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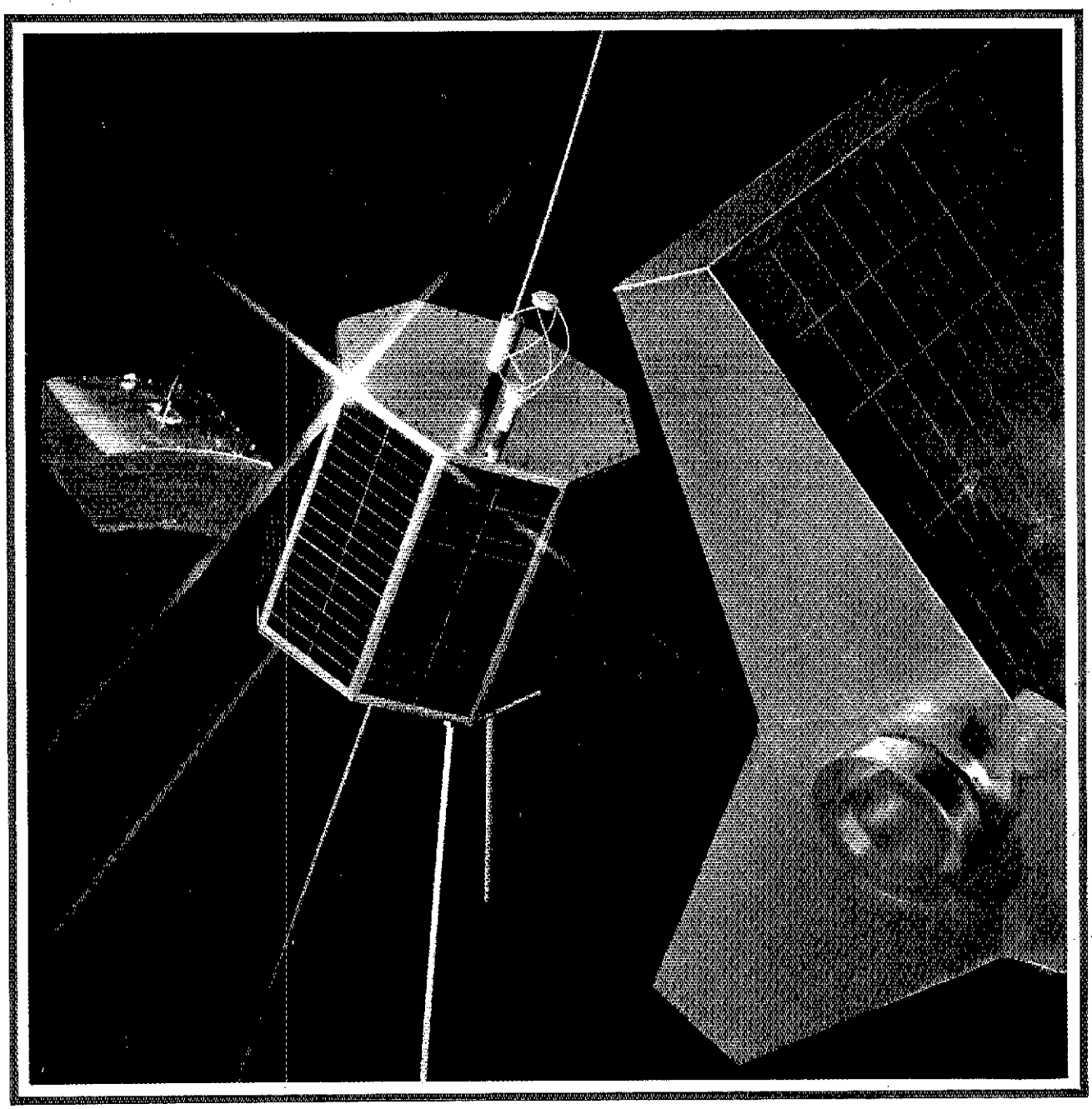
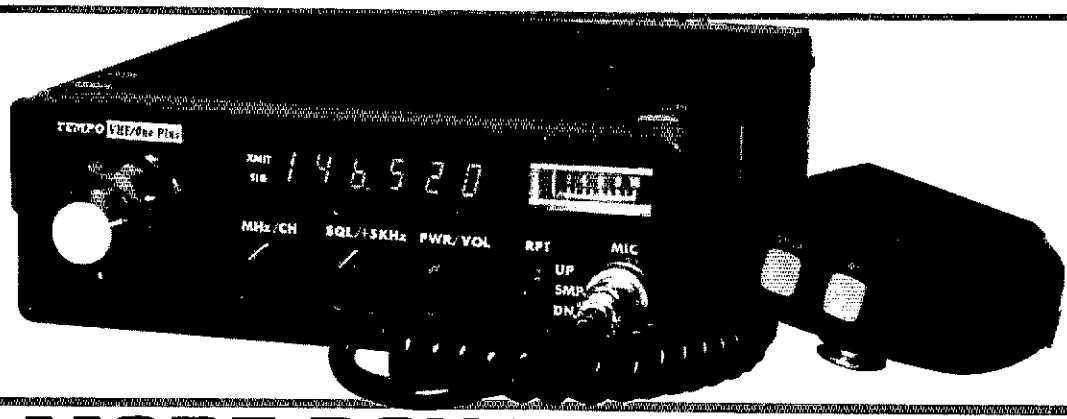


You've come a long way, OSCAR! See what the future has in store.

Page 11

NEW TEMPO VHF ONE/PLUS



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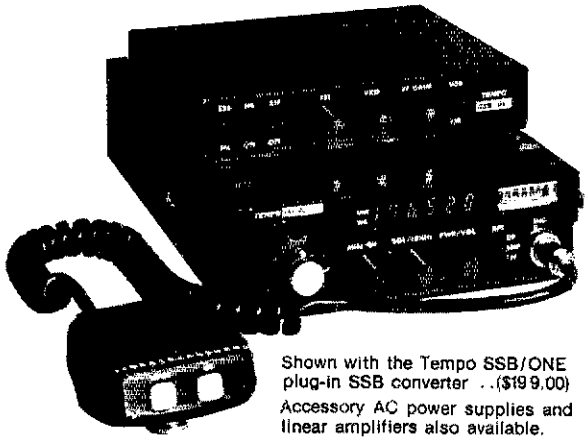

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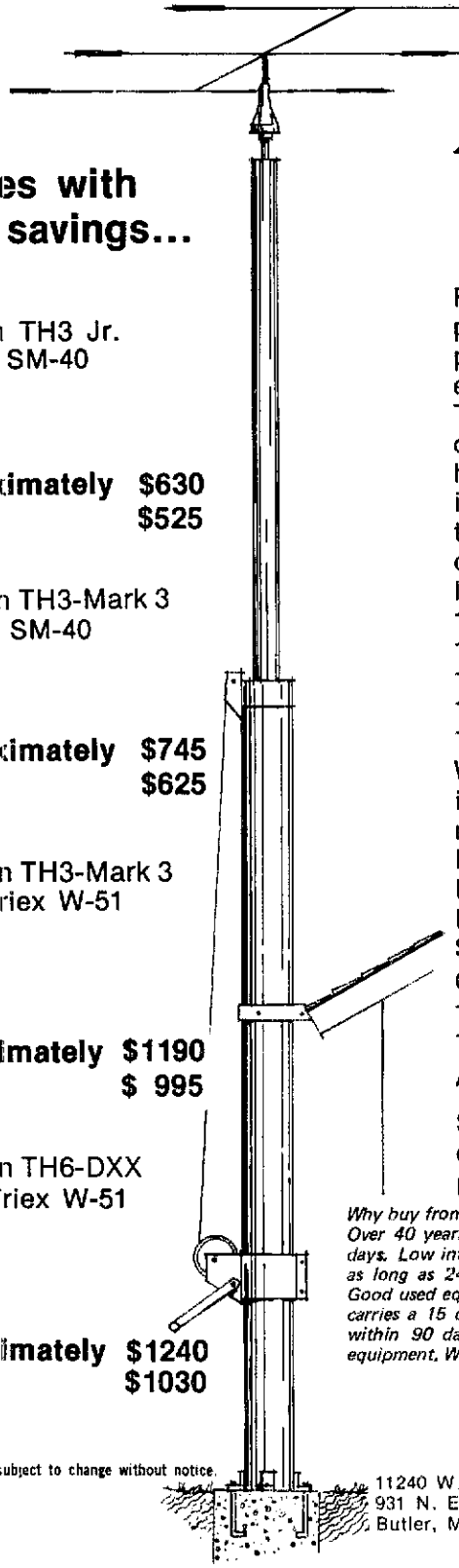

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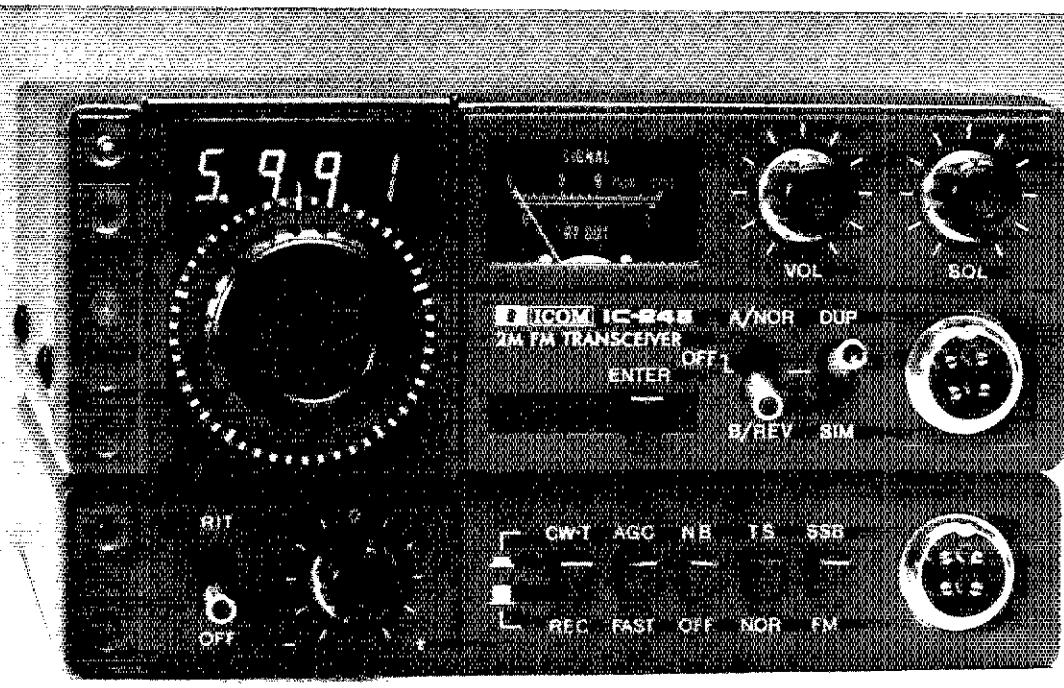

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June 1977
Volume LXI Number 6
Published monthly as its official journal by the American Radio Relay League, Newington, Conn., U.S.A. Official organ of the International Amateur Radio Union.

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225 Main Street
Newington, Connecticut 06111
Tel: 203-666-1541

Subscription rate $12.00 per year postpaid, U.S. funds, U.S. & Possessions. $13.50 in Canada; $14.50 elsewhere. Single copies $1.50. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U.S. and for an equivalent amount in U.S. funds.

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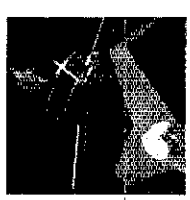
Indexed by Applied Science and Technology Index, Library of Congress Catalog Card No. 21-9421. Microform editions available from Xerox University Microfilms, Ann Arbor, MI 48106.

THE COVER

The three phases of OSCAR. Models thanks to Project OSCAR, W2SDU and WA1POI. See page 11.



Contents

Technical

Basic Radio

General

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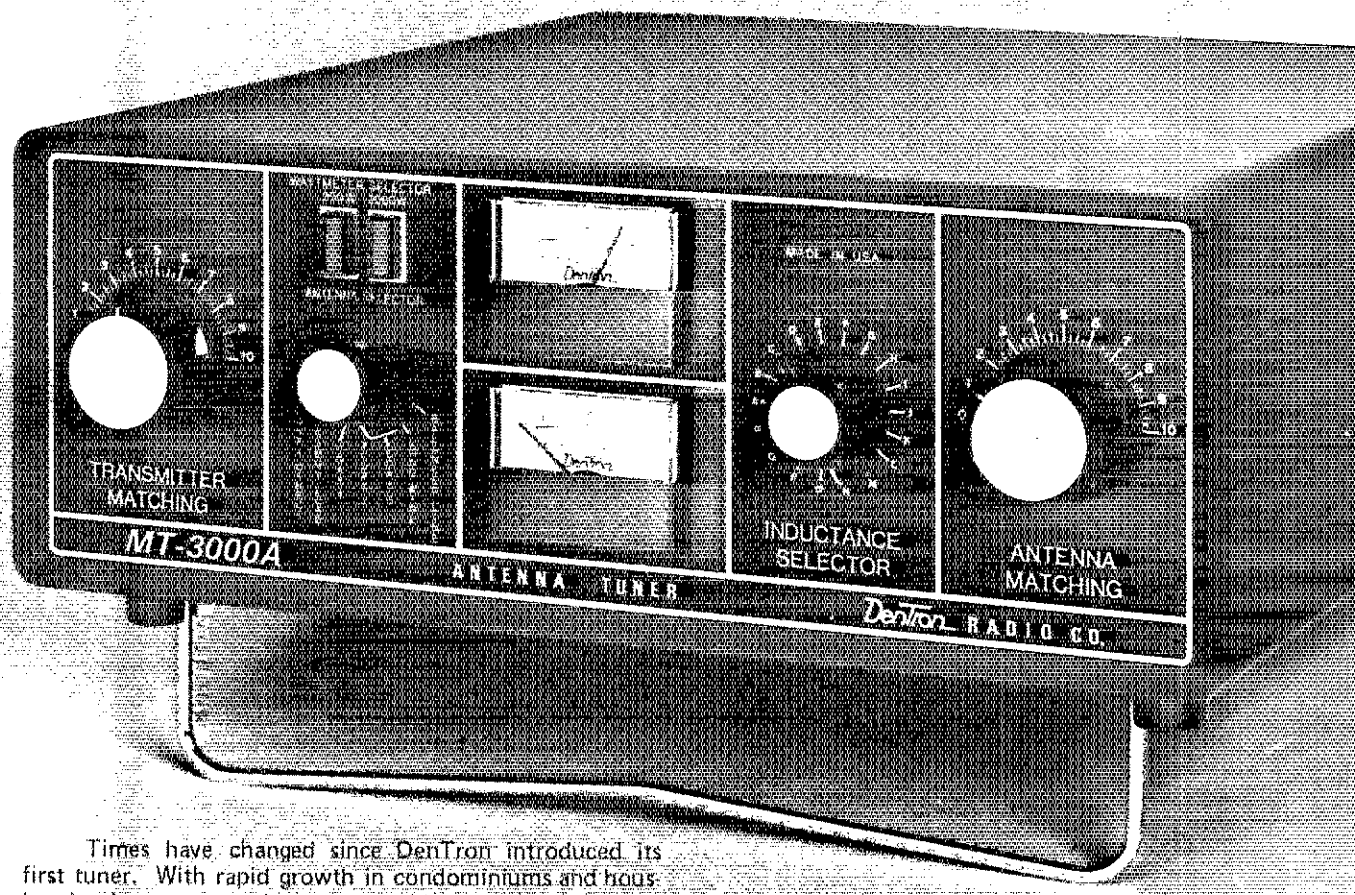
Look closely at the new MT-3000A. You've never seen anything like it.



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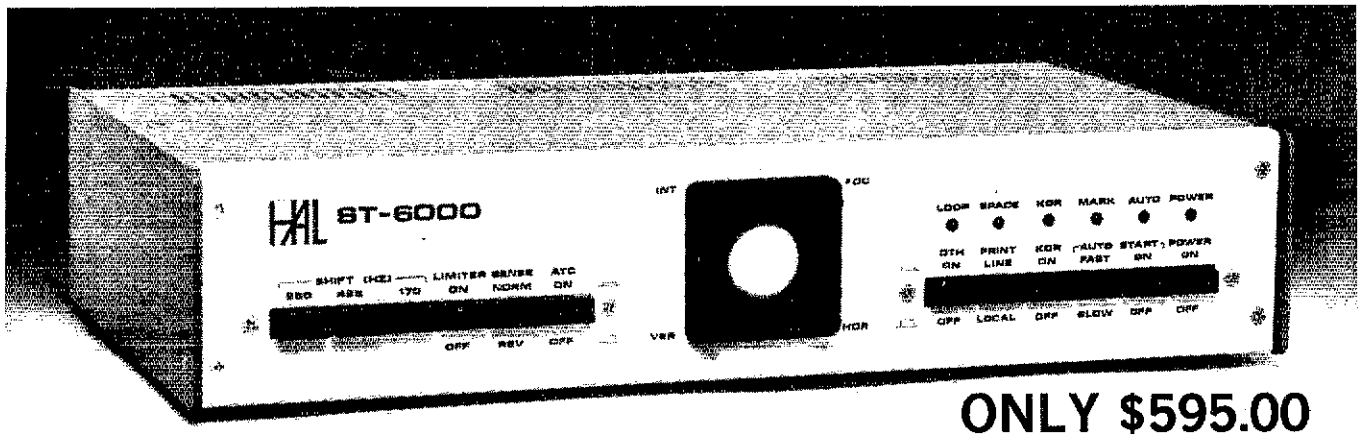

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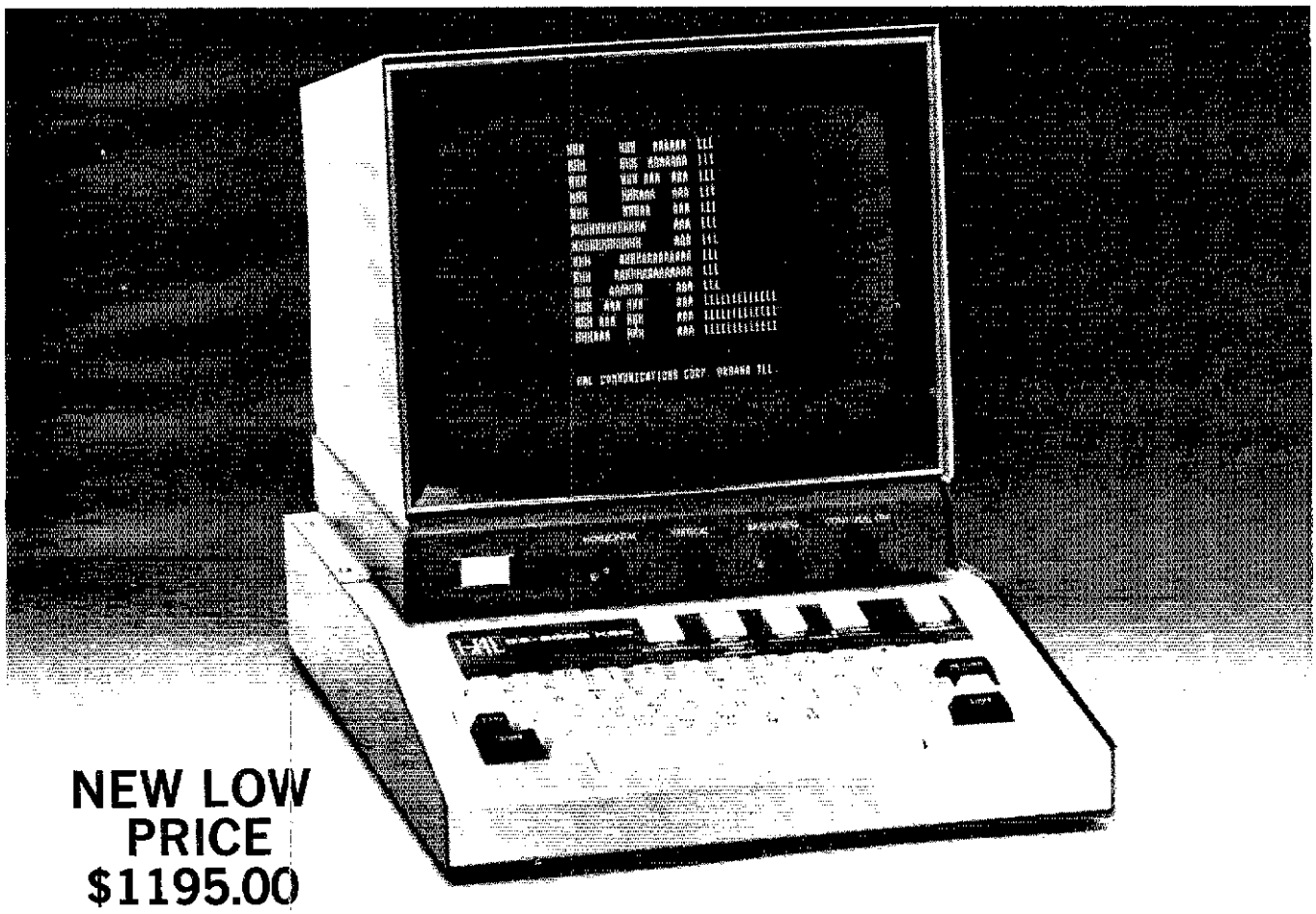

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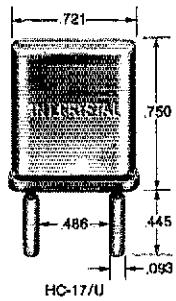
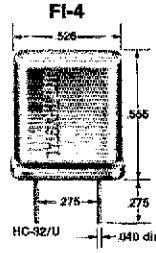
F-609



FI-4



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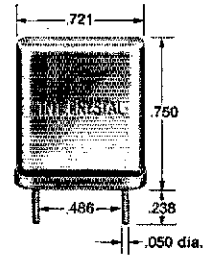
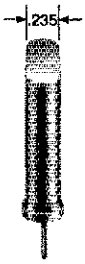
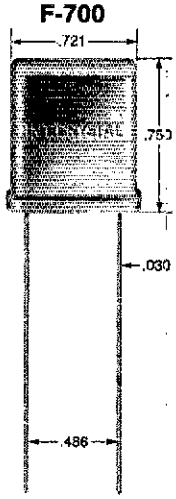


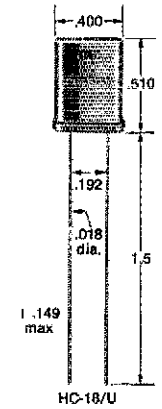
F605-SL

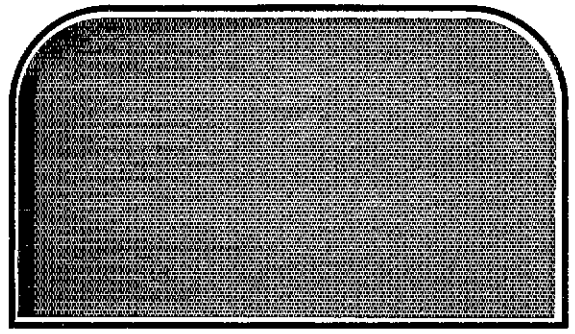


F-700



FM-1





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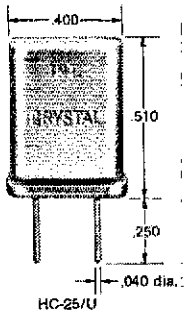
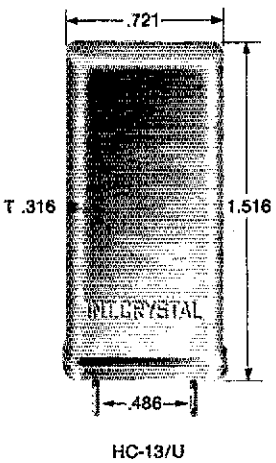


F-13



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THE AMERICAN RADIO RELAY LEAGUE, INC.

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

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

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

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

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

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"It Seems to Us..."

Part 97.1(e)... Another Dimension

As we approach the 1979 World Administrative Radio Conference (WARC) it is apparent that amateurs everywhere must concern themselves with projecting the best possible image for the Amateur Radio Service.

Unlike the other radio services seeking frequencies in an increasingly crowded spectrum, the amateur service is not supported by any vested financial interest. Our competitors for frequencies include a variety of governmental agencies having a manifest requirement for communications or for navigational services wherein a bona fide public need is served. Commercial activities seek frequencies for use in expanding their markets and profits, and the shortwave broadcasters to purvey propaganda . . . *they* have the funds to press their case.

Amateurs, on the other hand, must depend entirely upon their record and reputation as a public resource.

While the virtues of amateur radio are well known to many of those who will be deciding international frequency matters at the World Conference, there will be some – particularly from less technologically advanced areas – who have little comprehension of, or appreciation for, the benefits of such a purely volunteer service. Scientific avocations, as such, are nonexistent in some parts of the world, and the idea of permitting individual citizens to communicate with one another by radio may be viewed by authorities there as unnecessary, or perhaps even dangerous. Certain governments will, as a courtesy to visiting foreigners (particularly those bringing needed expertise), permit them to operate amateur radio stations . . . while denying this privilege to their own citizens. Some of them simply have not yet recognized the manifold advantages of establishing a domestic amateur radio service.

The world has changed greatly since the last international frequency conference in 1959. Many former colonies have become independent nations, eligible to cast a vote at the WARC. Among them are several which amateurs regard as "rare" countries because of their lack of indigenous amateur activity.

Quite naturally, it is to such countries that amateurs are prone to mount "DXpeditions." Properly managed, such undertakings *can* reflect most creditably upon amateur radio. Thoughtlessly or hastily conducted, however, a DXpedition might have a damaging effect on our image and cost us support at the WARC. From the point of view of government officials in a newly independent nation, the would-be DXpeditioner may appear as a brash and insistent foreigner, pressing for privileges not normally granted. Tactless or critical behavior in dealing with government officials, or the use of operating practices that offend local amateurs, obviously will not help our reputation.

Amateurs whose work takes them to distant lands, or those on vacation visits, are understandably eager to operate there. Unfortunately, however, some amateurs have abused the privilege of operating abroad . . . in fact, amateur radio is nonexistent today in some countries because a foreigner, given permission to operate there, handled third-party traffic in violation of local regulations or used frequencies or transmitting power beyond the limits of the permit issued to him. *How do you think such countries are likely to vote when matters concerning amateur radio arise at the WARC?*

Putting the shoe on the other foot . . . many of us have expressed concern over the visitor from abroad who employs his reciprocal license to engage in an endless series of phone patches in (what is to us) a foreign tongue, perhaps with a badly adjusted transmitter. An irritant? Sure . . . but it is no more than an example of the discourtesy and thoughtlessness that some of our amateurs have displayed while *they* were privileged guests in another land.

In this increasingly mobile world, we might now wish to give further thought to our traditional role in fostering international friendship and understanding, vis-a-vis Part 97.1(e) of our regulations, for that role now seems to extend beyond the exchanges of goodwill by radio. Foreign travel, for business and pleasure, is increasing by leaps and bounds. Naturally aware of the importance of maintaining good relationships in QSOs with their opposite numbers abroad, radio amateurs in growing numbers are being afforded the chance for personal contact with the citizens of other countries. Most amateurs are natural ambassadors and will recognize this golden opportunity to "sell" amateur radio as a worldwide resource, and – at the same time – to strengthen the prospects for its survival beyond 1979. – *W4KFC*

League Lines...

If the FCC can meet its timetable, another important WARC-related notice will be out by late May. It will include a further refinement of the draft Table of Frequency Allocations which was included in the Third Notice of Inquiry in Docket 20271 (February QST, page 62).

The "Communicasting" petition (May QST, page 65) has been assigned file number RM-2846 by FCC. Supporters of the concept report that comments are needed at the Commission by June 13.

An inadvertent omission of rules in Section 97.33 was corrected in an FCC Report and Order of April 20, 1977. The waiting period after failure of a code test is again 30 days, the same waiting period in effect before Docket 20282 was accepted in 1976.

Two inadvertent omissions of operating rules in May QST left out some stipulations, too. For the June VHF QSO Party, in addition to the new rule regarding 2 meter work, contacts made by retransmitting either or both signals (repeaters) do not count on any band -- including OSCAR Satellite contacts. For Field Day, individuals or groups operating portable (classes A, B and C) must sign "portable" during their operation in the traditional manner even though it is no longer required by the FCC.

Wanted: Satellite Operations Manager for AMSAT-OSCAR 8. Experienced amateur satellite communicators looking for full-time employment at ARRL Hq. at starting salary level should send resume to Chod Harris, WB2CHO, c/o ARRL.

Any ham planning to attend the National Boy Scout Jamboree in Pennsylvania this August should bring along his original license. A complete amateur station is being planned.

Be Prepared . . . good motto for Scouts, but also good for amateur exam applicants. Be prepared when you go for a test. FCC staffers report the failure rate has gone up since the fees were cancelled! More FCC staff time devoted to frivolous exam-taking means less time for catching bootleggers, etc.

160-Meter buffs take note of the month-long activity period -- the transequatorial tests, daily from 0000-0030Z. EU stations will transmit on 1825-1830, S.A. on 1800-1808, ZS stations 1965-1970. Keep the QSOs short and check your own frequency first after a CQ.

If your letter was published in your local paper or you appeared on a radio talk show refuting misconceptions of the Jack Anderson column, you may qualify for a special certificate. If you haven't already done so, send details to the ARRL Public Information Office along with your name and call.

From June 4 to 12, British amateurs will be permitted to substitute the special prefix "GE" for their regular call sign prefixes. This special permission is in honor of HM The Queen's Silver Jubilee.

Amateur Radio and the National Weather Service is a booklet available free of charge to interested amateur radio groups and public officials. For a copy, write to Southern Region Headquarters, National Weather Service, ATTN: WFS1, 819 Taylor St., Room 10E09, Ft. Worth, TX 76102.

Work in the media and also a ham? Let ARRL Public Information know. This information is for internal use only. All information will be treated as confidential.

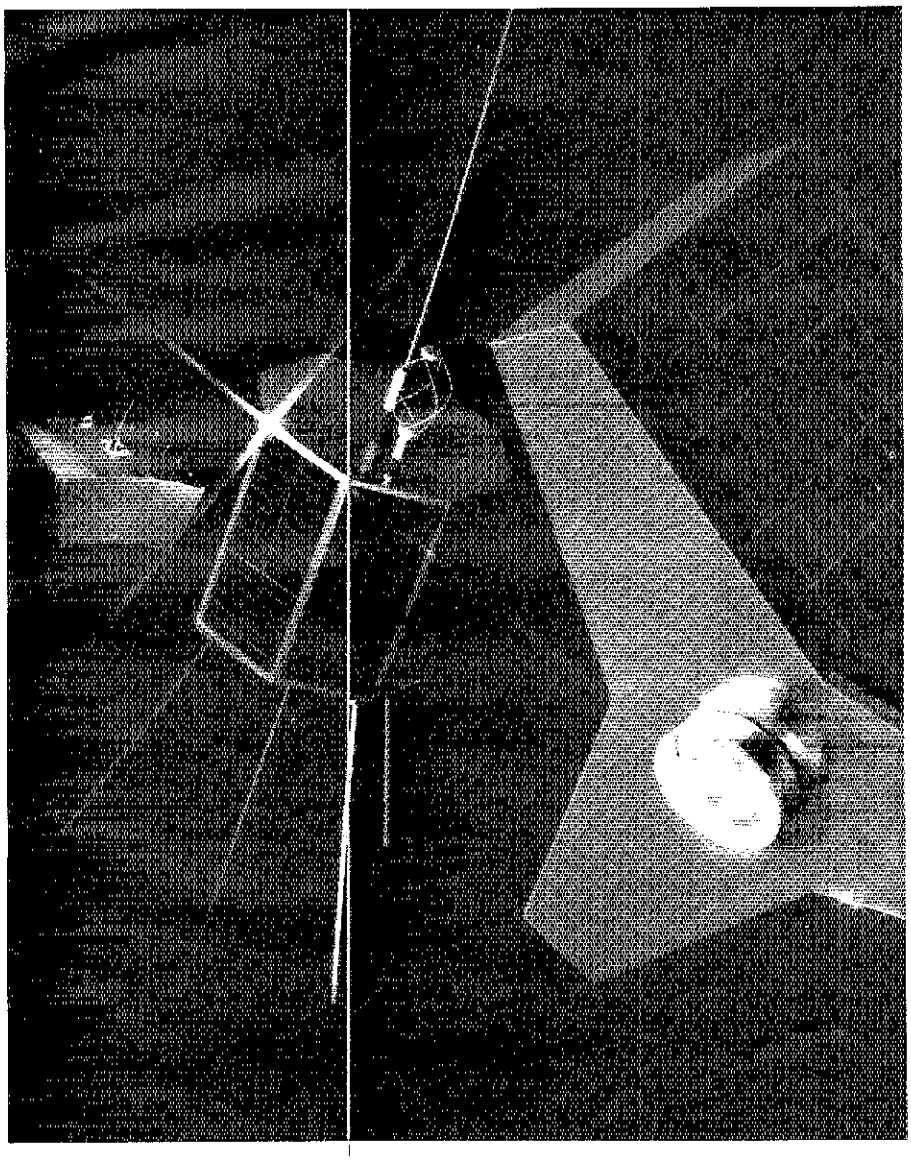
By the time you read this, ARRL will have published a new booklet, "Learning to Work with Integrated Circuits." A copy of this will be furnished each ARRL affiliated club, to be used as a give-away at club meetings and as a further benefit in the ARRL affiliated club program.

Elizabeth Aguilar, WA7WXA has just been named as a Presidential Scholar and will be presented with that award by the President in early June. She has also received a $4000 scholarship from Burroughs Corp. and has been accepted at Stanford . . . EE probably. Now 17 and a ham since the 7th grade, she's also the president of -- are you ready for this -- Explorer Post 599! Congratulations.

Phase III: Toward the Ultimate Amateur Satellite

Part 1: The most versatile amateur spacecraft yet designed will bring untold benefits to the amateur community. But considerable work remains before its scheduled launch in 1979.

By Jan A. King,* W3GEY



The amateur satellite program has come a long way from OSCAR 1, at left, the tiny 10-pound bird which greeted amateurs with its cheery HI HI beacon more than 15 years ago. OSCAR 1 has long since burned up in the earth's atmosphere, but AMSAT-OSCAR 7, at center, is still going strong nearly three years after launch. The Phase III spacecraft, at right, is a whole new ball game – a long-lifetime amateur satellite that will bring an entire hemisphere within range for as many as 12 hours at a time.

In 1979, you won't need high power, a 90-foot tower and reams of propagation charts to work Europe and Japan. In fact, you will be able to work them at the same time, in a six-hour round-table conversation – on 435 MHz! How? With AMSAT-OSCAR Phase III, the amateur satellite that will provide a quantum jump in efficiency and usefulness over previous OSCARs. Its disaster relief and educational benefits alone will be enormous. Part 1 of this series defines the need for this revolutionary satellite and explores some of the hurdles that must be overcome if it is to become a reality. Next month, the technical considerations that go into designing its onboard systems will be discussed. Part 3 will explore how amateurs and others interested in the amateur satellites can help make this ambitious project reach fruition.

It has been more than 15 years since a small group of amateur radio operators designed and built OSCAR 1, the world's first nongovernmental satellite. Like the six satellites that have followed, it was built of, by and for the amateur community.

The response from amateurs around the world has demonstrated that communications satellites have become an integral part of the Amateur Radio Service. Consistently lively band conditions attest to the unprecedented interest in the satellites, and the imminent launch of the eighth OSCAR is focusing

*Project Manager, AMSAT-Phase III, P. O. Box 27, Washington, DC 20024

additional attention on the amateur space program.

Toward Phase III

Each successive satellite has drawn upon the ones before it, forming a systematic progression toward an entirely new kind of amateur satellite.

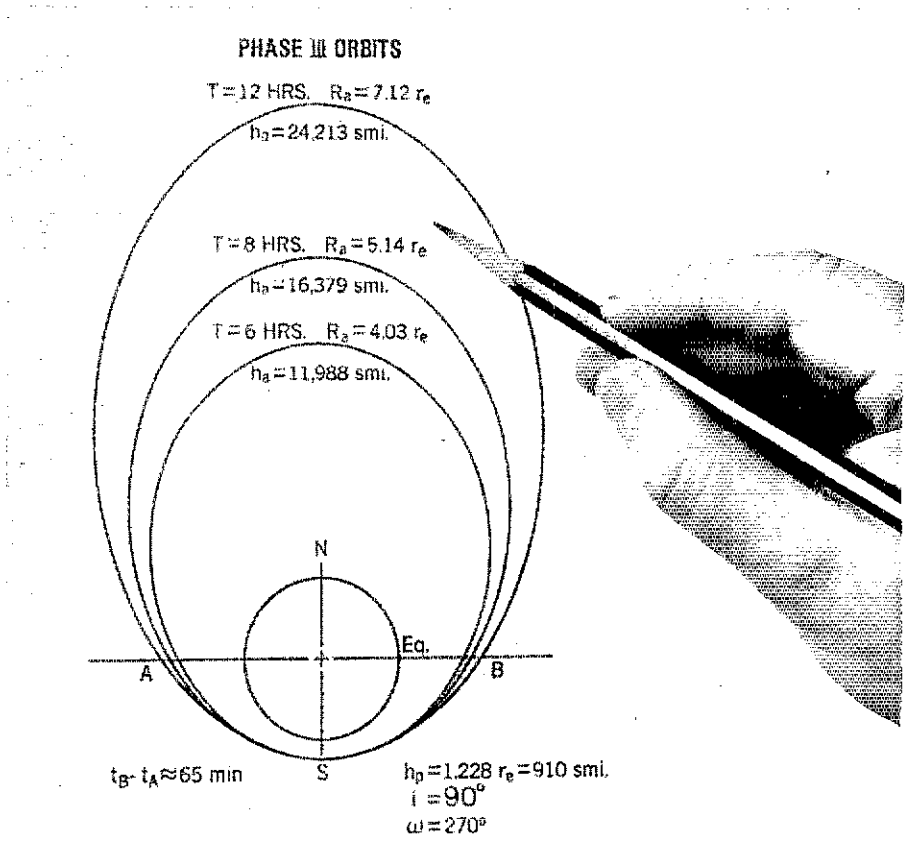
The first five OSCARs can be considered to have comprised the infancy of the amateur satellite program. These Phase I spacecraft laid essential groundwork for systems used in later, more sophisticated, satellites. Amateurs learned to track an orbiting satellite, receive and interpret telemetry and use this information to command the spacecraft. Most importantly, the Phase I OSCARs demonstrated that the spacecraft could become a useful and popular resource for the day-to-day operations of hams worldwide, as spaceborne repeaters (transponders) were developed.

The launch of AMSAT-OSCAR 6, the first long lifetime solar-powered amateur satellite, marked the start of Phase II. It continued with A-O 7, and will advance with A-O D, to be called A-O 8 once in orbit. In this, the "crawling stage," amateurs applied expertise gained with the Phase I satellites to design and build spacecraft that could be controlled at will while continuously and automatically monitoring their own electronic circuits. With Phase II, communication via amateur satellite has become almost routine, as sophisticated transponders allow nearly all amateurs, not just those with technical expertise, to use the spacecraft.

Encouraged to apply their creativity, amateurs have shown that the Phase II satellites have vast possibilities in the realm of public service. Their educational potential, NASA's primary justification for launching the OSCARs, is being demonstrated coast-to-coast, as students are learning science, math and foreign languages through OSCAR. Successful experiments have proven the satellites' capability to pinpoint downed aircraft from emergency locator transmitters and to relay electrocardiograms from an automobile in motion to a distant hospital. Unique intersatellite linking tests and low-power operations have further expanded their potential.

Why Phase III?

With the successes of AMSAT-OSCAR 6 and A-O 7, the question arises: Are we through with our crawling yet? It seems as though we are, as we have progressed about as far as possible with Phase II. With a few minor exceptions, it would be difficult to improve the quality of communciations over that provided by the DJ4ZC transponder (Mode B) in A-O 7. While current microprocessor technology would add some overall control flexibility, A-O 7 is quite advanced in this regard.



Three possible orbits for the Phase III spacecraft are compared on this diagram. Notice that the time it would spend in the Southern Hemisphere remains nearly constant for each of the three orbits. The most elliptical orbit would thrust the spacecraft more than 24,000 miles into space at apogee, the farthest distance from earth.

The major shortcomings of the Phase II satellites are their limited availability (less than two hours a day for most amateurs) and relatively short communications range. Since we will gain little by continuing to just crawl, perhaps we are ready to begin walking.

Overcoming Hazards

As anyone who has learned to walk can tell you, it's no easy task. First, you must conquer the fear and anxiety that are attendant with all new ventures. Not coincidentally, the creators of the Phase III spacecraft face similar difficulties. As amateurs, engineers and scientists, we are seeking a way to better meet our communications needs, in this instance through satellites. We would, of course, prefer "optimum solutions" to the problems we face, but these are not always feasible. A detailed look at the orbital considerations for the Phase III satellite will make this apparent.

It is known that (1) more than 90 percent of the amateur population is located in the Northern Hemisphere, and (2) the amateur population is distributed, unevenly, over all geographic longitudes. If we assume that all amateurs wish to "see" the satellite each day for a maximum period of time and want to communicate over the maximum geographic separation with no penalty for working shorter distances, then it can be concluded that the satellite should (1) spend a majority of its time in the Northern Hemisphere, (2) be as high above the earth as is practical (allowing for the fact that signal strength decreases as the inverse square of the height), and (3) should not favor any geographic longitude. The popular geosynchronous orbit does not satisfy this last consideration and is, therefore, not optimum when *all* amateurs are considered. A family of orbits which best satisfies all requirements (and several others which Mr. Isaac Newton strongly suggested) is shown in the accompanying photograph.

Since a satellite cannot be located permanently over the North Pole, and because we do not wish to ignore amateurs in the Southern Hemisphere, this series of orbits is nearly optimum. This can be demonstrated if we represent the communications efficiency of the orbit as

$$\text{communications (efficiency) } \Upsilon = \frac{\text{time spacecraft is above Northern Hemisphere}}{\text{orbit period}}$$

Objects in elliptical orbits travel much more slowly near their apogee (maximum altitude) than at perigee (minimum altitude) where speed is greatest. If the apogee can be located nearly above the North Pole, all the desired effects can be achieved. For the orbits shown here (with periods of from six to 12 hours), it was found that the time each satellite spends in the Southern Hemisphere (below the line AB) is very nearly the same: 65 minutes, or about one hour. The communications efficiency thus becomes

$$\tau = \frac{\text{orbit period} - 1 \text{ hour}}{\text{orbit period}}$$

It can now be seen that the efficiency for the 12-hour orbit is 11/12 while the six-hour orbit gives an efficiency of 5/6 - a slight advantage for the higher orbit. The point of diminishing returns is already being reached at 12 hours since higher orbits do not significantly increase the geographic range or percentage of communications time, and signals are getting weaker by

$$\frac{1}{\text{height}^2}$$

One feasible orbit has a period of 11 hours, an inclination (the angle it crosses the equator) of 63.4° and an apogee as far north as possible. This particular inclination value keeps the perigee position from drifting. For any single station in the Northern Hemisphere the communications efficiency or visibility time per day for this orbit is not as good as that given in the above formula. Most Northern Hemisphere stations will "see" the spacecraft for 14 to 16 hours each day while Southern Hemisphere stations above 45°S will have six to seven hours of communications daily. Most stations would have 10 times more visibility than they now have with AMSAT-OSCAR 7. At apogee, the communications range along the surface of the earth would be approximately 18,000 km (11,200 smi), nearly a complete hemisphere.

As the satellite is at its northernmost point, virtually every station in the Northern Hemisphere could communicate with every other – something that has never before happened in amateur radio. Using communications transponders in the 2-m and 70-cm bands, users of the satellite would never experience skip propagation or "no propagation" problems common to ionospheric communications. Even severe ionospheric disturbances would affect the performance of the satellite communicator only slightly.

If we built and launched such a satellite, we would have clearly shown that Phase III would be an exciting step forward – one that is definitely worth taking. In fact, a case could be made that such a satellite would in effect add one or more "new" amateur DX bands to our spectrum.

The Technical Challenge

The Phase III spacecraft must perform two major tasks if it is to be of maximum use. It must be capable of injecting itself into the final desired orbit, and it must provide reliable communications for ground stations with simple equipment. In order to meet these requirements, a tradeoff study was conducted to determine the operating characteristics of each system aboard the satellite. As will be shown, each system design depends upon the other.

Unlike past OSCARs, the final desired orbit for Phase III cannot be obtained directly by having it launched piggyback on another space mission. The only method of obtaining these orbits is for the Phase III spacecraft itself to have a propulsion capability so that available orbits may be changed into an orbit of the type discussed above.

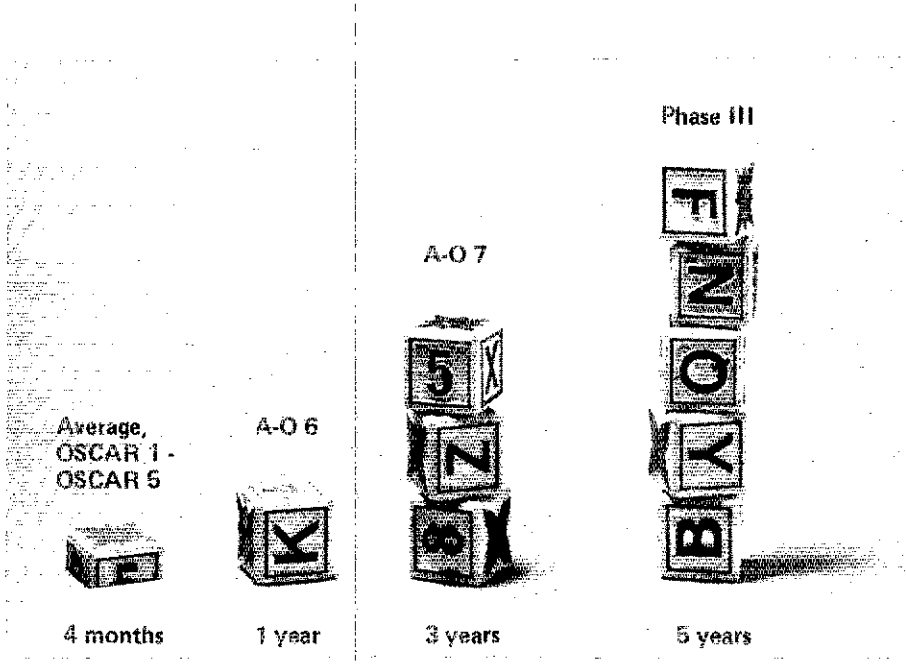
Orbit modifications require that the satellite's velocity be increased at some point along its path. The velocity increase or ΔV may be thought of as a vector with a component along the orbit "track" and components perpendicular to the track or "crosstrack." Velocity added along the track will change the apogee and/or the perigee of the orbit while one of the crosstrack components will change the inclination of the orbit. Once the properties of the initial orbit and the final desired orbit are known, the necessary ΔV and firing angles may be calculated.

The two types of orbits available to AMSAT for Phase III launches are low altitude polar orbits (like those of A-O 6 and A-O 7) and synchronous transfer orbits, with a high apogee, low perigee and low inclination. The ΔV requirements to change both of these orbits to the Phase III orbit have been studied in detail. The velocity increase in each case is about the same (1,500 m/s). In one case, however, the "kick" of the propulsion system is applied along track to increase the apogee and in the other it is applied crosstrack to increase the inclination.

Solid Propellant Best

Several types of motors were considered to provide the orbit transfer. While a liquid-fuel system would provide many advantages, such as the ability to provide multiple burns, it is significantly more complex than other types. One interesting motor, the water electrolysis rocket, which produces two high-energy fuel components (hydrogen and oxygen) from the simplest and safest of liquids, is under consideration for later Phase III flights. Without doubt, the simplest and most reliable motor for the first Phase III satellite is a small solid-propellant motor. Loaded with powdered aluminum and organic chemicals in a spherical shell with a single exit nozzle, the motor selected by AMSAT will produce a ΔV of about 1,600 m/s during its single 20-second burn. The firing, which may not be terminated once underway, will burn away fully 50 percent of the mass of the satellite while changing its orbit.

The propulsion system impacts the



The Phase III satellite's design lifetime is 40-percent greater than any previous OSCAR, and 15 times greater than the average design lifetimes of the first five ("Phase I") OSCARs.

rest of the satellite design in several important ways. Prior to firing, the attitude of the motor nozzle must be brought to the proper direction for injection into the new orbit. It is desirable to control this angle to within one degree (1°) of its true position in space. This means the attitude control system must not only be actively controlled but the earth and sun sensors used to determine the satellite's position in space must be precisely aligned.

The ΔV available from the motor depends on the total mass of the spacecraft. For this reason it must be designed to be a specific weight. As might be imagined, there is a tendency for the weight of the components to become excessive and it is difficult to find ways of removing excess weight, particularly as launch day approaches. Weight must be monitored continually throughout the design and construction of the satellite.

Mechanical alignment of the motor is another important consideration. The structure of the spacecraft must assure that the axis of the motor nozzle passes exactly through the center of gravity..

The Management Challenge

Although there have been management problems associated with launching and maintaining satellites in the Amateur Radio Service, Phase III introduces an entirely new class of difficulty. It is important to AMSAT that amateurs be aware of them so we can work together to solve them.

To most enthusiasts amateur radio is, as its label suggests, a hobby; something to be done in one's spare time. With the onset of the amateur satellite program, however, it was necessary for Project OSCAR members to work closely with professional organizations which provided launching services and other support needed to build and test the spacecraft.

Interface with professionals within government and industry has increased steadily throughout the history of the satellite program. The importance of radio amateurs being "professional" during contacts with nonamateurs in the professional world cannot be overemphasized. To some of these people, hams are "Those guys who are always causing my TV to act up," while to many more amateur simply means nonprofessional. The problem becomes a matter of credibility. How, they may ask, can amateurs accomplish effectively a task that professionals at times have difficulty with?

An example will put the problem into better focus. In a recent discussion between AMSAT and a Project official representing a $50-million NASA spacecraft, the official commented that he wanted to hear more about this "Radio Shack Satellite" before he would consider flying it as a piggyback next to the NASA satellite.

His concern was not totally unwarranted; with a large sum of tax dollars at stake, it is proper that an in-depth review of our project be conducted and that the people involved become satisfied with the integrity of "amateur hardware." To date, AMSAT has a perfect record in convincing the professional/technical community that amateurs are indeed competent, but these preparations must always be done with the greatest of care. This, however, consumes time that is given up at the expense of equally vital hardware work and operations planning. With the advent of Phase III, professional interaction becomes increasingly important as spacecraft complexity takes another quantum jump, as with a kick motor, which is considerd to be a hazardous system.

It is necessary to be half professional and half amateur in such a venture. At times it's a difficult task.

Having explored some of the considerations necessary to put a precedent-breaking satellite into orbit, Part 2 of this series will look at the onboard systems that will bring vastly improved communications capability to the amateur community. QST

Strays

□ If you've visited a hamfest in Florida lately, you've probably run into one of the most determined of the hundreds of volunteers working for the advancement of the amateur satellite program. Walt Dixon, W4DWN, a Miamian with some spare time to devote to a worthy cause, has chosen AMSAT as the beneficiary of his creative energies.

Take February's Orlando Hamcation. With the assistance of fellow AMSAT Area Coordinator Mark Calderazzo, WB4UOK, Walt built and manned an impressive AMSAT booth, explained the OSCARs to a few hundred curious visitors and one television news crew, and explained the ARRL OSCARLOCATOR to people who had "heard about those satellites but never really got involved."

Walt recounted the weekend as follows: "The AMSAT booth was a tremendous success. We handed out all the material sent down and if that package hadn't arrived Saturday late we would not have had any for Sunday. The booth was shown in TV channel 6 Orlando on their news show. We had two eight-foot tables, L-shaped, at one side of the huge room with the swap tables. Of course, this was where all the action was. And we got it! This is in contrast to last year's AMSAT booth when we had about 15 people total stop to look. Things have sure changed. This year I estimate 250 to 300 people. Was a super experience and am glad I was able to participate."

The AMSAT booth at the Orlando Hamcation, featuring literature and photographs supplied by the League and AMSAT, the Radio Amateur Satellite Corporation.

A-O 6 MAY BE OFF FOR FIELD DAY

□ AMSAT Vice President for Operations Rich Zwirko, K1HTV, reports that AMSAT-OSCAR 6 may not be activated for special Field Day orbits this year. Traditionally well used during FD weekend, A-O 6 has experienced serious battery degradation, and it is feared that a period of high usage may cause permanent damage. A-O 7 will be on as scheduled, beginning Saturday afternoon, June 25, and continuing in Mode B (70 cm up, 2 m down) until Sunday afternoon, local time.

FM Repeater Audio— Good or Bad?

Does your repeater sound crummy? Remember a repeater is a "gosintacumscuta" device and if the device itself is bad, everything that cumsouta is going to be bad.

By Edward F. Avilla, Jr.,* WB6SDW

Since the advent of the fm repeater, most articles and books written about this subject have contained relatively little information concerning repeater audio. I consider this area just as important to an efficiently working repeater as the receiver/transmitter system or the antenna system. And I've found that there is no consistency in the audio quality of repeaters. Some repeaters had exceptional quality and clarity, while others were so poor I couldn't recognize a good friend's voice. Here, I would like to discuss some of the techniques used in obtaining good quality audio from repeaters.

Most commercial and ham-oriented fm transceivers have a frequency response between 300 and 3000 Hz because most speech sounds are contained in these frequencies. Of this frequency range the 2000- to 3000-Hz frequencies contain a good share of the consonant sounds, and the consonants form the majority of speech sounds. The natural amplitude of the speech sounds between 2000 and 3000 Hz is low, so we must boost this range of frequencies or they will be subjected to excessive noise. To improve the signal-to-noise ratio for the important higher frequencies, preemphasis is used in the audio system of most fm transmitters. This consists of amplifying the higher frequencies more than the lower frequencies.

Preemphasis

A typical preemphasis circuit is shown at Fig. 1. This preemphasis circuit is needed in a transmitter that uses true frequency modulation because the frequency swing is proportional only to the amplitude of the audio signal; the frequency of the audio signal does not affect the frequency deviation in true frequency modulation.

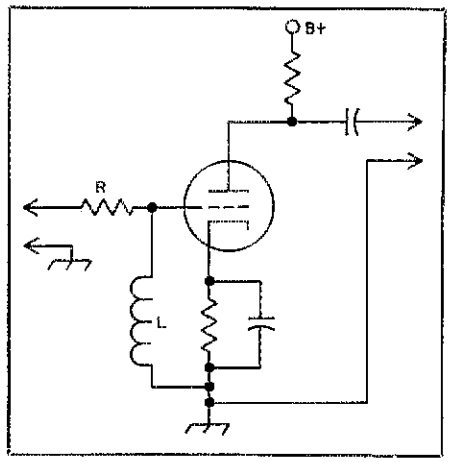


Fig. 1 — R and L comprise the preemphasis input found in fm transmitters. Time constant is 75 μs, equal to L/R.

At the receiving end we use a deemphasis circuit such as shown in Fig. 2. This circuit amplifies the lower audio frequencies more than the higher ones to compensate for preemphasis of the transmitted audio. Because of the capacitor, C in Fig. 2, the gain of the circuit decreases as the audio frequency increases. This is because the reactance of C decreases with an increase in frequency. The product of R and C is chosen to give us the same time constant as the preemphasized audio coming from the transmitter.

Phase Versus Frequency Modulation

Many repeaters are phase modulated rather than frequency modulated. One important difference between the two methods of modulation is that when phase modulation is used, the frequency deviation is proportional to both the amplitude and the frequency of the audio signal. I won't go into the theory of phase modulation but will refer the reader to the references.[1,2,3]

Essentially, during phase modulation the amount of frequency deviation produced by a given phase shift of the carrier is proportional to the frequency of the modulating signal. As the modulating frequency is increased, the deviation is proportionally increased. What we have is a "natural" preemphasis of the higher modulating frequencies. So in a pm transmitter the use of the circuit in Fig. 1 is usually unnecessary. By careful design of the phase modulator circuitry, we can obtain our necessary preemphasis.

When operating fm simplex our speech is amplified, filtered for a 300- to 3000-Hz frequency response, and then preemphasized. The audio signal at the receiver is deemphasized and the receiving operator hears the original audio composition. When we communicate through a repeater, the audio signal should be unaltered as it is retransmitted to a receiving station. But this isn't always that easy to ac-

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[1] References appear on page 16.

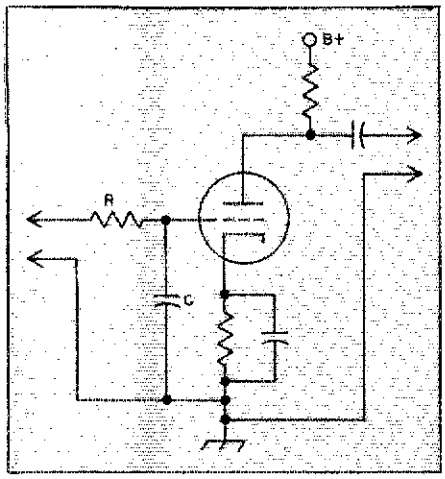

Fig. 2 — *R* and *C* comprise the deemphasis circuit usually found in fm receivers after the discriminator. The time constant is *R* times *C*.

complish. At the repeater much depends on where we pick up the audio signal at the repeater receiver and where we inject the audio signal into the repeater transmitter. Let's follow an audio signal through a repeater.

First we must pick up the audio signal somewhere in the receiver circuitry. The most common point is the output of the discriminator. Here, the audio should be the same as when it left the original transmitting station. We could also take our audio following the deemphasis circuitry, if this circuit isn't located beyond the squelch or volume-control circuits. The squelch circuit would introduce squelch-closing noise each time the carrier disappeared from the receiver. If taken after the volume control, the audio would vary with the adjustment setting of the control. Not a very good idea in either case. Remember also that if the audio is taken after the deemphasis circuit, it must be pre-emphasized in the repeater transmitter to gain the advantages of preemphasis.

Next, we need to couple the audio signal from the receiver to the transmitter. In doing so we must match the relatively high impedance of the receiver discriminator output to the low input impedance of the transmitter. The most efficient way I've found is to use a cathode-follower (or emitter-follower) circuit such as given in Fig. 3. In addition to exhibiting a high input impedance and a low output impedance, response is essentially flat over a wide frequency range. The gain of the cathode follower is close to one or unity.

Two very important concepts must be considered when coupling the audio signal to the repeater transmitter. First, is the signal coming from the repeater receiver preemphasized or deemphasized audio? And, second, does the repeater transmitter you are using incorporate true frequency modulation or is it a phase-modulated transmitter? Obviously, we must take both situations into account when deciding the best way to design our repeater audio channel. If on the one hand we derive our audio from the receiver discriminator and are using a true frequency-modulated transmitter, the audio signal will be unaffected as it passes through the repeater and on to the station receiver. The output should contain the correct amount of preemphasis and sound like the original signal. On the other hand if we couple the audio signal from the discriminator output into a phase-modulated transmitter which "naturally" preemphasizes the audio, we need to use a correction network such as shown in Fig. 4 to convert the pm transmitter output to a frequency modulated signal. If this isn't done we will have essentially an audio signal that has been preemphasized twice; once at the original transmitting station and again at the repeater transmitter. The correction network is a simple voltage divider. At low audio frequencies the reactance of *C* is high compared to the resistance of *R*, and as the frequency increases the reactance of *C* decreases. This causes the high frequencies to be lower in amplitude than the lower frequencies and counterbalances the effect of the pm transmitter which pre-emphasizes the higher audio frequencies. Of course, we could take our audio after the deemphasis circuit in the receiver and run it into a pm transmitter which would add preemphasis to it. Or, we could couple the deemphasized audio to a frequency modulated transmitter and install a preemphasis circuit in it, if there were not already such a circuit in the transmitter audio stages.

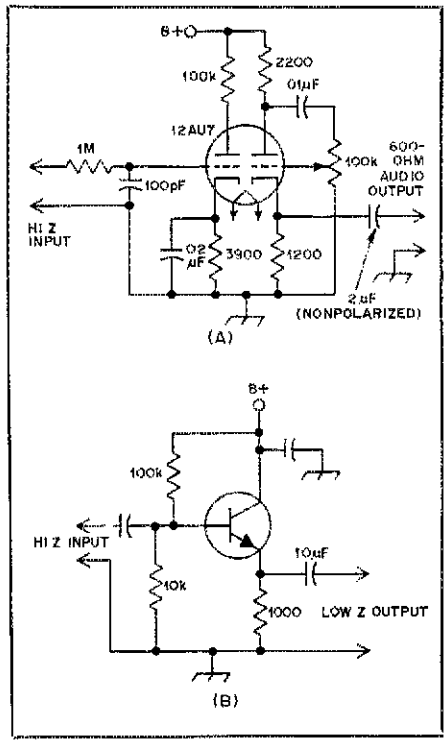

Fig. 3 — Use of either the cathode follower (A) or the emitter follower (B) to couple the relatively high impedance of the receiver discriminator to the low impedance of the transmitter. The tube circuit has slightly more gain.

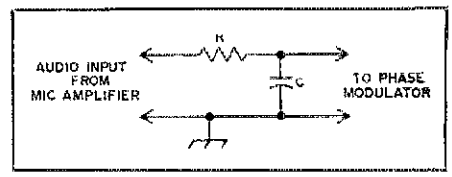

Fig. 4 — An *RC* network used to convert a phase-modulated transmitter to a frequency-modulated signal.

I hope that this article has given some insights into the problems of designing a system which not only works well, but also sounds good. The importance of audio signal quality cannot be underestimated, for isn't this what communication is all about? QST

References

[1] *The Radio Amateur's Handbook*, ARRL.
[2] *FM and Repeaters for the Radio Amateur*, ARRL.
[3] Shrader, *Electronic Communication*, 2nd edition, McGraw-Hill Book Co., New York, NY.

Strays

STOLEN EQUIPMENT

□ Clegg FM 27B, serial no. 4887. Stolen from car on February 28 in Bridgeport, CT. Inscribed with K1NYT on rear of main pc board and on back face of the vertical pc board at the front. Robert H. Horen, K1NYT, P. O. Box 1112, Fairfield, CT 06430.

□ ICOM 1030, serial no. 4889. Inscribed with name Fred Monger, his call and soc. sec. no. 231-56-0569. John F. Monger, WA4OFR, phone 301-459-0798. Reward.

□ Stolen from auto in Tacoma, WA. KDK FM 144 transceiver, serial no. 7245. Wesley J. Drummond, K7WQB, 523 South 144th Street, Tacoma, WA 98444 or phone 206-531-4234.

Testing Grade-Out Integrated Circuits

End that head scratching over questionable bargain-house ICs! You can grade out that latest batch of unknown-quality chips with a simple but effective tester.

By R. P. Norris,* G3ZDN

It is now possible to buy packs of untested digital ICs (grade-outs) at very low prices compared to fully coded and working devices, and the author has found these to be a useful source of such circuits not only for experimental work but also for permanent pieces of equipment. The commonly available devices are the SN7400 range of TTL (transistor-transistor logic) circuits which are in 14- and 16-pin dual-in-line plastic packages, and the μA930 range of DTL (diode-transistor logic) circuits in 14- and 16-pin dual-in-line ceramic packages. Both use the same supply voltages and logic levels.

Simple GO/NO-GO tests will usually show about 40 percent of the circuits supplied to be completely working, although this figure becomes lower as the complexity of a device increases. In addition to these completely working devices, there are usually partly functional devices, wrongly coded devices and occasionally devices that can be repaired. The number of devices that are totally useless are likely to be less than 10 percent.

If circuits are tested by soldering wires to the pins and by performing the various functional tests, then a large amount of time is spent connecting and disconnecting wires. If a fairly large number of devices are to be tested, it is well worthwhile building a simple tester to perform tests quickly and efficiently.

As an example of the likely yield, the following survey was taken of a selection of packs of untested circuits. A total of 10 packs was included, which cost £5 (approximately $10) and contained a total of 98 devices. A summary of the findings is given in Table 1, which lists the numbers of working and partly working devices. In addition to these, three miscoded devices were found; two fully working SN7490s (both in a pack of SN7400s) and a fully working SN7474 (in one of the packs of SN7440s). Ten of the SN7404s were in fact coded as the lower-power SN74L04 and all were working. For many purposes these two devices are interchangeable, caution being needed only when the SN7404 is to drive several other devices.

To summarize, the 98 untested devices yielded 56 fully working devices and 26 partly working devices. The cost of the fully working devices alone, if bought at the normal retail price, comes to around £20 ($40) representing a saving of £15 ($30). The yield will sometimes be higher, sometimes lower. Occasionally, there may be a bonanza, as recently when the author found three completely coded, working SN74150s [price £2.90 (approx. $6) each] in a pack of SN7400s, but this is unusual.

The Integrated-Circuit Tester

This tester is specifically designed for testing SN7400 series TTL ICs and will also test the μA930 series DTL circuits. It, therefore, has a socket to accept 14- or 16-pin devices but sockets for other encapsulations could of course easily be incorporated if necessary. One purpose of the tester is to provide a stable mounting for the device to which connections can be readily and rapidly made. It also has sockets to provide the dc supply of +5 V for which the devices are designed.

These devices, being digital, recognize only two types of signal: "high" (or logical "1") and "low" (or logical "0"). A wire is "low" if it is carrying a voltage of less than +0.4 V with respect to earth and "high" if that voltage is greater than +2.4 V with respect to earth. A fully functional device should therefore treat anything up to +0.4 V as logical "0" and anything above +2.4 V as logical "1." In fact, this tester uses 0 V and +3.3 V as logical "0" and "1" respectively, so that the device is not tested at its specified limits. However, this looser specification is adequate for

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Table 1
Results of Using the Tester

MARKED TYPE	TOTAL NUMBER BOUGHT	NUMBER WORKING	NUMBER PARTLY WORKING	NUMBER OF WRONGLY CODED DEVICES
SN7400N	24	16	6	2
SN7404N	24	19	3	–
SN7440N	24	6	14	1
SN7474N	16	8	3	–
SN7483N	10	4	–	–

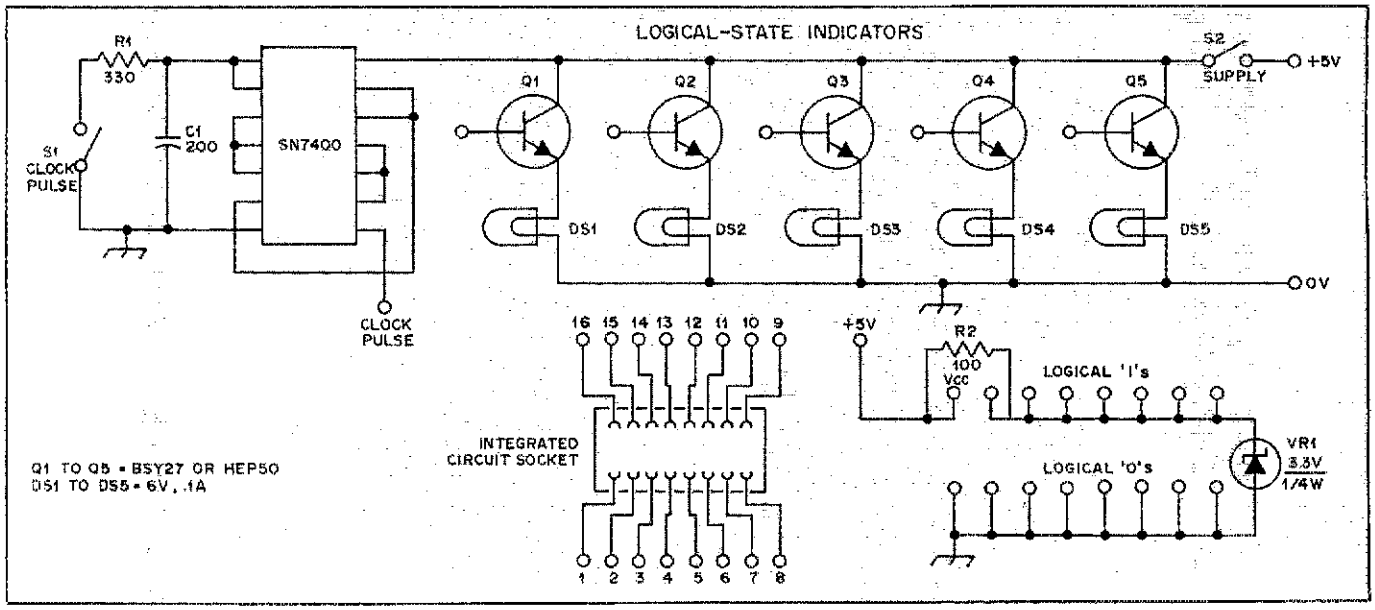


Fig. 1 — Circuit of the tester.

most purposes and only once in the author's experience has a fault in a piece of equipment been attributable to this discrepancy, out of hundreds of devices tested and used.

The tester, the circuit of which is given in Fig. 1, therefore has a supply of logical "0" and logical "1" sockets. It also has a clock-pulse circuit. This circuitry is necessary to provide a clean single rise or fall with no "spikes" and a short rise time, for use in testing shift registers and counters. The resistor-capacitor integrating circuit is used to remove the spikes from switch-contact bounce. This is then followed by a series of NAND gates used as amplifiers to give the pulse a short rise time.

Finally, the tester contains five logical-state indicators which show whether an output is at logical "0" or "1," the bulbs lighting for a logical "1." The circuit is simple, and although it gives no indication of the exact output voltage, each indicator draws about 1 mA from the IC. This is considerably more than a normal load on an IC, so ensuring that the latter has a reasonably low output impedance. The reason for including five indicators is that many devices have four or five outputs, but very few have six or more.

It was found convenient to mount both the IC socket and the SN7400N (for the clock-pulse circuit) on one piece of 0.1-in. matrix Veroboard, which is then mounted as shown in Fig. 2. It may be found useful to mount both 14- and 16-pin dual-in-line sockets but the author found this unnecessary, 14-pin devices being inserted into the 16-pin socket leaving the two end connectors in the socket unused. When doing this, however, one must remember that the pin numbers above 7 on the tester will be numbered wrongly and connections made accordingly. The whole tester may be mounted on the lid of a 6 X 4 X 2-inch aluminum box as shown in Fig. 3.

It is a good idea to insert a test meter in the supply line to the IC under test to check that it is not drawing excessive current, since devices can appear to be functional when tested but when run for some time overheat and break down.

The Testing Sequence

The aim when testing is to reproduce as nearly as possible the conditions under which the IC will have to perform, ensuring that it performs correctly. In practice, a compromise must be struck between this and the time taken to test each device. The following sequence is that used by the author.

First, the V_{CC} (positive supply) pin is connected to the V_{CC} supply socket, the ground pin to a logical "0" socket and the outputs to logical state indicators. Various inputs are then fed in, depending upon the type of IC under test, and then the indicators are checked to see if they are giving the correct indication.

It is a feature of these integrated circuits that open-circuit inputs will assume a logical "1" state. It may therefore be decided, in order to save time, to leave an input open-circuit when a "1" is needed, rather than to connect it to a logical "1" socket. The author often does this but it does not detect a short circuit between the input pins, which may not be detected until a piece of equipment is built and all the circuits wired in. Some time may then be spent in detecting the fault and replacing the IC, but the decision may be taken simply to accept this risk and save a great deal of time in testing the integrated circuits.

Suppose, for example, the device to

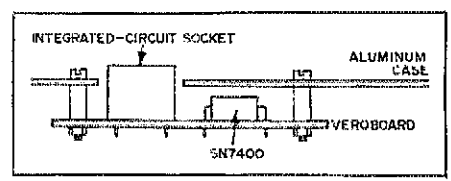


Fig. 2 — Side view of the tester.

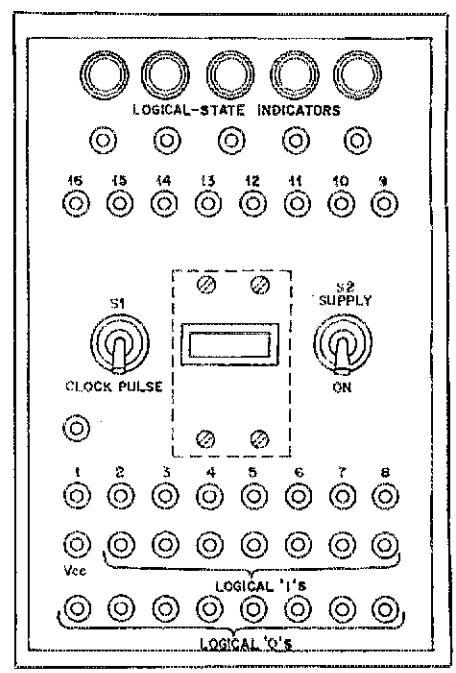


Fig. 3 — Front view of the tester.

be tested is an SN7400. This is a quadruple two-input NAND gate, meaning that there are four separate two-input NAND gates in one package. The output of a NAND gate should go "low" when both the inputs are "high" and should go "high" when either or both of the inputs are "low," causing the appropriate indicator to light. In other words, testing an SN7400 consists of touching a wire connected to logical "0" to each input in turn, leaving the other inputs open-circuit and making sure that the appropriate bulb lights. It will be found that many devices will have just two or three gates working and so may be used as such, leaving any nonfunctional gates disconnected.

If it is decided to "play safe" and detect shorts between inputs, then instead of leaving the other inputs open-circuit, they should be connected to logical "1" and a test meter on its current range used for connecting inputs to logical "0." A short between two inputs will then reveal itself as a high reading on the test meter. Similar procedures may be used for other devices, bearing in mind the logic of the particular device under test.

Partly functional devices may be marked as such by shortening the appropriate pins by about 1/8 inch. This is sufficient to locate them easily, yet when the circuits are mounted on a printed-circuit board, the inherent neatness of dual-in-line packages is not ruined, since the shortened leads cannot be seen from the top of the package.

Reclaiming "Duds"

In the testing procedure outlined above, there will invariably be found devices that show no signs of working at all, or work in a totally unexpected way; for example, an SN7400 may show bistable properties. In the latter case, it is an easy matter to compare the result with the data sheets on other devices in the same series. In the example above the device may perform exactly as a fully working SN7474, which is a dual type flip-flop. In this case it is not unreasonable to assume that the device is in fact a wrongly coded SN7474 and to code it as such.

If the device does not work at all, it is often worthwhile trying the effect of applying the V_{CC} and ground wires to a pair of pins which are the V_{CC} and ground pins for another device, and seeing if it then performs any recognizable functions. This is facilitated by the fact that the majority of devices have the same V_{CC} and ground connections. For example, most 14-pin devices have V_{CC} and ground at pins 14 and 7, respectively; and those that do not have these connections have them instead either at pins 4 and 11, or at 5 and 10, respectively. A similar rule can be worked out for 16-pin devices. Incidentally, the best way to examine a device for other functions is to disconnect all pins apart from those connected to V_{CC} and ground and measure the voltage to ground of each pin. If the V_{CC} and ground are correctly connected, the outputs will be either at about 0 V or greater than about 3 V, whereas inputs will be somewhere in between, depending upon the resistance of the meter used. Experience enables one to rapidly distinguish between these. Once they are found, logical state indicators are connected to the IC outputs and the IC inputs in turn connected to logical "0" to find a recognizable function.

In the course of the above tests, it may be found that there is a short between two pins that renders the device nonfunctional. In such a case, if the pins are adjacent, check that there is no metal bridge between them outside the package; this is often present if the pins have not been stamped out correctly and it may easily be removed.

For data on the SN7400 series, a useful publication is the Texas Instruments' *TTL Designers Handbook*, obtainable from Texas Instruments.

Strays

□ Paul Weinstock, W6SIF and Harley Gabrielson, K6DS, have been helping out at the Madison Avenue Orthopedic Center for about three years now. Located in El Cajon, CA, the center is a school for physically and mentally handicapped children from all over San Diego County. Schools similar to this one exist in most major metropolitan areas and present an excellent opportunity for Ham Radio Clubs to perform a public service and receive publicity for it, too.

W6SIF helps Greg Henderson solder a board. *(photo courtesy of San Diego Union-Tribune)*

K6DS explains an electronic principle to Valerie Diaz. *(photo used by permission of San Diego Union-Tribune)*

SILVER JUBILEE AWARD HONORS KING HUSSEIN

□ The Royal Jordanian Radio Amateurs Society is honored to announce that on the special occasion of the Silver Jubilee of His Majesty King Hussein of Jordan, JY1, all JY stations will be using the special prefix JY25, followed by their individual calls. These special call signs will be used from 2200 UTC on May 24 until 2200 UTC on June 25, 1977.

The Silver Jubilee Award will be issued to any amateur able to work 10 JY25 stations by ssb, cw or fm on 3.5, 7, 14, 21, 28 or 144 MHz. Each JY25 station may be worked only once on each band. Applicants for the award should send 10 IRCs and a list of JY25 and QSL cards for Jordanian stations worked to The Royal Jordanian Radio Amateurs Society, P. O. Box 2353, Amman, Jordan.

□ From the Love at First QSO Department comes word that two members of Wayne Wright's Novice licensing class in Iola, KS, became engaged soon after completing the course. Aside from the future bride and groom, Cheryl Ann Maple and Michael Epperson, others in the class included Cheryl's father and mother and an uncle. — *WB0PNE*

Learning to Work with Integrated Circuits

Part 9: Circuit improvements . . . these minor changes to the digital voltmeter simplify calibration adjustment and provide stability during operation.†

By Jerry Hall,* K1TD (ex-K1PLP) and Charles Watts,** WA6GVC/1

You've often heard the old saying about building a better mousetrap. There is a corollary to that proverb which goes something like this: "Anything worth doing well can always be improved upon." Maybe we've got our proverbs mixed up a little bit, but this last saying always seems to apply to amateur construction projects. Popular circuits keep reappearing, but each time with some improvements or embellishments. And so it is with the digital voltmeter/frequency counter. If you've completed the project but can't quite get the voltage-to-frequency converter calibrated so it'll read correctly, this information is for you.

The fact of the matter is, there's nothing really wrong with the basic voltage-to-frequency converter circuit which is shown in Fig. 23, Part 6, of this series. Most problems that have been experienced with either calibration or stability have been traced to the device used at Q2. Even with a change of devices, though, we've heard from a number of builders who have had varying degrees of success in getting a linear calibration, one where the reading would "track" the voltage input. Bob Shriner, WAØUZO, of Circuit Board Specialists, has offered help and suggestions to many, many builders of the DVM, and it was he who motivated us into preparing this additional part to the series. With the tips and guidelines presented here, it should be a cinch for you to calibrate your instrument in fairly short order.

The Improved Circuit

The circuit with improvements incorporated for the voltage-to-frequency converter is shown in Fig. 32. Not all the changes from Fig. 23, Part 6, are required, as some are just a matter of convenience for the calibration procedure. If you wish you can stick with your original circuit board, CW-LW5, and make the modifications to it. But if you're building the converter from scratch, a slightly modified circuit-board pattern with the circuit changes is shown in Fig. 33.

What changes did we make? Here are the important ones. First, we've already mentioned the device for Q2. Many MPF102 transistors will do fine, especially the high-grade ones. Oftentimes these are identified with a splotch of green or yellow paint on the top of the package (5 and 4, respectively, in the color code). Be leery of MPF102s with orange or red (lower color-code numbers), or even no paint splotch at all. If you replace Q2, obtain a 2N5486 transistor, which is equivalent to a high-grade MPF102.

Place a 10-kΩ resistor from the

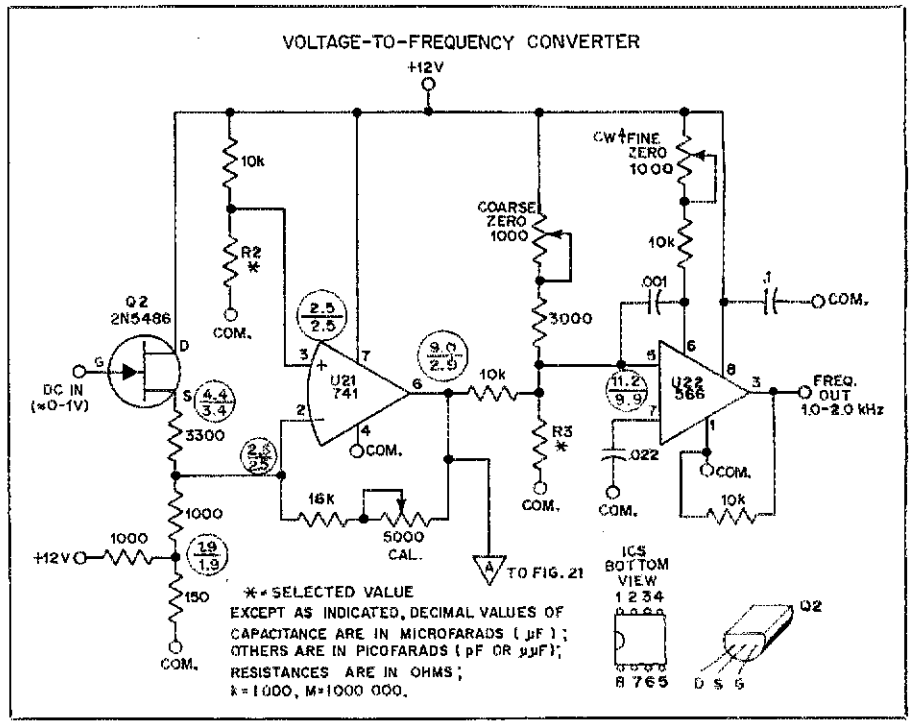


Fig. 32 — Schematic diagram of the voltage-to-frequency converter with circuit improvements. See Fig. 23, Part 6, for parts information not given here. Dc voltages at various points in the circuit are shown in the circles; those above the line appear when the input probe is touched to the 12-volt bus, and those below the line with the input probe grounded. All measurements were made with an electronic voltmeter.
Q2 — Field-effect transistor, 2N5486.
Linear-taper control, 1000 Ω, 2 W carbon. This control is to be front-panel mounted (FINE ZERO control).

†Parts 1 through 7 appeared in *QST* for January through July, 1976 and Part 8 in October 1976.

*Associate Technical Editor, *QST*
**Former Assistant Technical Editor, *QST*

output of the voltage-controlled oscillator, pin 3 of U22, to common. This serves to provide a relatively low load impedance for U22, a help if it is looking into the 1-MΩ input of the wave-shaper circuit. Further, place a 0.1-μF capacitor from pin 8 to pin 1 of U22 to eliminate the possibility of its "taking off."

A "convenience" modification is the relocation of the FINE ZERO control. Originally, a 200-Ω pot was used in series with the COARSE ZERO control to the 12-V bus. As relocated, the FINE ZERO control is placed in series with the 10-kΩ frequency-determining resistor at pin 6 of U22. The 200-Ω value is a bit small here, however; 1000 Ω give a better range of adjustment. If you've already constructed the circuit and don't mind experimentally finding the best value for that 10-kΩ resistor during calibration, you can get along without moving the FINE ZERO control.

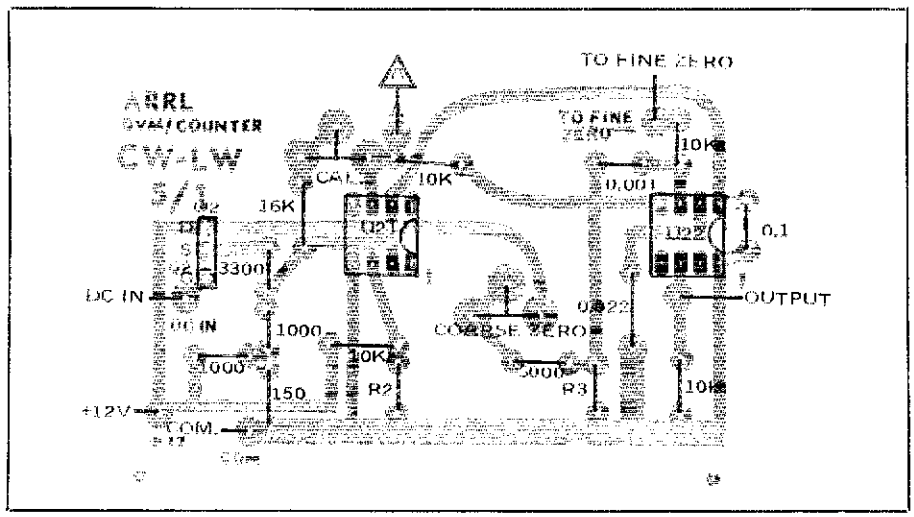


Fig. 33 — Etching pattern and parts placement guide for the improved voltage-to-frequency converter circuit. This layout is shown at actual size from the foil side of the board, with grey representing copper.

Calibration

This calibration procedure is slightly improved over what we gave in running text form in Part 7. And let's face it, all the information which accompanies that procedure to explain what's happening does tend to hide the procedure itself. No doubt you'll find these step-by-step instructions easier to follow.

1) Set all controls associated with the v-f converter to the center of their ranges. *Be sure* the lead from the over-range/reverse-polarity indicator is connected to the v-f board. Set S1 and S2 to measure 10 V dc and apply power.

2) Ground the input probe and measure the voltage at pin 6 of U21. "Trim" the value of R2 for a reading of 8.5 to 9.5 volts. The final resistance value should be near 2600 ohms, obtained by paralleling a high-value resistor (100-kΩ or so) with 2700 Ω.

3) Touch the input probe to the 12-V bus. The voltage at pin 6 of U21 should drop. Adjust the CALIBRATION control so the voltage is 6 V below the reading obtained in step 2.

4) Ground the input probe and select a value for R3 so the voltage at pin 5 of U22 measures 3/4 volt less than the supply potential. The COARSE ZERO control may also be moved slightly here. R3 should end up being 56 kΩ to 68 kΩ.

5) With the input probe still grounded, select a value for the 10-kΩ resistor at pin 6 of U22 for a display reading near .00, using fixed-value resistor combinations. Precision is not required in this step.

6) Use first the COARSE and then the FINE ZERO controls to get exactly a .00 reading. Recheck the voltage at pin 5 of U22. If it is outside the range from 3/4 volt to 1 volt less than the supply potential, repeat steps 4, 5 and 6.

7) Check first for a .00 reading with the input probe grounded; then note the reading when the probe is touched to the 12-V supply bus.

8) Ground the input probe and adjust the CALIBRATION control for a reading of *half the error* noted in step 7. If the reading was below 12 V, subtract half the error from 10.00 and adjust for that reading. Then zero the display with the COARSE ZERO control.

9) Repeat steps 7 and 8 until you are satisfied.

10) If trouble exists, repeat step 6. *Do not* repeat steps 2 and 3 unless the voltage at pin 6 of U21 goes to +1 V or +11 V.

Wrap-up

And that, as the saying goes, should fix you up in calibrating the v-f converter. If you are having a problem in the counter with extra counts or a reading that is too high, change the 15-kΩ resistor at pins 6 and 9 of U24 on the input wave-shaper board to 1500 ohms, and tie pins 11 and 13 of U24 to +5 V.

If your regulated 12-V supply potential is a half volt or so low, as may be the case with some regulators, here is a simple fix. Add a "boost" resistor between the "common" pin on the 12-V regulator, U1, and circuit common. Use a 75- or 100-Ω 1/2-W resistor. You should also add a bypass capacitor at the output of U1, a 0.15-μF disk.

And just one more point. In Fig. 26, Part 7 (July 1976 *QST*), two resistor values in the rectifier for ac voltage measurements were inadvertently reversed on the drawing. The 1-MΩ and the 1.5-MΩ resistors in the lower left corner of the drawing should be interchanged. QST

Strays

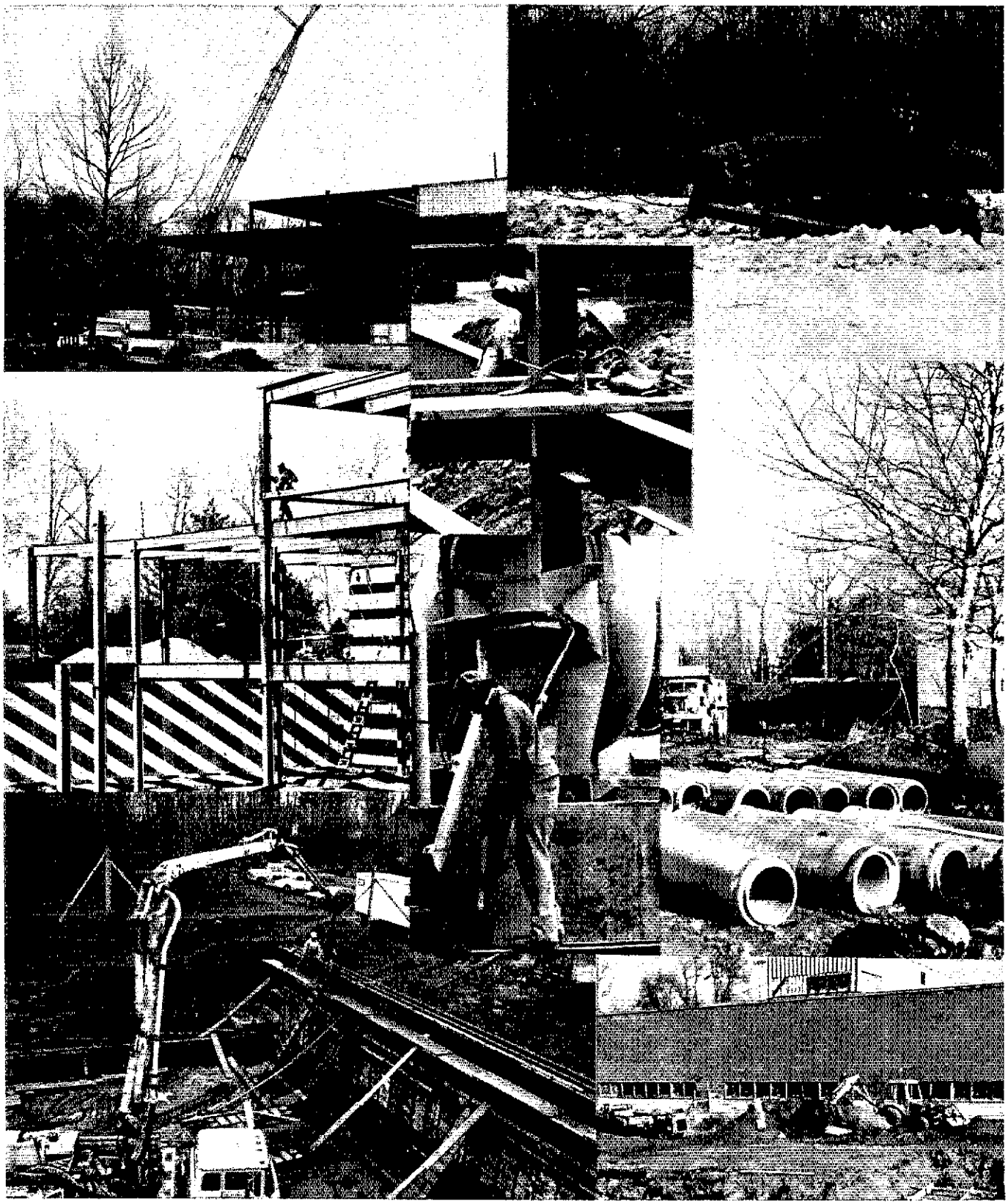
FRANCE OPENS TOP BAND FOR LIMITED USE

□ Looking for 160-meter DX contest contacts? For the first time since 1939, you can try working France, as French authorities have agreed to limited use of the band for the first time in almost 40 years.

After many meetings between REF President F9FF and representatives of the DTRI (Direction des Telecommunications du Reseau International), several French amateurs were granted permission to operate 160 meters for the CQ-World-Wide DX Contest this past January. Following their successful return to the band, permission was granted all French amateurs for contest operation after March 18, 1977. Operation is allowed only on 1826 kHz. Only A1 emissions can be used, and the power input to the PA stage is limited to 10 watts. DTRI clearance must be secured before each international contest.

The contest log of F8EX indicates that several U.S. amateurs left the DX test with a cherished "new one" to add to their slowly expanding list on top band. – *F8EX*

Strays

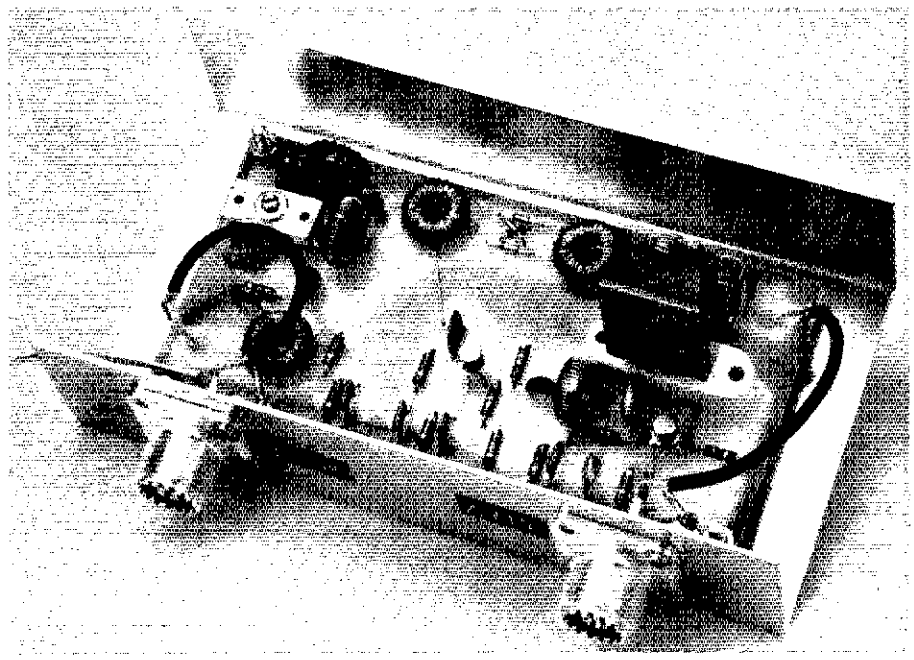


Construction for expanding the ARRL headquarters facility began in February of this year. Some of the sights, as captured by the lens of W1YL, are shown here.

A High-Performance Low-Frequency Converter

Need a fun project for the weekend? Build this simple high-performance converter and hunt for beacon signals from those inveterate experimenters who hang out in the 160- to 190-kHz band.

By Doug DeMaw,* W1FB and Jay Rusgrove,** WA1LNQ



Have you heard about those denizens of the 1579- to 1875-meter band? There's quite a group of experimenters grinding out low-power signals in that part of the spectrum, and the name of the game is DXing. There are some rather stiff restrictions imposed on transmissions in the so-called experimenter's band: Maximum dc input power to the last stage of the transmitter is 1 watt, and the maximum overall length of the transmitting antenna – inclusive of feed line – is 50 feet![1] A quarter-wavelength vertical would be 1231 feet long at 190 kHz. Try that one on for size in a city lot! If you extrapolate all of this to the 10-meter band, your 50-foot antenna on 1579 meters would equate to a 1.13-inch (28 mm) antenna on 10 meters!

Fortunately, there aren't any restrictions when it comes to receiving on the low-frequency band, and the longer the receiving antenna the better. Therefore, it will behoove any intense experimenter to use the best receiving equipment he can manage if he wants to extract weak signals from the mish-mash of commercial signals and noise in the 160- to 190-kHz range: A good converter is the first step to take.

What's Happening on 1579 Meters?

The FCC has allocated this portion of our lf spectrum to short-range transmissions for various communications and signaling purposes. Provided the transmitter and antenna conform to the regulations mentioned earlier, it is not necessary to obtain a license or call letters. Many amateurs have built equipment for the experimenter's band, and DXing is underway in various parts of the USA. Some rather fantastic distance records have been reported (well in excess of 100 miles), but generally the operators find a range out to, say, 50 miles a rather brisk challenge.

The most effective mode of transmission is cw, but some have experimented with ssb and RTTY in the 1579-meter band. The operating frequency is chosen for the area where activity is taking place. Frequency selection is based primarily on what's already in the band, of commercial nature. For quite some time the East Coast group settled near 189.5 kHz, as that was a relatively clear channel.[2]

An advantage to cw as an operating mode is that of being able to employ high degrees of receiver selectivity. This helps to bring weak signals up out of the noise for improved copy. The authors use modern communications receivers as the tunable i-f (1.8- to 2.0-MHz tuning range to cover 100 to 200 kHz). W1FB uses a Yaesu FT-101E as the main receiver, and a 500-Hz cw filter is switched in during lf reception. Additionally, a four-pole *RC*-active filter is used at the receiver output for greater enchancement of cw selectivity. WA1LNQ uses a similar setup: The receiver is a modified Kenwood R599A.

Some experimenters use BC-453 Command receivers (Q-5ers) which have been detuned to cover the desired lf

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[1] Footnotes appear on page 26.

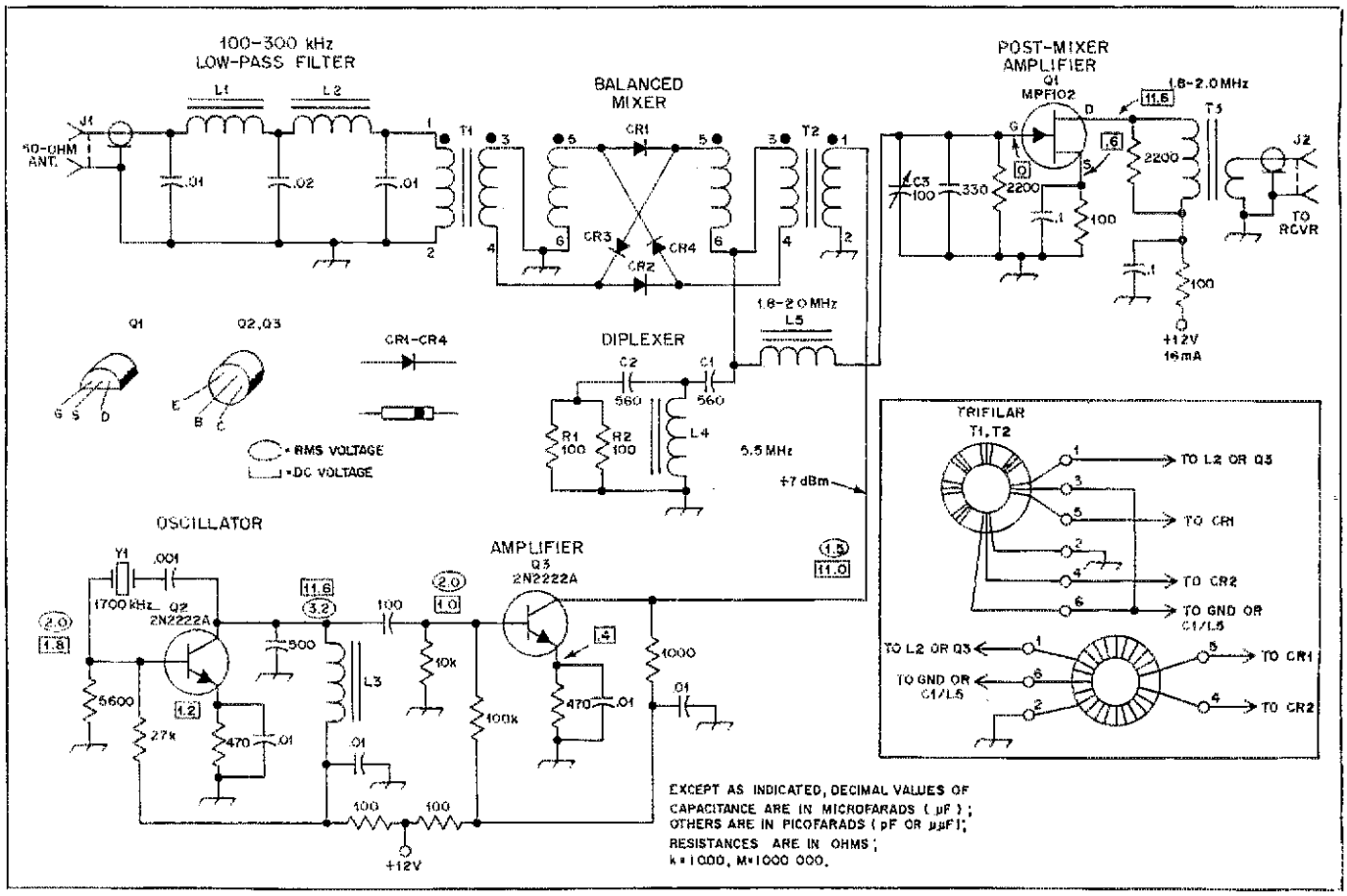


Fig. 1 — Schematic diagram of the converter. Numbered components not appearing in the parts list are for text reference only.

C3 — Variable capacitor, 100 pF max. (Arco 423 or equiv.).

J1, J2 — Coaxial receptacles.

L1-L3, incl. — 40 turns no. 30 enam. wire wound on a T50-3 core.

L4 — 17 turns no. 28 enam. wire wound on a T50-2 core.

L5 — 70 turns no. 30 enam. wire wound on a T50-2 core.

T1, T2 — Broadband transformer. For conventional style winding: primary, 27 turns no. 30 enam. wire wound over secondary turns. Secondary, 54 turns no. 30 enam. wire wound on an FT-50-43 core. For trifilar winding: three individual windings of no. 30 enam. wire on an FT-50-43 core. Connect as shown in inset drawing.

T3 — Broadband transformer. Primary, 50 turns no. 30 enam. wire on an FT-50-72 core. Secondary, 7 turns no. 28 enam. wire wound over primary turns.

Y1 — General-purpose crystal, 1700 kHz, 32-pF load capacitance. See text for crystal-holder designation.

range. It has been said that a few operators have added *Q* multipliers in an effort to aid selectivity. In the interest of modern techniques, the writers prefer good i-f filters and *RC*-active audio filters. Certainly the latter permits the greatest latitude in control and overall stability. Naturally, solid-state circuitry is used!

Although some experimenters have used their amateur call letters on the lf band, the usual practice is to identify the signal by means of the operator's initials. For example, the writers might use DDM and JR as station calls. This is useful in situations where the experimenters are not licensed amateurs.

Although point-to-point communications are effected on 1579 meters, it is common to find the various stations simply transmitting beacon signals, repeating their identifiers over and over. This enables other operators to listen for signals and determine whether or not they have made significant improvements in their equipment and antennas from week to week. Most of this work is carried out during daylight hours, and more specifically on weekends. Once the sun goes down all manner of crud creeps into the band to ruin reception. Light dimmers are probably the worst offenders — throwing hash throughout the lf spectrum as the SCRs are triggered. At W1FB the hash level from light dimmers in the neighborhood is in excess of 50 μV at times, rendering the band useless. Various appliances generate QRN also, especially at mealtime. Saturday and Sunday mornings are the least troublesome with respect to man-made noise.

Converter Design

Our government may ask for the band from 160 to 190 kHz for amateur use at WARC in 1979. In the event a favorable outcome results, the reader may wish to start familiarizing himself or herself with the band. There is nothing to be gained from building a "Mickey Mouse" type of receiver or converter for 1579 meters. With only a reasonable amount of components and workshop effort, a high-performance converter can be assembled, and the results will be more than worth the extra care taken in the project.

A too-simple converter can become unusable (overloading) if bc-band stations are operating nearby. Such a converter may be so simple that it represents a loss between the antenna and main receiver instead of providing unity gain or a slight overall gain. Images and spurious responses should be held to a minimum. This is particularly important when one tries to identify weak signals from other experimenters.

Noise figure is not a primary consideration at lf, as the external noise prevents one from realizing the benefits of a low-noise circuit. Therefore, an rf-amplifier stage buys nothing for the user in the 160- to 190-kHz range. Elimination of the rf stage will greatly improve the dynamic range of the receiving setup by allowing the antenna to be routed directly to the mixer input.[3] The desired converter gain can be secured by adding an i-f amplifier after

the mixer (post-mixer amplifier).

Fig. 1 shows the circuit treated in this article. A low-pass fixed-tuned filter is used at the mixer input. It has a cutoff frequency of 300 kHz and has been designed for a loaded Q of 1 at 50 ohms. This kind of input circuit was chosen because it eliminates the need for a preselector tuning control. Furthermore, it will reject bc-band energy by virtue of the filter being low pass in nature: It passes the frequencies below 300 kHz but attenuates those above 300 kHz. Since the characteristic impedance of the doubly balanced diode-ring mixer is 50 ohms, the filter is terminated correctly.

Homemade broadband transformers are used at each end of the ring mixer. This type of mixer has a conversion loss of 6 to 8 dB. It will stand up against strong signals without causing overloading and cross-modulation effects. It also assures excellent IMD characteristics. CR1 through CR4 are listed as 1N914s, but hot-carrier diodes may provide slightly better performance. For best results one should attempt to use matched diodes. A close approximation can be had by sorting through a batch of 1N914s with an ohmmeter, selecting four diodes whose front and back resistances are similar. Typically, they will be on the order of 10 ohms in the forward direction and a megohm or more in the reverse direction.

The mixer output is terminated in a diplexer to give the mixer a 50-ohm load. Addition of this circuit (L4, C1, C2, R1 and R2) improves the mixer performance. The diplexer is tuned to three times the converter i-f. L5 and C3 complement the diplexer while transforming the 50-ohm mixer impedance to 2200 ohms at the input of the post-mixer amplifier, Q1. L5 and C3 form a low-pass network, while the diplexer operates as a high-pass network. The reactance of the latter is 50 ohms, and the loaded Q is 1.

In the further interest of avoiding peaking controls, Q1 has been made a broadband amplifier, and T3 is a broadband transformer. A 2200-ohm resistor is used to establish the primary impedance of the transformer. The turns ratio is set to step 2200 ohms down to 50 ohms. Q1 has enough gain to just make up for the loss of the mixer. This provides unity gain, or nearly so, for the converter. This procedure will help prevent the front end of the main receiver from being overloaded by too much converter gain. The technique under discussion is called *gain distribution* . . . an important byway toward high dynamic range.

The local-oscillator strip is without special character. It consists of a Pierce oscillator which is followed by an *RC*-coupled buffer/amplifier. Low-cost 2N2222As are used at Q2 and Q3, mainly because they are so plentiful as surplus. The proper injection level for a diode-ring mixer is approximately +7 dBm, and this oscillator chain satisfies the requirement.

All of the inductors in this converter are wound on toroid cores. This was done because the cores are relatively inexpensive and easy to obtain. Also, toroidal inductors are self-shielding: This eliminates the need to isolate the circuits by means of shield compartments.

Construction

All of the components that make up the converter circuitry are mounted on a printed-circuit board that measures 2-5/8 × 5 inches (6.67 × 12.7 cm). The foil pattern and parts overlay for the board are shown in Fig. 2. Single-sided copper circuit-board material is used. Since the circuit proved to be unconditionally stable, double-sided board and shielded partitions were not required.

A Millen 33102 crystal socket was used in the unit shown in the photograph. The builder can keep the cost of the project down by using a crystal with wire leads, soldering it directly to the circuit board. A socket was used in the test model only to facilitate changing of crystals should the need arise. If a socket is used, a crystal with a type HC17/U holder will be required. The proper designation for a crystal holder with wire leads is HC33/U.

As the inset drawing on the schematic shows, there are two different ways in which T1 and T2 can be wound. One way is to wind them in the conventional fashion — one winding over the other. The second method consists of three separate wires wound together over the core (called trifilar). The writers prefer the trifilar method since better transformer balance can usually be achieved. After the transformers and coils have been soldered to the board, a small amount of Q dope or plastic cement should be used to secure them to the board. Since small gauge wire is used for most of the windings, only a few repeated flexings are required to break the leads. Affixing the coils to the board is a good maintenance preventative step.

A look at the photograph of the completed converter shows CR3 and CR4 mounted in piggyback fashion. This arrangement was used to keep the circuit-board pattern simple. Make sure all diode leads are kept short so there is

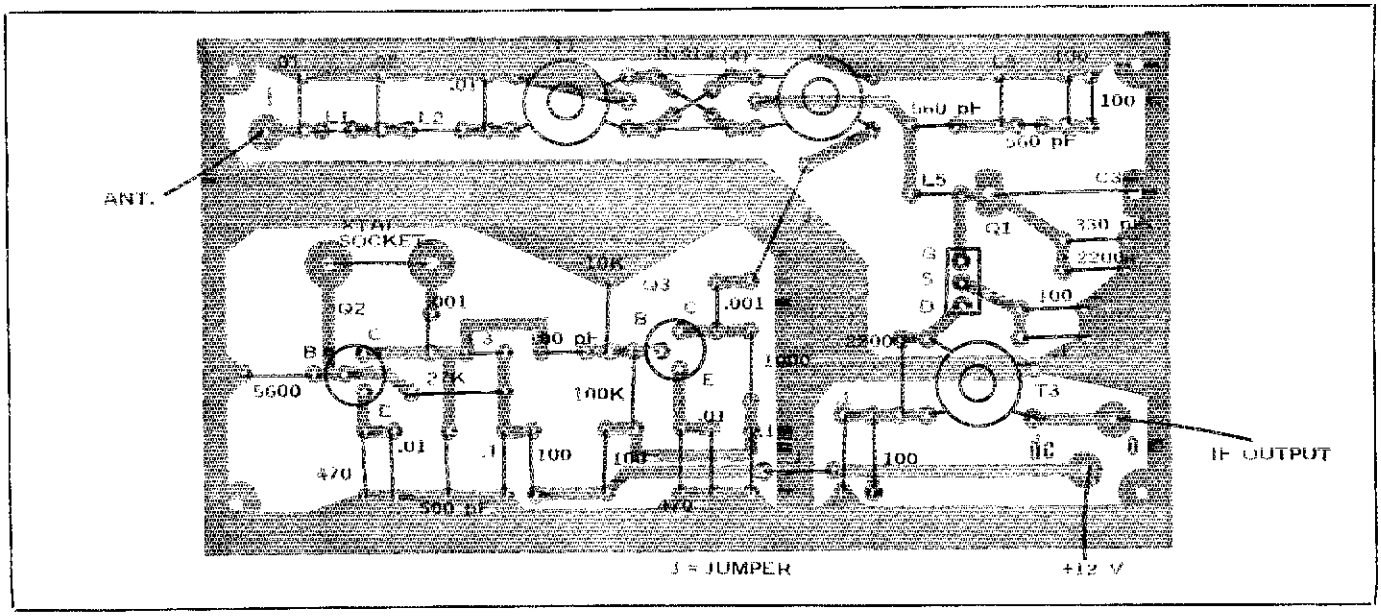


Fig. 2 — Scale drawing of circuit-board foil pattern. Grey areas represent unetched copper surface.

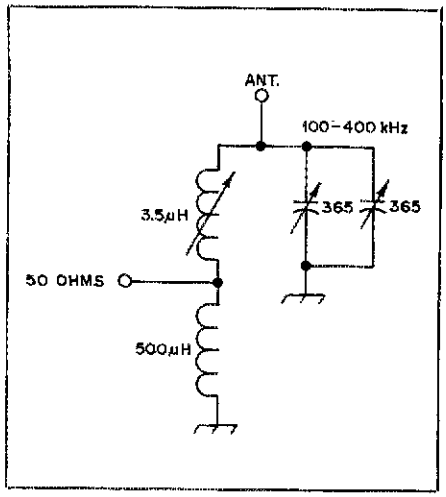


Fig. 3 — Here is a simple impedance-matching device for random-length wire antennas. The two variable capacitors can be a standard dual-section broadcast type. A Miller 42A333CB1 coil can be used at the variable inductor position.

no chance of unwanted contact.

Connections from the input and output of the converter board to the coaxial receptacles should be made with miniature coaxial cable. RG-174/U is suitable. Ordinary hookup wire can be used for the dc connection.

Checkout and Alignment

A 12-volt dc supply capable of delivering 16 mA will be required to power the converter. Before applying power, connect an antenna to J1 and make a connection between J2 and the station receiver. Now apply power and make a check of the circuit dc voltages, comparing them to those given on the schematic. If the measurements are within 10 to 20 percent of those shown, all should be in order. Make a check of the rms voltage at the collector of Q3. If the reading is significantly different (20 percent) from 1.5 volts rms, the value of C4 should be adjusted. Less capacitance is required if the rms voltage is too high, and more capacitance should be used if the collector voltage is too low.

Alignment of the converter is quite simple. After it has been determined that all of the operating voltages check out, tune in a signal around 200 kHz. Remember, 1800 kHz on the station receiver now corresponds to 100 kHz and 1900 kHz is 200 kHz and so on. While listening to a station, peak C3 for a maximum signal strength as indicated by the station receiver. This completes the alignment of the converter — no further adjustments should be necessary. QST

Footnotes

[1] FCC Rules and Regulations, Part 15, section 15.203.

[2] Cornell, W2IMB, "Exploring the 1750-Meter Band," *Ham Radio Horizons* for April, 1977.

[3] Hayward, W7ZOI, "Defining and Measuring Receiver Dynamic Range," *QST* for July, 1975.

Strays

□ With the unprecedented number of newcomers to amateur radio comes the responsibility to welcome them to our ranks and cater to their needs. The ARRL Virginia State Convention, sponsored by the Northern Virginia Amateur Radio Council (NOVARC), will do just that on Sunday, September 18, with a full-day session devoted to the interested general public and the Novice operator.

Other highlights will include an ARRL Technical Symposium featuring papers on subjects of general interest on Friday evening, September 16, and a full-day session Saturday the 17th on "Amateur Radio — a Public Service."

The convention will be held at the Tysons Corner Ramada Inn, Falls Church, a suburb of Washington, DC. For detailed information, write NOVARC, P. O. Box 682, McLean, VA 22101.

□ Two Michigan residents, K8CJQ and WB8NBT, will be looking for QSOs from their DXpedition site on St. Pierre & Miquelon beginning June 17. The portable FP8 station will operate on the low ends of the 10-80 bands, using ssb and cw. Operation is expected to last about nine days. QSL via K8CJQ.

□ From East Coast to West Coast, folks are out walking. As March-of-Dimes Walk-a-thons are held around the country to help combat birth defects, radio amateurs in large numbers are assisting with communications for these events.

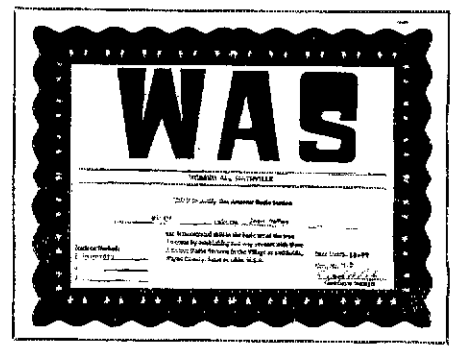
In Brockton, MA, the Massasoit Amateur Radio Association Inc. received kudos from the Southeastern Massachusetts Chapter of The National Foundation — March of Dimes for "the conscientiousness and efficiency of your members in their efforts to provide the best in communications. . . ." The praise was for MARA hams who manned seven checkpoints along with a net control overseeing a parade of some 1000 hikers and runners in the Brockton Area Walk-a-thon last fall.

In January, over 80 hams coordinated the efforts of 8 to 10 thousand marchers over a 20-mile course in California's San Fernando Valley. Hams with hand-helds monitored "poop-out" trucks driven by National Guardsmen and assisted podiatrists taking care of blisters and the ambulance personnel handling emergencies.

To list the calls of all those involved could take up pages, but their work underscores once again the radio amateur's commitment to use his or her talents without reward for the benefit of others.

I would like to get in touch with . . .

□ other amateurs who share my admiration for Nikola Tesla. I have reprints of articles and would like to exchange information about Tesla. Nick Basura, 3414 Alice St., Los Angeles, CA 90065.



Smithville, OH, (population 1,278) is proud to claim half-a-dozen radio amateurs. So proud, in fact, that a special award is presented to hams who have "Worked All Smithville." The certificate is presented to amateurs who have made contact with at least three operators with a Smithville address. So far, only 13 amateurs have qualified, but it is expected to become "one of the most popular awards around."

□ In order to be more effective in helping to let the world know the good deeds hams do, ARRL is compiling a card file of all hams known to work in the media (radio stations, TV stations, newspapers, magazines, etc.). This file will be for our internal use only; all information contained in it will be treated as confidential and will not be given out indiscriminately. If you are employed in such a capacity, please send your name, call, place of employment and work phone number to the Public Information Office, Hq.

Build This Solid-State Titan

Part 1: Solid-state linear amplification from 1.6 to 30 MHz? Why not? Put 8 watts into the amplifier and take 180 watts out at 30 MHz! The Titan is broadband and operates from a 13.6-V dc supply. Great for mobile or fixed-station use!

By Helge Granberg,* K7ES/OH2ZE

Are single rf power transistors for the 50- to 100-watt power class exotic devices that only the industrial and military contractors can afford? Absolutely not, because the semiconductor technology has improved, making higher manufacturing yields possible! This, and the fact that rf power transistors are made in large quantities today, has caused the prices of some devices to be reduced drastically. Hobby lines have been generated by several manufacturers (Motorola HEP line for one), but the related prices are slightly higher than those obtained in the normal 1-99 bracket. This results from the added cost of dealer handling and other expenses.

Many amateurs are skeptical about semiconductors – especially in regard to rf power applications, because of transistor vulnerability to damage. In a vacuum tube one can at least notice the anode glow when danger is at hand, but a transistor can blow out faster than a fuse. This article offers some design hints and precautions for high-power transistor amplifiers.

We will treat broadband linear amplifiers for use from 1.6 to 30 MHz. A single circuit-board layout is used as the foundation for three amplifier power levels. The component values will differ slightly for each model. Motorola HEP-S3037, MRF454 and MRF421 transistors are specified. Nominal operating voltage is 13.6 dc. This makes the amplifiers suitable for mobile or fixed-station use. Here are some guidelines:

1) Use a more powerful device than is specified for a given application.

