W88CYB 182, W88DXF 58, WA8POS 20, WR1M 19, WA8LFW 12, K8OLW 10, W88DOX 8, W8AEC 7, W8D1V 7, WA8OKG 5, W8BBMW 4, W8GDP 4, WA8NDY 4, WA8UNP 4, WA8WCK 4, W8HAX 3, W8KWL 3, W8BAKO 2, W8CKX 2, W8FZP 2, W8GWR 2, W88DMS 1, W88HA 1, W8KKN 1, WA8LFZ 1.

ROCKY MOUNTAIN DIVISION

COLORADO - SCM, Clyde O. Penney, WAØHLQ - SEC: WAØQOY. RM: WØLRN. PAMS: WØAWG, WØCXW, KØIGA, WØLRW. WØLLA is now the proud operator of two stations, using Drake line and Hallcrafters gear, all bands, all modes. W4UDS/Ø has a new classic 3S beam with which he worked over 700 QSOs covering 73 sections, in the phone SS. He also has qualified for his DXCC 140 sticker. Congratulations! WØLCE reports improved operation since he reworked his 160-meter antenna. WØØQJ is enjoying his new Swan-500 transceiver. WØMSV has modified his HW-16 for 20-meter operation and will forward necessary information to anyone interested in this change. Congratulations to the SSN on celebrating its first anniversary on Oct. 26. Also congratulations to WØLCE on receiving his new Advanced Class ticket. Net traffic for Nov.: Hi-Noon QNT 935, QTC 44, informals 98, phone patches 19, phone calls 4, time of 862 minutes for 28 sessions. CCN QNT 170, QTC 63, 26 sessions (Oct. QNT 193, QTC 75, 30 sessions). SSN QNT 279, QTC 136, informals 44, time of 958 minutes for 50 sessions. Columbine QNT 1195, QTC 51, informals 177, time of 1240 minutes for 27 sessions. Traffic: (Nov.) KØZSQ 1037, WØWYX 298, WØLO 190, WØLLA 162, WØLRW 109, KØJSP 86, WØNZI 50, WØIW 49, WØLRN 41, WØLCE 35, WØSIN 28, W2TPV/Ø 28, KØDSP 26, WAØYGO 14, WØPCCB 13, KØIGA 8, WØLEK 8, WAØNIC 6, KØMNO 4, WAØHIO 2, WAØSIG 2. (Oct.) KØZSQ 845, WØLRN 15. (Sept.) WØLRN 14. (Aug.) WØLRN 38.

NEW MEXICO - SCM, James R. Prime, WSNU - Section Nets: Roadrunner Net, Tue-Sat, 0100Z, 3940 kHz; Post Office Net, Sun. and Mon. 0100Z, 3940 kHz; New Mexico Net, Tue-Sat 0230Z, 3570 kHz. K5DAA and K5DAB provided communications for the Queens. NM deer hunt camp for the period Nov. 17 - Dec. 3. WSDMG was a pedestrian loser to an auto turning at an intersection in Nov. Hope the bruises were not too severe. W8FKP and

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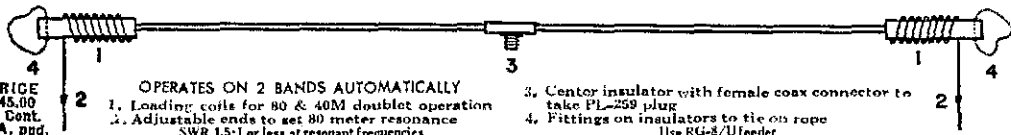
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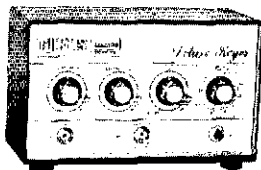
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W5DILL set out to service the repeater on Mt. Taylor on Nov. 27 and got caught in a lightning and snow storm forcing an over night stay in the transmitter shack. Reports are that static electricity makes the hair stand on end. W5SOHL has a new Allied 190 receiver. W5DAD has installed a foot switch for phone patch service. W5KMC finds the phone net an essential service during telephone failure as it is several miles from the house to the ranch gate. Traffic: K5MAI 193, K5DAB 36, W5EFLG 35, W5PPDY 73, W5MYM 30, W5BAXC 22, W5DAD 20, W5SOHL 12, W5DMG 10, W5BUL6, W5RWV 6, W5SMY 6, W5JNC 5.

UTAH - SCM, Carroll E. Soper, K7SOT - SEC: W7WKF. RM: W7OCX. The Utah Amateur Radio Club's new pres. for 1972 is WA7MSR. Good luck in the coming year Bill. The Club held their Christmas Party Dec. 2nd with an excellent turnout and a good time enjoyed by all. WA7BRB handled 150 phone patches during Nov. for the service personnel in the base area. The Wasatch VHF Net meets every Tue. at 1900 MST 146.34 in 146.94 out MHz or simplex 146.94 MHz; all interested persons are invited to participate. The Beehive Utah Net meets daily at 12:30 MST and again is having an increased participation. QNI 926, QTC 67, average time 17 13 minutes. Traffic: W7EM 152, W7OCK 128, WB7MEL 16, W7IOU 12, K7SOT 9.

WYOMING - SCM, Wayne M. Moore, W7COI - SEC: K7NOX. RM: W6GM1, PAMS: W7TZK, K7YUG. OBSS: K7NOX, W7SDA, WA7HA, K7YUG. Nets: Pony Express, Sun. at 0800 on 3920; YO daily at 1830 on 3608; Jackalope Mon. through Sat. at 1215 on 7760 (air. 3920); Wx Net Mon. through Sat. at 0630 on 3970; PO Net 1900 Mon. through Fri. on 3950. Casper lost a couple of more hams - WA7FIB and W7NAB. New officers for the Casper Club in 1972 are K7KMT, pres.; W7UBJ, vice-pres.; WA7NHP, secy-treas. Cheyenne has tentatively agreed to host the 1972 ARRL Division Convention. Date and time are not known at this time. The Casper Club has purchased a new solid state 2-meter repeater and will maintain it under the same call K7KMT. The Wyoming Mobile Club had a very successful test in Nov. of their capabilities. Traffic: W7TZK 52, K7VWA 52, W7SDA 31, W7RHH 25, W7YWW 20, W7HNT 18, WA7NHP 9, K7BTE 2.

SOUTHEASTERN DIVISION

ALABAMA - SCM, James A. Brashear, Jr., WB4LJK - SEC: W4DGH. RM: W4HH1, PAM: W4WLG. Regret to report the passing of W4MI. WB4VKW is active on 80 and 20 cw using a new matchbox. WN5SON has again qualified for BPL. K4JK is active with a new SB-200. WB4SVH is working on a new HW-101. W4ZWE moved to the country and among all his antennas, he had a long wire that was too long to measure! Congratulations to new ARRL affiliate the Covington Radio Club of Andalusia. The Huntsville ARC set up some stations recently in a local mall to originate some holiday traffic and everyone had a ball! According to reports from our ECs we have only 109 ARRL members in the section. I am sure there must be more. How about SEET? Did you submit a report of your activities? If not, be sure and report to your EC/SEC. Appointers: If your appointment was dated more than one year ago, and you desire to continue the appointment, please let me know. Appointments: WB4LJD as EC; K4HJM and WB4VKW as OPS; Endorsed: K4HJM as EC. Traffic: WB4SVX 373, WB4SVH 307, WB4LJK 175, WN4SON 132, WB4KDI 123, WB4OKT 94, K4OAZ 82, WB4JMI 75, WB4KSE 50, WB4NJL 28, WB4VKW 8, WA4VLE 6, W4DGH 2.

CANAL ZONE - SCM, Larry McMillen, KZ5ZZ. The Canal Zone Phone Net meets every Tue. at 1000 Hz on 3790 kHz and the net follows. All Canal Zone amateurs are reminded that Jan. 29 and 30 are the ARRL SEET days. The YKPC and RACTC Net, in the Canal Zone, are not sufficiently organized to participate in this year's SEET. However, all Canal Zone amateurs are urged to monitor and participate during this period. Suggested times and frequencies are: after 1400 local time, frequencies 3547 kHz and 3670 kHz. Canal Zone amateurs are invited to participate in the ARPC Net, every Mon. at 1900 local time on 3790 kHz. Traffic: KZ5GW 16, KZ5Z7 10.

EASTERN FLORIDA - SCM, Regis K. Krause, W4ILE - SEC: W4IYL. SEC: SEC: W4SMK. RMS: WB4OMG and K4IHY. PAMS: W4OXA 75 and W4SDR 40. Florida visitors - bring your rigs along and QNI one of the following nets, send a message back home! We do a thriving business. Plenty of Repeaters for you FLers too.

Net	Freq.	GMT/EST	Days	QNI	QTC	Secs.	Mgr.
GN	7115	1330	8:30 A	419	326	30	W4IA
QFN	3651	0000	7:00 P	Dy			30 WB4OMG
QFN	3651	0300	10:00 P	Dy	889	677	30 WB4OMG
QFIN	3715	0200	9:00 P	Dy	82	16	25 WB4PNG
EPIN	3940	1200	7:00 A	M-S	456	153	26 W4NGR

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(Please see the other side of this page for an application for membership in ARRL and 12 issues of QST.)

