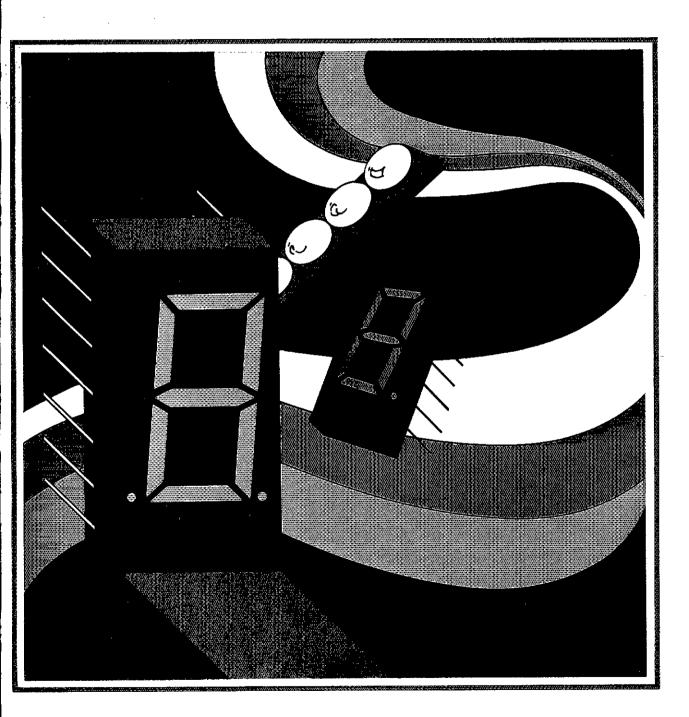


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March 1978 Volume LXII Number 3

Published monthly as its official journal by the American Radio Relay League, Newington, CT, U.S.A. Official organ of the International Amateur Radio Union.

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Offices

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

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

Second-class postage paid at Hartford, CT and at additional mailing offices. Postmaster: Form 3579 requested.

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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 48109.

THE COVER

We've all seen them, but few of us really know what makes them shine. Delve into LEDs and LCBs, beginning on page 11.



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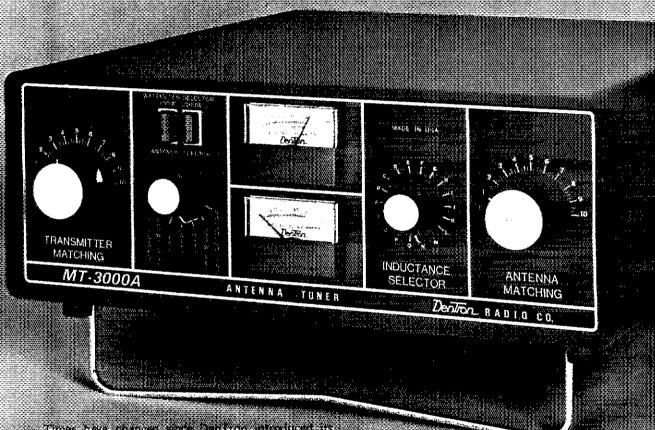
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Look closely at the new MT-3000A. You've never seen anything like it.



Times have interpret since Detrifich introducted its first tuner. With rapid growth to condominisms are hitter ing developments, we have new problems that interire her solutions.

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Third, it has a built-in 50 ohm dummy load for proper exciter adjustment.

Fourth, the antenna selector switch; (a) enables you to by pass the tuner direct; (b) select the dummy load or 5 other antenna systems, including random wire or balanced feed.

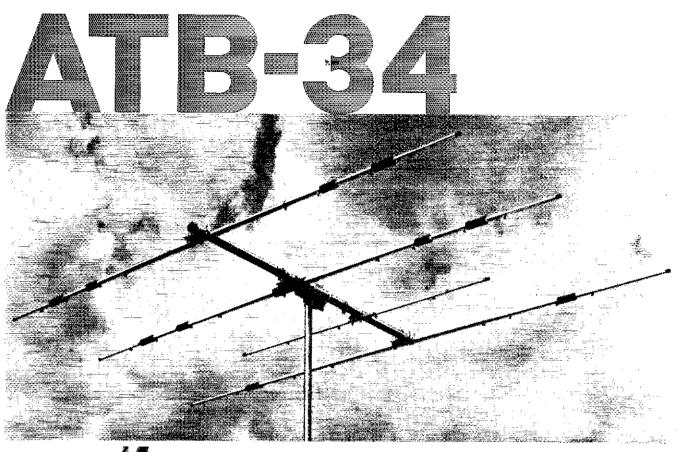
The nominal size stone of the M.I. SHEM (5%" a 14" x 14") makes in reproductionary. Combine that with its four attition agreements and we've sure years against hat the MT 3000A is one of the most innovative and exchang install ments offered for amorting as

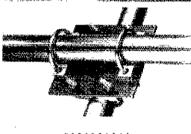
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5



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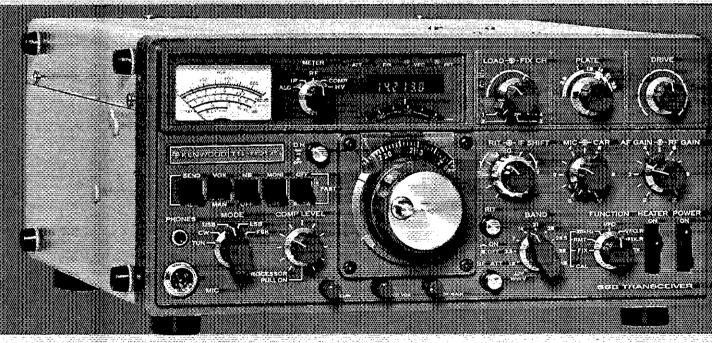
TS-8209

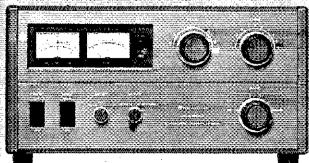
The TS-B20S outs out probably the cleaness signal on the bands. The third order products are at least = 35 dB due to Kerwood's unique RF-Negative Feedback (RFNFB) circuit. State-of-the-Art PLL and single-convarsion design are combined for superb spurious characteristics far exceeding today's FCC requirements. The non-harmonic spurious emissions are better than = 80 dB and the harmonic spurious are better than = 40 dB.

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The man to see your local Authorized Kenwood Dealer. He can give you all the information you need and the best deal.

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TL-922

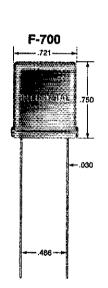
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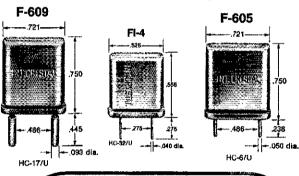
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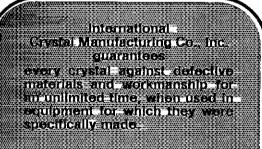
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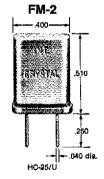


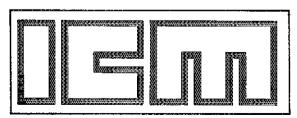


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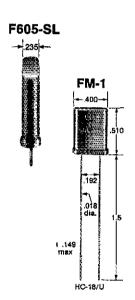
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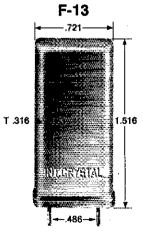
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Robert B. Vallio, W6RGG/N6KB, 18655 Sheffield Rd., Castro Valley 94546 (415-537-6704) Leonard Norman, W7PBV, P. O. Box 945, Boulder City 89005 (702-293-2091) J. P. Corrigan, KH6DD, P. O. Box 698, Kaneohe HI 96744 Norman A. Wilson, N6JV, Rte. 1, Box 730, Woodland CA 95695 (916-666-1465) Mark L. Nelson, AA6DX, 2023 Kent Ct. Arcata, CA 95521 Charles P. McConnell, W6DPD, 1658 W. Mesa Ave., Fresno CA 93711 (209-431-2038) James A. Maxwell, W6CF, P. O. Box 473, Redwood Estates CA 95044 (408-353-2094)

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"It Seems to Us..."

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Another Opportunity for the Amateur Radio Service

On the second of February, there was a demonstration before the FCC Commissioners of the narrow-band voice modulation system that was reported on in the December issue of QST. An overflow crowd in the Commission's meeting rooms listened to some rather interesting statistics on how this system could markedly increase the number of channels available to, for example, the Land Mobile Service, and to a technical analysis prepared by the Electrical Engineering Department at Stanford University.

In the statistics department, it was noted that in the present land-mobile bands between 30 and 470 MHz, there are now 1586 fm channels, but that adoption of this spectrum-efficient technology for voice communications would permit an increase to 12,390 channels!

During the technical analysis there were a number of test tapes played which demonstrated the capabilities of the new system under various conditions of noise, interference, different carrier modes, and so on. This writer found the high-noise tapes particularly interesting, in that the voice on an fm signal without the use of the new technology would not even be audible, but with the new technology it would be aimost 100 percent intelligible.

There were a number of penetrating questions asked by Commissioners and staff in the morning meeting, and by members of the public in the afternoon meeting. It was emphasized by the coordinator of the FCC's Task Force presenting this report that while the preliminary laboratory tests on the system appear favorable, it seems obvious that no farreaching, frequency-management decisions will be made by the Commission until the system has been proven under actual communication conditions. That's where we amateurs come into the picture.

Many of the readers of this page will recall the history of single sideband in the early 1950s. It was a mode that had been known technically for some time, and indeed there were a small number of commercial circuits using ssb, but it had never been adopted on a mass scale, for a variety of reasons.

In 1949 there first appeared (in QST, of course) a number of ssb articles by amateurs on how-to-do-it. A new monthly column provided stimulus for amateurs to

adopt the new technique. Before long, manufacturers provided complete ssb transmitters, and the rush was on. Ssb proved itself to be spectrum-efficient and communications-efficient. DX enthusiasts, particularly, found that single sideband would get through where a-m just couldn't make the grade.

The then-commander of the Strategic Air Command, General LeMay, himself an amateur, recognized the value of ssb and wanted the Air Force to engage a contractor to provide a test in order that there would be data on which to base an Air Force shift to ssb. But the cost of such a civilian contract was deemed too high, and so General LeMay installed a ham rig on board an Air Force plane and arranged that on an overseas flight he would maintain communications with the base back in the United States and with amateurs all over the world, all using ssb. It was a convincing demonstration, and was instrumental in ssb being adopted by the Strategic Air Command.

The rest is history. Ssb is almost the only voice mode used at hf by the Amateur Service, and has been rapidly adopted by many other services (albeit reluctantly in some instances). But the first extensive use was by radio amateurs.

Now we come upon what appears to be a promising new technology. It bids fair to substantially increase the number of channels that can be used by voice stations on both hf and vhf/uhf. But before the Commission or any other body will jump off the deep end and support this new spectrum-efficient technology, it needs to be demonstrated on a nationwide and worldwide scale. Who else can do it better than radio amateurs? No one!

The technology has been developed, the hardware is almost with us. As quickly as possible we'll have another *QST* article giving how-to-build-it details on a system using both amplitude and frequency compression/expansion. The amplitude-compandor has been with us for some time; the frequency-compandor is new. An integrated circuit which is the heart of the frequency-compandor circuit has been designed and is now in the throes of production.

Who's going to be the second amateur to put in an order for one of the new units? — WIRU

League Lines...

"Quiet Progress" in this issue tells about the <u>annual meeting of the ARRL Board of Directors</u>. Nothing earthshaking -- but quite a few items of interest to active amateurs! See page 55.

Did you miss "FM Repeater News" in February? It contained <u>quidelines</u> for use of autopatches and phone patches which can keep amateur radio out of trouble with FCC on this score! Extra copies of the Guidelines are available for an s.a.s.e. addressed to Hq. with "Phone patch Guidelines" in bold letters on the envelope.

Coming up -- the ARRL National Convention. When? September 22-24, 1978. Where? San Diego! More details soon, in QST.

Have good eyesight? QST is available in microform, from University Microfilms, Ann Arbor, MI 48104.

Need updated information about materials available to blind and handicapped persons interested in amateur radio? The new Blind and Handicapped Kit is now ready for distribution from Hq.

AMSAT-OSCAR D (to be known as OSCAR 8 after successful orbit) is now scheduled to be launched on Sunday, March 5, 1978. The launch window is between 1754Z and 1804Z. Monitor WIAW and OSCAR 7 Codestore for up-to-the minute information.

KMICC highly successful with over 7700 contacts logged. QSL (with s.a.s.e.) to WIGAY, Duncan Kreamer, Main St., Vineyard Haven, MA 02568 (DX to WI QSL bureau).

Starting April I, WIAW will aim 20, 15, and 10 meter beams at Europe for code practice and cw and RTTY bulletins at 1400, 1500, 1600, and 2100 UTC, Monday, Wednesday, and Friday only. This will be a 3-month trial and continuance of the service will depend on listener response.

Did you participate in the February 11-12 QCWA QSO Party? Sorry about the confusion in the rules but please remember to send your logs to the N.J. Chapter, Box 312, Park Ridge, NJ 07656.

It's not too early to register your public-service net for the upcoming 1978-79 ARRL Net Directory. Registration cards may be obtained from Hq. for an s.a.s.e. Request CD-85.

Several months ago the Technical Department was reorganized. Recently, page 3 of QST was altered to reflect the new division of labor in that department. Rumors of Doug DeMaw's disappearance from QST are greatly exaggerated. He now has more overall responsibility but less direct contact with the magazine.

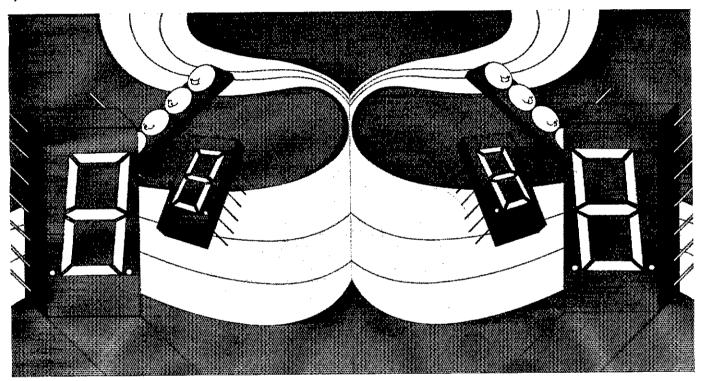
The <u>Code of Ethics</u> emblem is now being distributed to those firms who support the ARRL in its efforts to have amateur transmitting equipment sold only to those people who are authorized to use it. It will take a few months for it to appear in advertising and on dealers' counters, but you can <u>ask</u> if a company has signed the Code and supports the League's efforts in this matter.

FLASH! At presstime we received word that the FCC has taken action in Docket 21135 to abolish the future licensing of secondary and special-event station licenses (effective date unknown, but should be around mid-March). No action was taken concerning the abolishment of club, military recreation, and RACES station licenses; but an immediate freeze was imposed on the acceptance of new applications for these types of licenses. Meanwhile, the FCC has adopted a Notice of Proposed Rulemaking concerning the revision of eligibility criteria and processing procedures for club, military recreation, and RACES station licenses. Present secondary station licenses will be valid until the end of their terms, and licensees who prefer their secondary call sign over their primary will be allowed to modify their primary station license to show their preferred call sign. Details in "Happenings" for April.

How Visual Displays Work

Hardly a month goes by that another "digital-dial" radio isn't introduced. Read this for a clearer understanding of the chemical and electrical concepts behind those numerical readouts.

By Patrick A. Dreher,* WB1AJN



Almost six years have passed since QST's Doug Blakeslee introduced readers to the families of solid-state devices known as light-emitting diodes (LEDs) and liquid-crystal displays (LCDs). Now those "readouts" have become commonplace items seen in almost every household. They can be found in myriad consumer devices, as well as amateur radio equipment of all kinds.

Amateurs are becoming less and less familiar with mechanical tuning devices (some readers may never have the "pleasure" of restringing a dial cord), while they struggle simultaneously with becoming more at home with LEDs and LCDs. In this article some useful data are provided on how the devices work in equipment which may already be on the workbench or operating table, while at the same time giving some guidelines to designers and home builders as to the use of displays, both light emitting and liquid

crystal. We hope the reader will be looking at his or her watch, transceiver or microwave oven in a different light in the course of the next few pages.

The Light-Emitting Diode

The process of extracting light from certain materials has been known for over a half century. It was discovered by an electrical engineer named Henry J. Round in 1907 when he connected two wires from a battery to a piece of silicon carbide and observed that the crystal emitted a vellowish light. However, it was not until the advent of solid-state components in electronics that the light-emitting diode began to appear to have commercial possibilities. The familiar technique of "doping," or introduction of a slight amount of foreign substance to semiconductor materials, was adopted in attempts to mass-produce LEDs.

Researchers experimented with various amounts of doping in different materials in hopes of producing useful LEDs in the visible range. To attain these goals they required the resultant emitted light from the LED to be restricted to the very small portion of the electromagnetic spectrum to which the human eye is sensitive. Fig. 1 shows the spectral response of the human eye to color as a function of wavelength. and the relative sensitivity to different colors. Depending on the design goals for a particular LED, the doping process could be either very helpful or completely disastrous. Hence, research work proceeded slowly in fabricating and constructing suitable material and in manufacturing processes for production of visible LEDs. (There is also a series of LEDs that operate in the infrared range of the electromagnetic spectrum but because these wavelengths are longer than those to which the human eye is sensitive they cannot be used in visual displays.)

Visible LEDs

During the course of research with these solid-state lamps a number of infrared

LEDs and visible LEDs were successfully produced. The first practical visible LED emitted a red light at approximately 660 nanometers. (It was constructed of gallium arsenide phosphide.) At about the same time another material (gallium phosphide) was found to emit red light at approximately 690 nm with an overall brightness of 2.4 times that of the first

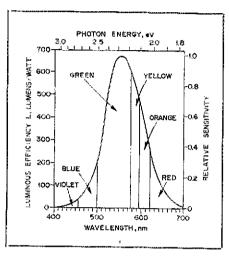


Fig. 1 — Spectral response of the human eye. A 500-nm wavelength is the same as 5000 angstroms.

diode. However, this wavelength at 690 nm translated into a resultant luminous efficiency of only three percent compared to the six-percent figure for the 660-nm LED. (Photometric definitions and terms are of critical importance in evaluating the characteristics of visible LEDs; see the appendix.)

Although the LEDs emitted light in the red part of the spectrum, red is not the ideal color for a visible-light-emitting diode. It would be much better if yellow or green LEDs could be produced, as the human eye is more sensitive to these colors. Research into green LEDs has produced some progress; the red LEDs, however, remain the most popular, inexpensive, solid-state lamp.

Multidigit LED Displays

Light-emitting diodes are finding increasing application in frequency-measuring devices and visual displays in amateur radio. What are some of the requirements and limitations that are placed on the LEDs that are used in these multidigit display devices?

Gerald Hall and Charles Watts in their series of articles, "Learning to Work with Integrated Circuits," extensively discuss digital readout displays using integrated circuits. The articles focused on constructing a seven-segment numeric display, showing the necessary integrated circuits needed and their function in the overall construction, whether it be a fre-

quency counter or digital voltmeter. Fig. 8 of Part 4 (QST, April, 1976, page 20) shows the block diagram containing the clock, inputs, BCD counters (SN7490), data latch storage registers (SN7475), and the decoder/drivers (SN7447) necessary to finally display the correct digit to the LED.

As more digits are added to the visual display this block diagram for construction of digital readouts may suffer from financial problems. The total cost of the integrated circuits for these multidigit displays becomes prohibitive and an alternative technique known as multiplexing is used. This process uses one decoder-driver which is sequentially time-shared with each of the LED displays individually. All of the segments of the display devices are wired in parallel, thereby providing a simple system for shifting the characterenable voltage from one display digit to the next. (Only a connection to the anode of each position is required to activate a single display.) A single BCD-to-sevensegment decoder provides the appropriate segment connections. Does this new circuit arrangement have any effect on the operation of the LED?

In order to maintain the brightness of each digit, the current to each LED segment must be increased. A typical display should be operated at a peak current of 100 mA for each segment, with a pulse cycle of 50 to 250 microseconds at a duty cycle of 20 percent. Not all LEDs can perform satisfactorily under these conditions, however. For example, the light output from the 690-nm LED saturates at relatively low current densities and cannot

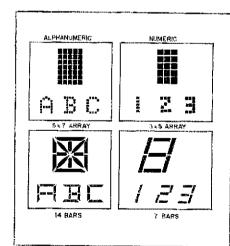


Fig. 2 — Various formats for symbolic displays.

be used in numeric or alphanumeric displays. The 660-nm LED does not have this problem and it is also inexpensive. Hence, it is the most widely used LED for visual displays.

In addition, not all LEDs are the sevensegment numeric type. Fig. 2 illustrates other numeric and alphanumeric LEDs that are manufactured. Each of these requires its own decoder-driver system which may entail a bit more expense that the seven-segment system. Similarly, thes LEDs may also be multiplexed. In fact, is essential to multiplex these LEDs when they are used in large multidigit display because of the expense of constructing full set of integrated circuits to drive each LED individually.

Suggestions When Using LEDs in Construction Projects

A large number of manufacturers now market LEDs which operate in the visible region. However, before purchasing any specific brand, consider a few points.

First, the specification sheets for different LEDs from the same manufacture

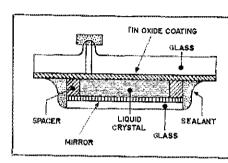


Fig. 3 — A cross section of a typical reflection device (LCD).

and for the same LED from different manufacturers are, in general, very difficult to compare. This problem arises when dealing with the photometry characteristics of each diode (see appendix). Basically, two types of diodes are manufactured: point-source diodes, and area-source diodes. The point-source diodes are used as indicators or status lights and the area-source diodes are used for numeric and alphanumeric displays. When considering which area-source LED you should use for your visual display construction project, the following factors must be considered; the character height, width, ambient lighting conditions affecting the contrast ratio, and the ease of visibility of the LED at various angles.

The size of the characters and the ease of visibility must be chosen so that the display output meets the needs of the user. Do you require the display output to be seen for a large distance? If not, the smaller characters may suffice. The larger the characters, the more difficult it is to maintain a uniformly bright output. Do you require that you be able to view the output at some angle other than perpendicular to the output face? Then be careful which LED you purchase!

Many LEDs have a limited viewing angle for very definite reasons. Some of the first commercial LEDs were packaged in a clear epoxy lens. When tested in a dark room the LED output was plainly

visible, but in bright light the LED output could barely be observed. The output of the diode seemed to be "washed out" by the ambient lighting conditions. The reason for this was that the bright ambient light was reflected from the shiny internal parts of the diode such as the connection leads, the evaporated metal contact regions on the chip, and the chip itself. The resultant situation was that the surrounding light conditions either equalled or exceeded the power density of the LED output.

Two methods were used to correct this problem, some of which restricted the viewing angle. Some manufacturers corrected the problem by producing LEDs with blackened reflective metal connections and mounted the entire display behind a barrier with viewing slits. These steps helped mask most of the reflecting surfaces with only a minimal decrease in the effective viewing angle of the LED itself. The other technique to reduce the problem of ambient lighting was for the manufacturer to package the chip in a dye which is transparent only to the particular wavelength of the LED output.

If the requirements for your construction project still necessitate clear-lensed LEDs that must be used in bright light, don't despair. Manufacturers of clearlensed diodes will usually offer a compatible filter that can be used with the LED. Either a red filter or a circularly polarized filter placed in front of the LED can correct an ambient-lighting problem. These filters only decrease the output of the LED by a small amount while trapping the reflected light from the internal parts of the LED, thereby preventing the display from being washed out. Finally, certain manufacturers may encase alphanumeric-display diodes in integral or hubble-cylinder lenses. These lenses are designed to increase the apparent size and viewing angle of the display through magnification. Although these techniques allow the output to be viewed from a wider angle, any imperfections in these bubble lenses will produce distortions in the LED output display.

So what LED should you buy? That depends on the requirements for your project. Dozens of companies presently market many different types of LEDs. A partial list might include General Electric, Fairchild, Texas Instruments, Hewlett Packard, RCA and Monsanto. Perhaps the best information that can be given about using LEDs in your construction projects is just to shop around, know exactly what you will require from your visual display, and match those needs to the different products on the market. There is no specific LED display that covers the builder's needs in every situation.

The Liquid Crystal

The liquid crystal, like the light-

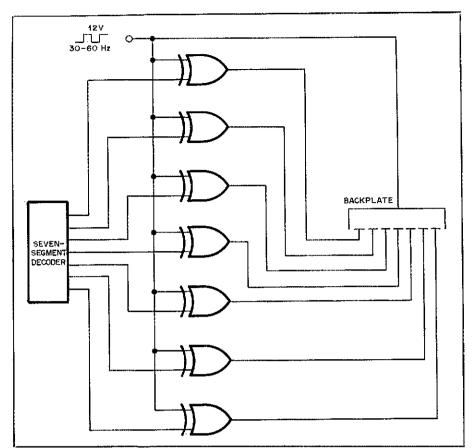


Fig. 4 — Phase-shift addressing commonly used to drive a typical seven-segment LED.

emitting diode, has a long history. Liquid crystals were discovered in 1888 but it wasn't until 1936, when the first patent was approved for a device using these materials, that liquid crystals were considered to have commercial possibilities.

The original patent was for a device called an optical shutter, an invention that established the basic principles of modulating light by means of liquidcrystal materials. In the years which followed, though, interest in electro-

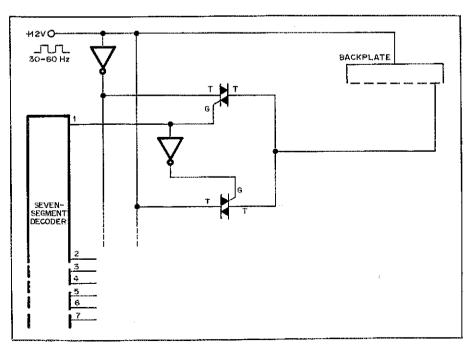


Fig. 5 — Phase-shift addressing using bidirectional switches requires less circuitry to drive an LED.

optical devices waned. It wasn't until the late 1950s that Westinghouse and RCA began investigating the possibilities of using the liquid crystals for slow-speed switching and memory applications. From this work evolved the idea for the liquid-crystal display in the 1960s, and research work with these devices has progressed steadily since that time. But what is a liquid crystal, and how does it act as a visual display?

There is a very small group of organic materials that have the peculiar characteristics of simultaneously exhibiting some of the properties of a crystal and some of the properties of a liquid. What!? The liquid crystal maintains the properties commonly attributed to a liquid, but in addition displays something called "longrange orientation" commonly found only in solid materials. This long-range orientation allows the molecules to act in harmony and produce large responses to electric fields applied to these materials. This produces something called an anisotropy in the material. It is this process which is responsible for enhancing reflection and scattering of light incident on the liquid crystai.

Liquid-Crystal Displays — How Do They Work?

The most common LCD in use today is the nematic liquid crystal which uses dynamic scattering (reflection and transmission). The term dynamic scattering describes the strong, wide-angle light scattering that is produced when light hits the liquid crystals mounted in their cells. But what is the difference in producing an LCD-output by reflection or transmission?

In reflective display (Fig. 3) the scattered light must have a high contrast with the background. This is accomplished by placing the mirror in the LCD cell so that it faces into a dark background. In transmission displays a visual output is produced when an enable voltage is applied to the liquid crystals set between parallel electrodes in the cell. This voltage randomizes the polarization of the LCD and enables a bright image to be displayed contrast to the normally dark background. (The dark background is produced when the liquid crystal cell is placed between crossed polaroids.) Do these reflection and transmission devices actually work? Yes, in spite of some difficulties shared with the LED family.

The reflection device runs into the same problem that plagues the LED — the viewing angle. Reflective dynamic scattering gives rise to spurious reflections which destroy the readability of the device at certain angles. The transmission LCD has troubles, too. Although this LCD has a high contrast ratio (display to background) it suffers from the drawback that it requires some type of light behind the liquid crystal to produce the output, thus

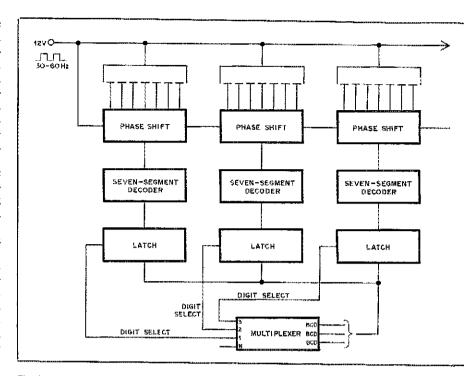


Fig. 6 — Block diagram of phase-shift addressing a multidigit LCD using a multiplexer.

canceling its only advantage over the reflective devices — its low power requirement.

How to Drive LCD Displays

Liquid-crystal displays, like the LEDs, can be driven by using a standard BCD counter, data latch storage register and a seven-segment decoder-driver, with each LCD needing a set of these integrated circuits to generate an output. Again the question arises - what if I want to build a multidigit display using LCDs? Do I have to invest in all these ICs or can I multiplex the display? The answer is yes, liquid crystals can be multiplexed, but not in the same manner as an LED. The current cannot be increased to produce a stronger applied field against the liquid-crystal segment. When this "conventional" multiplexing technique is used, sneak paths develop in the LCD, producing activation of unwanted segments. An alternative method must be developed. Before we see in detail how LCDs are multiplexed, let's look at another method of driving a single LCD and see if we can adapt it to multidigit displays.

The technique is known as phase-shift addressing and is illustrated in Fig. 4. Square waves of equal amplitude and frequency are connnected to the backplate (anode) and the segments (cathode). The relative phase between the two square waves determines the state of each segment. The LCD segment is switched on when the square-wave outputs are exactly 180° out of phase; it is switched off when the relative phase of the square waves at the segment again matches that of the backplate.

A similar method of phase-shift addressing which is also used to drive LCDs is called a bidirectional switch (transmission gate) and is illustrated in Fig. 5. To construct such a switch, an n-channel transistor and a p-channel transistor must be connected in parallel. By adding a control inverter, a single-pole single-throw switch is formed which can conduct in both directions. The switch is turned on and off by either a high- or low-positive level at the control input. Each LCD segment is connected to a pair of these bidirectional switches with the decoder output being the control mechanism governing the on/off states of the segment.

Multiplexing LCDs

Let's take a close look at exactly what happens to a liquid crystal when it is driven by a multiplexing circuit. Dynamic scattering occurs in LCDs when turbulence in the liquid crystals overcomes their long-range orientation, producing either a reflection or transmission of light. In order to control this turbulence and enhance the contrast ratio between liquidcrystal segments that are on or off, a magnetic field may be introduced to help maintain the long-range orientation of the molecules. In practice, however, it is very difficult to construct such a device. An alternative method is to introduce highfrequency electric fields. This technique has the same effect on the liquid crystals as does the magnetic field, while having fewer construction problems. This procedure, using both high- and lowfrequency square or sine waves to drive the LCD segments, is called twofrequency addressing. By addressing the segments with two frequencies the threshold for dynamic scattering is increased, thereby increasing the threshold voltage and enabling matrix addressing to be used to drive the visual display.

What is important to realize is that a high contrast ratio must be maintained in the LCD segments. The decay time of the liquid-crystal material must be sufficiently long to prevent any significant change in the state of the LCD segment before it has been rescanned.

Finally, there is another technique which may be used to multiplex liquid crystals. This technique will not save the builder construction time or money in ICs, but it seems to be the easiest way to construct an LCD display capable of being multiplexed from the original parts of an LED display with the standard BCD counter, data latch, and decoder-driver for each digit. Fig. 6 shows this approach. The input is multiplexed and then a phase-shift addressing scheme using exclusive-OR gates is used to drive the LCD.

What to Expect in the Future

Visual displays are only the "tip of the iceberg" in optoelectronics. As developments in LEDs and LCDs occur, they will

find applications not only in visual displays, but in a host of other areas that haven't even been mentioned here such as optical isolators, light-sensitive FETs, light-activated SCRs, photoresistive detectors, PIN photodiodes and phototransistors. Only the limits of an amateur's cleverness in applying these optical devices to amateur radio will determine the extent of their development in our hobby.

Appendix

The following are definitions and terms used in optics to characterize the properties of an LED.

Incident flux density is defined as the amount of radiation per unit area (expressed as lumens/cm² in photometry; watts/cm² in radiometry). This is a measure of the amount of flux received by a detector measuring the LED output.

Emitted flux density is also defined as radiation per unit area and is used to describe light reflected from a surface. This measure of reflectance determines the total radiant or luminous emittance.

Source intensity defines the flux density which will appear at a distant surface and is expressed as lumens/steradian (photometry) or watts/steradian (radiometry).

Luminance is a measure of photometric brightness and is obtained by dividing the luminous intensity at a given point by the projected area of the source at the same point. Luminance is a very important rating in the evaluation of visible LEDs.

While luminance is equated with photometric brightness, it is inaccurate to equate luminance as a figure of merit for brightness. The only case where this rating is acceptable is when comparing physically identical LEDs. Different LEDs are subject to more stringent examination. Manufacturers do not use a set of consistent ratings for LEDs (such as optical flux, brightness and intensity). This is because of the dramatic differences in optical measurements between point- and area-source diodes. Point-source diodes are packaged in a clear epoxy or set within a transparent glass lens. Area-source diodes must employ a diffusing lens to spread the flux over a wider viewing area and hence have much less point intensity (luminance) than the point-source diodes.

References

'Blakeslee, "By the Light of a Diode," QST, May, 1972.

^{17/2}.
²Hall and Watts, "Learning to Work with Integrated Circuits," *QST*, January-July, October, 1976, and June, 1977.

Feedback

☐ Herbert Stevens, W6RSP, advises that in his simple cw QSK ("Hints and Kinks," QST for December, 1977) item, insertion of relay K1 in the coaxial line does serve to inhibit hash and backwave.

☐ In "Hints and Kinks" for January, 1978, the drawing for the "Alternate Receiving Antenna Modification" should have shown the two leads attached to the additional miniature phone jack in reverse position for correct operation.

☐ When WB9RXV contacted WA1YJF during his amateur radio demonstration (January, *QST*, page 58), he wasn't speaking to a YL, as he had thought. WA1YJF is a 15-year-old OM, whose new call is W1YE.

☐ "Silent Keys" in January 1978 QST incorrectly listed WØHQE. The correct call is WBØHQE.

☐ The weight-control drawing appearing in "Hints and Kinks" for February, 1978, should have indicated that the 47-kilohm resistor is to be connected to C1, R4, CR1 and O1.

Strays 🧀

OST congratulates . . .

☐ John F. Kienzle, WA2UON, who has been included in the 1976-77 edition of Notable Americans as well as the current editions of Community Leaders and Noteworthy Americans, and Dictionary of International Biography.

☐ Bill O'Kain, K4LTA, named Tennessee Insuror of the Year by the Insurors of Tennessee.





During a recent business trip to the U.S., Martin Aitken, G2ACK, visited amateur friends in New York, New Jersey and Indiana, renewing acquaintances made over the air from England. G2ACK is shown at the station of Ron Stier, W9ICZ.



For only a few seconds once every 36 days, OSCAR 7 is in a common window to both Hawaii and Washington, DC. Nevertheless, Lee Wicai (left), KH6BZF and Earl Skelton (right), N3ES, were able to copy each other through the satellite after many months of effort,

An FET Volt-ohmmeter with Linear Ohms Readout

Good test equipment is a must for any ham shack. But most are also expensive. Not this handy electronic volt-ohmmeter. Build it, and save money.

By Jay Rusgrove,* W1VD

k a dozen hams what piece of test equipment is most valuable around their shacks, and most would probably respond, "My vacuum-tube voltmeter," Why a VTVM? Because this one instruments allows measurements of, to some degree of accuracy, ac voltage, do voltage, and resistance. An important feature of the VTVM is the high impedance it presents to the circuit under measurement. This is particularly important with dc-voltage measurements. An instrument that has a low impedance (as is common with inexpensive VOMs) tends to load down the circuit being measured and disrupt normal circuit operation. Fig. 1 iflustrates how normal circuit voltages are changed by connecting a low-impedance instrument to the circuit. The lower the impedance of the instrument, the greater the error introduced by the meter.

Typical VTVMs have an input impedance on the order of 10 megohms. As can be seen in Fig. 1D, this type of meter has little effect on the circuit. An instrument with a specification of 1000 ohms/volt will often make it appear that a circuit is working improperly when in fact it is functioning normally. This likely brings up another question, "Why are VOMs so popular?" The answer to this is simple. VOMs are small, inexpensive and portable, not requiring the ac mains as a power source. The circuit to be described here blends the attractive qualities of both the VTVM and the VOM -- measurement accuracy and portability.

Circuit Details

The circuit shown in Fig. 2 makes use of two field-effect transistors in a balanced circuit. Since no two active devices have exactly the same characteristics, some means must be incorporated to balance

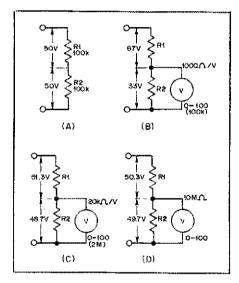


Fig. 1 - Effect of voltmeter resistance on indicated voltage in a typical case. Shown at A is the circuit in which voltages are to be measured, B. C and D show the effects of "loading" by voltmeters having various impedances. At B, for example, the instrument with a sensitivity of 1000 ohms per volt on the 100-volt range (full scale) has an impedance of 1000 × 100 or 100,000 ohms. Electronic voltmeters (represented at D) have essentially the same input impedance for all ranges of the instrument. Although all three meters may be equally accurate, each indicates a different voltage because the presence of the meter itself changes the voltage across R2.

the circuit under static conditions. The zero potentiometer does just that since the meter will read exactly "0" when the circuit is balanced. Any imbalance causes the meter to deflect, the amount of deflection proportional to the degree of imbalance.

Voltage scales for both ac and dc are 0-0.5, 0-5, 0-50 and 0-500. A series of dividers (R2 through R5) feed a portion of the voltage being measured to the bridge circuitry. A 1-megohm resistor is used in the tip of the dc probe bringing the total input impedance to approximately 7 megohms. The use of potentiometers in the divider alleviates the need for precision, special-value resistors, thereby reducing the cost of the unit considerably.

Measurements of ac voltage are facilitated by rectifying the ac and reading the resulting dc directly. Two 1N34 diodes, a 22-megohm resistor, and a 0.05-µF capacitor form the rectifier circuit. R1 is used to calibrate the instrument for ac measurements.

Resistance measurements are made in ohms using five ranges: 0-50, 0-500, 0-5000, 0-50k and 0-500k. This circuit makes use of a linear ohms-readout system. Conventional VTVMs and VOMs use scales that are cramped on the high end and expanded on the low resistance end. This logarithmic system is impractical for a home-constructed instrument since special meter faces are not generally available. Linear readout of resistance allows the user to read the value of resistance directly from a standard meter face. With this system a single meter scale can be used for resistance and voltage measurements.

Potentiometers R6 through R10 are used in place of precision, nonstandardvalue resistors. Each potentiometer controis the voltage division for its associated

Under normal circuit conditions with the instrument placed in the ohms position, the meter will rest gently against the peg, off scale at the high end. When the ohmmeter leads are connected together, the zero potentiometer is adjusted so that meter indicates 0 resistance. Separating the leads causes the pointer to return to its position resting against the high-end peg. D1 is used to limit the voltage fed to the bridge so that the pointer does not slam against the peg.

Construction

The enclosure is made from pieces of

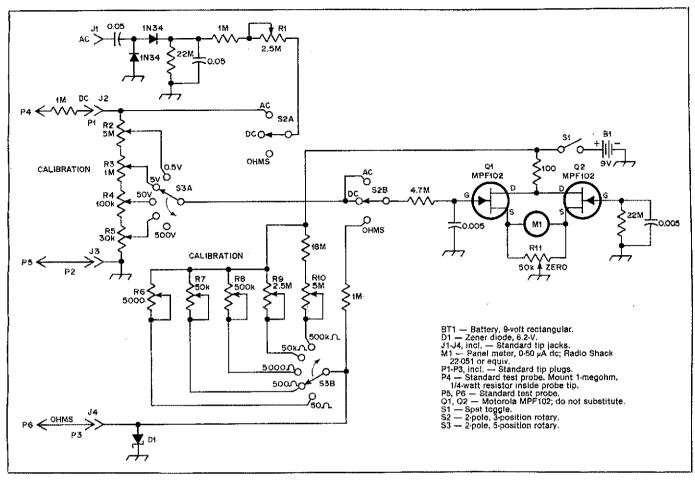
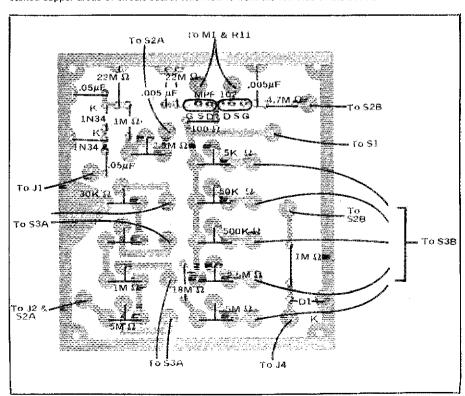


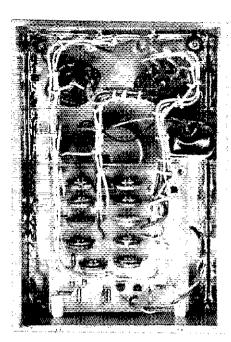
Fig. 2 — Schematic diagram of the FET VOM. All resistors are 1/4-watt carbon types except for the potentiometers. Numbered components not appearing in the parts list are for text callout only. All controls except R11 are for calibration.

This inexpensive FET volt-ohmmeter can be built with easily obtainable parts. Accurate ac, dc and resistance measurements are made quickly with this high-impedance device, without loading down the circuit being measured.



Fig. 3 — Circuit-board layout with parts overlay for the FET VOM. Shaded areas represent unetched copper areas of circuit board. This view is from the foil side of the board.





The inside of the FET VOM. Leads are dressed with wire-tying twine to provide a neat appearance.

double-sided, glass-epoxy circuit board material with the overall dimensions measuring $4 \times 6 \times 2$ -1/4 inches (100 \times 150 \times 60 mm). All seams are soldered together along their entire length to ensure a rigid construction. The battery is held between two pieces of circuit board material soldered to the sides at several locations.

All components other than the meter, switches, battery and zero potentiometer

are mounted on a circuit board that measures $2-7/8 \times 3-1/8$ inches (73 \times 79 mm). A suitable foil pattern with parts layout is shown in Fig. 3.

The schematic shows a number of connections to ground. In this particular circuit, ground is not the cabinet of the instrument but rather a "floating" ground. By not connecting any of the circuitry to the cabinet there is no chance of having dangerous voltages on the case. This means that the circuit board ground foil should not be allowed to contact the cabinet.

Although the unit shown in the photographs was left natural (tarnished copper) with a clear acrylic coating, there is no reason why the builder should not paint the finished VOM. Treat the copper like any other metal surface when painting. Any type of labeling that suits the builder's fancy may be used. Dry transfer type labels were used on the unit shown.

Calibration

Adjustment of the completed FET VOM is simple. However, it does require the use of a calibrated meter and a source of variable-voltage dc. The dc ranges should be adjusted first. Connect the calibrated voltmeter in parallel with the FET VOM and attach these connection points to the variable-voltage dc supply. Start with the lowest range (0-0.5) and set the supply voltage for a midscale reading (0.25 volt). Adjust R2 so that the FET VOM reading conforms with the reading on the calibrated meter. Do the same for each of the other ranges using a voltage

that will allow the meter to read near midscale. Should 250 volts not be available for the high-range calibration, 50 volts could be used, yielding only a small difference in accuracy. Care should be taken to touch only the plastic insulation on the potentiometers since potentially dangerous voltages are present in the circuit.

Ac calibration is somewhat simpler since the basic voltage dividers have already been calibated. The ac line voltage should be used for calibration, again conforming the reading on the FET VOM with the calibrated meter. R1 is provided for this adjustment.

Calibration of the ohmmeter circuitry is done in a similar manner. A resistor that will allow the meter to read approximately midscale for each range will be required. If the resistors are of the precision variety, a calibrated ohmmeter will not be required. However, if the resistors used for calibration are of five-percent tolerance or greater, it would be wise to use a calibrated meter. For example, a 27-ohm precision resistor could be used for the lowest frequency range. R6 would be adiusted for a reading of exactly 27 ohms on the FET VOM. A 10- or 20-percent tolerance resistor could be used provided a calibrated meter is available. In that case the FET VOM reading should be made the same as the calibrated meter. Simply do the same for the remainder of the resistance ranges. That completes the calibration of the instrument, and it is ready for use in those many applications around your shack.

Strays 🐝

QST congratulates . . .

I Dr. Robert Reed, vice president, engineering, of the John Zink Co., Tulsa, named Inventor of the Year by the Oklahoma Bar Association.

ACQUAINTANCES RENEWED

Despite knowing each other for more than 32 years after meeting in the Solomon Islands during World War II, Allan Papworth, ZL1PA, of Warkworth, New Zealand and James Hanson, W1NQO, of Haddam, CT, had made successful on-the-air contact only twice. Late last summer they finally had a chance to really catch up on old times when Papworth took an extended vacation to North America. Ironically, both men's wives are named Irene.

Deprior to departing for Europe on a long-delayed honeymoon last summer, Steven Decho, WB6ZFI, of Canoga Park, CA, happened to make a 20-meter contact



with Henry and Yvonne Meier, DF1KM and DJ0JF, near Aachen, Germany, and was immediately invited to spend a weekend there. They did enjoy the hospitality and with a reciprocal permit Steve worked back into the L.A. area between pileups on the DL repeaters. The Dechos were similarly hosted by another on-air friend, Carlo Bugnano, I1BGJ, in the Italian Alps.



Worldwide, total strangers in amateur radio can easily become good triends. Shown in the photo at left, DF1KM (left) and wife DJØJF hosted WB6ZFI and his wife, while at right, ZL1PA (left) visited W1NQO (right).

New Tasks for the Digital Voltmeter

The versatility of the QST IC-course digital voltmeter/ frequency counter expands with this compact, easy-to-build adapter. Use it to measure R and C values.

By Robert Shriner,* WAØUZO

ith diligence you completed the course on ICs (QST for January through July and October, 1976, and for June, 1977). Resting amid your sparkling amateur radio equipment is that versatile digital voltmeter/frequency counter, a product of the course trail that led you through the mysteries of ICs. Perhaps you went the distance and even added some 14 TTL ICs as suggested in my article, "The DVM/Frequency Counter Becomes a Clock," which appeared in OST for January, 1977. Satisfied with your accomplishment, you might lean back in your swivel chair and ask, "So, what else is new?"

This, the second of what I am sure will

*1740 E. 15th St., Pueblo, CO 81002

[Editor's Note: The entire series, all nine parts, has been reworked and is now available in a 48-page booklet format with an attractive cover. A shopping list and index have been added, and printing errors in the earlier QST parts have been corrected in the booklet. These booklets are available from the Circulation Department of ARRL hq. for \$2 per copy ppd. in the U.S., \$2.50 elsewhere.]

be many adapters for the DVM/counter, is an answer to that question. The usefulness of a device for measuring unknown resistances and capacitances stands without reservation. Any amateur who likes to build and service his own equipment knows the desirability of being able to take such measurements. Then, where does the DVM/counter come into the picture? Well, right here.

Back at my drawing board, determining what would be required to adapt the DVM/counter for measuring such parameters, provided an interesting challenge. With a "black box" approach, a prototype evolved that permitted the adapter output to be fed to the DVM by means of the DCV and DC10 range. When constructed, the black box responded like a genie evolving from a magic lantern.

Overall design objectives called for a compact device with solid-state construction and a self-contained power supply. Not only would the finished product be able to measure resistances and capacitances as shown in Table 1, but also additional capability would be incorporated whereby there would be two auxiliary ranges for capacitance testing and one auxiliary range for resistance testing. A regulated power supply would provide the +6, +12, -6 and -12 voltages needed for operation. Two rotary switches would

Table 1 - RC Adapter Range

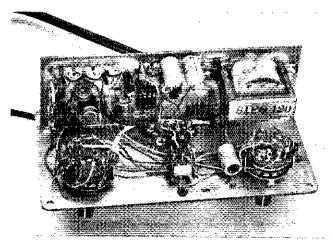
Capacitance	S1A Position
0-1 µF	+ 10 (B)
0-10 µF	MF (C)
0-100 μF	×10 (D)
0-1000 μF	× 100 (E)
Resistance	S2A Position
0-1000 Ω	+ 10 (H)
0-10 kΩ	Ω (J)
0-100 kΩ	×10 (K)
0-1 MΩ	×100 (Ĺ)

B through L are switch positions shown on schematic diagram.

The resistance/capacitance adapter designed for use with the QST ICseries DVM/frequency counter.



Inner construction of the RC adapter. The chassis, constructed from poboard material, is protected by a rugged plastic utility box having outer dimensions of 5-7/8 \times 3-1/16 \times 2-1/8 inches (149 \times 78 \times 54 mm).



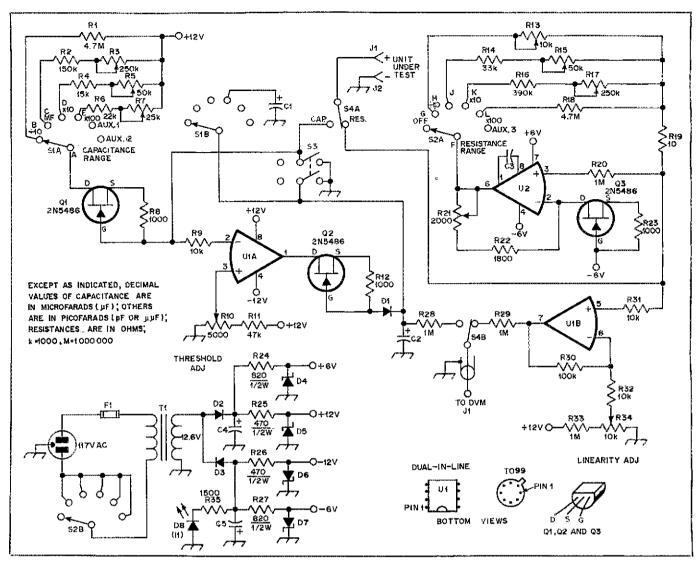


Fig. 1 — The resistance/capacitance adapter. Resistors are 1/4 watt except as noted. R1-R7 and R13-R17 are calibration resistances. Potentiometers are linear-taper pc variables. Circuit boards and components are available from Circuit Board Specialists, Box 969, Pueblo, CO 81002. Tel. 303-542-5083.

C1, C4, C5 - 220 µF, 16 V, Sprague 227G016CG or equiv.

C2 - 22 µF, 16 V, Sprague 226G016AS or equiv.

C3 -- 130-pF disk, Sprague 1CC0G131X0100C4 or equiv.

D1 -- Silicon small-signal diode, 1N914 or equiv.

D2, D3 - Silicon rectifier diode, 200 V. 1 A; 1N4003 or equiv.

D4, D7 — Zener diode, 6.2 V, 400 mW,

1N753 or equiv.

D5, D6 -- Zener diode, 12.0 V, 400 mW,

1N759 or equiv.

D8 - 3/16-in, red LED, Motorola MLED50 or equiv. (I1 on pc board).

F1 - 1/2-A pigtail fuse, Buss MDV 1/2 A, 250

J1, J2 --- 5-way binding post. (Radio Shack package no. 274-661 includes red and black posts.i

Q1, Q2, Q3 - N-channel JFET, 2N5486 or едціу.

\$1, \$2 - 2-pole, 6-position rotary switch, CTS no. T206 or equiv.

S3 -- Dpdt momentary toggle switch, Alco no. MTA206T or equiv.

S4 - Dpdt toggle switch, Alco no. MTA206P or equiv.

11 - 12.6-V, 100-mA power transformer, Mouser no. 81PG120. Mounting centers

1-13/16 inch. U1 -- Dual operational amplifier, National Semiconductor type LM1458. Interchangeable with IC type 5558.

U2 - Linear IC operational amplifier, RCA type CA3130.

enable the device to cover the resistance and capacitance test range.

The Capacitance Section

To explain the functions of the adapter as an accessory for the DVM/counter, let us examine the capacitor test section first. The main principle behind this part of the adapter is that when a voltage is applied to a capacitor, a specific time period will be required to bring the capacitor to full charge. The time period of course depends on the value of the capacitor. One must note, however, that charging will not take place normally in a linear fashion unless some special arrangement is made. If a capacitor is charged with a constant current, then charging will take place linearly. This fact of electronic life forms the basis for operation of the capacitor testing section of the adapter: For this project, an n-channel, depletion-mode 2N5486 JFET

was pressed into service as Q1, a constantcurrent source.

If you refer to Fig. 1, you will observe that the supply voltage for Q1 is fed through SIA, the capacitance-range rotary switch. R1 through R6 are the current-limiting resistances for the four range steps normally used in capacitance testing with the adapter. For the moment, we will not consider the auxiliary ranges.