2) Use a high-voltage device for low-voltage operation. (The transistor will saturate at a lower power level, and the possibility of exceeding the breakdown voltage or maximum dissipation rating will be diminished. This will result in a reduction of the power gain to some extent – a condition which may not be desired at vhf and uhf.)

3) Make sure the circuit does not oscillate. Oscillations may cause overdissipation of the device or an exceeding of the breakdown voltages.

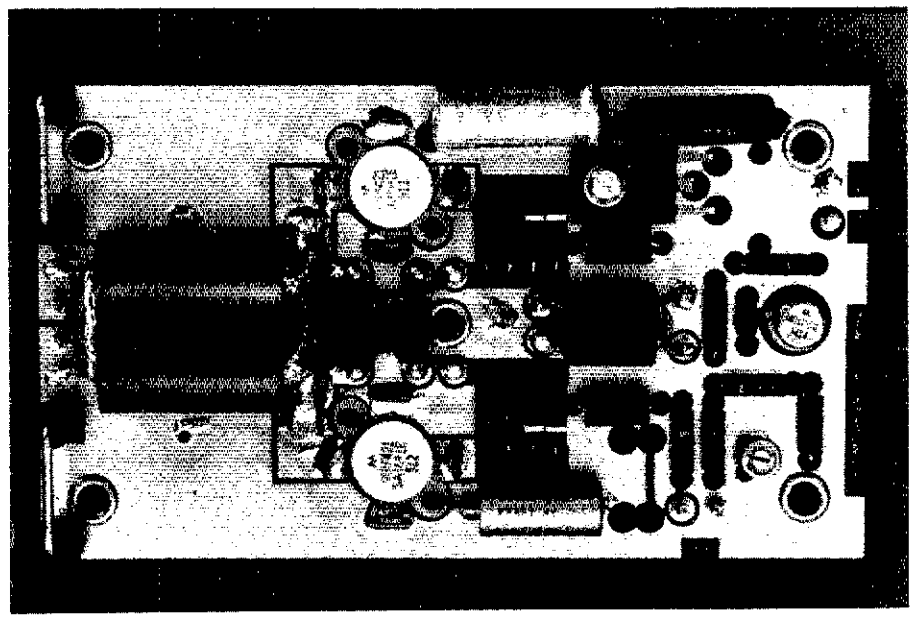
4) Limit the power-supply current to prevent overdissipation.

5) Adopt protective circuitry, such as fast-acting alc.

6) Make sure the device is properly attached to a heat sink, using silicone grease (such as Corning 340 or GC Electronics 8101) to fill all thermal gaps.

The Transistors

Out of the three devices mentioned earlier, the MRF421 is the largest. It is specified for a power output of 100 W PEP or cw. The maximum permissible dissipation is 290 watts, which means that the continuous collector current could be as high as 21.3 A at 13.6 V, operated into any load. The data sheet specification is 20 A, which is actually determined by the current-carrying capability of the internal bonding wires.



Top view of a completed model of the amplifier (180-watt version).

*2144 E. Aurelius Ave., Phoenix, AZ 85020

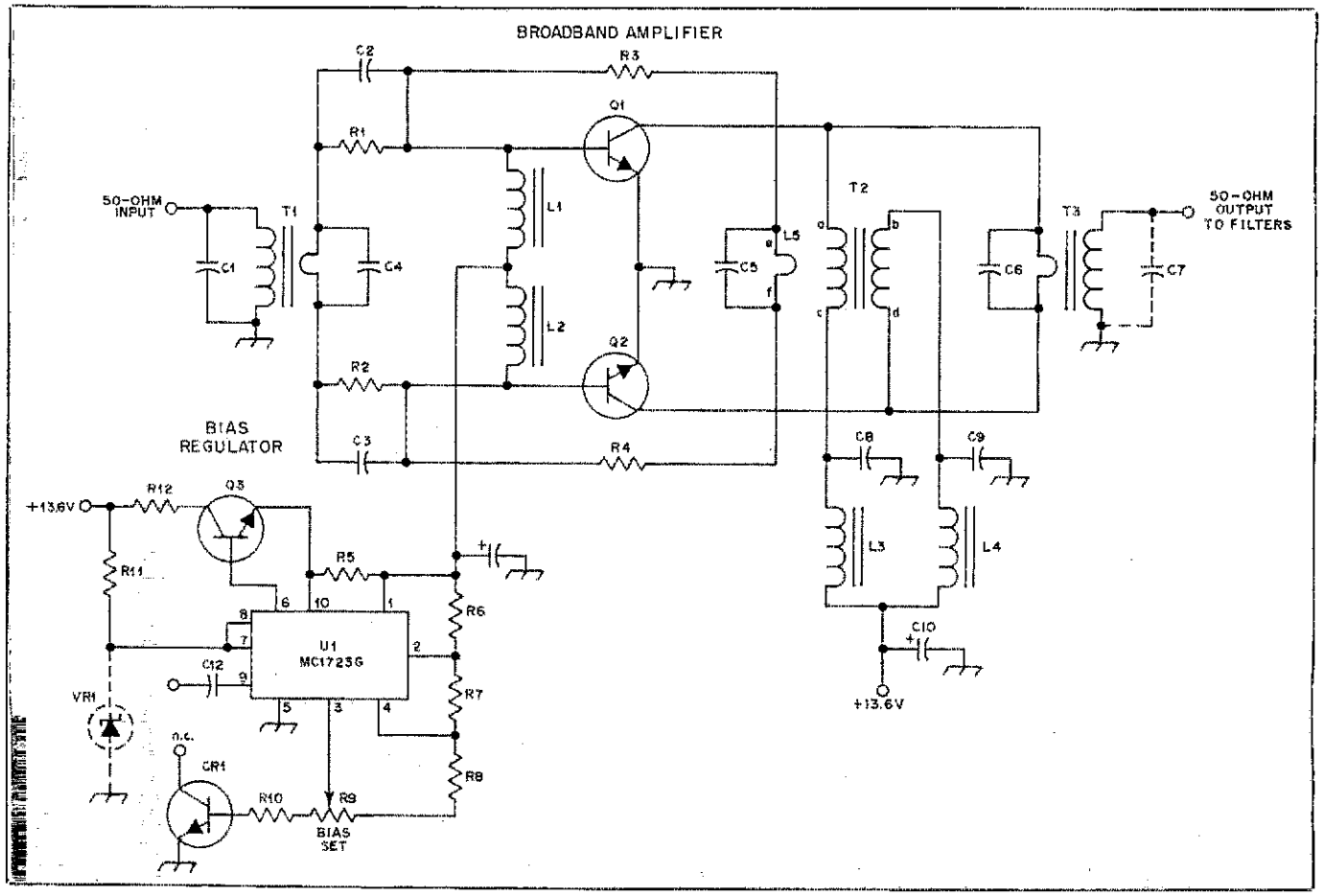


Fig. 1 — Schematic diagram of the amplifier. The circuit is the same for all three power levels, but the component values are different in some instances. Table I gives the parts values for each version.

These figures are valid at a 25°C mount temperature.

The minimum recommended collector idling current in Class AB is 150 mA. This can be exceeded at the cost of collector efficiency, or the device can even be operated in Class A at an idling current of approximately one fourth of the maximum specified collector current. This rule of thumb applies to most rf power transistors, even if not specified for Class A operation.

The MRF454 is specified for a power output of 70 W on cw. Although the data sheet does not give broadband performance or IMD figures, typical distortion products are about –31 to –33 dB below one of the two test tones with a 13.6-V supply. It has the highest figure of merit (the ratio of emitter periphery and base area), which correlates with the highest power gain.

The maximum dissipation is 250 watts, and the maximum continuous collector current is 15 A. The minimum recommended collector idling current is 100 mA, and like the MRF421, it can be operated in Class A.

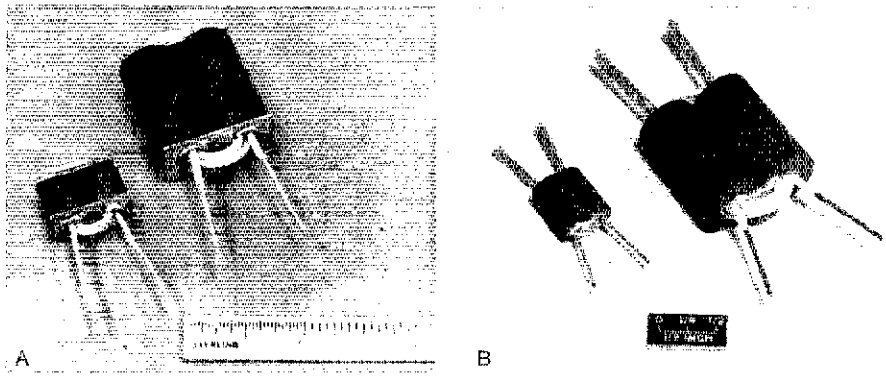


Fig. 2 — Two variations in assembly for the broadband input and output transformers of Fig. 1. Metal tubing is used in the version at A to form the low-impedance winding. Shield braid is used at B for the same purpose (see text).

The HEP-S3037 has the lowest figure of merit, but due to the lower power specification its power gain exceeds that of the MRF421. This is caused by the lower currents incorporated within the transistor package. This lessens the physical difficulties of constructing a circuit for low-voltage operation.

At a power level of 180 watts (at 13.6 V), the peak currents approach 30 A, and every 10th of a volt lost in the emitter grounding or collector dc feed has a significant effect on the peak-power capability. The minimum collector idling current for the HEP-S3037 is recommended as 75 mA for Class AB, but it can be operated at 3 A for Class A service.

The HEP-S3037 is specified for 65 watts PEP (referenced to the EIA), and typically provides an IMD of –32 to –34 dB in reference to one of the two test tones at 50 watts PEP, 13.6 volts.

It should be noted that the data-sheet figures for power gain and linearity are lowered when the device is used in a multioctave broadband circuit. Normally the device input and output impedances vary by at least a factor of three from 1.6 to 30 MHz. This means that, when impedance-correction networks are employed, some of the power

gain and linearity must be sacrificed.

The input-correction network can be designed with *RC* or *RLC* combinations to give better than a 1-dB gain flatness across the band with a low SWR, but there is little that can be done about the output, especially in a low-voltage system, without reducing the maximum available voltage swing.

The Basic Circuit

Fig. 1 shows the basic circuit of the linear amplifier. For different power levels and devices the impedance ratios of T1 and T3 will be different, and the values of R1, R2, R3, R4, C1, C2, C3 and C6 will have to be changed.

The Bias-Voltage Source

The bias-voltage source employs active components (MC1723G and Q3) rather than the clamping-diode system seen in some designs. The advantages are line-voltage regulation capability, low standby current ($\lesssim$1.0 mA) and a wide range of voltage adjustability. With the component values shown, the bias voltage is adjustable from 0.5 to 0.9 volts, which is sufficient from Class B to Class A operating conditions.

In Class B, the bias voltage is equal to the transistor V_{BE}, and there is no collector idling current present (except a small collector-emitter leakage, I_{CES}), and the conduction angle is 180°.

In Class A, the bias is adjusted for a collector idling current of approximately one half of the peak current for actual operating conditions, and the conduction angle is 360°.

In Class AB, which is common for ssb amplifiers, the bias is set for a low-collector quiescent current, and the conduction angle is usually somewhat higher than 180°.

The required base-bias current can be approximated as I_c/h_{FE} where I_c = collector current, which assuming an efficiency of 50 percent and P_{out} of 180 W, is $2P_{out}/V_{CC}$ = 360/13.6 = 26.47 A. The h_{FE} = transistor dc beta (typical 30, from data sheet), and the bias current = 26.47/30 = 0.88 A. In this case R12 shares the dissipation with Q3, and its value must be such that the collector voltage never drops below approximately 2.0 V. E.g., 13.6 – 2/0.88 = 13.2 ohms. The MRF421s employed for this design had their h_{FE} on the high side (45), and R12 was calculated as 20 ohms, which is also sufficient for the lower power versions.

R5 determines the current-limiting characteristics of the MC1723, and 0.5 ohm will set the limiting point to 1.35 A, ± 10 percent.

For ssb operation, excluding two-tone testing, the duty cycle is low, and the energy charged in C11 can supply higher peak bias currents than required for 180 W PEP.

Table 1

	100-W AMPLIFIER	*140-W AMPLIFIER*	*180-W AMPLIFIER*
C1	51 pF	51 pF	82 pF
C2, C3	5600 pF	5600 pF	6800 pF
C4	–	390 pF	1000 pF
C5	680 pF	680 pF	680 pF
C6	1620 pF (two 470 pF chips + 680-pF dipped silver mica in parallel)	1760 pF (two 470 pF chips + 820-pF dipped silver mica in parallel)	1940 pF (two 470 pF chips + 1000-pF dipped silver mica in parallel)
C7	Not used	Not used	Not used
C8, C9	0.68 μF	0.68 μF	0.68 μF
C10	100-μF/20-V electrolytic	100-μF/20-V electrolytic	100-μF/20-V electrolytic
C11	500-μF/3-V electrolytic	500-μF/3-V electrolytic	500-μF/3-V electrolytic
C12	1000-pF disk ceramic	1000-pF disk ceramic	1000-pF disk ceramic
R1, R2	Two 3.9-ohm, 1/2-W in parallel	Two 3.6-ohm, 1/2-W in parallel	Two 3.3-ohm, 1/2-W in parallel
R3, R4	Two 4.7-ohm, 1/2-W in parallel	Two 5.6-ohm, 1/2-W in parallel	Two 3.9-ohm, 1/2-W in parallel
R5	1 ohm, 1/2 W	0.5 ohm, 1/2 W	0.5 ohm, 1/2 W
R6	1000 ohms, 1/2 W	1000 ohms, 1/2 W	1000 ohms, 1/2 W
R7	18,000 ohms, 1/2 W	18,000 ohms, 1/2 W	18,000 ohms, 1/2 W
R8	8200 ohms, 1/2 W	8200 ohms, 1/2 W	8200 ohms, 1/2 W
R9	1000-ohm trimpot	1000-ohm trimpot	1000-ohm trimpot
R10	150 ohms, 1/2 W	150 ohms, 1/2 W	150 ohms, 1/2 W
R11	1000 ohms, 1/2 W	1000 ohms, 1/2 W	1000 ohms, 1/2 W
R12	20 ohms, 5 W	20 ohms, 5 W	20 ohms, 5 W
L1, L2	Ferroxcube VK200 19/4B ferrite choke		
L3, L4	Two Fair-Rite Products ferrite beads, 2673021801 or equivalent, on no. 16 wire each		
L5	1 turn through toroid of T2.		
T1	9:1 (3:1 turns ratio)	9:1 (3:1 turns ratio)	16:1 (4:1 turns ratio)
	Ferrite core: Stackpole 57-1845-24B, Fair-Rite Products 2873000201 or two Fair-Rite Products 0.375-inch OD X 0.200-inch ID X 0.400-inch, Material-77 beads for type A (Fig. 3) transformer. See text.		
T2	6 turns of no. 18 enameled wire, bifilar wound. Ferrite core: Stackpole 57-9322, Indiana General F627-8 Q1 or equivalent.		
T3	16:1 (4:1 turns ratio)	16:1 (4:1 turns ratio)	25:1 (5:1 turns ratio)
	Ferrite core: 2 Stackpole 57-3238 ferrite sleeves (7D material) or number of toroids with similar magnetic characteristics and 0.175-inch sq. total cross-sectional area. See text.		
	All capacitors except C12, part of C5 and the electrolytics are ceramic chips.		
	Values over 82 pF are Union Carbide type 1225 or Varadyne size 14. Others are type 1813 or size 18, respectively.		
Q1, Q2	HEP-S3037	MRF454	MRF421
Q3	2N5989 or equivalent		
D1	2N5190 or equivalent		
D2	–	Not used	–
	100-W AMPLIFIER	*140-W AMPLIFIER*	*180-W AMPLIFIER*
Curves given in part 2 of this article	Dotted line in performance data	Dashed line in performance data	Solid line in performance data

The basic regulator circuit is presented in the MC1723 data sheet. It is possible to operate it at lower output voltages than specified, with modified component values, at a cost of reduced line and output-voltage regulation tolerances, which are still more than adequate for this application. Temperature-sensing diode CR1 is added for bias tracking with the rf power transistors. The base-emitter junction of a 2N5190 or equivalent device can be used for this purpose. Even if the die processing is quite different from that of the rf transistors, a temperature tracking within 15 percent up to 60°C is achieved. The 2N5190 has physical dimensions which allow its use for the center standoff of the circuit board.

The measured output voltage variations of the bias source from zero to 1.0 A were ±8 to 12 mV, which amounts to a source impedance of about 30 milliohms.

The Input Frequency-Correction Network

The input correction network consists of R1, R2, C2 and C3. With the combination of the negative feedback derived from L5 through R3 and R4 (Fig. 1), it forms an attenuator with frequency-selective characteristics. At 30 MHz the input power loss is 1 to 2 dB, increasing to 10 to 12 dB at 1.6 MHz. This compensates the gain variations of the rf transistors over the 1.6- to 30-MHz band, resulting in an overall gain flatness of approximately ±1.0 to ±1.5 dB.

Normally, an input VSWR of 2:1 or lower is possible with this type of input network, which is considered sufficient for most applications. More sophis-

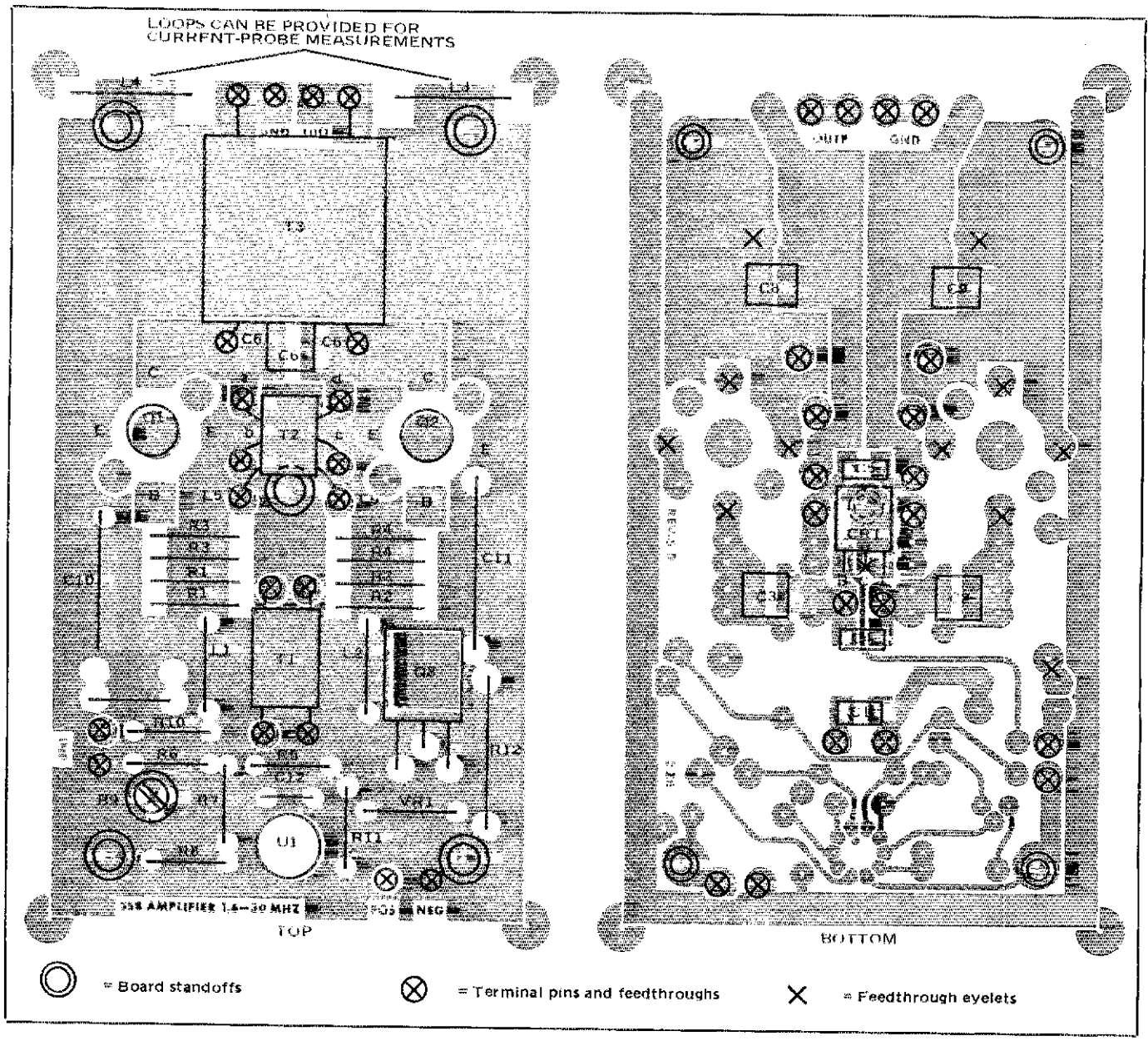


Fig. 3 – Scale layout and parts-placement guide for both sides of the amplifier circuit board. The numbers on the parts correspond with those in the diagram of Fig. 1.

ticated *LRC* networks will yield slightly better VSWR figures but are much more complex, and sometimes require individual adjustments. More information on designing and optimizing these networks can be found in the references.[2,3,4]

The Broadband Transformers

The input transformer, T1, and the output transformer, T3, are of the same basic type: The low-impedance windings consist of two pieces of metal tubing – electrically shorted in one end – the opposite ends being the connections of the windings (Fig. 2A). The multiturn high-impedance windings are threaded through the tubing so that the low- and high-impedance winding connections are in opposite ends of the transformer.

[2] References appear on page 31.

The physical configuration can be implemented in various manners. A simplified design can be seen in Fig. 2B. Here the metal tubing is substituted with copper braid, which can be obtained from any coaxial cable of the proper diameter (ref. 6).

The coupling coefficient between the primary and secondary is determined by the length-to-diameter ratio of the metal tubing or braid, and the gauge and insulation thickness of the wire used for the high-impedance winding. For very high-impedance ratios (36:1 and higher), miniature coaxial cable, where only the braid is used as the conductor, gives the best results. The high coefficient of coupling is important only at the high-frequency end of the band (e.g., 20 to 30 MHz). Additional information on these transformers can be found in ref. 7.

Both transformers are loaded with ferrite material to provide sufficient low-frequency response. The minimum required inductance in the one-turn winding can be calculated as $L = R/2\pi f$, where L = inductance in μH, R = base-to-base or collector-to-collector impedance, and f = lowest frequency in MHz.

For example, in the 180-watt version the input transformer has a 16:1 impedance ratio, which makes the secondary impedance 3.13 ohms with a 50-ohm interface. Then, $L = 3.13/6.28 \times 1.6 = 0.31$ μH. For the output transformer, which has a 25:1 impedance ratio to a 50-ohm interface, $L = 2/6.28 \times 1.6 = 0.2$ μH. It should be noted that in the lower power versions, where the input and output impedances are higher

and the transformers have lower impedance ratios, the required minimum inductances are also higher.

T2, the collector choke supplying the dc to each collector, also provides an artificial center tap for T3. The combination of the two functions provides a real center-tapped transformer with even harmonic cancellation. Furthermore, T2 makes a convenient low-impedance source for the negative-feedback voltage, which is derived from a separate one-turn winding.

T3 alone does not have a true ac center tap, as there is virtually no magnetic coupling between its two halves. If the collector dc feed is done through point e (Fig. 1) with T2, the IMD and power gain are not affected, but the even-harmonic suppression may be reduced by as much as 10 dB at the lower frequencies.

The characteristic impedance of ac and bd (T2) should equal the collector-to-collector impedance, but is not critical. So, for physical convenience a bifilar winding is recommended. The center tap of T2 is actually bc (Fig. 1), but for stabilization purposes, b and c are separated by rf chokes which are bypassed individually by means of C8 and C9.

General design considerations and performance specifications for these amplifiers will be treated in part 2 of this paper. The latter will appear in a subsequent issue of *QST*. The pc-board artwork of Fig. 3 is printed to scale. Double-sided board is used, and patterns are provided for each side of the circuit board.

The transistors specified here can be obtained from authorized Motorola dealers. Etched boards and/or a set of three transformers for any one version of the amplifier are available from Lea Eng. Assoc., 1230 E. Loyola Dr., Tempe, AZ 85282. An assembled board (less transistors) is also available from the same supplier. QST

References

[1] Hejhall, "Understanding Transistor Response Parameters," *Motorola Technical Information Note AN-139A.*
[2] Granberg, "A Two-Stage 1-kW Solid-State Linear Amplifier," *Motorola Application Note AN-758.*
[3] Mulder, "A Single-Stage Wide-Band Linear Power Amplifier for 80-100 W PEP in the 1.6- to 28-MHz Frequency Band Equipped with Two Pieces of BLX 14," *Philips Laboratory Report ECO 7114.*
[4] Koppen, "A Single-Stage Wide-Band (1.6-28 MHz) Linear Power Amplifier for 300 Watts PEP Using 2 × BLX 15," *Philips Application Laboratory Report ECO 7308.*
[5] Granberg, "Get 300 W PEP Linear Across 2 to 30 MHz from This Push-Pull Amplifier," *Motorola EB-27.*
[6] Granberg, "Broad Band Transformers and Power Combining Techniques for RF," *Motorola Application Note AN-749.*
[7] White, "Thermal Design of Transistor Circuits," *QST* for April, 1972, pp. 30-34.
[8] Danley, "Mounting Stripline-Opposed-Emitter (SOE) Transistors," *Motorola Application Note AN-555.*
[9] Granberg, "Measuring the Intermodulation Distortion of Linear Amplifiers," *Motorola EB-38.*
[10] *Reference Data for Radio Engineers,* ITT, Howard & Sams Co., Inc. Also, see the *ARRL Electronics Data Book,* chapter 6.

Strays

LIKES NOVICES

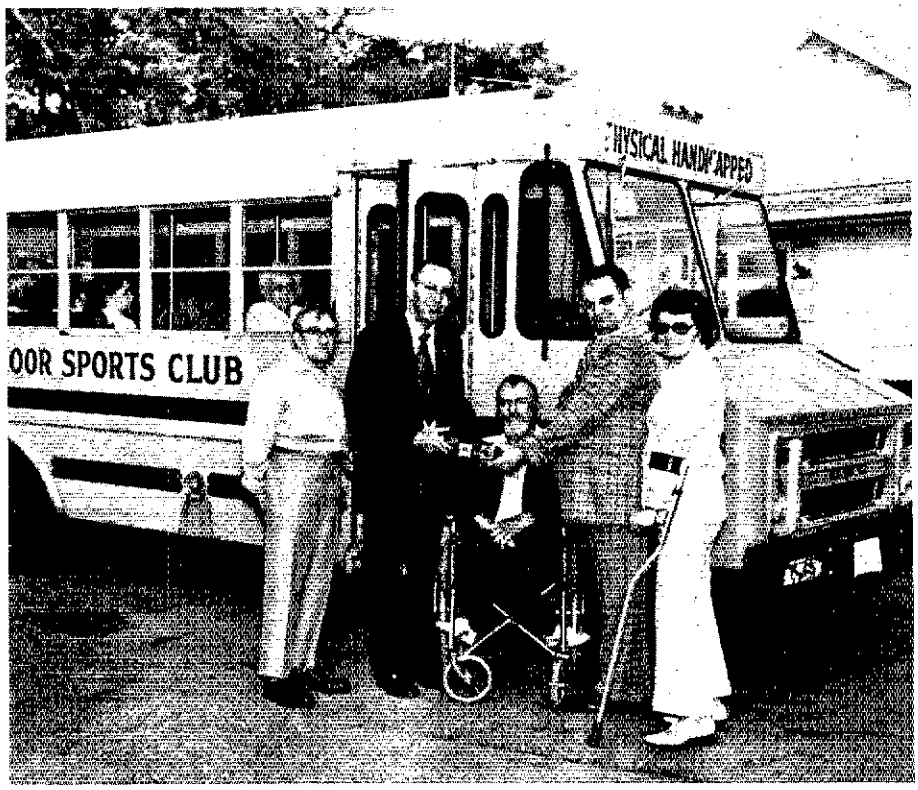
□ K8SWW worked his 9,000th Novice 17 years to the day after his first QSO as KN8SWW.

□ Mrs. Cecile J. Gibbs retired May 31, 1977, after serving 32 years with the Federal Communications Commission. Better known by hams as "Granny Gibbs," she is held in the highest esteem for her genial manner and unfailing assistance. During her 32 years of service Mrs. Gibbs served with Engineers in Charge L. L. McCabe, J. H. McKinney, E. H. Marshall, C. R. Williams and, finally, Daniel A. Cantrell.

A HAPPY ENDING

□ A shortwave receiver is a precious possession to a 15-year-old with time on his hands. Sandy Lynch, of Raleigh, NC, has wanted one for a long time, but his family's steadily mounting medical bills have made such a purchase impossible. Suffering from spinal cancer, Sandy must spend hours in bed each day, cut off from friends and neighbors.

Recognizing its importance to her son, Mrs. Lynch contacted Bob Ferrero, vice president of the Northern California DX Foundation, to ask for his help. The Foundation responded by sending Sandy a modern shortwave receiver along with a certificate making him an Honorary Member of the Foundation, as are renowned amateurs worldwide.



Recognizing the need for instant communications should an emergency occur, two members of the Lynn (MA) Indoor Sports Club, who are also active radio amateurs, arranged for a two-way radio to be installed in the club's specially equipped bus.

Shown at the presentation are left to right, George Fisher, the driver; Frank Housman, W1DGY, president of Merit International, a subsidiary of Automatic Radio Manufacturing Co. of Melrose, MA, donor of the radio; Charlie King, W1HOO, communications director of the club; Earle Coppelman, club president and June Sears, WA1WFB, co-director. Assisting in the installation of the radio system but not in the photograph were radio hams Ellsworth Gibson, W1ADD; Frank Gaudet, WA1DVO; Alfred Rousseau, W1FJJ and Kirk Brown, WA1SUW.

Design Your Own Active Audio Filters

QRM? QRN? An active filter will shape your receiver audio response, helping you pull the weak signals through. This article tells you how to design the right filter for the job.

By Howard M. Berlin,* W3HB/WB3AIX, ex-K3NEZ

How many times have you had a QSO ruined when another station got too close to the one you were trying to copy? His voice sidebands or the heterodyne of his cw signal may make it impossible to copy your contact. On today's crowded bands, only the finest mechanical or crystal filters can help. Even the best receivers can occasionally use a little help in the selectivity department. Some less-expensive receivers do not have provisions for shaping the audio-frequency characteristics of the audio chain, allowing low-frequency beat notes, high-frequency noise and every other undesirable signal through. A filter constructed with lumped-constant components of inductance, capacitance and resistance was once the answer. Now, low-cost integrated circuits have made possible *active* filters which greatly exceed the performance of the old-time *passive* filters, yet are small enough to fit inside the tiniest QRP rig. By proper selection of components, an IC op amp smaller than a postage stamp may be operated as a very selective audio filter. This article will discuss the basic design of low-pass, high-pass and band-pass active filters. Each filter consists of one or more op amps and a handful of resistors and capacitors connected in feedback networks to the op amp. Although some basic network theory will be discussed, we are only concerned with how to apply some of the basic relationships to

*2 Colony Blvd., Apt. 123, Wilmington, DE 19802

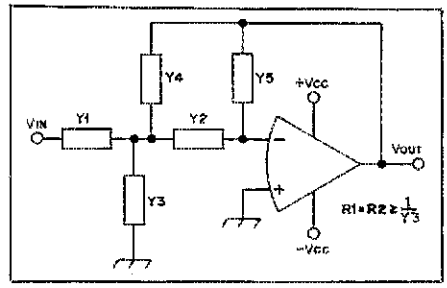


Fig. 1 — Basic active-filter circuit, showing multiple-feedback paths. Transfer characteristics for the three common filter responses may be found in Table 1. Analysis of these transfer characteristics yields second-order functions with resistive and capacitive admittances, represented here as Y1 through Y5.

be derived. The low-pass and high-pass filters have a 2-pole Butterworth, or maximally flat, response in the passband, with unity gain.[1] The band-pass

[1] Footnotes appear on page 34.

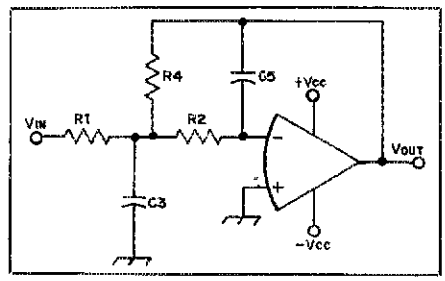


Fig. 2 — Low-pass active-filter circuit having Butterworth response. Transfer function for this filter may be found in Eq. 2.

version is a 2-pole filter with selectable gain and bandwidth.

The Basic Circuit

Fig. 1 gives the basic op-amp filter circuit using multiple feedback paths. Analysis of the transfer characteristic V_{out}/V_{in} yields a basic second-order function with only resistive and capacitive admittances Y_1 through Y_5. Table 1 summarizes the required transfer functions giving the low-pass, high-pass and band-pass responses. In terms of the five admittances, the generalized equation relating the filter output voltage to its input voltage is

$$\frac{V_{out}}{V_{in}} = \frac{-Y_1 Y_2}{Y_2 Y_4 + Y_5(Y_1 + Y_2 + Y_3 + Y_4)} \quad \text{(Eq. 1)}$$

It should be recalled that the admittance of a resistance R is $1/R$, and the admittance of a capacitance C is sC. The variable s may be considered to be related to an actual frequency ω by*

$$s = \sqrt{-1}\ \omega \text{ or } = \sqrt{-1}\ 2\pi f^*$$

*[Editor's Note: The expression for the 2-pole Butterworth filter then becomes

$$\frac{V_{out}}{V_{in}} = \frac{-\omega_o^2}{-\omega^2 + j\sqrt{2}\ \omega(\omega_o) + \omega_o^2}$$

where ω_o is the radian frequency at which the gain is down by 3 dB. Quite often, only the *amplitude, magnitude, modulus* or *absolute value* of a complex number is required. This is given by

$$\left| \frac{1}{a + \sqrt{-1}\ b} \right| = \frac{1}{\sqrt{a^2 + b^2}}$$

Slightly rearranging the formula for the Butterworth response and applying the foregoing definition, the absolute value of response becomes

$$\frac{V_{out}}{V_{in}} = \frac{1}{\sqrt{\left[\left(\frac{\omega}{\omega_o}\right)^2 - 1\right]^2 + 2\left(\frac{\omega}{\omega_o}\right)^2}}$$

The reader might verify that this equation can be written as

$$\frac{1}{\sqrt{\left(\frac{\omega}{\omega_o}\right)^4 + 1}}$$

and applying the definition for attenuation then becomes

$$\text{Attn} = 20 \log_{10} \left| \frac{V_{out}}{V_{in}} \right| =$$

$$10 \log_{10} \left[\left(\frac{\omega}{\omega_o}\right)^4 + 1 \right]$$

which is the formula that results for a k of 2 in the attenuation equation on page 48 of *The Radio Amateur's Handbook*, 54th (1977) edition.]

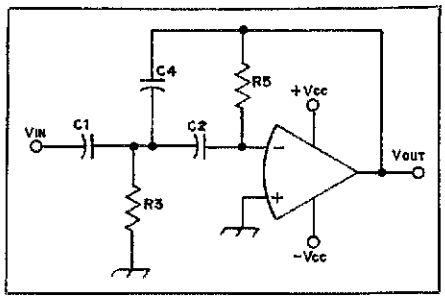


Fig. 3 — High-pass active-filter circuit. Note the transposition of *R* and *C* components in comparison with Fig. 1. Transfer function for this filter, which yields a Butterworth response, may be found in Eq. 5.

The Low-Pass Filter

From Table 1, the transfer function of a low-pass Butterworth filter with unity gain is

$$\frac{V_{out}}{V_{in}} = \frac{-\omega_o^2}{s^2 + \sqrt{2}\,\omega_o s + \omega_o^2} \qquad \text{(Eq. 2)}$$

If for the admittances given in Fig. 1 we let

$Y_1 = 1/R_1$
$Y_2 = 1/R_2$
$Y_3 = sC_3$
$Y_4 = 1/R_4$
$Y_5 = sC_5$

for the circuit given in Fig. 2 Eq. 1 becomes

$$\frac{V_{out}}{V_{in}} = \frac{\frac{-1}{R_1R_2C_3C_5}}{s^2 + \frac{1}{C_3}\left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_4}\right)s + \frac{1}{R_2R_4C_3C_5}} \qquad \text{(Eq. 3)}$$

Comparing Eq. 2 with Eq. 3, we find that

$R_1 = 2R_2$
$R_4 = R_1$
$C_3 = 4C_5$

so that the cutoff frequency in hertz will be

$$f_o = \frac{0.450}{R_1C_3}$$

An application of the above equations is the design of a low-pass Butterworth filter with a cutoff frequency of 2 kHz. Begin by selecting a convenient value for C5, such as 0.01 μF. Then

C3 = 0.04 μF
R1 = R4 = 5600 ohms
R2 = 2800 ohms

We must now confirm that the parallel impedance of $1/Y_1$ and $1/Y_5$ is small when compared to the input impedance of the op amp used. A 741 op amp has a typical input impedance of 2 MΩ. The parallel impedance of R1 and C5 at 2 kHz is equal to

$$\frac{R_1}{\sqrt{1 + (2\pi C_5 R_1 f_o)^2}} \quad \text{or 4590 ohms}$$

which satisfies this condition. It is also necessary to confirm that the impedances $1/Y_4$ and $1/Y_5$ are both large when compared to the output impedance of the op amp. Typical output impedance of a 741 op amp is 75 Ω. The impedances of R4 and C5 at 2 kHz are 5600 Ω and 8000 Ω respectively. The second condition is obviously satisfied as well.

Because the circuit given in Fig. 2 is a 2-pole filter, the response, or rejection, will be at a rate of −12 dB/octave or −40 dB/decade for frequencies beyond the cutoff. By cascading two identical sections, a cutoff rate of −24 dB/octave or −80 dB/decade is obtained, giving the response of a 4-pole filter, though not that of a 4-pole Butterworth-response filter.

The High-Pass Filter

Using the information contained in Fig. 1, letting

$Y_1 = sC_1$
$Y_2 = sC_2$
$Y_3 = 1/R_3$
$Y_4 = sC_4$
$Y_5 = 1/R_5$

Table 1 — Basic 2-Pole Filter Transfer Functions

FILTER	TRANSFER FUNCTION
Low pass	$\frac{-\omega_o^2}{s^2 + \sqrt{2}\,\omega_o s + \omega_o^2}$
High pass	$\frac{-s^2}{s^2 + \sqrt{2}\,\omega_o s + \omega_o^2}$
Bandpass	$\frac{-(A_o/Q)\,\omega_o s}{s^2 + (\omega_o/Q)s + \omega_o^2}$

Basic 2-pole filter transfer functions. Low-pass and high-pass functions are for filters having a Butterworth-response characteristic. Band-pass filter function is derived for a desired *Q*, rather than for a Butterworth response.

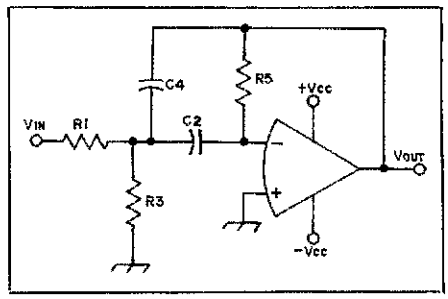


Fig. 4 — Band-pass active-filter circuit. Filter *Q* is related to center frequency and bandwidth, and may be determined from Eq. 6. Performance is tailored for the design *Q* using Eq. 11. Butterworth response is not desired in this application. Where high gain and *Q* are required, R3 may have a negative value. In this case, filter gain should be reduced, and necessary amplification developed in a later stage.

and given the circuit of Fig. 3, then Eq. 1 is changed to

$$\frac{V_{out}}{V_{in}} = \frac{(C_1/C_4)\,s^2}{s^2 + \frac{1}{R_5}\left(\frac{C_1 + C_2 + C_4}{C_2C_4}\right)s + \frac{1}{R_3R_5C_2C_4}} \qquad \text{(Eq. 4)}$$

From Table 1, the transfer function for a Butterworth high-pass filter is

$$\frac{V_{out}}{V_{in}} = \frac{-s^2}{s^2 + \sqrt{2}\,\omega_o s + \omega_o^2} \qquad \text{(Eq. 5)}$$

so that when Eq. 4 is compared with Eq. 5, we find that

$R_5 = 4R_3$
$C_1 = C_4$
$C_2 = 2C_1$

and the cutoff frequency in Hz may be stated as

$$f_o = \frac{0.225}{R_5C_1}$$

Now let's design a 2-pole high-pass Butterworth filter for ssb reception. The 741 op amp will be used. A cutoff frequency of 375 Hz is desired. Arbitrarily selecting a value of 0.001 μF for C1, then

R5 = 600 ohms
R3 = 150 kΩ
C4 = 0.001 μF
C2 = 0.002 μF

Again confirm that the two impedance conditions are satisfied. The parallel impedance of C1 and R5 at 375 Hz is 249 kΩ, and the impedances of C1 and R5 at the cutoff frequency are 425 kΩ and 600 kΩ respectively.

The Band-Pass Filter

A single-stage band-pass filter using the multiple feedback paths of Fig. 1 is applicable for any value of *Q* less than

10, to minimize "ringing." The Q, or quality factor, is dependent upon the filter center frequency and bandwidth such that

$$Q = \frac{f_o}{BW} \qquad \text{(Eq. 6)}$$

where the bandwidth is the difference between the upper and lower frequencies at which the filter response is 3 dB down from that at the center frequency. Or

$BW = f_U - f_L$

It should be strongly emphasized that the center frequency is not equal to the algebraic average of the –3-dB frequencies, that is

$$f_o \neq \frac{f_U + f_L}{2}$$

but rather, equal to the geometric average

$$f_o = \sqrt{f_U f_L} \qquad \text{(Eq. 7)}$$

By combining Eq. 6 and 7, the lower –3-dB frequency for a given bandwidth and center frequency may be found from

$$f_L = \frac{-BW + \sqrt{(BW)^2 + 4f_o^2}}{2} \qquad \text{(Eq. 8)}$$

and the upper frequency is then

$$f_u = f_L + BW \qquad \text{(Eq. 9)}$$

From Table 1, the transfer function for a band-pass filter is

$$\frac{V_{out}}{V_{in}} = \frac{-\left(\frac{A_o}{Q}\right)\omega_o s}{s^2 + \left(\frac{\omega_o}{Q}\right)s + \omega_o^2} \qquad \text{(Eq. 10)}$$

where A_o is the filter gain at the center frequency. Note, this is not a Butterworth-response band-pass filter. The only difference between the denominator of Eq. 10 and that of Eq. 2 or 5 is that we desire to select a value of Q, instead of designing for a Butterworth response. Were that the case, the Q would be stated as

$$Q = \frac{\sqrt{2}}{2}$$

From Fig. 1, letting

$Y_1 = 1/R_1$
$Y_2 = sC_2$
$Y_3 = 1/R_3$
$Y_4 = sC_4$
$Y_5 = 1/R_5$

and given the circuit of Fig. 4, Eq. 1 becomes

$$\frac{V_{out}}{V_{in}} = \frac{-\left(\frac{A_o}{Q}\right)\omega_o s}{\frac{}{R_1 C_2^2 C_4}} \Big/ \left[s^2 + \left(\frac{C_2 + C_4}{R_5 C_2 C_4}\right)s + \frac{1}{R_5 C_2 C_4}\left(\frac{1}{R_1} + \frac{1}{R_3}\right)\right]$$

(Eq. 11)

By comparing Eq. 10 with Eq. 11, we find that

$$R_1 = \frac{0.159\,Q}{f_o A_o C_2}$$

$$R_5 = 2A_o R_1$$

$$R_3 = \frac{R_1 R_5}{4Q^2 R_1 - R_5}$$

$$C_2 = C_4$$

It should be noted that equation for R_3 may produce a negative result if high gain and Q are simultaneously required. Should this occur, the gain of the filter section must be reduced and amplification obtained in a later stage.

As a design example, consider an active filter having a center frequency of 750 Hz, gain of 1.32 (2.41 dB) and Q of 4.17. Again, a 741 op amp will be used. Bandwidth is determined as

$$BW = \frac{750\text{ Hz}}{4.17} = 180\text{ Hz}$$

and the upper and lower –3-dB frequencies will be

$f_U = 845.4$ Hz
$f_L = 665.4$ Hz

Beginning with a reasonable value for C2, say 0.01 μF, then

R1 = 67 kΩ
R5 = 177 kΩ
R3 = 2650 ohms
C4 = 0.01 μF

As was done in the previous examples, impedance conditions must be confirmed. The parallel impedance of R1 and R5 is 48.6 kΩ and the impedances of C4 and R5 at 750 Hz are 21 kΩ and 177 kΩ respectively.

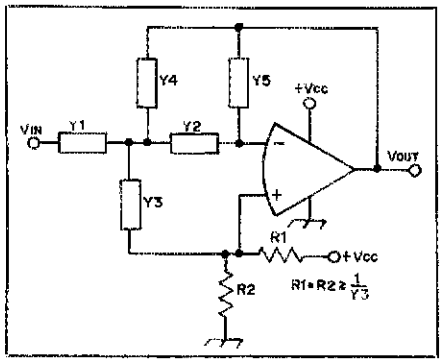


Fig. 5 — Op amps are designed for operation from a dual-polarity supply. Use of resistors R1 and R2 to form a voltage-dividing network allows the device to be operated from a single supply. R1 and R2 are equal, and each should be equal to, or greater than, 1/Y3.

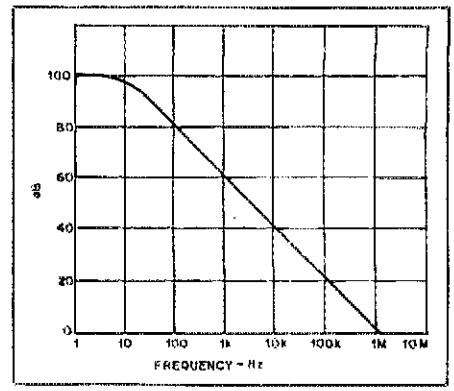


Fig. 6 — Type 741 op-amp open-loop gain plotted against operating frequency. Useful gain is obtained through 10 kHz, allowing excellent results for active filters intended for communications applications.

Selecting an Op Amp

To insure filter performance meets design specifications, op-amp gain bandwidth is an important consideration. According to Lancaster, a reasonable guideline is to specify an op amp providing at least 10 to 20 times the gain required at the highest frequency used.[2] Fig. 5 gives the open-loop gain vs. frequency curve for the 741 op amp. While the device has limited application at frequencies above about 10 kHz, for cw and ssb reception the device will yield excellent results. Input and output impedances of the 741 are constant up to about 100 kHz, greatly simplifying design. Of no small concern to the experimenter is its low cost, often less than 50 cents.

Conclusion

This article was limited to a discussion of active filters using multiple feedback paths. Other configurations may be used, such as those with controlled sources, biquads or state-variable filters. For more information, refer to the sources cited at the end of this article. QST

Footnotes

[1] ARRL, *The Radio Amateur's Handbook*, 1977 edition, p. 48-50.
[2] Lancaster, *Active Filter Cookbook*, Howard W. Sams Co., Indianapolis, 1975.

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Weak-Signal Reception on 160 – Some Antenna Notes

Effective DX signal reception on 160 meters doesn't come from waving a magic wand. It takes a lot of experimenting to learn what works best at a given location. Here are the results of one man's efforts.

By Barry Boothe,* W9UCW

"Yes, I am using some different low-noise receiving antennas with varying degrees of success." That was the answer I gave when W1FB asked for information on my recent experiments. You may be wondering what "hears" best, "a vertical or a horizontal antenna?" Well, there's no simple answer. Some background which led me to the notable results I am getting at present may be of interest to you.

My first rig used a Pierce oscillator which drove a pair of 6L6 tubes. That fact doesn't mean much by itself, but the oscillator wouldn't work above 5 MHz! As a Novice I was stuck on 80 meters, so when I obtained my General ticket in 1955 I extended my horizons in the only direction possible – 160 meters.

A 200-foot horizontal wire antenna radiated enough rf to permit contacts up to 600 miles: I concluded that the world on 160 meters ended in Nebraska! DX was heard occasionally, but it was rare that QSOs were possible beyond my 600-mile radius. A new rig and a short excursion to the 40-meter band provided good results with the 33-foot vertical I had erected. I missed the peaceful small-town atmosphere of 160, so I put my newly acquired WRL Globe Scout transmitter on 1.8 MHz and made a real splash! A loading coil was placed in the base of the 40-meter vertical to make the system function as a short quarter-wavelength radiator on 160. Letters came from every direction asking why I wouldn't answer the calls of other stations. The answer was simple . . . I had acquired an S9 noise level along with the new rig and antenna! At the time I didn't really understand the problem.

About that time marriage, fatherhood and home ownership took me away from radio. When the dust cleared, I noticed that I had room on my property for a *full-size* half-wavelength dipole for my favorite band – 160 meters! Wow! I would soon be king of the band. I envisioned banner-size headlines in *QST* which read, "TOP BAND SIGNALS FROM W9UCW BEND S-METER NEEDLES IN EUROPE." I dared to dream that some rare DX station would answer me first, even though W1BB was in the pileup.[1]

*RFD 1, Minooka, IL 60477

The major noise source at W9UCW is the 160-meter vertical (Minooka Special).

The two-wire Beverage runs through the woods with the feed-line end aimed at Europe. Spacing is 18 inches (46 cm), and height is 10 to 12 feet (3 to 3.7 m).

Sure, the noise level was low on the new horizontal antenna, and I could *really* hear 'em. But with few exceptions the only ops who heard *me* well were inside the original 600-mile radius. I wasn't even able to beat out W8HHS (now W1FB) from Detroit, and that was bad. Some answers were needed – right then! I started reading; I wrote letters; I experimented. From reading books and studying the antenna systems and results of more than 100 correspondents around the world I drew these conclusions:

1) Verticals are very effective on 160. They transmit well at low angles (good for DX) and they "hear" well.

[1] Footnotes appear on page 38.

But, they also hear noise well (mostly vertically polarized noise), and the noise covers up those weaker signals that one needs to hear.

2) Long end-fed wires hear better than verticals do — not because the signals are stronger than with verticals (they're not), but because horizontal antennas don't hear noise as well as verticals do. I concluded also that low-to-the-ground (less than a quarter wavelength high) horizontal antennas compare favorably with dummy loads for transmitting.

3) Half-wavelength dipoles erected horizontally hear better than verticals or end-fed wires for the same reason mentioned in item 2. If you have a dipole with the feed point 130 feet or greater above ground, hook it to both the transmitter and receiver. Below that height it makes an excellent antenna for ragchewing within that dreaded 600-mile circle. However, if your call prefix is other than W, K or N, add 20 dB to the signal report you will receive!

4) When the center-fed half-wavelength antenna is used only for low-noise reception, it can be erected just a few feet above ground — high enough, however, so that the XYL won't be injured while she mows your lawn. You can even use a short dipole with loading

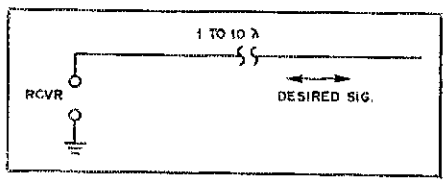


Fig. 1 — A simple form of the Beverage antenna.

inductors. It will still beat the end-fed wire and vertical for low noise. Oh yes, keep it as far as possible from your vertical antenna. More on that subject comes later.

Special Receiving Antennas

In the 1960s someone told me about something called a *Beverage antenna*. I thought it must mean a tall drink of water, but that wasn't the case. Friends described it as a long, low wire, end fed and running toward the desired direction of reception (Fig. 1). My friend, W9YYF, helped me erect one. It was 3,000 feet long, 12 feet high, and ran through a dense woods. As you might suspect, this job was done on a January day in northern Illinois — during a snowstorm. (I recall my wife mumbling something about my reluctance to put up 25 feet of clothesline on a warm day the previous July.)

The wire ran due west from my

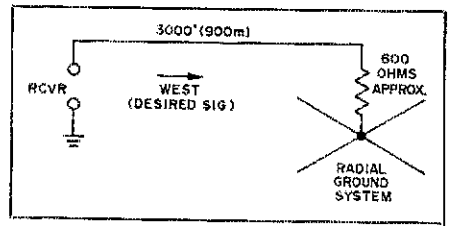


Fig. 2 — An improved version of the antenna shown in Fig. 1. A noninductive terminating resistor is placed at the far end of the wire to provide unidirectional antenna response. The termination is connected to a ground-radial system.

shack and provided reception of KH6, ZL and VK signals, such as I had never expected! The noise level was "zilch," and signals from the Pacific stood out prominently, often when they were undetectable on my other antennas. Eventually the Beverage was terminated at the far end in accordance with a suggestion from an experienced amateur (Fig. 2). Before making the change I could hear very little off the side of the antenna, but after adding the termination (600 ohms), I experienced excellent rejection off the back of the Beverage (east) as well. Performance off the front (west) remained essentially the same.

At that time I was able to listen with six antennas — a 130-foot vertical, an open-wire fed 1/2-wavelength dipole, another 1/2-wavelength dipole (fed with 1,200 feet of hard-line coaxial cable) and two shorter wires which were 500 and 1,700 feet in length, respectively. I was really into the act of experimenting at that point, and the results were interesting.

More Beverage Information

About that time I received the first of a series of letters from Art Butler, W8GLX. Art, a retired engineer from RCA/NBC, wanted to help someone with Beverage antennas: He had a surprise in store for me. First, he brought me up-to-date on the evolution and use of Beverage or "wave" antennas. I quote some excerpts from his first letter. "The wave-antenna principle was first applied by Harold H. Beverage of RCA Communications in the very early 1920s, and the method took his name. For many years, through the 1930s, the Beverage antenna was common at commercial receiving sites for reception of signals mostly below 500 kHz. Some of these antennas were very long. They varied in length in different receiving circuits, and as a function of frequency. A few thousand feet was common, but many were three to seven miles long, and at the real low end of the spectrum there was one 17 miles long."

Art explained the Beverage antenna, saying it was a long, open-wire transmission line. "It has a high degree of exposure to the horizontal component of a down-coming wave front. This induces in the line a continuous series of emfs that are propagated along the line

in the form of a traveling wave. The entire wire receives energy from the down-coming wave so that the effects are cumulative at the receiver. A relatively large amount of energy is extracted from the space wave for energizing the receiver."

Art went on to mention, "These

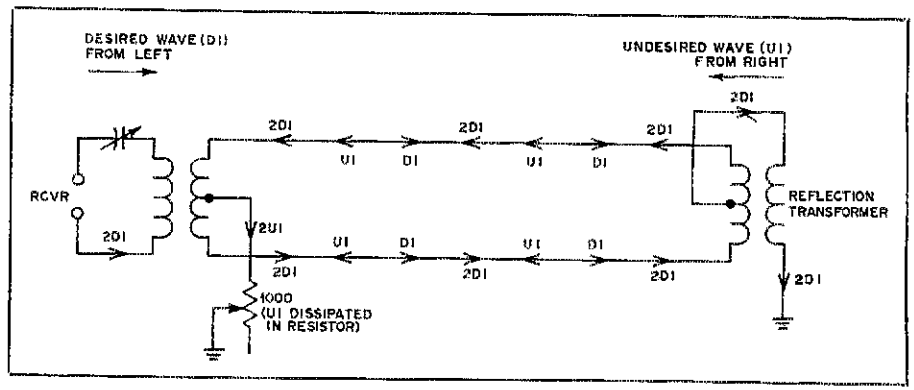


Fig. 3 — Diagram provided by Art Butler to illustrate the function of a two-wire Beverage antenna. An explanation of how it functions is given in the text.

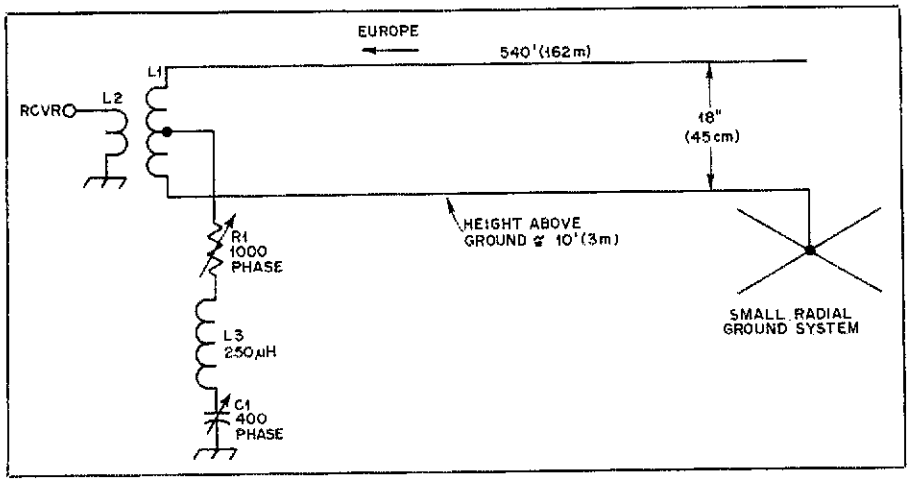


Fig. 4 — An experimental version of the two-wire Beverage antenna tested at W9UCW. Height above ground is roughly 10 feet.

antennas have a 25 to 30 dB front-to-back ratio, and 60 dB or better rejection of side signals, and a consequent improved signal-to-noise figure that is almost unbelievable compared to conventional receiving antennas. I would think offhand that 1,800 kHz is approaching the useful mf limit of the Beverage antenna because as the frequency increases, polarity "tumbling" gets worse and defeats the traveling-wave principle of these antennas. The Beverage antenna is positively NG as a transmitting antenna for those who may get notions in this department!"

He continued by saying, "For receiving, the single-wire version has ground-return path problems, and the termination requirement changes with weather and seasons. But even so, it is still a good antenna." He followed up by commenting, "The two-wire version has many advantages over the single-wire system. Principally, it gives twice the signal at the receiver input, the termination is at the receiving end for easy corrective adjustment, and the losses are lower."

Art included the diagram of Fig. 3 for illustrative purposes. The letter went on to say, "Both the desired wave front coming from the left and the undesired front coming from the right induce current in phase in both wires. The *undesired* signal current (U1) moves to the left end of the system and is dissipated in the resistor. The *desired* signal current (D1) travels to the right end, through the reflecting transformer, and is sent back to the receiver 180° out of phase, using the antenna wires as a balanced open-wire line."

Art wrote to his old friend Ed LaPort[2] and asked for more design parameters, but some questions remained unanswered. Thus far, I had the impression that the minimum useful length would be about 3,000 feet and that the symmetry and balance were critical. Although I knew that the *reflection transformer* had to be built carefully (and balanced), I had no idea about its size, turns ratio and shielding. I hesitated. Meanwhile, Art Butler moved to New England and I lost touch with him.

During September of 1976 I was honored to be a speaker at the W9-area "DX bash." The subject was "antennas." In passing I described Beverage antennas and included what information I had concerning the two-wire version. I was approached later by Jim, W9LI, a retired engineer from WGN in Chicago. He promised to send me something that would solve some of my mysteries. It came a few days later . . . an FCC report issued on April 1, 1958, the heyday of the Conelrad System. That "something" was a publication entitled *Antennas for Reception of Standard Broadcast Signals.* The largest part of the report contained information on the Beverage wave antenna. The material was authored by Adolph Anderson and Benjamin Wolf. That report contained everything I needed — optimum length, wire spacing, height above ground, coil dimensions, and more!

An Experimental Antenna

The following weekend I was worming my way through the back woods, stringing wire. I chose the two-wire system shown in Fig. 4. It was aimed directly at Europe from my location in Minooka, IL (46°). Grounding the far end of one of the wires accomplishes reflection and phase reversal. The network containing R1, L3 and C1 allows adjustment of the depth and angle of

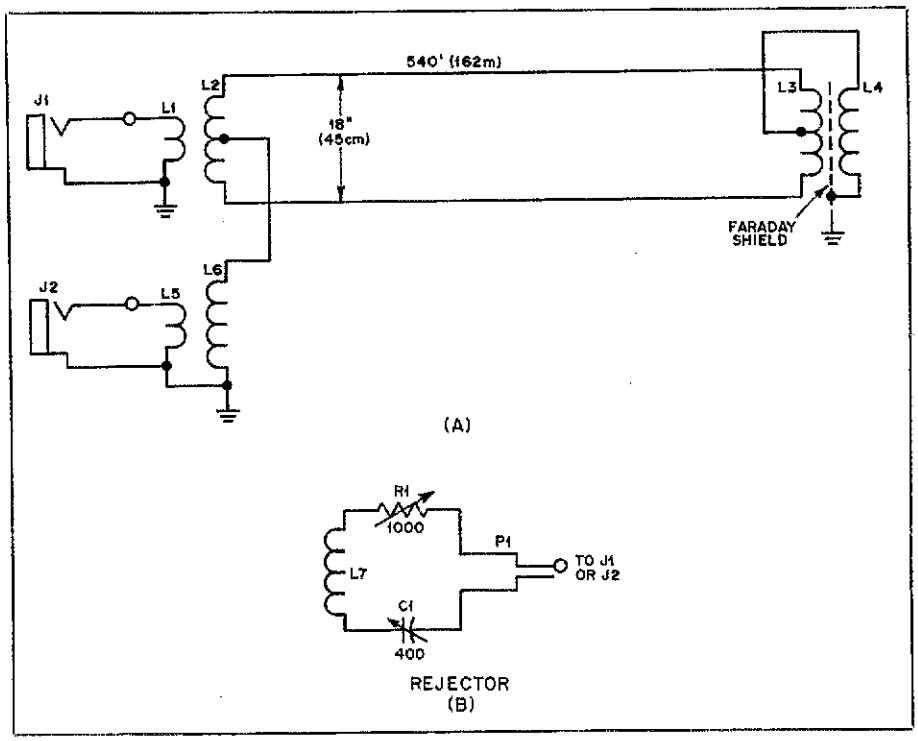


Fig. 5 — An improved version of the system shown in Fig. 4. This two-wire "shortie Beverage" is presently in use at the writer's station.

C1 — 400-pF variable capacitor.
L1, L5 — 6 turns no. 14 enam. wire, 2.5-inch diameter, close wound. Install inside L2 and L6 near center taps.
L2, L6 — 56 turns no. 14 enam. wire, close wound on 3.5-inch diameter form, center tapped.
L3 — 60 turns no. 26 enam. wire, 4-inch diameter, 4 inches long, center tapped. Coil is wrapped with single layer of metal foil which has 7/8-inch split full length to prevent shorted-turn effect. Shield is grounded.
L4 — 40 turns no. 26 enam. wire centered over L3.
L7 — 40 turns no. 24 enam. wire, 1-inch diameter, 1 inch long (250 μH).
R1 — 1000-ohm linear-taper carbon control.

the rejection notches. By varying R1 and C1 it is possible to move and deepen the notches from 60° off the left end to directly to the right of the system. The results were phenomenal! In the Midwest, where signals from Europe are not an everyday thing, I hear them consistently when they are undetectable on other antennas. I often give RST 569 reports to Europeans when my cohorts are hearing nothing. By adjusting R1 and C1 I can null out signals and noise sources (like thunderstorms in the Southeast) without affecting the European's signal.

An Ultimate Version

An improved version of the antenna is seen in Fig. 5. To receive signals from the left, the receiver is connected to J1, and the rejector at B in Fig. 5 is connected to J2. The connections are reversed to receive signals from the right. I plan to build one of these systems to run east-west for receiving signals from Africa and Australia.

A Fence-Line Beverage

I tried an interesting trick this season for listening to the south. The antenna was a ready-made Beverage — a fence! When the horses went from the woods to the barn for the winter, I disconnected the electric-fence charger and attached a transmission line to the wire, bringing the feed into my shack. This gives me a half-mile long Beverage, 18 to 24 inches above the earth. The now-passive antenna wire of the fence is mounted on insulators (Fig. 6) and is flanked by barbed wires above and below. It is by far the most directional Beverage I have used. My noise level is zero, and signals from South America and the Caribbean are always loud. The stateside signals off the side of the antenna (east and west) are rejected by a considerable amount. The far end of the wire (south) is connected to the barbed wires. The latter serve as a ground. This wire is no. 16 galvanized steel. It was necessary to solder some jumpers around splices and spots where the wire was coiled around insulators. For a new installation the no. 18 copper-plated steel electric-fence wire would be better. It is still available from some suppliers.

By way of comparison between the fence Beverage and the vertical, KV4FZ runs 20 dB over S9 on the vertical, but there is an ambient noise level of 10 dB over S9. On the fence Beverage KV4FZ is S9, but the noise level is zero! LU1DZ is too weak to be heard on the vertical, is in the S6 "mud" on the dipole, but is S2 and readable on the fence Beverage.

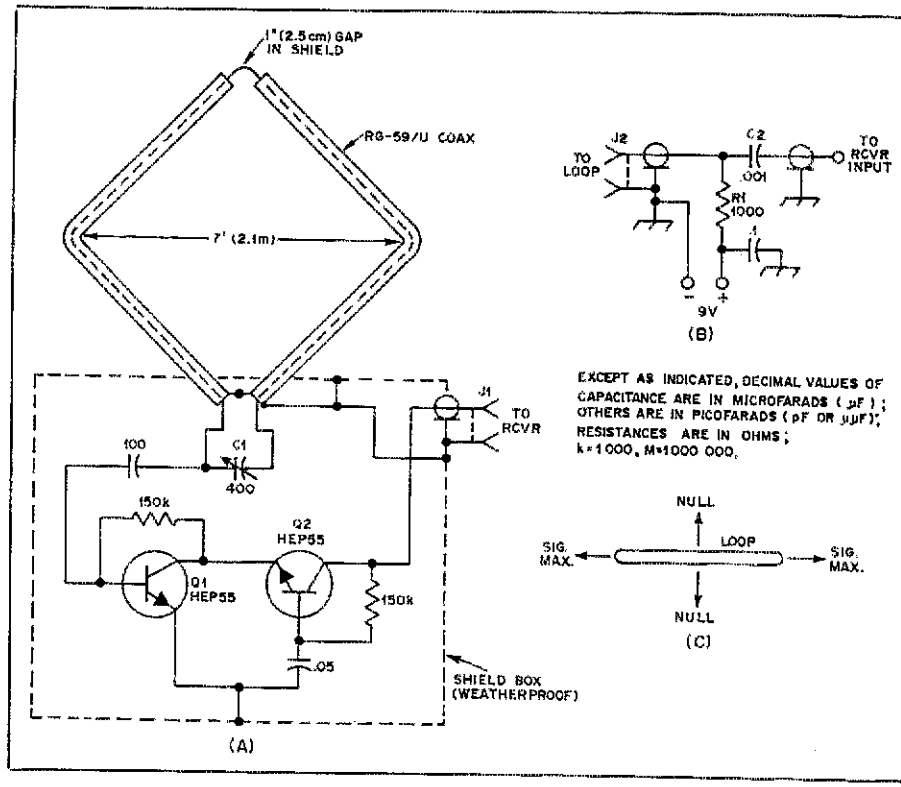


Fig. 7 — Schematic diagram of the shielded W1FB loop and W9UCW preamplifier (A). Operating voltage for the amplifier is supplied through the coaxial feeder from the shack. (B) The method for supplying 9 volts to the preamplifier. R1 isolates the signal energy from ground, and C2 prevents dc voltage from reaching the receiver input. C1 at A is a mica compression trimmer. The directivity pattern of a balanced loop, as seen from above the antenna, is illustrated at C. The null is off the broadside of the loop.

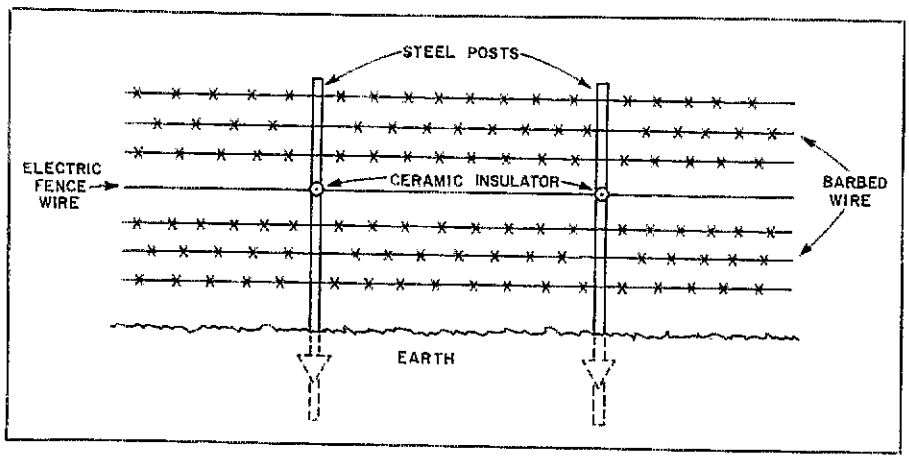


Fig. 6 — Illustration of a section of the electric fence used at W9UCW as a Beverage antenna (see text).

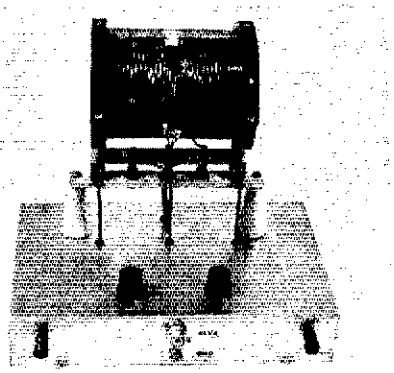
Receiving Loops

I'd been hearing about loops for some time, so I decided to build the W1CER (now W1FB) shielded version from *QST*.[3] In order to get enough signal voltage to be of use, I had to add a preamplifier to the 5-foot-square antenna. The circuit is given in Fig. 7. The small loop served me well. I pulled signals out of the noise that could not be copied with the antennas I had at that time.

The peaking of the loop was broad, and that troubled me. I was using RG-59/U coaxial cable as the antenna element. So I tried a new loop fashioned from aluminum hard line (foam dielectric) which was 0.875 inch in diameter and had a 72-ohm characteristic. I made the loop 13 feet in diameter.

The tuning was so sharp that I missed the peak the first few times I tweaked the trimmer. The loop was so effective that on strong signals the preamp would saturate. I found that I did not need the amplifier, as there was plenty of signal voltage without it.

I was perplexed by a QSB condition on the noise I was hearing with the



Coupling unit for the two-wire European Beverage. A BC-610 tank coil is used. It meets the textbook specifications.

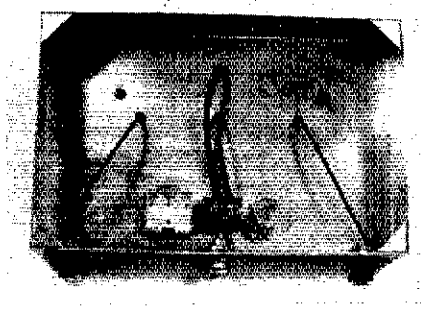
loop. I discovered that the antenna was moving about when a breeze was present. The null of the loop was crossing the path of some noise source. A more secure mounting method was used to correct the problem.

The noise source turned out to be my vertical antenna. The latter was collecting noise and reradiating it to the loop and other nearby antennas. The best solution in situations of this kind is to locate the loop as far as possible from the vertical, and rotate the former so the null is aimed at the vertical. Some operators report improved results by detuning or grounding their verticals while receiving with their loops.

While on the subject of proximity effects, many reports have confirmed my findings that the interaction between a good-size vertical and other antennas is serious. The results are poor receiving characteristics, lopsided transmitting patterns and jumbled polarization. If your dipole is attached to the vertical consider it to be *one* antenna. During the antenna survey mentioned earlier, it was learned that those who had a setup of this type saw little difference between verticals and horizontals. I had to move my dipole at least a half wavelength from the vertical to prevent serious interaction.

Final Comments

That wraps up the story I told to W1FB. Upon reading it he thought the information should be shared with others who take their 160-meter work seriously. I might add that once in a while I hear something rare when my receiver is hooked to my tri-band beam, or to the finger stop on my telephone. Beverages are my best, with the two-wire job of Fig. 5 running well in front of the others. That's where my effort will be placed next season. The references I am including should be helpful to those who want to dig deeper into this subject. QST



Bottom view of the coupling unit, showing rejector components.

Wave-Antenna References

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Footnotes

[1] [Editor's Note: W1BB has long been known for having an outstanding signal on 160 meters. He holds no. 1 DXCC certificate for "top band."]

[2] Author of *Radio Antenna Engineering*, McGraw-Hill Book Co.

[3] DeMaw "A Receiving Loop for 160 Meters," *QST* for March, 1974.

Strays

CBERS JOIN HAMS

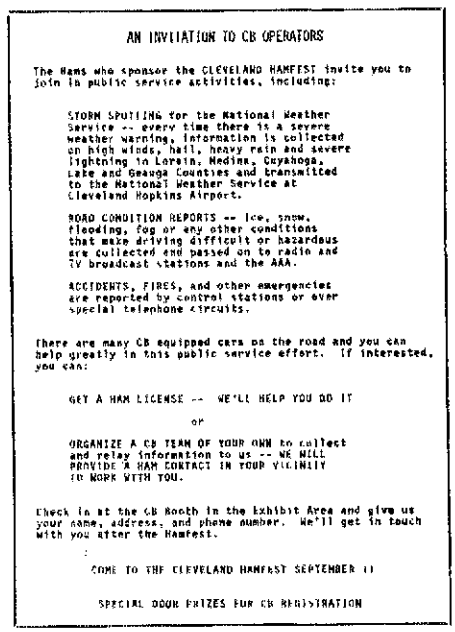
The myth of "CB vs. ham" – the two services fighting each other tooth and nail at every opportunity – met a quick demise at the Cleveland (OH) Hamfest. Making a concerted effort to attract citizen's band operators, the Lake Erie Amateur Radio Association set up a "CB Recruiting Station" booth that attracted a continuous stream of curious CBers.

Special Hamfest flyers carried an invitation to learn what amateur radio has to offer in the way of public service. Copies of *Tune in the World with Ham Radio* and Radio Shack's *From 5 Watts to 1000 Watts* were offered as door prizes, with a Regency Weatheralarm Monitoradio as the grand prize. Local groups sponsoring licensing classes supplied literature and helped man the booth.

In an effort to separate those truly interested in ham radio from those more concerned with the door prizes, the registration card was divided. To qualify for the drawing, a registrant had only to give his name, CB call and hamfest ticket number. We then asked for an indication of interest in getting a ham license or joining in public service activities, and asked those interested to give an address and telephone number at which we could get in touch with them.

A total of 177 non-hams registered at the booth; of these, 117 listed CB calls. Most of the others were wives or children of hams. 92 of the 117 CBers checked one or both ham radio and public service as an area of interest and gave their address and phone number. Their cards have been sorted geographically, and each registrant from Ohio quickly received a follow-up phone call and offer of help from a club member. Out-of-state cards were sent to League Headquarters for follow-up.

Those who took part in this recruiting effort are convinced it was worth the work. Next year we plan a booth at Cleveland's CB show! – *R. B. Shreve, W8GRG*



AN INVITATION TO CB OPERATORS

The Hams who sponsor the CLEVELAND HAMFEST invite you to join in public service activities, including:

STORM SPOTTING for the National Weather Service -- every time there is a severe weather warning, information is collected on high winds, hail, heavy rain and severe lightning in Lorain, Medina, Cuyahoga, Lake and Geauga Counties and transmitted to the National Weather Service at Cleveland Hopkins Airport.

ROAD CONDITION REPORTS -- Ice, snow, flooding, fog or any other conditions that make driving difficult or hazardous are collected and passed on to radio and TV broadcast stations and the AAA.

ACCIDENTS, FIRES, and other emergencies are reported by control stations or over special telephone circuits.

There are many CB equipped cars on the road and you can help greatly in this public service effort. If interested, you can:

GET A HAM LICENSE -- WE'LL HELP YOU DO IT

or

ORGANIZE A CB TEAM OF YOUR OWN to collect and relay information to us -- WE WILL PROVIDE A HAM CONTACT IN YOUR VICINITY TO WORK WITH YOU.

Check in at the CB Booth in the Exhibit Area and give us your name, address, and phone number. We'll get in touch with you after the Hamfest.

COME TO THE CLEVELAND HAMFEST SEPTEMBER 11

SPECIAL DOOR PRIZES FOR CB REGISTRATION

The Cleveland Hamfest featured an enticement to CBers. Did it work? You bet!

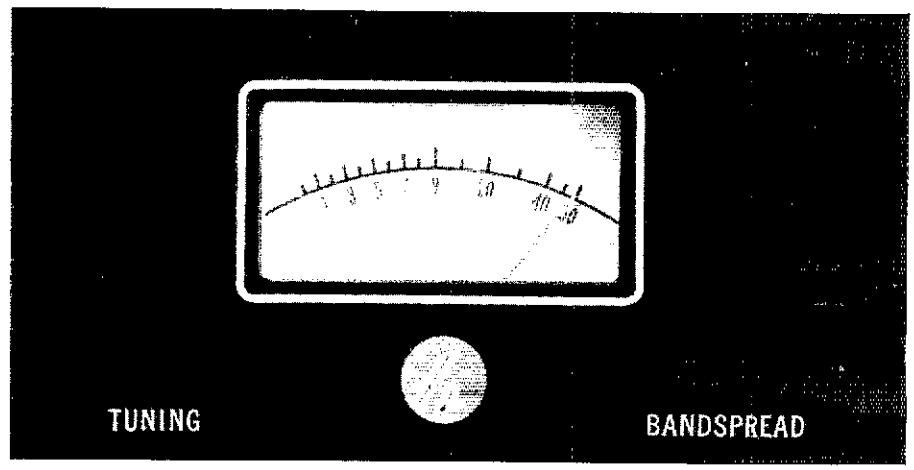
What Does My S-Meter Tell Me?

Are receiver S-meters useful to the operator, or are they simply thrown into the equipment package as fancy "window trimmings"? These tips for beginners will explain some of the Black Magic of signal-strength reporting.

By Doug DeMaw,* W1FB

Hey! Isn't that S-meter pretty with its green back lighting? And, wow, look at the 40 dB over S9 signal that guy's pumping out on 10 meters! "Say, OM, you're really strong here at my QTH . . . 40 over, but I missed your QTH and handle, so how about a repeat on the next go-around?"

Dialogue of that variety isn't especially representative in a grossly inflated signal-report situation, but many an S-meter on a commercial receiver tends to speak with a "forked tongue." The newcomer to amateur radio is inclined to accept the meter readings at *face value*, if we may slip in a pun, but the true value of the signal report is nebulous at best. Let's scrutinize the general situation and learn what really happens with respect to S-meters in a run-of-the-mill group of ham receivers.



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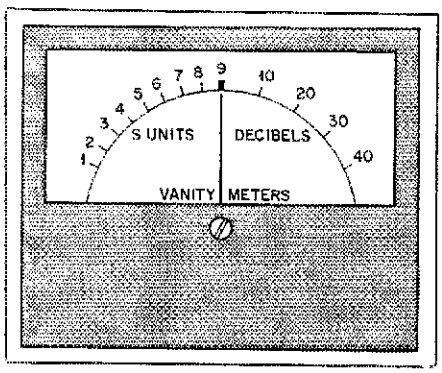


Fig. 1 — Illustration of a typical receiver S-meter. S9 is the reference point (midscale) for readings greater than S9, and below S9 the strength reported is in S-units. Traditionally, S-units were equivalent to 6 dB each.

Meter Scales

An attempt was made by at least one principal manufacturer of receivers during the World War II era to set a standard for signal strength versus decibels and S-units. A signal level of 50 microvolts was chosen to represent S9 on the meter face (Fig. 1). The S9 mark appeared somewhere near midscale on the calibration arc of the instrument. The divisions below S9 were rendered as S-units, with 6 dB per S-unit as the prescribed value. The divisions above S9 were specified in dB, and the meter face was marked off in 10-dB increments up to, say, 40 dB. To date, most S-meters have faces with markings that follow that general pattern, but very few of them provide the same reading in S-units or dB for a given level of received signal. In other words, receiver no. 1 might show the signal to be 15 dB over S9, and receiver no. 2 would indicate that the same signal was only S7. The latter is referred to by many operators as a "Scotch S-meter" because the operator feels that it is miserly in its readings. On the other hand, the meter which read 15 dB over 9 might be called a "generous S-meter," or "Bourbon S-meter," to use the vernacular.

An unfortunate psychological by-product has emerged from all of this S-meter folderol . . . the practice among some amateurs of flattering the other operator by passing out big signal reports — especially when working a DX station whose QSL card is being sought. It is not uncommon in such an instance to hear the other station come back with, "Thanks, OM, for the FB signal

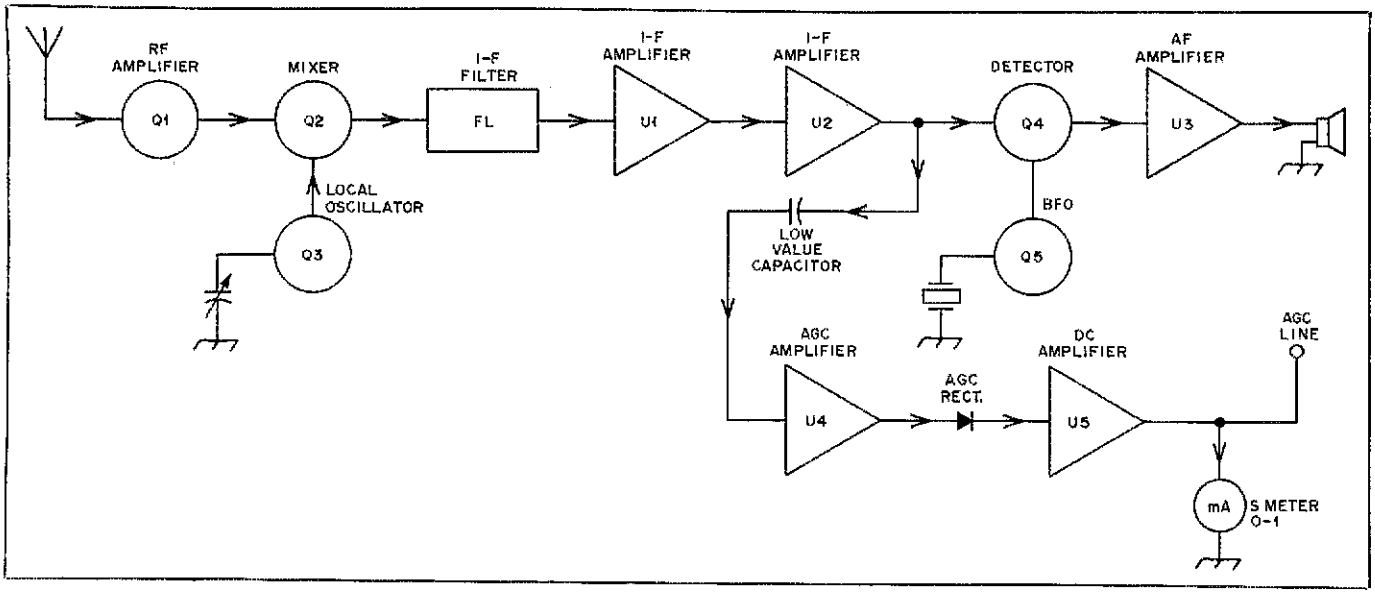


Fig. 2 — Block diagram of a simple receiver which has an S-meter. In this example the i-f energy is sampled and amplified by means of U4. Output from U4 is rectified to provide a dc voltage, and U5 amplifies the effects of the dc voltage changes. Output from U5 is applied to the S-meter and the receiver agc line. The arrows indicate the direction of the signal and voltage paths.

report!" It's almost as if the giver of the report has gone out of his way to do the other station a large favor. This routine has put S-meters in the "vanity" class of accessories, while practically rendering them worthless in a technical sense.

In Perspective

A *truly calibrated* S-meter could be provided quite easily in a one-band ham receiver. By means of an accurate laboratory type of signal generator, the various signal levels could be plotted against the meter readings in S-units and dB. However, in a multiband receiver (e.g., 160 through 10 meters), the accuracy of the meter readings would vary considerably from band to band, and this is the general situation with our present commercial and homemade receivers.

The variations in accuracy for multiband receivers result primarily from differences in receiver gain as measured from the antenna jack to the point at which the S-meter is connected in the circuit (Fig. 2). Probable causes for the variations in gain are differences in losses for the front-end tuned circuits or filters in modern receivers as the various bands are selected, and the inherent gain characteristics (f_T and beta) of transistors and ICs versus the operating frequency. Transistors exhibit more and more gain as the operating frequency is lowered, a condition which is particularly prevalent when they are used in narrow-band amplifier circuits. The condition can be corrected to some extent if broadband amplifiers are employed, but most of them display unequal gain at various points in the spectrum for which they are to function as broadband amplifiers.

Still another reason for the variance in meter readings as one switches bands is the injection level of the local-oscillator energy to the receiver mixer. Unless the manufacturer maintains the same mixer parameters and injection level for all of the bands, the conversion gain of the mixer stage will not be the same for all frequencies, or for that matter, across the tuning range of a *single* amateur band!

A receiver which could be built to provide accurate S-meter readings on all of its bands would be a very sophisticated one, and the price would probably turn one's blood to ice! Furthermore, the operator would have to keep the tuned circuits in perfect alignment all of the time, to say nothing of being certain that the various tubes or transistors in the circuit were performing in a like-new manner.

These considerations tell us that a typical receiver S-meter is good only for making relative (not absolute, just comparative) signal-strength measurements. More specifically, the receiver owner can tell another ham with whom he's in communication on an amateur band how much signal difference there might be between two antennas he was testing. If the S-meter showed one antenna to be 10 dB better than the other one, the fellow doing the experiments would have an idea, in *relative* terms, as to which antenna was best for the distance apart the two stations were. Chances are that the difference would not be precisely 10 dB: It might be a 6-dB or even a 13-dB difference.

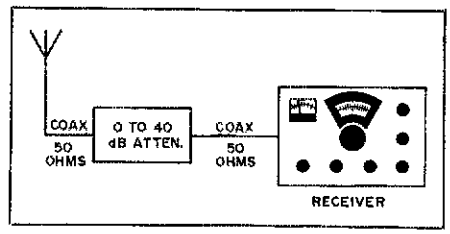


Fig. 3 — A step attenuator can be inserted in the feed line ahead of the receiver to permit reasonably accurate measurements (in dB) of signal level changes. First, the attenuator is set for zero attenuation, then the relative comparison between two signal levels of interest are observed on the S-meter. Following that check, the attenuator is adjusted to provide the same change in signal level as noted on the S-meter. The amount of attenuation required to cause an identical change in S-meter reading is the number of dB the signal varied.

The Ideal S-Meter

Perhaps it's time for the manufacturer to provide an S-meter which has a calibration scale in microvolts rather than in S-units and dBs. The reference would show how many microvolts the incoming signal registered above the noise level. The operator would set the meter-calibration control so that his meter read zero, preventing the noise from registering. On the lower bands (especially on 160, 80 and 40 meters) the static crashes would probably swing the needle above zero, but that would be no problem. At vhf and uhf the meter would be zero'd at the combination receiver and antenna-noise level. Readings in microvolts would take on a worthwhile significance if the scale accuracy could be assured for all of the bands accommodated by the receiver.

An Alternative

We amateurs can go a step beyond giving relative readings with our S-meters. We can place a step attenuator in the coaxial line to the receiver antenna jack (Fig. 3). Since step attenuators are built to knock down the strength of

a signal which passes through them – by a specific number of decibels per step – it is possible to make accurate comparative measurements of signal levels. The technique is a useful one when the amateur conducts antenna experiments, measures the gain of a preamplifier he has built for use ahead of his receiver, and for a host of other applications in the course of his experimentation. Circuit examples are given in Fig. 4.

Let's Summarize

Most S-meters operate from voltages which are sampled in the i-f amplifier circuit of a receiver. Others may read the change in current of one or more of the i-f amplifier devices (tube or transistor) as the signal level varies. Some homemade receivers sample the audio voltage at some point ahead of the af gain control. But typically, some of the i-f energy in the receiver is sampled, amplified, then rectified to provide a dc voltage for the S-meter. In some receivers the dc voltage is increased by means of dc amplifiers, and the amplifiers drive the S-meter. Generally speaking, the meter has a dc movement of 100 μA, 500 μA, or perhaps even 1 mA. The greater the strength of the incoming signal, the greater the dc voltage amount and the higher the meter reading. That same dc voltage is often used for controlling the receiver gain – *automatic gain control*, or *agc*, as it is called.

The easiest way to tell whether your receiver S-meter is a Scotch or bourbon one is to compare the reading against the background noise which embraces the signal. Unless there is an electrical storm in progress, or a noisy appliance (electrical impulse noise) running in the neighborhood, an S9 signal should pretty well mask the noise coming in on the antenna. One would hear some noise, typically, on an S6 signal, and there would be considerable noise on an S1 or S2 signal. If noise is heard on an S9 or greater signal, under normally quiet conditions, you've got yourself a bourbon type of S-meter! That fellow you gave the 20 dB over 9 report to was probably running S6 or S7 in reality. One consolation is that he probably went away in a happy frame of mind, thinking that he was laying down a real blockbuster at your house! QST

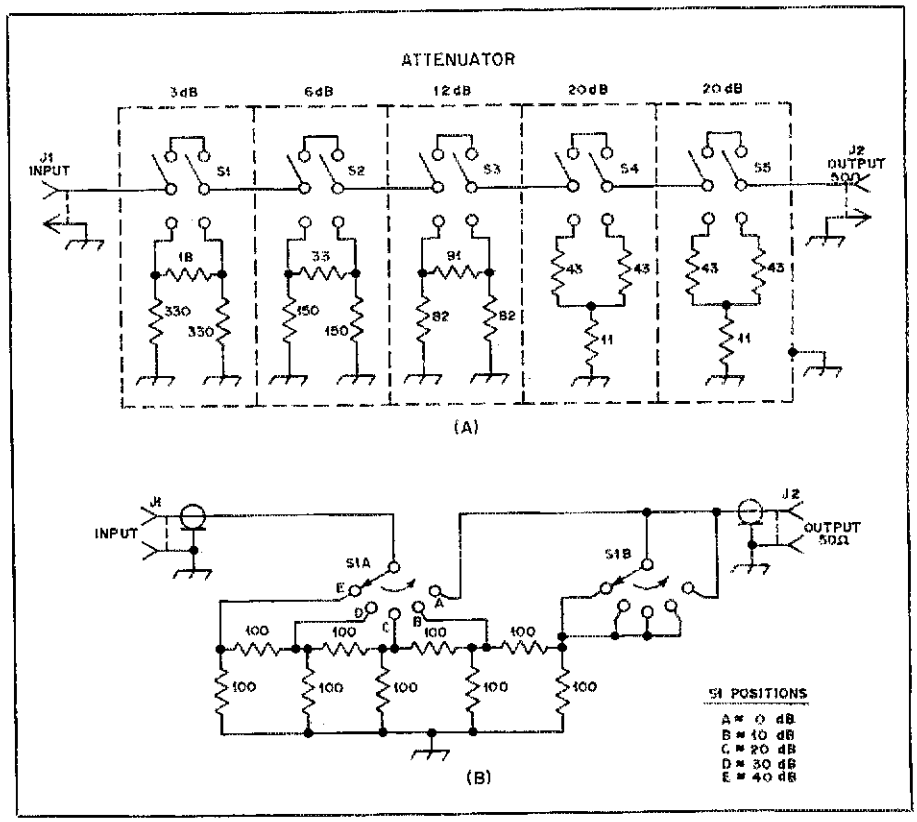


Fig. 4 — Schematic diagrams of typical homemade attenuators. A step attenuator with five resistive pads is shown at A. The dotted lines show where shield partitions should be placed. The resistors are 1/4-W composition types, five-percent tolerance. S1 through S5, inclusive, are miniature slide or toggle switches. At B we find a ladder type of step attenuator. Standard resistor values are specified to provide an impedance of roughly 50 ohms. The resistors are 1/4-W composition types, five-percent tolerance.

Strays

□ Retired engineer Ivan Coggeshall recently undertook an amateur radio project that has created quite a bit of interest in his native seafaring town of Newport, RI. As a child, Dr. Goggeshall befriended an older neighbor, Morris Kimber, who operated amateur radio station MK and kept a meticulous log and diary in the early years of the century.

Under the auspices of the Newport Historical Society, Dr. Coggeshall reviewed the amateur records of his now-deceased friend, and the result is a fascinating account of the early days of radio. Dr. Coggeshall, who operated station BSG, presented a copy of his manuscript to the Newport County Amateur Radio Club, of which he is a life member. Its title: "Amateur Wireless Watch over Atlantic Sea-Lanes, Newport, 1908-1911."

CANADAWARD

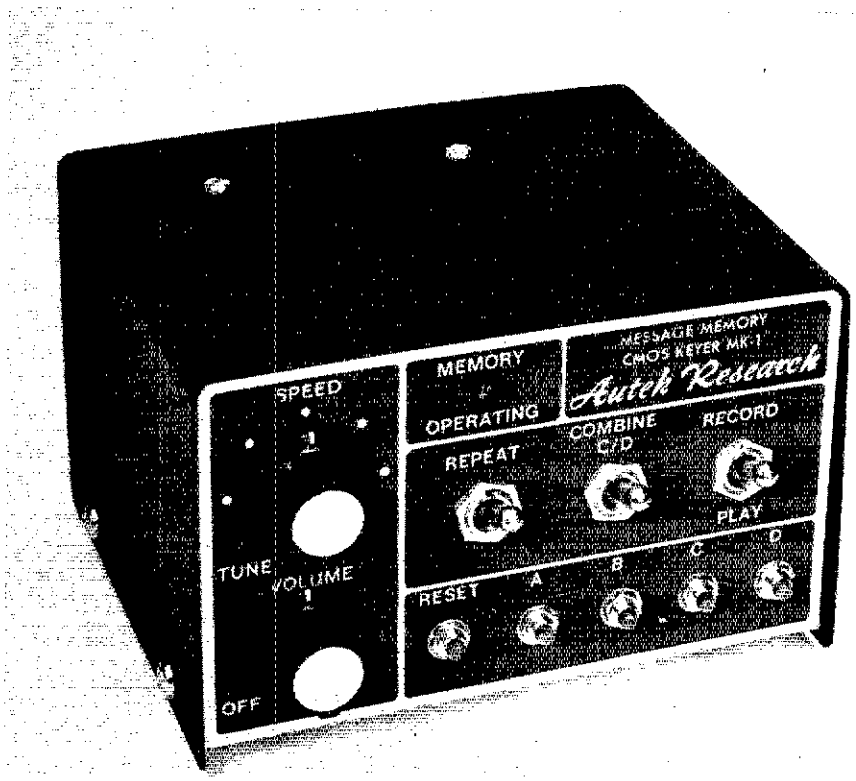
□ A colorful certificate will be issued by the Canadian Amateur Radio Federation to any amateur who confirms two-way QSOs with all 12 Canadian provinces and territories. All QSOs are to be on one band only and the certificate will be endorsed for the band. Separate awards are available if all QSOs are made on the same mode.

A special plaque will be issued to amateurs who confirm two-way QSOs on each of five or more separate bands. Only contacts made after July 1, 1977, will be considered. Submit QSL cards and $1 for the certificate or $7 for the plaque along with funds for return postage (CARF members send postage only) to P. O. Box 76752, Vancouver, BC, Canada V5R 5S7.

□ When something important happens and ham radio is involved, please remember to call ham radio NEWSLINE so that we can help you get the maximum publicity. Just dial 203-667-0138 and leave your name, call, phone number and the essential details of your story; Hq. will take it from there.

Product Review

Autek Research MK-1 Keyer



This is the day of the keyer. All manner of these station appendages can be found in the technical articles and advertisements of amateur magazines and journals. So, what sets them apart? How does one decide which product to buy, or what circuit to build? It isn't easy – especially if the would-be user has never pounded out the Morse with anything other than a straight key or a bug. Chances are that the amateur's first electronic keyer (once mastered) will seem to be perfect. When there is no frame of reference, a technique or product that is better than the previous one can be mighty pleasing. Highlights of circuit performance can be subtle, and judging one keyer against another is often a subjective exercise. No amount of manual dexterity can make good cw come out of a keyer if it has a poor timing circuit, is subject to RFI and misfires now and then. So, the first thing a person should look for is a unit that does not suffer the foregoing ailments.

Another consideration is whether or not the station needs a memory circuit. The capacity of the memory or memories is still another consideration. That is, how many code characters can be stored and recalled for use later? Keyer memories find their greatest application during contests, wherein the operator can store his CQs, such as, "CQ CQ CQ CD de W1AW W1AW K." The simple punching of the memory button permits the keyer to actuate the transmitter and send the message. Another memory could be programmed to provide the reply to an answer, "QSL es TU 599 CT BK." The principal advantage to all of this automatic monkey business is that there is time for logging and filling in the dupe sheet. It all makes for a faster contest operation. The greater the capacity of the memories, the longer the message which can be programmed into the keyer.

The Autek MK-1 seems to meet most of the requirements for a first-rate keyer. It has four memories, two of which can be bridged by throwing a switch on the front panel. Bridging permits the storage of a long message. Total memory can contain approximately 100 characters.

An internal clock runs continuously while the memory is being programmed. This means that you can insert pauses in the message if you wish. However, if the entire memory capacity is not utilized it will be necessary to let the clock run out before using the short message. If not, the unused portion of the memory will spew out some rather interesting gibberish, which would of course key your transmitter if the desired message was not stopped at the proper time!

A 9-volt transistor radio battery can be used as a "memory saver" for several hours (overnight, perhaps) if the ac power to the keyer is interrupted or lost. Field Day enthusiasts should appreciate this feature because of the tempermental nature of some portable power plants! The MK-1 is totally CMOS equipped. CMOS ICs draw very low current, thus making battery operation entirely practical.

The speed of the keying is adjustable from less than 10 to above 50 wpm. There is a built-in sidetone monitor, and the pitch can be adjusted by means of an internal pc control.

A triggered clock is used in the MK-1 to assure instant starting of dots or dashes the moment the paddle is tapped. There is also a dot and dash memory feature. This means that if the operator starts a dot or a dash, but releases the paddle before either is completed, the code character will continue and exhibit the correct length in time.

The MK-1 also provides iambic operation. This enables the user to use "squeeze keying" if he has a paddle of the double-lever type. Iambic keying will require a learning period before the operator gets the real "hang of it." The effort is worthwhile in the interest of faster sending.

Operation of the keyer was a pleasant and interesting experience. No unwanted "glitches" in performance showed up. It is worth mentioning that no rf-derived malfunctions were noted during operation from 160 through 10 meters. The circuit has been sprinkled with bypass capacitors for the purpose of eliminating RFI.

One feature that the writer missed while using the MK-1 was *keyer weighting*. There is no control for that characteristic of the sending. The need for weighting (or lack thereof) depends on the keying characteristics of the transmitter being used. Several members of the Hq. staff tested the keyer at their stations: All reported satisfaction and excellent performance. It is worth saying that a wide assortment of transmitter brands was involved in the evaluations. The manufacturer states that the keyer is compatible with all commercially made amateur transmitters that have been produced since 1963. The keyer output transistor (dc switch) is rated for ±300 volts maximum. It will handle up to −15 mA for grid-block keying. For cathode or other positive keying it is rated at 200 mA maximum. An external keying relay is required for currents in excess of those amounts. A reed

type of relay is recommended for the latter.

The color scheme of the MK-1 is gray (front panel), black (cabinet cover) and white (rear panel). Dimensions (HWD) are 3-1/2 × 6 × 5-1/4 inches (89 × 150 × 132 mm). Weight is 2 pounds (0.9 kg). The MK-1 price class is $85. Power requirements are 117 V ac or +9 V dc. Available from Autek Research, Box 5127E, Sherman Oaks, CA 91403. – *W1FB*

HEATH IP-2715 BATTERY ELIMINATOR

With the ever-increasing interest in the vhf-fm mode of operation, several new models of frequency synthesized transceivers have sprung up in the amateur-equipment marketplace. The difference between these units and their crystal-controlled cousins is the amount of current required to operate them. It is not unusual for these synthesized rigs to draw from 2.5 to 10 amperes in the transmit condition, and 1.5 to 2.5 A in receive.

Some folks can put this type rig in their cars, and most do. But what about the guy who wants to operate the rig in his house? Heath may have the answer. The IP-2715 is a 20-A power supply that could be the answer to the question.

The Heath IP-2715 is a brute of a power supply which will deliver 20 A intermittently, or will provide 12 A continuous service. The writer used the IP-2715 to power a 120-watt, 220-MHz amplifier in a repeater system for several months. At one point the system "locked up" and was in continuous use for nearly three hours with the IP-2715 subjected to a grinding 17-ampere + load. After a brief rest, and all the burned paint removed from the top of the power supply, the unit was turned on again and has continued to give satisfactory service ever since.

What's Inside?

Most of what is inside the IP-2715 is the *very* large and *very* heavy power transformer. Obviously designed to provide the current, this hunk of iron and copper weighs a short ton, at least. Two 10,000-μF electrolytic capacitors are also sharing the quarters within the power-supply chassis. All of the regulator circuitry is contained on a pc board which is mounted on the back wall of the chassis. Also mounted on the back wall is the fuse holder for the dc-voltage line and the ac-power cord. Two massive heat sinks, one on each side of the power supply, hold the four pass transistors. Metering of both voltage and current is provided by separate front-panel mounted meters. A voltage-adjust control is also front-panel mounted to permit fine adjustment of the voltage (adjustable from 9 to 15 V). Two heavy plastic handles are affixed to the top of the power-supply cabinet to make it easier to move the unit about in the shack.

Construction

This writer constructed the IP-2715 in three evenings, with the usual time out to tuck the kids into bed and watch a couple of TV programs. Heath has been using the pc-board construction approach with some of their newer power-supply designs. I like this approach because it simplifies construction considerably over the point-to-point technique. The only parts which are not located on the circuit board are the controls, binding posts, components which require a heat sink, the power transformer, two big electrolytic capacitors, some power resistors, a bridge rectifier, and a few other parts. No wiring harness is used in the power supply so the builder makes connections in the cut, connect and solder method (sometimes known as point-to point). When *peering into* the power supply with the cover removed, it looks mighty crowded inside, and it is! But there's still room inside to work where necessary.

The enclosure for the battery-eliminator power supply measures 5-1/4 × 11 × 11 (HWD) inches. The weight of the power supply is 26 lbs., and most of that weight is in the transformer. Power requirements for the power supply are 110-130 or 220-260 volts ac, 50 or 60 Hz. The current required from the ac line depends on the dc load. Price class at the time of this review is $135. The IP-2715 is available from Heath Company, Benton Harbor, MI 49022. – *WA6GVC/W3*

NATIONAL SEMICONDUCTOR INS8080A MICROPROCESSOR IC

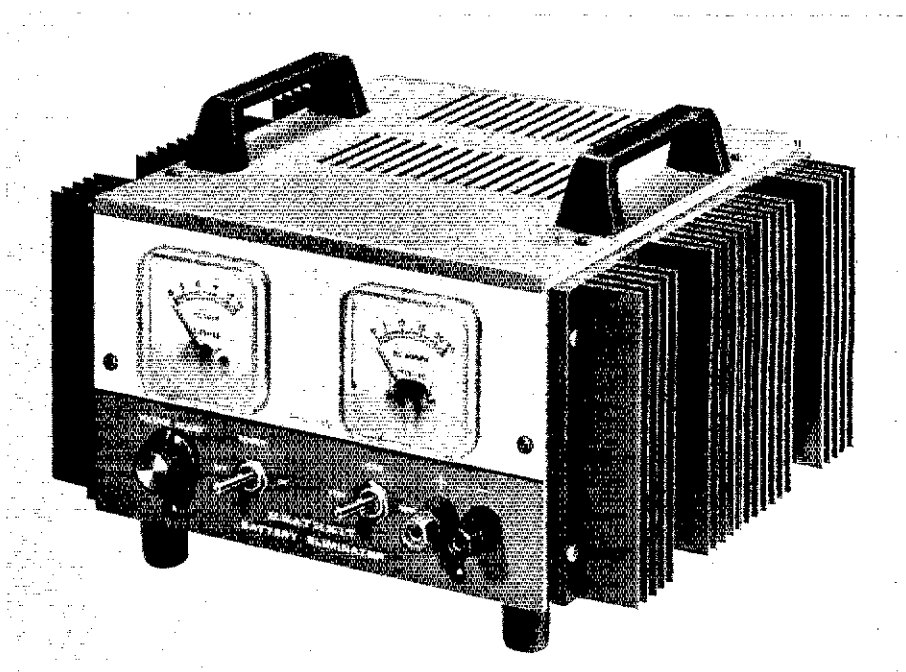
National Semiconductor has announced the availability of a pin-for-pin and functional replacement for the Intel 8080A microprocessor IC. The model 8080A eight-bit microprocessor offers powerful programming capability, with 72 problem-solving instructions and multiple register pairs for general-purpose operations. Addressing capability is good – the 8080A can address up to 65 kB of memory and up to 512 input/output (I/O) ports. The radio amateur who wishes to design his own system around the National INS8080A can take full advantage of the above-mentioned features, plus the fact that instruction cycle time is better than 2 μs, and that's *fast*.

In support of the 8080A, National is offering several interface ICs such as the 8224 clock generator which provides timing signals for the CPU and for the system, and the 8228 system controller/data-bus buffer IC. If you are planning to develop your own microcomputer for use in the station, the ubiquitous 8080 is a good choice for a system CPU. This IC type is probably the most common in use today and much software is already available. For further information write to National Semiconductor Corp., Attention Roy Twitty, 2900 Semiconductor Drive, Santa Clara, CA 95051. – *WA6GVC/W3*

NATIONAL SEMICONDUCTOR – PACE MICROPROCESSOR

National Semiconductor's Process and Control Element (PACE) was the industry's first single-chip 16-bit microprocessor. The PACE system still is providing designers with sophistication which can result in cost-effective systems and simplified application approaches. As the microprocessor marketplace reaches maturity, lessons once learned during similar stages of minicomputer development are being learned or rediscovered again. PACE is a true 16-bit microprocessor and it incorporates a variety of other features that result in ease-of-use and uncluttered, economical implementation of powerful systems.

The successful application of microprocessors, including PACE or any other system, demands a variety of supporting products and services ranging from support chips, cards and development systems to software, training and field support. PACE is fully supported. National Semiconductor's



The Heath IP-2715 makes a neat power package as evidenced by this view.

support system assures that the designer will have the necessary firmware and software required to make the application of a PACE system successful.

PACE Support ICs

There are three specially designed ICs available which greatly simplify development of a PACE system. The system timing element (STE) DP8302 produces the MOS non-overlapping clock signals required by PACE and also supplies two TTL clock signals to accommodate user requirements. The Bidirectional Transceiver Element (BTE) DP8300 is an eight-bit transceiver that provides controlled translation of signals between the PACE microprocessor MOS buses and the system TTL buses. The Microprocessor Interface Latch Element (MILE) DP8301 provides an eight-bit latched interface between the system TTL address/data bus and the user peripherals.

With the five-chip PACE system, the amateur can build a powerful 16-bit microprocessor. The instruction set for the 16-bit system allows a flexibility that is different from the eight-bit systems, and some radio amateurs will find it more suited to their system needs and capabilities. – *WA6GVC/W3*

Strays

□ In an effort to find out who or what is causing the Russian signal that has been troubling radio communications around the world, the Cincinnati (OH) *Enquirer* CB columnist tried a new tack. His report, reprinted from the March 17 issue, follows:

"Explanations for the powerful Russian radio signal lousing up citizens band (CB) and ham radio communications were sought straight from the horse's mouth.

"Enquirer CB columnist Fred Simon tried to reach Moscow for some possible answers. He was jammed. But he got through to the Russian Embassy in Washington twice this week.

"On one call, Simon was told he would be put in touch with the proper people if he would travel to Moscow. He had to pass up that offer.

"On the second call, a man at the embassy said, 'CB-CB-CB is good, is good. Cincinnati is good. Peter Rose is good. I have a CB. Love those Reds.'"

Sometimes it seems like a losing battle – trying to convince the media that hams are indeed different from the CBers they've heard so much about. But it helps to have someone like Eddie Cox, WB5TIV, to help set the record straight. Chief photographer for the Monroe (LA) *Morning World*, he recently contributed a nicely written article and photo (which he fittingly snapped himself) that introduced ham radio and played up the Twin City Ham Club's free Novice class that was starting soon thereafter. The response was excellent. – *WB5IKT*

You Have Been Assisted By An AMATEUR RADIO OPERATOR.

We are part of a nationwide society devoted to technical investigation, communication, and public service. Since 1919, assistance to the public in time of need or distress has been the foremost tradition of the Amateur Radio Service. Amateurs are examined by the Federal Communications Commission, and their ability and competency is pre-determined before a license is issued.

For more information, Contact:
American Radio Relay League
225 Main Street
Newington,CT 06111

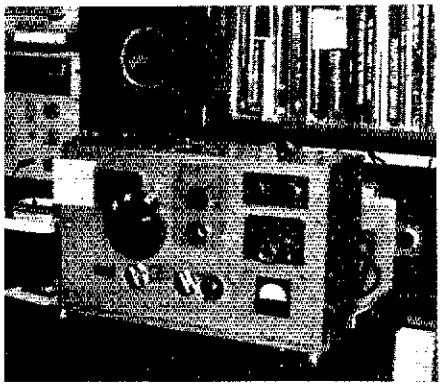
Courtesy of West Virginia State Radio Council

Public service and public relations make a good team, and the West Virginia State Radio Council is spreading the word with these cards. Hams from member clubs of the Council use them whenever they render assistance.

The Student Radio Club of Muskingum Area Technical College, Zanesville, OH has received its amateur license for station WD8DQA. Everett Jackson, Jr., WA8CZS, MATC's learning resources specialist, radio club moderator and station trustee (left), has been a ham for 15 years. Here he proudly shows the new license to Dr. Terry Puckett, president of the college, while electronics engineering student Janet Finch is at the controls.

One of the most noticeable booths at the recent fund-raising event for handicapped students at W. T. Clarke High School, Westbury, NY, was this one, sponsored by the school club, WA2FLC. In operation from 7:00 P.M. to 11:00 P.M., the station handled traffic to all parts of the Long Island area, helping make the day-long event a huge success.

One of the more inventive QSL cards we've seen recently is that of WB6NMO. "Hasten to add," he scribbled on the back, "that *I* am the one *standing up*."



Daryl L. Waite, K9JPQ, may not have set any radio records but he does have a favorable ratio of miles per dollar! His transmitter, a $20 investment, is a modified Gates a-m broadcast VFO from about 1950 with approximately 30 watts on 160, 80 and 40 meters, and reduced output to drive an adventurer on 20, 15 and 10 meters. His NC300 receiver works with a Wurlitzer juke box amplifier (not shown) for a-m on 10 meters. Daryl is no. 3162 for the Bicentennial WAS award.

Feedback

□ 5BWAS no. 270 was issued to W8LBM, not WB8LBM, as reported in May *QST*.

□ The call sign for Sy Schlitt, page 62, May *QST* should be W2SL.

□ One of our editors goofed when calculating the metric dimensions for K6HMS's J antenna ("A Two-Meter J Antenna," by W. B. Freely, *QST* for April, 1977, page 35). Readers wishing to know the metric equivalents of the correct English dimensions may calculate them by multiplying each dimension by 2.54, instead of dividing like the editor did! Thanks to all who wrote in advising of the error.

Hints and Kinks

DUAL-BAND OPERATION WITH A 33-FOOT VERTICAL

One of the more popular antennas for use on the 40-meter band is a quarter-wavelength vertical fed against a suitable radial system. It has long been recognized that this antenna also makes an efficient low-angle radiator for the 20-meter band, offering a gain of a dB or two over a shorter quarter-wave monopole. A typical feed system for two-band operation is shown in Fig. 1. A relay, controlled from the operating position, allows the coax to be connected directly to the antenna for 40-meter operation or through the L-section network for 20-meter operation. The base impedance of the antenna on 20 meters is approximately 1000 + *j0* (see reference 1). The reactance values for the L network are easily calculated by using these data and *Handbook* formulas.

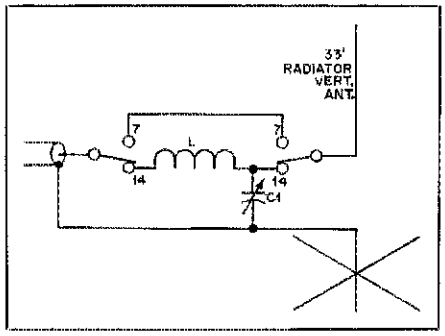


Fig. 1 — Antenna relay for operating antenna on 7 or 14 MHz.

Shown in Fig. 2 is a network that is presently used at the base of the writer's dual-band vertical. The significant departure from the system shown in Fig. 1 is that no relay is required. Operation of the modified network (Fig. 2) is easily understood if it is compared with the simpler L network of Fig. 1. The value of C1, the shunt capacitor, is the same in each network. The reactance of this capacitor at the lower band, 7 MHz, is about 450 ohms. Because this is high when compared with the low base impedance of 35 + *j0* of the antenna, it introduces an insignificant mismatch. The inductor of Fig. 1 has been replaced with a series-tuned circuit. This element has the same net inductive reactance at 14 MHz as does the inductor of Fig. 1. However, the resonant frequency of the series circuit is 7 MHz. Hence, the base impedance of the vertical is unaltered by the L1-C2 combination on the 40-meter band.

An iterative approach was used for adjustment of this network. Battery-operated QRP transmitters were used with an rf resistance bridge, allowing all measurements to be done on the roof where the antenna is located. The tap on the inductor was set for near maximum inductance and 7-MHz energy was applied to the bridge. C2 was tuned for minimum VSWR. Then 14-MHz energy was applied and C1 was tuned for minimum VSWR. The match at 14 MHz was poor, initially. The tap on the coil was then moved toward lower inductance. C2 was again adjusted at 7 MHz and C1 was tweaked with 14-MHz excitation. About six iterations of this kind yielded a good match on both bands. The tuning network is housed in a watertight metal box, a requirement of special significance in Oregon. The antenna itself is bolted in a chimney mount with plastic tubing used to insulate the radiator from the mounting brackets. The plastic tubing was the type normally used with golf clubs and is available in most sporting goods stores.

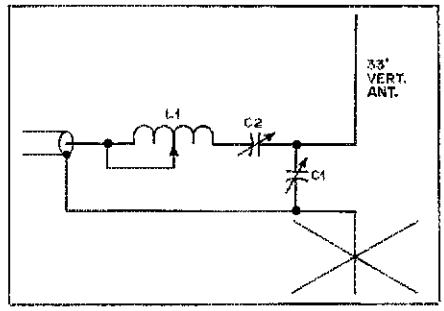


Fig. 2 — Modified L network for dual-band operation.
C1 — 5-80 pF air-variable capacitor.
C2 — 20-300 pF air-variable capacitor.
L1 — 5 mH (maximum) air core.

This matching method is undoubtedly not new, although this writer has found no written reference to the application. Using the data for base impedances of vertical radiators presented by Laport (see reference 1), several other cases were studied. The general conclusion reached was that a suitable network could be found to match any practical radiator simultaneously on two bands. It is not necessary that the radiator be resonant on either of the two bands. In the general case the adjustment procedure will not be as straight-forward as that used with the writer's antenna. — *Wes Hayward, W7ZOI*

1) Laport, E. A., *Radio Antenna Engineering*, McGraw-Hill, New York, 1952.

GALVANIC ACTION AND GROUNDS

Whenever two dissimilar metals are in contact, there is a strong possibility of galvanic corrosion. In the presence of moisture a battery is formed, and the more active metal is destroyed. For example, if copper ground radials are connected to a galvanized tower, a copper-zinc battery is formed and the zinc galvanizing is rapidly eaten through.

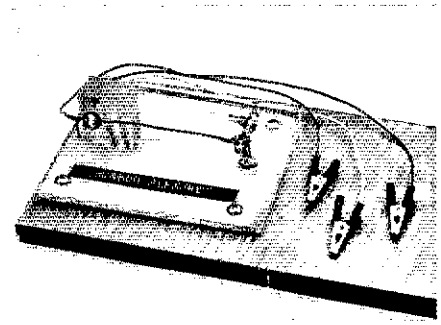
This process can be stopped by introducing a "sacrificing anode" of a more active metal such as aluminum. Bury an old chassis or cooking pot after connecting it to one of the tower legs with a short length of wire. The aluminum will corrode instead of the tower.

Periodically, check the condition of the aluminum and the connections. Faulty connections might become a source of TVI. — *Paul Zander, WB6GNM, ex-WA8JCM*

SUNDAY, AND NO WAY TO PADDLE

As I put the finishing touches on my Accu-Keyer on a Sunday afternoon, I was still without the needed paddle. Radio supply stores were closed and there was a lack of money, anyhow. What was the alternative? In desperation, the junk box was raided. All the necessary material to make a paddle was found.

The treasures included some Plexiglas from an old storm window. Super Glue became the bonding agent. A plastic ice scraper was used as the base.



The WD8BDQ keyer paddle.

What resulted from my effort was a thing of pleasure. Here is a picture of the original contraption. It is easy to operate and quite satisfactory at most keying speeds. With equipment prices so high these days, it may be worth making a similar unit for your keyer. I was so pleased with mine that I built another (including a case) for use as my permanent keying mechanism. — *Craig V. Iansiti, WD8BDQ*

REMOVING TRANSISTORS FROM PC BOARDS

In order to rapidly remove transistors from pc boards with a minimum amount of damage to the boards, three tools are required. They include a low-heat 20-watt soldering iron, a desoldering bulb, and curved or needle-nosed pliers.