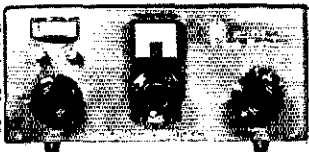
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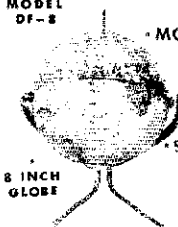
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 IPTN 3940 2200 5:00 P.M-S 374 114 26 WB4NCH
 EAST 3940 2300 6:00 P.Su- 789 151 26 WB4MIQ

BPLers: WB4AIW, WB4OMG. Versability gives PSIR to WB4OMG, WB4PNG, K4IAC and WB4VOS. W4DVO reports W4DUG Tampa ARC handled over 100 radiograms for the Hobby Show. Thanks go to K2GSP/4, W2GTO/4, WA4CJG, W4CL, WB4DMZ, WB4AIW and W3CUL! W4RGO thanks QI FN - they handled his first priority message. WB4QFH SSd for 56,500 points. Tentative planning for the Florida QSO Party this year calls for recognition of Aggregate Club Scores. Com'on gang! Now that your rested up from the SLT - why not try a St. Valentines radiogram to Aunt Minnie up "north." We need some organizing among the RTTY group, how about a traffic net. Drop a line to W4ILL or ARL ? for RTTY sked - and if you want to make this new SCMS life complete file your Station Activity report via the net of your choice! Hope ya'll work 5BDYCC this month! Traffic: (Nov.) WB4AIW 730, WB4OVO 369, WB4OMG 366, WA4JFH 332, WB4NCH 228, W4I PC 199, WB4HKP 293, W4OVO 180, WA4NBT 156, W4ILL 145, W4SDR 140, WB4HIW 123, W4DQS 88, WB4MIQ 82, W4NGR 82, WB4HNL 81, K4IAC 77, WB4SMA 72, WB4TFI 69, K4QG 63, K4IWM 58, WB4PNG 54, W4BM 51, W4LSR 49, WA4HD 45, W4IA 41, K4BLM 36, W4TIM 35, K4FYN 33, WB4SKI 33, WA4BCW 31, WA4HDH 31, W4IYT 31, W4GUC 29, WA9JSX/4 28, W4KRC 27, W4SMK 27, W4IAD 26, WB4FLW 25, W4KGL 23, WA4OWG 23, WB4RLU 23, W4ZAK 23, K4KE 22, W4YYP 20, K4IBF 19, W4DIP 18, WA4RUE 18, WB4QFH 17, K4MV 16, K4SCL 16, W3FBN/4 15, WB4FJY 12, W4OGX 12, W4OQH 12, WB4OAA 10, K4OFR 10, K4SJH 10, W4RGO 9, K4DVM 8, W4FH 8, WB4QID 8, K4EJW 7, WB4NGJ 7, W4NTF 5, W4MML 2, W4YSO 2. (Oct.) WA4OWG 23.

GEORGIA SC M, A.J. Garrison, WA4WQU -

Net	Freq.	Time(Z)/Days	QNI	QTC	Mgr.
USN	3595	0000/0300 Dy	856	279	K3WAI
Ga. SB	3975	0100 Dy			WB4DMO
CTN	3718	2300 Tiv	186	60	WB4SPR
Ga. Cracker	3995	1300 Su	107	8	WA4QU

W4DQD reports that QSL's have been mailed to all DX stations who worked the Georgia Southern College special event station K4C-D. State-side stations desiring a QSL are asked to send an S&M to W4DQD P.O. Box 2067, Statesboro, Ga. 30458. The Southwestern DX Club elected the following officers for 1972: W4OJL, pres.; K4FK, vice-pres.; W4GTS, secy.; W4IPL, treas.; K4EZ, act. mgr. DXers in the greater Atlanta area desiring to join in on some good fellowship and improve their DXCC scores at the same time are invited to contact any of these officers. New officers for the Augusta Radio Club are WB4SKO, pres.; K4PSW, vice-pres.; K4OIK, secy.-treas.; Traffic: WB4QGN 187, W4FEP 148, K4DNI 89, K4BAI 80, W4AMB 58, WB4SPB 48, WB4RUA 46, W4PIM 41, WB4MUR 38, WA4WQU 36, W4CZN 33, WB4PEV 24, W4RNL 16, W4JM 8, W4DOC 6, W4PDN 5.

WESTERN FLORIDA SC M, Frank M. Butler Jr., W4RKH
 SEC: W4IKB, RM: K4LAN, RTTY: W4WLB, PAM: W4NOG.

Net	kHr	Time(Z)/Days	Secs	QNI	QTC
W4PN	3987	2330 Dy	30	457	73
QFN	3651	0000/0300 Dy	60	-	-
QFTN	3715	0200 Tiv	-	-	-

Note new time for W4PN 2330Z. Pensacola: K0BAD/4 is on 80-meter RTTY, 85U/170 Hz shift. WA3ODA/4 has new tower and rig for 6 meters. WB4DVM moved to new QTH. WB4PKW, K4I KY and WB4JHQ are experimenting with 6-meter facsimile. WB4JCV reappointed FC. K4LAN renewed OO activity. W4WVA is a new Novice. Milton: WB4JRP back on the air from new QTH. W4WXP a new ham in Gulf Breeze. Fort Walton: W4IDJ, WB4UFK and WB4TPR active on QI TN: 1PR NCS on Wed. W4WNY active on 75-meter ssb and 40-meter cw from Nicewille. K4KIS/4 an AF Weather Officer at Harbor. WB4NHH building his own gear! WB4KX, W4UXW and W4BYF teaching a Novice class at Choctaw H.S., Delmar Springs; WB4YB, (D Dir for Walton County received his ticket. Panama City: New PCARC officers are WA4IMC, pres., plus WB4GAU, WB4LLE and WB4NI Q. K4YFY worked all sections and got a nice score in SS. Chiplee: W4PVB now has a Tech ticket. W4IKB and family spend holidays in Ariz. Bloomington: WB4UQH installed an HR-2A for mobile. Marianna: WB4YBO a new ham on 2 meters. W4KCA renewed FC appointment. My sincere thanks for your vote of confidence in returning me as SC M for another term. Traffic: (Nov.) K4VY 254, WB4SBI 251, K0BAD/4 153, WB4IF 63, W4NOG 24, W4RKH 13, K4DOT 6. (Oct.) W4RYZ/4 143, K0BAD/4 68, WA4IMC 65.

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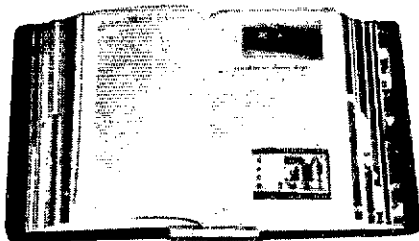
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SOUTHWESTERN DIVISION

ARIZONA — SCM, Gary M. Hamman, W7CAF — SEC: K7GPZ. RA: K7NHL. PAM: W7UXZ. Congratulations to those elected to office for 1972 in the following organizations: Amateur Radio Council of Arizona (ARCA) K7JWB, chmn.; K7YTR, vice-chmn.; W7QZH, secy.; W73CE/W7, treas. Arizona Repeater Association (ARA) K7KLO, pres.; W7EKV, vice-pres.; K7BSA, corr. secy.; W7KBN, rec. secy.; WA7AOH, ea. custodian. Old Pueblo Radio Club (OPRC) WA7JCK, pres.; K7CRN, vice-pres.; W7MGF, secy. treas.; WA7JF, controller; W7FAH, editor. Scottsdale Club (SARC) WA7SA1, pres.; WA7JWH, vice-pres.; WA7OVH, secy.; WA7IRZ, treas.; W7DLL, member-at-large. The annual Winter Hamfest sponsored by ARCA will be Sun., Feb. 6, at Squaw Peak Park in Phoenix. The ARA is handling arrangements this year which include a pot-luck lunch, prizes, transmitter hunts, tables, etc. The Arizona ARC set up a demonstration station and handled Christmas messages from Bayless Old Country Store in Phoenix. K7HQE and NYL toured Okinawa as guests of Kadena AFB. Ken has run over 150,000 patches for servicemen overseas. K7WHI has spent some time in Europe. W7OUF has a new 14-X transmitter to match her R4. Section Net Certificates were earned by K7FMM, K7GLA, WA7HTI, WA7KOE, K7MTZ, WA7NOA, K7NTG, W7OUE and K7RLI. Traffic: K7NHL 220, K7NTG 138, K7MTZ 114, K7FMM 59, WA7NWL 19, W7CAF 14, K7RLI 9, K7GLA 8, W7OUF 8, WA7KOE 6, WA7JCK 4, WA7NOA 2.

LOS ANGELES — SCM, Eugene H. Violino, W6INH — RM: W6LYY. Traffic on SCN is beginning to pick up. W6LYY and W6ZVC are being kept busy. W6KMC received delivery on a new FT-101. W6PZY is vacationing in Tahiti. K6ASK still operating on 433 MHz fm and checking into SOCON 2 traffic net. W6KW doing a hang up job as OD. We need more ODs if interested please let me know. W6GMC has a good article in the San Gabriel Valley Radio Club paper regarding reducing the output of the Swan 600-E to drive a beam amplifier. K6SUJ arranged field trip to ML Wilson for the Ramona Radio Club members. The Santa Clarita Club had their installation dinner Sat. Jan. 15 in Van Nuys. W6NJU gave a talk on DX at the San Fernando Radio Club. W6IXJ reports the Los Angeles City CD Board has just approved joining the County RACES system. The Palisades Amateur Radio Club has printed a new membership roster. K6RFU is now a piano tuner-tech. The Ramona Radio Club station license is K6SIR. WA6LLA recovering from an operation. The Crescenta Valley Radio Club had their Christmas dinner at the Kings Arms in Burbank with 54 members present. W6JPH is a proud father again. W6HS had a small group of the OCWA meet in Montrose for a Chinese dinner with W6AM, W6MAB, W6MLZ and W6CL present. W6PMP still busy building vht and uhf converters. W6GCD with West Valley P⁹ on SS. W6HUU still having antenna troubles. K6FA back from the east and active on SCN again. It has been suggested that the OD appointees have a get-together and discuss various problems that they encounter and have some new suggestions. W6USY has been getting a lot of air time flying. K6DYK makes BPI again — 3rd time in a series. W6KCV preparing for DX contest in Feb. Those interested in the Southern Calif. ATV Club contact WB6JXL. WB6PKA was operating on 3.5 MHz during recent DX contest. WA6AAW finished building new keyer and also has a new FT-101 for mobile use. W6GI has been active as an EC for over 20 years and still checks into net Tue. 7:30 P on 28.680 ssb. WB6GFI reports into the Channel City Net. WB6IXE presented slides on AREC at the San Fernando Radio Club. The OOTC had a get-together dinner at Rudes Restaurant — 65 attended with W6DRV and W6MAB as MC. WA6AJJ keeping sleds on 7 MHz. Traffic: W6INH 530, WA6OQL 272, K6UYK 182, W6USY 146, W6OAF 121, K6QPH 76, WB6ZTI 69, W6YIZ 42, K6JA 36, WA6ZKL 27, WA6DWM 26, WB6RJK 26, WB6BBO 22, W6IVC 20, WA6AAW 11, W6OAW 9, WB6GGL 6, W6HUU 6, W6DGH 3, K6ASK 2, W6BHG 1, K6CL 1.