As you look across the schematic

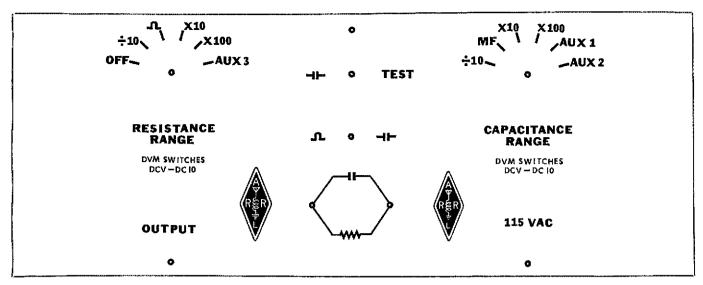


Fig. 2 — Faceplate template at actual size. Black represents copper. Epoxy pc-board material is used for the faceplate and the circuit board. The Ω and the MF switch positions are direct-reading positions without a multiplier.

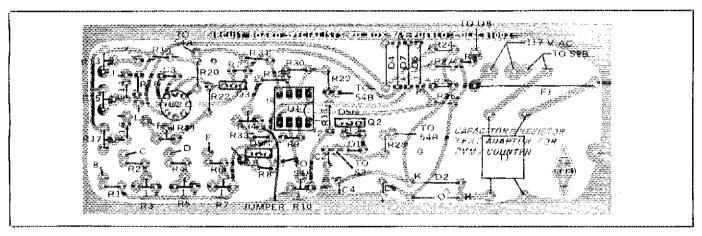


Fig. 3 — Actual size circuit-board template and parts placement guide. Black represents copper. A jumper is to be connected between the foil common and R34.

diagram, U1A comes into view. This LM1458 operational amplifier, with which you might be well acquainted from other projects, stands as a traffic director for this part of the adapter. It is equivalent to the 5558 operational amplifier. Section U1A functions as a dc switch, the purpose of which is to call a halt to the charging at a specific voltage point. Q2, another 2N5486, provides an additional constant-current source. And D1 is the one-way guard that prevents C2 from discharging back into U1A.

Now, let's view this area a little more closely. Presume for instance, that we have an unknown capacitor, the value of which we wish to determine. We connect the capacitor to be checked across terminals J1 and J2, S4, the selector switch

for either resistance or capacitance tests, is placed in the capacitance position. S3 is used to short out the capacitor under test and also C2. The output lead is plugged into the DVM/counter on which the controls are set for DCV and DC10. Observe in Fig. 1 that the output lead to the DVM is connected to S4B. Back at U1, pin 1 is standing high (+12 V) and supplies voltage to Q2.

As we open S3, two things begin to happen. The unknown capacitor starts charging up as well as C2. When the unknown capacitor reaches a voltage that causes UIA to switch from positive to negative, then C2 stops charging. Diode D1, being unidirectional, prevents C2 from discharging into U1A.

Once the charging process is ended, we

have a voltage standing on C2 that is proportional to the value of the unknown capacitor. We then proceed to feed this voltage into the DVM where it will be indicated. There is something to be said for the adage that seeing is believing. So, let us see for ourselves.

For an example, set the capacitancerange switch (S1) to the MF position and connect a capacitor to the jacks, J1 and J2. Press the capacitor test switch into the test position and observe the reading on the DVM. Suppose, then, you see 4.70 volts appearing on the meter. Such a reading indicates that the capacitor under test has a capacity of $4.7 \,\mu\text{F}$. This becomes a direct reading. In other words 1 volt on the DVM means 1 μF of measured capacitance. A reading over 10 volts on the DVM indicates an overvoltage. Therefore, we move the capacitance range switch S1 to $\times 10$. Should the meter indicate 4.70 volts, the value of the unknown capacitor would be 4.70 \times 10 or 47 μ F. On the other hand if the reading appears to indicate less than 1 volt, the procedure to be followed is to set the capacitance range to ± 10 and remeasure. Now, if the meter shows 4.70 volts, the value of the unknown capacitor would be 4.7 divided by 10 or 0.47 μ F.

As you scanned the schematic diagram, perhaps you noticed C1 resting adjacent to S1B. This capacitor comes into play when measurements require the high range. By means of S1B it is switched into the circuit to parallel C2.

The Resistance Section

The nature of the resistance measurement section should seem fairly obvious as one looks over that portion of Fig. 1. The linear integrated-circuit operational amplifier, CA3130 (U2), is incorporated as a voltage-to-resistance converter. Very simply stated, the output (at pin 6) is fed back to pin 3 through a range resistor. The unknown resistor is connected at J1 and J2. The lower the value of the unknown resistor, the less the voltage available through R31 to pin 5 of U1B and consequently, the lower the voltage at pin 7, which is fed to the DVM. Because of the high input impedance of the CA3130 (1.5 × 10¹² ohms), this COSMOS operational amplifier is well suited for use as U2.

Pin 2 of U2 is fed by Q3, another constant-current source, and is connected to pin 6 by way of R22 and R21 in order to control the range. An explanation of the procedure for testing resistors is covered under calibration.

Construction

The compact arrangement of components without the sacrifice of easy access to the parts is evident in the photograph showing the construction features. In the prototype, I mounted the circuit board against the front panel which is also a piece of circuit board material. This feature permits mounting everything on one chassis, a convenience for easy servicing. The front panel, shown in the first photograph, was polished with fine steel wool and coated with polyurethane varnish. The circuit board is soldered on both sides and at right angles to the front panel. Its purpose is to provide a rugged chassis for mounting all components. -

General procedure for constructing the adapter is to assemble all parts, except the ICs, on the circuit board and mount the switches and jacks on the front panel. Connect the switches as shown on the schematic diagram. All soldering should be done with high-quality solder to assure good solder joints. Proper wiring can be

simplified with the use of color-coded wire. C: is mounted on S1B and is the only component mounted off the board. Connect a jumper from point X to point X on the board.

Upon completion of construction work, recheck for possible errors and poorly soldered connections. Then plug the acline into a 117-V source and turn the dude on. Test for proper supply voltages at UI and U2.

Next, turn the unit off and plug in U1. Caution: Be very careful in handling U2. This unit comes from the factory secured to a piece of black foam which, in effect, shorts all pins together. Before removing U2 from the foam, wrap several turns of very small wire around the pins close to the case. After plugging U2 in the socket, remove the wire. This measure is to protect the device from damage by static electricity. Once installed, the danger is over.

Calibration

After the adapter has come off the production line and the initial tests, described above, are completed, calibration is the only remaining task. If you suddenly have a feeling of dismay because of all the variable resistors, may I assure you that calibration is not at all difficult. Simply relax and proceed one step at a time.

Capacitance

A good approach would be to start with the capacitance section first. One should understand at the very start of this exercise that capacitor values have a very high tolerance. A 4.7- μ F capacitor, for instance, may well have a tolerance of -10 percent to +50 percent such that the capacitance might actually be anywhere from 4.23 to 7 μ F. However, we will read it out as 4.70 on the DVM. This situation might be compared to sending a *race horse* out to plow the north 40; extreme accuracy is rather foolish.

The advice, therefore, is to locate the following values of capacitors in the best tolerance rating you can get your hot little hands on: 0.47 μ F, 4.7 μ F, 47 μ F, and 470 μF. Connect the 0.47-μF capacitor to J1 and J2. Set S1 to position B (the +10 position). Plug the unit output lead into the DVM with the latter set for DCV and DC10, the one-second time base. Press S3 and observe a reading. Release the switch and adjust R10 a little. Repeat this procedure until 4.700 is read on the DVM. Recall, now, that the adapter is in the DIVIDE-BY-10 position, Therefore, 4.7 should be divided by 10 with the result indicating a capacity of 0.47 μ F. What may disturb you is the slow decrease of the reading on the DVM as you hold S3. The reason for this decline is that the DVM is slowly drawing the voltage out of C2, a normal condition.

Continuing the calibration process, a 4.7-µF capacitor should next be connected to J1 and J2 (observe polarity) and set S1

to C, the MF position. Press S3 and note the reading. Release S3 and adjust R3. Repeat until the DVM indicates 4.70. Proceed to S1D (×10) and S1E (×100) following the same process for calibration.

Resistance

Adjustment of the resistance section is just as easy. Locate the most accurate resistors you can in the following values: 470 ohms, 4700 ohms, $47 \text{ k}\Omega$ and $470 \text{ k}\Omega$.

Set S2 to L (\times 100). Turn R21 to midrange. Short J1 to J2. Adjust the fine zero on the DVM. Connect a 470-k Ω resistor to J1 and J2 after removing the temporary short between the terminals. The exact value of the resistor is not important but do get a resistor with the best tolerance available. Adjust R34 for the exact reading of the resistor. Next, try several resistors between 100 k Ω and 1 M Ω . What this test should disclose is whether or not the adapter is providing a linear reading. If not, move R21 and try again. Continue until the linearity seems satisfactory.

For the remaining adjustments move S2 to the H position (Ω). Connect a 470-ohm resistor across J1 and J2. Adjust R13 for exact reading. Use a 4700-ohm resistor for adjusting R15 and a 47-k Ω resistor for setting R17.

With the construction and calibration completed, your little shoe box now has the capability of testing two more component parameters. Should you not have a DVM/counter (by all means you ought to), the output of the adapter can be matched to any high-impedance meter, digital or analog, by changing the values of R28 and R29. For instance if a meter should have an input impedance of $2 M\Omega$, then the values for R28 and R29 would be changed to $2 M\Omega$ respectively.

The auxiliary positions have been provided to enable the builder to meet future needs. For example, one might desire to have a particular testing range apart from those in the basic design. Some possible uses for the auxiliary positions might be for temperature sensing, antenna elevation indication, or rain-gauge measurements. These could be handled through the auxiliary no. 3 channel. A use for the capacitance auxiliary might be the testing of a variable capacitor.

The adapter is capable of rendering dependable capacitance measurements between 0.01 μ F and 1000 μ F. While it is possible to take measurements in the vicinity of 5000 μ F there could be a higher margin of error.

Although not directly related to the adapter, I'd like to conclude with a suggestion for those amateurs who may experience difficulty in construction and operation of the DVM. You must get the frequency counter section working first, followed by the de-volt portion, and finally the ac-volt section.

Locating Geosynchronous Satellites

Tracking a satellite requires new azimuth and elevation figures every few minutes . . . unless its position is "fixed." Then a pocket calculator will tell you where it's at.

By Bill Johnston,* N5KR, ex-WB5CBC

Radio amateurs have developed much interest over the past few years in the use of satellites. Most of this interest centers on the OSCAR communications satellites—those amateur "repeaters" which are circling the earth several times daily. There are others, as well, known as NOAA, ITOS and TIROS. These scries are weather satellites, and all are in very nearly identical polar orbits.

But more recently several pioneering amateurs have sparked an interest in the use of other satellite series, such as those called ATS, SMS and GOES. For some years these satellites have been transmitting high-resolution earth photos on vhf and inferowave frequencies. Transmissions are made in both real-time and in play-back modes. A number of hams have prepared home-built equipment to receive the pictures. What's so different about these latter satellites? Each is placed in a geosynchronous orbit, one whereby the satellite seems to remain in the same place all the time. A geosynchronous OSCAR is entirely within the realm of possibility within the next few years. The task of directing antennas to it would become an important element of its use.

Computing azimuth and elevation angles with a pocket calculator for non-synchronous satellites is not particularly practical since this type of satellite is constantly changing position and requires recomputation of a new set of figures every minute or so. Consequently, most hams tracking these satellites use some

form of computer-generated perpetual printout' or plotting board.

The synchronous satellite is a different story, however, since it always remains in the same position in the sky, relative to the observer. This occurs because the satellite is placed in a perfectly circular equatorial orbit. Its altitude is such that its orbital period exactly matches the rotation of the earth (i.e., 24 hours), corresponding to an altitude of about 35,800 km (22,245 miles) above the earth's surface. Consequently, it is necessary to compute only one set of azimuth and elevation angles to position an antenna for a given synchronous satellite. This task can be easily accomplished in a few seconds on

GROUND STATION

EQUATOR

SATELLITE
SUBPOINT

Fig. 1 — The angle of great-circle arc, c, between the ground station and the satellite subpoint may be solved as a right spherical triangle (see Eq. 1). The satellite subpoint is that point on the earth directly beneath the satellite.

any pocket calculator with trig functions.

The procedure for computing satellite azimuth and elevation angles is well documented,4 and the method to be used for a synchronous satellite is actually no different from any other. Its special characteristics, however, permit a number of simplifications, and the problem reduces to little more than the solution of a right spherical triangle. Additionally, for our purposes we can make the following assumptions: (1) that the earth is perfectly round, and that its radius is 6367 km (3957 miles), and (2) that every synchronous satellite has a perfectly circular orbit, lying directly over the equator, at an altitude of 35,800 km (22,245 miles) above the earth's surface.

The Actual Computation

The first step we want to carry out in the actual computation is to compute the great-circle angle, c, between the ground station and the satellite subpoint. (This is the point on the earth directly below the satellite.) See Fig. 1. The formula, then, is that for a right spherical triangle

$$c = \cos^{-1}(\cos b \times \cos a)$$
 (Eq. 1)

where

c is the great-circle angle between the ground station and the satellite subpoint.

a is the latitude of the ground station (north is +, south is -).

b = g - f.

g is the longitude of the ground station (east is +, west is -).

f is the longitude of the satellite subpoint (east is +, west is -).

When computing b, be sure to retain the proper algebraic sign. Also, b must re-

^{*1808} Pomona Dr., Las Cruces, NM 88001 'References appear on page 25,

main within the range from -180° to $+180^{\circ}$, and if it does not, we must add or subtract 360° as necessary to put it back within that range. Note that c is an angular measure, just as a and b are angular measures in terms of latitude and longitude.

Not only is c used in a subsequent calculation, but it gives us a quick check at the beginning as to whether the satellite is actually within view of the ground station (i.e., above the horizon). The absolute value of c must be less than 81.3° to be useful. (This is the value of c when the elevation angle is zero). If it turns out to be greater than this value, then the satellite is below the horizon and there is no need to carry out any further calculations. For that matter, in the step prior to computing c, if b turns out to be greater than 81.3° we know even then that the satellite is not visible. That difference of longitude would put it below the horizon even if the ground station were located on the equator.

Incidentally, if you care to know the great-circle distance along the *surface* of the earth between the ground station and the satellite subpoint, multiply c (in degrees) by 111.136 to get the distance in kilometers, or by 69.057 to get the distance in miles. We can now compute the azimuth angle, A, directly.

For a northern-hemisphere ground station, use

$$A = 180^{\circ} + \tan^{-1} \left(\frac{\tan b}{\sin a} \right)$$
(Eq. 2n)

For a southern-hemisphere ground station, use

$$A = \tan^{-1} \left(\frac{\tan b}{\sin a} \right)$$
 (Eq. 2s)

The purpose of having separate formulas (2n) and (2s) for northern- and southern-hemisphere ground stations is simply as an aid in handling the algebraic signs of the computed angles and identifying the appropriate angular quadrant in the final result. This simplifies matters when solving the problem on certain types of calculators, but I do not mean to imply that this is the only way to get the solution. In either case, if you come up with a negative azimuth angle, add 360° to it so that it will lie in the range from 0° to 360°.

Now, looking at the earth in cross section, Fig. 2, the great-circle angle, c, is shown on the surface of the earth. The central angle, C, is the same angular measure and is equal to c.

The slant range, S, between the ground station and the satellite is found by the law of cosines

$$S = \sqrt{R^2 + (R + h)^2 - 2R(R + h) \cos C}$$
(Eq. 3)

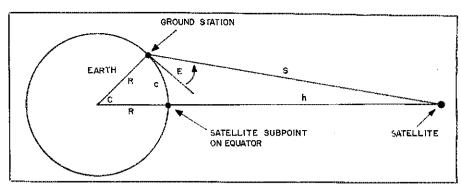


Fig. 2 — Cross-section representation of the earth showing the ground-station/satellite relationship. The angle of great-circle arc, c, is the same as that shown in Fig. 1, and is equal in degrees to included angle C.

where

R is the radius of the earth (6367 km or 3957 miles).

h is the height of the satellite above the surface (35,800 km or 22,245 miles).

C is the central angle, equal to c. The elevation angle, E, then, is given by

$$E = \cos^{-1}\left\{\frac{S^2 + R^2 - (R + h)^2}{2 RS}\right\} - 90^{\circ}$$
(Eq. 4)

We now have all the formulas we need to compute azimuth, elevation and slant range, plus a couple of other useful items. So that we can put them to practice, Table ! gives the present longitudes of a few synchronous satellites that we might be interested in.

Table 1 Geosynchronous Satellites

Satellite	Longitude	Frequency (MHz)
GOES-1 GOES-2	75° W en route	1691.0/1687.1 1691.0/1687.1
SMS-1	105° W	1691.0/1687.1
SMS-2 ATS-1	135° W 149° W	1691.0/1687.1 135.6
ATS-3	69° W	135.6

(See text for address to obtain latest status.)

Because of a variety of orbital pertubations, most geosynchronous satellites wobble a few degrees from a perfect orbit, and for operational reasons their station longitudes are adjusted from time to time. For these reasons, the longitudes shown in the table are rounded values, but they will be quite suitable for our purposes.

Also keep in mind that not all of the satellites transmit continuously. ATS-1 and -3, for example, have both been in orbit for over 10 years, and for the past few years have at various times been placed in

reduced activity or inactive status, as their functions were replaced by the SMS series satellites. The same is now true of SMS-1 and -2, as their primary functions are in the process of being replaced by GOES-1 and -2.

For the latest information on geosynchronous satellite status and station longitude, write to United States Department of Commerce, National Oceanic and Atmospheric Administration, National Environmental Satellite Services, Washington, DC 20233. Be sure to be specific in your request as to what information you need.

Example Calculations

Now let's take a look at a few examples which will help in using the formulas,

Example 1:

Ground station at Atlanta, GA, 33°45′ N, 84°24′ W (latitude 33.75, longitude 84.40). Satellite: GOES-1 at 75° W (-75.0°).

Then, $a = 33.75^{\circ}$, $g = -84.40^{\circ}$, $f = -75.0^{\circ}$, and $b = (-84.40^{\circ}) - (-75.0^{\circ}) = -9.4^{\circ}$. Since the absolute value of b is less than 81.3° , we may proceed.

From Eq. 1, $c = \cos^{-1}(\cos -9.4^{\circ} \cos 33.75^{\circ}) = 34.9^{\circ}$. Since the absolute value of c is less than 81.3°, we know that the satellite is visible.

The ground station is in the Northern Hemisphere, so we use Eq. 2n to get the azimuth angle:

$$A = 180^{\circ} + \tan^{-1} \left(\frac{\tan -9.4^{\circ}}{\sin 33.75^{\circ}} \right)$$

= 163.4°

The slant range is determined from Eq. 3, and the elevation angle from Eq. 4. The solutions for this example are given in Table 2. From that information, then, an antenna in Atlanta, set at an azimuth of 163.4° and an elevation of 49.5° would point directly at GOES-1.

Example 2:

Ground station at Honolulu, HI, 21°18' N, 157°52' W (latitude 21.30°, longitude

Table 2 Determination of Slant Range and Elevation for Example 1.

$$S = \sqrt{(6367)^2 + (42,167)^2 - (2)(6367)(42,167)} \cos 34.9^\circ$$

= 37,124 km

$$E = \cos^{-1}\left\{\frac{(37,124)^{\circ} + (6367)^{\circ} - (42,167)^{\circ}}{(2)(6367)(37,124)}\right\} -90^{\circ} = 49.5^{\circ}$$

$$S = \sqrt{(6367)^2 + (42,167)^2 - (2)(6367)(42,167)\cos 74.1^2} = 40,879 \text{ km}$$

$$E = \cos^{-1}\left\{\frac{(40,879)^{\circ} + (6367)^{\circ} - (42,167)^{\circ}}{(2)(6367)(40,879)}\right\} - 90^{\circ} = 7.3^{\circ}$$

-157.87°), Satellite: GOES-1 at 75° W (-75.0°) .

Then $a = 21.30^{\circ}$, $g = -157.87^{\circ}$, f = -75.0° , and b = (-157.87°) - $(-75.0^{\circ}) = -82.87^{\circ}$. Since the absolute value of b is greater than 81.3°, we know that the satellite is below the horizon and there is no need to make further calculations.

Example 3:

Ground station at Quebec, PQ, 46°49' N, 71°13' W (latitude 46.82°, longitude -71.22°). Satellite: ATS-1 at 149° W $(-149.0^{\circ}).$

For this example: $a = 46.82^{\circ}$, g = -71.22° , f = -149.0° , and b = $(-71.22^{\circ}) - (-149.0^{\circ}) = 77.8^{\circ}$. Since the absolute value of b is less than 81.3°. we may proceed.

From Eq. 1, $c = \cos^{-1}(\cos 77.8^{\circ} \cos$ 46.82°) = 81.7° . Since the absolute value of c is greater than \$1.3°, the satellite is below the horizon, and there is no need to proceed further.

Example 4:

Ground station at Brisbane, Australia, 27°28' S 153°02' E (latitude -27.47°, longitude 153.03°). Satellite: SMS-2 at 135° W (-135.0).

Then: $a = -27.47^{\circ}$, $g = 153.03^{\circ}$, f = -135.0° , and b = (153.03°) - $(-135.0^{\circ}) = 288.03^{\circ}$. Since 288.3° is greater than 180°, we subtract 360° to put the value in the range from -180° to $+180^{\circ}$: b = 288.03° - 360.0° = -71.97°. The absolute value of b is less than 81.3°, and we may proceed. Again from Eq. 1, $c = \cos^{-1}(\cos -71.97^{\circ} \cos$ $-27.47^{\circ}) = 74.1^{\circ}$.

Because the absolute value of c is less than 81.3°, the satellite is visible. The azimuth angle, from Eq. 2s, is

$$A = \tan^{-1} \left\{ \frac{\tan (-71.97^{\circ})}{\sin (-27.47^{\circ})} \right\} = 81.5^{\circ}$$

The solution for slant range (from Eq. 3) and for elevation (from Eq. 4) is shown in Table 3, Therefore, an antenna at Brisbane, set at an azimuth of 81.5° and an elevation of 7.3°, would point at SMS-2. Note, however, that this is not very far above the horizon and reception would probably be marginal.

The examples above demonstrate the straightforward method that one can use on a pocket calculator to determine, first of all, if a particular geosynchronous satellite is within view of his ground station, and then to compute the azimuth and elevation angles for pointing the antenna. Accurate results are obtained in a few seconds just by plugging the appropriate figures into the formulas.

Although most geosynchronous satellites are located in the western hemisphere, the formulas work for all satellites and all ground-station locations, The only word of caution is to make sure that you always retain the proper algebraic sign for latitudes and longitudes, as explained earlier.

As a final note on the use of synchronous satellites, you will remember that the great-circle angle between the ground station and the satellite subpoint must be less than 81.3° if the satellite is to be visible. Obviously, then, no ground station beyond 81.3° north or south latitude can possibly see any synchronous

satellite regardless of longitude. These areas include parts of Greenland, Svalbard, Franz Josef Land, the northernmost Canadian arctic islands. and of course a good-sized chunk of Antarctica. As a practical matter, however, few stations beyond 70° north or south latitude would be within view of an operational geosynchronous satellite, but even these areas include no significant population centers.

So if you've been thinking about building a station to receive weather photos and other information from synchronous satellites, but were worried about how to aim your antenna, worry no more. And if you're too lazy to even pull out the ol' pocket calculator, you may just send along a large s.a.s.e. and \$1 (to cover the cost of computer time), and I'll have a giant IBM 360 print you out a nice chart showing azimuth and elevation angles, plus range, from your station location to every possible synchronous satellite location, in one-degree increments. (Readers outside the U.S. may omit the s.a.s.e.)

A number of amateurs are presently receiving high-resolution earth photos from these satellites, and aiming the antenna is even easier than tracking OSCAR, It's another facet of our hobby that you're sure to enjoy. US!- |

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SHORT ON WALLPAPER?

☐ The Union de Radioaficionados Espanoles offers three different awards, available to all amateurs. The "Diplomas 100 EAs-CW" is issued for submitting proof of 100 OSO points, with the OSO point value dependent on the applicant's CQ Magazine zone. For contacting 125 different EA stations, with at least three QSOs in each of the eight Spanish districts, URE awards the "Espana Diploma." In addition, the most outstanding amateur with an Espana Diploma is awarded a gold medal. Finally, the "C.I.A. Diploma" is given for proof of contact with either 20 different Latin American countries for the gold certificate, or 15 for the silver certificate. Both must include contact with Puerto Rico, Portugal and Spain. Obtain full details on all these from URE, Hortalezy St., 2-6° Derecha, P. O. Box 220, Madrid 4, Spain.

☐ The Highveld Branch of the South African Radio League offers the "Highveld Branch Award" for proof of contact with six to 12 ZS stations. The exact requirements are dependent on where the applicant's station is located and bands used. Write to SARL, Awards Manager, P. O. 117, Edenvale, Transvaai, South Africa.

 ☐ Island-hoppers can receive "Islands of the World DX Award" by working either 50, 100, 150 or all 162 islands, including Whidbey Island, WA. which appear on a list prepared by Bill Gosney, WB7BFK. More information can be obtained from him at 4471 40th N. E. St., Oak Harbor, WA 98277.

A Permeability-Tuned Variable-Frequency Oscillator

Want a top-notch VFO with precision tuning? Here 'tis!

By Warren A. Gregoire, Jr.,* W6TME (ex-WA6BIP, ex-W5CUV)

igital frequency readout - that contemporary bit of electronic showmanship - can provide a touch of glamour to your station. Watch a visitor's eyes. The moment the LEDs respond to the tuning knob's movement, eyes are drawn to the display. But for you, the operator, the DFR is a practical device; the attraction offered is of lesser importance. You have learned to rely on this accessory for correct frequency indication.

But are the results as reliable as you'd like? Is it possible that your receiver VFO is the weak link in the chain? If it doesn't toe the mark, then a permeability-tuned oscillator may be the remedy.

Providing a precision tuning mechanism is perhaps one of the most challenging hurdles facing the home constructor of amateur radio communications equipment. The builder may elect to splurge on this crucial item, spending \$50 or more for variable capacitor and suitable reduction-drive dial. Surplus units as adapted by Brunmeir' are means for a convenient solution, but in my case, the diminutive size of the station receiver eliminated this possibility. I decided, therefore, to build my own miniature permeability-tuned oscillator, precluding the need for a variable capacitor and including a built-in vernier mechanism.

The PTO described here is intended for use as the tunable oscillator in homemade receivers with 160-meter tunable i-f stages, as featured in recent issues of QST.2.3 Frequency coverage is 2255-2505 kHz and the direct-reading dial is accurate within ± 1.5 kHz over the entire 250-kHz tuning even without moving mechanically adjustable pointer. Error from any 25-kHz dial mark to either adjacent 25-kHz mark is less than 1 kHz. Thus, when the pointer is reset at the nearest 25-kHz mark, very accurate readings are possible, as the main dial is

Fig. 1 — The circuit for a permeability-tuned oscillator that provides stability and linearity at low cost. It is well suited as a VFO replacement for communications receivers such as described in The Radio Amateur's Handbook, 54th edition, ARRL, 1977, page 277. L1 consists of 28 turns of no. 36 enameled copper wire occupying 1/8 inch on a J. W. Miller form (part no, 64A022-2). Mechanical parts list: text.

1/4-inch shaft with integral panel bushing, H. H. Smith no. 148.

Phono idler wheel, approximately 1-1/8-inch diameter, available at GC and Walsco parts dealers. See text.

Main drive wheel, approximately 1-13/16-inches diameter, center hole threaded to accept a no. 6-32 screw and provision for setscrew. See 1-1/4-inch angle-aluminum stock, 2-1/2-inches

2-inch angle-aluminum stock, 1-1/2-inches long. Vinyl tubing, 1/4-inch inside diameter for tight fit

8 metal washers, 1/4-inch diameter. A 1/4-inch sleeve with setscrews may be substituted as shown in photographs.

calibrated in divisions of 1 kHz each. Tuning is smooth, with excellent freedom from backlash, slipping and mechanical instability. The dial is also resettable with a high degree of accuracy.

A Different Approach

After conducting preliminary experiments based on prior publications on the subject of permeability-tuned oscillators, 4,5,6,7 this writer decided to try an entirely fresh approach using a standard J. W. Miller slug-tuned coil form with an adjustable lead screw. A simple arrangement results. The wheel which supports the main dial scale couples directly to the tuning inductor lead screw and is secured by a knob-type setscrew. A

1/4-inch shaft, covered with vinyl tubing, rotates against this wheel, causing it to turn and effecting a 6:1 turn reduction for the tuning knob. The dial-scale drive wheel moves back and forth along the 1/4-inch shaft as it follows the in-and-out motion of the tuning core. Since the total in-and-out travel of the dial scale is only 3/32 inch, this movement is not easily perceptible during normal operation.

My associates have expressed skepticism over the simplicity of the frictiondrive system and seemed surprised that it doesn't slip. Actually, similar frictiondrive mechanisms are used in very prestigious, commercially marketed products, such as the Collins S/Line and Heath SB series.

VFO MPF102 2255-2505kHz 1N914≶_{100k} 1000 ⇒BUFFER GATE EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (UF) 1 OTHERS ARE IN PICOFARADS (pF OH דעע;); RESISTANCES ARE IN OHMS: k #1000 , M=1 000 000

^{*940} Diamond St., San Francisco, CA 94114 References appear on page 28.

The oscillator tank circuit was developed so that for each revolution of the tuning core (and also the dial scale), approximately 100 kHz is spanned. Since 2-1/2 revolutions of the dial are required to cover the 250-kHz range, a means of identifying the particular 100-kHz segment being tuned is provided. This function is performed by a small rubber wheel (phonograph idler wheel replacement) which rides atop the tuning-inductor lead screw, immediately behind the main dial. This small wheel turns only a few degrees for each complete revolution of the main dial because it is driven by the much smaller diameter lead screw. The black rubber wheel is calibrated and marked with white dry-transfer numerals such as those used for panel lettering. The position of the turns-counter dial is indicated by the edge of the main dial scale.

Winding the Coil

The tuning inductor consists of 28 turns of no. 36 enameled copper wire, close wound, occupying about 1/8 inch along the ceramic coil form. This size wire is rather delicate and must be handled carefully to avoid kinks which can cause aberrations in dial linearity. First, the brass mounting threads of the coil form are gently chucked into a hand drill which has been secured laterally in a vise. Then one end of the wire is soldered to the terminal nearest the mounting end. Now the coil form is slowly rotated in the drill as the wire is fed under light finger tension to achieve an even, close-spaced winding. Care should be exercised so the lead of the winding is perpendicular to the form. Any wobbling motion should not appear as the coil is rotated. Counting turns as the winding progresses is advisable. The finished coil is secured temporarily with cellophane tape as the remaining end is soldered. During final adjustment of the PTO, the cellophane tape is replaced with coil dope.

Modifying the Tuning Core

In order to obtain good dial linearity without using a variable-pitch inductor, this design includes a simple modification of the tuning core itself. After removing

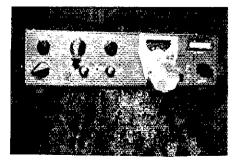


Fig. 2 — A precision-tuned VFO is located behind the faceplate of this neatly constructed device. Tuning is accomplished by a simple friction-drive mechanism.

the core from the form, the lead screw is wrapped thickly with vinyl electrical tape to protect the threads, then placed in the chuck of a high-speed drill. During this operation, one should provide some form of protection for the eyes and hands. In general, proceed with caution. As the core is rotated at high speed, use a file to grind the core to a shape which conforms approximately to the illustration of Fig. 6. Although the cores are sturdy and indeed seem almost to fight back during grinding, spare cores are recommended in case of breakage. The notched contour of the core spreads out the naturally more compressed area in the center of the tuning range. As a result, the central dial segments of tuning conform more closely to those at the extremes of the range,

Mechanical Construction and Alignment

Form a sturdy, adjustable, two-piece frame from 1/8-inch angle-aluminum stock. Elongated holes allow a wide range of adjustment to the friction-drive system. Bolt the 1/4-inch shaft, locked into the integral panel bushing, in place on the front section of the frame. Vinyl tubing is slipped over the shaft, followed by several 1/4-inch washers — the exact number of which is selected to allow the two parts of the frame to be joined and adjusted. The shaft should fit snugly but rotate freely.

Next, install the circuit board into the frame. The tuning coil is mounted loosely in the elongated hole, after which the dialscale wheel is attached to the lead screw. Now tighten the inductor mounting nut to lock the coil into position at the exact spot which allows the dial-scale wheel to engage the 1/4-inch shaft under tension. The tension should be just enough to take up the slack in the threads and to press the lead screw firmly against the stationary threads. This adjustment, executed properly, prevents backlash and assures good resettability of the dial. If the slug fits very tightly in the stationary threads, removal of the compression spring on the coil may be necessary before installing the dialscale wheel.

Finally, the turns-counter wheel is aligned so that the rubber edge becomes compressed slightly by the lead-screw threads. Since small changes in these adjustments result in large variations in tension, experimenting is necessary to produce the desired "feel" and smooth operation. Light grease should be used to lubricate the bearing points but the friction-drive surfaces must not be lubricated!

Dial Bezel and Pointer System

The faceplate, constructed from 1/8-inch scrap aluminum, serves not only to enhance the appearance of the dial presentation, but also functions as the support for the resettable pointer. To fashion the faceplate, a hacksaw, a coping

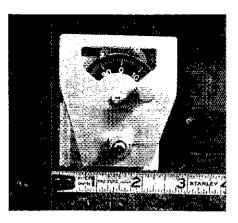


Fig. 3 — A closeup of the dial faceplate. The shaft for the tuning knob is at the bottom. A vernier knob is at the right, just beneath the

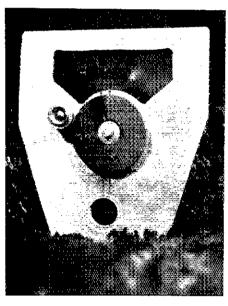


Fig. 4 — The dial pointer is mounted as shown.

saw and a drill were used. Another impromptu friction drive is used in the faceplate. It is inserted between the reset knob and the pointer, as may be seen in Fig. 4. A flat plumbing washer with a no. 6-32 nut pressed into the center hole of the washer is used to mount the thin, red-painted brass pointer.

As used by the author, the friction-drive shaft consists of a "captive bolt" with two circular nuts locked together on the bolt threads. Since these are not available readily, an ordinary bolt which fits the reset knob is suggested for the drive shaft. The hole for this bolt should be located so that the washer will be engaged by the bolt in a positive nonslip manner.

In order to reduce parallax errors in dial

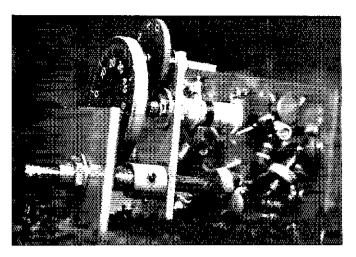


Fig. 5 — The inner construction of the precision-tuned VFO. Behind the large main tuning dial is the smaller counter dial. Beneath the dials is the sleeve with setscrews mentioned in the mechanical parts list. The manner in which L1 is mounted is clearly visible in the component area.

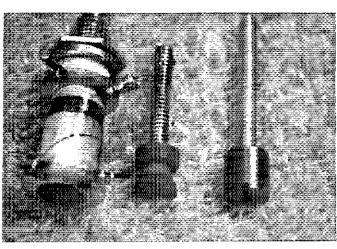


Fig. 6 — Coil assembly and slugs for the permeability-tuned VFO. Positioning of the coil on the Miller form is illustrated. Steps to be followed for winding the inductor and for modifying the tuning core, as shown above, are explained in the text.

reading, the pointer depth should measure 1/8 inch from front to back. The completed bezel/pointer assembly is mounted on the main 1/4-inch shaft bushing with an additional 3/8-inch nut.

The Circuit

A variation of a recent design by DeMaw* is used for the VFO circuit. This adaptation uses a parallel-resonant tank in a Colpitts configuration. Because of availability, a 5- to 20-pF trimmer capacitor was included, but a unit with a greater capacitance range would be preferable from the standpoint of easy initial adjustment.

Parts Procurement and Substitution

The I/4-inch shaft, complete with panel bushing is obtainable from large electronic parts distributors. A length of brass brazing rod, or even a common 1/4-inch bolt may be substituted, but for smooth tuning the panel bushing is highly recommended.

Visible in Fig. 3 is the turns-counter wheel. This is a replacement phonograph idler drive wheel. Such wheels are often found displayed as "hanging stock" at parts outlets serving the radio and TV repair trade. A flat, black plumbing washer with a no. 6-32 nut pressed into the center hole can be substituted, with some sacrifice in reliability of the counter dial. The plumbing washer is very well suited for use with the pointer drive mechanism.

Vinyl tubing for the main 1/4-inch shaft may be purchased from large hardware and home-handyman stores, but vinyl electrical tape is a very satisfactory substitute. Almost any truly round wheel with an accurately located center hole and some means of securing it tightly to the in-

ductor lead screw can serve as the main dial-scale wheel. The dial scale itself may be hand drawn or, for a more professional appearance, should be drafted at large scale, photographed, and printed at the desired smaller size.*

Development of Tuning Inductors for Other Frequencies

For other tuning ranges, the VFO is assembled and a coil is wound with even, close spacing. The number of turns applied should be that which could reasonably be expected to resonate at the desired frequency. Parallel capacitance and turns of wire are added or subtracted as necessary to produce resonance at the center of the tuning range with the tuning core located at the middle of the winding.

Then, with the inductor functioning in the VFO circuit, dial readings are recorded at 25-kHz intervals throughout the tuning range of the inductor. This is accomplished by using the PTO to tune the receiver while listening for the 25-kHz crystal-calibrator markers. The PTO output may also be monitored on a frequency counter. You'll observe that greater bandspread exists at the extremes of the tuning range than in the center. A relatively large number of 25-kHz segments may occupy approximately the same number of dial divisions (more than likely not the desired 25 divisions!). If, for example, a centrally located 25-kHz segment occupies about 47 dial divisions, the coil may need rewinding with smaller diameter wire. Alternatively, a smaller diameter coil form may be used. The goal is to wind a coil which provides

*The author has available a limited quantity of duplicate drive wheels and photographically reduced dial scales, both of which will be supplied by mail to interested amateurs, for \$6 postpaid in the continental U.S.

too little bandspread with perhaps 15 or 20 dial divisions occupied by a 25-kHz segment. Then the tuning core may be notched or otherwise reduced inside, in small steps, until the central segments occupy the desired 25 dial divisions.

The entire tuning range of an inductor must be investigated because the same frequency spectrum may appear more than once within the range of the slug adjustment. The degrees of bandspread in each case will be different.

Current design goals were accomplished as the result of very early experiments with "contouring" the tuning core. Additional attention has not yet been devoted to exploration of this area. Perhaps with the proper slug configuration at a higher frequency, 500-kHz linear coverage would be possible using these methods.

I hope information supplied here will inspire further experiments by other amateurs into the realm of precision permeability tuning and simple, friction-drive vernier mechanisms. The cost is low and the results can be very satisfying!

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The Flagpole Deluxe

If you've got to hide your antenna, make this flagpole do double duty as an efficient four-band vertical.

By Fred J. Schnell,* W6OZF

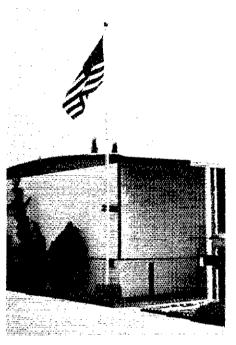
hen I moved into a mobile home park some eight years ago I was faced with an antenna problem. The manager of the park told me I could put up an antenna at night, but would have to take it down during the day and also "stay out" of the TV system. The TV problem did not bother me, but putting up an antenna at night and taking it down every day had no appeal. I first mounted a Swantenna mobile antenna on a 42-inch, chain-link fence and got along very well for several years. But I was always dreaming of something different, something with automatic band switching.

I decided to concentrate my efforts toward building a flagpole antenna, with no bulges like the trap verticals. It had to cover 40 through 10 meters and be able to fly a 4 × 6-foot flag. I had room for neither radials nor a large copper screen, so only a ground rod could be used — a compromise. Faced with these constraints, I proceeded with the design of my flagpole.

When finished the antenna is an aluminum tubing vertical with slim, home-built traps, covered by standard PVC pipe, and topped with a toilet-tank ball. The PVC pipe has nothing to do with the antenna itself; it is the flagpole. The base is small and simple, thus easily concealed by brickwork, rocks or flowers.

Problem Solving

A suitable ground system and skinny traps were two areas requiring some head scratching. I settled on a 10-foot (3.05 m) length of copper water pipe for the ground rod. Installation of this pipe was accomplished by soldering a hose fitting on one end of the pipe, connecting a garden hose to it, and turning the water on full force. You'll have to stand on a step ladder to do this but the method works beautifully. I have another ground rod under the mobile home, and the ground system consists of the two ground rods and also the "skin" of the home.

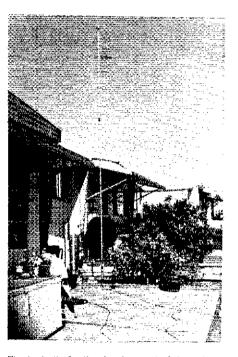


Would you believe this flagpole is really a fourband antenna, covering 40 through 10 meters? Sturdy enough to fly the flag in a stiff breeze, this trap vertical presents a good match to 50-ohm coaxial line.

After much experimenting I finally settled on putting the capacitors inside the trap forms; I selected capacitors which would keep the total height of the vertical under 19 feet. It topped out at 17 feet, 9-3/4 inches (5.43 m). The capacitors used are the Centralab 850S series doorknob transmitting type. I had used them before when I built a five-band dipole which has been described in *The ARRL Antenna Book*. The first traps were made of formica tubing reinforced with Lexan rod, but I recommend fiberglass rod for the added strength and lighter weight.

Learn to Be a Pack Rat

If you start from scratch, you will have to visit several stores in order to obtain all the materials. Try stores like Sears, Ward's and Penney's for miscellaneous items, then hardware, metal, building and lumber companies. The aluminum tubing is 6061-T6 or equivalent, 0.058-inch wall thickness. The T- and U-bar stock is con-



The test site for the development of the antenna was the "backyard." Upon completion the antenna was moved to its permanent location and "camouflage" was added to conceal the base, shown at left.

struction aluminum pieces and is available from most metal supply companies.

Auto supply and discount stores are excellent sources for U bolts and clamps. The I-1/4-inch conduit may be purchased from an electrician, but since you will only need 2 feet of this he will probably give you that much from his scrap heap. Assemble all the materials before you start since nothing is more exasperating than beginning a project and then not being able to readily get all the parts. Table 1 is a complete list of the necessary parts.

Getting Started --Preliminary Construction

Fig. 1 shows details of the base mounting assembly. Drill and countersink a hole to accommodate a no. 8-32 × 9/16 flat-head screw. Drill and tap the insulator block and mount it inside the U channel. Drill eight 3/8-in. (10 mm) holes in the T bar as shown; the 2-in. U bolts will straddle the U channel. Assemble the U and T

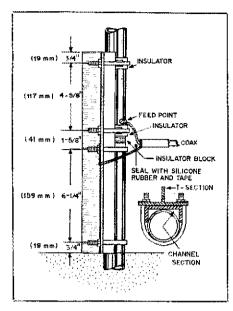


Fig. 1 — U- and Γ -bar stock details for the base assembly.

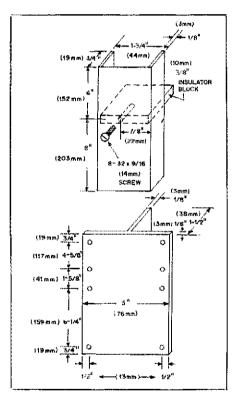


Fig. 2 — Construction details of the T bar and U channel for the base mounting assembly.

bars per Fig. 2, leaving the U bolts loose. Fit the insulator sleeves on the 36-in. length of 1-1/8-in., 0.125-in. wall tubing (Fig. 2). These insulators should fit snugly and the U bolts which clamp them to the base assembly will hold them tight. Drill and tap the tubing for a no. 10 screw, 1/4 in. (6 mm) above the top insulator; this will be the feed point.

Preliminary Construction — Traps

Refer to Fig. 3. Cut one 7-1/2-in. (191-mm) and two 8-in. (203-mm) lengths

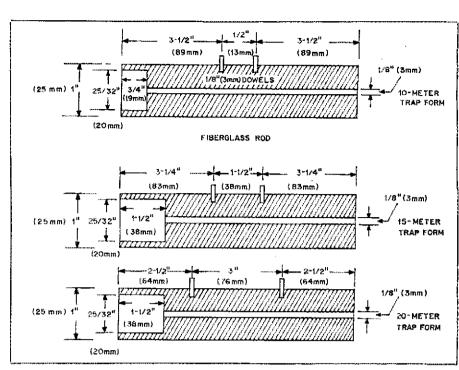


Fig. 3 — Cross-sectional views of the three traps.

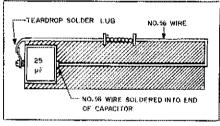


Fig. 4 - 10-meter trap winding detail.

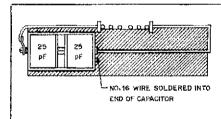


Fig. 5 — 15- and 20-meter trap winding details.

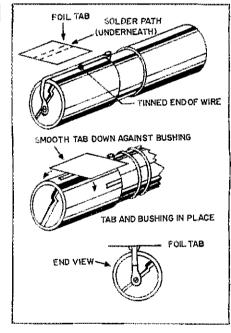


Fig. 6 — Further details of trap construction, showing the foil tab and bushings.

of 1-in. fiberglass rod, and through all three pieces drill a 1/8-in. (3-mm) hole lengthwise. In one end of the 7-1/2 in, rod, drill a 3/4-in. (19-mm) hole 3/4 in, deep. In the other two pieces, drill a hole in one end 1-1/2 in. (38 mm) deep. I used masonry drill bits for these holes.

In the 7-1/2-in, rod, drill two 1/8-in, holes (3/16 in, deep) for pegs, as indicated in Fig. 3. Insert 1/8-in, pegs in these holes. These pegs will be used to hold the windings in place.

Referring to Fig. 4, wind the 10-meter

trap. Begin by soldering one end of a suitable length of no. 16 wire (Formvar or Thermaleze) to one end of a 25-pF capacitor. Push the wire through the rod from the large hole end and push the capacitor all the way in, then pull the wire snugly over the end of the rod to the nearest peg and wind five turns, close spaced. Coming off the next peg, dress the wire to the capacitor and solder to it by means of a no. 6 solder lug. This completes assembly of the 10-meter trap.

Following the same procedure, wind the

15- and 20-meter traps. Note that these traps are space wound and that the last turn is spaced a little more than the others; Figs. 4 and 5 illustrate. The 15-meter trap has 13 turns spaced to a length of 1-3/8 in. (35 mm) and the 20-meter trap has 23 turns spaced to a length of 2-3/8 in. (60 mm), with the last turn of each spaced slightly more than the rest. This aids in later tuning of the traps.

Referring to Fig. 5, scrape the enamel off both ends of each winding from the pegs to the ends of the fiberglass rods, and carefully tin each one with a hot soldering iron. Cut six foil tabs, each $3/4 \times 1-1/2$ in. (19 \times 38 mm) and run a solder-path lengthwise along each tab, on one side only. Now solder these tabs onto the previously tinned wires (Fig. 5).

Cut six lengths of the 1-1/8-in. tubing, each six in. (152 mm) long. In one end only of two of the tubes cut a slot 3-1/2 in. (89 mm) long, using two hacksaw blades together in the hacksaw (Fig. 7). This will make a slot about 1/8 in. wide. On the other four tubes, make this slot 3 in. (76 mm) long. Remove one hacksaw blade and cut three more slots in the same end as the wide slot, spacing them 90 degrees apart. Clean and deburr all cuts. These slots permit tight compression when the hose clamps are applied.

Carefully push these bushings (the slotted tubes) into place on the trap forms, up against the pegs; the longest slotted bushings go onto the 10-meter trap. Then gently press the foil tabs down against the tubing. The bushings must be in place for the following operation (Fig. 8).

The traps should be grid dipped and adjusted for resonance at the following frequencies: 28.0 MHz, 20.5 MHz and 14.0 MHz. Do not couple too tightly to the traps as the grid dipper can be "pulled," resulting in erroneous readings. Adjust the traps by carefully spreading or compressing the last turn on each trap.

Construction of Adjustable Sections

Refer to Fig. 9 and cut the 12-foot (3.66-m) length of 1-1/4-in. tubing into four lengths, as follows: 5 ft, 6 in. (1.68 m); 1 ft, 9 in. (0.53 m);* 2 ft, 10-1/2 in. (0.88 m);* 1 ft, 10-1/2 in. (0.57 m). The starred (*) items may be cut in half and a bushing inserted to permit adjustment of the 15- and 20-meter bands (Fig. 8). If you choose this method, four more hose clamps will be required.

The tubes just cut are all slotted and deburred on both ends, inside and out. If this deburring is not done the aluminum may sieze or gall and it then becomes difficult (if not impossible) to separate or adjust. A stainless-steel hose clamp is placed over each slotted end of each tube.

Cut and deburr a 6-foot (1.8 m) length of the 1-1/8-inch tubing and insert the 1-inch piece of round aluminum rod, which should be drilled and tapped for 1/4-20 thread all the way through. Secure

this in the end of the tubing by drilling two no. 36 holes and tapping for 6-32 screws

Putting It Together

Fig. 9 provides an overall picture of assembly of the vertical. Nothing is critical except that care must be exercised when attaching the traps to the 1-1/4-inch tubing sections. Start by spreading *one* of the slots in the tubing ends to expand the diameter slightly. The foil on each trap must be started smoothly between the trap bushing and the tubing sections. This is made easier by carefully pushing the foil tightly against the bushing before sliding the bushing onto the trap itself.

Start by sliding the 21-inch, 15-meter tubing section onto the capacitor end of the 10-meter trap, up against the peg, and tighten the hose clamp securely. In the same manner, clamp the 34-1/2-inch, 20-meter section onto the capacitor end of the 20-meter trap. Tighten all clamps securely, then slide the 15- and 20-meter sections onto the bottoms of their respective traps. See Fig. 9. Next, clamp the 6-foot length of 1-1/4-inch tubing to the bottom of the 10-meter trap, the 36-inch

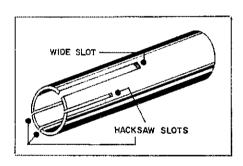
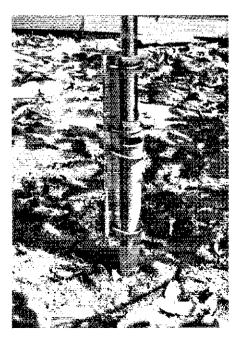


Fig. 7 — Method of slotting the tubing for use as bushings.



Complete base-mounting assembly in place.

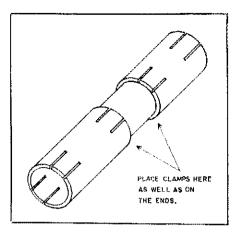


Fig. 8 — Bushings mounted in place on the 20-meter trap.

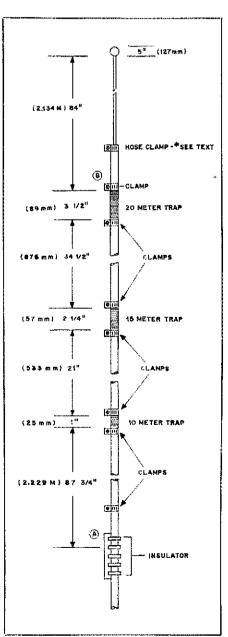


Fig. 9 — The complete Flagpole Deluxe vertical.

Table 1

- 1 Insulator block, 1 × 1-1/2 × 3/8" (25 × 38 × 10 mm) (formica, Plexiglas, plastic, etc.).
- Length aluminum tubing, 1-1/4 \times 0.058 \times 144" (3.66 m) 6061-T5.
- 1 Length alumimum tubing 1-1/8 \times 0.058 \times 144" (3.66 m) 6061-T5.
- 1 Length aluminum tubing 1-1/8 x 0.125 x 36" (914 mm) 6061-T5.
- 1 Piece of aluminum rod 1 × 1" (round).
- 1 Fiberglass round rod 1 × 24" (25 × 305 mm).
- 4 -- 2" U bolts.
- 5 25-pF Centralab transmitting capacitors, 850S series.
- 1 Piece of construction aluminum channel stock, $3/4 \times 1.3/4 \times 14''$ (19 \times 44 \times 356 mm), 1/8'' wall thickness.
- 1 Piece of construction aluminum T-bar stock, 3 x 1-1/2 x 14" (76 x 38 x 356 mm), 1/8" wall thickness.
- 8 1-1/4" hose clamps.
- 1 2-foot length (0.61 m) 1-1/4" EMT conduit.
- 1 3-foot length (0.91 m) 1-1/4" EMT conduit.
- 1 12-foot length (3.66 m) of 2" PVC schedule

- 40 water pipe.
- 1 2"- to- 2"PVC coupling. 1 — 1-1/2" PVC cap.
- 1 12-foot length (3.66 m) of 1-1/2" PVC schedule 40 water pipe.
- 1 PVC reducer, 2" to 1-1/2".
- 1 Tank ball or Eagle 5".
- 1 10-foot length (3 m) copper water pipe (for ground, if required).
- 1 Piece of copper or brass foil, 0.005 x 1 x 12" (0.13 x 25 x 305 mm); this may be salvaged from an old transformer or shim stock, or may be purchased from auto supply or metal suppliers.
- 2 Insulating sleeves made from plastic tubing 1-1/8" inside diameter, 1/2" wall thickness. These can be made from two PVC 1-1/4-to-3/4"bushings. These are obtainable wherever PVC pipe is sold. The bushings will have to be reamed very slightly to have a press fit over the 1-1/8 x 0.125" aluminum tubing. Either file or turn the flange off on a lathe.

above the concrete. Mount the antenna assembly on this conduit (Fig. 1), and connect a ground strap from the ground rod to the base assembly.