Here is the technique. Place a soldering bridge across two elements of the transistor, using the two closest foils. With the pliers gently pull the transistor while applying the

soldering iron to the other two elements. As heat is transferred to the three elements, the transistor will give slightly, and when the solder is liquified, the component can be removed. After removal of the transistor, clean out the holes in the foil and remove the solder bridge with the desoldering bulb.

When removing transistors which have four leads, gently rock the transistor with the pliers while applying the iron alternately between the leads, heating two at a time. Where pc boards contain eyelets, care must be taken that no more heat than necessary is applied in order to avoid pulling the eyelets from the board. – *Alan Illidge, VE3EJM*

FOR THE BIRDIES

For some time I have been plagued with birdies and scratching noise as I tuned my SB-102. Cleaning the worm drive in the LMO helped. The final cure consisted of fastening one end of a small coil of copper braid to the main tuning shaft. The other end of the braid was secured to a small spring that was attached to the chassis. I've experienced no trouble since. *Taylor Cowan, W4SZP*

EASY DOES IT

Here is a kink that I have successfully used to install a 2-meter magnetic-mount mobile whip at a fixed location. Solder four 19-inch copper radials to a tin-can lid that has been trimmed to the shape of the antenna base. Attach the tin-can lid to the antenna base and it will be held in place by the magnet. Hang the antenna at some convenient location and you have a ground plane unit ready for action. When you're ready to put the antenna on the car, with a flick of the wrist the radial assembly is removed. – *Loren Disper, K6DD*

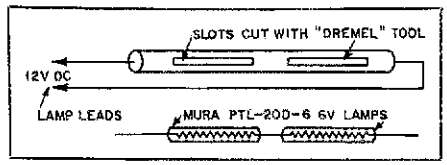
LEST WE FORGET

In order to remember upcoming events, I keep a small desk diary handy while reading my ham magazines and make notes of the events on appropriate pages. The diary, obtained from a stationery store, includes reminders for contests, special operating events, conventions, hamfests and local club activities. Magazine issues and page numbers are also noted for reference. By checking ahead in the diary every week, I have a complete schedule of all upcoming events at my fingertips. – *David Miller, WA3COS/9*

DISMANTLING TOWER SECTIONS

After two men using an automobile jack spent several hours trying in vain to separate three sections of a 100-foot Rohn tower, WD-40 was applied to the bolt holes. Thereafter, no difficulty was experienced in separating and removing the tower sections. This leads to another bit of advice. When erecting a tower, dab a lubricant such as Dow DC-4 on the mating sections to prevent them from rusting together thus aiding any future dismantling.

WD-40 is a silicone lubricant, available in spray cans. It is a product of the WD-40 Co., 1061 Cudahy Place, San Diego, CA 92110 and is available at many hardware stores. – *Dick Sander, K5QNY*



Mura lamps illuminate meters.

METER LIGHTS

Because the two panel meters on my mobile SWR bridge were not adaptable to back lighting, I used this simple scheme to illuminate them. A small slot was cut lengthwise in a piece of 3/16-inch aluminum tubing (available at hobby shops). Then, a Mura PTL-20D lamp was inserted in the tubing. The Mura lamp is tubular and has a filament that is about one inch long, sufficient to cover the face of the meter with light.

With two meters to illuminate, I installed two Mura PTL-20D/6 (6-volt) lamps in series. The entire lighting strip is then mounted over the top of the meters and the light is well distributed within each meter. Silicone sealant was used to glue the tube to the meter. Where only one meter is employed, a Mura PTL-20D/12 (12-volt) lamp is required. This method should work equally well for mobile or fixed-station equipment. – *Dick Shorwell, W7GDA*

EMERGENCY DIAL CORD

Twenty-pound test monofilament fishline makes a good temporary material for replacement of receiver dial cords. Use a bowline knot to form the ends of the loops. – *E. W. Ljonquist, W4DWK/W1CQS*

OILING HARD-TO-REACH PLACES

After finding it difficult to lubricate the dial-drive gears in my receiver, I devised this simple method of applying oil to parts that are not easily reached. I slightly enlarged the hole in the nozzle of a household oil can. Then I stripped about 3 inches of insulation from some hookup wire and inserted the insulation into the enlarged hole. The stretched hole in the oil-can tip tends to shrink back to the original shape, thus holding the insulation tightly. Now, I have an oiler with an extension tube capable of reaching many of those otherwise inaccessible spots. – *W. Myerson, WA1QON*

REFINISHING EQUIPMENT

I had considered having my Drake R-4C refinished to match the appearance of a brand-new companion, the Drake T4-XC. It occurred to me, however, that complete refinishing might not be necessary. My easier approach was to apply some "Future" water-white acrylic floor wax to the exterior surface with a damp sponge. The resulting appearance was great! Being a water-based acrylic emulsion, it should not harm any existing finish on either old or new equipment. The original sheen of the paint is restored without any trouble. Of course the older the original finish, the harder it is to restore it this way. Yet, this method should eliminate any stripping and repainting operations due to loss of gloss.

One should exercise care to keep cups of hot coffee, soda pop and the like off the acrylic, since they will soften it. Also be sure to stay only with *water-based* polish, since solvent dispersions (E6 Aerosol) could, and usually will, destroy the enamel. – *Paul Reiter, WA7RKJ*

MODIFYING THE W1CER/W1FB AGC LOOP FOR USE WITH MOSFET I–F AMPLIFIERS

I recently built a modified version of the "His Eminence the Receiver" which appeared in June and July *QST* for 1976. I wanted to use FT0601 MOSFETs in place of the CA3028A i-f amplifiers, so it was necessary to modify the age-loop circuit to provide the desired control-voltage amount and swing. I used a 9-MHz i-f, preferring that to the original 455-kHz scheme used by the author of the receiver article.

My MOSFETs are biased by means of 2.1-V Zener diodes. They are placed in the source leads of the FETs to force the gate-2 voltage negatively with respect to the source voltage. This permits full age action, a condition which would otherwise not prevail. My circuit changes for the age section of the *QST* receiver are shown in Fig. 1. – *Georges Ricaud, F6CER, REF Magazine staff*

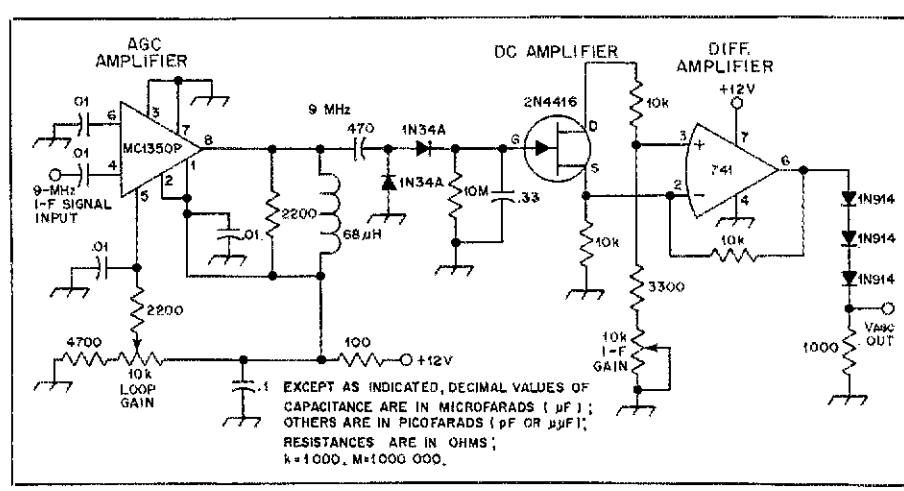


Fig. 1 – Modification of the W1CER/W1FB age loop.

Educators Learn About OSCAR and Amateur Radio

Yes, teachers can learn too. A day-long conference at Kennedy Space Center taught the participants that amateur radio and OSCAR are educational tools worth using.

By Joel P. Kleinman,* WA1ZUY

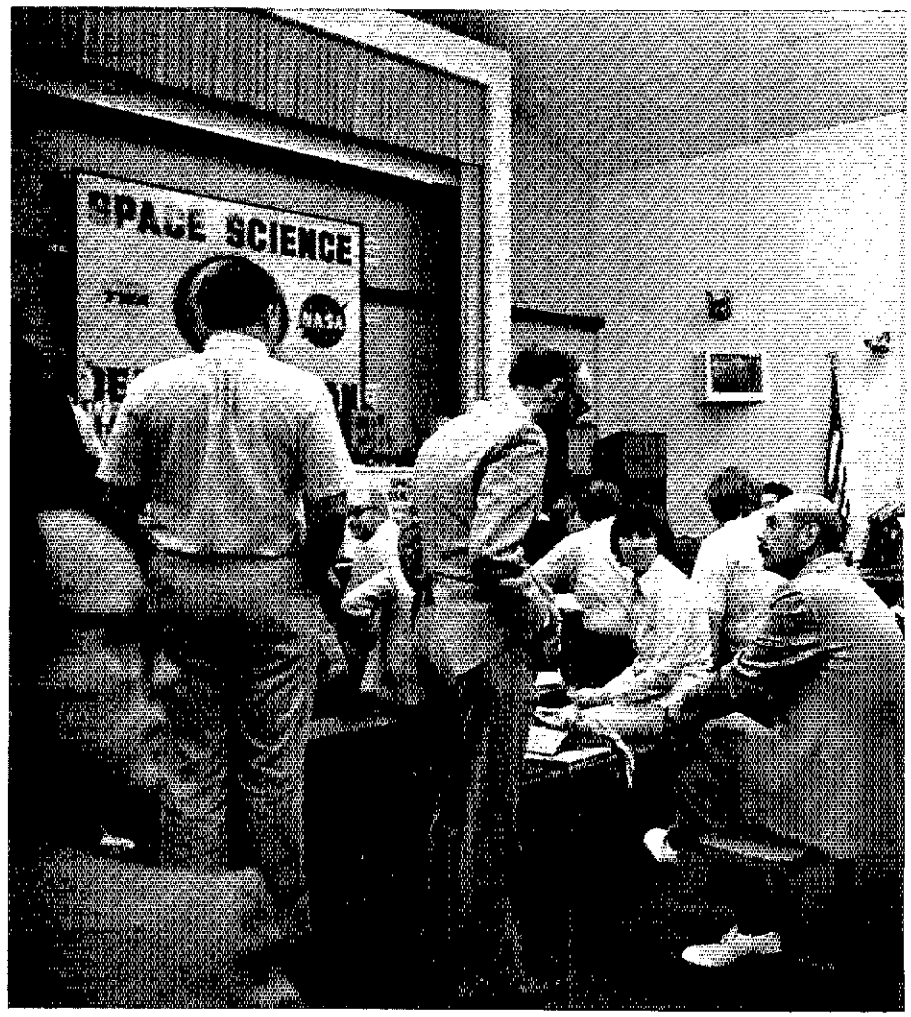
Using amateur radio may not be the most obvious way to teach social studies. But after attending a day-long conference on the uses of amateur radio and OSCAR in the classroom, more than 100 teachers have discovered that it may be the most effective. Held February 21 at the NASA Kennedy Space Center, the conference attracted educators from Georgia and Texas as well as Florida, all of whom were looking for ways to bring "the real world" into their classrooms.

A social studies teacher who uses amateur radio to bring his students into direct contact with the subjects they are studying told of a valuable lesson they learned one day while chatting with a VP8. One of his students asked the amiable islander, "Why would anyone want to live so far away?" His reply, "Far away from what?" Lou Hoekstra, W1TRB/4, told his audience that students grasp history and geography much more easily if they have a way to experience it firsthand, and amateur radio is his way of doing it.

Concentrating on OSCAR's varied educational uses, Lester Dwyer, W4ZJX, showed how easily teachers can tune in the spacecraft, bringing a taste of the space age right into their classrooms. Using the *Space Science Involvement* curriculum supplement, he provided a thorough introduction to the satellite's applications in the areas of science, math and foreign languages.

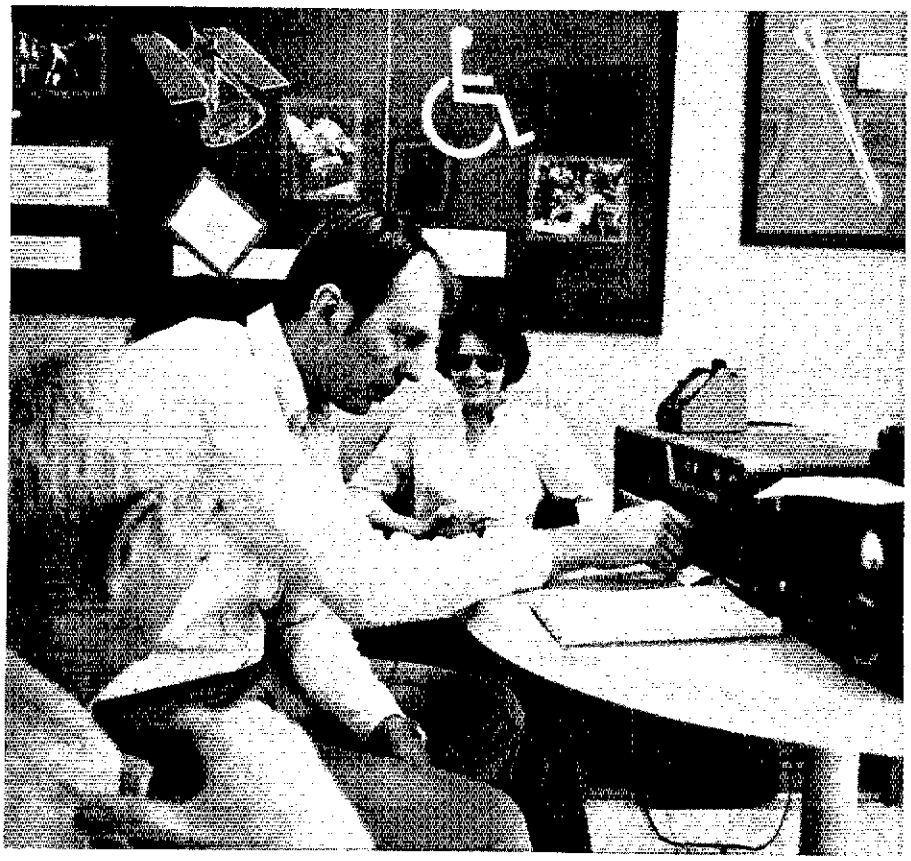
Early arrivers were treated to a live OSCAR demonstration, via the Kennedy Space Center's satellite console, WB4ICJ (see accompanying article). After this writer briefly introduced the amateur satellites, OSCAR 7 came down over the western Atlantic at about 11:00 A.M. — right on schedule. AMSAT volunteer Fred Merry, W2GN, greeted conference participants from his QTH near Albany, NY. The console performed flawlessly as KSC employee Chris Adams, WA4LHK tuned in OSCAR's telemetry beacon and although most of the audience had never heard sideband, no one had difficulty picking up the satellite's voice and code signals.

The afternoon session featured a live transmission from the amateur station at the Smithsonian Institution, NN3SI, in Washington, DC. While QRN on the 20-meter ssb contact detracted from its effect, the educators learned a bit about propagation and how amateur radio is used to provide reliable communication over long distances.

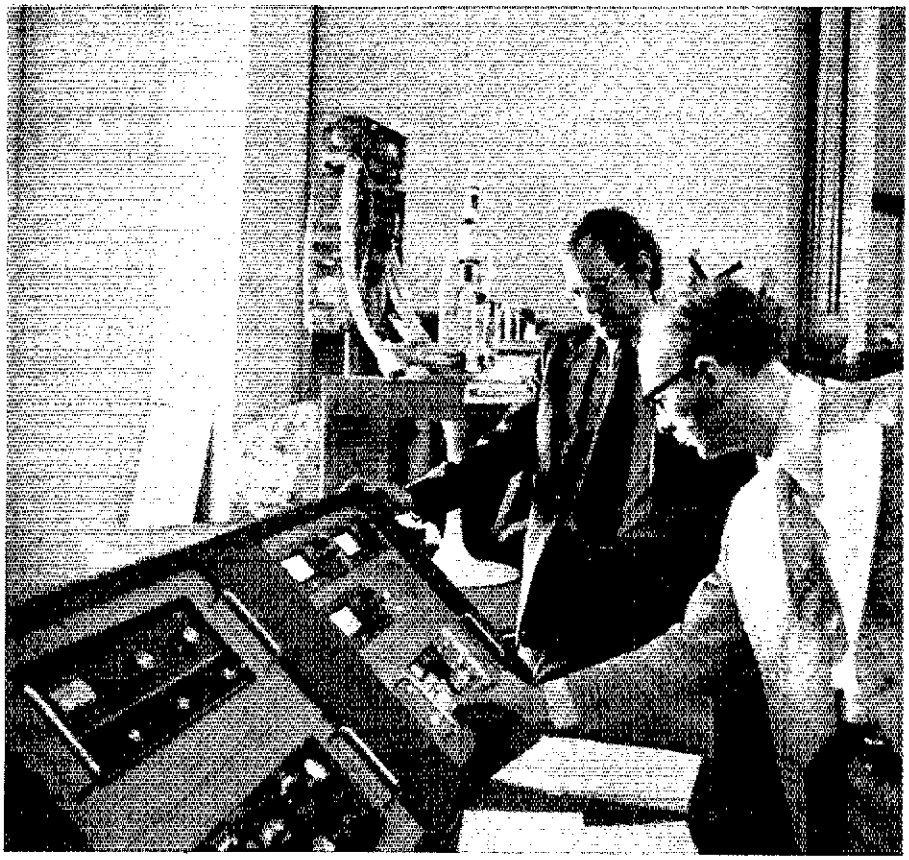


A sampling of conference participants wait for the morning session to begin. At center, WA2INB chats with Dr. Glenn Tucker, WB4DAH, a science consultant for the State of Georgia, one of many educators who are active hams. *(WA5GNB photo)*

*Editorial Assistant, *QST*



J. D. Collner, W4GNC, looks intent on making an impressive contact for the benefit of his audience of visitors outside the lecture hall, Kennedy Space Center. Other members of the Indian River Amateur Radio Club loaned equipment and manned stations during the conference. *(WA5GNB photo)*



Hq. participants WA1ZUY (left) and WA2INB try out the OSCAR console at WB4ICJ. Note the rocket models and robot on the stage in the background. *(WA5GNB photo)*

Members of the Indian River Club — which provided antennas, several kinds of amateur gear and many energetic bodies for the conference — chat with visitors in front of the club trailer. It is used extensively for demonstrations on Field Day and for SET. Club members who participated included W4s FL, DXZ, GNC, ZER, OBR, MFH, LJB and BFQ; WA4MMD, K4s TF, JFP and YS (president); WB4IMA; KØBZV/4 and WA5MY1/4. Members of other clubs included K4s ADB, DDY, EMI; W4s SK and UUM; WB4s LHK, MEQ, BXJ and CHC. *(WA5GNB photo)*

Members of two local clubs, the Indian River ARC and the Brevard Repeater Association, collaborated on the 20-meter QSO. Using a 2-meter Handie-Talkie link between an hf rig outside the lecture hall and another one inside, the volunteer hams relayed word that contact had been made with NN3SI without disturbing the speaker.

Antennas for the hf gear were set up on the Indian River Club's trailer parked outside (see photo). It attracted a host of curious tourists eager to find out about those strange antennas and cables.

Other highlights of the day-long conference included an OSCAR slide presentation by ARRL Educational Programs Manager William Dunkerley, WA2INB, and a showing of the film, *Moving Up to Amateur Radio*. Each participant was given a packet of League educational material as well as the names and addresses of their new partners, local hams. Several teachers who attended have expressed interest in holding live OSCAR demonstrations at their schools, while Lou Hoekstra's hometown school board was sufficiently impressed with his work to purchase amateur radio gear for two junior high schools and one high school in Orange County, FL.

Co-sponsored by the ARRL and NASA, the conference achieved its intended goals, and then some. Several KSC lecturers have begun learning how to operate the OSCAR console and are well on their way to the Technician license. As a result, the 1.2 million annual visitors to Kennedy Space Center may soon see regularly scheduled live OSCAR demonstrations, bringing them an exciting — and relevant — facet of amateur radio. QST

See OSCAR and Lots More at Kennedy Space Center

The focal point of the U.S. space program, NASA's gigantic facility is bound to be a highlight of any trip to Florida. And while you're there, say hello to OSCAR.

By Charles J. Harris,* WB2CHO

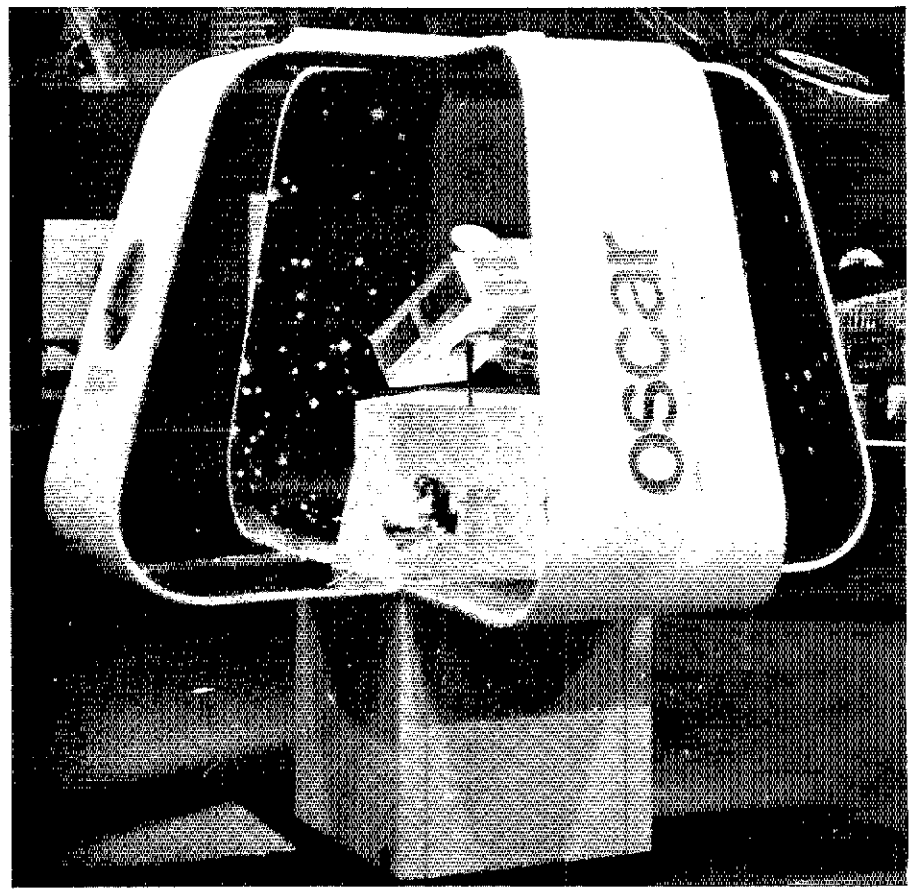
Sprawling over 140,000 acres of meadows, beaches and swampland, NASA Kennedy Space Center looks more like a wildlife preserve than the launch site of moon rockets and Mars probes. Much of it, in fact, is a wildlife refuge. You don't have to look too closely, however, to find evidence of the U.S. space program – and amateur radio.

How does amateur radio fit in? With OSCAR, its contribution to the space age. To start, there's a model of AMSAT-OSCAR 6 right inside the attractive visitors' center (see photograph). A visitor-activated tape recording gives a vivid introduction to the amateur satellites and amateur radio, and the tape and revolving model are consistent crowd pleasers. The display was a gift to NASA from the ARRL.

OSCAR Via WB4ICJ

Nearby, in the lecture hall used for regularly scheduled space science demonstrations, you'll see a blue console housing a sophisticated satellite ground station. With high frequency capabilities added as an extra (just the opposite of most stations), the console's main purpose is obvious – to access the tiny amateur satellites called OSCAR.

A Collins KWM-2 transceiver is used to transmit, via a Swan TV-2 transverter, on the 2-meter uplink. Illuminated push buttons allow independent use of the transceiver for hf work. OSCAR is received on a Kenwood R-599 receiver, fed with a Janel 10-meter preamplifier. The satellite's telemetry beacon never fails to register Q5, the sign of a top-notch OSCAR station.

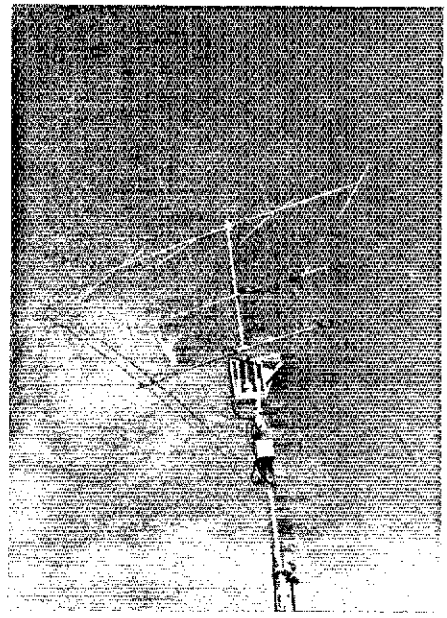


AMSAT-OSCAR 6 can be seen at the center of the attractive and educational amateur satellite display at Kennedy Space Center. A recorded message tells visitors what OSCAR is all about, while the satellite rotates on its axis. Formerly located in the Hall of Satellites, as pictured here, the display has since been moved to a prominent area in the nearby visitors' information center.

The antenna system employs a three-rotor tracking arrangement. Two rotors at right angles form a standard azimuth-elevation (az-el) pointing system, while a third, also at right angles to the first, swings the antenna through the satellite pass. To track OSCAR as it speeds overhead, the antenna is pointed at the center of the pass with the az-el rotors. The tracking rotor then swings the antenna array along the arc of the track. The chief advantage to this system is that a single rotor control provides precise tracking during the

*Club and Training Manager, ARRL

Two of the space science lecturers who make lively and informative presentations several times each day admire the OSCAR console that brings the exciting world of communications satellites into the lecture hall.



The three-rotor antenna system that follows OSCAR across the sky. Note the circularly polarized 2-meter uplink antenna in the midst of its larger neighbors.

pass. The azimuth and elevation rotors are reset between passes.

The antennas themselves show the same lack of compromise which characterizes the rotor system. The 2-meter uplink is fed into a 20-element, circularly polarized beam. The 10-meter downlink signal is captured by a four-element quad. Almost dwarfed by the satellite array, two-element monoband beams for 15 and 20 meters occupy bottom priority on the motorized crankup tower. The whole system ducks down behind the visitors' center during hurricane season.

You Can Use It

Operating the station is a pleasure. With the az-el rotors centered on the highest point of the upcoming satellite pass (based on a specially generated computer printout of az-el tracking data), little is left to chance. Full duplex operation during the pass makes tuning easy, as you can compensate for Doppler shift while you continuously monitor your signal. Complete az-el tracking is accomplished by means of a single rotor control. Just a light tap every few minutes keeps the satellite within the usable beamwidth of the array. The circular polarization nearly eliminates fading due to polarization changes.

Anyone with a Technician or higher class amateur radio license can operate the club station. Just bring your original license and arrange your visit to avoid conflict with scheduled lectures. If you have never operated through the satellites before, you are in for a real treat. Even longtime satellite enthusiasts will enjoy the ease of operation from Kennedy Space Center's satellite ground station. "CQ OSCAR CQ OSCAR from WB4ICJ . . ."

Aside from the model of OSCAR 6, the visitors' center provides a firsthand look at what the space age is all about. Attractive and functional displays range from a scale that gives your weight all over the solar system (look out for Jupiter!) to spacecraft whose blackened re-entry pads show they have survived an actual space flight. The Hall of History, featuring models of many types of spacecraft, will keep visitors of all ages spellbound for hours.

When you hear the announcement for the next space science demonstration, head to the lecture hall. Both educational and entertaining – the one this writer saw featured a functional robot – the demonstrations show graphically how our knowledge of outer space helps us here on earth. The friendly and knowledgeable lecturers keep the show lively and are eager to answer questions from the audience, which invariably includes children of all ages. Just across the hall, you can see a continuous series of films, all with a space theme.

Once you've seen what's inside, you'll want to join most of the 1.2 million annual visitors and take the three-hour guided bus tour of the giant facility. Highlights include lonely gantries that stand poised for future space missions, the Mission Control Center with its thousands of colored lights and giant map of the world and the enormous Vehicle Assembly Building, where Saturn V rockets are readied for launch.

Like Disney World, located 60 miles to the west, Kennedy Space Center will enthrall all members of the family, be they hams with a bent toward OSCAR or kids who love rockets. QST

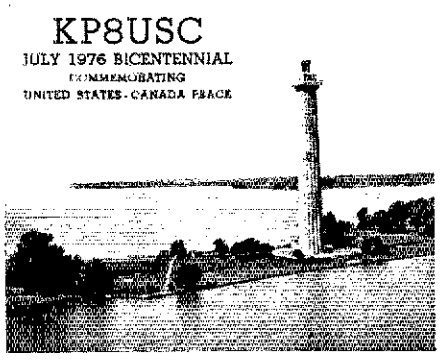
Getting High for the Bicentennial

Born on a lazy summer day, a wild idea turns into a noteworthy promotion for amateur radio atop Commodore Oliver Hazard Perry's Memorial in the middle of Lake Erie.

By Stu Stephens,* W8KAJ

A hundred years after Commodore Perry's victory in the Battle of Lake Erie, a tower was built commemorating the event — and the unarmed frontier between the U.S. and Canada. Little did its builders realize that the nation's bicentennial would be celebrated atop its 317-foot-high observation tower by a crew of amateur radio operators and a host of tourists.

With the help of a local congressman, the National Park Service and fellow members of Cleveland's Southeast Amateur Radio Club, KP8USC logged several hundred QSOs and made many new friends for amateur radio over the long holiday weekend. Perched near the top of the 352-foot-high Doric column, the station boasted a Drake



The Peace Memorial is shown rising 352 feet above Lake Erie on KP8USC's QSL card. It is located on an island in the western end of the lake, between Cleveland and Toledo.

TR3 and an all-band vertical antenna. Another station at the visitors' center at the monument's base provided a reliable 24-hour operation that was well protected from the elements.

*2386 Queenston Road, Cleveland Heights, OH 44118

The idea of operating from the "column," officially named Perry's Victory and International Peace Memorial, came to this writer one day during the summer of 1975 while cruising by in my 12-foot open sailboat. Such fabulous visions as an 80-meter quad, *rotatable,* or even a five-eighths wave 160-meter vertical *top-loaded,* danced in my head. After months of procrastinating, I broached the subject at a meeting of the Southeast Club. Initial reaction wasn't promising — many had never heard of the memorial, and most could not make the hundred-mile drive plus ferry trip for just a day's operating.

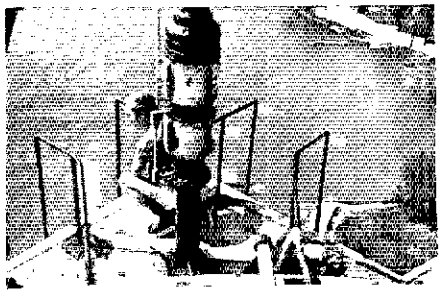
Undaunted, a few of us kept the idea alive, and the project soon took form. A special call sign was obtained — KP8USC: USC for United States/Canada, KP8 for peace, and because it could easily be confused with KP4 and KP6! Some guys will do anything for contacts . . . .

The National Park Service gave its blessing only two days after permission was asked, and we were on our way.

At the National Park Service's urging, an all-band vertical took the place of the exotic ones this writer had imagined. Down below at the visitors' center, NZD and this writer assembled the considerable odds and ends for the second and third positions: HQ-170, Swan 260, courtesy of Henry Radio, Ameco cw transmitter, GPR-90, two antenna tuners and my old Gotham V80 vertical, stake mounted. Housed in a corner of the center, we hosted a steady and curious stream of visitors for three days. Many of them came away with a newly awakened interest in amateur radio, thanks to the League's posters and printed material.

Unfortunately, conditions were hardly outstanding, interfering with our quest for DX contacts. The column station functioned primarily on 20 and 40 ssb, with rather notable results. There were peak times of 30 to 90 minutes where pileups ran two to four deep. At other times, we couldn't buy a QSO — our low-radiating vertical was plopping up 59, 500 miles due west of San Francisco or smack in the middle of the Bermuda Triangle. The longest DX was a lone PY7, though it was fun to have an FG7 calling us on 20-meter cw.

After two full days of operating, Sunday evening featured an impressive fireworks' display that provided what were perhaps this writer's most pleasant memories — operating a fairly decent opening into the west on 20 meters, while looking over the ledge to 30 miles of lights, distant fireworks and stars.



WA1SNJ seems unperturbed by the drop as he secures the vertical atop the monument. Others who operated or assisted included K8RBV, W8KAJ, WB8CHU, WB8SKC, W9NZD (ex-W5TTH) and K9KOM, plus assorted spouses and offspring.

After a few final QSOs, Monday morning saw our tired crew hurriedly reassemble, pack gear and children, and head for home.

In two full days of operation, KP8USC yielded 301 QSOs, 45 states, seven provinces, seven countries and two mild cases of sunburn. QST

Assessing the CD Appointment Structure

Part 1: No, this article is not about civil defense. It is about the ARRL Communications Department and its structure of appointments — and some considerations for restructuring.

By George Hart,* W1NJM

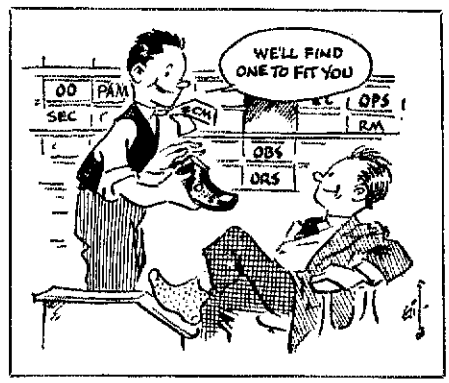
Since its earliest days, the ARRL has provided the framework for hams' organized efforts at example-setting, self-enforcement, and public service in their on-the-air operating. The League's Communications Department (CD) is responsible for encouraging these activities, and more besides. With today's rapid growth and the development of new amateur operating interests, the CD field organization of elected officials and appointees - the structure of which has been left basically unchanged for decades – is faced with new challenges. Is the appointment structure relevant to today's amateur radio? Are some changes needed? Or is the whole concept as outmoded as a spark-gap transmitter?

In the first installment of this two-part series, Communications Manager W1NJM describes the present appointment structure and explains how it has evolved. The second part, to appear in a subsequent QST, *will suggest some changes and solicit your comments.*

Not interested? Think again! If you're an active amateur who hasn't been attracted to CD programs, but who recognizes the need for Official Observers, Emergency Coordinators, and the like, you're just the kind of member we're talking to.

There is a song which has a line, "Let's start at the very beginning, a very good place to start." The concept of the first ARRL "official" appointment came into being on that day in 1914 when Hiram Percy Maxim found his spark transmitter unable to reach Springfield from Hartford, a distance of approximately 30 miles. Wishing to get a message to Springfield, he contacted an amateur in Windsor Locks, about halfway between, and asked him to relay. The function was accomplished and started the Maxim thought-gears in motion. Yes, that's where the "Relay" comes from in ARRL, and that amateur in Windsor Locks, whose identity doesn't seem to have been recorded, was the first "relay" station of ARRL. Today, there are over a thousand of them. They are called Official Relay Stations, ORS.

Of course, that was a long time ago and a lot of things have happened since then; but from that start, through a lot of historical machinations, we now have a CD appointment structure of about 5,000 licensed League members, all under the jurisdiction of 74 elected Section Communications Managers (SCM). The structure consists of five basic and five leadership appointments, each dedicated to enhancement of some on-the-air operating phase of amateur radio.



While the various appointments have different eligibility requirements, any class of amateur licensee is eligible for at least one of them.

Different Kinds of Appointments

The above are not the only kinds of appointment within the ARRL field structure. Appointments are also made by the president, by directors and a few by ARRL headquarters staffers. Roughly, they can be divided along on-the-air and off-the-air lines. The on-the-air appointments are administered by the CD. Off-the-air appointments are handled through other departments or persons or groups – appointments such as assistant director, advisory committee member, public relations assistant, technical assistant. These are important appointments, but are not part of the scope of this article. What we are talking about here are SCM appointments for on-the-air operating activities. Let's keep the two separate for discussion purposes, even though they can be held by the same person.

SCM Appointments

You know all about SCMs, of course? You don't? Well, read the article on page 61, *QST* for January, 1977, for a full education on the subject. As you will note therein, SCMs have a raft of functions, but one of the most important is the appointment of amateurs to set the standards in certain on-the-air fields. He has two kinds of appointees: basic and leadership. A complete rundown appears in Fig. 1.

What Do the Appointees Do?

Holding an appointment is an honor, but there is nothing honorary about the appointment's requirements and commitments. Sure enough, a certificate is part of the deal, and a special colored-background ARRL membership pin is

*Communications Manager, ARRL

Fig. 1

SCM Appointment Information

BASIC APPOINTMENTS	*LICENSE REQUIREMENT*	*OTHER REQUIREMENTS*	*FIELD OF OPERATION*
Official Relay Station (ORS)	General	15 wpm code speed	Traffic handling (cw)
Official Relay Station II (ORS-II)	Novice	10 wpm code speed	Traffic handling (beginner)
Official Phone Station (OPS)	General	None	Traffic handling (phone)
Official Bulletin Station (OBS)	Technician	None	Bulletin transmission
Official Observer (OO)	General	4 years' experience as General class or higher	Self-regulation notices
Classes I thru IV			
Class V	Technician	4 years' experience as Technician class or higher	
Official VHF Station (OVS)	Technician	None	Traffic and on-the-air experimentation (vhf)
LEADERSHIP APPOINTMENTS			
Emergency Coordinator (EC)	Technician	None	Emergency organization (local)
Route Manager (RM)	General	15 wpm code speed	Traffic organization and net management (cw)
Phone Activities Manager (PAM)	General	None	Traffic organization and net management (phone)
Phone Activities Manager — vhf	Technician	None	Traffic organization and net management (vhf)
Section Emergency Coordinator (SEC)	General	None	Emergency organization (section)
Assistant SCM (ASCM)	General	None	General assistant to SCM, or per assigned function

also available to appointees, along with some operating privileges. But appointment is not just a status symbol, as are operating achievement awards, plaques, pins, patches, etc., that you can display to show your importance or past achievements. SCM appointments require continuing performance to remain in effect.

Basic appointment holders are example-setters in their specialty fields, observing specific rules of deportment in pursuit of their assigned duties. Leadership appointees observe the same kind of rules, but in addition undertake leadership responsibilities in their fields. All appointees must report to their SCM every month and all must be ARRL full members.

There are many more details than we have room for in this article, but a handy-dandy little publication entitled *Operating an Amateur Radio Station* (free to ARRL members, for an s.a.s.e. and two units of postage, 50 cents a throw to others) explains it all. Every active amateur should have a copy.

Who Is Eligible for Appointment?

You are, if you are a full League member and interested in one of the fields shown in the right-hand column of the SCM appointment information.

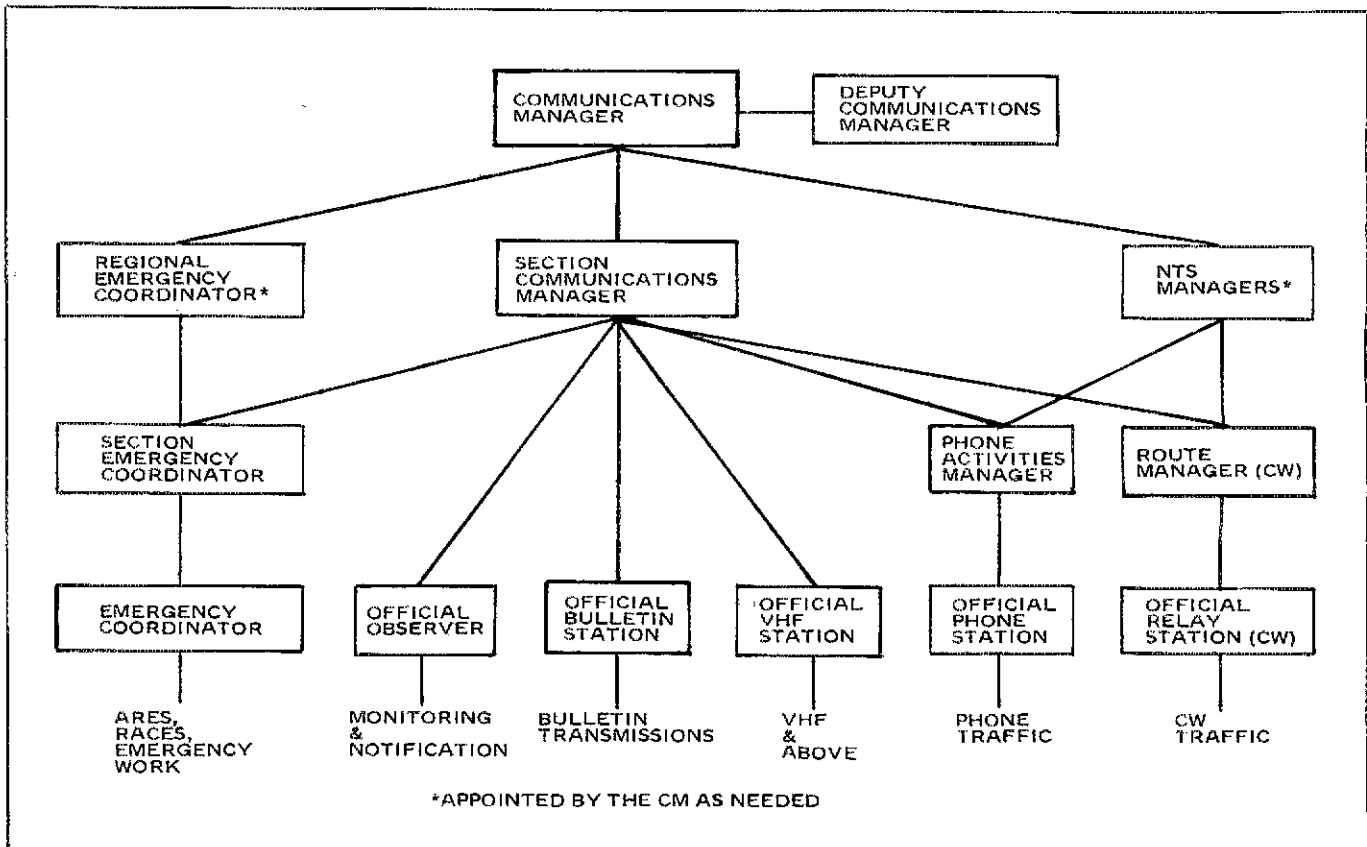


Fig. 2 — Diagrammatical representation of existing Communications Department appointment structure.

Fig. 1. While the various appointments have different eligibility requirements, any class of amateur licensee is eligible for at least one of them.

Please note that you do *not* have to be a League member to participate in an ARRL-sponsored program. You can take part, for example, in the National Traffic System (NTS) or the Amateur Radio Emergency Service (ARES) (see Fig. 2) or in any of a number of other regular ARRL-sponsored activities. Especially in the public service program (ARES and NTS) we encourage this because, although we want everybody to belong to ARRL, we would much rather have you participate as a non-member than not participate at all. Everybody is welcome.

How Do You Get an Appointment?

It's easy, if you're qualified. Just write your SCM for an application form. You'll find his address on page eight of any *QST*. He can also answer your inquiries, but SCMs are often busy people and can't handle all their correspondence, so initial inquiries might also be addressed to ARRL headquarters. We'll send you all info on qualifications and an application form, and you can take it from there. Just complete the form for the appointment of your choice and send it (or give it, if you see him occasionally) to your SCM. Then it's up to him.

Things Wrong with the Structure

Most of those holding appointments feel there is nothing wrong with the structure as it is, and a couple of proposals for changes promulgated through the *CD Bulletin* (a quarterly Hq. bulletin to all appointees) and opinion polls on the subject have been negative to most change proposals. Yet the criticism continues. Usually, critics contend that the structure does not seem to encompass some of the modern types of amateur radio operating, that it relates primarily to the service aspects of amateur radio, hardly at all to the "fun" aspects, whereas the emphasis today seems obviously toward the latter. Also, its topsy-like development has led to a number of inconsistencies (see box).

Things Wrong with the Present Structure

1) There are no appointments based on DXing or contesting, two of the more popular operating activities extant.

2) Repeater operating, OSCARing and on-the-air experimentation are similarly without specific recognition in existing appointments, although all three are considered important to amateur radio's future.

3) The traffic field holds two basic appointments, the emergency field none.

4) Some of the appointments are based on mode (ORS and OPS), some on basic function (e.g., traffic and observing), some simply on the part of the spectrum utilized (e.g., vhf). Shouldn't we decide on a single basis for appointment and adhere to it?

5) Existing appointments seem to suppress versatility rather than encourage it.

These inconsistencies, and possibly others we have overlooked, have occurred through the years mostly as a result of membership demand. Every new development in amateur radio acquires its advocates, who recruit others, who then become numerous enough to become a pressure group, and the pressure starts for special considerations. Sometimes it reaches policy-making levels (i.e., the Board of Directors), sometimes it is relieved by action at headquarters level – action that is really *re*action more often than it is leadership innovation. Insofar as this process affects appointments, it has sometimes led to creation of new concepts that turn out to be at best temporary, at worst ill-advised.

Responding to pressure and demand from the membership is one of the things we do a lot of at Headquarters, and there is certainly nothing wrong with this. Yet, some critics feel that the Headquarters people, hired because they have expertise in their specialized fields, should do more innovating, more leading and less reacting. On at least two occasions we have proposed innovative changes in the structure, only to be turned down by the appointees themselves.

A New Proposal

So we intend bringing the problem to the general membership through the medium of this, your official membership journal. We know that the existing holders of appointments, by and large, want the setup to remain pretty much the way it is. We know this because we asked them, in at least two *CD Bulletin* polls. But how about the rest of you operating members? Wouldn't you like to contribute to the well-known amateur radio expertise and become example-setters in the fields in which you prefer to operate? What do we need to do in order to bring our appointment structure up-to-date? We'll tackle these considerations in the second part of this series. QST

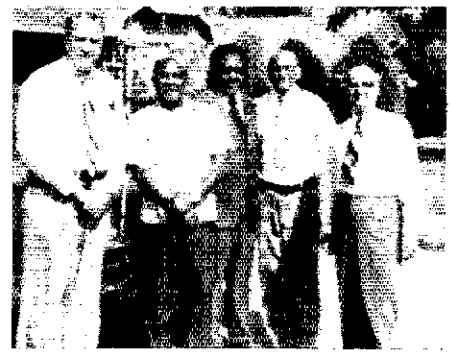
Strays

□ Twenty thousand residents of Washington state now associate amateur radio with public service, as that number of litter bags with the notation "Please Don't Litter – a message from the Amateur Radio Broadcasters of Washington State" have been distributed at neighborhood clean-up projects and amateur radio public-service events. The brainchild of Northwestern Division PRA John Brown, W7CKZ, the litter bags were also given to service stations for free distribution. The project tied in nicely with his job with the State Department of Ecology.

Since moving to the Division of Travel Promotion, he has found new ways of combining promotion for his state and his avocation. A color poster showing Washington's scenic wonders has been decked out with a sticker advertising the upcoming Northwestern Division ARRL Convention in Seattle. "The only cost to the convention committee," Brown reports, "has been $90 for printing the small stickers. The postage and poster cost is from my budget because those sent out of state are classified as advertising tourism."

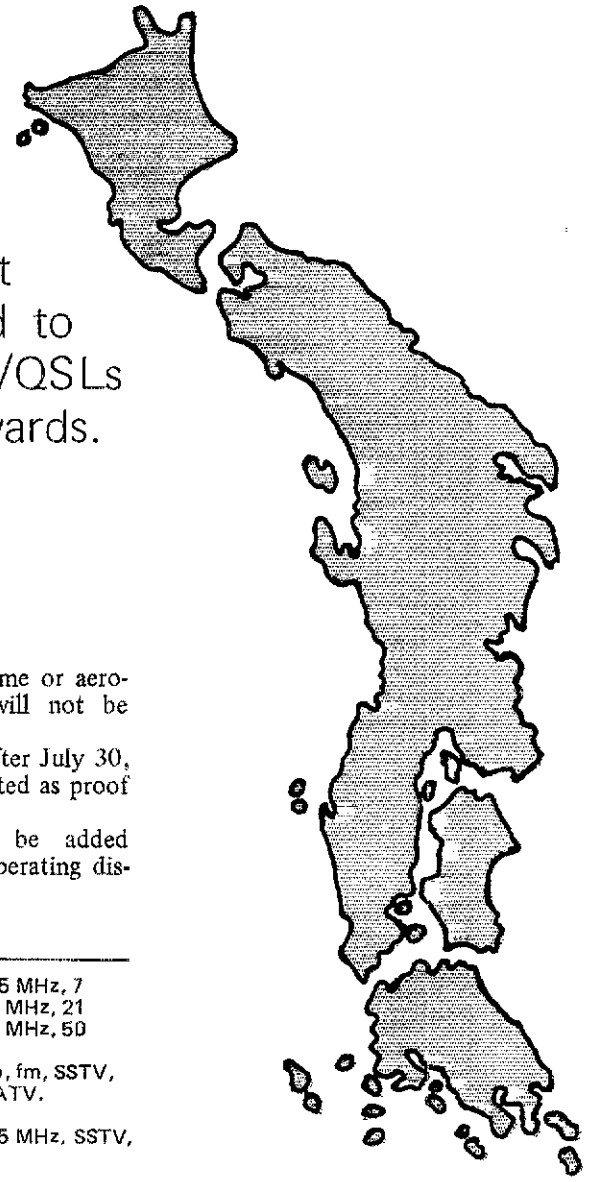
Not content with this, the dedicated PRA carries a large supply of business cards that proclaim, "Amateur Radio for Public Service." He has given them to policemen investigating highway accidents, people who ask about his HAM license plate and to answer general inquiries about ham radio. These are encouraged by a listing of his name, address and telephone number in the local service club guide under American Radio Relay League. He reports that the listing has brought requests for information from many CB organizations.

"These are a few ways," he writes, "that I promote amateur radio on half a shoestring!" Who says a good idea has to cost a lot of money?



During a trip from Los Angeles to Oklahoma City, WB5LHO followed WA6IAU mobile as he talked to WA5ZXB. A meeting was then arranged for WB5LHO's QTH in Oklahoma City. Relatively new at hamming, WB5LHO began his radio career at the age of 71. The five hams brought together by amateur radio are, left to right: E. Ray Long, W5TY, Oklahoma City clerk; Bill Black, WA6IAU, Los Angeles retired government worker; Don Davis, WA5ZXB, Oklahoma City lawyer; Douglas V. Magers, WB5LHO, retired Presbyterian minister, and Melvin Bolger, W5AXM, retired oil company worker.

The JARL Awards Program



Twenty is open to the north! That spine-tingling call to action can lead to JAs by the score. Use those QSOs/QSLs to collect a challenging series of awards.

By Ellen White,* W1YL

Ham radio is a popular way of life in Japan – just witness the fact that one out of every fourteen Japanese citizens is a licensed radio amateur! Their crowded island society has apparently led to their development as super courteous operators. They're disciplined and fun to work. Just as they find it challenging to chase W7s for an elusive Wyoming station so will you find it intriguing to look for specific prefectures for the WAJA, or cities for the JCC Awards. The Japan Amateur Radio League (JARL) Awards Program is both enjoyable and interesting as a side pursuit to your hobby.

JARL invites your participation too in their annual All-Asian Contest. This is an excellent opportunity to get started on the various awards. The "AA" phone session takes place June 18-19, and cw scheduled for August 27-28 (rules in May Operating Events).

I guarantee you'll collect many an *arigato* (thank you) before you're bid a polite *sayonara* (farewell).

All set? *CQ JA*!

Ground Rules

1) JARL awards will be issued on payment of a fee of 8 IRCs.

2) Each claim must be accompanied by a list showing the date of the two-way communications achieved for the award concerned.

3) Each list must be accompanied by documentary proof in the form of letters or cards showing that two-way communication has taken place, or by a statement from the applicant's national society or from any two amateurs other than the applicant himself that the necessary cards have been checked.

4) Cards will be returned by registered mail at no additional cost.

5) Contacts with maritime or aeronautical mobile stations will not be accepted.

6) Cards dated on or after July 30, 1952, only may be submitted as proof of contact.

7) Endorsements will be added upon request for earned operating distinctions as below.

AJD, SWL-AJD WAJA, HAJA, JCC, SWL-JCC, WACA, HACA	1.9 MHz, 3.5 MHz, 7 MHz, 14 MHz, 21 MHz, 28 MHz, 50 MHz. Cw, a-m, ssb, fm, SSTV, RTTY, ATV. Satellite
HAC, ADXA, SWL-ADXA	1.9 MHz, 3.5 MHz, SSTV, RTTY.

8) Contacts may be made from any location in the same call area, or if no call area exists then from the same country.

9) Contacts with KA stations will not be accepted (they are considered military, not amateur).

10) All correspondence should be sent to Awards Manager, Japan Amateur Radio League, P. O. Box 377, Tokyo Central, Japan.

Worked All Japan (WAJA)
Heard All Japan (HAJA)

This award may be claimed by any amateur (or listener) who can produce evidence of having made two-way communications with amateur stations located in all 47 Japanese prefectures.

All Japan Districts (AJD)

This award may be claimed by any amateur (or listener) who can produce evidence of having made two-way communications with amateur stations located in all (1 through 0) Japanese call districts.

Heard All Continents (HAC)

An SWL "special" which may be claimed by any listener who can produce evidence of having heard signals from amateur stations in all six continents.

Tokyo, the capitol, is one of the three largest cities in the world.

Asian DX Award (ADXA)

This award may be claimed by any amateur (or listener) who can produce evidence of having made two-way communications with amateur stations located in at least 30 Asian countries (according to DXCC rules) including Japan.

*Deputy Communications Manager, ARRL

Japan Century Cities (JCC)

This award may be claimed by any amateur (or listener) who can produce evidence of having made two-way communications with amateur stations located in at least 100 Japanese cities. The JCC-100, 200, 300, 400, 500, 600 will be issued as separate awards.

The most important Japanese ports are Yokohama, Kobe and Nagoya.

Worked All Cities Award (WACA)
Heard All Cities Award (HACA)

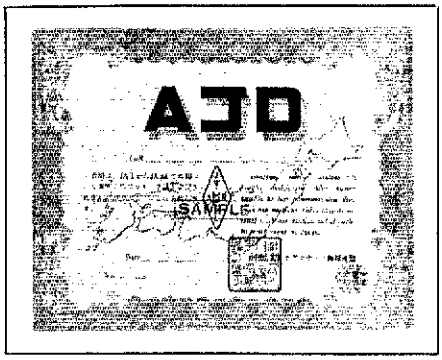
This award may be claimed by any amateur (or listener) who can produce evidence of having made two-way communications with amateur stations located in all existing Japanese cities. (Now *that* should keep you busy through several band openings!)

The 47 Japanese Prefectures

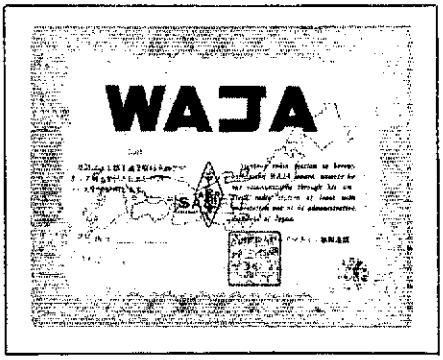
01	Hokkaido	25	Osaka
02	Aomori	26	Wakayama
03	Iwate	27	Hyogo
04	Akita	28	Toyama
05	Yamagata	29	Fukui
06	Miyagi	30	Ishikawa
07	Fukushima	31	Okayama
08	Niigata	32	Shimane
09	Nagano	33	Yamaguchi
10	Tokyo	34	Tottori
11	Kanagawa	35	Hiroshima
12	Chiba	36	Kagawa
13	Saitama	37	Tokushima
14	Ibaraki	38	Ehime
15	Tochigi	39	Kochi
16	Gumma	40	Fukuoka
17	Yamanashi	41	Saga
18	Shizuoka	42	Nagasaki
19	Gifu	43	Kumamoto
20	Aichi	44	Oita
21	Mie	45	Miyazaki
22	Kyoto	46	Kagoshima
23	Shiga	47	Okinawa
24	Nara		

Districts Prefectures

JA1	Tokyo (including JD1), Kanagawa, Chiba, Saitama, Ibaraki, Tochigi, Gumma, Yamanashi
JA2	Shizuoka, Gifu, Aichi, Mie
JA3	Kyoto, Shiga, Nara, Osaka, Wakayama, Hyogo
JA4	Okayama, Shimane, Yamaguchi, Tottori, Hiroshima
JA5	Kagawa, Tokushima, Ehime, Kochi
JA6	Fukuoka, Saga, Nagasaki, Kumamoto, Oita, Miyazaki, Kagoshima, Okinawa
JA7	Aomori, Iwate, Akita, Yamagata, Miyagi, Fukushima
JA8	Hokkaido
JA9	Toyama, Fukui, Ishikawa
JAØ	Niigata, Nagano

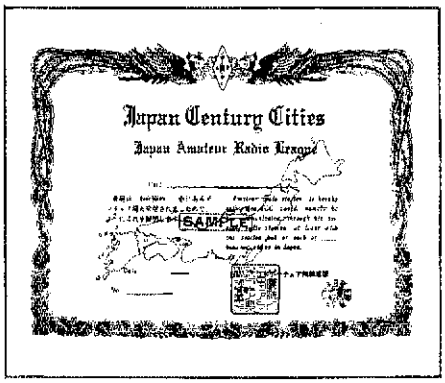


Here's a relatively "easy" one to start with, the AJD (All Japan Districts) Award. It's yours for proof of contact with all 10 Japanese call districts. You'll find this an attractive addition to the shack — it's 8-1/4" X 10-1/4", with a good looking green border.

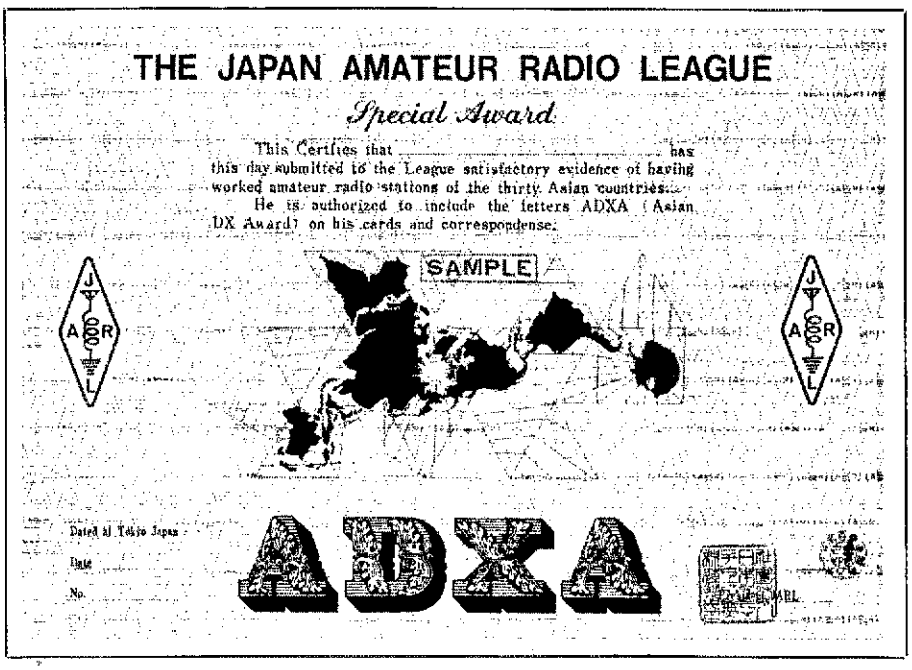


Want a challenge? Confirm a contact with a station in all the 47 Japanese prefectures! That's what the WAJA (Worked All Japan) Award is all about.

If you're a W7RM (or one of the "big sixes"), you'll be working lots of JAs as you strive for the WACA, Worked All Cities, Award. You'll have to confirm contacts with amateurs in *all* the existing Japanese cities!



The Japan Century Cities (JCC) Award is issued separately for contacts with 100 cities (JCC-100), 200, 300, 400, 500, 600. It is particularly attractive, with a gold border bearing the JARL logo, and an orange outline map of the Japanese islands in the background.



The ADXA Award (Asian DX Award) is the largest one in the group, 10 X 14", printed in red and black. This award may be claimed for showing proof of contact with at least 30 Asian countries.

Countries List for ADXA

A4 (MP4M)	Sultanate of Oman
A51 (AC5)	Bhutan
A6 (MP4T)	United Arab Emirates
A7 (MP4Q)	Qatar
A9 (MP4B)	Bahrein
AP	Pakistan
BV	Formosa
BY	China
CR9	Macao
EP	Iran
HM, HL	Korea
HS	Thailand
HZ, 7 Z	Saudi Arabia
JA, JE, JF, JG, JH, JI, JR	Japan
JD1 (KG6I)	Ogasawara Is.
JD1	Okino Tori-shima
JT	Mongolia
JY	Jordan
OD5	Lebanon
S21 AP	Bangladesh
TA	Turkey
UA9 UA0	A.R.S.F.S.R.
UD6	Azerbaijan
UF6	Georgia
UG6	Armenia
UH8	Turkoman
UI8	Uzbek
UJ8	Tadzhik
UL7	Kazakh
UM8	Kirghiz
VS6	Hong Kong
VU	India
VU2, VU7	
VU9	Andaman & Nicobar Is.
VU5, VU7	Laccadive Is.
XU	Cambodia
XV5, 3W8	Vietnam
XW8	Laos
XZ2	Burma
YA	Afghanistan
YI	Iraq
YK	Syria
1S	Spratly Is.
4S7	Sri Lanka
4W	Yemen
4X4, 4Z4	Israel
5B4, ZC4	Cyprus
7O VS9	South Yemen People's Rep.
7O VS9K	Kamaran Is.
8Q6, VS9M	Maldive
8Z4	Saudi Arabia/Iraq N.Z.
9K2	Kuwait
9M2 VS1, 9M4	West Malaysia
9N1	Nepal
9V1 VS1, 9M4	Singapore
	Abu Ail

Deleted Countries

AC3	Sikkim
AC4	Tibet
C9	Manchuria
CR8	Damao, Diu
CR8	Goa
FI8	French Indo-China
FN8	French India
KR6, KR8	Ryukyu Is.
VS9H	Kuria Muria
ZC6, 4X1	Palestina
9K3, 8Z5	Kuwait/Saudi Arabia, N.Z.
9M2, VS2	Malaya

Japanese Prefecture and City List (644 Cities as of April 1, 1974)

HOKKAIDO (01)
0101 Sapporo
0102 Asahigawa
0103 Otaru
0104 Hakodate
0105 Muroran
0106 Kushiro
0107 Obihiro
0108 Kitami
0109 Yubari
0110 Iwamizawa
0111 Abashiri
0112 Rumoi
0113 Tomakomai
0114 Wakkanai
0115 Bibai
0116 Ashibetsu
0117 Ebetsu
0118 Akabira
0119 Monbetsu
0120 Shibetsu
0121 Nayoro
0122 Mikasa
0123 Nemuro
0124 Chitose
0125 Takikawa
0126 Sunagawa
0127 Utashinai
0128 Fukagawa
0129 Furano
0130 Noboribetsu
0131 Eniwa
0132 Kameda
0133 Date

AOMORI (02)
0201 Aomori
0202 Hirosaki
0203 Hachinohe
0204 Kuroishi
0205 Gosho-gawara
0206 Towada
0207 Misawa
0208 Mutsu

IWATE (03)
0301 Morioka
0302 Kamaishi
0303 Miyako
0304 Ichinoseki
0305 Ofunato
0306 Mizusawa
0307 Hanamaki
0308 Kitakami
0309 Kuji
0310 Tono
0311 Rikuzen-Takada
0312 Esashi
0313 Ninohe

AKITA (04)
0401 Akita
0402 Noshiro
0403 Odate
0404 Yokote
0405 Honjo
0406 Oga
0407 Yuzawa
0408 Omagari
0409 Kazuno

YAMAGATA (05)
0501 Yamagata
0502 Yonezawa
0503 Tsuruoka
0504 Sakata
0505 Shinjo
0506 Sagae
0507 Kaminoyama
0508 Murayama
0509 Nagai
0510 Tendo
0511 Higashine
0512 Obanazawa
0513 Nan-yo

MIYAGI (06)
0601 Sendai
0602 Ishinomaki
0603 Shiogama
0604 Furukawa
0605 Kesen-numa
0606 Shiroishi
0607 Natori
0608 Kakuda
0609 Tagajo
0610 Izumi
0611 Iwanuma

FUKUSHIMA (07)
0701 Fukushima
0702 Aizuwakamatsu
0703 Koriyama
0704 Taira
0705 Shirakawa
0706 Haranomachi
0707 Sukagawa
0708 Kitakata
0709 Joban
0710 Iwaki
0711 Soma
0712 Uchigo
0713 Nakoso
0714 Nihon-matsu
0715 Iwaki

NIIGATA (08)
0801 Niigata
0802 Nagaoka
0803 Takada
0804 Sanjo
0805 Kashiwazaki
0806 Shibata
0807 Niitsu
0808 Ojiya
0809 Kamo
0810 Tokamachi
0811 Mitsuke
0812 Murakami
0813 Tsubame
0814 Naoetsu
0815 Tochio
0816 Itoigawa
0817 Arai
0818 Gosen
0819 Ryotsu
0820 Shirone
0821 Toyosaka
0822 Joetsu

NAGANO (09)
0901 Nagano
0902 Matsumoto
0903 Ueda
0904 Okaya
0905 Iida
0906 Suwa
0907 Suzaka
0908 Komoro
0909 Ina
0910 Komagane
0911 Nakano
0912 Omachi
0913 Iiyama
0914 Chino
0915 Shioziri
0916 Shinonoi
0917 Koshoku
0918 Saku

TOKYO (10)
1001 Tokyo 23 wards
1002 Hachioji
1003 Tachikawa
1004 Musashino
1005 Mitaka
1006 Ome
1007 Fuchu
1008 Akishima
1009 Chofu
1010 Machida
1011 Koganei
1012 Kodaira
1013 Hino
1014 Higashi-murayama
1015 Kokubunji
1016 Kunitachi
1017 Hoya
1018 Tanashi
1019 Fussa
1020 Komae
1021 Higashi-yamato
1022 Kiyose
1023 Higashi-murayama
1024 Musashi-murayama
1015 Tama
1026 Inagi
1027 Akigawa

KANAGAWA (11)
1101 Yokohama
1102 Yokosuka
1103 Kawasaki
1104 Hiratsuka
1105 Kamakura
1106 Fujisawa
1107 Odawara
1108 Chigasaki
1109 Zushi
1110 Sagamihara
1111 Miura
1112 Hadano
1113 Atsugi
1114 Yamato
1115 Isehara
1116 Ebina
1117 Zama
1118 Minami-ashigara

CHIBA (12)
1201 Chiba
1202 Choshi
1203 Ichikawa
1204 Funabashi
1205 Tateyama
1206 Kisarazu
1207 Matsudo
1208 Noda
1209 Sawara
1210 Mobara
1211 Narita
1212 Sakura
1213 Tougane
1214 Yoka-ichiba
1215 Asahi
1216 Narashino
1217 Kashiwa
1218 Katsu-ura
1219 Ichihara
1220 Nagareyama
1221 Yachiyo
1222 Abiko
1223 Kamogawa
1224 Kimitsu
1225 Kamagaya
1226 Futtsu

SAITAMA (13)
1301 Urawa
1302 Kawagoe
1303 Kumagaya
1304 Kawaguchi
1305 Omiya
1306 Gyoda
1307 Chichibu
1308 Tokorozawa
1309 Han-no
1310 Kazo
1311 Honjo
1312 Higashi-matsuyama
1313 Iwatsuki
1314 Kasukabe
1315 Sayama
1316 Hanyu
1317 Konosu
1318 Fukaya
1319 Ageo
1320 Yono
1321 Soka
1322 Koshigaya
1323 Warabi
1324 Toda
1325 Iruma
1326 Hatogaya
1327 Asaka
1328 Shiki
1329 Wako
1330 Niza
1331 Okegawa
1332 Kuki
1333 Kitamoto
1334 Yashio
1335 Kamifukuoka
1336 Fujimi
1337 Misato
1338 Hasuda

IBARAKI (14)
1401 Mito
1402 Hitachi
1403 Tsuchiura
1404 Koga
1405 Ishioka
1406 Shimodate
1407 Yuki
1408 Ryugasaki
1409 Nakaminato
1410 Shimozuma
1411 Mitsukaido
1412 Hitachi-ota
1413 Katsuta
1414 Takahagi
1415 Kita-Ibaraki
1416 Kasama
1417 Toride
1418 Iwai

TOCHIGI (15)
1501 Utsunomiya
1502 Ashikaga
1503 Tochigi
1504 Sano
1505 Kanuma
1506 Nikko
1507 Imaichi
1508 Oyama
1509 Mo-oka
1510 Otawara
1511 Yaita
1512 Kuroiso

GUMMA (16)
1601 Maebashi
1602 Takasaki
1603 Kiryu
1604 Isezaki
1605 Ota
1606 Numata
1607 Tatebayashi
1608 Shibukawa
1609 Fujioka
1610 Tomioka
1611 Annaka

YAMANASHI (17)
1701 Kofu
1702 Fuji-yoshida
1703 Enzan
1704 Tsuru
1705 Yamanashi
1706 Otsuki
1707 Nirasaki

SHIZUOKA (18)
1801 Shizuoka
1802 Hamamatsu
1803 Numazu
1804 Shimizu

1805 Atami
1806 Mishima
1807 Fujinomiya
1808 Ito
1809 Shimada
1810 Yoshiwara
1811 Iwata
1812 Yaezu
1813 Fuji
1814 Kakegawa
1815 Fujieda
1816 Gotenba
1817 Fukuroi
1818 Tenryu
1919 Hamakita
1820 Shimoda
1821 Susono
1822 Kosai

GIFU (19)

1901 Gifu
1902 Ogaki
1903 Takayama
1904 Tajimi
1905 Seki
1906 Nakatsugawa
1907 Mino
1908 Mizunami
1909 Hajima
1910 Ena
1911 Minokamo
1912 Toki
1913 Kagamihara

AICHI (20)

2001 Nagoya
2002 Toyohashi
2003 Okazaki
2004 Ichi-nomiya
2005 Seto
2006 Handa
2007 Kasugai
2008 Toyokawa
2009 Tsushima
2010 Hekinan
2011 Kariya
2012 Toyota
2013 Anjo
2014 Nishio
2015 Gamagori
2016 Inuyama
2017 Tokoname
2018 Moriyama
2019 Konan
2020 Bisai
2021 Komaki
2022 Inazawa
2023 Shinshiro
2024 Tokai
2025 Obu
2026 Chita
2027 Takahama
2028 Chiryu
2029 Owari-asahi
2030 Iwakura
2031 Toyoake

MIE (21)

2101 Tsu
2102 Yokkaichi
2103 Ise
2104 Matsuzaka
2105 Kuwana
2106 Ueno
2107 Suzuka
2108 Nabari
2109 Owase
2110 Kameyama
2111 Toba
2112 Kumano
2113 Hisai

KYOTO (22)

2201 Kyoto
2202 Fukuchi-yama
2203 Maizuru
2204 Ayabe
2205 Uji
2206 Miyazu
2207 Kameoka
2208 Joyo
2209 Nagaokakyo
2210 Muko

SHIGA (23)

2301 Otsu
2302 Hikone
2303 Nagahama
2304 Omi-hachiman
2305 Yokaichi
2306 Kasatsu
2307 Moriyama

NARA (24)

2401 Nara
2402 Yamato-takada
2403 Yamato-koriyama
2404 Tenri
2405 Kashihara
2406 Sakurai
2407 Gojo
2408 Gose
2409 Ikoma

OSAKA (25)

2501 Osaka
2502 Sakai
2503 Kishiwada
2504 Toyonaka
2505 Fuse
2506 Ikeda
2507 Suita
2508 Izumi-otsu
2509 Takatsuki
2510 Kaizuka
2511 Moriguchi
2512 Hirakata
2513 Ibaraki
2514 Yao
2515 Izumi-sano
2516 Tonda-bayashi
2517 Neyagawa
2518 Kawachi-nagano
2519 Hiraoka
2520 Kawachi
2521 Matsubara
2522 Daito
2523 Izumi
2524 Mino
2525 Kashiwara
2526 Habikino
2527 Kadoma
2528 Settsu
2529 Fujiidera
2530 Takaishi
2531 Higashi-osaka
2532 Sennan
2533 Shijonawate
2534 Katano

WAKAYAMA (26)

2601 Wakayama
2602 Shingu
2603 Kainan
2604 Tanabe
2605 Gobo
2606 Hashimoto
2607 Arita

HYOGO (27)

2701 Kobe
2702 Himeji
2703 Amagasaki
2704 Akashi
2705 Nishinomiya
2706 Sumoto
2707 Ashiya
2708 Itami
2709 Aioi
2710 Toyooka
2711 Kakogawa
2712 Tatsuno
2713 Ako
2714 Nishiwaki
2715 Takarazuka
2716 Miki
2717 Takasago
2718 Kawanishi
2719 Ono
2720 Sanda
2721 Kasai

TOYAMA (28)

2801 Toyama
2802 Takaoka
2803 Shinminato
2804 Uozu
2805 Himi
2806 Namerikawa
2807 Kurobe
2808 Tonami
2809 Oyabe

FUKUI (29)

2901 Fukui
2902 Tsuruga
2903 Takeo
2904 Obama
2905 Ono
2906 Katsuyama
2907 Sabae

ISHIKAWA (30)

3001 Kanazawa
3002 Nanao
3003 Komatsu
3004 Wajima
3005 Suzu
3006 Kaga
3007 Hakui
3008 Matsuto

OKAYAMA (31)

3101 Okayama
3102 Kurashiki
3103 Tsuyama
3104 Tamano
3105 Kojima
3106 Tamashima
3107 Kasaoka
3108 Saidaiji
3109 Ihara
3110 Soja
3111 Takahashi
3112 Niimi
3113 Bizen

SHIMANE (32)

3201 Matsue
3202 Hamada
3203 Izumo
3204 Masuda
3205 Ota
3206 Yasuki
3207 Gotsu
3208 Hirata

YAMAGUCHI (33)

3301 Yamaguchi
3302 Shimonoseki
3303 Ube
3304 Hagi
3305 Tokuyama
3306 Hofu
3307 Kudamatsu
3308 Iwakuni
3309 Onoda
3310 Hikari
3311 Nagato
3312 Yanai
3313 Mine
3314 Shin-nanyo

TOTTORI (34)

3401 Tottori
3402 Kurayoshi
3403 Yonango
3404 Sakai-minato

HIROSHIMA (35)

3501 Hiroshima
3502 Kure
3503 Takehara
3504 Mihara
3505 Onomichi
3506 In-noshima
3507 Matsunaga
3508 Fukuyama
3509 Fuchu
3510 Miyoshi
3511 Shohara
3512 Odake
3513 Higashi-hiroshima

KAGAWA (36)

3601 Takamatsu
3602 Marugame
3603 Sakaide
3604 Zentsuji
3605 Kannonji

TOKUSHIMA (37)

3701 Tokushima
3702 Naruto
3703 Komatsu-shima
3704 Anan

EHIME (38)

3801 Matsuyama
3802 Imabari
3803 Uwajima
3804 Yawatahama
3805 Niihama
3806 Saijo
3807 Osu
3808 Iyomishima
3809 Kawanoe
3810 Iyo
3811 Toyo

KOCHI (39)

3901 Kochi
3902 Muroto
3903 Aki
3904 Tosa
3905 Susaki
3906 Nakamura
3907 Sukumo
3908 Tosashimizu
3909 Nan-koku

FUKUOKA (40)

4001 Fukuoka
4002 Kokura
4003 Moji
4004 Yahata
4005 Tobata
4006 Wakamatsu
4007 Kurume
4008 Omuta
4009 Nogata
4010 Iizuka
4011 Tagawa
4012 Yanagawa
4013 Amaki
4014 Yamada
4015 Yame
4016 Chikugo
4017 Okawa
4018 Yukuhashi
4019 Buzen
4020 Nakama
4021 Kitakyushu
4022 Ogori
4023 Kasuga
4024 Chikushino
4025 Onojo

SAGA (41)

4101 Saga
4102 Karatsu
4103 Tosu
4104 Taku
4105 Imari
4106 Takeo
4107 Kashima

NAGASAKI (42)

4201 Nagasaki
4202 Sasebo
4203 Shimabara
4204 Isahaya
4205 Omura
4206 Fukue
4207 Hirado
4208 Matsu-ura

KUMAMOTO (43)

4301 Kumamoto
4302 Yatsushiro
4303 Hitoyoshi
4304 Arao
4305 Minamata
4306 Tamana
4307 Hondo
4308 Yamaga
4309 Ushibuka
4310 Kikuchi
4311 Uto

OITA (44)

4401 Oita
4402 Beppu
4403 Nakatsu
4404 Hita
4405 Saiki
4406 Usuki
4407 Tsukumi
4408 Taketa
4409 Tsurusaki
4410 Bungo-takada
4411 Kitsuki
4412 Usa

MIYAZAKI (45)

4501 Miyazaki
4502 Miyakonojo
4503 Nobeoka
4504 Nichinan
4505 Kobayashi
4506 Hyuga
4507 Kushima
4508 Saito
4509 Ebino

KAGOSHIMA (46)

4601 Kagoshima
4602 Sendai
4603 Kanoya
4604 Makurazaki
4605 Kushikino
4606 Akune
4607 Izumi
4608 Naze
4609 Oguchi
4610 Ibusuki
4611 Kaseda
4612 Kokubu
4613 Taniyama
4614 Nishino-omote
4615 Tarumizu

OKINAWA (47)

4701 Naha
4702 Ishikawa
4703 Hirara
4704 Ishigaki
4705 Koza
4706 Ginowan
4707 Gushikawa
4708 Nago
4709 Urazoe
4710 Itoman
4711 Okinawa

Listed below are "obsolete" cities which were available on or before the listed date.

2018	Moriyama	Feb. 10, 1963
4002	Kokura	Feb. 15, 1963
4003	Moji	" " "
4004	Yahata	" " "
4005	Tobata	" " "
4006	Wakamatsu	" " "
4409	Tsurusaki	Mar. 10, 1963
3507	Matsunaga	Apr. 30, 1966
0704	Taira	Sept. 30, 1966
0709	Joban	Sep. 30, 1966
0710	Iwaki	" " "
0712	Uchigo	" " "
0713	Nakoso	" " "
0916	Shinonoi	Oct. 15, 1966
1810	Yoshiwara	Oct. 31, 1967
2505	Fuse	Jan. 31, 1967
2519	Hiraoka	" " "
2520	Kawachi	Jan. 31, 1967
3105	Kojima	Jan. 31, 1967
3106	Tamashima	" " "
4613	Taniyama	Apr. 28, 1967
3108	Saidaiji	Feb. 16, 1969
0803	Takada	Apr. 28, 1971
0814	Naoetsu	" " "
0132	Kameda	Nov. 30, 1973
4705	Koza	Mar. 30, 1974

The Silent Leaf Assault

What unknown brew can transform sedate elderly ladies into vengeful perpetrators of ill will against hams? That's no potion; it's television interference!

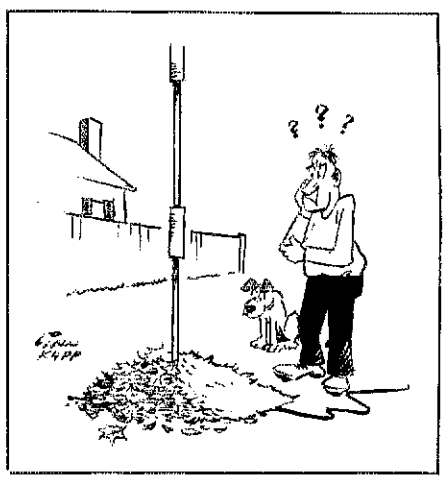
By Ralph Thomas,* WB6PCZ

Tales of TVI problems and the solutions which amateurs must concoct to improve their image at times exceed the beyond-the-call-of-duty stage. Such tales may evoke the vast array of human emotion that can turn nice, elderly ladies into vengeful perpetrators of dastardly deeds.

The silent leaf assault is a case in point.

For two years, neatly stacked piles of leaves had appeared miraculously beneath my 60-foot high, 20- and 40-meter combination array. Curiously, there were no trees close by to provide the material for some capricious, whirling wind to carry and deposit at the base of my structure. The leaves were clearly from my own peach, eucalyptus, pecan and fig varieties. Interrogation of once-friendly children and neighbors brought only furtive glances; soon, their paces quickened when I approached. Continuous surveillance of the yard was infeasible, what with work and slumber interfering, so I became resigned to a life of leaves.

*1100 N. Buena Vista Street, Burbank, CA 91505



The day of reckoning came one quiet afternoon while I was perusing the *License Manual* in my yard. A pencil-like shadow suddenly appeared over the pages, I turned my head apprehensively, and aged 30 years on the spot. A small bamboo pole was projecting over my fence, at the end of which hung a large, plastic bag. A flap facilitated release of the bag's contents by a piece of heavy twine ingeniously rigged in much the same way as a fishing pole. With mouth agape, I observed the green flap open. A cascade of leaves fell like confetti on the recently manicured greenscape. The mystery behind the leaf assault had begun to dissolve.

Reflexively I shouted, "What the X?$%!" The pole retreated, but my outburst was smothered by a barrage of virulent venom the like of which I had never experienced in my Navy days or since. The perpetrator exhibited no shame, fear or humility at being caught in the act, but instead continued her profane assault on my person and ancestry. When the harangue reached a crescendo, my own mother appeared from her house in the rear and interceded, leading to the final unraveling of this most curious story.

It seems that whenever the good lady, an incurable football addict, had attempted to tune her favorite game, vertical lines would dance in cadence on her screen. This she immediately attributed to "that ham next door," and she vowed to take revenge.

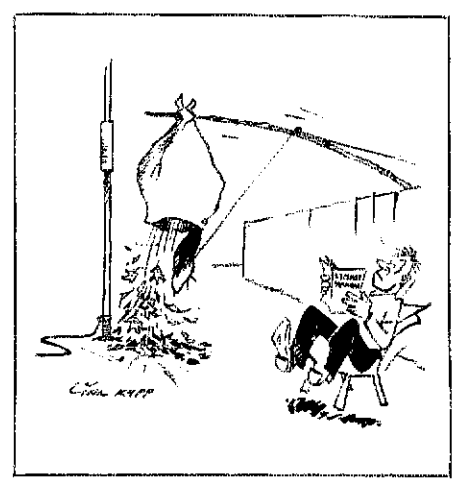
When she calmed down and explained her problem, I thought: "Ah ha, sawtooth generator!" Then, "Uh uh, that would be horizontal." Seeing my hesitancy, she became livid. I quickly suggested she call me when her set acted up and beat a temporary hasty retreat.

Soon thereafter, I attempted to prove my innocence by showing my neighbor my logbook, and suggested further that the interference might be coming from a diathermy machine which in the past had created a spectra trespass.

Almost as an afterthought I then examined her "rabbit-ear" TV antenna, which turned out to be so worn in the telescoping joints that an audio impulse would disrupt the electrical length, creating a visual strobe effect which interfered with the vertical oscillator. That explanation being a bit abstruse I simply wiggled the ears to create my own effect.

As my elderly neighbor registered sheer amazement, I calmly suggested an outdoor antenna, or at least new "ears." Her sole comment: "I make my son do it when he comes." I was then ushered out the door. There was no mention of an apology, nor of her heinous leaf assault.

Thinking about the episode, it seems simple enough from her point of view. For a period of two years, this kind, elderly lady had been raking leaves from my trees which had fallen on her side of the fence and returning them where she thought they would do the most good.



The 1976 Presidential Bicentennial Relay

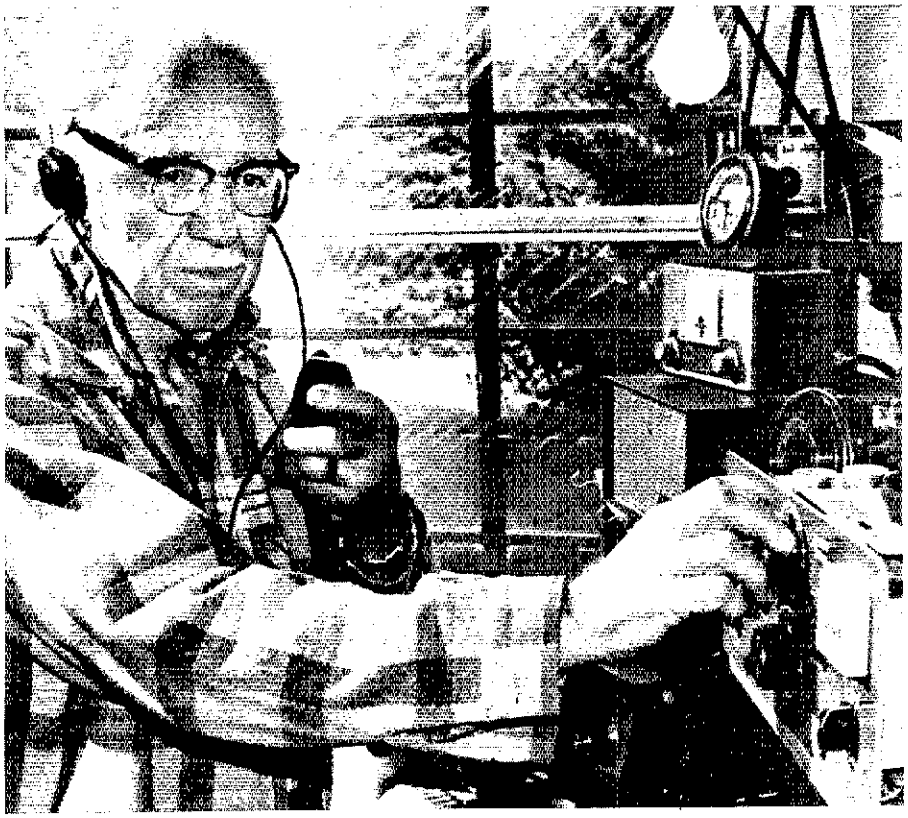
GPRs, they were called — Governors-to-President Relays. Reviving tradition, the Quarter Century Wireless Association sponsored the 1976 GPR on this bicentennial election year.

By Lee Knirko,* W9MOL

This 1916 cartoon still applies!

It took a bit of doing (about 18 months' worth, to be exact) and involved a lot of people, but on January 12, 1977, a group of amateurs gathered at Blair House in Washington, DC, to present President Carter's representative with a sheaf of messages from governors throughout the U.S. congratulating our new president on his election — all handled, of course, by amateur radio. Alas, we have no picture of the event; Washington was having a blizzard and neither of two photographers scheduled to take pictures showed up. As luck would have it, none of the amateurs present had brought their cameras either. It had been a rough operation, but now it was over and we could all relax.

*222 South Riverside Plaza, No. 2400, Chicago, IL 60606



Prof. Eric Shalkhauser, W9CI, Emeritus, Bradley University, 83, Honorary Chairman Bicentennial Relay, at his home in Washington (Peoria), IL.

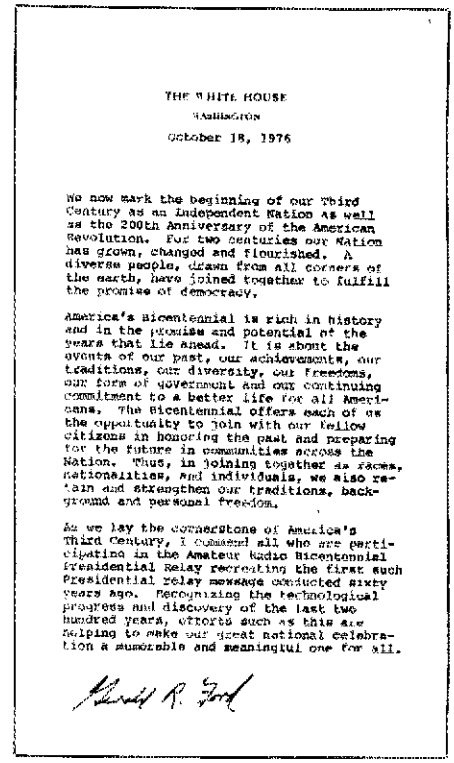
How It All Started

The first GPR was in 1916, and there have been several of them since then, most of them sponsored by ARRL. This time (1976) the Chicago Area Chapter of QCWA brought up the idea at a Radio Expo regional luncheon in September of 1975. Actually, the person who brought it up was Prof. Emeritus Eric Shalkhauser, W9CI, an old-timer from Peoria and a former professor of electrical engineering at Bradley University. "Why do we not commemorate this event," he said, speaking of the 1916 GPR, "with a global message, again originating in the ninth district, this time sponsored by QCWA?" Why was W9CI interested? Because he participated personally in that 1916 relay, 60 years ago! Probably the only person still living who did so!

Well, the idea took hold and started developing. Before the eventual format was decided upon, the involvement included ARRL Director Phil Haller, W9HPG; *HR Report* Editor Joe Schroeder, W9JUV; Chuck Towns, K6LFH; ARRL PR Counsel Don Waters; Prof. Shalkhauser ("Shaw"), W9CI; Foundation for Amateur Radio President Bill Miller, K4MM; MD-DC SCM Karl Medrow, W3FA; ARRL Vice President

Chronological List of Governor-to-President Messages

RECD ORDER	DATE RECD	TIME RECD (EST)	FROM STA.	FREQ.	CW/PH	ORIG. STA.	STATE	STATE ORDER	OTHER INFO
1	11/3	2217	WA3SJS	3915	ph		GA	1	
2	11/3	2238	K4JLM	3905	ph		SC	2	Decline
3	11/3	2323	K3WRV	3920	ph	K3WRV	MD	3	Direct
4	11/4	0026	K3ORW	3643	cw	K1BQB	VT	4	
5	11/4	0039	W3HKS	3643	cw	W3DKX	DE	5	
6	11/4	0429	WØGW	3750	cw	WØGW	CO	6	Direct
7	11/4	2020	K3CAV	Landline		W7SQT	WY	7	
8	11/4	2218	W3UBM	Landline		K7UGA	AZ	8	
9	11/4	2229	W1DJ	3905	ph	W1DJ	MA	9	Direct
10	11/4	2306	WA3ATQ	3920	ph	KL7MF	AK	10	
11	11/5	2052	WØTGQ	7250	ph	WØIYW	IA	11	Direct
12	11/5	2121	WA3THT	3915	ph	W4ZEC	AL	12	
13	11/5	2127	WA3THT	3915	ph	WAØWLP	ND	13	
14	11/5	2143	WB3BYT	3643	cw	W5RB	OK	14	
15	11/5	2143	WB3BYT	3643	cw	W9BR	IN	15	
16	11/5	2200	WA3ZUO	3643	cw	W2JI	NJ	16	
17	11/5	2209	WA3ZUO	3643	cw		ND		Dupe
18	11/5	2217	WA3ZUO	3643	cw	WB8AKU	OH	17	
19	11/5	2225	AA3YKK	3643	cw	W4CYL	TN	18	
20	11/5	2232	AA3YKK	3643	cw		WY		Dupe
21	11/5	2235	AA3YKK	3643	cw	W1GFT	CT	19	
22	11/6	0412	WØRXD	3920	ph	WAØSQN	KS	20	Direct
23	11/6	1505	K3KAJ	3643	cw	W7QOP	WA	21	
24	11/6	1518	K3KAJ	3643	cw	W7BXZ	MT	22	
25	11/6	1514	K3KAJ	3643	cw	W7DKB	UT	23	
26	11/6	1518	K3KAJ	3643	cw	W7DG	OR	24	
27	11/6	1522	K3KAJ	3643	cw	W1NH	NH	25	
28	11/6	1526	K3KAJ	3643	cw	WA8LMH	MI	26	
29	11/6	1531	K3KAJ	3643	cw	W8NR	WV	27	
30	11/6	1535	K3KAJ	3643	cw	K3HNP	PA	28	
31	11/6	2121	WA3THT	3915	ph		IA		Dupe
32	11/6	2126	WA3THT	3915	ph	WA5VNV	AR	29	
33	11/6	2130	WA3THT	3915	ph	WBØLJH	MN	30	
34	11/7	0012	W4BAZ	3643	cw	W4BAZ	KY	31	Direct
35	11/7	2127	WA3THT	3915	ph	W9PRN	IL	32	
36	11/9	0006	W3IHM	3643	cw	K1BCS	NH		Mayor
37	11/9	0011	W3IHM	3643	cw	WA4FBI	FL	33	
38	11/10	0028	WA3WPY	3643	cw	W5TQA	LA	34	
39	11/10	0038	WA3WPY	3643	cw	W5BW	MS	35	
40	11/13	1822	K3KAJ	3920	ph	WA5YTX	NM	36	
41	11/13	1826	K3KAJ	3920	ph	KH6GQW	HI	37	
42	11/17	2025	WØTGQ	7250	ph	WØMYT	NE	38	Direct
43	11/22	2316	WB3DEG	3920	ph	WØHH	ME	39	Decline
44	11/22	2316	WB3DEG	3920	ph	WØHH	VA	40	Decline
45	11/23	0034	WA3WPY	3643	cw	W5UJJ	TX	41	
46	11/24	1503	W7PBV	Landline			NV	42	Decline
47	12/7	0435	WA3DMF	Sat./LL		W6NJU	CA	43	
48	11/26	0114	K3PHP	Landline			NC	44	Decline
49	12/7	2135	WA3UYB	3915	ph	KØRWL	MO	45	
50			W9HJH				WI	46	Decline



THE WHITE HOUSE
WASHINGTON

October 18, 1976

We now mark the beginning of our Third Century as an Independent Nation as well as the 200th Anniversary of the American Revolution. For two centuries our Nation has grown, changed and flourished. A diverse people, drawn from all corners of the earth, have joined together to fulfill the promise of democracy.

America's Bicentennial is rich in history and in the promise and potential of the years that lie ahead. It is about the events of our past, our achievements, our traditions, our diversity, our freedoms, our form of government and our continuing commitment to a better life for all Americans. The Bicentennial offers each of us the opportunity to join with our fellow citizens in honoring the past and preparing for the future in communities across the Nation. Thus, in joining together as races, nationalities, and individuals, we also retain and strengthen our traditions, background and personal freedom.

As we lay the cornerstone of America's Third Century, I commend all who are participating in the Amateur Radio Bicentennial Presidential Relay recreating the first such Presidential relay message conducted sixty years ago. Recognizing the technological progress and discovery of the last two hundred years, efforts such as this are helping to make our great national celebration a memorable and meaningful one for all.

Gerald R. Ford

Vic Clark, W4KFC; QCWA Executive Secretary Ethel Smith, K4LMB – and many, many others.

Getting the Relay Organized

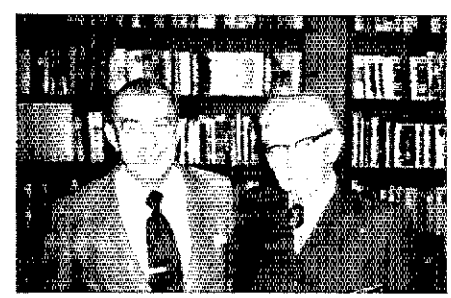
Before the plans were finalized, a good many proposals were considered and discarded for various reasons. The one finally decided upon was to get a QCWA chairman and an ARRL chairman from each state to take responsibility for getting the message from the governor and seeing that it got started along its way to Washington, where it was to wind up in the hands of W3FA for eventual delivery. A call went out to all ARRL SCMs to name a co-chairman, with a similar letter going out to all QCWA chapter secretaries to name a QCWA co-chairman. Slowly things began to take shape.

Oh yes, there were problems; lots of them. One of the problems in organizing this communications event was communication. SCM response was excellent, but not 100 percent, and QCWA experienced the same difficulty, making centralized coordination at the Chicago Area Chapter difficult. Not until the week before the election had co-chairmen been selected from all 50 states, instructions sent, a sample message and suggested publicity release drafted and distributed, while workers at the Washington end made arrangements with representatives of both candidates to receive the messages as appropriate. If you think organizing something like this is easy, try it some time!

Message Transmission

Anyhow, messages were finally obtained from all the governors but nine who responded that they preferred not to participate. Amateur traffic nets performed beautifully in relaying the messages to W3FA. Karl, who took part in his first GPR in the thirties as W9AKT, furnishes the following highlights:

Kudos to ARRL-sponsored NTS nets, especially 3RN (E & D), MDD, MEPN, MDCTN and also the Washington Region Public Service Net. One message came by amateur satellite (OSCAR): California Governor Brown's message was transmitted by W6ASA via OSCAR 6 on orbit 18939 to W3BNV, and then to WA3OMF via OSCAR 6 on orbit 18950 for delivery to W3FA. Of the others, 22 came via cw, 15 via phone. Two were delivered by landline. Six co-chairmen advised that their governors declined to participate or had communicated by other means. Messages from the governors of Colorado, Iowa, Nebraska and Kansas were han-



Bill Miller, K4MM, and Eric Shalkhauser, W9CI, both principals in the relay. K4MM is president of the Foundation for Amateur Radio; W9CI, a retired college professor who participated in the first presidential relay in 1916.

Ron Harvey, WB7CRW, ARRL Bicentennial Relay co-chairman with Ben James, W7SQT, transmitting message from Wyoming Governor Ed Herschler to President-elect Jimmy Carter via a Handie-Talkie from the capitol steps while the Governor's press secretary, Jerry Mahoney, watches. *(Brammar photo)*

Ed Webb, W9IPO, president of the Chicago Area Chapter, Quarter Century Wireless Association, sponsors of the Amateur Radio Bicentennial Relay; Prof. Eric ("Shaw") Shalkhauser, W9CI, honorary chairman, receiving award in Chicago of message from President Gerald Ford, with Lee Knirko, W9MOL relay chairman. *(John Bayalis, W9CSA photo)*

Message Origination by States, November, 1976

STATE	GOV.	CO-CHAIRMEN ARRL	CO-CHAIRMEN QCWA	MESSAGE ORIG.	VIA
Amateur Radio				K4MM	
AL	Wallace	WB4EKJ	W4RQS	W4ZEC	WA3THT
AK	Hammond	KL7CUK	KL7MF	KL7MF	WA3ATQ
AZ	Castro	W7FCQ	W7PG	K7UGA	W3UBM
AR	Pryor	WA5VNV	W5UAU	WA5VNV	WA3THT
CA	Brown	K6LFH	(3)	W6NJU	WA3OMF (2)
CO	Lamm	WØOVL	WØGW	WØGW	W3FA
CT	Grasso	W1GVT	(3)	W1GVT	AA3YKK
DE	Tribitt	W3DKX	W3HKS	W3DKX	W3HKS
FL	Askew	W4RH	W4SZ	WA4FBI	W3IHM
GA	Busbee	K4WC	W4KL	K4WC	WA3SJS
HI	Anyoshi	KH6GQW	(3)	KH6GQW	K3KAJ
ID	(1)	WA7EWV	(3)		
IL	Walker	W9PRN	W9SKX	W9PRN	WA3THT
IN	Bowenme	W9UMH	W9BS	W9BR	WB3BYT
IA	Ray	WØLFF	WØYOG	WØIYW	WØTGQ
KS	Bennett	KØBXF	(3)	WAØSQN	WØRXD
KY	Carroll	W4BAZ	(3)	W4BAZ	W3FA
LA	Edwards	W5GHP	W5RQH	W5TQA	WA3WPY
ME	(1)	WA1MUX	W1SZ		
MD	Mandel	W3FA	W3AC	K3WRV	W3FA
MA	Dukakis	W1ALP	W1DJ	W1DJ	W1DU
MI	Milliken	W8CJT	W8IAC	WA8LMH	K3KAJ
MN	Anderson	KØGVW	(3)	WBØLJH	WA3THT
MS	Finch	WB5DCY	W5SRU	W5BW	W3FA
MO	Teasdale	KØRPH	(3)	KØRWL	WA3UYB
MT	Judge	W7LR	W7PX	W7BXZ	K3KAJ
NE	Exon	WØJCP	WØMYT	WØMYT	WØTGQ
NV	(1)	(3)	WA7RPZ		
NH	Thompson	W1NH	W2BFU	W1NH	K3KAJ
NJ	Byrne	WB2GTE	(3)	W2JI	WA3ZUO
NM	Apodaca	WA5YTX	K5BVP	WA5YTX	K3KAJ
NY	(1)	WA2PJL	W2APF		
NC	(1)	W4WXZ	K4JO		
ND	Link	WAØWLP	WAØWLP	WAØWLP	WA3THT
OH	Rhodes	W8ETU	W8ZCQ	WB8AKU	WA3ZUO
OK	Boren	W5RB	W5AXM	W5RB	WB3BYT
OR	Straub	W7HLF	W7DEG	W7DG	K3KAJ
PA	Shapp	K3HNP	(3)	K3HNP	K3KAJ
RI	(1)		W1EOF		
SC	(1)	W4CE	K4JLM		
SD	Kniep	WBØKWL	(3)	WBØKWL	WA3ZUO
TN	Blanton	WA4GLS	W4CYL	W4CYL	AA3YKK
TX	Briscoe	W5LR	W5LHX	W5UJJ	WA3WPY
UT	Rampton	W7EU	W7DKB	W7DKB	K3KAJ
VT	Salmon	W1SOV	(3)	K1BQB	K3ORW
VA	(1)	W4DQY	(3)		
WA	Evans	(3)	W7PN	W7QGP	K3KAJ
WV	Moore	W8JM	W8NR	W8NR	K3KAJ
WI	(1)	W9NJH	K9FHI		
WY	Herschler	WB7CRW	(3)	W7SQT	K3CAV

(1) Governor not participating
(2) Transmitted via AMSAT
(3) Unable to obtain confirmation of co-chairman

dled by direct schedules with WØGW, WØTGQ and WØRXD. W1DJ, K3WRV and W4BAZ reported into local nets and transmitted messages from Massachusetts, Maryland and Kentucky directly to W3FA. WØTGQ also did yeoman service in stirring up late messages from midwestern and far western states. W3FA was the principal receiving point for nearly all messages, only four states (ID, NY, RI and SD) being unaccounted for by Karl.

A delay in setting up the delivery presentation date made it possible to track down a few loose ends, such as messages not started because co-chairmen thought it was too late, and messages that had gone astray. The chronological chart tells the story. *Every one* of the originated messages reached its destination. The first one received was from (you guessed it!) Georgia on Nov. 3. By the weekend (Nov. 6) 30 states had been accounted for; on that date, 29 messages could have been delivered to President-elect Carter. The remainder came in on Sunday (7th) and the following week, a few being originated late and therefore received late. The delivery of 41 messages from governors was finally made, as mentioned above, on Jan. 12 in Washington.

Conclusion

Traffic men may feel that a better job could have been done, and this is probably true, but the exercise produced some mighty good publicity for amateur radio, as witness the montage of clippings, and the many participants, both amateur and public, were enriched by the experience. A few lessons were learned which, if remembered, will enable us to do an even better job the next time we put on a GPR. 1980? QST

First Canadian WARC Proposals List New Ham Bands

Will radio amateurs have new bands after 1979? The answer is yes, if the first-draft Canadian proposals stick.

By David Sumner,* K1ZZ

Canadian preparations for the 1979 World Administrative Radio Conference are moving rapidly. In late February, after a series of meetings with representatives of the various radio services in Canada, the Department of Communications released its First Draft Proposals for revisions to the Radio Regulations of the International Telecommunication Union. The proposals contain several items of interest to radio amateurs:

1) Provisions have been made for the following new, exclusive amateur bands:

10.1-10.4 MHz
18.3-18.65 MHz
24.0-24.5 MHz

2) The band 3.5-3.8 MHz is proposed as exclusive amateur, an improvement over the present sharing with the fixed and mobile services; *but* amateurs would be excluded from 3.8-4.0 MHz,

The Canadian proposals differ in several respects from those of the FCC in the U.S.

with half the band being turned over to fixed and mobile, and the other 100 kHz to broadcasting.

3) The band 6.9-7.1 MHz is proposed as exclusive amateur, *but* amateurs would be excluded from 7.1-7.3 MHz.

4) The fixed and mobile services which now share 1.8-2.0 MHz with amateur and radiolocation would be excluded from the band. (This would have little or no impact on amateur operations in North America.)

5) The status of the Amateur Radio Service at 220-225 MHz and 430-450 MHz would be upgraded from secondary to primary, with radiolocation made secondary; *but* amateurs would be excluded from 420-430 MHz.

6) No mention is made of a new band at 160-190 kHz.

The Canadian proposals differ in several respects from those of the Federal Communications Commission in the U.S. (February 1977 *QST*, page 62, and April 1977 *QST*, page 64). Organizations and individuals in Canada have until June 1 to file comments in response to the DOC proposals. ARRL-affiliated clubs in Canada were notified of the proposals by a newsletter from the League's Canadian Director, Ron Hesler, VE1SH, who has been flying the Canadian Radio Relay League banner in WARC negotiations. Naturally, there has been considerable opposition to the proposals to reduce the size of the present 3.5-, 7.0- and 420-MHz amateur bands; on the other hand, the proposals for new bands at 10, 18 and 24 MHz are very encouraging. Amateurs throughout the world are working to convince their administrations of the need for additional amateur allocations in the high-frequency spectrum. In the U.S., the response from the administration thus far has been to propose slight expansions of existing bands in preference to new bands. The Canadian first-draft proposals are the first concrete recognition from an administration of the legitimate need for all three new amateur bands, in order to improve the reliability of our long-range communications circuits. Other administrations have indicated, informally, some receptivity to the idea of one or more new amateur bands for this purpose.

The first-draft Canadian proposals are by no means a finalized position.

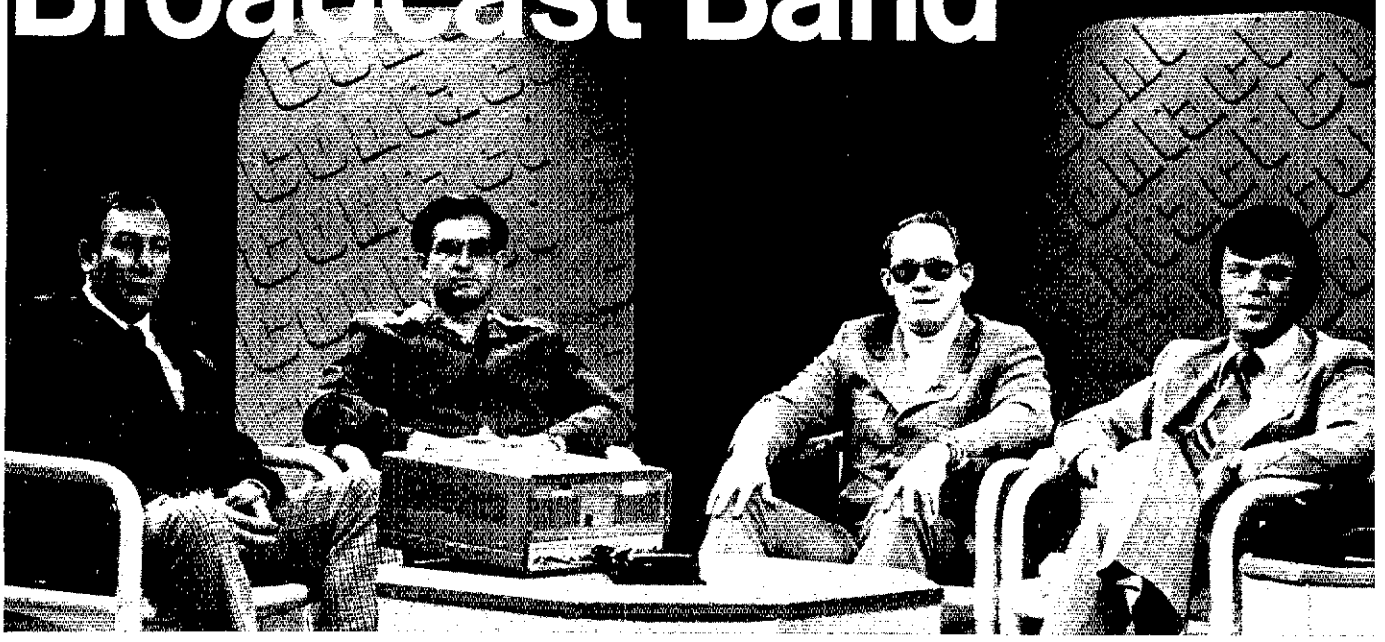
The provision of one or more new high-frequency bands would be of tremendous assistance to amateurs. For example, in the Managua earthquake in 1972 the Canadian amateurs played a major role in handling emergency communications into and out of the stricken city. During the day, the 14-MHz band carried the load; at night, however, long-distance communication was possible only on lower frequencies. A 10-MHz amateur allocation would have effectively bridged the gap between the interference-plagued 80- and 40-meter bands, and the daytime-only 20-meter band.

In general, the Canadian approach suggests reduced sharing between services. On the other hand, the U.S. approach has been focused upon finding new ways of sharing spectrum. Bilateral meetings between the Canadian and U.S. administrations will be aimed at resolving such differences, beginning later this year.

The first-draft Canadian proposals are by no means a finalized position. They are subject to considerable change as discussions continue, and as the conflicting needs of Canadian spectrum users are weighed. Much work remains to be done between now and 1979, for amateurs and administrators alike. QST

*Assistant General Manager, ARRL

Ham It Up on the Broadcast Band



By Bob Margolin,* W2SDU, Lloyd Colston,** WB5AXH, Jim Beedle,*** W9NIN, Dennis J. McCarthy,**** KØYTI and Peter O'Dell,***** WB8NAS

Participants in a St. Louis discussion hashed out the question of age barriers to getting ham tickets. For an Illinois audience, the puzzle was what is a WB4KCG? In New Jersey the guest wrestled with the jawboning of a CBer over the merits of an antenna installation. What each episode held in common was the use of the electronic media to explain amateur radio to thousands of Americans.

Here, in a let's-talk-strategy presentation, five authors are brought together to present a panoramic view of what they have been doing and what can be done in this largely ignored vast resource: From his experience, Bob Margolin outlines practical considerations for individuals who would like to guest on a talk show; as a professional writer who accompanied staffer Chod Harris to an interview/call-in type talk show, Dennis McCarthy watches host, guest and audience interact from his behind-the-scene perspective; never once in his subtle sell-ham-radio pitch to CB-oriented listeners does radio announcer Jim Beedle run down the opposition and along with Public Relations Assistant Lloyd Colston, staffer Peter O'Dell considers local TV as an outlet for ham visibility.

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One problem facing local radio clubs is that of getting good and effective publicity for their activities. Most clubs do make use of posters, and some even succeed in placing a story about their activities in the local newspaper. But one very effective publicity tool that is hardly ever used is broadcast radio.

You'll find within easy traveling distance of your community at least one radio station that has an evening or nighttime talk show. These talk shows feature a radio personality host who interviews guests of interest to the listening audience. In some cases, the listening audience is even invited to telephone in questions to the guests, who then provide answers over the air.

While some of the larger stations are rather selective in choosing the people who appear on the talk shows, many stations, especially the smaller local and regional stations, are eager to find interesting guests for their shows. These are the stations that you can use to effectively promote your club activities. However, to gain maximum effectiveness from your radio exposure, you must carefully plan your strategy.

Select Your Audience

The first problem is finding the right station on which to appear. Of course, if there is only one station in the area with a talk show, that's the station you'll use. But, if there is a choice of stations, choose the one that serves the audience *you* want to reach. While it may not seem so at first glance, a small 250-watt local station may be a more effective publicity tool for your purposes than a 50-kW clear channel powerhouse sta-

tion. For example, if you're interested only in publicizing the existence of a ham station at a local shopping mall or carnival, you'll only want to reach those people likely to attend. The local radio station serving the area will prove to be more effective for this than the clear-channel station serving the entire East Coast. Of course, if your club is interested in doing missionary work for ham radio, then the much larger listening audience of the regional and clear-channel stations make them more effective tools than the local stations.

Once you've decided which station *you* want to appear on, you've got to convince the station management that *they* should want you to appear. Remember that the station management is much more interested in pleasing its listening audience than in helping you promote ham radio. When you contact the station about the possibility of your being a guest on their talk show, make sure that your presentation clearly points out areas of listener interest. Include among the topics you want to discuss on the show such areas as CB and even RFI. Of course, once you're on the air, you can avoid those things you feel are best left alone. Your purpose here is not to write a script, but rather to get on the air.

Whom to Contact

The first step in getting on the air is contacting the right person at the station. The fastest way is to telephone the station and ask for the name and title of the individual responsible for arranging guests' appearances for the show on which you want to appear. The next step is to write that person a concise letter outlining why you'd like to appear on the show, what you'd like to talk about, why you're qualified to talk about it, and of course, why the audience would be interested in listening to you. If you want to publicize a specific event, make sure to indicate the date you'd like to appear. If your schedule permits, give the station a selection of dates; they may have already scheduled a guest for the date you'd most like to have.

It may take a week or two for the station to get back to you. However, if you still haven't heard from them after the second week, telephone the individual to whom you wrote. Your letter may have been lost in the mail or misplaced at the station. Don't overlook the possibility that some of the station personnel are hams. They may be able to provide an "in" for you.

While negotiating with the station about your appearance, you should be planning the appearance itself. For example, who is actually going to appear on the talk show? You? The club president? This decision is critical. Don't make it on the basis of club politics or friendships. Rather, choose someone who speaks well, has a good vocabulary, can put together complete sentences, and who makes sense. Remember this individual is not just speaking for your club; he is speaking for amateur radio itself. Someone who laces his speech with "you know" and "ah," and stumbles over words won't make much of an impression on the listening audience; at least not the impression you want to have made. Another quality your spokesman must have is the ability to think on his feet. The host may ask some very embarrassing questions. Your spokesman must be able to handle these questions easily with only a second or two of thought.

Just Plain Talk

Being able to communicate well and to think on one's feet are not the only criteria, however. The person appearing on the show must be able to explain very complicated things in a very simple manner. The fastest way to lose the audience is to talk over their heads. The spokesman must assume that no one listening to him knows anything at all about radio, and must, therefore, explain every term he uses. For example, many hams appearing on radio shows make reference to repeaters, but never explain what they are. Here's one possible way of handling the problem:

"Many CBers think ham radio is only for long-distance communications. That's not true. In fact, hams make use of special automatic re-transmitting stations called repeaters to provide interference-free local communications. These repeaters are usually located on top of the tallest radio tower or building in town, or on top of the highest mountain in the area. Hams using low power radios in their cars, or even walkie-talkies, transmit a signal up to the repeater. The repeater then rebroadcasts the signal over an area of several hundred square miles. Because of this, one ham can talk with another ham on the other side of a mountain, or across town with total reliability. By using repeaters, hams avoid losing contact with one another because of buildings and mountains; something every CBer has experienced."

While you may prefer to explain repeaters in another way, you can see that this suggestion explains what they

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Fifty-Gallon QSO

WØNJB reached for his keyer and sent "CQ." Since he was using 50 kW he got results. Hams from all over the country began to call him. WØNJB is Jim White, KMOX radio personality (St. Louis), and hosts "At Your Service" from midnight to 3 A.M. With him that morning was Chod Harris, WB2CHO, Club and Training Department Manager for ARRL.

The two were scheduled to chat for an hour explaining amateur radio and taking calls from listeners. By the time the hour was up, word had spread over the ham bands and amateurs throughout the country tuned in to hear the program. Many had called in. Because Jim's telephone board was lit continuously, the program went into an unscheduled second hour.

"My boy might want to get a ham license, is there any tower age limit for getting a ham ticket?" asked one. "We don't like to see any amateur radio operators under two years old," Chod answered facetiously. Then he carefully explained that age is no barrier to getting the license. When the 15 year old called asking where he could get information on Novice classes, Chod told him to write the ARRL.

WØNJB pounds out 50 kW of "CQ" as WB2CHO beams approval. Chod has always wanted to run power.

An SWL called, worried about WARC because some CBers through their illegal operations are "giving the world a bad impression." This gave Chod an opening to tell the listeners that there have been some recent seizures of equipment and some prosecutions of illegal CB operators. They talked about the self-policing of the amateur bands and the fact that it seems to be spreading to CB.

A ham in Nashville called to say that the program was "coming in 30 dB over S9." He had heard Jim's keyer at the beginning of the program. "That's the best cw signal that I've heard in a long time."

When the program was finally over, Jim turned to Chod and pointed to the telephone board (still lit), then he asked, "Do you think we are doing a service for ham radio?"

When we got to the lobby, the door was locked and the guard was on his rounds. We couldn't get back to the studio because the elevator required a key — and there was no phone in sight. A quick call on 34/94 got a local ham who called the station to have someone let us out. — *KØYT/*

are and how they work in terms that any nontechnical person can understand.

You may decide that two or more people appearing on the talk show can do a better job than just one spokesman. Perhaps this is the case because the event you want to publicize involves several areas of expertise. If so, it is very important that the group puts forth a common philosophy about ham radio. If asked about CB radio, all the guests should agree that the majority of CBers are good people who would make excellent hams. However, if one of the group volunteers that he feels "all CBers are jerks who don't have the brains to become hams," the group's credibility as spokesman of your club, and of ham radio, will be destroyed. Remember, you're trying to make friends, not start World War III.

Keep on Track

Most talk show hosts are not hams themselves, but because of their association with broadcast radio have picked up some knowledge of it. While this may make them sympathetic to your point of view, it may also cause them to steer the program into areas with which they are familiar. This may be helpful, but in most cases these areas will not be among the things you'll want to discuss. The best way to handle the situation is to answer the host's question or respond to his comment, then steer the conversation back to the topic you want to discuss. As for example.