ORANGE — NCM, Jerry E. Verdult, W6MNY — ASL SCM: Richard W. Birbeck, K6LJD, SEC: WB6COR, RM: WB6AKR, K6CDD, WB6COR and W6CPB were guest speakers at the Lee Deforest ARC meeting in Gilman Hot Springs. W6ISC is a new ORS on SCN and Orange County 40-meter AREC. Appointments are available for PAM and OO for vht. OO W6FBF made the Sept. FMT Honor Roll once again. New affiliated clubs are Troy High ARC of Fullerton and UC Riverside ARC. WB6VTK made BPI for Nov. traffic originations and deliveries. We will miss W6TK who died Thanksgiving day. He was one of the few 50-year ARRL members. EC WA6TVA reports the Orange County 40-meter AREC net handled 12 third party messages in Nov. The Inyo Co. AREC held its first trial drill Nov. 1 on 10 meters ssb. W6DZO is a new Asst. EC for San Bernardino Co. and is Net Control for the WA6ALV repeater AREC net. K6YNB served as Net Control for the Barstow

to Vegas motorcycle races with nearly 300 situation reports in nine hours. W6GB still is working 75-meter DX. Asst. SCM K6CID presented a talk on the Riverside Co. RACES over station KHSJ of Hemet. W6WRJ reports the following stations provided communications at the Lake Havasu champion outboard motor races: W6GPR, WRJ, WA6CGP, HKW, QAD, VKL, MRC, BYY, WB6CCG, LEE. Over 500 situation reports were handled. K6ZQH sent me a Nov. 4 copy of the "Diesel Sentinel" newspaper which contained a writeup on Desert Hot Springs area radio amateurs. W6QBD was pictured in the Lucerne Valley news taking a Thanksgiving day message for later transmission via NTS. Glad to see this publicity. PSHR: W6MNY 40, WA6TVA 37, WB6AKR 25. Traffic: (Nov.) WB6VTK 410, WB6AKR 184, W6QBD 81, W61NC 75, W6MNY 71, WA6TVA 47, K6GCS 10, W6GB 4, W6WRJ 4, WB6ZTN 4, WA6YWS 2, W6NH 1. (Oct.) W6NH 2, K6OPF 1.

SAN DIEGO - SCM, Paul C. Thompson, W6SRS - Asst. SCM, Art Smith, W61NI, SEC: W6TAL. Thanks to all members of the ARFC and NTS and the CD who participated in the SET in Jan. Congratulations to the new officers of organizations here in the S.D. section. SDRARS has elected WA6SHT, pres.; El Cajon elected WA6HGH. The Novice crystal bank is in need of another deposit. Contact mgr. WB6LYG. Novice nets are on 3725 kHz, Sun. 8 A.M. and Tue. at 1930. Members of the southern district held an SET in cooperation with the Chula Vista Red Cross. Congratulations for a job well done. Clubs: North Shores attended a program of ARRI films on amateur activities. El Cajon held elections and a pot-luck banquet. This was WB6ODR's last year as pres. SUBARS held elections also. Palomar held a party at Fallbrook and W6DIY is pres. for this year. SDDX Club will begin holding their meetings at the Convar Gun Club, Gillespi Field. IVARA is holding meetings again at IV College. Also IVARA has been providing communications to De Anza rescue for Baja searches. Station activities: WA6HHA now is on 2 meters; K6CAR is IC for the Imperial Valley district; K6BTO has 432 gear in operation. Many stations helped in the check point communications for the dune-buggy races Jan. 1 and 2. PSHR: W6BJA, W61RI. Traffic: W6VNO 589, W6BGF 381, W6JOU 352, W6BJIMY 107, K6KDE 90, W6LRU 78, W6YKF 40, W6DEY 26, W6OVKV 22, W6SRS 8, K6PM 5, W6MI 2.

SANTA BARBARA - SCM, D. Paul Gagnon, WA6DFI - SEC: W6JTA, RM: W6UJ, PAM: K6EVO. I have been encouraged by the number of people who have been checking into the section net on 3935 at 8:00 P.M. Wed. We have had poor band conditions, but they will improve. I hope to pass out all the latest information and invite all to check in with any questions. W6JDU sends Official Bulletins on 7105 kHz at 7:00 P.M. Wed. New ORS appointee W6JJA took SCN net control for me while I was out of town during Oct. and Nov. Thanks, Bob. WB6BWZ is getting active again as an OD. K6EVO has moved to Buellton and plays on a 500-ft. long wire. QVS WA6JGX is an active net control on the Channel Cities 2-meter net which meets daily at 1830 local on 145.8. Committees are working hard on plans for the 1972 SW Division Convention to be held in Santa Maria. WA6XD is a newly licensed Technician in the Baywood Park area. Don't forget the 88s for our XYI or favorite YI on Valentines day. Traffic: W6JJA 139, WA6WYD 54, WB6MXM 25, WB6PGK 19, WA6JGX 10, WA6DEI 9.

WEST GULF DIVISION

NORTHERN TEXAS - SCM, L.E. Gene Harrison, W5LR. Asst. SCM: Gene Pool, W5NPO. SEC: WA5VJW. Asst. SEC: WA5KHE, PAM: W5BOQ, RM: W5QGZ. Attention all ECs. Please send reports re ARFC work to Miss Ruth. The DARC Christmas Party was held Dec. 19 at Windmill Theater. Congrats to WA5SRK on excellent job at Port Aransas during Camille. The Tex Traffic Net moving on and upward in check-ins. W5PXX sport car rally held Nov. 27 with 22 rally points controlled from NW Ramada Inn. Participants include W5HS, K5VOU, WA5FEF, W5NSQ, W5PCX, WA5GXP, W5SWY and Nick Jennings. New class on Skywarn started Jan. 15 at Ft. Worth Bureau. DARC SS score 713 on phone and 572 on cw with 65 and 08 sections respectively. Following EC appointments over two years old are WA5CJHS, W5GWH, K5OLF, W5UVP, K5CLH, W5OLA, W5RID, W5PYI, W5DKT, W5LOS, WA5QGF, WA5CMC, W5BLEY, W5AJ, K5AVG, W5MBP and W5DJW. W5VJD reports 19306 points, 49 sections in SS. W5MWA one of moving forces behind Irving ARC repeater. The Temple ARC group completed field trip to inspect MARC Ft. Hood. Kilocycle ARC meets at Continental Inn. W5SGM new school for General Class has 12 students. W5KWF finally found NEHEN on 3970 kHz 8:00 A.M. Sun. W5JA eyebank man for Dallas area wishes to thank those stations operating near 3970 kHz from 0100-0115Z for discontinuance of "four patches" during fifteen minutes of eyebank operating. There are 14 new Novice licensees in Dallas.



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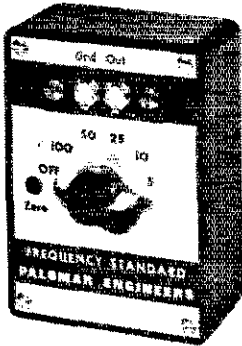
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Local Oscillator of Panhandle ARC announces formation of VHF Repeater Assn. with Don Dillard, Steve Clinger and John Gifford as officers. WSTHG an "OT" reports interest in league activities. SCM attended Arlington ARC inaugural ball Dec. 4 with XYL. Also present were W5FYB, his XYL and other officials. See you in DX test. Traffic: WA5VJW 294, W5OQ 218, W5NFO 45, W5IAR 39, WA5QGE 28, W5PBN 21, W5LR 14, W5TI 13, W5DWW 11, WA5CJ1/5 10, W5HY 8.

OKLAHOMA - SCM, Cecil C. Cash, W5PML - Asst. SCM; Joseph M. Schlosser, WA5IMO. SLC: WA5FSN. RM: W5RBP. PAMS: W5MPX, WA5WHV, K5DLE and WA5ZRW. All brass pounders are invited and urged to meet W5RB and the Okla. cw net (OLZ) on 3682.5 kHz each night at 0100Z (7:00 P.M.). It's the way to get your code speed up for that Extra Class license or they will slow down to your speed if you just reached the General Class. Congrats to W5TU: the OUARC at Norman, our Dir. visited with their club in Oct. and I just learned they have been approved as an ARRL affiliated club. Congrats to Novice W5NFO of Grand Lake, also glad to know W5KG going ssb and retiring the am rig, and also for the news that K5PVE is back down on the hi bands some. New officers of the Muskogee ARC, W5EJK, are K5WNG, pres.; W5SCL, vice-pres. Glad K5OCX found out that OLZ is again active. W5JJ reports working ZLs and JAs on 3.8 MHz. Short skip I guess H0 W5TKC has received notice of a three year tour in Germany.

Net	Freq	Local Time	Sess.	QNI	QTC	WXRpts
OPEN	3915	0800 Su	4	164	8	
OPEN	3913	1700 M-F	21	428	167	
STN	3850	1730 M-S	28	421	11	
OLWXN	3913	1745 M-S	24	385	12	245
OLZ	3682.5	1900 Dy	29	52	44	

Traffic: K5TFY 566, W5RB 44, WA5ZOO 35, W5EKL 22, W5SDXP 20, WA5OUV 16, W5PML 14, WA5IMO 10, WA5DC 7, WA5NZM 7, WA5WRC 7, K5WPP 6, K5OCX 2, W5JJ 1.