Once everything is in place and tightened, grid dip to determine the resonant frequencies of the vertical on each band. When making adjustments, remember that any change made on one band affects all lower frequency bands. Adjust the 10-meter section first, and measure the SWR by attaching the coax and applying very low power to the antenna through an appropriate SWR indicator. Continue with the other bands; very little trimming or adding should be required. If adding length is necessary, the alternate method described earlier of cutting a section of tubing in half and adding a sleeve is recommended.

After the 40-meter section is adjusted, remove the hose clamp and secure the tubing with four no. 6 sheet-metal screws. This is necessary because the 1-1/2-inch PVC pipe will not clear the hose clamp.

After all adjustments have been made, SWR should not exceed 2:1 at any band edge.

Camouflaging

The time has come to turn the vertical into a flagpole, or vice versa. Lay the entire antenna (including the base mounting assembly) flat on the ground, with the 2-inch PVC alongside it. Carefully measure the distance from the top of the base assembly (Point A, Fig. 9) to the top of the 20-meter trap (Point B) and cut the PVC to length. Install the 2-inch to 1-1/2-inch reducer assembly with PVC cement. Next measure the distance from the ridge inside the reducer to the top of the tubing of the 40-meter section; make sure you have the end of the 2-inch PVC even with the top of the base assembly. Cut the 1-1/2-inch PVC to length and cement it into the reducer.

Drill a hole in the PVC cap to clear the 1/4-20 stud in the end of the 40-meter section. Remove the base assembly and slide the antenna through the PVC pipe until the stud comes out the top; slip the cap onto the stud and screw the top ball on tight. Then slide the antenna back until the cap slides all the way on in place on the end of the 1-1/2-inch PVC. Do not cement the cap in place. One word of caution — make certain all clamps are tight before sliding the antenna back and forth in the PVC, to prevent any change in dimensions. The end of the 2-inch PVC should now be even with the base mounting assembly when the antenna is reattached.

This completes construction of the Flagpole Deluxe. The author uses a small pulley and rope for flying a flag from his vertical, and comments from neighbors indicate full approval of the obviously handsome flagpole. Results radio-wise have been rewarding, and it is not even necessary to stop operating when it rains! Finally, the author gratefully acknowledges the assistance of George Rice, W6OGR, in the preparation of this article.

length of 1-1/8-inch tubing into the last tubing just installed and adjust the total length to 87-3/4 inches (2.23 m) from the 10-meter trap to the end of the tubing.

Install the ball on the end of the 6-foot length of 1-1/8-inch tubing, which has the aluminum plug in it, using a 2-inch length of 1/4-20 threaded stock. This can be cut from a 1/4-20 bolt, Install this section of tubing into the end of the tubing on the 20-meter trap and adjust to the dimension shown in Fig. 9. Recheck all clamps for tightness at this time.

Testing and Adjustment

If your situation is like the author's, you will be forced to test and tune the antenna somewhere other than its eventual "camouflaged" location. Do your tuning in the final position if it is at all possible, since the effects of surrounding objects can undo an entire afternoon's work. Set the 3-foot length of 1-1/4-inch EMT conduit in concrete next to your ground rod, leaving 7-3/4 inch (197 mm)

Strays 🛷

QST congratulates . . .

☐ the South Eastern Massachusetts Amateur Radio Association, W1AEC/WR1ADR, for being awarded the "Outstanding Service Award" by the National Foundation for the March of Dimes. The amateurs provided communications support during walk-a-thons in New Bedford and Westport.

☐ Benjamin Frank Borsody, K4EC, whose biography appears in the latest edi-

tions of Who's Who in America and Who's Who in the World. He has also been admitted as a senior member in the Florida Engineering Society, a component of the National Society of Professional Engineers.

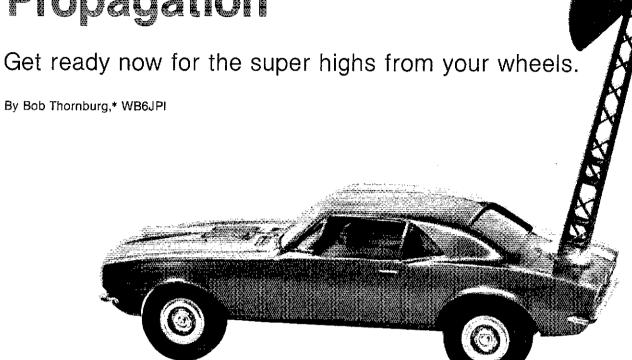
A PROSPECTIVE HAM NAMED JASON

LI One prospective amateur in Arkansas is a bit more determined than most others. But then again he has to be. Jason White, a seven-year-old from Texarkana, AR, was born with a rare disease that prevents him from digesting food. He has been

critically ill many times but has always managed to struggle back. Still, he requires treatment at the Texas Children's Hospital in Houston.

Among those helping to offset the staggering medical debts is the southern section of the Country Cousins Net. Also, they gave him a receiver so he can listen to hams, a pastime he enjoys a great deal. Besides continuing to give of themselves as a group project, they are asking other amateurs to make contributions to the Jason White Trust Fund, P. O. Box 1998, c/o The Commercial National Bank, Texarkana, AR 75502, Attention: Mr. Mike Sanders. — W4YWP

Microwave Mobile Propagation



s 2 meters filled up in your area? Are 220 and 420 looking like they aren't far behind? Amateurs in many parts of the country can answer these questions in the affirmative and can envision amateur mobile work in the microwave region of the spectrum as more than just idle dreaming in the next decade or so.

Routine amateur work above 420 MHz becomes more of a possibility every day; Microwave Associates (and others) now offer commercial gear for the microwaves at reasonable cost and in configurations usable by amateurs. Experimentation in Europe has shown astonishing DX possibilities even at 10,000 MHz (10 GHz). Repeaters and remotes are using microwaves for point-to-point auxiliary links. This article will examine some of the propagation quirks in the 1200-MHz region in particular and the possible effects of those quirks on amateur mobile work.

Mobile Flutter

This parameter has a number of names, including short-term fading, multipath loss, and mobile flutter. At vhf and uhf this characteristic produces a slight modulation at a few cycles per second on weak signals. Throughout this article we will assume an fm mode of communica-

tion with good limiters in the receiver. This mobile flutter modulation is, for the most part, an amplitude modulation of the received signal caused by the vector addition of signals arriving at the antenna from a number of different paths. The process is stationary in the short term (not changing with time), but is very spatially sensitive, changing with movement. In general, it will change significantly for distances on the order of one-half wavelength.

The resulting "frequency" of the flutter is therefore directly proportional to the carrier frequency. In fact, there is a relationship between this multipath phenomenon and Doppler shift, at least in that they are in the same frequency range. Because of the angle of arrival and the multitude of paths involved, the flutter frequency will be higher than the equivalent Doppler, but usually by less than a factor of two. For example, measurements indicate that for 1200 MHz and a speed of 55 mi./h the flutter rate will be about 100 Hz average. Instead of a flip-flip-flip type of flutter common on 2 meters or a ch-ch-ch common on 420, the 1200-MHz flutter will be a buzz, and at 10,000 MHz a whine. At 1200 MHz this frequency is in the domain of CTSS (Continuous Tone Squelch System) and PL (Private Line) circuits and will undoubtedly wreak havoc on them.

The amplitude of mobile flutter is not greater at higher frequencies (uhf), but is

about the same as at 420. As mentioned, flutter arises from alternating enforcement and cancellation caused by signals from a number of different paths. These paths result from energy reflecting off objects in the propagation path. Since most objects in the real world are large compared to a 420-MHz wavelength, they are also large compared to a 1200-MHz wavelength. The probability that all those reflections are exactly the correct amplitude and phase to cancel, say, 20 or 30 dB is very small, so the flutter is mostly a 10- to 15-dB problem and signal strengths sufficient to cause limiting of this level will remove the amplitude flutter from fm receiving systems.

Another related problem is called phase distortion. This phenomenon is caused by the reflections having sufficiently different path lengths to actually have different modulations at any given time. This requires the reflection points to have path lengths that are different by a number of miles. This phenomenon seems to dissipate as the frequency becomes higher, being most noticeable on 2 meters and relatively rare on 420 MHz. It is not a problem on the microwave frequencies.

Note that mobile flutter is most annoying at 2 meters because it occurs at about the syllabic rate of speech. The fades remove syllables of words. At 420 MHz the flutter frequency is higher and is just another noise and does not bother intelligibility as much as it does at 2 meters.

^{*}Thorntech, Inc., 13135 Ventura Blvd., Suite 206, Studio City, CA 91614

The rate is higher than syllables but lower than voice-pitch components. At 1200 MHz the flutter is near the voice pitch and will give distortions like poorly tuned ssb but will not affect intelligibility as much as at 2 meters. At 10,000 MHz the flutter will once again appear as being noise.

In summary, mobile flutter is not a unique or serious problem with microwave mobile operation but it is different. For those interested in playing with quasi-stationary random-variable mathematics, there are some good realistic models developed for evaluating microwave mobile path phenomena. 1,2,4,4

Signal Strength

The previous section discussed the short-term fading problem but did not address the average signal strength or coverage one could expect from a transmitter. Several factors play a part bera

the general rumor microwaves only propagate over a line-ofsight path is bunk. The stuff goes everywhere, or at least places that are not anywhere near line-of-sight. As the frequency increases, the number of obstacles that are large compared to the wavelength increases and more things in the real world become reflectors. For 10 meters, mountains are significant; for 2 meters, buildings get in the way; at 420, objects the size of cars are reflectors, and at 10,000 MHz (wavelength about one inch) almost everything is a reflector. If an object is reflecting energy, it will make an equivalent shadow behind the object. This makes radar work and also gives rise to the rumor that microwaves only go where light would go (line of sight).

But what of these reflections? They act as little transmitters, scattering the microwave energy back in all directions (diffuse reflection) to be once again reflected off some other object. Most every real object has "roughness" on the order of a quarter wavelength, so the reflection is not specular (like a mirror), but is diffuse (like a wall painted white) and radiates over the exposed hemisphere where it can encounter another object and repeat the process. So the microwave energy "bounces" around and conceivably can go anywhere.

However, each time microwave energy is reflected it loses energy. Some is absorbed by the reflector, and since it is reradiated over a hemisphere, some is lost by going in unwanted directions. Finally, there is also a propagation phenomenon known as the "knife edge" effect. This effect, operating by diffraction, causes the rf power to "bend" over an obstacle, and may enhance signals in an area where you'd expect a shadow.

The propagation characteristics described are very difficult to analyze and model, but numerous measurements have been made indicating that hope is with

us. 1,4,6 The measurements show that, for antennas that have very low elevation, the loss in the city is very high (70 dB below line of sight) and not much better in suburban areas (50 dB). This will preclude mobile-to-mobile direct communication using microwaves over more than a mile or so. For repeater operation things pick up considerably. If the repeater (or base station) is located at 600-1200 feet above the mobile, the excess loss (above line-ofsight loss) is only 30-40 dB at 1200 MHz. At 10,000 MHz, for urban ranges out to 20-30 miles, the excess loss is 40-50 dB, and is 10-20 dB better for suburban areas. This is usable.

Another interesting phenomenon has been observed in New York City: Signals at 11.2 GHz arriving parallel to the direction of the street are 10 to 20 dB higher than waves arriving at other angles. Luckily, NYC is nearly all streets!

The effect of rain on microwave signals must also be considered. At 1200 MHz the effect is negligible but at 10,000 MHz you can forget communicating if it's really pouring. The rain loss at 10 GHz in a good downpour can reach 5 dB per mile. A slight sprinkle, however, is only about 0.01 dB per mile.

Getting Down to Some Real Numbers

Let's now consider an example. A repeater, located at 600-feet elevation on a mountain with an antenna gain of 10 dB, is receiving a mobile transmitter with 10 watts effective radiated power. We will calculate at both 1200 MHz and 10,000 MHz. The power density, PDR, at the receiver is given as (free-space line of sight)

$$P_{DR} = \frac{P_T}{4\pi R^2}$$
(Eq.1)

where P_T is the erp of the transmitter and R is the separation of the transmitter and receiver.

The received power PR is given as

$$P_{R} = P_{DR} \cdot A_{R}$$
 (Eq.2)

where A_R is the effective area of the receiving antenna given by

$$A_{R} = \frac{-G\lambda^{2}}{4}$$
 (Eq. 3)

where G is the gain and λ is the wavelength. Combining these equations along with a loss factor, K, accounting for the urban loss and solving for the range, R

$$R = \frac{\lambda}{4\pi} \quad \sqrt{\frac{P_T G K}{P_R}}$$

(Eq.4)

For the preceding example,

$$\lambda_{1200} = 0.82 \text{ ft}$$
 $\lambda_{10Q} = 0.098 \text{ ft}$
 $P_T = 10 \text{ watts}$
 $G = 10$
 $K_{1200} = 0.001$
 $K_{10Q} = 0.0001$

 $P_R = 10^{-15}$ watt (-120-dBm or 50-kHz noise bandwidth, 10-dB noise figure).

The range for 1200 MHz is 124 miles and for 10,000 MHz is 4.7 miles in an urban environment. In suburban terrain the range for 1200 MHz would be limited by curvature to about 200 miles and at 10,000 MHz one could expect 50 miles.

Antenna Considerations

Note that the effective area of the receive antenna (in Eq. 3) is directly related to the square of the wavelength. Well, the 10-GHz wavelength is very small. A quarter-wave stub is about a quarter inch long. A 10-dB-gain antenna with 360-degree coverage is quite small physically and its effective area is also quite small. If the size (gain) is made larger, the angular coverage will become smaller and the number of multipath directions that will be accepted will reduce. This will cause more flutter problems. The best approach is to keep the antenna gains at 10 dB or less and increase the height.

For the base or repeater antenna a change from 300 feet to 3000 feet will improve the signal by over 20 dB. Even more drastic improvements are possible by raising the mobile antenna. Moving the antenna from rooftop (five feet) to 13 feet improves the signal by 6 dB. As the antenna is quite small, it is practical to mount it on the end of a pole.

in conclusion, it may be stated that short-range mobile two-way communication using microwave frequencies is practical. This is true for the entire 1- to 10-GHz range, for base- or repeater-to-mobile fm voice communications in urban and suburban areas. As the lower amateur bands become more and more congested in urban areas the appeal of microwaves is bound to increase.

Footnotes

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Technical Correspondence

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

VARIABLE-BANDWIDTH FILTERS -- IRISH STYLE

17 I read with interest W9QQ's September 1977 QST article on a variable-bandwidth filter. Incorporation of this facility in an existing piece of equipment is undoubtedly a fine piece of work, but I was disappointed to find little information regarding the minimum bandwidth he achieved. He does state, "When receiving cw, the bandwidth can be made so orarrow that ringing will be severe enough to obliterate intelligibility." I would like to suggest that such ringing may not be caused by exceptionally narrow bandwidth, but perhaps by some other fault (which I cannot discern).

My remarks here are based on personal experience with a variable-bandwidth system similar in operation to Hulick's in which a minimum bandwidth of 240 Hz is obtained. The absence of ringing, particularly on impulse noise, is remarkable. Several people on listening to signals in this bandwidth were skeptical that it was so narrow due to the lack of ringing and hollow sound one associates with conventional 250-Hz crystal filters.

For the following calculations I do not have the exact figures for the 2.1-kHz filter response of the SB-303, but I believe that the figures of 2.1 kHz at -6 dB and 6 kHz at -60 dB are not wide of the mark. The Collins filter used by W9QQ, although not positively identified, probably has a -60-dB bandwidth of 4.2 kHz (as used in the Collins 75S-1). The skirt attenuation factor of each filter is obtained by subtracting the 6-dB bandwidth from the 60-dB

Table 1
Results of Combining Passband Filters

Nominal Bandwidth (~6 dB 'Hz) (Hz)	−60 dB (Hz)	insertion Loss (dB)
250	240	960	-6
250	270	1004	-3
500	500	1260	+2
1500	1500	2220	0
2100	2140	2776	0

handwidth, dividing that answer by two and then by 54. The resulting factor is Hz per dB for each skirt. The assumption is made that skirt attenuation is constant. It's then a simple matter to predict the response resulting from the overlapping of two similar passbands. Around the nose of the passband, predicted results tend to be optimistic. In practice the transition from skirt to passband of each filter is rounded, and the two passbands may have to be offset from each other considerably to achieve the narrowest 6-dB bandwidth theoretically attainable. Using the two filters above and by tolerating high "insertion loss," a 6-dB bandwidth of about 325 Hz should be obtained. The 60-dB bandwidth will be approximately 2.9 kHz. That's not exactly a sharp filter. By using better filters and additional crystals, I obtained the results set out in Table 1.

Insertion loss is that measured relative to response midband in the 2.1-kHz bandwidth.

Those who judge filters by shape factor will observe that the 2.1-kHz position has a 100-dB bandwidth of 3.5 kHz. A more meaningful view of filter effectiveness is obtained by observing the skirt attenuation factor or by simply quoting the frequency difference, in Hz, between the 6- and 60-dB-down points on the skirt. For the 2140-Hz filter in the table, this figure is 300 Hz, while for all other bandwidths selected it is 360 Hz.

The filters used were a KVG XF9-B and a YTK 107-2.4, the latter being Japanese made with a center frequency of 10.7 MHz. To obtain the very steep skirts two crystals per filter were shunted across the filter input and output and tuned to series resonance on the hf skirt of each filter. Additionally, part of the source resistance at each filter input was bypassed by another crystal tuned to series resonance around the hf shoulder of the filter passband to sharpen up the shoulder. This procedure accounts for the 500-Hz position, having an insertion "loss" of +2 dB, and it also materially assists in reducing relative insertion loss at the very narrow bandwidths. Fig. 1 shows how the variable bandwidth filter is incorporated into the front end of the complete receiver here. The receiver is part of a comprehensive hf-bands transceiver presently under development. Extensive listening tests confirm that the expense and trouble involved are worthwhile: it's a remarkably inexpensive way of having four or more (or indeed any number of) filters available to cope with today's crowded band conditions. - C. P. Clarke, EI3CP, 16 the Grove, Woodpark, Ballinteer, Dublin 16, Ireland

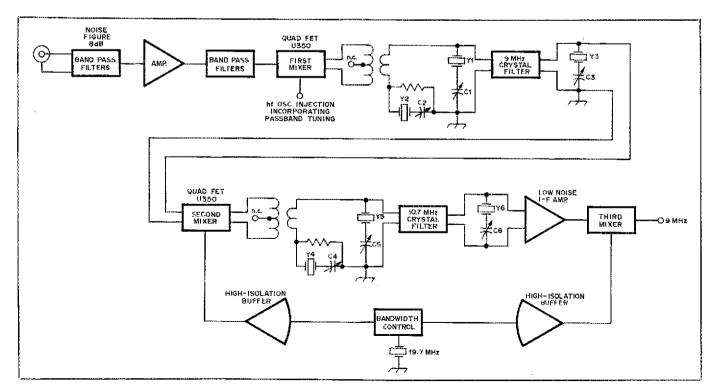


Fig. 1 — EI3CP's experimental receiver setup.

Table 1
Standard Frequency and Time Stations, LF and VLF

Station	Frequency kHz	Output Power (kW)	Radiated Power (kW)	Antenna Efficiency (%)
GBR, Rugby, U.K.	16.0	300	40	13
NAA, Cutler, ME	17.8	2000	1000	50
NBA, Canal Zone	24.0	300	30	10
NPG/NLK, Jim Creek, WA	18.6	1200	250	21
NPM, Lualualei, HI	2 6 .1	1000	100	10
NSS, Annapolis, MD	21.4	1000	100	10
WWVB, Ft. Collins, CO	60.0	30	9	30
(Source: ITT Radio Handbook, Fifth Edition)				

LOWFERS — LOW-FREQUENCY EXPERIMENTERS

Here are some excerpts from LOWFERS, a builetin I recently sent to If buffs around New England. Through the month of September, 1977, I ran a beacon on weekends on 186 kHz. I called it beacon "B" as a propagation experiment, to increase If interest in New England, and notified all LWCA (Long Wave Club of America) members within a 130-mile radius. Best DX reported was 38 miles, and 1 uncovered four If-equipped stations! My conclusion was that a 50-foot antenna (such as I am using) is not a serious handicap, and routinely working several hundred miles is a reasonable expectation. This fall and winter I am planning equipment and antenna improvements, and perhaps some experiments below 10 kHz. The accompanying table gives us some idea of what the "professionals" do with short antennas (and quite a bit of power).

Beacons

We all use If aircraft-beacon stations to check band conditions and requipment, but know little about them. So perhaps a description is in order. Their standard antenna system is a 30- to 60-foot vertical wire, and a 250-foot flat top for loading. The ground systems consist of 12 radials in an elliptical pattern, about 100 by 250 feet. Where coupling to power lines is a problem, and for new installations, instrument-landing systems (ILS) use a 30-foot vertical with a distributed winding and top loading. The ground system is 12 50-foot radials.

Beacons used as ILS outer markers are usually 15-watts output, to give a 15-mileradius aircraft range. Some are 25-watts output for 25 miles. In mountains, where attenuation is higher, 50 watts is the norm, while a few beacons are 2 kW for 75 miles (such as TUK at 194 kHz on Nantucket Island, MA). Canadian beacons are 400-watts to 2-kW output.

Carrier-Current Signals

Those pesky unmodulated carriers now stand revealed: They are radiated by power company "carrier current" equipment. The power companies feed rf into their high-voltage lines to actuate receivers connected at the other end. Frequencies used are from 30 kHz to 300 kHz, and most seem to have migrated to 160-190 kHz to escape high-power, If RTTY stations. Power levels are mostly from 1 to 20 watts, occasionally as high as 100. Modes used are fm, ssb, fsk and keyed carrier for relaying and telemetering.

Equipment for these power companies' circuits is coupled to the high-voltage lines via capacitors. Traps are used at transformers, as they present a low impedance to ground for rf. Receivers are typically very narrow band (about 200 Hz) and, due to the noise environment, receiver sensitivity is usually measured in volts. Maximum sensitivity is 5000 microvolts!

The commonly heard carriers are a "guard" channel, which shows the circuit is live and presumably working. When something is supposed to happen the signal will shift frequency about 100 Hz and may increase power from 1 to 10 watts. Considering their receiver characteristics there is little chance of interfering with these carrier-current systems. Anyway, the power companies have been using them for the last 50 years without benefit of FCC authority or regulation and theoretically they have no legal standing.

Light Dimmers

Finally, consider light-dimmer interference. Such dimmers fill the 1800-meter band with synchronous hash during the evening hours, rendering it useless. This would be a joke if FCC made the band a new broadcast band. Dimmers come under Part 15 of the FCC rules and regulations as incidental radiation devices. It allows 100 mV of rf on the power line from 450 kHz to 9 MHz, and more at higher frequencies. There are no restrictions at lower frequencies. The only quiet dimmer is the "Lutron." — Richard G. Brunner, WIATO, 10 Brookside Dr., Foxboro, MA 02035

SOLDERING ALUMINUM?

[3] By a strange coincidence my reading this evening encompassed two articles on the soldering of aluminum. One was in a 1902 issue of *Model Engineer* and the other was W1FB's item on Alu-Sol 45D (QST for October, 1977). Only the 1902 item emphasized the real problem in soldering aluminum. There are dozens of ways of getting a good, initial bond; some simple, some complex, but no inventor has solved the corrosion problem that causes failure of the bond. W1FB hints at this in the last sentence of his first paragraph, but neglects it in the remainder of the article.

As was explained in the 1902 article, aluminum is an extremely active metal, and were it not for a self-repairing, protective oxide coating, the metal and its alloys could not be used for any commercial purpose. When aluminum is bonded to a metal or alloy (a solder) of considerably lesser activity, the protective oxide film either cannot form or is imperfect. The aluminum, therefore, becomes

strongly anodic to the solder and is converted at the interface to corrosion products having little or no strength, and the bond fails. This may take a few hours, weeks or months, depending on the system and environment, but you can be sure that failure will occur sooner or later. There may be little or no visual evidence of the corrosion because it is confined to the very narrow zone that comprises the interface.

Obviously, someone should invent a solder whose activity is the same or nearly the same as that of aluminum and its commercial alloys. So far no one has done this. (The composition of Alu-Sol 45D makes it evident that it is strongly cathodic to aluminum and that it will fare no better than its myriad of predecessors.)

As is evident from the preceding remarks, there is no point in working on fluxes (there are plenty of good ones available); the culprit is the solder. I don't envy anyone the task of finding an alloy that will meet the chemical and electrochemical requirements as well as those for a solder.

Perhaps QST readers should be alerted to the probability of bond failure for Alu-Sol 45D, or the manufacturers should be asked to provide evidence that their solder bond is permanent in the environments likely to be encountered in electronics service. — Harold J. Read, Professor Emeritus of Metallurgy, Pennsylvania State University; P. O. Box 5085, Grove City, FL 33533

HW-8 ITEMS

☐ Interest in my July 1977 OST article, "Full Break-In and RIT for the HW-8," inspired me to relay a few more notes on this popular little Heathkit rig. A common complaint with both the HW-7 and HW-8 is ac hum when using a commercial main's power supply instead of a battery. This hum was easily eliminated from both the Heath HWA-7-1 supply and a Cairad supply. The method is to open up whatever supply you have and try connecting a 0.005-µF disk capacitor from chassis to various transformer and rectifier terminals. Usually a cure results with the capacitor from either primary connection to chassis. Connecting the capacitor to a secondary terminal and chassis is preferable, but two capacitors connected to different rectifier or secondary terminals may be needed for a permanent cure.

Keep in mind that ac is very hard on a capacitor and so is heat. A 150-V dc rating is sufficient for capacitors connected to the secondary side of a 13-V supply, but at least a 1000-V dc rated capacitor must be used where connection is made to 120-V ac. Double that rating is needed if the supply is ever to be fed by 240 V ac, although high-quality capacitors rated at 1.4 kV are commonly used in commercial gear to bypass 120- and 240-V ac lines to the chassis. A capacitor should not be mounted above a power transformer nor too close to any component that generates heat. If the capacitor itself heats up in use, it is not suitable and should be immediately replaced by a better one. The primary circuit is only to be connected to an outlet properly protected by a fuse or circuit breaker.

Finally, the QRT-262 varactor diode specified in the article is, with other "Q" numbered parts, an item from the Sprague Q-Line. Many stores stock these items, along with the following suitable replacements: D201, GE90, HEPR2503, RT-262, SK3126 and ZEN453. — Ben Saylor, K6TG, Box 2314, Modesto, CA 95351

Product Review

The Dentron MLA-2500 Amplifier

It was a crisp day in the fall of 1976 when Dennis Had and his top engineer, both of Dentron Radio Co., stopped in at Headquarters for a combination business/pleasure visit. Three well-wrapped shipping cartons accompanied them. One contained a Dentron 160-10L SuperAmp which was in for testing. The second box, quite a bit lighter than the first, contained an alphanumeric code reader that displayed the characters Broadway style—right to left across the front of the unit. Onlookers stood marveling at the device, which, at the time, was copying WIAW code practice, flawlessly.

It had become obvious that the gentlemen from Dentron were anxious to show us the contents of the third box. By now you've probably guessed what emerged from the carton — the MLA-2500 prototype. Although not nearly as pretty as those units presently being sold, the unit gave us a good idea of what was to come. As the prototype was wired into the test setup, several skeptics drew near. There were a few "oohs" and "aahs." Most seasoned amplifier buffs chuckled to themselves, "This'll never work — it's just too darned small to be any good!" With the head of Dentron at the controls, the amplifier promptly placed the needle

of the Bird model 43 wattmeter, with a 2500-watt element, in the "peg" position. Any doubts concerning the capability of the amplifier were quickly dismissed.

Physical Attributes

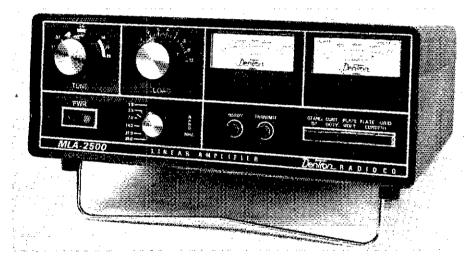
The review MLA-2500 arrived several months later in two boxes. One contained the 8875 tubes (two), time-delay relay, and control relay. The other box housed the remainder of the amplifier. To insert the vital components, the top cover of the '2500 must be removed. This is accomplished by removing six flat-head, hex-type screws (hex wrench included with amplifier).

Upon removal of the cover the first area of interest is the rf compartment. Two high-quality variable capacitors are used for the plate tuning and loading controls with additional fixed capacitances switched in for 160-, 80-, and 40-meter operation. A hefty rotary switch handles all of the band-switching functions, including adding in the extra capacitances mentioned above.

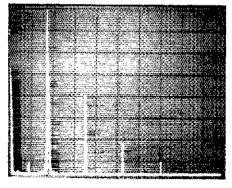
The 10-, 15- and 20-meter section of the plate tank coil is wound with silver-plated, heavy-gauge wire to help assure good tank efficiency on those bands. The rest of the tank coil (160, 80 and 40 meters) is a bit unconventional in the sense that the coil turns are close-spaced. To prevent the turns from shorting, type-E Teflon-covered stranded wire is used.

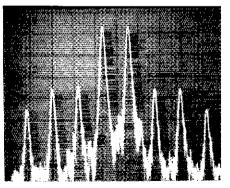
Two Eimac 8875 external-anode, ceramic/ metal triodes are mounted at the rear of the rf compartment. These tubes are designed to be transverse cooled through their large fins. To accomplish this the amplifier makes use of a two-speed, muffin-fan system attached to the rear apron. A thermal sensor mounted near one of the tubes determines whether the tubes are operating within the specified temperature range. If the tubes are running hot, as would be the case when operating continuous duty or contest style, the fan is automatically switched to high speed for additional cooling. Once the tubes are sufficiently cooled the fan automatically switches to the lower speed, A front-panel switch labeled CONTINUOUS DUTY overrides the thermal control to place the fan in the high-speed position at all times. Other items of interest in the rf compartment include the rf-switching relay with plated contacts, the rf-wattmeter circuitry, which is mounted on a small circuit board, and the alc components, also on their own board,

The most striking object in the power supply compactment is the power transformer. This specially designed and built transformer occupies nearly 1/4 of the space available inside the amplifier. A glass-epoxy circuit board (all boards used in the amplifier are of the same material) supports the 12 power supply diodes and associated spike protection capacitors along with the time-delay relay and control relay. The wiring harness and mounting screws are arranged so that the board can be swung up



Would you believe a 2.5-kW amplifier in a 5 by 14 by 14-inch box, weighing only 47 pounds? Well, here's one! It's the Dentron MLA-2500.





The photograph at the left is the worst case for spectral purity. This spectrum analyzer photograph shows the output of the amplifier on 160 meters running one kilowatt do input. The second harmonic is down approximately 40 dB. The horizontal scale represents 1 MHz per division and the vertical is 10 dB per division. The analyzer photograph at the right is a two-tone IMD display of the MLA-2500 at the 2000-watt PEP level. The horizontal display represents frequency with each division corresponding to 1 kHz. Each vertical division represents 10 dB. The display is adjusted so the amplitude of each component may be read from the scale at the right, directly in dB below the peak-envelope power (PEP) output. Responses other than the two individual tones near the center are distortion products. Third-order products are down approximately 35 dB, fifth down 37 dB, seventh down 45 dB.

Table 1

MLA-2500 Manufacturer's Specifications

Frequency coverage: 1.8 to 2.5 MHz 3.5 to 4.5 MHz 7.0 to 7.3 MHz 14.0 to 14.35 MHz 21.0 to 21.45 MHz 28.0 to 29.7 MHz.

Power requirements: 235/117 V ac, 50/60 Hz.
Plate power input: 2000 watts PEP for ssb operation; 1000 watts dc for cw, RTTY and SSTV.
Drive requirements: For 2 kW PEP, approximately 65 watts; for 1 kW dc, 36 watts.

Duty cycle: 100 percent at full legal power. Output impedance: 25-100 ohms.

Wattmeter accuracy: ±10 percent full scale into a 50-ohm resistive load.

Harmonic radiation (third-order): Equal to or better than 30 dB down from output signal at full legal power, on all bands.

Tube and semiconductor: 2 tubes, 18 diodes, 1 Zener diode,

Accessories: Rack-mounting kit (standard 19inch rack).

Table 2
Results of MLA-2500 Tests Performed in ARRL Laboratory

Band	Power input (Watts)	Power Output (Watts)	Internal Wattmeter Reading (Watts)	Drive Power (Watts)	Eft. (%)
160	1000	460	330	30	46
160	1900	1250	950	100+	66
80	1000	340	300	23	34
80	2000	1260	1100	100 +	63
40	1000	360	360	20	36
40	2000-	1200	1200	70	60
20	1000	580	700	27	58
20	2000	1250	1300	85	62.5
15	1000	560	750	32	56
15	2000	1350	1600	100 +	67.5
10	1000	580	700	30	58
10	2000	1250	1600	100 +	62.5

for easy access should parts ever need to be replaced. The power supply filter consists of six electrolytic capacitors, each with its own bleeder/equalizing resistor.

Five push-button switches control the metering functions (plate current, high voltage and grid current), fan speed and the amplifier "through" mode for exciter tuneup. The switch contacts are soldered directly to a circuit hoard into which plugs a multiconductor cable.

Electrical Details

The heart of the amplifier is a pair of Eimac 8875 triodes, operating in grounded grid. Anyone who is familiar with an amplifier using the 8873, 8874 or 8875 series of tubes knows that only a relatively small amount of drive from the exciter will push the tubes well past the legal amateur input level. In order to dissipate some of the extra drive from a 100-watt exciter and provide a better match to the transmitter. Dentron uses a 100-ohm, noninductive, swamping resistor from the cathodes (input) to ground.

An 8.1-volt Zener diode in the cathode circuit causes the tubes to run Class AB2. During receive, the cathodes are connected to ground through a high-value resistor, effectively cutting off the tubes. Alc voltage from the exciter is also fed to the cathodes with the amount controlled by the alc-adjust potentiometer located in the rf compartment.

The plate tank circuit is of the standard pinetwork variety. Relatively small values of variable capacitors are used for the plate tuning and loading controls. Additional fixed-value, transmitting-type capacitors are paralleled with the tuning control on 80 and 160 meters while additional capacitors are paralleled with the

loading variable on 40 through 160 meters.

A built-in rf wattmeter monitors the forward power at all times. The second meter is pushbutton switched for the parameters outlined earlier.

The cathodes of the 8875 tubes require a oneminute warm-up period before drive is applied. A 60-second delay relay is provided to keep drive from being applied to the tubes during the initial warm-up. Should the user inadvertently apply drive during this time there's no need to worry. The amplifier will be in the "through" mode and the drive power will be transferred to the load.

The power supply makes use of a full-wave, voltage-doubler circuit. There are four power-transformer secondary windings; 800 volts for the high-voltage supply, 120 volts for the alc circuitry, 12.6 volts for the pilot lights and control relay, and 6.3 volts for the tube filaments and delay relay filament. A dual-winding primary allows the amplifier to be run from either 117 or 235 volts, 50/60 Hz. The manufacturer recommends that the amplifier be run from 235 volts if at all possible for best voltage regulation.

Six 1N4007 diodes are used for each leg of the voltage doubler. Across each diode is a transient-suppressor capacitor (0.01 μ F). Six 150- μ F, 450-volt, electrolytic capacitors make up the filter. Each is strapped with a 100-k Ω , 2-watt, composition resistor.

Operation

When the amplifier is first switched on only the meter illumination lights will come on. The amplifier will automatically go into its 60-second delay routine. After the delay period, a green panel light will come on signifying that the amplifier is ready for use. Whenever the amplifier is in the transmit mode, a red panel light will shine.

Amplifier tune-up is smooth and simple. All the operator need do is watch the plate-current meter and power-output meter, adjusting for maximum power output consistent with the legal amateur input level. One should keep in mind that the built-in wattmeter reads both forward and reflected power on the line. A high SWR will cause erroneous readings as far as actual power output is concerned.

Problems and Corrections

Several problem areas were noted while gathering data for this review. First, it was found that the plate-current meter was indicating values approximately 25 percent lower than those actually being run. This meant the amplifier was running nearly 1250 watts when tuned up for an apparent kilowatt! Also, it was noted that the grid-current meter was sampling a portion of cathode current — not grid current. Additionally, the amplifier suffered from tather poor efficiency on the lower bands at the cw, 1-kW input level.

When the manufacturer was contacted concerning these findings, a fresh unit which incorporated changes to correct the problem was promptly sent. The error in the plate-metering circuitry was traced to non-uniformity of handwound meter shunts. For better accuracy Dentron now uses commercially made shunts in al MLA-2500s. Circuit changes were made to allow the meter to monitor actual grid current when switched into that position.

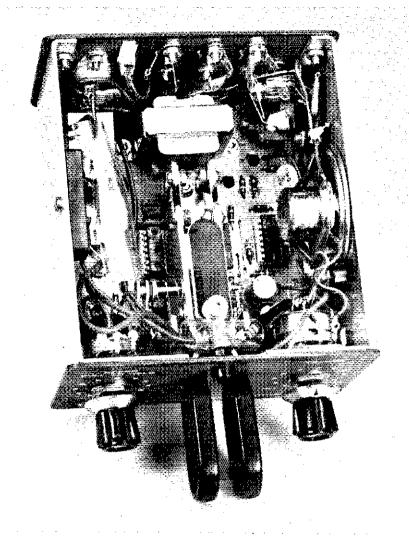
Poor efficiency at the 1-kilowatt level on 80 and 40 meters still remains a problem (34 and 36 percent respectively at the low ends of the bands). Although Dentron has added a fixed-value capacitor (100 pF) directly across the loading variable, it is insufficient for operation into a 50-ohm load — the loading capacitor remains fully meshed on these bands at the 1-kilowatt level. One could expect the efficiency to be somewhat better when operating the amplifier into a higher impedance. On the other hand, it will be somewhat worse when operated into impedances lower than 50 ohms

All pertinent specifications, spectral displays and test data are presented elsewhere in this review. More information can be obtained from Dentron Radio Co., Inc., 2100 Enterprise Parkway, Twinsburg, OH 44087. The price class of the amplifier is \$800. — WIVD

The manufacturer informs us that a modification kit will be sent to every MLA-2500 owner from whom they have received a warranty card.

HEATH HD-1410 ELECTRONIC KEYER

The Heath HD-1410 electronic keyer represents a substantial departure from the earlier model HD-10 keyer that came on the market in 1966. Not only is the new keyer attractively packaged in a manner characteristic of the SB-equipment series, but also the design incorporates squeeze paddle iambic operation. With its low profile and small size, the keyer requires a minimum of operating space. Attractive contours of the HD-1410 are compatible with most modern equipment and will blend well with the appearance of many older transmitters and receivers.



The versatile Heath HD-1410 electronic keyer, Squeeze-paddle design permits lamblic operation. A built-in sidetone oscillator and monitor speaker with adjustable tone and volume are provided.

Operators will find several conveniences provided in this electronic keyer. There is a built-in sidetone oscillator and speaker, with adjustable tone and volume. A headphone jack on the rear panel permits speaker silencing. Audio from the receiver is routed to the headset through a separate rear-panel jack. The built-in paddles are adjustable for tension and travel, No springs are exposed that could pop loose during operation. The solid-state output eliminates bounce and sticking commonly associated with relay-equipped devices, Sufficient weight is provided in the construction to prevent the keyer from walking while in use. A front-panel "hold" switch is convenient for transmitter tune-up. An external key may be connected by means of a rear-panel jack.

For portable or emergency operation the HD-1410 may be powered by an external battery. A diode protects the power supply against reversed battery polarity. The ac power cord, which plugs into the rear panel, may be easily disconnected. A conventional, series-regulated bridge circuit supplies 5 V dc for the memory, clock, generator, oscillator and output circuits.

Keying speed may be varied from less than 10 wpm to over 60 wpm. An alternative connection may be made on the circuit board to cover speeds of 10 wpm to 35 wpm. A Darlington transistor pair is used to key positive

lines to ground, and the keying current is limited to 10 mA.

Heath designed the HD-1410 to be compatible not only with most transmitters that use solid-state keying circuits, but also those sets employing grid-block keying or cathode keying. For those solid-state keying circuits which require the keyed line to be brought to within a few tenths of a volt from ground to operate properly, a minor modification may be made as explained in the instruction manual.

Assembly of the HD-1410 can be comfortably accomplished as a nice weekend project.

Heath HD-1410 Keyer Specifications

Power requirements: 120/240 V, 50/60 Hz ac, 3.5 W, or 10 to 14.6 V dc, negative ground, 150 mA. Keying function: lambic (less than 10 to over 60 wpm).

Sidetone: Frequency internally adjustable from 500 to 1000 Hz.

Audio: Built-in speaker or external headset.

Dimensions (HWD); 3 x 5 x 7.4 inches

 $(76 \times 127 \times 188 \text{ mm}).$

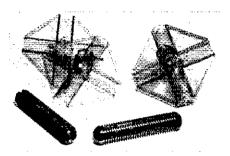
Weight: 2.75 lbs (1.25 kg)

Directions are explicit. The builder may find a magnifying glass to be helpful while installing the IC sockets and for positive identification of small components.

When tested, the keyer built for this review displayed no glitches. There appeared to be no difficulty with RFI when operating on the 10-through 160-meter bands, but careful removal of paint from panel bolt holes to secure good continuity is a must. Price class is \$49. It is manufactured by Heath Company, Benton Harbor, MI 49022. — WIJEC

PROPAGATION PRODUCTS INSULATORS AND QUAD KIT

Propagation Products has made available two products that should be of interest to amateurs who like to make their own antennas — and many of us do! The first item is called a Trend insulator. The Trend insulator is molded from a material having good dielectric qualities and, according to the manufacturer, excellent weatherability. The insulator is 6-3/8 inches long. It is grooved to take a coil winding (trap); the available coil-winding length is 5-1/4 inches at 6 turns per inch. The total turns available are



At the top are the Propagation Products quad spiders and immediately below are two of the Trend insulators.

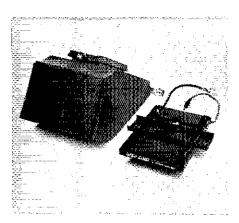
32 at one-inch diameter. The spiral grooves will handle any wire size up to and including no. 12. Price class is \$5 per pair.

The other item from the company is a quad spider kit (shown in the photograph). The spiders are made from injected molded GE Lexan providing a lightweight support for quad elements. The spiders will accept one-inch diameter elements and will fit on a boom of 1-1/8-inch diameter. The kit contains two half-spiders (makes one quad element) and two clamps for attaching the spider to the boom and the necessary screws and nuts. Price class for a single kit is \$8. Additional information is available from Propagation Products, 1855 Cassat Ave., Jacksonville, FL 32210. — WICP

GAMBER-JOHNSON SOUND MOUNT

An interesting item that could appeal to many amateurs is an item called the Sound Mount. This unit can be installed in an automobile or van, either on the transmission hump or the inside roof of the vehicle. Your transceiver can be mounted on a bracket which in turn slides into the Sound Mount. When you park or leave the vehicle it is a simple matter to slip your rig off the mount and take it along with you, avoiding theft.

In addition, the Sound Mount has a built-in speaker, snap-in mic holder, and all the necessary connections for antennas and power. The case is made from a combination of black



At the left is the Sound Mount. Note the fittings on the top of the mount. At the right is the unit that is to be attached to the transceiver.

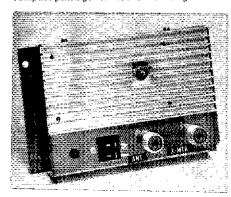
plastic and metal, presenting a very pleasing appearance. Gamber-Johnson informs us that they also make an under-dash mount. Literature is available from the manufacturer on request. Price class of the Sound Mount is \$32. Manufacturer: Gamber-Johnson, Inc., 801 Francis St., Stevens Point, WI 54481 — WIICP

TELCO 125 2-METER CLASS C AMPLIFIER

If a piece of equipment has a lot of knobs and switches, a reviewer can go on ad nauseum listing every detail, but what can you say about a piece of equipment that has no switches or knobs to fiddle with? Well, it is certainly simple to operate. The Telco 125 is a 2-meter, Class C (fm and cw) amplifier designed to operate from 12 volts. One watt of rf drive gets you 25 watts of output. Its size of $4 \times 6-1/2 \times 1-1/2$ inches ($102 \times 165 \times 38$ mm) permits it to be mounted out of sight (under the dash), although I was reluctant to do so because it is a strikingly attractive piece of equipment.

The 125 is the second generation of Telco vhf power amplifiers: The company has been building them for marine and land-mobile services for marketing under private label. Thus,

The Telco 125 amplifier makes a neat, compact package for mobile mounting.



it is not surprising that the unit we tested easily met the new FCC standards (see accompanying spectrum analysis), nor is it surprising that the 125 is built like the proverbial battleship. High-quality components along with rugged construction should provide reliable continuous service.

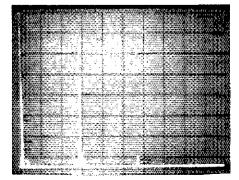
An antenna changeover relay is used to switch the amplifier in and out of the circuit. The 1-watt signal goes through a 9-dB attenuator and the input network, which is essentially a low-pass filter designed to transform the line impedance down to that of the transistor. The attenuated signal (1/8 watt) is applied to the first amplifier, an MRF237 transistor in a common-emitter configuration, which produces a 3-watt signal. After passing through the tuning and filtering network, the 3-watt signal is applied to an MRF238 amplifier stage which brings the level up to 25 watts. From there the signal passes through the tuning/filtering output network.

The 25-watt output is a continuous-duty rating. The 125 will withstand high-SWR mismatch and is protected for incorrect de polarity. Insertion loss on receive is less than 1 dB. The owner's manual gives complete instructions for retuning if that should become necessary.

So much for the technical details, the main concern of most amateurs is "Does it work?" The initial test was to try to key a distant repeater that can just barely be heard, and cannot be keyed at all with a Drake TR-22 by itself. There was no problem keying it and we were told that we were making it about 80 percent full quieting, which was better than the repeater was doing. The net results of several weeks of testing is that if I can hear a repeater, I can work it with the amplifier in, if I can key it with the TR-22 barefoot, I make it full quieting with the 125 added. In short, it works quite well for the operator who wants to use a handheld rig for mobile operation. With the proper antennas, it would be useful for getting on Mode-A OSCAR.

Additional information can be obtained from Telco Products Corp., 44 Sea Cliff Ave., Glen Cove, NY 11542. Price class is \$85. — WB8NAS

Spectral analysis of the Telco 125 output (drive for the amplifier was provided by a Drake TR-22 at 147 MHz when this photo was made). The amplifier introduced no detectable spurious energy. The horizontal scale is 50 MHz per division, and the vertical scale 10 dB per division. As may be seen, the second harmonic is down 70 dB from "full scale." (After calibration of the analyzer for full-scale representation of the fundamental signal, a notch filter tuned to 147 MHz was added to the system to enhance its dynamic range.)



NEW BOOKS

80-Meter DXing

80-Meter DXing, by John DeVoldere, ON4UN. Copyrighted 1977 by Communications Technology, Inc., Greenville, NH 03048, Price is \$4,50, Softbound, 8 1/2 × 11 inches.

Just the call sign ON4UN on the cover lends credibility to the contents of this 75-page manual for long-haul work on the 80-meter amateur band. Many, perhaps most amateurs, still subscribe to the inyth that 3.5 MHz is a "local band," not supportive of more than an occasional 3000-mile contact. This does not deter author DeVoldere from convincing us not only that plenty of good DX is available on the band, but also that it can be predicted and sought methodically. So much for the local tagchew band.

The book is divided into four chapters: The first, on 80-meter propagation, combined elementary ionospheric wave propagation theory with specific techniques to deal with factors speculiar to the 80-meter band. Namely, factors such as auroral disturbances, seasonal variations, and "gray-line" propagation constitute the meat of the chapter for the 80-meter beginner.

Similarly, ON4UN's discussion of antennas begins with well-known principles of directivi ty, gain and impedance matching before discussing specific, effective antennas for 80-meter work. Of special interest are chartshowing expected radiation angles for delta loops and quad loops with different feed points, and a good discussion of the Beverage receiving antenna. For the optimist, Wilkinson power dividers and splitters are examined Those anticipating vertical antennas wil perhaps perhaps be needlessly discouraged by DeVoldere's admonitions. "They should be be needlessly kept at least a quarter wavelength away from any object that is greater than one-third of the antenna height and, generally, two wavelength away from structures that are as tall as th antenna itself." Forty-meter Yagis aren't sup posed to work at 50 feet, either, but they do!

Chapter 3 deals with equipment, and contains a tabulation of receivers used by 40 "well known, 80-meter DXers." Happily, the chapter consists of one page on transmitting and four on receiving. The table of receivers in use may be somewhat skewed by the probability that the stations surveyed are not located in midtown Manhattan! DeVoldere's comment on desirable receiver characteristics (cross modulation rejection and selectivity) are righ on the mark.

Perhaps most useful is the final chapter or operating practices, beginning with a charshowing allocations of frequencies within the 80-meter band for various countries. One wonders how many DXers have worked a hundred countries on 80 and still don't know tha VK DXers hang out between 3690 and 3700 kHz; ON4UN knows and tells all. Consideration is also given to "master-of-ceremonies" operations, "list operation" and even how to zero beat properly on cw. A few pictures of well-known stations around the world round out the operating chapter,

Like anything else 80-meter DXing is best learned by experience, but a start with DeVoldere's book can help the newcomer avoid the pitfalls of such learning. Nothing is more embarrassing than to jump into a pileup, do the wrong thing, and get called a lid by a dozen stations on frequency, — K1TN

Hints and Kinks

CW AND THE HW-101

The Heath HW-101 operates on cw in the semi-break-in mode. When the key is depressed, an audio tone is applied to the input of the VOX amplifier. This is amplified and sent to the relay amplifier, which pulls in the transmit-receive relays. If a pause exists between characters beyond the time limit set by the VOX delay, the transceiver will drop back to the receive mode. This can be annoying.

What is needed is an easy way to make the transceiver latch in the transmit mode so that it won't drop back to the receive mode until a release button is pressed. The HW-101 contains a spare phono jack and a spare set of relay contacts on one of the transmit-receive relays, making it easy to implement such a function. The only change required internally is the addition of a wire connected from pin 8 of V12B to the center conductor of the spare phono jack.

A miniature spst toggle switch and a normally closed, push-button switch are mounted in a small metal box measuring $1-3/4 \times 2 \times 2-1/4$ inches ($44 \times 51 \times 57$ mm) and connected in series to a pair of wires extending from the box. One of the wires is connected to the center of the phono plug and the other to pin 11 of the power plug. The phono plug is then pushed into the spare phono jack.

The small box may be placed adjacent to the cw key. To operate cw, the toggle switch is put in the cw position. Pressing the cw key down switches the transceiver to the transmit mode in the normal fashion. However, once in the transmit mode, the spare contacts on RL1 are

closed which, via the switch box, ground pin 8 of V12B. This latches the HW-101 in the transmit mode.

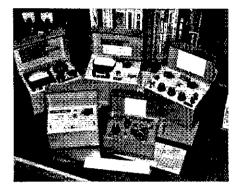
To receive, press the release button, which will break the latch and allow the transceiver to drop back to the receive mode. For ssb operation, the toggie switch is placed in the ssb position which prevents the transceiver from latching in the transmit mode. — James O. Fishbeck, WAISTQ

DRESSING SMALL CABLE HARNESSES

Dental floss works quite well as lacing cord for small cables found in miniaturized equipment. The rubber tip mounted on the handle of some toothbrushes works well to clear inadvertent solder bridges on printed-circuit boards. After melting the solder with a soldering iron, quickly draw the rubber tip through the solder bridge. — Duane Latourell, W61G

METAL CARD-FILE BOXES MAKE NIFTY CABINETS

The photograph shown on this page illustrates an idea that may interest those amateurs who have recently priced small cabinets. All the enclosures shown are metal card or index files. Each device shown is the result of a project described in QST. Reading left to right in the top row — Wheatstone bridge, QST, November, 1976; capacitance meter, QST,



Compact testing devices in this photograph are installed in inexpensive card-file cabinets.

December, 1975; and sweep generator for fm, QST, January, 1972. These cabinets are $6 \times 4 \times 4$ -1/2 inches (152 \times 102 \times 114 mm) and cost \$1.19 each.