Guest: "Hams aren't limited to just voice communications as are CBers. They have a choice of many other ways to communicate. They can use Morse code or tele . . ."

Host: "Is Morse code hard to learn? I know a lot of people who won't get into ham radio because of the code."

Guest: "Not at all. Morse code is really very simple to learn, especially using the new learning methods now available. People from all walks of life, and all ages have learned the code. Why even a five year old was able to get his ham license. Of course, if you don't like the code, you don't have to use it. Once you get a permanent ham license you can use voice, or teletype, or facsimile, or even television if you'd like. The thing that makes ham radio so great is that you have a choice of the kind of communications you want to use."

Using this technique, you can say whatever you originally wanted to say without angering the host, something you really don't want to do.

If the format of the show you're appearing on allows listeners to telephone in with questions, you'd better be prepared to answer the most outlandish questions you've ever heard: "My son just gave me a nice radio for my birthday. He said I can set it so that it will stop playing after I fall asleep, and then wake me up in the morning. Can you tell me how to set the controls to make it work?" You'll also run across the expert who disagrees with your answer: "What da ya mean I can't use a TV antenna for my CB? It's a good antenna and it works real well on all the channels. I paid 50 bucks for it." The important thing to remember when fielding these kinds of questions is that you must never insult the listener, no matter how stupid he may sound to you. Once you start insulting or talking down to the audience you've lost them.

It's always a good idea to try to work into your answers the excitement and fun of ham radio. When you can, mention things like the OSCAR satellites, phone patching, the thrill of talking to people in faraway places: "The world of ham radio is really unlimited. Why just the other day I chatted with a scientist in Antarctica. They were having a heat wave. The temperature actually got up to 22 below zero."

If your club is involved in an activity for which you'd like to solicit mail response, you'll have to give a mailing address. You can save yourself a lot of grief by using a post office box rather than your home address. When you make arrangements to rent the box, ask the postmaster if you can use a box number such as 1000 or 1977. Rent the box as "Amateur Radio." The idea is to get a mailing address that the listener won't quickly forget. "Write Amateur Radio, Box 1000, Anytown" is a lot easier to remember than something like "write the Newington Amateur Radio

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CB Savage

I play country music all night on a major Chicago radio station (WJJD fm), which seems to attract all the truckers and CBers. *They like their country music.* As a defense against all the "10-4 Good Buddy" lingo that was constantly being piped into my ear by telephone, I started mentioning that I was a ham radio operator. I even started mixing call signs into record introductions. "Here is a great song by a friend of mine, WB4KCG. It is Ronnie Milsap." (Ron was chosen Top Male Artist of the Year, 1976.)

People started calling and asking, "What is a WB4KCG?" I briefly explained that was Ron's call sign, then I told them mine, and said that we talk to each other via "ham radio." They wanted to know if they could do that with their CBs. BOY, what an opening!

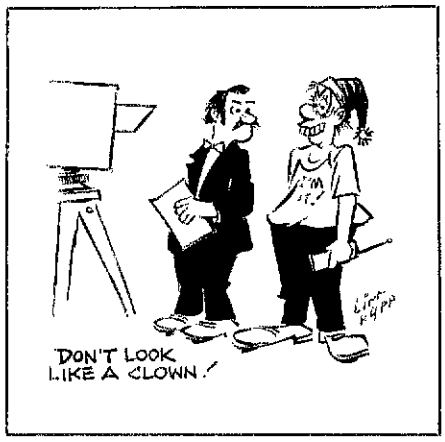
I'd chat with them for a few minutes, providing the ARRL address and suggesting the books available from the library. I'd tell them that ARRL has a new training program designed especially for the newcomer.

A few weeks later, the Chicago FM Club sent us the reel of ARRL Public Service Announcements (PSA) featuring Dick Van Dyke, and information on their "Ham Help Line," a phone answered 24 hours a day either live or by machine. Just like ARRL, they inform the prospective ham of convenient club locations providing code and theory classes.

Then I had an idea; why not make tapes of some "QSOs" and play bits and pieces around the entire promotional package? On those nights having a "QSO" segment, I'd promote the fact that I was going to air another interesting "ham radio" conversation. Then, about an hour later, I'd roll the tape. When it ended I would reiterate what had just been played. When I asked if anyone had any questions, the phones exploded. CBers who had a true interest in the art of communications came out of the woodwork.

I did a survey on the most-often-asked question. The code? Negative! The most often asked question was, "How much does it cost?" Questions about the code were the second most asked. I explained that the cost of a good used ham transceiver was comparable to what they probably had invested in CB gear. Two things really excited them: (1) Antennas need not be expensive and can be made from hunks of wire that might be laying in the garage or basement. The coax that is already on their base antenna will work on their new ham rig; and (2) A very effective transmitter can be built, for the most part, from discarded TV sets.

I think that we, as old time amateurs, have lost sight of these sweet basics. Telling the prospective amateur about your $2,000 rig can be a real turnoff. Give them a little romance to spur their budding interest. It works. Be friendly, attentive and truthful. Listen to their questions and objections -- somebody listened to ours. GENTLY guide them in the right direction -- it'll pay off. — *W9NIN*



and Technical Society, Post Office Box 386, Anytown."

Getting the Word Out

Don't overlook using other forms of publicity to publicize your appearance on the talk show. You can make up posters for display in radio store windows, possibly on supermarket bulletin boards, and other suitable locations. Another good area of publicity is local newspapers, particularly weekly papers and so-called weekly "shoppers."

In order to make use of newspapers, you'll need to prepare a professional-looking news release. Using rub-on lettering, stencils or the talents of the club artist, letter the top of an 8-1/2 × 11 sheet of paper with an appropriate heading. You can use the words *News Release* if you'd like, or something else such as *Amateur Radio News* or *XXXXX Radio Club News.* If you'd prefer, you can use the printed news release forms available to affiliated clubs from League headquarters.

Next, write a concise news release about your appearance giving the name or names of the people appearing on the show, the topics to be discussed, the name of the program and host, the call sign of the radio station carrying the program and its frequency, and the time and date of the appearance. Make sure to point out why the readers of the newspaper would want to listen to your program.

A news release is the kind of thing where neatness, spelling, punctuation and grammar really do count. Take your time and do it right. Once you're satisfied with it, copy it onto the news release form, and then distribute it. If the newspaper is a weekly, time the distribution so that your release arrives three or four days before publication of the issue immediately preceding the program. The chances of your release being picked up and run are about 50-50, so don't be disappointed if it doesn't appear. It is worth the effort to try.

Local radio is an excellent publicity tool, if it is used intelligently. Using the tips in this article, and a little common sense, you can use it effectively to promote your club's activities. — *W2SDU*

For several years now hams have been receiving regular publicity in the printed media. With the Dick Van Dyke Public Service Announcements (PSAs) provided by ARRL and some local effort, over 350 radio stations have given free air time as a public service to promote ham radio. Yet, television has been largely unused — the major exception being the N6V stories, tied in with slow-scan reception of the Mars photos. These possibly got more air time on TV than all other amateur news stories combined. Situations such as N6V do not come along everyday. If, therefore, we are to make effective use of TV as a medium for publicizing and promoting ham radio, we must not sit back and wait for the next story of N6V proportions. The following ideas should be considered as a starting point and not as an inventory of everything possible.

Getting Ideas

The first step is to decide what is available in your area. How many TV stations are in the area? Are they network stations or are they independents? Are they locally owned or are they owned by someone or some corporation with headquarters in another area? Who is the programming director at each station? What type of market does the station serve? Are there any hams on the staff? This information should be determined before any approach is made to the station. There are two excellent sources of answers to these questions. Go to the local library and spend some time reading *Broadcasting Yearbook, 1977.* Then ask questions of the people that you know and the ones that you meet. You may be amazed at what you can find out by simply asking questions.

At this point in the game, don't overlook an additional type of TV station. More and more small cities and a majority of the larger ones have cable TV systems that supply their communities with a variety of TV programming. Some systems do little or no *local origination,* i.e. local production, while others provide extensive local programming. Most cable systems provide, at the very minimum, a channel which shows local weather, time and announcements for the benefit of the public. Frequently, this is accomplished with an electronic character generator.

The Approach

After having collected the information in the preparatory stage, your next step is to open communications with the programming director. Here, as in working with newspapers or radio stations, the most critical thing is your attitude toward the other party. If he is viewed as someone to be taken advantage of, then your chance of success is minimal. The proper attitude is one of helpfulness. What can you do to make his job easier for him? How can you assist him in meeting his responsibility to the public interest of the community. Whether you have phoned for an appointment or just dropped in, keep your first meeting brief and on the information-gathering level. Just simply find out what kinds of subjects he would be

interested in, the format that he would prefer, and the production deadlines.

There are several possible ways that a programming director might use material that you provide him. He might decide that ham radio would make an interesting topic for one of the talk shows produced locally. It may be that the news director is looking for human interest stories; if so, the programming director would probably refer you to him. The programming director may be looking for good PSA material; if it is a cable system using the electronic character generator, it may only be necessary to provide a script. ARRL has a number of sample scripts that will be sent to any member upon receipt of an s.a.s.e. Some of the ARRL affiliated clubs have been exploring the possibility of teaching the ARRL Novice License Course over cable TV. One thing to keep in mind is that TV's greatest impact is visual. If you appear on a talk show, wear conservative, business clothes, and avoid loud colors in particular. If you provide a sign or visual aid, make sure that it looks professional – even if it means paying a commercial artist. If possible, demonstrate some type of amateur equipment – most nonhams seem to find Handie-Talkies and slow-scan fascinating. As far as TV is concerned, one picture speaks louder than 10,000 words. Make sure it is the right picture.

Say Thank You

Most people like to feel useful and appreciated, and programming directors are no different in this respect. When they are able to provide you with exposure, it is a good idea to thank them. ARRL now provides hams with a blank certificate of appreciation which can be presented to anyone who has assisted in publicizing amateur radio. Perhaps, you might want to invite the recipient to a club meeting as guest of honor – or even to your annual banquet. When presenting the award, make him feel important – he is! If it is not possible to have the recipient present at a meeting, then take the award to him in person. Be sincere in expressing your appreciation for what he has done for all of us in amateur radio.

One thing to keep in mind is that TV's greatest impact is visual.

Where Do We Go from Here?

While in the past the electronic media has been underutilized, it's obvious that with the knowledge and skills already at our disposal we can take steps toward more effective use. Getting PR material on TV is not as easy as getting it into print. It can take several months of preparation, but it can be done – and done right, too! The same rules hold true for TV and radio PR as for other types: Analyze the situation from the other person's point of view, adopt an attitude of helpfulness, and be persistent.

Although we know that a large number of hams work for the media (electronic and otherwise), we do not have a list of the individuals, their functions or their interests. ARRL is starting such a list. If you are involved in the media or if you know any licensed ham who is, please send the details to the Public Information Office, ARRL. Begin thinking how you can put the local outlets to good use. Remember that every broadcast station in the U.S. is charged with meeting a certain amount of public service programming. How can you help them to better serve the public? – *WB5AXH and WB8NAS*

Strays

Talk-show host Clark Weber, W9GHM, invites hams to call in. "It's a great way to get free publicity for hamdom."

□ Recently WB9YLR called my nightly talk show on WIND radio in Chicago and expressed his displeasure over Jack Anderson's recent slap at ham radio. Now bear in mind that the ham bands were bubbling over with indignant remarks, but the public wasn't hearing them. My job as a talk-show host is to play devil's advocate, but in this case I agreed wholeheartedly with YLR. That gave me an opportunity to wade into CBers for their incredibly bad operating procedures and misuse of their frequencies. After that you can be sure the foul hit the fan. CBers came out of the woodwork for several days, and so did the hams. The result was that ham radio never looked so good to thousands of listeners who didn't know the difference between CBers and hams.

Now that doesn't mean you have to take a bite out of the legs of CBers in order to justify getting on the local airwaves. It can also be informative. Case in point: a Chicago paper recently ran a story about a "CBer" who saw a robbery in progress and notified the police via his 2-meter repeater station from his mobile unit.

Obviously, the reporter had his head in his armpit when he wrote the story and we all know the hero was a ham. *But the public didn't!* Call a talk show and let 'em know. Many of those talk shows such as mine are rated number one in radio listeners and you're reaching a lotta hungry ears.

Those "Town Halls of the Airwaves" are always looking for conversation that's either controversial or informative. And don't tell me you wouldn't know what to say cuz most of you guys could ragchew your way through a brick wall. So next time you find a little time for ragchewing, QSY to the broadcast band and let the rest of the world in on one of the finest of hobbies. – *Clark Weber, W9GHM*

Anderson Answered: Local Hams Do the Job

Grassroots reaction to newspaper column gives great public exposure to amateur radio, turns inaccurate report into a real success story for hams.

By Peter O'Dell,* WB8NAS

Without exception the initial reaction was one of shock followed by indignation. Early Monday morning Hq. phones began ringing like a three-alarm fire. They didn't stop for the next three days. What can I as an individual do? What is the League going to do? Call after call carried the same theme.

What caused this flurry of response was the April 4 Jack Anderson column published by hundreds of local papers across the country. Briefly, the column stated that somehow 300,000 hams were suppressing 9,000,000 CBers from getting expanded frequencies, thereby causing the congestion on CB. The column painted the FCC as being staffed by ham henchmen out to keep nine million CBers from what was "rightfully" theirs. The ARRL was described as just a lobbying organization representing hams in Washington and sending out "flash bulletins" to its members to keep the CBers off the ham bands.

Early on, it became obvious that Jack Anderson had triggered a grassroots involvement that we at Headquarters had been encouraging for some time with little success. The "average" ham was looking for ways to get his story in front of the public. The familiar "Why doesn't somebody do something?" refrain became an emphatic "What can *I* do?"

Rally to the Pen

What hams across the country were doing soon became apparent to us at Headquarters. We began receiving clippings of the Anderson column stapled to photocopies of letters to the editor from locals throughout the nation. Editors usually react negatively to anything that resembles a form letter; even "model" letters, would probably have resulted in the editors getting several identical letters, which would discourage them from printing anything. Therefore, we decided to encourage our members to write their editor and express their feelings in their own words.

Hour by hour the clippings piled up. One week later on the following Monday, we began to see a new trend that soon dominated the incoming mail-clippings of rebuttal letters. The vast majority of rebuttals got more space than the original column. All the published letters seemed to be well thought out, logical and squarely addressed to the central issues.

That really isn't surprising if you stop and think about it: Most editors would be reluctant to print something that addressed itself to Mr. Anderson's ancestry, the marital status of his parents, or his relationship to certain wild animals.

Eloquent Prose

The following is a random sampling from typical letters that made it into print:

"I joined the American Radio Relay League long before I became a ham, without sinister intentions, much as I joined the National Geographic Society, by subscribing to a magazine. Why shouldn't the staff of the FCC have the same right? Is the commissioner of motor vehicles, who presumably drives an automobile, also guilty of conflict of interest? Do members of the Public Service Commission, who police the telephone system, refrain from using the telephone?" – *Gloria A. DeMauro, WB2EFS*

"The amateur bands are open to any U.S. citizen who passes an exam on Morse code, radio theory and regulations. Many CBers have gone on to become hams, and they will tell you the effort involved is a small price to pay for the added privileges and freedom from hassle. The amateur exams for the five levels of licenses are not that difficult; many elementary-school students are amateur radio operators. Radio privileges are no different from anything else in life: The rewards are, or at least should be, in keeping with the effort put forth." – *Billy Williams, WA4UFW*

"The central fallacy in the Anderson-Whitten column on CBs and the FCC is this: There is not a single one (other than the mentally incompetent) of the CB-licensees who cannot obtain access to the frequencies assigned to hams legally, by the simple process of obtaining a ham license. It is an error and misleading to write as if there were some set group of persons who are CBers and another who are hams. It's not like being born black or white, which you live with all your life. The FCC will issue anyone (practically) a license to use CB frequencies and another license to use ham frequencies." – *Guy Black*

"Perhaps what Anderson objects to is the requirement that citizens must earn – *not purchase* – the privilege of operating radio equipment on the frequencies designated for amateur radio purposes. If because of crowded citizens band conditions we should redistribute the amateur frequencies, then let's carry it a little further and redistribute clothing, automobiles, money and everything else which for one reason or another is unequally divided. A guide on how to do this was written by Karl Marx some years ago." – *Tommy Bond*

Better Yet, Talk

Others took things one step beyond sitting down and writing the editor of the local paper. In Adrian, MI, Sally Fay, WB8VBP, called the local radio stations and arranged to be on two talk shows. In Salinas, CA, Art Bell, W6OBB, moderator of a KIDD talk show, had John Wong, K6JE and Lloyd Jones, W6DOB, as guests to present a public rebuttal to the column.

In order to show Headquarters' sense of pride in the accomplishments of the "average" ham in the field, we are presenting a special award (suitable for framing) to anyone who either got a letter published or appeared on a talk show refuting the Anderson column. If we had put 20 staff members working day and night on this, we could not have gotten the coverage that *you* did. Congratulations on jobs well done! QST

*Public Information Officer, ARRL

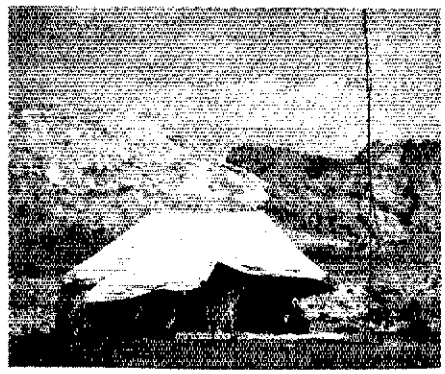
Sixteen Years in Iran: the EP2BQ Story

This geologist left the Borneo jungles for Persia, 17 years ago, wondering what to expect. Now, he recounts the problems of diplomacy, transfers and fluctuating electricity that accompanied him in the land of the peacock throne as he made 80,000 QSOs.

By Dr. Harry McQuillan,* EP2BQ/ZL2SQ

The tent flap lifted as Aidi Mohammad appeared with my early morning tea. "Breakfast order as usual, Agha?" he asked. "Yes, Aidi," I replied, "but start up the generator first." The time: 0500 hours, Iranian Standard Time (0230 UTC) on a cool February morning in 1975. The place: a high, narrow plain nestled amongst the fold belt of the Zagros mountain range in Southwest Iran. The first purple-red glow of the approaching sun was already outlining the high peaks to the east and this signaled the imminent opening of the 160-meter band to Europe, North America and perhaps even to South America again. The 2.5-kW generator spluttered to life, and as Aidi Mohammad shuffled away to his Mecca-oriented prayer mat, the green panel lights of the Drake line lit up. Sure enough, there were the familiar signals of EI9J, OK1ATP, W1BB and a few other regulars on the band. Outside, a 70-foot-high pole supported the apex of the inverted V antenna, which had accounted for Asia's first 160-meter Worked All Continents award, and many other top-band firsts. A short CQ brought back W4EX. The band was open – just enough time for a few QSOs before joining my helicopter crew for breakfast in the mess tent.

Fifteen years earlier I had camped on the same spot, a weird place with a backdrop formed by a towering mountain range pierced by a huge plug of solid salt. The close-by village of Shumbeh was now little changed and Dorab Khan, the chieftain, welcomed me back as if it were but a few days since we had been sitting on his carpeted mud floor.



Many 160-meter contacts were made from this tent shack, overshadowed by the salt-pierced mountain in the background.

Salt squeezed up like toothpaste from a depth of five miles and cascaded down the mountain flanks as glistening white salt glaciers.

In those days, rather than having a helicopter standing by to carry me around the mountains, a train of 50 mules transported all the stores and equipment that go along with an oil exploration party. "Equipment" then included a heavy Heathkit Apache transmitter, SB-10 sideband adapter, and SX-100 receiver. The EP prefix was perhaps even more rare than my VS5JA call.

Setting Up

Early in 1959, a Dyak messenger paddled his dugout into my camp at the headwaters of the Tutoh in Brunei, Borneo. The message he carried in the folds of his loin cloth was that within the month I was to be transferred to the position of exploration geologist with an oil company in Southwest Iran. My initial reaction was one of reluctance. I had, after some delay, managed to set myself up as VS5JA, and was enjoying the jungle-explorer type life despite its hazards and hardships.

The oil company personnel made it quite clear that no ham equipment was to be sent to my new country of employment.

The intriguing problem that presented itself was how to gain an EP call. It had been indicated to me that no official licenses were issued in Iran and, moreover, the oil company personnel were well aware of my hamming activities, making it quite clear that no ham equipment was to be sent to my new country of employment. The occasional operation out of Iran had been granted by permission of influential local offi-

*9 Raynham Way, Silverstream, Upper Hutt, New Zealand

The author often visited 9K2AL, who, though more than 500 km away, was one of the closer ham neighbors.

cials, but no licensing system was in existence. While home in New Zealand on leave, the VS5JA story (*QST*, September, 1959) was written as preparations were made for the departure to Iran.

My first indication of the difficulties to come was the patience required when it was necessary to wait four days in Karachi for the issue of an Iranian entry visa. I eventually arrived in Tehran on July 24, 1959. The city was then quiet, sedate and had an engaging charm. On reporting at the company office I learned of my posting to Gachsaran, a then developing giant oil field located in the foothills of the Zagros range some 200-km east of Abadan. Tending to three drilling rigs spaced out over 60 km along the oil field and being called out at any time when daytime temperatures soared above 130°F were a great contrast to the Borneo jungle.

At that time, I wrote to the husband of the Princess in Tehran with high hopes of securing an EP call. He was a W6's college friend. The time passed slowly until three weeks later the newspapers carried a story of the divorce of the man I had imagined was my only chance of obtaining a call. The year spent on the oil field was a dreary one, not even a receiver to check the ham activity. In 1960 I was sent to join an exploration party in a remote part of Fars Province.

Licensed, At Last

The summer of 1961 saw me working at the Tehran head office and there inquiries regarding ham radio operation were reason for some real optimism. It transpired that a United States vice consul had managed to obtain the call EP2BB, and a few other calls had begun to appear on the bands. Some months later, I joined their ranks signing EP2BQ. My first operation was from a downtown fourth-floor apartment using a series of ground planes for the hf bands.

Among the most difficult problems was securing a reliable power supply from the mains. In those days, many small privately owned power companies supplied electricity around the city. Power failures were common and extremely low voltages even more so.

Among the most difficult problems was securing a reliable power supply from the mains.

115-V lamps worked well in the 230-V lines, and occasionally all the appliances in an area would burn out when phases became crossed among the tangle of overhead wires. The best move was to subscribe to several of the more reliable companies and have a selector switch to change to the best voltage at a given time. Despite all this, EP2BQ was heard on the hf bands with great regularity.

Around the Country

The following winter saw me out in the south of Iran on exploration again. The most sure-footed amongst the mules was singled out to carry the fragile ham equipment. Special padded wooden boxes fashioned after "yakhduns" (literally, ice-boxes) were constructed with metal rings for roping to mule saddles for the transportation of the heavy ham gear. It was not uncommon for a heavily laden animal to lose its balance and disappear over the edge of narrow mountain tracks. Normally, there is a long elapse of time between exploration surveys and the actual drilling for oil and gas. Now, it is gratifying to know that some of the structures mapped during those long trips have been revealed as some of the largest oil and gas fields in the world.

While back in Tehran again for the summer of 1962 I met a Scottish girl who, by coincidence, was governess to the children of the selfsame Princess mentioned earlier. Maureen and I were married late that year and she remained on the Palace staff during the next season of exploration and ham activity. One of our most prized wedding gifts is a quality Persian carpet given to us by the then Prime Minister with whom we had struck up a friendship. It is a friendship that has lasted, and one which had a very direct benefit to ham radio in Iran during later years.

During the mid and late 1960s, EP2BQ was well-known on all the hf bands, especially among the huge pileups in international DX contests. Operation was either from a tent high in the Zagros mountains or from our Tehran villa. Many more EPs had appeared and at that time we were fortunate in having Hank Meyer, EP3AM, in our ranks. Hank, as the United States Ambassador to Iran, did much to promote hamming in the country and his call was familiar on the DX bands. The Amateur Radio Society of Iran was formed and our President, Ebish Nuban, EP2BF, saw us through our negotiations with the PTT Ministry.

Late in 1967 word came of my transfer to Nigeria – what a blow, since it was the time of civil war there. I cast my mind back to the offer I had once received from our Prime Minister friend. He was then Chancellor of Pahlavi University at Shiraz in South Iran and had requested my help in setting up a department of geology at that prestigious university established by order of the Shahanshah.

At an elevation of 5000 feet, with an excellent takeoff in all directions, the operation from Shiraz was a joy.

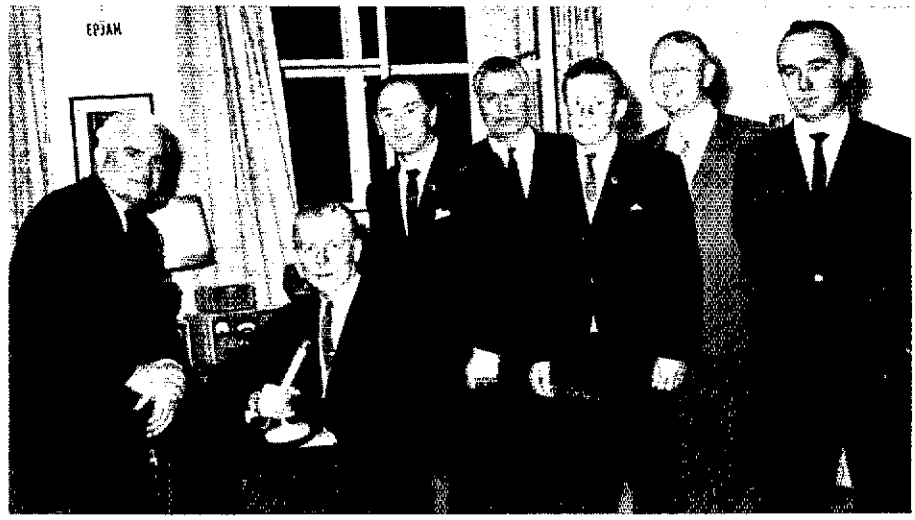
It was either Shiraz with my family, a professorial posting and an EP call, or Nigeria alone – without a call. The choice was easy. So a year later we set up home in Shiraz. At an elevation of 5,000 feet with an excellent takeoff in all directions, the operation from Shiraz was a joy.

From a turret shack atop our villa, I was able to span the centuries of history as I looked out on the mountains known to Darius, Xerxes and other early Persian kings. Tall stands of plane

and cyprus trees marked the garden tombs of the Persian poets Hafiz and Saadi. From the same turret I spanned the modern world of ham radio.

International DX contests created a great deal of interest in those years, and the introduction of the 5BDXCC award added further stimulation. A visit from Reg Beck, VU2REG, helped when he demonstrated what 3.5 MHz could do. Soon after EP2BQ made the first 5BDXCC in Asia. From Shiraz we made several trips by Landrover to Kuwait where Zaman, 9K2AL and Mohammad, 9K2AM, were wonderful hosts. Zaman was a regular on 3.8 MHz where we often worked DX together. It was frustrating to transit Iraq to reach Kuwait, unable to use a YI call.

In 1969 there were rumors that ham licenses in the country were to be discontinued. The rumors became fact when some of the Tehran hams were refused renewal and in some cases their equipment was sealed. As the months passed, EP activity, which had been at a high level a short time earlier, dropped until only a handful of us were left on. Of this few only a month or so of operation remained despite repeated representation through normal channels. During a visit to our highly placed friend, I made mention of the difficulties besetting the hams. I was hesitant to approach the problem from that angle, but the letter I signed outlining the situation was taken and slid into our friend's pocket without further ado. Next morning he called by telephone and, after an exchange of pleasantries said, "Oh, by the way, I gave your letter to His Majesty as we were flying back to Tehran yesterday and he is in agreement. It will be all right now." Later, old licenses were reissued and a number of new ones began to appear.



During the mid-sixties Iranian amateurs enjoyed a high level of activity. Gathered here in the shack of U.S. Ambassador EP3AM are (left to right) W2SKE, EP3AM, EP2RV, EP3RO, EP2BQ, EP3GF and EP2AX.

On the Top Band

About that time my interest was aroused in 160 meters as I read more and more frequently of increased DX activity on that band. The Drake equipment I possessed was capable of 160-meter operation so that by merely extending the 80-meter inverted V antenna, the station was ready to go. The first trial resulted in a QSO with EI9J. Paddy later informed me that he was sure he was working a phony. Many North American contacts were logged in the following months, and after skedding with PY1DVG (now PY1RO) for some weeks, we made it for the first Asia to South America on 160 meters. Other firsts followed and the exchange of reports with VK6HD rounded off the 160-meter WAC, another Asian first. My lone Middle Eastern watch on the band was then relieved by John, 4W1AE, who, although far distant in Yemen, I nevertheless regarded as a local. The 1971-73 period saw many 160-meter contacts. During that time Ray, JY9FOC, an old friend from early days in Tehran, showed up on the band from Amman.

Stew, W1BB, kept our interest high with his frequent letters and top-band bulletins, while at the same time letters requesting skeds flowed in. The band exhibited some incredible peak conditions a few minutes after sunrise when signals would reach fantastic strengths for one or two minutes and then disappear completely. Such was the case one morning when KV4FZ said "switch to ssb." This I did and we exchanged 59 reports immediately followed by a similar exchange with KP4AST; all in the space of two minutes, then nothing. Iran hams joined in the new prefix craze, though 9C9 made for a clumsy cw call in contests.

One of the highlights of our stay in Shiraz was the Persian Empire 25th centennary celebrations at Persepolis just 40 km outside the city. Hams will remember that time as the year of the EQ prefix. The chance came to return to Tehran to resume oil exploration work. Less antenna space was available where we lived in Tehran than in Shiraz, but soon the 160-meter signal was radiating out again. Winter months were spent in the Zagros foothills while the summer months saw us soaring up to 15,000 feet in the High Zagros. Down in my base camps the 160-meter antenna was very much part of the scene. Little did the operators at the other end of those 160-meter contacts with EP2BQ realize the unusual aspect of the QSOs, as I sat operating often surrounded by inquisitive Bakhtyari or Qashqai tribesmen.

In his first years as a geologist, a train of 50 mules transported the equipment necessary for an oil exploration; then came the air age.

We had visited most parts of the country in those 16 years and now our holiday jaunts were to remote parts of eastern Turkey and the Hindu Kush in Afghanistan (YA). My desire to put YA on 160 meters was shelved when ham activity ceased in that country following the change in administration. Early in 1975 I took a position as petroleum geologist back in my native New Zealand.

Home Again

The upheaval after living so long in Iran is indescribable, but now at least our treasures from those years are installed and a rig set up in our ZL hideaway. EP2BQ is silent now, but the call remains and it is hoped that it will be reactivated from time to time especially on 160 meters. My old call ZL4JA had to be dropped at the new QTH, but ZL2SQ has already been heard on 160 meters. The bush-clad hills and cool temperate climate are a far cry from the barren beauty which is Iran. When I work familiar calls like W1HGT, I can recall our early contacts and see in my mind's eye, some of the remote operating spots or the turret shack in Shiraz, reliving the excitement of those times. QST

Correspondence

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

INCENTIVE INCENSE

□ W2FXU DE WB6UWM. I can only blame incentive licensing for my Extra Class, my commercial First Class and the incentive to learn more. If it were not for incentive licensing I would probably be sitting back on my laurels with my General ticket not knowing what I would have missed. Eat your heart out, Russell! — *Al Ginbey, WB6UWM, Beale AFB, CA*

AMATEUR MUSIC MAN

□ You did it again. You printed another picture of a radio club presenting ARRL publications to a pretty librarian. Don't you guys ever get a picture from a plain ordinary-looking librarian? I am still in love with one of those pictures you printed a few years ago. Is this a male chauvinistic plot to promote ARRL by exploiting pretty innocent YLs? Why am I wasting my time writing this letter? I could be down at the local library learning all about ARRL and other fascinating subjects. - *Ken Steward (DOM), W4SMK, Ft. Myers, FL*

INDEX???

□ It has always been a problem for me to find in back issues of *QST* information that I was looking for. It is necessary to go to the December issues of each year to look at the index for the year. With the new format of *QST* it would be very easy to have the yearly index provided as a tear-out, with just a small change in layout so that holes for a standard binder could be punched. It would be possible for the League to have the indices for the last 10 years reprinted in the new format so that reference would be easier: you could then sell the 10-year index for a reasonable charge. I am sure that due to the rapid advances in the state of the art many of us are doing a lot of searching for the valuable information contained in our magazine, and an index in loose-leaf form would be a great help. *Karl Flanter, K4NQ, Sarasota, FL*

PR AND THE SINGLE HAM

□ Recently there has been a healthy effort on the part of the ARRL, amateur radio magazines, and the fraternity to sell the public on ham radio. I decided about three years ago to become involved, so for two years I put together an amateur radio display at the local CB "coffee break." As the only ham present, I was the center of attention, not only explaining my exhibit, but answering questions about the CBers' problems as well. But very few were interested in getting started in ham radio, until recently.

I was invited to tend the ARRL table at the Lima Hamfest (Ohio) last October while the ARRL representative conducted a forum. I was asked why the ARRL charged for the 1975 *Repeater Directory* and was issuing the 1976 edition for free. When I told him that enough advertising had been sold to cover the cost, he said he would tear it out. I reminded him that the advertising had saved him a dollar — he quieted down. Some hams even thought that the League was trying to pick on them by asking for the frequency that their repeaters were on!

We need to further acquaint the ham fraternity, as well as the public at large, with what amateur radio is about and with what the League is doing. We need a lot more PR — inside and out. — *Raymond Milligan, WA9ABI, Geneva, IN*

RUNS IN THE ALLEY

□ I think this is a copy of the W1AW Qualifying Run at 10 wpm. I hope it is the run since I copied it under rather unusual circumstances. It seems that Wednesday night is also my bowling night and I am in a late league. Since the run was at 9:30, I had to make a decision as to whether to not bowl, miss the first game, or to miss the run.

Well, I finally decided I could do both. How? By telephone relay! I showed my wife how to tune the receiver, taught (?) her "QST" and "W1AW" in code and had a trial run on the 7:30 practice, which seemed to go well. After the second frame I made my break for the phones. Both of them were in use! I waited a couple minutes until it was time for me to bowl again. When I finished the third frame I ran for the phones again, I got through to my wife only to find that she had forgotten to tune the receiver. There was something on that sounded like 10 wpm, so I told her that I would copy it. That is when I discovered that I left my pad of paper with my coat. My teammates were calling me to bowl the fourth frame. For the moment, I forgot bowling, found an envelope near the phone and started copying. That was the easy part. After about two minutes my teammate dragged me away from the phone to bowl the fifth and sixth frames. — *Frank Bernhardt, WD8DOS, Cincinnati, OH* [He passed. — Ed.]

INVITE JUVENILE DELINQUENTS TO PLAY WITH YOUR KIDS

□ Please do not consider this multi-year renewal as an endorsement of your policies or of the dues increase. My only purpose is to keep *QST* coming for a few more years with the hope that before my membership expires we'll be able to get rid of the empire builders and get the ARRL back to its purpose of serving the interests of the general membership.

I do not like the dues increase and do not feel that it is justified. I am not afraid of WARC and resent your tactics of using this boogeyman to justify your dues increase and your other objectionable policy of recruiting CBers indiscriminately in the belief that somehow that will help justify our existence. If we double the number of hams or lose half our frequencies, the end result is the same. The only difference is that with the addition of some of the notoriously lawless CBers to our bands, the quality of operation will decrease. I doubt that they will conform to peer group pressure from the present hams. It is like inviting juvenile delinquents to play with your children with the expectation that they will see the light and go straight. It may happen sometimes, but more often the results are just the opposite. I hope you reconsider your present policies. — *Ron Burford, WB8KFD, Mentor, OH*

BRING BULK BACK

□ I have recently used the "bulk" system in connection with a Novice course, which was most successful in that 17 CBers are or shortly will be licensed hams. The instructors in the class followed the procedures for bulk exams to the letter and found the system very good. The cooperation of FCC was most helpful.

Words of congratulations for a job well done to the training staff at Headquarters for the fine job they are doing in "spreading the word." It is my hope that the FCC will reconsider their decision to abolish bulk exams. — *Tom Jaworski, WA1MJE, Great Barrington, MA*

CAIN ABLE

□ I suggest that J. D. Cain, WA9AUM, should read the book of Job in the Bible so he might learn something of patience and understanding. The only band that I know of where you have a clear frequency is ESP — even there your message might come in garbled. I'm on my second set of plastic teeth due to gritting them while attempting to copy traffic through usb, lsb, cw, a-m and prolonged CQs on net frequency. WA9AUM should be so lucky as to be on the receiving end once in a while to gain experience. — *Lee Ulrey, K5HZR, Marion, TX*

TIN EAR?

□ Your tin can specials are fantastic. I have had great success with the Herring Aid, Tuna-Tin 2, and Codzilla. Last week I got my ticket and have been on the air consistently with these devices. The most laudible feature of the rigs is their parts availability. You don't need to write to Vladis Radio Parts in Novosibirsk, Siberia. Keep up the good work. — *Tom Poliquin, WA6WRA, Los Angeles, CA*

SKILL PLUS WILL

□ Being an apartment dweller I believe that my chances for DX are not so promising. My rig consists of an HQ-145A and a DX-60A. The antenna is a half-wave dipole strung down our apartment hallway. Last night after coming home from work I turned on my rig for maybe a QSO or two before retiring. As I listened to 20 all I heard was a lot of hash, until suddenly there was a signal. My first contact was with ZL2GG and the second was with ZL2UW. Who says he can't work DX? — *J. E. Riplinger, WB4YVC, Norfolk, VA*

THANKS

□ I want to thank the League for helping me get my old call back. So, from W0GFS . . . to WB0WJI . . . to W0GFS again. Thanks! *W0GFS* Thank you for advocating the use of interim licensing. I passed my Advanced this morning and don't have to wait to use it. *WA4OSH/AT* If "Getting to Know OSCAR" hadn't come along I would have probably let my Novice expire and taken up fishing. But now I am ready to become an active ham. *WD8BNF*

Happenings

Conducted By Perry F. Williams,* W1UED

Repeater/Remote Reregulation: ARRL Reaction

"Free up remote bases; ease up on repeaters but keep the framework," seems to be the gist of comments filed by ARRL in Docket 21033, the latest round in FCC's program to make amateur rules simpler and easier to follow.

In its 40 pages of text, the League:

Urges retention of repeater subbands
Sees repeater expansion as separate topic
Asks FCC to keep WR calls and licenses
Rejects repeaters in hf bands
Finds height, erp limits unnecessary
Sees taping by open repeaters as needless
Feels "remote bases" differ from repeaters
Agrees no special license for "aux links"
Approves "aux-link" control from mobiles

In January, FCC published its Notice of Proposed Rulemaking in Docket 21033, which would make sweeping changes in rules for remotely controlled and repeater stations. *QST* had full coverage, in "Deregulation – Another Round," by Judith Gorski in the March issue. Following discussion by the ARRL executive committee and input from individual amateurs and the VHF Repeater Advisory Committee, ARRL has filed views we feel to be the consensus of our members on the subject.

The League strongly feels that the basic framework for repeater operation – separate licenses, distinctive call signs, specific subbands in the 29-MHz area and in the vhf bands – is beneficial to the amateur service and should be retained. Amateur radio is a broad field of endeavor, encompassing such diverse modes as cw, a-m, fm, ssb, RTTY, SSTV and ATV; such diverse interests as repeaters, satellites, radio control of model vehicles, moonbounce and meteor scatter; and such diverse activities as message handling, emergency preparation, DXing, contesting, ragchewing, and technical experimentation. Some of these interests have conflicting needs for frequencies. The explosive growth of fm and repeaters in vhf and uhf bands tends to obscure the fact that many thousands of amateurs enjoy other forms of operating in these bands. Their needs deserve to be considered and protected.

The simple inescapable fact is that subbands for repeaters must be retained. It is the only practical and effective way to accommodate the diverse interests of the fraternity. Commission enforcement action is not required to maintain observance of the subband restrictions; all that is required is that the rules be there, and amateurs will obey them. The continuance of subband allocations will not be an administrative burden to the Commission. Rather, it will forestall serious disputes between amateurs attempting different types of communications, and it will encourage the continued coordination of repeater frequencies, thus averting an increase in demand for FCC intervention.

In its arguments against dropping repeater subbands, ARRL concedes that some of the repeater subbands are exceedingly crowded in some areas, while adjacent frequencies are relatively quiet. There might well be a separate docket to discuss widening some of the repeater subbands, to which all those with varying interests could respond. But the League maintains that dropping all repeater subbands would not be the proper response to the problem.

On the other hand, the League already knows it doesn't want expansion of repeaters into the hf bands. In an earlier docket, nearly three years ago, the Commission observed, "It should be obvious to all amateurs that transmissions in the repeater segments of the amateur frequency bands should be limited to those intended to be transmitted." A powerful argument for retention of repeater subbands, and against opening the hf bands to repeaters! On a band with worldwide propagation, one could not control what was repeated and what was not. One could not effectively avoid interfering with communications in progress. The user of an hf repeater would probably not be able effectively to monitor the output frequency before beginning a transmission. And two of the hf bands are shared in some parts of the world. Thus, an amateur using an hf machine could quite accidently disrupt nonamateur communications thousands of miles away.

Back to 10-meter and vhf/uhf repeaters: The League is convinced that separate licenses and distinctive call signs for repeaters are highly desirable. Repeater stations are quite different from other amateur stations in both technical and operational terms. By its very nature and purpose, a repeater must be available to more than a single amateur to serve a useful purpose. Its frequency utilization must be coordinated in advance of its operation to minimize interference and to reduce the possibility of an unwise investment in crystals, duplexers and other frequency-dependent components. By requiring a separate application for a repeater license, the applicant is placed on notice that something more than the grant of a simple application is required.

Frequency coordination of repeaters is most desirable and, in many areas of the country, absolutely necessary. The League feels the Commission can greatly assist amateurs in voluntary self-regulation by including a question on form 610 and 610-B to be answered by all applicants for repeater station licenses:

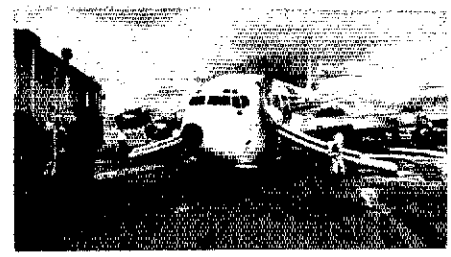
> "Have the frequencies to be used by this repeater station been coordinated by the recognized frequency coordinator for your area? Yes _____ No _____. If not, please supply an explanation."

Such a question would greatly assist the volunteer coordinators and would minimize the possibility of receipt at the Commission of interference complaints.

More than 3,000 repeaters have been authorized. A distinctive call sign for repeaters makes it possible to recognize immediately that a repeater is operating on the channel. Moreover, the standardization of repeater call signs, which began in 1972 with the adoption of Docket 18803, has made repeater directories most useful, especially to amateurs traveling outside their local areas.

FCC sought a discussion of effective radiated powers and heights above average terrain (HAAT) with respect to repeaters. ARRL proposes elimination of erp limits and the dropping of log requirements with respect to HAAT. Balance between a repeater's receiving and transmitting capability is more important than actual watts of erp. The relative importance of achieving good coverage versus the need for avoiding cochannel interference varies widely with terrain and population across the country.

ARRL believes that tape recording of open repeaters in automatic control is unnecessary. In fact, the current requirement tends to encourage closed over open re-



ARRL Vice President Carl Smith, WØBWJ, flies airplanes for Western Airlines, but he doesn't usually land like this! Back in January, Carl's nose wheel wouldn't drop down, so he set the plane down smoothly without it. Among other accolades for a job well done, he received the Good Guy Award from The Honorable Frank F. Fasi, mayor of Honolulu. Terri, Carl's wife, joined them for this photo.

*Manager, Membership Services, ARRL

peaters, though open repeaters would seem to be more in the public interest.

ARRL agrees with FCC that identification every 10 minutes for repeaters and stations in auxiliary operation, rather than at the five-minute intervals now required, should be satisfactory. The 10-minute rule already applies to all other amateur operations.

Restrictions on "remote base" operations should be removed, in the ARRL view. We are in agreement with FCC that separate licenses should not be required for auxiliary-link or control stations. Restrictions on operation of these stations in mobile status should be lifted. Thus, the remote control of a fixed station would be returned to the flexibility which was available before adoption of Docket 18803 in 1972.

The League respectfully disagrees, however, with FCC's statement that "remotely controlled base stations closely resemble repeater stations, and it may be desirable that such stations should be treated identically." Remote base stations have more in common with the usual fixed station than with repeaters and should not be subject to the same considerations as repeaters. In practice, the operation of a remote base by two or more amateurs is not unlike that of a club station, except that the members don't have to travel to the clubhouse to operate. A group operating a remote base does so in order to communicate with *other* amateurs, not with other members of the group. Repeaters, on the other hand, are installed for the group to be able to talk to each other, primarily from their mobile units.

The only special considerations for a remote base station involve the selection of frequencies for the links to and from the remote site. Good spectrum management dictates that these frequencies be in relatively uncrowded portions of the amateur bands, where interference *to* and *from* other operations will be minimal and where the integrity of the control links can best be maintained. The present rule, which requires that frequencies above 220 MHz be utilized by auxiliary stations, serves to codify what is good amateur and good engineering practice. The League believes, then, that this restriction should be retained. To prevent a blurring of the lines between auxiliary-link and repeater stations, ARRL feels an additional sentence should be added to proposed Section 97.86: "A station in auxiliary operation must employ means to limit access to those stations specifically authorized by the licensee."

Those readers who are especially interested in this subject are invited to send a 9 by 12-inch self-addressed envelope bearing 28 cents postage for third class or 46 cents postage for first class to receive the full text of ARRL's Comments, Docket 21033.

PURITY OF EMISSIONS: A STAY?

Last month in this space we reported on new rules for the purity of amateur emissions, Section 97.73, adopted as a first Report and Order in Docket 20777 and effective April 15.

The regulation as adopted specifically sets out, for the first time, limitations to be met by a transmitter or external power amplifier. Up to this point, FCC regulations for the amateur service have been directed to the *operation* of the station and not to the various equipments such as the receiver, the transmitter, the power amplifier if used, the transmission line and the antenna. Up to this point, amateur operation has been judged by its final effect as observed over the air. Thus, an amateur could comply with old 97.73 – "Spurious radiation from an amateur station being operated with a carrier frequency below 144 MHz shall be reduced or eliminated in accordance with good engineering practice. . ." – by installing a low-pass filter between the transmitter or amplifier and the antenna.

Suddenly, we have instead a rule saying, "The mean power of any spurious emission or radiation from any amateur *transmitter* or external radio-frequency power *amplifier* being operated with a carrier frequency below 30 MHz shall be at least 40 dB below the mean power of the fundamental . . ." (For vhf, the rule is still more stringent!) Suddenly, the filter doesn't help: If the regulation means what it says, an amateur may not trade in an old transmitter or amplifier for new, may not sell his old transmitter or amplifier to another amateur, and may not purchase new equipment unless and until the manufacturer has demonstrated compliance with the spurious-emission provisions of new Section 97.73. (Section 2.805 of FCC's general rules regulates the sale, etc., of devices which do not need type acceptance but for which standards have been set; amateur equipment now comes within the purview of that section.)

Obviously, the new rule – if it stands as is – generates a crisis for radio amateurs and their suppliers. Accordingly, ARRL filed on April 11 a petition for reconsideration and a petition for a stay in the effective date of Section 97.73. At deadline for this column no word had been received from the Commission concerning our petitions. But check "League Lines," this issue, which has a later deadline, or listen for information on W1AW's regular bulletin schedules.

A footnote: Several manufacturers have also filed petitions in this matter. And League headquarters has sent a letter to all manufacturers and distributors of amateur radio equipment, explaining the rules and offering suggestions on compliance. Incidentally, the League's technical staff found that most current equipment truly intended for the amateur market meets the specs.

The Amateur Transmitters Association of Western Pennsylvania celebrated 50 years of continuous service to amateurs of greater Pittsburgh and of affiliation with ARRL at a gala dinner. A plaque marking a half century of affiliation was presented by Harry A. McConaghy, W3SW, director from the ARRL Atlantic Division to club president Ben Freiland, W3OJW (right). The club has met regularly since November, 1925, at various locations in or near the Golden Triangle, including the West Penn building, the Fort Pitt Hotel, the Pittsburgh Press building and, currently, the Buhl Planetarium. *(W3KWW photo)*

Don Search, W3AZD, recently joined the staff as Assistant Communications Manager in the DXCC branch of the Communications Department. Don brings an impressive ham background to the post. He's an Honor Roll DXer and is widely known from his activities in several Washington-area clubs, attendance at hamfests and conventions, and work with the W4/K4 QSL Bureau.

MORE TIME, PLEASE!

Heathkit, Drake and ARRL all have asked for more time for the study of, and preparation of alternatives to, Dockets 21116 and 21117, which would ban linear amplifiers capable of operation in 24 to 35 MHz, and which would establish type acceptance for amateur equipment for the first time.

The original deadlines for both dockets were May 25 for original comments and June 6 for reply comments. If the requests are granted, these deadlines would be extended to August 25 and September 6, respectively. Check "League Lines," this issue, for possible news of extensions, or tune in to the bulletins transmitted by W1AW.

Should there be an extension, amateurs wishing to file comments during the period may wish to obtain a copy of RM-2839, a proposal by the San Antonio Repeater Organization (SARO) to require licensing of amateur radio equipment dealers and proof of license by purchasers of such gear. (A brief resume of the petition appeared on page 72, April *QST*.) RM-2839 may be requested from SARO, P. O. Box 1753, San Antonio, TX 78296; a self-addressed stamped envelope would be helpful.

An extension of time has also been requested in Docket 21135, FCC's proposal to abolish all additional station licenses (beyond the basic or "Primary" amateur station-and-operator ticket). See "All Special Calls – Doomed?" on pages 58-60, May *QST*. The original deadlines were June 2 for original comments and June 30 for replies; new dates would be July 6 and July 27 respectively.

ANTI-THEFT BILL IN CONGRESS

The Honorable Edward P. Beard, representative from Rhode Island, has introduced HR 4656, a bill to prohibit the theft of any radio communications device which is licensed by the Federal Communications Commission. It has been assigned to the Committee on the Judiciary. The text:

Cathy Hrischenko, VE3CJH, was presented with a Certificate of Merit by the CRRL, recognizing her work as a founder of the Canadian Ladies Amateur Radio Association (CLARA) and similar work. Presentation was by Bill Loucks, VE3AR, vice director of the Canadian Division, at a meeting of the Scarborough Amateur Radio Club.

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled. That any person who steals or otherwise converts to the use of such person, or to the use of any other person, any radio communications device which is licensed by the Federal Communications Commission shall be fined not more than $5,000, or imprisoned for not more than one year, or both.

"Sec. 2. For purposes of this Act – (1) the term 'radio communications device' means any device for radio communication which is operated from any fixed, land, or mobile vehicle station for the purpose of short-distance or long-distance personal or commercial communication, radio signaling, experimentation, safety service, or control of any remote object or device by radio; and (2) the term 'mobile vehicle' means any automobile, motorcycle, truck (whether driven as a private vehicle or for commercial or farming purposes), ship or other marine vessel, aircraft, or any other similar self-propelled vehicle, including any vehicle which is designed for operation on rails."

SILENT KEYS – VE6TK, W6EWX (ex-W4ASR), W9EWH

We regret to report the deaths of three amateurs who have made their marks on the League and amateur radio on the national level.

Duncan C. Davidson, VE6TK, has been ARRL QSL Manager for Alberta, VE6, since February 24, 1972. His home was in Calgary, and his work was with Canadian General Electric. An amateur since 1939, Dunc was active on phone and cw, on all the popular bands. He has been president of the Calgary DX Club and was a long-time member of the Calgary Amateur Radio Association. His replacement as VE6 QSL manager is G. D. Holston, VE6AGV, 4003 1st Street, N.W., Calgary, Alberta T2K 0X2, Canada.

W. C. Shelton, K6AAK/W6EWX and former W4ASR, died March 7 in Camarillo, California. Bill was ARRL Director from the Southeastern Division from 1940 to 1950, prior to that an assistant director, and in 1937, was SCM, East Florida. Before retirement he had been a supervisory engineer at the Pacific Missile Test Center, Point Mugu. Bill, who was 68, leaves his wife and a son.

Franklin F. Wingard, W9EWH, an attorney in Rock Island, Illinois, died in February at the age of 72. A ham since 1921, Franklin was also an avid collector of early radio equipment, tubes and literature. A portion of his collection, some one thousand items, was presented to the Smithsonian Institution in Washington, DC in 1962. We understand that an additional bequest is made in his will. W9EWH was a member of the Antique Wireless Association, Boy Scouts of America, Kiwanis, YMCA, Junior Chamber of Commerce, Masons, the Broadway Presbyterian Church in Rock Island and other organizations; he was very active in civic affairs as well.

GIRL GUIDE ENCAMPMENT, CG1CR

The banks of the Mira River, near Sydney, Nova Scotia, will be the site of a Girl Guides encampment July 20 through August 2, 1977, for 1,536 girls from throughout Canada and its Armed Forces stations overseas. Among displays and exhibits erected by the Royal Canadian Mounted Police, the Nova Scotia Government, Sports Canada, the Department of Recreation, Bank of Nova Scotia and Canada Post will be an amateur station set up by Sydney Amateur Radio Club and operating under the special call CG1CR. The station will be open for visits by the public from 2 to 5 P.M. daily. Amateurs working CG1CR on 80 through 2 meters will receive a special commemorative QSL; yours should go to Sydney Amateur Radio Club, 91 Harbourview Drive, Sydney, NS B1S 2A8.

And tune in this column next month, for news of Boy Scout Jamborees.

CANADA RULES

The Canadian Parliament has under consideration new legislation to streamline federal regulation of telecommunications in Canada. The proposed Telecommunications Act would replace the Broadcasting Act, the CRTC Act, Radio Act, Telegraph Act and certain provisions of the Railway Act and the National Transportation Act.

On another front, two General Radio Service (CB) channels were designated effective April 1, for possible preemption for official emergency communications in British Columbia and the Yukon. Channels 13 and 23 (27.115 and 27.255 MHz) could be taken over for marine rescues or land searches by order of a responsible official of a municipal, provincial or federal emergency organization (including a mayor or police chief). Channel 13, already in use by marine auxiliaries, the Coast Guard and others, will be used for sea rescues; Channel 23 for land. Channel 9 remains as the emergency and calling channel, but it should not be used for extended operations. At the conclusion of the emergency, the official preempting it would declare the channel again open.

BEHIND THE DIAMOND

We'd like to introduce you this month to *Don Waters, WB1???.* "What sort of call is that?" you say. We'll tell you about the call later, but for the present we'll say that Don is the League's public relations consultant and has been so since 1965. We all know the importance of PR to ham radio, and the League is getting more and more involved in PR activities. Don's talent has aided these activities tremendously.

We won't keep you in suspense any longer about his strange call sign. The plain truth of the matter is that Don only recently took the test for the Novice license, and at this writing is still awaiting his ticket. He used to feel that by not having a ham ticket he could be more objective and put amateur radio into clearer perspective – thereby increasing his effectiveness as a PR consultant. Well, the bug must have bitten too hard because Don will soon be one of the boys.

Don earned his AB degree at Lafayette College in 1940. World War II found him serving as an infantry company commander in Italy, and during the Korean conflict he was a member of the army general staff stationed at the Pentagon. The later 1950s he spent with General Foods Corp. involved with corporate public relations. In 1960 he went into business for himself as Don Waters and Associates.

Don is actually a half-time member of the League staff now (maybe that's why some people say that he's not all there!), the other half being devoted to Don Waters and Associates, which serves banks, industry and other clients.

If you ask Don what he feels are the League's most important PR programs at the present time, he will put the club and training program at the top of the list. Also important are the League's films (*Moving Up to Amateur Radio* being the most recent) and the OSCAR Education Program, which brings live satellite communications directly into the classroom. Don is especially proud of the Public Relations Assistant (PRA) program, which he feels has been a major step forward in the ARRL's grass roots PR efforts.

Don and his wife Marilyn live in Ridgefield, CT. They have five children: Christopher, Timothy, Jeffrey, Kevin and Elizabeth, and three grandchildren. In fact, he includes grandchildren as one of his hobbies. His other hobbies are hunting, photography and (get this) malacology. Bet you didn't know Don was that kind of a person! Well, at least he's come out of his shell long enough to get his ham radio ticket. With that, I'll take my cue and clam up. – *K1FHN*

Sequel

Hal wrote the "Behind the Diamond" about Don Waters for the May issue. It was squeezed out by articles which had a definite time factor. But now we're just as happy – Don has traded in that WB1??? for a real call, WB1CUJ. We've swapped photos, too, to show Don at the equipment he'll be using to start with. – *W1UED*

Don Waters, WB1CUJ

Moved and Seconded...

MINUTES OF EXECUTIVE COMMITTEE MEETING
No. 362
March 26, 1977

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at the Sheraton Inn Washington-Northeast, New Carrollton, MD, at 9:00 A.M. on March 26, 1977. Present: President Harry J. Dannals, W2HD, in the Chair; First Vice President Victor C. Clark, W4KFC; Directors Max Arnold, W4WHN; Richard A. Egbert, W8ETU; Ron Hesler, VE1SH; and Robert B. Thurston, W7PGY; and General Manager Richard L. Baldwin, W1RU. A number of other officers, directors and vice directors of the League were also present, together with General Counsel Robert M. Booth, Jr., W3PS.

The general manager presented the names of 436 life members who had been elected since the January meeting of the Executive Committee, and these were acknowledged by the committee and will be published in *QST*.

On motion of Mr. Arnold, seconded by Mr. Clark, unanimously VOTED to confirm the mail vote previously granting approval of the following conventions: Mississippi State, May 14-15, 1977, Jackson, MS; Midwest Division, October 12-14, 1979, Cedar Rapids, IA; and to grant approval of the following convention: Virginia State, September 16-18, 1977, Falls Church, VA; and to approve the changes of dates of the following conventions whose applications had previously been approved: Delta Division, October 8-9, 1977, to September 24-25, 1977; West Gulf Division, July 22-24, 1977, to October 7-9, 1977.

On motion of Mr. Egbert, seconded by Mr. Clark, unanimously VOTED to approve the holding of an ARRL Technical Symposium at the Virginia State Convention on September 16.

On motion of Mr. Clark, seconded by Mr. Hesler, affiliation was unanimously GRANTED to the following societies: Bayou Amateur Radio Club, Houma, LA; Capital Amateur Radio Society, Frankfort, KY; Carbon County Amateur Radio Society, Rawlins, WY; Circle Amateur Radio Club, Chicago, IL; Cooke County Amateur Radio Club, Lake Kiowa, TX; Cypress Chapter 10-X International, Longwood, FL; DeVry Institute of Technology Amateur Radio Society, Atlanta, GA; East Peoria Community High School Radio Club, East Peoria, IL; Flushing Radio Amateur Technical Society, Rego Park, NY; Glastonbury High School Amateur Radio Club, Glastonbury, CT; Greensboro Amateur Radio Association, Inc., Greensboro, NC; Henderson County Communications Club, Athens, TX; Hopkins County Amateur Radio Club, Sulphur Springs, TX; Humboldt State University Amateur Radio Society, Arcata, CA; Kettle Moraine Radio Amateurs Club, Waukesha, WI; Lake Monroe Amateur Radio Society, Sanford, FL; Laurel Lasses, Butler, PA; Long Island Chapter-Quarter Century Wireless Association, Inc., Garden City, NY; Magnetic Mountain Repeater Assn., Craig, CO; Manhattan Area Amateur Radio Society, Manhattan, KS; Milltown Amateur Radio Society, Milltown, IN; Mississippi Valley DX/Contest Club, St. Louis, MO; Robert Moses Jr. H.S. Amateur Radio Club, Babylon, NY; Nishna Valley Amateur Radio Club, Atlantic, IA; Northern Berkshire Amateur Radio Club, Inc., Pittsfield, MA; The North Shore Repeater Association, Inc., Peabody, MA; Orchard View Middle School Amateur Radio Club, Muskegon, MI; Palo Verde H.S. Amateur Radio Club, Tucson, AZ; Princeton Amateur Radio Society, Princeton, KY; Carl Sandburg Amateur Radio Club, Orland Park, IL; Sawyer Amateur Radio Association, Sawyer A.F.B., MI; Shelter Island Amateur Radio Club, Shelter Island Hts., NY; Temple City High School Amateur Radio Club, Temple City, CA; Tri-County Repeater Association, Delphos, OH; Valley Amateur Radio Association, Staunton, VA; University of Texas at Dallas Amateur Radio Society, Richardson, TX; Wallingford Amateur Radio Society, Wallingford, CT; Wiesbaden Amateur Radio Club, Wiesbaden, GERMANY; W/K Amateur Radio Club of Greater Milwaukee, So. Milwaukee, WI.

On motion of Mr. Arnold, seconded by Mr. Egbert, after discussion, VOTED to authorize the general manager to increase the limits to $100,000 on the travel accident policy which provides coverage for ARRL personnel, including staff, elected and volunteer, who are traveling for the League on either business or membership matters.

After extended discussion unanimously VOTED to refer for study by the Membership Affairs Committee and the Management & Finance Committee a proposal for insurance coverage for members and clubs that had been prepared by the staff in response to minute 62 of the July 1976 meeting of the Board.

The general manager displayed preliminary proofs of a new membership certificate and membership card which are to be produced by computer printout, rather than by the present method of hand-typing each certificate and card. After discussion, the design was APPROVED, on motion of Mr. Arnold, seconded by Mr. Thurston. (The effect of this approval is to rescind a 1954 action of the Board concerning the previous design of membership certificates.)

After discussion, on motion of Mr. Thurston, seconded by Mr. Egbert, it was VOTED that the general counsel be authorized to file for reconsideration of the recent report and order in Docket 20777 (purity of emissions) if, in his opinion and after further study by his office and by the staff, such reconsideration is deemed advisable.

After extended discussion, the general counsel was instructed to file comments in Docket 21033 (repeater subbands, etc.), these comments to be based on the document prepared by the staff and to be modified in accordance with discussion at this meeting. The Executive Committee wished to be recorded as expressing its thanks to the VRAC and the staff for their work on this document.

After discussion, and upon consideration of the fact that these were complicated dockets which would have a far-ranging effect on the amateur service, on motion of Mr. Egbert, seconded by Mr. Thurston, the general counsel was instructed to file for a 90-day extension of the time for comment in Dockets 21116 (linear-amplifier ban) and 21117 (type acceptance of amateur equipment).

After discussion, noting that Docket 21135 (simplification of call-sign assignment) had been received too late for adequate publicity in the April issue of *QST*, and that this would be an emotional issue with many members, moved by Mr. Arnold, seconded by Mr. Thurston, that the general counsel file for a 30-day extension of time for comment. The staff was instructed to prepare a response based on membership comment received.

During the course of the meeting the committee discussed, without formal action, guidelines for technical symposiums, the font to be used when preparing membership certificates, the traditional policy of providing membership pins free to those who have been elected to office and at cost to those who volunteer or are appointed, FCC-ARRL liaison, the Novice Training Program, the extent to which ARRL can participate in lobbying activities, the question of filing for additional Novice privileges at this time, liaison with manufacturers in matters affecting amateur radio, the possible sale of land to a Newington neighbor, IARU liaison and WARC preparation, technical advisors, solicitation of additional nominations for the VUAC, the publishing of the list of overseas QSL bureaus in *QST*, the DXCC backlog and a report on business matters and building addition progress by the general manager.

During the course of the above, the committee was in recess for lunch from 12:35 to 1:42 P.M.

There being no further business, the committee adjourned at 2:56 P.M.

Respectfully submitted,
Richard L. Baldwin, W1RU
Secretary

LIFE MEMBER APPLICANTS

The Executive Committee acknowledges the following Life Members who were elected between September 18, 1976, and January 19, 1977.

Dale C. Bagley, WBØELJ; Warren W. Bergman, WØTDR; Garry Dean Cartwright, WAØHNW; Roberta J. Chamalian, WB1ADL; Frank Cizin, WA2EJF; Andrew V. Clark, WA4PRF; Arthur M. Coates, W1VFJ; Donald M. Dasher, W4PVW; Ronald H. Evans, K4KTB; Boris Field, WB6KVQ; Jerald L. Goble, WA6LGZ; J. Robert Hanson, WA4WEO; Brian D. Harden, WB8QYU; Erwin C. Heimbuck, Jr., KØOTZ; Peter T. Hills, WØHXB; Joseph J. Jachimiec, W7KXD; Gary W. Jackman, WB6KOC; Harry C. Keil, WA9AIH; Herman C. H. Knief, W2YTO; Tom Kravec, K8PBZ; Robert D. Laughlin, K6HVN; W. Lee Mack, WA7VDY; Howard F. Malone, WA2RZV; Edward M. Maluke, K8COI; Oran T. Marksbury; Randolph E. Mather, WA7BCS; Robert S. McCuskey, W8MJE; David C. Moore, W9NFW; Allen N. Nelson, K7JIO; Noreen Nimmons, VE3GOL; Robert V. Nunez, Jr., K5EJP; John Oades, VE7AJI; Steven A. Opochinsky, WA2BIZ; Ronald D. Reuter, WA6WEQ; Myron Rhoades, WØMYQ; David A. Rogers, K7SWP; Norman M. Schklar, WA4ZXV; Erle W. Scott, W6OAU; Forest E. Shick, WB9KVQ/WA2MZG; James R. Smith, WA3MTA; Paul E. Smith, K4VXP; John W. Spence, WB5HOD; Si Spisak, WBØGLQ; Ray Stilwell, WB8LOA; Clarence M. Sykora, WBØJGC; Charles F. Taylor, WA3TVS; Paul W. Terrell, W8NTZ; Francis K. Tomita, KH6AUO; Ronald J. Tonneson, KØQVF; Thomas E. Trowbridge, Sr., WB9IHR; Donald T. Wallace, WB7CLC; William D. Wallace, K4TVE; Harold L. Walton, WBØKAP; Robert M. Wampler, K9SSI; Curtis M. Wann II, K4ITO; Paul R. Wells, WA3FHL; Jason F. Wheeler; James L. Whiting, Jr., W4WGE; Edward A. Whitman, K2MFY; John E. Wiley, K6FID/WB8TOY; John F. Williams, WA1QBQ; Margaret H. Williams, WA4FTJ; Larry Winemiller, K3GLK; Walter Wingate; Amelia E. Wise, W5OVH; Frank K. Wong; John C. Wyman, WB2PWQ; Edward Yadzinski, W2DNZ.

International News

Conducted By Bruce A. Johnson,* WA6IDN/WA1ZQP

Are You Legal?

The number of radio amateurs traveling and vacationing outside their own countries is clearly on the increase. And almost all of these amateurs want to operate in other countries. Excellent!

There is but one cardinal rule to be kept in mind at all times, in all countries: To operate legally, you need *written* permission from the telecommunications ministry of the country whose jurisdiction you are in. Oral permission is simply not enough, and therefore not legal.

Many amateurs are learning this the unpleasant way: arriving at customs in a foreign airport, only to have their equipment confiscated because they cannot present this piece of paper. If you are visiting a country which requires that you call in person at the ministry to get your permit, be sure to make advance arrangements with the country's consulate in the U.S. to import your equipment.

Yes, some countries issue reciprocal applicants special call signs (e.g., United Kingdom issues G5xxx calls; France issues FØxxx, etc.), but others will allow you to operate with your own call sign, followed by the Morse "/" or oral "portable" and the prefix of that particular country.

While we're on the subject of taking equipment into other countries, we advise that amateurs be familiar with the amateur regulations of the country they're planning to visit. Taking a 1,000-watt linear amplifier into a country which allows its amateurs to operate with no more than 150 watts, for example, can mean trouble — whether at customs lines or later on. Similarly, one should beware of handling third-party traffic; few countries permit this.

The International Services desk at ARRL hq. has reciprocal-licensing and third-party information on almost every country in the world. We are pleased to help applicants obtain their legal permits.

What can happen if you operate without the legal paper? Almost anything: confiscation of equipment, imprisonment, stiff fines. In the United States, for example, a person operating without a reciprocal permit is in violation of Section 301 of the Communications Act and can be fined up to $10,000 per day, in addition to a one-year prison term.

Don't gamble: Take the steps, and protect yourself *and* the Amateur Radio Service. With the World Administrative Radio Conference (WARC-79) coming up, we need to keep our records as clean as we can. And every violation overseas counts against us at the conference in Geneva later in 1979.

Tom Clarkson, ZL2AZ (left), and "Samy" Saito, JH3PJE, are shown here together at a recent gathering in Southeast Asia. Both OMs are directors of the IARU Region 3 Association.

PORTUGAL: AMATEUR RADIO THRIVING

Amidst severe financial inflation, frozen wages, heavy import/export quotas and limited foreign travel, amateur radio is growing in Portugal. The growth and resurgent interest are largely due to the IARU society there, Radio Emissores Portugueses.

Headquartered high atop a building along a narrow Lisbon back street, the dynamic and youthful leadership of REP continues to gain popularity with the Portuguese government. Services to members have been significantly increased, too: a QSL bureau, a bi-monthly bulletin, a special bi-weekly bulletin (including news of amateur radio around the world), a propagation service, and weekly headquarters broadcasts on 2 and 80 meters.

When this writer visited REP headquarters in February, 1977, he saw active training classes with many enthusiastic students of code and theory in attendance. Many of these students came to REP after the recent television series REP produced on national television. The last segment was the ARRL-produced film, *Ham's Wide World*.

REP's president, Jaime "Jim" Gracias, CT1OF, travels around Portugal regularly, speaking to various clubs about WARC and its importance to the future of the Amateur Radio Service throughout the world. He augments these talks with meetings with the Portuguese military, who are becoming increasingly interested in amateur radio as a valuable asset to Portuguese life. Surplus equipment is being donated to REP as a result of this exchange. This helps to solve the severe problem of amateur equipment shortages in the country, while encouraging amateurs to roll up their sleeves and put some of that theory to work.

1977 marks the 50th anniversary of REP. Later this year, special bronze and silver medallions will be made available to interested amateurs throughout the world. We at IARU and ARRL hq. wish the REP and Portuguese amateurs the very best in their impressive and active efforts to promote amateur radio throughout Portugal.

Against the cobblestone backdrop of the 15th century Charles Bridge in Prague, Czechoslovakia, Alan Romanowicz, WB2DHC, holds the banner of the Central Radio Club of Czechoslovakia.

AMERICAN AMATEURS: WANT TO OPERATE IN CZECHOSLOVAKIA?

Alan Romanowicz, WB2DHC, has just returned from one of his frequent visits to Prague. While there, he learned from the IARU society (Central Radio Club of Czechoslovakia) that Americans can now obtain permits to operate there, using another Czech station or their own equipment! Each application is considered on an individual basis, since the U.S. and Czechoslovakia hold no reciprocal agreement. Applicants should bear this in mind, and not be offended if their application is turned down. *At least* three months before you intend to travel, send a detailed letter to The Central Radio Club of Czechoslovakia, Box 69, 11327 Praha 1, Czechovakia. List all of your equipment, class of license (include a photocopy), the area you will want to operate from, and the specific dates of your stay. An OK8 call will be issued, if your application is approved. QST

*International Services Assistant, ARRL

Washington Mailbox

INSTANT UPGRADING

Q. I've been hearing some awfully strange call signs on the air lately: calls like W4DQD/SV and WA1FCM/BS. What do they mean?

A. They're part of the FCC's new instant-upgrading program. Nowadays, if you already have an amateur license of some class, and successfully upgrade it at an FCC examination point to a higher class license, you can leave the FCC office with authorization to use your newly earned privileges immediately. This authorization comes in the form of an "interim permit," and you must use special identification procedures on the air when operating under your new privileges. This is so FCC monitoring stations will know that you have recently upgraded and at which examination point you took your test. If the monitoring stations did not have this information, they could conceivably send you a citation for out-of-band operation.

Q. What sort of special identification must I use when operating under my new privileges?

A. When you pass your examination, the examiner will assign you a two-letter identifier which you must append at the end of your call sign when using your new privileges. The two-letter identifier indicates at which FCC examination point you took your test. Examples of these two-letter identifiers are BS for Boston, MA, SV for Savannah, GA, and PA for Philadelphia, PA. When an FCC monitor hears such a special identifier, he can check his records to see if the operator did indeed recently upgrade to a higher class license at the examination point in question. (97.32 & 97.87f)

Let's say WA1UDN successfully upgrades to General from Novice at the Boston office of the FCC. When operating on portions of the bands reserved for General class licensees, he would, on cw, sign WA1UDN/BS. On phone he would sign as follows: "This is WA1UDN interim BS."

We heard of one funny story of a ham who upgraded at the Philadelphia examination point (Philadelphia's special two-letter identifier is PA). He was using his new privileges on the phone bands one day and signed, "This is WA3XXX interim PA." The response was, "Interim, PA? Where's that?"

Q. Do I have to use the special identifier after my call if I'm not using my new privileges? For example, if a Novice upgrades to General, would he have to use the special identification procedures when operating on the Novice bands?

A. No, it is not necessary to append the special identifier to your call if you are not using your newly earned privileges. (97.87f)

Q. How about people who take an amateur examination for the first time? Suppose I go to an FCC office and pass the General test, but do not hold a Novice or Technician ticket. Can I receive permission to get on the air immediately?

A. Unfortunately, no. There are no provisions at this time for allowing a newly licensed person to get on the air at once. What you are asking about is called "instant licensing," as opposed to the present program of instant upgrading. An instant licensing program is under consideration, but its implementation is well in the future.

OVERSEAS EXAMS

Q. I am a serviceman stationed overseas and expect to be here for some time. Is there any way I can take the test for a Technician or higher class license?

A. Arrangements for taking a Technician or higher class exam from an overseas location are now made on a case by case basis. You should submit your request in writing to the Personal Radio Division, Federal Communications Commission, Washington, DC 20554.

The Novice exam is conducted by mail only, and this exam may be taken overseas with no special arrangements if you can locate a qualified examiner. A qualified examiner must hold an FCC General class or higher license, be 21 or older, and be unrelated to the applicant. For all other classes of license, you should write the Personal Radio Division as above. (97.28b)

KEEPING IT IN THE FAMILY

Q. I just became a ham. My father, who passed away several years ago, was a ham most of his life and was the one who actually got me interested in ham radio. Is there any way I can receive his call sign, which is currently unassigned?

A. No, there are no provisions in the rules which would permit you to acquire the call of a deceased member of your family. In the past, the rules allowed for a club to be assigned the call sign of a deceased former member, but this is no longer the case. (97.51)

AMATEUR RULES

Q. Where can I purchase a complete set of the FCC regulations pertaining to amateur radio?

A. Amateur rules – part 97 of the FCC's Rules and Regulations – may be obtained from the Government Printing Office for $1.50. Write the Superintendent of Documents, Government Printing Office, Washington, DC 20402. Ask for stock number 004-000-00325-0.

The amateur rules are amended frequently, and the GPO's volume of the rules can be outdated quickly. The reader is advised to keep current on amateur rules changes by checking sources such as *The Federal Register* or *QST*.[1]

THIRD-PARTY COMMUNICATIONS

Q. I am a licensed amateur. My daughter, who is not a ham, is now living in Japan as part of a cultural exchange program. Is it legal for me to talk with her via phone patch through a Japanese amateur's station?

A. The answer is no, and the reason is because there is no third-party agreement in force between the U.S. and Japan. International regulations forbid the passing of third-party traffic between countries unless those countries have specially agreed to allow such traffic. This special agreement is called a third-party agreement.

Q. What countries does the U.S. have third-party agreements with?

A. The U.S. has third-party agreements with Argentina, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Israel, Jordan, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay and Venezuela.

In addition to the above, U.S. amateurs may conduct third-party communications with W7JXE/SU in Egypt, and with 7Z1AB in Saudi Arabia, and with 4U1ITU in Geneva, Switzerland.

Q. What types of third-party communications are prohibited?

A. Third-party traffic involving material compensation to anyone (station licensee, control operator, or any other party) is prohibited. And except in emergencies, third-party traffic involving business communications on behalf of any party is prohibited. Of course, third-party traffic is allowed only with countries that have signed a specific agreement to that effect with the U.S.

CONDITIONALS TO GENERALS

Q. I have a Conditional class license which expires in a year. I know that the Conditional class test by mail is no longer being offered, and that present Conditionals are being grandfathered into Generals. How do I go about converting my Conditional license to a General ticket?

A. You don't have to do anything. Your Conditional ticket now carries with it all the privileges of the General class ticket, including examination credit for all the exam elements you passed by mail. You are also authorized to conduct the Novice class examination if you are 21 or older and unrelated to the applicant.

The next time you modify or renew your license for any reason, it will be returned to you with General class privileges printed on it.

[1] [Editor's Note: The complete amateur rules are also contained in the ARRL *License Manual*, available for $3 from Hq. The *License Manual* also contains study material needed for obtaining the Technician through Amateur Extra Class licenses.]

FM Repeater News

Conducted By Lew McCoy,* W1ICP/WR1ABH

Rules and Guidelines

Most repeater groups don't take very long after their initial organization to realize that they need guidelines for their members and users. It is not so much that some amateurs want to hog the repeater, or that some want to use bad habits developed on low-frequency bands – let's just say that some of them are uneducated to repeater use. Recently, we received a copy of the rules that are used to govern the operation of the LIMARC group (Long Island Mobile Amateur Radio Club). The rules may not be applicable in some areas of the country but there is good food for thought for nearly all repeater users. One other point: While these rules do not cover the use of autopatch, we do need guidelines in amateur radio for such operation. Do you have any suggestions?

Oops! Last month in this column we said most vhf rigs won't meet the new FCC specs – retraction, most will, only some won't.

Guidelines and Rules for Operation of LIMARC Repeaters

1. Club Rules:

A) The primary purpose of LIMARC is to extend the range of *mobile stations* and to provide *emergency communications.*

B) Leave a 3-second pause between transmissions . . . on WR2ADM wait for the beep.

C) Limit your transmissions to 55 seconds. Do not drop your carrier, then pick it up to extend your transmission time.

D) The use of the word *break* is for emergency or time-critical communication.

E) When emergency traffic is being passed do not enter the conversation unless specifically asked . . . wait until the stations have completed the emergency traffic before reusing the repeater.

F) When you hear stations jamming . . . do not make any comments. If you can override the jammer, continue with your conversation. If not, sign off.

2. FCC Rules – these are federal laws:

In addition to all the part 97 rules, *all* amateurs must know and abide . . . the following are listed as a reminder in everyday repeater use.

A) You need identify only *your station* at the beginning of your *initial* transmission and *every* 10 minutes thereafter.

B) At the end of your final transmission you must clear by identifying any one of the stations in the conversation and your own call. It is not necessary to identify more than one member of the group.

C) Do not use excessive transmitting power.

D) The repeater trustee is held responsible by the FCC for all that is said through the repeater.

3. Club Guidelines – common sense and courtesy:

A) Reserve the input and output frequencies for repeater use.

B) Do not hog the repeater . . . other members of the club have the same rights as you.

C) Listen . . listen . . listen for a while before breaking into a conversation. You should know who all the stations are, who to turn it over to when you have finished.

D) When entering a conversation, simply announce your call letters between transmissions. Wait for a natural pause in the conversation. Don't enter when someone is about to answer a question.

E) Phonetics are rarely needed. Use them only when asked.

F) Q signals useful on cw are not necessary on repeaters. Most times they take more time than plain language.

G) Bad-sounding signals have no place on the air . . . LIMARC has a Technical Assistance Group (TAG) to help members obtain good-sounding signals.

H) Unless you have an emergency, if your signal is weak, don't try to have a conversation. Don't continue to encourage a weak station to keep trying, keep trying . . . Don't enter a conversation just because you want to talk . . . enter when you have something to contribute, or to make a call. It is not necessary to announce, "I am just listening" or "How am I making it?"

I) If you make a call, be brief then turn it back to the station who turned it over to you. Don't throw it up for grabs.

J) During busy times we tend to talk to the same stations each day. Let's make an effort to encourage others to enter the conversations . . . so we can all broaden our horizons.

Ham radio is a hobby – an enjoyable one – but one that depends on how we use the shared airways. We all make mistakes; we all are sometimes not courteous.

If you receive a copy of these guidelines in the mail, with some notations, don't be offended . . . they are meant as constructive comments.

Read the guidelines and review your operating habits.

34/94 AND A WALK-A-THON

On March 26th over 50 Kansas City area 2-meter hams provided communications for the fifth annual March of Dimes Walk-a-thon. Better than $120,000 was pledged by the sponsors of the more than 3,800 young people who hoofed the 20 miles.

*VRAC Liaison, ARRL hq.

The hams participating are not members of any particular organization, but simply are active users of the 34/94 repeater. These men have furnished radio support for all five of the walks and the March of Dimes officials are quick to state that much of the success of such activities falls on the shoulders of the hams.

This year marked the first year that a member of the amateur radio community was sponsored in the walk by his fellow hams. Jesse James, WBØMZZ, finished the walk successfully with over $220 pledged in his behalf. Jesse carried a TR-22 so all the hams could watch the progress of "their man." (By the way his name is really Jesse James – just check your *callbook*). – *Larry Staples, WØAIB*

Here is Jesse, WBØMZZ, leading a group of youngsters on the walk. The legend of the original Jesse had him as a Robin Hood – well, *this* Jesse is the real thing. *(WØHSK photo)*

Some of the boys from the 34/94 Kansas City machine check in at their command post for the Walk-a-thon. *(WØHSK photo)*

Hamfest Calendar

California: The Satellite Amateur Radio Club's annual Santa Maria Amateur Radio Picnic and Swapfest is Sunday, June 19, to begin at noon, at the Newlove-Union Oil picnic grounds on Orcutt Hill. (Watch for the sign marking the turnoff, one mile south of Clark Ave. on U.S. 101.) Swap tables available at $3 each. Santa Maria style barbecue at 2:30 (all you can eat), soft drinks available; bring your own beer. Talk-in on 146.52 and 7280 kHz. The tickets are $5 adults; $2.50 under 12. Send checks to Santa Maria Swapfest, P. O. Box 1031, Nipomo, CA 93444.

Illinois: The Egyptian Amateur Radio Club, W9AIU's annual hamfest is June 12 at Granite City, Club House. Talk-in 16/76. Food available, games for children, activities for ladies.

***Illinois:** The Six Meter Club of Chicago, Inc.'s 20th annual hamfest at Santa Fe Park, 91st St. and Wolf Rd. in Willow Springs on June 12. Admission $1.50 advance; $2 at gate. Write Val Hellwig, K9ZWV.

Illinois: Jacksonville hamfest is June 26. Talk-in 146.40/147.00 WR9ACS. Details from Box 571, Jacksonville, IL 62651.

Indiana: The Lake County Amateur Radio Club's 3rd annual hamfest is June 19 at the Isaac Walton League in Portage. (Take I-94 to IN 249 exit, then north on IN 249 1/2 mi.) Tickets $1.50 advance; $2 at gate. Write Herbert Brier, W9AD (W9EGQ), 409 S. 14 St., Chesterton, IN 46304.

***Massachusetts:** The Northern Berkshire Amateur Radio Club's hamfest is July 9-10 at the Cummington fairgrounds, Cummington.

*ARRL hamfest

Free overnight camping. Tech talks, demos and dealers. Flea market $1. Advanced admission $2, with XYL $4; at gate $3 and $5. For info write Hildy Sheerin, WA1ZNF, 79 Greylock Terr., Pittsfield, MA 01201.

Michigan: The Tahquamenon Amateur Radio Society's swap n' shop is Sunday, June 12, from 10 A.M. to 6 P.M. at the Pentland Township Hall. (3 mi south of Newberry and 2 mi west on Highway M 28.) Refreshments at the site; ample parking, campsites available at a nominal fee. Registration $2 at the door. Talk-in on 25/85, 28/88, 52 and 94 simplex.

Mississippi: The Chickasaw Amateur Radio Assoc.'s Tri-State Hamfest is June 11-12. All indoor facilities with plenty of room. Parking area with campsites, lakes, and motels nearby. Tables available at $2 each. Doors open from noon to 6 P.M. Saturday and 8 A.M. to 4 P.M. on Sunday. Large indoor displays, forums and activities for all the family. Plenty of food and beverages on grounds. Talk-in 31/91, 146.52, 3987.5. For more info write C.A.R.A., P. O. Box 2, Attn. R. Gates, Hernando, MS 38632.

Missouri: The Missouri Single Sideband Net annual picnic is June 12 from 9 A.M. at the Shelter House, Memorial Park, Jefferson City. Covered-dish dinner, beverages furnished. Swap tables. Talk-in 94/94. Donation $1 at the door. For further info write WB0FND, Rte. 4, Box 886, Warrensburg, MO 64093.

New Jersey: The sixth annual flea-market hamfest of the Raritan Valley Radio Club, the W2QW/WR2ACS group, is Saturday, June 18; rain date is Sunday, June 19, at Columbia Park, Dunellen. For info phone WB2MNE at 201-356-8435 or write RVRC, Rte. 3, Box 317, Somerset, NJ 08873.

New York: A giant hamfest and swap n' shop is sponsored by the Long Island Mobile Amateur Radio Club, Inc. Located on the grounds of Islip Speedway, Islip, on Sunday, June 5, from 9:30 A.M. to 4 P.M. Featuring amateur radio, CB, computer, amateur television, AMSAT satellite booth, ARRL info, theory contest along with large displays of test equipment and parts. Admission $1.25 (wives, children and sweethearts free); $2.50 per exhibitor per space; no advance registrations necessary. Proceeds from the hamfest to benefit public service and emergency communications on Long Island. For info call Henry (Hank) Wener, WB2ALW, chairman; office 212-355-0606; home 516-484-4322. Talk-in on 25/85 repeater, 146.52 simplex and CB channel 7.

Ohio: The Goodyear Amateur Radio Club of Akron's 10th annual hamfest and family picnic is June 12 at Wingfoot Lake Park between the hours of 10 A.M. and 6 P.M. The park is located southeast of Akron on County Road 87 near Rte. 43. Ample parking, rain shelters, picnic facilities, kids play area and refreshments. The flea-market/swap n' shop space is free with an admission ticket. Sorry, no overnight parking or swimming. Family donation $2 advance; $2.50 at the gate. For details write Don Rogers, 161 S. Hawkins Ave., Akron, OH 44313. Phone 216-864-3665.

Pennsylvania: The Harrisburg Radio Amateur Club's annual hamfest is scheduled for Monday, July 4, at the Indian Echo Caverns, located between Harrisburg and Hershey, just off of Rtes. 422-322. Registration is $2. Free tailgate space.

Wisconsin: The fifth annual Madison Swapfest sponsored by the Madison Area Repeater Assoc. is rain or shine, Sunday, June 19, in the Dane Co. Expo Center Youth Bldg. in Madison. 12,000 sq. feet of electronic equipment and components for hams, computer hobbyists and experimenters. Delicious food, all-you-can-eat pancakes served all day; tasty barbecue-beef luncheon. Family fun, old time classic movies and cartoons, arts and crafts, entertainment. Tickets $1.50; at door $2. Tables $2, at door $3. Excellent overnight camping; motels and hotels nearby. Reservations in by June 1. Mail to M.A.R.A., Box 3403, Madison, WI 53704.

Wisconsin: The South Milwaukee Amateur Radio Club's "Swapfest 77" is Saturday, July 9, at Shepard (American Legion Post No. 434), 9327 South Shepard Ave., Oak Creek. Activities begin at 7 A.M. till about 5 P.M. Parking, picnic area, hot and cold sandwiches and liquid refreshments. Overnight camping. Admission is $1 and includes a "happy hour" with free beverages. Talk-in on 146.94 MHz fm. For more details incl. map write South Milwaukee Amateur Radio Club, Inc., S. F. Schreiter, W9AKF, Sec., 104 Brookdale Dr., South Milwaukee, WI 53172. QST

Coming Conventions

June 3-5
ARRL National, Toronto, Ontario

June 18-19
Georgia State, Atlanta, GA

July 2-3
West Virginia State, Jackson's Mill, WV

July 9-10
Roanoke Division, Norfolk, VA

July 30-31
Northwestern Division, Seattle, WA

September 16-18
Virginia State, Falls Church, VA

September 23-25
New England Division, Hartford, CT

September 24-25*
Delta Division, New Orleans, LA

October 7-9
Midwest Division, Wichita, KS

October 7-9
Southwestern Division, Santa Maria, CA

October 8-9*
West Gulf Division, Austin, TX

October 15-16
Pacific Division, San Mateo, CA

November 19-20
South Florida Section, Clearwater, FL

*Date Change

GEORGIA STATE CONVENTION

June 18-19, 1977, Atlanta, GA

The 1977 Georgia State Convention/49th Annual Atlanta HamFestival will be held June 18-19 in Atlanta at the downtown Marriott hotel. (Rooms: $18 single, $24 double)

This year's show will be the biggest and best yet with more than 120 commercial booths; covered flea market/swapshop, with space for 250+ cars; more than 50 technical forums, and the kind of prizes you've come to expect from the Atlanta HamFestival – more than $6,000 worth.

Doors open at 9 A.M. Saturday, June 18 and Sunday, June 19.

Advance registration is $3 individual and $5 family; at the door, $4 individual and $5 family. A pre-registration package will be mailed on May 1 to all who have attended the HamFestival within the past three years; if you have not received a package by May 10th, you may write to Atlanta HamFestival, 53 Old Stone Mill Road, Marietta, GA 30067 or call area 404-971-HAMS anytime day or night.

Contact the hotel directly, toll-free, at 1-800-228-9290 for reservations – and hurry!!

WEST VIRGINIA STATE CONVENTION

July 2-3, 1977, Jackson's Mill, WV

The 19th annual West Virginia State ARRL Radio Convention, sponsored by the West Virginia State Amateur Radio Council, will be held at Jackson's Mill State 4-H Camp the weekend of July 2-3.

Program activities include the ARRL Forum on Saturday evening with First Vice President Victor C. Clark, W4KFC and Division Director L. Phil Wicker, W4ACY.

Technical Forum will be conducted by Lew McCoy, W1ICP, from ARRL. The Beginner and Novice Forum will be handled by Chod Harris, WB2CHO, also from ARRL.

Other activities will include phone, cw and Novice net meetings and election of Net Control Managers, pizza party, cw copying contest, free swimming in the new Olympic-size swimming pool and a large flea market both days. Prizes include a Drake TR-4C with power supply and a Clegg fm DX 2-meter transceiver and many more.

The convention is truly a fun-filled family weekend at beautiful, historical Jackson's Mill. Registration tickets are $3 each, 2 for $5, or 5 for $10. This fee entitles you to participate in all of the convention activities but does not include any food or lodging. A full-registration ticket includes four meals at the Mill, dorm lodging and all convention activities for $15, if you pre-register. Registration at the Mill for this package is $17; children under 8, $8.

The full-registration tickets are available from Dorothy Morris, WB8LAI, 1136 Morningstar Lane, Fairmont, WV 26554. The $3, $5 and $10 tickets may be obtained from George Puzzuole, K8QEW, 3616 Morgan Drive, Weirton, WV 26062.

Brochures were mailed early in May by the Tri-State Amateur Radio Association of Huntington. If you did not receive a brochure, write to Secretary, State Radio Council, 1136 Morningstar Lane, Fairmont, WV 26554 for further details. See you at Jackson's Mill.

ROANOKE DIVISION CONVENTION

July 9-10, 1977, Norfolk, VA

Calling the Norfolk-Virginia Beach region "the area that has everything" will really be true Saturday and Sunday, July 9 and 10, of this year. That's when the Roanoke Division ARRL Convention will be staged in the Norfolk "Scope" convention center.

The convention, which drew heavily against competition last year and was a first effort by its promoters, is expected to more than double its attendance. Tidewater Radio Conventions, Inc. is the sponsoring group, which in turn represents all area ham clubs – some seven who contribute both cash and perspiration for the event.

The affair is almost sweatless, however, for the entire convention site, including tailgating area, is air conditioned and away from all the elements, whether sunny or rainy.

The "everything" of the Norfolk-Virginia Beach resort area includes bathing at the beach, fishing in some of the world's most fabulous piscatorial waters, the Williamsburg restoration some miles away, Busch Gardens with entertainment from cultural to foamy, and various community historic tours.

Indoor tailgating areas will be provided for up to 200 vehicles at $5 per day per car space. One admission ticket is included, good for both days. Tables are $10 per day, including a two-day ticket. Single 8- by 10-foot booths are $75 for the two days, including one ticket and a $15 credit toward advertising in the convention booklet. Double booths are $125 for the two days and include a ticket and a $25 ad credit. Shelves and risers are not included, and drapes are $15 extra.

For all reservations, write Tidewater Radio Conventions, Inc., Box 9371, Norfolk, VA 23505. Tickets for admission are $2.50 in advance and $3.50 at the door. Special rates are available at several area hotels and motels by mentioning the convention. At convention headquarters, the *Admiralty Motor Hotel*, rooms are available at $16 daily single and $22 double. Poolside rooms are somewhat higher. Call 804-461-5555 and mention the ARRL Ham Convention.

For reservations at *Holiday Inn-Scope* – closer to the convention, but higher in price, call 800-238-5400, mentioning the convention. For the new *Omni International Hotel*, the number is 800-241-5500. Prices at this one are higher also, but it is touted as a genuine luxury establishment some blocks from the convention.

Convention forums will include, of course, ARRL; NASA personnel from nearby historic Langley Airfield; Army and Navy MARS affairs are in the planning stages, and the FCC will stage exhibits.

The Scope convention facility, with more than 65,000 cool square feet for the hamfest, is in the downtown Norfolk area, convenient to abundant parking. Indoor parking is also available at the building itself. For the XYL, in addition to planned programs, there is the entire downtown shopping area. The famed MacArthur Memorial – occupying what was once Norfolk's City Hall – is within walking distance, or a short cab ride for those who think DX afoot is more than a few hundred footsteps. For the hamburg-and-shake set, a McDonalds is little more than across the street. Light refreshments will be sold from stands within the convention itself.

Local area 2-meter repeaters will be available for talk-in, as will the 52/52 frequency. The local repeaters are on 19/79 (actually located in Chesapeake, VA), 37/97 (Virginia Beach), 13/73 (Hampton), and 34/94 (Langley Field).

For those spending more than convention time in the area, a good idea according to previous visitors, is to visit the Wright Brothers Memorial and museum some 120 miles to the south in North Carolina's fabulous Outer Banks region at Kitty Hawk. Charter fishing craft are available through the entire Norfolk and Virginia Beach area at reasonable daily rates. Of course, the beaches are free. Suntan oil is extra! QST

Strays

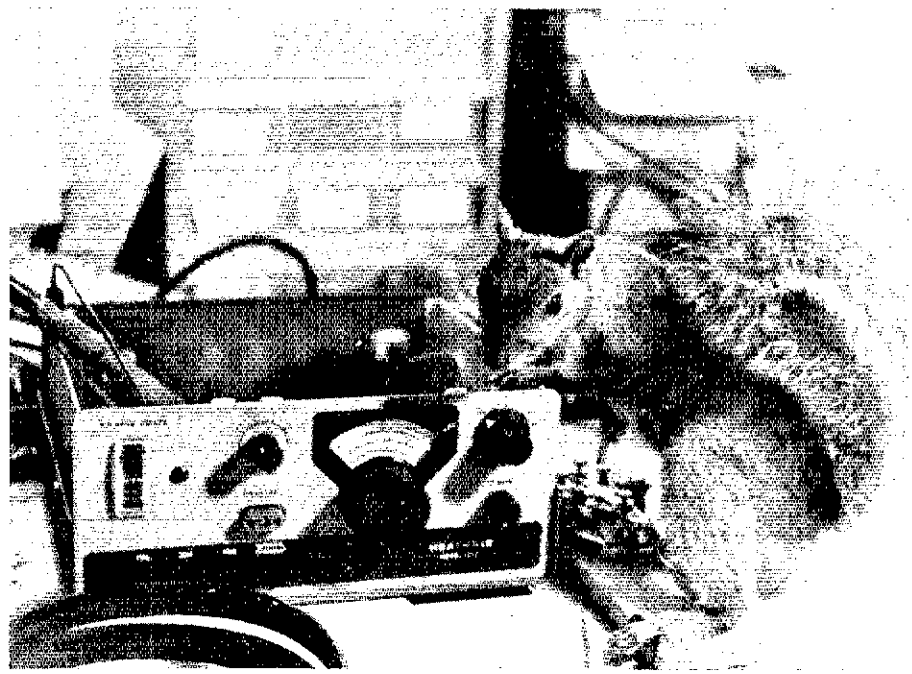
All amateurs and SWLs are eligible for the Worked All Norwegian Communes Award sponsored by the Vadso Society of the Norwegian Radio Relay League. The award is issued for working at least 25 communes and Arctic/Antarctic areas. Stickers will be issued for contacts with additional commune stations in multiples of 25. Special certificates are available for all cw, ssb, RTTY, SSTV, Novice and mobile/portable contacts. OSCAR contacts are valid. Further details can be obtained from Sverre J. Schmidt, LA1QK, P. O. Box 3, N-9801 Vadso, Norway. Enclose two international reply coupons to cover return postage.

WHAT'S IN A CALL SIGN?

It may not make for accurate QSLing, but it's sure a noteworthy event when two members of the same family have call signs like WA2KPK (Michael Tanner) and WB2KPK (Joseph Tanner). Just to make things interesting, Alyson Tanner sports WA2KPJ. Got that straight?

STOLEN EQUIPMENT

Swan 400 transceiver, serial no. 100801, stolen from car on February 10, 1977 at City of Industry, CA. Refer info to L.A. County Sheriff's Dept., Industry Station, file no. 577-02681-1424-696.



Barry Hoyt, WA1ZSA, of Greenwich, CT, had some special help while working on his QRP "peanut-whistle" rig. He tells us, "Her name is Fred, she has very good hearing, and she works for peanuts." *(WA1ZSA photo)*

YL News and Views

Conducted By Louise Moreau,* W3WRE

Years of Growth for JLRS

Forty-three years of steady growth – that's the story of YL amateur radio in Japan. The tale's once-upon-a-time begins with a lone YL operator J2IX in 1934. And the formation in 1956 of a national YL club, the Japanese Ladies' Radio Society marks one of the notable adventures in that story.

As with many YL clubs, a small group of women operators organized JLRS both to promote social interaction among members and to stimulate the growth of amateur radio among women in Japan. Expanding from a handful of women in a single district, the club membership now includes all 10 of Japan's call districts. JLRS members select their officers every three years. The club bulletin, *The JLRS*, carries reports of club business, news of YL activities in Japan, plus information of awards and contests sponsored by other YL clubs.

One of the most attractive certificates offered by any of the women's amateur radio organizations is the YL-10 certificate sponsored by the JLRS. This award is given for proof of two-way communication with 10 different YL amateurs. For any country outside Japan, these contacts must be with Japanese women, while the Japanese YLs must contact 10 DX women to qualify. The awards manager for the YL-10 certificate is JH1ANX.

The purpose of the YL-10 certificate, as with the JLRS itself, is to encourage women in the club to get to know other YL amateur radio operators worldwide and at the same time share a common interest with their fellow club members.

"YL News and Views" congratulates the JLRS on their 21st birthday and the outstanding record of the membership.

WA6UBU, Esther Gardner and WA6UBN, Wanda Gerkin, assisted with the ATV Long Beach Crowd Surveillance at the Long Beach Grand Prix Auto Races, with the Long Beach Emergency Communications Network. *(K6IPJ photo)*

YLRL DECALS NOW AVAILABLE

The official YLRL decals are now available. A dark blue YLRL emblem on a grey background, these circular decals are available in sets of three from Phyllis Shanks, W2GLB.

ENGLISH YL AWARD

Diana Hughes, G4EZI, has designed a new YL certificate to be awarded for working YL stations in Yorkshire. Located in the north of England, Yorkshire is known as the White Rose County giving this name to the certificate. There are over 22 G4 YLs listed in the *callbook* magazine who will help qualify those who work them for the award.

For full information for the White Rose Award write Diana, G4EZI, custodian, or listen on Mondays at 1700 UTC on 3.710 MHz to work contacts for this newest YL certificate.

*YL Editor, *QST*. Please send all news notes to W3WRE's home address: 305 N. Llanwellyn Ave., Glenolden, PA 19036.

FLORIDORAS NEW TAPE TOPICS LIBRARIAN

The eastern YLRL Tape Topics librarian will be the Florida YL club, Floridoras. The gals plan to use cassettes to tape *Harmonics* and other YL news to be sent to all blind YLs upon request. At present, six YLs in the eastern United States are making use of this permanent YLRL activity. Others who are interested may contact W4VQZ for this service available to blind YLs.

LX1TL, Lia Toussaint, one of Luxembourg's few YL operators, will be visiting this country this summer. *(WA8EBS photo)*

NEW FRENCH YLS

Looking for French YLs? *Ondes Courtes Informations* has listed six new YLs who have qualified for licenses. F6EPZ, Therese Normand; F6ERH, Jocelyne Jacot; F6EOI, Mme. Bertrand Raymonde, F1ENQ, Martine Falcoz; F1EOS, Franceline Walter; F1EOY, Madeline Neau. It has been requested that as with so many of the DX YLs we speak slowly when working them since it is easier for them to understand us.

YLRL MEMBERSHIP AWARD

1977 YLRL President Beth Newlin, WA7FFG, has announced that a special trophy will be awarded to the YLRL member securing the highest number of new members for the year 1977. Membership in this oldest worldwide YL club has been the subject of many letters to "YL News and Views." Those who wish to join should write to Membership Chairman Beth Taylor, W7NJS, 14637 S.E. Fair Oaks Avenue, Milwaukie, Oregon 97222; or those DX gals to the International Chairman Ione O'Donnell, WA2DMK, Newcomb, New York 12852. QST

First licensed as 2BY in 1927, Dot Saunders, W4UF, has received the QCWA Golden Anniversary Award to commemorate her 50 years in amateur radio. When first licensed Dot was the only YL in the second call area. *(W1SX photo)*

How's DX?

Conducted By Rod Newkirk,* W9BRD

A Tale of the Southwest

Young squirts finally become bored by old-timer yarns about the good old days. A little DX nostalgia goes a long way even in the interests of radio history. But we find ourselves continuing an intriguing series of "can you top this?" because W6OWP's well-seasoned ears perked up at our recent mention of Press Wireless and the WWII years. And this one concerns generations of ham newcomers right on down to this very day.

"Those fascinating comments on the closing of big point-to-point commercial hf stations have, I'm sure, generated interesting mail from those of us who worked in such facilities. The excerpts from WA1SMP's article in MTC's *Dots and Dashes* brought back a lot of memories. I was one of the PW 'field day' crew that followed MacArthur's return to the Philippines in 1944.

"One sidelight of this operation extended directly into the realm of ham radio. As the war wound down in the Pacific, the nomadic nature of our Press Wireless assignment gave way to the work of building a permanent communications installation at Manila. One of my responsibilities was the training of Filipino technicians in maintenance of high-speed radiotelegraph equipment.

"The time came for me to return home. As a going-away present two of my students – Nic Calanglang and A. S. Lorenzo – handed me a painstakingly rebuilt Kleinschmidt tape perforator 'for my amateur radio station.' On their own time these gentlemen had scrounged salvage material, much of it left by the Japanese, to assemble a piece of equipment they hoped would be a real asset to my ham outfit. It surely was – and is. This is the machine on which tapes for all West Coast ARRL Code Proficiency schedules have been punched since I began these transmissions in 1948."

A heartwarming radio recollection if ever we heard one. But maybe we're vulnerably biased because W9BRD splashed off an LST at Leyte, too. Sorry we missed you there, Bart! By the way, OMs and YLs who really dig wire and wireless history inspirationally presented should drop inquiry to W9LHL/Ø, 712 South 49th Street, Lincoln, Nebraska 68510. Morse Telegraph Club, founded primarily by veteran landwire ops, has the welcome mat out for key-oriented radio amateurs.

DL7FH, DKs 4TA and 6JO, left to right, enjoyed a DXpeditionary jaunt to the Faeroes in February. Hans, Gunter and Rolf appended "OY" to their calls from this boggy but effective QTH of the Month. The trio looks forward to other rarish activations in the year ahead.

FROM *QST'S* DX MAILBAG

ASIA: I expect to spend most of the summer in Saudi Arabia with permission to operate HZ1AB. Hope there's improved propagation for Stateside QSOs. On a previous session at that station W5UJT and I generated gigantic European pileups overriding weak and watery signals from the USA. HZ1AB is a MARS/amateur setup manned from time to time by a variety of personnel. Since late February the station has been without regularly assigned operators. (K8CSG) . . . Inquiries are welcomed concerning LBCC, Low-Band Century Certificate, a diploma offered by Japan Low-Band Amateur Association in recognition of DX achievement on 40, 75, 80 and 160 meters. (JA2AAQ) . . . VU2RMS home-brewed a five-watt 6V6 a-m rig the day he received his voice privileges, QSOing many locals on 40. His XYL assisted the high-speed construction. HB9MKP will sign VU2MKP on 20 and 15 for the next two years. Forty-nine new amateurs suddenly appeared in Bangalore as the result of recent classes. VU2SAZ's one-transistor flea-power rig impresses friends on 7 and 14 MHz. VU2KZ/mm enjoys three months of shore leave on 40 meters. (VU2s ARC CBE) . . . I'm looking for more 7-MHz W/K/Ns from my new Madras QTH. (VU2GW) . . . VU2GO was a nice cw surprise for my 50-watter and dipole on 21 MHz. (WB4JKP) . . . The recent ARRL DX Test produced stacks of Stateside QSOs. Just finished building an HW8 for QRP DX sport. Not sure how much longer I'll be in Okinawa. (KA6DX-N1DX) . . . VS6AF, 21,030 kHz at 1400 UTC, is a lightning-fast QSLer. (WØUBT) . . . Fifteen-meter Novice-band contacts with JAs 1FJW 2BP 2YKD 3AAW 3BAG 3KM 8RIJ, JE3s JSA MUC, JF1COE and JH4LBE increased my Japanese prefecture collection to 14. (WA5IYX) . . . This month I return for duty to the same Korean QTH I had as HL9TG in 1974-'76. Not sure I'll use the same call. I'll be hitting 6 through 80 meters and mode-B OSCAR. (WA7NTF) . . . Fun working W1AW on 80 cw from my radio shack aboard M/V *Maritime Brilliance* off the East Coast. I was in airlines communications before going to sea. (ELØAP/mm-HM5AP) . . . Nevada and South Dakota will sew up UH8DL's WAS near 14,030 kHz at 1400-1700 UTC. 4Z4GH needs Sevens and Zeroes for the same reason near 21,310 at 1400. (WCDXB) . . . A51RG pops up on 15 cw's low edge at 1000-1100 UTC. (VERON) . . . Mark off November 18th-20th on your '77 calendar for Southeast Asia Net's next bang-up convention in Bangkok. (WCDXB)

AFRICA: It's always a pleasure to find an old-timer returning to DX with renewed interest. SU1CR, first licensed in 1936 and inactive for the past quarter century, is putting up dipoles for 10, 15 and 20 to go with an NCX5. Mohammad's son Rasheed signs WBØYFM in Minneapolis. Mo often is found near 21,350 kHz at 1300 UTC. SU1CR and the seven other Egyptian licensees are banding together club fashion. At present 80- and 160-meter operation is not authorized in SU-land. (EP2NQ-K5MM) . . . Northern California DX Foundation (W6WX) sponsored my springtime contest activity from Mauritius as 3B8DT. (K4FOK) . . . Lots of action in this year's Novice Roundup and ARRL DX Competition. (ZS6WW-WA6QGW) . . . The Senegal surely was well represented on 20 cw January 29th when I worked 6W8s BB GM CC MA and EX in that order in little more than an hour. (WA9MOE) . . . 9J2BO, newly returned to Zambia, answered my HW101 despite marginal 15-meter cw conditions. (WB5NDE) . . . African addenda courtesy WCDXB: LA1VC's February stopover on Bouvet Island as 3Y1VC gave W6ID the only Yank contact among 29 QSOs. Your next shot at the place may not come till '79 when another scientific survey is scheduled. . . . When the cyclone season wanes 3B8DA intends to go to St. Brandon isle, according to ZS5PG. . . . S8AAA transmits from Transkei near 14,200 kHz after 1700 UTC. . . . Two roving DL types keep STØRK audible around 1030 UTC near 21,315 kHz. . . . FH8CJ offers Mayotte near 14,200 kHz after 1700 UTC with FH8CY lurking nearby. Visitor FL8OM tries his DX luck as FHØOM.

OCEANIA: After our enjoyable operational visit to New Zealand in 1974-'75 the XYL and I decided it would be a nice place to raise our two girls. We took the plunge and emigrated to ZL-land December 1, 1976, settling about 70 miles southeast of Auckland and five miles from the blue Pacific. DX conditions to North America from April through October are superb at my 1300-foot-high QTH. (ZL1BCG, ex-VE3EZM) . . . DXers on 80 cw be advised that Novice KM6EL has new crystals for 3704, 3712 and 3719.5 kHz. (W6DOR-W7BYF) . . . VKØAC's Macquarie long-wire pours through on 7030 kHz at 0630-0730 UTC. He'll return to VK3ZQK at the end of '77. (W2OLU) . . . Just received a 30L-1 linear to aid our WAS

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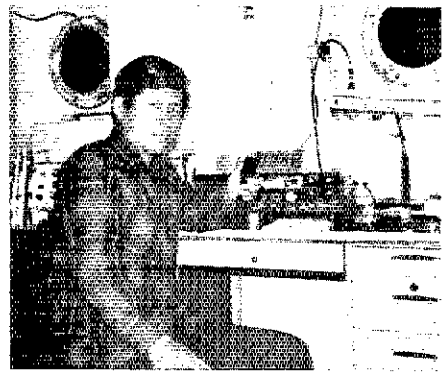
hunt from Kusaie, Eastern Carolines. We Navy Seabees like 10, 15 and 20 meters with a TS520 and groundplane. A new quad is in the works. (KC6KO) . . . Since May of '74 my three Midway ham courses have turned out about 30 new amateurs. Hope to provide more KM6EB/KH6 contacts from Kure Island when opportunity arises. (KM6EB-K4DNU) . . . Pacific patter via the club, group and individual grapevine: YBs 2AK 2CR 2VE 3AP 9ACB and other Indonesians seem to favor 21,250-21,280 kHz around 1300 UTC. . . . VK9s JA and JD tempt the throng from Norfolk Isle. . . . W9MR's ZK2AT emanations occurred under International DX Association's banner. . . . No soap in April but ZK1BA may make it to Manihiki next month. . . . W4BIM anticipates a two-year Peace Corps tour as 3D2DM. . . . KJ6DL terminates his Johnston Isle DX career after several thousand welcomed contacts. . . . Chilly Scott Base has ZL5DL warming 14,135 kHz at 0430 UTC or so. . . . W6YO hits places like the Galapagos, Easter and Pitcairn aboard *Yankee Trader*. Jules, mainly on cw, hopes to issue landbased QSOs from equally rare spots as the vessel wends westward.

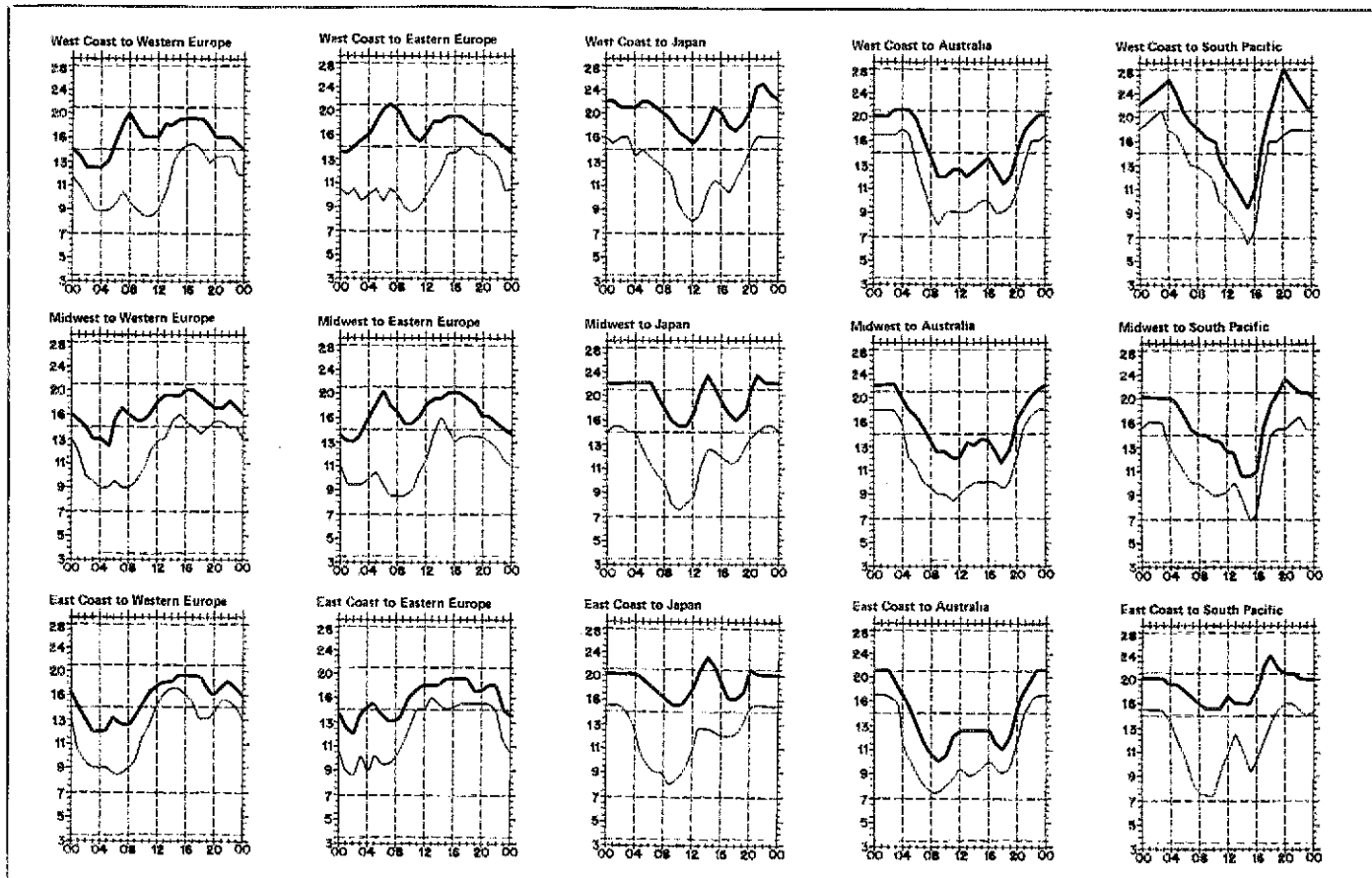
EUROPE: On the 4th-6th of this month Limerick Radio Club will sign EI0AB from the Aran Islands on 80 through 10 meters. Watch(cw) 10 kHz up from each band's low edge, (ssb) 3790, 14,195 and 14,210 kHz. (EI3AV) . . . DX activity in JW-land is very brisk. JWs 4QV 4RV and 8LU radiate from Hope Island, JWs 5IJ 7FD and 9WT from Bear Island, JW2CF from Svalbard. (LA5NM) . . . I return to college and WB9JEN this month. (PA9AWG) . . . F8VJ likes to work our western states on 80 meters and is devising shunt 3.5-MHz feed for his 60-foot Versatower. Lucien awaits arrival of the crystal that will ready his T4XC for 160-meter DX developments. (W4BRB) . . .



EL0AP/mm is typical of the many radio amateurs who roam DX bands while voyaging the high seas. Cho is equally prominent in Asian DX circles when home at HM5AP. He formerly signed HMs 1AP 9AP, EL0P/mm, 5L0P/mm and likes building his own equipment. This sharp layout is aboard M/V *Maritime Brilliance* bound for the Persian Gulf this spring with grain cargo.