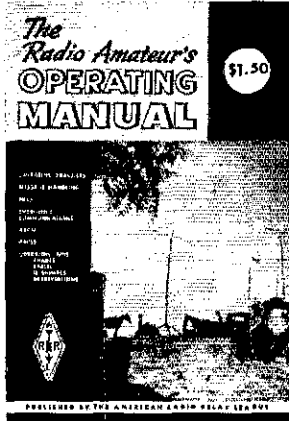
SOUTHERN TEXAS - SCM, E. Lee Drey, K5HZR - SLC: K5HAR. PAMS: W5FUA, W5KLV. RM: W5SSL. Congratulations to new RM W5SSL, OO K5LJL, OPS W5MUM and OBS W5QO. Renewed appointments: W5KR, K5GDH EC; K5FJA OO and WA5NLU OBS, OO K5TSR is new member of the ARRL Contest Committee. ORS W5ABQ advises High Noon Net (Novice) now meets on 7175 kHz at 1700 GMT. ORS W7WAH/5 reports he passed his exams for Phil in Astronomy. W5AG's repeater now operating during daylight hours with possible change in frequencies soon. OO K5LJL participated in Nov. FMT. EC W5JEW reports Jefferson County ARRL assisted in Boy Scout Good Turn Day with good results on 3-meter fm. OPS W5CB1 now active on 160 with more activity than anticipated. EC W5KR back in night school for radio and TV repair trying to recoup old licenses. F1 Paso ARC reports their WAE contest a big success. STN alerted for Laura but was not activated. Received OO reports from K5LJL, K5HHA, WA5MIN, W5N6W, W5RIY and W5VW. W5RBB and K5KOZ made PSRR again this month. RM W5SSE advises Tex net (H0) liaison to RNS. Received activity reports from EC W5KR and OBS WA5JUV. WA5YLA must move - lake being built on his QTH.

Net	Freq	Sess.	QNI	QTC
TFX*	3770	60	386	127
TTN*	3961	30	1710	144
7290 Hc	7290	42	1889	704

ENTS, Traffic: (Nov.) WA5MUM 214, W5SSE 196, WA5EJN 148, W5RBB 131, W5VW 124, WA5YEA 110, W5KBP 106, K5ROZ 93, W5ABQ 87, WA5GZX 74, K5HZR 74, K5EJL 39, K5RVE 38, W5ZPD 37, WA5IH 32, W5QO 31, W5SJEZ 29, W5KLV 29, WA5YXS 29, W5TFW 27, W5HWY 21, K5LH 17, W5AC 15, W5EZY 15, W5UKN 10, W5CB1 9, W5SBWV 7, WA5RUI 4, WA5MIN 2, K5HUA 1. (Oct.) W5SBWV 5.

CANADIAN DIVISION

ALBERTA - SCM, Don Sutherland, V61GK - Asst. SCM; Doney Booth, V66YL. We were sorry that V66ADS had to drop PAM for the APSN. All members appreciate his efforts for the net. I wish to congratulate V66ALQ to his appointment to this position. V66ALQ did outstanding work as mgr. of the old ssb net and I am sure will have as much success on APSN. Vulcan is again organizing an ARRL group with V66AGZ as LC. The club is quite active and I'm sure their operation will be successful. V66ASK is on SSTV and would like to meet others on the same mode. V66IZ, V66AWW and V66ANI are auto-start RTTY on 3620 kHz. Several V66s hit the SS with V66ANK running up a line score. V66AYU is promoting more contest activity by V66s. Calgary has a second 2-meter repeater in operation, V66RPT - input 146.34, output 146.94 with an output of 50 watts. Traffic: V66EK 87, V66AC 15, V66YW 10, V66HR 7, V66SC 6, V66SS 6, V66YL 6, V66AIQ 3, V66ALQ 2, V66HN 2, V66VE 2, V66V 1.



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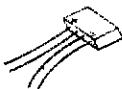
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BRITISH COLUMBIA - SCM, H.E. Savage, VE7FB - Vancouver ECs are VE7AMW and VE7UM. We need an EC for Victoria. OCWA held their annual supper with thirty-five members and their gals present. VE7KN's 9th Edition of the Handbook is out in the stores. Powell River ARC: VE7BRL, pres.; VE7YK, vice-pres.; Ed Smith, secy. VE7TT is another owner of an FT-101. VE7H has retired from DOC. North and West ARC had a successful auction with VE7JF again the auctioneer. In Nov. the amateur list of in and out of hospitals were high, we wish all a fast recovery. The BCEN Slow Speed Net is showing a good number still interested in upping their code and traffic handling. VE7DB is active on sb. VE7AYI 2 meters stolen from the car. Traffic: VE7QQ 71, VE7LL 52, VE7BLO 47, VE7TT 7.

MANITOBA - SCM, Steve Fink, VE4TQ - WARC held a successful auction Nov. 11. VE4HR has been appointed EC for Winnipeg. VE4MG, son of VE4ST and VE4TT, is a new ham. VE4FG has 18 new counties on RTTY while VE4KS reports FB activity with a new HW-16 and HG-10B. VE4DI is on again after some TVI trouble. VE4EA has been issued an MTN certificate. Antennas: VE4VB-homebrew quad; VE4UM-15 elements on 2 meters; VE4MA-using the Winnipeg CATV site for vhf. Vacations: VE4ZX to Fla., VE4GB, Tex., VE4UJ, VK-ZL-Lands. Ex-VE4ML is now VE7NU in Victoria. MTN, VE4RO mgr., reports 29 sessions, 131 QNI, 75 QTC, MLEPN, VE4QJ mgr., reports 30 sessions, 1033 QNI and 23 QTC. The ARRL DX Test goes as usual in Feb. and Mar. Let's see some VE4 activity. Traffic: VE4RO 64, VE4KE 40, VE4FA 34, VE4YC 21, VE4FQ 14, VE4RQ 14, VE4JA 12, VE4DI 9, VE4F 8, VE4NE 7, VE4OP 5, VE4CP 4, VE4UJ 4, VE4LN 4, VE4QJ 3, VE4DQ 2, VE4MK 2, VE4OL 2, VE4RRC 2, VE4WT 2, VE4LA 1, VE4PA 1, VE4QK 1, VE4RB 1.

MARITIME - SCM, W.D. Jones, VE1AMR - PAM: VO1FX. It is with regret we report VE1WF and VE1AAN as Silent Keys. New appointments: VE1RO, VO1CA as RMs; VE1ASN, VE1IWV as ECs; VE1ARB as ORS. A new net started Dec. 1 is the Newfoundland Traffic Net at 2315Z on 3656 kHz with VO1CA as net mgr. We have a new emergency Corps formed in Moncton and area through the efforts of VE1WU, VE1AMF, VE1NU and others. A 2-meter fm repeater is planned for Blomidon. Congratulations to VE1TG on his excellent showing in Bern. VO1FX is now Asst. Dir. for Newfoundland-Labrador, WB4TSD/VO1 is active from Argentina providing an outlet to the northern peninsula. VO1GQ experiencing local QRM, congratulations on first harmonic. The Yarmouth Club is holding classes for 10 students. VE1AFU is sporting a new rig. APN reports sessions 28, QNI 97, QTC 48. Traffic: VO1CA 78, VE1RO 58, VE1ARB 55, VE1AMR 34, VE1DB 6.

ONTARIO - SCM, Holland H. Shepherd, VE3DV - VE3EWD an SEC since June 1969 has asked to be relieved of his appointment and although I will miss him I have agreed to seek a replacement. I would appreciate receiving enquiries/recommendations for this most important post. A pleasant welcome to VE3BNN, newly formed club of Bell/Northern at Bramalea. It is of course a part of the Telephone Pioneers Group and recently held a hobby show in conjunction with another well known Pioneers Club, VE3PAR of Toronto. A special welcome to two successful graduates of the Ont. Traffic Training Net, VE3ASZ and VE3GJG. Both are now ORSs. The second class of the OTN commenced on Jan. 3. If interested in this class please write me. All ARRL appointees are reminded that endorsement by the SCM was Jan. 1, 1972. On Nov. 30 I was informed by Hq. that they had received a valid petition nominating me for another two year term as your SCM. This should not deter other nominations because if you think we need a change in leadership it is your duty to press on and do the job. I'm happy to report that VE3BUR is showing much progress since his Oct. heart attack. OO VE3GQJ is going to try 160 meters. VE3BVG has converted his HW-22 to operate on 160 meters. Traffic: (Nov.) VE3DPO 110, VE3DV 105, VE3ERU 88, VE3FXI 83, VE3ARS 81, VE3FQZ 73, VE3CYR 56, VE3GJG 43, VE3ASZ 40, VE3ATR 36, VE3GFN 31, VE3BFC 20, VE3GT 18, VE3DU 16, VE3ERG 16, VE3BHC 10, VE3EFG 9, VE3DH 1. (Oct.) VE3LWD 27, VE3EBC 9, VE3GQJ 6.

QUEBEC - SCM, Joe Unsworth, VE2ALE - VE2MS reports that VE2NV is no longer QSL bureau; many thanks to John for a job well done over the past number of years. The new mgr. is VE2HJ. Have also received request from VE2BTZ to be replaced as SEC. VE2WM reports 2-meter activity is increasing in the lower St. Lawrence area. VE2APT now life member ARRL. The QR Net meets daily during the winter months on 3.775 MHz at 0030 GMT. With great success they covered VO1-VO2-VE3-VE1-VE2-VE3 some VE4 and New England state areas. VE2AKM received a Christmas present from the VE2RM club, a 3/4 meter transceiver.

VE2AUD now is VE2ZH, RM VE2BZD now is VE2YU and VE2DHY is VE2BP, VE2AVP and VE2BMO creating great interest in solid state and printed circuit board ICs homebrew projects. Ex-VE2BSH now back from VE6-Land with new call VE2AW, VE2BEN built pip squeak running 100 milliwatts out with good signal on 2 meters. VE2BOK in new QTH. No news received this month from RAQI representative. VE2FPN back on 75 meters after many years on vhf/uhf. Your SCM may not run for reelection this coming summer. VE2BHH now in new QTH. VE2BRP and VE2AYY newcomers to uhf along with VE2AKM. VE2XW now in new location on Mount Bruno. PSIR: VE2APT 30. Traffic: VE2UN 225, VE2DR 108, VE2DHY 54, VE2DLG 41, VE2EC 21, VE2WM 20, VE2ALE 13, VE2APT 9.