In the front row — frequency calibrator, QST, July, 1976; and audio oscillator, QST, November, 1974. These cabinets are $5 \times 3 \times 3$ -3/4 inches (127 \times 76 \times 95 mm) and cost just 89 cents each: — Roy E. Lyon, WA4WZJ

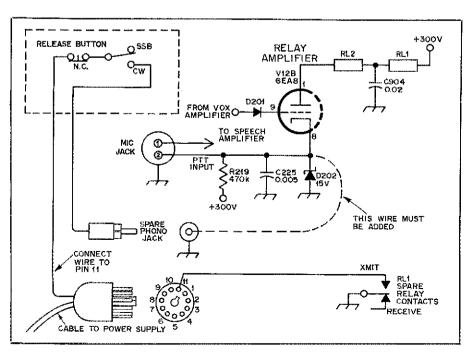
ON-OFF INDICATOR FOR BATTERY DEVICE

Have you ever wanted an on-off indicator on a battery-operated device but excessive current drain of the incandescent lamp prohibited it? The little-publicized LM3909N flasher/oscillator is a practical solution.

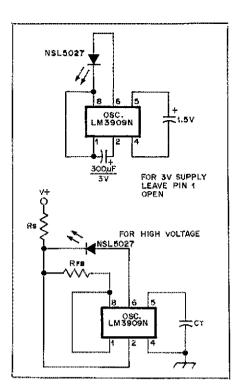
Table 1 Component values for flasher/oscillator. Resistance is in ohms. Capacitance is in μF . One-watt resistors are used for $R_{\rm p}$.

V _t Nom.	6	15	100
Flash		_	
Hz	2	2	1.7
C _t	400	180	180
R_s	1000	3900	43k
C _f R _s R _{fb} V+	1500	1000	1000
Range	5-25	13-50	85-200

The LM3909 (available from Digi-Key, Box 677, Thief River Falls, MN 58701, for 69 cents) is an 8-pin DIP requiring only an external electrolytic timing capacitor to set the flashing rate of an LED. It will operate on potentials as low as 1.5 V from an AA battery, and battery life is almost as long as the shelf life.



Useful latching circuit for cw operation with the HW-101.



A useful flasher/oscillator. Top circuit is for use with low operating voltage. The bottom circuit is for higher voltages as shown in the table.

This little device has other applications, such as a square-wave oscillator or a buzz-box continuity and coil checker. The data sheets shown in the Digi-Key catalog give full details. — Chuck Shaw, K8ET, ex-WB8CND

SIMPLE EMERGENCY POWER

in emergencies that interrupt commercial power service, an independent energy source that will operate a light as well as a weather radio and a portable a-m/fm receiver can be most useful. The family flashlight or the portable radio cannot always be depended upon for having batteries that are up to full charge.

The arrangement I use employs a 12-volt motorcycle battery and a trickle-charge circuit. Sufficient energy is provided for the single light, activating the two radios and even operating a handheld transceiver for many hours.

About 100 mA are drawn by each receiver. Variable dropping resistors, such as a Mallory M100PK, may be used to drop the potential to 9 V for each receiver. The lamp assembly may be constructed from an automobile dome light, or a 12-V lamp may be jury-rigged inside an empty coffee jar.

The GE-63 lamp in the charging circuit acts as a current limiter and the glow indicates the charge condition. Charging current is about 150 mA. Power from the battery will operate both radios for several weeks without recharging. The single light may be used for up to four days. — Joe Rice, W4RHZ

DEMAGNETIZING YOUR SCREWDRIVER

To prevent your screwdriver or pliers from picking up unwanted steel, nuts and screws, simply insert the particular tool all the way between the rods of your soldering gun. Next, turn on the gun and slowly withdraw the tool until it is completely out. The problem of magnetized tools has plagued me many times while working in places that are difficult to reach. — Roger Mace, W6RW

INEXPENSIVE 2-METER ANTENNA MOUNT

Like many amateurs who must tighten the purse strings, I have always searched for alternatives to buying expensive parts and ac-

12.6V
3A

12.6V
3A

12.6V
3A

12.6V
3A

12.6V
BATTERY

SEE
TEXT

S2

TO A-M/FM
RADIO

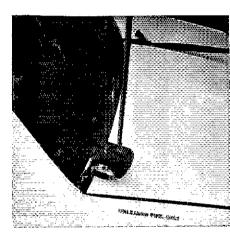
TO WX RADIOO

TO WX RADIOO

A radio and a single light may be powered in emergencies with this simple system. T1 is Radio Shack no. 273-1511. D1 is Radio Shack no. 276-1141.

cessories. Recently I needed a trunk mount for my 2-meter mobile antenna, but the ninedollars-plus figure quoted for this item seemed ridiculously high for such a simple device.

While eyeballing other clamps, angles, brackets and hardware, I saw an object called a universal driving lamp bracket. This item contained two no. 12-24 hex bolts and a flat, thick, neoprene gasket to avoid marring the auto paint. The lip fits snugly under the trunk lid and when secured makes a tight, nonmoveable neat installation. This unit is sold by S.S. Kresge Co. stores (K-Mart) and bears the code number 82-20-65. The price? Just \$1.88. — Rene M. White, W6WDF

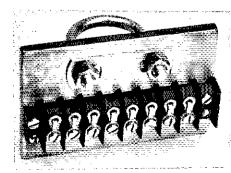


This inexpensive lamp bracket is used for an antenna mount.

LIGHTNING ARRESTOR FOR ROTOR CABLE

To improve the lightning protection for my beam antenna, I not only installed a Cinch-Jones plug on my rotor cable for quick disconnection, but also constructed the arrestor shown in the photograph as a means of providing a path for shunting any strike current. This arrestor is installed on a tower leg at the point where the rotor cable is fed away from the tower at a 90-degree angle.

The arrestor is made from a terminal strip mounted on a durable copper plate. Tabs on the strip are cut flush with the back of the strip. The terminal assembly is supported a small distance away from the plate by means of washers in order to provide an electrical gap. A U bolt holds the arrestor to the tower leg. After the cables are connected, a means of weather-proofing may be employed. — Lance Q. Johnson, KIMET



A homemade lightning arrestor for a rotor cable. The "gaps" for the arrestor are between the backs of the terminals and the mounting plate.

Microwaves, Mozzarella Burgers and Mountains

After conquering West Peak, Mt. Tom and Talcott Mountain, communing with nature and living to tell about it, we learned to love microwaves. We're not sure about nature!

By James E. Kearman,* W1XZ

ewington, July 27. At 11:30 A.M., WICF, WIRU, WIZA, WIRN and W1XZ set off for West Peak in Meriden, CT. WICF is at the wheel; WIRU is navigating. In the back of the station wagon rests a new phase-locked, 10-GHz transceiver. Somewhere in Massachusetts, WA1HVG is heading for Mt. Tom, near Springfield. Purpose of the mission: establish contact over the 50-mile (83-km) path to prove the simplicity of operation of the new transceivers. A 2-meter fm transceiver will provide liaison en route. All we have to do is contact WA1HVG when we arrive, confirm that we're on the air, swing the microwave antenna to peak the signal and make the contact. The path is a clear shot. This fact has been confirmed by the young woman accompanying WA1HVG. She makes her living laxing out paths for commercial microwave links. Success is assured.

As W1RU smoothly guides us down Route 15, W1CF calls WA1HVG just to let them know we're on our way. We can see West Peak off to our right. WA1HVG does not answer our call. No matter, they're probably getting set up on Mt. Tom already. Cruising now through the labyrinth of downtown Meriden, we continue to call them. Our only answer is the sultry voice of the taped repeater identification. Where are they? We begin to imagine flat tires, an overheated radiator, a missed turn, or . . .?

Gunn-Diode Transceivers

The microwave transceivers are similar to the unit described in *QST* for September, 1977. These Microwave Associates transceivers are fitted with an



The rugged south face of Mt. Tom, the object of our day's outing. (Dorrie Ignatovich photo)

additional cavity, into which is injected a sample of the Gunn-diode-generated rf. This sample is divided in frequency and compared with the signal from a stable crystal oscillator. Any difference in frequency results in an error voltage. This error voltage is applied to a varactor diode mounted in the rf-generating cavity. One transceiver is operated on 10,250 MHz. the other at 10,280 MHz. Because the Gunn diode serves as both a transmitter and a local oscillator for receiving, a 30-MHz i-f is established. From there, detection proceeds in typical fm-receiver fashion. Our transceiver is equipped with a 17-dB-gain horn antenna, WAIHVG has the option of using either a two- or four-foot (0.6- or 1.2-m) parabolic dish

mounted on a tripod. The dishes have a gain of about 33 or 39 dB respectively. Power output of the transceivers is 15 mW.

We're now at the foot of West Peak with no sure idea of how to reach the top. WA1HVG is still among the missing. W1RU consults with the owner of a gas station right next to West Peak. Twenty years at this location, but no knowledge of the route to West Peak. Undaunted, we inspect our map and select a road. As we start up the wide, well-paved road, we look at the trees and listen to the birds. We all reflect on what a great hobby ham radio is, that gets us outside on such a glorious day. All except for W1CF, who's still trying to raise WA1HVG on the

^{*}Asst. Technical Editor, ARRL

[&]quot;The Microwave Associates 89127 10-GHz Transceiver," Product Review, QST for September, 1977, p. 42.

radio. Sure now that they're sitting atop Mt. Tom wondering where we are, he plunges onward. We haven't been climbing long when the road begins to take on a very natural appearance; natural that is, for the surface of the moon. With one hand on the wheel, the other holding the mic, W1CF steers from one crater to another, ever climbing.

Assault on West Peak

At last! WA1HVG responds to our call. They're at the foot of Mt. Tom, but have no idea of how to reach the top. Finding a road, they ask us about security surrounding the commercial installations at the top. WA1HVG has no desire to be shot at. We urge them on, in the name of science. Luck is with them, for they reach the top without incident.

With W1RU still navigating, we reach the top of our mountain and stop at the base of a stone lookout tower resembling a castle turret. The view from the overlook is quite impressive on this clear, sunny day. Off to the south we can see New Haven, nestling in its smog, and beyond that, Long Island Sound. Unfortunately, Mt. Tom is to the north. All we can see in that direction are trees. Trees provide shade from the sun and homes for birds and squirrels. They also function verv effectively as attenuators of microwave signals.

Our transceiver is intended to operate from the 12-volt system of the car. It is equipped with a cigarette-lighter plug and a 10-foot (3-m) long cord. We'll have a clear shot from the top of the lookout tower but the cord won't reach. We could carry the car battery up there, but we have no tools to disconnect it. Young couples whose enjoyment of the day and each other was somewhat disturbed by our clamorous arrival go back about their business while we consider our next move.

A short perusal of the map leads W1RU to conclude that we are on East Peak, rather than West Peak. Telling WA1HVG, who has been waiting for us to get it together, we jump back in the car and roar off.

Over on the western side of the moun-

Strays 🐠

NYC-AREA EMERGENCY PATROL TO ORGANIZE MARCH 11

☐ The group of New York-area amateurs who provided much-needed assistance during last summer's blackout will soon see their brainchild, the Civilian Amateur Radio Patrol, take form. Applications for membership in the group will be taken at an organizational meeting at I P.M. Saturday, March 11. It will be held in the auditorium of Police Headquarters, 1 Police Plaza, adjacent to City Hall.

tain we encounter fewer lovers and more trees. W1CF pilots our car up countless dirt roads to numerous commercial installations. At each stop we marvel at the tall trees and even taller towers.

Joyce Kilmer Never Tried Microwaves

W1ZA has concluded we aren't going to make it unless we clear out some trees. Before giving up to look for a chain saw, we decide to try a few more spots. At one point we find a microwave relay station and two technicians are just arriving to do some work. They allow us to climb to the roof of their building. The only way up is to climb a tower, encircled by barbed wire. From the roof, Connecticut is spread below us, a gorgeous view in almost every direction. Looking toward Mt. Tom we see --- trees. The power cord is stretched to the breaking point so we can't climb the tower. We do hear a signal - leakage from the many other transmitters on the site. We make a mental note to use better shielding on our power and audio cables. A short piece of waveguide, which will act as a high-pass filter, between the transceiver and the horn would help as well.

By this time, users of our liaison repeater on Mt. Tom are getting bored listening to our frustrated lamentations and tell us so. We decide to switch to 146.52-MHz simplex. We can hear WA1HVG right away, but he can only hear intermodulation products from all the commercial installations on Mt. Tom. We try other repeaters with the same result. Apologetically, we return to 34/94, WR1ABX. An hf link, perhaps using CB rigs converted to 10 meters, seems a good idea for next time. After a few more futile efforts at finding a suitable location we once again consult the map.

On the Road Again

Twenty miles (33 km) north is Talcott Mountain. We know the road to the top, and it's a clear shot — we think. By now it's about 1:30 P.M. and we're all thirsty and hungry. Telling WA1HVG to stand

All interested amateurs are invited to attend. For further information about the meeting, contact Sgt. Staehs or Officer Power at 212-374-3804 or 374-3805. Once in operation, the group will provide emergency communications and other assistance during emergencies. Other details about CARP can be found in February QST, page 41.

220 PUBLICATION DISTRIBUTED

☐ 220 NOTES, a new publication devoted to promoting the use of the 220-MHz band, has distributed its complimentary first issue to more than 1800

by, we head back down the mountain.

W1CF skillfully hits almost every pot hole in the road going down, but we arrive in downtown Meriden with our appetite intact. We spot a restaurant and liquo: store side by side, and couriers are dispatched for beer and hamburgers, hold the onions. It is here we come face to face with an entity known as the "Mozzarella Burger." Under other circumstances it. unlikely the meal would be eaten with such vigor, but when pursuing a goal one doesn't quibble over something as in significant as food. Chewing and sipping we head north. Our comrades on Mt Tom seem hardly concerned that we're eating while they sit and wait. Thei selfless dedication is inspiring. We oper another beer and reflect on what a grea hobby ham radio is to cause us to do thes things on such a fine day.

The road to Talcott Mountain Science Center, our destination, tends to curve a bit and offers some spectacular views o the Farmington River valley almost 100 feet (330 m) below. W1CF whips a few more horsepower from our gasping ca and we blast up the steep driveway and through the gates. Unheeding of the crie of Science Center employees, we blast al the way to the top of the hill. Before W1RU can complete negotiations to pre vent our arrest, WIZA and WICF have the microwave gear in operation. We can actually see Mt. Tom in the distance! Ou trespass is quickly forgiven when the voic of WA1HVG pops out of the speaker. We quickly exchange reports and congratula tions. He switches from one dish to another with no perceptible change in signal level. The smaller antenna is easier to keep pointed in the wind so it remain in use. After all our efforts the contact seems almost anticlimactic. We've learned a few things about liaison frequencies, sit location and food, detailed in this article We hope you'll benefit from our ex perience.

We complete a few more transmissions sign with WAIHVG, open the last of th beer and pack up. On the way back to Headquarters we reflect on what a greathobby ham radio is, to get us outside or such a fine day.

amateur radio operators, primarily in th greater Chicago area. While the primar impact will be news of 220 repeater and simplex groups in the area, articles o general interest to 220-MHz users are ex pected to attract subscriptions from out side the Chicago area. Articles of genera interest should be sent to Julian Jablin W9IWI, Editor, 9124 N. Crawford Ave. Skokie, IL 60077. For a copy of the com plimentary issue, contact Lee Knirko W9MOL, 833 Park Plaine Ave., Pari Ridge, IL 60068. To subscribe, send \$3 fo six issues annually to Virginia Sterling WB9UFV, Business Manager, 9128 N Linden Ave., Morton Grove, IL 60053.

The Lure of 2 Meters

Part 2: Once you decide 2-meter fm is for you, you're faced with the enjoyable dilemma of how to begin assembling a station. This article should make it a bit easier.†

By Mark S. Starin,* WA1TZK

If you're about to join the tens of thousands of amateurs who are having the time of their lives on the 2-meter band, you'll want to know some things about vhf-fm equipment. As even a cursory glance through the display advertisements and Ham-Ads in this issue will show, equipment designed for the 2-meter mobile or home station has proliferated over the past few years.

It was a fairly simple matter to go out and buy a 2-meter transceiver a few years back. You had your choice of several manufacturers who offered such options as switchable output power, 6- or 12-frequency capability, push-to-talk mic buttons, Touch-Tone encoders and total solid-state construction. These days, all those features are common, but budding fmers must now contend with a whole new generation of options and types of gear. They include digital readout, synthesization, 4-MHz band coverage, and a new type of rig — the multimode transceiver.

Two Basic Types

Nearly all 2-meter fm equipment can be divided into either of two types: crystal-controlled or synthesized. The crystal-controlled type, which usually requires a separate crystal for each receive frequency and another for each transmit frequency, remains the most common. Since crystals cost about \$6 apiece, some rigs use a more complex design to get by with only one "rock" for both send and receive frequencies.

Rapidly overtaking the crystalcontrolled transceiver, synthesized gear uses only one or perhaps two crystals to generate all their operating frequencies. Initially, the cost of frequency synthesization kept hams away, but technology has made them nearly competitive with their "rockbound" counterparts. For more information about operating a synthesized transceiver, see the related story, "Operating a Synthesized Rig."

Features and Options Galore

Once you've decided which basic type of rig to buy, you'll need to look at other features. Some are indispensable and almost universal; others are frills which the beginner on 2 meters can often live without.

Just about all 2-meter transceivers have squelch and volume controls, and a frequency (or "channel") selector. Most are designed for mobile use, but can be used at home with a power supply. Few are exclusively tailored to operate from a fixed location.

Power is certainly an important consideration. The transmitters usually have outputs of between 1.5 and 25 watts, with 10 watts about the most common. Some will have a HI-LO switch, enabling the

user to conserve precious battery current while operating local simplex or into a nearby repeater. Because of repeaters, I watt will often be adequate for 2-meter operating, whether at home or while mobile.

The Kenwood TR-2200, for example, switches from a "high" power of 2 watts to a "low" of 400 milliwatts. Many amateurs use this and similar rigs every day with the switch in the 400-mW position; their signal into the repeater belies the QRPp (very low) power level. By using the lower output level, they are saving the trouble of frequently recharging the nickel-cadmium batteries, or replacing the nonrechargeable type.

This brings us to dc accessories, which make portable 2-meter operating more economical. Most handheld transceivers (also called HTs, for Handie-Talkies) come with an antenna but require optional batteries, battery charger, and carrying case. Rechargeable nickel-cadmium batteries, or NiCads, are more expensive

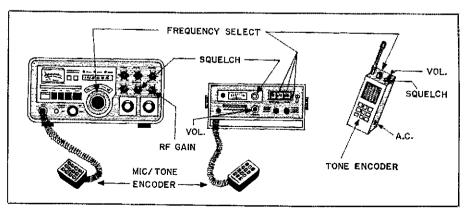


Fig. 1 — The three sizes of 2-meter fm gear. Although not designed solely for mobile operation, multimode 2-meter transceivers (left) are small enough to fit comfortably in a car. Many have built-in ac power supplies. Mobile rigs (center) are extremely compact, while handhelds (right) can be as small as six inches high.

*Membership Services Assistant, ARRL †Part 1 appeared in QST for February, 1978.

batteries, or NiCads, are more expensive initially, but save money in the long run over conventional batteries. A quarterwave helical whip, nicknamed the "rubber-duckie," is a common HT antenna. HTs are sometimes sold in packages, with these accessories included.

Into the Phone Lines

Responsible in recent years for a great deal of goodwill toward the Amateur Radio Service, autopatching is quickly becoming a popular part of 2-meter operating. Many repeater groups allow autopatching, direct access to local telephone lines, through their specially equipped machines. All that's needed to use autopatch is a device called a tone encoder, or Touch-Tone pad.

Depending on the type of rig, it may attach either to a jack at the rear, to the mic, or directly to the transceiver (as with a handheld). It may be bought separately (see the Ham-Ads of any QST for a good selection) or purchased at flea markets and from other sources of used equipment. Surplus telephone company encoders are popular as well.

Antennas

Several types of 2-meter fm antennas are in common use. Which one is best for you? If you live in hilly or mountainous terrain, it may be worthwhile to use a gain type antenna (see related sidebar story). Such an antenna has the ability to "shape" the signal fed to it, providing greater signal strength in desired directions. If you operate over flat terrain, simple 2-meter antennas will usually be adequate, depending on the range you need to cover.

Since vhf radio waves don't usually skip like hf waves do, it is usually best to keep the antenna radiation angle low for best line-of-sight coverage. This can be done with a gain type antenna. The mobile antennas most amateurs use make the signal appear about twice as strong as the simplest type. They do this by concentrating the signal toward the horizon rather than above and below the car where it does little good.

The simplest 2-meter fm mobile antenna is the quarter-wavelength whip. Only 19 inches long, it is easily mounted on the roof. A 5/8-wavelength antenna provides more gain, at some cost of convenience. Because of its length, about 48 inches, it is often relegated to the trunk lid, where it loses some effectiveness.

A third type of mobile antenna that usually works quite well on a trunk mount is the collinear, actually two antennas with a 19-inch coupling section between them. It works well on both simplex and distant repeaters. As does the 5/8-wavelength antenna, it helps eliminate picket-fencing, the fluttering that results mainly from

Table 1
Most-Common Repeater Frequencies

Input	Output	Percentage
146.34	146.94	9
146.16	146.76	7
146.28	146.88	7
146.22	146,82	7
146.04	146.64	5
146.13	146.73	5
146.07	146.67	4
146.25	146.85	4
146.31	146.91	4
146.01	146.61	4
146.19	146.79	4
146.37	146.97	4
146.10	146.70	3

Source: Tabulation from the 1977-78 ARRL Repeater Directory by WASSXL

How Many Frequencies?

If you do a lot of traveling, it will pay to have access to as many repeaters as possible. That's where a synthesized rig really pays off. But if you're going to operate pretty much in your local area or into only a few repeaters, you can get by with relatively inexpensive, crystal-controlled equipment.

Most mobile rigs come equipped with 12 crystal positions, while the more compact handhelds often have six. As shown in Table 1, if you acquire a couple of "rocks" tor local operation and use the rest of your positions for the most-used North American frequencies, you'll have access to many repeaters.

To learn more about crystals, see Bartlett, "Crystals Inside Out," QST, January, 1978.

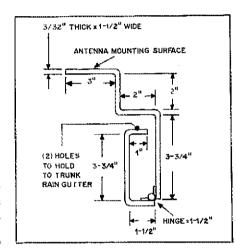


Fig. 2 — This easy-to-build antenna mount allows easy storage of your mobile antenna in the trunk. It was designed by WA1QHZ and W1VOV

obstructions between the mobile transmitter and the repeater.2

Unless you're planning to do a great deal of operating on a repeater's fringe area, 3 a 5/8 whip should be adequate. Combined with a 10-watt mobile rig, the signal will usually be sufficient to reach most local repeaters.

Home-station antennas for 2-meter fm work differ little from their mobile counterparts, with two exceptions: Yagis and quads are sometimes used, and mounting is different. Several antennas suitable for home-station use are described in FM and Repeaters for the Radio Amateur.⁴ Instructions also are included for modifying a CB mobile antenna to a 5/8 whip for 2-meter fm.

One advantage of home stations over mobile is the feasibility of using beams. No mobile antenna can match a directional beam in bringing weak signals above the noise level. Stations using beams can sometimes reach other 2-meter stations hundreds of miles away, as well as low-powered mobile stations up to, perhaps, a hundred miles away.

Mounts

With the popularity of mobile

Gain and the 2-Meter Operator

While some of us are lucky enough to live within five miles or so of our favorite repeater, most of us aren't. To get into a distant machine consistently without using a power amplifier, you need a gain antenna.

As explained in the text, a gain antenna focuses power from your transmitter in a desired direction. Gain is determined by measuring this characteristic of an antenna against a half-wavelength dipole.

Measured in decibels, gain is a unit of relative power. A change of 1 decibel is just detectable under ideal conditions.

Compared to the dipole, a quarter-wave groundplane (actually a quarter-wave whip above a groundplane) has -1.8-dB gain, while a 5/8 antenna measures 1.2-dB over the dipole. Thus, the 5/8-wave antenna measures 3.0-dB above the quarter-wave (1.8 + 1.2 dB).

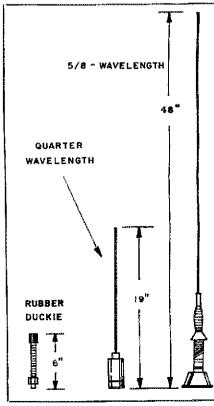


Fig. 3 — Three common 2-meter fm antennas.

Operating a Synthesized Rig

One of many synthesized, 2-meter fm rigs on the market, the Heathkit HW-2036A is a popular transceiver featuring 4-MHz coverage. It is available only in kit form. To gain a better understanding of how to operate this type of rig, we will look at this particular model in detail. Most of its features can be found on models offered by other manufacturers.

Like its "rockbound" (crystal-controlled) cousin, the HW-202, this transceiver features an S meter to provide a relative indication of incoming and outgoing signal strengths squeich and volume controls. But there the similarity ends.

three thumbwheel switches are set to the frequency of your choice. If you choose 6-8-2, for example, your operating frequency is 146.82

Instead of turning a channel-selector switch.

operating has come a wide variety of mounts used to attach your antenna to your car. Mobile mounts can be purchased or built (see Fig. 1); some antennas come with mounts, but others don't.

If you're like many people, you won't want to drill a hole in your roof or rear fender unless you have to. Several types allow you to avoid this procedure. A raingutter mount is easy to install and remove. while a trunk-lip mount may have a hinge to allow storing the antenna in your trunk without removing it. Larger antennas may require a bumper mount. If you don't mind drilling a hole in the middle of your roof, many quarter-wave antennas come with mounts that require a 3/4-inch hole. Omnidirectional coverage is improved with an antenna placed at this location.

With all but the quarter-wave whip, a spring-loaded base is recommended to avoid having the antenna snap when it brushes against trees or other obstacles.

Feed Lines and Connectors

Since feed-line losses are frequencydependent, it is best to avoid using RG58/U or RG59/U for vhf applications except for runs of less than 25 feet. A good rule of thumb to follow for home stations is to use the feed line with the least loss. Since low-loss coax is somewhat more expensive, however, cost may be a consideration. RG8/U is a good compromise.

The most common connectors for vhf mobile installations are the PL-259 and BNC. Special, quick-disconnect fittings are an added convenience, as they make it easy to remove a mobile rig into a briefcase or trunk when you leave the car. If you operate a handheld in a car, it's a simple matter to carry it with you when you leave. You'll prevent theft and expand your 2-meter operating capability at the same time.

Amplifiers

A necessity for weak-signal work, amplifiers are used on fm for working repeaters in hilly terrain or over large distances. They commonly run from 40-to 150-watts output.

MHz. To transmit on 146.22, all you need do is move the offset (or Mode) switch to the -600 position.

To operate simplex at 146.94, you'd set the thumbwheels at 6-9-4, and turn the Mode switch to SIM. Moving it back to -600 kHz will allow you to operate a three-four/nine-four repeater.

Likewise, a seven-tive/one-five machine can be accessed by dialing in 7-1-5 and setting the Mode switch at +600 kHz. Provisions are also made for working the less-common 15-kHz and 1-MHz splits.

There's even a way to work your crystalcontrolled friends when the repeater is down. How? Simply by reversing the normal process of accessing the repeater. If it's a twotwo/eight-two machine; for example, you'll dial in 6-2-2 and switch the mode to ± 600 kHz.

This will bring your transmitter onto 146.82 MHz and your receiver onto 146 22 MHz

With the appropriate crystal plugged in to a spare socket inside the rig, nearly any kind of split is provided for. There is a Mode-switch position labeled AUX to take advantage of this feature.

Of special interest to 2-meter operators in metropolitan areas, the fone selector is an additional feature of the HW-2036A. Since most, if not all, common repeater pairs are used in cities such as New York, Los Angeles and Chicago, repeater clubs frequently resort to subaudible tones to avoid interference to machines on the same frequencies, Although 100 Hz is a standard frequency throughout the U.S. and Canada, others may be found as well. For this reason, the HW-2036A has selectable tones ranging from 70-to 200 Hz.

Are they difficult to operate? Not at all. Modern, commercially built, 2-meter amplifiers are simply placed between the rig and antenna. They operate on 12 volts. Antenna changeover is automatic: relays are not required.

It's a good idea not to attempt to use a high-power amplifier in your car before checking your car battery. A 40-watt amplifier will draw about 6 amperes at 13 volts. Likewise, if you have doubts about your home-station power supply's ability to handle the current drain, avoid using an amplifier with it.

Available from a number of suppliers, 2-meter amplifiers can be purchased in kit form or already wired and tested. Many dealers and manufacturers advertise their products in each issue of QST.

Multimode 2-Meter Gear

The ultimate in 2-meter operating is provided by the class of transceivers that use cw and single sideband as well as fm. Some also feature a-m. Their flexibility, wide frequency range (usually 4 MHz) and convenience are making them increasingly popular.

Why would anyone want to operate ssb on 2 meters? For one thing, there's OSCAR, the orbiting repeater that is accessed just below the repeater subband, at about 145.85 MHz. Since fm is an inefficient use of the satellite's "transponder," it is not recommended; cw and ssb are used for working through OSCAR.

Then there is weak-signal work such as moonbounce, briefly surveyed in Part 1 of this series. Nearly all of it is done on cw. and 2 meters is a favorite band.

One multimode transceiver available on the used market is the Kenwood TS-700A. A more recent version, the TS-700S, features digital readout and a receiver preamplifier. The ICOM IC-211 and IC-245 are also versatile multimode rigs. as are the Yaesu FT-221R, Tempo VHF/One Plus (with ssb converter), and KLM Multi-2700. Comparable equipment may also be available; check the display ads in QST.5 Precise specifications can be found in QST advertisements. Power output of these transceivers is approximately

The Technician License

If you're a Novice, you're already halfway to the next step, a permanent amateur radio license that will provide phone privileges on just about all of the 2-meter band. There's no need to pass another code test; just a 50-question exam, which you must take at a local FCC district office or additional examination site. The examicovers rules and regulations and intermediate theory pertaining to Technician and General class operating privileges

In addition to the 2-meter band, Technicians can operate on 6 meters and all the uhf bands. And you'll keep your Novice privileges, as well. The license is good for five years, and is renewable.

Once you hold a Technician license, all you'll have to do is pass a 13-wpm code test to qualify for the most popular amateur license, the General.

Experience has shown that the best way to upgrade is by taking a class. The ARRL sponsors Novice and General amateur radio classes in all 50 states and many provinces. For the name of an instructor near you, contact the ARRL Club and Training Department.

10 watts, making them ideal for repeater or simplex operation. Weak-signal work requires the addition of a power amplifier. and a good home-station antenna, however.

Having surveyed the rich variety of equipment available to the 2-meter enthusiast, we will look at some unique ways of operating on the band in the third and final part of this series.

Footnotes

Since autopatching is similar in many ways to using the telephone from your home, it can be easy to lose track of the fact that you are actually on the air. Guidelines governing the use of this privilege can be found in "FM Repeater News," QST for February, 1978. A list of autopatch guidelines also can be obtained free of charge from the ARRL. Please enclose a stamped, self-addressed envelope.

Picket-fencing occurs when the signal, reaching its destination by traveling over two or more paths, seems to change signal strength rapidly at the receiving station.

The area covered by a repeater is a function of its height above average terrain and the type of terrain hetween the transmitter and repeater, among other factors. It is common to hear reports of repeaters being accessed over distances of hundreds of miles in the Midwest and along the Continental Divide, but those distances are virtually impossible to cover in hilly regions such as the Northeast.

'FM and Repeaters for the Radio Amateur, ARRL, 1st ed., 1972, pp. 90-98, 213.
'See these QST "Product Reviews": Kenwood TS-

700A, March, 1976, p. 38; Kenwood TS-700S, February, 1978, p. 31; ICOM IC-245, September, 1977, p. 40; Yaesu FT-221, July, 1977, p. 46.

От России с Любови!* *From Russia with Love!

Why? QSLs, awards. What? The Krenkel Central Radio Club. Where? Box 88, Moscow, USSR.

By Ellen White,* W1YL

t's early spring. but Mikhail. UA3ADN, tells you how much it has snowed already this month in Moscow. He's one of the more active Soviet amateurs on 40-meter cw, and you recognize his precise fist and polite, inquisitive manner almost as quickly as his name and call.

Mikhail isn't unique; there are tens of thousands of Soviet hams just like him active, friendly and eager to work North Americans. With improving conditions and a wide range of frequencies and beam headings to choose from (the Soviet Union stretches across 10,900 km or 6800 miles!), you'll soon be collecting oblasts, chasing the republics and participating in your own 24-hour contest!

It won't take long to discover that Russian amateurs enjoy collecting operating awards as much as anyone. The best part about it is that anyone can qualify.

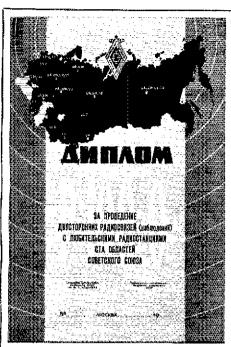
As the accompanying illustrations show, Soviet awards are as impressive as they are attractive. To apply, send your QSL cards, a cover sheet with your name, call, mailing address, the name of the award you are applying for, plus a list of confirmations (date, call, emission, frequency, reports) to Box 88, Moscow, USSR. Each application must be accompanied by 14 IRCs (the equivalent of 1 ruble) to cover the cost of the return of the cards by registered mail.

W-100-U

The W-100-U Award was established in 1959, on the occasion of the 100th anniversary of the birth of the great Russian scientist A. S. Popov. The award goal is to work 100 different USSR stations on one or any combination of bands 80-10 meters, including five stations in the ninth region. All contacts must be made either on cw or phone and have taken place on or after January 1, 1959. The QSLs must



^{*}Deputy Communications Manager, ARRL







carry reports no less than RST 337 or RS 33.

R-10-R

If you're looking for a 24-hour challenge, your own mini-contest, this is it! Work the following 10 regions on any one or more bands (cw or phone) during a 24-hour period. Required minimum reports are RST 337 or RS 33. Contacts must have taken place on or after July 1, 1958.

USSR Regions and Prefixes

Regions	Prefixes
1	UA, UN, UW
2	UA, UC, UP, UQ, UR
3	UA, UW, UV
4	UA, UW
5	UB, UO, UT, UY
6	UA, UW, UD, UG, UF
7	UL
8	UH, UI, UJ, UM
9	UA, UW, UV
ø	UA, UW

R-6-K

Here's a WAC, but with a twist! Confirm 12 contacts on ssb, cw or phone as follows: one contact each with Europe, Africa, North America, South America, Asia and Oceania plus three contacts with European Russia (UA1/UN1/UW1/UA2/UC2/UP2/UQ2/UR2/UA3/UW3/UV3/UA4/UW4/UB5/UO5/UT5/UY5/UA6/UW6) and three contacts with Asiatic Russia (UD6/UG6/UF6/UL7/U18/UJ8/UH8/UM8/UA9/UW9/UV9/UAØ/UWØ). Contacts must be dated on or after May 7, 1962.

The R-6-K Award consists of three classes: First Class, all contacts on 80 meters; Second Class, all contacts on 40 meters and Third Class, any amateur bands.

R-150-S

The Soviet version of a DXCC-and-a-half, requires contacts with 150 countries of the world, *including* the 15 republics of the USSR. Contacts count made on or after June 1, 1956. The usual minimum reports of RST 337 or RS 33. In general the Countries List for the award follows the ARRL DXCC list (available for an s.a.s.e. from Hq.).

Soviet Republics

Azerbaijan	Armenia	White Russi
Georgia	Kazakh	Kirghiz
Latvia	Lithuania	Moldavia
Tadzhik	Turkoman	Uzbek
Ikraine	Estonia	RSESR*

*includes both European and Asiatic Russia

R-15-R

Ready, set, go! This one represents another 24-hour sprint. Within that time span you must contact the 15 republics (see the list in the R-150-S section) on cw or phone only. Contacts must be dated on or after July 1, 1958, with the usual minimum reports of RST 337 or RS 33.

R-100-C

The R-100-O is challenging, requiring contact with 100 regions (oblasts) of the Soviet Union. Contacts must be made on

all cw or phone. The cards must carry minimum reports of RST 337 or RS 33. All contacts made on or after January 1, 1957, count.

The R-100-O Award consists of three classes: First Class, all contacts on 80 meters; Second Class, all contacts on 40 meters and Third Class, any amateur bands.

Cosmos

Honoring Yuri Gagarin, the first man in space, this particular award is the most difficult of the lot. Contacts must take place on 2 meters, on or after April 12, 1961, as follows: First Class, 30 two-way



USSR

Oblast List

001 Azerbaijan 002 Nakhichevan 003 Gorno-Karabakh 104 Armenia 005 Brestskaya 006 Vietebskaya 007 Gomeiskaya 008 Grodnenskaya 009 Minskava 010 Mogilevskaya 012 Georgia 013 Abkhazian 014 Adjar 015 South Ossetia 016 Celinogradskaya 017 Aktubinskava 018 Alma-Stinskaya 019 East Kazakhstanskaya 020 Gurievskaya 021 Jambulskaya 022 Uraiskaya 023 Karagandinskaya 024 Kizil-Ordinskava 025 Kokchetavskava 026 Kustanaidkaya 027 Pavoidarskaya 028 North Kazakhstanskaya 029 Semipalatinskaya 030 Taldy-Kurganskaya 031 Chimkentskaya 034 Oshkaya 036 Kirchiz

037 Latvia 038 Lithuania 039 Moldavia 040 Tadzhik 042 Gorno-Badakhstan 043 Turkoman 044 Marviskava 045 Tashauzskaya 046 Chardiouskaya 047 Andijanskava 048 Bukharskaya 049 Namanganskaya 051 Samarkandskaya 052 Surkham Darinskaya 053 Tashkentskava 054 Ferganskaya 055 Khorezmskaya 056 Kara-Kalpak 057 Vinnickaya 058 Volinskaya 059 Luganskaya 060 Dnepropetrovskaya 062 Zhitomirskava 063 Zakarpatskaya 064 Zaporojskaya

065 Kievskaya

067 Crimskaya

068 Lvovskaya

066 Kirovgradskava

069 Nikolaevskaya

070 Oddesskava

071 Poltavskava

072 Rovenskava 073 Doneckaya 074 Ivano-Frankovskava 075 Sumskaya 076 Ternopolskaya 077 Karkovskaya 078 Hersonskava 079 Hmeinickaya 080 Cherkasskava 081 Chernigovskaya 082 Chernovickaya 083 Estonia 084 Bashkir 085 Buryat 086 Daghestan 087 Kabardino-Balkarsk 088 Karelian 089 Kalmyk 090 Komi 091 Mari 092 Mordovian 093 North Ossetian 094 Tatar 095 Udmurt 096 Checheno-Ingush 097 Chuvash 008 Valout 099 Altai 100 Gorno-Altai Aut. 101 Krasnodar 102 Adigei Aut. 103 Krasnovarsk

104 Khakass Aut. 107 Primorve 108 Stavropol 109 Karachai-Cherkess 110 Khabarovsk 111 Jewish 112 Amurskaya 113 Arhagelskaya 115 Astrakhanskaya 117 Belgorodskaya 118 Brianskava 119 Vladimirskaya 120 Vologodskaya 122 Gorkovskava 121 Voronejskava 123 Ivanovskava 124 irkutskaya 125 Kaliningradskaya 126 Kalininskava 127 Kaluiskaya 128 Kamchatskaya 130 Kemerovskava 131 Kirovskava 132 Kostromskava 133 Kuibishevskaya 134 Kurganskaya 135 Kurskaya 136 Leningradskava 137 Lipeckaya 138 Magadanskaya 142 Moscow 143 Murmanskaya 144 Novgorodskava

145 Novosibirskava 146 Omskava 167 Orenburgskava 147 Orlovskava 148 Penzenskava 140 Permskaya 149 Pskovskava 150 Rostovskava 151 Riasanskaya 152 Saratovskava 153 Sakhalinskava 154 Sverdlovskaya 155 Smolenskava 156 Volgradskaya 157 Tambovskava 158 Tomskaya 159 Tuva 160 Tulskaya 161 Tiumenskava 164 Ulianovskaya 165 Cheliabinskaya 166 Chitinskava 168 Yaroslavskaya 169 Leningrad 170 Moscow 169 City Leningrad 170 City Moscow 171 Arctica 172 Antarctica 173 Syrdarinskaya

174 Úst. Ordynsky Buriats 175 Aginsky Buriatsky

contacts with 15 countries. EU stations must make 10 of the contacts with USSR stations, and five of those countries with USSR territories. Second Class, 20 twoway contacts with 10 countries. Here again EU stations face a greater degree of difficulty in that six of the contacts must be with Russian stations and three of the countries must be USSR territories. Third Class, five two-way contacts with five countries. EU stations must make two of the contacts with USSR stations and two of the countries with Russian territories. Extra blocks of five countries earn a

special "sticker" for the First Class award.

All the Soviet republics, 1, 3, 4, 6, 9 radio amateur regions as well as every oblast of the Soviet Far East and Siberia (Tiumen, Kurgansk, Omsk, Tomsk, Novosibirsk, Kemerov, Irkutsk, Chitinsk, Amur, Magadan, Kamehatka, Sakhalin oblasts; and Altai, Krasnoyarsk, the Primorye Territories, Yakut, Buryat-Mongolia, Tuva) are counted as separate territories for this award. All the other countries are counted according to the Countries List.

Су	rillic A	Aiphabet		
А Б В Г Д Е Ж 3	A B W G D E V Z	П К С М N O D E N I K C M N O	PRCTU VFH XCM MM	Ш ММ Щ о ы ү Ю ГМ Я АА ъ х Э UT

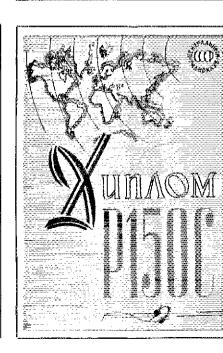
Some Common Phrases What to Send on CW

Thanks for the QSO Good day Good luck Goodby

Spasibo za QSO Dobryj denx Bsego Horommego Do swidaniaa (usuall abbreviated DSW)







PR Coup — NYC Marathon

When New York City hams decide to assist with a marathon, they do it right and they get credit for their efforts. Find out how you can get credit for the work that your group does.

By Steve Mendelsohn,* WA2DHF and Peter O'Dell,** WB8NAS

Amateur radio is allowed to exist because of acts of public service and (more subtly) because public officials are aware of the good deeds that amateurs do. Both authors have witnessed the frustration of other amateurs involved in public service work who wake up the day after only to find that credit has been given to a "local group of CBers."

Amateur radio recently got credit for playing a critical role in a giant event—the 1977 New York City Marathon. The marathon attracted over 5000 runners from all 50 states and from 38 foreign countries with many participants accompanied by a number of governmental "assistants" from their countries. It is estimated that over one million people lined the "course." Many saw amateurs (clearly identified as amateur radio operators) playing key roles. The marathon was covered by the local media, the wire services and the networks; many gave some credit to amateurs.

It is difficult for the outsider to estimate the complexity of organizing a communications network that would provide instant, reliable communications up and down the 26-mile, 385-yard course. It stretched from the Verrazano Narrows Bridge to Central Park, from the high rises along Fifth Avenue to the slums of the South Bronx.

The Planning Stages

Literally hundreds of hours of work went into the plans for the amateur participation in the marathon. The situation was far too complex for a last-minute effort to work.

In August of 1976 Len Duey, K2KRI and also a member of the Road Runners Club (RRC), which sponsored the marathon, attended a meeting of the Tri-State Repeater Council (T-SARC). He foresaw the amateur's (particularly T-SARC's) ability to provide RRC with concise, interference-free communica-





The command post at the finish line. Notice the amateur radio placards prominently displayed.

tions over a 26-mile course.

T-SARC is a very public-serviceoriented group; they reaffirmed this by voting overwhelmingly to provide their services for the 1976 New York City Marathon when K2KRI asked them. The 1976 race was much smaller in terms of everything but the distance. Yet it did provide T-SARC with some insight into what would be needed for a much larger race.

The amateurs held a "debriefing session" immediately after the race, but nothing was decided officially until the next regular meeting in January (1977). By then it was known that RRC intended to make this an annual event and that there would be an all-out push to make it the largest marathon in the world. At that meeting Steve Mendelsohn, WA2DHF,

was appointed to coordinate the plans of T-SARC with RRC.

In addition to being not a last-minute effort, it was not a "one-man-show" either. In some rather small, local events, one occasionally finds a single "leader" who makes all the decisions, makes all the plans, and generally does most of the work. When dealing with such a diverse group as T-SARC, nobody in his right mind would attempt to do all the work himself. From the beginning it was obvious that 150 to 200 volunteers would be needed. Volunteers love to cooperate and hate to be ordered about by a dictator.

As Steve brought more information back from RRC, T-SARC began to assign coordinators. Jerry Abrams, WA2ZEK, from WR2ACH on Staten Island, was in charge of efforts in his area. Dave Minott, WA2EXP, council president and representative from midtown's WR2ACD, took charge of the Queens and midtown portions of the race. Paul Vydareny, WB2VUK; Gary Kantor. WA2BAU: Pete Glenn, WB2YGT and Bob Grace, WB2MIY, were assigned to recruit people to fill in various spots along the course. The Long Island Mobile Radio Club (LIMARC) Amateur ultimately supplied over half of the 178 volunteers.

During this time Steve spent several hours each month attending various RRC meetings, where he listened a lot, attempting to find out in as much detail as possible what the RRC planned to be doing and what they thought they wanted the amateurs to do. Then he would meet with the hams and try to figure out how best to help the RRC meet their objectives.

Flexibility - Adjusting to Changes

It was necessary for T-SARC to stay very flexible during these early days (and up to the last minute, for that matter). RRC was dealing with dozens of city agencies, which meant tons of red tape for RRC. That, in turn, meant changes in plans.

There are, however, times not to be



Left to right: Bob Steinberg, WA2KHR; Phil Fiol, WB2BMC; Art Gerson, WB2IRA and Steve Mendelsohn, WA2DHF, discuss plans for keeping the press up-to-date before the marathon starts.

flexible. Probably, the most serious and amusing misunderstanding between RRC and T-SARC came when, shortly before the race, RRC requested an additional 40 hams. When Steve inquired what exactly the RRC wanted the additional 40 hams for, it was explained that they would be used to load baggage on buses that would carry the runners from the YMCA in midtown to Fort Wadsworth on Staten Island.

On the outside Steve remained calm while he explained that the hams were a highly trained, highly motivated group of volunteers with a great deal of pride in their ability to provide "professional" communications as a public service. Not only would such use of their talents be a waste, it would probably create a good deal of ill will. When working with the general public, amateurs need to have a lot of patience and be willing to do a lot of educating.

How It All Worked

The race was not simply a matter of a bunch of runners taking off and running 26 miles. Before the race could be run, the runners had to be transported from the midtown area to Staten Island — around 10 miles. During the race the streets had to be kept clear by the police. This meant that the police had to be informed of where the front-runner was. Perhaps most significantly, there was always the possibility of a downed runner; in cardiac cases, fast, reliable, concise communications could mean the difference between life and death.

The first of 30 buses was scheduled to leave the YMCA at 6:30 A.M., so T-SARC started setting up the control centers around 5 A.M. RRC has an office

on the fifth floor of the YMCA, so it seemed to be an obvious choice for one of the command posts. The finish line was in Central Park, about seven blocks away, so another command station was set up there.

A car, adequately equipped for full operation on 2-meter fm, was stationed at each mile marker of the race. Two operators were stationed at each car; one of the operators was equipped with a handheld unit. The result was flexibility.

At each five-mile point an additional operator with a handheld was stationed with the timing official. Several operators were used at the finish line. One car was assigned to follow each bus as it made its way to Fort Wadsworth, where other amateurs were assisting military personnel with traffic control. The list of details could go on for pages.

Amateur Visibility

Around 10 A.M. the toll plaza of the Verrazano Narrows Bridge began to fill with runners. At 10:25 the stragglers were still arriving. Allan Steinfeld, KL7HIR, carried a 2-meter handheld and listened to time signals being relayed to him from WWV. Exactly at 10:31, one minute past the designated starting time, Allan gave the word to the cadets from West Point who fired their cannon to signify the beginning of the race. (Obtaining a permit to fire a cannon in New York City is a story unto itself.) Thus, with a dash of showmanship, amateur radio provided the RRC officials with precise timing information for the start of the race.

ARRL had provided T-SARC with 200 bright yellow placards (5 × 14 inches) bearing the words "AMATEUR RADIO." Each car involved, each con-

trol station, each operator who desired one, was given one of these placards with the instructions to display it since it would be a "parking pass."

The most prominent vehicle displaying the placard was the lead car, which carried the Director of the Marathon Fred Lebow and other officials. Steve rode in this car and kept them in touch with the police and everyone else.

Other vehicles that made the route just in front of the runners were the press vehicles. Each press vehicle was also equipped with an amateur with a handheld unit. Hudson Director Stan Zak, K2SJO, was on one of the buses with the reporters. Stan carried packets of information with him that explained amateur radio. Each reporter was given one of these packets. Also, each ham had his handheld on all the time so that the reporters were able to hear aspects of the race that they would not have known about otherwise.

Throughout the city, hams with either handheld units or external speakers on their cars' rigs became the object of attention as groups formed around them to find out the latest details on the race. This was another of the intentional public-relations coups of the day.

These PR efforts were thought out well in advance, like the rest of the amateur operation. Steve had prepared for the RCC newsletter an article that described in detail what the hams planned to do. That newsletter was passed out to thousands of spectators on the day of the race. Key reporters were informed in advance of the role that amateur radio would play.

Resuits

Remembering that many of the runners were from foreign countries, perhaps the most significant comment came from the eventual winner who said after the race: "Every time I looked up I saw an official in a marathon jacket holding a walkietalkie and standing next to a car that said amateur radio. You guys did one heck of a job." Hopefully, the foreign runners carried this same message back to their homelands.

Summary

The larger the communications assignment, the more that the amateur leadership will have to plan in advance; however, it is absolutely necessary to maintain an attitude of flexibility because plans change up to the last minute. Volunteers love to cooperate but hate to be ordered about by a dictator. Maximum positive exposure for amateur radio can be gained if PR plans are also worked out well in advance.

Some of you may be wondering who won the marathon. The winner was Bill Rodgers, a 29-year-old native of Newington, CT. WHAT? WHERE? No. . . .?

Dr. Glen: An Uncommon Man

Dr. Glen Eschtruth used amateur radio to further his humanitarian ideals. He can serve as an inspiration for us all.

By Earl E. Weston, M.D.,* W8BXO

hen he delivered the banquet address at last year's annual meeting of MARCO, the Medical Amateur Radio Council, Dr. Glen Eschtruth, 9Q5GE, held his audience spellbound. The organization's president, Dr. J. Charles Jordan, K4IEP, later called the presentation "heart-tingling."

But Dr. Jordan was even more impressed with the speaker's selfless dedication to the people of Zaire, whom he served as a medical missionary for 16 years: "In this day of mounting hospital costs and concern about doctors' fees, he worked for nothing."

His work was far from finished when he was killed by rebel soldiers last spring. He died on his 49th birthday.

Dr. Glen, as his many amateur friends

*5655 Forman Dr., Birmingham, MI 48010

knew him, had been chief of surgery at Patrick Air Force Base, FL, before he and his wife, Lena, went to what was then called the Congo in 1961. While there, they brought a special brand of concern to the 100,000 people they cared for. During part of his time in Africa, Dr. Glen was the only physician in an area the size of Michigan, his home state.

His Hobby Helped

In times of emergency, and there were many, Dr. Glen relied on amateur radio to bring him into contact with experts in the field. In December, 1970, for example, he became one of the first amateurs to send electrocardiograms over the air; in this case a distance of 7000 miles from Zaire to W8BXO in Detroit, MI. In April, 1971, he obtained an orthopedic consultation for a young man whose leg had been chewed by a lion. A patient with a skull

fracture was saved in May, 1972, thanks to neurosurgical advice that came from K2JVA. At the time of his death, Dr. Glen was preparing to send medical information to K5CY via satellite.

For nearly 10 years, 9Q5GE and W8BXO kept twice-weekly skeds, which served to keep the isolated medical outpost in Kapanga abreast of the latest news of medical and nonmedical interest.

Aside from his missionary and healing work, Dr. Glen was a talented electronics handyman, building and maintaining much of his amateur equipment.

Working with another physician, Glen and Lena, 9Q5EL, a dietician, managed to establish rural clinics and greatly expand the medical facilities in northwestern Katanga province.

Well Rewarded

When we learned that Dr. Glen would



Dr. Glen built and repaired much of the equipment in his well-appointed shack. His emergency consultations to amateur friends in the U.S. and within Zaire helped make his medical tasks easier to bear. Among his other accomplishments, he was one of the first to send EKGs over the amateur airwaves.