OK1HBE is very consistent on 20 with his homespun 300-watter. (K9PKQ) . . . Glad to have 20-meter buddy PA0SOL visit me and neighbor W3GVR on his recent trip Stateside. In Holland Bob uses mic and key on 160 through 2 meters plus RTTY on 3.5 and 7 MHz. (W3YAF) . . . Potential TVI and BCI problems caused me to earn DXCC field-day style away from the home QTH. A Honda power generator, 12 AVQ and 18 AVT verticals did the job on weekends and holidays. (OZ1ZE) . . . OK3KFF yearns for New Mexico and South Dakota to complete 7-MHz WAS. (WB0NOU) . . . Thanks to reciprocity with Portugal I now operate at Terceira in the Azores, mostly near 7025 kHz on cw, 21,350 on voice. (CT2BZ) . . . IY4FGM, formerly I0FGM and II4FGM, is a memorial station installed in the Pontecchio dwelling where Guglielmo Marconi conducted his first wireless experiments. Recent contest activity produced two thousand fast QSOs. (I4BFY) . . . A disastrous fire destroyed printing equipment, files and much of VERON's office facility in late March. Please be patient if our communications are delayed. (PA0s BN TO) . . . 9H4G's YL-DXCC is said to be the first in Europe. (DXNS) . . . K7CBZ knocks off from CT4AT next month after an outstanding DX performance from Portugal. (WCDXB)

THE AMERICAS: W3AZD/1 succeeds WA1VCG returned to WB9CJS, at ARRL's DXCC Desk. Don deserves your cooperation and patience as he tackles the complexities of his new post. Simple considerations, such as not failing to arrange your QSL mailings in alphabetical order by country, can help keep things rolling smoothly. (W9BRD) . . . Sure nice to be a General after digging out 80 countries as a Novice. Now I'm 105/40, mostly on 7 and 21 MHz, and I credit the old WN ticket for getting me to appreciate and prefer cw. No beam yet so I don't do much on 20. (WB4JKP) . . . Five DX-filled envelopes from the local ARRL QSL Bureau branch brightened my birthday. SSB on 40 was great in the ARRL Test. What a DX band 7 MHz would be without that SWBC clutter! (WB0NOU) . . . Forty's a blast in Texas, too. (WB5NDE) . . . One-sixty appears to have been about 10 percent better than last year in its 1976-'77 season. By January my stations and countries stood at 151 and 60 compared to 1975-'76's 140 and 56. DXpeditions to the



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. On 50 percent of the days of the month, the highest frequency propagated will be at least as high as the upper curve. On 90 percent of the days of the month, it will be at least as high as the lower curve. See January 1977

Caribbean and awakening 1.8-MHz interest in Europe helped many top-band DX logs. (W1BB) . . . Thanks to Yasme Foundation's W5IGJ, three blown transmitter capacitors were quickly replaced at PJ8KG where we managed 7500 contacts from Philipsburg. Our next stop, W6QL/VP2A, resulted in 10 kilo QSOs with 126 countries including 4000 sideband contacts in the ARRL DX Contest. Then we were off again, this time to VP2MAQ. (W6s KG QL) . . . Air Force Communications Service recently licensed three new OX5s. AC and AD work 20 sideband and OSCAR while AB goes for daily cw QRP fun near 14,040 kHz. (OX5AB) . . . Traded Tennessee and K4KCK for rugged Idaho where I'll soon file for DXCC. (W7LLM) . . . The frequency-devouring shortwave broadcast business must be one of the world's greatest hoondoggles. Beyond a very limited audience of foreign-based diplomats, businessmen, travelers and hobbyists, who'd miss it? (WA1SPM) . . . Forty cw burst open for a fast "WAC" here in late February with 9M6RR included. (WA2AYY) . . . OH6JW, ZS4AK, WØCB, HC1HD, ZL1PQ and JE2LYQ in that order presented me with a two-hour all-continent trick on 40 cw in mid-March. As a new ham in the 1930s it took me many years to make WAC. (W6NSK) . . . Every now and then 21 MHz surprises me with nice ones. Our Michigan DX Association approaches the 25-member mark. (WA8TDY) . . . I find mobile cw work an interesting challenge, 69 countries so far. More widespread familiarity with lesser-used "Q" signals would facilitate in-motion operation. OTs may remember me as former EL4A and DL4IO. (W7VCB) . . . At the 200-country mark the XYL and I would like to do our bit as QSL managers for busy overseas ops. Mary Ann is WB9DWF. (WB9DWG) . . . Still scraping up stuff like DM2BML, HAs 1ZD 5GT 7KSR, HV3SJ, 1K3ZRL, LA9CO,

W8KPL carefully hunted appropriate DX stations and sweated out matching QSLs until he accumulated a rare "heel-and-toe" DXCC — goes EP2AP-AP2F-F8VQ-VQ9HB-etc. — which is much tougher than it first appears. Took Bill years to complete. Some years ago W1VG, then of ARRL, displayed a similarly unique QSL collection, to our knowledge the first heel-and-toe ever assembled.

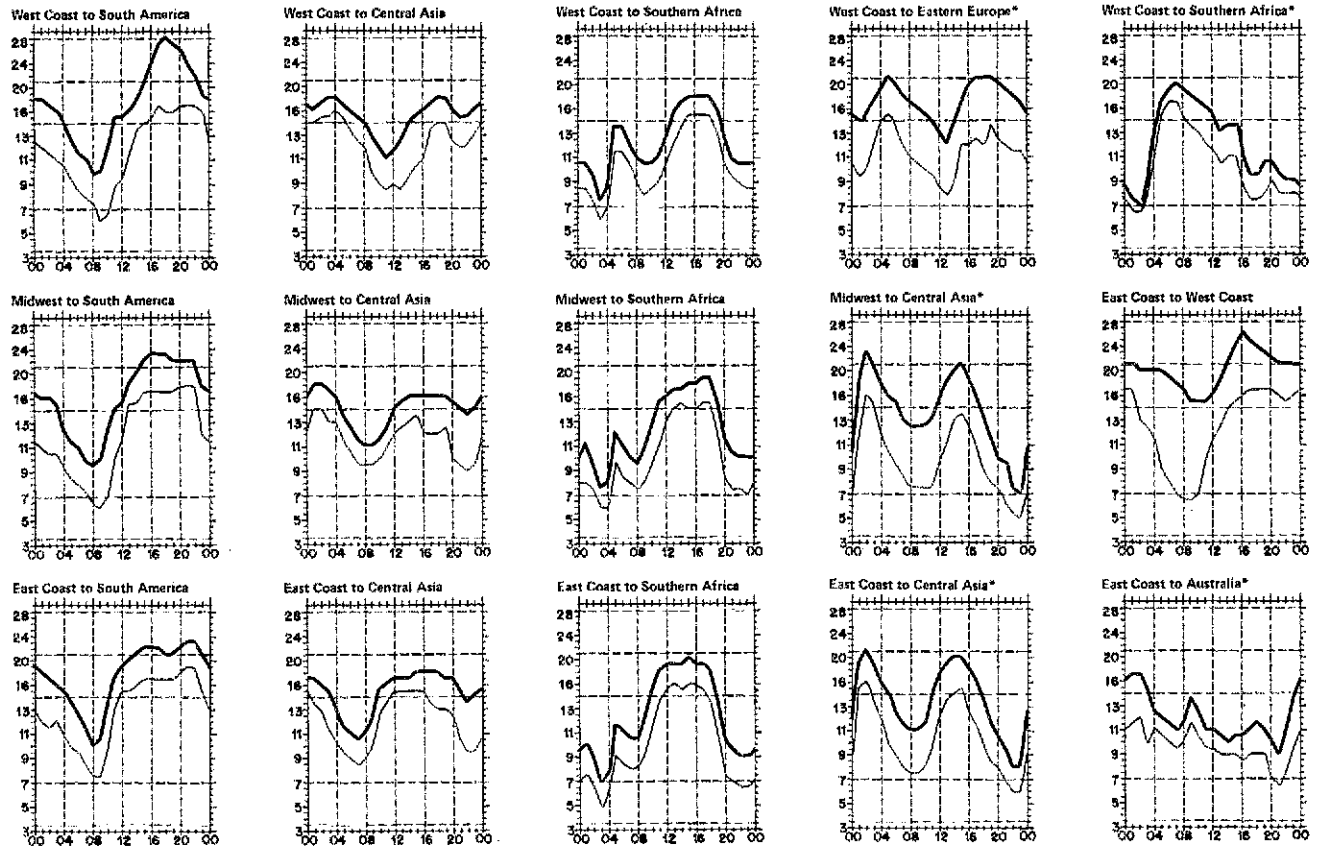
LZ2DR, SK2JV, SPs 5GX 7ATY, W5ONL/HB, WB5TUV/VQ9, WG4YL and ZS6KU in the 21-MHz Novice slot. (WB8ZRL) . . . After my furious Bicentennial pace I find it hard to slow down. WØJCT was 1977 QSO no. 8000 on April 7th, well ahead of my '76 rate. (KV4AA) . . . My recent DXpedition as K7VPF/KV4/VP2A/VP2D/VP2LDT with stops at KV4FZ and KP4AST netted about 12,000 QSOs. Special effort gave the Novice bunch and the JA gang a good shot at the Caribbean, some 500 Novice contacts and a thousand QSOs with Japan. One-sixty buffs were offered contacts from Antigua, St. Lucia and Dominica. I'm serving as editor of Western Washington DX Club's *Totem Tabloid* while W7EXM, who took over the task from WA7JCB, teaches college in Oklahoma. (K7VPF) . . . HKØTU's March Malpelo landing managed eight kilo QSOs on 10 through 160. Sixteen HKs participated. (WCDXB) . . . For much of its content "How's" gratefully acknowledges contributions by Canadian DX Association *Long Skip* (VE1AL/VE3), Columbus Amateur Radio Association *CARAscope* (W8ZCQ), *DX News-Sheet* (G. Watts, Norwich, England), Newark News Radio Club *Bulletin* (M. Witkowski, Rte. 6, Box 255, Stevens Point, WI 54481), Northern California DX Club *DXer* (K6SSJ), North Florida DX Association *News* (WA4UFW), Southern California DX Club *Bulletin* (WA6KZI), VERON's *DXpress* (PAØTO), West Coast *DX Bulletin* (WA6AUD) and Western Washington DX Club *Totem Tabloid* (K7VPF). Keep those presses rollin'!

DXCC NOTES

A change in DXCC rule 9 has been approved, *but it has not yet been implemented.* The new rule 9 is stated on the current DXCC Countries List, but the old rule is still in effect. See January 1977 *QST* "DXAC Notes" (page 76) for details. QSL cards for DXCC credits under the provision of new rule 9 are not being accepted at this time. This applies both to DXCC endorsements and to new applications. The DXCC branch is unable to hold cards or to make a record of cards received at ARRL headquarters before the implementation date. The date for accepting QSL cards for DXCC credit will be announced in *QST*'s "DXCC Notes" within the next few months. Details for submitting cards will be given at that time.

Thanks for your patience!

QST



QST, page 58, for a complete explanation. The horizontal axis shows Universal Coordinated Time (UTC); the vertical axis, frequency in MHz. Asterisk indicates long-path circuits. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions for June 1977 assume a sunspot number of 16, which corresponds to a 2800-MHz solar flux of 76.

DX Century Club Awards

The ARRL DXCC is awarded to amateurs who submit written confirmation for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 20-country increments through 240, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from January 1 through March 31, 1977. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

K6CAZ/289
JA0BNX/284
I2PNB/254
JA7CDV/254
JF1PJK/248
DJ2EH/246
K6ZT/222
JA7DOV/219
WA2UOA/217
YU2RCZ/213
JA7DRM/212
DJ0JC/200
DK4BW/200
YU1OCV/190
W1WH/189
I1ANP/185
YU2RUA/175
ZP5AO/167
FG7XA/166
JA1OHD/166
JH1DXM/162
SM0CMH/160
JA7GAX/156
3C3GCO/156
WB4ROY/153
W9JI/152
WA9VKN/150
W6IIM/149
DK7BJ/147
W3EV/146
JA7BVH/144
K0EUW/144
JR6CWC/137
DK7FZ/134
DJ2OW/132
WA6CXQ/132
DL6WT/131
WB2MDR/129
K0GVA/129
WA5DTK/126
WB9DWG/125
JA1CZI/124
VE3MV/123
W8GMH/123
DK4HD/122
DL9ID/122
JA4NA/122
JA6AHT/122
K7SFN/122
WB8PJR/122
AC4CRW/121
JA1PX/121
WA2YPF/121
WA1KUL/120
K6DWV/120
W7GOV/120
DK1AD/119
JA6YAP/119
I1QJC/117
VE6HT/115
WA4GNT/115
9H1ED/115
DK6BR/112
DL9OT/112
JA6VWV/112
JE1WIH/112
K3TZV/112
VE3FZW/111
JA1CKE/110
JA9AQE/110
K4IZE/110
W8BT/KP4/110
WB2KXD/110
W3DQZ/110
W4OHZ/110
WA4JTC/110
DK5WY/109
JA7KXD/109
W1IPU/109
W6HJP/109
I8NLC/108
JA2DTE/108
WB4NIR/108
HA5KKN/107
WA4BNU/107
W0YC/107
I8MTQ/106
JA7SGV/106
WB2UVL/106
WA4MCH/106
WA5NDV/106
W6IA/106
WA0DKC/106
WV8ITU/106
YU3TXU/106
F6CFT/105
F6DHB/105
JA2HFB/105
JA8DSO/105
K1AF/105
K5HDO/105
OK2BJU/105
OK3CGH/105
K3PTV/105
WA3RGJ/105
W8CD/105
W9JIF/105
CG3GCO/104
DK4SF/104
DK6ED/104
JA6EKZ/104
LA7SI/104
OK1AUP/104
OK1JAX/104
WA1TPR/104
WB6OZJ/104
W8BIP/104
YB0AU/104
HB9AHA/103
HB9AZZ/103
W2IDZ/103
DJ1ND/102
HB9AUR/102
JG1ESQ/102
K9GMT/102
VE2DGQ/102
VE3GNB/102
VE7BEF/102
W1PUO/102
WA2BZX/102
WA4CAO/102
WB8IJW/102
DL2LA/101
HB0NL/101
K4EZZ/101
K4FKB/101
KH6IJA/101
WA3PVW/101
WA4JCS/101
WA5LZZ/101
WA6TYQ/101
WB8SCD/101
WA9OUX/101
WB9REB/101
DL8WH/100
GM4DKO/100
K2JZT/100
K9DID/100
K0UAA/100
SP6FER/100
WA1FCN/100
WA1PUE/100
WA2YUH/100
WB2FUE/100
WA4BTS/100
WA4GAJ/100
W9IT/100
WA9OUX/100
WB9NMN/100

Radiotelephone

VE3UX/302
K3SGE/300
K6CAZ/286
XE1CCP/262
JA0BNX/244
JF1PJK/233
EA4KN/206
JA7AQR/206
JA7CDV/206
K4KZP/180
I1ANP/177
WA2UOA/177
OK1IQ/174
W2GHV/171
I1FNX/169
F6DJN/162
WA2BDP/160
I2RGV/158
JA7DXD/157
VK3AH/152
JH1DXM/149
WA9VKN/149
W0RWC/141
EA7PW/130
W0SIP/7/127
G4DKT/125
VE1DI/124
KZ5AS/123
K2BWQ/121
WB9DWG/121
DJ0VZ/120
JA1CZI/120
PJ3DO/120
WA1KUL/120
F6BIV/119
WB4KVM/118
K6ZT/117
WA4LOF/117
VE4AT/110
DF4FX/114
DK1AD/114
JA6RTJ/113
F0ADO/FC/112
HB9LP/112
OZ1ZE/112
W3DAW/112
WA6CXQ/112
6Y5HJ/111
JA4NA/110
JA6VWV/110
VE4AT/110
DK8MZ/109
DL2LC/109
G4ATF/109
JA1PX/109
WB8HPN/YV4/109
VE8RA/CX/108
FW0AB/108
WB8PJR/108
W4CDB/107
WA8BJR/107
I1LNU/106
I8OMA/106
TU4AA/106
VP2MRA/106
DF2KT/105
SV1IG/105
W4TUK/105
W5TGU/105
I1TBA/104
W8FYP/104
W0SML/104
I8EBN/102
K5BPY/102
K0GXI/102
LX1MK/102
VK3AUL/102
W1BMY/102
W9JIF/102
WB9IEE/102
EA3AHH/101
JY8RA/101
K2SBW/101
VE7BEF/101
WA1TPR/101
ZL1BOQ/101
CE3ANB/100
G4AHJ/100
I6ONE/100
K9GMT/100
KL7HRN/6/100
VE3EJK/100
W2JS/100
WA2AOG/100
WB2CVL/100
W4WVB/100

CW

W8AH/207
FG7XA/152
JA7GAX/125
JF1PJK/123
I1QJC/115
K4NV/115
WA4LDM/115
DL3BK/114
K4IEX/112
W6BS/111
HA5LZ/110
JA1DUH/110
JH1PBR/110
K5TSQ/110
W7ISY/110
VE3EJK/109
W2OB/108
JA1CKE/106
JH7IOS/106
W8GKM/106
JH1VRQ/105
K1OKT/105
K2FL/105
ZP5AO/105
WB5NLC/104
WA7HRE/104
DJ2AA/103
K6ZT/103
K4KZP/103
W4JGE/103
WA4MCH/103
WA9ITB/103
JA2IU/102
K4SB/102
K8DYZ/102
WA2UOA/102
W5MCO/102
W5UTT/102
I1YRL/101
K1YZT/101
DJ0JC/100
I1LDX/100
W2LMO/100
W3GL/100
WB0ORK/100

160 Meters

K1PBW
W4BRB
W2QD
W2DEO

Radioteletype

W4PK

5BDXCC

W4YWX
WA4EWX
VE8RA
DL7BQ
W2GXD
K4BYM
DL1KS
OK1IQ
K8VRZ
WA5RTG
K4KG
DK4KL

Endorsements

Mixed

W1BIH/359
W4OM/357
W8GT/356
K6OJ/355
W0SYK/352
W6KZL/351
G3AAE/348
W4WV/346
I8KDB/344
W6ONZ/344
K6KII/343
W2IRV/343
W5ABY/343
W9TKV/343
W6HYG/342
K2TQC/341
K2UVU/341
W5WZQ/341
W2PV/337
W4UG/336
K6ZGM/335
OH2QQ/335
JA7AD/333
UA1CK/333
DL1DC/331
W4OO/331
W6YA/331
HB9DX/330
K4KG/330
ZS6YQ/330
JA4ZA/328
W4NNH/328
K5QHS/326
W8PR/326
W9OHH/326
W6HVN/325
W9NA/325
K3UZY/324
W3GE/323
W4BRE/323
OZ1LO/322
WA8NYB/322
W8CNL/321
G6RC/320
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W5IO/320
W0OAQ/320
K3SGE/318
OE2EGL/318
OH2BR/318
SM6DHU/318
WA3HUP/318
W7LFA/318
OH2BAD/316
I3EVK/315
K9AWK/315
OE1UZ/315
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VE3AKG/201
W1NJL/201
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WA3SXH/201
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K1PNS/191
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N3KH/160
WA2FIJ/160
WA4UVG/160
WB4DHO/160
WA5ZIB/160
WB6ZPO/160
HB9HT/159
K3KPH/153
K9QXY/153
W1OPJ/150
WB2JJN/150
WB5KPN/150
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K1OEY/141
K2ODZ/141
ON4JV/141
PJ2ARI/141
WA2HQH/141
W5UFF/141
OL6VW/140
WA4LOF/140
WB4VKW/140
W5MDP/140
WA7OBH/140
WA7VDY/140
WB2SZS/140
YU1NFT/X/140
WA4DBG/134
DL0II/130
SM6CSB/129
WA4BTQ/129
KG4FU/126
OH2BN/126
K4GFH/122
K4IBP/122
K9GCX/122
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K4OAF/120
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Radiotelephone

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K8PYD/301 OH2BR/301 F8SK/300 K2ANT/300 W8PR/299 W3GE/298 W6USG/298 W4YN/295 WB4SIJ/295 VE3BX/294 K3EH/291 W2SUA/291 W7GRH/291 WA4YVQ/290 JA8EL/285 K4BVQ/284 KØWWX/283 PY4AKL/280

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W8PNC/240 WA3EPR/240 K1RAW/234 K6LIK/234 K7GEX/230 W8JJK/226 DK5XN/221 IØMBX/221 JA2AYH/221 VE3AER/220 WA1EUO/220 WA2DXJ/220 WØKH/220 W3US/218 K2RAP/216 YU3TXT/212 DZ7OP/2II W2UI/2II

WB4OXD/206 WB5HVY/205 WA6LFN/204 I8JH/202 OE2VEL/201 W6KYA/200 WA7UVO/200 WA8PWZ/200 VE3PG/199 WA2MBF/198 I2ARQ/191 W9LUH/189 I3FDC/183 W9MHX/181 WA6CPP/181 G4DYO/180 VE3AKG/180 VK2AOU/180 WA4CWU/180

WB4NXR/180 WAØVDX/179 JA1NVB/177 W4HYY/170 WB4IDM/170 W6BCQ/169 DJ9UM/166 W1MX/165 WA7UFS/163 W8FAW/163 WA8PPF/163 K2YIY/160 K5HWO/160 W1JR/160 W3CDG/160 W6VDJ/160 IØZTG/158 OZ1WL/158 W2JGR/157

WB2JJN/150 WB4KCL/149 JA1TNV/144 JA2DLM/142 G3DOG/141 K2GAT/140 OK1OAT/140 VE3GDO/140 WB2FDQ/140 W2MPI/139 W9VWV/139 WA2HQH/135 WA8NDE/134 HB9ARE/126 K9GCX/121 VE3MV/123 K1CPJ/120 VE3HDC/120

CW

K6GA/247 W1DA/240 K4LRO/202

K4PI/200 K9UTN/200 W9ZM/200

K6VY/180 K5ETA/165 OZ1LO/161

K6AC/160 W1JR/151 K6RLY/143

WØBW/141 JA1KWV/140 W2MD/140

W4NBP/140 WA6DNM/140 WB8JEY/139

IØWLS/131 DL1EV/124 K6CBL/121

WB8DTT/121 W2TO/120 W4YN/120

Notes: K8ETO should have been shown at 107 in the May CW New Members. SM5BHW's call was incorrectly given as SM5BHV in the March listing of new cw members. A misunderstanding arose regarding the issuance of the serial numbers for the 160 Meter DXCC Award. As a result, both W8LRL and KV4FZ are considered to be tied for serial number 3.

THE ARRL DX QSL BUREAU SYSTEM

The ARRL DX QSL bureau system distributes cards free of charge from DX stations to amateurs within the League membership area (see page 8). Every active DXer should keep several 5 X 7-inch envelopes on file with the bureau of his home district. Place your call sign in large block letters in the upper left corner, and attach a single first-class stamp, unless you normally receive more cards. Unclaimed cards are discarded after one year. For more details on the bureau system, write ARRL hq.

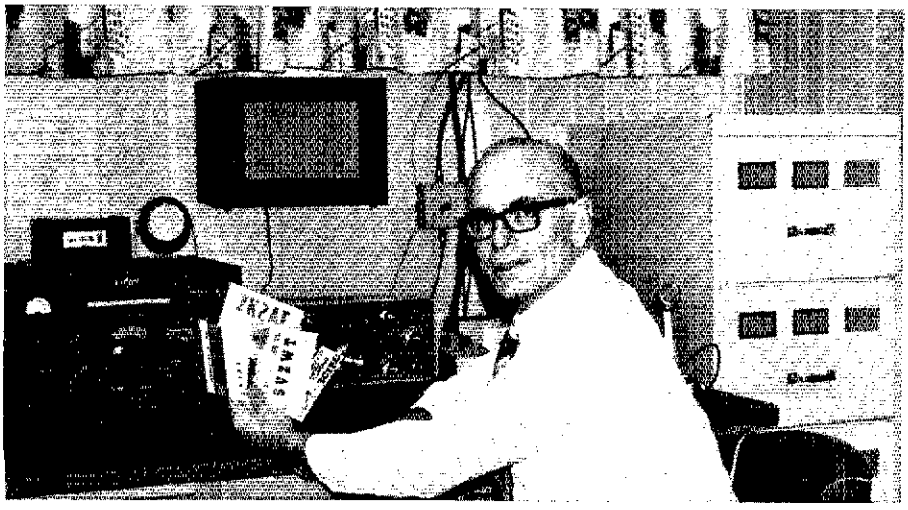
□ First Call Area: all calls* — Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.
□ Second Call Area: all calls* — North Jersey DX Assn., P. O. Box 8160, Haledon, NJ 07508.
□ Third Call Area: all calls* — Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.
□ Fourth Call Area: K4, N4, W4 — National Capitol DX Assn., Box DX, Boyce, VA 22620.
□ Fourth Call Area: WA4, WB4, WD4, WN4 — Sterling Park Amateur Radio Club, P. O. Box 599, Sterling Park, VA 22170.
□ Fifth Call Area: all calls* — ARRL W5 QSL Bureau, Box 1690, Sherman, TX 75090.
□ Sixth Call Area: all calls* — ARRL Sixth (6th) District DX QSL Bureau, 2814 Empire Avenue, Burbank, CA 91504.
□ Seventh Call Area: all calls — Willamette Valley DX Club, Inc., P. O. Box 555, Portland, OR 97207.
□ Eighth Call Area: all calls — Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.
□ Ninth Call Area: all calls — Northern Illinois DX Assn., Box 519, Elmhurst, IL 60126.
□ Zero Call Area: all calls — WØ QSL Bureau, Ak-Sar-Ben Radio Club, P. O. Box 291, Omaha, NE 68101.
□ Puerto Rico: all calls* — Radio Club de Puerto Rico, P. O. Box 1061, San Juan, PR 00902.
□ U.S. Virgin Islands: all calls — Graciano Berlardo, P. O. Box 572, Christiansted, St. Croix, VI 00820.
□ Panama Canal Zone: all calls* — KZ5 QSL Bureau, KZ5OD, Box 407, Balboa, CZ.
□ Hawaiian Islands: all calls* — John H. Oka, KH6DQ, P. O. Box 101, Aiea, Oahu, HI 96701.
□ Alaska: all calls — Alaska QSL Bureau, Star Route, Box 2401, Wasilla, AK 99687.
□ SWL — Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

□ *QSL Cards for Canada (VE and VO) may be sent to: ARRL Central QSL Bureau, P. O. Box 663, Halifax, NS, Canada, B3J 2T3. Or, QSL cards may be sent to the individual bureaus.*

□ VE1* — L. J. Fader, VE1FQ, P. O. Box 663, Halifax, NS.
□ VE2 — A. G. Daemen, VE2IJ, 2960 Douglas Avenue, Montreal, Quebec H3R 2E3.
□ VE3 — The Ontario Trilliums, P. O. Box 157, Downsview, ON, Canada M3M 3A3.
□ VE4 — W. A. Studen, VE4BJ, 578 Oxford St., Winnipeg, MB, Canada, R3M 3J9.
□ VE5* — A. Lloyd Jones, VE5JI, 2328 Grant Road, Regina, SK S4S 5E3.
□ VE6* — D. C. Davidson, VE6TK, 1108 Trafford Dr., N. W., Calgary 47, AB.
□ VE7 — Howard Martin, VE7AFY, No. 45-9960 Wilson Road, Ruskin, BC V0M 1R0.
□ VE8* — Al Sturko, VE8NS, P. O. Box 72, Fort Smith, NWT X0E 0P0.
□ VO1, VO2 — William Coffen, VO1KM, P. O. Box 6, St. John's, NF.

*These bureaus sell envelopes or postage credits. Send an s.a.s.e. to the bureau for further information.

QSL bureaus for other areas can be found in the December, 1975, issue of *QST*, page 64.



Lloyd Jones, VE5JI, manager VE5 QSL Bureau, has been at the helm of the VE5 QSL Bureau since October, 1968. He received his first amateur radio license in 1956 as VE5JI. He also held the call VE7JN in 1958. DXing is his prime interest but since taking on the QSL bureau he doesn't have as much time for it as he would like. Contesting is also one of his interests.

A professional engineer by vocation and a civil servant, Lloyd worked 21 years for the federal government and the last nine years for the provincial government.

Married, with two children, Lloyd says, "I have a wife who is very understanding when it comes to ham radio." She must be very understanding. When you're married and manage a QSL bureau for eight and a half years, while it might not be absolutely necessary to have a sympathetic wife, it sure does help! And the rest of you VE5s can help Lloyd by keeping your envelopes on file with him. QST

The World Above 50 MHz

Conducted By
William A. Tynan,* W3XO

Our Untapped Resource — The Microwave Bands

Despite their having been opened to us some 30 years ago, our bands above 1215 MHz have seen little use. Sure, sporadic operation occurs from time to time. Here and there, a few contest stations attempt a 1296 contact or two. Every few years a pair of stations is set up on mountaintops aiming at a new record on this microwave band or that. Successful or not, the equipment is usually packed away and forgotten after the attempt is completed. Yet, there seems to be almost no regular day-in day-out use of the microwave portion of the amateur spectrum with the exceptions of CA and the East Coast, particularly in the case of the 23-cm band. Also, some reports note routine 13-cm activity in the New York City area. But, by and large, the vast frequency domain represented by our microwave assignments still awaits our exploration and exploitation.

Amateur microwave assignments are not silent everywhere. In Western Europe there is considerable 23-cm activity and even regular operation on 3 cm. On this latter band, the English Channel has been spanned on numerous occasions with everything from World-War-II surplus klystrons to Gunn-diode rigs producing about 20 mW. A pair of such rigs feeding 2-1/2-foot dishes was used to set the 3-cm world's record of 324 miles on an overwater non-line-of-sight path. Interest in this part of the spectrum in Great Britain is sufficient to warrant a monthly column devoted exclusively to microwaves in the RSGB journal *Radio Communications*. A map of the UK published in a recent edition of the column shows the UK crisscrossed by paths both optical and nonoptical that have been successfully negotiated on 10 GHz. If it can be done there, it can also be done here. All we need are the interest and a little ham ingenuity. Help appears to be on the way in the form of less expensive solid-state microwave devices and even a complete 3-cm assembly, the Microwave Associates "Gunnplexer."

There are numerous uses to which the microwave part of the spectrum can be put. Want a private channel between you and a buddy? The plentiful choice of frequencies will probably be free of QRM for years to come. Is 450 getting too crowded for your repeater control or auxiliary link? The microwaves should be ideal for this application. Looking for some room to do your thing on ATV? Once again, the bands above 1215 MHz provide the answer. Maybe you just want to try something new that hasn't been done before. There are plenty of fields to conquer in the world of 23 cm and down. Can the path from the West Coast to KH6 be spanned on the microwaves? No one knows but success would be one of the most exciting amateur radio accomplishments one could imagine. What about the Gulf of Mexico? That particular area is probably one of the best places in the world for tropospheric ducting. It has already been bridged on 23 cm by K4NTD in FL and K5LLL and W5LDV of Houston. Anyone ready to try to break that British 3-cm record?

The microwave bands offer a great deal. Since this same part of the spectrum is very popular with the commercials, with WARC-79 coming up we had better get moving.

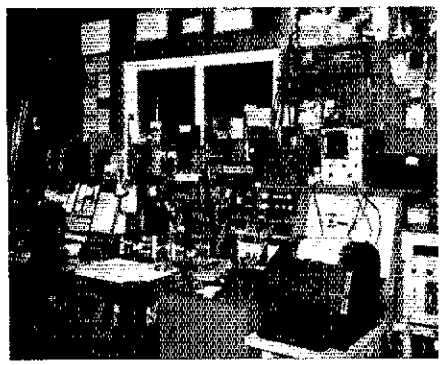
FRENCH 50-MHz BEACON AUTHORIZED

In support of the North Atlantic sporadic-E propagation investigation mentioned in last month's column, the French government has authorized F8SH to operate a beacon on 50.1 MHz under the call FX3VHF. The beacon should be on just as soon as its antenna is installed and it has demonstrated conformance to certain performance standards with respect to radiation in undesired directions. Anyone who is sure that he has heard the beacon is urged to send details to Ed Tilton at ARRL headquarters. Those wishing to take part in a systematic program of observation in connection with the North Atlantic sporadic-E investigation may obtain official report forms from Ed.

CENTRAL STATES VHF CONFERENCE COMING UP

One of the high spots of the vhf/uhf year is the Central States VHF Conference. This year's conference, the 11th, will be held August 19 through 21 at the Breckenridge Inn, Kansas City, MO. Between 100 and 200 active vhfers and their families from around this country as well as Canada, Mexico and possibly other far-off places are expected. For further information send an s.a.s.e. to Ted Mathewson, W4FJ, 1525 Sunset La., Richmond, VA 23221. CU in KC!

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730 or call 301-384-6736 and record your message.



The well-equipped shack of KL71FP in Ketchikan, AK. Listen for John on 6 meters and OSCAR.

ON THE BANDS

6 Meters — Following a good January and a fantastic early February, March seemed rather pale in the Es department. Nevertheless, some areas of the country report fairly good conditions for the time of year. The days most mentioned are the 8th, 12th, 19th through the 21st, 23rd, and the 24 and 25th. It is interesting to note that all the reports come from west of the Mississippi and all mention openings involving only the western states. Among his other inputs, WA0TRO of Smith Center, KS, notes reception of the WA6MHZ beacon on the 20th. Its frequency was 50.087 and it remained in for about 30 minutes after other signals had disappeared. Larry tells us that he had 182 DX contacts on 6 meters this winter. Most of them were in January. Not bad for a time of year when conditions and activity are supposed to be just so-so. K7ICW of Las Vegas also reports that conditions were quite good for March. Al says that the 12th provided a nice opening to OR, WA and VE7. Other days mentioned were the 19th through 21st to TX and OK and the 25th netting stations in SD and NB. K1VPD/5 in San Antonio, now sporting a QSL confirming his February 11 QSO with KH6IAA, reports several openings to the south during March. Kerry particularly singles out the 23rd when he heard a weak a-m station on 50.105 which he believed to be an amateur. There seems to be no lack of signals below the band, in that part of the world, which can be used to assess conditions. K1VPD/5 mentions particularly a wideband multiplexed signal on 49.9 MHz. He also hears fm communications in the 49.44- to 49.9-MHz region, some in English. He believes that they are coming from the Mexican oil fields on the Yucatan Peninsula.

WA5IYX has prepared some very interesting statistics on Es for the first three months of this year. Pat's findings are summarized in the table. Note the greater prevalence of Es at Pat's QTH in San Antonio, TX, this year in comparison to other years.

KH6GRU writes that the KH6EQI beacon is operating daily. It is aimed at the Mainland from 1600 until 0400 UTC. From 0400 until 0700 the beam is pointed in the direction of KG6 and JA. It was heard between 0335 and 0425 on April 8 by KG6JFY. Between 0700 and 1600 it is headed due south. Bert says that the best way to break the beacon is to call him at 808-689-0111. Conditions seem to be picking up even at this early point in the sunspot cycle. KH6GRU reports hearing 35-MHz paging services during March. On the 30th between 0230 and 0300 UTC the

Table 1
Number of minutes per month in which Es was observed at WA5IYX, San Antonio, TX.

YEAR	JAN.	FEB.	MAR.	3 MO. TOTAL
1964	120	0	0	120
1965	0	130	220	350
1966	849	295	20	1160
1967	505	100	0	605
1968	860	1070	40	1970
1969	425	535	380	1340
1970	485	690	95	1270
1971	950	725	125	1800
1972	70	75	590	735
1973	865	1100	255	2290
1974	1315	190	435	1940
1975	680	1405	0	2085
1976	900	30	0	930
1977	2840	1995	540	5175

beacon was reported heard by VK4RO. This was off the back of the beam. Another indication of improving F-layer conditions is passed along by WB4OSN. Joe, in a 10-meter contact with ZL2HE was informed that the New Zealand station had, in early April, heard the 52-MHz a-m signal of HP9XMM in Panama. In addition, many ZL and VK stations were working the JAs in late March and early April. A 48-MHz Korean hc station is apparently heard widely and with quite strong signals in New Zealand and Australia.

There are several DXpeditions shaping up for about the time you read this. WB4PXW plans to operate from 6Y5 from June 8 through 15 and W2BN (ex-WA2HJF of C6A fame) is reportedly going somewhere, possibly Beliz to visit the QTH of VP1MPW. Dave plans to operate 6, 2 and 70 cm and be on during the June contest. With all this talk of DX, it's a good time to renew the strong suggestion made last season by the south FL gang. Leave the 50,100 to 50,110 slot open for the DX. Sure, listen and call on 50,110, but when the band is open, move up not down. When you hear a DX station in the "DX window," by all means get in there and work him but, when QSO is complete, get out and give the other guys a chance.

Talk about 6-meter DX tidbits, how's this for an exciting and tantalizing one. It happened last summer during that wild Es weekend of Field Day. You remember what that was like. In a letter just received from K7JA, Chip tells of an incident which occurred at the W7FR/7 Field Day site. Although no QSO took place, the operators at the 6-meter position definitely heard JH1WXT speaking in Japanese to a JA8. The fact that the Japanese station was on 6 meters at the time was confirmed personally by K7JA when he visited Tokyo in September at which time he inspected the log of JH1WXT. Just prior to hearing this fine piece of DX, W7FR/7 completed a QSO with a very loud KL7, so it appears that the band was open in the right direction. Maybe this season we'll see some two-ways!

Attention all 6-meter nets. K5ZMS of SMIRK is compiling a directory of 50-MHz nets, a-m, ssb, fm, cw or what have you. Ray asks that information on meeting times, frequencies and modes be sent to him at 7158 Stone Fence Dr., San Antonio, TX 78227.

2 Meters – News for this band is somewhat sparse this month. This does not seem to be a result of low activity or lack of propagation. Activity, particularly of the ssb variety, continues to increase all across the country. Consistent work over 200- to 500-mile paths is quite commonplace. All of this success has apparently led people to take it for granted and not report it. One area where propagation conditions in the form of ducting have been consistently good throughout most of the winter is the Gulf Coast. Numerous 10-watt stations have gotten in on the fun of making contacts of up to about 800 miles. A section of the U.S. from which we do not hear too much 2-meter information is the Pacific Northwest. On a recent trip to the Seattle area, I found that the 2-meter ssb bandwagon is rolling there as it is elsewhere. W7FAB of Tacoma told me that, to add spice to 2-meter ssb operation, several hardy souls go mountaintopping several nights per week. One such group is WB7AEF and WA7ZWD. Tom and Phil regularly operate from about 4,000 feet up Blue Mountain near Pendelton, OR. Another is WA7HJJ who is a geologist and can be found on many evenings camped out with his 2-meter ssb rig on some lofty windswept slope. They have managed to agree quite well on a common frequency with the most used frequency in the area 145.1, but they are still having some problems standardizing on antenna polarization. Many are still vertical, a holdover from fm, while others have switched to horizontal. Reporting on the situation to the south, K7ICW, "Lost Wages," says that the southern CA gang is still split on frequencies. About half have gone to 145.1 while many of the rest cling to the old West Coast spot of 145.005. Al complains that this makes it a little tough for "boondock dwellers" to monitor. Also he says that activity is becoming great enough that a considerable number of stations can be found on frequencies other than these two.

From the Caribbean comes word of an interesting 2-meter contact. It involved KP4AST and YV5BUK who made the grade on cw for the first 2-meter contact between these two countries that I have heard of. The date and other particulars are unknown at this writing.

70 Cm – Although 70-cm EME activity is rising at a steady pace throughout the world, it is far from the only game on this very interesting band. Of course, there is OSCAR 7 Mode B which is becoming more popular as each month passes. But there is also a reawakening of interest in terrestrial operation. As an example, here in the Washington/Baltimore area there are QSOs going on just about every evening. That certainly was not true a year ago. Some of the active stations within easy working range of the DC area include W3UN, W3GHX, WA3DMF, W3TFA, W3OUX, PA0ZN/W3, K3LFO, K3AOK, K3HZO, W3JPT, W3OZ/W3TMZ, WA3GGT and W3XO on the MD side of the Potomac. In the Old Dominion W4FS, WB4EKG, W4UCH, WB4YRB, W4FI and WA4GPM hold up their end. Most have ssb capability but cw is still king when signals are weak. The increase in 70-cm activity in this area is indicative of the situation in many other parts of the country. A report from W4ISS tends to bear this out. It recounts the work of W4LJ in Ocala, FL, on the evening of Sunday, March 13. In one of the Gulf's famous tropo sessions, TX stations W5UPR, K5JRH, WB5JVR, WB5JWL and WA5HNK of the Houston area; WA5TBE and W5GVE, Corpus Christi and K5PTG, Friendwood along with WB5KIA, Gretna, LA, were worked. How many times has this path been open in years past and no one was on 70 cm? W3RUE near Pittsburgh took note of our comment in the February column about working 70-cm tropo while the leaves are off the trees and made a sked with W4ISS of Augusta, GA. He worked Frank for a 20-minute cw QSO on March 10 for a new state for each of them but that's not the whole story. In Ted's attempts to work W4ISS which started on February 20, he also had several contacts with NC stations W4VHH and K4PKV. This illustrates how getting on and running schedules will generate activity on any vhf/uhf band. K4PKV passes along the information that he has 400 watts output to an array of four Tilton Yagis and is looking for skeds. Those interested can write Dick at Rte. 5, Box 318A, Mocksville, NC 27028 or call 704-492-5411. He also suggests that the Central States VHF Net which meets at 2030 Central Time each Friday and Sunday on 3818 kHz is a good place to get together and make vhf schedules.

The 32-foot dish at ZE5JJ is getting quite a workout. As of this writing in mid-April there are reportedly seven WACs via 70-cm EME: K2UYH, G3LTF, W1JR, SM5LE, PA0SSB, K3PGP and I5MSH. According to I5TDJ who wrote regarding the activities of I5MSH, the equipment there is all homebrew and completely solid state except for the K2RIW amplifier. The antenna is a 36-foot dish with a rotatable feed. Operation was begun in November 1975 and so far 25 stations in 14 countries have been contacted, two of them, VE7BBG and LX1DB, on two-way ssb. K3PGP is justifiably proud of his WAC. He turned the trick after being on 70-cm EME only since June of last year.

The JA1VDV preamp mentioned in the March column has been duplicated by JA1ATL. Uta laid out the equivalent of $156 for the V244 GASFET but apparently it was worth it. He is reportedly getting a noise figure of 0.8 dB when working into a 3.5-dB noise-figure converter.

A new station, which should go a long way toward giving many less well-equipped stations their first actual experience with moonbounce, should be active by the time this appears in print. It is K3NSS, the combined club station of the Southern Maryland Amateur Radio Club and the Naval Communications Center Amateur Radio Club. These groups have the use of an 84-foot dish which the U.S. Navy used years ago on a moonbounce link with HI. The boys have been doing a lot of work getting the installation back into shape and installing the 70-cm equipment. As of mid-April they are receiving echoes and are about ready for skeds. Stay tuned!

WA6UAM passes along the following anecdote: One evening not long ago, WA7TZY/6 pointed his dish to intercept the moon as it passed the local zenith and turned on his receiver to 432.0. He then left the shack, which is in the garage, and went inside to draw a bath. Relaxing in the tub, he forgot that his receiver was on until, wafting through the house, came the easily copyable cw signal of K2UYH. The question that WA6UAM poses is, "how much above armchair copy is bathtub copy?"

23 Cm and Down – What may be a low-power DX record was chalked up by WA6GUY of Hawthorne, CA, in a 100-mile QSO with WB6NMT in San Diego. The rig at WA6GUY produced +5 dBm. That is about 3 milliwatts. If that's not enough, Chip's feed line attenuated that miniscule power by 10 dB before his antenna could do its thing. The equipment at the WB6NMT end is high powered by comparison. Lou runs 10 watts to a 3-foot dish. With this setup, he has been able to work K6ZMW in Goleta over a 196-mile path on several occasions with signals up to S6. Plans are underway to get going on 13 cm as well with 50 watts to a 6-foot dish on the front lawn. Those that laugh haven't seen WB6NMT's QTH. That front lawn is a great antenna site! Lou says that W6YFK is about ready to go again on 13 EME and terrestrial work. On the terrestrial side, Steve will use a portable setup, to try to cover the 500-mile path between the Bay area and Lou's front lawn. On the East Coast, the *Northeast VHF News* reports that Tuesday nights are now devoted to 23 cm. The gang meets on 144.200 and then moves to 1296, reporting results back on 2 meters after each contact. Regulars include W2EIF, WA3JUF, W3HMU and K1PXE.

WB2GFQ writes from Cape May Courthouse, NJ, that he is interested in doing some microwave work and wonders if anyone else in Cape May is also so inclined. If so, contact John at Route 2, Box 330. Zip is 08210.

Strays

Designed for hams who love to holler (as well as those who don't), the Ham Holler-in Award will be issued to all stations who contact NC4NHC, the special station on the grounds of the National Hollerin Contest at Spivey's Corner, NC. NC4NHC will be operating from 9:00 A.M. to 9:00 P.M. on the day of the world famous contest, June 18, on the following frequencies: 14280, 7280 and 3980 kHz.

Sponsored by the Cape Fear Amateur Radio Society, the handsome two-color certificate will grace the shacks of stations who contact NC4NHC. Send a dollar to cover postage and handling to the Cape Fear ARS, Methodist College, Box M-618, Fayetteville, NC 28301. Applications must be received before Sept. 1, 1977.

Results, Seventh Annual ARRL 160-Meter Contest

December 4-5 event tops off the 1976 contest calendar.

By Bill Jennings,* WA1AHI

Just like that helium-filled balloon that "escaped" your sweaty little palm at the circus or parade, the 160-meter scores continue to rise, higher and higher, the trailing string just out of grasp. Scores that would have made the top-ten listing only last year, good solid scores, obtained by hours of squeezing very weak signals out of the normally high QRM and QRN levels, miss the elusive 10 highest score listings by several thousand points. Why? Perhaps better propagation conditions. Maybe the easy access to the electronic operator aids; electronic memory keyers and microprocessor "log-keeping machines" that take the burden of a lot of the grunty work away and allow the operator more time to operate rather than perform menial chores, peripheral to the actual working of QSOs and multipliers. The proliferation of multimode, multiband super whoopie, deluxe transceivers that now include 160-meter coverage as a standard feature might also be the answer to the question of why more QSOs and multipliers show up each year to be worked. And the scores continue upward.

The seventh annual running of the 160-Meter Contest drew almost a 20-percent higher turnout in terms of entries received, a total of 364 entries, compared to 306 in the 1975 event.

Even though it took a score 26 percent higher this year just to place in the top ten in the single-operator category than it did last year, six of the top-ten single operators were also in there in 1975. K1PBW repeats this year as the top single operator, even breaking his old all-time single-operator record by over 11,000 points at 111,972. Jim is still the only operator to break the 100,000 point barrier. Other "repeaters" to the top-ten single-operator category are W2DXL, W3IN, K4PUZ, W8LRL and WA9BWY.

On the multioperator side of the ledger, an 11-percent jump in the minimum score needed to make the top-ten listing, and even more of a status quo as far as the stations that did make it. Seven of the top-ten multioperator stations of 1975 also show up on the 1976 list, among them the multioperator stations of WA2SPL and WA8IJI, who retained their positions of numbers one and two respectively, each increasing their total score by about 7,000 points. W4PRO, W4OZF, K8HLR, W8LT and WØAW are the rest of the stations that retained their top-ten positions.

It takes teamwork to build a competitive station. At left is Ken, W9JZE, antenna designer. On the right is Ron, the antenna erector. Seated center is Rod, WA9OGD, who operated the station to 383 QSOs and 54k points in the Illinois Section.

For those of us interested in the number of DX stations worked by each entrant, W3IN has come up with a nifty plug-em-in formula to calculate the number of DX stations, strictly from the information given in the line score for each entrant. The formula is as follows:

$$N = \frac{\frac{A}{B} - 2C}{3}$$

where N = number of DX QSOs, A = total score, B = number of multipliers and C = total number of QSOs.

Contrary to popular belief, KV4 *is* included in the West Indies Section, *not* to be claimed as a separate country multiplier, or as a five-point DX QSO. The rules are quite explicit in stating that QSOs with ARRL sections count two points *not* five points, and KH6 and KL7 as well as KP4 stations all are within ARRL sections. More than a few entrants will find their scores adjusted to reflect the above conditions and to conform to the published rules.

Soapbox

Line noise? Good thing that I didn't have a chain saw. (VE5DX) The 26-year-old vertical with its duplex-control circuits (15 thru 160 meters) still working FB. The only conductors are those of one lone coax, underground. (WØGK) Just testing my new home-brew transverter, using my 80-meter dipole as a

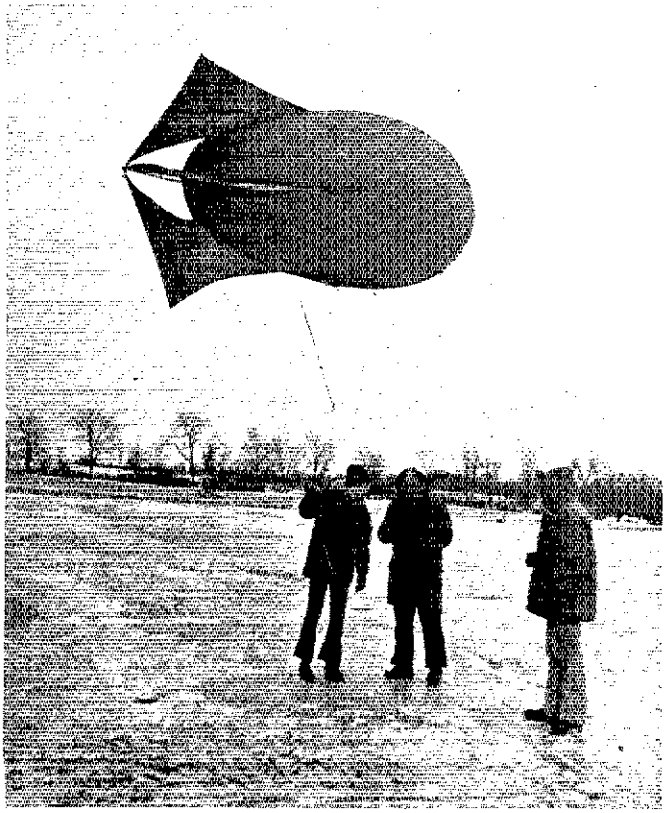
*Communications Assistant, ARRL

The rebirth and death of the Kytoon. Vic, WA1LKU, Bob, W8ERD, Gary, WB8IBZ, and Cathy, WB8TXE, all part of the mob at W8LT, are shown above resurrecting their beloved antenna support balloon, the Kytoon. The Kytoon seemingly met its fate during the 1975 160-Meter Contest (see story in June 1976 *QST*) and the continuing saga of the Kytoon is related to us by Jeff, WB8JXS, another of the Ohio State University Amateur Radio Club members.

"Everything went smoothly as far as the Kytoon was concerned. We lowered it and gave it a booster of gas on Saturday morning, and it kept away from the trees and metal structures. Saturday night was very cold, and on Sunday morning the Kytoon was dragging a bit. It was taken down and given a booster. It flew straight again, and we continued operating. The sun came up. It was getting warmer, and we were glad that we didn't have to gather up all of the antennas in the cold. The gas in the Kytoon expanded (PV=nRT). When the contest had ended and the last push on the Accu-Memory had faded away, we glanced up at the ". . . old dependable Kytoon.

"There was something strange about it. It seemed to have added a new, lighter color to itself. It was too far away to see exactly what was going on, so we took it down.

"It looked like it was giving birth to the largest spawn of guppies recorded in modern times. The outer skin had burst lengthwise, from the nose to the tail, allowing the gas bladder to grow out of it. This is probably the last time that this Kytoon will fly."



Marconi, and surprised at how well it worked! (W2LYH) Conditions on Friday night were very good. On Saturday, a front moved through with static becoming very heavy and signals down in level. I heard all sections but VE7, VE8, KL7 and Montana. It's most frustrating to hear a needed section who slips away never to be heard again, or even worse to hear one call CQ test and you crank away at him with never a reply! (W4QM) The highlight of the contest, for me, was a contact with W6OKK. Pat and I were classmates back in 1942 at Navy Radio Material School, Treasure Island, California. Of the 40 or so hams who were in class 3B this is the first "on-the-air" contact that I've had with any of them. (W6MUV) Boy! What fun this contest is going to be when LORAN is finally removed! (WA6MBP) I noticed that 25 percent of all stations worked were two-letter calls. (K5LZJ) It was a great satisfaction to beat Murphy by having two, 20-year-old SX-99 receivers. The first one blew up half-way through the contest. (W7JAL) I changed my 80-meter dipole to a 160-meter dipole on the second day of the contest with greatly improved results. Seemed to work fine even with the end going in all directions to keep it inside my lot. (WBØBIY) Last year my score was so poor – less than 4000 points – that I didn't bother to send it in. But if I had, I would have won for San Diego Section!! I know of scores higher than mine this year, but here is my log anyway. I've learned my lesson! (W6ABT) The band was unusual this year (that is for 4-land), in that there was a complete absence of atmospheric QRN during the entire contest period. Although I prefer to operate (with my power level) above 1830, LORAN became so intense at times that I was compelled to go below the DX window. Because of the conditions, the low end of the band sounded like 40 meters during the Sweepstakes. (W4FCJ) The activity was so great that DX was very difficult to work. DX stations who tried to work in among the Ws were really clobbered and not many other than the Europeans tried to use the DX window. The window was fairly well respected in principle by the contestants, but they encroached a kHz on each end, which narrowed it down effectively to three kHz. (W9GT) A pox on those that contact a KL7 and then call CQ on that frequency! (W9EI) 160 is the last band populated only by gentlemen and ladies. Nice to work a band where courtesy is taken for granted. (VP1MPW) Condx very good. I had to go to work on Sunday night, so not much of a score. An always pleasant contest. (JA2UEO) Another great 'test. Now up to 47 states worked on 160. Just KL7, KH6 and Idaho to go. Spent 90 percent of my time above 1830 kHz, as there was no room below. (VE3ECP) Haven't heard the old band so busy since before World War II. (VE7AGN) Heard all U.S. call areas, but could only work 6 and 7. Other areas seemed to work only the loud top layer. (VE7XN) Enjoyed meeting old friends and such good operators. A pleasure not to have the usual contest QRM. (W2DW) Understand that 92 multipliers were on the air. Missed simple ones like ND, SD and some close-in DX. Just can't seem to break that magic 100k score. (WA2SPL) Used Yaesu FT 101B, 95 watts and a low *mongrel* dipole. (W2GP) ZL3ZQ blew my mind for some reason. Too bad DX activity was low, I might have recovered more rapidly. (W2MTA) Amazing amount of daylight activity this time. (AC3IN) Antenna is a 66-foot, 7-MHz aluminum dipole roped to a tree. W3IWT shivered out words of encouragement as we laid radials in the snow. (K3BSY) In one 20-minute period on Dec. 5, I counted 12 U.S. stations operating in the DX window. At the very least you should publish their calls; at the very best, make operation in the window a disqualification criteria. (K4SB) After five hours of 2.1-kHz selectivity, my order for rig's cw filter is in the mail. (WA4ECB) Heard a couple of fellows on 80 talking about the contest, so I decided to get on. Built transmitter, a 210 Colpitts oscillator and modified the 75A1 receiver. Lots of fun with 10 watts input. (W4NUM) With a top-loaded vertical, tangled in a 40-meter beam, Globe Chief and VF 1 VFO, I think next year that I will upgrade to a spark gap and a clothesline! (WB5HOD) Recommend that DX-to-DX contacts be allowed in the future to promote more DX activity. (K6SE) Chased all over on Saturday night looking for Maine and Delaware. Almost fell out of my chair when K1RQE (Maine) and W3GL (Delaware) both came back to one of my CQs at the same time. (WB6NRK/7) Too many alligators for us elephants! (K7RA) Seems like the big signals get bigger every year. (WA8SJX) Every QSO is simply more fun on 160. (W8IBX)

Division Leaders

SINGLE OP	*DIVISION*	*MULTIOP*
AC3IN	Atlantic	K3BSY
W9MTT	Central	W9YH
WØHW	Dakota	WØAW
K4PUZ	Delta	
K4GSU	Great Lakes	WA8IJI
W2DXL	Hudson	WA2SPL
WØNFL	Midwest	WØIS
K1PBW	New England	W1MX
W7SUY	Northwestern	K7GGD
W6KQG	Pacific	
W8LRL	Roanoke	W4PRO
WBØLLR	Rocky Mtn.	WØPXO
K4SB	Southeastern	W4OZF
K6SE	Southwestern	WB6HJW
W5SBX	West Gulf	K5QNM
VE3IXE	Canadian	VE1AXT

Jim, WA1WVK, piloted station W1YNC to 26,061 points and third place in the Connecticut Section.

Top Ten

SINGLE OP		*MULTIOP*	
K1PBW	111,972	WA2SPL	97,193
K4GSU	99,636	WA8IJI	90,244
K4PUZ	95,978	WØAW	86,250
W2DXL	94,836	K8HLR	85,320
W8LRL	93,808	W9YH	84,916
W9MTT	91,476	W8LT	79,125
AC3IN	89,908	W4OZF	75,522
WA9BWY	85,396	W4PRO	73,416
W9DL	82,288	WA8SJX	56,445
WA5RTG	81,928	K8SJU	54,746

Check Logs

W1HDC W1HGT W2LYH WA9QHO/2 K4JM AA4WCG W5IOU W7IMP W7MKB K9AKC WØAIH WØLNZ VE3AWE.

Scores

Scores are listed by country within each continent, by province within Canada, and by section within each U.S. call area. The highest single-operator station in each ARRL section and in each country receives a certificate. The highest multiple-operator station in each section and country receives a certificate if there are three or more such entrants or, if, in the opinion of the Awards Committee, the entrant displays exceptional effort. Read the score listings as follows: call, score, QSOs, multiplier, hours of operation. Asterisks denote Hq. staff members, who are not eligible for awards when operating their own station or that of another staff member.

DX

Belize

VP1MPW 9090-101-45-30

Czechoslovakia

OK1AIP 850- 25-17-10
OK2PGU 2- 1- 1- 1

England

G3LBR

G3UBR(G3ZQN,G4s BCH,BTY, oprs.) 5670 81-35-11

Finland

OH2BO 144- 12- 6- 2

Republic of Ireland

EI9J 30- 5- 3- 2

Japan

JA3ONB 702- 27-13- 4
JA9BQH 108- 9- 6- 3
JA2UEO 96- 8- 6- 2
JH1LKH 2- 1- 1- 1

U.S.A.

1

Connecticut

W1FB* 39,232-296-64-18
W1BIH 27,864-241-56-42
W1YNC(WA1WVK*,opr.) 26,061-264-51- 7
AA1VCG* 21,573-225-47-12
K1TFA 19,044-207-46-13
K1LGM 16,614-213-39-18
W1WY 15,512-128-56-16
K1RGO 8034-103-39- 8
W1VZ 2640- 60-22- 5
K1ZZ* 2184- 52-21- 2
W1QV 3190- 58-27- 2
WA1WVK* 850- 25-17- 2
W1GSH 748- 22-17- 3

Eastern Massachusetts

K2UOC/1 59,592-367-78-21
W1FJ 33,040-274-59-42
W1PI 26,950-265-50-42
W1RR 15,317-134-53- 6
W1GDB 12,276-186-33-42
AA1MSK 5696- 89-32- 6
W1BB 2472- 35-24- 7
WA1GKD 850- 25-13- 2
W1MX(WA1RJX,WA1TIG,opr.) 52,930-379-67-42

Maine

K1RQE 42,048-270-73-17
W1HRQ 31,722-308-51-30

New Hampshire

W6MZW/1 27,200-205-64-13
K1GQ 15,635-137-53-42

Rhode Island

K1LPA 42,222-330-62-42
WA1YPN(W1ELQ,WA1s NXW,POJ, RPF,oprs.) 45,568-341-64-42

Vermont

K1IK 17,888-205-43-10
W1SPK 570- 19-15- 4

Western Massachusetts

K1PBW 111,972-606-86-33

2

Eastern New York

W2DXL 94,836-539-84-42
AA2EAH 66,450-425-75-21
W2LW 25,821-225-57-42
WB2DXL 21,648-221-48-42
W2MNK 18,768-194-48-17
WB2NEC 10,101-135-37-35
W2DW 1890- 45-21- 2
W2IP 300- 15-10-42
WA2SPL(+WB2OEU) 97,193-560-83-42

N.Y.C.-L.I.

WA2YJN 32,460-263-60-19
W2KTU 21,600-240-45-22
WB2FLF 7910-113-35- 6
W2GP 1750-125-31-42
WB2HZH 3888- 81-24-42

Northern New Jersey

WA2SRQ 38,280-313-60- 9
AB2CST 21,000-250-42-42
WA2UOO 19,787-209-47- 8
W2KHT 16,800-197-42-19
W2WQ 12,616-166-38-42
W2HUG 7400-100-37- 4
W2GXD 7004-103-34- 4
W2MPP 650- 25-13- 5

Southern New Jersey

K2BWR 15,600-153-50-15
W2PAU 11,152-136-41- 6

Western New York

W2MTA 49,302-366-66-42
AA2QKF 22,795-241-47-17
AD2FJ 14,580-162-45-12
AB2ABD 3618- 67-27- 4
WB2JLM 2100- 50-21- 6
WB2GIN 960- 30-16- 7

3

Delaware

W3GL 22,734-206-54- 9

Eastern Pennsylvania

W3FM 56,338-395-69-21
W3NZ 32,872-286-66-42
W3AJS 20,020-226-44-42
W3BGN 19,575-210-45- 9
W3AP 18,084-204-44- 6
K3II 17,908-202-44-42
WA3SXU 9072-126-36- 8
W3NUA 6160- 88-35- 6
K5JZN/3 950- 25-19- 3
K3JJO(+WA3VCA) 14,965-181-41-42

Maryland-D.C.

AC3IN 89,908-581-76-31
WB2JYM/3 25,245-246-51-11
K3ZZ 25,308-219-57-12
AC3USS(WA1FEQ,opr.) 23,688-252-47-17
W3FCR 1504- 47-16- 7

Western Pennsylvania

WA3WIK(WA3SZX,opr.) 80,064-550-72-30
W3UHP 30,264-291-52-24
W3HDH 15,006-183-41-10
W3BZN 6734- 91-37-18
W3SN 4898- 79-31- 6
K3BSY(+W3IWT) 49,042-394-62-26

4

Alabama

W8FAW/4 26,818-250-53-10
K4TO 22,048-208-53-42
WB4VKW 12,784-136-47-42
WB4ASV 3132- 54-29- 9

Georgia

K4SB 71,213-497-71-42
K4QMQ 68,724-492-69-25
W4YWX 40,722-304-66-10
WA4IAR 23,744-221-53-42
WB4RUA 22,860-189-60- 9
AC4WRY 5244- 66-38- 6

Kentucky

K4GSU 99,636-648-76-28
K4FU 45,990-327-70-15
W4YOK 12,760-145-44-42
W4KFB 10,406-121-43- 9
WB4ECB 9120-120-38- 5
WA4EBN 9584-116-37-12
WB4KTR 32- 4- 4- 2
WB4NTB(WA4UNJ,WB4DEM, oprs.) 4256- 76-28- 9

North Carolina

W4TMR 47,368-379-62-29
K4JYS 30,385-256-59-26
W4HHN 10,192-101-49- 7

Northern Florida

K4YFQ 48,032-304-76-19
K4IEX 27,328-218-61-10
W4QN 1224- 36-17- 7

South Carolina

WA4UPR 33,728-269-62-35
AD4II 24,300-222-54-16
K4RF 11,850-117-30-11
WB4TGQ(+WA4s JWS,QGG,VZG, WB4s EFZ,FDU) 8296-122-34-28

Southern Florida

W4QM 47,451-331-69-20
WA4NFF 38,280-281-66-15
W5SUS/4 21,942-188-58-24
W4AWS 11,224-122-46-14
WA4ZHU 7600- 97-38-42
K4JDC 6392- 94-34-14
AA4LZR(WA4FCT,opr.) 4512- 69-32- 7
W4MAN 3648- 54-32-42
W4BAA 1224- 34-18- 3
W4GUU 784- 28-14- 7
W4NUM 348- 13-12-42
W4OZF(+K4DBZ) 75,522-438-82-30

Tennessee

K4PUZ 95,978-644-74-30
W4LUH 41,040-342-60-19
WA4ATI 7176- 92-39-16
W4FCJ 5624- 74-38- 9
K4MZE 84- 7- 6- 1

Virginia

K4CYU 63,802-428-73-42
W4WSF 41,654-350-59-12
W4DHZ 39,894-318-61-36
W4KFC 34,371-300-57-42
W4ZM 24,024-231-52- 9
K4JWD 14,514-177-41-10
K4RS 12,915-142-45- 9
W4NVN 9360-130-36-36
W4FZG 4158- 77-27- 4
K4KA 4026- 61-33- 3
K4FTO 3952- 76-26-42
W4JVN 3780- 70-27- 8
W4KMS 3500- 70-25-10
WA4MJE 360- 15-12- 2
W4PKO(+K3RUQ,W4HBK, WA4DUS) 73,416-465-76-42

5

Arkansas

WA5RTG 81,928-533-76-29
W5KL 26,400-220-60-42

Mississippi

W5TXA 25,315-206-61-16
WA5NYG/5 19,504-184-53-42
W5XX 9718-113-43- 3
W5AQ 6495- 89-32-20
W5GWD 1716- 39-22-20

New Mexico

W5DO 20,496-183-56-42

Northern Texas

W5ZSX 45,866-320-71-17
K5JVF 36,352-250-71-23
K5QNY 35,092-283-62-22
WB5KIU 32,574-267-61-23
W5FIX 12,136-148-41-17
WA5VOQ 10,528-112-47-10
W5QF 10,336-136-38-42
W5LA 2160- 54-20- 3

Oklahoma

WA5KUD/5 8282-101-41-10
WB5GMK 1344- 32-21- 5
K5QNM(+AB5JFR) 17,680-170-82-25

Southern Texas

W5SBX 58,504-406-71-18
K5DEG 35,216-281-62-18
W5RPJ 15,750-175-45-15
AA5LTQ 12,648-124-51-16
WB5IZN 6916- 91-38- 3
AB2UFG/5 180- 10- 9- 1
WB5HOD 108- 9- 6- 3
K5LZJ(+WB5LVL) 1936- 44-22- 4

6

East Bay

K6HIH 35,926-270-62-42
W6FCU 252- 14- 9-
W6EJA 108- 9- 6- 2

Los Angeles

K6SE 72,930-442-78-26
W6RW 33,215-242-65-11
WA6MBP 10,304-112-46-17
WA6VCZ 7272-101-36-10
K6YFZ 3420- 57-30-42
W6RTT 1024- 32-16- 4

Orange

WB6ZVC 50,694-351-71-24
W6BA 15,510-165-47-17
W6SKQ 2812- 74-19-21
AB6AKR 1326- 39-17- 3

Santa Barbara

W6TYR 1020- 30-17- 7
WB6HJW(+WA6MSN) 34,584-262-66-17

Santa Clara Valley

AA6PGB 44,287-317-67-42
K6STI 41,726-323-62-34
W6UKK 4212- 78-27-42

San Diego

K6NA 29,632-227-64-11
W6HLZ 15,225-100-75-11
WA6CXK 12,848-146-44-42
W6ABT 10,450-103-50-10

San Francisco

WA6QQG 47,056-337-68-32
WB6NHF 16,954-173-48-42
K6LRN/6 340- 17-10- 2

San Joaquin Valley

AD6MO/6 23,100-185-60-16
W6MJ 20,706-203-51-31
K6TG 6820-110-31-16
W6MUV 1360- 40-17- 9
WB6ITM 50- 5- 5- 1

Sacramento Valley

W6ZGM 11,136-116-48- 7
W6OWP 4576- 88-26-15
WA6BRV 1700- 50-17- 4

Hawaii

KH6IJ 12,896-124-52- 7
KH6CHC 11,656-112-47-42

7

Arizona

WB6NRK/7 51,246-345-73-42
WB7CRK 27,918-210-66-17
K7WQO 3080- 55-28-42

Idaho

W7SUY 33,672-276-61-42
W7LDG 6460- 95-34-21

Montana

K7ABV 5110- 72-35- 6
W7LR 4598- 81-29- 5
AD7CPC 4380- 73-30-12
W7CBY 2500- 50-25-15

Nevada

W7MRS 46,308-333-68-19
W7YN(K6ILB,opr.) 38,934-303-63-42
W7ABX 8260-118-35-11
W7DIM 3360- 56-30- 8

Oregon

WA7PEZ 12,870-143-45-15
W7LT 2886- 68-21- 9
W7VSE 2392- 46-26- 6

Utah

W7CYH 16,830-187-45-19
WA7OAU 11,280-120-47-12

Washington

W7DPW 30,680-236-65-42
WA7GCI 24,300-189-60-31
WA9RAT/7 10,500-125-42-42
W7NP 10,668-127-42-15
WA7OFH 9918- 87-57- 8
W7HAD 7424-116-32-24
W7DAZ 6438- 87-37- 9
W7EYK 5814- 75-38-14
K7IRE 1870- 55-17- 6
K7DZ 1848- 44-21- 6
W7DRA 1634- 43-19- 9
K7GGD(+W7DNU,WA7s WMC, WMD) 17,388-189-46-19
K7RA(+K7JCA) 16,640-160-52-42

Wyoming

W7UGL 7030- 85-37-22
W7TO 2376- 44-27- 8

Alaska

KL7GIH 360- 20- 9- 3

8

Michigan

W8YY(WA8ZDR,opr.) 33,728-263-64-29
W8VSK 33,604-271-62-42
WA8WWM 26,290-239-55-13
W8KAZ 14,784-168-44-42
W3GN/8 11,528-131-44-42
W8CNL 10,752-128-42-12
W8EWTD 7276-107-34-42
WB8IOT 5984- 88-34-42
WA8CZH 4340- 70-31- 3
W7KQU/8 3528- 42-42- 3
K8HLR(+K8IDE,WA8s EDC, JUN) 85,320-588-72-32
WA8SJX(+WA8WCZ) 66,445-396-71-42
W8MAI(K8SLE,W8s GHN,OHS, WWO,WA8s TBL,ZSE,WB8NSF, oprs.) 27,888-249-56-30
WA8TDY(+K8DYZ) 22,936-244-47-42

Ohio

K8CCV/8 65,688-470-69-29
W8DB 58,892-428-69-25
W8QXQ 22,256-214-52- 8
K8CVJ 18,304-176-52- 6
W8EX 12,628-151-41-10
W8PCS 12,341-142-42- 9
W8IBX 11,520-128-45- 4
AA8TYF 2704- 52-26- 2
WA8IJI(+K8KAS,W8Bs MZZ,TCO) 90,244-574-77-30
W8LT(WA1LKU,K8MLO,W8ERD, WB8s IBZ,INY,JXS,PHI,TXE, oprs.) 79,125-520-75-36
K8SJU(+K8JK, W8s QHW,QKO, WB8RYZ) 54,746-440-62-26
WA8YEE(+W8Bs FMX,WMB) 44,713-365-61-42
WA8ZDF(+W8BRIJ) 41,478-333-62-10

WA8YWX(+W8IDM) 29,680-262-56-18
WB8GUJ(+W8LWA,W8Bs GQH, IJI,KGO,MVR) 23,638-223-53-42
AB8OFR(+AB8s ILW,MRU,RDO, WB8s GXB,JKY,NTY,SVN) 23,320-220-53-42

West Virginia

W8LRL 93,808-648-82-34
K8OQL 30,090-295-51-30
WB8UKQ 4200- 75-28-42

9

Illinois

W9DL 82,288-550-74-23
K9FB 68,072-508-67-42
W9YYG 56,028-403-69-18
WA9OSD 54,040-383-70-35
W9QT 50,470-356-70-21
WA9HHH 35,931-300-59-14
K9AB 23,816-229-57-15
W9OHH 19,502-199-49-10
W9AG 14,896-152-49-42
AD9UKM 11,562-141-41-42
W9UDK 5964-106-47- 6
AC9QWM 5922-121-41-42
K9LWR 5546-129-37-12
W9REC 7200-100-36-42
WA9IXF 6768- 94-36-42
K9KEP 5508- 81-34-10
W9GSB 2450- 49-25- 6
W9ABA 1840- 46-20- 3
WB9KLW 1348- 43-18-15
W9YH(WB9s IJV,IMV,NPB,OEP, oprs.) 84,916-598-71-42
K9UYK(+K9s CHZ,DDA,WA4sHV, WB9s APE,QPI,RRM,WB@WCL) 52,564-385-68-39
W9AZ(multiop) 43,407-343-63-42
W9QVE(WA8AYC,K9IKI, WB9MNT,oprs.) 23,956-226-53-28

Indiana

W9MTT 91,476-585-77-32
WA9BWY 85,396-571-74-30
K9UWA 61,180-437-70-17
W9BRN 49,210-350-70-29
AB9QCP 47,256-355-66-23
AC9LT 41,824-326-66-18
WB9LHI 41,470-319-65-13
K9ZUH 19,458-207-47-20
W9IQO 15,824-184-43-13
WB9BUV 11,040-138-40-42
WA9ITB 10,752-112-48- 6
W9EI(+W9NJD) 39,294-333-59-33

Wisconsin

WA9MCC 80,446-945-73-28
W9GIL 14,490-161-45-42
K9DAF 14,280-140-51-42

ø

Colorado

WBØLLR 32,949-260-63-15
WØETT 32,004-254-63-42
WØPHF 21,840-182-60-42
WØRE 4950- 75-33-11
K2YYN/Ø 1872- 36-26-42
WØPXO(+WA8BHS,WØECN) 32,028-214-68-42
K8ILI/Ø(+WØMVK) 20,240-184-55-21

Iowa

WØNFL 47,448-328-72-25
WØBQ 2400- 50-24-42
WØIS(+K9DMR,W9AMF,WB9s ASF, FGN,FVY,JWH,MXI,OOS,YTT, WØOJD,WAØs,WGL,WNE, WBØLHE) 52,920-420-63-42
WBØUUA (+KØGXR, WAØs MHJ, ODK,UIB,WBØs KUJ,OLX) 50,952-386-66-33

Kansas

ACØIUB 23,792-264-64-15
WØPSF 16,356-142-57-13
WØAM 15,258-128-62- 6
WAØMLE 16,014-157-51-42
WBØBIY 15,455-139-55- 6
WAØGSG 2800- 50-28- 2
WAØTAS 2214- 41-27- 9

Minnesota

WØHW 57,615-416-69-16
WØBF 15,570-173-45- 6
WØAW(+WAØYLN,WBØs ANT, DSJ) 56,250-572-75-33
WØJUS(+KØSHO,WABFSE, WBØHLS) 45,696-336-68-41

Missouri

WAØFBQ 42,108-319-66-17
WØGK 20,502-201-51-23
WØJRP 3776- 59-32-42

North Dakota

WØZIL 31,878-253-63-13

VE

Maritime-New Foundland

VE1CD 38,199-271-65-29
VO1HP 2461- 37-23- 7

VE1AXI (+VE1BCZ) 34,192-237-48-32

Quebec

VE2WA 25,116-237-52-15
VE2GS 2750- 55-25- 6
VE2DDH 1020- 34-15- 7
VE2OJ(VE2s DNW,SD,opr.) 17,100-190-45-17

Ontario

VE3IXE 53,935-398-67-42
VE3ECP 33,064-329-66-42
VE3AUI 15,936-166-48- 4

Manitoba

VE4VV 3650- 73-25-42

Saskatchewan

VE5DX 46,760-334-70-42

British Columbia

VE7AGN 5146- 83-31-42
VE7VO 3822- 91-21-16
VE7XN 1320- 44-15-42

Frequency Measuring Test

Results of February 13 test runs: A counter-revolution that's wide in scope and, although a lot of fun, it still hertz.

By Jean DeMaw,* W1CKK and Bill Jennings,** WA1AHI

It's getting pretty crowded at the top. The 43 participants who made the Honor Roll in the February 13 Frequency Measuring Test represent almost 30 percent of the total 152 entries received. In fact 146 or 96 percent of the entrants were able to achieve sufficient accuracy to qualify at the Class II OO level of 179 parts per million or better.

Of the 2061 measurements taken, only a very few were on 20 meters during the early run. Lack of signal due to poor conditions as well as the usual amount of QRM thwarted even the "umpire," who did not find a signal of sufficient strength on 14 MHz to measure. The official readings for the early run were 3523.124 and 7039.085 kHz.

A change for the better in propagation conditions resulted in solid official measurements on 80, 40 and 20 meters for the late run. 3544.446, 7100.786 and 14120.413 kHz became the measurements of record.

Honor Roll

This top listing is the standing of the frequency-measuring leaders. In consideration of the minimum possible error due to Doppler (and other unavoidable factors), we accredit as of equal merit all those reports computing 4/10th parts per million (or better) accuracy. Please note that a participant must submit a minimum of two measurements to qualify for this listing. Again, the following top achievers are of equal merit, most conveniently shown in alphabetical listing by call area and suffix: W1BGW W1JH WA1MEY W1PLJ K1VHO W2AXT W2DW W3BFF W3JW K3LPP K4KA W4NTO W4RHZ K4VA W4WXZ K5EVK W5FMO W5IJW WB5LDF W5OS W5QIV WB6AAL W6CDF WA6FAD K6JG WB6LCI W6OQI W6TM W7ANF WB8BGY WB8STQ W8CUJ WA8MSC W8OK WA8TIC W9HPG W9TJ K9WGN W9ZTK WØMDL WØRUR VE3AC ex-7HM.

*Communications Assistant, ARRL
**Communications Assistant, ARRL

Better Than 35 Parts Per Million (Class I OO Qualification)

(.5) WA1MDU K6MZN, (.6) W9KO W6RQ, Ireland, (.8) K4KO, (1.1) WB8EUK, (1.2) WB7NKC, (1.3) K4IAA, (1.6) K6HI, (1.7) W8PZT, (1.8) W4CQJ, (2.0) K9WMP, (2.1) WB2GFQ, (2.4) WB4RUA, (2.5) W1AYG, (2.6) WB5NGF, (2.8) W1DDO W2AIQ, (3.0) K7UWT, (3.4) W2ND, (3.5) WA2DBD, (3.6) K4JK, (3.8) W9AG, (3.9) W7BUN, (4.1) K6EC, (4.3) WBØHBM, (4.5) W3YO, (5.3) K6CL, (5.6) W6ME, (5.7) K4MC W9MRQ, (6.3) W9PBI, (6.8) WA7HGB WØOUM, (7.2) K4JQY, (7.8) W6CBX, (8.0) W3QVZ, (8.1) W3ADE, (8.6) VE6BAF, (8.7) WØNEE, (8.9) WA4ZXC, (10.0) K2RG W4UCL WB6RQE W9MNY, (10.1) K6TMY, (10.3) W8DPW, (10.4) W7DQS, (11.7) WA9PVS, (11.8) WA1ZRM/9, (12.1) WA2MID, (12.5) WB8NTY, (13.0) VE6MJ, (13.6) WB8HAT, (13.8) K6VRS, (14.1) W1MK, (14.5) WB4ACV, (15.8) K8LIX, (16.4) K1EPL, (16.5) W1VH W3HRG, (16.8) W9FKJ, (20.4) W4PKD, (20.6) WA1OLK, (21.0) W9LMI, (22.9) W8HZA, (23.4) K4YO, (23.5) W3FYK, (26.0) K4HMD, (26.1) W8JLJ, (27.1) W7JIE, (27.7) WA2ERP, (28.7) W1CSS Hudelson, (31.2) W5FFW, (34.2) W1QV.

Better Than 179 Parts Per Million (Class II OO Qualification)

(35.4) VE6XO, (37.5) W3KEK, (39.7) W2MDM, (40.2) WAØRIQ, (40.5) K6GG, (41.2) W2SE, (45.5) W6AEE, (47.0) KØMKD, (49.4) W4SHL, (50.6) K5VIP/8, (52.5) W8BU, (62.0) WA7OBH, (62.6) WA7LQV, (88.0) KH6GDN, (90.0) K6EPX, (92.8) K6QPE, (94.0) K6QPG, (95.4) W8BPB, (98.7) WB4CLE, (103.4) W9TGN, (114.0) WB2FWS, (114.2) WA2NVO, (118.0) W3NC, (125.7) WA6VPJ, (129.4) W6ASH, (141.2) WAØEBZ.

Honor Roll Measuring Methods

I zero beat my BC-221 with W1AW in my R-4B and measured the 221 on my HP 524C. The receiver S-meter gave a very adequate indication of zerobeat, the 221 was very stable, and I had recently calibrated the 524C. (WA1MEY) Equipment used was an

SB-300 receiver with reverse conversion mixer and a homebrew eight-digit counter with a mainliner frequency standard in clock. Readings taken at one-second count. (W2AXT) Used NC 300 receiver on 0.5-kHz i-f position with URM-79 frequency meter. Zero-beat determined by ear and S-meter. (W2DW) Used 75A4 receiver, 10-kHz multivibrator, audio oscillator and scope. (W3BFF) Using a BC-221, which was converted to solid-state per the article which appeared in *QST* for February, 1977, page 35 and which VU2CX wrote. My frequency standard, replacing that of WWV, was the "Time Machine" which will appear in a forthcoming issue of *QST*. My procedure was to use the BC-221 to zero beat against W1AW and use a frequency counter to measure the BC-221 frequency. Remembering that the fundamental range of the BC-221 is from 2,000 to 4,000 kHz, which means that if I zero beat W1AW on 40 meters, the BC-221 is actually on 80 meters and I must multiply by two to get the 40-meter frequency. The same idea occurs on 20 meters. I installed a special vernier capacitor to enable exact zero-beat inside the BC-221. This is simply a small piece of no. 12 wire arranged on a shaft, which brings the wire either closer or farther away from the VFO tuning capacitor. As the output of the BC-221 is rich in harmonics, it is necessary to run the output of it to a tuned circuit to separate the fundamental from the various harmonics. It is also necessary to have some means to adjust the output amplitude of the BC-221 so that W1AW and the BC-221 present equal amplitude. The BC-221 sees a resistance pot inside the matching box, which accomplishes this purpose. (W4RHZ) My frequency counter is from *QST* for October, 1970, by W1EO/7. I constructed it in 1971 and have had excellent results. I switch the counter to the "signal mode" and read the frequency (incoming) directly. My receiver is a Collins 75S3. (WB6LCI) I used my SPR-4 receiver with a frequency counter on the first local oscillator. I calibrated it with WWV before the test. I got the zerobeat on an oscilloscope. The counter had an external TXCØ, which I divided down to 50 kHz to beat with the final i-f of the SPR-4. (W7ANF) The TS-820 with digital readout sure is a big help getting into the "ballpark." The rest of the gear is used to sort out the "players." Homebrew secondary standard with 4-MHz oscillator in proportional oven dividing to 10 kHz, audio oscillator, counter, scope and 75A4 receiver. (W8OK)

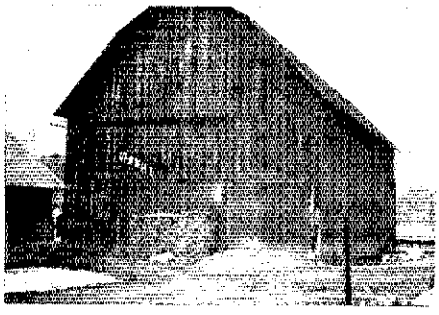
QRGee

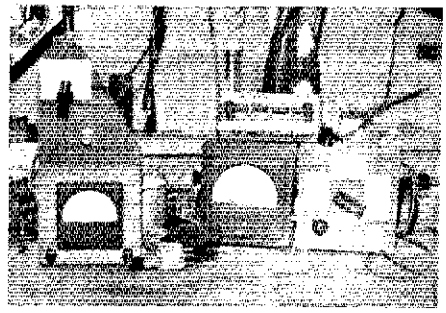
Hey, let's cut back to the five dots that precede the long dashes. I'm an old man and can't wait through 20 dots!!!!! (W6RQ) The FMT is the shortest 30 minutes of the year. I hope the test stays on for a long, long time to come. (Ireland) Bands very poor, but had fun anyway, using my LM 14 and a 10-kHz oscillator. (K6HI) Equipment used was a Collins R388 receiver and homebrew counter with a 25-foot longwire antenna, strung through the kitchen. Moving to a new home during the winter is not the best way to take care of antennas. (K9WMP) First try ever, not as easy as it sounds . . . 14-MHz reception was via scatter only! (WA2DBD) Much QRM again here too. S-meter only reading S4 on peaks. If signal was stronger, I believe better readings would result. (W9AG) There were no 20-meter signals. Forty was fair on the early run but very weak on the later run. Noise wiped out the weak 80-meter signal at 6:30, but fairly good on the 9:30 run. QRM was terrific with a broadcast station adding to the confusion. The usual jammers were very much in evidence, doing their level best to louse up the tests. However, we OOs are supposed to be able to circumvent all situations such as this. Someday, I'm going to fly my equipment back to Newington and set up close enuf to the station to get six good signals. Then maybe I'll get back on the Honor Roll again. (W6CBX) Equipment here is a Yaesu FTDx 401, a Hufco 25-MHz counter (counting the VFO of the receiver), and an oscilloscope monitoring the audio output. This night was very nice to measure, since it was very free of people keying their transmitters. (VE6BAF) How about an FMT earlier in the day, so we West Coasters could hear you on 20 meters? (WB6RQE) Was just looking over some of my early readings and found that I have been doing this (FMT) for over 10 years. It's still one of the best competitions, although the QRM was fierce. (W8DPW) Odd. Twenty-meter signal considerably stronger in the late run than in the early run, although general band conditions sounded much poorer during the late run. You crafty folks are tweaking up the antennas again, aren't you? (W7DQS) I just read it right off the receiver dial. After all, isn't this supposed to be a test of our "on-the-air" rig, or is it a contest between this person's and that person's lab equipment? (KØMKD) I am sure glad that we don't have to rely on one band to take measurements from. The ones that are used are presenting a big challenge. (WAØEBZ)

Feedback

The Sept. listing for K5EVK should read 1.9 ppm *not* 23.2 ppm. QST

Strays





George Hudson, W2BHZ, of Pine City, NY, recently retired to a 100-acre farm where he has built his ham-"castle" in a 12- X 16-foot room under his call letters. Heated by a wood-burning stove, the barn is where he's homebrewed his camper, his jeep-mounted snow plow and his rig. Note the wooden cases. Wood is cheap and readily available, and George prefers it to metal. If shielding is necessary, he just lines the enclosure with aluminum foil held in place with Duco cement. George says, "Old *QST* designs never die," but his 8-tube receiver, made from a design in *QST* for August, 1946, is relegated to his library shelf in the attic, where he also has neatly cataloged 35 years of *QST, Handbooks* and other radio literature. All this keeps him "so busy that I wonder how I ever managed to work."

1976 VE/W Contest Results

Some new rule changes — and more to come — spark new interest in an old favorite activity.

By Court Broad,* VE2LZ

Top Ten Scores

CANADA		*U.S.A.*	
CW		*CW*	
*VE7CC	210,364	*W5LUJ	143,640
VE5DX	178,752	W4YWX	117,760
VE3LUE	178,180	AA3ATX	81,760
VE7AV	80,800	K4IAF	81,760
VE3IXE	74,200	W9SZR/3	78,520
PHONE		*PHONE*	
*VE5DX	141,750	*W4YWX	112,560
VE3PET	132,660	W6HX	72,480
VE5UA	106,518	WA6EPQ	67,760
VE3IXE	41,168	WA4KKP	50,820
VE2BP	29,054	W7AYY	31,080

*Plaque winners

The Montreal Amateur Radio Club, Inc. is pleased to announce the results of the 1976 VE/W Contest, held September 18-19, 1976. Evidenced by the statistics developed from the contest, the W/K participants outnumbered their VE/VO counterparts. In checking the logs received, it was clear that many operators who took part in the contest did not submit their results. It is hoped that this situation can be reversed for the 1977 contest, to be held September 17-18.

Many participants provided positive input to the rule changes, which can only increase activity in future contests. As a result, there will be some rule changes for the next contest, which will be published in *QST* well in advance of the actual event.

Congratulations to W4YWX on winning the phone section for the second successive year. Paul always puts forth his maximum effort and provides many VEs with contest points from the Georgia section.

Again this year the Canadian cw honors went to the West Coast. VE7CC, the runner-up last year, was this year's champion. W5LUJ, always a great competitor, is the plaque winner for the W section of the cw contest. VE5DX, another contest competitor, who in the previous VE/W Contest took top slot in the Saskatchewan phone section, is this year's phone plaque winner.

Congratulations to all who participated. The MARC contest committee looks forward to an even better contest in 1977.

Soapbox

Maybe we could petition the DOC to get 10 and 15 open next year! (VE4VV) Had to fight S9 noise level all weekend. By next year hope the power company will have it fixed. (VE5DX) My first contest. Working with an all-indoor antenna system sure adds a challenge. (WA7YAF/VE6) Highlight of contest was a low-level pass by an F5 Fighter, which caused QRM about 140 dB over S9! (VE1AWV) More participation by U.S. is required cuz it seemed like more VEs than Ws were in action during the last hours of the contest. (VE3ATD) I enjoy the contest every year and the work your group puts into it is certainly appreciated. (VE3EEW) New 18AVT arrived on Friday, but too wet to erect it. Just like the Argos Football Team, wait till next year. Hi! (VE3EZU) VE stations very hard to find. I think a few were siphoned off by the big signals in the W Advanced subband, especially on 20 ssb. (WB6MDF) VEs should turn their beams south once in a while on 20. Frustrating for W6s to hear East Coast coming back to unreadable VE6s and VE7s. (AA6MQS) Look forward to this contest each year. Unfortunately, conditions were really crummy this year. 15 meters never opened and I never heard a VE1 on 40 or 80. Oh well, maybe next year! (KØGJD/6) Worked VE5DX on 1.8 thru 14 MHz. (W9UDK) Your system of scoring makes the contest potentially interesting. Not much activity this time due to bad condx. (AA8ZAV) Conditions poor, sigs weak, operators good. (W8DWP) My third VE/W competition and the best from here. Perhaps 10 and 15 meters will be more cooperative next year and help toward increased activity. (W5SOD) Thanks for a great event. Enjoyed it much more than last year. Biggest thrill was working VE1ATJ. Biggest embarrassment was in checking to find a counting error in my score! (W7ZMD) Enjoyed contest as usual. Wish there was more activity so I could operate the entire time. Like the separate cw and phone periods of the contest. (W4YWX) I enjoy this contest more than any other. (W4BEY) Hope my five-watt peanut whistle didn't cause too much QRM for those kW fellers! I have never used over five watts in the past 46 years of hamming. (W4ZRJ) Have enjoyed contest over the years as WA2BEX and now as a K4. (K4IAF) First effort in 11 years on phone. Even my good VE, cw buddies said, "What's that call again?" Spent all summer getting four-element wide-spaced Yagis built and erected for 10 and 15 meters, then never heard a signal on either band! (AA3ATX) Just put up the antenna the day before the contest. Conditions seemed poor on 14 MHz and missed several multipliers on that band. Hope to have better antenna arrangements for next year's contest. (W9HE) Congrats on really getting out the VE4s and VE5s. Also heard 2 (two!) VE8s. (AB9NME) How come VE signals don't come to New Mexico?? I fished 20 cw dry by making 28 contacts! (AB5KPN) Five stations wanted to know where all the New Hampshire stations were. (W1CHA) All of the

*Contest Chairman, Montreal Amateur Radio Club, Inc.

contacts for this contest were made while mobile within the city of Baltimore – Washington International Airport. (W3GCQ/3) Didn't do as well as last year due to conditions. See you again in '77. (W4KFB) Where was Newfoundland? (WA1CUN) Eastern VE land totally missing at this QTH. Guess it was condx. (W1VH) This was my first VE/W Contest. It was enjoyable, but somewhat disappointed at the small number of stations worked. 75 meters was too noisy, 40 had too much broadcast QRM, and 20 was not in the best of propagation conditions. Did not try 10 or 15 meters. Anyway, I am awaiting the next contest. (W4MVM) This contest has great potential. Wish we had more participation. Band conditions have been better on the higher bands. (W4DZZ) The contest was a lot of fun. Only sections not heard were Yukon and Labrador. (W2PQZ) Thank you again for a really fine contest activity. How about considering encouraging QRP with an additional incentive (multipliers)? (W2EY) Thanks for the suggestion. (VE2LZ)

Scores, 1976 VE/W Contest

The station listed first in each section is the certificate winner for that section, provided there are at least 3 entries in that section and mode. Listings consist of call sign, score, number of contacts and number of multipliers.

VE — CW

Nova Scotia

VE1AJP 10,914-107- 51

Quebec

VE2AH 51,152-278- 92
VE2HY 29,016-186- 78
VE2GA 23,182-173- 67
VE2WA 19,040-136- 70
VE2EKB 950- 25- 19

Ontario

VE3LUE 178,180-690-151
VE3IXE 74,200-350-106
VE3EJK 58,504-244-104
VE3ATD 40,076-233- 86
VE3GVH 33,936-202- 84
VE3EEW 27,600-184- 75
VE3IR 22,908-166- 69
VE3CBC 15,600-130- 60
VE3EZU 3360- 48- 35
VE3GOP(multiop) 78,302-329-119
VE3ERO(multiop) 36,040-212- 85

Manitoba

VE4UM 69,120-320-108
VE4ZA 2500- 50- 25

Saskatchewan

VE5DX 178,752-608-147
VE5XC 14,820-130- 57
VE5SC 9856-112- 44

Alberta

VE6OY 36,852-222- 83
VE6ATT 13,688-116- 59

British Columbia

VE7CC 210,364-683-154
VE7AV 80,800-404-100
VE7CE 43,262-223- 97
VE7CMF 9180- 85- 54

U.S.A. — CW

1

Connecticut

W1VH 11,040- 46- 12
WA1CUN 6120- 34- 9

Western Massachusetts

W1UUK 24,000- 75- 16

2

Eastern New York

W2PQZ 27,300- 65- 21
W2EY 22,680- 63- 18

Northern New Jersey

AG2HTR 27,200- 68- 20
W2HAZ 800- 11- 4

Southern New Jersey

W2LYL 56,640-118- 24

3

Eastern Pennsylvania

AA3ATX 81,760-146- 28
WB3BKD 6600- 30- 11

Maryland-D.C.

W9SZP/3 78,520-151- 26
W3ERG 28,440- 79- 18

Western Pennsylvania

AC3ARK 26,600- 70- 19
WA3JGY 11,440- 44- 13

4

Alabama

W4DZZ 15,900- 53- 15
K4ZGB 15,680- 56- 14
W4MVM 3780- 27- 7

Georgia

W4YWX 117,760-184- 32
W4BTZ 60,840-117- 26
W4BEY 26,400- 66- 20
AD4BAI 17,400- 58- 15

North Carolina

WB4SXX 20,160- 63- 16
WA4LWO 13,720- 49- 14

Northern Florida

AA4UFW 16,800- 60- 14

Southern Florida

WB4OGW 75,400-145- 26
VE3AMP/W4 3220- 23- 7

Tennessee

K4JEZ 27,000- 75- 18
AA4MKU 23,400- 78- 15
K4PR 6240- 26- 12

Virginia

K4IAF 81,760-146- 28
W4ZRJ 720- 12- 3

5

Arkansas

W5CIJ 3360- 21- 8

Louisiana

W5WG 43,560- 99- 22
AC5OB 23,120- 68- 17

New Mexico

AB5KPN 6660- 37- 9

Northern Texas

W5LUU 143,640-266- 27
WA5EHA 22,220-101- 11
W5SOD 18,560- 58- 16

6

East Bay

K6ZM 42,180-111- 19
WB6HDH 5120- 32- 8

Los Angeles

W6DGH 5940- 33- 9
WA6VVR 3780- 21- 9

Orange

K#GJD/6 62,480-142- 22

Santa Barbara

AD6QPH 58,960-134- 22
W6PRP 34,020- 81- 21
W6OUL 32,400- 81- 20
AC6GEB 24,000- 60- 20
WB6FTM 7380- 41- 9

Santa Clara Valley

K6MO 8580- 33- 13

San Diego

AB6DPV 34,580- 91- 19

Sacramento Valley

K6LZT/6 20- 1- 1

Hawaii

KH6IJ 14,300- 55- 13

Arizona

W7ZMD 53,760-128- 21
W7AYY 48,840-111- 22
W7YS 5760- 32- 9

Idaho

K7RLS 9360- 36- 13

Nevada

AC7BKK 6480- 36- 9

Washington

W7KWF 7200- 30- 7

8

Michigan

W8KRR 57,240-106- 27
AA8ZAV 12,000- 40- 15

Ohio

W8DWP 27,720- 66- 21
AC8GQC 25,920- 81- 16

9

Illinois

W9UDK 75,400-130- 29
WA9LUD 38,720- 88- 22
W9NU 12,040- 43- 14

Indiana

W9JOO 53,040-102- 26

Wisconsin

W9HE 34,800- 87- 20
AB9NME 26,880- 64- 21

Ø

Iowa

WØPRY 48,960-102- 24

Kansa

WØLRB 24,820- 73- 17
WBØQFU/Ø 14,840- 53- 14

Minnesota

WAØKDI 36,120- 86- 21

Missouri

WØZLN(multiop) 51,000-102- 25

Nebraska

WØAP 63,360-132- 24
WØQNP 14,840- 53- 14

VE — PHONE

Prince Edward Island

VE1CFB(multiop) 18,550-175- 53

Quebec

VE2BP 29,054-199- 73
VE2GA 16,170-147- 55
VE2EHS 11,760-120- 49
VE2WA 532- 19- 14

Ontario

VE3PET 132,660-495-134
VE3IXE 41,168-248- 83
VE3DAC 24,708-174- 71
VE3CBC 11,800-118- 50
VE3DDR 1828- 58- 33
VE3GD 1450- 29- 25
VE3ERO(multiop) 13,920-116- 60

Manitoba

VE4MR 17,930-163- 55
VE4ZA 60- 6- 5

Saskatchewan

VE5DX 141,750-525-135
VE5UA 106,518-433-123

Alberta

VE6ACT 18,768-138- 68
WA7YAF/VE6 2964- 57- 26

U.S.A. — Phone

1

Connecticut

WA1CUN 6660- 37- 9

New Hampshire

W1CHA 1800- 15- 6

Western Massachusetts

W1UUK 11,760- 49- 12

3

Eastern Pennsylvania

AA3ATX 4320- 27- 8

Maryland-D.C.

W3ERG 18,240- 57- 16
W3GCQ/3 6400- 40- 8

Western Pennsylvania

WA3JGY 6120- 34- 9

4

Alabama

W4DZZ 11,280- 47- 12
W4MVM 1600- 16- 5

Georgia

W4YWX 112,560-201- 28

Kentucky

W4KFB 5200- 26- 10

Northern Florida

AA4UFW 4000- 25- 8

Tennessee

K4YLH 22,800- 57- 20
AA4MKU 1920- 28- 7
K4JEZ 2380- 17- 7
AB4WHE 2040- 17- 6

Virginia

WA4KKP 50,820-121- 21
WA4BUU 4480- 28- 8
W4KMS 3120- 26- 6
K4IAF 1120- 14- 4

5

Mississippi

K5SVC 22,320- 93- 12

Northern Texas

WA5EHA 21,400-107- 10

Oklahoma

K5DEL 3520- 22- 5

Southern Texas

K5OOU 25,920- 72- 18

6

Los Angeles

WA6EPQ 67,760-154- 22
WA6VVR 1500- 13- 5

Santa Barbara

W6HX 72,480-151- 24
AC6GEB 2400- 15- 8
AD6QPH 1200- 10- 6

Santa Clara Valley

AA6MQS 5280- 24- 11
WB6MDF 4500- 15- 7

Sacramento Valley

K6LZT/6 20- 1- 1

7

Arizona

W7AYY 31,080- 74- 21

Washington

K7GGD 660- 11- 3

8

Michigan

W8CNL 23,400- 65- 18
W8QVU 19,800- 55- 18

Ohio

AD8JPF 2520- 14- 9

Ø

Colorado

WBØNYY 25,600- 64- 20

Missouri

WØZLN 22,780- 67- 17

50 Years Ago

June, 1927

□ The Editor assures members that our band in the 150- to 200-meter region will not be taken from us to expand the broadcast band.

□ Bell Telephone has demonstrated its television system, using a scanning disk in front of a photo-electric cell for the "camera," but a multi-segmented plate in a large neon tube for the receiver presentation.

□ This seems a special 5-meter issue. Don Mix of Burgess and Frank Jones, 6AJF, join Technical Editor Kruse in a symposium on receiver design. A series, rather than shunt, tuning circuit seems the current "hot" idea.

□ Ed Glaser, 2BRB, contributes info on a 5-meter transmitter, beginning with a 40-meter crystal stage followed by three doublers plus a recommended 852 output tube. W. H. Hoffman, also of Burgess, uses an 852 but self-excited.

□ 8ZZ's cover cartoon shows the devastating effects of summer QRN, which alone could be a good reason for going down to 5 meters. Besides, there's a CQ party coming up on that band. But if you're stuck on lower frequencies, S. Y. White has an audio amplifier for your receiver with only 4 volts on the tube plate, so that it acts as a limiter of strong signals and static crashes.

□ 6AM has a novel idea for measuring power consumption of your rig: with only a 100-watt lamp connected in your house, count the revolutions of the wattmeter disk, then compute everything else proportionately — inversely, of course.

□ Through some fine work on the part of General Counsel Segal, the League has established the principle in a Portland, Oregon, case that local interference ordinances cannot limit transmitting stations, which are federally licensed.

□ Featured in the station description sections this month is the installation at 9APY, now W9WR.

□ Only 56 amateurs around the world have so far qualified for the new WAC certificate.

25 Years Ago

June, 1952

□ Goodwin L. Dosland, W0TSN, has been elected the new president of ARRL, succeeding George W. Bailey, W2KH. Among other actions, the League's Board continued its stiff opposition to FCC's proposal to abandon the Advanced Class license.

□ FCC regulatory output is heavy and wide-ranging. New proposals include opening a portion of 7 Mc. to voice, and allowing Novices on a segment of that band (the Board seconded both motions). The Commission additionally says that instead of requiring the new Extra Class license for phone use of 75 and 20 meters, it may open those voice bands to *all* amateurs (!).

□ W6OWP gets near-crystal stability with his 2.5-Mc. v.f.o. beating against a 5-Mc. xtal signal for 80-meter output, and also achieves excellent keying and break-in.

□ The "gold-plated" test oscillator in war surplus is a beauty in itself, but more practically can be used for an excellent 420-Mc. converter.

□ Finally! — the new 21-Mc. band becomes ours, but with only c.w. privileges to start. ARRL has recommended that 21,250-21,450 be opened to voice.

□ W1PKW gets multiple directivity with a stationary beam of vertical elements by switching the various director/reflector elements from the shack.

□ The TVI troubles of the popular Viking I transmitter are not too difficult to solve, W1DBM shows in detail, by careful use of standard techniques.

□ Most teleprinter enthusiasts get frequency shift by keying a small capacitor across the crystal, but W2PAT suggests another method — changing the load impedance the crystal faces.

□ Gil's cover drawing shows the joys of Field Day activity, soon to be with us. — *W1RW*

Silent Keys

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

W1EQB, Francis L. McGrath, Bethel, VA
K1GVF, Ernest S. Reynolds, Harwichport, MA
W1IEI, Lincoln B. Smith, Holyoke, MA
W1IJ, Owen Shepherd, Jr., Woodsville, NH
W1MFR, Earl R. Holmes, Colchester, CT
WA1MKP, Max Blumer, Woods Hole, MA
W1NKI, Harry F. Hawkins, Manchester, NH
K1QOK, Chester L. Pepper, Melrose, MA
W1TYC, Benjamin H. Mercer, Lawrence, MA
Ex-W1UU, Robert S. Clark, Wellesley Hills, MA
W1WOR, Harry F. Vickers, Princeton, ME
W2ALH, Russell H. Tighe, Bergen, NJ
Ex-W2AYL, Wallace Putkowski, Clifton, NJ
W2BNU, John C. Stass, Tom's River, NJ
Ex-W2CNO, Melvin J. Stagg, Garfield, NJ
WB2DTX, Charles A. Roller, Forrest Hills, NY
WA2HUI, Robert S. Shorey, Rochester, NY
WB2NAA, Howard Wessenburg, Moorestown, NJ
K2RUM, William B. Gombert, North Tonawanda, NY
W2SJY, Thomas C. Abbott, Chateaugay, NY
W2TYB, George J. Drab, Amsterdam, NY
W2UM, Paul Todd, Somerville, NJ
W2YPZ, Charles E. Travers, Ocean Grove, NJ
WB3ANR, Edward A. Mahan, Drexel Hill, PA
Ex-W3AOO, Robert L. Hensell, Jr., Piney Point, MD
WA3EHN/WA1PMX, Susan L. Emely, Philadelphia, PA
W3EOS, Frank D. Reese, Felton, DE
W3GEW, Sidney Weiner, Philadelphia, PA
WA3LBU, Stephen O. Lee, Baltimore, MD
W4AV, Harold S. Lewis, Cape Coral, FL
W4BAD, George "Doc" Tamer, Norton, VA
K4CDM, Gordon B. English, Richmond, VA
K4EIW, Richard W. Daniels, Pensacola, FL
K4FCC, William W. Oliver, Englewood, FL
W4H2P, Nino J. Ravarino, Memphis, TN
K4KVG, James T. MacGeorge, DeLand, FL
W4LT, Frank Cobb, Panama City, FL
W4NOW, Blanche J. Strode, Winchester, KY
K4QB, Herbert W. Curtis, Lehigh Acres, FL
WB4RAG, Alfred S. Wyllie, Danville, VA
W4RNW, John C. Kiger, Pfafftown, NC
W4WVH, Woodrow J. Shaw, Winnsboro, SC
W5CFQ, John L. Hug, Charleston, AR
WB5HUM, William B. Whitacre, Hot Springs, AR
K5LTE, Homer W. Driesslein, San Antonio, TX
WA5LYA, Immon O. Walker, Lake Kaiwa, TX
WB5MNL, Daryle D. LeBlanc, Pearland, TX
Ex-KH6CM, Joseph P. Silva, Honolulu, HI
KH6DY, Wilfred Y.K. Chock, Kaneohe, HI
WB6EUR, Harold M. Okano, Los Angeles, CA
W6EWX/K6AAK, William C. Shelton, Oakhurst, CA
W6HCE, August L. Bernes, Point Richmond, CA
W6IBI, Russell B. Burnett, Los Angeles, CA
W6IT, Willaim D. Wineteer, San Diego, CA
WB6JAI, Robert D. Crichton, Mentone, CA
WB6NPO, Edward T. Maloney, Chula Vista, CA
WB6PCE, Millard F. "Red" Smith, Bakersfield, CA
W6QZ, Joseph W. Lowry, Berkeley, CA
WB6RER, Andrew V. Devine, Newport Beach, CA
WB7AJX, Donovan M. Henifin, Olimpia, WA
W7HJG, Harrison H. Herron, Othello, WA
K7NYM, William J. Alley, Vancouver, WA
W7OHT, Charles E. "Gene" Harwood, Anaconda, MT
W7QPR, Mark G. Bedell, Jr., Seattle, WA
Ex-W7SZB, Linden E. Rasmussen, Harlowton, MT
WA7WOY, Arthur V. Jensen, Marysville, WA
WB8CGQ, Orville S. Litzenberg, Findlay, OH
W8WYN, Richard J. Mitchell, Warren, OH
WA9AFP, Ellsworth L. Tappa, Elcho, WI
K9DKA, Gerald S. Clackum, Richmond, IN
W9DUZ, Irvin C. Chapel, Warshaw, IN
W9DZZ, Alexander Smith, Greenfield, WI
W9EWH, Franklin F. Wingard, Rock Island, IL
W9ILW, Thomas Snedden, Glen Ellyn, IL
W9IUX, Charles B. Palmer, Aurora, IL
W9MD, William L. Holst, Chicago, IL
WB9OJB, Robert J. Zehring, Belleville, IL
Ex-W9RO, Robert J. Woolsey, Glen Ellyn, IL
WA9WLM, George M. Weir, Canton, IL
WB9YFF, Edward H. Baumer, LaPorte, IN
WA0AKT, James T. Ronan, Marceline, MO
WB0AZJ, Roger B. Lyons, Port Angeles, WA
WB0BLN, Harry Berkowitz, Minneapolis, MN
W0DB, Francis J. Beck, Milbank, SD
W0HDE, Samuel H. Flyte, Hot Springs, SD
WA0KCB, Joseph Trombino, Marion, IA
K0KZF, Richard E. Bardsley, Sun City, AZ
W0LHM, Schuyler M. Burris, Pleasant Hill, MO
W0NIX, Wayne L. Soth, Alliance, NE
W0NNK, Jasper W. Standley, Raytown, MO
W0PDN, Clifford G. Proetz, St. Paul, MN
K0TH, Clayton G. "Gus" Koth, Lemars, IA
VE3CTD, Harold A. Benson, Midland, ON
VE3YG, Ronald G. Innes, Barrie, ON
VE7CGJ, G. L. Johnsen, Vancouver, BC
VK3GS, G. S. C. Semmens, Victoria, Australia
F8SK, Roger Dort, Pouzac, France
OE1SFA, Dr. Friedrich Stoffel, Vienna, Austria

Public Service

Conducted By Robert J. Halprin,* K1XA

When All Else Fails

As this is being written, hams are wrapping up emergency operations in several different areas of the country. Devastating floods swept through Kentucky, West Virginia and Virginia. In Michigan and Alabama, nature's physical graffiti came in the form of murderous tornadoes. Complete reports aren't in yet, but *briefly* this is what happened during this hectic first week in April.

Damage estimates are in the millions for the Appalachian region which was ravaged by floods. Normal communications were completely disrupted. Kentucky's emergency nets were active as the state civil-defense office was relying on amateurs for practically all their communications. In West Virginia, an emergency net operated on 3990 kHz by request of the state government. Net control was located at the "Governor's Emergency Communications Center" at the state capitol. Over 30 amateurs operated the station around-the-clock, supplying law enforcement, relief agencies and the news media with the only means of communications into the disaster area. Southwestern Virginia was similarly affected. The Virginia Fone and SSB Nets combined forces, going into emergency session when a station in Grundee, VA, operating on battery power, broke into report the chaos around him.

With hams supplying the only reliable communications with the disaster zone, they were able to arrange for the shipment of emergency medical and food supplies into the area. Low band and 2-meter gear was also airlifted into the areas, many times accompanied by amateurs themselves, who came to assist or relieve those hardy souls operating continuously in the affected areas on emergency power. Of course, there was the other flood – the flood of health and welfare messages into the region. Many thousands were handled but there wasn't enough time to handle all of them, with more vital communications taking priority. Hundreds of hams participated in the emergency, either actively or monitoring emergency frequencies to be there if needed.

Michigan's Calhoun and Kalamazoo Counties were clobbered by a tornado and almost instantaneously, amateurs affiliated with SKYWARN, ARES and RACES were providing communications. The center of operations was the mayor's office in Augusta, Michigan, which was totally without power until hams used their own emergency generators to get it going. Using 2-meter gear, hams kept municipal and state officials and relief agencies in constant contact with each other and accompanied police on patrol. Local repeaters were given a good workout. During this time, government officials were reluctant even to leave city hall unless accompanied by a ham equipped with a hand-held transceiver. The officials must have been impressed. When the governor of Michigan came to the area to see the damage for himself, local authorities asked the hams to supply backup communications for his visit!

In Alabama, tornadoes pillaged sections of the state. The Jefferson County ARES manned the Red Cross headquarters station in Birmingham continuously until the situation finally stabilized. The amateurs in Birmingham and in the field provided status reports, damage surveys and provided a link between the Red Cross headquarters and various units around the state. It is expected at this writing that the Alabama authorities will ask for a Presidential disaster declaration.

□ It is important that someone in *your* group be assigned the task of contacting ARRL hq. (Newsline – 203-667-0138), to briefly report your activities in an emergency situation. Then, when the smoke clears, a written report should be filed with Hq., for *QST* coverage and Public Service Awards.

PUBLIC SERVICE DIARY

□ Colorado Springs, CO – September 19-20 (1976). A hiker who fell to a ledge and was seriously injured near Pikes Peak was rescued by WBØKDN, W8LWM/Ø and other members of the El Paso and Arapahoe Counties' search and rescue teams. Throughout the operation, local hams provided communications between and among the public-service agencies. (WØPT)

□ Georgia – February 12-17. The Georgia ARES Net, 3975 kHz, coordinated a successful emergency search for a man who was en route from Michigan to Florida. (K4YRL, SEC GA)

□ Peacock Point, ON – February 20. Isolated without telephone service due to a snowstorm, VE3JP broke into the ONTARS Net, 3755 kHz, when he suffered a heart attack. VE3CAX (a doctor) and VE3GVF answered and VE3JP was rescued by ambulance. (VE3FHQ, EC Hamilton)

□ Altoona, PA – March 1-3. Over 100 amateurs and three Western Pennsylvania repeaters were used to locate two runaway girls. The operation was headed by K3KMO and K3DEJ. (W3TEF)

□ Anaheim, CA – March 4-7. When a local hotel was completely destroyed by fire, the Orange Co. ARES provided communications for the Red Cross relief efforts for the more than 60 homeless families. (WA6VMI, EC Orange Co.)

□ Cleveland, Ohio – March 6. K8AJG, vice president of the Cuyahoga A.R.S., called police via 2-meter autopatch when two individuals tried to rob the home of a blind amateur. Within minutes, the two men were apprehended. (WB8PJO)

□ Colorado Springs, CO – March 10. Members of Servo. Comm. established radio communications for authorities during blizzard rescue operations in the area. (WØLM)

□ Northwest Kansas – March 11. The Trojan ARC mobilized to assist the National Guard and other authorities during emergency conditions in the wake of a blizzard. (KØRXT, EC Zone 15A)

□ Southern Alberta – March 28. When a severe snowstorm knocked out power, a net was set up on 3760 kHz to handle emergency traffic. (VE6AVV, EC Nanton)

□ *Repeater Log.* According to reports received to date, repeaters were used to report 102 automobile accidents and related occurrences, nine disturbances, three fires, three burglaries, one tornado and one search. Repeaters involved were WR1AAC, WR2AHU, WR3AAB, WR5s ABA ABY ADP AEU AJG, WR7s ACA AEL, WR9ABY, WRØADU.

□ SEC reports received in March totaled only 28, as opposed to 37 this time last year. Reported ARES members totaled 11,135, as compared to 11,576 in 1976. Sections reporting were Ariz, Ark, Colo, Conn, Del, EMass, Ga, Ind, Kans, Me, Mich, NC, NFla, NNJ, NTex, Ohio, Okla, Ont, Org, Oreg, SDgo, Sask, SFla, SNJ, Utah, Va, Wash, WMass.

NATIONAL TRAFFIC SYSTEM

PAN manager K7NHL reports that at times he feels like he's an admiral in the Navy! To wit, here are some of those new calls in the traffic world: NØIN (WAØMLE), N8XX (W8CHT), N7FB (WB6WQH), N6DE (WB6DJP), N6KA (WB6PKA), N5XA (W5TXA), N4RF (W4QDY), N1EE (WB2OYV), KØCW (KØAEM), W9LF (WA9EED), K8JQ (WA8POS), K6QE (K6JZR), K5RG (W5UGE), W4YE (W4YZC), W3RJ (K3OIO), K2AV (W2HVA), W2CS (WA2PJL), W2JJ (K2KIR), K2NY (K2KTK), W2TV (WA2RYD), K1GN (WA1HSN), K1GQ (K2SIL), W1HL (W1EIH), K1XA (WA1WEM). There's more out there; let us know *who's who* on your net. WA1FCM had to resign as 1RN-D assistant manager due to other commitments and WA1VET has replaced him. The Fourth Region nets need West Indies and Canal Zone representation.

March Reports

1	2	3	4	5	6	7
EAN	31	1797	57.9	1.433	98.3	
EAN	62	638	10.3	.541	86.0	
CAN	31	1242	40.0	1.057	100.0	
CAN	61	225	3.6	.184	94.0	
PAN	31	1144	36.9	1.045	98.9	
PAN	62	123	1.9	.161	84.0	
1RN						96.7
1RN	31	98	3.1	.288	84.7	87.1
2RN	92	566	6.1	.459	95.8	96.7
2RN	49	201	4.1	.392	64.5	82.2
3RN						100.0
3RN	31	95	3.0	.519	100.0	95.2

*Asst. Communications Mgr., ARRL

4RN	62	663	10.7	.457	73.5	100.0
4RN	62	477	7.7	.341	66.5	95.2
RN5						100.0
RN5	31	227	7.3	.319	86.6	98.3
RN6	62	591	9.5	.438	100.0	100.0
RN6	31	188	6.0	.227	84.0	90.3
RN7	62	447	7.2	.510	91.9	96.7
RN7	62	88	1.4	.138	51.6	83.8
8RN	57	338	5.9	.330	82.0	100.0
8RN	30	99	3.3	.377	78.4	96.8
9RN	58	505	8.7	.458	78.6	100.0
9RN	31	120	3.9	.315	89.5	95.1
TEN	61	519	8.5	.377	83.3	100.0
TEN						88.7
ECN	58	340	6.0	.462	91.4	96.7
TWN	62	568	9.1	.436	98.4	100.0
TWN	22	49	2.2	.107	60.0	90.3
CTN	31	271	8.7	.380	100.0	
TCC Eastern	116[1]	807				
TCC Central	90[1]	715				
TCC Pacific	120[1]	855				
Sections[2]	5053	19320	3.8			
Summary	6316	33316	5.2			
Record	5565	34089	18.1			

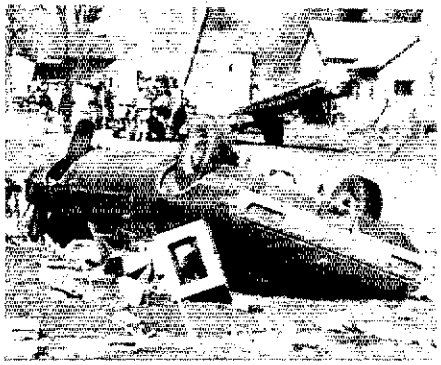
[1] TCC functions not counted as net sessions.
[2] Section and local nets reporting (132): BCEN (BC), MTN (MB), APN (Mar/NFld), WQV/UHF (PQ), SATN (SK), AENB AEND AENJ AENM AENW SENS (AL), ATEN HARC (AZ), AMBN APN ARN OZK (AR), NCN NEN SCN (CA), CWN (CO, WY), CN CPN (CT), DTN (DE), FAST FMTN FPTN GN QFNS SPARC TPTN (FL), CVEN GARES GSSBN (GA), IMN MTN (ID, MT), ILN ISN (IL), I75MN TLCN (IA), QKS QKS-SS (KS), KNTN KRN KTN KYN MKPN (KY), LAN LRN LSN LTN (LA), MSSN PTN SGN (ME), MDCTN MDD (MDC), EMRI EMRIPN EM2MN NENN WMN WMPN (MA), HEN KCAN MACS MI6m MNN QMN WSBN (MI), MSN MSPN MSSN MWX PAW (MN), MTN (MS), MON MOSSBN MSN PHD (MO), NJN NJPN (NJ), SWN (NM), NLI NLIPN NLS NYS WDN (NY), NCSSBN SCSSBN THEN (NC, (SC), BN BNR ONN O6mN OSN OSSBN (OH), OAN OFON OLZ OPEN OTWN STN (OK), OSN WCN (OR, WA), WPTN (Pac), EPA PFN PTTN WPA (PA), ETTMN TN TNN TPN (TN), BEN BEN-UHF TEX TTN (TX), BUN UCN (UT), VFN VN VSBN VSN (VA), WSN (WA), WVN WVNN WVPN (WV), BEN BWN WIN WNN WSBN (WI).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVG.
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

March was the best month TCC-C has had in over a year! Ditto on TCC-P, with the lowest failure rate in many months — no failures due to conditions. TCC-E also had a fine month, minimal failures, much traffic and only one missing report, again thanks to the "fancy legwork" of Asst. Director VE3SB. Certificates: WA1FCM (TCC-E), WB9NOZ (TCC-C) and WØETT (TCC-P).