SASKATCHEWAN - SCM, Barry Ogden, VE5BO - Welcome to new PAM VE5DN. VESHZ is being transferred from our district. Thanks for the FB effort as PAM. VESKE has taken over as Regina EC from VESDO who has done an outstanding job over the past years. Very pleased to receive ARRL Certificates for endorsements. There are several appointments still vacant so let's have your inquiries fellas! It can be fun! The SET exercise scheduled currently is more important to VES hams this year as there is a possible problem facing us from the Bertha Army Worms - again! At a recent club meeting Asst. Dir., Sask. BMO said that there is a definite place for the AREC in providing extra emergency communications for our Provincial Government organization. Traffic: VE5SC 33, VESQS 24, VESHP 12, VE5BO 11, VESRJ 11, VESQJ 10, VESKE 6, VESKZ 6, VESQ 4, VESDN 3, VE5FA 3, VESIX 3, VESRF 3, VESYR 3, VESFT 2, VESKI 2, VESLG 2, VESAO 1, VESDR 1, VESLC 1, VESFN 1.

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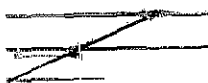
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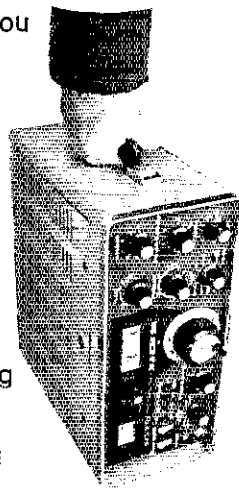
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TOLEDO Mobile Radio Association's 17th annual hamfest & auction, will be held at the Lucas County Recreation Center, Maumee, O on Feb. 20, 1972. \$1 registration, open table sales, map and info. Write FMRA, W8HFF, Box 273, Toledo, OH 43601

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SELL: Apache smtr TX-1 \$40. Carlton Stewart, W1EUL, Brooklin, Maine 04616

HALLCRAFTERS HT-30 ssb transmitter, manual, excellent, \$75. Homemade 200 watt linear \$25. You ship. W8BKK, 436 Linden Circle, Huntington, WV, 25705, (304) 523-9797

"HOSS Trader Ed Moory" says he will not be undersold on cash deals! Shop around for your best price and then call or write the "Hoss" before you buy! New Regency HR-2A two meter fm transceiver, 15 watts, immediate shipment, amateur net, \$229.00. Package deal, new kW station, new NCX-1000 transceiver, Mosley TA-33 beam and Ham-M rotor, reg. \$165.00, cash price \$948.00. New Rehm 50 ft. foldover tower prepaid \$235.00; New Mosley Classic 33 and demo Ham-M rotor, \$209.00; Used equipment: HT-37, \$189.00; R4-B, \$349.00; Ham-M, \$85.00; T4-XB, \$359.00. Moory Electronics Co., P.O. Box 506, DeWitt, AR 72042. Tel: 501-946-2820

QST magazines 1923-1959 inclusive, completely intact - bound, excellent condition. Make offer for complete set. Also Radio 1934-1939 bound. Please contact Mr. M. Higgins, 10430 Hoyne, Chicago 60643 IL

BUYING? Selling? Trading? Don't make a move until you've seen our new publication. Free sample copy! Six issues for \$1. Ham Ads, P.O. Box 46-653A, L.A., CA 90046

FOR SALE: HQ-180-AC Hammarlund receiver - like new - original carton. Best offer over \$325. Hallcrafters HT-37 transmitter. Excellent condition. Best offer over \$150. Brand new 4D32 tube never used. Surplus receivers BC-453, 454, 455. Rack-mounted Super Pro SP-600-JX. Runs fine! Make good offer. W4NJE, Mac Springs, 9910 Channing Ln., Richmond, CA 94325

SELLING 14 AVQ built. \$45 or best offer. Call 916-421-9193 or "George" 5213 Galaxy Pkwy, 95823

WANTED: Used Drake TR22. State price and condition. W0MZC, 26 Princeton, Longmont, CO 80501

CASH or trade for pre-1925 radios for personal collection. Carl Osborn, W6RXP, 13816 Calvert St., Van Nuys, CA 91401

HQ-500 wanted - cash for best offer. Henry G. Hayes, K2E4QM, c/o Teledyne-Ryan Aero Co., Box 759, Fajardo, Puerto Rico 00648

SR-102, cw filter, HP-23A-supply, SB-600 speaker, all new, assembled and tested by experienced builder. Also Swan 250C - 6M transceiver, 117KC supply/speaker, new, original packing, manuals, make offers. Wanted SB-200, Larry Tucker, WB9CLU, RFD, Leland, IL 60531. 815-485-9140

DRAKE MN-2000 matching unit. \$150, plus shipping. K1EVO 203-354-9735

DRAKE TR-3 \$325, AGC \$25, RV3 \$50, All \$375. Excellent. E. M. White, WA2JDW, 848 Broad St., Shrewsbury, NJ 07701

WANTED: Manual or photocopy Ferns Signal Generator model 22-D. W0AJ, 1800 Swadley Dr., Denver, CO 80215

INVADER 2000 \$225; Clagg 22er immmc. \$140; Johnson 60W 2M fm \$250. K0RVN, L. Fischer, R4, Box 217, Waseca, MN 56093

FCC "Tests-Answers" ... Original exam manual for F.C.C. First and Second Class License. plus - "Self-Study Ability Test," \$2.95. Satisfaction guaranteed. Command, Box 26348-T, San Francisco 94126

TOUCHCODER II keyboards, Ref. July 1969 issue. Still available: \$26. p.p. William J. Hawkins, 27 5th St., Carnegie, PA 15106

WANTED: Two or more Robn No. 6 tower sections. No top sections. Any reasonable price. Local only. K2OWR. Tel: 201-338-6942

TECH manuals - \$6.50 each: TS-34A/AP, TS-497B/URR, R-274/FRB, SP-6000X. Hundreds more. S. Consalvo, 4905 Roanoke Dr., Washington, DC 20021

FOR SALE: Complete package Drake T4X with power supply, R4A with matching speaker, in original cartons. Drake low pass filter, Heath SWR Bridge, cables, connectors, box of surplus parts, coax, many extras. \$650. Glen C. Davis, Rothsville, PA, north of Lancaster, PA. Tel: 717-626-4986

PHONE men - For two years ARRL has run a contest on 160 meters limited to cw only. If you feel this is discrimination drop a card to WYLY # ARRL, Ken Cornell, W2IMB, Box 721, Westfield, NJ 07091

FOR SALE: National NC-300 receiver with crystal calibrator, \$125. Johnson Viking 2 with homebrew VFO, \$100. Both perfect with manuals and original cartons. George Culbertson, W7CUB, Spanish Fork, UT 84660

SELL: Hallicrafters HT-44 with power supply PS150-120, manuals, cartons, cables. Never used, \$250 cash. Firm. You pick up. J. H. Smiley, 24 Laurel Pl., Upper Montclair, NJ 07043. (201) 744-2513

HAM Radio Hammarlund HQ-145-C general band receiver with 18 foot ground plane antenna. Eico 720 90 watt transmitter with many crystals. Best offer, 609-829-0935. Richard Ebner, 215 Stephen Dr., Cinnaminson, NJ 08077

WANTED: Used Signal-One, K9TTE, c/o 211 Physics Bldg., Urbana, IL 61801. 217-352-6696

WANTED: 2 meter equipment; Communicator IV with matching VFO, or Pawnee, Lafayette TR108, linear amplifier, K6RQT

DRAKE 2-C rcvr with 2CQ/2AC \$180, SB-10 \$25. Both excellent shape with manuals. P. Van Wie, W3DUD, 6527 Edgerton Dr., Lanham, MD 20801

FLORIDA: Retiring U.S. Federal employee age 54 no dependents desires ham location Florida. Purchase or renewable lease. Because of travel must have minimum maintenance. L. H. Saucke, Box 2501, 2016 Main, Houston, TX 77002

NUTS with ham radio - Sell Drake 2-B/2A-Q calibrator - extra crystals \$189. DEAKE mobile power supply, used with SB-101 \$80. Hustler mobile whips, resonators 10-60 make offer. Will deliver anywhere Boston-Washington corridor. Contact K1THQ, 311 Eddy Glover Blvd., New Britain, CT 06053

THE NOVICE Magazine - new Novice publication, 40c, \$3 year (10 issues), 1240 21st St., Hermosa Beach, CA 90254

FOR SALE: Heathkit HW-18 MARS station, on 4595 sbw with power supply \$110. Larry Jaffe, WA1FH, 11 Herbert Rd., Worcester, MA 01020

NOVICE Crystals. Free flyer. Nat Stimette Electronics, Umattilla, FL 32784

TELETYPEWRITER machines, parts, bought, sold, S.a.s.e. for list. Tygetronics, Box 8373, Ft. Lauderdale, FL 33310

PRIVATE collector wants early wireless and wire communications gear, Teslacoids, books, magazines, etc. Quote mail price. Will Nangle, 761 29th St., Milwaukee, WI 53208

FANTASTIC Novice rig - excellent - like new Drake R4B rcvr with MSA speaker, ZNT xmitr, Hy-Gain 14AVQ antenna, crystals etc. Sell entire \$450. No separates. Robert Stark, WN2MZZ, 69 Intervale, Roslyn, LINY 11876, Phone 616-621-0480

MUST sell - Collins 329-3B transmitter, 516F-3 P/S; Heath SB-200 linear amplifier; Hammarlund HQ-170A-C-VHF receiver; Hallicrafters HT-40 transmitter. Rich Gross, 17364 Montero Road, San Diego, CA 92128 (714-487-5000)