A concerned mother can't bear to watch as her infant son receives Dr. Glen's expert medical care. During his 16 years in Zaire, 9Q5GE helped establish clinics to treat leprosy, tuberculosis and kwashiorkor (malnutrition).

be home during the summer of 1976, several ARRL and MARCO members arranged to have him speak at the meeting in Dallas, TX. I sent out 30 brief letters to members of MARCO who knew of his work, and more than two-thirds responded with donations to enable him to attend. Those of us who were in Dallas were well-rewarded. Aside from enjoying his companionship over several days, we were greatly impressed by his beautiful photographs and recordings.

Just before his death, the Eschtruths' 22-year-old daughter Martha, who had spent most of her life in Zaire with her parents, said of them: "They have a real commitment there. They love Zaire and the African people. It's a beautiful country. They are very dedicated. It's been home to all of us."

Lena Eschtruth now lives in St. Clair Shores, MI. She has not decided whether to return to Zaire, where her husband is buried, and his work left unfinished.

MARCO: Amateur Radio Lifeline

Whether a medical missionary in Africa needs a consultation from stateside specialists, or a Central American country urgently needs drugs and medicines in the wake of a devastating natural disaster, MARCO stands ready to help. Founded in 1966, the Medical Amateur Radio Council, Ltd., is a unique organization boasting 500 members. It is designed to meet the medical-electronics and radiocommunication needs of its members. They are licensed amateurs, and doctors, dentists or veterinarians (or holders of doctoral degrees who practice in a paramedical science).

Aside from assisting in medical emergencies, such as the Guatemalan earthquake in 1976, MARCO nets serve to relay medical, electronics and communication information of mutual interest across the country and around the world.

Affiliate membership is open to persons who either hold an amateur license or meet the professional requirements. For further information, contact William L. Sprague, M.D., WA6CRN, Secretary, MARCO, 8028 San Lucas Dr., Whittler, CA 90605.



9Q5GE wearing his Lunda headdress, given him when he and his wife, Lena, were made honorary chiefs of that tribe. The missionary couple were also the first white people to assist in the crowning of a new chief, in 1974,

Strays 🦦

MOONBOUNCE IN YU-LAND

☐ Thinking of moonbounce? Here's how members of the Radio Club Zagreb (Yugoslavia), YU2CNZ, put an EME (earth-moon-earth) station on the air. The group, YU2s, RGC, RGO and RMP, made their first contact with SM7BAE in Sweden on May 25, 1977.

Equipment includes a Yaesu FT-221 with a low-noise preamp (Siemens BFT66 bipolar transistor with 1.1-dB noise

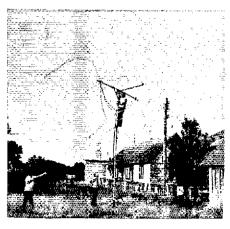
figure) to improve sensitivity and a Collins 51S-1 receiver to provide the needed selectivity. For transmitting, the FT-221 drives a 1.7-kW amplifier. (The YU power limit is 2000 watts.) Four F9FT Yagis totaling 64 elements make up the antenna array.

Located at a portable site about 32 km (20 miles) south of Zagreb, the equipment is transported back and forth to meet schedules. On the day of the first successful contact the headphones and electronic keyer were left behind, so the first EME QSO from Yugoslavia was made by pressing the push-to-talk switch on the microphone to send cw! — K1ZZ

NOTHING IS SOMETHING

☐ Soon after a fire last fall destroyed the house, barn and all personal possessions of Don Hawes, K7YLV and his family, of Scio, OR, various amateur groups were gathering emergency funds and goods to help them rebuild. Among those helping was the Nitwits Over The Hill Inspirational Nut Group, a ragchew net in the Pacific Northwest. Many had regularly contacted Don on the net, but had never met him in person. Besides material and monetary relief from 75 fellow amateurs, a complete station was donated by Bill Miller, W7PCB, of Hillsboro, OR. Other groups assisting were the Washington Amateur Radio Traffic System and the Oregon Emergency Network, — From the Salem (OR) Community Press

With a portable setup, three amateurs operate Yugoslavia's first moonbounce station. (YU2RTX photo courtesy of Savez Radioamatera Jugoslavije)



HELP WANTED

☐ Editor/writer needed to join *QST* staff as Features Editor. Journalism or related degree plus ham radio background needed. Work involves both original writing and editing contributed material. Contact Joel Kleinman, WAIZUY.

I would like to get in touch with . . .

amateurs, teenage through 20s (male or female), to be pen pals. Hobbies: electronics, ping pong, hocky, swimming and detective stories. "I believe in international friendship as a means of learning how things are getting on in other lands." John Abakah, West Africa Secondary School, Box 1880, Accra, Ghana.

Ed Martinson (left), WØGYH, receives congratulations from Glen Bartoo (right), WØNG, president of the Twin City (MN) DX Association, for completing a 5B-WAC effort on 160 meters. Soon after, Ed wrapped up 10 meters to earn the fifth endorsement, worldwide, for 6B-WAC.



Quiet Progress

Two events occurred in Hartford the week of January 18. One attracted headlines all over the country — "Coliseum Collapses"; the other has been unsung until now — the Board of Directors' annual meeting.

By Perry F. Williams,* W1UED

n contrast to some recent gatherings of the Board of Directors of ARRL, the annual meeting held January 19-20 was quiet. No devastating FCC dockets churned the consciousness of directors this time. Yet, important and useful decisions were made for the benefit of amateur radio and League members.

Over the years ARRL has been escalating its Washington presence in steps. We've had a Washington phone number for several years; an average of eight or 10 man-days per month of Headquarters staff and officer time has been spent in Washington over the past couple of years; a Hq. staffer has been putting in increasing hours as "Washington coordinator" since July and had been scheduled for full time (part of it in Newington) in that capacity by February. But the Board of Directors, feeling that full-time presence was also of importance, has now created the post of resident Washington, DC, representative. The President and the General Manager are to proceed immediately to write a position description and to seek from the ranks of the amateur community a qualified candidate. The Executive Committee is to approve both the job outline and the initial candidate selected for the post. Along the way, Board members will be kept posted on progress. Details are at Minute 40.

Elsewhere in Washington relations, ARRL will urge the Federal Communications Commission to seek Congressional approval for the use of qualified volunteers in its examination programs (Minute 57). An approach on this subject to FCC a few months ago netted the opinion of the FCC General Counsel's office that the Commission needed specific per-



A short break in the 1978 Annual Meeting of the ARRL Board allowed time for this photo. For brevity we'll identify participants by call only; see Minute 1 for the full list. Seated, from left, W9PRN, KØGA, W6ZM, W1RU, W2HD, W7PGY, W3SW, W1HHR, W1JFF, WØBWJ. Second row, W4LQE (with name badge), W4WHN (light coat), WØJCP, W4RA, KØHRZ, W1RW, K2SJO, W1QV, W8ETU, W4ACY, W5GM, W3KT. Third row, VE2VW, K1ZZ (in rear), W1UED, W4UG, VE3AR, VE3CJ, W1XT, WØFIR, W9NTP, W6EJJ, W4KFC, WØSIN, VE1SH, WB1CUJ, K7BT, W3PS.

mission from Congress; agencies such as the Federal Aviation Administration had secured passage of legislation allowing nongovernmental persons to assist. (Incidentally, an approach to Congress had already been made by ARRL on this point during Committee hearings on revision of the Communications Act, in September, 1977.) FCC will also be asked, in accordance with Minute 25, to allow 45 days for volunteer examiners to return Novice papers, as against 30 days now. A number of examiners had requested the action in the wake of poor postal service on the one hand, and strict enforcement of the 30-day rule by FCC, on the other. And to help ARRL clubs and officials keep better track of goings-on in Washington, Hq.

will prepare a quarterly update of dockets pending and petitions for rulemaking (RMs) awaiting FCC attention (Minute 50).

On another matter where, seemingly, officialdom's hands are tied—sales of amateur equipment to, and use by, unlicensed persons—ARRL's Board affirmed the grass-roots nature of the Code of Ethics movement. It directed the General Manager to publish from time to time information on those manufacturers and suppliers who have, through their actions, demonstrated a commitment to the principle of seeking means to limit the unlawful use of amateur radio equipment. Not only could such a list contain the names of those who have agreed to the

*Manager, Membership Services, ARRL

ARRL Code of Ethics, but it could also include dealers and manufacturers with programs of their own supporting the goals. The motion was first made at Minute 26, tabled there, but removed and adopted at Minute 58 after a thorough discussion of problems and potential problems posed by active promotion of amateur gear among nonamateurs.

Continuing on with organizational matters, the Board has asked (Minute 30) the Executive Committee to review outstanding directives and recommendations which require followup action by the staff, officers or committees and report the results to the Board. Material support for the ARRL Foundation was provided by the Board at Minute 41 when it canceled two previous loans totalling \$35,000. Official documents of the League came in for minor alterations: Bylaw 31 was changed (Minute 8) to move Ocean County, NJ, out of the Hudson Division into the Atlantic, in accordance with a poll of members there; and the rules governing advisory committees, numbers 4 and 7, were altered, specifying reappointment to committees for two-year terms, and clarifying the reporting of advisory committees to Board and staff (Minute 13). The rules under which membership lists can be furnished to League officials and affiliated clubs for noncommercial, fraternal purposes were combined and restated

Studies Ordered by the Board

If the Board did all the League's business during the meetings, they'd have to last weeks instead of days. But the more complicated or less-pressing issues are assigned to five standing committees and five advisory committees for attention between Board meetings. Some of this year's crop (with the minute number in parentheses): Membership Affairs - a study of the Hq. Awards Committee (27), use of mailing permits issued in the name of ARRL (47), and a possible book on radio equipment no longer on the new-equipment market (70); Plans and Programs - proposed Division Technical Coordinator (28), a no-code license with privileges above 220 MHz for microprocessor fans (51), and a possible Public Relations Advisory Committee (72); Management and Finance - financial aspects of the Life Membership program (52); the VHF Repeater and VHF/UHF Advisory Committees - joint study of band plans for 220 and 420 MHz, so these can be passed along for use in Region 2 (11); Contest Advisory Committee - shortwave listener participation in ARRL contests, a review of the rules and policies used in administering contests and compiling results (49), and the format and duration of hf contests; Emergency Communications Advisory Committees — two possible forms of Public Service awards to replace the one now issued by ARRL (56), ways to increase volunteer participation in the Amateur Radio Emergency Service (63), and adding practical guidelines, based on this past year's experiences, to the Emergency Coordinator Workbook (also 63). Hq. is to study ARES decals (34), and a possible booklet separate from the License Manual, containing Part 97 of the FCC Rules.

by the Board (Minute 35). The League also continued support to the Personal Communications Foundation with a grant of \$250 per month for six months. And the Board raised pensions of retired employees by the greater of 20 percent or \$50 per month to compensate for several years of inflation.

Turning to matters of more direct interest to members, the limit within which one can move without having to start over for the Worked All States and 5-Band Worked All States Awards was raised to 50 miles from 25 miles (Minute 48). ARRL official bulletins will continue to be mailed to official bulletin stations, per minute 39. Club competition in future ARRL sponsored contests will be possible on three levels, depending on geographical size of the area covered and on the number of contest entries (Minute 44), following a recommendation of the Contest Advisory Committee. A 60-year membership award will join the 25-, 40and 50-year awards already offered (Minute 88). Radio and TV broadcast stations which use ARRL public-service messages will receive a letter of appreciation signed by the President. Similarly, OST authors henceforth will receive Certificates of Recognition (Minutes 55 and 53). The Calendar of Events will appear in OST at least once per year (Minute 32) and timeliness will overtake technical/ nontechnical balance as a criterion for making up QST issues (Minute 74). And the Board asked that the log book be returned to the horizontal format, at as, reasonable a price as possible (Minute 45).

As with any organization, the work ends up being done by a finite number of volunteers, officers and staff and as usual some of these merit special attention in the minutes. The ARRL RFI Task Group was "commended for their contributions in quest of solutions in this difficult problem area" by the Board, who also expressed their continued support and encouragement of the Group. In a parallel move, the Board called also for the early completion of the ARRL RFI Handbook.

The ARRL Technical Excellence Award for 1976 was conferred on P. Rhodes, K4EWG and J. Painter, W4BBP, for "The Log-Yag Array" in December 1976 QST; honorable mention went to W. WB6FGR and Thomas, S. Belter, WN9SGP, for the series, "Meet the Microprocessor," in the August. September and October, 1976, issues (Minutes 36 and 37, respectively). Congratulations and appreciation were expressed to the members of the IARU Region 2 Executive Committee and to the editorial staff of the bilingual IARU Region 2 News at its first anniversary (Minute 68). In a formal resolution with five "Whereas" clauses (Minute 64), the Board extended its profound admiration and deep gratitude to Lenore Kingston Jensen, W6NAZ, a public relations assis-

"The Team" Reelected

The Board reelected its present officers for two-year terms, its present Executive Committee members for one-year terms, and returned three directors to the ARRL Foundation board for three years. Harry J. Dannals, W2HD, continues as president, supported by First Vice President Victor C. Clark, W4KFC and Vice Presidents Noel B. Eaton, VE3CJ and Carl L. Smith, WØBWJ, all of whom were reelected (Minute 15), (Noel and Vic continue under IARL rules as president and vice president, respectively, of the world organization; Vic is also currently president of the Region 2 group within IARU.) Similarly, Richard L. Baldwin, W1RU and John Huntoon, W1RW, carry on as secretary and treasurer respectively (Minute 16). The present honorary vice presidents now with life status as a result of a bylaw change since the last election - continue in office: David H. Houghton; Robert W. Denniston, WØDX; Robert York Chapman, W1QV; Wayland M. Groves, W5NW; Francis Edward Handy, W1BDI; Roemer O. Best, W5QKF and Charles Compton, WØBUO (Minute 17). Also reelected, at Minute 18, were the director members of the Executive Committee: Max Arnold, W4WHN; Richard Egbert, W8ETU; Ron J. Hesler, VE1SH and Robert B. Thurston, W7PGY. (The president, first vice president, and general manager are automatically members of the Executive Committee by virtue of office.) Directors of the ARRL Foundation named to three-year terms (Minute 22) are Messrs. Arnold, Egbert and Chapman, all of whom have served previously.

tant in the Southwestern Division since the inception of the appointment and ARRL's "ambassador to Hollywood and the networks." A century of professiona service to ARRL was recognized in resolutions (Minutes 86, 87, 90, 92 and 93 marking the 25th anniversaries of staffer Robert L. White, W1CW; Ellen White WIYL; Charles R. Bender, WIWPR and Margaret L. Crowe; and another 30 years by Leitha Phillips Tilton, who has now joined husband Ed, W1HDQ, in retire ment (if that is what you call it -- the Tiltons are on an ARRL membership contact trip in Florida as this copy is written!). The Board also expressed its thanks to Lewis G. McCoy, W1ICP, for his continuing efforts on behalf of the League and extended its sincere best wishes for ar early recovery from a heart attack suffered January 19.

And that's the summary. We recommend you peruse the full minutes, which follow this story. If you've got ideas for any of the matters being studied by a committee, send them to Hq. clearly marked (both on the envelope and on the suggestion) "For the Attention of the CAC" or whatever. All that remains to be said is: Yes, that coliseum which came crashing down was near our Holiday Inn. Yes. some directors were roused out of sleep by it, and we all got a good look from the 18th-floor elevator window! And yes, that was one whale of a snow! Many directors had to stay in Hartford well into the weekend. Anyone for Miami?

Moved and Seconded...

MINUTES OF THE 1978 ANNUAL MEETING OF THE BOARD OF DIRECTORS THE AMERICAN RADIO RELAY LEAGUE, INC. January 19-20, 1978

1) Pursuant to due notice, the Board of Directors of the American Radio Relay League, Inc., met in annual session at the Holiday Inn, Hartford, Connecticut, on January 19, 1978. The meeting was called to order at 9:30 A.M., with President Harry J. Dannals, W2HD, in the Chair, and the following directors present: Gar-field A. Anderson, K&GA, Dakota Division; Max Ar-nold, W4WHN, Delta Division; Charles M. Cotterell, W9SIN, Rocky Mountain Division; Richard A. Egbert, W8ETU, Great Lakes Division; Jack D. Gant, W5GM, West Gulf Division; Paul Grauer, WØFIR, Midwest Division; Ron J. Hesler, VEISH, WoFIR, Midwest Division; Ron J. Hesler, VEISH, Canadian Division; Jay A. Holladay, W6EJJ, Southwestern Division (Acting); Harry A. McConaghy, W3SW, Atlantic Division; Don C. Miller, W9NTP, Central Division; Larry E. Price, W4RA, Southeastern Division; William J. Stevens, W6ZM, Pacific Division; John C. Sullivan, W1HHR, New England Division; Robert B. Thurston, W7PGY, Northwestern Division; L. Phil Wicker, W4ACY, Roanoke Division; Stan Zak, K2SJO, Hudson Division Also in attendance as members of the Roard Roanoke Division; Stan Zak, K2SJO, Hudson Division. Also in attendance, as members of the Board without vote, were Victor C. Clark, W4KFC, First Vice President; Noel B. Eaton, VE3CJ, Vice President; Carl L. Smith, W6BWJ, Vice President; and Richard L. Baldwin, W1RU, General Manager. Also in attendance, at the invitation of the Board as non-participating observers, were the following Vice Directors: Jesse Bieberman, W3KT, Atlantic Division; Maurice O. Carpenter, K6HRZ, Rocky Mountain Division; Robert H. Dilworth III, W4LQE, Delta Division; C. Richard Dyas, W0JCP, Midwest Division; Fred Evans, W1JFF, New England Division; William W. Loucks, VE3AR, Canadian Division; Ednond A. Metzger, W9PRN, Central Division; and mond A. Metzger, W9PRN, Central Division; and Gay E. Milius, W4UG, Roanoke Division. There were also present Honorary Vice President Robert York Chapman, W1QV; Treasurer John Huntoon, W1RW; General Counsel Robert M. Booth, Jr., W3PS; Canadian Associate Counsel B. Robert Benson, QC, VE2VW; Assistant General Managers Robert Myers, W1XT and David Sumner, K1ZZ; Membership Services Manager Perry F. Williams, W1UED; and

Public Relations Consultant Don Waters, WBICUJ.

2) On motion of Mr. McConaghy, seconded by Mr. Sullivan, unanimously VOTED that the agenda is

adopted as presented.

3) On motion of Mr. Thurston, seconded by Mr. Cotterell, unanimously VOTED that the Minutes of the 1977 Second Meeting of the Board of Directors are approved in the form in which they were issued by the

4) Reports of officers were presented here. Highlights of President Dannals' report included the ARRL presentation before the House Subcommittee on Communications in September; the termination of the docket which might have put Class E CB activity in the 220 MHz band; possible expansion of operating privileges in the 160-meter band in the event Loran use of the band decreases; possible personnel changes within the Federal Communications Commission: FCC dockets pending; and preparations for the World Administrative Radio Conference in 1979. First Vice President Clark, who also serves as Vice President of the IARU and President of the IARU Region II Division, reported on WARC preparation at the international level; the Region II News; the forthcoming meeting of the IARU International Working Group in Geneva and the ITU Aeronautical Conference; contacts with Washington area officials; the work of the ARRL RFI Task Group; and general observations on the state of amateur radio and the League. More in-formation on WARC preparations in the international arena, and on IARU affairs, came from ARRL Vice President/IARU President Noel B. Eaton, VE3CJ. IARU meetings in Monrovia, Liberia, Monaco, Italy, and the Fox-Hunting Championships in Yugoslavia

were summarized. A tentative schedule of IARU travel for 1978 involving 7 ARRL officials was outlined. Vice President Smith spoke briefly, referring to an

earlier-written report.

5) General Manager Baldwin presented an extensive oral report. First came the status of the building addition, virtually complete at a cost to be around \$691,000, as compared with an original estimate of \$825,000. Membership growth, the training program, the public information program, U.S. preparations for WARC, 1977 financial results and the 1978 forecast, staff matters, the code of ethics, and internal communications rounded out the report. During the course of the above, the Board was in recess from 10:30 to 10:53 A.M., and again for luncheon from 12:10 to 1:25 P.M.

6) A preliminary report was presented by Treasurer Huntoon, particularly covering investments of Life Membership funds. A report was also presented by General Counsel Booth, mentioning the Personal Communications Foundation, Washington contact, legal matters pending in various courts and similar matters. Associate Counsel Benson reported in cor-responding vein on legal matters in Canada.

The Board was in recess from 3:10 to 3:30 P.M. 8) Mr. Zak, as Chairman, presented the report of the International Affairs Committee, which touched briefly on the travel of Headquarters personnel overseas, budgets and related matters for the World Administrative Radio Conference in 1979, and the change in call sign for the United Nations Radio Club

from K2UN to 4UIUN.

9) Mr. Arnold, as Chairman, spoke briefly for the Plans and Programs Committee. The Membership Af-fairs Committee report was presented by Mr. Wicker, as Chairman, covering assignments from the July 1977 meeting (Minute 24, Minute 44, Minute 47) and the September meeting of the Executive Committee, re non-profit mailing permits, Later in the meeting there was to be a motion on mailing labels and membership

lists; a report on insurance programs; and a motion for a change in geographic limits for WAS.

10) Mr. Egbert, as Chairman, presented the report of the Management and Finance Committee covering revisions in position descriptions for officers and the general manager; zero-base budgeting; the Commit-tee's function as the Board Audit Committee; a preliminary analysis of Life Membership reserves; Headquarters building addition costs; League investments and investment policy; 1977 travel expenses and 1977 financial results. The report of the Legal & Regulatory Committee was presented by its Chairman, Mr. McConaghy, primarily in response to Minute 43, of the July 1977 meeting concerning practical guidelines governing the nature of antenna cases in which ARRL can most effectively provide legal

assistance and support.

11) Vice President Smith, as Liaison, reported briefly for the VRAC. On motion of Mr. Clark, seconded by Mr. Thurston, unanimously VOTED that the VHF/UHF Advisory Committee and VHF Repeater Advisory Committee develop and present to the president by April 1, 1978, recommended band plans for the 220 and 420 MHz amateur bands, which can be used to encourage uniformity in the use and occupancy of these bands throughout ITU Region II. Mr. Zak, as Liaison, presented the report of the Contest Advisory Committee, including the new UHF and Earth-Moon-Earth Contests; club competition; the IARU Radio Sport Competition; use of channelized fm in VHF contests; and a full scale review of the DX Competition, presently underway and due to be completed in 1978. Moved, by Mr. Zak, seconded by Mr. Grauer, that the report of the CAC be accepted, but after discussion, with the consent of his second, Mr. Zak withdrew the motion.

12) Mr. Milius, as Liaison, presented a report of the DX Advisory Committee covering country status of Geyser Reef, Saudi Arabia Neutral Zone, Spratly Islands, Transkei, Southern Sudan, Water Islands, and Pribilof Islands. Also discussed were deletions of inactive countries, countries which do not issue amateur licenses to their citizens, and the status of unusual miscellaneous areas. Other discussions of the

Committee were also summarized in the report. 13) Mr. Arnold, as Liaison, reported briefly for the Emergency Communications Advisory Committee. The report covered study of an automatic calling device, the Gateway Program for international emergency traffic, standard emergency autopatch code, RACES, and a worldwide alerting procedure. On motion of Mr. Clark, seconded by Mr. Holladay, it was VOTED that Rule 7 of the "Rules and Regulations Concerning Advisory Committees" shall be amended to read as follows: "7. Advisory Committee authority shall be limited to the preparation of recommendations within its specialty area, based upon consultation with segments of the membership and upon Committee studies; these are to be presented to the staff and/or Board as appropriate to the situation. Advisory Committee recommendations may be solicited by Board motion, or, during intervals between Board meetings, by the Executive Committee or the President, Such solicitations should specify when and to whom the recommendation is to be presented. Advisory Committee recommendations may also originate with the Committee itself, although assignments by the Board shall take precedence. If not otherwise specified, and insofar as possible, reports and recommendations shall be submitted for Board consideration 30 days prior to each scheduled meeting of the Board." On further motion of Mr. Clark. seconded by Mr. Zak, unanimously VOTED that Rule 4 of the "Rules and Regulations Concerning Advisory Committees" shall be amended to read as follows: "4. Members may be reappointed for not more than one additional two-year term, but are again eligible for appointment to Committee membership after a lapse of one year." In the absence of Mr. Griggs, Mr. Holla-day presented a brief oral report on the VHF/UHF Advisory Committee. Its review of ARRL band plans is still in progress.

14) Mr. Clark, as Liaison, reported briefly for the RFI Task Group. On motion of Mr. Wicker, seconded by Mr. Sullivan, unanimously VOTED that the Board endorses continued support and encouragement for the efforts of the ARRL RFI Task Group, calls for the early completion of the ARRL RFI Handbook, and commends the volunteer members of the Task Group for their contributions in quest of solutions in this difficult problem area. Mr. Holladay, as Chairman, reported for the Amateur Satellite Service Committee. summarizing Oscar 6 and 7 activities, and plans for

Amsat Oscar D and the Phase III satellites.

15) The Chair announced the opening of nomina-tions for the office of President and named Messrs. Metzger and Chapman as Tellers. Mr. Thurston nominated Mr. Dannals. Mr. Price nominated Mr. Clark, who declined the nomination. On motion of Mr. Zak, seconded by Mr. Stevens, unanimously VOTED that nominations are closed. The Tellers announced the result of the balloting as follows: 16 votes for Mr. Dannals with no blanks. Whereupon, Harry J. Dannals, W2HD, was declared elected President of the League for the ensuing term (Applause). The The League for the ensuing term (Appliause). The Chair announced the opening of nominations for the office of First Vice President. Mr. Egbert nominated Mr. Clark. On motion of Mr. Zak, seconded by Mr. Wicker, it was unanimously VOTED that nominations are closed. The Tellers announced the result of the are closed. The Tellers announced the result of the balloting as follows: 16 votes for Mr. Clark, with no blanks. Whereupon, Victor C. Clark, W4KFC, was declared elected First Vice President of the League for the ensuing term (Applause). The Chair announced the opening of nominations for an additional Vice President. Mr. Sullivan nominated Mr. Eaton. On protion of Mr. McConschu, seconded by Mr. Eaton. motion of Mr. McConaghy, seconded by Mr. Egbert, unanimously VOTED that the nominations are closed. thanimously VOTED that the nonmanous are closed. The Tellers announced the result of balloting as follows: 15 votes for Mr. Eaton, one blank. Whereupon, Noel B. Eaton, VE3CJ, was declared elected as Vice President of the League for the ensuing term (Applause). The Chair announced the opening of nominations for an additional Vice President. Mr. Ar-nold nominated Mr. Smith. On motion of Mr. Sullivan, seconded by Mr. McConaghy, unanimously VOTED that nominations are closed. The Tellers anworld that nonlinations are closed. The feliefs and nounced the result of balloting as follows: 16 votes for Mr. Smith, with no blanks. Whereupon, Carl L. Smith, WØBWJ, was declared elected Vice President of the League for the ensuing term (Applause).

16) The Chair announced the opening of nomina-tions for the office of Secretary. Mr. Wicker nominated Mr. Baldwin. On motion of Mr. Zak, seconded by Mr. Anderson, unanimously VOTED that the nominations are closed. The Tellers announced the result of the balloting as follows: 15 votes for Mr. Baldwin, with one blank. Whereupon, Richard L. Baldwin, W1RU, was declared elected Secretary of the League for the ensuing term (Applause). The Chair announced the opening of nominations for the office of Treasurer. Mr. Anderson nominated Mr. Huntoon, On motion of Mr. Egbert, seconded by Mr. Zak, unanimously VOTED that the nominations are closed. The Tellers announced the

result of balloting as follows: 16 votes for Mr. Huntoon, with no blanks. Whereupon, John Huntoon, WIRW, was declared elected as Treasurer of the

League for the ensuing term (Applause).

17) The Chair announced the openings of nominations for Honorary Vice Presidents (in addition to David H. Houghton who continues to serve). Mr. Grauer nominated Mr. Denniston. Mr. Sullivan nominated Mr. Chapman. Mr. Gant nominated Mr. Groves. Mr. Eaton nominated Mr. Handy. Mr Groves, Mr. Baton nominated Mr. Handy, Mr. Anderson nominated Mr. Compton, Mr. Arnold nominated Mr. Best. Whereupon, without dissent, Wayland M. Groves, W5NW; Roemer O. Best, W5QKF; Robert York Chapman, W1QV; Francis E. Handy, W1BDI; Robert W. Denniston, WØDX; and Charles Compton, WØBUO, were declared elected as Nanacasta Vice Presidents (A product).

Honorary Vice Presidents (Applause).

18) The Chair announced that the Board would now proceed to the election of four directors to the Exccutive Committee for the ensuing year. Mr. Mc-Conaghy nominated Mr. Hesler, Mr. Gant nominated Mr. Arnold, Mr. Grauer nominated Mr. Anderson. Mr. Wicker nominated Mr. Egbert, Mr. Hesler nominated Mr. Thurston, Mr. Egbert nominated Mr. McConaghy, Mr. Price nominated Mr. Zak, but Mr. Zak declined the nomination. On motion of Mr. Stevens, seconded by Mr. Cotterell, unanimously VOTED that the nominations are closed. The Tellers announced the results of the first ballot as follows: Mr. Arnold, with 14 votes, Mr. Egbert, with 13 votes, and Mr. Hesler, with 11 votes, were elected. On the second ballot, Mr. Thurston was elected with 9 votes.

19) The Board was in recess from 6:00 to 8:05 P.M.

for dinner, reconvening with all attendees present except Messrs. Metzger, Clark and Gant.
20) On motion of Mr. Sullivan, seconded by Mr. Anderson, it was unanimously VOTED that the reports of the officers and directors of the League are

accepted and the same placed on file.

21) At this point the following committee appointments were announced: International Affairs Committee, Mr. Zak, Chairman, Mr. Griggs, Mr. Hesler. Plans and Programs Committee, Mr. Anderson, Chairman, Mr. McConaghy, Mr. Wicker Membership Affairs Committee, Mr. Gant, Chairman, Mr. Cotterell, Mr. Stevens. Management and Finance Committee, Mr. Arnold, Chairman, Mr. Grauer, Mr. rice, Mr. Sullivan. Legal and Regulatory Committee, Mr. Egbert, Chairman, Mr. Miller, Mr. Thurston.

22) Mr. Egbert, as Chairman, reported for the Official Availability Committee with respect to the ARRL Foundation. Nominations for director of the Foundation were declared open, Mr. Arnold nominated Mr. Egbert, Mr. Anderson nominated Mr. Zak, Mr. Sullivan nominated Mr. Chapman, On motion of Mr. Thurston, seconded by Mr. Cotterell, unanimously VOTED that nominations are closed and the foregoing elected as directors of the ARRL Foun-

dation for three-year terms.

23) On motion of Mr. Sullivan, seconded by Mr. Egbert, unanimously VOTED that the Membership Affairs Committee establish criteria for the selection, nomination and election of Honorary Vice Presidents and present it to the Board at its July meeting. During the course of the above, Mr. Clark entered the meeting, at 8:18 P.M.

24) On motion of Mr. Stevens, seconded by Mr. McConaghy, unanimously VOTED that the Contest Advisory Committee make a study on the possibility of adding a shortwave listener classification, with suitable awards, to either the DX or Sweepstakes Contests and report its findings to the July, 1978, meeting

of the Board.

25) On motion of Mr. Wicker, seconded by Mr. Mc Conaghy, VOTED that ARRL request the Federal Communications Commission to modify Part 97 of the regulations governing the Amateur Radio Service to extend from 30 to 45 days the period allowed for Novice examinations by volunteeer examiners. Mr. Hesler abstained, During the course of the above, Mr. Metzger entered the meeting at 8:25 P.M

26) Moved, by Mr. Price, seconded by Mr. Arnold, that the General Manager is directed to publish from time to time information on those manufacturers and suppliers who have, through their actions, demonstrated a commitment to the principle of seeking means to limit the unlawful use of amateur radio equipment. After discussion, on motion of Mr. Egbert, seconded by Mr. Zak, VOTED that the matter is laid on the table. Mr. Price and Mr. Cotterell requested to be recorded as voting against the motion to table

27) Moved, by Mr. McConaghy, seconded by Mr. Grauer, that the membership of the Headquarters Awards Committee be modified to include the Board Liaison members and the Chairman of the Contest Advisory Committee and the DX Advisory Committee, and that the Committee be renamed the ARRL Awards Committee. After discussion, on motion of Mr. Price, seconded by Mr. Sullivan, it was unanimously VOTED to amend the motion by striking

the text and substituting therefor the following: "The Membership Affairs Committee is directed to study the function and composition of the Headquarters Awards Committee and to report its findings at the July meeting of the Board," Whereupon, the question being on the motion as amended, the same ADÓPTED.

28) On motion of Mr. Miller, seconded by Mr. Holladay, VOTED that the Plans and Programs Committee study and report to the July Board meeting the formation of a position of Technical Coordinator (TC) in each Division, to coordinate technical activities, provide suggestions for technical speakers, League technical radio nets, provide consultation to other amateurs, and suggest articles of technical interest to the QST staff. The Technical Coordinator would have assistants in various technical categories to help him. This position already exists in many areas, but the ARRL recognition would put the ARRL in a forward position for recognizing "giants."

29) Moved, by Mr. Anderson, seconded by Mr. Stevens, that Article 6 of the Articles of Association be amended by striking the words in line 8, "but no less often than quarterly." After discussion, on motion of Mr. Price, seconded by Mr. Sullivan, tion of Mr. Price, seconded by Mr. Sullivan, unanimously VOTED that the matter is laid on the

30) On motion of Mr. Arnold, seconded by Mr. Holladay, VOTED that the Board instructs the Executive Committee, as one of its continuing responsibilities, to review outstanding directives and recommendations which require followup action by the staff, officers or committees; further, that the Ex-ecutive Committee, following each of its meetings, shall report to the Board by a Directors' Letter or other appropriate channels, the results of its review.

31) Moved, by Mr. Zak, seconded by Mr. Cotterell, that By-Law 25 is amended by deleting from the territory of the Hudson Division in the listing of counties of the State of New Jersey, "Ocean." A roll call being required, the question was decided in the affirmative, 15 votes in favor to none opposed. All of the directors voted in the affirmative, except Mr. Gant, who was absent. So the By-Law was amended, in effect transferring Ocean County to the Atlantic Division.

32) On motion of Mr. Grauer, seconded by Mr. Sullivan, unanimously VOTED that the calendar of major ARRL operating events and conventions be published in QST at least once a year. The Board recessed at 9:15 P.M., reconvening at 8:30 A.M., January 20, 1978 in the same place, with all persons herein before mentioned present except Mr. Huntoon.

33) Moved, by Mr. Sullivan, seconded by Mr. Mc-Conaghy, that the Board accept the DXAC recom-mendation for single mode DXCC contacts. After discussion, on motion of Mr. Smith, seconded by Mr. Price, VOTED that the matter is laid on the table. Mr. Sullivan requested to be recorded as voting opposed.

During the course of discussion, Mr. Huntoon joined the meeting, at 8:51 A.M.

34) On motion of Mr. Stevens, seconded by Mr. Thurston, unanimously VOTED that the General Manager investigate the possibility of making available to members ARES decals similar in design and colors to the ARES shoulder patch, and to report

and colors of the Nation Shoulder patch, and to report his findings by the July 1978 meeting of the Board.

35) On motion of Mr. Wicker, seconded by Mr. McConaghy, unanimously VOTED that the "Addendum to Membership Affairs Committee Report" as distributed is adopted as the policy governing the availability from Headquarters of lists of ARRL members and affiliated clubs.

36) On motion of Mr. Cotterell, seconded by Mr. Price, unanimously VOTED that the 1976 ARRL Technical Excellence Award for QST articles is hereby enthusiastically conferred upon P. Rhodes, K4EWG and J. Painter, W4BBP for their article "The Log-Yag Array" appearing in the December 1976 issue of

OST.
37) On motion of Mr. Smith, seconded by Mr. Cotterell, unanimously VOTED that the Board endorse the articles in August, September, and October 1976 QST entitled "Meet the Microprocessor" written by W. Thomas, WB6FGR, and S. Belter, WN9SGP, for Honorable Mention in the consideration and selection of a winner for the ARRL Technical Excellence Award for 1976

38) On motion of Mr. Price, seconded by Mr. Smith, unanimously VOTED that the Secretary shall publish each year an "Annual Report of the ARRL' which shall consist of a compilation of the Annual Reports of Directors required by By-Law 12, Reports of the Officers, Audited Financial Statements of the League, and a comprehensive review of operations for the year just ended as well as such additional material as the Secretary shall from time to time determine.

39) On motion of Mr. Holladay, seconded by Mr. Stevens, unanimously VOTED that the Communications Manager be directed to continue the practice of mailing official bulletins to duly appointed Official Bulletin Stations.

40) Moved, by Mr. Miller, seconded by Mr. Mc-Conaghy, that the Board instructs the President and the General Manager to proceed immediately to establish the position of Resident Washington, D.C., Representative for ARRL, to prepare a suitable position description for this new function and to seek, from the ranks of the amateur community, a qualified candidate; further, that the position description and the initial candidate selected for this position be approved by the Executive Committee and that the Board be kept fully informed on the progress of this undertaking. After discussion, moved, by Mr. Ar-nold, seconded by Mr. Egbert, that the Legal and Regulatory Committee, in conjunction with the General Counsel and the General Manager, study the establishing of such a position; but the motion to amend was lost. Whereupon, the question being on the original motion, the same was ADOPTED.

41) Moved, by Mr. Anderson, seconded by Mr. Zak, that the Board of Directors authorizes the cancellation of the loan to the ARRL Foundation authorized by Minute 38 of the 1976 Annual Meeting and the advance authorized by Minute 55 of the 1974 Annual Meeting. After discussion, moved by Mr. Grauer that the matter be laid on the table; but there was no second, so the motion to table was lost. Whereupon, the motion was ADOPTED. Mr. Grauer

requested to be recorded as voting opposed. 42) The Board was in recess from 10:06 to 10:30

A.M., at which point Mr. Gant, who was ill, left the

43) On motion of Mr. Egbert, seconded by Mr. Sullivan, unanimously VOTED that the Board adopt the revised position descriptions developed by the Management and Finance Committee for the President, Vice Presidents and General Manager and that these be included in the Directors' Workbook.

44) On motion of Mr. Zak, seconded by Mr. Wicker, unanimously VOTED that the Contest Advisory Committee recommendation of a three-tier club

competition plan be implemented as outlined in the Committee's Annual Report.

45) On motion of Mr. Grauer, seconded by Mr. Price, unanimously VOTED that the Log Book reverlack to the horizontal format, and that it be priced as economically as possible.

46) Moved, by Mr. Sullivan, seconded by Mr. Grauer, that advisory committees be allowed to communicate among their membership by telephone, in-dividually or by conference call, with the approval of the General Manager, on urgent or important matters, funding for this means of communication not to exceed \$400. After discussion, on motion of Mr. Anderson, seconded by Mr. Thurston, VOTED that the matter is laid on the table. Mr. Sullivan requested to

be recorded as voting opposed to the motion to table.

47) On motion of Mr. Wicker, seconded by Mr. Thurston, unanimously VOTED that the Membership Affairs Committee develop a policy and/or guideline defining the permissible use of mailing permits obtained in the name of the ARRL for consideration at the

next meeting of the Board.
48) On motion of Mr. Cotterell, seconded by Mr. Sullivan, VOTED that, because of the continually expanding size of large urban areas, the mileage limits of twenty-five miles in the rules governing Worked All States and Five Band Worked All States be changed to

49) On motion of Mr. Price, seconded by Mr. Zak-unanimously VOTED that the Contest Advisory Committee is requested to review the rules, regulations and policies used for the administration of ARRL sponsored operating activities, including but no limited to the criteria for rejecting submitted logs, and to submit a report prior to the July meeting of the

50) On motion of Mr. Holladay, seconded by Mr. Stevens, unanimously VOTED that the Genera Manager be directed to prepare a periodic listing of rulemaking petitions and other actions pending before the FCC which pertain to amateur radio together with a brief summary of their current status. This summary is to be issued at least quarterly, with distribution to include officers, directors, assistant directors and af filiated clubs.

51) On motion of Mr. Miller, seconded by Mr. Mc Conaghy, unanimously VOTED that the Plans and Programs Committee study the possible licensing (no code) of microprocessor enthusiasts in the VHF/UHI

bands and report to the July Board meeting.
52) On motion of Mr. Egbert, seconded by Mr.

Sullivan, unanimously VOTED that the Managemen and Finance Committee, in collaboration with the General Manager and Treasurer and seeking such other expertise as they deem appropriate, review the status of the Life Membership program, and report the findings to the Board at its July 1978 meeting.

53) On motion of Mr. Zak, seconded by Mr. Egbert, unanimously VOTED that an appropriate certificate of recognition be awarded to each author whose article has been accepted and published in QST

commencing with the January 1978 issue.
54) On motion of Mr. Sullivan, seconded by Mr. Egbert, it was VOTED to remove from the table the motion concerning Article 6 of the Articles of Association. Moved, by Mr. Anderson, seconded by Mr. Sullivan, that the motion be amended to read as follows, beginning with the second sentence: "The Executive Committee shall meet at the Call of the President, normally on a quarterly basis, but need not meet when a regular meeting of the Board of Directors is imminent." After discussion, on motion of Mr. Grauer, seconded by Mr. Zak, it was VOTED that the

matter is laid on the table.

55) On motion of Mr. Sullivan, seconded by Mr. Zak, unanimously VOTED that a letter of appreciation signed by the President be sent to radio and TV stations that use the ARRL public service messages.

56) Moved, by Mr. Sullivan, seconded by Mr. Zak, that the Public Service Award be replaced by two new awards, one for recognition for an amateur's contribution during an emergency and the second for outstanding or notable communications service to the public by an amateur. The General Manager shall provide suitable guidelines. These awards shall be made effective no later than July 1, 1979. After discussion, on motion of Mr. Smith, seconded by Mr. Thurston, it was VOTED that the matter is referred to the Emergency Communications Advisory Committee for study in conjunction with the Membership Affairs Committee, the report to be rendered at the July 1978

S7) On motion of Mr. Wicker, seconded by Mr. Holladay, unanimously VOTED, Mr. Hesler abstaing, that ARRL urge the FCC to seek necessary legislation from the Congress to enable use of volunteer assistance by qualified radio amateur and and a superior of the congress to enable use of volunteer assistance by qualified radio amateur and and a superior administering a mateur radio. radio amateur groups in administering amateur radio examinations in order to improve service without ad-

ditional cost to taxpayers.

58) On motion of Mr. Cotterell, seconded by Mr. Price, unanimously VOTED that the Board informally discuss the problems caused to the Amateur Service hy the sale of amateur transmitting equipment to those who have no valid FCC license to use it. During the course of the discussion, the Board was in recess from 11:42 to 11:52 A.M., and for function from 12:29 to 1:20 P.M. Mr. Gant rejoined the meeting at this time. At the conclusion of the discussion, on motion of Mr. seconded by Mr. Sullivan, unanimously VOTED to lift from the table the motion by Mr. Price concerning the unlawful use of amateur radio equipment. Whereupon, on motion of Mr. Price, seconded

by Mr. Arnold, the same was ADOPTED.

59) On motion of Mr. Price, seconded by Mr. Zak, unanimously VOTED that Robert M. Booth, Jr., W3PS, is appointed ARRL General Counsel for the

year 1978.

60) On motion of Mr. Hesler, seconded by Mr. Sullivan, unanimously VOTED that B. Robert Benson, QC, VE2VW, is appointed ARRL Counsel for Canada for the year 1978.

61) On motion of Mr. Price, seconded by Mr. Wicker, unanimously VOTED that John Sullivan, WIHHR, is appointed as parliamentarian of the

Board for the year 1978.

62) On motion of Mr. Holladay, seconded by Mr. Zak. VOTED that the General Manager is directed to initiate a Headquarters study on the feasibility, including marketing potential, of the ARRL publishing Part 97 of the FCC Rules and Regulations on a timely basis. Recommendations are to be presented at the July 1978 Board meeting.

63) On motion of Mr. Holladay, seconded by Mr. Arnold, unanimously VOTED that the Emergency Communications Advisory Committee is directed to carry out studies in the following areas: (a) Ways to promote increased participation in ARES activities, (b) Consideration that the next update to the Emergency Coordinator's Workbook include practical guidelines for emergency communications, based on disaster communications support during the past year. Recommendations are to be presented at the July

1978 Board meeting.
64) On motion of Mr. Holladay, seconded by Mr. Hesler, the following resolution was unanimously ADOPTED: WHEREAS, Lenore Kingston Jensen, W6NAZ, has served with notable distinction, dedication and resourcefulness as Southwestern Division Public Relations Assistance since the inception of the appointment, and WHEREAS, Lenore Kingston Jensen, W6NA7, has moreover, by virtue of her qualities and capabilities, contributed immeasurably to the enhancement of public recognition for amateur radio nationwide, and WHEREAS, Lenore Kingston Jensen, W6NAZ, through her recordings for the blind, providing direct contact with home for thousands of overseas servicemen, and in manifold other ways has rendered exceptional public services, and WHEREAS, Lenore Kingston Jensen, W6NAZ, in these many activities has exemplified the finest traditions of the Amateur Radio Service, now, therefore, IT IS HEREBY RESOLVED that the Board of Directors of the American Radio Relay League in Annual Meeting assembled does extend its profound admiration and deep gratitude to W6NAZ on behalf of the entire Amateur Community, 65) On motion of Mr. Gant, seconded by Mr. Zak,

unanimously VOTED that, in light of increasing numbers of participants, contact totals and the attendant logging and log-checking burdens, the Contest Advisory Committee is requested to undertake a study of the format and duration of HF operating competitions sponsored by ARRL and to make recommendations to the Board, prior to July 1, 1978, for any suggested changes.

66) Moved, by Mr. McConaghy, seconded by Mr. Holladay, that funds be contributed to the Personal Communications Foundation in the amount of \$500 per month for the first six months of 1978. This funding is in lieu of the second \$5,000 appropriation authorized by Minute 47 of the January 1977 Board meeting. After discussion, on motion of Mr. Price, seconded by Mr. Grauer, VOTED that the amount is amended to read \$250 per month. The question then being on the motion as amended, the same was ADOPTED. During the discussion Mr. Waters left the meeting, at 2:40 P.M.

67) Moved, by Mr. McConaghy, seconded by Mr. Holladay, that the expenditure of \$10,000 in the next six months be authorized to support litigation cases involving amateurs which, in the opinion of the Ex-ecutive Committee, may result in precedents either favorable or adverse to amateur radio. After discus-

ravorable of adverse to amateur ratio. After discussion, on motion of Mr. Grauer, seconded by Mr. Price, VOTED that the matter is laid on the table, 68) On motion of Mr. Hesler, seconded by Mr. Wicker, unanimously VOTED that the ARRL Board of Directors expresses its congratulations and ap-preciation to the members of the Region II IARU Ex-ecutive Committee and to the Editorial Staff of the Bilingual IARU Region II News upon completion of

its first publication year.
69) Moved, by Mr. Miller, that the Board instruct the General Manager to delete the "X" from "XYL" in all future publications of the ARRL. But there was

no second, so the motion was LOST

70) Moved, by Mr. Miller, seconded by Mr. Anderson, that the Board instruct the General Manager to publish a separate booklet showing photographs and specifications of used commercial equipment that may not be currently manufactured. After discussion, on motion of Mr. Sullivan, seconded by Mr. Thurston, unanimously VOTED that the matter is referred to the Membership Affairs Committee for study.

71) Moved, by Mr. Miller, seconded by Mr. Price, that the Board instructs the General Manager to print the classified ads in QST in larger print for easier reading. On motion of Mr. Zak, seconded by Mr. Egbert, unanimously VOTED that the matter is laid

72) Moved by Mr. Zak, seconded by Mr. Sullivan, that a Public Relations Advisory Committee is created. The purpose of this Committee shall be to ad-vise, provide information to the Board of Directors to provide guidelines for the functioning of the Public Relations Assistant appointments and to provide a common meeting ground for ideas and discussions relating to the most appropriate way of projecting the image of amateur radio to the general public pertinent organizations. The Advisory Committee shall concern itself but not necessarily limit itself to study and advise the Board on the most effective way of projecting the amateur radio image. This Commit tee shall undertake such tasks as directed from time to time by the Board of Directors that are within its general scope. All communications between and among the committee members and liaison personnel shall be by mail. After discussion, on motion of Mr. Price, seconded by Mr. Cotterell, VOTED that the matter is referred to the Plans and Programs Committee for study. Messrs, Sullivan and Zak requested to be recorded as voting opposed to the referral.

73) The Board was in recess from 3:05 to 3:24 P.M. 74) On motion of Mr. Zak, seconded by Mr. Cotterell, after discussion, VOTED that, in view of QST a historical journal documenting the complishments of our members by publishing infor-mation of everyday activities such as providing emergency communications and other forms of communications for public affairs, etc., it is therefore resolved that primary consideration shall be given to those articles, accepted for publication, of a timely nature and not necessarily to their technical or non-

technical content.
75) Moved, by Mr. Zak, that a long-range study be undertaken by the Plans and Programs Committee to, develop a plan for redistricting Divisions of the League at some future date. The study shall be made in conjunction with the Headquarters staff and should not limit itself to the existing 16 Divisions. But there was no second, so the motion was LOST.

76) Moved, by Mr. Zak, seconded by Mr. Wicker,

that the VRAC review the subject of frequency coordination with the possible designation of establishing a frequency coordination position, reporting to the Board at its July 1978 meeting. But, after discussion, the motion was LOST.

77) On motion of Mr. Grauer, seconded by Mr. Sullivan, unanimously VOTED that the General Manager is hereby authorized to reimburse the division directors for actual expenses incurred by them during the year 1978 in the proper administration of ARRL affairs in their respective divisions, up to the amounts as follows: Canadian Division, \$6,000;
Atlantic Division, \$5,600; Central Division, \$4,500;
Dakota Division, \$2,200; Delta Division, \$3,800;
Great Lakes Division, \$4,000; Hudson Division, \$3,500; Midwest Division, \$3,750; New England Division, \$4,000; Northwestern Division, \$4,200; Pacific Division, \$6,000; Roanoke Division, \$4,500; Rocky Mountain Division, \$2,100; Southeastern Division, \$6,350; Southwestern Division, \$6,000; West Gulf Division, \$4,500.

78) On motion of Mr. McConaghy, seconded by Mr. Arnold, unanimously VOTED that the additional sums of \$219.20 for the Canadian Division, \$204.30 for the Hudson Division, \$383.47 for the North-western Division, and \$19.16 for the Pacific Division, are authorized as additional reimbursible expenditures

during the year 1977.

79) On motion of Mr. Arnold, seconded by Mr. Cotterell, unanimously VOTED that to continue the Board's policy of reimbursing Section Communications Managers for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1978 a total amount not to exceed \$21,000, under terms prescribed by the Communications Manager, following the general pattern established by the Board.

80) On motion of Mr. Cotterell, seconded by Mr. Price, unanimously VOTED that to continue the Board's policy of reimbursing QSL Managers of League for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1978 a total amount not to exceed \$4,000, under terms prescribed by the General Manager, following the general pattern

established by the Board. 81) On motion of Mr. McConaghy, seconded by Mr. Zak, unanimously VOTED that the additional sum of \$3,723.15 for SCM and QSL Manager travel is authorized as additional reimbursible expenditures during the year 1977.

82) On motion of Mr. Arnold, seconded by Mr. Mc-Conaghy, unanimously VOTED that to continue the Board's policy of reimbursing Section Emergency Coordinators for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1978 a total amount not to exceed \$9,000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

83) On motion of Mr. Thurston, seconded by Mr. Egbert, VOTED that to continue the Board's policy of reimbursing National Traffic System Officials above the section level for certain approved travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1978 a total amount not to exceed \$6,000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

84) The Board was in recess from 4:30 to 4:39 P.M. 85) On motion of Mr. Sullivan, seconded by Mr. Zak, unanimously VOTED that the General Manager is directed to increase the monthly benefits of the

League's present retirees by 20 percent or \$50 per

month, whichever is greater.

86) On motion of Mr. Sullivan, seconded by Mr. Thurston, the following resolution was unanimously ADOPTED: WHEREAS, on September 22, 1977, Robert L. White, WICW and Ellen White, WIYL, completed a quarter-century of faithful service to the American Radio Relay League, and WHEREAS, WICW for most of that period has carried out conscientiously exacting duties as the guardian of the DX Century Club, and WHEREAS, that performance has been capped skillfully as creator and manager of a new QSL Service important to the members of ARRL, and WHEREAS, W1YL has built a reputation for thoroughness and objectivity on a mountain of contest logs, and WHEREAS, WIYL has progressed onward to intelligent and creative work as Deputy Communications Manager, now, therefore BE IT RESOLVED, that the Board of Directors of the American Radio Relay League, Inc., in Annual Meeting assembled this twentieth day of January, 1978 does hereby express its gratitude to Bob and Ellen White, for outstanding service and offer them warm

best wishes for the future,
87) On motion of Mr. Wicker, seconded by Mr. Eaton, the following resolution was unanimously ADOPTED: WHEREAS, since September 9, 1952, Charles Reay Bender, WIWPR, has been a voice of the American Radio Relay League through WIAW. and WHEREAS, his technical skill has been instrumental in maintaining the enviable record of reliability of the Station, and WHEREAS, his friendliness and humor have made him an ambassador of goodwill to thousands of visitors, now, therefore BE IT RESOLVED, that the Board of Directors of the American Radio Relay League, Inc., in Annual Meeting assembled this twentieth day of January, 1978 hereby warmly thank Charles Reay Bender, WIWPR, for his quarter century of service and wish him well for the future

88) On motion of Mr. McConaghy, seconded by Mr. Zak, unanimously VOTED that a 60 year Membership Award will be established similar to the

present 50 year Award. 89) The Board was in recess for dinner from 5:47 to 8:01 P.M., at which time all persons herein before mentioned reassembled with the exception of Messrs.