These two shots are a sample of the damage in the Augusta, Michigan, area. See "When All Else Fails." (*WA8ULG photo*)



74	WB4EKJ	K5ZSI	WA1ZAZ
WB5KGP	WB4OBZ	WB6JIK	WB2EMU
66	WB5NEZ	W6RNL	K3YHR
WA5RKU	WA5YEA	W7VSE	WA5IQU
64	WA6TVA	WBØLFY	WA5ZZA
WA3YJG	W7OCX	54	WB6UZX
W4OGG	WB8JGW	K8LGA	W7GHT
W5KLV	WB9ICH	WB8YDZ	WA7MEL
63	60	WBØTAQ	W8DIL
WA2BMI	WA4EPJ	53	KØCVD
62	W6RFF	WA4PSL	KØEVH
K1PAD	59	WB6PVH	WØFT
WB5NKD	WB4ARJ	52	WBØOFQ
WB5NUM	58	W4WNY	VE1ACU
61	K4BKX	WA7KQE	VE3DPO
WA1FCM	WB9QKH	WA9QCF	VE5WM
WA1TEH	WØRFF	VE7DKY	48
WA1VEI	56	50	WA1TBY
WB2CST	WA1MSK	WA2ZJP	WA3UYB
WA2ECO	W2MLC	WB4FDT	47
WB2LZN	WB4CAK	K5MAT	WA2DIW
W2MTA	WB4DBK	49	WA2YYM
WA3SXU	WA4FBI	W1RWG	WA3VBM
			K4YFC

	1	2	3	4	5
Eastern		120	97.5	2079	807
Central		93	96.8	1430	715
Pacific		124	96.8	1713	855
Summary		337	97.0	5213	2377

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (March): Eastern Area (W2FR, Dir.) — W1s NJM QYY, K1s EIR GN XA, WA1s FCM MSK, W2s CS FR GKZ, K2HI/VE2, WA2ICB, WB2ASD, WA3s SXU VBM, W4UQ, K4KNP, W8s LTA PMJ, K8KMQ, WB8ITT, VE1AAO, VE3s GOL SB. Central Area (W5GHP, Dir.) — W4RQS, WB4SKI, W5s GHP MI RB UJJ, K5RG, WA5s IQU ZZA, W9s CXY DND LF NXG, WB9s NOZ TWT, WØs AM HI QMY, KØs CVD CW, WAØTNM. Pacific Area (K5MAT, Dir.) — W5s KH RE, K5MAT, W6s BGF EOT MLF OA VZT, K6HW, W7s DZX GHT KZ, K7s IWD NHL QFG, N7FB, WØs ETT IW KLE LQ, KØs DRL TER, WBØs DJY QOT, VE7ZK.

Independent Nets (March)

1	2	3	4
Clearing House	31	323	605
Early Bird	31	102	297
Hit & Bounce	62	1104	456
Hit & Bounce Slow	16	49	56
IMRA	27	467	1121
Mike Farad		111	387
North American SSB	27	185	376
North American Traffic and Awards	31	87	1239
Washington Region PON	17	42	365
20 Meter ISSB	27	353	490
75 Meter ISSB	31	561	1337
7290 Traffic	46	341	2412

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll March 1977

This listing is available to amateurs whose public service performance during the month indicated qualifies for 40 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 10; (2) Checking into phone/RTTY nets, 1 point each, max. 10; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned liaison, 3 points each, max. 12; (6) Phone patches, 1 point each, max. 20; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly with a disaster area, 1 point each message; (9) Serving as net manager for entire month, 5 points. This listing is available to Novices and Technicians who achieve a total of 20 or more points.

WA6BFL	WA2ERT/1	VE1ZH	WA6LBO
VE5XC	K2HI/VE2	VE1AAO	W9NJP
46	WA2UYL	VE3GOL	WB9PIR
WA2AIV	WA2VEN/Ø	VE4IX	41
WB4OXT	W3IPX	VE7GY	W2CS
WB4SKI	K3KAJ	43	W6AUC
WB8NCD	K4EV	K3ORW	40
WA8RQQ	WB4GHU	WA3PRW	WB2YKG
WB8VLR	WB4QBB	WA4OEM	WA4EYW
45	WA4RDI	WA4PZD	W9LTU
WA1MJE	N4SS	W6JXK	WB9OZW
K1RAW	WB4TEK	WAØYVT	28
W8VPW	W5GHP	42	WA1VKB/N
WØOYH	WB5PVL	W1DMS	22
WBØQOT	WB6FTY	WA1YWK	WA1YUJ/N
44	WA8JPX	W4ANK	WB4DHC/N
W1BVR	WB8YVI	W4MEE	WA4PZK/T
WA1UWF	W9GGW	W5UJJ	WD8COS/N
WA1YUZ	W9NXG	WA5VBM	WB9YMF/N
	WØHXB		

Brass Pounders League March 1977

BPL Medallions (see December 1973 *QST*, p. 59) have been awarded to the following amateurs since last month's listings: WA4JDH W5JOV W5KLV K6OE VE1AAO VE1BDT.

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.

1	2	3	4	5	6
W3CUL	573	1211	1593	77	3454
WØWYX	58	1199	421	778	2456
WAØRWM	58	674	10	633	1375
W4MEE	4	544	497	18	1063
W3VR	280	286	370	20	956
KØZSQ	1	383		383	767
KØYFK		358	13	345	716
K4IWT	309	26	309	25	669
KØONK	4	477	139	12	642
W4RQS	2	283	338	4	627
WA3YJG	10	253	232	101	596
K4TH	23	263	177	115	578
K9CPM		308	31	219	558
WA4JDH	3	278	256	3	540
W7TZK	51	300	1	182	534
W7SQT		339	5	169	513
WB6EIG	9	248	245	3	505
WB4ARJ	1	233	267	1	502
W4ILE	131	117	236	18	502
KØYFK (Feb.)		457		457	914
WB8KWD (Feb.)	5	380	386	12	783
WA8MCR (Feb.)	2	282	242	9	535
KØYFK (Jan.)		369		369	738
KØYFK (Dec.)		419	1	418	838

More-than-one operator station

BPL for 100 or more originations-plus deliveries

WA3ATQ	208	WØFIR	121
K7VWA	183	WA4EYW	104
VE1ZH	143	K1BCS	101
W9IOH	141	W7DAN	233
WA9GBW	128	(Dec.)	
K5TM	161	W9YB	114
W1HEB	125	W1TKZ	105

1 — CALL
2 — ORIG.
3 — RECD.
4 — SENT
5 — DEL.
6 — TOTAL

Operating News

Conducted by George Hart,* W1NJM

Field Day Time

How many times has Field Day been the subject of this column? We just counted up the last 10 years' worth and find that it has been the lead of this column six times and has been at least one of the topics of the Public Service column five times. That's a lot of discussion.

So what else is there to say about it? Probably nothing, but a great deal that bears repeating. For example, someone just recently asserted knowledgeably and firmly that Field Day is *not* a contest. We beg to differ with him; it most certainly is one of the most avidly contested activities we have. Okay, then, it is not an emergency exercise. Wrong again; it's that too, and a very important one.

Well, if half the participants go out for the contest, and the other half go out for an emergency exercise, how about those who just want to get out in the field and have some relaxing fun exercising? Shucks, no reason why they can't do so. That's the greatest part of FD – it's anything you want it to be, or anything you want to make of it. Everyone can take part. Yes, everyone, whether you go out in the field, operate from your summer camp or retreat, operate from your home station, or *even if you're not a ham!* That's right, FD is the one ARRL-sponsored activity in which thousands of nonhams participate. They can assist in a great many ways – climbing trees for antennas, holding ropes during antenna mast erections, lugging equipment, cooking and serving food, servicing the generator, running miscellaneous errands, even doing certain kinds of logging chores. Some FDers take their wives (or husbands) and kids along, just for an outing, to spend a weekend out in the country.

Almost every year, someone comes up with something different. Field Days have been held in pastures, in swamps, in abandoned buildings, in old buses or trucks, in tents, trailers, campers. One group we remember rented a refrigerator truck trailer, kept nice and cool inside with the temperature over 90 outside. Just look at the annual FD writeup in *QST* (usually the November issue). A cow grazing on a coil of coax. Solar cells for natural power. OSCAR contacts. Balloon-supported antennas, with attendant, sometimes hilarious, difficulties. Rain, cold, heat, hail, snow, electrical and windstorms, mosquitoes, black flies ("no-see-ums"). Almost everybody that has been on FD more than once or twice has a story to tell and some (like the writer) can yarn for hours. Don't get us started.

So don't say that FD is not a this or not a that or only a something else. It's everything! It's anything you want to make it. The contesters want to run up the biggest score, to *win*, and no small number of groups go out for this purpose. The emergency preparedness teams want to try out their gear under field conditions, and this is encouraged by some scoring incentives, many of which are deplored by the contesters. FD is one of our best publicity vehicles, and we make the most of it, including another scoring incentive. Just plain inventiveness plays a large part – use of natural power, QRP, working through OSCAR, overcoming manifold difficulties unexpectedly encountered. You'd be surprised at the number, extent and variety of difficulties that can arise in the simplest FD operation.

For those of you who are too old, too young, too indisposed or just disinclined to go out, you too can participate by getting on and giving some contacts to field stations and competing with others who do the same. To all the rest of you, and especially to you newer amateurs, we urge that you consider active participation. Even if you don't enjoy yourself (and if you don't, it will be your own fault!), it will be an experience you will be glad you had. Go out with your club, if you belong to one and it is going out. Get up a nonclub group. Team up with a buddy and go out. Go out by yourself! But somehow, get out there and be a part of this little piece of everything in ham radio. It's Field Day Time!

BEAT THE HEAT WITH THESE COOL CONTESTS

Whoever once said that summertime is dead where organized operating activities are concerned didn't pay much attention to his *QST* Operating Events column. June features the VHF QSO Party and Field Day, and July is the month (starting this year) for the IARU Radiosport Championship. Details for all of those events may be found in last month's *QST*.

We provide here excerpts from the relatively new ARRL *Ham Radio Operating Guide*, a 128-page compilation of facts and hints on all facets of amateur on-the-air operating. Below are just a few short paragraphs from that book which we hope you will find useful as you plan for the VHF Party and Field Day. Look over the rules, request appropriate log sheets ahead of time from Headquarters, and get ready for summer!

Field Day

The big decision at this point was going to be whether or not Field Day is a contest. Field Day is first an emergency preparedness exercise. The real winners are those groups or individuals who prove they can set up and communicate under adverse circumstances. There's a lot of planning and effort which must be carried out before the first radio contact can be made. Once everything is set up and humming, the 24-hour operating period is almost anti-climactic.

The idea is to communicate, and the more efficiently the better. After all the work of setting up is done (a manual for which would consume an entire book), the proof is in the pudding of operating. That's why we see how many other stations we can work during the FD period. When the club gets ready to divide up the 24 hours of on-the-air time and the first-chosen sit down at the rigs, then we see who has practiced his operating techniques and who hasn't. But FD, being a group effort, has more than just the operators working, even after the antennas are strung and the generator is gassed up. Those who fill the generator, unkink the feed line in the middle of the night, and carry out the dozens of other tasks are just as vital to the overall operation as the person wearing the headphones.

Rather than think of FD as a contest or not as a contest, let's just consider it the ultimate amateur demonstration of ability to do what we exist for: to provide communication in time of need when lesser individuals and institutions cannot.

VHF QSO Parties: June and September

These two operating activities can be treated as one because they are identical, except for being held on different weekends at opposite ends of the summer. In many ways, they are similar to Field Day, because they have become activities for clubs as much as for individuals and because much of the operation in them has revolved around portable setups on mountaintops and in rare states.

The VHF Parties are blessed with possibly the best times of the calendar year for interesting propagation on the vhf bands. In addition, they provide clubs and small groups of individuals the opportunity to utilize choice vhf locations and thus explore the very edges of vhf propagation under a contest atmosphere.

Most of the comments relative to the January VHF SS also apply to the VHF QSO Parties. The channelized fm situation also exists in the Parties and the solution, when it is found, will probably be the same. – *K1TN*

SCM ELECTION RESULTS

The following were elected for two-year terms of office beginning July 1, 1977.

	UNCONTESTED
Alberta	S. T. Jones, VE6MJ
Canal Zone	P. F. Ebdon, KZ5TJ
MD-DC	K. R. Medrow, W3FA
NNJ	R. Neukomm, WA2MVQ

*Communications Mgr., ARRL

W1AW Operating Schedule (April 24-October 30, 1977)

PDST	CDST	EDST	UTC	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
6 A.M.	8 A.M.	9 A.M.	1300	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]		
7 A.M.	9 A.M.	10 A.M.	1400	←		Cw Bulletins[3]		→		
8 A.M.	10 A.M.	11 A.M.	1500	←		RTTY Bulletins[4]		→		
1 P.M.	3 P.M.	4 P.M.	2000	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Slow[1]
2 P.M.	4 P.M.	5 P.M.	2100	←		Cw Bulletins[5]				→
3 P.M.	5 P.M.	6 P.M.	2200	←		RTTY Bulletins[4]				→
4 P.M.	6 P.M.	7 P.M.	2300	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Fast[2]
5 P.M.	7 P.M.	8 P.M.	0000	←		Cw Bulletins[3]				→
6 P.M.	8 P.M.	9 P.M.	0100	←		RTTY Bulletins[4]				→
6:30 P.M.	8:30 P.M.	9:30 P.M.	0130	←		Phone Bulletins[5]				→
7 P.M.	9 P.M.	10 P.M.	0200	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Slow[1]
8 P.M.	10 P.M.	11 P.M.	0300	←		Cw Bulletins[3]				→
9 P.M.	11 P.M.	12 P.M.	0400	←		RTTY Bulletins[4]				→
9:30 P.M.	11:30 P.M.	12:30 P.M.	0430	←		Phone Bulletins[5]				→

[1] Slow code practice on cw bulletin frequencies, 8 minutes each session; 5, 5, 7-1/2, 7-1/2, 10, 13, 15 wpm.
[2] Fast code practice on cw bulletin frequencies, 8 minutes each session; 35, 30, 25, 20, 15, 13, 10 wpm.
[3] Cw bulletins, 18 wpm, on: 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz.
[4] RTTY bulletins 60 wpm/170-Hz shift on 3.625 7.095 14.095 21.095 28.095 MHz.
[5] Phone bulletins on 1.835 3.99 7.29 14.29 21.39 28.59 50.19 147.555 MHz.

Operating-visiting hours are Monday through Friday 7:30 A.M. to 1 A.M. and Saturday and Sunday 3:30 P.M. to 1 A.M. (all local Eastern Time). The station address is 225 Main St., Newington, CT 06111 (about 7 miles south of Hartford). Maps with local street detail are available upon request. Please note that all footnoted frequencies are approximate. If you wish to operate when visiting, you must have your original operator's license with you. (Schedules can also be arranged to work W1AW). The station will be closed May 30, July 4 and Sept. 5. *Staff:* Chief operator/Asst. Communications Mgr. C.R. Bender, W1WPR; Chris Schenck, W1EH; Stan Gibilisco, WAØOKV.

In a communications emergency monitor W1AW for special bulletins as follows (times in UTC): *phone* on the hour, *RTTY* at 15 minutes past the hour, *cw* on the half hour.

To improve your fist by sending in step with W1AW (but not over the air!) and to allow checking the accuracy on certain tapes, note the UTC dates and *QST* text to be sent in the 0200 practice from the issue of *QST* two calendar months past: June 2, It Seems to Us; June 5, Correspondence; June 11, League Lines; June 24, Public Service; June 27, World Above; July 1, YL News.

Operating Events

JUNE

2: West Coast Qualifying Run**
4-5: Minnesota QSO Party*
11-12: VHF QSO Party*
15: W1AW Qualifying Run**
18-19: All-Asian Contest phone*
West Virginia QSO Party*
22: W1AW Morning Qualifying Run**
25-26: Field Day*

JULY

4: Straight Key Night**
6: West Coast Qualifying Run
9-10: IARU Radiosport Championship*
14: W1AW Qualifying Run
16-17: HK, Apollo, 10-10 Contests**
26: W1AW Qualifying Run

AUGUST

4: West Coast Qualifying Run
6-7: Illinois QSO Party***
YO Contest***
13: Wonderful WI Rapids Week***
13-14: WAE***
19: W1AW Qualifying Run
20-21: SEANET Contest***

*Detailed last month
**Details this issue
***Details next month

20-22: NJ QSO Party***
25: W1AW Qualifying Run
27-28: All-Asian Contest cw*

SEPTEMBER

10-11: VHF QSO Party

NOVEMBER

5-6: SS cw
19-20: SS phone

JUNE

2: West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0400Z (Universal Coordinated Time, abbreviated UTC with Z shown as a time designator). The run will take place on approximately 3590/7090 kHz. Note that this is 2100 PDST 9 P.M. Pacific time, the night of June 1. Dates are always shown several months in advance and times are always the same local Pacific time. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL for grading. Please include your full name, call (if any), and complete mailing address. A large (legal size), stamped, addressed envelope will help to expedite your award/endorsements.

15: W1AW Qualifying Run, 10-40 wpm at 0200 UTC, transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 and 147.555 MHz. This is 2200 EDST, 10 P.M. local Eastern time, the night of June 14. Underline one minute of the highest speed copied, certify the copy was made without aid and send it to ARRL per instructions above.

22: W1AW Morning Qualifying, 1300 EDST (9 A.M. local Eastern time), 10-35 wpm. Other details as above.

JULY

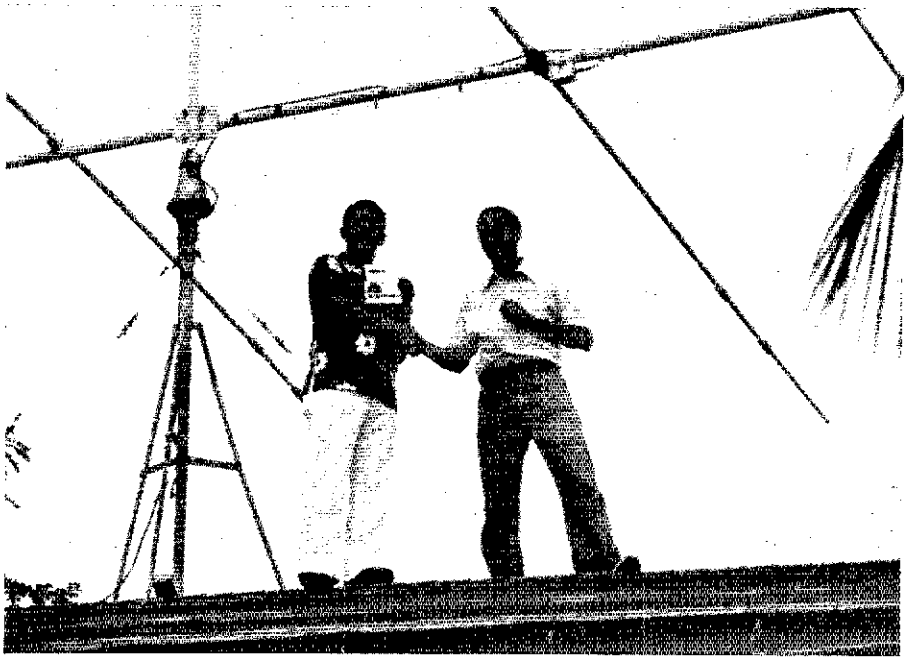
4: Straight-Key Night, the full 24-hour period. This is a friendly meeting on the air, using straight keys; from 0000-2400Z. Suggested areas of operation on 80-40-20 are 060-080 kHz up from the bottom edge of the cw band; 10 kHz up from the bottom of each Novice segment. When participating, please use SKN in lieu of RST, preceding the 3-digit report to clue in "passersby." Following SKN, send a list of the calls of the stations you worked plus your vote for the best fist heard that period (not necessarily one you've worked). This is not a contest and we aim to keep it that way! Vote too for the most interesting QSO. With your report include any interesting appropriate photos for consideration. Check page 88 of the March issue for a bit of flavor of the last running of SKN.

16-17: Ten-Ten International Net Summer QSO Party, full 48-hour period UTC. Open to all, but members only are eligible for awards. All contacts to be made on 10 meters, any mode. Exchange name, QTH, 10-10 number. Score 1 point for each contact; add 1 point if with a 10-10 member (maximum 2 points per contact). Give the name of your chapter for chapter credit. Awards. For the cw portion, same dates and scoring but all contacts must

be made below 28.5 MHz (and frequency must be noted in log info.). If 10 or more logs are received from Novice members, 1st, 2nd and 3rd place certificates will be awarded. Send logs to Grace Dunlap, K5MRU/ϕ, Box 13, Rand, CO 80473 no later than August 31, 1977. Results will be published in the fall bulletin. **Apollo II 8th Anniversary Space Net Contest**, from 6 P.M. to 9 P.M. local, all vhf/uhf bands, all modes (except repeaters). Power classes: 1, 100-300 watts input; 2, 25-100 watts; 3, 5-15 watts; 4, 1-5 watts (special XYL class, all power combinations; club class based on aggregate scores). Each completed contact is equal to 2 points, same station may be reworked in another mode and on another band for additional points. Each different Zip code is equal to 1 multiplier. Trophies, certificates. Logs must be postmarked no later than August 10 and sent to K4AWS VHF Space Center, Box 15, Sumterville, FL 33585. **Independence of Colombia (HK Contest)**, sponsored by the HK Society, the LCRA; the full 48-hour period UTC, 80-10 meters, phone and cw but no cross mode. One point per QSO, for non-HK contacts. Stations in the Americas count 3 points for each HK contact. The total multiplier is the addition of the total number of HK zones plus the total of different countries worked on all bands. Call CQ HK. Exchange report and consecutive serial starting with 001. Mail logs before Sept. 30 to Independence of Colombia Contest, c/o LCRA, Ap. 584, Bogota, Colombia, S.A. Categories are one op, one rig; multiop, one rig; multi-multi.

20-21: SEANET Contest***
20-22: NJ QSO Party***

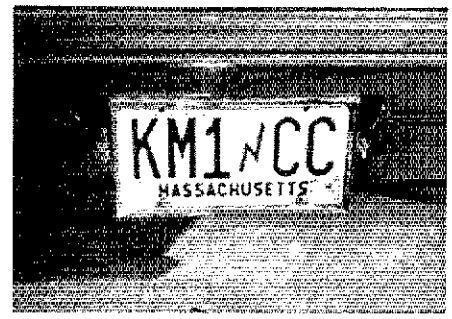
Strays



Gene Humphrey, WBØOZG (ex-KA6GG), left, and George Robbins, WB5KVC (ex-KA6RS), became friends in 1974 on Okinawa, but not until George had moved to Hawaii did Gene get his license. Then they managed to work each other on sked, and on his way to the U.S. after completing his Okinawa assignment, Gene and his family visited George and his XYL for two weeks. They finally swapped QSL cards under George's 5-element Yagi on top of his two-story house! "A card well worth waiting for," reports George. *(photo by XYL Debby)*

Ken Dufford, WA8QZY, assistant EC of the Firelands Amateur Radio Red Cross Emergency Communications Club, received the club's Red Cross award for "Outstanding Amateur Radio Volunteer of the Year," presented by EC Mary Ryden, K8ONV. The club, founded in 1968, operates WB8DHS and meets on 2 meters a-m and fm each Wednesday. Its 65 active members in the primary coverage area of Erie and Huron (OH) counties have served well in a number of emergencies.

1977 officers of the club are (l-r) Vice President K8KWO, EC K8ONV, President K8CYZ, Station Trustee K8WLP and Secretary WB8HMI.

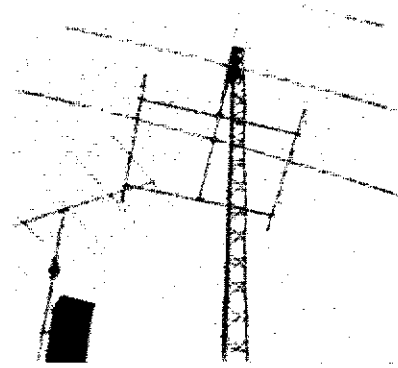


Whitey Doherty, the proud owner of this auto tag, is no South Seas DXer! He's celebrating the 75th anniversary of Marconi's first radio transmission between the U.S. and Europe. Special events station KM1CC, sponsored by The Town of Barnstable (MA) Radio Club, is gearing up for celebration activities in 1978.

Forbid Amateur Radio Operations

WASHINGTON, Dec. 8.—(I.N.S.)—he Federal Communications Commission has banned all amateur radio operation in the United States and its possessions except for stations specifically authorized by federal, state or municipal authorities in connection with emergency matters.

When we begin to think government regulation of the airwaves is just so much red tape, it's good to remember items such as this, taken from a 1942 newspaper. — *WB9QHV*



WA9GBP, Moline, IL, almost became a moon-bouncer against his will after a January windstorm bent his mast just over the top of the tower. Both the tribander and 2-meter array came to rest pointing straight up.

Station Activities

SCM ≤ AREC ≤ ORS ≤ OVS ≤ SEC ≤ OBS ≤ TCC ≤ OO ≤ NTS ≤ WAC ≤
CP ≤ A-1 OPR ≤ EC ≤ DXCC ≤ CLUBS ≤ RM ≤ OPS ≤ RCC ≤ PAM ≤ WAS

CANADIAN DIVISION

ALBERTA: SCM, Sydney T. Jones, VE6MJ — I am very pleased to have been re-elected as your SCM and shall do my best for all concerned during my term of office. Congratulations to VE6s BIF BID & BIZ who have recently qualified under the White Cane program and thanks to VE6OB and all those who have done so much for this program. VE6AGV is our new QSL manager. Congrats! VE6NX is back in the fold as an OO and is active not only from the home QTH but also portable from the Lake. VE6MJ is busy chasing Oscar with new Multi 2700. VE6FS has finally got the rig working again. VE6AVV and the boys in Southern Alberta did a good job during a recent spring snow storm. VE6APL has recently passed his Advanced ticket. Traffic: VE6FS 85, VE6AMM 39, VE6HO 22, VE6AVV 9, VE6MJ 7, VE6OY 5, VE6WN 5, VE6BBU 2, VE6WV 2, VE6YW 2.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — The British Columbia Emergency Net 3650 kHz at 0300Z several months back decided that all net activity will be conducted at the code speed of 10 to 15 wpm. Off frequency passing traffic can go to their limits. This change has greatly increased the check-ins. Also talk of straight key nights. Route Manager VE7CDF and Net Manager VE7GY are most pleased and hope now to come up with an answer on how to bring traffic to the net. VE7TS is 5Z4KLW setting up electronic school in Nairobi. Traffic: (Mar.) VE7ZK 172, VE7DKY 132, VE7OM 116, VE7FB 65, VE7DFY 58, VE7COA 43, VE7BLO 22, VE7AXH 21, VE7BLS 21. (Feb.) VE7GY 30, VE7AXH 16, VE7CCJ 16, VE7BLS 4.

MANITOBA: SCM, Steve Fink, VE4FQ — Asst. SCM: Peter Guenther, VE4PG. RM: VE4UL. PAM: VE4JP. We regret to report the passing of VE4HS. The Miami repeater has been assigned VE4HS in his honor. VE4BJ assumed the ARRL QSL Bureau duties from VE4OX who deserves a big hand after 13 years at the job. Make sure you have a supply of SASEs on hand with Bill. VE4ABB is new from Portage, while traffic-men VE4s PG UL and IX are tinkering with RTTY. VE4CR again active after a hospital stay in late Mar., while ex-VE4TN now signs VE5OQ. The Agassiz Chapter of the 10-X net (28,725 MHz Sun. 20:00 local) is issuing a new certificate so join the fun. MTN: 31 sessions, 313 QNI, 179 QTC in 732 minutes. MEPN: 31 sessions, 1241 QNI, 68 QTC. Traffic: VE4UO 131, VE4PG 127, VE4RO 106, VE4UL 65, VE4YE 35, VE4IX 33, VE4VV 27, VE4JP 21, VE4OW 12, VE4LU 7, VE4AAB 6, VE4QJ 5, VE4CR 4, VE4JK 4, VE4LN 4, VE4NE 4, VE4FK 2, VE4ID 2, VE4MP 2, VE4US 2, VE4XN 1.

MARITIME & NFLD.: SCM, Aaron D. Solomon, VE1OC — Asst. SCM: Maurice Gladden, VO1FG. SEC: VE1DI. PAM: VO1JN. RM and APN Mgr.: VE1AMR. NTN Mgr.: VO1GW. OBS: VE1GL. Silent Keys: VE1AEB VE1EI VE1VO Pat. J. Fitzpatrick. VE1DI newly appted Asst. Dir. and SEC. VE1ASW appointed EC Hfx., replacing VE1BBK. Winners VE1 Contest, phone VE1ACB; cw VE1AWN; Winners White Cane Contest VE1YE, runner-up VE1GA. LOLA Winners: 1st. YL, VE1AMB; 1st OM VE1VI; VE1AKO came 2nd. in both phone & cw, VE1 Contest. VE1ACU Asst. NCS, APN looking for more NCS. VE1AAO and VE1BDT won medallions for BPL. New Ex. CBC ARC VE1UB, pres.; VE1APP, vice-pres.; VE1QI, secy. HARC has new home and club room at NSIT. MAARC now Inc. VE1AWS, chmn.-RFI committee. Mar. IRG Bull. contains special tribute to VE1ER, VE1ZF had int. display on Am. Radio at local library. VE1DI passed Em. tfc. for IICIB for Panama & Columbia. VO1BR VO1CU & VO1CC have new rigs. VO1CC wants listings for his Swap Shop. Appointment EC North Newf. & Labrador open. APN sessions 27, QNI 130/26, QTC 108; NTN sessions 27, QNI 142, QTC 40. Traffic: (Mar.) VE1ZH 313, VE1AAO 281, VE1ACU 135, VO1GW 79, VE1BDT 9, VE1HJ 6, VE1AVL 2, VE1EJ 2. (Feb.) VE1AWS 65, VE1AVL 24, VE1EJ 7.

ONTARIO: SCM, Larry Thivierge, VE3GT — Georgian College, Barrie, celebrated their 10th anniversary by sponsoring a two day amateur radio demonstration using VE3GCB. Twenty-two club members provided 2- thru 80-meter operation on cw, ssb, RTTY and SSTV. Club pres. VE3BLB estimated an attendance of two thousand. Congratulations and best wishes are in order to the following: VE3UW on receiving the Jim Jarvie award from the Metro ARC, Russ served 13 years as VE3QSL mgr.; VE3GJH on being presented with the ARRL Certificate of Merit by VE3AR, Vice-Director, Canadian Division, at a recent SARC meeting, in recognition of her work with the YL clubs; VE3BMG on being named "Amateur of the Year" by the SARC. A commemorative certificate will be issued by the Guelph ARC to Ont. amateurs who provide details of 10 two way QSOs with stations using the prefix VB. Stations outside of Ont. require 5 QSOs. Contact Awards Chairman, PO Box 1305, Guelph. I regretfully announce the following Silent Keys VE3s RU, ZI, BNF and EVU. VE3ZI was first licensed as VE3ZD in 1923 and later was VE3ASH after WW 2. VE3HRC coordinating a DX column for the Ottawa "Groundwave." London club members will be operating a station at the Forest City CB Club International Jamboree at Fanshawe Park June 17 thru 19. VE3BRS is an Esperanto buff. VE3HCS has his Advanced. VE3G2M discussed microprocessors at a recent Hamilton club meeting. VE3HTT devoting more time to his studies. VE3DZK QSYing to Nobleton. The 1800 hour Sat. session of the Trans-Canada net celebrated its 5th anniversary. VE3s DV CDK and GFN have returned from warmer climates. Club competition will be very keen during this year's Field Day June 25 and 26. Field Day participants can earn bonus points by sending a properly prepared message to the SCM during this event. VE3DV new mgr. of the ODN replacing VE3FRG, who is taking a well deserved rest. VE3HNJ new pres. of the Quinto club. VE3GOL working hard on club affiliation. On to the National in Toronto — see you there. Traffic: (Mar.) VE3SB 393, VE3GOL 278, VE3CDK 273, VE3DPO 205, VE3HTT 144, VE3GFN 137, VE3GT 97, VE3ISW 71, VE3HGJ 70, VE3EWD 61, VE3ATR 51, VE3GNW 39, VE3DVE 31, VE3DH 27, VE3GJG 22, VE3AWE 16, VE3BDM 10, VE3IDL 7, VE3BZB 6, VE3FGV 4, VE3FHQ 3. (Feb.) VE3AWE 52, VE3FXQ 14, VE3BZB 7.

QUEBEC: SCM, Larry Dobby, VE2YU — Congratulations to VE2FU whose top score in Que. Section CD landed him 149940 points. Not satisfied with this Phil is attempting to increase his tower size even more and put out a bigger signal from his Silleray QTH on 20 and 40. Congratulations to Claude Dessureault on being re-elected pres. of the St. Maurice ARC. Welcome to VE2EAO and VE1GH, one a newcomer and the other an oldtimer. Good conditions prevailed during the second half of the ARRL DX Test and several locals were heard in the pile-ups. A new rock-crusher at the QTH of VE2YU has helped his signal on 40 & 80. Microprocessors are the word today with many clubs in the Montreal area picking up on this topic. Keep in mind the other VHF bands. There is lots of fun and challenge to be had on 6 meters ssb & fm, 220 ssb & cw and 432. The ARRL sponsor 3 contests a year on these bands and VE2 is a valuable multiplier. Lets get together and put VE2 on the map in contests. VE2DKK VE2DPO and VE2DPI are moving west. The West Island ARC had another very successful auction which was well attended and ably organized by VE2BD and crew. VE2BMQ is now steering the VE2RM club. VE2EGZ and VE2DTB are hard at work planning the Montreal Hamfest for Aug. 1977. Traffic: (Mar.) K2HI/VE2 191, VE2CTA 113, VE2EOH 91, VE2EC 55, VE2BP 42. (Feb.) VE2EC 37, VE2FU 14. (Jan.) VE2FU 37.

SASKATCHEWAN: SCM, P. A. Crosthwaite, VE5RP — The SSB Traffic Net working very well. There has been an average of three pieces of traffic per session. However this may be reduced through the summer months. Repeaters still springing up in our fair province and experiments on 220 MHz for the linkage of the repeaters is presently in progress. Be on the lookout for some QRP signals in the northland of Sask. VE5s SO FP and VE5RP will be on the Churchill River for two weeks commencing June 5. They expect to check the SSB net on 01:30 3750 MHz each evening. Traffic: VE5RP 60, VE5WM 55, VE5DN 51, VE5XC 42, VE5QS 33, VE5XS 30, VE5AAE 28, VE5YK 21, VE5PM 19, VE5NJ 16, VE5EK 8, VE5IZ 8, VE5BD 4, VE5LC 4, VE5OG 4, VE5PD 4, VE5UB 4, VE5UP 4, VE5UX 4, VE5HE 3, VE5KZ 3, VE5QY 3, VE5KS 2, VE5YO 2.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: K3KAJ. RM: W3EEB. PAM: WA3DUM. PSHR: K3YHR 49, K3KAJ 44. Delaware Hams were saddened by the death of the Father of WA3QLS. Kent Co. ARC advises that their Novice class is doing well using the ARRL guidelines and materials. K3NYG now K3JP and WB3BMF is K3DX. W3TZI gave the Delaware ARC an interesting program on Ham applications of microprocessors. WB3GPV received his Novice ticket, 2 days later passed his General and the following day made Advanced. His XYL is Novice WB3GPW. DTN QNI 355, QTC 44. Traffic: K3KAJ 140, WA3WPY 106, W3EEB 42, W3DKX 40, K3YHR 32, W3WD 24, WA3WIY 24, W3YAH 14, K3HBP 1.

EASTERN PENNSYLVANIA: SCM, G. S. Van Dyke, Jr., W3HK — SEC: W3FBF. RMs: WA3OGM WA3SXU WA3YJG. PAMs: W3AVJ WA3PZO. Net reports: EPA QNI 326, QTC 267; PTTN QNI 170, QTC 114; PFN QNI 473, QTC 558; AREC 10, QNI 5. AREC 2, QNI 7. OO reports: W3NC W3VOI W3CL W3KCM W3KEK. OVS reports: W3GOA WA3BJQ W3CL WA3NDQ. OBS reports: W3ID W3CL W3ATJ. BPL: W3CUL W3VR WA3YJG WA3ATQ. PSHR: WA3YJG WA3SXU W3IPX. WA3YJG now Extra and sports a CP35. Big guns W3CUL and VR busy with State Fairs! W3VR I thought, said he was getting rid of his 1914 rig! Found out it was a Model 19 and 14 IT sts! WA3ATQ reports strange sight in Poconos "no snow." New Novice WB3GND. W3ID says he needs a real emergency to get the local AREC gang moving! WA3CFU/3 reports hitting the Wilkes-Barre repeater from State College. WA3CKA busy with new jr. op. W3WRE still silent woman, no antenna! W3EU recvr warranty was for 1 year, it went south 1 year & 5 days! W3GMK racing the clock on repairs for next CD contest. School will be over now so look for those active guys you only hear on vacation! W3BUR says if they make these automatic keys with memories any better he will be able to wurk next CD contest no hands! Welcome WB3CTU a newcomer to tfc nets. RF Hill ARC is going out after the CBers to make them hams! Fellas with the XYLs poor health and my strict diet I avoid banquets like the plague so please try to understand! Doc says even once in a while is too much. Traffic: (Mar.) W3CUL 3454, W3VR 956, WA3YJG 596, WA3ATQ 355, WA3THT 324, WA3SXU 284, K3KW 164, WA3ZRY 150, WA3ZXI 144, W3IPX 135, WA3WQP 75, WA3NDQ 50, W3ID 33, WA3UKZ 33, W3ATJ 31, WA3ZBR 22, WA3CFU/3 20, W3ADE 19, W3AVJ 12, W3CL 11, WA3CKA 11, K3RVC 8, N3KZ 7, WA3YHR 7, K3GJL 6, W3HK 3, WA3TMP 3, WA3BJQ 2, K3HXS 2, W3WRE 1, W3VOI 1, W3GOA 1, W3KCM 1, W3EU 1, WA3VDQ 1, W3KEK 1, W3GMK 1, W3BUR 1, WB3CTU 1. (Feb.) WA3SXU 276, W3ID 10, W3GMK 1.

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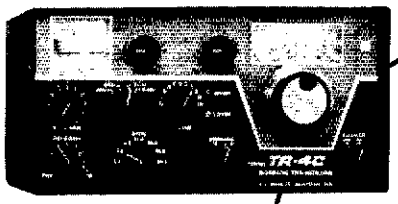

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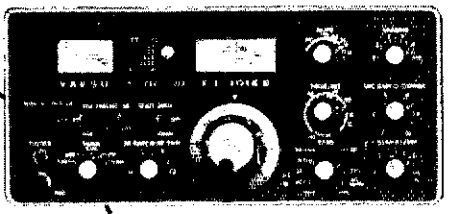
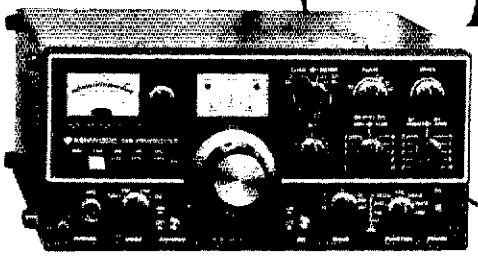
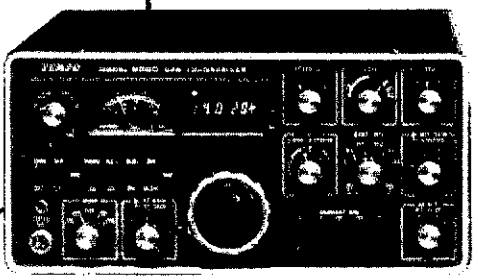


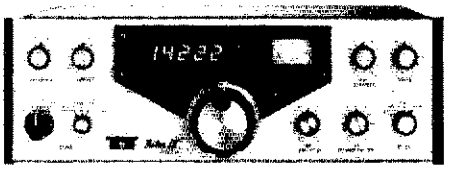
YAESU
FT-101EE SSB transceiver



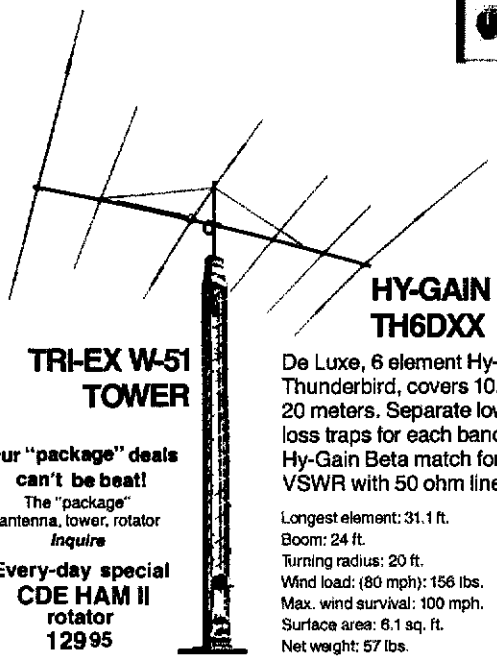
KENWOOD
TS-520 SSB transceiver



TEMPO
2020 SSB transceiver



TEN-TEC
Triton IV Digital SSB transceiver



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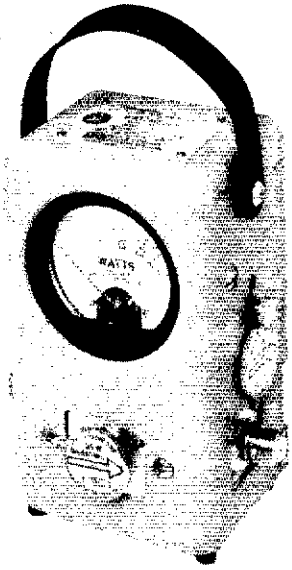

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MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — SEC: N3II. RM: W3FZV. PAM: K3ORW. NCM: WA3PRW. The section is saddened to report K3TGB and K3PHP Silent Keys. Lotsa net activity — Mgr/Net/Sessions/QTC/QNI avg.: W3FZV/MDD/61/214/7.5; WA3PRW/MEPN/20/62/24.9; K3ORW/MDCTN/18/66/18.8; W3DFW/WR PON/17/42/21.3; W3OYY/MDC PON/5/24/24.8; W8QOW/W VA PON/5/10/16.8. Top Brass Feb. K3KAJ W8BZY/3 and WA3WPY. Mar. WA3UYF K3KAJ and WA3WPY. MEPN Toppers W3ADQ K3RIJ; others W3HWZ W3JQN W3LDD K3ORW WA3PRW and K3YNO. Congrats to you all. Congrats to WB3CLO General; WB3BDU WA3WKC WA3YKK Advanced, and WA3ZAK to Extra. W3TK/W3IHM for a new call. WA3OAO and WB3FTB keep Georgetown WA3FXJ active with DX and 50. Amer. Phone Patches. WA3UYB discovers PSHR to give some competition to WA3PRW and K3ORW. WB3CQT and W3QW just missed. Good show. QQ reports from W3WBY WA3JSZ WA3KCY WA3RSK WA3NSA and W3ELS. W3CDQ made it a visit with W4PPQ in warm FL. W3EEB became mgr. of MDD on Apr. 1 replacing W3FZV. Tnx to W3FZV for a good job well done. WA3IHW and 25 others provided 2-mtr. coverage of the WDC Cherry Blossom parade. WA3QKB is Joe Cool. The new dipole at W3IKA helps the totals. WA3ZAK is NCS on HBNS Fri. WA3RSK has code practice on 28/88 Mon. at 1900Z. Add a TS-820 for WA3KCY. WA3GXN sends info on the Air Streamers nets. K3HPG has big antenna plans for the summer along with the rest of us. W3QW with a new keyer. K3ORW with new gear. W3ELS new 2-mtr. antenna. W3TFP new HF beam and W3CJT with new 2-mtr. gear. An affluent group. W3ZNW is back with tfc and RACES. W3FCI did the DX contest up brown. WB3BUA is busy trying to tame his dipole. WA3UYF a regular MDD NCS and took his club with money to the hamfest. WB3CQT is trying 20 meters and has a phone patch. W3ELS is chasing Pirates on the repeaters. The BARC Modulator is right on time. W3ABC K3NA WA3LJP WA3QIA WA3TOE. WA3ZAS and WB8IJW mounted a multi-multi effort from W3FA in the DX tests. Traffic: (Mar.) WB3CQT 132, WA3UYB 114, W3FA 92, WA3UYF 87, W3IKA 79, WA3PRW 54, W3FZV 33, K3ORW 25, K3OAE 23, WA3YKK 19, WA3ZAK 17, WB3BUA 16, K3HPG 8, W3ZNW 2. (Feb.) W3FZV 65.

SOUTHERN NEW JERSEY: SCM, Raymond F. Clancy, WB2GTE — SEC: W2HOB. PAM: WB2LCC. Congrats to group of recent amateurs WA2HUH WA2IAD WA2IAG WA2IOI WA2JDG WA3JNK WA2JNM WA2JNN WA2JRF WB2LCH WB2IAB WB2IAF WB2IOH WB2IOI WB2IWB WB2JBM WB2JLW WB2JNM WB2JRF WB2JRG WB2KKA WB2JTU WB2JRM WB2JLM WB2JJM WB2JNK. When your hear these calls, make them welcome to our League. Worked on 2 M N3AA. W3QZF now K2JF, W2FXN now W2XM has Alpha 77. WB2EQK now N2CW. W2BZL is W2OB. K2BKG is K2MB. K2JOK is W2NJ. W2CGP is W2CG. K2CIR is W2JH. K2KH is W2CQ. W2RUX is K2LA. Congrats WB2CQJ to Extra. WA2ZIF Advanced. WA2IAS General. Tri-City ARC W2FRJ demonstrated new rig at meeting. West Jersey RAC classes taught by WB2LBT K2SQS WB2LCC. WA2YMT made Advanced. WB2KKS new Tech. Vineland repeater group's W2HVW sez they will be off until new unit comes. Old Barney RC had mini computer demo by WB2PMF. Stone Harbor ARK welcomes 10 Novices. Shore Area RC starts weekly social meeting at Bonanza. WB2JLW now General. Southern Counties ARA has fine newspaper by WB2BAB. SJRA has 9 father/son hams plus OM-XYL-grandson hams. WA2ELJ W2FZP made Extra. W2OGZ op 25 yrs. W2SDD keeps weekly sked with Liberia missionary. W2IYB worked W1AW. Rancocas Valley ARA's FD QTH will be Mt. Laurel. Traffic: (Mar.) W2ZQ 248, WB2LCC 126, WA3LMY/2 26, WA2AWU 16, W2LPJ 12, K2BG 10, W2IU 9, (Feb.) W2IU 60.

WESTERN NEW YORK SCM, Joseph M. Hood, K2YA — Asst. SCM: W. B. Thompton, W2MTA. SEC: WB2EDT. I am writing this report with the help of my micro-processor based text editor. Have an 8080 system going and I am interested in QSO with other WNY ops with interest in micros. The Rochester Hamfest looks bigger than ever this year. Speakers include reps from all three MARS services, Harry Dannals, Pres. ARRL and FCC Chief Engineer Spence which will be timely in view of the most recent FCC proposals regarding type acceptance of amateur gear. I will be proctoring FCC exams on Sat. morning and hope to see many from WNY there to upgrade. Speaking of hamfests RAGS is planning one, their 13th annual, for Oct. 8, 1977 in the Syracuse Auto Auction Bldg. So mark it on your calendar. Due to a typo NYSTN Asst. Mgr. was incorrectly reported. It is WA2PUU of course, apologies to Viv. By the way, Viv is one of two XYL Asst. Directors of the Atlantic Div. ARRL. The Penn Wireless Assn. will be doing the Wouff Hong at Rochester Hamfest again this year. The Amateur Radio Society at SUNY Buffalo added the following new calls as the result of recent Novice courses: WA2LHL WA2LHF WB2LHL and WB2LHE. Welcome to these new WNY ops. I regret to report that K2MAJ and WA2HUI are Silent Keys. GRAM are planning a demonstration for the Batavia Home Show with WA2TRR coordinating as chmn. GRAM also just passed 20 new Novices. New Directors for RAWNY are: WB2YMT W2AQY W2CYE and W2OTY. WB2FJC is pres. of RAGS for the rest of the year. Replaces WA2LUF who had to resign due to conflicts. ARATS had an auction on Mar. 15. WB2CJL of ARATS coordinated a 6 Club demonstration for Mar. 25 & 26 at Boulevard Mall. New 2 Letter calls — WB2ZOW is now W2HG, W2HXP is K2RJ, W2FZK is W2TZ and WB2WZG is W2TR. Stations submitting monthly traffic reports are reminded to mail them so I get them no later than the eighth of the month. Local stations delivering reports are requested to hold telephone delivery until the eighth of the month. This will minimize multiple calls and allow concise report delivery. Hope to see many of you at the National in Toronto in June. Traffic: W2FR 182, W2MTA 173, W2RUF 133, WA2ELD 79, W2PZL 70, WA2ZJP 66, WA2AIV 59, WB2QIX 53, WA2TPC 27, K2OFV 19, W2TZ 19, WA2LUF 6.

WESTERN PENNSYLVANIA: SCM, Donald J. Mystewski, K3CHD — SEC: WA3VUP. Asst. SECs: K3SMB WA3LJW. PAM: K3SMB. RMs: W2KAT/3 W3NEM W3LOS W3KUN.

Net	kHz	Time/Days
WPA CW Traffic	3585.0	7:00 PM Dy
WPA Phone Traffic	3983.0	6:30 PM Dy
WPA RACES	3990.5	9:00 AM Su

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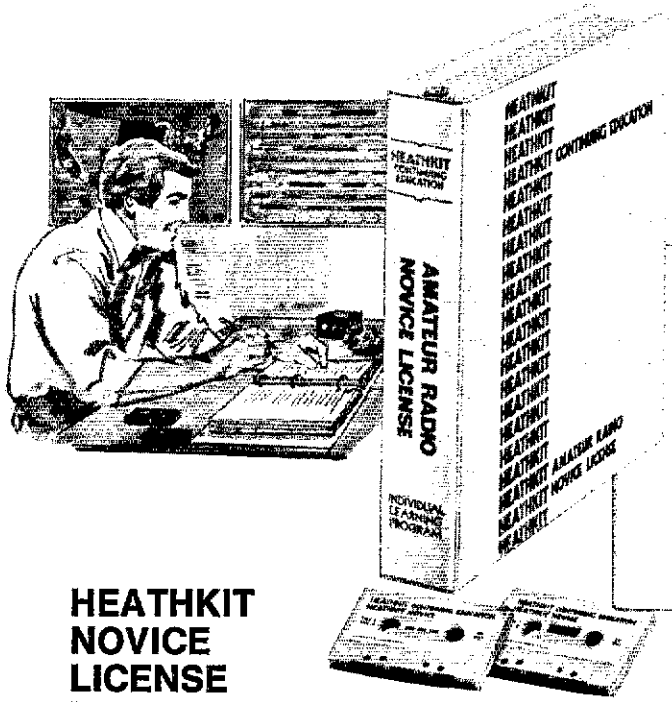

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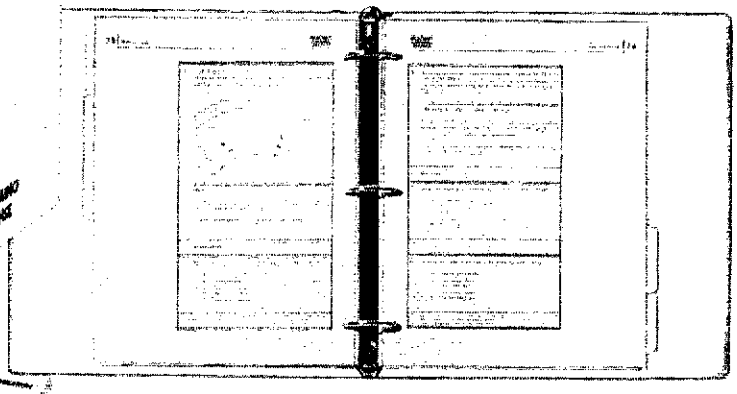

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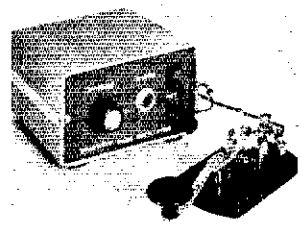

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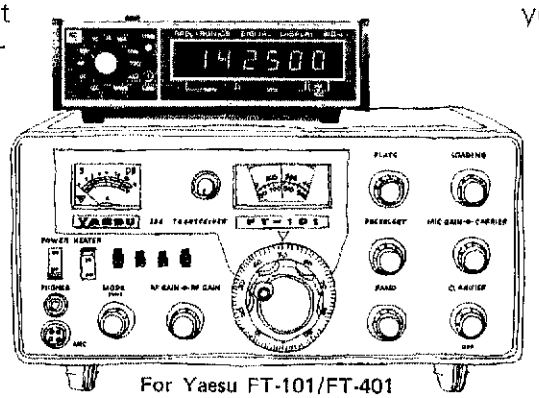

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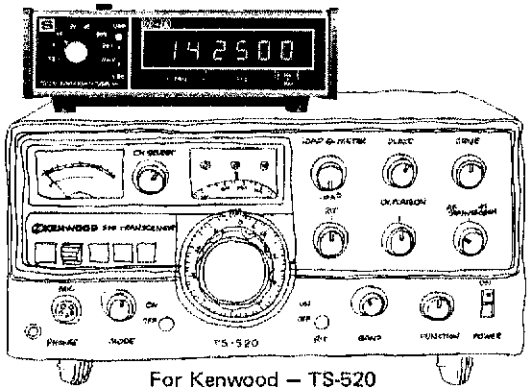

For Kenwood — TS-520
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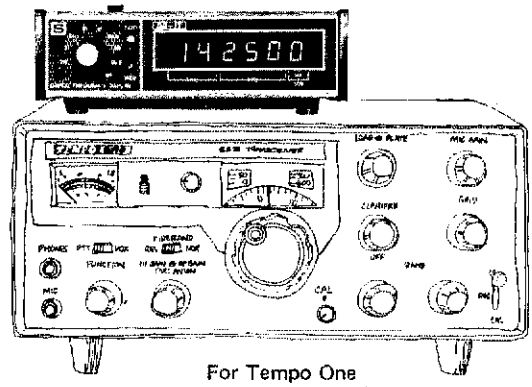

For Tempo One
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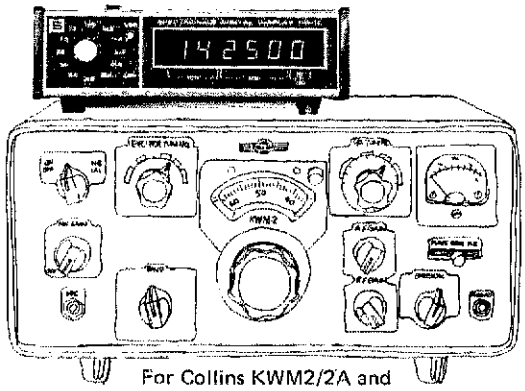

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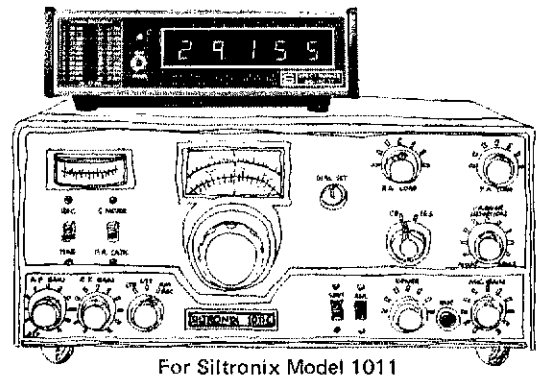

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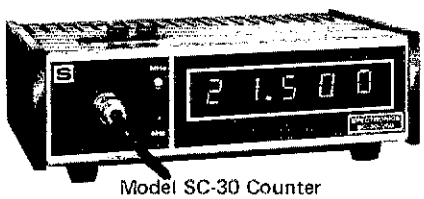

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New appointments: W3TEF as EC for Blair County, WA3YXJ as EC for Crawford County, W3AS as ORS & OPS, W3OFM as OBS. SEC WA3VUP reports serious consideration is being given to the formation of a WPA ARES/RACES Net. More details to follow later. Welcome to the Laurel Lasses, a new YL club in the Section. K3CR Penn State ARC handled many Valentine Day messages for the students. It is with deep regret to note the Silent Keys of W3QVT and W3USG. Get well wishes for K3GFO and K3VYO. The Amateur Transmitters Assn. of Pgh. are conducting Novice classes at the Penn Technical Institute. W3EGJ and WB3EQZ are building the new HW-2036 FM rig. The Penn State ARC officers for 1977: WA3SVK, pres.; W3AS, vice-pres.; WA3NQX, treas.; WA3ULL, secy. WA3YDP is sporting a homebrew HT on two meters with a scanner. WB3COR reports that the Cambria County ARES net meets every Wed. at 7:30 PM on 146.34/.94 WR3ACS. Over 40 years ago W3KZW then W8FRC provided vital communications during the Johnstown flood. RTTY can be operated thru WR3AIY repeater in Beaver on 147.135 in-147.735 out using 170 Hz shift. Upgraded to Tech., WB3ENG; to General, WB3DPO WA3YYA WA3SKG WB3CIM WB3AME; to Advanced, WB3EKC WB3AHI WB3CXR WA3WEE WA3ZPN and welcome to a new Novice WB3GSD. WB3AGB is on the HF bands with a new trap vertical. Remember that Field Day is June 25/26. Try to get out with your favorite club or make an individual effort. Let the USA know that the WPA Section has the most active Field Day operators! The WPA Phone & Traffic Net had 29 sessions in Mar. with 180 check-ins and handled 18 messages. The WPA CW Traffic Net had 31 sessions in Mar. with 458 check-ins and handled 145 messages. PSHR credits WA3VBM. Traffic: WA3VBM 339, W2KAT/3 289, K3CR 235, WA3AHP 135, W3YI 128, W3EGJ 100, K3CHD 66, K3HCT 41, K3MIY 34, W3KUN 25, W3ATQ 24, K3SMB 24, W3UT 21, WA3ZAO 17, W3AS 16, W3SN 16, W3YD 7, K8MYU/3 6, WA3QNT 5, W3IDO 4, W3GQJ 2, K3LVO 1.

CENTRAL DIVISION

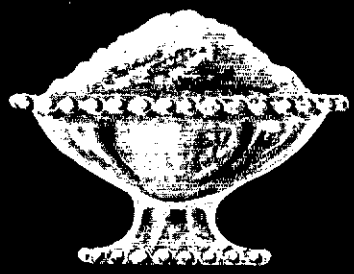
ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst. SCM: Harry Studer, W9RYU. SEC: W9AES. PAM: WA9KFK. RM: W9NJP. Cook County EC: W9HPG.

Net — Freq.	GMT	Days	Tfc.	Sess.
ILN — 3690	0030/0400	Dy	352	62
Ill Phone — 3915	1300/1800	M-S	—	—
NCPN — 3915	1300/1800	M-S	273	54
IEN — 3940	1400	Su	8	4
ISN — 3712	1400	M-F	14	13
ISSB — 1400	14277	M-S	363	27

The League's Executive Committee has approved the applications of the Circle Amateur Radio Club (U of I at Chicago Circle), the Carl Sandberg Amateur Radio Club and the East Peoria Community High School Radio Club have declared them duly affiliated clubs. The newly elected officers of the SARA (Shawnee Amateur Radio Assn.) are W9CJW W9WED WB9ELP and W9ERI. WA9OBP and WA9GBX have passed their Extras. WB9CGS is now N9SS, the first N prefix in the Peoria Area. WA9SFB is now W9JB (also WB0LKW at U of Iowa). New Novice in Waukegan is WD9CKL and WD9CLV is a new Novice in Chicago. WB9PEA built a W9QUW equalizer speech processor and reports FB results. W9CPD has returned from a trip to Tibet. K9VCJ's new QTH is Belvidere. K9WKR/9 is now active on 6 mtrs. WA9LHU reports that the new calls in Dewitt County are: WN9UTY WN9UTZ WD9ARA WB9TZQ and K9TZK. This column's sympathy to the families and friends of W9SUV and also Ginny Davis, ex-K9DXK who recently joined the ranks of Silent Keys. Rams club of Chicago had a very fine meeting with Pete O'Dell, WB8NAS, of ARRL on Apr. 1. K9FRW is recuperating after a serious illness. The 15th annual IL QSO party will be held Aug. 6 from 1800Z to 2300Z on all bands. Consult future QST Operating Events column or contact, K9CJU at 3620 N. Oleander Ave., Chicago 60634. WB9QYY WB9ZJZ WB9GZR W9TRO WB9IGB and WA9ZNX were elected officers of the St. Clair Amateur Radio Club. WB9JKZ gave a talk on net procedures at the last meeting of the Northwest Amateur Radio Club. W9FL has retired from the W.A. Whitney Corp. and is anticipating a new life of leisure. The Hamfesters annual Hamfest will be held Sun. Aug. 14 at Santa Fe park. WB9VGB is a new General and WB9WAJ is waiting for his Advanced ticket. WA9GBW is the only BPL recipient this month. Traffic: WA9BGW 355, W9NJP 254, W9NXG 241, WB9NOZ 198, W9HOT 184, WA9KFK 128, K9KHI 114, WB9JSR 101, W9KR 99, WA9JJE 90, WB9RSW 74, K9ZTV 66, W9LNQ 62, WA9EBT 56, K9MWA 56, W9OYL 45, WA9GBX 41, W9OK 34, W9PRN 24, WB9RGZ 24, W9JIJ 21, WB9PHM 8, W9HPG 5, WA9APA 2.

INDIANA: SCM, M. P. Hunter, W9LF — SEC: W9UMH. You will note that I have also given into the new call fad and have retired WA9EED after 16 years. Hoosier Hills ARC now has a 13/73 machine, WR9AJE. W9NTP was a guest speaker at the Mar. meeting of FWRC. Several new hams and upgrades are being sported by FWRC. Congrats to WB9PIO who was named Ham of the Year by Lake Co. ARC. WA9SRB reports that he and W9SWH are both proud holders of new Extra tickets. Several good scores have shown up for the ARRL DX test including W9CL with 2.2 million. K9OTB surfaced from VP2KN for a few days in Mar. The IRCC held its spring meet at Indy Red Cross on Apr. 3 with good representation from ARRL officials (W9NTP, Dir.; W9LF, SCM; W9UMH, SEC; WB9KTR, 9RN Mgr.; WB9FOT, D9RN Mgr.; W9QLW, CAS MAL; W9LTU, QIN Mgr.). W9NTP discussed his aims as Div. Director And Asst. Director W9BUQ mapped strategy on some key issues. Congrats to Milltown ARS on their new ARRL affiliation. WA9IEE reports he is now assigned in HK-Land and is seeking a license. ITN 447, QIN 306, INTN 83, Hons. VHF 165, IPON 1. Traffic: (Mar.) WB9KTR 382, W9IOH 287, W9YB 244, W9GGW 190, W9HUF 182, W9QLW 173, W9LTU 168, K9DCX 153, W9EI 114, WB9PIR 110, WB9FOT 103, WB9OZW 95, WB9NAQ 78, WA9QCF 67, K9TKE 62, WB9IHR 44, WB9DIX 41, W9JGE 40, WA9TJS 37, K9YBM 37, WB9SOY 24, WB9QEZ 22, K9RPZ 22, K9JQY 21, W9ENU 18, W9PMT 18, K9RWQ 18, WB9SKA 17, K9WWJ 16, K9KTB 15, WA9OHX 15, WR9YXN 14, W9RTH 12, W9BDP 11, W9DLF 10, K9FOV 9, WB9ORM 5, W9CMT 4, WA9ITB 4, W9AUB 2, W9JU 1. (Feb.) WB9SKA 136.

The proof of the pudding is in the eating.



The proof of Triton IV is in owner satisfaction.

Here's some of the proof . . .

K4EME — This is my second TRITON IV. They are excellent xceivers! **WA8ICK** — Luv it. Dynamite! **W9NXU** — I am very thrilled with this unit, it is great. I think you have scooped the field. **WA0AYA** — I like CW and full break-in. (Beautiful) **K3TFU** — I love the unit. **WA3VEZ** — Rig is just great. Combined with your service makes a super transceiver. **WN0SED** — Beautiful radio to use. Magnificent CW filter! Just a pure joy. **W8IIT** — I have had my TRITON IV for two months and am delighted with it. **YN1MBV** — It is a very nice rig. **W3GTX** — New features very welcome. **WØBYC** — Bought one of the first TRITON II, like it so well I updated it with a TRITON IV. **W2TBK** — It is absolutely fantastic. **WB0OPI** — I am pleased with the rig. **WA3GJA** — Very-very-very nice. Good audio quality. **W5ZBC** — The most outstanding rig I have ever used. **K8CJQ** — Excellent rig. Good filters. **W7BKK** — Very happy . . . getting excellent quality reports. **W2CET** — Power-signal reports good. **WB2UEH** — I like the compactness and appearance. **VE3IBK** — An excellent rig with superior receiving quality. **K4IVM** — I think it is tops. **WA4LOG** — I've become so used to dip, peak and adjust, this TRITON is a beautiful new experience. **KL7IHW** — Easy to set up—works great. **K4JXD** — Seems to be very FB rig. **WA7KHE** — Fantastic performance. Thanks for a fine rig. **WB4BPG** — No problems—fine rig. **VE1BZ** — Good work. **W9HQT** — Receiver better than expected, CW break-in is super. **WØAP** — Tremendous transceiver. I appreciate your engineering. **WA2ZRG** — Wonderful. **KØSFV** — Real nice rig. You thought of almost every feature and built it in. **KQ9DQ** — Beautiful. **WBØJIQ** — Beautiful radio; however, your ads do not do justice to the radio. **WN5SOH** — Very sophisticated—Easiest tuning rig ever. Very glad I bought it. **K3ØJV** — Very impressed. **W4LZP** — Very good results. Put out 100 watts as good as 300 watt rigs. **WA4DQY** — I think the TRITON IV is great. **W6QXN** — Appreciate full CW break-in. **WØINH** — Enjoy light weight. **VE3CYK** — I am extremely pleased with the clarity of receiver and after putting rig on the air, received unsolicited compliments on the audio quality of the transmitter. **K4PHY** — Was 3rd in USA, first in fourth district in WWCQ contest. **W8RYU** — Own Argonaut. Both fine rigs. **W4CDA** — Compact, light weight, good engineering. **WB2WZG** — TRITON IV is the most versitile CW/SSB radio I have ever used. **WB2FMV** — Outstanding. Highly pleased with performance. **WA8ACZ** — A real nice rig. I have owned about every other make. **W5EGK** — Works nicely. **WB4ECO** — I tried this rig, a pleasure to operate. **WA4YRK** — Excellent reports on audio. **WB8NKB** — Wonderful. **W9QPQ** — An excellent rig. Love it. **W8SOP** — Makes running SSB nets a real breeze. Also good on CW nets. **WL7IRT** — Fantastic rig. **W4MDB** — Has rekindled my interest and enthusiasm in Amateur Radio to an extent I hadn't thought possible. It far out distances any competitive product at **any** price. **W6EYR** — Very nice. Been a ham for 45 years and now solid state perfection. **W2RPH** — Excellent rig. **WNØTDK** — TRITON IV is a fabulous piece of equipment. **W5VIW** — Very nice rig **WB2LQF** — Wow! **W9JCV** — Tnx for giving us a FB piece of equipment made in the USA. **W8GHO** — Very pleased. **K4KXB** — Seems to have everything desired. **W4SZ** — A pleasure to operate. **W2FKF** — Greatest rig I ever had. So far in a month 34 QSO's without one miss. Been a ham since 1922. **W4GVC** — Nothing but complements. **WB9EZE** — Well pleased with performance and simplicity of operation. **K4ETI** — Rig is great. **W8CNV** — Man—! what a rig. I've had this call since 1929. Never saw anything like it and I've seen them all! **WB2MZU** — Seems like everything the S - - - - - O - - was supposed to be at one third the price. **WNØVHE** — I think it is a very good rig. **WB9FTD** — Break-in CW is very impressive. **KØCBA** — I believe it is one of the finest HF transceivers on the market. I can't tell you how pleased I am with the noise blanker. I can get on the air from my home station again for the first time in a few years. Other rigs with noise blankers just didn't hack it. **WA7YHW** — I am very pleased with this equipment. It is certainly of high quality. **W7IIA** — Excellent equipment. **WBØRWA** — Couldn't be more pleased with it. It certainly has performed beautifully and is all I expected and more. **WB4QJT** — Like it very much — keep up the good work. **WN1YVX** — Really impressed with looks and performance. **WØNC** — Very FB rig. Performs up to specifications, an excellent design. **K8PBZ** — Already have TRITON II and IV. **W7KD** — This little "T-4" is smooth as silk . . . I've received some very flattering reports about transmitter voice quality and the CW operation is the greatest. **WN8TTO** — I found that the TRITON IV was the best rig on the market for around $800. I love it! **W2JBK** — It is absolutely fantastic. **W8FEI** — Am amazed at receiver performance. I thought I had a top notch receiver with the H - - - - - - - - ! **W1FYM** — Your guarantee is refreshingly proper. **W1EIR** — Sure makes a guy look twice at his old tube type gear. **W1TFS** — Finest CW ever, CW selectivity very good. **WB6IVR** — Very satisfied with TRITON IV. Just what I was looking for to use on my yacht. Thanks. **WA8ONP** — Also have a TRITON II. I am pleased that Al Kahn and the **good guys** at TEN-TEC thought of the CW operator! **W2EMX** — Excellent Amateur gear meets and exceeds advertised claims. **WØAMJ** — It looks like there is nothing left to be desired. It is beautiful. **W6SE** — The receive function is outstanding. It is superb in transmit. **W1BV** — In love with this fantastic gem. It's so easy and a pleasure to operate. **W6ASH** — Very happy with performance. Particularly impressed with full break-in and light weight. **WAØIMS** — By far the best rig I have ever operated. I am glad I decided on the TRITON IV and not one of the other transceivers on the market. **WA8HQD** — Thank you gentlemen.

Add your name to the growing list. See your TEN-TEC dealer or write for full details.

TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862
EXPORT:5715 LINCOLN AVE., CHICAGO, ILL. 60646

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: K9ZZ. PAMs: W9AYK W9IEM K9UTQ. RMs: WB9ICH K9KSA W9OT K9LGU. Nets, Freq., Time, QNI, QTC, Mgr.: BWN, 3985 kHz, 1245Z M-S, 581, 489, W9AYK; BEN, 3985 kHz, 1800Z Dy, 635, 194, W9IEM; WSBN, 3985 kHz, 2330Z Dy, 1257, 208, K9UTQ; WNN, 3725 kHz, 2315Z, 117, 18, WB9ICH; WIN-E, 3662 kHz, 0100Z Dy, 250, 138, W9OT; WIN-L, 3662 kHz, 0400Z Dy, 196, 94, K7LGU; RTTY, 3662 kHz, 0130Z S, 8, 2, K9EN; WI ExPO, 3925 kHz, 1810Z M-F, 679, 38, WA9NIX. WIN-L certificate to W9NUI. WB9YMM has WAS and WAC. WSBN endorsed WB9QKH. 9RN for Novices on 40 meters 2200 daily. WSBN certificate to WB9JLL. If you have any news pertaining to traffic please get it to K9ZZ by June 1. WNA is again going to put out a bulletin. WB9LAM new EC for Manitowoc county. MARA swapfest is now June 19, make a note. WIN-L certificate to WB9QKH. I regret to report WB9MIX WA9AFP Silent Keys. K9ZZ worked SU. WB9UEP is now General. WB9YMQ now Advanced. W5BN certificate to WB9QCC. WB9VZQ is now W9OAX. K9PKQ is K9ZZ. WB9TFJ WB9UQT Novice to Tech. WB9YXX WB9WHJ General to Advanced. WB9YXY Novice to General. WB9SEI Tech. to General. WB9NOA has Extra and first phone commercial with ship radar endorsement. W9LXE is now W9NW. K9CPM made BPL. W9ZTP has Extra. WD9CQG new Novice Oshkosh who is handicapped. WD9BCG new Novice Neenah area. Sorry to hear K9CPM in hospital, hope he will be out soon. WNA picnic at Baraboo July 10. 3-F's ARC swapfest July 24. Traffic: (Mar.) K9CPM 558, K9MZO 355, W9DND 214, W9SFL 178, W9OT 151, WB9ICH 143, K9SAO 128, K9MZO 355, W9DND 214, W9SFL 178, W9OT 151, WB9ICH 143, K9SAO 128, K9FHI 93, K9LGU 78, W9IEM 69, WB9QKH 63, W9AYK 49, W9IHW 47, K9UTQ 42, WB9JSW 40, K9JPS 37, WB9OEC 33, WB9HLS 31, WA9QVI 29, W9YFW 22, WB9RRV 18, WB9SHK 15, WB9PYG 10, WB9QXO 10, WB9RRU 9, K9ANV 8, WB9LKC 8, W9KHH 3. (Feb.) W9IHW 33, W9KHH 12.

DAKOTA DIVISION

MINNESOTA: SCM, Frank Leppa, KØII — The 1977 9th annual County Hunters Convention will be held in Rochester on June 30, July 1st and 2nd. Contact WØKHH, 9 Hillside Ct., Northfield, MN 55057 for an information packet. Remember Field Day is June 25. It's time now for those last minute changes and preparations. WAØWXL has constructed an electrical power generating system using wind. He can power his hf rig from this natural source. EC WAØJUK called an emergency test on Mar. 26. 19 individuals participated, being dispatched to five key agencies. Many received experience handling traffic under adverse conditions. WAØQIT has 80 novice students in the largest class on record at Lincoln Jr. High. WAØLRW completed 75M WAS. WRØPTB has confirmed 60% of his 5BWAS. New Novices are Staples: WBØYLW WBØYMJ WBØYRV WDØAKE; Duluth: WDØAPZ; Tech: WDØAPZ; Adv. KØEVE KØMVF WAØCQG WBØKYJ WAØOLZ WRØNAA WBØPGZ WBØPTB; Extra: KØFZG WAØETR. New calls: WØIYP is KØTO, WØOXN is WØSA and KØZXE is KØII. KØSVW and WAØCQG are each fathers of newborn sons. WBØQOB, EC, Grand RApids reports his men provided 2M communications for a March of Dimes Marathon. Congratulations and best wishes to all the above. WBØMAO is on 2M fm. To all of Minnesota's ARRL members a pleasant summer. Traffic (Mar.) KØCVD 280, WAØYVT 164, WBØPKG 135, WØDUW 127, WBØLDW 127, KØZXE 125, WBØOFQ 91, WØQMY 85, WØPFT 70, WAØGLI 65, WBØDUH 57, KKØCSE 53, WØRTQ 50, KØRMX 48, WØOSJ 44, WBØRAS 43, WAØTEC 41, WBØQPO 41, WBØNZB 38, WØHKF 37, WBØLSI 37, KØZBI 31, KØPIZ 25, WBØMAO 25, WØOPX 21, WBØPGZ 19, WAØMMV 18, WAØQIT 16, WAØURW 16, WAØLVG 15, WAØJPR 14, WAØWOV 14, WAØRKF 12, WØOBB 10, WBØQEU 10, WBØJYT 9, WBØOCT 8, WBØVNC 8, KØBDD 6, KØSXQ 4, KØFLT 3. (Jan.) WØHKF 34, KØCSE 55. (Dec.) WØQMY 259, WAØJPR 12.

NORTH DAKOTA: SCM, Mark J. Worcester, WAØWLP — New calls in ND WBØWSQ WDØAVD. WØOUX received Advanced Class license at last Bismarck FCC exam. Grand Forks is giving 2 Novice classes; one at State School For the Blind, and one at Valley Jr. High. First EC net went well. Bismarck ARC had a ham display at local shopping center with a lot of people stopping by. Bismarck Club had a ham get together at local supper club. We regret to announce the passing of WØPHC. Since he was Trustee for the Bismarck Repeater it will be off the air until license arrives from FCC.

Net — kHz Manager	CDT/Days	Sess.	QNI	QTC
DATa — 3996.5 WAØSUF	1700 S-S 1800 M-F	53	532	310
Goose River — 1990 WØCDO	0900 Su	4	51	
YL Wth. — 3996.5 WAØRWM	0700 S-S	31	945	980
Mar. 30 Blizzard		4	93	93

Traffic: WAØRWM 1375, WBØPDP 361, WAØCRH 167, WAØSUF 161, WØCDO 121, WBØBMG 117, WØDM 45, WØWWL 36, WØRIB 6.

SOUTH DAKOTA: SCM, Ed Gray, WØSD — Eastern SD has been moved from the St. Paul district FCC office to the Kansas City, MO office. The address is 1703 Federal Building, 601 East 12th St., 64106. New Rapid City Novices are (XYL of WØLXH) WBØZBX WBØYXK WBØZQU WBØZCS WBØYXL (XYL of KØCXH) WBØZCF WBØYZU WBØZKS. For the second year in a row Black Hills ARC provided communications for the Badlands Baja which is an annual Feb. mud race. KØCXL has a new quad that really tears up the ether. WØSMV of Sioux Falls has a new TS-520. The SD Hamfest will be held at Chamberlain the weekend of June 18 and 19. New two letter calls are WAØJUM now KØJM; WAØTZC-WØJR; WAØYAK now WØWE; WAØNUX now WØVH; WBØKJQ now KØSD and WAØCPX now WØSD. WAØVFX and WAØNRE Rapid City and WØSD all have new homebrew kilowatts on two meters cw/ssb.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU — SEC: WA5VNV. PAMs: W5POH WA5ZWZ. RM: W5MYZ.

Nets, kHz, Times/Day, QNI, QTC, Mgr.: ARN, 3995, 2330Z/Dy, 956, 101, K5MEA; OZK, 3760, 0000Z/Dy, 198, 33, W5MYZ; APN, 3937, 1100Z/M-S, 922, 46, W5POH; M-Bird, 3928, 2130Z/M-F, 730, 22, WA5ZWZ. New officers FSARC, W5NF, pres.; W5MDP, vice-pres.; WA5SOG, secy.; WA5DMT, treas. New calls in AR, WB5ZRB & ZRF. WDbs ABP AFG AFO AFT AFU AGR AGV AGX AHO AHP AHQ AHR AHU BDE BDN BDO BEK BFH & BGP. New ECs, WB5KIJI for Independence Co. & WB5MWI for Madison Co. Eleven new Novices in El Dorado area due to licensing class by S. Ark. ARC. Officers for S. Ark. ARC WB5NDP, pres.; WB5GVE, vice-pres.; WB5TZG, secy-treas. K5GKN changed call to K5DW. Traffic: WA5HNN 179, W5BED 67, K5MEA 41, WB5QWU 29, W5POH 23, K5DW 12, W5UAU 9, W5KL 8, W5SHY 4, WB5GQH 2.

LOUISIANA: SCM, Robert P. Schmidt, W5GHP — SEC: WB5CIQ. RM: WA5ZJA. PAM: WB5NEZ, VHF PAM: W5VBX. New PAM and LTN Net Mgr. is WB5NEZ of Shreveport. Regret to announce the resignation of WA5NYY as Asst. SCM. John has been a great help during the last three years. WB5MKJ, XYL of WA5ZCF, became a Silent Key March 19th. The Hammond repeater now has weather available. K5CAV had excellent results in recent DX Contest. WB5LSH and WB5MXE both worked the 2-mtr. opening recently. WA5ZZA, RM advises that Section Net Certificates have been awarded to WA5VQE WB5FHU WB5IYH WB5NEZ WB5NVB WB5OOM WB5PTH and WB5QCJ. SELARC new class for Novices started Apr. 1. Classes will be on Thur. nights. WA5ANV LSN net mgr. back on the air. LARC Summer Social will be held June 4th. Their Novice class just finished with approximately 40 graduates. W5GZR now W5ZR, K5UYL now N5AN. The FCC now holding exams in Shreveport twice a year. ARCOS new 2-meter repeater is now installed with excellent coverage. WB5AMN formally in TX now in Kenner, new OPS-ORS.

Net — Freq.	Time/Days	QNI	QTC	Manager
LAN — 3615	7 & 10 PM Dy	543	254	WA5ZZA
LTN — 3910	6:15 PM Dy	385	56	WB5NEZ
LSN — 3703	8:30 PM M-F	86	15	WA5ANV
TRN — 3587.5	7:00 PM Su	14	10	WB5FHU

Traffic (Mar.): W5GHP 471, WA5IQU 373, WA5ZZA 256, WB5PTH 175, W5MI 122, WA5TQA 92, WA5VQE 79, WB5OOM 71, WB5NEZ 65, WB5NVB 52, WB5CDX 60, WB5LBR 40, WB5FHU 38, WA5ANV 13, W5YN 12, WB5RTW 9, (Feb.) WB5OOM 24.

MISSISSIPPI: SCM, E. Ed Robinson, W5YTN — SEC: WB5FXA. Urgently needed: more stations to check into the MS Traffic net (daily 0045Z-3665 kHz) and the MS Slo Net (0000Z MWF 3733 kHz). Recent Newsletter from WB5FHA MTN RM is excellent. To get a copy check into the MTN. WB5MTQ now Extra class. Congrats. W5UCY active on 2 meters and Oscar, also reports good activity in Jackson County ARC. Heard on MSBN — WB5UXM WB5WFQ WB5NVD WB5HVY (has 99 DX countries on 75). Hattiesburg ARC had fine visit from W5RUB. Enjoyed FB meeting with Vicksburg ARC. WB5HAS reports Novice class under way in Philadelphia. DRN5 (W5KLV) QTC 227. MS represented 90.3% by WB5LXX N5XA W5UKR K5QLF/5, CGCHN (W5DT) QNI 3282, QTC 121. MTN (WB5FHA) QNI 254, QTC 56. MSN (WB5MTQ) Late Feb. & Mar., QNI 16, QTC 5. Miss-Lou Weather Net (K5VXV) QNI 132, QTC 0. N MS — Al FM Net (WB5TZN) QNI 24, QTC 1. Traffic: WB5FHA 128, WB5LXX 105, K5OAF 99, W5EDT 72, WB5QCA 41, W5LSG 28, W5WZ 28, WA4KVR/5 24, W5YTN 24, W5BW 11, WB5NJZ 10, WB5SNB 7, W5OXA 6, W5RUB 6, W5VKR 6, K5VXV 6, W5LL 4, K5RRG 4, WB5HAS 2, WB5NGF 2.

TENNESSEE: SCM, O. D. Keaton, WA4GLS — SEC: WB4DYJ. PAM: WB4PRF. RM: WB4DJU.

Net — Freq. Manager	Time(Z)/Days	Sess.	QNI	QTC
TPN — 3.980 WA4EWW W4PFP WB4YPO	1140 M-F 1245 M-F 0130 M-Su 1400 SSuH	76	4141	381
TN — 3.635 K4YFC	0130 Dy	31	317	143
TNN — 3.710 WA4CNY	2300 M & Th	8	51	21
ETVHFN — 50.4 WA4WZJ	0200 MWF	12	101	3
ETVHFN — 145.2 WB4DZG	0200 TTh	8	40	0
MTTMN — 28.8 W4EAY WTVHFN	0200 TF	8	68	0
146.37 — 146.97 WA4VVX TCDARC	2330 Dy	30	956	340
146.16 — 146.76 W4CYL	0200 W	4	124	0

The Jackson ARC has 18 Novice and 15 General students enrolled in training. K4CNY has received the 1976 SCM Traffic award. Section Net Certificates have been issued to K4YOL WA4CGK W4OGG W4HHU K4QKW WB4GBI W4PFP WA4BCS W4VJW W4RUW K4FSK W4PSN K4UMW as net control stations and WB4MPJ WB4ZSZ K4JSF K4WWQ WB4WHE WA4CDH WA4GUE K4TKR WB4VEN WB4UUG W4SYE WA4ZBC as alternate net control stations. The Tenn. Repeater Frequency Coordinating Committee has been finalized and ready to serve you. Chairman WA4VVX, secy W4LQE; the area coordinators are as follows: Tri-Cities WB4NIR, Knoxville W4LQE, Chattanooga W4ZOK, Manchester WB4DJH, Nashville K4RTA, Jackson WA4VVX, Memphis WB4YID. Anyone installing a repeater in the future get in touch with your respective coordinator and ask for his assistance. Traffic: WA4CNY 224, K4CNY 208, W4OGG 181, K4YFC 136, K4VM 70, WB4ZSZ 60, WA4DKC 50, WB4BKF 48, K4FSK 38, W4RUW 30, WA4GLS 29, W4TYV 21, WA4VVX 21, WB4YPO 19, WB4WHE 18, WB4HOI 16, WA4YSJ 11, N4ZZ 11, WA4IDN 10, WB4MPJ 9, WA4VWV 8, WA4TYN 7, K4UMW 6, W4PSN 5, W4SGI 4, W4VJW 4.

GREAT LAKES DIVISION

KENTUCKY: SCM, Tud Huddle, W4CID — SEC: WB4ZML. March Nets:

Net	QNI	QTC	Net	QNI	QTC
KRN	306	37	KYN	195	79
KTN	1150	121	KNTN	235	77

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PRIME - HIGH SPEED RAM

21L02-3 400 NS

LOW POWER - FACTORY FRESH

1-24	$1.95 ea	100-199	$1.60 ea
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OVER 500 PCS. **1.39** ea.

PRINTED CIRCUIT BOARDS for CT-7001 Kits sold separately with assembly info. PC Boards are drilled Fiberglass, solder plated and screened with component layout.

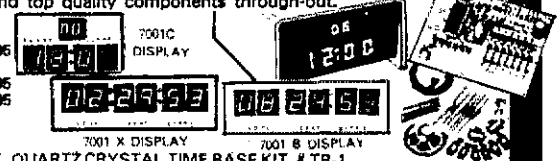
Specify for 7001 ***B, C or X - $7.95***

6-DIGIT LED CLOCK CALENDAR KIT

DATE-TIME-SNOOZE ALARM & MORE... KIT 7001

FOR THE BUILDER THAT WANTS THE BEST. FEATURING 12 OR 24 HOUR TIME — 29-30-31 DAY CALENDAR. ALARM, SNOOZE AND AUX. TIMER CIRCUITS

Will alternate time (8 seconds) and date (2 seconds) or may be wired for time or date display only, with other functions on demand. Has built-in oscillator for battery back-up. A loud 24 hour alarm with a repeatable 10 minute snooze alarm, alarm set & timer set indicators. Includes 110 VAC/60Hz power pack with cord and top quality components through-out.



KIT - 7001B WITH 6 - .5" DIGITS $39.95
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KIT - 7001X WITH 6 - .6" DIGITS $45.95

KITS ARE COMPLETE (**LESS CABINET**)
ALL 7001 KITS FIT CABINET I AND ACCEPT QUARTZ CRYSTAL TIME BASE KIT # TB-1

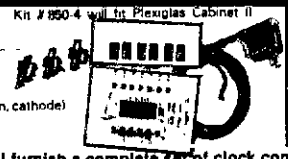
6 DIGIT LED CLOCK KIT # 850-4

12/24 HR. OPERATION BIG .4" DIGITS - 50/60 HZ OPERATION.

KIT INCLUDES
- INSTRUCTIONS
- QUALITY COMPONENTS
- 50 or 60 Hz OPERATION
- 12 or 24 HR OPERATION

6-LED Readouts (FND-359 Red, com. cathode)
1-MM5314 Clock Chip (24 pin)
13 Transistors
3-Switches
6-Capacitors
5-Diodes
9-Resistors
24-Molex pins

Kit # 850-4 will fit Plexiglas Cabinet II



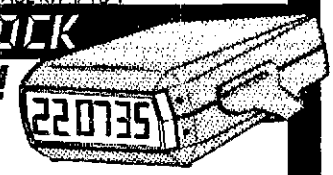
$11.95 ea QTY. 1-5
$10.95 ea. QTY. 6-11
$9.95 ea QTY. 12 OR MORE

"Kit #850-4 will furnish a complete set of clock components as listed. The only additional items required are a 7-12 VAC transformer, a circuit board and a cabinet, if desired."

PRINTED CIRCUIT BOARD FOR KIT # 850-4, SCREEN PRINTED DRILLED AND SOLDER PLATED FIBERGLASS $2.95
MINI-BRITE RED LED'S (FOR COLON IN CLOCK DISPLAY) ... Pkg. of 5-$1.00
MOLDED PLUG TRANSFORMER 115/10 VAC (WITH CORD) $2.50
NOTE. Entire Clock may be assembled on one PC Board or Board may be cut to remote display.

MOBILE LED CLOCK

12/24 HR .4" DIGITS!



MODEL #2001

12 VOLT AC or DC POWERED

- 6 JUMBO .4" RED LED'S BEHIND RED FILTER LENS WITH CHROME RIM
- SET TIME FROM FRONT VIA HIDDEN SWITCHES • 12/24-Hr. TIME FORMAT
- STYLISH CHARCOAL GRAY CASE OF MOLDED HIGH TEMP. PLASTIC
- BRIDGE POWER INPUT CIRCUITRY — TWO WIRE NO POLARITY HOOK-UP
- OPTIONAL CONNECTION TO BLANK DISPLAY (Use When Key Off In Car, Etc.)
- TOP QUALITY PC BOARDS & COMPONENTS - EXCELLENT INSTRUCTIONS
- MOUNTING BRACKET INCLUDED

KIT #2001 COMPLETE KIT (Less 9V. Battery) **29.95** EA. 3 OR MORE **$27.95** EA.
115 VAC Power Pack #AC-1 **$2.50** EA.

ASSEMBLED UNITS WIRED & TESTED ORDER #2001 WT (LESS 9V. BATTERY) WIRED FOR 12 HR OR 24 HR IF NOT SPECIFIED OTHERWISE **$39.95** EA. 3 OR MORE **$37.95** EA.

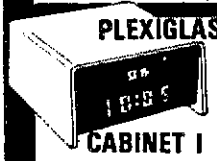
60 HZ. XTAL TIME BASE

Will enable Digital Clock Kits or Clock-Calendar Kits to operate from 12V DC.
1"x2" PC Board
Power Req: 5-15V (2.5 MA. TYP.)
Easy 3 wire hookup
Accuracy: ± 2PPM

#TB-1 (Adjustable)
Complete Kit **$4.95** ea

Wir & Cal $9.95

PLEXIGLAS CABINETS



Great for Clocks or any LED Digital project. Clear-Red Chassis serves as Bezel to increase contrast of digital displays.

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3"H, 6¼"W, 5½"D

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2½"H, 5"W, 4"D

Black, White or Clear Cover
$6.50 ea

RED OR GREY PLEXIGLAS FOR DIGITAL BEZELS
3"x6"x1/8" **95¢** ea **4/$3**

SEE THE WORKS Clock Kit Clear Plexiglas Stand

- 6 Big .4" digits
- 12 or 24 hr. time
- 3 set switches
- Plug transformer
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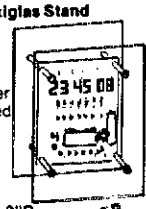

Plexiglas is Pre-cut & drilled
Kit #850-4 CP
Size: 6"H, 4½"W, 3"D

$23.50 ea. **2/$45.** A SUPER CLOCK!

JUMBO DIGIT CLOCK

A complete Kit (less Cabinet) featuring: six .5" digits, MM5314 IC 12/24 Hr. time, 50/60 HZ., Plug-Transformer, Line Cord, Switches, and all Parts. (Ideal Fit in Cabinet II) Kit # 5314-5 ... **$19.95 2/$38.**

WITH PC Board

JUMBO DIGIT CONVERSION KIT $9.95 ea.

Convert small digit LED clock to large 5" displays. Kit includes 6 - LED's, Multiplex PC Board & easy hook-up info.
Kit # JD-1CC For common Cathode
Kit # JD-1CA for common Anode

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EF-21360

2-1/4"x3" 5/32" thick

$4.95 6/$28.

25 AMP BRIDGE

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A truly "State of the Art" counter using quality components throughout.

KIT INCLUDES: DETAILED INSTRUCTIONS, XTAL, TOP QUALITY FIBERGLASS DOUBLE SIDED PC BOARD, IC'S WITH SOCKETS AND ALL PARTS LESS POWER SUPPLY AND CABINET.

50 MHZ COUNTER KIT	#FC-50	**$69.95**
5 VOLT REGULATED 1 AMP POWER SUPPLY KIT	#PS-02	$9.95
350 MHZ PRESCALER KIT	#PSL-350	23.95
650 MHZ PRESCALER KIT	#PSL-650	$29.95
CABINET [& MTG HARDWARE]	#CAB III	$19.95

[CABINET WILL HOUSE #FC-50, #PS-02, AND A PRESCALER]

Fairchild Super Digit FND-359

.4" Char. Ht. 7 segment LED RED Com. Cath. Direct pin replacement for popular FND-70.

95¢ ea, 10/$8.50 100/$79.00

SET OF 6 FND-359 WITH MULTIPLEX PC BOARD $6.95

NYLON WIRE TIES

8" TIE-WRAP 100/$1.95
4" TIE WRAP 100/$1.75

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12 VAC at 150 MA	$ 2.50
12 VAC at 500 MA	3.50
VAC at 1.75 VA	93.50

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74S00	$ .35
74S01	.40
74S04	.55
74S05	.60
74S09	.55
74S10	.40
74S20	.50
74S22	.45
74S40	.45
74S50	.45
74S51	.55
74S60	.65
74S64	.55
74S74	.85
74S75	1.75
74S78	1.50
74S86	.95
74S107	.95
74S112	.95
74S113	1.40
74S114	.95
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74S134	.75
74S138	1.75
74S139	1.50
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74S155	1.95
74S156	1.95
74S157	1.80
74S158	2.50
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74S175	2.50
74S181	2.95
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MM5312	$ 4.95
MM5314	3.95
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CT-7001	7.95
CT 7002	13.95
MM5369	2.50

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7448	.95
75491	.65
75492	.55
9368	2.50

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LM 309 K TO-3	1.75
7805 TAB	.95
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7812 TO-3	1.50
7815 TO-3	1.25
7815 TAB	1.25
78L 15 TO-5	.75
7824 TO-3	1.25
723 DIP	.75
723 TO-5	.75

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2513 SIG	$ 9.95

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8	$ .25	$ .22	$ .20
14	.25	.22	.20
16	.28	.25	.23
18	.31	.28	.25
24	.50	.45	.40
28	.60	.55	.50
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5.242880 MHZ. $4.95
3.579545 MHZ. $1.95

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$0.95

Reel of 1000
100 for $1.25

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2N2712	TO 98	5/$1.00
2N3415	TO-9	5/$1.00
2N3704	TO-92	5/$1.00
2N4400	TO-92	5/$1.00
2N4125	TO-92	5/$1.00
2N4139	TO-92	5/$1.00
2N4437	TO-92	5/$1.00
2N6027	PUT	2/$1.00
2N5457	N J Fet	2/$1.00

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IN 4005	1A 600 PIV	11/$1.00
IN 4007	1A 1000 PIV	10/$1.00
RECTIFIER	2.5A 1000 PIV	4/$1.00
IN 914	SIL. SIGNAL	20/$1.00
IN 4148	SIL. SIGNAL	20/$1.00
DYAC	28V	4/$1.00

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556	DUAL TIMER	.95
565	PLL	.95
566	FUNCTION GEN	1.75
567	TONE DECODER	1.75

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DL 750	RED	.6"	LHDP	$2.95
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XAN 664	RED	.6"	NDP	$1.95

COMMON ANODE

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MAN 72	RED	.3"	LHDP	$1.25
XAN 81	YELLOW	.3"	RHDP	$1.75
XAN 351	GREEN	.3"	RHDP	$1.50
XAN 362	ORANGE	.3"	LHDP	$1.50
XAN 662	RED	.6"	NDP	$1.95
XAN 692	RED	.6"	NDP	$1.95

OP AMPS

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301	TO-5
709	DIP
709	TO-5
741	DIP
741	M DIP
741	TO-5
747	TO-5

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4016	.40
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4025	.20
4027	.40
4028	.85
4030	.35
4042	.75
4044	.60
4046	1.75
4049	.40
4050	.40

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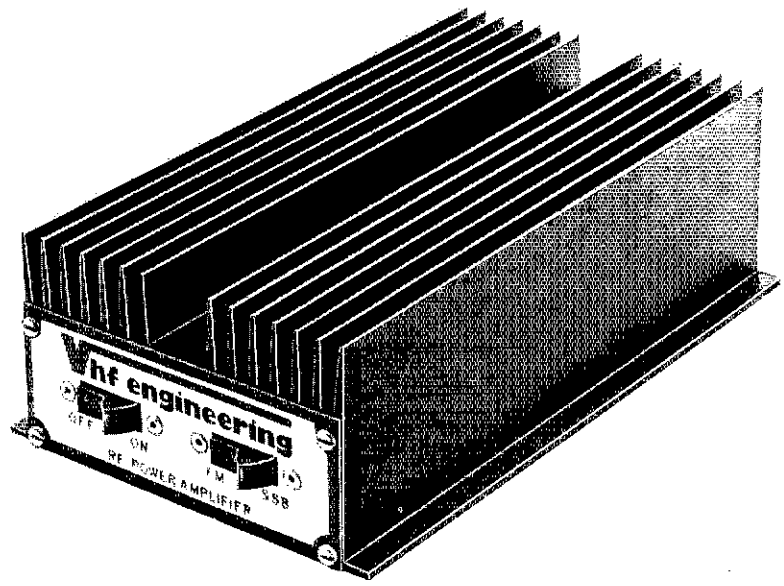

MODEL	FREQUENCY	EMISSION	POWER INPUT	POWER OUTPUT	WIRED AND TESTED PRICE
BLB 3/150	45- 55MHz	CW-FM-SSB/AM	3W	150W	TBA
BLC 10/70	140-160MHz	CW-FM-SSB/AM	10W	70W	139.95
BLC 2/70	140-160MHz	CW-FM-SSB/AM	2W	70W	159.95
BLC 10/150	140-160MHz	CW-FM-SSB/AM	10W	150W	259.95
BLC 30/150	140-160MHz	CW-FM-SSB/AM	30W	150W	239.95
BLD 2/60	220-230MHz	CW-FM-SSB/AM	2W	60W	159.95
BLD 10/60	220-230MHz	CW-FM-SSB/AM	10W	60W	139.95
BLD 10/120	220-230MHz	CW-FM-SSB/AM	10W	120W	259.95
BLE 10/40	420-470MHz	CW-FM-SSB/AM	10W	40W	139.95
BLE 2/40	420-470MHz	CW-FM-SSB/AM	2W	40W	159.95
BLE 30/80	420-470MHz	CW-FM-SSB/AM	30W	80W	259.95
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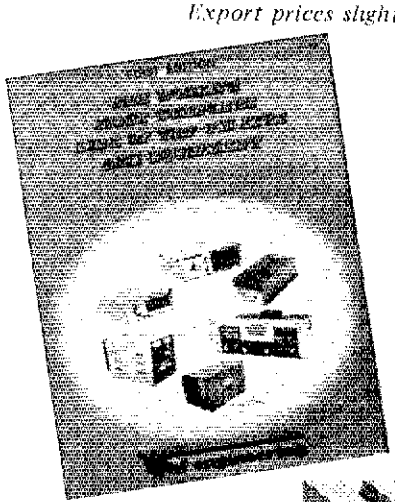

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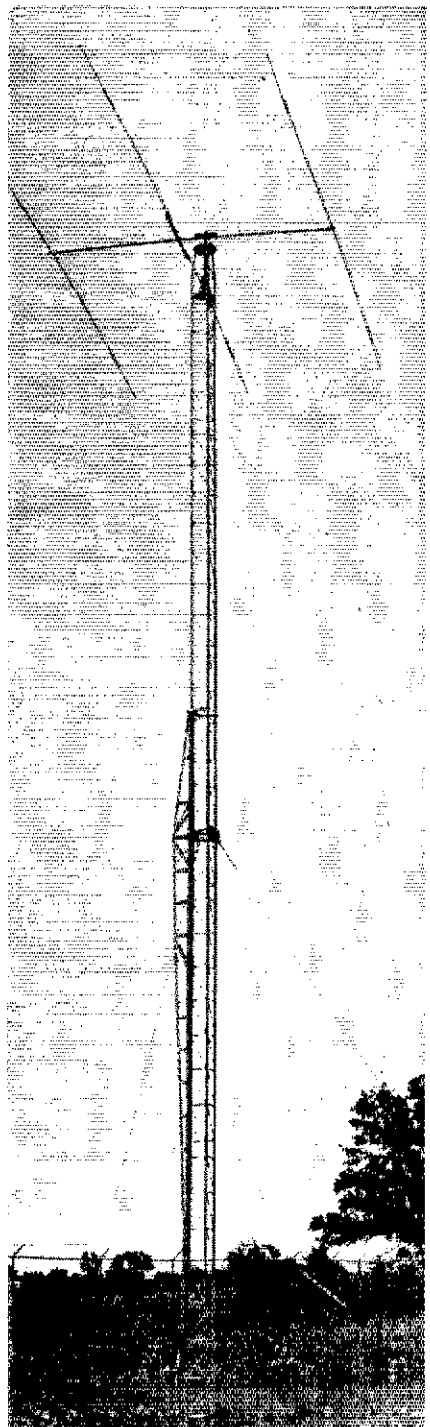

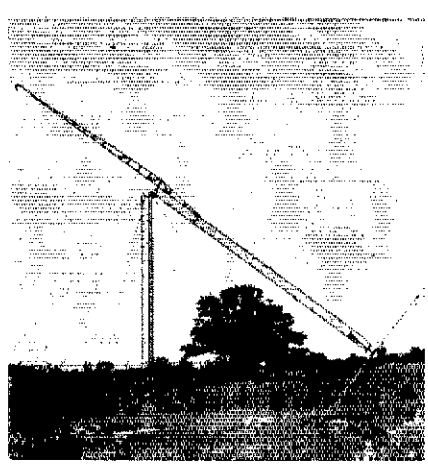

KPON	57	8	5EKEN	36	1
			LTAN	8	1

Very sorry to report WB4QVS as a Silent Key. He was very active on our Phone Nets and will be missed by all. WB4KTR and W4JHE have new rigs. Many thanks to WB4KLC for taking much of your incoming traffic reports. A reminder: applications for call-letter license plates are due Sept. 1. New appointments: WB4NAR WB4FXQ and WB4KLC as ORSs. Traffic: W4BAZ 93, WA4IGS 58, K4HRF 49, WB4EOR 44, W4CID 43, WA4JAV 36, K4HOE 29, WA4AVV 20, WA4RCD 19, W4CDA 19, K4UNW 15, WA4WSM 15, WB4KLC 14, WA4NAR 13, WB4JMQ 13, K4LOL 9, WA4SAC 7, K4FUM 5, WA4ROI 3, WA4KLN 2.

MICHIGAN: SCM, A. L. Baker, W8TZZ — SEC: W8MPD. RMs: W8JYA WB8NCD. PAMs: W8SOP K8LNE. VHF PAM: WA8WVV.

Net — Freq.	Time/Day	QNI	QTC	Sess.
QMN — 3663	2300 /0200 Dy	1144	411	90
MACS — 3953	1600 Dy	972	324	36
WSBN — 3935	0001 Dy	917	122	31
UPEN — 3922	2230 Dy	807	76	35
CLETN — 3932	0230 Dy	629	76	27
BR/MEN — 3930	2230 Dy	754	67	31
MI6M — 50.7	0001 Dy	270	29	27
MNN — 3720	2230 Dy	131	28	28
VHF PAM		381	5	16

K8SWW reports he lost the ZF1 call due to some US Ham using a ZF1 call portable 4. It appears ZF1 calls will no longer be available. March appointees are: WA8WWS ORS; K8ROH EC; W8SOP PAM; WB8DCR OO. K8VQP is now W8TO. W8JYZ will be active in FL as N4MB. Election results: Wolverine Net Manager W8SOP; Asst. Mgr, WB8VAI; Secy/treas, W8POZ. New licensees: WD8s DQR DQS DQT DQV EBV ECH JEP JER JES JET JNQ JNR JNS. Congratulations. Please report your 2M net activities to WA8WVV for tabulation. WA8AAP is now active on 2M. New equipment: WB8ABF has a Wilson HT, WB8ALG a TS 820. Your club or group may route its Field Day message to the SCM through any of the nets listed at the beginning of this column. Regretfully I report W8NAN is a Silent Key. Traffic: (Mar.) WB8ITT 258, W8VPW 182, WB8YDZ 139, WB8POL 127, WB8DKQ 125, W7KQU/8 112, WA8OIE 104, WA8DHB 97, W8GLC 85, W8YIQ 78, W8NOH 69, W8OW 66, W8CSO 65, W8UFS 65, K8LNE 62, WA8WZF 62, W8MO 59, W8IYA 54, K8WRJ 54, WD8CIQ 51, WB8NCD 50, WA8WWS 50, WB8JIX 49, K8PYN 45, WA8SVI 44, WB8DJS 42, K8DTG 36, WB8UFS 32, K8EYI 31, W8CUP 30, W8IHX 25, W8IUC 24, WA8WWM 24, W8EOI 23, WB8SNT 22, K8JED 20, W8JUP 20, W8LDS 20, W8SDB 20, W8TZZ 20, WB0T 18, WB8BYB 17, W8VIZ 17, WD8AIO 16, WB8CIN 15, WB8FBG 14, W8HKL 14, W8IOT 14, WB8QYC 14, WB8MTD 12, W8UOQ 12, WB8JNJ 11, W8SCW 11, WB8VAI 11, K8ZJU 11, K8GXV 10, WA8WVV 10, WB8EYM 7, W8RNQ 7, W8WVL 5, WD8AXG 4, WB8KBZ 4, W8TBP 4, WD8CUU 2, W8JLD 2, WB8TTA 2, W8LOU 1. (Feb.) W8JYA 118, WA8TBL 32, WB8MTD 66, W8KBZ 40, WB8BYB 17, WB8VOM 17, W8DC 16, W8LOU 11, WA8AXF 6. Total 3179.

OHIO: SCM, Hank Greeb, W8CHT/N8XX/WR8AJO/WR8AJP. SEC: WA8KPN. Asst. SCM: William K. Schaeffer, WA8MCR. PAMs: W8OIL, W8FU WA8SSI. RMs: WB8KKI W8LTA WB8JGW WB8VLR. Net reports (Mar.)

Net — Freq.	Time(Z)	Sess.	QNI	QTC
O6MN — 50.16	0100	31	196	40
ONN — 3.708	2230	22	94	26
BN — 3.577	2245/ 0200	61	459	262
BNR — 3.605	2200	31	119	122
OSN — 3.577	2210	31	219	88
OSSBN — 3.9725	1430/ 2000/ /2245	93	1549	894

Ohio Interstate QSO Party, Aug. 27 & 28, 1977, sponsored by Ohio Council of Amateur Radio Clubs. Details in July QST. OH Amateurs assisted in flood relief operation for floods which hit neighboring West Virginia and Kentucky. Public Relations is getting a big boost in Cleveland, with K8ONA and W8UDG on interview on WJW and WDOK. W8OMY and WA8COA write regular newspaper column in Columbus and Cincinnati, respectively. Tri-County Repeater Assn., Delphos, is new affiliate. WA8KPN reports highest activity ever during SET and real emergencies which occurred during Jan. Traffic: WA8MCR 435, W8PMJ 305, WB8KKI 225, W8LTA 223, W8ALS 202, N8CW 194, WB8YVI 135, K8BYR 116, WB8KWD 116, WB8WTS 116, W8TH 113, W8OE 100, K8LGA 98, W8DIL 94, N8IM 94, WD8ACM 83, WB8OMQ 78, N8XX/8 72, WB8CJU 71, WB8TRK 71, WB8MRL 67, K8ONA 61, K8MLO 53, WA8RQQ 48, W8JD 46, WA8KPN 46, W8LZE 44, W8TP 43, WB8VRX 38, WA8ZWH 37, W8IQ 36, W8CXM 35, WB8HHN 34, K8LXA 33, WA8COA 27, W8WEG 27, WB8YBJ 27, WB8OFR 24, W8IM 22, W8QZK 22, W8OUU 19, K9QYR 19, WB8PIY 18, W8GOE 17, WB8GGR 13, WA8GPO 12, WA8MAZ 12, WA8VEC 12, W8ARW 11, K8CKY 11, WD8DQX 10, W8BHL 9, W8DCX 9, WD8DMD 9, W8QCU 8, WA8TSX 7, W8EK 6, K8MR 6, N8AA 5, W8DPW 4, WB8UIN 4, WB8WEK 4, K8HF 2.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Gary J. Ferdinand, W2CS — Asst. SCM: Guy Olinger, K2AV. SEC: WB2VUK. Asst. SEC: K2AYQ. RMs: WB2IXW K2OYG. PAMs: WB2QEI WB2EMU. Congratulations to WB2EKM and WA2LNA on receiving their Extra Class licenses. Also to WB2CAA WB2BDX WA2EWP and WB2VVS who have recently become Advanced Class, and to WB2ACX WA2ZCO WA2AXH WA2PGI and WB2DOI who have recently received their General Class tickets. New Novice graduates of the Albany club class: WA2LHN WB2LHN WA2LVB WB2LUB WA2LUV and WA2LUD. WA2KHI and WB2KNN received their General Class tickets while the course was still in progress. The club is planning a General class course for the fall. Students from the Maple Hill high school club, WB2YCR participated in the March of Dimes Walkathon. SEC WB2VUK presented a charter of affiliation to the radio club at the Montrose VA Hospital, WB2ELA. WB2YQU reports working a high latitude aurora on 2 meters. With only ten watts to a sixteen-element beam he worked VE2 VE3, and PA. WA2ZPT worked W8 and W9 in the same opening. Sincere apologies to K2HNW whose Jan. traffic total of 32 was accidentally omitted. More call sign changes: WA2CNE now W2JU, WA2AMU now

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10 Amp	50V	1.25
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Over 50,000,000 in stock

*330 ohm	22K ohm
470 ohm	27K ohm
**680 ohm	33K ohm
1K ohm	39K ohm
1.2K ohm	43K ohm
2.2K ohm	47K ohm
3.3K ohm	82K ohm
4.7K ohm	100K ohm
6.8K ohm	150K ohm
10K ohm	220K ohm
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MK 5005

4 digit counter/latch decoder; 7 segment output only. 24 pin dip with specs.
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- 3½" x 3½" x 1½"

ONLY $19.95

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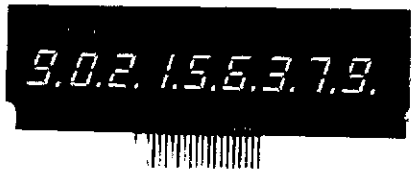
Kit Includes: 12 digit display .4" Character Power supply for display above Complete specs for hookup.

Line cord Not Included. **ONLY $ 3.95**



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Small	Med.	Large
$1.50	$2.00	$2.75
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W-4-3/4"	W-4-7/8"	W-7"
H-1-7/8"	H-3-1/2"	H-4"

All cases have a sloped front; white with black wrinkle finish.

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7806	7824
7808	7905
7812	7912
7815	7915

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TI 6 digit array C.C. 3/1.00
MAN 8 .3"CA Yellow .89
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*Continously variable from 5V to 20V
*Excellent regulation up to 500 mil.
*4400 Mfd of filtering
*Drilled fiberglass PC Board
*One hour assembly
*Kit includes all components
*Case Included

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Same as above but with 1 amp output, also with case.

ONLY $13.95

CLOCK KIT

Kit includes
- LT701 clock module
- Power Supply
- Punched case
- 12 or 24 hour operation

Complete except for line cord

LT701E 12 Hour Clock
ONLY $14.95

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2N2222	6/1.00
2N2369	6/1.00
2N2905	4/1.00
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2N3906	6/1.00
2N4400	6/1.00
2N4443 SCR	3/1.00
1N4004	15/1.00
1N4007	10/1.00
1N4148 (1N914)	20/1.00
3N201 VHF Pre amp	.80
D40C1 Power Darl – 8/1.00	

*House numbered and P.C. Lead

PC BOARDS

4 digit PCB for FND800 or 807	2.50
6 digit PCB for FND800 or 807	3.50
4 digit PCB for DL707	1.50
6 digit PCB for DL707	2.00
4 digit PCB for FND503 or 510	2.00
6 digit PCB for FND503 or 510	3.00
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6 digit PCB for DL747	3.00
4 digit PCB for DL727 or 728	2.00
6 digit PCB for DL727 or 728	3.00
4 digit PCB for FND359 or 70	1.75

NOTE: All PC Boards are multiplexed for adding additional digits.

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New, includes 2-56, 4-40, 6-32 and 8-32 screws and nuts. A very usable selection.

½ pound $1.50
1 pound $2.60

TTL

7400	.17	7473	.21
7401	.17	7474	.35
7402	.17	7475	.55
7403	.17	7476	.35
74H04	.25	7480	.45
7404	.17	7483	.76
7406	.25	7485	.89
7408	.17	7486	.35
7409	.17	7490	.71
7410	.17	7491	.71
7411	.25	7492	.71
7413	.45	7493	.67
7420	.17	7494	.90
7421	.17	7495	.71
7423	.35	7496	.85
7425	.27	74100	.96
7426	.25	74121	.31
7427	.17	74123	.61
7430	.25	74125	.44
7432	.30	74141	.71
7437	.35	74145	.97
7438	.35	74151	.71
7440	.17	74153	.81
7442	.60	74154	.97
7443	.60	74161	.91
7444	.65	74163	1.05
7446	.85	74164	1.05
7447	.81	74174	.91
7448	.81	74175	1.40
7450	.20	74180	.76
7451	.17	74181	2.25
7453	.17	74191	1.20
7454	.17	74192	1.20
7470	.35	74193	.95
7472	.21	74195	.65

LINEARS

LM301	.30
LM307	.30
LM309K	.95
LM311	.85
LM377	1.85
LM380 (8 pin)	.75
LM3900	.30
LM710	.25
LM711	.25
LM723	.40
LM741	.25
LM748	.25
NE553	1.95
NE555	.40
NE556	.95
NE565	.95
NE566	.95
NE567	1.10
1458	.49
RCA3043	.75
75491	.30
75492	.30

L S

74LS00	.25
74LS02	.25
74LS04	.30
74LS08	.25
74LS10	.25
74LS11	.32
74LS20	.31
74LS21	.33
74LS22	.33
74LS27	.30
74LS30	.31
74LS32	.33
74LS37	.40
74LS38	.35
74LS74	.49
74LS90	.85
74LS132	.90
74LS138	.89
74LS139	.89
74LS155	.90
74LS157	1.00
74LS162	1.39
74LS163	1.39
74LS175	1.09
74LS193	1.09
74LS258	1.09
74LS367	.70
74LS368	.70

CMOS SALE

4020	.85	4046	.90
CD4000	.16	CD4040	1.00
CD4001	.16	CD4041	.69
CD4002	.16	CD4042	.59
CD4007	.16	CD4043	.60
CD4009	.45	CD4044	.59
CD4010	.45	CD4047	.59
CD4011	.16	CD4049	.35
CD4012	.16	CD4050	.35
CD4013	.29	CD4051	.90
CD4014	.75	CD4053	.90
CD4015	.75	CD4056	1.00
CD4016	.29	CD4058	.90
CD4017	.80	CD4060	1.00
CD4018	.80	CD4066	.69
CD4019	.39	CD4069	.30
CD4021	.90	CD4071	.16
CD4022	.90	CD4076	.99
CD4024	.70	74C04	.29
CD4025	.19	74C107	.29
CD4027	.39	CD4116	.39
CD4028	.75	CD4507	.40
CD4029	.99	CD4512	.50
CD4030	.16	CD4516	.85
CD4034	2.30	CD4518	.85
CD4035	.99	CD4520	.85

60 Hz Crystal Time Base Kit

– Kit enables a MOS clock circuit to operate from a DC power source. Ideal for car, camper, van, boat, etc.

60Hz output with an accuracy of .005% (typ.) Low power consumption 2.5 ma (typ.). Small size will fit most any enclosure. Single MOS IC oscillator/divider chip 5-15 volts DC operation.