WANTED by K4PL: radio & wireless items of the 1920s - Prefer small sets or parts. Franklin Museum, 92 - 31st Ave., St. Petersburg Beach, FL 33706

NOVICES: Need help for General ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License, P.O. Box 6015, Norfolk, VA 23508

OLD QSTs. All copies from Jan. 1962 through Dec. 1968. Will sell as single set only. Best offer. Michael Lukens, 170 East High St., London, Ohio 43140

WANTED: Johnson 6 and 2m Thunderbolt in mint condition, also Henry 4K. State price and cond. in first letter. Bill Smitherman, Rt. 2, East Bend NC 27018. 919-699-8699

RUBBER stamps: Your call in 1/2-inch letters. \$2. Call plus name and address, \$4. Postpaid. Ellis Enterprises, Dept. Q, Box 3007, Anchorage, AK 99501

HW12A w HB ac supply \$100, SR46 \$75, RCA scope \$15. 8 bamboo quad spreaders \$15. C. Courtney, WA1FOK, Old Lyme, CT 06371

SELL: Two mobil antennas with coils, Mosley Lancer, and a Hustler, all \$35. Mosley TA-33 Jr. beam, \$35. Charles Juedemann, Benton, MO 63736

2.5 kw 115/230 VAC generator used two hours \$350 new. \$200 takes it. R. L. Nuckolls, K0DYH, P.O. Box 17227, Wichita, KS 67217

SB-102, HP23A, SB-600, cw filter, perfect, \$350. WB8DAR, Hillbrand, 7630 Reitz Rd., Lot No. 2, Perrysburg, OH 43051. Ph: 419-833-6386

SALE: New Hy-Gain DB-24 beam \$110, 3 el 20M/2 el 40M, ferrite balun feed. Deliver w/in 100 ml. W3FTG, 1394 Letchworth Rd., Camp Hill, PA 17011

HELP. Urgently need schematic Browning Labs, oscilloscope, O123A serial 245. F. McCullough, Rte AZ, Box 236, Dunneton, FL 32630

W3UO estate. SBE34 \$200, SBE-21A linear \$160, Drake 2B-2BQ multiplier \$180, CE-20A exciter \$50, CE-6001, linear \$200, Panoramic PCA-2T200 new \$45, 38 Heathkit scopes & test instruments, s.a.s.e. for list. W3ATV, 200 W. Pembrey, Wilmington, DE 19803

FOR SALE: Drake R-4B, A1 condx. \$375. Jim Weber, 39610 Grand Ave., Beaumont, CA 92233

SIGNAL-ONE CX7A, new. Trade for Collins, Payne, 109 Black Patch Dr., Springfield, TN 37172

FT DX 560 \$375, Swan 260 \$275, HA460 \$75, TR106 \$50, W5KDM

SELL: Drake T-4X, R-4A, AC-4, MS-4, will pay shipping. W3PDT, 1187 Ash, Provo, UT 84601

CLEANING shack; xfrms, switches, pots, capacitors, semi-conductors, art 13/MS ARC 3/p/s. Send s.a.s.e. for list, W4PTE, Rt. 1, Box 244, Troutville, VA 24175

COLLINS KWM-2 ser. no. 15905 with FM-2 transistor power supply, 812B-3 speaker and mike. This equipment has been used for only 2 months and is in absolute perfect condition, as good as new. \$975 complete. W2CHW, Lynt, 416 Pearl St., Brooklyn, NY 11201. (212) 643-1446, (516) 621-4821

BACK QSTs Mar. 1933; Aug., Sept., Oct., Nov., Dec. 1934; 1935 through June 1937. Missing in the runs Sept., 1938-Sept., 1942, Feb. Dec. 1947; Jul., Aug., Dec. 1950; Dec. 1951, May, nov. 1952. ARRL Handbooks; Special Defense Edition, 1943, 1944 bound, 1945, 1947, 1949, 1951, 1956, 1957, 1959, 1962, 1970. Other 18 ARRL Publications. First reasonable offer. Prefer local or pick-up deal, if not, shipping extra. Mrs. Vera L. Lowman, 1126 16th Ave. SW, Cedar Rapids, IA 52404

BACK issues of "73." Complete from 1960 to 1969 inclusive, except for Jan. 1961. \$25 for the entire set of 110 copies, beginning with Vol.1, No.1. WA2EIT, 18 Linden Pl., Summit, NJ 07901

SALE: 25W-432 am trans with ps, mod. & 11 el. Yagi ant. \$75; 452 Conv. \$25; N2 2m VFO, ps, mod. \$125; 25w converter \$25; Ham-Scan Heath HO-13 \$35. Pick up only. W2GQK, 201-463 0445 evenings.

XMTR - Novice; Eico 720, 90 watt in good condition. Best offer, Jack Marder, 6 Koening Ln., Freehold, NJ 07728

HW-100 receiver, \$200; HP-23A ac supply, \$35; SB-600 speaker in cabinet, \$20. (ac supply in speaker cabinet). Separately, or all for \$225. Checked by Heath Center. Seller will ship. David J. Askine, 703 Central Ave., Laurel, DE 19956

WANTED for unique collection. Original rigs per QST, CQ, Ham Radio articles, etc. supplies also desired. Rigs will remain unmodified and will be kept on the air. K1ETU, Charles J. King, 100 Laura Ln., Rocky Hill, CT 06067

WANT assembly manual or copies for Knight T-150 transmitter. W6JOE, 3812 Don Julio Bv., North Highlands, CA 95660

MARRIAGE eliminates hamming. Sacrifice near-new Hallicrafters SR-400 with ac supply, beautiful condition, original cartons, \$800. WB6WFI, 248 San Gabriel Ct., Sierra Madre, CA 91024

COLLINS sale: 30S-1 ampl. \$980; 75S-3C rcvr. \$660; 32S-3 Contax \$495; HW-16 2 part supply \$150; Call 800-1150 17th St., N.W., Washington, DC 20036. Tel: 202/466-4793

TO SETTLE the estate of WA8APY. T-4X, AC-3 \$280; 2-B, 2-NE \$180; SB-200 \$200; HD-10 keyer \$30; 24-hour clock \$10; or all for \$660. Mrs. Nancy Albert, 16 Braden Ct., Tiffin, OH 44883

FOR SALE: Collins 75A4 receiver with mechanical filters. Central 200V transmitter. Both in excellent condition: \$350 each ppd. W2CXM, 401 Barton Hall, Ithaca, NY 14850

SELL: Apache TX-1 needs work, Collins 75 A2 receiver excellent, HW-16 excellent, Link field indicator meter, needs work. Best offers, can't ship. WN3PFW or WA3MNS

TEKTRONIX 545-CA-2 trace & scopemobile \$1200, teletype 32ASR \$400, Mite \$250, H-P test equipment, counters, DVM, RCA computer at junk prices. Free list. Perera, 410 Riverside Dr., NYC 10025

FOR SALE: Clegg 22er \$125, Johnson Matchbox/ Directional Coupler \$40, Galaxy FM-210 with power booster and Hustler gain antenna \$130. Everything in excellent condition. George L. Lancerft, WA1FSK, Main St., RFD, Ivoryton, CT 06442

HOOSIER Electronics Your ham headquarters in the heart of the Midwest where only the finest amateur equipment is sold. Authorized dealers for Drake, Hy-Gain, Regency, Ten-Ten, Galaxy, Electro-Voice, and Shure. All equipment new and fully guaranteed. Write today for our low quote and try our personal friendly Hoosier service. Hoosier Electronics, Dept. C, R.R. 25, Box 403, Terre Haute, IN 47802

HEATHKIT cw station complete. HW-16 transceiver, HG-10B VFO, HD-10 keyer, HD-20 calibrator, HM-15 SWR bridge, all new, aligned, and calibrated, \$175. Hammarlund HQ-129X general coverage rcvr, \$80. K1IQZ, 12 Rick Dr., Florence, MA 01060

TELETYPE station for sale complete. CE-200V, complete model 19, Drake 2B rcvr. \$1000 takes entire station. TT completely overhauled by Western Electric with new drive train gears. Write K0FQM, 4380 Moore St., Apt. 4, Wheat Ridge, CO 80033

ELMAC AF 67 xmitr. ac supply, 6/12 V dynamotor. Mobile bands \$25. K0QZ, C. E. Berns, 246-23 Thornhill Ave., Douglaston 11362, NY 212-229-6559

WANTED: Level indicator meter from HT-32A series xmitr. W9CAS, 5625 West Brooklyn, Milwaukee, WI 53216

WANTED: Collins 75A-1. Please state price & cond. in first letter. Ken Hesler, 602 Taft Ave., Charleston, IL 61820

VHF/UHF receiver 38 MHz thru 1000 MHz with 3 tuning heads, i-f unit & demodulator with "S" meter, and matching 5-inch "pseudopar" spectrum analyzer. All 120VAC 60 cycle; good working condx. Govt. cost \$3800; Sell \$135. W4UCH

CONTACT us for new or reconditioned Collins, Kenwood, Tempo-One, Drake, Galaxy, Hy-Gain, Mosley, Henry linear, towers, antennas, rotators, other equipment. We try to meet any deal and to give you the best service, best price, best terms, top trade-in. Write for price lists. Try us, Henry Radio, Butler, MO 64730

2METER fm gear for sale: Motorola U43 base on 146.58 \$160. T43 trunk mtg 2 freq & tuned \$150. GE MA36W trunk mtg 4 freq on 2M \$250. PDM-2 10W transistorized 6 channel transmitter 12vdc w/ac pwr supply \$185. W7VHS, 319 N 26th St., Billings, MT 59101

SELL: dc power supply for twoer, 812 never used; Heath HRA-10-1 crystal calibrator kit, never opened, \$5; Facon telephone amplifier, \$7, takes 9-volt transistor battery; Heath HS-24 speaker, \$5; pair CEPRO-40 motor traps, never used, \$8. Make 50% deposit, will refund if sold to someone else. Will ship COD for balance plus postage and fees. R. Doppmeyer, 1042 Mary Ave., Opelousas, LA 70570