Dyas, Huntoon, Myers, and Waters.

90) On motion of Mr. Egbert, seconded by Mr. Sullivan, the following resolution was unanimously ADOPTED: WHEREAS, in August, 1977, Leitha Phillips Tilton retired after 30 years of loyal and conscientious service to the American Radio Relay League, and WHEREAS, her attention to exacting duties connected with publications of the League has greatly enhanced the reputation of the organization among the dealers in its technical works, now, therefore BE IT RESOLVED, that the Board of Directors of the American Radio Relay League, Inc., in Annual Meeting assembled this twentieth day of January, 1978 does hereby warmly thank Leitha Phillips Tilton for her faithful service, and wish her well for a long and healthy retirement.

91) On motion of Mr. Egbert, seconded by Mr. Thurston, VOTED that the firm of Ernst & Ernst is appointed ARRL Auditor for the year 1978; Mr. Price requested to be recorded as voting opposed.

92) On motion of Mr. Zak, seconded by Mr. 92) On motion of Mr. Lak, seconded by Mr. Wicker, the following resolution was unanimously ADOPTED: WHEREAS, on March 31, 1977 Margaret L. Crowe completed twenty-five years of diligent service to the American Radio Relay League, and WHEREAS, her skillful handling of matters pertaining to publications of the League has contributed materially to the reputation of the organization, now, therefore BE IT RESOLVED, that the Board of Directors of the American Radio Relay League, Inc., in Annual Meeting assembled this twentieth day of January, 1978 does heartily commend Margaret Crowe for her faithful service to the League and expresses its best wishes for the future.

93) During the course of the meeting it has been reported that Assistant Technical Editor Lewis G. Mc-Coy, WIICP, had been taken to the hospital on Thursday. On motion of Mr. Grauer, seconded by Mr. Zak, unanimously VOTED that the Board extends its heartfelt thanks to Lew McCoy for his continuously thanks to the McCoy for his continuously thanks thanks thanks the McCoy for his continuously thanks the McCoy for his tinuing efforts on behalf of the League, and extends its sincere best wishes for an early recovery.

94) All of those present were given the opportunity for informal closing comments. Whereupon, there being no further business, on motion of Mr. Sullivan, seconded by Mr. Thurston, the Board adjourned, sine die at 9:57 P.M. Total time in session as a Board, 16 52 minutes. Total direct authorizations, \$117,049.28.

Respectfully submitted, RICHARD L. BALDWIN, WIRU Secretary

MINUTES OF EXECUTIVE COMMITTEE MEETING No. 367 January 18, 1978

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 2:07 P.M. on January 18, 1978, at the Headquarters offices in Newington, Conn. 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, VEISH, and Robert B. Thurston, W7PGY; and General Manager Richard L. Baldwin, W1RU, Also Wars, Vice President Carl Smith, W@BWJ, Vice President Noel B. Eaton, VE3CJ, and a number of directors and vice directors.

On motion of Mr. Thurston, the Committee recognized the names of 195 individuals who had recently been elected to Life Membership, and instructed the General Manager to list their names in QST. The president noted with pleasure that King Hussein of Jordan, JY1, was one of those who had recently been elected to Life Membership in the

On motion of Mr. Egbert, the Committee approved the affiliation with the League of the following amateur radio societies: Amateur Radio Club, Bishop, CA; Amateur Radio Club, Polytechnic Institute of CA; Amateur Radio Clib, Polytechnic Institute of NY, Farmingdale Campus, NY; Ambridge Area School District ARC, Freedom, PA; Bald Knob Brass Pounders ARC, Beaver Dam, KY; Beaver Valley Amateur FM Association, Beaver Falls, PA; Billerica Amateur Radio Society, Billerica, MA; Bunker Ramo ARC, Westlake Village, CA; Central Junior High ARC, Quincy, MA; Central Michigan Contesters, Grand Blanc, MI; Claymont Amateur Radio Club, Grand Blanc, MI; Claymont Amateur Radio Club, Uhrichsville, OH; Club Radio Aficionados Boricua, Guaynabo, PR; Emporia Amateur Radio Society, Emporia, KS; Falcon ARC, Cerritos, CA; Greater Lansing DX Group, Lansing, MI; Grissom High School ARC, Huntsville, AL; Half Moon Bay Amateur Radio Club, El Granada, CA; Hilltop Sakkers ABC Bridsmeter NU Velenchers Radio Club, El Granada, CA; Hillop Seekers ARC, Bridgewater, NJ; Holmesburg Amateur Radio Club, Philadelphia, PA; Hoodview Amateur Radio Club, Gresham, OR; Hueneme High School Amateur Radio Club, Oxnard, CA; Huntington High Amateur Radio Club, Oxnard, CA; Huntington High School ARC, Huntington, NY; Ill-Wind Contesters, Oak Forest, II.; Irwin Area Amateur Radio Association, North Huntingdon, PA; Johnson High School Amateur Radio Club, St. Paul, MN; Leon High School Amateur Radio Club, Tallahassee, FI.; Litton Data Systems Div ARC, Van Nuys, CA; Macon County VHF Association, Decatur, II.; Mansfield Amateur Service & Emergency Repeater, Inc., Mansfield, OH; McLean Amateur Radio Klub, Livernore, KY; Metropolitan ARC, Tucson, AZ; Napies more, KY; Metropolitan ARC, Tucson, AZ; Naples F.M. Association, Naples, FL; North Eastern Michigan Amateur Radio Society, Wurtsmith AFB, MI; North Liners Radio Club, St. Paul, MN; North Schuylkill Jr. Sr. High School Spartens ARC, Ashland, PA; North Texas Contest Club, Allen, TX; Ashland, PA; North Texas Contest Club, Allen, TX; Otsego County Amateur Radio Association, Cooperstown, NY; Radio Amateur's of Skagit County, Mount Vernon, WA; Robbinsdale Amateur Radio Club, Robbinsdale, MN; Rockway Jr. High School ARC, Miami, FL; Sam Houston Amateur Radio Klub, Cleveland, TX; Sandite Sidewinders Amateur Radio Club, Sand Springs, OK; Silvercreek Amateur Radio Association, Doylestown, OH; Stanislaus Amateur Radio Association, Modesto, CA; Tioga Amateur Radio Society, Monticello, IN; Treasure Valley Radio Association, Payette. ID: Tri-City Valley Radio Association, Payette, ID; Tri-City Amateur Radio Club, Holdenville, OK; Tri-County ARC, Inman, NE; U.C.I. Amateur Radio Club, Irvine, CA; University City High School ARC, University City, MO; Ware Radio Club, Ware, MA; Wisconsin Nets Association, Ltd., Wis. Rapids, WI.

On motion of Mr. Arnold, the following convention dates were approved: Roanoke Division, April 1-2, 1978; Missouri State, April 22-23, 1978; Georgia State, June 3-4, 1978; Mississippi State, November 11-12, 1978; and Midwest Division, October 10-12, 1998; April 2009

Mr. Thurston reported to the Executive Committee an updated list of officials responsible for organizing the 1980 National Convention.

Director Price called to the attention of the Committee the fact that the dates of the South Florida Section Convention should be correctly listed as being on November 25-26, 1978.

The General Counsel reported on various matters of litigation in the courts which are of concern to the League, and also reported on the present discussions at FCC regarding the refunding of fees and the possible imposition of license fees in the future.

Director Hesier presented a contribution of \$100 to the League's WARC fund from the West Island Amatuer Radio Club of Dorval, Quebec (applause), and the General Manager was instructed to make appropriate written acknowledgement to the officers of

There being no further business, the meeting was adjourned at 2:54 P.M.

Respectfully submitted, RICHARD L. BALDWIN, WIRU Secretary

LIFE MEMBER APPLICANTS

David J. Althoen, K6YHL; Antonio J. Anzevino. David J. Althoen, Koyhli; Antonio J. Anzevino, WBZKDE; Paul G. Arvin, KL7FBU; Loman E. Atkin, K6CRD; John J. Baranyi, WA8CZH; Norman Berlat, WD9AAF; John A. Birken, K2SFS; James F. Bishop, WA8HSM; Ben F. Bissman III, W8HXT; Christopher L. Blake, WB4VFF; Matthew J. Blender, W4MGX; Glenn D. Boche, WB\$\text{\text{US}}\), David T. Bock, WA6PRL; John V. Bochme, K4PRK; David R. Boggs, WA3DBJ; Thelma J. Bolvin, WBAAUR; Charles L. Bradley, W5QD; Thomas F. Brandt, K9EOP/WB2INN; Susan J. Brandt, WB2ZSK; Homer B. Briggs, Jr.; Harry E. Brown, WA7OZP; J.

W. Brown, Jr., WD4JBG; John H. Brown, WØWAV/W7CKZ; Henry Canamar III, K5WQX; Walter O, Carr, W3LDD; Roy Vincent Castle, Jr., WA4YIT; Vincent J. Cattolica; Paul D, Chapman, WB6NDW; George A, Clutter, WB4PDK; Bobby L. Conner, WAØBKS; Ronny D, Cornwall, WA5WNH; Luther G, Cuthrell, WB4VEJ; Jim M, Cutshaw, WB6OJN; Sheldon B, Darack, WAZUBK; J. Joseph Geouvelle, III. K3ORIL: Eernando, de Ellyabura. WB6OJN; Sheldon B. Darack, WA2UBK; J. Joseph deCourcelle III, K3OBU; Fernando de Elzaburu, EA4UN; Joseph Vincent DeGaetano, WB6GSB; Robert J. DeVore, WB8ZRV; Martin J. DeWitt, WA9IRP; Thomas H. Dean, W7JCH; Jules P. Deschenes, WA4ERJ; Harold E. Dill, K7PAF; Charles E. Dommer, WB8VVQ; Stanley Dunn, K3SD; Steven Edick, WA1UCY; John W. C. Edmonds, W3CX; Elmer M. Ehasz, Jr., WB8MKP; Jack R. Ekstrom, K9BQL; Ariel M. Elam, K4AAL; Chester L. Fairsheets, WD0DCI; Jerrold J. Feldner, WA6JZL; Glenn E. Fenzel, WB8CDA; Philip D. Freehold, WD8NGI; Ben M. Frizzell, Jr., W4VTY; Melvin Fukunaga, KH6IRJ; Robert J. Fulmer, WB2HHE; David L. B. Gearing, W1WPW; William WA6JZL; Glenn E. Fenzel, WB8CDA; Philip D. Freehold, WD8NGI; Ben M. Frizzell, Jr., W4VTY; Melvin Fukunaga, KH6IRJ; Robert J. Fulmer, WB2HHE; David L. B. Gearing, W1WPW; William A. Gerber, W8CBH; George W. Goodwin, VE2DQ; James H. Grace; James Grandinetti, WA2SRM; Larry P. Greenberg, WA9MAG; Lawrence A. Guerera, WB2NFJ; David J. Haring, WB6UPU; Russell M. Harrison, WA4NCC; Marvin E. Hayes, WB6RCU; John W. Heacock, K3YCP; Dwight S. Hensley, WB8EZR; Marion J. Henson, W6NKR; Robert D. Herndon, W7XN; Richard A. Hillyer, W9MFX; Carl A. Hoff, WB7DJR; John A. Howard, WB6KFS; Rubin L. Hughes, WA6AHF; HRH Al-Hussein ibn Talal, JY1; Ernest William Jennings, K1WJ; Edward A. Johnson, K1IXT; John L. Johnson, W3DQ; Jay Irwin Kaplan, WB6QYD; Michael P. Kelly, WA9YNJ; Thomas F. Kelsey, WA4UXD; Michael P. King, WA3PYU; Robert L. Kirchner, WAØZFC; Karl S. Kish, WB8TJA; Lyman Klein, KL7LK; Derry L. Knight, W6RXH; Jorman I. Koski, W5KSX; Wayne C. Kramer, K9JHW; Christopher J. Krempel; Frank C. Krushina, K4DW; Ronald M. Kupers, WB5ZRF; Melvin M. LaGrone, WD8JYU; Thomas N. Laird, WB9QPI; Gerald A. S. Lander, HB9AJU; Samuel Lebowich, WB4HAV, Bryan R. Leipper, WA6RBE; Ray E. Leslie, WA7EKH; Jack Louthan, N5KT; Jeffrey A. Maass, K8ND; Socrates Martinez, N3SM; Bruno J. Marusarz, K9QKB; John E. Matz, WA9KIO; Michael K8ND; Socrates Martinez, N3SM; Bruno J, Marusarz, K9QKB; John E. Matz, WA9KIO; Michael KBND: Socrates Martinez, N3SM; Bruno J. Marusarz, K9QKB; John E. Matz, WA9KIO; Michael Paul McClure, WA9YUN; Donald L. McDole; Kenyon E. McGuire, WA2YFN; John McKinney, WØAP; Perry D. McLean, WØLGW; Karl McIter, WB9DDQ; John R. Miller, K7EB; Arthur Moe, WA7RTA; James L. Moon, W9NS; H. Chester Moore, K6ICZ; Harrison W. Moore, Jr., W2JOS; Paul E. Morey, KIPNB; Robert W. Morgan, WB2OTV; Woodrow D. Morgan, WA7CVJ; Dustin E. Morris, W7ITM; Leslie H. Morton, W6KCL; Bill Bullin, K4ZVS; Ed Nohava, WØJBT; Carlos A. Olivero, KP4BNY; Leo E. Oyler, Jr., WØGOW; Edward T. Parker, W9PA; Theodore E. Parks, W9NOT; John H. Parrott, Jr., W4FRU; Ken Pasqualetti; John S. Pettingell, WB6JIZ; Martha Pfeil, WB5MYF; Patrick M. Philipps, WB9VBD: Jeffrey Scott Pierce, WA2AFE; Janos Pribanyec; C. Norm Price, WØUNM; Nicolas Princz, YV5AUY/KP4; Howard Pyle III, WA3UMR; John A. Raksany, WA9MXC; Richard R. Ramsey, WB8WDD; Charles, Raney, WA7VZT; David A. Raskin, W5TYL; Tony Repici, Jr., WB3BBY; Michael L. Richardson, N5MR; Ulrich L. Rohde, DJ2LR/W2; Bella M. Romain, WA2CZU; Stewart J. Romain, WA2NNQ; Roger R. Roth, KØMPH; Kathleen F. Ruddick, WB9PTD; Richard C. Ryckman; Maurice S. Salamy, WA4SEE: Peter J. Salvatori, WB2SSI; Leo ROGET R. ROTH, ROMPH; RATHEEN F. RUGGICK, WB9PTD; Richard C. Ryckman; Maurice S. Salamy, WA4SEE; Peter J. Salvatori, WB2SSU; Leo J. Scanlon, WB5OJT; William J. Seibert, K4MZK; Victor G. Self, WA9YLE; Malcolm H. Shelton, W4PSS; Janice Shillington, N9YL; Valeria L. Shinall, WA4OPP; Stanley D. Sides, K&QMV; Richard F. Smale, W5IL; George R. Smith, WB9JKP; Larry A. Smith, WA6GCX; Roscoe B. Smith, Jr., W3LZN; Dean W. Spencer, K1FRD; John E. Stearnes; George C. Stephens, K&BLH; James W. Stevenson, WB5OCD; Clifford Stoll, WB2PSX; L. D. Strietelmeier, AA4OK; Dean F. Striley, K&RN/K&AVZ; Tom C. Stripling, WB5QLR; Harris W. Swan, K5MWC; Terence R. Talbot, VE6ATT; V. Anthony Tamosaitis, K1VTE; Edwin H. Taylor, VE3FRM; Hillel Taylor, VE4TP; William B. Tenner, WB8QOO; Roger G. Thering, WB6FWK; Robert J. Thomas, K6UCG; David K. Thompson, W84Y1E; Myrtle W. Thompson, WD6FJE; Robert M. Toney, WA7OPZ; Gary L. Van Winkle, K5KU; Lester B. Veenstra, K1YCM; Robert K. Wallace, K8BYO; Ullius C. Ward, W21T; Michael E. Watson, K5MWH; Ronald A. Waxman, W9KNB; William Ray Weavertor G. Self, WA9YLE; Malcolm H. Shelton, W4PSS; Ronald A. Waxman, W9KNB; William Ray Weaver-Rohald A. Waxman, Wykins; William Ray Weaver-ling, WBøJJL; William J. Weigel, K9RHO; Lawrence M. Weil, WB2YYY; Lila Jean Wheeler, WA7OII; Dale A. Whitney, WA1UUU; Richard L. Wilson, KL7JDP; Robert Wolters, WSTPF; Robert J. Wood, WA7MXZ; Perry A. Yantis, WB8OTH; Linda A. Zimmer, WA2YDZ; David R. Zollers, K3HLN, USE

Happenings

ARRL Petitions for Novice Subband Expansion

On January 3, 1978, the League petitioned the FCC, requesting that the 80-meter Novice subband be expanded by 25 kHz to 3675-3750 kHz. "Although the Novice class frequency allocations have remained unchanged since November 22, 1972," the League stated, "the number of Novice class operators (and station licenses) has increased from 22.607 on that date to 54,708 on December 1, 1977, representing a growth of 142 percent in this class alone. Moreover, based upon observations of the League's Novice training program, the League projects that there will be 90,000 Novice class licensees by the end of 1978." The League then pointed out that with the addition of 64,733 Technician class licensees now authorized operation on the Novice subbands, there are now 119,441 amateurs restricted to highfrequency operation on the Novice subbands. "The need for additional Novice class frequencies is clear," the League said.

The League further stated that the greatest good to the greatest number of people would be derived by expanding the 80-meter Novice subband rather than the 40-, 15- or 10-meter Novice subbands at this time. Because 15 and 10 meters are not usable at night during all parts of the 11-year sunspot cycle, and because 40 meters is subject to severe interference from high-powered broadcast stations, "the only Novice subband expansion which would be effective at relieving congestion must occur at 80 meters."

The League also recognized and provided for the impact that Novice class frequency expansion would have on other amateur operations, principally net operations on 3675-3700 kHz. The petition states that the impact on net operations will be minimized by expanding the Novice subband downward by only 25 kHz at

this time. Some nets would have to be relocated, to be sure, but the ARRL pointed out that all but two of the affected nets are members of the ARRL-sponsored National Traffic System, and that the net managers could be reached directly through the mail to effect the necessary changes. ARRL hq. would be prepared to coordinate the relocation of the affected nets.

In petitioning for an additional 25 kHz for the Novice class, the League stated, "Achieving some operating success at the present license grade is a powerful incentive to upgrade. If the Novice is completely frustrated by interference from other amateur stations, he might give up amateur radio as being too frustrating rather than experience any incentive to upgrade. However, the Novice subbands should not be expanded so far as to discourage Novices and Technicians from upgrading to higher classes of licenses."

LEAGUE RENEWS REQUEST FOR FULL VHF PRIVILEGES FOR TECHS AND GENERALS

As far back as 1969 the League petitioned the FCC requesting full 2-meter privileges for Technician class licensees. This petition hung fire until December, 1974, when, as part of its overall restructuring proposal (Docket 20282), the Commmission proposed to open up to Technicians all amateur frequencies above 50 MHz (which would also include 50.0-50.1 MHz, presently restricted to Advanced and Extra Class licensees). The League endorsed this particular proposal wholeheartedly in comments filed with the Commission at that time.

Although the FCC issued a First Report and Order in Docket 20282 in June, 1976, which, among other things, granted full Novice privileges to Technician class licensees, there has been no action on its proposal to open up all of 6 and 2 meters to Techs. Therefore, the League, on January 3, 1978, filed a petition renewing its previous comments, and requesting prompt action to open up all frequencies above 50 MHz to Technicians. The League pointed out that this particular proposal was noncontroversial, and would be well accepted by the amateur community.

LEAGUE ALSO RENEWS REQUEST FOR ADDITIONAL VOICE-BAND PRIVILEGES FOR ADVANCED AND EXTRA CLASS LICENSEES

Another specific proposal of Docket 20282 was to open up 21,250-21,270 kHz (presently allocated to Extra Class only) to Advanced class amateurs. This was supported by the League; in addition, the League requested that

an additional voice subband, 14,175-14,200 kHz, be opened up for the exclusive use of Extra Class amateurs. These proposals have not been acted upon by the Commission to date. Feeling that these specific proposals could be put into effect without significantly affecting the work load of the Commission, the ARRL has filed a petition urging adoption of these provisions of Docket 20282.

INTRODUCING NEW ADVISORY MEMBERS

As each year comes to a close, ARRL President Dannals chooses, from among those nominated by fellow members, radio amateurs to serve on the various ARRL advisory committees. Positions are opened during the previous year due to expiration of terms or resignations. These advisory committees, each with a specialized task, give League members a chance to make their feelings known on the issues confronting amateur radio today. Every committee is composed of 11 volunteers representing Canada and each call area of the United States. Members wishing to serve on a committee are nominated by three League members at any time; forms for the purpose are available from Hq. on request.

This year 15 individuals were picked to fill vacated slots (including a new Hq. liaison person for the Contest Advisory Committee):

Emergency Communications Advisory Committee

Robert Josuweit, WA3PZO, of Havertown, PA, was first licensed in 1970 (he now holds the Advanced class), Bob is the PAM for EPA; net manager, EPAEP & TN; amateur radio coordinator and public service director, American Red Cross, Mid-Atlantic Division; assistant EC, Delaware County, PA; member, RACES. His past assignments include assistant net manager 3RN-D (1974-1976); NCS, D-EAN; net manager, Johnstown Health and Welfare

Net (July, 1977); assistant coordinator during the Hurricane Eloise emergency and the Vietnamese Refugee Operation at Indiantown Gap, PA. He has been a League member since 1971.

Also new to the Committee is Everett R. Snider, W7DO, of Richland, WA, who holds the Amateur Extra Class license. Everett is a past net manager of WSN; a past EC of Benton County, WA, and has been an active member of c.d. there since 1959. From 1952 to 1959, Snider was busy with c.d. in Pierce County, WA. A recipient of two ARRL Public Service Awards, he was active during the Alaskan earthquake of 1964 plus numerous local disasters. Snider checks into the Northwest Weather Net regularly and is trustee of WR7AKE.

H. O. Townsend, WA5MLT, of Norman, OK, holder of the Advanced class, has been a member of the League since 1974. Townsend was Assistant EC for Cleveland County, OK, 1975-1976 and EC for same in 1977. He was appointed SEC in 1977. Townsend also was appointed PAM for OPEN last year.

Bruce B. Woodward, W9UMH, of Indianapolis, IN, holds the Advanced class and has been licensed since 1965. He is currently the SEC for Indiana and an NCS of the Indiana Traffic Net. He was formerly net manager of the old Post Office Net as well. A very active traffic man, Woodward holds the Indiana Outstanding Amateur of the Year for 1975 and the 1977 Hoosier Courtesy Award.

Contest Advisory Committee

Licensed for 30 years, Richard W. Guy, VE7TT, is a holder of the Advanced Amateur license and resides in Burnaby, BC. His awards for operating include WAS, WAC and DXCC (182 countries to date). He enjoys operating the cw Sweepstakes and the CD Parties — in fact, any cw contest will do. His only other hobby is bagpiping.

Fred Minnis, KØMM, of Clinton, IA, an

Amateur Extra Class licensee, was first licensed in July, 1956. He is an active participant in Sweepstakes, CD Parties and Field Day, either cw or phone. He has been a League member since 1960.

The CAC has a new Hq. liaison. He is Tom Frenaye, K1KI, ex-WB6KIL and a former operator of KC4AAC. Tom holds the Amateur Extra Class ticket plus WAC, WAS, DXCC and also placed third in the CQ Worldwide Contest of 1976 in the single-operator phone category. He now resides in Newington.

VHF Repeater Advisory Committee

Whitman E. Brown, WBØCJX, of Steamboat Springs, CO, was licensed six years ago and now holds the Advanced class license. He is a member of the Colorado Council of Amateur Radio Clubs as well as the Castle Rock Repeater Group. He is the trustee of WRØAGL and enjoys flying, skiing and golf when not on the air. Brown is employed by the Communications Division of the Rio Grande Railroad.

K2QPF, otherwise known as Charles H. Harrison of Oyster Bay, NY, was licensed in 1957 and now holds the Advanced class license. He has been a League member since 1960. His qualifications include frequency coordinator for the New York Metropolitan area (northern NJ, southern NY, which encompasses Long Island as well, and southwestern CT), and trusteeship of WR2ABT and WR2ACE. He also served on the technical committees of WR2ABA, WR2ADM, WR2ADZ and WR2AHK. Finally, he is the EC for Oyster Bay.

Joe Jarrett, K5FOG, of Arlington, TX, was first licensed in August, 1960 and now is an Advanced class amateur. He is president of the Texas VHF FM Society, a member of the North Texas Repeater Association and the Greater Southwest Repeater Club. Jarrett is trustee for repeaters WR5AIT, WR5AEO and WR5AQJ. He is employed by Mostek Corporation as marketing manager for telecommunication products. Jarrett is a certified scuba diver who finds time to ski and sail, too.

Gordon Schlesinger, WA6LBV, from San Diego, CA, holds the Technician class ticket. He was first licensed in February, 1960 and has been a League member most of the time since 1963. Active on amateur fm since 1968, Schlesinger is the present owner/operator/trustee of WR6ADW (6 and 2 meters). In the past he has served with the CARC Technical Committee (frequency coordination), is now on the SCRRBA Technical Committee (frequency coordination), is also the secretary of SCRRBA. He was the trustee of WR6ACF from 1971-1973 (he also started that machine). He is employed as a chemist at the University of California at San Diego.

Allan K. Thurber, VE1AKT, of Fredericton, NB, is a holder of the Advanced Amateur ticket and has been licensed for 17 years. A member of the International Repeater Group, Thurber became interested in repeaters back in 1967 when some local hams put an a-m (!) machine on the air. He is employed as a transmitter maintenance technician by the Canadian Broadcasting System. He enjoys flying and photography as well as amateur radio, His XYL is VEIAJT.

DX Advisory Committee

W1OT, Anthony Berg of Acton, MA, was first licensed in January, 1952. He now is the

holder of an Amateur Extra Class license and has been with the League since 1952. Prior to acquiring his 1×2 call, he was known as WIVAH. He is a member of the A-1 Operators Club, FOC and DXCC (317 countries—mixed). He holds a Code Proficiency Certificate for 35 wpm. Berg also is a member of the Southern New England DX Association. When he is not hamming, WIOT works as a senior design engineer for Raytheon Company.

Daryl H. Kiebler, WB8EUN, of Lansing, MI, holds the Advanced class, was first licensed in 1969, and became a member of the ARRL that same year. He is a member of DXCC (310 countries). His 5B-DXCC number is 399 and his 5B-WAS is number 184. His traveling has taken him to Asia, Europe and North America (his XYL speaks six languages).

C. Robert Scully, W2XN, of Oaklyn, NJ, was first licensed in 1935 and has had almost continuous membership in ARRL since that year. His old call was W2FXN. A DX Honor Roll member in the 1960s, Scully is only one contact away from it presently. He has 334 countries confirmed and is a member of OCWA.

James T. Rafferty, N6RJ, of Anaheim, CA, holds the Amateur Extra Class license and was on the first Kingman Reef DXpedition. He is a member of the Northern California DX Club.

WAITZK

FCC NOTES

Gary T. Gorniak of Louisville, KY, was convicted of operating an unlicensed amateur radio station by U.S. District Judge Edward H. Johnstone in Louisville, October 25, after pleading guilty to operating an unlicensed amateur station.

Judge Johnstone fined Gorniak \$2000 and placed him on one year's probation with the provision that he refrain from all radio operation during the probationary period. The judge said Gorniak could forfeit his radio equipment in lieu of the fine.

The conviction was obtained by U.S. Attorney for the Western District of Kentucky Albert Jones on coordinated information supplied by the FCC's new Cincinnati office and the nationwide radio-direction-finding network.

In a similar vein, FCC Administrative Law Judge Walter C. Miller has denied the application of Ali Hassan of Los Angeles, CA, for amateur radio station and Technician class operator licenses and revoked his license for citizens band radio station KFN4952.

Judge Miller found that on two separate occasions Hassan violated numerous Commission Rules, some of which were repeated. Such repeated violations along with other recorded facts, the judge said, indicated that Hassan has a total disregard for the FCC's processes, and thus was not qualified to be a Commission licensee.



Marian Anderson, WB1FSB, recently capitulated and got her Novice license after working at Hg. for 10 years. A case of conhamination?



His Excellency, Michael S. Dukakis, Governor of Massachusetts, signs the Marconi Week proclamation. Those looking on are (left to right) Irish Vice Consul Patrick Igoe; Italian Consul General Franco Saa Di Bruno; Ambassador John Volpe; Robert J. Doherty, K1VV, Marconi Station KM1CC control operator; Mrs. George A. Braga, Marconi's daughter; Gerald Sarno, FCC and British Consul General Geral Kent.

MARCONI WEEK

His Excellency, Michael S. Dukakis, Governor of the Commonwealth of Massachusetts, proclaimed the week of January 14 through 22, 1978, as Marconi Week and urged the citizens of the commonwealth to the cognizance of the week and to participate fittingly in its observance.

Seventy-five years ago in January, 1903, Marconi completed the first successful two-way radio transmission between the United States and Europe. The United States station was located in South Wellfleet (Cape Cod), MA, and has since been a historic landmark.

Among those present for the proclamation ceremony was Mrs. George A. Braga (Marconi's daughter). Robert "Whitey" Doherty, KIVV, was there on behalf of the Town of Barnstable Amateur Radio Club, which sponsored the highly successful special-event station KM1CC during Marconi Week.

AMRAD CALLS FOR PAPERS

The Amateur Radio Research and Development Corporation (AMRAD) has announced that "Amateur Computing 78." a microcomputer festival, will be held July 22-23 at the Sheraton National Motor Hotel, Arlington, VA. Those interested in presenting a paper, participating in a panel discussion, displaying an amateur computer system, or sponsoring a tutorial session should submit a letter of intent along with a one-page abstract or outline by April 15 to John Wall Miller, Program Chairman, 6921 Pacific Lane, Annandale, VA 22003. Tel. 703-256-5702. Authors will be provided with instructions for preparation of camera-ready papers which are due by June 1.

Especially welcome will be topics concerning amateur radio applications of microcomputers. Information on Amateur Computing '78 may be obtained by writing AMRAD, P. O. Box 682, McLean, VA 22101.

ARRL-RED CROSS AGREEMENT

The ARRL Communications Manager and the Chief of Emergency Communications of American Red Cross have entered into an agreement concerning principles of handling disaster welfare inquiries by amateur radio and Red Cross facilities during major communications emergencies.

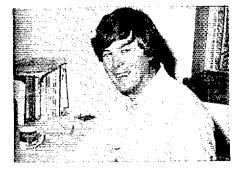
This agreement will ask amateurs to observe



Jim La Porta, N1CC



Barbara Spear



Bernie Glassmeyer, W9KDR

the following procedures in handling such traffic:

- 1) Refer all inquiries to the local Red Cross chapter, which is equipped to handle them.
- 2) If for any reason this cannot be done, amateurs may undertake to originate such traffie in standard ARRL message form via established routes, preferably the ARRL National Traffic System. Messages should be addressed to RED CROSS DWI at the location of the disaster. The text should contain as much of the following information as possible: (a) Full name of person or persons being inquired about, hereafter referred to as the inquiree. (b) Full street address. (c) City and state. ZIP code not required, (d) Home telephone number. (e) Name, address and telephone number(s) of employer(s) of inquiree(s). Full name, address and telephone number of inquirer. (g) Any additional information required, other than standard welfare report.
- 3) Do not solicit such traffic or in any way advertise your ability to handle it.
- 4) Disaster welfare inquiries (DWI) bear the precedence Q (inQuiry). Any welfare information coming out of the disaster area bears the precedence P (Priority).
- 5) DWIs can be initiated by amateurs directly to the disaster area if amateur facilities for this purpose exist. In such cases, the same information as above should be included. DWI replies can be handled either by amateur facilities or Red Cross landline teleprinter facilities.

STAFF NOTES

Jim La Porta, N1CC/K6SXX

Headquarters now has a deputy communications manager in training and his name is Jim La Porta, NICC/K6SXX (ex-W5LA). Jim comes to us from Mesquite, TX, where he worked for the Veterans Administration. His ham interests include traffic, DX, contesting, OSCAR, cw and awards. Jim is also a Life Member of the League. Other activities range from a family of two to bowling and stamp collecting.

La Porta's broad communications background has not only benefited amateur radio, but other organizations as well. A veteran of 17 years with the U.S. Army (both active and reserve), Jim, who by the way is a first sergeant, teaches communications at the local Army Reserve Center on weekends. Welcome aboard, Jim.

Barbara Spear

Although she graduated with a BA cum laude in English from the University of Hartford, Barbara Spear found art work more to

her liking. (She also attended both the Paier and Hartford Art Schools to sharpen her skills.) The result? A job as QST design coordinator.

Last employed by the Time Share Corporation, she is a 17-year resident of West Hartford, CT. While studying for her Technician ticket, she pursues broadcast-band DX, listens to country-and-western music, and hunts for antiques. She also enjoys designing needlework and has embroidered several schematic diagrams in which she color-coded the components with yarns.

Bernie Glassmever, W9KDR/W6TMX

To paraphrase a portion of a song popular during the World War I era, "How ya gonna keep 'em down on the farm after they've seen the League?" It is pretty clear Bernie has all intentions of leaving country living behind for a white as he begins his new job as OSCAR program manager. Although he misses the lownoise features of his antenna "farm," Bernie feels confident he'll he active on OSCAR again, soon.

Farming for Bernie was 500 acres or so in Illinois. He was formerly employed as an electronics engineer in California and before that by the USAF aboard B-36 and B-52 bombers. He is married and presently makes his home in West Hartford.

An Advanced class ham, licensed since 1952, he holds DXCC, WAC and a VHF Section Award from ARRL. At home he is active on 160 meters through 70 cm. He is a member of OTC, RCC, the North Bay ARC, and the Montgomery County ARC. — WAITZK

BEHIND THE DIAMOND

As a New Englander, I have sort of a fixed view in my mind with respect to a typical Southern gentleman of the old school—tall, soft-spoken and polite. Guess what? Max Arnold, W4WHN, is all those things and more. He is the kind of director (Delta Division) who does whatever he can for the members in his division with an extra touch of dedication to top it off.

Max was born in Kingston, PA, but his family moved to Colorado shortly afterward for his father's health, then on to Arizona. Although not at the same time, Max attended the same high school as W4KFC, ARRL VP, and Terri Smith, wife of Vice President Carl Smith, W0BWJ. They still get together as a group at least twice a year to sing the aima mater of Phoenix (AZ) Union High School, According to Max, "It's never been the same since all of us left. They are still trying to recover." Wartime service lasted from 1942 to 1946 for Max,



Delta Divison Director Max Arnold, W4WHN.

with the U.S. Army Reserve as a part-time career from 1946 to 1966. Max officially retired from the Army Reserve on his 60th birthday, January 31, 1978.

For the last 18 years Arnold's civilian occupation has been working for the Clarence Sutherland Company in Nashville, TN, where he is vice president. The company is a subcontractor of architectural millwork, which means all the woodwork in a building except the floors and ceilings. When he is not working, Max is active in most phases of amateur radio, and is a fancier of standard poodles, "Before I became an elected official of ARRL, I had plenty of time to operate. Twenty-meter cw was my favorite," he said, "but now I barely have time to breathe, I am so busy." His two poodles, named Starr and Dammit ("Come here, Dammit!") are entered in competition and do quite well. Max is a member of the Nashville Dog Training Club as well as an instructor in dog handling. (No, it is not true Nashville is "going to the dogs.")

He also finds time to teach amateur radio classes in Nashville with over 1000 graduates from his course. His old students still pop up occasionally — like the Air Force sergeant who asked Max if he remembered him from a class 15 years ago (Max did, by the way). Max is very active in the various Masonic bodies in the Nashville area too. As if all those things did not satisfy a desire to stay busy, he squeezed in enough flight time to qualify for a single-engine land pilot's rating. Now starting his fifth term as director of ARRL's Delta Division, Max served as vice director from 1966 to 1970 and has been a member of the Executive Committee since 1974.

The only negative note I am able to sound concerning Max is his tendency at dog shows to pursue obscure issues with reference to dog handling. One fellow competitor was heard to lament as Arnold began chewing out a referee for a bad decision, "Oh well, there goes Max again — barking up the wrong tree." — WAITZK

Canadian NewsFronts

Surprise Vote Turns Down Novice License

In a move contrary to the majority will of Canadian amateurs, the DOC/CARF National Amateur Radio Symposium turned thumbs down on the proposed Canadian Novice license at its late-November meeting in Ottawa. However, the Experimenter license, with DOC modifications of vhf-and-above privileges only, got a nod from the general assembly. Symposium participants included a delegation of 10 CRRL officials.

Reflecting the voice of its membership, as indicated in a 1976 survey on the issue, CRRL delegates stood among the few proponents strongly supporting creation of a Canadian Novice license. CRRL built its case on the overwhelmingly affirmative vote of its members in response to the survey: 2153 in favor, 403 opposed. In addition, officials pointed to the proven track record of the Novice program in 15 other countries as essential to the future welfare of the Amateur Service.

At the same time, in a surprising move, CARF delegates rejected establishment of a Novice license, although a similar referendum by CARF of its members showed majority support.

Rejecting the symposium's negative vote on the issue as being representative of the Canadian amateur, CRRL reaffirmed its intent to continue to strive for creation of a Canadian Novice license with every means at its disposal.

PRIVILEGES FOR NEW AMATEURS

A matter of growing concern to the CRRL is the fact that a large percentage of the new VEs do not appear to progress further than 2-meter repeater activity. The CRRL recently conducted an opinion survey of its assistant directors and SCMs. The results indicated, that on a cross-country average, a percentage as high as 80 percent of our new amateurs do not proceed beyond 2 meters for an indeterminable period. The League does not consider that this serves the purpose or indeed even the future welfare of the Amateur Experimental Service, as defined by DOC. The CRRL therefore has made a submission to DOC that the present radio regulations be amended so as to prohibit any phone operation during the first six months of a new amateur license. Following this period and as presently regulated for the 10-meter phone endorsement, the license could be endorsed for 10-meter and-above phone privileges.

NEW WARC TRAINING FILM

We are pleased to announce the immediate availability of a new slide film, recorded presentation, "GENEVA — 1979," edited for Canadian showings. This film fully explains the history of ITU conferences and of frequency allocation right up to the present. Amateur participation through the International Ama-

teur Radio Union is fully covered. This is a must for the program of any amateur club. Bookings may be made through your CRRL headquarters (P. O. Box 418, Sackville, NB EOA 3C0) and shall be made on a first-come, first-served basis, with preference given to ARRL affiliated clubs.

ADVISORY COMMITTEES

Following are the Canadian members of the various ARRL Advisory Committees, for the next two-year period: Contest Committee, Richard Guy, VE7TT; VHF Repeater Committee, Ai Thurber, VEIAKT; DX Committee, Hal Parsons, VE3QA; Emergency Committee, Bill Parker, VE5CU; VHF/UHF Committee. Les Weir, VE3AlB. Any remarks, criticism or whatever that Canadian members might care to make, in these various activities, should be directed to the appropriate member above. Al Thurber, VEIAKT, would especially appreciate it if Canadian repeater councils, clubs, etc., could kindly place his name on their bulletin mailing lists. His address is 365 Southampton Drive, Fredericton, NB E3B

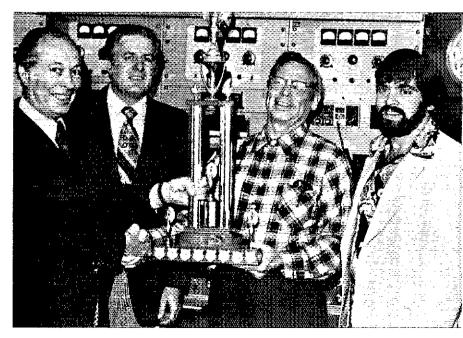
HUMANITARIAN AWARD PRESENTED

Edwin Samms, VO1GP, has proven that a sound body is not a necessity for service to his fellowman and has been recognized by the

federal government for his humanitarian efforts. Edwin recently received a special medal from the government, commemorating the Silver Jubilee of Queen Elizabeth II, for his efforts to provide powered wheelchairs to quadraplegics in western Newfoundland, Additionally, Edwin was recently presented a service medal from the Toronto Muscular Dystrophy Association in recognition for his work which produced 40 powered wheelchairs.



Colonel Pierre Richard of the United Nations Emergency Force in the Middle East, presents Bob De Clercq, VE2OG, with a special plaque on behalf of the Canadian Forces personnel serving in the Middle East. In his presentation, Col. Richard stressed how much the Canadian Forces personnel appreciate the efforts of Canadian hams to facilitate voice communications between the servicemen and women in the Middle East and their families in Canada.



The Clifford Marsh Trophy, for Amateur of the Year (1977), by the Radio Society of Ontario, was recently presented to well-known Guelph, ON, amateur, Fred Hammond, VE3HC. Tom Atkins, VE3CDM, past president of RSO (left), made the presentation, assisted by Society Director Harold Braun and Rocco Furtaro, president of the Guelph Amateur Radio Club.

*Director, Canadian Division

50 Years Ago 25 Years Ago

Strays 🐝

March, 1928

- ① A deluxe receiver is described by Dr. Wilfred Taylor, featuring a pair of the new UX-222 screen-grid tubes as r.f. amplifiers, double detection, and then a band-pass system for high selectivity.
- [] Hearings on the short-wave spectrum held by the Federal Radio Commission prompted dozens of industries to clamor for their own channels on which to conduct company business. The amateur is reasonably protected with the assignment of bands internationally at the recent world conference.
- ☐ Fourteen pages are required for a classic paper by Messrs. Clapp and Chinn on antenna directivity, complete with diagrams on effects of height above earth, steel versus wooden towers, etc. Phased-element systems forecast future Sterba curtains and the like.
- ☐ Assistant Technical Editor Westman presents a code practice unit for the beginner not an oscillator, but a long-wave receiver to copy those slow-sending commercial stations of 2000 meters and up!
- ☐ League directors contribute strongly to this issue. Midwest's Quinby fills many requests (prompted by the new *Handbook*) for info on his receiver with coils wound on old tube bases. Pacific's Babcock trots out all the sines and cosines and such to illustrate computation of how far away is that new DX you just worked.
- ☐ Radio transmission is being used as a timing device for oil exploration, relaying the instant of dynamite detonation to a remote receiving location equipped with seismographs.
- \square Variable condensers used in high-power transmitters need special design and construction, as Bert Smith of Cardwell illustrates.
- ☐ If you bother the neighbor's b.c. set you might find A. L. Budlong's key-click filter a solution to the problem.
- ☐ Minnesota's 9AIR has constructed a neat little portable transceiver for 80 and 40 meters, with a hand-cranked magneto generator that puts out.d.c. He can crank and send at the same time!

March, 1953

- ☐ K2AH of RCA provides details on his history-making transistor QSO the first use of the device for transmitting.
- □ W4AO and W3GKP also made history the first amateur moonbounce. The pair actually accomplished the feat in 1950, but the proof was so skimpy they waited until success could be more fully documented. Stacked rhombics, 144 Mc., a low noise figure and ultimate selectivity combined with ingenuity and perseverance to do the job.
- [] The Editor points out that F.C.C. figures on amateur totals are inflated, e.g., the same person holding both Novice and Technician classes is counted as two amateurs, so the League membership percentage is not as low as mere arithmetic indicates.
- ☐ WIDF shows us a neat way to combine the lowpass filter and antenna coupler in one practical unit.
- "TVG" or "time-varied gain" is W2RDK's and W2NVY's tag for their system of electronically silencing a receiver milliseconds before the key goes down, and thus providing ear relief (and longer tube life) in break-in systems.
- ☐ You wouldn't want WIDX's super-selective i.f. amplifier in a hand-held unit because of its mass, but it can convert any incoming signal from 455 ke and make it stand up and out just where you want it
- I A magic-eye indicator is the main feature in a miniature grid-dip meter design by W1JEQ.
- ☐ Impedance matching with quarter-wave sections is analyzed in depth by W4UCW.
- □ WHCP finds that his correspondence from new Novices shows a lack of understanding on just what the various knobs and circuits are doing, and so presents a dissertation on the fundamentals.
- ☐ Civil defense and the Radio Amateur Civil Emergency Service in particular are taking more specific shape, and a feature of this issue is a "what it is and what it isn't" description of RACES as concerns the average amateur. WIRW

AMSAT QSL BUREAU NOTES

[] With the changeover of the AMSAT-OSCAR QSL Bureau to Ross Forbes, WB6GFI, now completed (QST for January, page 90), some additional points to remember are (1) put your call sign in large letters in the upper left-hand corner of each s.a.s.e., (2) affix only one ounce of first-class postage to each envelope, which will be mailed when full, and (3) domestic OSCAR QSLs will be sorted and processed through the AMSAT-OSCAR QSL Bureau. The address is P. O. Box I, Los Altos, CA 94022.

STILL AT IT AFTER 60 YEARS

□ Even before the Bureau of Navigation, Department of Commerce, issued amateur radio licenses, amateurs were already on the air, busily keeping schedules. Today, two of those wireless pioneers still meet on the air once a week. G. S. Corpe, W6LM, of Wrightwood, CA, first went on the air in 1909, using "GS" for a call sign. A year later he had his first QSO with Harold A. Lloyd, now W6SRI, of Santa Barbara, CA. Can anyone top this record, now 68 years running?

OST congratulates . . .

- ☐ George Jacobs, W3ASK, director of engineering for the U.S. Board for International Broadcasting, recipient of a fellowship from the Radio Club of America.
- ☐ David W. Winter, W2AUF, retiring chief engineer of WEVD AM/FM in New York City after 46 years of service and 48 years as an Elmer to the many hams who worked there.
- ARRL staffer WAITZK, recently installed Junior Steward of Hospitality Lodge no. 128, Ancient Free and Accepted Masons, Wethersfield, CT.

Silent Keys

it is with deep regret that we record the passing of these amateurs:

W1CAB/WA4CCB, Horace Young, St. Petersburg, FI.
WA1CHS, Matthew J. Palumbo, Worcester, MA
WA1FCZ, Harold A. Newcomb, Braintree, MA
W1FMW, George N. Potter, S. Lawrence, MA
K1HGF, John E. Hussey, Deerfield, NH
W1JKT, Earl D. Collins, New Bedford, MA
WA1L1G, Anthony J. Giordano, Groton, CT
W1MAA, Wendell P. Turner Jr., Melrose, MA
W1QCO, Rufus Taylor, Lincoln, RI
W1TAN, Warren F. Barnes, Rutland, VT
W2AFS, Leon L. Adelman, New York, NY
W2GQO, Robert W. Young, Erial, NJ
WB2JPI, Alvin K. Stryker, Carmel, NY
K2L1Z, Anna A. Gray, Ridgefield, NJ
W2LT, William S. Barnes, Syracuse, NY
W2MGS, James S. Dawson, Bay Shore, NY
K2MWS, Clarence I. Cook, Medina, NY
W2YBU, E. Charles Gregor, Lockwood, NY
W3BYL, Michael Fitzgeraid, Ardmore, PA
W3AFZX, John R. Freed, Glenside, PA
W3AFZX, John R. Freed, Glenside, PA
W3GWC, Anne N. Slate, Reading, PA
K3NTS, William A. Condie, Aliquippa, PA
W4AFP, James A. Engram, Albany, GA
W4AFP, James A. Engram, Albany, GA
W4AFVN, Betty S. Beaven, Birmingham, AL
W4FWE, Clyde L. Walkden, West Palm Beach, FL
W44PW, Charles H. Chester, Oklawaha, FL
W44SN, Charles P. Jones, Port Charlotte, FL
W44OW, Lames A. Joyner, Richmond, VA
W4RZI, Neal B. Bunn, Savannah, TN
WB4SYE, Salvatore J. Perrotti, St. Petersburg, FL

K4TZ, Edward E. Millard, Mechanicsville, VA W4VI, W. Walter Watts, Captiva, FL K4YHI, Joseph H. Turrentine, Tampa, FL W4YXF, Sidney G. Wescoat, Winston Salem, NC W4ZMH, Theodore R. Smith, Virginia Beach, VA WD5AHV, Harold E. Hani, El Paso, TX W5BDE, Grover Z. Hunsicker, Mena, AR WD5BKL, Zelmer Z. Mitchell, Dallas, TX K5JRZ, Dennis J. Pledger Jr., Shelby, MS WA5KOB, Herman R. Davis, Lexington, OK W5WAF, Elmer J. Balcom, Okmulgee, OK W6CCN, Gregory J. Toben, Paradise, CA W6ENT, Desmal A. Davis, San Fernando, CA W6FZB, Louis A. Brummel, San Jose, CA W6GWK, William R. Dunaway, Mountain View, CA W6GWK, William R. Dunaway, Mountain View, CA W6GWL, Leland B. Firman, El Cajon, CA WA6ILO, Charles R. Carkeek, Altadena, CA W6KCW, Donald R. Crumpton, Encinitas, CA W86KPX, Frank B. Vining, La Mirada, CA W6KFN, Arthur L. Peterson, Escondido, CA W6SFN, Arthur L. Peterson, Escondido, CA W6FS, Curtis T. Wolff, Watsonville, CA K6YSS, Curtis T. Wolff, Watsonville, CA K7GJA, William G. Edwards, Olympia, WA K7HHA, Jean E. Schwiebert, Phoenix, AZ W77WFV, Warren E. Thomas, Mesa, AZ W77YFV, Warren E. Thomas, Mesa, AZ W77YFV, Warren E. Thomas, Mesa, AZ W77YFV, Warren E. Hearn, Cincinnati, OH W8COM, Harold S. Davis, Barnesville, OH

WA8FZS, Charles A. Toothman, Springfield, OH W8LEW, John R. Crane, Olmsted Falls, OH K8LXA, Clyde A. Rosaa, Conneaut, OH W8MO. Theodore H. Stahi, Grosse Pt. Woods, MI WB8MRR, Hiram W. Kennicott, Winnetka, IL. K8NXV, Otto W. Vlcek, Parma. OH WB8UIP, Glenn W. Kermode, Warren, MI W9AE, Joseph H. Rohter, LaCrosse, WI W9CLL, Leonard J. Sikora, Kaukauna, WI W9IBC, Dayton L. Warner, Chicago Heights, IL W9LVL, James W. Planque, Evansville, IN WA9MEF, Harold D. Johnson, Fort Wayne, IN W9MEI, Harold S. Hart, Boulder Hill, IL WA9MPG, J. Leonard Herron, Chicago, IL WB9NIH, Jon A. Pawlik, Naperville, IL W9WIC, Anton D. Voss, Oswego, IL W9VHD, Arthur W. Sutton, Kenney, IL W9WIC, Anton D. Voss, Oswego, IL W9WIC, Anton D. Voss, Oswego, II. W0AE, George K. Shirling, St. Louis, MO WD0BIL, Marvin R. Boston, Sr., Des Moines, IA W0EOW, Walter N. J. Pearson, St. Louis, MO W0FAE, Curtis W. Grabow, Minneapolis, MN W0FM, Dr. Sidney J. Blum, Kansas City, MO W0GG, Harvey L. Treit, Council Bluffs, IA W0HZM, Donald J. Anderson, Grand Forks, ND W0KSS, Homer M. Cox, Ayrshire, IA W0HZM, Donald J. Anderson, Grand Forks, ND W0KSS, Homer M. Cox, Ayrshire, IA W0HZM, Donald J. Anderson, Grand Forks, ND W0KSS, Homer M. Cox, Ayrshire, IA W0HZM, Donald J. Anderson, Grand Forks, ND W0KSS, Homer M. Cox, Ayrshire, IA W0HZM, Donald J. Anderson, Grand Forks, ND W0KSS, Homer M. Cox, Ayrshire, IA W0HZM, Donald J. Anderson, Grand Forks, ND W0KSS, Homer M. Cox, Ayrshire, IA W0HZM, Donald J. Anderson, Grand Forks, ND W0KSS, Homer M. Cox, Ayrshire, IA W0HZM, Donald J. Anderson, Grand Forks, ND W0KSS, Homer M. Cox, Ayrshire, IA W0HZM, Donald J. Anderson, Grand Forks, ND W0KSS, Homer M. Cox, Ayrshire, IA W0HZM, Donald J. Anderson, Grand Forks, ND W0KSS, Homer M. Cox, Ayrshire, IA W0HZM, Donald J. Anderson, Grand Forks, ND W0KSS, Homer M. Cox, Ayrshire, IA W0HZM, Donald J. Anderson, Grand Forks, ND W0KSS, Homer M. Cox, Ayrshire, IA W0HZM, Donald J. Anderson, Grand Forks, ND W0KSS, Homer M. Cox, Ayrshire, IA W0HZM, Donald J. Anderson, Grand Forks, ND W0KSS, LD. D.