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2 for $10.00

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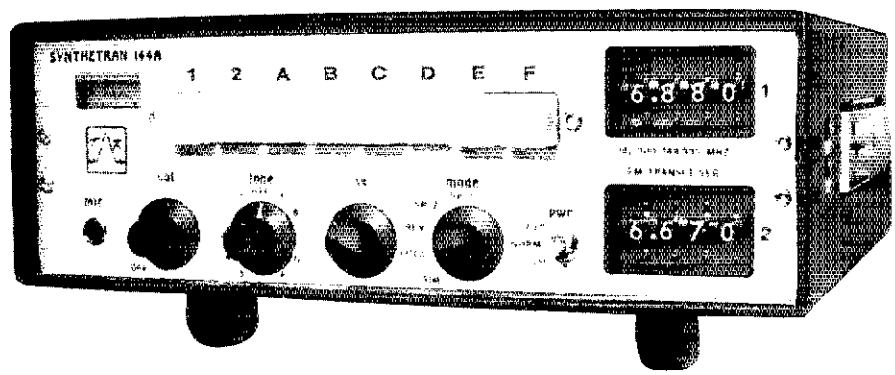
New Distinction In Amateur Communication . . .

the SYNTHETRAN 144



The SYNTHETRAN 144 is a distinctive, new transceiver designed for amateur 2 meter communication. Engineered for the knowledgeable amateur who desires the unchallenged enjoyment of quality FM communication, the SYNTHETRAN 144 offers advanced capabilities that distinguish it from all others.

The unique styling of the SYNTHETRAN 144 enhances the appearance of a unit that provokes the imagination.

Cabinet Size:
10.25 x 10.25 x 3.38 inches
Supply Requirement:
8-15 volts d.c.
13.6 v. d.c. nom.
6 Amps on Transmit
Weight:
9 Pounds
RF Power Output
20 Watts

You won't find CW, SSB, or AM here, since compromised circuitry has no place in a radio that is intended to provide complete operating convenience and the pleasure of pure FM in today's 2 meter band.

From extensive research and development emerges a receiver that is superior to the market with unprecedented intermod rejection and AM (ignition noise) rejection.

Sophisticated electronics allows the operator to select at the push of a button, six of his own pre-programmed frequencies with automatic $\pm$ 600 kHz repeater offset or simplex capability. Yet, easy to adjust front panel dials permit access to the synthesizer and the choice of any two additional frequencies. This unusual versatility offers the amateur complete freedom of operating frequency from 142.000 to 149.995 kHz, and simplifies operation for those who desire immediate channel selection.

Crystal controlled subaudible tones, tone burst, and autopatch encoder interface are available.

All chassis and cabinetwork is fabricated with extra-strength metal which provides physical protection for reliability and dependability of the electronic functions of the transceiver during mobile use.

When you look inside you'll find that the solid state design and components of the electronic circuitry are identical to the precision craftsmanship of the highest quality laboratory instruments.

The front panel is made of anodized, brushed aluminum and is glare-free and scratch resistant, and all lettering is done with two-part epoxy paint to ensure long-life.

The frequency selection push-buttons are large sized and the channel in use is lighted for operator reference. All front panel lighting is controlled photoelectrically so that light intensity is automatically varied with changes in the environment, especially helpful to reduce glare and distraction during night-time mobile operation. Control knobs are properly sized and logically placed for ease of operating convenience. The cabinet is covered with cushioned vinyl for shock absorption, enriched audio response, and attractiveness.

Pause for a moment.....envision how elegant the SYNTHETRAN 144 would look in your shack, den, or office.

Consider the enjoyment of communication with a sophisticated instrument designed just for your pleasure, with advancements so new that it is truly distinguished from the others.

Sounds satisfying, doesn't it?

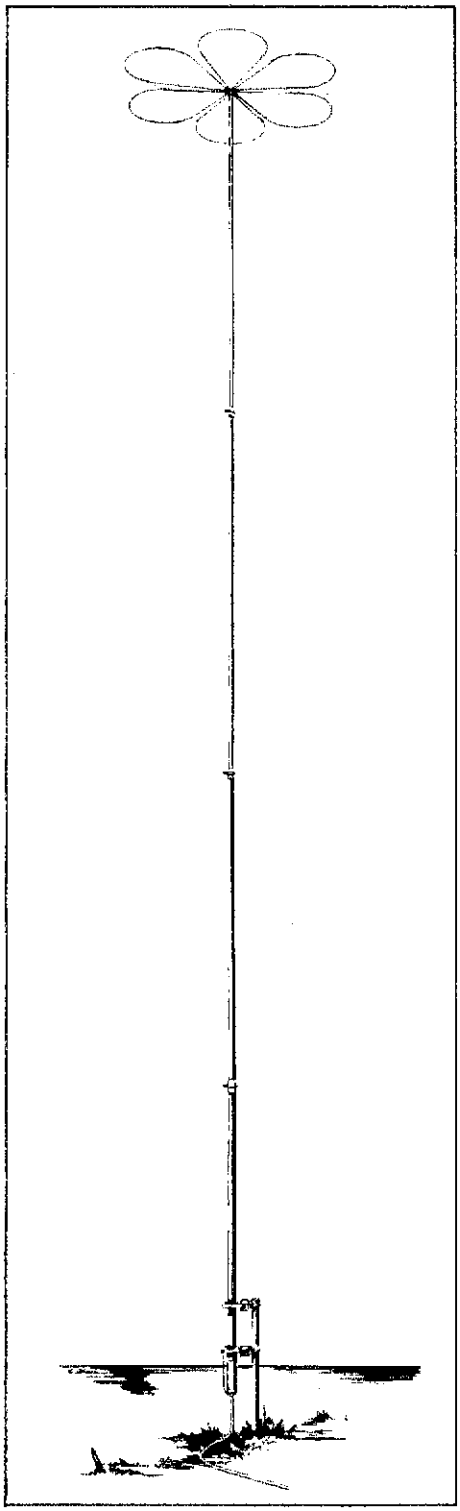
You'll find no other transceiver on the market that compares for 2 meter FM communication.

The SYNTHETRAN 144
A radio that commands attention - and demands respect.

Inquire at your dealer's or write for more information

TEC-KAN, Inc.
2918 ARNOLD AVE
BUILDING NO. 317
SALINA, KANSAS 67401
Tel. 913-823-2235

The new standard in vertical antennas: Ω



The Omega-t HV-3 triband 80/40/20 meter vertical represents a standard against which all future vertical antennas will be judged, offering a combination of features unmatched by any other vertical at any price:

- **Performance**—Top loaded 30 foot vertical has **no traps;** the **full height** is utilized on each band, resulting in higher radiation resistance and directivity, hence greater bandwidth, efficiency, gain, and a lower angle of radiation.
- **Construction**—Heavy duty, self supporting construction of 6061T-6 heavy wall extruded pipe is chromate dipped to Military Specifications. All hardware and top loading rods are stainless steel. Rated for wind load of 30 psf (86 mph).
- **Ease of Installation**—Quickly assembled and installed. Tilt-up mounting base attaches to pipe driven into ground or 4x4 post.
- **Appearance**—Inconspicuous—Stands slim, tall and straight. No guy wires.
- **Convenience of Tuning**—All tuning and matching is done at the base with our HP-series plug-in matching units. Continuously variable slug-tuned coils are used for tuning and matching. Tuning within a band or changeout of matching units can be accomplished in seconds.
- **Band Coverage**—Model HV-3 includes basic HV-1 radiator and revolutionary HP-T triband matching unit for 20/40/80 meter operation without switching (patent applied for). Other plug-in matching units are available for all frequencies in the 1.8-18 MHz range.
- **Power Handling**—Full legal power, SSB and CW.
- **Value**—Model HV-3, including radiator and triband matching unit—$169.90; HV-1 (radiator only) $129.95; single band plug-ins—$39.95 or $44.95 depending on band. F.O.B. Richardson, Texas.

See your amateur radio dealer or order direct.

Another Omega-t product by:

ELECTROSPACE SYSTEMS, INC.

P.O. Box 1359 • Richardson, Texas 75080 • Telephone (214) 231-9303 • TWX 910-867-4768

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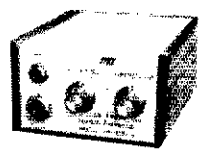
UP TO 400% MORE RF POWER
PLUGS BETWEEN YOUR MICROPHONE AND TRANSMITTER

$49.95

LSP-520BX. 30 db dynamic range IC log amp and 3 active filters give clean audio. RF protected. 9 V battery. 3 conductor, ¼" phone jacks for input and output. 2-3/16 x 3-1/4 x 4 inches.



$59.95

LSP-520BX II. Same as LSP-520BX but in a beautiful 2-1/8 x 3-5/8 x 5-9/16 inch Ten-Tec enclosure with uncommitted 4 pin Mic jack, output cable, rotary function switch.

SUPER LOGARITHMIC SPEECH PROCESSOR

Up To 400% More RF Power is yours with this plug-in unit. Simply plug the MFJ Super Logarithmic Speech Processor between your microphone and transmitter and your voice is suddenly transformed from a whisper to a **Dynamic Output.**

Your signal is full of punch with power to slice through QRM and you go from barely readable to "solid copy OM".

$27.95

CWF-2BX Super CW Filter

By far the leader. Over 5000 in use. Razor sharp selectivity. 80 Hz bandwidth, extremely steep skirts. No ringing. Plugs between receiver and phones or connect between audio stage for speaker operation.

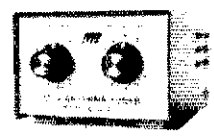
• Selectable BW: 80, 110, 180 Hz • 60 dB down one octave from center freq. of 750 Hz for 80 Hz BW • Reduces noise 15 dB • 9 V battery • 2-3/16 x 3-1/4 x 4 in. • CWF-2PC, wired PC board, $18.95 • CWF-2PCK, kit PC board $15.95

$49.95

CMOS-8043 Electronic Keyer

State of the art design uses CURTIS-8043 Keyer-on-a-chip.

• Built-in Key • Dot memory • Iambic operation with external squeeze key • 8 to 50 WPM • Sidetone and speaker • Speed, volume, tone, weight controls • Ultra reliable solid state keying +300 volts max. • 4 position switch for TUNE, OFF, ON, SIDETONE OFF • Uses 4 penlight cells • 2-3/16 x 3-1/4 x 4 inches



$39.95

NEW

MFJ-16010 Antenna Tuner

Now you can operate all band — 160 thru 10 Meters — with a single random wire and run your full transceiver power output — up to 200 watts RF power OUTPUT.

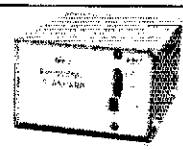
• Small enough to carry in your hip pocket, 2-3/16 x 3-1/4 x 4 inches • Matches low and high impedances by interchanging input and output • SO-239 coaxial connectors • Unique wide range, high performance, 12 position tapped inductor. Uses two stacked toroid cores

$29.95

SBF-2BX SSB Filter

Dramatically improves readability.

• Optimizes your audio to reduce sideband splatter, remove low and high pitched QRM, hiss, static crashes, background noise, 60 and 120 Hz hum • Reduces fatique during contest, DX, and ragchewing • Plugs between phones and receiver or connect between audio stage for speaker operation • Selectable bandwidth IC active audio filter • Uses 9 volt battery • 2-3/16 x 3-1/4 x 4 inches

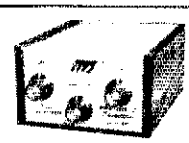


$27.95

MFJ-200BX Frequency Standard

Provides strong, precise markers every 100, 50, or 25 KHz well into VHF region.

• Exclusive circuitry suppresses all unwanted markers • Markers are **gated** for positive identification. CMOS IC's with transistor output. • No direct connection necessary • Uses 9 volt battery • Adjustable trimmer for zero beating to WWV • Switch selects 100, 50, 25 KHz or OFF • 2-3/16 x 3-1/4 x 4 inches



$49.95

MFJ-1030BX Receiver Preselector

Clearly copy weak unreadable signals (increases signal 3 to 5 "S" units).

• More than 20 dB low noise gain • Separate input and output tuning controls give maximum gain and RF selectivity to significantly reject out-of-band signals and reduce image responses • Dual gate MOS FET for low noise, strong signal handling abilities • Completely stable • Optimized for 10 thru 30 MHz • 9 V battery • 2-1/8 x 3-5/8 x 5-9/16 inches

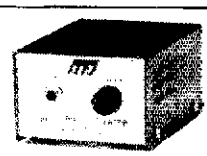
$27.95

MFJ-40T QRP Transmitter

Work the world with 5 watts on 40 Meter CW.

• No tuning • Matches 50 ohm load • Clean output with low harmonic content • Power amplifier transistor protected against burnout • Switch selects 3 crystals or VFO input • 12 VDC • 2-3/16 x 3-1/4 x 4 inches

MFJ-40V, Companion VFO $27.95
MFJ-12DC, IC Regulated Power Supply, 1 amp, 12 VDC $27.95



$15.95

NEW

CPO-555 Code Oscillator

For the Newcomer to learn the Morse code.
For the Old Timer to polish his fist.
For the Code Instructor to teach his classes.

• Send crisp clear code with plenty of volume for classroom use • Self contained speaker, volume, tone controls, aluminum cabinet • 9 V battery • Top quality U.S. construction • Uses 555 IC timer • 2-3/16 x 3-1/4 x 4 inches

TK-555, Optional Telegraph Key $1.95

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73, Martin F. Jue, K5FLU

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TO PLACE YOUR ORDER:

The all solid state full coverage Atlas 350-XL transceiver is now in full production at our Oceanside, California factory, and we are shipping units daily to all our dealers.

Call your Atlas dealer today. If he doesn't have them in yet, he will in a few days.

And if you are impressed with the high performance, wide versatility, many advanced state of the art features, power and clean signal of the Atlas 350-XL, we suggest you place your order soon with your dealer. While we are catching up with the sales, we anticipate being back-ordered for several months, so the earlier you place your order, the sooner you'll have the transceiver that has everything you'll ever need.

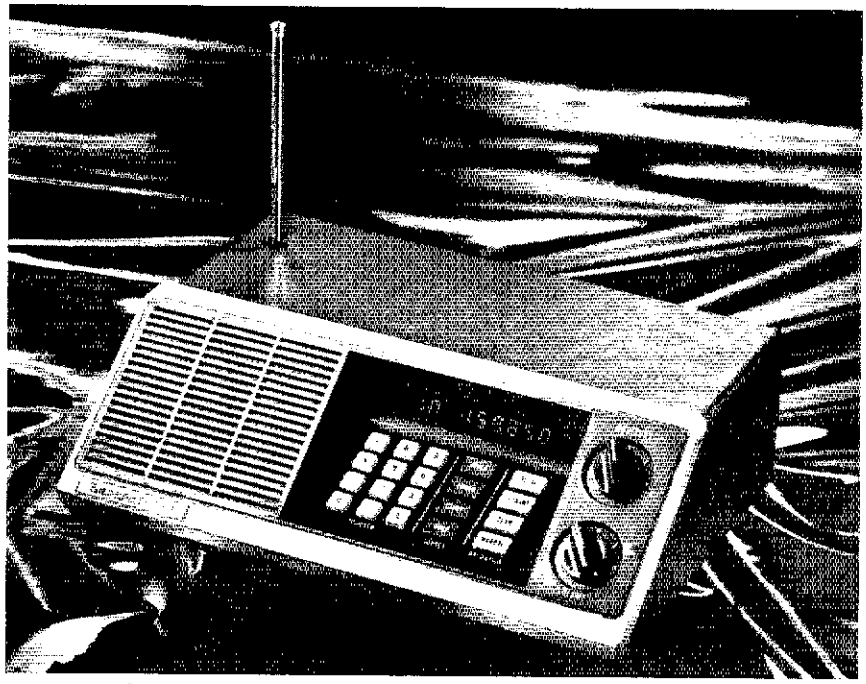
- 100% solid state
- SSB/CW Transceiver
  Includes VOX, CW side-tone, and full break-in
- Full coverage of 10-160 meter bands
- 350 watts P.E.P. or CW input
- Digital Dial Frequency Readout (Optional)
- Plug-in auxiliary VFO or crystal oscillator (Optional)

Atlas 350-XL (less options) $895

ATLAS RADIO INC.

417 Via Del Monte, Oceanside, CA 92054
Phone (714) 433-1983
Special Customer Service Direct Line
(714) 433-9591

Bearcat® 210 $289.



The Bearcat® 210 is a sophisticated scanning instrument with the ease of operation and frequency versatility you've dreamed of. Imagine, selecting from any of the public service bands and from all local frequencies by simply pushing a few buttons. No longer are you limited by crystals to a given band and set of frequencies. It's all made possible by *Bearcat* spaceage solid state circuitry. You can forget crystals forever.

Pick the 10 frequencies you want to scan and punch them in on the keyboard. It's incredibly easy. The large decimal display reads out each frequency you've selected. When you want to change frequencies, just enter the new ones.

Automatic search lets you scan any given range of frequencies of your choice within a band. Push-button lockout permits you to selectively skip frequencies not of current interest. The decimal display with its exclusive "rolling zeros" tells you which channels you're monitoring. When the *Bearcat* 210 locks in on an active frequency the decimal display shows the channel and frequency being monitored.

With the patented track-tuning system, the Bearcat 210 automatically aligns itself so that circuits are always "peaked" for any broadcast. Most competitive models peak only at the center of each band, missing the frequencies at the extreme ends of the band.

The Bearcat 210's electronically switched antenna eliminates the need for the long low band antenna. And a quartz crystal filter rejects adjacent stations as well as noise interference.

Call toll-free 800-521-4414 now to place a BankAmericard or Mastercharge order. This is our 24 hour phone to our order department and only orders may be processed on this line. To order in Michigan or outside of the U.S. dial 313-994-4441.

Add $5.00 for U.S. shipping or $9.00 for air UPS to west coast. Charge cards or money orders only please. International orders invited. Michigan residents add tax. Please write for quantity pricing.

Bearcat® 210 Features

- **Crystal-less**—Without ever buying a crystal you can select from all local frequencies by simply pushing a few buttons.
- **Decimal Display**—See frequency and channel number—no guessing who's on the air
- **5-Band Coverage**—Includes Low, High, UHF and UHF "T" public service bands, the 2 meter amateur (Ham) band, plus other UHF frequencies
- **Deluxe Keyboard**—Makes frequency selection as easy as using a push-button phone. Lets you enter and change frequencies easily try everything there is to hear
- **Patented Track Tuning**—Receive frequencies across the full band without adjustment. Circuitry is automatically aligned to each frequency monitored
- **Automatic Search**—Seek and find new, exciting frequencies
- **Selective Scan Delay**—Adds a two second delay to prevent missing transmissions when "calls" and "answers" are on the same frequency
- **Automatic Lock-Out**—Locks out channels and "skips" frequencies not of current interest
- **Simple Programming**—Simply punch in on the keyboard the frequency you wish to monitor.
- **Space Age Circuitry**—Custom integrated circuits . . . a *Bearcat* tradition
- **UL Listed/FCC Certified**—Assures quality design and manufacture.
- **Rolling Zeros**—This *Bearcat* exclusive tells you which channels your scanner is monitoring.
- **Tone By-Pass**—Scanning is not interrupted by mobile telephone tone signal
- **Manual Scan Control**—Scan all 10 channels at your own pace.
- **3-Inch Speaker**—Front mounted speaker for more sound with less distortion.
- **Squelch**—Allows user to effectively block out unwanted noise
- **AC/DC**—Operates at home or in the car.

Bearcat® 210 Specifications

Frequency Reception Range

Low Band	32—50 MHz
"Ham" Band	146—148 MHz
High Band	148—174 MHz
UHF Band	450—470 MHz
"T" Band	470—512 MHz

*Also receives UHF from 416—450 MHz

Size
10⅝" W x 3" H x 7⅝" D

Weight
4 lbs. 8 oz.

Power Requirements
117V ac, 11W; 13.8 Vdc, 6W

Audio Output
2W rms

Antenna
Telescoping (supplied)

Sensitivity
0.6μv for 12 dB SINAD on L & H bands
U bands slightly less

Selectivity
Better than −60 dB @ ± 25 KHz

Scan Rate
20 channels per second

Connectors
External antenna and speaker; AC & DC power

Accessories
Mounting bracket and hardware
DC cord

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KLM Multi 2700

A brilliant new 2 meter transceiver with every in-demand operating feature and convenience

★ **Synthesizer and VFO.**

★ **All modes: NBFM, WBFM, AM, SSB w/ USB/LSB and CW.**

- **Frequency synthesizer (PLL)** 3 Knob, 600 channels. 10kHz steps.
- **VXO,** plus or minus 7kHz.

★ **LED readout on synthesizer.**

- **Standard 600 kHz splits** plus...
- **Two "oddball" splits.**

★ **OSCAR transceive 2 to 10 meter operation.**

- **OSCAR receiver built-in.**
- **Connectors on rear for separate 2 meter and 10 meter antennas.**
- **Built-in VFO** (continuous coverage, 144-148MHz in 1.3MHz segments. 1kHz readout).
- **8 pole SSB filter** plus **two** FM filters.
- **100kHz crystal calibrator.**
- **Voice operated relay** (VOX) or p-t-t.

★ **Audio speech compression.**

- **Noise blanker.**
- **RIT,** plus or minus 5kHz.
- **Power out/"S" meter.**
- **FM center deviation meter.**
- **10W minimum output power. NO TUNING!**
- **Hi-Lo power provision.**
- **Built-in AC/DC power supply.**
- **Double conversion receiver.** 16.9MHz and 455kHz I-F's.
- **Receiver sensitivity:**

  FM: 0.5μV for 28db S/N.

  SSB/CW: 0.25μV for 14db S/N.

  AM: 2μV for 10db S/N.
- **Size:** Inches: 5H, 14.88W, 12D. MM: 128H, 378W, 305D
- **Weight:** 28 lbs. (13KG).
- **SOON!** 432 MHz **Transverter.**

OUR APOLOGIES for incorrect dealer listing in Apr. '77. QST.

Should have been:

AMATEUR ELECTRONIC SUPPLY, Inc. 4828 West Fond du Lac Avenue, Milwaukee, Wis. 53216 (414) 442-4200
AMATEUR ELECTRONIC SUPPLY, Inc. 17929 Euclid Ave., Cleveland, Ohio 44112 (216) 486-7330
AMATEUR ELECTRONIC SUPPLY, Inc. 621 Commonwealth Ave., Orlando, Fla. 32803 (305) 894-3238

Omitted: E. J. NARWID ELECTRONICS
61 Bellot Road,
Ringwood, N.J. 07456
(201) 962-4695

Incorrectly listed: JIMS HAM RADIO SALES
3086 N. Milton St.,
St. Paul, Minn. 55113
(612) 484-8030

At your favorite dealer. Write for catalog.

KLM electronics, inc.
17025 Laurel Road, Morgan Hill, CA U.S.A. 95037

W2MU. W2DPV WB2GMN WA2JPC and WB2DXL of the Communications Club of New Rochelle, demonstrated Amateur Radio to a local evening youth program. The new addition at Hq. building in Newington is progressing well. Why not take a drive over and see for yourself! PSHR to WA2YYM WA2UYL WB2EMU W2CS. Traffic: (Mar.) W2YJR 361, W2CS 171, WB2EMU 163, WA2UYL 155, W2BIW 119, WA2YYM 61, WB2AJD 28, WA2PAU 24, WA2CJY 23, K2HNW 18, WB2EKM 17, WB2ELA 7, WB2VVS 4. (Jan.) WA2YYM 44.

NEW YORK CITY — LONG ISLAND: SCM, John H. Smale, WB2CHY — Asst. SCM: Art Malatzky, WB2WFJ. SEC: K2HTX. RM: WB2LZN. PAM: WA2ECO. The following are traffic nets in and around the section:

Net	kHz	Time/Day	Manager
NLI*	3630	1900/2200 Dy	WB2LZN
NLI Phone*	3928	1730 Dy	WA2ECO
NLS*	3730	1800 Dy	WA2BMI
Clear House	3925	1100 Dy	W1UX
Mic Farad	3925	1300 MTWThFS	W1DFT
ESS	3590	1800 Dy	K2UIR
NYSTPEN	3925	1800 Dy	WA2RSP

*Denotes Section Net, all times local. WA2BMI now Mgr. for the NLS Net, I want to thank WB2YKG for the FB job he has done with the net. WA2BRF has been appointed Asst. EC for Kings County. It is with deep regret that we list WB2DTX as a Silent Key. The Hall of Science ARC went on a trip up to League Hdqts. Larkfield RC had their annual "carry in" auction at their Apr. meeting. WA2HMM is moving to FL. The Larkfield RC also reports that there now is a 10-meter rptr., thanks to FB effort from K2QPF. The freqs. are 29.56 in, 29.66 out, the machine is fm, also the freq. for their 220 rptr. is 223.02 in, 224.62 out. WB2IDP, harmonic of WA2QAO now has his General. WA2CRK has a new Heath 2m rig. WB2FHN reports that the Shelter Island ARC graduated 23 in their first Novice course. K2GCE is trying out a Hygain vert on all bands and good results. WB2CHY now has a WB2VYH keyer, now if I could just get back on 80 cw, and have a good sig, and win the state lottery and . . . The Kings County Rptr. Assn. had K2SJO as their guest speaker for the Apr. meeting. WA2BMI is looking for check-ins for the NLS net. W2LYH is building a portable/emergency cw xmtr/rcvr, using tubes yet, maybe we'll see an article in QST soon. For those who don't know it, WA2BMI is only 14 years old, he reports that he needs desperate help in paying for the postage for mailing out the bulletins, if anybody could help he would greatly appreciate it. W2MQB reports that the Montauk ARC is being affiliated with ARRL and that they have Novice classes. K2UMM is now K2LS and his ant. system now consists of 2 EIE at 50' for 40m, and four-elenent at 60' for 20m. K2OVS put up new ants. for 2m and 432. WA2ECO looking for more Manhatten EC members. I'm sorry to say that WB2LZN will be departing for Phila in the near future, Bob's one of those people that do so much for everyone else and he will be missed greatly. WA2HSQ is now a Life Member. Congratulations to WA2YEI who was promoted to head Technician at WQCC. His brother WB2KHR now has a new IC 215. WA2JZX has a new ICOM 225. Traffic: W2EC 387, WA2BMI 179, WB2LZN 137, WA2ECO 133, W2MLC 70, K2GCE 53, W2DBQ 40, W2LYH 29, WB2YKG 23, WB2BTA 17, WA2YEI 14, K2JFE 8, WA2HSQ 5.

NORTHERN NEW JERSEY: SCM, Louis J. Amoroso, W2ZZ —

Net — Freq. Manager	TIME(PM)/Days	Sess.	QNI	QSP
NJN — 3695 WB2CST	7:00 Dy	31	391	130
NJN — 3695 WB2CST	10:00 Dy	31	172	51
NJSN — 3730 WA2WIW	8:15 Dy			
NJPN — 3950 WA2SLF	6:00 Dy	31	540	233
NJPN — 3950 WA2SLF	9:00 A Su	4	79	24
PVTN — 145.7 WA2OPV	8:00 Dy			

SEC: WB2PBO. PAMs: WA2SLF and WA2OPV (VHF). RMs: WB2CST and WA2WIW. Congratulations to WA2DIW and WB2CST on making PSHR. Our Dir. K2SJO and V-Dir., W2IHA spoke at a recent meeting of the Tri-County Radio Assn. WB2PBO gave a presentation on traffic handling to the Cranford ARS. W2TV is active on 160. OscarDXCC totals as follows: W2BXA at 83, W2LV at 76 and W2RS at 63. WA2UOO has a vertical for 160. WA2AYY looking for a KL7 on 40. WB2FIU worked Zone 23 with his 60 watts. WA2GEZ DXCC now at 193. WA2JHP passed the General. WB2TRS reports that the Kearny ARC is conducting Novice Classes. W2NKD reports that the NJ RACES and Army MARSwill conduct a joint drill in Oct. Some change of calls in the section include: K2QDN is N2NA, WA2RYD is W2TV, W2GAM is N2RD, K2DNW is N2NN, WB2AXY is W2VT, K2SBW is N2CC, WB2OZW is K2OZ, WA2IDM is K2CL, WA2WBE is W2NJ, K2DT is K6FM and W2LT is K4DE. WA2UDT is active again with FT-101E and MN-4 plus TR-2200A for mobile. WA2MVQ will be the new SCM for our section beginning July 1. Please give him the support you gave all the others before him. He will need your support. Traffic: WB2ASD 464, W2TV 312, WA2AYY 81, W2ZEP 69, WB2CST 60, WA2FIB 40, W2SWE 38, WA2DIW 37, WA2NPP 33, W2ZZ 25, K2ZFI 22, WA2FZJ 21, WB2PBO 20, WA2CAK 17, WB2VTT 16, W2CC 13, WA2SLF 12, W2CU 11, WA2UOO 11, WA2DLZ 9, K2AM 7, W2CVW 6, WA2FUI 4, W2WOJ 3, W2ODV 2, WA2QJU 2.

MIDWEST DIVISION

IOWA: SCM, Max R. Otto, W0LFF — I regret to report K0TH (Ex-W0EGI), K0RDO and K0RHI are Silent Keys. Siouxland ARC has 99 members, and converting a travel trailer for emergencies. Scoland Repeater Assn. has 74 members. Congrats to K0UPV and W0BSH for Extra Class, WB0NBB for Advanced and WB0VVS for Tech. K0POF has a son W0CPC whose XYL is W0WDC and a son WB0OSK, another son WD0AKG whose XYL is WD0AKH, and cousin WB0LHM. Age range is 17 to 93. Some hold family reunions, they have a Hamfest. W0BX has 50-yr. QCWA pin. WA0WCR and W0FHE have cw DXCC. WA0VDX is now W0VX and W0LTB is W0KD. WB0DPG and W0GN operating WA0KHF with a TS-520. New equipment: WB0ODA WA0PHW and WB0TEM have TS-700A. WB0QMU a Paca-152,

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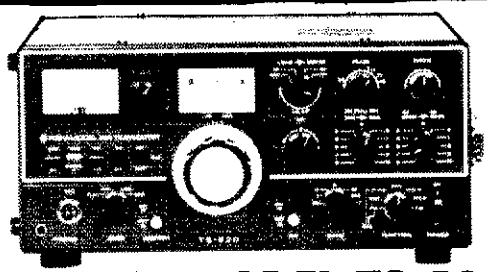

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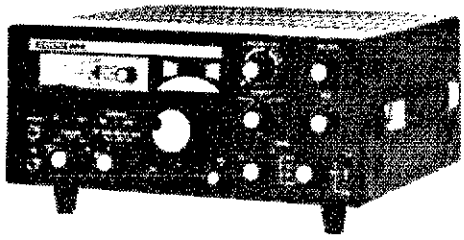

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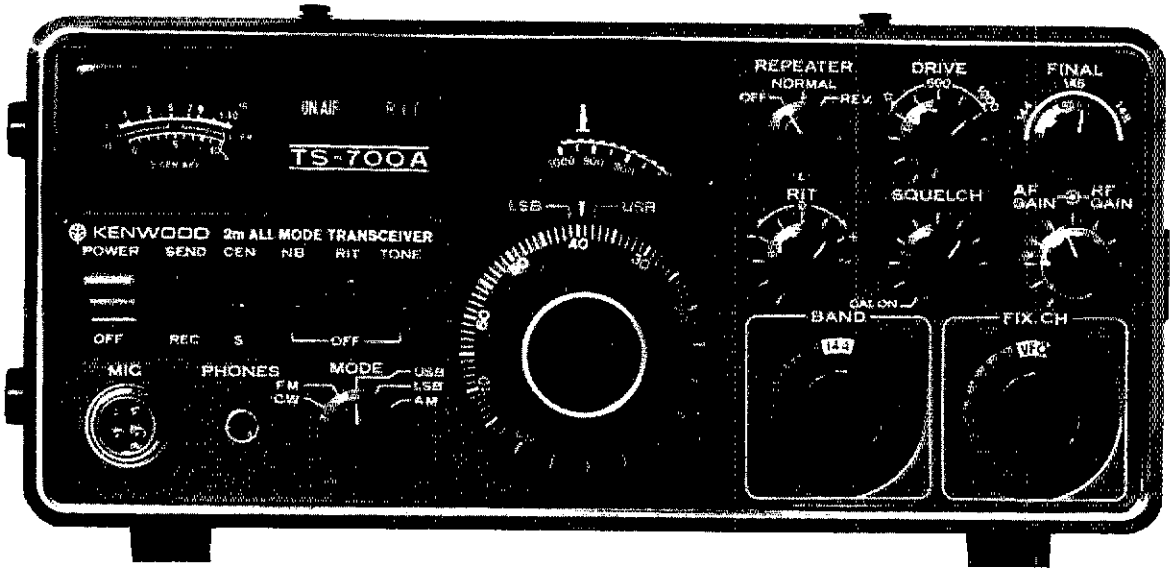

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4 MHz band coverage (144 to 148 MHz), completely solid state, AC and DC capability, automatically switches transmit frequency 600 KHz for repeater operation (146-148 MHz).

All this at a very attractive price.

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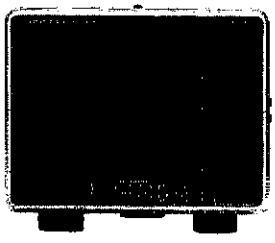
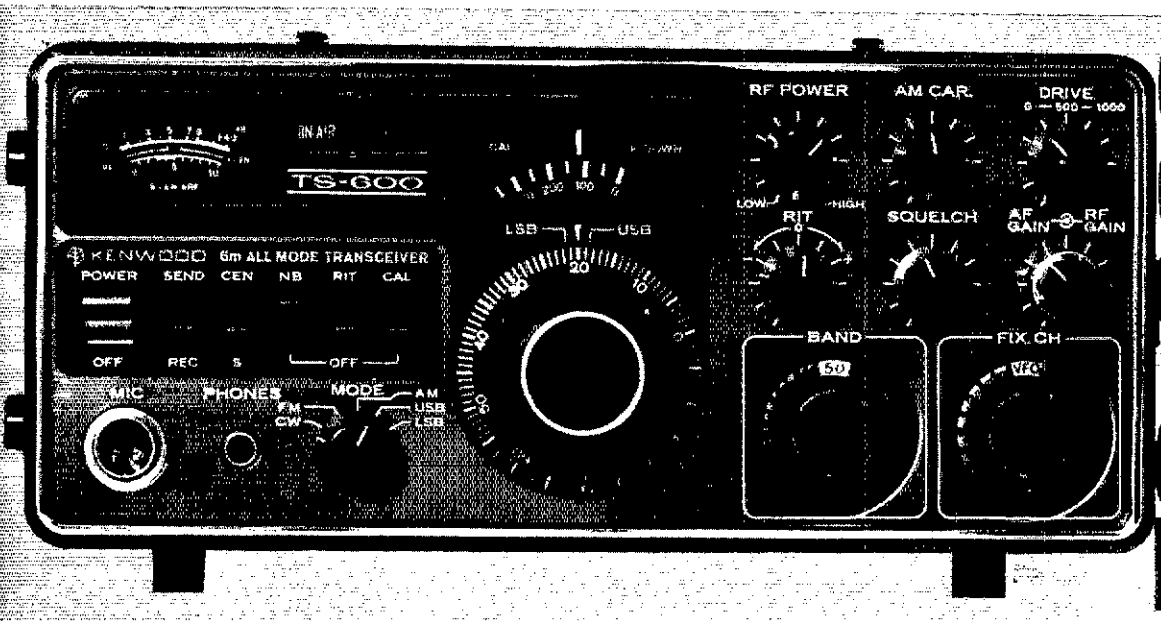


SP-70

This companion external speak provides outstanding audio chara teristics for your TS-700A ar TS-600.



TS-600

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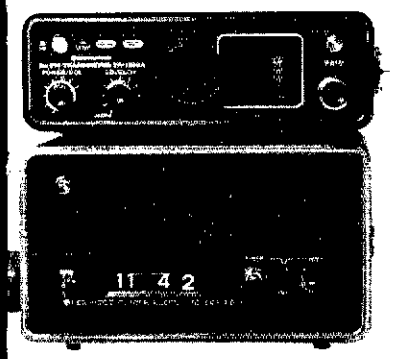
The hottest 2-meter mobile rig on the market. Features a brand new and unique squelch system with continuous tone coded squelch, tone burst, or carrier squelch. Full 4 MHz band coverage and 25 watt output. It's phase-locked loop (PLL) frequency synthesizer provides operation on 800 channels. The TR-7400A's list of features goes on and on, but even more important is its superb performance and dependability . . . and all at a surprisingly low price.



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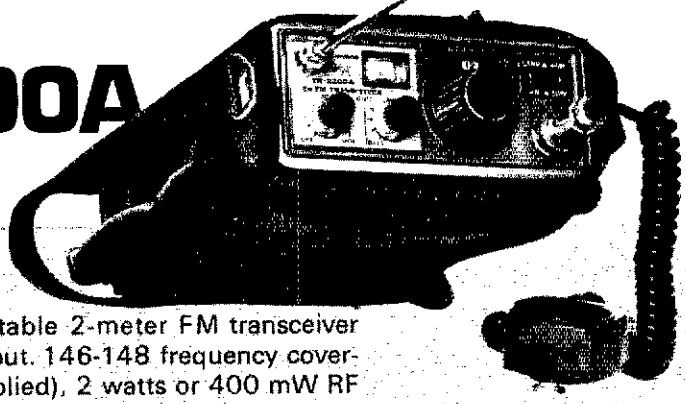
Kenwood's other 2-meter FM mobile transceiver . . . compact, rugged and packed with features like a priority channel for your favorite frequency, 146-148 MHz coverage, 22 channels (6 supplied), completely solid state, and 10 watt output. Shown with the PS-5 AC power supply for home operation.

TV-502

An easy way to get on the 2-meter band with your TS-520, TS-820, (and most other transceivers.) Simply plug it in and you're on . . . SSB and CW.

TR-2200A



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- **FREQUENCY RANGE:** Receive: 144.00 to 148.995 MHz, 5KHz steps (1000 channels). Transmit 144.00 to 148.995 MHz, 5KHz steps (1000 channels) + MARS-CAP.*
- **FULL DIGITAL READOUT:** Six easy to read LED digits provide direct frequency readout assuring accurate and simple selection of operating frequency.
- **AIRCRAFT TYPE FREQUENCY SELECTOR:** Large and small coaxially mounted knobs select 100KHz and 10KHz steps respectively. Switches click-stopped with a home position facilitate frequency changing without need to view LED'S while driving and provides the sightless amateur with full Braille dial as standard equipment.
- **FULL AUTOMATIC TUNING OF RECEIVER FRONT END:** DC output of PLL fed to varactor diodes in all front end R-F tuned circuits provides full sensitivity and optimum intermodulation rejection over the entire band. **No other amateur unit at any price** has this feature which is found in only the most sophisticated and expensive aircraft and commercial transceivers.
- **TRUE FM:** Not phase modulation — for superb emphasized hi-fi audio quality second to none.
- **FULLY REGULATED INTEGRAL POWER SUPPLIES:** Operating voltage for all circuits, i.e., 12v, 9v and 5v have independently regulated supplies. 12v regulator effective in keeping engine alternator noises out and protects final transistor from overload
- **MONITOR LAMPS:** 2 LED'S on front panel indicate (1) incoming signal-channel busy, and (2) un-lock condition of phase locked loop.
- **DUPLEX FREQUENCY OFFSET:** 600KHz **plus** or **minus**, 5KHz steps. Plus simplex, any frequency.
- **MODULAR COMMERCIAL GRADE CONSTRUCTION:** 6 unitized modules eliminate stray coupling and facilitate ease of maintenance.
- **ACCESSORY SOCKET:** Fully wired for touch-tone, phone patch, and other accessories.
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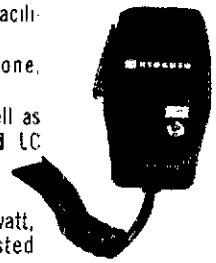
- **OTHER FEATURES:** Dynamic microphone, mobile mount, external speaker jack, and much, much, more. Size: 2⅛ x 6½ x 7½ All cords, plugs, fuses, mobile mount, microphone hanger, etc., included. Weight: 5 lbs.



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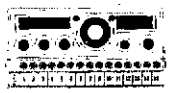

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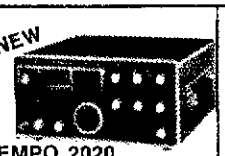

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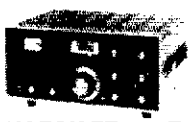

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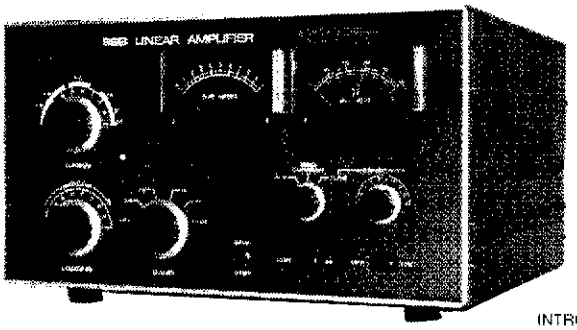

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BANKAMERICARD master charge

WA0CLM a Wilson HT. W0AZH a TR7400 and WB0VOW a TR2200. Organized efforts by Davenport, Muscatine and Sioux City Clubs plus many letters has kept our Call Plate fee at $5. K0EVH W0YLS W0SS W0OMV K0FLY WB0RWN WA0HYD and W0MOQ gave IA 100% on NTS-TEN. WA0AUX kept IA alive on DTRN. WA0LKM active again with overhauled rig. I am QRV for FD. IA 75M 3970 kHz, 1730Z, QNI 1187, QTC 118, WA0VZH Mgr. 2300Z, QNI 1357, QTC 64, WA0QNB Mgr. Tall Corn 3560 kHz, 2330/0300Z, QNI 419, QTC 108, sess. 59, K0EVH Mgr. Traffic: WA0AUX 442, K0EVH 304, W0SS 114, W0YLS 109, W0TGQ 75, W0OMV 44, W0UPX 40, WA0LKM 24, WB0AVW 22, W0LFF 16, W0LJW 10, W0IKT 6, WA0KHF 5, W0BW 4, W0JAQ 4, W0BQJ 2, W0BX 1.

KANSAS: SCM, Robert M. Summers, K0BXF SEC: W0KL. PAMs: WA0SEV WB0BCL. RM: K0MRI. Not long ago we mentioned a town in KS that had doubled its Ham Radio Operator population, not to be left out now, we have to give certain credits to Smith Co. for increasing its Ham Radio Operator population by 300%. Congrats to the new hams in the Northern part of KS. Also to the new ham radio ops from all various club radio classes and those who have come as a result of an individuals efforts. Let your SCM know of the results of on the air operation now and then. New club: Manhattan Area Radio Society, WB0TOF, pres. now ARRL affiliated. Net reports for Mar.: QKS-SS QNI 79, QTC 39 in 35 sessions. If you can be of assistance to new tfc. handler contact W0RFF for assignment. QKS: QNI 572, QTC 211 in 62 sessions, K0MRI Mgr. CSTN QNI 821, QTC 77; Feb. QNI 811, QTC 77, WA0OMB Mgr. Kansas Wx. Net QNI 839, QTC 283, no severe Wx sessions reported but tornado season is just around the bend. Mid-States Mobile Monitor Service for Feb. QNI 254 and only 2 mobiles needing help. Summer vacation should pick up the QNI and service to Mobiles. Give a listen to 3920 kHz nitely after the regular net until 10 PM or so. Check in and out often and assist the Monitor control for weak stations. Net Controls or all nets please take note and get your reports in to the net Mgr. promptly so that totals may be printed in this column each month. Traffic: WA2VEN/0 192, W0FIR 123, W0RFF 94, W0OYH 77, W0CHJ 73, W0HZ 72, W0FT 68, WB0LBB 65, K0BXF 62, WB0LKA 59, WA0MLE 59, W0IX 51, WB0LUN 37, W0AM 32, W0FDJ 28, WB0BIY 25, WB0HGG 22, W0RBO 21, WB0KDE 12, WB0QPC 12, W0FCL 6, W0PB 6, W0KL 4, WB0KWI 4, WB0OQX 3, WB0TNW 2, WB0TRO 2.

MISSOURI: SCM, L. G. Wilson, K0RWL — Asst. SCM, Joe Flowers, W0QTF. SEC: WB0DBW. The Missouri Single Sideband Net has moved net time back to 0000 GMT for the summer months to compensate for skip conditions. St. Louis ARC have their DX contest going again. WECOMO ARC presently have 25 in their Novice class. The Heart of America Radio Club is sponsoring free Novice classes in Kansas City. If interested, contact Jim, WA0MOF for further information, KM0MO, Missouri State Fair Station will again be activated in Aug. This station is looking for both donations and operators. If interested, contact WB0FND, Robert Pierce, Sr., Rte. 4, Warrensburg, MO 64093.

Net	QNI	QTC	Net	QNI	QTC
MSN	71	46	MON	195	131
SCEN	76	4	MON2	92	39
HBN	313	7	MOSSBN	1121	142
PHD	38	7			

WA0LCV is sporting a new TH6DXX and 40-ft. tower. K0RCT W0AIP and WB0OWL all have new rigs. Congratulations to new Novices WB0ZOB through WB0ZOI, WC0ACO and WB0VLD, information via Central Missouri ARC. Congratulations to W0KLM and WB0VXW on obtaining Advance license. W0GTK is now retired and operating from Sun City, AZ as W7LNS. .37/.97 repeater at Aurora is in operation after extensive repair work and installation of new equipment. Traffic: K0ONK 642, W0HH 138, K0CW 112, W0BV 102, WB0LFY 96, WB0NXX 76, WA0OCU 70, W0OUD 66, WB0FND 58, W0QAU 57, WB0MEO 49, WB0SND 45, K0RWL 42, W0BVL 32, WA0FKD 27, WB0LMW 26, WA0FMD 25, W0EPI 24, WA0LCV 21, W0OQD 18, WA0MOF 13, W0GBJ 9, K0AHL 6.

NEBRASKA: SCM, Claire R. Dyas, W0JCP — K0DBX is a Silent Key. WE0AIR, eleven year old is the newest Novice in Bassett. The Sidney ARC had a large attendance at their Mar. meeting to hear a program by the SCM. The Midway ARC held their annual dinner meeting on Mar. 24, over 100 members and guest attended. WB0s,CLP presented the club ARRL charter. W0EOI awarded 50-yr. QCWA certificate. W0OKG & W0FQB recovering from major operations. Net Reports: QCWA, QNI 65; Cornhusker, QNI 2239, QTC 53; Sandhills Wx, 533 QNI, QTC 8; 160 M WX, QNI 244, QTC 132; Western NE, QNI 660, QTC 59; AREC, QNI 159; NE Morning Phone, QNI 1323, QTC 2; PM, QNI 337, QTC 25; NE Storm, QNI 1216, QTC 43; 160 M WX net for the season. Traffic: W0VEA 118, W0HOP 36, WB0EVS 29, K0BRS 24, WB0CSW 20, W0MW 18, W0FQB 15, WA0PCC 14, W0GEQ 13, W0JCP 12, W0VYX 12, WA0QEX 11, WB0GMQ 9, WB0JWQ 9, W0RJA 9, WA0GHZ 6, K0HNT 6, W0YFR 5, K0ODF 4, WA0EEI 3, W0NIK 3, W0ZNI 3, WA0LOY 2, K0SFA 2, W0LCE 1.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, John McNassor, W1GVT — SEC: W1XX. RM: K1EIR. PAM: K1EIC. VHF PAM: WA1ELA.

Net — Freq.	Time/Days	Sess.	QNI	QTC
CN — 3640	1900/2200 Dy	59	310	233
CPN — 3965	1800 M-S	31	485	175
	1000 Dy			

VHF 2 — 28/88 2130 Dy

High QNI: CN — W1EFW and W1KV. CPN — W1NQO K1DFS & WA1VGP. SEC W1XX (ex-W1DGL) will be looking for Field Day contacts. Director W1HHR sends Radiogram welcome to all new amateurs. 24th Annual CN/CPN dinner meeting well attended and much enjoyed. Net Certificates awarded plus 3rd Annual W1MPW High QNI Award to: W1CTI & W1EFW for CN; W1NQO for CPN; WA1VGP for CN/CPN. ICRC 28/88 continues with 3 active repeaters. Tri-City ARC has 3 classes of Novice & General. Manchester ARC gave Plaque to First Pres. W1EDL for 50 years service! Stamford ARA new officers: K1OAS, pres.; K1POK, vice-pres.; WA1LOR, treas.; K1DLM, secy. WA6IDN speaker at Southington

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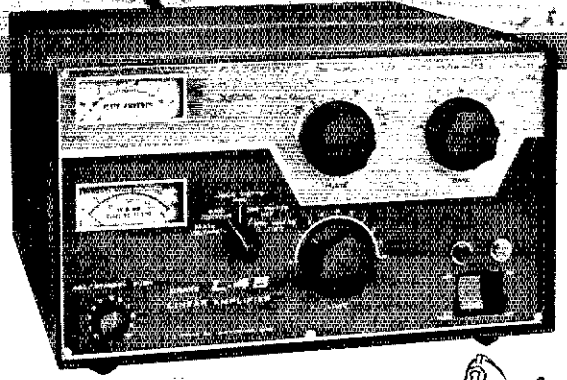

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ARA gave interesting enjoyable report on ARRL preparations for WARC Conference with details of recent overseas trip. CD Bulletin covers Board Meeting and new antennas at W1AW. W1NQO missing CPN due to stay in hospital. CN regrets W1CTI inactivity. W1QV chasing DX. Novice Band 5 lo Speed Traffic Net needed — progress underway, advise if interested. Congratulations to: Wallingford ARS and Glastonbury High School ARC for ARRL affiliation; WA1YEC Tech. Class; and WB1CTD Novice Class! Field Day is here! Make it meaningful for the many newcomers — use public relations — send announcements to newspaper, radio, and TV stations — expose the Wonderful World of Amateur Radio! Traffic: (Mar.) WA1VGP 304, WA1WEM 153, WA1URA 145, K1DFS 39, W1GVT 39, W1KV 30, WA1UOT 19, K1AQE 18, WA1RXL 17, W1BDI 12, W1BDN 10, WA1TXM 6, W1CUH 5, W1ZQP 5, W1QV 3. (Feb.) W1EFW 355. (Jan.) W1EFW 364.

EASTERN MASSACHUSETTS: SCM, Frank Baker, W1ALP — We wish W1UX the best of luck, he is moving to FL. W1NOV/W1BYU are Silent Keys. T9 Club met at WA1IZF's. WA1VMU on Oscar. K1GB was WA1JWQ. K1PJ was WA1AKK. K6PM, ex-W1DHX hopes to be at Convention in CT in Sept. W1ALP now a Public Relation Asst. WA1FNM a new home and QTH in So. Dartmouth. W1KSZ has his Advance, K1TKI/2 on 2 FM mobile, homebrew antenna. W1KSA in Quincy and W1KZW on 2 fm. South Shore ARC had a talk on "Electronic-Numeric Machine Tool Controls." W1QFN on 2 fm. WA1VKA lost his antenna to ice. WA1AKS has six-element Yagi for 10. K1KNM back on air after 14 yrs. K1LWI wrkd VP8HA on 10. WA1ZAZ has his General. WA1CRI now Extra. W1AEC Club to build a new building. WB1ASD on cw looking for WAS. W1HEB made BPL, also W1TKZ. WA1VWF a new FT101E. W1DMS made 42 tone patches with Coast Guard. WA1YWK now General, also ORS. W1PJ has his 50-yr. plaque. WA1OAM will be on VHF bands. New appointments: WA1ZAZ as ORS/OPS; K1GN ORS/OO; WA1UWF ORS/OPS. W1QFN endorsed as EC. W1DA busy with DXAC, has 250 countries. So. NE DX Assn. had K1ZZ & W1HHR as guests. EMRIPN had 320 QNI, 196 QTC in Feb., 381 QNI, 235 QTC in Mar. No. Shore Repeater Assn. new ARRL affiliate. W1CUO is pres. NEEPN had 67 QNIs, 10 QTC. WA1KBG WA1PDM have Extras. W1JS/5 was K4KYV. K1CZH is W1OJ. WA1VOH is a Tech. WB1BTD on 15. W1NF had hospital visit. W1DRB now in Hyannis on 2m/tm. W1JR on EME worked G3LTF & ZE5JJ, working on a kW on 2. K1PD was WA1EMN, lost his antennas. WA1QAA/QAB vacation in W7-Land. WB1CIL has a Heath 2036 & 303. K1CIJ in hospital. WA1TOU back on 2. W1BB sent out the 160-meter bulletin. W1OLP is on HW-2036 2. WA9NEW a new OPS in Chelmsford, spoke at the Club on "RFI/TVI," WA1SCH spoke on "Jamming". WA1QKD has his Extra. The exhibit at the Boston Museum of Science was a resounding success thanks to WA1LJB & K1GB. Middlesex ARC meets 2nd & 4th Thur. at Newton Police Hq. at 8 PM. Capeway RC held Ladies Night at Ridders in Whitman. W1DL spoke at the Framingham RC on antennas. Massasoit ARA had a "Mini Auction" with K1DC doing his stuff. W1GXT sent a very nice copy of Northeast VHF News. K1YZW gave a talk at the Quannapowitt RA on "COMDEL" & "VOMAX." K1OCD back in Wakefield. K1PAD has PSHR 52 in Feb. W1GQN now in E. Bridgewater. EM2MN had 114 QNIs, 30 QTC. W1PEX a new rig for 2m FM. WA1YUJ WA1VKB now Generals. W1LAV has HW-2036. SEC W1AOG is home, received reports from: W1s QFN FJI III BB; K1PAD; WA1s TJG QKD; K1WVW. (W1PL retiring.) EMRI had 609 QNI, 350 QTC. Traffic: (Mar.) WA1MSK 423, WA1TEH 423, WA1VEI 404, WA1ZAZ 323, W1PEX 236, K1PAD 163, W1FJI 160, WA1TBY 130, W1HEB 125, K1GN 120, WA1UWF 111, W1DMS 110, W1UX 110, W1TKZ 105, W1DMH 91, W1EMG 85, W1HL 84, WA1RVZ 61, WA1OWQ 40, WA1YWK 27, K1RAW 24, WA1FNM 22, WA1VKB 18, WA1YUJ 17, W1PJ 12, WA1IFE 8, K1LCQ 5, WA1OAM 6, WA1PAZ 4, WA1PQY 2, N1EE 1. (Feb.) K1PAD 102, W1MX 29, WA1QKD 6.

MAINE: SCM, Ed Bristow, WA1MUX — New ECs WB3BOK/1 K1OJN W1HDC W1KYO K1GDI WA1GWU KL7IEP/1. New in Maine: Novices WB1s ADW AEK AFH AFK AFM AGP AIY AJK AJR ALQ ALY AMR ANB AOD AOQ AOR AOS AOT APE AQJ AQP BQI BQJ BQK BQR BRF BRG BRH BSS BST BTP BTQ BTZ BUI BUJ BUK BVH BWI BWJ BWN BWO BWX; Techs WB1s ALF ARG; Genls WB1AMT BRR. Nets: SGN QNI 1178, QTC 151; PTN QNI 293, QTC 212; MSSN QNI 92, QTC 18; Barnyard QNI 931, QTC 35. PSHR WA2ERT/1 WA1FCM WA1YUZ W1RWG. A big welcome to all. Also a note of appreciation to all the clubs and individuals who helped them. A word of commendation to those who consistently make PSHR. Many thanks to those who have furnished reports and news and apologies for lack of space. This is my last report as personal obligations preclude my continuing. See you on the nets. Traffic: (Mar.) WA1FCM 352, W1ERW 150, WA1YUZ 148, W1RWG 135, WA2ERT/1 133, WA1JHT 58, K1GUP 40, K1TZH 32, W1ISO 30, W1CEV 27, WA1MUX 18, WA1JCN 5. (Feb.) W1BJ 10.

NEW HAMPSHIRE: SCM, Robert G. Mitchell, W1SWX/W1NH — SEC: K1RSC. RM: WA1GCE. More two letter call changes; W1DXB to W1UN, KH6RS/1 to K1GQ, WA1ABV to K1RX & W1EEF to W1MK. Your SCM & K1MFQ attended the IEEE seminar on WARC 79 in Waltham, MA. W6MZW/1 needs AK for 160 WAS. WA1PSI has new Drake equipment, is active on slow-scan TV. The Saddleback repeaters new officers are VE1FCH/W1, pres.; W1GQX, vice-pres.; WA1SHR, secy-treas. Congrats to 38 new hams. Endorsements of W1UBG & W1SWX as ORSs. W1BYS/WB4RCP reports numerous repeater and much activity in Tampa. Your SCM & Rotary pres. W2BFU/1 showed the "Hams Wide World" film at the Manchester Country Club meeting. The QSPN had 446 check-ins & 97 traffic. CBer Bob Perry is studying for a ham license. W1HWB now Extra Class, and appointed as ORS. W1JY's new homebrew frequency counter works. W1MK active in the NH QSO party and the EMT. W1DXB vacationing in Europe. W1SPU now N1JH. W1LIM has a new Icom IC-225. W1OST vacationing in AK. W1KGZ vacationed in Bermuda and was on their 2-meter repeater. Traffic: (Mar.) K1BCS 476, K1NH 54, W1TN 40, W1BYS 6, W1NH 5, W1HWB 4. (Feb.) K1PQV 31, W1TN 21.

VERMONT: SCM, R. L. Scott, W1RNA — In celebration on VT's Bicentennial, Burlington AR Club has reinstated VT Century Club Award. Basic award will

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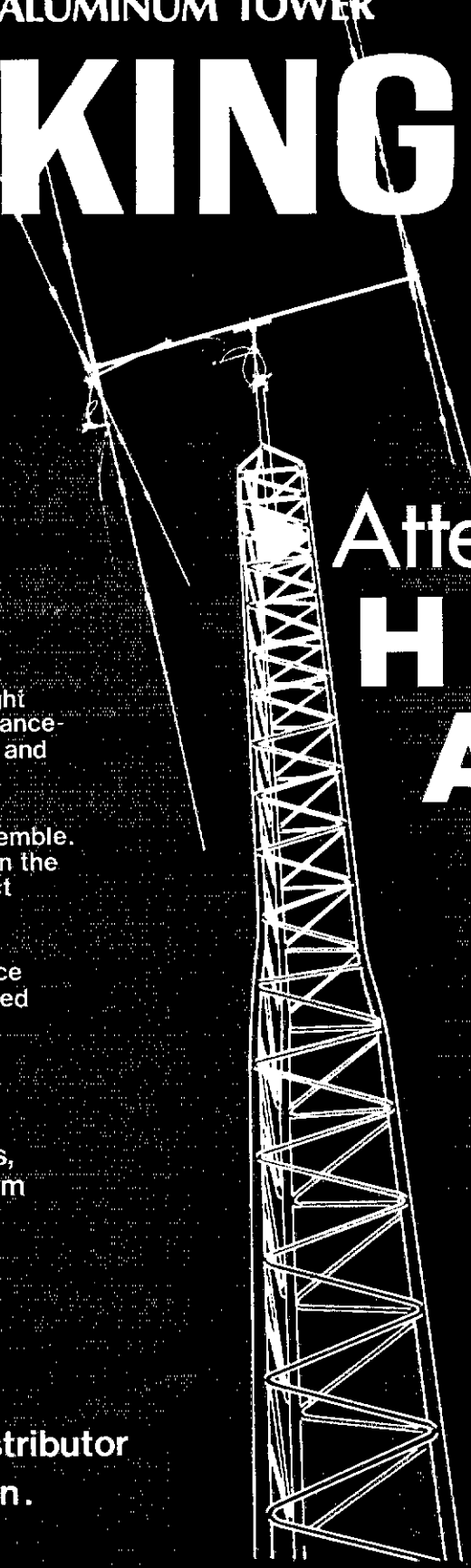

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be issued for working 10 VT amateurs, any HF band any mode. Seal endorsements for 25, 50, 75 & 100 contacts. Awards will be for an indefinite period. Further info inquire VT nets or BARC VTCC Mgr., PO Box 312 Burlington 05402. K1BQB assisted by W1TXY and W1ZJL had amateur booth set up at Bellows Falls Home Show Apr. 1, 2, 3. Appointments: W1AIM OVS; WB2JSJ/1 OBS. BARC Field Day — Aug. 13-14, Charlotte, VT. GMN 669/73; Carrier 605/77; VT 55B 5/1/87; VT Fone 4/97/11; VT RFD 4/88/20. Silent Key: W1EQB. Traffic: K1BQB 101, W1RNA 21.

WESTERN MASSACHUSETTS: Percy C. Noble, W1BVR — 16 took exam in Great Barrington after classes with W1TM WA1MJE, W1KZS WA1UUZ & WA1ZTL. WA1UUZ now General. Classes by W1DWA have graduated many! WA1LNF now K1JH at MIT. W1IBZ built a code typewriter. W1OBA now W1OA. W1GSJ trustee of WA1WPU, Hampshire College. W1IBZ new 80-mtr. inverted V. NOBARC's annual hamfest will be at Cummington on July 9 & 10. ARRL meeting at 2:30 PM July 9. WA1DNB for WMEN (Sun. 3935 8:30 AM): 4 sessions, QNI 291 (including 173 by liaison with 2-mtr. repeaters). FB! W1DVW for WMN (daily 3562 7:00 PM): 31 sessions, QNI 191, traffic 123, 14 stations. WA1MJE for WMPN (M-F, 3935 4:30 PM): 23 sessions, QNI 290, traffic 20, 68 stations. Holyoke's St. Pat Parade covered by 19 operators thru Mt. Tom Repeater. FB! Traffic: WA1MJE 364, W1TM 124, W1UD 105, W1BVR 104, W1DVW 96, WA1OUZ 56, W1ZPB 19, WA1PLS 9, K1IJV 7, WA1OPN 7, K1RGQ 7, WA1LNF 5, WA1YXL 3.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davis, KL7CUK — The Alaskan amateurs again supported the International sled dog race, the "Iditarod" a distance of 1049 miles from Anchorage to Nome. Hundreds of hours were expended, thousands of miles traveled and thousands of messages passed in support of the race. KL7HDX had some serious rig problems while in a very remote area while working on the race but came through with vital traffic. The Fairbanks, Ketchikan and Anchorage clubs are still turning out new licensees. The new 22/82 repeater will soon be on the air which will interconnect the Lake Minchumina repeater with the Fairbanks 22/82 machine making it possible to span and connect Anchorage with Fairbanks. Please note if you have any items which you would like passed on via this column please mail them so I will have them by the 5th of the month.

IDAHO: SCM, Dale A. Brock, WA7EWV · SEC: W7JMH. PAM: WA7HOS. RM: WA@KKR/7.

Net — Freq.	Time	QNI	QTC	Manager
FARM — 3.935	0200 Dy	902	21	W7TGU
RACES — 3.99	1415 M-F			W7KDB
IMN — 3.635	0300	210	59	W7GHT

Pocatello ARC reports 40 students in their Novice class. They also report the FCC will be administering exams there in June. W7ZPO received Bicentennial WAS number 778. The Chirp Kings got a break this spring as OO. W7FIS has been on vacation in CA. Now home. Kootenai ARS, Coeur D'Alene, reports WA7IKZ had a heart attack, but is now recovering nicely at home. New calls: WA7ACG is now K7DLT, W7CTX now W7ID, and WA7WZI now K7RT. W7ID made two European contacts on Oscar-B CW, no easy task. Boise AR Teletype Soc. will soon have their RTTY repeater going on 146.10/.70. Traffic: W7GHT 247, W7AXL 64, W7GBO 34.

MONTANA: SCM, Robert Leo, W7LR — K7LTV mailed first WIMU memo. W1MU at Macs Inn ID Aug. 5, 6, 7th. W7DB puts bulleting on MTN. Billings Yellowstone ARC puts out club bulletin "Splatter." WA7YAU suggests 2-meter RTTY for emergencies. Sorry to report K7UON Silent Key. W7OIO & W7DB working on 6-meter gear. WA7KKN WA7OBH K7CTI WA7PZO W7LR in DX tests. DX counts: WA7OBH 140, W7LR 127. Traffic: W7DED 58, W7TGU 24, W7NEG 18, WB7AZJ 10, W7LR 7, W7DB 6, K7SIK 2.

OREGON: SCM, Dwight J. Albright, W7HLF — Asst. SCM: Leland McIntosh, WA7UJU. SEC: W7LBH. PAM: K7RQZ. RM: K7OUF. K7RQZ wants someone to take her place as PAM? BSN, 3908, 620 QNI, 62 QTC, 31 sessions, WA7SSO Mgr.; OSN, 3585, 169 QNI, 103 QTC, 28 sessions, K7IWD Mgr.; WCN, 3702, 392 QNI, 137 QTC, sessions 31, WA7UJO Mgr.; JC RACES/AREC, 147.06, 155 QNI, 11 QTC, 13 sess, WA7UJU; AREC, 3993.5, 450 QNI, 10 QTC, WA7NEG (Feb.) PDX AREC, 618 QNI, 8 QTC, 32 sessions, K7WWR Mgr.; OEN, 3890, (Feb.) ck-in 3055, 16 QTC, 281 contacts. Solid QNI Feb., W7CPV W7TBT K7DDI K7DLS W7GWC W7TCT W7GNC WB7CVH W7MW W7JHA WA7JNS WA7BTW. W7ZXS is cartoonist for the "Netter." BSN Picnic at Eagle Fern Park 25 miles SE Portland July 10, contact WA7GFE. WA7VGA has a new TH6DXX, has rec'd DXCC. There is a TEX-X net in the Portland Area on Wed. 28.645 kHz 7:30 PM. Look on Oscar WB7DSK Mode B, K7WWR Mode A, K7ZSK Mode A, W7FBM Mode A. WB7DSK wrkd Hawaii Oscar 7 Mode B. LaGrand has 17 new hams. For the ARC W7HLF sent a msg to Kalamazoo, MI via K7NTS dlvd. by WA8LSO; W8QCU sent info back via WA7GMP, the families thank you. SEC W7LBH wants to know of any meetings you might wish him to attend. WB7AWO rec'd a nice shiny straight key. Now all she needs is a transmitter. FCC gave her a General ticket to work with. Keep trying GERI. Traffic: (Mar.) W7VSE 159, K7NTS 113, K7IWD 107, K7OUF 101, WA7IJO 83, WA7TXV 36, W7LT 14, K7IWN 5, WB7CBA 2, WA7GOO 1. (Feb.) K7WWR 33.

WASHINGTON: SCM, Marv E. Lewis, W7QGP — SEC: K7VAS. RM: K7OZA. PAM: K7YRQ. VHF PAM: K7GWE.

Nets — Freq.	Time	QNI	QTC	Sess.
Manager				
NTN — 3970 W7PED	11:30	1712	132	31
WARTS — 3970 W7QGP	18:30	2160	82	31
WSN — 3590 K7OZA	10:30	379	177	31
NWSSB — 3945 WA7RCR	18:30	725	132	31
ARES — 3930 K7VAS	09:00	57	7	4

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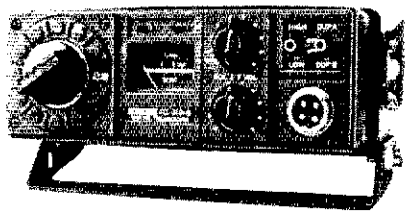

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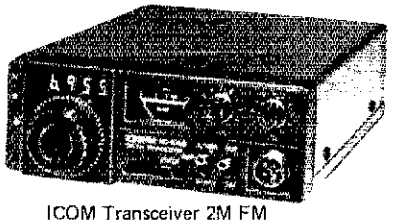

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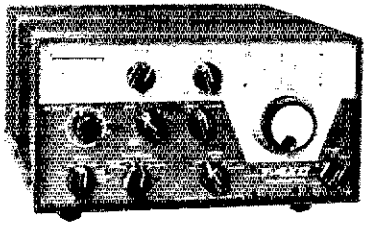

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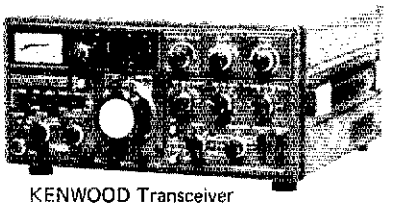

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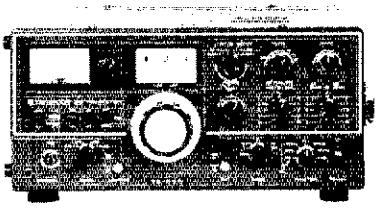

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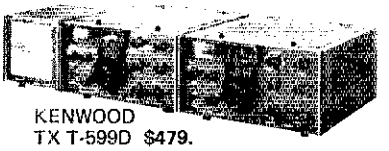

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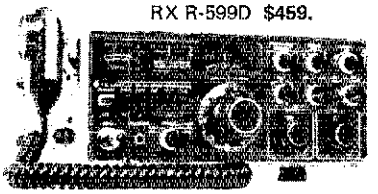
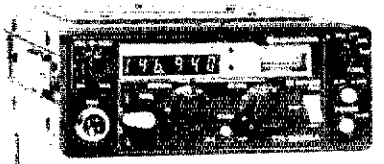
TX T-599D $479.
RX R-599D $459.



KENWOOD FM/SSB
TS-700A $599.



KENWOOD 2M FM
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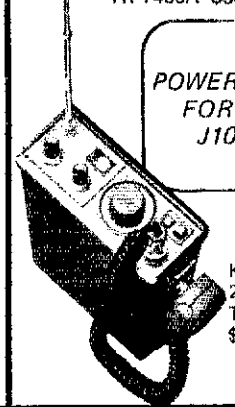

KENWOOD
2M FM
TR-2200A
$229.

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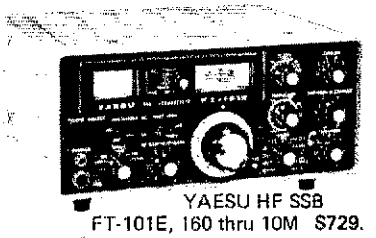
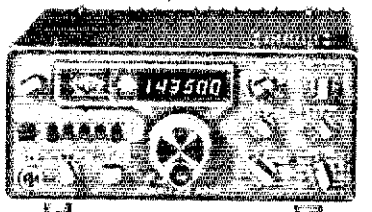


YAESU HF SSB
FT-101E, 160 thru 10M $729.



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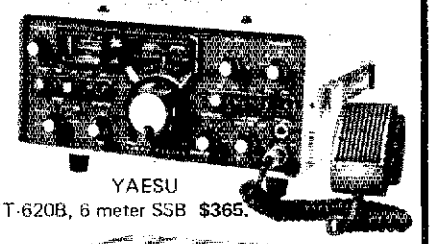
HF Transceiver FT-301D, Solid State
160 thru 10M $935.



YAESU
FT-620B, 6 meter SSB $365.

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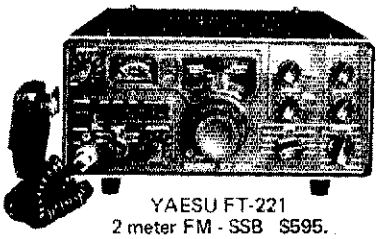
FRG-7 Broadcast to 30 Mhz $299.



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K7VAS WA SEC needs to hear from ARRL members interested in being ECs from Grays Harbor, Pacific, Island, Cowlitz, Wahkiakum, Kittitas, Garfield, Ferry, Stevens, Pend Oreille, Lincoln, Grant and Adams counties. Pay is poor, but self satisfaction is great, besides doing a service for your community. W7JIE took vacation to W6-Land so only sent in 45 IW reports, no OO reports. W7KWT reports 14 new countries on 80 CW during DX test. WA7WET Life Member ARRL and PAN relay to RN7. The rush for 1X2 calls has created a problem. Please notify your net secy by mail of change in your call, also notify ARRL, it is your responsibility. Do not blow your lid on the nets at NC. Sorry to report the passing of W7BX and W7FPL. W7QGP and W7JWJ journeyed to DC for QCWA-DT banquet and promoted the SEA-G-DX convention in Seattle, July 29-31, 1977. Advanced registration $5.00, with banquet $17.00. QCWA luncheon Sat. at noon with W2NSD speaker $9.00. Ladies program and activities for kiddies. Seattle Center will keep you busy all weekend. Traffic: (Mar.) W7DZX 462, WB7AIX 136, W7LG 95, K7OZA 83, WA7OJI 71, W7APS 65, W7GB 65, K7KWT 62, WA7WET 62, WA7BDD 52, W7BUN 44, W7HAD 40, WA7LQV 39, W7PWP 26, WA7DKA 17, W7AIB 12, WA7GVB 4, K7VNI 3. (Feb.) WB7AIX 125.

PACIFIC DIVISION

EAST BAY: SCM, Charles R. Breeding, K6UWR — Asst. SCMs: W6ZF VE2AQV/W6. SEC: W6IIH. Asst. SEC: WB6DSI. Paul Parker, former SCM, has received his BS in engineering from UC. Congratulations! W6OJW teaching night school radio classes. K6HW reports traffic count high for this time of year. WB6JIK has been named Asst. Mgr. for NCN/3 on WR6ADC. We are sorry to learn that K6MIS has become a Silent Key. WA6NEQ passed his Advanced. WB6DXR is net control of the new Napa Valley Emergency net which meets Wed., 7 PM on 28528. WB6BNR has a new FT101E. WN6IMU has returned from Iran and is again active. W6UX and W6GYA worked the Maritime Academy's CA Bear on its recent cruise. W6LRT a new Icom 230 and not to be topped W6SJA a new Icom 225. K6TI now on the air from Danville. From CCRC the following new calls were listed. WN6PAA WB6PNO WB6OWY WN6PAB WB6PPE WA6OZR WA6DXC WA6PNI WN6PIN WN6PIV WA6POQ WN6PIQ WN6PVQ WA6PWC WN6PNA WN6PYP WA6PTW WN6PSJ WB6RSA WA5RPG WB6RPI WA6RTD WA6RPF and WA6RTX. Remember to make plans for the Pacific Division Convention, Oct. 15 and 16 in San Mateo. Traffic: K6HW 429, K6OE 238, WB6JIK 232, W6OA 162, W6JXK 141, WB6UZX 34, WB6WBG 18, WA6BFL 11.

NEVADA: SCM, Leonard M. Norman, W7PBV — SEC: K7ZAU. K7VYT in charge of Code & Theory class in Reno. SNARS members sporting new club badges. K7ZOK needs RI and Me for WAS on SSB Oscar 6. K7ZAU getting several AREC members signed up. LVRAC has started a net on 34/94, 2000 PST Tue. It is time for getting the nomination petitions signatures for SCM candidates. Tahoe ARC members active on 2M fm and getting ready for the summer tourists. LVRAC has attractive club patches for members. W7OK and WB7PWL attended the Fresno DX conference. W7JUO W7MWF and W7OK each battling for number one DX position. All NV Radio Amateurs are urged to apply for Call Letter automobile license plates. WA7WZB has been on the accident list from a fall on his Harmonic's skateboard, was he operating mobile? A new repeater on 04/64. Traffic: W7ILX 215.

PACIFIC: SCM, Pat Corrigan, KH6GQW — SEC: KH6CKJ. RM: KH6JAC. Kahala Mall joint Ham/CB display a great success with many calls inquiring about classes. Thanks to KH6s CKJ JCB RIV KH and all others. TV coverage was excellent. Your SCM was pleased and proud to recently present the Kauai ARC with its ARRL Charter of Affiliation. KARC is doing very well with much interest in Public Service. Due to good PR, many CBers showing up at meetings. 5W1AU and family recently visited KH6 as did JA1KSO. KH6IPN returns home to VA this month. Fresno Int'l DX Conv. saw KH6s IJ IGJ HCM GQW & W6PSQ from Pac., along with 5W1AU. KH6CKJ had grand visit to ZL in Mar. KM6EB was to put Kure Isl. on the air Apr. 23. He hopes for future trips also. KC6JC heard agn after long absence. KH6BZF trying hard to provide 50th State for E. Coast on Oscar Mode B. We need more Intruder Watch members in Pac. If interested write ARRL and ask for info. Traffic: KH6IJE 122, KH6GQW 16.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV/WA6JVD — SEC: W6SMU. The North Hills RC has scheduled their Sac. Valley Ham Swap for May 21 at Carmichael Park. The Golden Empire ARS will sponsor the Golden Empire Hamfest on July 16 in Durham at Durham Park. The Sacramento area lost another well known amateur with the passing of WA6AEX. W6AJY passed his Extra, WB6AKF and WB6RHC made Advanced and WB6PMJ with WB6VLC got their General Class tickets. W6DZK dropped the K from his call and is now W6DZ. WA6JVD likewise did some alterations. The RAMS provided communications for the Buena Vista-Comanche bicycle road race on Mar. 6 and The Mt. Vaca RC did likewise with the Buffalo Stampede on Mar. 20. W6NJU chaired the DX forum at the Fresno DX Convention. The El Dorado ARC now has 35 members and in the last 2 years has graduated 25 new hams from their classes. Congratulations. Traffic: W6RSP 153, W6DEF 38, K6RPN 34.

SAN FRANCISCO: SCM, Rusty Epps, W6QAT — Congratulations to all 45 of the Marin hams who once again proved the effectiveness of their emergency preparedness system by being on the air within 24 minutes of the time the County Disaster Coordinator initiated a surprise test of the system. WB6PMX moved to San Anselmo. The Del Norte Co. gang have an informal get-together the last Sun. of each month at 16:00 at the Ship Ashore. More than 40 hams showed up for testing in Arcata when the FCC examiner made a special trip there to administer upgrade examinations. K6PB has received NARC authorization for a 147.63/.03 low level repeater in the Pt. Arena area. 14-year-old WA6OYJ received his General, WA6WJB passed Novice, and K6MZN passed Advanced, congrats to all. The 1977 Pacific Division

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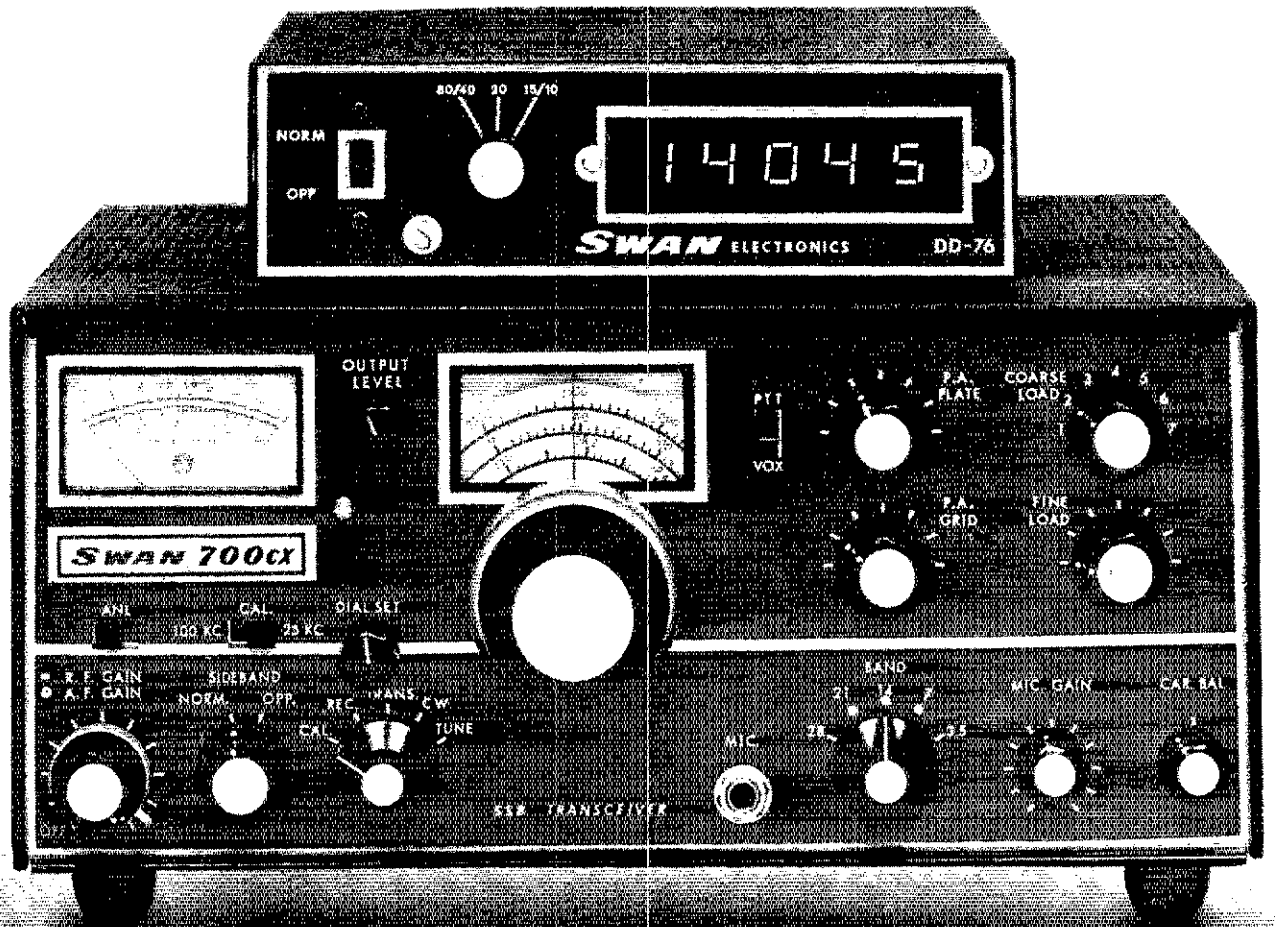

Convention will be held Oct. 15 & 16 at the Royal Coach Inn in San Mateo. Traffic: K6TP 178, W6RNL 176, W6NL 92, K6PB 40, WB6UPV 16, WB6JEO 4.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6HNO, WA6TVC and WB6VIN are OOs. WB6VIN is OVS. Kings County RC the 3rd Thur. at the Armona Elementary School for now. Central Valley RC has a cw net at 8 AM on Sat. on 3,710 MHz. Fresno ARC remodeling a van as an emergency vehicle. WB6JRL now K6XJ. WB6PEE now K6PE. W6EWX, WB6KZO and WB6PWV are Silent Keys. WB6HWH passed Advanced. WA6DEF WA6MZQ WB6QYQ and WA6OKS passed General. WB6MGK and WB6PIY passed Tech. WB6YAR WB6WYA WB6WZK are new Novices. WB6MGK W5EJQ and WB6SKR have TS700A. WB6QFX a FT620B. WA6YAB a HR212. WB6PIY a TR 2200A. K6YK getting ready for the six meter DX season. WA6NRH now W6VY. K6AYA has a TS 820. WB6WMJ a Tech. K6PBT after DX. WA6CPP an active county hunter. W6PSQ visited from Hawaii. Twenty hams from the SJV attended the Fresno DX Convention. The 1977 Pacific Division Convention will be Oct. 15-16, 1977 at the Royal Coach in San Mateo. Fresno ARC presented the World of Amateur Radio at Fresno Fashion Fair Shopping Center on Apr. 4-9, 1977. Traffic: (Mar.) WA6RXI 24, WA6YAB 6, W6DPD 4, WA6GJV 2. (Feb.) WA6RXI 21, K6PSJ 4. (Jan.) WA6RXI 44.

SANTA CLARA VALLEY: SCM, Jim Maxwell, W6CF — The new VHF session of NCN is going well, reports NCN Mgr. W6RFF. The daily session is held at 1900 local over WR6ADC (84/24). WA6TUF worked 6Y5DE for lucky country nr. 13 via Oscar 7. TUF is also using Oscar data to support a physics class project at college. And while on the subject of Oscar, congrats to WB6JNN, recently elected to the Board of Directors of Project Oscar. JNN also active supporting Amsat in their plans for future spacecraft. Recent call changes in SCV include WA6WTX now K6XS, and W6QNB now hiding behind N6AU. The new simplex frequency for the West Valley ARA 2M net is 146.55. It will be used for all public service activities of the club. The annual SCCARA flea market is still go for Sun., June 12, at the Quement Electronics parking lot in San Jose. Welcome to WB4SMA, now QRV in SCV and active on NCN with a new ORS appointment. Readers of this column who are interested in more details regarding ARRL Appointments and other Communications Department activities are invited to drop a line to me for more info, to the address given on page 8 of this QST. SSB activity is increasing on 220, reports WB6JNN. A weekly SSB net is now held on 222.0 at 1930 local time. New CCRC officers consist of WA6CTV, pres.; W6URA, vice-pres.; WA6NIL, secy.; K6RTU, treas.; WA6HVX, editor; WA6NIL, Pub. of the CCRC Bulletin. About 25 showed for the NCN potluck dinner at W6RFF during Mar. In addition to the food and good cheer, the group took advantage of the VHF calibration gear provided by RFF. Traffic: W6YBV 179, W6RFF 116, W6AUC 79, W6NW 40, W6KZJ 33, WB6HBT 15, N6AU 9, WA6HAD 5, W6CF 4.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Chuck Brydges, W4WXZ — SEC: W4EHF. PAM: W4OFO. VHF PAM: K4GHR. RM: K4MC. EC of the Month is K4BGD covering lonely Pamlico County, so if you are near get in touch. Charlotte Hamfest was huge success with about 5000 attending, thanks to Mecklenburg ARS for a fine event. Note from W5QPX notes that IARH (International Amateur Radio Hosts) is active with coordinators in various countries, so if you are travelling contact W5QPX. Upgrading from ORS-II are WA4SRD & WA4FKY now ORS and General. W4EAT qualified for FL Daytime Tfc Net Certificate. K4AIH (EC) has WB4ZBB asst. EC in Western NC, also net going on Franklin Rptr 147.84/24 with QNI from NC, SC, TN, GA. Central NC Tfc Net (CNCTN) has QNI at 1203, 11 QTC, tnx WB4VIM. Had interesting pix from K4AI at operating position holding two plaques, one for 50 Year Membership in League, one for Life Membership, so it is never too late to support organized Amateur Radio. At Onslow ARC League Affiliation Banquet on Mar. 19 W4OFO received Certificate of Merit for his many services to Amateur Radio and W4WXZ & XYL enjoyed the event. Reminder: This is Field Day month, so get those batteries charged and charge out yourself. WB4EXW gave Oscar program to Forsyth ARC and was very well done and enjoyed. Club news from Cape Fear ARS, Alamance ARC, Onwlow ARC, Alamance Rptr Asn., ENC Repeater Inc., Raleigh ARS & Forsyth ARC. Tnx. Greensboro ARA now League affiliated tnx K4SNI, pres. Sympathy to family and many friends, ham and non-ham, to W4OTE, now a Silent Key. Traffic: (Mar.) WA4PSL 177, K4FTB 99, K4FBG 96, W4EAT 77, K4MC 70, WA4KSO 61, WB4MXG 54, K4EZH 48, W4OFO 44, WA4SRD 36, W4WWR 31, W4ACY 29, W4WXZ 28, W4PCN 24, WB4UBA 20, W4VOX 15, WA4QJL 14, WB4OXT 10, W4EHF 8, K4TTN 8, W4IZI 7, WB4VHE 7, WB4WOR 7, K4EG 7, WB4CES 5. (Feb.) K4FBG 46, W4IZI 24, W4ACY 22.

SOUTH CAROLINA: SCM, Tom Lufkin, WA4DAX — Asst. SCM: Gary Barnette, WA4MDP. SEC: WB4TNS. Chief PAM: W4MTK. PAM: WB4CAK. RM: WB4CAK. Amateur Radio week is planned for May 22-28. Does your club or group have activities planned? The South Carolina Side Band Net is looking for an Editor for a Quarterly Publications, anyone interested contact W4MTK. WB4OBZ writes SC again 100% D4TN. He is also trying to qualify as OO. W4NTO reports spbg club contemplating 2 mtr reptr. All appointees should make special effort to get activity reports to me before 7th of the month. Don't forget Charlestowne Hamfest July 9 & 10. Greenville working on getting Division Convention there next year. Net reports, SCSSBN QNI 1467, QTC 153; Anderson 2 mtr QNI 563, QTC 10. Traffic: WB4ARJ 502, WB4OBZ 376, WA4KXZ 208, W4ANK 131, W4MTK 56, WB4UDK 38, WB4CAK 33, W4NTO 29, WA4DAX 25, W4OCX 21, W4FMZ 20, WA4MDP 18, WB4BZA 12, WB4JNE 12, W4ORF 7, N4EE 6, W4FVV 5, WB4NBK 2.

VIRGINIA: SCM, Robert L. Follmar, N4RF — SEC: WB4DTG. PAM: K4VWK. Asst. PAM: WA4YIU. RMs: VN K4BKX, VSN: WA4EPJ, 4RN W4SHJ. K4BKX getting new four-element 20-mtr Monobander. WB4DBK having success with new TS-520. He tripled

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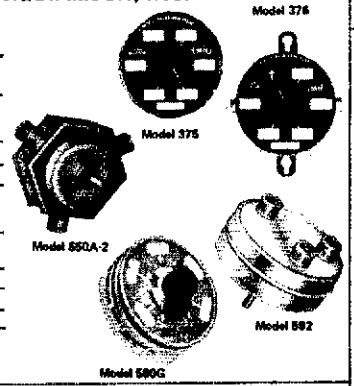
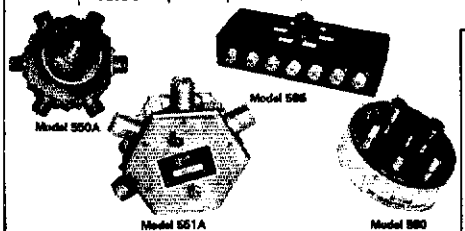
592	16.50	2	Axial	
595	18.50	6	In-line	Grounds all except selected output circuit.





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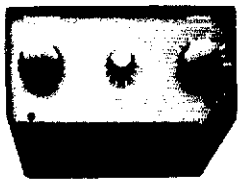

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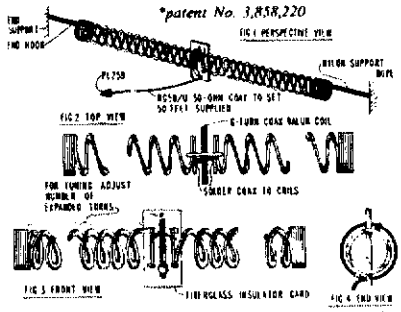

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his tfc. count! By the way: Your SCM wud like if you include some remarks with your monthly reports. Some do, many don't, hi. WA4YIU made WAS and also rcd PSA. WB4FDY putting out a FB VA ham, Kudos Pip! WA4RDI had such a successful Oscar demo that the teacher now wants it on a yearly basis. He also rcd Bi-Cent. WAS. W4THM with help of W4NTG built & erected (50') ten-element slot 2-mtr. ant. The Williamsbg Area AREC started Novice classes at James Blair HS. The Farmville Rptr was used by WB4NWP to call K4VWK for help after breaking his ankle. No neighbors were home but he remembered the "Handi-Talkie" in his hip pocket. K4VWK called the local rescue squad for help that arrived in minutes. WB4JFK finally got all antennas back up that blew down in last wind storm. WA4AJF put HW2036 together in 4 days — wrking FB with WA4QBN asst. K4GR tfc count lo due to FB cruise to Bermuda. W4YZC rpts: No. VA. Rdo Club finished Novice training classes with 15 grads & tnx to WB4DBK WA4ERJ K5DZF/4 (instructors). Bud also celebrated 25 yrs. a ham with QCWA Life Membership from his dad W5KL and made 538,000 pts. in ARRL DX Test. VA QSO Party lots of fun says WA4STO who was pleased to meet WB4FDT & WB4IIT while (they) were mobiling thru Shenandoah Co. Congrats go to WA4NYZ for upgrading from Advanced to Extra! Stopped by for a short visit to W4OOL abode on my return from PA where I attended my brothers' funeral. Met John's XYL and surveyed his "antenna farm." Conclusion: "Pete" don't have enuf space, hi. K4EJ, one of our newer ECs needs an assistant. He now has 15 enrolled in AREC. Any takers? VP W4KFC took part in 2nd weekend of DX Test (cw), visited several Central Am. & So. American Societies on WARC preparations & checked into VN from HP1YV. Says everyone cums in FB down there. OO WB4OXD operated DX Ph Test with aid of LAB8/E computer. WA4SBC upgraded to Advanced and now has new 432 ssb/cw 35W stn. W4JUJ is feeling btr & wrking abt 5 to 6 hrs. per day. W4ZM putting on his "Spark" show and wrking ARRL DX Tests. K9PIV/4 now K9JH, FB. WA4FDV rpts no activity becuz K4BKX "hogged the rig," hi. WA4STO showed movies on ham rdo to grammar school children and gave demonstration. OO rpts recd from W4HU WB4OXD W4THN & WA4AJB. Club rpts from VARA; Richmond ARC, LARC; Tnx to net mgrs K4BKX; K4VWK; WA4EPJ & WB4OBZ (D4RN), for their excellent reports. Just had phone call from SEC WB4DTG who is resigning June 1. New job in LA. Hate to lose Bodie. Traffic: (Mar.) K4BKX 379, WB4DBK 331, WA4EPJ 218, W4UQ 192, W4LXB 167, K4KNP 166, K4MLC 152, N4RF 141, K4IAF 106, WB4DTG 101, K4JM 92, WB4FLT 87, WB4KIT 71, WA4YIU 70, WB4FDT 66, WA4RDI 66, W4TMN 65, WB4PNY 59, WA4EAZ 56, K4VWK 56, W4YVG 47, WA4QQI 46, WA4PBG 44, WB4EKY 43, W4SHJ 41, WB4FJK 40, W4NWM 38, W4ZNB 34, WA4AJF 32, K4GR 31, W4YZC 28, WA4STO 27, WB4DQZ 20, WA4UUX 19, WA4NYZ 17, WA4CLK 16, W4OOL 16, WA4KKP 10, W4KX 9, WA4RBF 7, K4EJ 7, W4MK 7, W4KFC 6, WB4LEK 5, K4ITV 4, WA4WKG 3, W4KXE 1, W4TY 1, W4ZDN 1. (Feb.) WB4FDT 82, WA4STD 18. (Jan.) WA4STO 30.

WEST VIRGINIA: SCM, Donald B. Morris, W8JM — As this is being written, a severe flood disaster is occurring in Southern W. VA. An emergency Communication Center, staffed with amateurs, is working around the clock. Complete details, next issue. Jackson County ARC, newly affiliated with ARRL will hold Hamfest Cedar Lakes, near Ripley on Aug. 14. Officers are WA8NXV, pres.; K8SNW, vice-pres.; WA8CTO, secy-treas.; K8AON, act. mgr. WB8LCO upgraded to Extra and WD8DVC to Tech. Noon and WVN Phone Net in 62 sessions, 1878 stations, passed 275 msgs. CW Net, 31 sessions, 183 stations and 46 msgs. WA8FCM now N8RR. K8LOU now K8SR. Novice Net in 31 sessions and 208 stations with 86 msgs. Hillbilly Net in 4 sessions with 136 stations and 33 msgs. Remember-West VA State ARRL Convention, Jackson's Mill, July 2-3, with Lew McCoy and Chod Harris from ARRL. Traffic: WB8TDA 78, WB8DQX 64, WB8TJN 38, W8JM 30, W8CKX 28, W8CUL 24, WB8YMJ 23, W8FZP 16, WB8SAW 9, K8QEW 8, WB8TEE 7, W8HZA 5, W8IJ 5, WA8KXI 5, W8GSN 4, WA8LFW 4, W8CUL 3, K8DFS 3, K8MHR 3, WA8RUZ 3, K8ZDY 3, W8ETF 2, W8EUE 2, W8DL 2, WA8FIE 2, WB8IHA 2, WD8BRD 2, WB8ZMX 2, WB8TJO 2.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Clyde O. Penney, WAØHLQ — SEC: KØFLQ. RM: WBØHCK. PAMs: KØCNV WAØYGQ. Congratulations to WBØQUT on receiving his Extra Class license. He is also providing transmissions for code practice in the Colo. Sprgs. area, on a freq. of 21.160, Wed. & Fri. at 9:30 PM, local. KØOTU presented talks to Rotary, Kiwanis, Ham Club, County Commissioner & Sheriff, in Creede, CO, on Amateur Radio. Net Tfc. for Mar.: CWN QNI 341, QTC 259, QNF 1055, 31 sessions; HI-Noon QNI 1387, QTC 54, informals 285, QNF 1473, 29 sessions; Columbine QNI 1942, QTC 150, informals 566, QNF 2169. Late Net Tfc. for Feb.: Columbine QNI 1565, QTC 147, informals 371, QNF 1756; CWN QNI 298, QTC 288, QNF 943. Traffic: (Mar.) WØWYX 2456, KØZSQ 767, KØYFK 716, WBØQOT 359, WØEJD 186, WØHXB 178, WBØTAQ 156, WØIW 145, WBØPVT 143, WØKLE 133, WAØYNP 121, WBØBAL 99, WØETT 96, WBØMCL 81, KØOTU 77, WØRE 65, WBØNHA 47, WBØQPQ 32, WØLAE 17, WØNFW 12, WØGO 6. (Feb.) KØYFK 914, WBØIBS 254, WØEJD 243, WBØTAQ 169, WØNZL 140, WØETT 113, KØOTU 112, WBØMCL 67, KØTIV 64, WBØs,IZO 38, WAØREX 36, WØPT 23, KØSPR 16. (Jan.) KØYFK 738. (Dec.) KØYFK 838.

NEW MEXICO: SCM, Edward Hart, Jr., W5RE — Asst. SCM: Joe T. Knight, W5PDY. SEC: W5ALR. PAMs: K5IKL W5PNY. RM: K5KPS. SWN Reports good activity on 3585 at 1915 daily and had 325 check-ins, handled 256 msgs. Anyone wanting to get started in cw tfc. handling report into this net. It is run at a slow enough speed and will answer at the speed you use in calling in. Breakfast club meets daily 3940 kHz at 7 AM daily, had 696 QNI and 23 QTC. NMRRN meets daily on 3940 kHz, had 1245 QNI and handled 43 msgs. WA5JNC now recuperating after a bit of a rough time. Mesilla Valley ARC officers: WA5RGI, pres.; WB5DKN, secy.; WB5DQC, treas. K5YRY had an operation from which he is now recovering. A club is being formed in T or C, get in touch with WB5ROP. New repeater on 07/67 from Socorro. WB4KSS now K4KH. Traffic: W5DAD 302, W5UH 292, W5JOV 260, W5KH 167, K5KPS 150, W5ENI 149, WB5LZF

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135, W5RE 80, W5VDH 80, K4MAT 44, W4QNQ 18, WB5MIY 16, W5YQ 16, WA5OHI 12, WB5OLA 11. (Feb.) K5MAT 118, WB5KSS 104, WB5OLA 8.

UTAH: SCM, Ervin Greene, W7EU — Lots of activity on 220 MHz in the Wasatch front area. W7GPN coordinated the efforts in Ogden area, ordering sixteen rigs on one order. A 220 repeater will be on the air by the time this appears covering the Provo, Salt Lake and Ogden Areas. More wives are getting interested in getting their tickets lately. More stations are reported to be working Oscar all the time. WA7ZBO giving demonstrations at every opportunity and doing a great job. The first annual UARC Easter Egg Hunt went over very well. Highlight was WA7RHH and his AM broadcast band easter egg transmitter. Swap table showed signs of long collecting winter. Many items were exchanged. With FD coming up, UARC has intentions of taking 1st place in the 7th call area again this year. WA7ZBO in charge this year. UT Hamfest this year will be at Saratoga resort between Provo and Saltlake at Lehi. Date is July 16. Camping available and amusement park, swimming and boating all are available. WA7MEL appointed CW RM for UT. Good work Dallas and thanks for the efforts with UCN. Traffic: WA7MEL 112, WA7JRC 79, WA7KHE 45, W7OCX 44, WA7OAU 43, K7HLR 34, W7UTM 18, W7BE 16, W7EU 13.

WYOMING: SCM, Chester C. Stanwaitty, W7SDA — SEC: WA7NHP. RM: K7KSA. W7OUX has a new FT221, listen for him on Oscars. The Sheridan area hams have reactivated the Sheridan ARC. New officers are W7QPP, pres.; WB7NVR, vice-pres.; WB7NVS, secy-treas.; K7BA, first dir.; WB7NGB, second dir. WA7WXQ, KL7HGJ/m7, WA4KDJ/m7 and WA7SNU using Laramie Peak Repeater 28/88 notified WY Highway Patrol of an intoxicated driver traveling north in south bound traffic lane. Highway Patrol apprehended driver possibly preventing serious accident. Central WY College of Riverton has applied for a club station license. The Cheyenne ARC has donated fifty dollars to the Personal Communications Foundation. Fire gutted the home of W7ILL Mar. 26. K7SLM reports 23 sessions, 761 QNI, 15 QTC. Traffic: W7TZK 534, W7SQT 513, K7VWA 450.

SOUTHEASTERN DIVISION

ALABAMA: SCM, Jim Brashear, WB4EKJ — Thanks to W4RQS for assuming duties as NM, AENB and RM appointment. Congratulations to K4GKJ and WA4AYA new Life Members ARRL. Gov. Wallace has proclaimed June 20 through 26 as Amateur Radio Week in AL. The Valley Amateur Radio Club has been reactivated, K4FJZ, pres.; WA4VEK, vice-pres.; WA4CZY, secy-treas. K4JK gardening more than hamming — says his grits bushes are 6 ft. high. The Tuscaloosa ARC made a field trip to tour the weather radar station at Centreville. Wx watches in Mar. by: West AL Emerg. Net 6 times; AENW 2 times. The Sand Mtn. Repeater Assn. provided communications for three persons stranded by high water in the Buck's Pocket State Park — communications provided by K4CWD WA4BFN WB4BFH WB4BFJ WB4BFQ and K4VZN. Several ops were standing by to assist. K4JYO reports the West AL Amateur Radio Society has been formed with 7 licensed and 6 non-licensed members. WB4OXX teaching a Novice class and recently graduated 6. Twin Base club trying to get a Swapfest set up for the Montgomery area this fall. Liaison help from AENB to RN5 still needed. Also lend a hand on DRN5 if you can; 7.290, 2130Z. Endorsed WA4FYO WB4NLU K4JYO and WA4VEK as ECs. Appointed W4RQS RM. Traffic: (Mar.) W4RQS 627, WA4JDH 540, WB4EKJ 322, K4AOZ 86, K4LYY 34, WA4ZDW 15, WB4RCF 15, WB4AYO 12, WB4TVY 10, W4EF 7, WA4RMP 7, W4MHO 6, WA4BDW 4, K4HJM 4, K4UMD 4. (Feb.) WA4TMG 93, WA4JGG 47, WB4KSL 1.

GEORGIA: SCM, A. H. Stakely, K4WC — SEC: K4YRL. PAM: K4JNL. RM: K4FLR. Congrats to K4EV WB4TEK WA4PZD and WB4DHC on making PSHR. Though it occurred Apr. 4 instead of during Mar. heartiest congrats to the whole gang for an excellent public service during the tornado, flood and airliner crash. Dedicated training and organizational efforts paid off. Every tornado sighting and damage report reached State CD Hdqtrs first via ham radio! Crash site aid and assistance was done best by ham radio because other facilities were not handled by trained communicators. Reliability, accuracy and versatility show we serve when it counts! If you are not a member of GA Amateur Radio Emergency Svc, contact one of the following ECs K4CRO WA4FVT W4LWT K4JFY W4BKK WB4BDP WB4IUK WB4KXW W4YWP W4OHA WB4NTW WA4GBG K4PIK W4KAU WA4BBF K4VHC K4SWJ K4AEJ WA4CBT WA4PZD WA4BZY or our excellent SEC K4YRL. CVEN No. 1 QNI 64, QTC 1. CVEN No. 2 QNI 628, QTC 31. CGVFH QNI 117, QTC 7. GARES QNI 127, QTC 14. W4NWB having antenna problems. W4JM enjoying new TS820 and building up Atlanta chapter of QCWA. Coast Guard Auxiliary Net meets Mon. 2000E 3.975. W4DOC working on WAS. WB4TEK has new KDK144. Fine Columbus hamfest. WA4PZD doing excellent job organizing National Weather Svc. seminars. WB4DHC got a good 15-mtr quad up. QCWA net Sun. 1230 local on 3.830. WA4BZY EC for RTTY. W4VTA has new emergency generator, UeVry Institute ARS now ARRL affiliated with WA4BEH, pres. ARC of Augusta got Master's plan in order and signed up 60 for code and theory class. Traffic: W4FOE 453, WB4DHC 71, WB4TEK 61, WA4OZT 33, W4HON 29, K4YRL 26, WD4CON 25, K4EV 21, W4CZN 20, W4NWB 15, W4SHL 15, K4NM 7, WA4PZD 7 W4JM 4, K4WC 2, W4DOC 1.

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RH — SEC: WA4WBM. RM: N4WA. PAM: WA4TNC/75, WA4TXM/40, WB4BSZ/VHF.

Net	Freq.	Time(Z)/Days	QNI	QTC	Manager
NFPN	3950	2330Z Dy	1290	167	WA4TNC
QFN	3651	0000/0300Z Dy			W4MEE
QFNS	3715	0100Z Dy	233	94	WB4GHU

Appointments: WB4SKI as EC for Escambia Cty.; W4ILE EC Hernando Cty.; WA4TNC PAM/75; WA4TXM PAM/40; WA4ZVP OBS; WA4QBB WA4TNC WB4VDL & WB4YKV OPSs; WB4QBB ORS. SNCs earned by W4SDR W4DTV K4AOB WA4DXW WA4EYU WA4FJA WB4GHU WA4LDV W4LSR W4LYN WB4NMU K4OER WA4STZ &

W4WNY on FMTN; by WA4CLY K4DDY WA4IBV WA4IWW K4KXZ WA4OEM WB4PGB K4RZM WB4STD WA4TNC WA4TXM WB4VDL & K4VWE on NFPN; by WA4FKE on FPTN and by WA4TXM on ORN5. Officers of Five Flags ARA: K4QZO K4HYV and WA4RQH. WB4MBL active on 80 & 20m RTTY. W4WNY K4KRC WB4TPR K4IEJ & WA4ZNY now Extra Class. WB4YKV NCS for Bay Co. RACES Net. WA4FBI now N4WA; WA4RON now N4AZ. WA4ZVP QNIs QFN with 2 watts! NOFARS "Buddy System" underway; contact W4ZTW for assistance. WA4NDO won Science Fair first place for Oscar project. N. FL DX Assn. sponsors a "want list" of members' needed countries. WA4HHC reports Ocala Rptr. Assn. provided comm. for several local events recently. W4MGO has weekly column on ham radio in Daytona Beach newspaper. Lake Monroe ARS newsletter edited by WB4ZDD. WB4DTS working Oscar with a Tx-62. Hernando Co. ARA officers are: WB4EXA WD4BSO K4ZC & WA4OEM. Traffic: (Mar.) W4ILE 502, WA4FBI 294, WA4EYW 265, WB4SKI 224, WB4OBB 169, WB4GHU 168, W4JL 149, WB4TZR 136, WB4NMU 120, WA4TXM 113, W4KIX 110, WB4DTS 92, WA4OEM 88, W4LDM 69, WB4FJY 60, WB4HRG 56, WB4FHT 55, N4SS 51, W4RH 42, WA4TNC 37, WA4EYU 33, WA4CRI 32, W4MGO 32, WB4NJI 32, WB4VDL 30, WB4YKV 29, WB4DXN 26, WA4HKE 26, WB4IJR 24, WB4VAP 15, WB4ADL 13, W4IA 13, K4DDY 12, K4CVO 10, WA4ZVP 10, K4RNS 8, WA4HHC 6, K4FLV 5, WB4TVQ 5, WB4VMP 4, K4IKY 3. (Feb.) WB4GHU 258, W4WHY 152, W4YSO 17, WA4ZVP 6.

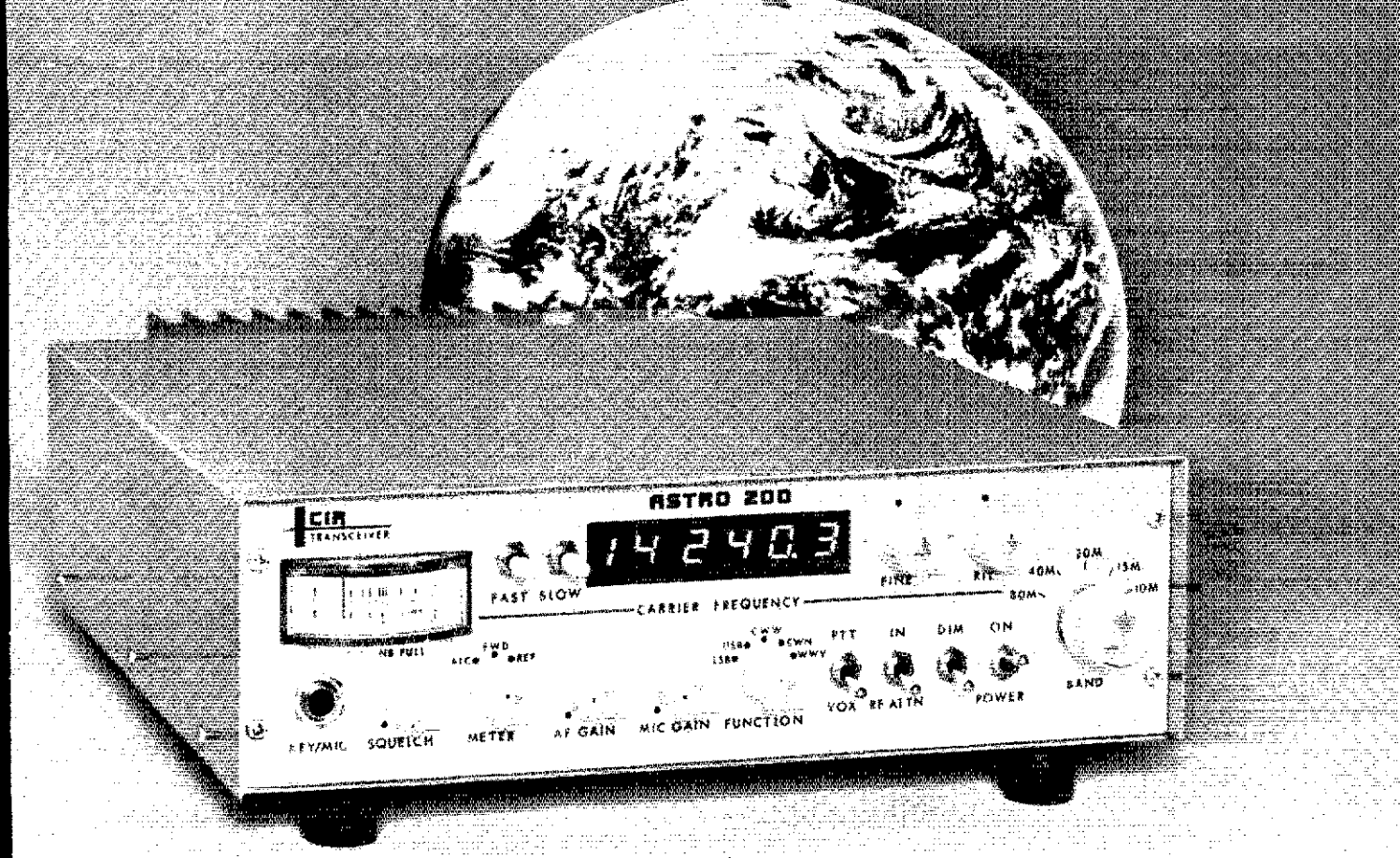
SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — SEC: WB4ALH, Asst. SEC: W4WYR. RM: W4MEE. PAMs: WB4AID WA4NBE. New appointment this month: WA4YQW EC Manatee County. Endorsements: WA4NBE PAM; WB4ALH EC Hillsborough County, OPS; WA4AYY EC Okeechobee; W4BFQ EC Brevard; WA4BPS EC Martin, OPS; W4BX EC Charlotte, W4ESH EC Collier; K4RCP EC Hardee, WB4RLU EC Palm Beach; WA4WZZ EC Polk; WA4BMC OBS, OVS; WA4CTM OBS; W4IYT OBS, OPS; W4KGJ OBS, OPS; W4ROA K4TH OBSs; WA4ZLW OBS, WVS; W4BK OPS, OO; K4CFV K4GFW K4KQ W4ROA WA4UVG OOs; WA4ATF K4BLM WA4NBE OPSs; WB4ZSQ OPS, OORs; WA4GBC W4GOG K4SCL K4SJH OPSs; W4ZO OVS. Congrats to W4MEE K4IWT and K4TH earning BPL certificates this month. K4IWT was set up at Dade County Youth Fair with 37 operators showing Amateur Radio to about 30,000 people. Mar. 19 saw about 15 hams operating on 220 MHz under direction of W4DPH furnishing communications for the Junior Packer Walkathon in Largo and Clearwater. Mar. 29 was the Festival of States Night Parade in St. Petersburg with Apr. 2 the Day Parade and Apr. 3 the Hurricane Classic ocean racing power boat event concurrent with the Mutt Derby dog races, all of which the St. Petersburg Amateur Radio Club supported with a total of 64 amateurs furnishing communications — 59 at one time for the day parade. W4OL continues to be our champion OBS station, completing 46 scheduled bulletin transmissions. Listen for him on 3655 at 8:30 and 10:30 MWF. W4BNE now retired and having a ball with ham radio. Your SCM has a big back-log of Net Certificates to be issued. Perhaps we can list them next month. Traffic: (Mar.) W4MEE 1063, K4IWT 669, K4TH 578, K4SCL 490, K4SJH 332, WA4NBE 311, WB4WYG 305, WA4SCK 243, W4WYR 241, WA4ZHU 210, WA4GYR 180, WA4JPV 174, WB4AID 149, W4EH 134, W4NTE 131, W4DVO 125, WA4EIC 87, K4BLM 77, WB4ALH 73, WB4KSJ 70, W4GDK 62, WA4WDM 58, WA4GQV 54, W4IRA 50, W4IYT 46, WA4PFK 45, W4QM 44, W4GPL 42, K4NAN 38, K4EUK 36, WA4GNI 30, N4EI 24, WB4PIB 22, W4TJM 17, WB4IZS 16, W4SMK 13, K8PXM/4 10, W4KGJ 9, W4MML 5, W4BNE 4, K4DRH 4, W4LK 3. (Feb.) WA4LGT 16.

WEST INDIES: SCM, David Novoa, KP4BDL — New leadership of the Radio Club de Puerto Rico: KP4CV, pres.; KP4EGO, vice-pres.; KP4ABN, secy.; KP4BSQ, treas.; KP4s BKP DKZ EBQ LT and AET, directors. KP4DHW is now KP4DX. Emergency Drill had good participation from the islands of Puerto Rico and Saint Thomas. Special Events Station NP4A was activated during Amateur Radio Week in Puerto Rico by KP4s DX and BDL. If you don't send your reports your call won't be listed here. So keep them coming. Traffic: KP4EHF 102.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Marshall Lincoln, W7DQS — PAMs: WA7KOE & W7UQQ. RM: W7EP. New officers of the Old Pueblo RC are WA7JEI, pres.; WB7DGQ, vice-pres.; W7JNT, secy-treas. The club will sponsor a hamfest at the Tucson Ramada Inn Nov. 12-13. New officers of the Hualapai ARC are W7KAX, pres.; WB7OKH, vice-pres.; WB7OVI, secy-treas. New officers of Explorer Post 599, sponsored by the Arizona ARC, are WA7WXA, pres.; WA7ZFU, vice-pres.; Anna Aguilar, secy.; WA7ZHA, treas. The Amateur Radio Council of AZ reports Superstition RC has graduated about 60 from its beginner's class. Welcome to the Palo Verde HS ARC at Tucson, now affiliated with ARRL. W7LLC reports 337 countries and 1,320 prefixes confirmed. Graduates of the Scottsdale ARC's first Novice class have received calls WB7PXB through WB7PXS. K7NHL is now W7EP. WB6WQH/7 now N7FB, and is writing a regular column on traffic handling for the Arizona Desert Aire Waves, published jointly by AZ and Scottsdale ARCs, and is copying W1AW bulletins off the air for the publication. New calls in Flagstaff are WB7PLX WB7PNZ WB7QAD and WB7QAV. Traffic: (Mar.) Cactus Net 485, SWN 256, ATEN 34; ATEN certificates to WB7BYQ K7PDY W7DNR K7IKM K7MGL WA7ZXD W7RQ K7NMQ K7GLA K7GH WA7JCK. Traffic: (Mar.) K7NHL 154, N7FB 125, W7HFR 65, WA7VTM 62, K7UXB 54, W7UQQ 50, WB7CAG 37, WA7KOE 28, WA7PDW 21, W7DQS 16, W7LLC 9, WA7WEB 7, K7GH 4, K7NMQ 3, K7GLA 1, WA7JCK 1, W7RQ 1. (Jan.) WA7WEB 11. (Dec.) WA7WEB 16.

LOS ANGELES: SCM, Eugene H. Violino, W6INH — RM: WB6PKA. The TELCO RC is planning four club construction projects. The first one will probably be "The wire antenna tuner" as it was the most popular. Those interested contact WB6BAH. They are also in need of parts for their Field Day generator, at present they have an axle, tires and wheels. Congrats to WB6KJJ on his new Extra Class license. Dave has been



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a faithful member of SECN for several years. The recent CB and Amateur Radio expo in KH6-Land generated some traffic for the So. Cal. group, WA6VBS and myself handled over sixty messages on 20 meters during this event, not a lot but at least we showed it can be done easily. The Ramona RC recently had the "Wide World of Ham Radio" they had a good turnout. The San Gabriel RC having their annual June banquet in June, they also will celebrate their twenty-fifth anniversary. If you have heard weird sounds on the bands the last few months especially on 20 meters; it is reported this is the result of three or four transmitters, and are located in the town of Gomel; 175 miles from Minsk. Speculation is that it is a QTH detection system (over the horizon), the Russians are developing for detecting the B-1. So far the Russians have ignored protests about interference from the Western world. Source of info is Flight International, a British publication. The recent Bulletin from the TRW group indicates a very busy schedule is upcoming. With membership drive, Field Day and refurbishing the club radio station, is going to keep the boys busy for some time to come. K6ASK reports he will be away from Hamming for a while, he is QRL with the boy scouts this summer. W6HUJ home after short stay in the hospital. K6EA reporting of moving shack back upstairs after much preparation. K6CL reports low activity due to XYL being away, the antenna cranked down and busy at work. WB6PKA now N6KA. Traffic: W6OEO 166, WB6GUD 146, W6INH 138, W6SGZ 123, W6BWG 60, W6HUJ 60, W6QAE 44, W6BRO 28, N6KA 24, K6EA 22, WB6KWU 12, W6NKE 10, WB6AIT 3.