SWAP for 16mm movie: NCX5 Mark II, NCXA excellent condition, Want Bolex H16 reflex camera. W2FAU, R. Barnard, 138 Weston Ave., Chatham, NJ 07828

"DON and Bob" guaranteed goodies. Ham-M 99.00; TR44 98.98; Mosley C135 \$14.00; Hy-Gain TH6DXK 139.00; Accessory cleoutlet; Galaxy V35C 22.00; CAL250 19.00; RF550 57.00; SC550 22.00; Swan 22 VFO adaptor 10.00; Hammarlund S200 speaker 19.00; Write quote list. MOT HEP170 Epoxy diode 2.5A/1000PIV 39c; MOT MC1709CG comp 709.50c; Sangamo DCM600MFD/450V capacitor 4.95; 576S code identifier \$2.35; 1/4" copper ribbon 10c/ft; gears collect. Warranty guaranteed. Mastercharge. BAC, Madison Electronics, 1508 McKinney, Houston, TX 77002 (713)2242668

FOR SALE: TR4-MS4 speaker power supply, purchased brand new last December. Never used because of illness, \$675. Also Transmatch Jr. #9201, \$35. Cannot ship. Elton Sockwell, 488 Irving Ave., Bridgeton, NJ 08302

SB-10 and modified Ranger (powers SB-10), \$80. Write for details. W1VAH, 11 Vanderbelt Rd., Acton, MA 01720

SELL: 2 mtv fm - GE Prog. T pwr 60 wt mobile w/ access. \$125. RCA 36 set base \$100. Both 2 freq. '94/'94 and '31/'66. WA1OCC, 203-377-3187 any time.

SELL: NC800; TA33, TR44, & tower; Eico 720/730, VFO; extras. \$350. Will separate. Chris, W2B2QH (212)829-3675

NEEDED: Schematic for HQ-110. Photocopy okay. WN5EMX, Box 248, West Memphis, AR 72301

NCX-D and Scanzalyzer Heathkit SB-620 \$50 and \$115 respectively or best offer. Scanzalyzer has parts for any i-f. RTUAQ, Bill Senebaugh, 10 Harold Ave., Wilmington, MA 01887

CASH for sb gear in need of repair. State condition, price, in first letter. W9HF, 5005 Indiana, Ft. Wayne, IN 46807

GOTTA sell! Best offer over \$300 excellent TR-4; over \$290 excellent MC12000; over \$75 excellent Dual-trace scope BP12A, 884 Matchbox Way, Sunnyvale, CA 94087, 736-7059. Morrison

JOHNSON EW Matchbox #95. Heath IG-68 color Gen. - excellent, \$35. I-177 tester with MX-949 atu adapter - mint \$50. Pair new T-160L tubes \$30. BC-312 dead \$25. W9YJM, 1007 W. High St., Jefferson City, MO 65101

SALE: Heath equipment in good condition; Mohawk RX-1 rev. #90; matching Apache TX-1 xmt. \$75; DX-100 \$50. Manuals included. Will ship your expense. Prefer Calif. del. Ken Taylor, W6NB5, 3390 Greer Rd., Palo Alto, CA 94303. Tel: (415) 327-3351.

SELL: Lafayette 6 meter transceivers, HA-750, \$75 and HA-460, \$85, both mint. J. A. Edwards, 7515 Sunview Dr., Columbia, SC 29209

WANT Jordan Antennas, Kern DF, Fink TV H'bk, NAB H'bk '80, Skolnik Radar H'bk. \$10 postpaid. W8AFM

SALE: Heathkit DX-60A transmitter, HR10 receiver, HG10 VFO, all matching. Asking \$100 for all. Please make offer. Clint Peterson, W4KJX, 505 Wintrop St., Ft. Walton, FL 32548

HAMMARLUND HQ110, Heath DX60B, HG10B, Both \$180. DX60 \$65. Caputo, 22 Crane St., Huntington, NY 11743

WANTED: Schematic with parts list, manuals, other literature, for precise 300-B oscilloscope. Ralph H. Hogue, 100 No. Almansor, Alhambra, CA 91801

"GEM" quad with extra parts \$50; Conertone 802 professional tapedeck \$55; new Johnson Directional coupler \$8; other parts, inquire. Ronen, Box 432, Princeton, NJ 08540

WANTED: rack mount exciter with VFO suitable for pair 812s class AB and C sell SB-110 \$150. WAYOX, James Blaskie, 413 So. Ocean Blvd., Pompano Beach, FL 33082

DECIDED to go transceive, will sell Hallicrafter HT-37 \$150, Hammarlund HQ-170 receiver \$125 with manuals, very good condition. C.O.B. Charles Allen, K9JBL, #21 South Vine, Connersville, IN 47331

WANT HC221 frequency meter, mint, with modulation, ac power, book. WN4555, 2015 Va. Ave., McLean, VA 22101

WANTED: BR-460 or 401. State condition and price. Roger Legg, 284 Broadway, Paterson, NJ 07501

SELL: Hammarlund HQ-170 with 24hr clock and matching speaker \$140. Eico 722 VFO \$20. WA2ZAV, 304 East Brookfield, East Lansing, MI 48823, Tel: 313-332-6451

DX-60B \$65, HR-10B (with calibrator) \$68. Both in excellent condition. You ship. Thomas Christie, WB5CSR, 500 N. Morgan St., Hamburg, AR 71646

Galaxy #T560, AC-4000 SC-550 speaker, Cal 25 calibrator VOX35C, \$375. All in excellent condition. WB8GUA, 1019 So. Weadock, Saginaw, MI 48601

FOR SALE: Linear amplifier, pair 4-250s in GG full kW input. 53-panel cabinet. \$150. Prop pitch motor with clutch, 2 sensors one with compass, remote controlled, 28 vdc power supply. See August 71 QST. \$99. Wm. McFadden, 29 Vernon Ave., Wheeling WV 26003, 304-242-3655

WANTED: Swan 500CX w/p, or Cyclone w/p, or SB-102 with/ps. Price right. K1KOW, 3 Beechwood Rd., Norwalk, CT 06854

FULL year 1971 mint QNTs, Ham Radio, 73s, \$4 ea., postpaid. J. Sandberg, K6HR, 1138 Rustie, Escondido, CA 92025

AMECO TX62 certified check \$80 prepaid. Virgil Gerner, Washington, MO 63090

SELL: S-129 receiver excellent condition \$140. WA2LQH, 955 Park Ave., New York, NY 10028

HAMMARLUND HXL-one. 1 1/2kW PEP new \$275. K4TG

WANTED: Moto-winch for EZ Way RBS 40, WA3FH, 125 Lang Dr., Coraopolis, PA 15108

SELL: or swap good used LA 400C linear. H. M. Johnson, W9VYW, Milton, WI 53563

DRAKE 2-NT transmitter, manual, and cables. Original carton, used, \$110 shipped. WN4UCC, 96 Hallmark Estates, Athens, GA 30601

1000 deluxe address labels, \$1; call, name, address, zip. Linsley M. Hamilton, Box 4473, Torrance, CA 90503

COLLINS KWM-2 516-F2 supply and Waters notch-filter \$650. 7583B receive and 312B3 speaker \$500. All equipment mint condition. Certified or cashiers check. Robert Murray, 2908 Canada Blvd., Glendale, CA 91208, Phone 241-1488

EICO gear: 720 xmt \$30, 730 modulator \$20, VFO \$20, 425 scope \$10, Hammarlund HQ110C & speaker \$50, Multi-Elim-A-E 4xmt & M-1070 ac/dc pwr supply \$50. Pick up only. Don Radman, K1VMX, Old Rock Ln., Norwalk, CT 06850

SELL: Drake 2-NT \$110, RME 8900 \$100. Both xmit condx. WN7QAL, 2495 Lawrence, Eugene, OR 97405

SELL: NCX3 plus power supply, \$175 takes both. WA1FOX, D. B. Edmonston, 50 Quint Av., Allston, MA 02134

WANTED: best priced 2KRSR and prefer Michigan pick up. W8AQA

SWAN 508 external VFO. \$75; Motorola B338AM on 28/88-34/94, \$80; Eico 425 scalled, \$30; Heath HD-15 phone patch, \$20. All excellent. Want R390A, Heath SB-620, SB-630, & SB-610. Andy, WA2CXM, 92 Coventry Ct., Voorheesville, NY 12184 - 518-765-4338

CRYSTALS Airmail: Novice FT-243, active accurate. Last month of January/February Novice. Special. Have many frequencies for many contacts. Mention QST. Five or more 40M-15M only 99c each, 80M \$1.59. (Band mix OK.) Less than five 40M - 15M \$1.50, 80M \$1.75. Add postage - Airmail 12c/crystal. 1st-cl B. General Purpose FT-243 0.1%: 3500 - 8600 Mc/cycles \$1.90. (Five \$1.75 each.) (Notes, ten same frequency \$1.45.) 1700 - 3450 Mc/cycles. 0.05%, add 50c/crystal. Add postage. MARS CB etc. Free General Purpose crystal listings. "Crystals Since 1933." Bob Woods, W9LPS, C-W Crystals, Marshfield, MO 65706

HQ-170C (Hammarlund) \$120, Johnson 275W Matchbox \$35 mint, Will not ship. Robert Geller, 212-648-8771 evenings.