FM Repeater News

We Need Help!

Last month in this column we ran the new guidelines recommended by ARRL for repeater autopatch operation. We pointed out that amateur radio could be faced with a serious problem with FCC as far as interconnects to phone lines are concerned if we don't clean up our act. It is not inconceivable that FCC could actually ban the use of all interconnects. So, for the sake of discussion, let us assume that we are going to be put in a position of having to defend our right to have interconnects. But first, let's look at a few statistics.

In the current issue of the ARRL Repeater Directory we show over 850 repeaters listed that have autopatch installed. It is probably safe to say that by now the number is well over

LET YOUR VRAC REP KNOW

The ARRL VHF Repeater Advisory Committee consists of an amateur from each call area and one from Canada. These amateurs are well versed in the field of repeaters, both technically and operationally. Their function is to collect information from the field, correlate that information, and then advise the ARRL Board of Directors, in turn, the Board takes ap-propriate action based on these recommendations. How knowledgeable is the VRAC? Well, we are not

going to go down the list, but their names read like who's who in the repeater and remote-base field. We have amateurs who have been the ones instrumental in forming fm councils. We have some who served and still serve as volunteer frequency coordinators. And so on. The important point is that these volunteers are trying to do a job to keep amateur radio in the field of repeaters and remote bases on the track, both as to band plans and regulations. To do the job, they need input from their areas of jurisdiction. And that means

If you have thoughts or ideas pertinent to any phase of the operation, whether it be band plans, frequency coordination, FCC regs, or anything else, let your representative know. These people cannot operate in a vacuum so they need your input. If you are interested in knowing who they are, they are listed this month in QST in "Happenings of the Month."

IN RESPONSE - DFing

"In response to your request for an exchange of information on direction-finding activities, I would like to relate to you what is happening with the Anaheim Amateur Radio Association here in Orange County,

*VRAC Liaison, ARRL hq.

1000. There also isn't much doubt that the number will continue to increase.

Is the use of autopatch in the public interest as far as amateur radio is concerned? To our way of thinking, there has never been anything in amateur radio that has proved to be a better emergency tool than repeaters -- combined with autopatch. Here in Connecticut we have several systems using autopatch. Hardly a day goes by that there aren't many calls going into the state or local police from amateurs reporting accidents. In fact, many repeater groups teach their users proper methods for reporting accidents so that the work is consis-

All this is well and good but if we are put in a position of defending interconnects, what good

"About one year ago our association held their first 'T-Hunt.' Much planning was done by the board of directors to assure that the activity would be in-teresting as well as educational. They decided to add a bit of socializing to the activities by having refreshments served at the finish line or the hidden transmitter site. The hidden transmitters are always located in an area where this can be done without encountering problems from the local gendarmes. So

far, no real problems have arisen.

'The event is 'timed' with the first to arrive at the hidden transmitter being declared the winner. The winner is held responsible for hiding the transmitter for the next event. The time required for the first team to locate the transmitter has been reduced to as low as 2-1/2 minutes per air mile from the starting point, and these times are becoming more consistent with each

"The equipment, of course, varies with the en-thusiasm of the individual as well as his or her pocketbook. Yelpers and Happy Flyers units are used as well as simple Yagis and quads. The four-element quad seems to be the more common, and is seen in the winners circle on a regular basis. Rf attenuators providing up to 160 dB of attenuation are used with the Yagis and quads. Field-strength meters using op-amp cir-cuits for gain control are substituted for the receivers when the hunters get close enough to encounter front-

when the nunters get close enough to encounter frontend overloading conditions.

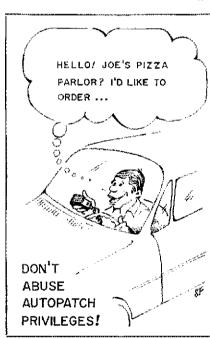
"The type of equipment used doesn't seem to be as
important as how it is used. Learning to use it is the
most important aspect. This is only done with practice, practice, and more practice. By combining the
purpose of "T-Hunting" with a bit of socializing, I feel
the Analysis A. P.A. has been by far the most. the Anaheim A.R.A. has been by far the most successful in our area for participation. For instance, last month's event consisted of 17 teams!

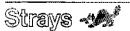
"It is my belief that if more amateurs equip themselves for DFing and regularly participate in DF-ing exercises, then publish the results, the more it will serve as a deterrent to those that choose to operate illegally. I might add, our repeater seems to have the

are all the life-saving autopatches if we have a record of them. And we don't have any re ords. Maybe some clubs keep such records, as if so, please send a copy of them to ARRL h

in any case, ARRL has to start building a f on this activity. If your club or repeater group isn't keeping records of emergency autopat calls, why not bring up the subject at a cit meeting and see what arrangements can made. If you decide to go ahead with maintai ing such records, please send copies to ARF hg., attention Bobbie Chamalian, WB1AD Also, if you get a really big one, don't forg our hotline which operates 24 hours a da seven days a week, telephone 203-667-0138. V need your help!

least jamming of any I have listened to in this are will be happy to answer any requests for ac-Twith the happy to answer any requests for at tional information concerning our DFing activitie those interested will write to WA6TEY, c/o Anah. Amateur Radio Association, P. O. Box 22 Anaheim, CA 92804."





SERENDIPITY, BRASS AND THANKS FROM REACT

LI Some of the most effective public-service demonstrations by amateur radio operators involve many persons and months of planning. Others just happen by accident because of a single person's alertness - screndipity.

Gordon LaVere, K8ZIS, assistant EC for Genesee County, MI, came upon a checkpoint for the first annual Bobby Crimm Road Race, a jogging event to benefit the Michigan Special Olympics. Some 750 people, ranging in age from eight to 70, had entered the 10-mile race, and since the weather was hot and humid, Gordon felt that communications would be vital. An official pointed to a REACT van parked nearby. The REACT operator was very impressed with autopatch and quickly put K8ZIS on the 11-meter band to talk with the REACT leader.

The CBers were having difficulty maintaining solid communications over the four-mile distance between their base station and the outermost unit, and had no way of talking beyond their own small group. They were eager to explore the possibility of having a "direct phone line" to the police dispatch. Though Gordon had an appointment to keep, W8WN was called in from a CAP exercise about 30 miles away to work with the REACT mobile base, EC W8U

joined in and cruised along the race route.

REACT continued to handle most of the ecmunications, with ARES providing service throughout the continued to the police dispatcher. About 10 c were made; none were an emergency, but several w priority. For example, an 80-year-old woman been waiting two hours for a cab, but couldn't get because of the crowds. Despite the weather and

participants' ages, just two were taken to the hosp as a precaution, while 550 finished the race! It was a strange feeling at first, for this was the f time that the local ARES and REACT groups had terfaced. But everything went beautifully, and memorable public service was performed. — She Ennis, W8WN

Washington Mailbox

A Potpourri of Recent Rules Changes

With amateur radio rules and regulations changing so frequently these days, have you ever wished you could have a summary of where things stand now to help you keep track of them ail? Well, even if you haven't, here they are.

Q. What is the latest on the bulk-mailing of Navice exams?

A. Early last year the FCC was mailing Novice exams in bulk to qualified examiners who requested five or more exams at a time, but this practice has been discontinued. The FCC said that the bulk-mailing program was actually increasing the work of the Commission rather than decreasing it, that many exams were simply not being returned at all, and that many examiners were requesting multiple copies of tests just to have them on hand in case of future need. Presently, examiners must file an individual application with code certification prior to administering each Novice written exam in order to acquire the written test. (97.28)

Q. What is the status of the "instant-upgrading" program?

A. The instant-upgrading program was instituted last March and came as welcome news indeed. It applies to people who already have some class of amateur license, and who take an FCC-administered exam to upgrade their privileges. For example, if a Novice class licensee successfully passes the exam for the General class license, the examiner will issue him an interim permit that allows him to get on the air immediately with his newly earned privileges. The interim permit is good for 90 days or until his new license arrives, whichever comes first. Special identification procedures must be used when operating under the authorization of the interim permit, but these procedures are explained right on the permit.

Q. What's the story on license fees?

A. On January 1, 1977, the FCC suspended the collection of all license fees. This suspension is still in effect at this writing. Send no money to the FCC for any sort of amateur application, renewal or modification. Sending money will only slow things down since the FCC then has to go through the additional paperwork involved in refunding the money.

Q. What is the latest on the issuance of twoletter call signs for Amateur Extra Class licensees?

A. The FCC's phase-in period of assigning two-letter call signs on a seniority basis according to when the applicant received his Amateur Extra Class ticket is now over, and two-letter call signs are now available to all Amateur Extra Class licensees regardless of the date the person obtained the Amateur Extra Class license. At this writing, Amateur Extra Class applicants for two-letter calls can request

the call of their choice, subject to availability, but this program would be discontinued if the Commission adopts Docket 21135 as proposed: Extra Class licensees would still be able to obtain a two-letter call, but not of their choice. See "Happenings" or "League Lines" in this issue for late-breaking news.

The FCC has opened up the "AA" block of call-letter prefixes to make them available to Extra Class licensees who desire a two-letter call but who are unfortunate enough to reside in a district in which the supply of W-, K- or N-prefixed, two-letter calls is exhausted. Presently, AA-prefixed, two-letter calls are being issued only in four- and six-land.

Q. What are the latest rules regarding purity of emissions in the amateur service?

A. The FCC has imposed strict spurious emission limitations that now must be met by transceivers, transmitters and external power amplifiers before they can be marketed. For such equipment operating below 30 MHz, the mean power of any spurious emission or radiation must be at least 40 dB below the mean power of the fundamental without exceeding 50 milliwatts. For equipment of mean power less than 5 watts, the attenuation shall be at least 30 dB.

Stricter standards are imposed on amateur transmitters, transceivers and external power amplifiers operating above 30 MHz but below 235 MHz. These devices must have any spurious emission or radiation attenuated at least 60 dB below the mean power of the fundamental. For a transmitter having a mean power of 25 watts or less, the mean power of any spurious radiation supplied to the antenna transmission line shall be at least 40 dB below the mean power of the fundamental without exceeding the 25 microwatts of power, but need not be reduced below the power of 10 microwatts of power.

There are exemptions to these new purity standards which allow the sale of transmitters, transceivers or external power amplifiers that fail to meet the new standards, but which were manufactured prior to April 15, 1977, or first marketed prior to January 1, 1978. (97.73)

Q. Haven't there been recent changes in the manner in which the FCC administers the telegraphy test?

A. One change in the FCC-administered telegraphy test is that the sending test has been deleted as part of the testing procedure. Applicants need only demonstrate ability to receive the code at the required speed. The sending test continues to be part of the requirement for Novice examinations administered by volunteers, however.

Another change is that the FCC is now administering comprehension-style receiving tests in which the applicant is given a multiple-choice test based on the content of a typical QSO sent at the required speed. While the five-minute message is being sent, the applicant may take whatever notes he wishes, and may

retain those notes during the multiple-choice test.

Q. How about the proposal to allocate part of the 220-MHz band for Class E citizens band use?

A. This proposal was officially known as Docket 19759, which was terminated by the FCC on October 13, 1977, as being obsolete. This does not mean that the issue is necessarily dead for all time. What it does mean is that in order to raise the question again, the entire FCC rulemaking procedure must be reinitiated in order to give the public ample opportunity to respond. Basically, Docket 19759 was terminated because the many events that took place since it first appeared in 1973 (including the rapid growth of the Citizens Radio Service and the formation of study groups to study the problem of personal radio use) had made the comments and reply comments filed in Docket 19759 obsolete, and new rulemaking would have to be framed, based on newer information. In the meantime, studies are underway of a number of alternative frequencies for CB expansion; 220 MHz is no longer singled out.

Q. Any other recent changes we should know about?

A. On June 13, 1977, the minimum age for a volunteer examiner conducting a Novice class examination was reduced from 21 to 18, (97.28b)

On March 3, 1977, a freeze was placed on the filing of applications for new secondary and special-event station licenses. This freeze is still in effect. However, applications for renewal or modification of existing secondary-station licenses are still being accepted and processed.

Later in 1977 a freeze was placed on the filing of applications for new repeater, control and auxiliary-link stations. This freeze is still in effect. However, applications for renewal or modification of existing repeater, control or auxiliary-link stations are still being accepted and processed.

In September, 1977, a reciprocal operating agreement between Liberia and the U.S. became effective.

In June, 1977, a third-party agreement between Jamaica and the U.S. became effective, and in November, 1977, a third-party agreement was established between Ghana and the U.S.

When U.S. Ambassador William Porter left Saudi Arabia, the agreement between Saudi Arabia and the U.S. to allow amateur radio station 7Z1AB to handle third-party traffic was discontinued.

Applicants claiming credit toward the Amateur Extra Class examination by virtue of having been originally licensed prior to May, 1917 and presently licensed as General or Advanced, can no longer receive such credit after March 1, 1978.

Amateurs in Hawaii can now use the 1800- to 1810-kHz segment of the 160-meter band from 4 P.M. to 8 A.M. local time with no more than 100-watts input power.

Correspondence

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

TRADITION UPHELD, 9-1

Delete "Station Activities" (CD Bulletin, January, 1978). Who cares if WB3EDX is eyeing a new tower? - Gary Andary, NoUU, Montclair, CA . . . "Station Frank Galvin, Activities" IS amateur radio. ---WIDMH, Boston, MA . . . The day that it is decided to remove the "Station Activities" report from QST, I respectfully suggest that you have another name picked out for the magazine. There are some traditions that should not be changed. - Donald Morris, W8JM, Fairmont, WV . . . How can the SCM get along without "Station Activities"? This is his way to tell the world what is going on in his section. Plus, it gives every ham a chance to express himself and get a little credit for his activities. I've been a ham and a member of the League for 54 years. - Basil Cutting, WIJB, Suncook, NH . . . The North Kingstown High School Amateur Radio Club voted unanimously in favor of keeping the "Station Activities" section. -N. Kingstown ARC, N. Kingstown, RI . . Why have SCMs, BPLs, Honor Rolls, directors, et. al.? Just print a magazine and have ads for gear on every page. "Strays" then will be former SCMs, ORSs, etc. Make it simple, just have subscribers, then for a great many of us, old and young, we shall truly be strays! - Armand Brattland, K6EA, Long Beach, CA . . . It is one thing that sets QST apart from other ham magazines. ARRL is a membership society, and this section furthers this principle. -- Bryan West, WB4DRC, McLean, VA If amateur radio is to maintain its quasi-official status of being able to handle communications in emergencies and provide a pool of trained operators, it is vitally important that they are indeed trained. If the "Station Activities" section, by mentioning calls and traffic accomplishments, provides a little more incentive to participate in traffic nets making up the NTS, it would seem to more than justify its existence. - "Sky" Wardwell, KIGF, Stamford, CT ... Even in my days of inactivity, I have referred to this section to keep abreast of who's who among the old familiar faces and it's always left me with the feeling that I should get back in there again. - Laurence Knutson, W9SFL, LaCrosse, WI ... It's about the only contact I have with hams in the section. I also read the Roanoke Division to see what is happening to hams I knew when I lived in VA 21 years; and check "rare" states to see who is active. -Bill Schuchman, W7YS, Flagstaff, AZ ... QST, being a journal of the membership, should clearly depict what the various groups of the membership are doing. "S.A." is one of these areas. Elimination of this published monitor of our activity would be self incriminating; saying that even though we claim to be important in times of emergencies, we really don't mean it since we don't want to use a couple of pages to show and see what we've done. If we don't publish this, well, "out of sight, out of mind," Combs, K9FG, Indianapolis, IN . . . Doing away with this section would be the same as cutting the heart out of the magazine. - Bill Miller, K2GCE, Freeport, NY

PICTURE THIS IN QST

[] How about a regular SSTV "gossip" column containing ideas, pictures of stations, etc. to run in alternate months? — Donald Vaughan, VK2AVZ, Terrey Hills, Australia

FOR OMS ONLY?

☐ After some effort I obtained my General class license and purchased "state-of-the-art" equipment because I thought that it would be a unique way to communicate with a number of different people. Since that time I discovered that amateur radio operators are certainly not as diverse a group as I had hoped. It's almost exclusively men who are old enough to be my

father or grandfather. How did I come to this conclusion? (1) By talking and listening to a number of them on the air, (2) by attending our local club meetings, (3) from page 26 of the 1977 callbook magazine's "Census of Amateur Radio Licenses," and (4) by observing the latest equipment which reproduces a man's lower-pitched voice much better than that of a woman. I suggest that the League in its efforts to improve amateur radio, encourage more young people and more women into the hobby, and work toward changing the design specifications of single sideband so that the voices of these people will reproduce better. — Phil Morin, KH6IDB, Milliani Town, HI

INTERFERENCE FREED

- □ Last October I communicated with your group. I happened to see a small article about you in our local paper. Over a long period of time I had frequent and loud interference on my fm radio from a neighboring radio operator. Communication with him and with the FCC brought no relief. You responded by suggesting that my manufacturer might be responsible for installing some type of filtering device. Well, I followed through on that. Panasonic responded promptly and took the necessary steps to repair the problems. I wish to thank you for steering me in the right direction. Valerie Binder, Detroit, MI
- ☐ I passed my General license test on September 23, 1977, but by December 23, 1977, hadn't yet received my permanent ticket from the FCC. I proceeded to take the necessary steps to find out the whereabouts of my license. Thinking that I would have to go back to my Novice privileges, and thinking this unfair, my OM and I called ARRL. They called me back to say I would be receiving a call from our District Engineer. Sure enough, in about a half-hour the call came. He said that it would be all right to continue to use my General privileges, but to make sure to send the interim identification behind my call. I had called the district office the same morning and couldn't get past the secretary. Brenda Gray, WB7PQU, Coos Bay, OR

"KOSHER" HAMS

LI I think the public service announcements promoting amateur radio are a terrific idea. I take exception to remarks made that because of these "promos," amateur radio and everything it stands for will be like CB is today and that hundreds of thousands of people will now become hams. As an "ex-CBer" and a newly licensed Novice, I feel that there is always room for one more or thousands more in this fraternity of people I respect, admire and aspire to "become one of." — Frank O'Halloran, WD5IGM, Folsome, LA

- ☐ I am very pleased to see that the ARRL is trying to limit the misuse of amateur equipment but I wonder if the Code of Ethics goes far enough? Many "bootleg" CBers are taking basic license courses and upgrading to amateur licenses. If a person operates illegal power and frequencies as a CBer, why should we assume he will do otherwise as a "ham"? Stanley Holz, WAISFN, Whitefield, NH
- [7] I am an "ex-CBer" and I'm proud to be an amateur. I worked hard to become an amateur and am working hard to become a better amateur. Jemphasis added Ed.] If ham radio ever looked like it was getting anything like CB, I would get rid of my gear. I think I speak for other ex-CBers when I say: We don't want to be made comfortable at the expense of ham radio. We got where we are by hard work and a desire

to get into a hobby we looked up to. We would no like to see it change for the worse. The ones who reall care won't mind learning what's needed to become at amateur. — John Chewront, WBTSAU, Astoria, Ol

- [] Thanks to a very helpful friend, WB5CZV, I an now on the air. He was open-minded enough not to run off a prospective amateur because he was a CBer Just think, out there lie a vast number of potentially good amateur operators; people who know what can happen to two-way radio when it gets out of hand. R. J. Barnard, WD5HQC, New Orleans, LA
- Do you remember when you first became interested in "short-wave" communication? Imagine, if you will, the many youngsters who began careers this way and greatly contributed to the advancement of radio and the electronics field. Now picture those same adventurous-minded youths today and their introduc tion to radio communication. We who know that there is far more to radio than 40 channels at 27 MHz and want to ensure that there remains more to radio than that, had better let the world know that: (1) we were the ones who "created" radio as it is today, (2 there is more to radio than "smokey reports," and (3 not all base-loaded, car antennas are for "ears." Tel the kid who asks "What's your handle?" what you're all about. Perhaps it's time that the electronics in dustry and the large retailers of consumer electronic lend a hand in spreading the word. - [Name witheld by request?
- □ When I decided to go from CB to amateur radio, is opened up a whole new world for me. More activities more operating modes, and most of all, more friends My thanks to the ARRL and a few of my friends for introducing me to the world of amateur radio. Russell Haring, WD&PEQ, Girard, OH
- As a former CBer and a recent addition to the "family of ham," I can readily recognize the importance of your programs to bring amateurs together in their efforts to maintain and expand the many aspect of amateur radio. If anyone has had the frustrating experience of trying to get out on a band where anybody is issued a license, where keying up on your neighbor and other acts of discourtesy are now more the rule than the exception, they don't need to be convinced of the importance your organization represents to the future of ham radio. Ronald Imbimbo, WBIFPC Bridgeport, CT

FASTER THAN A SPEEDING BULLET

As an amateur of 25 years I've never encountered the likes of this before. On December 21 I was afforded the opportunity of observing the prompt response to a message which required expediting. A message was picked up from a North Carolina amateur net. It had been transmitted to a Kentucky net. W4BEJ received this piece of traffic and upon finding a local ham via 2 meters, requested that he contact the person and have him available in his automobile for receipt of the message. Within five minutes WA4VFW had contacted the person and had him in his auto. Total clapsed time from origination to delivery was 30 minutes. The recipient of the message sent a reply back, "MERRY CHRISTMAS, AND GOD BLESS ALL HAM OPERATORS." — Gilbert Keith, W4OJN, Rineyville, KY

BREWED IN THE HOME

☐ I've been a ham for three years and have come to take for granted many of the things i worked so hard for. Anyone can go out and buy the things you require to have a good station, but to me, it's not right to operate it in the absence of some hand-crafted widget that makes you feel like the old-timers. I wouldn't trade the thrill of my first contact with anyone, but the thrill is extended with each new "home-brew" project. Thanks for reminding me with your December issue. Don't let me forget. — Daniel Fish, WBBOXC, Fridley, MN

International News

Want to Operate in the USSR? Part 2

Back in the February, 1977, issue of QST, we told you how you could go about securing permission to operate an amateur station in the Soviet Union. Several months later, the Radio Sports Federation of the USSR notified us that the procedure had to be changed, at the request of the Soviet government. Through the courteous cooperation of the Department of State in Washington, DC, the paperwork and correspondence necessary to implement the change was put into motion, and the system is now ready - and simpler than ever. Beginning February 1, 1978, licensed American and Canadian radio amateurs who hold the General class license or higher (or Advanced, if you're Canadian) may apply for permission to operate a club station in the USSR by following these instructions. Send two photocopies of your current license (both station and operator's certificates, if Canadian) and a letter stating clearly your itinerary and desire to operate a station. This letter should be addressed to the Radio Sports Federation of the USSR, Send the photocopies and the letter to the International Services Officer, ARRL Hq., Newington, CT 06111. He will translate your letter into Russian, add a cover letter certifying that you are a member of the ARRL in good standing, and that ARRL hq. recommends that a permit be issued. The papers will then be forwarded through the State Department channels to Moscow. Between 60 and 90 days advance notice are required in order for us to be successful.

The USSR boasts nearly 100,000 amateurs today, but most of them operate the many club stations around the country. Your permit will entitle you to operate one of these stations; under no circumstances will you be permitted to take along a rig of your own, or to operate a private station.

Nevertheless, operation of a club station should be fun. Want to learn more about

*International Services Officer, ARRL

Japan Amateur Radio League President Shozo Hara, JA1AN, recently visited the only two gentlemen authorized to operate an amateur radio station in Taiwan: Mr. Tim Chen (extreme left) and Mr. L. C. Huang (extreme right). (Photo courtesy JA1AN)



amateur radio in the USSR? See W1YL's article in this issue, "From Russia with Love."

PUBLIC EMERGENCY MET BY BERMUDAN AMATEURS

In this column for December 1977 OST, we showed how Bermudan amateurs were organizing an emergency training operation and gaining the attention and respect of government officials. Their goal was to show through disciplined preparedness, amateurs could be counted on to provide emergency communications support whenever needed. During the first several nights of the civil disturbance that occurred in Bermuda in early December, the amateurs of Bermuda proved their worth. They began by establishing a security watch in which prescribed frequencies were guarded and periodic schedules maintained. Several members of the National Capitol DX Association in Washington, DC, cooperated in the effort by Bermuda's amateurs: K3AO, K3RT, K3ZO, W3ZSR, K4DXO, K4FJ, N4RO, N4TX and W4QAW. Continuous liaison was maintained between the DC group and the island, while Bermudan amateurs quickly opened a 2-meter fm simplex net when a fire broke out in the building housing their repeater and rendered it inoperative. Watch frequencies were set up on the 80-, 40-and 20-meter bands to provide for uninterrupted propagation paths to Bermuda. (That sought-after 10-MHz band would have been very useful in this emergency situation! Now we have one more documented case where we can show the need for this allocation at WARC-79.)

NEWS FOCUS: ASIA AND THE SOUTH PACIFIC

Most amateurs know that the International Telecommunication Union in Geneva has

A later trip took Mr. Hara to Paris, where he met with Reseau des Emitteurs Français President Jean Coussi, F9FF (center) and REF Director F5FM (right). WARC-79 was the principal topic of the visit, and Mr. Hara reports that the exchange of ideas on WARC improved communications between the two IARU member-societies. (Photo courtesy REF)





Distributed to all Region 3 member-societies, Region 3 News keeps readers up-to-date on the activities of importance to them.

divided the world (for telecommunications purposes) into three regions. Region 1 includes Europe, Africa and the USSR. Region 2 is essentially the Western Hemisphere. And Region 3 is the rest of the world, including Asia, the Pacific island nations, and Japan, But did you know that the International Amateur Radio Union, too, respects the ITU division, and that the member-societies in each region collectively publish periodic newsletters? We are focusing this month on the newsletter published by the IARU Region 3 Association which began only recently (February, 1976). In its decision, the Association declared that the "Region 3 News" would offer a medium for "the frequent exchange of the latest information." The Japan Amateur Radio League generously offered to compile, print and distribute the news on behalf of the Association at no cost to the Association or to its members.

About 230 copies of each bulletin are published and distributed by JARL to all the member-societies of Region 3, all of the Executive Committee members of the other two regions, and to some parties outside Region 3. Editor Naoki Akiyama, JHIVRQ, collects articles of interest from sources like the monthly bulletins of each member-society, and he is constantly urging members to write on various aspects of amateur radio in their own countries so that "Region 3 News" can continue to be the informative spokespiece of IARU Region 3.

YL News and Views



CW Ladies

When Evelyn Headings, W7LLD, ex-W6ALM, won the code contest in Seattle, WA, last year she was continuing the history of women who have entered these contests and qualified, that began in 1932 with Jean Hudson, W2TEF. Jean entered and won a contest at the Century of Progress, the Chicago World's Fair. At that time Jean was just eight years old! Several years later she again qualified in the Class B competition at Asheville, NC, where Ted McElroy set his still-unbeatable record.

But contests aren't the only places where we can find the gals who have chosen brasspounding as their favorite form of operating. Liz Zandonini, W3CDQ, is a most active cw operator in both contests and nets, and keeps a number of schedules with members of the YLRC Italiano. Mae Burke, W3CUL, is an indefatigable brasspounder on all bands with hours of traffic handling to make close to two million BPL totals. Camille Hedges, W2HFR, works all cw in preference to phone. Clara Reger, W2RUF, has not only given us our YL signature, "33," but since the early 1930s has been an active ew operator and has been teaching handicapped persons the code and assisting beginners on the air, as has Kay Anderson, W8DUV, been on all bands helping newcomers, then switching off to keep traffic schedules.

And there are other gals to whom cw is a must if they want to operate as do Mary Lou Stocksill, WB6SSZ and Kathleen Clark, VE3KAY, both gals blind, deaf and depending on cw to meet and know amateurs worldwide. And there are the Novices, the YLs of the Novice bands, whose operating pleasure limits them to cw as it helps them increase speed to upgrade their amateur licenses, and become the future W7LLDs, W3CULs or VE3GOLs of amateur radio's YL picture.

1977 YL ANNIVERSARY PARTY RESULTS

The winners: phone (YLRL): K6KCI 11,943,75*, WA9TVM 11,433, WA3HUP 11,316. Cw (YLRL): VE7TDO 761.25*, YV5CKR 570, W8YL 531.25, Corcoran Award: WA9TVM 11,523 (combined). Hager Award: VE1AMB 8178 (combined), HB9ARC 5481 Award: VEIAMB 8178 (combined), HB9ARC 5481 (combined). Phone (YLRL): WALJYO 3022.5*, K1QFD 2247.5*, W1ZEN 3600*, WAZAKJ 36, WAZDMK 722.5*, W2EEO 724, W2GLB 7800, WAZDMK 742.5*, W2EEO 724, W3GLB 7800, WAZNFY 4752, WAZVIE 1058, W3MDJ 6327, K4AOH 6322*, WB4NKO 4641, WB4QBL 1316, WB4PRM 3585*, WD5FQX 9880, WB5LMZ 1462.5,

*YL Editor, QST. Please send all news notes to W3WRE's home address: 305 N. Llanwellyn Ave., Glenolden, PA 19036.

W5MWK 1618*, K5OPT 4368, K6DLL 6630*, K6OPG 193*, K6RLR 4992, WA6WZN 2683*, WA7BDD 447.5, WA7IRD 5500*, W71YX 4300*, WA8EBS 2556, K8ONV 11.25*, WB9LSM 805, WB9MFC 2956.25*, WB9TDR 5640, WB9VIP 3570*, WB9MMYC 3485*, W92WL 54, D11EIC 8636.25*, D10EK 102, DK1HH 2250*, DK2KD 330*, DL3LS 3293, DK5RU 1187.5*, DF2SL 1320*, DK5TT 2673, DJ5UAV 3893.75*, E17CW 6697.5*, G4ESR 56*, G8LY 91, HB9ARC 6457, JA1AEQ 140*, JHIGMZ 90*, LA3RN 242, LX1TL 8181.5*, OZ1AVV 1955*, PTZHQ 240, PY8JO 2146, PY2LY 1680, PY2SO 26, VE1AMB 7800*, VE7DTO 6500*, VE2JZ 945, VK3KS 1495*, VP9IJ 7205*, YV5CKR 3872, Z1.2JO 912.5*, WA6OFO/3D6 361.25, 4X4NW 4644, Phone (non-YLRL members): WIGAI 1418*, WIWS 10,809, N3IT 19, WB1ARV/41, WA4SRD 260, WA6HEL 5916, W6WDL 1038*, WB0KHO 48, KL7JDI 2613, DJ1BF 3570*, DK9CA 277.25, DL3JIC 337.5*, DL6JOC 2840, DK9IR 90*, DF3TE 3081.25*, DK9TS 12, DF8YU 1.25*, DJ9YL 3520, G4GAJ 5880, JA4VQX 371.25, OX3ZMN 1480*, CW (YLRL): WA2DMK 200*, W2HFR 192, WA2NFY 483, W3CDQ 3, K3YL 80, K4AOH 315*, WB4PRM 432, K6DLL 260*, WA9TVM 90, WB9VIP 1, WB9VMN 7, WB0JFF 61.25*, DF2SL 187.5, DK5TT 275, DJ5UAC 3.75*, F6BWX 56, HB9ARC 24, JA1AEQ 90*, LA3RN 3, VE1AMB 378*, VK3KS 31.25, CW (non-YLRL members): WIGAI 440, W1WS 121, N3IT 14, WB1ARV/4 15. *Indicates low-power multiplier.

*Indicates low-power multiplier.

PJYL ELECTION RESULTS

The following YLs have been elected as 1978 officers of the PJYL Club: President, Sylvia Soble, W3SLF; Vice President, Shirley Lukoff, W3VNN; Secretary, Jane Jones K3ZDN and Treasurer, Dottie Scialdone, K3YPH. The club meets on the second Tuesday of each month at 8 P.M. at various members' homes. All YLs of the Pennsylvania and New Jersey areas are invited to join.

During a recent trip Liz Zandonini, W3CDQ, met members of the YLRC Italiano with whom she chats regularly. (L-r) Liz Zandonini, W3CDQ, Alda, I1MQ, Nora and Tullio, I1MM.



CLARA 1977 AC-DC WINNERS

Member top score, Thelma Woodhouse, VE3CLT first prize (nonmember), Gary Hammond, VE3GCO second prize, Roy Tuttle, VE3BNV; third prize Sydney Jones, VE6MJ. Mini-draw winner (all entrant eligible), Diana Vanderzande, VE7DTO.



Women who attended the 22nd birthday party of TYLRUN. Front row (I-r): Mary Lawrence, K5MPI, Julie Young, K5JFJ, Liz Sheffield, K5DLI and Frances Smith, WA5MPM. Second row (I-r): Lynn Ohlson, W5RYX, Annie Smith, K5JKV, Bertha Watson, W5JCY, Opal Helms, W5UXW and Myrt Stinnett, WB5FGM, 1978 TYLRUN President. The net meets each Thursday morning at 8 A.M. CST on 3.940 MHz and welcomes all YLs. (K5TXQ photo)

Evelyn Headings, W7LLD (ex-W6ALM), is amateur radio's new YL code champion. She copled 51.2 wpm with a "stick" at the Northwest Division ARRL Convention to become on of the 10 top cw YLs of this country.



How's DX?

The Why and the How of DX

Have you ever asked yourself why you work DX? Do you know what keeps you glued to your equipment hour after hour while chores and other duties beg in vain for your attention? The answers you give to these questions will depend on the type of person you are. Perhaps you will recognize yourself in the following characterizations of typical DXers:

Collector — Collects countries the same way a philatelist acquires stamps. Treasures the rare one.

Competitor — Wants his total of countries to be the highest. Enjoys beating the crowd in a pileup on a DX station. May also find his competitive urge satisfied in DX contests.

Ragchewer — Likes meeting and talking with people. Enjoys developing on-the-air friendships with foreign hams.

Tourist — Travels by radio. Thrills over contacts with people in distant and exotic places.

Scientist — Perfects antennas and equipment. Studies propagation. Treasures the contact made at unusual times on state-of-the-art equipment.

Detective — As a member of Intruder Watch, looks for interlopers on our bands. in this case does not work the DX!

The How

Your personality and your motives determine not only why you work DX, but how you work it as well. For example, conventional advice tells you to tune carefully across your favorite DX band while looking for DX stations that are calling CQ. But that is not necessarily the best way for you to work DX. Are you a ragchewer or tourist, or are you one of the other types who may be satisfied by a quick contact including little more than a signal report? If you like ragchewing, and your operating time is limited, on many days your best bet is to call CQ DX to establish contact quickly. From the East Coast, for example, when conditions on 20 meters are good toward Europe, a quick CQ DX may even produce a small pileup on either the phone or cw portions

*c/o ARRL, 225 Main St., Newington, CT 06111

Have you worked any of these DXers lately? Below: FOØDET (op. WA7IJB). Clockwise, starting opposite: 9H1FF, EP2TY, YS1RRD, JG10QZ.



of the band. In that case your only problem is to pick a station that may be willing to ragchew with you.

But what if you want to work new countries? Undoubtedly, there are situations that require you to tune slowly across the band while listening carefully. DX expeditions usually park on a frequency for many hours. If you don't hear them because you are calling CQ elsewhere, you will obviously never work them. Also by tuning, you may with luck be the first one to hear a station in a rare country calling CQ. You may also find some new countries by listening to QSOs in progress. Many rare stations maintain schedules with QSL managers or friends and relatives in other countries. Often the operators will work other stations at the end of their QSO. As you cannot possibly be aware of most of those prearranged QSOs, you will find them only by patient hunting. Even if you operate in DX contests, careful listening is required to find some of the rare and distant multipliers that are often hidden under the general QRM. It is not unusual in a contest to hear rare but weak stations calling CO with no takers.

Are there any times at all when calling CO DX may produce a new country? The answer is definitely ves. Operators of some rare DX stations dislike pileups and use hit-and-run tactics to avoid them. They will answer a CO, but quickly leave the frequency after the QSO is over. In general, a signal will attract attention, On one memorable occasion, while ragchewing on the 15-meter band with a ham from England, I complained about the shortage of new countries to work. Immediately afterward. a breaker tried to gain our attention. Finally, we asked him to join our QSO. To my great surprise and pleasure, the breaker was from Rhodes - a new country for me. I have acquired other new countries in a similar way. Naturally you cannot expect to work a new country every time you call CQ, but especially if your list of countries worked is not long, you will occasionally bag a new one this way.

So what should you do? Probably, you should try a mixture of both tuning and calling,

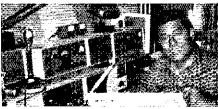
with the exact proportion depending on your own past experience and basic goals. In any case, good operating demands some listening. Everyone knows that you should not call CQ without first listening carefully to see if the frequency is clear. To make sure, good operators ask if the frequency is in use. (On cw. a universally accepted brief way of asking that question has not been developed. Many operators, however, use the Q signal, QRL? The ARRL prefers IE, which is letter C in the original Morse code.) Checking for a clear frequency is fundamental, yet the principle is violated countless times every day. Sometimes, this leads to the amusing situation involving a U.S. station and a DX station both calling CQ DX on the same frequency. Other times annoyance results, when someone begins calling CQ on top of an ongoing OSO.

If what we hear on the air is any indication, some operators still don't know that when you find a DX expedition, you should listen for a few minutes until you determine its listening frequency. In many cases, a DX expedition transmits on one frequency and listens on another, yet many operators will call on the expedition's transmitting frequency.

Here is another situation that requires careful listening. Many DX stations, if laboring under a pileup, will listen slightly off their transmitting frequency, but will not announce the fact. (This is more likely to occur on cw.) You will never work that station unless you locate the correct frequency on which to transmit by listening for those who are working the DX station. To complicate matters, the DX station may hop from one side of his transmitting frequency to the other, or may gradually listen further and further away from his frequency. Any pattern is possible. The sharp operators know this; the others labor on in vain.

Happy tuning, happy calling, and good DX! In future months the column will explore many other aspects of DXing. Don't hesitate to send us reports and photos (preferably black and white) of DX operators, stations, expeditions and activities. All will be welcomed.









THE DX SCENE

Worldwide

This year is developing into a good one for DXers. Propagation continues to improve with the growth of the new sunspot cycle. Activity is increasing as a result. The CQ Worldwide DX Contest saw a number of expeditions, and others are adding excitement to the ARRL DX Contest. As this is written, it appears likely that even long-dormant Clipperton may soon be put on the air. In addition, some of the personnel involved in the expansion of international business and in assistance to less fortunate countries are hams, and this should continue to provide much new activity—especially from Africa and Asia.

Here are some specific bits of information extracted from recent mail.

C6 — Customs in the Bahamas requires a 60-percent, refundable deposit on the value of equipment brought by DXers planning to operate there. (N4GC)

EP2MO is now being operated by WØPEU in Shiraz, Iran. QSL via W8UOQ.

F\$4CO was operated by K1IXG during October and November, 1976.

FOODET was operated in the first part of October by WA7IJB when he could tear himself away from other fun and frolic, QSL direct with an s.a.s.e.

HL9KO, HL9TA and HL9UJ (KSUJ) are barracks buddies in Korea. 'UJ hopes to move up from 3 watts and a dipole to 100 watts and a Yagi. (K5UJ)

Italian Prefixes Certificate — The Trieste DX Radio Club, P. O. Box 1342, 34100 Trieste, Italy, is offering a certificate for those who work 10 different Italian prefixes on five separate bands.

JW2CF — QSLs for contacts made from December, 1975, to July, 1977, should go direct to LA2CF.

KCAUSV has been active on 14.238 MHz at 1300 UTC on Saturdays. (K4TWJ)

KC6JC — Those still needing a QSL should send IRCs and s.a.e. direct to W2GC/W2RDD.

KC6VZ -- Contacts made during October, 1977, may

be confirmed via KH6HOU.

KG6JIL reportedly operates near 21.2 MHz at 2200 UTC. (WDØBGZ)

KH6 on 160 — Hawaiian amateurs may use the lower segment of 160. Watch for them on 1.800 to 1.810 MHz. (W1BB)

KM6FC (WA9CHG) expects to be active from Midway for another year.

KV4AA is still going strong, and completed 31,700 QSOs during 1977.

KX6LA used K2BT as his QSL manager only during 1974 to 1976. QSLs for recent contacts should go direct.

S.a.s.e. needed. As a reminder to new hams, the fastest way to get a card from a QSL manager is to enclose an s.a.s.e. with your card. Without one, response will be via the bureau, if at all. (WAFVT) VP3PE often keeps skeds with QSL manager WB9MFC on 28.385 MHz, Saturdays and Sundays.

1500 to 1600 UTC.

W40NY, who has previously operated as XW8CZ,
G5AIQ, VS6CZ and K3KZB, expects to go to
Okinawa this summer for a two-year tour.

WA3EEE/KG6 — If you need a QSL, WA3EEE still has the logs for his stay on Guam from 1968 to 1970. WA6YOU/DU2 left the Philippines in September on his way to OD5. QSL direct or via the bureau.

ZD8RG and ZD8RW are active from Ascencion Island, using three-element monobanders for 10 and 15, and dipoles for 20, 40 and 80 meters. (K8VIO)

3.46GY was operated by WB2EZG last December. He reports that henceforth all nonresident operators there will be required to sign their home call/3A2. (WB2EZG)

7GIL and 7GIQ were operated from July 25 to August 2, 1964 and from June 27 to July 4, 1965, respectively, by W8BY, using cw almost exclusively. QSLs for those cw contacts may still be obtained from him or W3KT. Any ssb contacts with U.S. hams were made by another operator. (W3BY)

7X may show more activity soon. Amateurs Radio

Algeriens has recently ordered 22 ssb transceiver (WA6IDN)

9HIEL no longer uses W5CPI as QSL manage: Cards may be sent direct with IRCs. (WB1CJK) 9HIEY, currently active from Malta, is ex-3D2A. (W6SC)

NEED A QSL MANAGER?

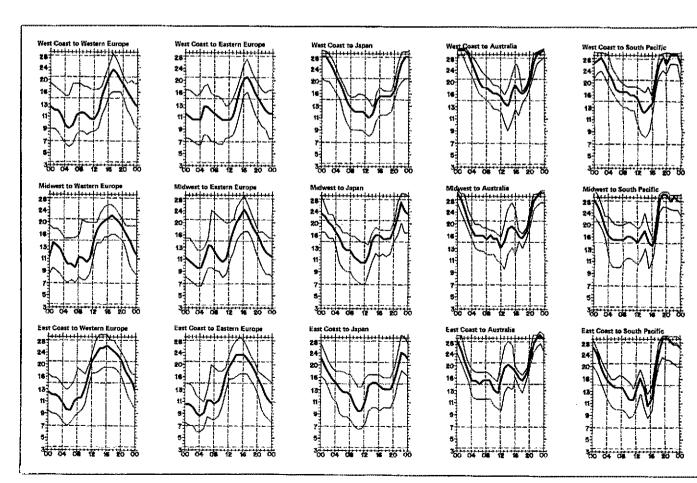
These volunteers have stepped forward: WAIGF, WAIYYX, WAIZGR, N2AR, WA2QAI WA4OUT, WB4AEJ.

QSL ROUTING INFORMATION WANTED

FG®DWT wanted by W1GAY CR7CD (11/64) wanted by W4DZZ EL6E (2/65) EL6S (2/65) KC6ES (6/71) KR6UA (2/65) wanted by WA4JX1 FQ8AJ (58) ZAIMA (1Q?-58) wanted by W4QCU KC6LG (8/72) 3D6AJ (12/75) 3D6AJ (7/72) wanted by K8LZ (WB8CGC)

THANKS FOR THE HELP

The following, plus those noted elsewhere in the coumn, are recent contributors: Ks 2BLL 2JFJ 3U. 5DB 5UR 6YK 8PYD 9DID; NS 5FG 5RM; Ws 1ML 1QQ 2AG 2QXA 3BY 3ODJ 4QCU 6MI 6MUS 7H 8GT 8ZCQ 9WHM; WAS 5YMW 8QOY 8VAI; WE ICPG 4WHE; CESCN, DJ9ZB, VE7BYP, YSIRRE



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. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or hpf). On 50 percent of the days of the month, it will be at least as high as the iniddle curve (maximum usable frequency, or muf). On 90 percent of the days of the month, it will be at least as high as the



On the left is Harry Stickley, 3D6BP, an Englishman previously active as VQ9HCS from Aldabra and Astove Islands. His friend is Wayne Cookson, an American, who may obtain a 3D6 license. Both work in broadcasting in Swaziland.

QSL CORNER

Administered by R. L. White, W1CW

Along with a new conductor for the "How's" train. QSL freight has been switched to a new, but not very different track. So you'll know where it's at. QSL Corner is the place to look each month for help on QSL routing and bureau addresses.

Those of you now using the ARRL Membership Overseas QSL Service might want to note a slight change in routine. Others who don't know about the service might want to join the 7319 folks who last year sent some 862,151 cards overseas. The following explains how to take advantage of the cost-cutting ser-

The ARRL service forwards DX QSL cards on a once-per-week schedule to some 150 "countries" outside the 48 contiguous states. A list is yours for the asking. To use the service, you must be an ARRL member. Each member may send in his outgoing QSL cards to the service a maximum of 12 times per year without any limit to how many cards in any single

mailing, Here's all you need to do:

1) Presort all cards alphabetically by prefix, numerical prefixes last, for example, G, HK, 4X4, 5N2.

2) With each mailing include a check or money order for \$1, your address label from the current QST (that's the white label on the wrapper showing name, address and membership expiration date), and a stamped, self-addressed envelope with 13 cents

postage to bring you acknowledgement of receipt.

3) Package and wrap securely. Address to ARRL Membership Overseas QSL Service, 225 Main St., Newington, CT 06111.

When you meet all three requirements, your cards stand an excellent chance of making the weekly mailing schedule. If any is missed, your cards probably won't be sent since they will be set aside and sorted only after cards from those folks who have complied.

Now on to the QTH and QSL notes. As always, the accuracy of the QSL information is not guaranteed. A2CSD, Box 7, Orapa, Botswana

CE5CN, Roberto Idieta B., Box 2545, Concepcion, Chile

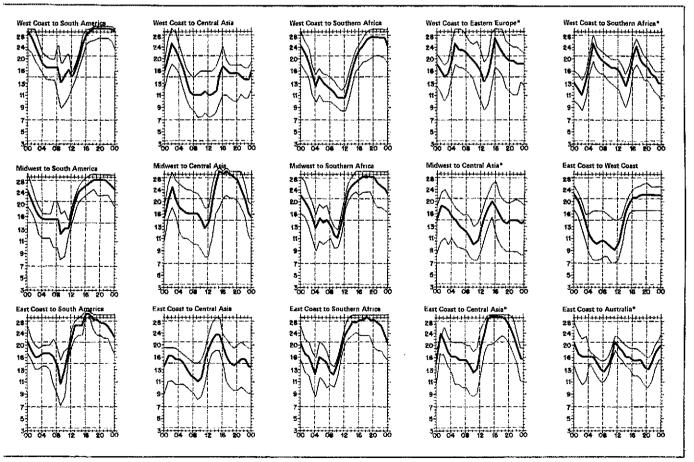
D4CBS, Box 101, Praia, Cape Verde Islands EA8URE, Box 860, Las Palmas, Canary Islands EL2R, Box 734, Monrovia, Liberia LA2CF, Sigurd Solheim, Huldrebraakket 12, 5033

LA2CF, Sigurd Solheim, Huldrebraakket 12, 5033 Fyllingsdalen, Norway
OX3LM, Box K-3930, Groennedal, Greenland
TR8RG, Box 177, Libreville, Gabon Rep.
WA6YOU/DU, R. C. Payne, 3843 California Way,
Livermore, CA 94550
WG4MW, NAV STA Box 27, FPO NY 09593
9H1EL, G. Morris, Box 575, Vauetta, Malta

A4XGY (K2RU) A6XB (KIDRN A6XB (KIDRN)
CN8CX (WBØMSZ)
D2AAI (W7VRO)
EP2LA (WD4NYY)
EP2MO (W8UOQ)
FØACO (KIIXG)
FGØCXV/FS (W4PRO)
FGØDDB/FS (WIUQ) FGØDDB/FS (WIUQ) FY7YE (W5JLU) G5CBW (WA9ELV) GU4DAA (G3FXB) HI8XDJ (K3SWZ) JW2CF (LA2CF) K9VCM/3D6 (W9MZA) K9VCM/3D6 (W9M KC6DK (K7DDY) KC6JC (W2GC) KC6VZ (KH6HOU) KG6SW (W7YBX) KZ5FR (WD8CPU) LU6XWB (N2AR)

N4GC/C6A (WB4MZD) N4GC/C6A (WB4MZD)
PPIZBM (WA2OKO)
VPIAJ ("77) (N5UR)
VP2SQ (W2MIG)
VP2SZ (WB80BA)
VP8PE (WB9MFC)
W2BKG/PZ (W2BKG)
WA4TWE/VQ9 (K5HWO)
VN9TM (K2TV)
TD8PG (R8MO) YN9TM (K2TV)
ZD8RG (K8VIO)
ZD8RG (K8VIO)
ZD8RW (WB8MBT)
ZF2AY (N8AA)
3AØGY (WB2EZG)
SR8AL (F6ACT)
SWIAT (WD8CPU)
8P6FD (VE2QO)
8P6HB (WB4HOI)
8RIX (VE3IXE)
9GIJN (W3HNK)
9Y4VT (W3DJZ)

A big TU to the following who did their bit in sending the foregoing for your benefit: Ks 11XG 2RU 2TV 5HWO 8VIO; Ns 4GC 5UR; Ws 2GC 8UOQ ØPEV; WA1ZGR; WBs 1CJK 2EZG 4HO1 4WHE 9MFC @MSZ @NOU; KH6HOU, LA2CF. Do you have something that might help? All contributions are always most gratefully received.



lowest curve (optimum traffic frequency, or fot). See January 1977 QST, page 58, and September 1977 QST, page 35, 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, CO. These predictions for March, 1978, assume a sunspot number of 66, which corresponds to a 2800-MHz solar flux of 116.