ORANGE: SCM, Wm. Heitritter, WB6AKR — Asst. SCM: John F. Cashen, K6KNC. SEC: W6AQB. RMs: WA6TVA WB6AKR. PAM: W6CPB. LCs: WB6ARK K6GGS W6LKN K6KNC WB6NSU WA6YWS. K6CID has resigned as Asst. SCM and relocated to Hawaii. K6KNC (formerly WA6VMI) has accepted the appointment of Asst. SCM in addition to being Orange County VHF EC. WA7POI/WB6HQV is on 220 with a Tempo CL-220. WB6ARK is on 220 with a Midland 13-509. WA6CHH has a new Icom IC-211 and Kenwood TS-520. K6LKN is now on 2 meters with Icom IC-225. WB6AKR now has dual station utilizing two Drake "C" lines. The following assisted the Orange County Red Cross in providing relief for more than sixty families left homeless by a fire which destroyed the Valencia Hotel on Mar. 4: WA6VMI WA6HKW K6UUO W6RE N6BR WB6UXE WB6ARK K6WS WA6QWJ WA6PUS WB6KBK WB6CLW W6SUL WB6IHZ K6TWK. W6KIJ reports Novice class is Riverside resulted in twenty five students passing Novice exam. WA8WDZ/6 is new ORS. WA6PTX now active on SCN. K6GGS reports WR6ACJ 220 autopatch in Japan and should be operational in 6 to 8 weeks. WA6WZO reports Orange County Council of Radio Clubs has WA6HKW, chmn.; WA6OPS, secy.; serving ten radio clubs in Orange County. Traffic: (Mar.) WB6EIG 505, W6RE 67, WA6TVA 42, W6CPB 23, W6QBD 22, WA8WDZ/6 9, WA6PTX 7. (Feb.) WB6NEX 12.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — Only 15 months until the ARRL National Convention in San Diego, Sept. 22-24, 1978. Plan now to take your 1978 vacation in San Diego. Clubs are urged to take leadership in assisting with the formation of Amateur Radio clubs and licensing classes in Senior and Junior High Schools. Here is where the future of Amateur Radio lies. Start planning now for next Fall. K6SCY is active with Chula Vista Junior High club via its station, K6ESU. W6SIF handles traffic via ARTS on 7060 kHz. W6DEY busy helping others with antenna problems. Call sign changes: W6PZU to N6AT, K6LKD to K6JN, KG6JES to WA6UAZ. WA6YJE upgraded to General. AB6OPV made Bicentennial WAS. KG6JES led section in Jan. phone CD party, and WA6EJL in the cw. WA6HJJ reports steady growth of ARES net on 146.52 MHz Sun. evenings at 1900. Welcome aboard to new ARES members WA6AQR WB6LOJ WB6PWI WA6SML WB6SUE WA6TIQ W4ZYT WB6SFJ K6MRK. TELCO Club has been approved for ARRL affiliation. SANDRA officers for 1977: W6PDA, pres.; WA6WVX, vice-pres.; WB6LXG, treas. Time to check out Field Day gear and brush up on operating procedures for Jun 25-26. Traffic: (Mar.) WB6PVH 445, WB6FTY 155, N6AT 79, W6BGF 74, W6SIF 52, W6DEY 33, WA6UAZ 18, WA6UFY 17, WB6CFT 3, K6JN 2. (Feb.) WB6FTY 186.

SANTA BARBARA: SCM, D. Paul Gagnon, N6MA — June 19 is the date for the Satellite Club BBQ and Swapfest at Orcutt picnic grounds near Santa Maria. WB6QMN is chmn. Santa Barbara had speakers on Microprocessors and antenna fundamentals. Ventura County Club heard K6YNB tell of his AK moonbounce expedition. WA6TMQ related his Japan trip to the Poinsettia ARC. The Simi Settlers meet the 3rd Thur. at 1930. Contact WA6OHX for details. The Section ARES net has moved to Sun. at 9 AM on 3935 to beat the QRM. Surplus CB rigs are being used on 28.8 MHz am in the Santa Maria area. The Novice Emergency Net meets on 3730 at 0930 Sat. The Poinsettia ARC net meets on 28.7 Mon. at 2030. W6ITW has installed a 40-meter beam for Antarctic patches. W6SMJ has a new IC-225 and has completed publication of a Directory of amateurs for the Satellite Club. WA6BLS has his inverted Vee now at 65 feet. WA6EBF is busy on 20M QRP and has worked JA with 3 watts. WA6UEO instrumental in getting help for an accident in Orange Co. thru a 6-meter repeater in Los Angeles. He lives in Ventura Co. WB6VKR on from Ventura with two meters. WA6DEI now N6MA. WA6KYW has a new TH6DXX up and enjoying the world of DX. K6YNB busy preparing talks for the VHF conference, DX conference, and the IEEE in NY. WA6TUO WA6OQZ K6EPY and K6FM have been appointed Disaster Communications Unit positions with the Red Cross in SB. PSHR: WA6LBO 42, K6WI 32, WB5KPL 31, WA6VBS 34, W6ITW 8. Remember your reservations for HAMCON in Santa Maria Oct. 7-8-9. Traffic: (Mar.) WA6VBS 194, WB5KPL 136, WA6MBZ 77, K6WI 54, WA6LBO 46, WA6DEI 23. (Feb.) W6JTA 32.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Ted Helthecker, W5EJ — Asst. SCM: Ruth Chance, WA5VJW. SEC: W5DWL. RM: W5LA. Dallas saw Amateur Radio working under emergency conditions during Feb. emergency caused by fire and explosions of chemical laden RR cars. Dallas County RACES with W5DWL, K5LZA &

WB5JBP as NCS coordinated crowd control and traffic control in the area, Garland RACES was activated and 147.84/24 was in operation with K5HTK as NCS. W5TGA NCS on 146.28/88. Efficient operation resulted in no casualties. Big OO report from W5QPX reporting more than 60 observed errors. W5EJ visited live-wire Hurst ARC to present ARRL affiliation charter. The UTD AR Soc. graduated a class of new amateurs from 23 to 72 years of age, W5LA is pres.; WB5BNG, vice-pres.; W5RNI, trustee; WA5JDM, instructor. WB5TAP put up home-made 70-ft. tower with TA-6. Amateurs in the area worked the Mile-O-Dimes walkathon at White Rock Lake on Mar. 19, kept 28/88 busy. Clubs in the region making plans foe Field Day, June 25/26 this year. W5LGY wrote good scorching letter to SCM who deserved it. Red River Valley ARC with new prexy, WB5PJU planning on 450 link from Paris to Sulphur Springs. WB5TTU has WAS for 1976. ETU expects to have a repeater going soon. K5IBI reports new Novice class started with 17 enrolled. PARC membership 100 now and growing out of space in old meeting place. Golden Spread Hamfest Aug. 12-14. Lots of new calls heard, WA5VQT now K5MW. SWOT first annual meeting was set for Apr. 30, contact K5ASZ, membership now at 600. After the demise of TX HB 383, W5UTT has been instrumental in writing HB 1440, read it and clamor for its consideration. WA5ZNZ passes General. W5SOQ on the spot. Dallas Tower ordinance completed, if you need information contact WB5JBP. DARC Blue Book due in short time, a must for everyone in NoTex. W5GM & WA5VJX attended DARC Old Timers meeting Apr. 5; Willy Waters won most everything at the meeting. Traffic in the Section continues to build. Anyone heard that slow-speed traffic net yet? If not call W5LA. RWK working to set up Field Day and K5ZJP sparking interest in special CW DXCC activities for Club. WA5KZA reports special meeting called to set up weather watch in Lamar County with cooperation of Amateurs, CB and law enforcement groups. RRVARC starting training on message handling and emergency communications to be high-lighted for Field Day activities — sounds like WB5GBR talking. FB, keep up the good work and the reports. W5KLV, DRN5 manager reports traffic 227 in 31 sessions. North Texas 100% reporting with W5SHN. Dallas County RACES had 300 members with 100 check-ins each Sun. with Garland and Irving having separate nets. Official bulletins on all nets. Traffic: W5TI 166, WB5HQU 111, WB5LWB 31, WA5INJ 15, W5GSN 11, W5DWL 10, K5SOR 6.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Asst. SCM: Ray Miller, W5REC. RMs: W5RB & WB5NKD. PAMs: WB5AZS WA5OUV & WB5NKD. New appointments for Mar.: WB5DYR & WB5OSN. ECs; WB5OSN OPS; WB5ABL ORS. Should soon have an OBS on every repeater in OK. A bad car wreck last winter interrupted W5FW's record as NCS on OLZ after 27 years. W5JJ keeping busy "in retirement" by teaching Electronics at an area Vo-Tech School. W5RB renewed RM Appointment & found out that OK winds can be hard on antennas. We are having our share of spring winds but "so far" no storms. The long dry spell has caused some problems with power line interference. The groundwork for an OK Repeater Organization was laid at the meeting at Stillwater Mar. 26th additional info later. Lawton Hamfest was its usual success. Watch for OK Ham Holiday Aug. 6-7. Certificate of Merit presented to WB5NKD recently for her Traffic Work. Edmond ARS met with Red Cross, with more to come. Many are getting ready for Field Day, are you? In watching traffic moving across the state, I hear a lot moving that does not get reported on the monthly reports. How about it you ORSs & OPSs? Traffic: (Mar.) WB5NKD 286, WB5NKC 200, WB5RXZ 200, W5REC 114, W5RB 106, WB5KGP 100, WD5ABL 69, WB5AZS 45, W5FKL 42, W5SUG 41, WA5FSN 25, WB5ELG 14, WA5OUV 9, WA5FLB 4, WB5PVL 4. (Feb.) WD5ABL 58, WB5OCZ 23.

SOUTHERN TEXAS: SCM, Arthur R. Ross, W5KR — SEC: W5TQP. RM: W5UGE. PAM: WB5NUM. OOs rprtg this month: K5WX (WA5ZBN), WB5CIT, W5VAH, N5ZZ (WA5LTQ). OVS rprtg this month: WB5CIT WA5QCP (Feb. & Mar.). OPS WA5VBM reports Lufkin Amateur Ops cooperating with Angelina College in offering a course in Amateur Radio. EC WB5TNN reports Brazoria County repeater operational on 146.31/.91 MHz, WR5AEC. EC WB5QXZ has appointed WB5NLJ as Asst. EC for Galveston Island; the group is planning a summer operating and camping trip with special QSL cards being designed. OO/OVS WB5CIT says Alamo DX Amigos operate DX hunters net Sun., 7:30 PM local, 28.659 kHz. Meterologist WA5ZBN has changed call to K5WX, he is happy with new Heath receiver. At Austin Scoutorama K5RM (ex-WB5IZN) originated over 150 messages and W5UJJ relayed them to other nets. EC N5TT (ex-WB5FMA) has new KWM-2. WD5s CLE CLF and CLG (father and 2 sons) have Trio-Kenwood Twins going on Novice bands. WD5CLH has new Tempo 1 for same; WD5CLI and WD5CLD (father and son) busy on new Novice tickets, have worked several JA stations in first week. WD5CLJ has Heath equipment on Novice bands. W5BFN and his lovely wife celebrated Golden Anniversary Mar. 5. WB5PBC WB5PIZ and WB5NVH upgraded to Advanced class. Congratulations. Traffic: (Mar.) W5KLV 448, K5HZR 373, K5TM 336, WB4KSG/5 334, W5UJJ 326, WB5NUM 223, WA5VBM 218, WA5YEA 216, WA5RKU 183, K5ZSI 172, WA5QAL 54, WB5GVO 35, W5TQP 32, K5GDX 26, W5KR 23, N5TT 14, WA5RVT 13, W5BHO 12, WB5TNN 12. (Feb.) WB5TNN 9.

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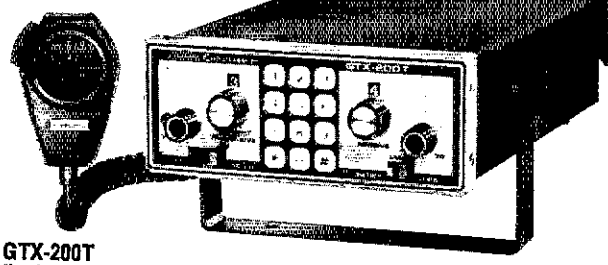

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Genave's GTX-200T offers the FM operator up to 100 channel combinations incorporating 10.7 MHz first IF and 455 MHz second IF for outstanding sensitivity, minimizing effects of adjacent channel interference.

ADDITIONAL FEATURES INCLUDE:

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CHECK THESE FEATURES:

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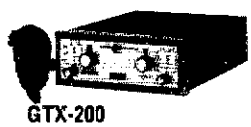
- 6 channels
- Factory-direct to you!

GTX-2
2-meter FM, 10 channels, 30 watts with pushbutton freuency selector (Incl. 146.94 MHz) **$189.95**



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2-meter FM, 100 channel combinations, 30 watts (Incl. 146.94 MHz) **$199.95**

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2-meter FM, 10 channels, 10 watts (Xtals not included) **$149.95**

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ACCESSORIES FOR GTX-1 and GTX-1T

☐ PSI-18 Optional Nicad battery pack	$29.95
☐ PS-2 Charger for GTX-1(T) battery pack	$39.95
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HY-GAIN 3806.

THE 2-METER FM SYSTEM YOU HOLD IN THE PALM OF YOUR HAND.

The remarkable Hy-Gain 3806 hand-held 2-meter transceiver.

So technically advanced it gives you unprecedented receiver performance and dynamic range. So over-engineered it's virtually failure-proof in normal use. And so compact it fits in the palm of your hand.

Yet, the Hy-Gain 3806 costs less than $200.

Try the complete 2-meter FM system you can hold in your hand at your Amateur radio dealer. Or write Hy-Gain for complete details. Do it today.

SPECIFICATIONS:

General

Dimensions
216mm h x 87mm w x 47mm d (8.5" x 3.42" x 1.85")
Weight
Approx. 1 kg. (2.2 lbs.) w/Nicad power pack
Power requirement
12VDC
Current drain
Transmit: Approx. 380 mA at 12VDC
Receive: Max. audio output 100 mA at 12VDC
Stand-by: Squelch on, 20 mA at 12VDC
Power source
8 AA penlight cells or optional Nicad power pack
Channels
6, crystals for 146.52 simplex supplied
Output impedance
50 ohms nominal
Frequency range
144-148 MHz
Compliance
Type Accepted under FCC Rules, Parts 81, 83 and 15.
Crystal specifications
Receiver: Mode, third overtone; Oscillation frequency and range, (F-10.7)3
Transmitter: Mode, fundamental; Oscillation frequency and range, F/12 (Where F is operating frequency from 144.1-148.0 MHz.)

Transmitter

Circuit system
Crystal-controlled, phase modulation 32 pf parallel load capacity, HC-25 holder
Nominal RF output
1 watt with 12VDC input
Frequency multiplication
12 times
Frequency stability
$\pm 10 \times 10^{-6}$ from −20° C to +50° C ambient temperature (10-14VDC)
Max. frequency deviation
±5kHz (phase modulation)
TX audio frequency response
Within +1 dB and −3 dB of true 6 dB per octave, pre-emphasis from 300 to 3000 Hz
Minimum signal/noise ratio
At least 35 dB below +3.3 kHz deviation at 1 kHz
Spurious and harmonic suppression
Exceeds FCC requirements
2.5μw in band, 25μw out of band internally
Modulation sensitivity
Adjustable sound pressure level mic preamp
Splatter filter
Exceeds FCC requirements
Spurious radiation
Less than −(43 + 10 Log 10p)

Receiver

Circuit system
Crystal-controlled, double conversion superheterodyne; 32 pf parallel load capacity, HC-25 holder
1st local oscillator frequency stability
$\pm 10 \times 10^{-6}$ from −20° C to +50° C ambient temperature (10-14VDC)
Sensitivity:
20 dB noise quieting
Less than 0.5 μv (closed circuit method)
12 dB Sinad
Less than 0.4 μv for 12 dB SINAD
Modulation acceptance
More than ±7 kHz (EIA)
Selectivity
More than 70 dB at ±20 kHz (20 dB quieting method) exceeds FCC requirements
Spurious and image response
−60 dB below rated sensitivity; exceeds FCC requirements
Squelch sensitivity
Noise compensated type; 0.3 μv threshold, below 2 μv with full squelch
Adjacent channel selectivity
2 signal generator method: ±25 kHz at 65 dB
Intermodulation
55 dB (EIA SINAD, 3 generator method) exceeds FCC requirements
Audio frequency response
Within +2 dB and −8 dB of true 6 dB per octave, de-emphasis from 300 to 3000 Hz
Audio output power
500 mV with less than 10% distortion

Complete line of accessories also available including AC and DC chargers. Carrying case. External antenna adaptor cable. Sealed Nicad power pack. And space-saving flex antenna.

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AMATEUR: ANTENNAS • ROTORS • TOWERS

3 CRANK-UP TOWER MODELS AVAILABLE

TT-45 FREESTANDING CRANK-UP TOWER, 45 Ft.
The TT-45 will support 9 sq. ft. at a height of 39 ft. freestanding when properly bracketed to a house or wall at the 8 ft. level. The loads decrease as the tower extension Mast is lengthened. (Loads are based at 50 mph and load permitted on the tower decreases with increases in wind speed over 50 mph). The tower can be completely freestanding with our new concrete or tower rotating bases, which allow the use of our raising fixture. Using these accessories, the towers can be installed by one man easily.

List **$310.00**

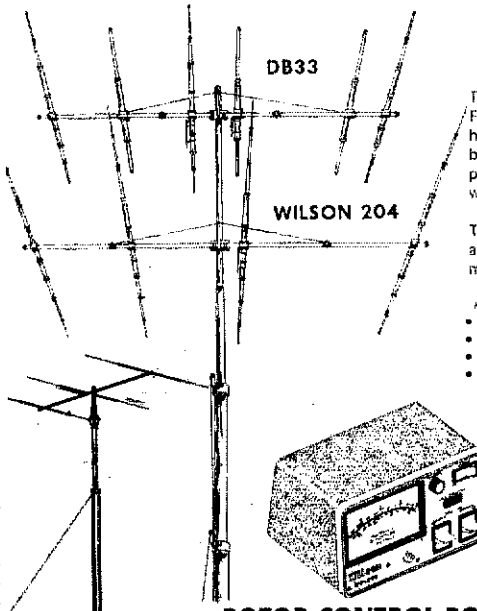
FOR THE TOWERING SIGNAL - WILSON'S SST-64 GUYED CRANK-UP TOWER, 64 Ft.
All steel tubing is galvanized plated and conforms to ASTM specifications for years of maintenance free service. The SST-64 is made of 4 sections, being 4.5", 3.5", 2.5" and 2". These large diameters give unexcelled strength and virtually makes the thin push-up poles a thing of the past. The large loads of today's antennas make the Wilson SST-64 the best value on the market today.

List **$375.00**

THE WILSON GT-46 GUYED CRANK-UP TOWER, 46 Ft.
The GT-46 features quality construction and materials, with the stability of the Guyed System.

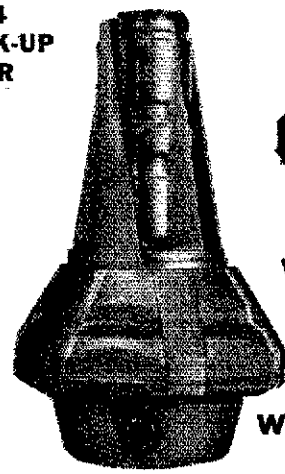
FEATURES OF THE GT-46:
• Low cost • High capacity • all steel. Conforms to ASTM (American Standard of Testing Materials) • Fully galvanized • 800 lb. winch standard • 2000 lb. raising cable standard (Aircraft Quality) • Can be roof mounted for extra height • Great looking, slim flag pole design, for the ecology minded.

List . . . **$249.00**

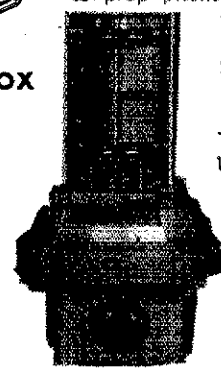


ROTOR CONTROL BOX

SST-64 CRANK-UP TOWER



WR 1000 ROTOR



WR 500 ROTOR

AMATEUR ANTENNAS

The Wilson 204 is the best and most economical antenna of its type on the market. Four elements on a 26' boom plus a Gamma Match (no balun required) make for high performance on CW & phone across the entire 20 meter band. The 204 Monobander is built rugged at the high stress points. Using taper swaged slotted tubing permits larger diameter tubing where it counts, for maximum strength with minimum wind loading.

The DB33 is the newest addition to the Wilson line of antennas. Designed for the amateur who wants a lightweight economical antenna package, the DB33 compliments the M204 for an excellent DXers combination.

All Wilson Monoband and Duoband beams have the following common features:
- Taper Swaged Tubing
- Full Compression Clamps
- No Holes Drilled in Elements
- Heavy Aluminum Booms
- Adjustable 52Ω Gamma Match
- Quality Aluminum
- Handle 4kw
- Heavy Extruded Element to Boom Mount

WR 1000 ROTOR

The Rotor everyone has been waiting years for — capable of the largest arrays up to 25 sq. ft.—Superior to prop pitches — Full 4,000 inch lbs. of turning torque. Braking system requires 12,000 inch lbs. before over-riding — accepts 2" - 3" masts — Weighs 60 lbs. — Size: 11" diameter, 19" high.

The Finest Rotor in the Market Today
WR 1000 . . . . . $469.00 List

WR 500 ROTOR

The Wilson WR500 Rotor has 780 inch lbs. of turning torque before stalling.

In addition, a Special Braking System requires 1300 inch lbs. of torque before windmilling—This is more than twice the braking ability of the other comparable rotor being marketed.

Full 98 Steel Ball Bearing raceway assures elimination of side torque jamming when Rotor is mounted in line with the mast.

Recommended for antennas of 7.5 sq. ft. or less . . . weighs 20 lbs.

The WR500 Rotor . . $149.95 List

WILSON AMATEUR ANTENNA SPECIFICATIONS

Model No.	Frequency	Boom Length (ft.)	Number Elements	Longest Elements (ft.)	Turning Radius (ft.)	Surface Area (sq. ft.)	Wind Loading at 80 MPH (lbs.)	Assembled Weight (lbs.)	Shipping Weight (lbs.)	Price
M340	40	40	3	70'0"	39'0"	15	300	180	220	$749.00
M520	20	40	5	36'4"	27'0"	8.75	175	74	96	299.00
M420	20	26	4	36'4"	22'6"	6.8	136	42	48	179.00
M320	20	19	3	36'0"	20'5"	5.25	105	35	40	139.00
M155	15	26	5	24'3"	18'0"	5.0	100	41	44	159.00
M154	15	19	4	24'3"	15'9"	4.0	80	30	33	119.00
M153	15	17	3	24'3"	14'8"	3.0	60	21	24	99.00
M108	10	40	8	18'0"	23'0"	5.5	110	49	77	225.00
M106	10	31	6	19'0"	16'1"	4.0	80	34	36	126.00
M105	10	26	5	18'0"	15'8"	3.0	60	29	32	101.00
M103	10	11½	3	18'0"	10'0"	2.0	40	10	12	39.50
DB54	20	40	5	36'4"	27'0"	12.75	255	94	119	375.00
	15		4	24'3"						
DB42	15	19	4	24'3"	15'8"	6.0	120	38	43	169.00
	10		3	18'0"						
DB33	15	17	3	24'3"	12'2"	4.5	90	30	33	139.00
	10		3	18'0"						

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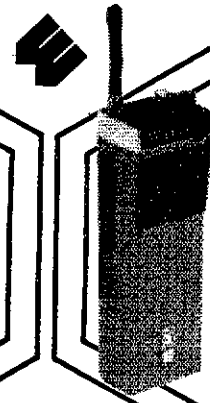
SPECS. 1405SM

- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 10.7 and 455 KHz IF
- .3 Microvolt Sensitivity for 20 dB Quieting
- Weight: 1 lb. 4 oz. less Battery
- Battery Indicator
- Size: 8 7/8 x 1 3/4 x 2 7/8
- Switchable 1 & 5 Watts Minimum Output @ 12 VDC
- Current Drain: RX 25 MA TX 480 MA (1W) 900 MA (5W)
- Microswitch Speaker Mic
- Unbreakable Lexan® Case
- Furnished with Flex Antenna and Simplex Xtal Frequency 52/52 installed.

ACCESSORIES:

- Battery Chargers
- Touch Pads
- Tone Options
- Speaker Mics
- Leather Cases
- Mobile Battery Charger



1402SM
HAND HELD
2.5 WATT
TRANSCEIVER
144-148 MHz
$192.95 LIST

SPECS. 2202SM

FREQUENCY RANGE 220-225 MHz
- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 10.7 and 455 KHz IF
- .3 Microvolt Sensitivity for 20 dB Quieting
- Weight: 1 lb. 4 oz. less Battery
- Battery Indicator
- Size: 8 7/8 x 1 3/4 x 2 7/8
- Switchable 1 & 2.5 Watts Output @ 12 VDC
- Current Drain: RX 25 MA, TX 400 MA
- Microswitch Speaker Mic
- Unbreakable Lexan® Case
- Furnished with Flex Antenna and Simplex Xtal Frequency 223.50 MHz installed
- Uses the same accessories as 1405.

$259.95 2202SM

1405SM
5 WATT
TRANSCEIVER
144-148 MHz
$259.95

Wilson 2 meter Hand-Held radios . . . The dependable ones . . . proven performance for the discriminating Ham who insists on quality and value.

Two models are available: the 2.5 watt model 1402SM, and the switchable 1 watt or 5 watt model 1405SM . . . options include Touch-Tone Pad, Battery Charger, Battery Packs Speaker Mike, Leather Case, and Tone Options.

Join the thousands of amateurs now using Wilson . . . the radio that goes where you do.

1402 SPECS

- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 10.7 IF and 455 KHz IF
- .3 Microvolt Sensitivity for 20 dB Quieting
- Weight: 1 lb. 4 oz. less Battery
- S-Meter/Battery Indicator
- Size: 8 7/8 x 1 7/8 x 2 7/8
- 2.5 Watts Minimum Output @ 12 VDC
- Current Drain RX 25 MA TX 500 MA
- Microswitch Speaker Mic
- High Impact Plastic Case

4502SM SPECS.

FREQUENCY RANGE 420-450 MHz
- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 21.4 and 455 KHz IF
- .3 Microvolt Sensitivity for 20 dB Quieting
- Weight: 1 lb. 4 oz. less Battery
- Battery Indicator
- Size: 8 7/8 x 1 3/4 x 2 7/8
- Switchable 1 & 1.8 Watts Output @ 12 VDC
- Current Drain - RX 25 MA, TX 500 MA
- Microswitch Speaker Mic
- Unbreakable Lexan® Case
- Furnished with Flex Antenna and Simplex Xtal Frequency installed. 446.00 MHz
- Uses same accessories as 1405.

$324.95

WILSON ALSO HAS DYNAMITE LINES OF ANTENNAS, CRANK-UP TOWERS, AND ROTORS . . .

MORE ABOUT THE WE-800:

Wilson's New Portable 800 Channel 2 Meter Synthesized Radio that can go anywhere with you • Switchable 1 and 12 watt output • 1 watt output with internal Ni-cad battery pack (takes regular 10 "AA" Ni-cads) • Low current drain CMOS synthesizer: Rx45 MA, TX 350 MA at 1 watt • 12 watt output mobile • Covers frequency range 144-148 MHz in 5 kHz steps, 600 kHz off-set up or down • Two positions available for other than 600 kHz off-set • Five pre-set channels • On-off switch control for meter light in rear for power saving use • Size 8-1/4" x 6-3/4" x 1-7/8" • Weight 1 lb. 5 oz.

ALL WILSON HAND-HELD RADIOS FEATURE:

- Performance
- Dependability
- Rugged Construction
- Versatility

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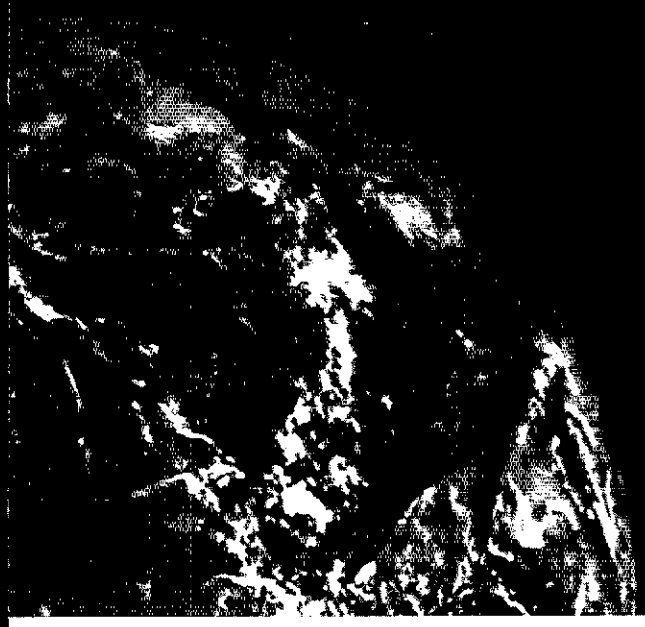
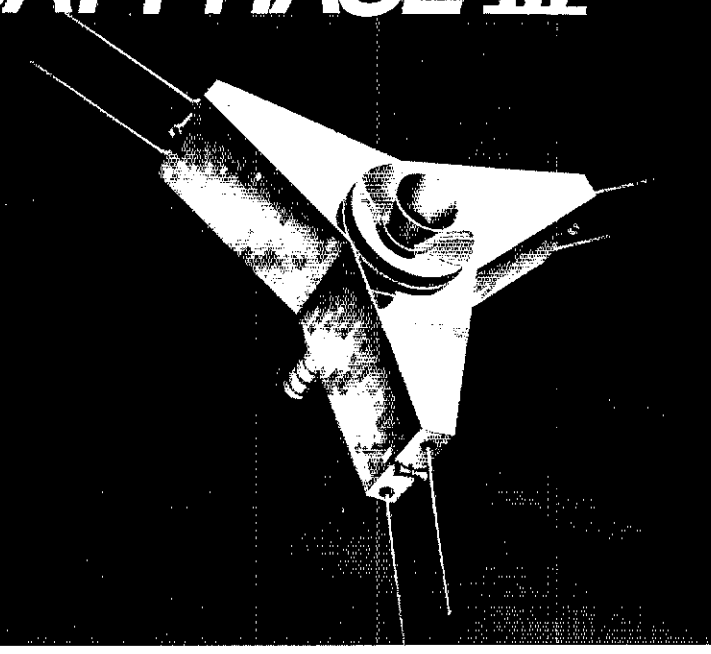
YOU... AND AMSAT PHASE III





An exciting new era in amateur radio is about to begin... the era of AMSAT PHASE III OSCAR satellites.

Many of you are familiar with the benefits of the AMSAT OSCAR satellites, notably OSCAR 6 and 7. These satellites, with a combined total of over 8 years in orbit, have provided communications between amateurs throughout the world. They have also provided a capability for an educational program in space sciences and many interesting experiments.

AMSAT, with members and contributing groups worldwide, and headquarters in Washington, D.C., has been responsible for our current satellite program. Many people feel that perhaps the greatest value of the amateur satellite program is the dramatic demonstration of amateur resourcefulness and technical capability to radio spectrum policy makers around the world.

The value of this aspect of amateur radio as we prepare for the 1979 World Administrative Radio Conference (WARC) is enormous.

The AMSAT PHASE III satellite program promises a continuing demonstration that amateur radio is at the forefront of modern technology. PHASE III satellites will routinely provide reliable communications over paths of up to 11,000 miles (17,600 km) for 17 hours each day. You can think of them as a resource equivalent to a new band.

The cost of these PHASE III satellites is a projected $250,000. Commercial satellites of similar performance would cost nearly $10,000,000.

Your help is needed to put these

Your valued, tax-deductible contribution can be as small as one of the 5000+ solar cells needed. A handsome certificate will acknowledge the numbered cells you sponsor for $10 each. Larger components of the satellites may also be sponsored with contribution acknowledgements ranging to a plaque carrying your name aboard the satellites. Call or write us for the opportunities available.

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Radio Amateur Satellite Corporation
Box 27Q, Washington, D.C. 20044
202-488-8649

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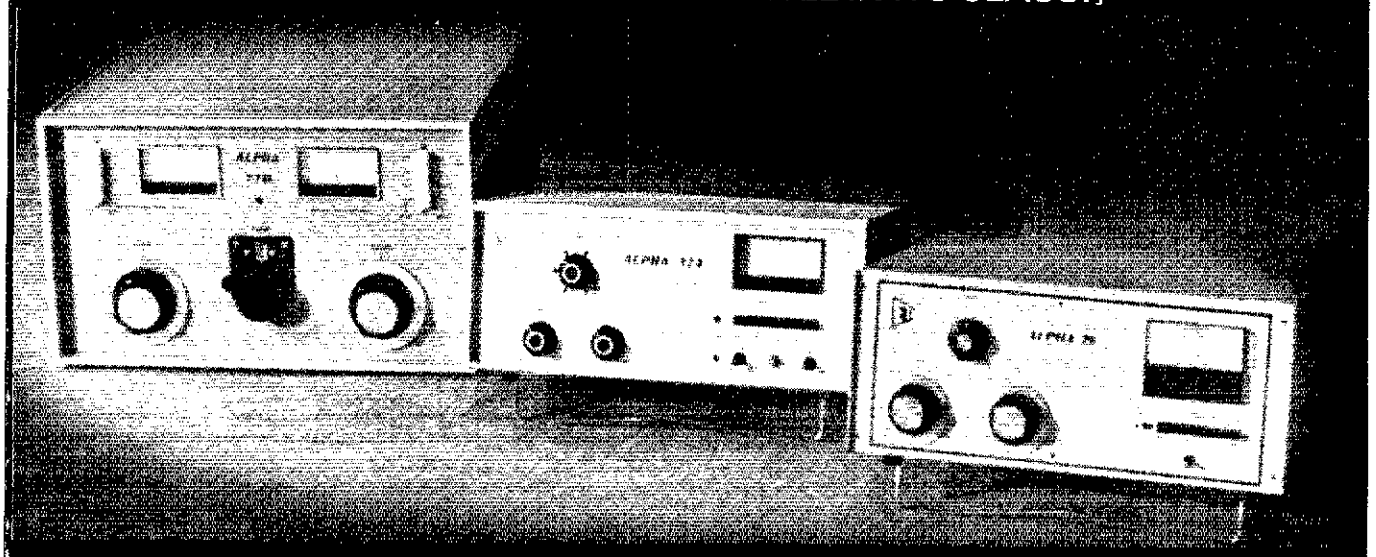
ALPHA: IF YOU CAN FIND A BETTER LINEAR . . . BUY IT QUICK! *

[BUT TAKE A *VERY* CLOSE LOOK FIRST — WE TRY AWFULLY HARD TO MAKE ALPHA UNBEATABLE IN ITS CLASS.]



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IF YOU DEMAND THE VERY FINEST, you should check out "THE ULTIMATE" linear.

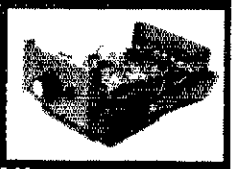
Anything your license allows, the '77D will handle. "Whisper-quiet" and practically stone-cold. Full coverage 10-160 meters, vacuum tuning and T/R, and built-in advanced QSK. **$2995.**

ALPHA 374
THIS COMPACT ROCK CRUSHER IS IN A CLASS BY ITSELF. No tune-up at all for maximum legal power, 10-80 meters.

Absolutely No Time Limit [NTL] on key-down time in any mode. Proven extremely reliable, super-convenient. **ALPHA 374** yields *nothing* to much bigger units. **$1395.**

ALPHA 76
YOU CAN BUY A CHEAPER LINEAR . . . BUT IS THAT REALLY WHAT YOU WANT?

ALPHA 76 delivers honest and cool maximum legal power [NTL of course] in all modes, 10-160 meters. No if's or maybe's. *Like all* **ALPHA** *linears, it's now guaranteed for a full 18 months!* **$995.**



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TOPS IN TALK POWER, this new split-band speech processor is really a breakthrough — it's unexcelled in adding clean "punch" to your signal, yet it is easy to use with any rig and introduces very little distortion. Carries a 10-day money-back guarantee and a full year factory warranty. **$179.50** [12VDC]; 120VAC power supply, **$15.00.**

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Illegal CB use of amateur-type transceivers, and of cheap "linears" which no self-respecting ham would touch, has led to FCC's proposing new rules to require that manufacturers (a) delete 10 meter coverage from power amplifiers and (b) secure FCC type acceptance of amateur transmitting equipment. You're virtually certain to pay more, for equipment with less useful capability, once such rules go into effect.

ETO considers these FCC proposals damaging and unfair to amateur radio, as well as unlikely to accomplish their intended purpose. But as this is written, it nevertheless appears probable that they'll be adopted.

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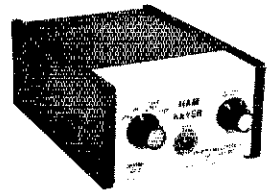

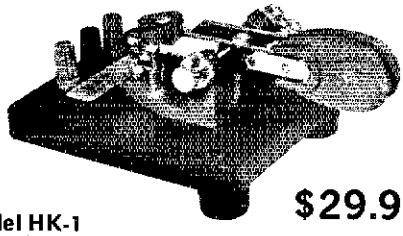

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- Dual lever squeeze paddle.
- Use with HK-5 or any electronic keyer.
- Heavy base with non-slip rubber feet.
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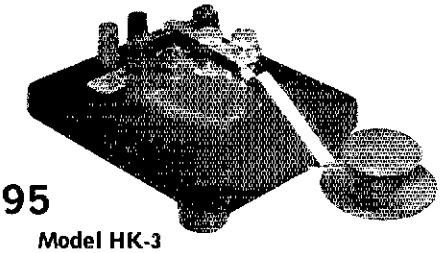

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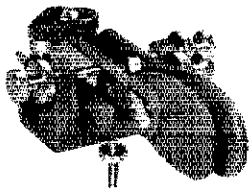

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Pins ⅜" long, 1/10" spacing. For displays, keyboards. Wt. 4 ozs. GM3594

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10 for $1.98
Barrels of 3's, 6's, & 9-digit readouts, some with driver chips. Wut a buy! Untested. No. GM3628

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3 for $1.98 6 ozs.
"Hand clap" sensitives crystal mike amplifier, triggers SCR. Cat. No. GM3625

BARREL KIT #221 IC SOCKETS
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Mfr unloads! Four 14-pin, four 16-pin. Solder tail, Lo-profile. No. GM3621

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Barrels of untested .17", .3", .5", 7-segs, Like FND-357, 500, 503, MAN-3's. Wut a buy! No. GM3619

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$1.98
Distributor unloads barrels of assrtd bulbs, pop'l'r voltages to 24V. Screw & bayonet. Wt. 4 ozs. No. GM3561

BARREL KIT #211 LO-PROFILE TO-5
50 for $1.98
NPN power transistors, mostly good. Bvceo 40V. Ic 2A. Hfe 30-100. Up to 250 MHZ! Like RCA 2N5189. Wt. 12 oz. No. GM3851

BARREL KIT #210 w/ GLOWIN' PANELS
3 for $1.98
4" x 1" panels that glow blue-green with 110VAC. Use for nite lites, indicators, etc. Cat. No. GM3550

BARREL KIT #205 MINI BLOCK CAPACITORS
50 for $1.98
Unbelievable! Worth $50. High precision submini caps for all applications. Wt. 8 ozs. Cat. GM3528

BARREL KIT #203 CALCULATOR KEYBOARDS
10 for $1.98
It's true! 20-key, 4 function keyboards at ridiculous give-away. Wt. 12 ozs. Cat. No. GM3524

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Distributor unloads! Includes AC, DC, RF, audio, 4-9 pin, all kinds, Wt. 1 lb. Cat No. GM3527

BARREL KIT #201 6V INDICATORS w/leads
15 for $1.98
Test lamp manufacturer dumps inventory! Worth 89¢ ea. Like grain-o-wheat. Cat. No. GM3526

BARREL KIT #200 9 DIGIT READOUT MODULES
5 for $1.98 with calculator driver chips beneath epoxy. Cat. No. GM3513

BARREL KIT #198 TRANSISTORS & DARLINGTONS
50 for $1.98
Motorola dumps 1,000,000 TO-220 in barrels. NPNs & PNPs. Cat. No. GM3513

BARREL KIT #194 10-AMP INLINE BRIDGE RECTIFIERS
20 for $1.98
Assrtd voltage. We can't test 'em. No. GM3475

BARREL KIT #192 NYLON GEARS
40 for $1.98
Wide variety of sizes 1" to 3" gears for the mechanical gear train hobbyists. Wt. 10 ozs. No. GM3427

BARREL KIT #191 CARBOFILM RESISTORS
800* for $1.98
*½ pound, approx. ⅛, ¼ watters. Assrt values. Unmarked. Cat. No. GM3445

BARREL KIT #188 400 Parts $1.98
Includes resistors, caps, transformers, rectifiers, diodes, etc. for p.c. work. Preformed, dumped into barrels by factories. 100%. Cat. No. GM 3401

BARREL KIT #186 KEYBOARD CHIPS
10 for $1.98
Truthfully we can't tell 'em. MM5740's, keyboard encoder chips. No GM 3414

BARREL KIT #184 ¼-WATT METAL FILM
150 for $1.98
100% metal film resistors. Long leads. GM3413

BARREL KIT #182 JUMBO RED LEDS
15 for $1.98
100% material, user cancellation from factory dumps, sy 10 mils. For 100's of projects, red lens. Cat. No. GM3369

BARREL KIT #181 MICRO ZENERS
100 for $1.98
1-Watt, tiny, 100% material, from 2V to 30V. Axial leads. No shorts, no opens. DO-7 & micro epoxy units. Cat. No. GM3368

BARREL KIT #163 MINI TRIM POTS
30 for 1 ozs.
$1.98
Assrt. values 100 to 1 meg. What a buy. Singe turn. ¼ W. Wt. 6 oz. GM3345

BARREL KIT #161 'POP' PLASTIC TRANSISTORS
25 for $1.98
2N3904's with some 2N3906's of 100% material. TO-92. Preformed. Cat. No. GM3343 1 oz.

BARREL KIT #160 V. REGULATORS
10 for $1.98
No. GM3330
LM309KC TO-8 V.R.'s barreled. Bot by the pound.

BARREL KIT #159 MODULAR SWITCHES
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Centralab switches. TV-makers excess. Dpdt, 6pdt, etc. Brand new. Cat. No. GM3150

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20 for $1.98 MAN-3, ½" seg readout, with built-on magnifier. Factory discontinued line. 100% material. Cat. No. GM3325 1 oz.

BARREL KIT #154 CLOCK CHIPS
20 for $1.98
We gathered an assortment of clock chip, alarm, calendar, beepers, who knows, all mixed. Cat. No. GM3308

BARREL KIT #149 ROCKER SWITCHES
12 for $1.98
No. GM3302

BARREL KIT #145 MINI TRANSFORMER
15 for $1.98 outputs, interstage and audio. Only 1" sq. Wt. 2 lbs. GM3294

BARREL KIT #144 RCA PHONO PLUGS
40 for $1.98
1,000,000 RCA phono plugs for this one. You hi-fi-ers know wut they are. 100% material. GM3293

BARREL KIT #136 PANEL SWITCHES
30 for $1.98
Did you hear of OAK? Another rgut maker barrelled barrel dump is your gain. Wt. 1 lb. Cat. No GM3136

BARREL KIT #135 MICRO MINI LAMPS
20 for $1.98 1 ozs.
Imagine! Micro size (⅛ x ¼") with wire leads, 3 to 5 VDC, 40 mils GM3269

BARREL KIT #126 MINI DIP ICs
100for $1.98
Large mfgr dumped 100's of ibs into barrels. Includes 7414, LM-380-8, 703, 567, 555, 556—but who knows? W. 1 lb. GM3245

BARREL KIT #127 AXIAL ELECTROS
40 for $1.98
Assrt. capacities and voltages. Cat. No. GM 3227

BARREL KIT #126 UPRIGHT ELECTROS
40 for $1.98
1mf to 3000mf in mixture of voltages. 100% marked 'n good. GM3226

BARREL KIT #115 MOLEX SOCKETS 100% good
200 for Cat.No.
$1.98 GM3144
Calculator maker dump! We got a zillion of 'em.

BARREL KIT #112 MICRO MINI LEDS
40 for $1.98
All the tiny leds, axial, upright of Monsanto, Litronix, variety of colors. Yield 50% or better. GM 3139

BARREL KIT #109 TERMINAL STRIPS
100 for $1.98
Wide assrt. of terminal strip connectors, from 1 contact up. Strip manufacturers barrel dump is your gain. Wt. 1 lb. Cat.No GM3136

BARREL KIT #104 SLIDE VOLUME CONTROLS
10 for $1.98
Cat.No. GM1057

BARREL KIT #101 RESISTOR SPECIAL
200 for $1.98
Includes: ⅛, ¼, ½, 1, 2-watters, carbon, 3 ozs. 100% good. GM3054

BARREL KIT #99 PHOTO ELECTRIC CELLS
10 for $1.98
Assrt. GE types, CDS types. Mixed by factory. Big job for us to separate. 100% good, Cat.No. GM3052

BARREL KIT #93 HALF WATTERS
200 for $1.98
Resistor factory tried to foul us by using 100% color-coded resistors in barrel. But value is there. 4 ozs. GM3046 Untested

BARREL KIT #92 3 AMP EPOXY RECTIFIERS Untested
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Cosmetic rejects, electrically fine business! You check 'em, it's not for us. Assrt. voltages. GM 3204

BARREL #91 SILVER MICAS
100 for $1.98
Axial, red case, variety of physical sizes & values Cat.No. GM 3018

BARREL KIT #88 LITRONICS LED READOUTS
10 for $1.98
7447's, 727's, singles, triples, etc. .33 to 0.6. Bot from factory, all mixed, have fun! No. GM 2851

BARREL KIT #87 NATIONAL IC BONANZA
100 for $1.98
Types 8080, 7400 series, DTLs, ROMs, registers, clock & calc chips, linears, etc. Cat.No. GM 2860 Untested.

BARREL KIT #86 HOBBY LEDS
40 for $1.98 Untested
7447's, 727's, singles, triples, etc. .33 to 0.6. Bot from factory, all mixed; have fun! GM2859

BARREL KIT #83 15 for $1.98 LM-340T VOLT REG
Factory rejected them for length of leads. May include 5, 6, 8, 12, 15, 18, 24 volts. Power tab Cat. GM 2635

BARREL KIT #81 SUBMINI RESISTORS
200 for $1.98
PC, upright type, color coded, ¼ watt. Assrt values. Come to us in a barrel. Cat.No GM 2746 100% good

BARREL KIT #76 1-WATT ZENERS
100 for $1.98
Factors same as 400-mw's. Never-to-see-again offer. 6, 8, 10, 12, 15V, under glass. Double plug. Cat.No. GM 2741 Untested.

BARREL KIT #73 TRANSISTOR ELECTROS
50 for $1.98
We don't wish to separate wide assrt voltages & values up to 300 mf. Cat. GM2747

BARREL KIT #71 CAPACITOR SPECIAL
100 pcs. $1.98
micas, moldeds, plastics, ceramics, discs, etc. Nifty 100% good Cat.No GM2738

BARREL KIT #68 2 WATTERS
100 for $1.98 100% good.
Suppliers throw 'em in the barrel. It's a BU gold mine. All marked. Cat.No. GM 2735

BARREL KIT #65 MIXED READOUTS
10 for $1.98
Factory returns — such numbers as MAN-4's, MAN-7's, MAN-3's, 11 barrels & no time to separate. Cat.No. GM 2733 Untested.

BARREL KIT #61 POLYSTYRENE CAPS
100 for $1.98
Finest caps made. As a gamble we bought 10 barrels from factory, mixed values; all good. Cat.No. GM 2729

BARREL KIT #58 SLIDE SWITCHES
30 for $1.98
All shapes, sizes, spst, spdt, momentaries, etc. Tremendous shop pak for 100's of switching projects. Cat.No. GM 2726 100% good

BARREL KIT #56 POWERS! POWERS!
100 for $1.98 Cat. GM 2724
Large distributor cleaned house. Barrels of power resistors 3 to 7 watts.

BARREL KIT #54 2 DIGIT READOUTS
10 for $1.98
Bargain of a lifetime! All we got was 1 barrel — the "blister digit" types. Multiplexed. Cat. No. GM 2722

BARREL KIT #40 PNP HIGH-POWER TRANSISTORS
20 for $1.98
Popular germanium TO-3 case GM 2618 100% good

BARREL KIT #39 2N3055 HOBBY TRANSISTORS
15 for $1.98
Fallouts of the famous 2N3055. GM2617 100%

BARREL KIT #37 1 AMP "BULLETT" RECTIFIERS Untested
100 for $1.98
Famous style, assrtd voltages, silicon, axial includes all types of voltages to 1KV. Cat.No. GM 2615

BARREL KIT #36 GERMANIUM DIODES Untested
200 for $1.98
Cat.No. GM 2614
famous maker, popular item. Never grows old.

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Famous NE-2's. All prime, but factory made millions and barrelled 'em. Your advantage Cat.No GM 2613

BARREL KIT #31 METALLIC RESISTORS
100 for $1.98
Made mostly by Corning, the finest resistor made. Mostly ½ watters, 1% to 5% tol. In a barrel of values. Cat. No. GM2609

BARREL KIT #30 PREFORMED RESISTORS
200 for $1.98
We got barrels of ¼ and ½" watters for pc use 100, ¼, 100 ½" watters No. GM 2608 100% good

BARREL KIT #27 PREFORMED DISCS
150 for $1.98
Hi-Fi mfr's shelf inventory but he dumped 'em in barrels. Preformed, for PC use. Mixed values tool GM 2605

KIT #26 PLASTIC TRANSISTORS
100 for $1.98 Untested.
Type TO-92 (TO-18), all manufacturers, variety of 2N #'s. Cat.No GM 2604

BARREL KIT #25 METAL CAN TRANSISTORS
100 for $1.98
Includes TO-5, TO-1, TO-18, etc., assorted 2N numbers, unmarked etc. Cat.No GM 2603 Untested.

BARREL KIT #20 LONG LEAD DISCS
100 for $1.98
"auction sale" Prime, marked subs, long leads Cat.No GM 2598 100% good

BARREL KIT #19 DIPPED MYLARS
60 for $1.98
Finest capacitors made, shiny finish. Imagine factory dumping 'em in barrels. Cat.No. GM 2597 100% good

BARREL KIT #17 LINEAR & 7400 DIPS
100 for $1.98 Untested
Marked and unmarked, internal numbers of raw factory stock. Cat.No GM 2431.

BARREL KIT #15 MOSFET TRANSISTORS
60 for $1.98
All 4 leaders TO-18 case, includes UHF transistors too! Cat.No. GM2429

BARREL KIT #14 PRECISION RESISTORS
200 for $1.98
Marked and unmarked ¼, ½, 2 watts. No GM 2428

BARREL KIT #11 POWER TAB TRANSISTORS
40 for $1.98
NPN, plastic TO220 type. Assrtd 2N numbers. No. GM 2425 Untested.

BARREL KIT #10 ROMS-REGISTERS
75 for $1.98
Untested
28 to 40 pin devices, marked, internal factory numbers, etc Cat. No. GM 2424

BARREL KIT #8 SUBMINIATURE IF TRANSFORMERS
75 for $1.98
Amazing, includes 455khrz, osc, antenna, who knows? Cat.No. GM 2422 100% good

BARREL KIT #7 VOLUME CONTROL
30 for $1.98 100% good
Singles, duals, variety of values, styles, big ones — small ones. Cat.No. GM 2421

BARREL KIT #5 SCRs, TRIACS, QUADRACS
40 for $1.98 Raw factory stock! All the 10 amp types. Cat.No. GM 2419 Untested.

BARREL KIT #4 "4000" RECTIFIERS
100 for $1.98 Untested.
1N4000 series. May include 2's, 50, 100, 200, 400, 600, 800 and 1000 volters. GM 2417

BARREL KIT # 3 1N4148/914 SWITCHING DIODES
100 for $1.98
Imagine famous switching diodes at these prices! Cat.No. GM 2416 Untested.

BARREL KIT #2 LINEAR OP AMPS, DIPS 75 for Untested **$1.98**
May include 709's, 741's, 708's, 560 series, 555 includes GM 2416

BARREL KIT #1 SN7400 DIP IC'S
75 for $1.98
Marked 14 and/or with 16 pin dips, may include gates, registers, flip flops, counters. GM 2415 Untest

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☐ SN7407N	.25	.26
☐ SN7409N	.18	.19
☐ SN7410N	.16	.17
☐ SN7411N	.25	.26
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☐ SN7420N	.16	.17
☐ SN7421N	.29	.30
☐ SN7423N	.35	.36
☐ SN7425N	.27	.28
☐ SN7430N	.16	.17
☐ SN7437N	.26	.27
☐ SN7438N	.26	.27
☐ SN7440N	.16	.17
☐ SN7441N	.84	.85
☐ SN7442N	.53	.54
☐ SN7445N	.69	.70
☐ SN7446N	.79	.80
☐ SN7447N	.79	.80
☐ SN7448N	.76	.77
☐ SN7450N	.16	.17
☐ SN7451N	.16	.17
☐ SN7454N	.16	.17
☐ SN7464N	.16	.17
☐ SN7470N	.45	.46
☐ SN7472N	.34	.35
☐ SN7473N	.36	.37
☐ SN7474N	.31	.32
☐ SN7475N	.49	.50
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☐ SN7489N	1.95	1.96
☐ SN7490N	.44	.45
☐ SN7491N	.73	.74
☐ SN7492N	.47	.48
☐ SN7493N	.47	.48
☐ SN7494N	.78	.79
☐ SN7495N	.78	.79
☐ SN7496N	.72	.73

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☐ SN74121N	.39	.39
☐ SN74123N	.59	.60
☐ SN74125N	.59	.60
☐ SN74126N	1.00	1.01
☐ SN74132N	.59	.60
☐ SN74141N	.88	.89
☐ SN74145N	.69	.70
☐ SN74148N	1.29	1.30
☐ SN74150N	.99	1.00
☐ SN74151N	.70	.71
☐ SN74153N	.65	.66
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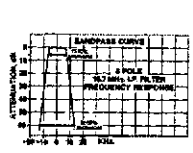
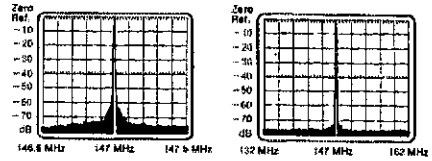


An 8-pole IF crystal filter greatly reduces adjacent channel interference.



Actual spectrum analyzer photos of the HW-2036 transmitter output operating at 147 MHz. Spurs within 20 MHz of carrier are down a full 70 dB!

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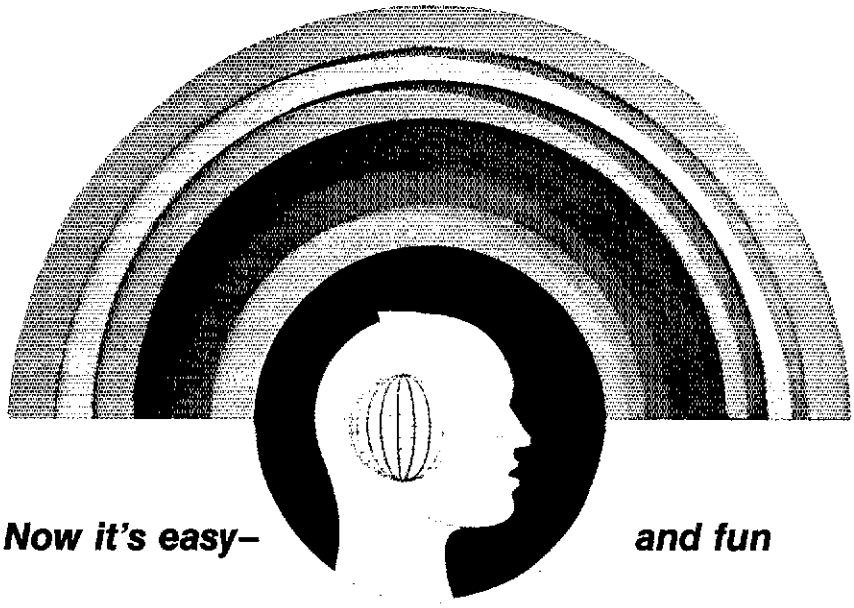

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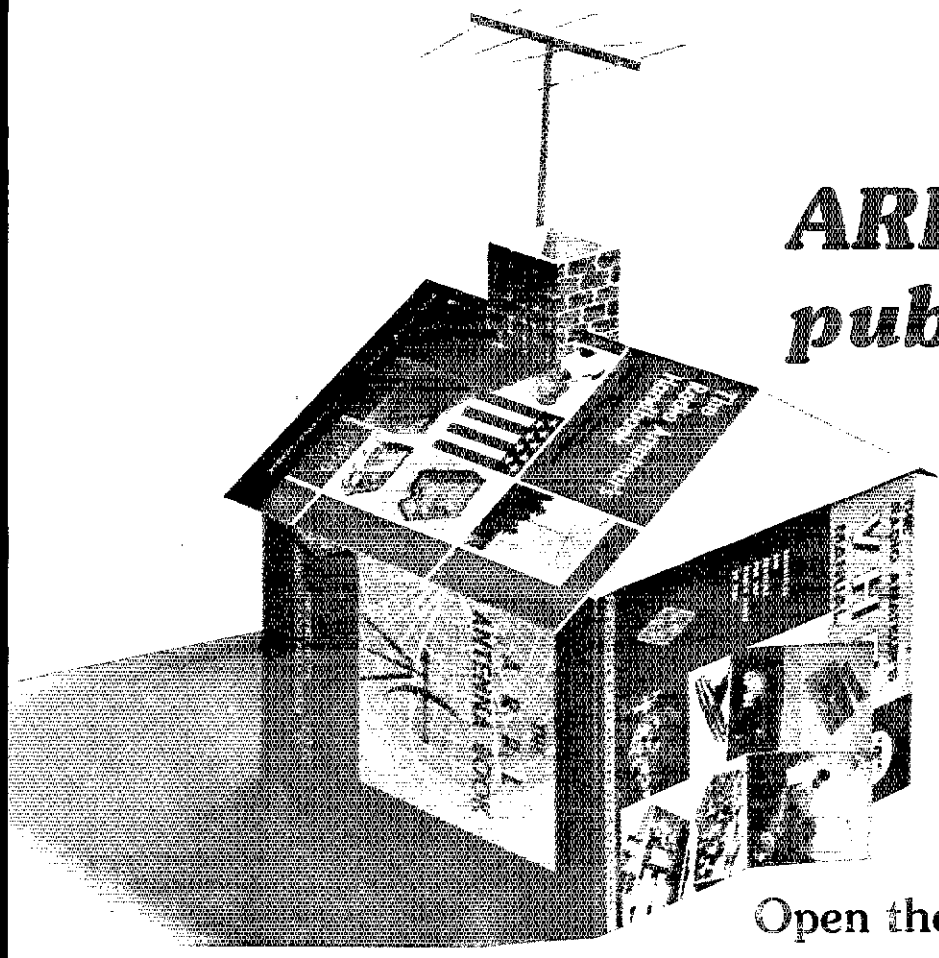

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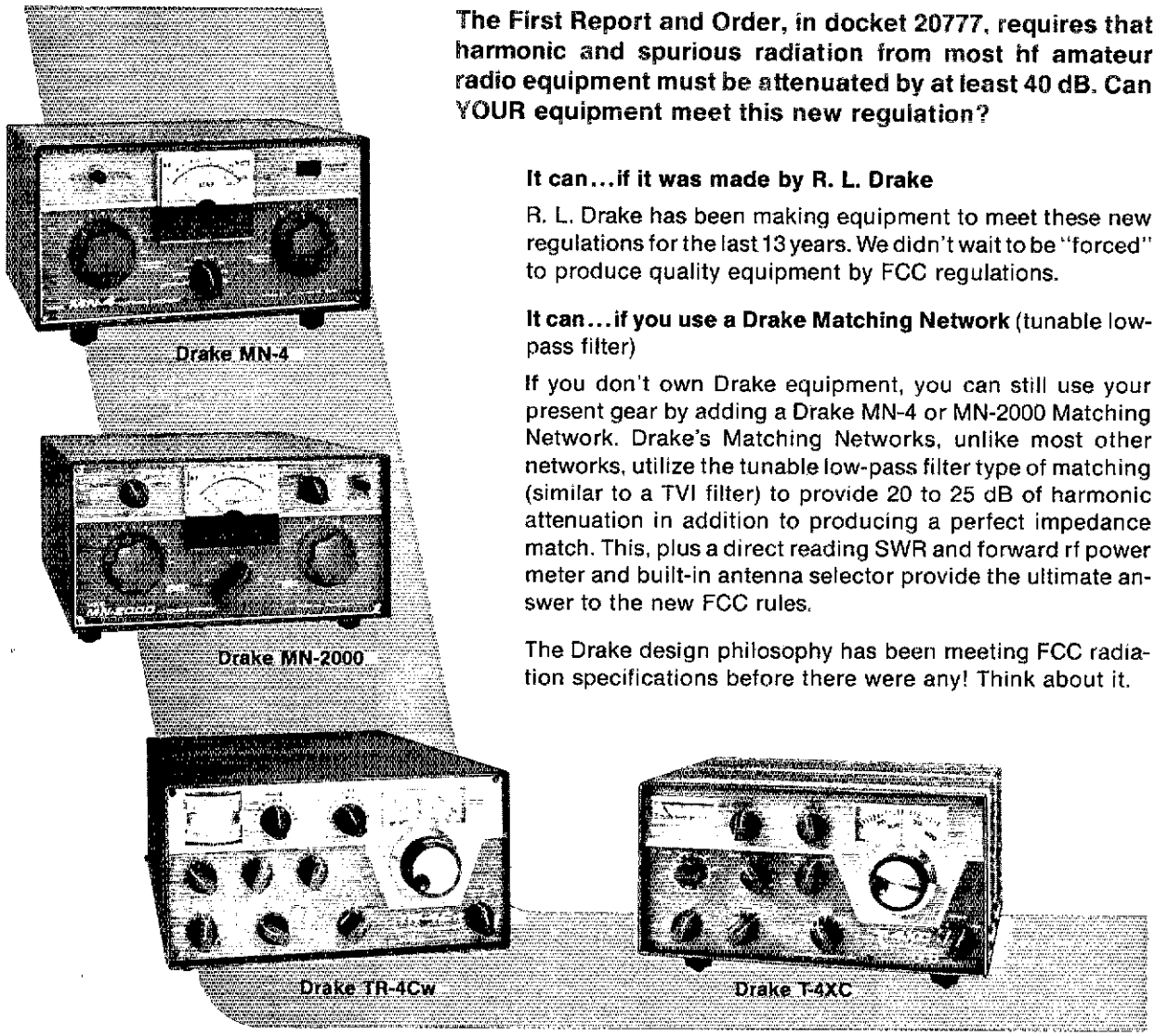

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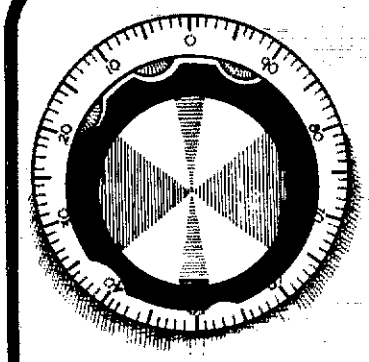

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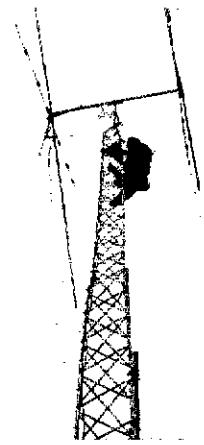

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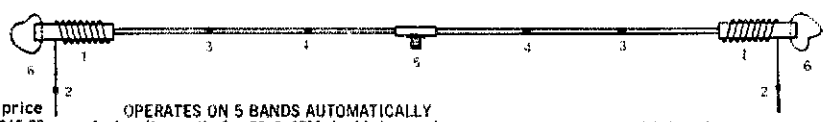

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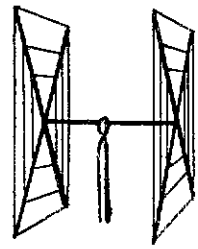

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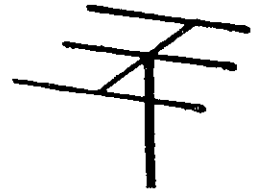

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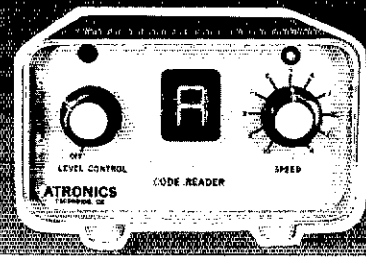

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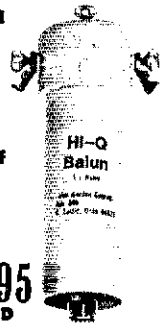

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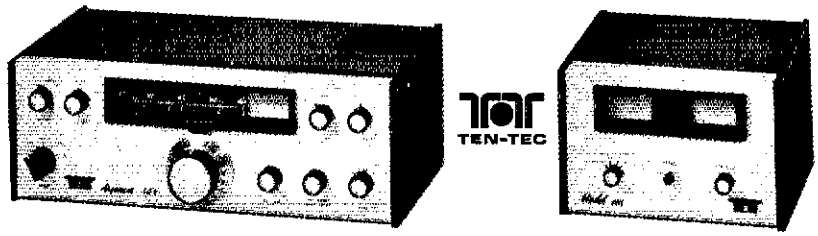

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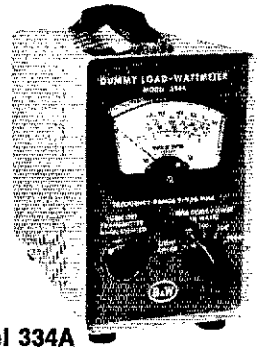

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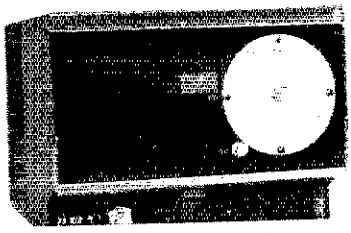

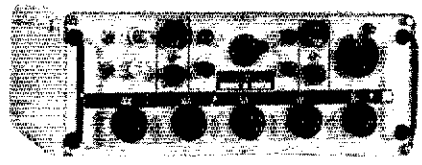

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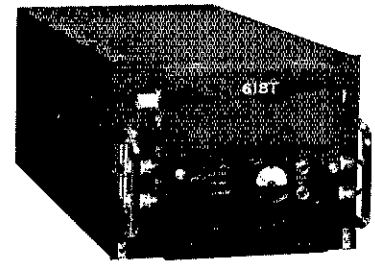

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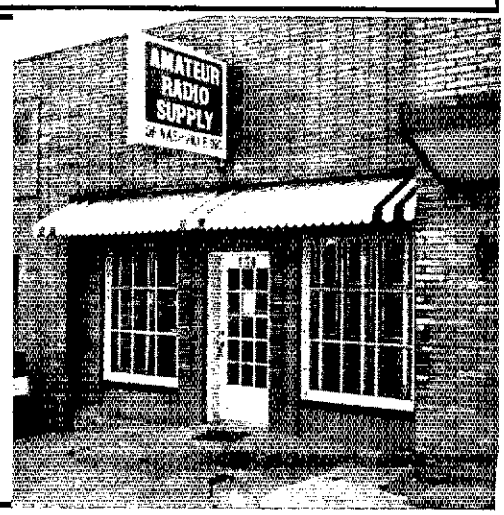

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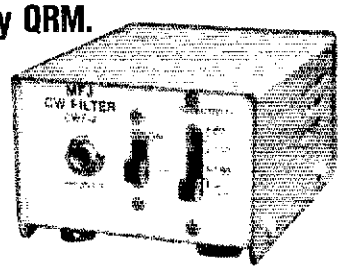

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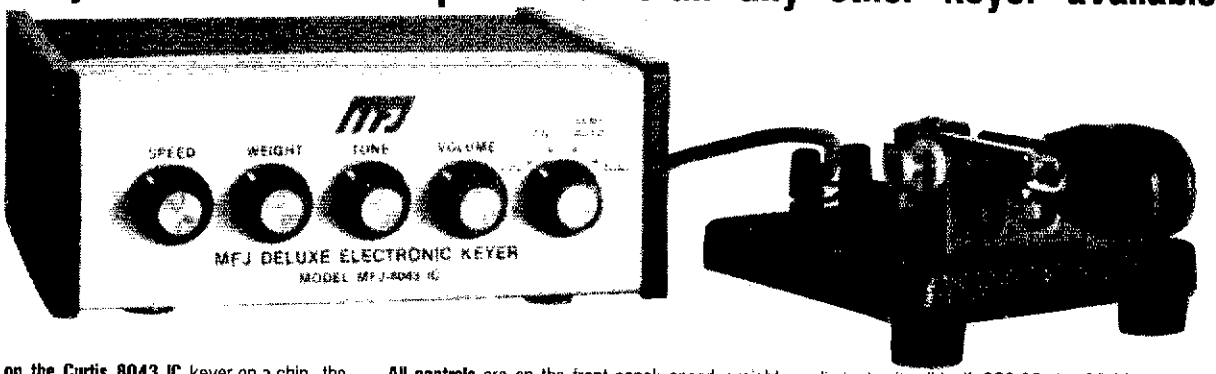

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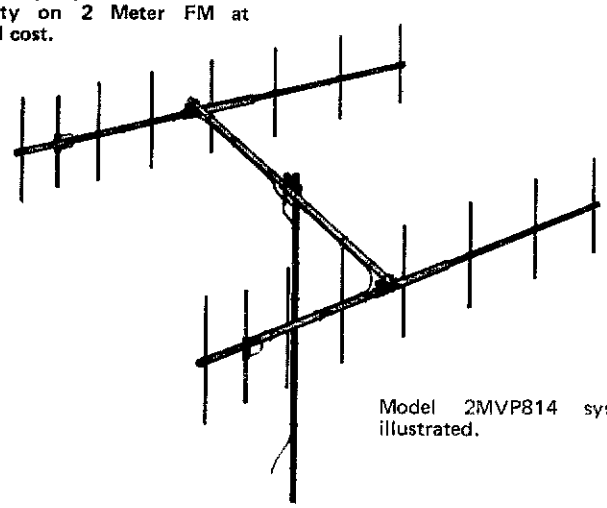

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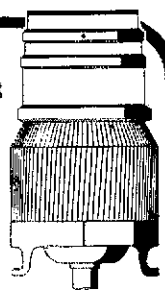

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TRANSMITTING Tubes, HV and filament xfmrs, rotary inductors, transmitting capacitors. Send stamp for flyer. T.S. Marinich Electronics, 102 Bell St., Weirton WVA 26062.

ATLAS Motorola FM and SSB Marine Radio. Motorola Pagers bought and sold. W5BCO, Ralph Hicks, P. O. Box 15633 Tulsa OK 74112. 918-266-2525.

WANTED: Mosley TA-33Jr. or similar. WA3NMW 717-544-3191.

HEAVY duty high-voltage power supply parts: plate transformers, filter chokes, bleeders, solid-state full-wave bridge rectifiers, oil-filled filter condensers, also 0-220V 20A Variac. WA6DUG, 785 Radcliffe Ave., Pacific Palisades, Calif. 90272. 213-459-2440. If no answer, please leave name and number on recording.

ENJOY the best DXing at Paradise Hotel, Ambergris Cay 35 miles off coast of Belize, Central America. Bring your own gear and operate. Guaranteed low noise level and perfect operating conditions. White off the air, enjoy best of fishing, diving and swimming in the clear Carribean. 20-meter antenna on premises. USA office 9225 Katy Freeway, Houston TX 77024, 713-461-2027.

WANTED to buy: 450th, 1000T tubes. K8CCV, 5471 Norquest Blvd., Youngstown, Ohio 44515.

WANTED: IO-105 Heath Scope, pay $250. KØMNA. 316-838-5385.

IF You're looking here for used ham gear, there's at least one other place you should be looking: Buyers & Sellers weekly equipment list. Each list (updated every week) contains hundreds of pieces of gear, currently available all over the United States, organized into SSB transmitters, 5-band transceivers, linears, etc. all having our mail purchase guarantee. A sample copy is Free by sending an s.a.s.e. to Buyers & Sellers — Dept. QC, P. O. Box 73, Kenmore Station, Boston, MA 02215.

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YAEHOO! I've got Yaesu. Also VHF Eng., ICOM, KLM, Swan, Dentron, CushCraft and Larsen. Use your bank credit card. Call or write WØEZ for new or used gear. Bob Smith Electronics, 12 South 21st St., Fort Dodge, IA. 50501. 515-576-3886.

MOBILE OPS. Tired of Ignition Noise? Please send s.a.s.e. for info on shielded ignition systems. Summit Enterprises, 20 Elder Street, Yarmouthport, MA 02675.

PICTURE QSL cards of your shack, etc. from your photograph or art work. 500 — $14.00, 1000 — $19.25. Also unusual non-picture designs. Generous sample pack 50c. Half pound of samples $1.00. Raums 4154 Fifth St., Philadelphia PA 19140.

CASH for your ham gear. Beacon Comm., 617-267-1975.

TOROIDS — Five 88mHy for $3.50 P.P. U.S. and Canada only. M.L. Buchanan P. O. Box 74 Soquel CA 95073.

BUY your Tri-Ex or Rohn tower (any size), discount prices, from UPI Communications. Call Bill Salerno (W2ONV) at 201-279-7500 or write 481 Getty Ave., Paterson NJ 07503.

MOTOROLA HT220, HT200, Pageboy, etc. service and modifications performed at reasonable rates. Hatfield, WA4FRV, 804-320-4439 evenings.

DXRs: Operate my FL-101, RF-101, FL-2100B, tower, antennas. Enjoy Montserrat, "Emerald Isle of the Caribbean" with pool and auto. $225/wk. "Arnie" L. 720 Parker, Ontonagon, MI 49953. 906-884-2336.

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ANTENNA Stuff no. 14 stranded copper antenna wire $6.50 per 100' ppd. 450 ohm open wire $8.50 per 100' ppd. Ed Eggert W3HIK P.O. Box 3094, Wescosville, PA 18106.

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Now in stock 1 meg. split kits complete with installation instructions $12 plus 50c postage.
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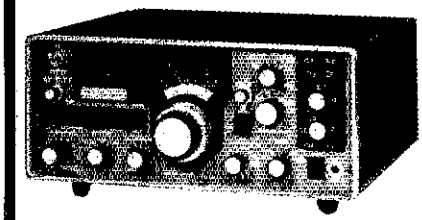

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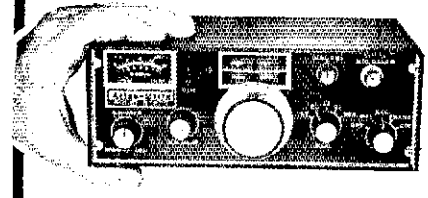

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PASSED 20 wpm Extra test — selling perfect Curtis IK440A Instructokeyer code generator/automatic keyer (see March 76 QST test). Cost $225 selling $165. Warren KH6GSH Box 431 Alea HI 96701.

SELL: Collins 32S3 xmtr with RF Processor, 516F-2 power supply; 75S-1 rcvr, all A-1 condition, with cables and manuals. $975 FOB K6CH, 1204 N. Alamo St., Anaheim, CA 92801 714-774-3710.

CALL SIGNS — 2 inch 3-D letters. Gold color on woodgrain plastic. Sticks on — stays on. Introductory special $3 each; 2 for $5. Shipped promptly ppd. WBØWAB George Wildeboor, 505 So. 71 Hiway, Savannah, MO 64485.

SELL — Collins S-line, 19 months old, mint condition, package deal only which includes 32S3A, 75S3C, 312B-3, 516F-2, 500hz. Filter $4500 Firm! 813-985-7080.

WANTED — Hallicrafter receivers & parts — any condition — for private collection, also want complete set of Rider's manuals. Write C. Dachis 4500 Russell Drive, Austin TX 78745.

TRAVEL-PAK QSL Kit — Send call and 25c; receive your call sample kit in return. Samco, Box 203, Wynantskill NY 12198.

FOR SALE: Utica 650 six meter transceiver and VFO $80 WB3EZS 301-997-0995.

R4B, T4XB, AC4, MS4, Extra crystals, must sell pride and joy, mint, $890. Gary Shilling, WBØJQC, Box I, Tonganoxie, KS 66086, 913-845-2386.

YAESU FR-101 Digital receiver and matching speaker. Mint. Only used 6 months for W1AW code practice. Original box, manuals. $495. WA2KQG 518-439-4122. 18 Paxwood Rd., Delmar, NY 12054.

QST 1966 through 1976 $30 postpaid, CQ 1966 through 1976 $25 postpaid. Art Johnson, K2POA, 29 Boone, Bethpage NY 11714.

GENERAL Ticket? If I did you can. 28 pages of code, theory, test-taking hints and tips, $1.50. Worry-warts only. WBØPTM, 516 9th Ave., Brookings, SD 57006.

WANTED: Heathkit HR-10B receiver in good condition, WB4WSF, Box B, Aliceville, AL 35442.

YAESU FV-101 VFO never used — $80. K1OZR Lynn, MA 617-598-4138.

HELP Save the whales — Greenpeace Foundation desperately needs your SSB or RTTY equipment, antennas or accessories, working or not, for use in our sea going anti-whaling campaign. Donations, loans or low cost purchases eagerly sought. Contact R. Dillman, 435 Utah Street, San Francisco, CA 94110. 415-UN4-6320.

NEW factory sealed Swan, Atlas, Ten-Tec, Lafayette, Dentron, 15% off, Tempo 10% off. All recent production runs. Discounts apply to $448. or more. Send certified check (payable to the manufacturer of the equipment you want) to Electronics World Inc., 3425 Denny Ave., Pascagoula, MS 39567, Attention: "Bill" WB5FXI Use of Bank Americard or Master Charge OK but discounts will be 11-1/2% and 6-1/2% respectively.

WANTED 54-38 transformer for a DX-40 transmitter. John Braden Rt. 1, Box 116 White Swan, WA 98952. 509-848-2821.

WANTED — Panadapter, send info and price, Bob Somers W2QYH, 411 Hamilton Rd., Glassboro, NJ 08028.

WANTED: Gonset 913A and 903A or Johnson 6N2 Thunderbolt — George Jones W4XP 10009 Nottingham Huntsville, AL 35803. AC 205-883-1503.

NOVICE station, Johnson Navigator, 160-10 vfo with sidetone. National NC-88 receiver with Heath QF-1 Q-multiplier, key, phones, cables, relay, SWR, good, $150 or best offer. Also Techraft model 144 2-meter converter mint $40 or best offer. Realistic DX-160 receiver good $125 or best offer. WA2ZPG, 14 Seacrest Ave., Staten Island, NY 10312, 212-984-2405.

WANTED HRO-60 coil sets for bands E, F, G, H, J, AA, AC. K2EVW 711 Shore Road, Northfield NJ 08225.

DRAKE R4A, T4X, AC3, MS4, spares, all HF xtals, TH3 beam, $700. WB2QCJ, 1 Jean Pl., Schenectady NY 12303. 518-355-1953.

TENTEC RX-10 rcvr, $30; DX-60B, $65; HG-10B, $35; HD-10 keyer, $25; Dycom 500c 2-meter amp, $35; Radio Craft Magazine, 1944, 1946, 1947, 50c each issue; sixer and twoer, $12.50 each; QST, 1956-1969, most good cond. $3.50/yr. All plus shipping. WA7ZYQ, 208-882-7951.

COLLINS KWM-2, round emblem, SN 38591, 312B-5 VFO, Power supply, manuals, cables, original boxes. Perfect condition, one of the last KWM-2s made; $1850. W6PLQ 408-356-0090.

SELL: Kleinschmidt teletype with perforator and manual. Local delivery preferred. WA1UOQ, 617-885-6603.

BROWN Brothers paddle — $25, NC88 rcvr $50, Vibroplex $20 — sell or swap — want Mobile TXCVR — Ken Hand WB2EUF P.O. Box 708 East Hampton NY 11937.

HY-GAIN Galaxy GT-550A (needs finals), Turner mic., AC-400 power supply all for $269. Drake MN-4 matching Network $50. Bob Mauro 257 Center Lane, Levittown, NY 11756.

NATIONAL Radio Ham set, transceiver — NCX-5, Power supply — NCX-A, console — VX-501, factory reconditioned by National Radio and put into storage in 1970, excellent condition, $400, Lubicich 516-794-4458.

SELL Heath SB-310 SWL receiver. Mint condition. $175. WA5PSW, 6209 Nasco Drive, Austin, TX 78757.

RP-MFA22 Synthesizer wired for HT220 $250 or $375 with HT220 installed. SBE-33 (trans output low) $99. 150 item list. K2DCY. 11 Squire Hill, N. Caldwell NJ 07006.

FOR SALE Drake 2-C receiver and matching speaker. Mint condition. $200. Mark R. Powell WBQTWA 3440 West Alamo Place Littleton, CO 80123 303-794-6635.

WANTED: Heath SB-500 and 640; ALSO cabinet for SB-101 or SB-200. WB2WPM, 43 Conrad, Depew, NY 14043.

WANTED: AC power supply for WRL Duo-bander 84. Al Dilley, Box 651, Lyndonville, VT 05851.

WANTED: (4) spectrum INT 70M6M46 J-Beams Nagata, 1330 Curtis Berkeley, CA 94702.

WANTED — Customized Heath HO-10 Front plate that will harmonize with Drake Twins. WBØGNL, 5223 North Flora, Kansas City, MO 64118.

NEEDED — Old working equip. for new ham club. Any donation will benefit many students. Contact E. Mikolaitis, Principal, Perkiomen Valley Mid. School Collegeville, PA 19426 — 215-287-7861 ext. 63.

SELL Central Electronics 100V, excellent condition. $315. T. Lifland Donmoor Road, Lawrence, NY 11559 516-569-1687.

SELL Clean 75S-3B, $695, filters available. K1VTM 203-621-6392.

SELL: Mint Heath HP1144 12vdc p/s. $85 WAØLYO, 1435 5th St., Spearfish SD 57783.

YAESU transceiver for sale — FTDX400 and external VFO plus speaker & mobile mike — less than 100 hourss operating time, 500 watts cw — 560 watts pep sideband — $375 — Mark — WA6PCP — 36311 Christine St. Newark, CA 94560.

RECEIVERS: Hallicrafters S-38B and Hammerlund Super Pro. Best offer or trade Bill Sorg. 903 S. Massachusetts DeLand, FL 32720.

WANTED — Blaupunkt no. KV810 and Gonset all band sw converters for automobile radios, Jon Buhler P.O. Box 4819 Memphis TN 38104.

FOR SALE: Collins — mint wing, 32S-3 SN. 13853 with 516F-2 $650. 51S-1 NSN $900. 312B-4 $175. 5-Line frequency synthesizer kit (see Ham Radio 12-75) 80% complete $40. George Schade 333 E. Glenn Drive Phoenix AS 85020, 602-943-6212.

MANUAL. Needed, for HQ-100A receiver. Urgent, for ham friend overseas. Write WA8QVC, Maplewood Ct. E-69, Berrien Springs, MI 49103.

HRO-60 w/spkr & coil cabinet, 9 coils (6 thru 160m and SWBC bands); Hallicrafters Skyrider Panoramic SP44 w/extra tube & manual; both VG condx. Best offer W4JND, 6015 Jennings Lane, Springfield VA 22150, 703-971-4015.

APT. Dweller going QRT. Selling NCX 1000, recent update and overhaul — $700. NCX5 MK2, PS-spkr, VFO — $550. Gonset linear GS30IMK $400. MN2000 — $175. Heath 10-103 scope $300. Waters Hybrid coupler and Compreamp, $75. Drake 2NT $75. M. Alexander 2114 Caton Ave., B'klyn. NY 11226 212-462-6245.

WANT GR-1601A adapters: 1601-204, 874WN, 874WM50, 874Q1. Also Wireless DF Keen 1938 or later, shore Adcock and Wullenweber manuals. W3AFM Paul Rockwell, 5800 Hillburne, Chevy Chase, MD 20015.

WANTED: Ham Radio Magazine, all issues thru 1976. State condition, price. K7PPC, 160 N. 6th, Laramie, WY 82070.

FOR SALE Collins S Line very little use 75S3B receiver; 32S3 transmitter; KWM-2 transceiver; 312B4 control; 516F2 supply; 312B3 speaker. No shipping. WAØYVS. 597-1695 Colorado Springs.

KENWOOD TS-520 Shure 444 Mike — 4 months new. $550. WB9MMW, 312-852-0741.

FOR Sale: Venus SS2 Slow Scan monitor, WØLMD — type fast scan-slow scan converter, Cartrivision camera. $550 or make offer. Roger Johnson 1627 36 Ave., Ct. Greeley CO 303-353-0735.

SALE: Complete console mounted kw station. Drake Twins, Heath linear, many extras. $1200. S.a.s.e. for photo and list. Prefer local sale. 914-963-3344 Don Storm K2MQR. 442 Palmer Rd. Yonkers, NY 10701.

DRAKE Ten-Tec, Icom, Swan, Hygain, Cushcraft, Midland, 2 meter amps, NYe Viking, etc. We deal and trade! Stereo Repair shop. 3206 Erie Blvd East, Syracuse, NY 13214. 315-446-2266.

NEW Eumig television cameras with zoom lens — $149. Color VTR's, supplies. Catalog — $1. (refundable) HAAS Enterprises, 6017 Majorca Court, San Jose, CA 95120.

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MUST Sell: All good or better condition. HW-16 $100, HG-10B $35, DX-60B $60. I ship UPS. Wanted: HM-102, cheap. WA1UZK, Box 27, Saunderstown, RI 02874.

WANTED: K-N electronics 4hpt, 4hpt oscillator decks, or schematics K4WSS 1303 Walnut Street, Albertville, AL 35950.

SELL measurements 85-C generator $175, Genrad Variac V5MT $20, Genrad audio meter $50, Bendix 211M freq. meter ac pack $50, Collins T-47Tart-13 xmtr $75, s.a.s.e. for list xtals tubes W3AW 9406 Evans St., Phila. PA 19115.

VIBROPLEX "Blue Racer," $25 ppd. CMOS 9TO keyer on pc bd., reed relay output, $20 ppd. RME 4350A ham bd rcvr., in service, orig. owner, $100 pick up only. Joel Anderson; 13 George Dr., Old Saybrook, CT 06475.

WANTED — Manual for Tectronic 532 scope. Morris Wickliffe, 521-1/2 West Lake, Lake Mills, WI 53551.

POWER Supply for 200W solidstate rig. Excellent electronic regulation, short circuit and overcurrent protection and overvoltage crowbar. 20A, 13.8 VDC, 115 VAC input, 50% duty cycle. $99 postpaid. Also Tempo One w/ac supply. WAØZPT, Box 102, Ipswich, SD 57451.

SELL: VX-501, Remote VFO Console for NCX-5, Mint, 125. Mint NCX-A, $60. W4ET, 2101 Hobson Ct., Augusta GA 30906.

300 MHz B&K counter, and prescaler. Price breakthrough! $191 postpaid. Portable. FActory built. Details. Catalog free. Spacetron-H, 948 Prospect, Elmhurst IL 60126.

HEATHKIT SB-104 digital transceiver, cw filter, NB, remote VFO, speaker, power supply, mint condition, $849. Want unassembled Johnson Viking kits, Ranger, Pacemaker, Courier, Thunderbolt, Garcia W1CDS/4, 8495 Madge Lane Apt. 202, Alexandria, VA 22309.

HEATH SB-303 w/filters, SB-401, SB-600, HM-102 wattmeter, 2-1/2 yrs. old excellent condition. $450. WB5PHF, 815 Loganwood Ave., Richardson, TX 75080 214-690-0418.

SELL Two Motorola MR-10 microwave terminals (transceivers) in seven foot racks — use for remote control? Must retune present xmtr freq. 6605MC — receive freq. 6725 MC — make offer — W7VK — 6022 N 2nd Ave. Phoenix, AZ 85013.

CENTRAL Electronics 200V transmitter, perfect condition, $200. K6BTH, 123 Forbes Avenue, San Rafael, CA 94901.

Wanted: ARRL Handbook 4th edition. W9DDL.

KEYERS Fully automatic, iambic keyer only $39.75 John Day 12 Oakdale Ave., Selden, NY 11784.

SALE: Swan 250 117XC P.S. A good one first 300.00 M.O. W4TJC Jim.

HT-220 — Universal Omni with remote speaker/mike 1.5 watts, six frequency (40/00, 34/94, 25/85, 07/67, 04/64, 54/54, Motorola charger, NICAD, rubber duck, collapsable antenna, 50 ohm adaptor, clipback, manual, alignment and control tools, mint. $450. John Edell, W2ZPG, 262 Hempstead Ave., Rockville Centre, NY 11570.

HEATHKIT VFO Viking adventurer Eico 50w modulator, Telrex 10 meter mini beam. Best offer W2HWN.

ROHN 25/45 tower sections wanted. Pick-up, take-down, W1/W2 areas preferred. Need only few for final setup. Pride, 603-899-5621.

WANTED — Push-Pull coils by B&W, Johnson, etc. Also Hi-voltage split-stattor capacitors. Paul Cooper, K6LTJ, 9845 Oakdale Ave., Chatsworth CA 91311.

SALE: URM-25F Signal generator $165., SPR-13A $275, HP-170A $300., TS-47 $50. Stamp for catalog of communications and test equipment. E. French, 10 Afton, Aurora, IL 60538.

HEATH power supplies for HW transceivers and others; HP-23B, 120VAC/800VDC, $55; HP-13B, 12VDC/800VDC, $55; Webster WMW-D mobile antenna with 80 meter coil, $30; K2AM 201-687-3518 after 6 P.M.

SALE — Collins 75 S1, 32 S1, 312B4, 516F2, cables, instruction books. Looks new. Prefer not to ship. $1350.00 W4JYX — 2214 Janlyn Rd., Jeffersontown, KY 40299. 502-267-1834.

COLLINS 75S3B serial 15529 mint $550. Universal AL tower Mdl. 7-50-complete $395. Cubex 2-EL quad $50. Heathkit HX-20 SSB xmitter w/ac pwr supply $100. Heathkit patch Mdl. HD-15 $25. HB 4-400 linear w/pwr sply $100. F. Teal 13503 Collingwood Terr. Silver Spring, MD 20904 TEL: 301-384-0410.

WANTED: Hallicrafter HT33B Linear amplifier, must be in mint condition Alfred Redlin Summit SD 57266.

WANTED: Hallicrafters SX117 in good operating order — K2MXE 8038 Willow Street, South Glens Falls, NY 518-792-0239.

HEATHKIT wanted, 40 meter transceiver, Model HW-22A, clean and in working condition, Harold Gutierrez, 2511 SW 27th Street, Apt. 4, Miami, FL 33133.

JOHNSON Viking Ranger Transmitter, Excellent condition, with Fsk. best offer. Ken Weiss, 650 Emerson St., Woodmere, NY 11598, 516-295-3891.

HEATH HW-16, HG10B VFO excel cond. w manuals, Johnson key, 90' RG58A/U coax w 40m dipole 1975 dlbk, $150 + UPS Brian Goetsch, 1124 Wilbur, Walla Walla WA 99362.

PREPARE for vlf. Selling Navy RAK-7 rcvr, 10 kHz to 600 kHz with power supply and manual. Never modified. Call W3EON 215-265-2437. Pick up only. Cash $100.

ALPHA-77 $1795, signal/one CX7B $1595 Both immaculately new, warranty. New Demo Apha-374. Payne Radio, K4ID, 615-384-2224.

BEARCAT 101 programmable scanner six months old. Excellent condx. No crystals required. $250 W1GWA Dennis 2307 N. Benson Rd. Fairfield, CT 06430, 203-255-0812.

SELL: HQ 170A WA7DKZ 508 Clark Laramie WY 82070.

WANTED: DMF-2 mechanical filter for Drake-2B made by Henry Radio in 1962. Also HT-41 or HT-33B in pickup range. 100 miles. Buonocore 81 Eberling Drive New City, NY 10956. 914-634-4242 W2POV.

HP-13A DC supply, good working condx. 1st $35 takes. A.K. Carr, POB 605 Bloomsburg, PA 17815.

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KLM Echo 70, 432 MHz. Trans $395.; GR Stephen 2 meter linear. 1200 w. pep SSB. 600W, a-m, fm, cw $475. Charles Borg. 19927 Prest. Ave., Detroit. MI 48235 313-342-3159.

SALE: Kenwood TS-520 w/cw filter, VFO-520, SP-520, MC-50 mic. Dentron super tuner. All only six months old. $750. Jim Welsh 4886-A Sonata Dr. Colorado Springs, CO 80918. 303-599-0409 after 5:00 P.M.

KENWOOD TS-520 with cw filter. Mint. $550. Regency AR-2, 75 watt 2 meter amplifier, $50. WA5SDV, Box 203, Sapulpa, OK 74066. 918-224-8315.

SELL: Drake R4B receiver — $325, Drake 2NT — $90, MS-4 speaker — $20 excellent condition, complete with cables, manual, original cartons, will ship. Call 516-676-4118 or write WB2SET, Peter Trinche, 20 Salem Way, Glen Head, Long Island, NY 11545.

FOR SALE: Simpson 160 VOM $50, DX-160 Receiver $80, Heath IG-102 rf generator $20, Heath IM-5228 VTVM $30, Heath GR-110 vhf Monitor $50. WA2HNG, Box 612, Normandy Beach, NJ 08739.

FOR SALE — Ideal ham radio home (year-round) on Cliff Island, Casco Bay, Maine, Fully furnished on 2 acres, 3 bedrooms upstairs, huge stone fireplace in living room — modern kitchen and utility room, sun room, dining room and full bathroom. Excellent drilled well water supply, electric water heater, baseboard hot-water heat. 61' Vesto tower on 4 concrete piles with Vesto Vesto TB5EC antenna. (Two Collins KWS-1 transmitters and 75A4 receivers with filters can be negotiated.) Fabulous radio location. Price $49,500. Clark C. Radimon, W1SZ, 7931 Princess St., La Jolla, CA 92037 — Phone 714-459-2878.

CALL Letter plates — 2" X 8" deep-cut engraved with adhesive back. Any color, $2.00 with stand-up plexi base $3.00 WB1BVO 22 Forest, Branford, CT 06405.

SALE: Mint P&H linear LA-400C (400 w. cw/800 w. pep) with four 837 spares. Solid state power supply. Original owner, carton, manual. $80. plus shipping. W2TO, 129 Foster Terrace, Ridgewood, NJ 07450. Tel: 201-444-5453.

DON AND BOBS big station specials. Call for quote on FT101E, TS520, TS820, Atlas 350XL, ETO, TS700A, TR7400A (sealed cartons); CDE Ham 2 129.00; CD44 104.00; Belden 8 wire rotor cable 14c/ft; Belden 8237 RG8 19c/ft; 8214 RG8foam 23c/ft; 8210 72 ohm kw twinlead 19.00/100ft; 22ga phosbronze antenna wire 3.50/1000ft; CDE .001/10KV doorknob cap. 1.95; Mallory 2.5A/1000PIV epoxy diode 19c ea; Telex headsets; Janel preamps; Swan SWR1 21.95; Amphenol PL259 59c. All items guaranteed. Prices fob Houston, quotes good 30 days. Send letterhead for dealer listing. Madison Electronics Supply, Inc., 1508 McKinney, Houston, TX 77002. 713-658-0268. Evenings: 713-497-5683.

LINEAR NCL2000, mint, $660, Pickup W2EAM 201-352-0981 after 5 P.M.

LOW Power club — Join QRP ARC International Joseph Szempias W8JKB 2359 Woodford Street, Toledo OH 43605.

DRAKE For sale T-4XC ps., R-4C N.B. cw filter, 5 extra xtals, $995 firm. Dentron supertuner 160-10, $95; Homebrew electronic keyer, $20. pickup Frank Stolpen, W2MZQ, 212-992-2743, 2060 E. 19 St., Brooklyn, NY 11229.

FERRIC Chloride, liquid. 40% board etching grade. Pints, quarts, gallons. Send s.a.s.e. Bob's Electronics Box 393-Q, Bay City MI 48707.

NEED CE600L W7KIZ, 1402 Craig, Moses Lake, WA 98837.

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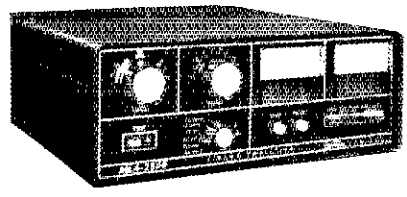

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WANTED: Maintenance manual for 2-9 Mc. Collins transceiver ARC 2A/RT-298. Please state price and condition in first letter. K4LJH, Charles Preston, Rt. I, Box 191, Hamilton, VA 22068.

BRANDNEW Bearcat 210 scanner. Unused, must sell $275. WIGWA 2307 N. Benson Rd., Fairfield, CT 06604 203-255-0812.

SELL: Complete Robot 70A monitor, 61 view finder, 50A camera with 25mm 1:4 lens with all connecting cables, instruction books, in original boxes; mint on the air less than 12 hours $500. Arthur S. Tomkinson, 9 Oliver Terrace, Revere MA 02151.

SELL — Drake 2C, 2Cq, 2NB, Calibrator, mint condition, w/manuals, $250. All new parts for WA4DSY HT220 synthesizer, $75. Price includes shipping. Wanted 4BTV. WA9WDB/5 John Teles, 10511 Tenneco, Houston, TX 77099. Phone 713-495-2340.

WANTED Wilson or Genave 2M H.T. Bender, WA2VOF, 1678 Northgate, Merrick, NY 11566. 516-623-6449.

TR22C with mic, 6 channels crystalized, good condition — N6LW/5 4526 Clear Spring, San Antonio, TX 78217.

HELP! I need a copy of schematic and/or service manual for Hallicrafters HT-37. WB6IVA 636 W. Lime Ave., Monrovia, CA 91016.

FOR SALE: RME6900, Dentron 160XV, Elco 753-752-751-CAL, HW 7 w/ps, SR34AC, COM IV 6m, SB10, Globe HI-bander 62, TX-1, G66B. Excellent condx. w/manuals. Joe Bedlovies, 30 Ridge Street, Milford, CT 06460.

SELL: Heath HM2102 VHF wattmeter, $22.; SB610 scope, $140. Archer auto capacitive discharge, $11.; all excellent, also GE portable 3" reel to reel recorder, solid state, Capstan Drive, 1-7/8-3-3/4 ips; good working condition, fair appearance, $14. You ship s.a.s.e. WA2DTI 210 Utica Tonawanda, NY 14150 716-692-5451.

51S1 Collins receiver 0.2 to 30 MHz. Excellent condition $850. 1-315-682-8185 after 6 P.M. W2GRU.

FOR SALE: 19" Motorola video monitor solid state exc. cond. John Relyea, WA2IWZ 100 Glendale Ave., Liverpool, NY 13088 457-1261.

SPRING Cleaning — Miscellaneous small parts: tubes, ceramic stand-offs, transmitting capacitors, transformers, connectors (N, BNC, PL-259): S.a.s.e. Rohde & Schwarz ZgDiagraph $100; WU Desk-Fax $25; Elco 460 scope $90; CV-157/URR (R-390 sideband converter) $60. Greg Fischer, WA7YRO, 650 W. Dana Ave., Mesa AZ 85202.

WARRIOR (Heathkit) Immaculate - little used linear — Solid State Rectifiers 1kW — $175. FOB NY W2KHV 914-WE7-2725 After 6:P.M.

TH6DXX, Ham-M-Ezway 45' crank-up, tilt-over tower, coax & control cables — antenna less than year old — asking $500. — you remove. W2KHV 914-WE7-2725 after 6:00 P.M.

KENWOOD TS-520 with turner 454X mic — RIT inoperative — otherwise excellent $429. SB-102 mobile mount, new — $15. Heath phone patch $30. Heath SB-614 monitor scope — as new $100. Hustler super resonators 40-20-15. With bumper mast brand new — $50. Hygain Hamcat 75, 40, 20 resonators, mast, spring, stainless bumper mount, uncut resonator tips — $85. Vibroplex deluxe original key — $30. Prefer local area pickup so you can inspect but will ship. WA2FDE — 914-762-1532 evenings.

DRAKE TC-6 and CC-1 converter console with SC-2, SC-6, CPS-1, SSC-1. All $450 mint. Bill WA6NRV 209-732-7163.

HYGAIN 14AVQ vertical and 80m coil $35. Hustler resonators: RM 75S — $15, RM-15 $6 Hustler MO-2 mast $9. Hustler quick disconnects $7. Hustler 2 meter mobile colinear $15. WA2TFT 212-461-4174.

WANTED: Heath SBA-300-2CW 400 cps filter for SB-100 WA9PDU 632 E. Doty, Neenah WI 54956.

GIANT Collins plate transf. 4600VCT 122 lbs. $65. Transfs, large chokes, tubes, Collins Autotune drive units, magnif. KWH meter $35., HIV caps, etc. S.a.s.e. for detailed descrip. Make offers! J. Cohen, 200 Woodside Ave., Winthrop, MA 02152.

HOSS-Trader Ed Says "We refuse to be undersold;" If you didn't buy it from the Hoss you paid too much. Shop around for the best price then telephone the Hoss last. New Demo Atlas 210X transceiver, $519.; New Drake TR-4C, $509. New Display Swan 700CX, $519.; Demo T-4XC, $489. New Rohn 50' Foldover Tower Prepaid, $439. Used Ham-II Rotor, $105. Used Atlas 210X, $459. Display Mosley TA-33 Beam $169. Hoss-Trader, Specials: New Dentron 2000 watt linears on sale, $475. New Display L-4B linear, $749 on sale. New Collins equipment 24% discount, or make offer. Moory Electronics Company P.O. Box 506, DeWitt, AR 72042. Tel.: 501-946-2820.

COLLINS 635V preselector/filter. Need digital readout 914B-3 control head. Paul Sellers, 4002 Columbus Ave., Norfolk, VA 23504.

HEATH HW-2036 2m synthesized rig with Heathkit micoder HD-1982, $335. Bill Gunckel, 14308 Gladiola, Apple Valley, MN 55124.

SELL: heath — SB104 — transceiver with factory modifications and adjustments, SB644 — Remote VFO, HP1144 — AC power supply, SB620 — Monitor, HP13A — Dual Power Supply, IB101 — Counter, IB102 — Scaler, IM25 — Solid State VOM, HD-10 — Electronic Keyer, All mint. Best offer within 30 days after publication. P. J. Preston, K7ANG, 1611 East 19th Street, Cheyenne, WY 82001.

SELL: Collins — 75A-4 with 4 mechanical filters, 51J-3, both mint — best offer within 30 days after publication. P. J. Preston, K7ANG, 1611 East 19th Street, Cheyenne, WY 82001.

WANTED Nonworking Heathkit SB110A WB5JEV

WANTED: Past issues of QST. Bill, WB5FXI, 604 Oakwood, Moss Point, MS 39563.

GENERATOR 2.2kW 60Hz 115V gasoline driven. Used less than 200 hours $275. Capacitors 30µf 4kV unused oil filled $40. Ni-Cad batteries 3AH 12V tested, sealed D-cells $15. I pay shipping except for generator. Chris Wartes, K7UWT/K7II, 706 Harvest Rd., Bothell, WA 98011. 206-485-5344.

WANTED: BC342N receiver in excellent condition. W2TB. Gardiner, 39-20 220th St., Bayside, NY 11361.

WANTED: Heathkit DX-100. Need not work. Write Norman Jordan, K0SEJ, Hills, MN 56138.

ANTIQUES; Moderns. Tubes; equipment; publications. Huge revised lists. S.a.s.e. Joe Harms, B158, Edgewater, FL 32032.

SENTRON: Write or call us for information and prices on all DenTron products. Kryder Electronics, P. O. Box 652, Ft. Wayne, IN 46801; Phone: 219-484-4946.

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TRITON 4 with 262-G vox power supply and cw filter $699. K8CVV 313-549-2353.

MINT Drake R4 $225/offer, Swan 117X supply $55, Heath HX30 $80. Swap SB102 for SB110. N6GN 3850 Selvage Rd., Santa Rosa, CA 95401.

SWAN 500C with 5S-16 filter and 117XC supply, excellent condition, $375. WB9TUN, Bob Woerner, Box 1232, Buena Vista, CO 81211.

FOR SALE: Collins 51J4 s/n 5662 0.5-30 MHz rcvr w/manual & 3 mech. filters w/manual $425. Conus shipping incld. H. M. Adams WA4OOF 286 Beachview Dr., Ft. Walton Bch,. Fl. 32548.

REALISTIC HI-LO Pocket scanner with all accesories. Cost $160. Sacrifice $100. Tom Pimental, 32 Woodside Avenue, West Warwick, RI 02893.

HALLICRAFTERS SR-400A (Cyclone III) with power supply, all Ham vand xtals, and kit of spare tubes. Like new. $650. Will ship. Address W7DY, Box 33, Worley, Idaho, 83876. Tel 208-686-1466.

COLLINS KWM-2 with 516F-2 mint condition $725. Call 616-941-0884 WB8TPR.

SERVICE, calibration of amateur transceivers. Conscientious professional workmanship, reasonable rates. FCC First and Extra class licenses, graduate Electrical Engineer. WØTVI, Route 4, Box 74, Leavenworth, KS 66048. 913-651-5149.

HEATH DX-60 $59, Hallicrafters SX-146 $159, Ameco CN-50 6 meter converter $39. All Excellent. WBØNEA, 612-439-7465, 13945 23rd St. N., Stillwater, MN 55082.

WANTED: Sales engineer with strong technical and commercial background in hf and vhf communications. International bid experience helpful. Growth opportunity with medium sized international marketing firm. Send confidential resume and salary requirements to Magnus Electronics Corporation, 5715 Lincoln Avenue, Chicago, Illinois 60659.

WANTED: GTX 600 6FM, T4, 2 meter ssb, Yaesu or Barlowadley gen coverage. WA5AAO Box 335, LaGrange TX 78945.

SELL: Drake SSR-1, $275; Heath IB-102 scaler, $70; Tennelec Memoryscan MS-2, $225; Regency ACT-10H/L/U scanner, $60; Heath HW-17 2-meter a.m. xcvr, $60. Prices firm but will pay shipping. Don, WA6CPM, 408-737-9052.

SBE-34, compact 95% solid state 4-band transceiver in excellent condition, microphone, mobile mount, extra finals, manual, $200.; HW-7, mint, factory checked, manual, power supply, $55. J. Rehbock, 213 Tuck Mall, Hanover NH 03755.

FOR SALE: 3 elem 20 M Monobander $80 3 elem 15 M Monobander $60. 2 elem 10 M Monobander $40. All full size antennas with omega match. WB2LTS M. Diaz, 133 North 19 St., Wheatley Hts. NY 11798.

GENAVE GTX-2 2-meter 10-channel 30 watt transceiver equipped with 7 channel pairs $135. WØMZC 26 Princeton Circle, Longmont, CO 80501.

SPECIAL — New, factory boxed, 6GH8-A $1.50, 6LQ6/6JE6-C $4.50. Add shipping. Tube, Capacitor, Resistor list 25c. Write Tommy, WB9CUL/4.

HT-100 wanted. W1BL via K1TFA.

HEATH HW 7 QRP transceiver with filter (excellent) for sale or trade toward old ham equipment. W1GWM Box 304 Kennebunk, ME 04043.

SELL: Hammerlund HQ-129X as is, Heathkit DX 100B excellent $85. M. Korotkin WA2AEO 5 Firelight CT. Dix Hills NY 11746.

KNIGHT R100A, S-meter, manual $75. Vibroplex Champion $20. Hustler SF-2 complete $15. Shipped UPS. WB9MYR 240 So. Waiola, LaGrange, IL 60525.

TX62 2/6M/am/cw (75W) $55. Am 1178/432Mc Tripler/amp (250W) HB/pwr $125. Nagata, 1330 Curtis Berkeley, CA 94702.

Comm-Tech, 104 N. Third Street, Richmond, KY 40475.

WANTED: Coil sets F,G,H, or J. for early HRO. M. Hart VE3TA Box 218, Sutton, West Ontario Canada L0E 1R0.

WANTED: One Drake no.C-4 Console, Drake TC-2, 2-meter transverter. Please send offers, condition and description to Gene Zepkin, K4SUH, Post Office Box 6610, Newport News, Virginia 23606, or phone 804-595-9702. No collect calls, please.

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TRANSMITTER Technicians — Voice of America has opportunities for qualified technicians at VOA stations in California, North Carolina, and Ohio. Duties include operations/maintenance of high power shortwave transmitters and related facilities on shift basis. Minimum qualifications: 3-years broadcast chief engineer 5 to 50 kW, or 3-years supervisor of operations/maintenance high power military transmitting plant, or equivalent. U.S. citizenship required. Salary $15-19,000. Submit standard government application form, SF-171 to VOA Personnel Office, Code 05-77, 330 Independence Avenue, S.W., Washington, D.C. 20547. An equal opportunity employer.

POSITION as a ham radio counselor at co-ed, sleep-over camp in N.Y.S. eight week season. Age 21 plus. Write Mr. Daimond, 4 Cropley court, Melville NY 11746 or call 516-643-2805.

COUNSELOR: Penna. Brother-Sister Camp seeks ham radio man with a General license. Write full particulars to David Blumstein, 1410 East 24 St., Brooklyn, NY 11210.

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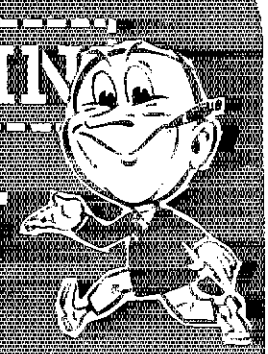

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DEAR OM:

If you're in the market for a new or used piece of HAM RADIO equipment, and in the process of "Shopping Around" for the "BEST DEAL" you can get — you no doubt realize that there are TWO IMPORTANT FACTORS to consider — the PRODUCT and the DEALER — or, in otherwords, WHAT you buy and WHERE or from whom you buy it! Furthermore, if you're truly a "Smart Shopper" — you probably take into account such variables as Price, Performance, Features, Quality, Resale-Value and SERVICE-ABILITY when making your comparison of the various makes & models available. And, if you're really ON TOP OF THINGS, you KNOW that there IS much-much MORE to a "GOOD DEAL" than just the "lowest price" — that, in the final analysis, the REPUTATION of the dealer standing behind YOU and your purchase is worth as much or MORE than the quality of the product itself.

Now, assuming that you AGREE WITH US up to this point; you're probably a little more than CURIOUS about our operation,and WHAT kind of a "DEAL" we've got to offer YOU!! To begin with, at BURGHARDT AMATUER CENTER in Watertown, South Dakota — of all places — our whole structure of business is built upon a foundation of FRIENDSHIP and PERSONAL S-E-R-V-I-C-E. We do not "PRETEND" to be "Big Operators" or "Wheeler-Dealers" as this would defeat our whole purpose in giving you the kind of FAST, DEPENDABLE SERVICE that you would expect — and you GET — from a company whose reputation as "AMERICA'S MOST RELIABLE AMATEUR RADIO DEALER" is on the line every day of the year. On the otherhand, we are BY NO MEANS a small nor inexperienced outfit just out to make a "fast buck" by selling one or two lines of HAM RADIO equipment, while the major portion of our enterprise may be devoted to other areas of communications — or entirely unrelated. Simply stated — "HAM RADIO IS OUR ONLY BUSINESS!!"

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Furthermore, when you deal with us, you ALWAYS receive our prompt, PERSONAL attention and INDIVIDUAL concern. Each and every letter or phone call puts you in INSTANT TOUCH with a licensed ham who is READY, WILLING and ABLE to give your order or inquiry his UNDIVIDED ATTENTION — not put you on "HOLD!!" We approach every new transaction with a "fresh frame-of-mind" (we'll try "ANYTHING" once) and you'll always find us willing to COOPERATE with YOU to the limit. You won't catch us using any stereo-typed methods or responses in our conduct of business either, because we KNOW that THERE ARE NO SHORT-CUTS IN GIVING "GOOD" SERVICE!!

In conclusion, we realize that WATERTOWN may not exactly appeal to you as the "crossroads of the country" — but, it may well be (or become) YOUR "cornerstone of CONTENT-MENT!!" We most certainly are ON THE MAP — and WE WILL go a long-long way to take VERY GOOD CARE of YOU and make you feel "WELCOME." Above all else, your CONFIDENCE in us is our MOST IMPORTANT asset — just as S-E-R-V-I-C-E is our MOST IMPORTANT PRODUCT, and, in terms of "dollars 'n' cents" — these will never be discounted. All WE ASK for is the "OPPORTUNITY" to serve YOU — whatever YOUR NEEDS may be — and we look forward to hearing from you soon.

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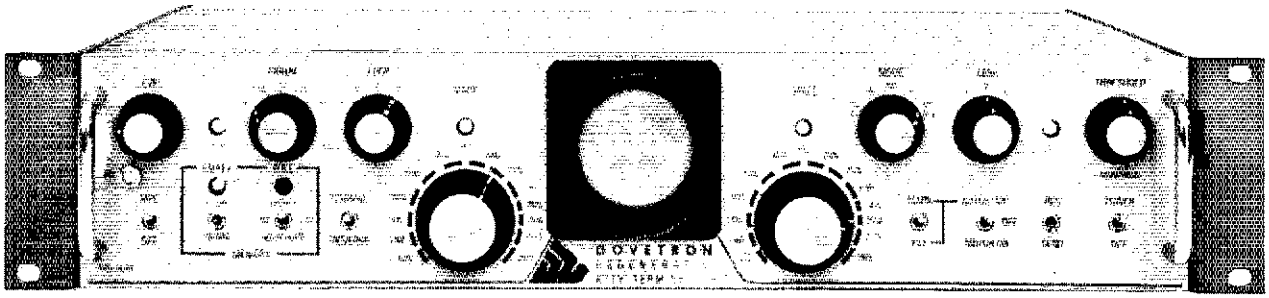

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A unique Character Rate over-ride and TD INHIBIT circuit prevents character over-runs during down-speed conversion.

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An inquiry on your letterhead or QSL will bring all the other features and complete specifications, or call 213-682-3705.

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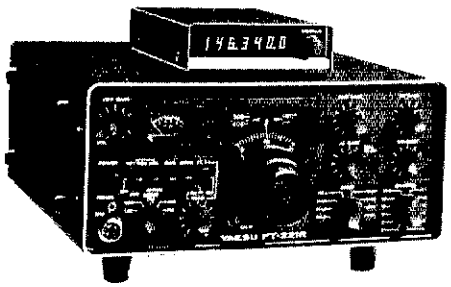
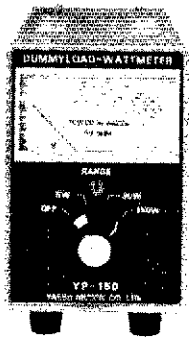
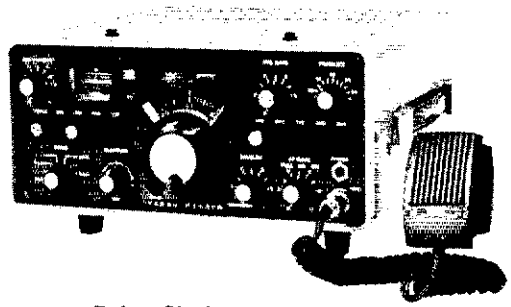


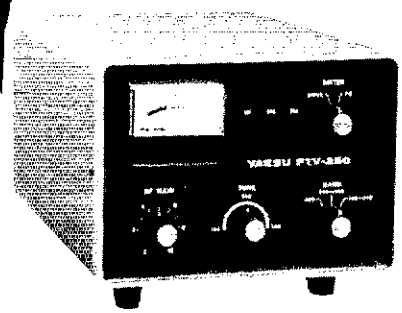
Here's the Two Meter CHAMP - FT-221R. All modes, VOX, synthesized, 24W PEP. Microphone included. New YC-221 Digital Display shown, available soon.



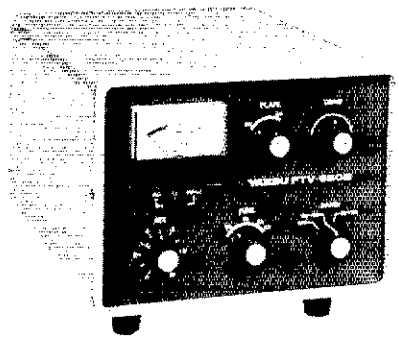
Check your power output with the YP-150 Wattmeter- 1.8 to 200 MHz



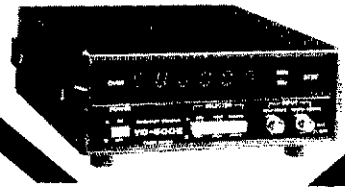
Enjoy Six Meter DX with the FT 620B! 24 watts PEP, USB, LSB, CW and AM



Enjoy Two Meters the economical way! FTV-250 plus your HF Transceiver and you are there with USB, LSB, CW & AM



Your HF Transceiver plus the FTV-650B and you are on Six with 50 Watts PEP



Don't be a NO-a-COUNT! The YC-500 series Counters covers 10 Hz -500 MHz

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