HY-GAIN ham-eat mast, 40/75 cuts. Like new. Used one week. Best offer. WA9EDZ, 308 West Wisconsin, Chippewa Falls, WI 54729

FOR SALE: Heath SB-401 transmitter and SB-301 receiver with cv filter. Perfect. \$250 each. W4LQ, 3515 Kings Point Rd., Randallstown, MD 21133. Tel: 301-655-2370

FOR SALE: complete station mint condition used very little Apache TX1 with SB-10 adp. mike and stand \$X-71 Hallicrafter receiver with matching speaker \$335. HW-12 40 meter mobile station with matching speaker 5WR Hustler antenna and mount \$145. 1700 - 3450 Mc/cycles. 0.05%. Pick up preferred \$150. Eddie Gigliotti, W8APE, 920 Oak St., Bangor, PA 18013

FOR SALE: Heathkit SB-100 transceiver, SB-600 speaker, p/s, SB-610 monitor scope. Package: \$350. K4OJB, WB8GIR. Tel: 304-768-3046

WANTED: Mint, factory-wired Johnson Navigator and mint 75A4. WB4CWP, RFD 1, Box 118, Afton, VA 22920

BC-610-E transmitter, shielded for TVI. Full coil set. Best offer. After 8 P.M. 201-TU7-5535, 89 Fairway Dr., East Hanover, NJ 07935

WANTED for handicapped people in Israel, all kinds electronic and amateur gear and parts. Everything accepted. Send to Handicapped Workers, c/o Weinstein, 43 Chetetzchaim St., Petah Tikva, Israel.

TRADE: Famous Writers Course for SB-200 or 300-500 watt Class C rf amplifier; sell antique Spartan battery radio best offer; dc meters 1 mA \$9; 200 mA \$9; 20 amp of \$5; 200 mA surface mount \$4; new 2C40 \$10; new Centralab 2511 ceramic switch; \$3; 20 new No. 46 bulbs \$1.70; HG-1004 mercury relay \$5. W2RUK, 7 Charles, Auburn, NY 13021

DRAKE TR-3, AC-3, HV-3 \$395; R4 \$225. Consider trade for TR-4, TXB, W6FW, 10609 Chabey Ave., Downey, CA 90241. PH: 213-862-8645

SB-34, great ssb mobile rig; 135w., Collins filter, solid state except for driver/final, Mike included, \$210. Very sharp condition. Ham cat mobile mast and 80 through 10 resonators \$20, with rig. WB6MNS, John Belve, 440 N. Mentor Ave., (No. 11) Pasadena, CA 91106. (Phone) 213-793-5039

NEW R4B and MS4 with warranty \$395, SB-500 \$89, SB-610 \$69, SB-630 \$59, Dumont 304H scope \$59, Tektronix 511AD \$75, DX-100B \$59, WA2LNU 212-789-5029

WANTED: Yaesu 2000B linear, 2khenry or Heath 220, Lynn White, 95 Hickory Ln., Tavares, FL 32778

FM: Galaxy FM-210 - all modifications, K1FFA

SB-101, HP-23A p/s, SB-600 spkr. mike. \$350, NTC area, call Len, WB2PPO (212) 375-6209

2 kilowatt balun, 1:1 ratio, 3-30 MHz, Teflon insulation, coax fitting and dipole connector, \$8.95, postpaid USA. Linear amplifier components, Gregory Kordes, Box 1279, Tustin, CA 92680

CYGNET power transformer 115 or 230V \$7 ea, 2000' RG-62U \$45; 300' RG-59U \$9; Ballantine 316 VTVM \$50; TR-3 mobile mounting rack \$4.50; 7550B EP4-Timer 100 kc with manual \$140; crystal oven \$3V \$2; 100 watt 360-440CV power supply 120V \$20. All FOB. Want small 2Mfm, Williams, Box 601, Huntington, NY 11743

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SALE: AW-16, perfect, less than year old, \$95, VFI, perfect, \$15, Neal Becker, 474 Regimental Rd., King of Prussia, PA 19406

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HW 22A trans, HP-13 mobile supply, Hustler ant., Turner mobile mike, all hardware, \$150. Jim, K4TAS, 529 Rainbow Cir., W. Columbia, SC 29169

CAMP Seatico, established brother-sister camp, 100 miles north of New York City, requires ham radio instructor for boys' program. General class license or higher, over 18 years of age, some camp experience. Write for application and information to: Irwin Fleischer, 25 Fenmore Rd., New Rochelle, NY 10804

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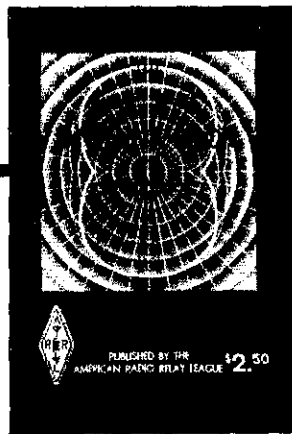
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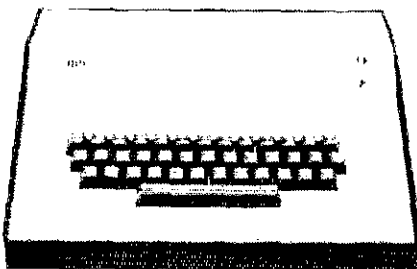
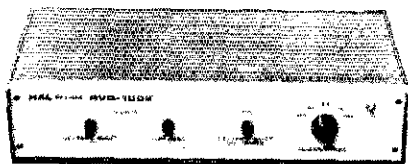
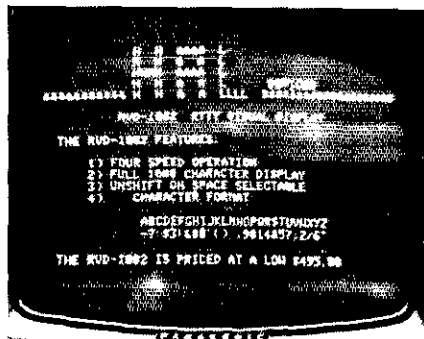
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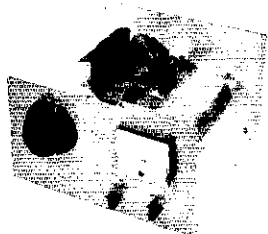
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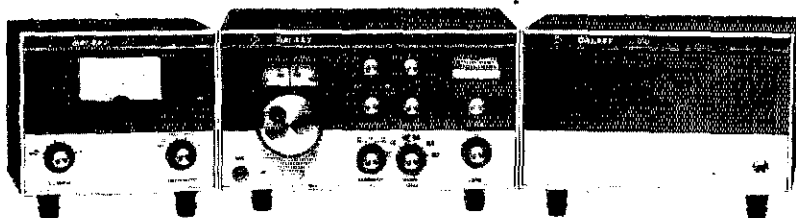
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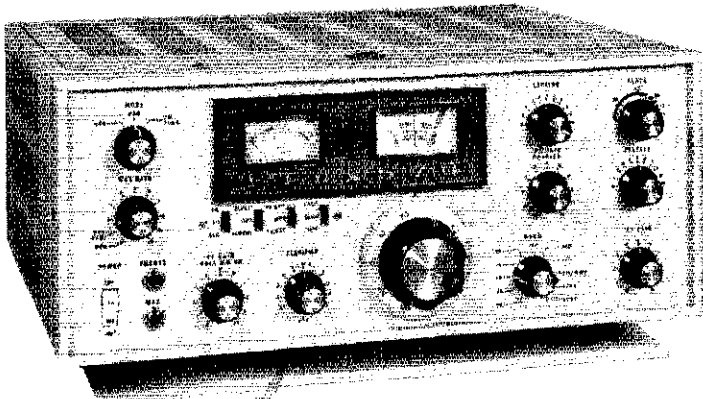
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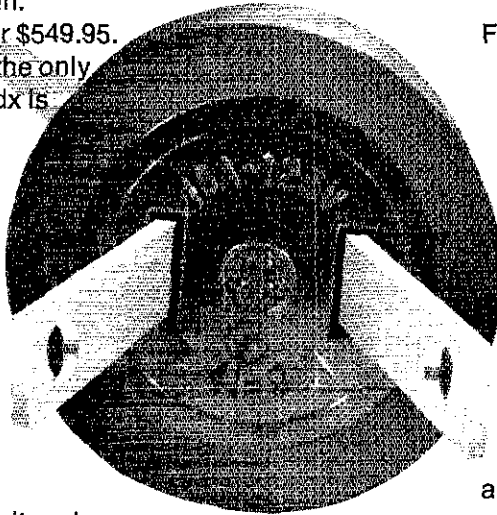
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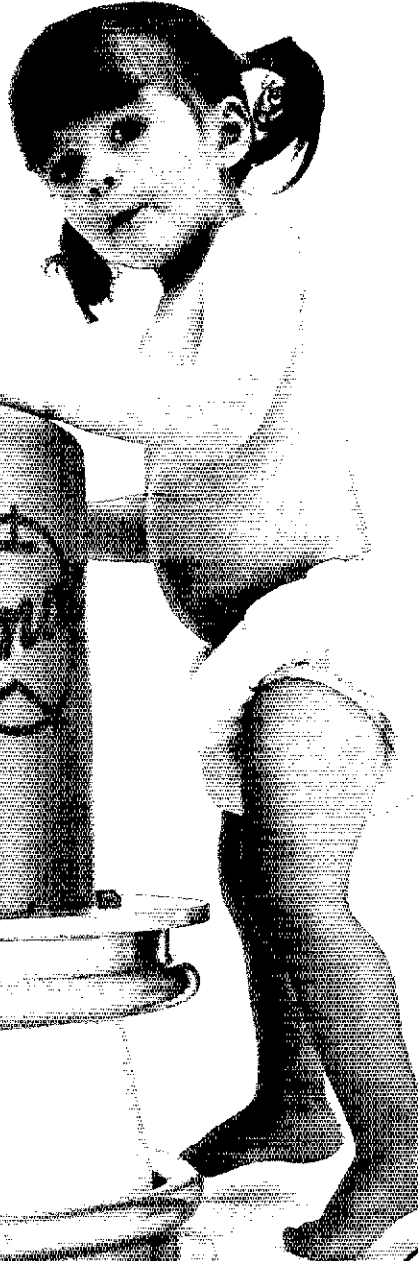
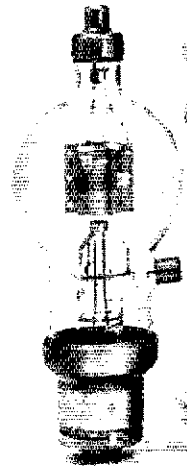
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