DX Century Club Awards

Administered by Don Search, W3AZD

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 December 1 through December 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 W9KRU/328 F2GL/240 JABAJS/226 JABMPJ/221 H89AMC/204 DL9CC/177 EATTV/145 OH1LF/130 W5VSZ/127 OZ3YI/125	K5ZK/125 ZL2AHD/124 VF3GCO/122 WB3ANF/119 WB6RSE/119 YU2CAO/117 W8IM/116 WB5RCB/112 WA6LFF/112 JG1FJ77110	WD4BRE/110 SM7EL/109 I7VIZ/108 WA3CXG/106 G3LXP/104 SM5DY/103 K2ZO/103 WA4FYT/103 WB90QU/103 DJ5UM/102	W1BL/102 WB4WSB/102 WB8GWB/102 WD8EOJ/102 SM7FSV/101 W2FYA/101 KBHF/101 WØTT/101 WAØYMK/101 WBØRSC/101	424GH/100 N2RD/100 W2MY/100 W4LDD/100 W54KD/100 W54EFI/100 K5MK/100 W5JW/100 W89BAH/100 K6MO/100
Radiotelephone JA6MPJJ200 HB9AMC/189 WB8GTA/170 PYSNG/163 WA20QM/161 N3RU/133	JH11AQ/124 WA6LFF/112 15LZJ/110 K5TSQ/109 AA4CK/107 13ZKD/107	K8AYZ/107 F5GW/105 WD4BRE/105 W5V8Z/104 WA1MYX/103	K1WJ/102 K1CUW/101 K5GK/101 K9PSN/101 WA1QNF/101	W2NCL/101 WBØRSC/101 K1BCG/100 WA2JUQ/100 W7CKW/100
CW JASAJS/166 W4AX/152 K2KA/132 180 Meters W4QCW	KL7PI/f14 K3GJ/f10 WB5RCB/f09	JA7JT/102 OL1BS/101	HIBMOG/101 YU1AG/101	W4WXZ/100 W86RSE/100
5BDXCC OK3DG W3OO WA1STN	W4XR L21KAA DL7NS	N4NX DJ2EH	K4VT DK3FB	VP9AD K6KII
Endorsements				
Mixed K6CH/346 K4SCH/346 K4SCH/346 K4SCH/346 K4SCH/346 K4SCH/346 K4SCH/346 K4SCH/347 K	W8XX/317 K3AV/315 W4XR/315 K6DT/315 W2FP/314 N4XX/314 N4EX/313 K6OZL/313 OE7III/312 WA4PFD/311 K4BVO/310 W4DHZ/310 J42HGA/306 SM3RL/302 W2UI/302 N4WB/300 K4DXO/300 N6HR/300 W4SUA/300 W6UY/300 N4CC/298 W4EJN/297 J43DWT/292 K2GMO/292 W7AZG/292 WA8TNJ/291 K7BR/290	W2GA/290 W8QFR/290 JH1VRQ/289 W9LF/289 W9N-RI/288 W6SN/287 DL18S/283 W8QBG/282 K3GYD/280 W1GDQ/280 W4ZR/272 K81A/270 N2AC/270 WA4HPF/270 W6TSH/266 N4PM/260 N5DD/280 W2TA/259 W1NB/257 N5FG/251 N1DL/241 W7BGT/241 W7BGT/2440 W1KLY/240 W1KLY/240 K8RGT/226	YU2CBK/221 YU2CG/221 K9ES/220 K2KA/212 EA3AEA/211 WA5HEC/203 W2JGR/203 W2BTG/202 G3JSV/201 K9GYX/201 K9GYX/201 W1EWD/200 WA4TLI/200 VE/KL/200 K9GSG/191 WB4EQQ/182 JASPU/181 K4PHE/181 WAØFBQ/180 W2SM179 ZS1FD/179 K4KPH/176 WA9ITB/175 K2GJ/173 CT1BY/170 N3RL/170 WØPT/166	WB9SEJ/163 N5MM/161 W3FAE/160 K4SE/160 WA4L0I/160 WA50UW/160 W7EE/J/160 WA4HDD/159 WA4OUF/159 WA4OUF/159 OEZBZL/161 KZJT/140 KZJT/140 KZJT/140 WB3BKD/140 WB4OPG/140 WB4OPG/140 WB4D/121 UFSW/122 DJSSG/120 WA1MYX/120 WB4AVG/120 WB4AVG/120 WB4SXX/120 WB4SYZ/120 WB4SXX/120 WB4NYZ/120
Radiotelephone W9JJF/340 W9HB/339 ISUA/335 OZ3Y/329 ZS6YQ/328 W3EYW/328 KH6BB/325 DLBNU/323 W6ISQ/323 W8JTD/322 W7JF0/321 JA1BN/320 SM6AEK/320 W4DPS/320 W6KST/320 JA8ADQ/319 K4IKR/318	DL7EN/316 K5ET/316 W8XX/312 OE7III/311 N4MM/311 W6LQC/310 W\$TJ/309 OZ5RT/307 W1JNV/306 W6YB/305 W86UJO/301 JA2H/300 JA2H/300 JA2H/300 W2SUA/298 K4BVQ/297 W4\$KDI/297 I2BOX/294 K4DVQ/294	W2FP/291 WA6OET/289 W6EJ/288 WB4TPU/286 K9PPY/283 WBUY/283 JH1VPG/281 W2GA/280 W8QBG/276 W4ZR/271 K6DT/270 W9DE/270 N4CC/268 WA1KYW/267 W4EPZ/263 W6KG/258 F6BDS/252	KH6BZF/249 W9ABA/243 W1GKN/240 W4RKN/240 W7BCT/240 K2UFM/239 WA7UV0/239 N5FG/233 DL185/230 N1DL/221 K9E5/219 ZL18KS/219 ZL18KS/219 J4ZD/202 P29JS/200 W2JGR/199 IØRKK/196 IØOLK/191	WA7UFS/184 W7BG/183 JA5PULI180 W3DQJ/169 WBYA169 K1CPJ/163 W1WS/160 WA4HDD/159 WA4TLI/158 K2CA/155 K2CA/155 WB9FUE/144 W1BMY/142 W9TEI/140 W3FAE/133 WB5LMN/124 W44LOF/120
CW DL6EN/236 OZ1LO/222 JA1EMX/221 K26HZ/203 OZ3Y/200	K6AC/199 W86ZUC/180 K2JJ/162 JA1BN/156	W8GKM/150 WA9ITB/147 N4OT/143 K4SE/141	W6UY/141 N8BM/140 VE7CNE/140 W3GRS/137	W9VJW/128 JF1VSA/122 W9IT/120 WBØNOU/120

CZ3Y/200

December Listing Mixed: W2GQN should be 331, K6OW, accidently left out, should be 334.



Bill Lowry, W1VV: Hardly a stranger to League hq., Bill spent the summer of 1973 in Newington as a laboratory assistant. "It never dawned on me that I'd ever be writing a column for QST."

LOWRY TAKES REINS FROM **NEWKIRK AFTER 30 YEARS**

Taking over a column written by the same man for . years is a challenge, but it's one that Bill Lowr WIVV, is eager to tackle. As the new QST co tributing editor responsible for the "How's DX?" co umn, he finds himself in familiar territory: He's a avid DXer (248 countries confirmed, and more on the

avid DACT (248 countries confirmed, and more on the way) and an experienced writer.

A licensed amateur since 1948, the 47-year-old Conecticut native operates what he calls a "modest" station at his home in Old Lyme, CT. It consists of Kenwood 599 pair, Heath linear and two-element quad at 30 feet. An Extra Class licensee, Bill is an a tive contester, and holds 5B-DXCC, a 35-wpm contester. proficiency endorsement and "some foreign awards. Asked about his DX operating, he explains that is especially enjoys taking the time to cultivate a dece conversation with foreign operators.

An associate professor of marketing at Centr Connecticut State College, Bill enjoys antenna wo and sailing in his spare time. He hopes someday combine the two into an around-the-world voyage "Ham tadio would almost be a necessity on a trip li

that," he says.
With his first effort out of the way, Bill Lowry

With his first effort out of the way, Bill Lowry already sifting through reports received from corespondents worldwide, for the second one. From til looks of it, W1VV will be at the helm of "How DX?" for many columns to come.

When Rod Newkirk took over "How's DX?" December, 1947, QST sold for 35 cents. For the ne 30 years, untold thousands of readers came to a ticipate each month's column, whether they were Diers or not Rod's seductive witing style didn': ers or not. Rod's seductive writing style didn't terfere at all with the main purpose of the column to provide information. It did this exceedingly we sometimes to the tune of six pages.

sometimes to the tune of six pages.

Though his home base was, and is, Chicago, Respent a few years at Hq. in the late '40s and early '5 as a W1AW operator and assistant to Managit Editor Harold McKean, W1CEG. A friend, Efrickson, ex-W9HPJ, sent us the accompanying photo with this tribute to W9BRD: "The views are his current environment fixing Illinois State Political Control of the property of the property of the property of the property of the page 10 page 11 page 12 page radios in a room that once was a very busy police station. This is the spot where I saw him copy a perfe \$5 wpm run — from a cold start. No frills and a be: up mechanical typewriter to boot. His bicycle (I hertz) is parked behind the homebrew service consol A car he does not and won't drive."



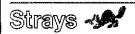
Rod Newkirk, W9BRD: His uncanny skill with typewriter brought this tribute from a one-time co-worker, W1YL:

A 1947 W1AW operator named Newkirk Was not one a writing duty to shirk. He wrote with a flair A DX column so rare That only Jeeves knew it was hard work.

DXCC HONOR ROLL

The DXCC Honor	Roll is comprised of t	those call signs which h	iave been credited w	ith at least 310 countr	ries of the 319 current cou	antries on the DXCC Lis	st.
Mixed	MEKTI ISCS	DL1KB/354 DL7AA/356 DL7EN/350 G3FXB/351 K2BK/348 K2LWR/348	LU4DMG/349 OH2BH/335 OH2QV/338 PY2PA/334 PY2PE/334 UR2AR/342 W1DGJ/337 W1HZ/351 W1JR/350 W2FXA/346 W2GC/347 W2GLF/346 W3AFM/346 W3AFM/346 W3DJ/340 W4AIT/356 W4BYJ/351 W4GXB/354 W4BYJ/351 W4GXB/354 W4IF/344	K6KII/344 K6WR/338 K6YRA/333	PY1HQ/347 PY1HX/344 PY2CQ/332 PY2SO/332 VE5RU/343		
MINGU	W6KZL/352 W6RT/353	DI 7AA/356	OH2BH/335	K6WB/338	PY1HX/344	W1WY/341 W2DXX/336 W2HO/348 W2NC/331 WB2HXD/331	WA60ET/330
319	W0H1/353	DITENUSEO	042011330	KAYPA/333	PY2CQ/332	W/2DXY/336	W7QK/342
	W8AH/352 W8MPW/354	G2EVD(351	DVODAGGG	K80NV/341	PY250/332	M2H0/348	W8KBT/342
G3FKM/354	W8MPW/354	MOD MOVO	PYODE BOA		VESRIUMA	W2NC/221	440VD11945
W1BIH/360 W1HX/357 W2AGW/361	W8OK/347 W9DWQ/349	K2DIN340	PY2PE/334	ONTADINION	1419 A V 1/250	WENCHAN	310
W1HX/357	W9DWQ/349	KZLVVM/348	UR2AH/342	UNANGISSZ	14/2/N 1 0/3/3/U	WBZHXD/331	310
W2AGW/361	WØMLY/352	K21 QC/341	W1DGJ/337	UZ3Y/346	VVZB/1M/340	W5AQI341	DL1BO/345
W28XA/361	•	K3GL/352	W1HZ/351	P17YS/342	W2GR/332	W6EJ/342	DL3BK/341
W2N1JT/353	317	K4JC/339	W1JR/350	SM3BIZ/349	W2G1/350	W6HYG/342	G2BOZ/346
W2TP/346	IT9T41/351	K4LNM/348	W2FXA/346	VK4QM/355	W2PDB/342	W6NJU/3 44	G3HCT/339
W2NUT/353 W2TP/346 W3KT/360	IT9TAI/351 K8DR/346	K2T WC1345 K2T QC1341 K3G L/352 K4LC/339 K4L NM/348 K6Q J/355 K9AB/347 K9ECE/343 VE2N V/352	W2GC/347	OK1ADM/337 ONANC/352 O23Y/346 PT7YS/342 SM3BIZ/349 VK4QM/355 W2CP/338 W2GQN/333 W2GK/336 WA2DIG/341 M3CGS/351	W2PN/332	WB2HAU731 W5AQ/341 W6EJ/342 W8HYG/342 W6NJU/344 W6QL/329 W8KPL/347 W9BZW/331 W9KRU/312	G3.IEC/326
W3LMO/350	W/1DK/954	K9AB/347	W2GLF/346	W2GQN/333	W3BWZ/326	W8KPL/347	G3UMI (326
MAEVISON	W4 1NIV/250	K9ECE/343	W3AFM/346	W2QK/336	W4MCM/342	W9BZW/331	1200111223
W4EX/361 W5MMK/358	WATERCOOK	VE2NV/352	W3D.17/340	WA2DIG/341	WA4WIP/330	W9KRU/312	IA (VIOO23
VYOR MICO	WODOWOR	W1N1/348	INTA IT/956	W3CGS/351	W5GC/340	W9QLD/331	184751220
W6AM/362	VV2BON352	WZBMK/346	WAROVISE	W4FFF/34R	W5HJA/340	W9TKD/340	384287330
W6PT/352 W7MB/361	WZDOD/353	W1NU/348 W2BMK/346 W2CR/351	1A74DV11/261	W4MI /352	W6CAE/350	MAAIIR/338	KECHOZA KOCH TURB
W/MB/361	W2FZY/348	W2011001	14(4CYD/9E4	MATMIRE	W6FP7/352	16JAK E/346	K2SH2/339
W7PHO/355	W2GK2/337	WADDIOGOS	14417/044	MEE IT/228	W6KNH/327	W9CLD/331 W9CLD/331 W9TKD/340 WØAUB/338 WØKF/346 YU1BCD/332 YV5BBU/329	K4DJ/327
W8BF/358	W2JVU/356	WASHINGS	VV417/344	WEI C1/242	1MRT7D/351	101000000	K4KG/331
W8GZ/380	W2LV/354	Mac Detate	VV3FF VV/349	WEOV7(220	1MBC11T(339	1400000028	K4VW/337
W8LKH/356	W2PV/337	VV3GR3/346	VV5GJ/340	113C/A2/333	1000011330	311	K6ZM/335
W8PHZ/352	W2QHH/356	W4AAV1355	WEABA/335	WAZDIGI341 W3CGS/351 W4EEE/348 W4ML/352 W4TM/354 W5EJT/338 W5LG/343 W5QKZ/339 W5TIZ/345 W6EUF/331 W6EUF/331	VE5RU/343 W2AYJ/350 W2BHM/345 W2GK/332 W2GT/350 W2PDB/342 W2PN/332 W3BWZ/326 W4MCM/342 WA4WIP/330 W5GC/340 W5HJA/340 W6GE/2/350 W6EPZ/352 W6KNH/327 W6TZD/351 W8CUT/338 W8JQ/331 W9DC/328 W9RKP/348 W9ZTD/338		K8LSG/338
W8RT/355	WA2RAU/336	W4UU/337	W6CHV/351	VY05.UF(33)	1410DKD/320	DJ5DA/330 G3AAE/348 GI3JIM/341	K9KA/323
W9ZM/360	W3EVW/356	M210/323	W6FF/347	W6RJ/336 W6RKP/346	443UVL(340	GJAAR/340	K9MM/323
W7F10/359 W8BF/358 W8LKH/356 W8PHZ/352 W8RT/355 W9ZM/360 WØDU/359	W3MP/357	W5QN345	W6GPB/354	WORKP/346	W9ZTD/338 YV5AB/349	GISJIM/S41	LA1KI/328
4X4DK/355	W4EO/349	W6BA/353	W415/1344 W5FFW/349 W5GJ849 W6ABA/335 W6CHV/351 W6FF/347 W6GPB/354 W6KTE/334	W7ADS/350	1 V5AB/349	HB9KB/343 !5ARS/334	310 DL1BO/345 DL3BK/341 G2BOZ/346 G3HCT/339 G3JEC/328 G3UML328 I\$JX323 JA4ZA/330 K2CL/324 K2SHZ/339 K4DJ/327 K4KG/331 K4VW/337 K6ZM/335 K8LSG/338 K9MM/323 LA1K/1328 N4WF/323
	KBDR/346 W1DK/354 W1DK/350 W1MV/350 W1MV/352 W2DOD/353 W2FZY/348 W2FZY/348 W2L/VJ356 W2L/VJ354 W2PV/357 W2LH/356 WA2PAU/336 W3EVW/356 W3EVW/356 W3EVW/356 W3EVW/356 W4EO/349 W4GD/365 W4GD/365 W4SWJ/343	W2CH/351 W2YY/342 WA2RLQ/335 W3NKM/351 W3GRS/346 W4AAV/335 W4UG/337 W5UC/353 W5QK/345 W6BA/353 W6EE/355 W6ID/353 W6ID/353	W6KTE/334 W6RGG/334 W7OF/349 W8ARH/336 W8EWS/357 W9CH/341 W9GU/344 W9HB/347 W9RCJ/345 W9EKL/345 W9EKL/345 W9LWG/343 XE1AE/342 YV5ANF/331 ZL1HY/357 ZL3IS/346	W7ADS/350 W7CMO/342 W8DMD/353 W9FKC/352 W8BN/337 W9NVZ/344		!5ARS/334	N4WF/323 UA1CK/333 UA9VB/333 VE3AAZ/341 W1GKK/353 W1YRC/323 W2CYS/350 WA3ATP/324
318	W4OM/357	W6ID/353	W6RGG/334	W8DMD/353	312	15AHS/334 JA1M/344 JA1M/01/326 JA1M/N/327 JA8ADQ/329 K1YZW/328 K4YFC/325 K6MA/334 K6RN/338 KV4FZ/324 ON4DM/347 PAMEY/340	UA9VB/333
DJ2BW/353	W4SSU/343	W61DJ333 W61SCJ341 W6ONZ/346 W6ZM/344 W8GT/357 W9BG/359 W9DY/346 W9SFR/349 W8BW/355	W7OF/349	W9FKC/352	DJØKQ/331 DL3OH/326 F9RM/340	JA1MCU/326	VE3AA7/341
DL6EN/351	W4WV/347	W6ONZ/346	W8ARH/338	WØBN/337	DL3OH/326	JA1MIN/327	W1GKK/353
DI 90H/247	W5NO/345	W6ZM/344	W8EWS/357	WØNVZ/344	F9RM/340	JA8ADQ/329	W1YRC/323
DL9OH/347 10AMU/354 K2FL/352	W4WV/347 W5PQA/353 W5PQA/353 W6BZE/354 W6EL/339 W6HX/358 W6KG/347 W6ZO/355 W7AQB/347 W7GN/351 W7KH/358 W7LDC/353 W8DAW/359 W8DAW/359	W8GT/357	W9CH/341	1610/346	F9HM/340 JA2JW/341 K1RQE/330 K2BZT/347 K2LE/331 K2PXX/334 K5QHS/326 K6QH/331 K8FF/335 K9BGM/330 KP4RK/340	K1YZW/328	W2CV8/350
KOEL 1989	W697E(354	W9BG/359	W9GU/344	YU2DX/328	K1RQE/330	K4YFQ/325	WASATE/324
KAC7/949	W6EL (220	W9DY/346	W9HB/347		K2BZT/347	K6MA/334	INAD I/240
K4EZ/342 K4PDV/353 K6DC/352	W6HY/250	W9SFR/349	W9RC-1/345	313	K2I F/331	K6RN/338	10/0/10/10/204
KALDAI303	W/6K/C/247	W 6 BW/355	WINGKI /345	DI 9MH1927	K2PXX/334	KV4FZ/324	14/5/10/00/05
K0501050	WORDS	₩ \$\$YK/352	W/01 W/G/343	ESATISAS	KECHS/326	ON4DM/347	141806 - 348
KDEC/350	W7A ODI247		XF1AF/342	CIGITATE	KEOHISSI	PA0FX/349 PY4AP/327 W1AX/352	1418 - 1411330
1.1400.1×1000	11/200/04/	315	VVSANE/331	UDOMVO41	KREF/335	PY4AP/327	MEDOGAS
EUODUA/300	WITH HOED	DI 3BK/350	71 1HV/357	106740(554)	K0RGM/330	W1AX/352	VVOTO/342
OF IEU/300	WYNTIAGO	DI 7HI 1/342	ZL3IS/346	IA LA COMA	KDABK/340	W1HH/340 W2HTI/345 W2IRV/345	14/7// 15/099
P12CIV359	W/LDC/303	ITDZGY(346		N41201044	LUSACIZAS	W2HTI/345	MALULA 1032
WIAAI349	WCC10VACOVA	IA1DK/341	314	K11XG/330	DV3DKO334	10/21P1//345	440DM331
K6EC/350 K6ZO/360 LU6DJX/360 OE1ER/356 PY2CK/359 W1AA/349 W2AG/356	W8JB1354	IA I DAUGGE	DJ7ZG/333	DL8NU/327 F3AT/342 GI3IVJ/346 HB9MX/341 I2KMG/331 JA1AG/344 K1IXG/338 K2FB/339 K2YLM/331 K3II/345	CARDUM(SOC	W2SAW/346	WA3A11/324 W48J/340 WA4MUB/324 W50B/338 W6BS.:345 W6FW/329 W6PO/342 W6YK/346 W7KR/333 W8DA/337 W8LY/340 W9HJ/338 W9ILW/334 WA9NIIO/336
W2AO/353 W2OKM/354	VV82CQ/349	14 + DDIV/336	007207333 0003(NIMED	KZY LMI/331	CAAGAEKIOOO	MANAGEMENT	W9HJ/338
W2OKM/354	W9G1L/352	MANAGE 227	G2BVN/350 H89MQ/350 H89TL/348	K311/345	SMOMENUSE	W2XX/346 W4BAA/346 W4BFR/337	W91LW/334
W2QM/351	M910A/323	KANIQGIGGI	HESMICASO	K4ID/333	3M9UN3/320	14(4000)227	WA9NUQ/326
W2QM/351 W2SSC/352 W3CWG/352	W8JBI/354 W8ZCQ/349 W9GIL/352 W9JUV/353 W#ELA/358 W#PGI/351	KANDINA KANDINA	1171/046	K5DX/348	OWITAN BIGGS	W4DQS/336	WWAIH/343
W3CWG/352	W@PGI/351	K41M349	11ZL/344 18KDB/345	K6EV/333	SMØAJU/342	1415 4 0 12 4 7	WØBK/337
W3GH/351	MANGGROOT	KBGA/342	18KUB/345	K6JG/332	VE3MJ/329	W5AO/347	YV5AHR/331
W3GH/351 W3LMA/358 W4QCW/352	4X4JU/350	KeLGP/345	K2UVU/343 K4IKR/330 K4KQ/350	K4ID/333 K5DX/348 K6EV/333 K6JG/332 K8JG/330 K8OHG/336	KM4HK/340 LU5AQ/345 PY2BKO/331 SM5BHW/326 SM6CK/326 SM6CK/326 SM7ANB/338 SMØAJU/342 VE3WJ/329 VE3WJ/329 VE3WJ/330	W5FT/346	WA9NUQ/326 W@AIH/343 W@BK/337 YV5AHR/331 YV5AIP/337
W4QCW/352	316	K6LU/339	K41KR/330	K8OHG/336	W1AZY/343	W5HDS/345	
VU4VPI1/353		DL3RK/350 DL7HU/342 IT9ZGY/346 JA1BK/341 JA1BN/338 JA1BRK/338 K4MQG/337 K4RPK/342 K4YR/342 K6GA/342 K6LGF/345 K6LU/339 K6RQ/343 K7GCM/341	K4KQ/350	N6AV/332	W1CBZ/345	W5UX/344	
W5KC/359	DL1HH/343	111 00011110 1 1	K4YYL/332	N6AV/332 N6FX/338	W1AZY/343 W1CBZ/345 W1CKA/340	W6KZS/331	
W6ET/348	DL1JW/346	K8DTZ/333	K5AAD/335	ON4QJ/335	W1FZ/348	WA6EPQ/333	

Radiotelephone



DXAC NOTES

274

W9KNI

The ARRL DX Advisory Committee welcomes comments from DXers on the following external agenda item: "Any country on the DXCC list which bans amateur radio by not issuing amateur licenses to its citizens or not allowing amateur operations by its citizens shall be removed from the list for Honor Roll

266

K6GA

254

N4RJ

purposes until such time as the restrictions are lifted?"
Please direct your comments to ARRL hq. for distribution to the DXAC.

249

K2TQC

I would like to get in touch with . . .

253

W6PT

CJ other owners of Hallicrafters models SX-115, HT-32B and HT-33B. Ed Harris K4UHJ, 4241 Castleton Rd., Charlotte, NC 28211.

Chicago-area ladies interested in LARK (Ladies Amateur Radio Klub). Nancy Huntington, WB9HGN, 75 S. Burr Oak, Lake Zurich, IL 60047. ☐ anyone with an S meter for a Hallicrafters S-20-R Sky Champion receiver, Francis S. G. Rose, G2DRT, 84 Cock Lane, High Wycombe, Bucks HP13 7EA, England.

241

K3FN

OZ1VY W3KT

[] amazeur friends from 1930-1940. M. Tenlund, SM7WX, "The Flying Cloud," Grimstagat-70, 16227-Vallingby, Sweden.

(J other Orthodox Jews or hobby computerists (or both) who would be interested in a net. David Eisenberg, WB2LQQ, P. O. Box 358, Cathedral Station, New York, NY 10025.

240

W9ZM

The World Above 50

Conducted By William A. Tynan,* W3XO

Reflections and Directions

This marks the completion of three years that I have had the privilege of serving as conductor of "The World Above 50 MHz." I assure one and all that this endeavor has been an interesting and rewarding one for me. I hope that I have done a job worthy of the three fine column stewards who preceded me. The response that I have received from the vhf/uhf gang, in the form of news of activities and encouraging words, has been most gratifying. I want to take this opportunity to thank all of those who have taken the trouble to write me or call the answering machine.

Anniversaries offer excellent times to reflect on what has preceded and look forward to future events. The three years that I have been at the helm of this column have been very eventful ones for our world above 50 MHz. The next three years give indications of being even more so. A major factor which heightened interest and led to some of the more noteworthy accomplishments over the past few years has been the increased activity on our vhf/uhf bands. This has been especially noticeable on 2 meters and is beginning to be felt on 70 cm as well. The OSCAR satellites and availability of good quality commercial equipment capable of cw and ssb operation have contributed greatly to this higher level of activity. The widening geographical distribution of vhf/uhf stations, brought on mainly by the satellites, has led to some interesting and possibly important propagation findings, such as the bridging of some 3000 miles on 2 meters via transequatorial propagation, first by YV5ZZ and LUs 7DAU, DJZ and 3AAT, and later others. The recordbreaking, meteor-scatter contact between GW4CQT and UW6MA reported elsewhere in this column is another example of the kind of work that can be accomplished on the bands above 50 MHz and that much of it takes place outside the U.S. and Canada. The work being done over some surprising distances in western Europe on the 3-cm band using low-power, solid-state oscillators and small dishes is another prime example of this. The accomplishment of WAC on the 70-cm band, first by K2UYH, and later by many active EMEers, demonstrated the fact that moonbounce is coming of age. We are now at the point in 70-cm EME that more contacts are being made by random operation than by schedules. This was not true only a few short months ago. The popularity of 2-meter moonbounce is also growing by leaps and bounds. Already it has helped KØMQS achieve the first WAS on the band and several others are hot on his heels. It is now well known that any amateur with the will to build a station producing power in the vicinity of the legal limit and an antenna system no larger than many hf arrays can be successful on 2-meter EME.

Our lowest-frequency vhf band showed some additional signs of life with new stations popping up regularly. Once again, commercial equipment availability is a significant factor in this. Propagation has been kind also, with TE becoming almost a regular occurrence across the earth's magnetic equator. Sporadic E, the mainstay of 6-meter DX, has also been more in evidence the past few years with some longhaul openings such as the ones between the West Coast and Japan and HI to the Midwest and East Coast, not to mention reception of the French 50-MHz beacon on this side of the Atlantic. That mode of propagation has also been in evidence on 2 meters with many strong and widespread openings occurring the past few summers and even a good one in February,

Meteor scatter has become the bread and butter of 2-meter DX. Many of the newer converts to 144-MHz ssb and cw are trying the "ping" mode and finding it surprisingly effective in making long-distance contacts. A goodly number of m.s. QSOs have been made from portable setups, and at least one participant accomplished one while mobile in motion!

Yes, recent years have been exciting and productive for the vhf/uhf world. What do the years to come hold? Prediction is always a risky business, but I'll go out on a limb and try

my hand at soothsaying. I believe that the increased-activity trend will continue especial on 2 meters and 70 cm. Those with the greate pioneering bent will gravitate to 1-1/4 mete and the microwave bands. The 23-cm and 3-c: assignments should benefit also, especially; th latter thanks largely to the availability of th Microwave Associates Gunnplexer and simila

Interest and participation in moonbound will continue to increase. Sophisticated signa processing methods will probably bring EM within the reach of many more hams. I woul not be too surprised to see an EME DXC sometime within the next five or 10 years! Th advent of the Phase III OSCAR satellites wi put vhf/uhf equipment into the shacks of countless more amateurs the world over. A has already been demonstrated, they won spend all of their time on the satellite, but wi want to see what else their new gear will do.

While I understand that it is particular dangerous to attempt to predict what Mothe Nature has in store, here goes anyway. From the way that the new solar cycle is behaving an the reports of 6-meter DX that are coming in, believe that Cycle 21 will be much kinder t 50-MHz operators than was the last one. may even rival the heydays of Cycle 19 whe we worked the world on 6. I can remember coming home by about 4:30 in the afternoo on many days in the winter of 1957-58 to wor stations in Anchorage, AK, Most of them we running just 5 watts of a-m and many time they had S9 signals. If anything like the pro agation of those days returns, we will be in fe a lot of fun. Today's better equipment and in proved knowledge of when conditions should be most favorable will allow us to take advan tage of many more opportunities for 50-MH DX. Let's be ready anyway!

With new satellites, higher sunspot count more and improved EME capability, a greate number of stations working m.s. and just plain increased population, the next few years should be the best ever for our world above 50 MH

WEST COAST VHF CONFERENCE

The 23rd annual West Coast VHF Conference is slated this year for May 12-14 at the Stardust Hotel in Las Vegas, NV. A top-notch program of technical talks. arranged by the San Bernardino Microwave Society, is promised along with antenna-gain and noise-figure competitions. If these aren't enough, the usual Las Vegas attractions should keep all attendees occupied. For further information, contact George Olcott, For further information, contact George Olcott K7ICW, 510 South Rose St., Las Vegas, NV 89106.

ON THE BANDS

6 Meters - As of mid-January, the old band has put on a few good shows for the winter Es season, but some, including K5ZMS, feel that this winter's festivities have been only "50-so." WB2RLK/VE1 does report a marginal opening to W4, December 22,

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730 or call 301-384-6736 and record your message.

followed by another such session the next day. The day before Christmas was somewhat better with Bob making contacts in the first, second, fourth and eighth call areas. Christmas night, as well as the 26th, was also productive, the latter netting 37 contacts in the first, second, third, eighth and ninth call areas in addition to VE3. The evening of New Year's Day brought a good opening to the Middle-Atlantic states. From about 0245 until after 0630 UTC January 2, this conductor had a field day with nines, zeros and fives,

From the far north, KL7HMU, Fairbanks, AK, notes several good aurora openings. On December 12 Dave worked VE6BAS, Edmonton, AB and KL7HFD, Anchorage, via the "buzz" mode. On the evenings of January 3 and 4 he hooked up with WA stations KTVNU and W7FIV in addition to VE6JX, Calgary. He also reports that fellow Fairbanks station KL7AG worked W6CZR, ND. From Edmonton, VE6BAS reports that he and VE6BCC are active on 6 meters. While we in the Northern Hemisphere are existing

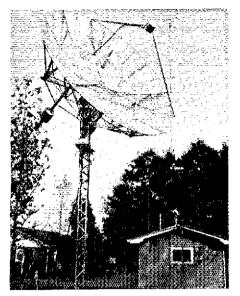
through our slim, winter Es season, those in the Southern Hemisphere are basking in their summer doings. Through K5ZMS, SMIRK no. 1, word comes of numerous contacts between ZL and VK as well as TE

QSOs with the JAs. It appears that activity in that pa of the world is picking up which could be very impo-tant if solar Cycle 21 leads to F2 openings in that dire

An interesting new publication devoted to 6 meters is being put out in the San Diego, CA, area by the S Meter Operator's Group (SMOG). Oddly enough, ti name of their monthly is SMOG Alert. Inquirishould be directed to WA6OIL, 1445 Shipley Ct., S2 Diego, CA 92114.

WA3WUL, Wilmington, DE, who runs just 3 wat to stacked fives at 25 feet, comes up with an it teresting method of making vhf contacts that is paticularly useful to those running low power. Brufinds that he can work stations out to about 200 mile though his normal range is about half of that, by ta ing advantage of reflections from aircraft. He poin out that unlike meteors, aircraft are quite predictable for this mode has netted WA3WUL QSOs with WIGRW, CT, WAIMAG, VT and NY station WA2PVV, K2CBA, WAZZPT and WB2HST/2. anyone clse using this mode regularly to make long haul wiff or unif contacts?

According to WAIUAT/6Y5, the Jamaican Rad



The 28-foot dish formerly belonging to Bill Smith, W3GKP/K4RJ, installed at WA4HGN, Savannah, TN. Bill is already receiving sun noise on 2.3 GHz and plans EME operation

Club beacon is now operational on 50,050 MHz with a continuous carrier and the call sign 6Y5RC sent three times per minute using Morse fsk. Reception reports are welcome.

2 Meters - Tropo and m.s. vie for the 2-meter news attention for December and early January. The big tropo opening in mid-December was a welcome surprise to many not expecting such an occurrence so late in the fall. W9IP, Champaign, IL, got on the air at 0140 UTC December 16. The first station worked was W5EMS, MI, for a new state followed by a string of WYSEMS, MI, for a new state followed by a string of fours and fives from AL to southern TX including 11 stations in the Houston area, many running low power. His best DX that night was WSIJWB, Kingsville, TX, a distance of 1030 miles. The band stayed open all that night but gradually shifted to the east as the hours passed. The next morning W91P worked W4UUF, Pensacola, FL, for another new state. The band remained open all day with stations in southern LA and the Atlanta area pounding in. Unfortunately, however, everything went dead about 2300 UTC, just as all were preparing for another evening of fun. Mike notes that the stations being heard seemed to lie in a straight line from his QTH. The effect was particularly noticeable early in the evening with the only stations workable situated within 50 to 100 miles of the line. By the next morning the same effect was observed, but the "hot" area had shifted to the southeast and stations could be worked over a broader range of azimuths.

The m.s. mode received mixed reviews for the period. WA4GPM notes that the Quadrantids were anything but a waste of time this year netting Buzz his 42nd state in the form of WAØZJJ, ND. WA9DOT gives good marks to the Geminids with most skeds requiring only about 15 minutes, except for the stations to the east which took the better part of an hour. Jim says he had fun even though he didn't work any new states. K7ICW reports similar results but W7LUX completed only two QSOs. Incidentally, Joe would like to try coherent cw on both 2 meters and 70 cm. He has an atomic standard so can generate the necessary frequency stability and expects to have high power on both bands soon. Those interested should contact W7LUX, 3465 N. Andes, Flagstaff, AZ 86001. While on the subject of m.s., here is some not so re-

cent but nevertheless important news received via a letter from GW4CQT to K2UYH. In it GW4CQT reports working UW6MA via meteors on August 11, 1977. The distance is 3117 km or 1937 miles. This ap-

pears to be a record for m.s. Can anyone top it?
Aurora news is quite sparse, but WOOHU, MN, does note working W7VEW, WY, during an opening January 4. In the course of the same session, neighbor KØSE made it with W7RZY, MT, while both were using vertical antennas. Let's not everyone get the no-tion that verticals are better for aurora and start flip-

ping beams over! WA2SLY announces his intention to start a net be-tween 1000 and 1100 Sunday mornings on 145.025 MHz. All are welcome. Speaking of nets, KV4FZ reports that 2 meter operators in the Caribbean con-

gregate at 0000 UTC every evening on 145.1.

As this is being written in mid-January, K5MB's EME DXpedition to HI is underway. Marshall, operating from the QTH of KH6HI, is known to have worked KIWHS and is in the process of running with others. A complete report next month.

1-1/4 Meters — Among those responding to the lead in the January column entitled "Another Chance for 220" were WB2ROV, New York City and W2IQK near Newburgh, NY. Both are considering ssb operation on the band and inquired about activity. From intion on the band and inquired about activity. From information I have, the stations along the East Coast that are most active include K4LHB, VA (near Washington, DC), W3EAX, MD (also near Washington), WA3QPX, DE, many Pack Rats in eastern PA, W2EIF, NJ, K2CBA near Albany, NY, K1PXE and K1FO, CT, as well as W100P and W1JR in the Boston, MA, area. Most activity, at present is concentrated on Tuesday expenses in line with the concentrated on Tuesday evenings in line with the operating plan being followed throughout the Northeast. It calls for Monday to be devoted to 2 meters, Tuesdays to 1-1/4, Wednesdays to 70 cm and Thursdays to 23 cm. Both letters express some misgivings relative to putting much effort into 1-1/4 because of a lack of activity. I can assure you that there are people on the band, especially along the East Coast but it's not like 2 meters. Anyone venturing onto 1-1/4 will be doing some pioneering and should look forward to the privations and rewards inherent in such an

The latest government move affecting 220 is the removal of restrictions on the use of the band which have been in force for years in parts of TX and NM. It is hoped that this will lead to increased activity in the affected area.

70 Cm — W1JR reports the weekly 432 night is producing good activity. Regulars in the Wednesday evening operating session are WA1OVT, K1LOG, WA1FSZ, K1FO, K1PXE, VE2LI, W3TMZ and K2UYH in addition to himself. New arrivals on the scene are K1SRZ and W1UHE. In recent EME activi-W5FF, NM. The latter station also worked W1XP, W4WD, F9FT and YV5ZZ during the two weeks that Fred had the 70-cm feed installed in the 32-foot dish.

The big mid-December tropo session reported in the The big mid-December tropo session reported in the 2-meter section was also felt by the 70-cm gang. Among those taking part was K5LLL, Houston, TX. Ron says that he worked stations in IN, IL, KY and AL in addition to closer-in states. The opening resulted in two new states bringing his total to 10.

QSP, the organ of the Rocky Mountain VHF Society, tells of a new ATV repeater going on the air in Boulder, CO. The input will be 439.25 MHz for both wideo and sound. The sound will be 5.44 deviation

video and sound. The sound will be 5-kHz deviation fm on the video carrier. The output, on the other hand, will be standard format so that transmissions may be received on regular TV receivers with appropriate converters. The video carrier will be on 427.25 with the sound 4.5 MHz higher. The unusual arrangement was dictated by a frequency conflict which would have occurred if the standard broadcast format had been used on both input and output.

MICROWAVES — It's official! The 267-mile, 5-cm band contact between KSPJR and KSFUD reported in the December issue has been investigated by the San Bernardino Microwave Society and declared a record for the 5600-MHz band. Congratulations to both par-ticipants and thanks to the SBMS for its help in certi-

fying the record.

WA6EXV also sends along information that the SBMS is putting on a 2.3-GHz beacon. The device, running about 2 watts to a vertical, 6.4-dB gain, om-nidirectional antenna, is to be installed on Heaps Peak just north of San Bernardino. The frequency will be 2304.195 MHz. For more information, contact WA6EXV, P. O. Box 605, Ridgecrest, CA 93555.

Who's Who Anyway?

The following is a list of new calls and their old counterparts that have been collected to date. Additions will be published as received.

New	Old	New	Old
K1FO	WA1FFO	K2NV	K2KNV W2OMS WA3QVN WA3ZRE WB3AMF W9NKO WA3VVJ WA3LND WA3EIY
W1JR	WIJAA	W2VC	
K1TB	WA1OAM	K3AP	
W1XJ	K1ABR	N3EG	
W1XP	K9AQP/1	N3FL	
W1XZ	WA1WVK	W3ILG	
K1ZZ	K1ZND	W3IP	
W2BN	WAZHJF	W3IWI	
K2NE	WA3HGX	W3IY	

New	Old	New	Old
K3XA	WLUEAW	K8HFX	WBBQMS
W3XO	W3KMV	NBIL	WB8IJW
K3YD	WASBSV	KBTG	K9PZM
WD4GXN	WA2CJK	W8WN	K4WNH/8
W4OJP	K5DZF	K8WW	KBUQA
N4PZ	Machi	N9AQ	WØPS
W4WD	W4ZXI	K9CA	WaCAW
N5AF	K5LZJ	K9CT	WARTXL
K5CM W5DC	K5WVX	K9EI W9IP	K9EIV WB5DOJ
W5FF	W5IOU W5LO	K9KB	Kersf
K5FF	WASMFZ	K9KC	WB9MTF
K5GW	W5SID	N9SS	WB9GCS
K5JL	WSORH	W9SE	WEGGG
NSKK	WB5TGZ	GÜEW	K9UYK
NSKW	WB5UQH	W9VI	Wacii
K5MB	WASUNL	W9YF	W9YYF
K5MW	WASVQT	NØAN	WA4FIX
N5RA	W5EYB	KØCJ	WOLCN
K5\$W	W5WAX	WØGL	
N5TX	W5QDB	NØIS	WAØTXV
WB5YWE	WB5XTQ	NØJA	WARCHK
W6BA	WEABN	NØLL	WANTRO
N6CA	WABGUY	KØNG	WØNGG
NGCT	WBKQG	WOPN	W¢MJS
N6NB N6TX	K6YNB	WØPW	WØEYE
W6XJ	WA6UAM W6KJD	KØRI/4 WØRRY	WAØDGL
K6YK	WEYKS	WØSD	K5BXG
Wici	WZRUC	WOTG	WAØCPX WØPMN
W7JF	W7JRG	Woux	KODVB
W7MP	WAZAUW	WØVB	WBQSJJ
K700	K9DKW/7	พี่ขึ้งที่	WOOQI
N700	W7VCN	KP4RS	KP4AST
KBAT	WBKPY	KH6HI	KH6GAY
K8BR	WA8VHG	VE3FN	VE3FVN

70-Cm Standing

Figures are states, call areas and best DX in miles.

			,	200 2110 2000			
W1JR K1PXE K1HVE K1HVE K1HVE W1AJR W1AJR W1AJR W1AJR W1AJR W1AJR W1AJR W1AJR W1AJR W1AJR W1AJR W2AJR W3AJR W	1433111 38442210202019181677716515141211 219187719141311111010 9 25222115151541211101214 9 9	1868557565544 188786606666664456644 765665676564 87885554344554482	10110 2600 2850 8100 2850 8100 7100 8200 7100 8120 7350 8120 7350 7450 7450 7450 7450 7450 7450 7450 74	W5RCI K5JL W5HN K5LLL WASHNK W5SWV W5FF W5GYE W5LYV W5LKO K5UGM W5SXQQ K5MWH WA6HXW W6DQJ K7ICW W7JRG K8DEO W8YIVX W6DQJ K7ICW W7JRG K8DEO W8HVX W8CNNT W8RQI K8DEO W8HVX W8CVNT W8RQI W8CVNT W8RQI W8CVNT W8RQI K9GAJ K9GAJ K9OXY W9YF K9OXY W9YF K9DAL WØPW KØDAL WØPR WØPW KØDAL WØPR WØPW KØDAL WØPR WØPW KØDAL WØPR WØPW VE3AL WØPR VE3AL WF	197751099877765554 64 43 944219131010188 221918651327 88842185141116 6 1921 97 12 9 8	5655556602222223 42 22 88777766556 987675652 01196654453 5 76755 87	8800 12001 14671 16121 16225 9915 9915 9915 9915 9915 9915 9915 9
K4IXC	5	2	800	ISMSH	6		10200
K4VOW W4AWS	5 4	4 2	2000 750	ISMSH	6	5	10200
tone i i i e	mE	10	0046	4Class			

*Club station

WB5LUA 25 10 9046

Public Service

The Crowd Roars

Appearing here in the December issue was an article that turned out to be rather controversial. It was even compared to Jack Anderson's notorious column of last spring; it was also decried as rank sensationalism. Some people were so upset that they called for this conductor's head.

Are we still talking about QST? Yes indeed, it was the thoughtful letter that we titled "Johnstown — One Man's Opinion." Maybe we should have gotten another opinion, say from the SCM or the emergency coordinator, and printed both the pros and cons side by side. Then again, it would have been preferable to run the Johnstown writeup ("Rain of Terror," January 1978 QST) in the same issue as "One Man's . . .," but publishing deadlines made that impossible.

So we learned a little bit about journalism, while hopefully the readers learned something about emergency communications. Here is a representative sample of the letters:

Editor Halprin's December column is an unjust condemnation of those amateurs who participated in the emergency communications effort at Johnstown. . . . 1 spent considerable time monitoring 34/94 and was impressed at the efficiency of traffic handling. ... Virtually all traffic I heard via WR3ACS adhered to ARRL message format. . . . Contrary to "One Man," I did not observe mass confusion at NCS, either in net direction or in knowledge of stations and their location. . . . I found NCS (WC3AAO) to be adequately manned and observed operating to be first class. . . . in conclusion, I submit that amateur involvement in emergency communications at Johnstown is a chapter in our amateur heritage which may be viewed with pride. I must reject the attitude

that amateurs did a poor job; it is simply untrue, (K3LBP) While I have no detailed information regarding the c.d., CB and vhf communications situation in and Johnstown during the flood, I do have personal knowledge and a tape recording of some of the finest emergency traffic handling that ever took place on 75 meters. (W3FZ) Thanks again for your most informative article in QST. (WB3EKJ) I find your publication of "Johnstown - One Man's Opinion" in very poor taste, (K3SCM) I agree emphatically with one ham who said, "when I read that article it just made me sick!" (WA1JZP) Without any verification, Halprin, in December issue, devotes an entire page to giving voice to the incompetent opinion of a paranoid malcontent who did nothing but cause trouble and disrupt the amateur radio operation at Johnstown following the flood. Quite frankly, 90 percent of what he says is simply lies and defamatory to every ham who took part in the emergency. . . Nowhere have I seen a more efficient and dedicated performance than at Johnstown. (W3EKG) Surely you jest, Mr. Halprin. . There was some disorganization but not to the degree this person implies. In a situation such as that of Johnstown, "lids," "kids" and "grumbling old busybodies" were not needed. This person should clean up his own shack before starting on someone else's. I spent 72 hours in Johnstown, beginning the day of the flood. Please don't print such a silly article again, even out of desperation. (WB3EKB) Your column of the letter from Johnstown was terrific, (N2YL) Please be informed that the operations at Johnstown during the disaster were in the most professional manner that could be expected. (WA3EKH) Your article, "Johnstown - One Man's Opinion," in the

December issue, was a slap in the face to man fine operators who came to our aid when w needed it. The narrow viewpoint espoused b your author, your refusal to print his name and his unfamiliarity with local conditions rende his argument unusable and unhelpful. An SET participation, while valuable, will no prepare a community for a mass disaster suc as the Johnstown flood, (N3WR) What wa proven by that letter in the Public Service sec tion of December OST from the frustrated har who was not allowed to "help" in th Johnstown flood disaster? He is a bitter an obviously dense individual. . . . The point i well made about training, though, (WB9BXS) wish to thank QST and KIXA for publishin "Johnstown - One Man's Opinion," in th December issue. . . . I hope we do better i southern Indiana if the need arises but it is har to convince many hams that training necessary for good emergency work (WA9TJS) I'm glad you ran it as you did Sometimes the truth has to hurt. . . . I got th same treatment as the individual whose stor you printed. I saw dozens of others get th same runaround, (K3JZD) ... Sure there were mistakes, there were foul-ups, there wer operational shortcuts. But this was not a gam of croquet being played on astroturf. This wa real. Times were desperate. Many of the people operating the net were personally involved local people. The work load of the net wa staggering and these people did a hell-ofgood job. (K3JQO) To sum this all up, all I ca say is that hams did one hell-of-a-good job Johnstown, (K4AC)

"When you have eliminated the impossible whatever remains, however improbable, mus be the truth." (Sir Arthur Conan Doyle)

PUBLIC SERVICE DIARY

Cygnet, OH — August 8. Members of Toledo's Most Reliable Amateurs responded to a call from the Salvation Army and set up communications at a five on the Standard Oil Company tank farm. (WD8DYX)

- [J] Bald Mountain, WA September 11. While making contacts in the VHF QSO Party, W7GZN and his son discovered a fire near their location. W7GZN called WA7LML on WR7ABZ, who notified the U.S. Forest Service. Within 20 minutes, fire fighters were on the scene. (K7VAS, SEC WA)
- □ North Salem, NY October 15. A group of amateurs set up communications in the search for a missing woman in a heavily wooded, hilly area of Westchester County. (WA2HZD)
- ☐ Lansing, M1 November 4-5. When fire swept through two apartment buildings, leaving 35 families homeless, local hams responded to a call from the Red Cross and established a communications network for the relief operation. (WB8YYG, EC Clinton, Eaton and Ingham Cos.)
- [] Mountlake Terrace, WA November 11. CE3AP broke into WB7PAS's QSO with emergency medical traffic; a brain valve, unavailable in South America, was needed for an operation that had to take place

- within 72 hours. WB7PAS works for the University of Washington hospital, and through their facilities he was able to procure the valve and ship it to Chile in time to save the patient's life. (W71EU, SCM WA)
- □ Ventura County, CA November 15. As a large brush fire spread within the county, the Ventura ARES assisted the Red Cross' relief effort by providing fire status information and giving directions for the evacuation of the area. (W6RIC, EC Ventura Co., and WA6BVL)
- ☐ Repeater Log. According to reports received to date, repeaters were used in conjunction with 146 automobile accidents and related occurrences, 13 disturbances, seven fires, two searches, two weather watches, one rescue and 10 miscellaneous incidents. Repeaters involved were WR1s AAC ABP, WR2ACV, WR4s ACS ADZ, WR5s ABA ABE ABY AIB AIT AJG, WR6s ABD ACS AEL AEZ AOX AWM AZO, WR7s ACB ACH AHR, WR8s ABS ABV AGA, WR9ABY, WR6s ADU ANT, VEILHR.
- December, 1977, was the year's best month with 40 SECs reporting 14,051 ARES members, while the same period in 1976 showed only 34 SEC reports of 11,990 ARES members. Sections reporting were Afta, Ariz, Ark, Colo, Conn, Del, ENY, EMass, Ind, Iowa, Mc, Mar, Mich, Minn, Mo, Mont, Nebr, NLI, NC, NFIa, NTex, Ohio, Okla, Ont, Org, Oreg, SDgo, SF, SIV, SCV, Sask, SFIa, SNI, STex, Utah, Va, Wash, WYa, WMass and WPa. As of our deadline for this

issue, for 1977 440 SEC reports from 56 different setions had been received. The total reports are slight down from 1976's 442, but sections reporting are to from 53 last year. 21 SECs reporting every mon showed an increase of one for the year over 1976. I cluding tate reports, the following sections had to percent reporting, the number in parentheses show how many years of complete reporting has occurre Ariz (3), Ark (1), Colo (12), Conn (3), Del (4), EMz (2), Ind (4), Mel (1), Mich (9), NC (4), NFIa (2), NT (1), Okla (1), SDgo (7), Sask (13), SFIa (26), SNJ (Va (1), WVa (2) and WMass (1). Over 90-perce reporters included: Alta, Ga, Kans, Org, Oreg at Utah. The all-time record of 100-percent reportings to SFIa with 26 consecutive years of reporting

On the negative end, nonreporters numbered 18, a improvement over 1976's 21. These sections are BCZ, EBay, EPa, Pac, Ida, Ill, La, NH, NMex, Qu RI, SC, SDak, Tenn, Vt, WI and Wyo.

NATIONAL TRAFFIC SYSTEM

W2JJ reports that EAN had a fantastic month — wi new records in traffic, rate and average/sessio W9FC says that there was so much traffic on 9R

during the Christmas season that it sounded like the good ole' days. Clara Reger, W2RIF, received the annual Bill Shaw, WB2VEJ, Award for 1977 — for outstanding performance in the second region nets. Rumor has it that once again Nick, OX3SC/aeronautical mobile, QNIed 2RN and EAN on Christmas Eve.

December Reports

(evening sessions) (daytime sessions)

1	2	3	4		6 7
EAN	31	4013	129.4 2		99.5
EAN GAN	62 31	1866 2568	30.1 82.8	.889	89.0 99.5
CAN	62	995	16.0		99.5
PAN	31	2418	78.0		99.5
PAN	31	1177	38.0	.622	97.B
Region Nets					
1BN	92	1412	15.3	694	93.3 96.0
2RN	121	1417	[1.7	,646	91.5 99.2
3RN	93	863	9.3	554	99.1 98.4
4RN	123	2498	20.3	.614	71.7 100.0
RN5	93	2448	26.3	.732	91.8 100.0
RN6	93	2009 1201	21.6 9.8	.529 541	96.0 100.0 93.9 100.0
RN7 8RN	123 82	754	9.2		82.2 99.2
9RN	90	1280		.558	92.5 98.3
TEN	90	1251		478	
ECN	60	550	9.1	572	89.8 100.0
TWN	91	1120	12.3	.460	93.0 95.9
TCC					
TCC Eastern	199	1615			
TCC Central	108	1490			
TCC Pacific	153	1897			
Sections:	4910	31577	6.4		
Summary	6309	61416	9.7		
Record	6289	55908	28.5		_
TCC function					
Section and	iocai ne	is reporti	ng (140	III DUE	N (DU),
MEPN MTN (LN ODN OPN	MD), AFI	N (IVI&I/INI IKi) IAI∕IVI	TION ON	20\ S4	ATN (SK)
ASN (AK), AE	NA AFN	DAFNM	ΔENIÑ	(AI)	ATEN
HARC /AZV A	MRN AF	N OZK /	ARI NE	N SCI	V (CA)

ASN (AK), AENB AEND AENM AENW (AL), ATEN
HARC (AZ), AMBN ARN OZK (AR), NEN SCN (CA),
CWN HNN (CO/WY), CN CORN CPN NYTN (CT), DEPN
DTN MDDTN MDD MEPN (DE/MOC), FAST FMTN
FFON NFPN PBTN OFN SPARC TPTN (FL), CGVN
CVEN GARES GSN GSSBN GTN (GA), 175m TLCN (IA),
IMN MTN (ID), ILN (IL), INTN ITN OIN (IN), KPN KSBN
CKS CKS-SS (KS), KNTN KSDAN KSN KTN KYN
MKPN (KY), LAN LAN LTN MLWN MTN (LAMS), MSN
PTN SGN (ME), EMRI HHTN RIEM WMN WMPN
(MA/RI), HEN KCAN MACS WWN OMN (MI), MSN
MSPN MSN PAW (MN), MOSSBN PHD (MO), CN (NE),
NHYTN (NHOYT), NJN NJPN (NJ), SWN (NM), NLI WDN
(NY), CNN NOSSBN SCSSBN THEN (INC), BN BNR
ONN OSN OSSBN (OH), OAN OFON OLZ OPEN OTWN
STN (OK), AEN AZM BSN OAN OSN WCN (OR), PTN
(PAC), ETA FAPER IN PTTN WPA WPAPATN
WPAZMTN (PA), SON SDSSN (SD), TPN (TN), EX TIN
(TX), UCN (UT), VFN VN VSBN (VA), NTN WSN (WA),
WYN (WV), BEN BWN WIN WNN WRN WSBN WSSN
(WI).

- NET - SESSIONS - TRAFFIC

5 — RATE 6 — %REP. 7 — %REP. TO AREA NET 4 - AVG.

Transcontinental Corps

W9NXG has been appointed director of daytime TCC operations for the Central Area, K1EIR and VE3GOL received second annual TCC-E certificates. The big numbers reflect the annual Christmas rush and associated extra functions.

1	2	3	4	5
Eastern	220	93,2	4924	1615
Central	117	92.3	2916	1490
Pacific	167	91.6	3807	1897
Summary	504	92.3	11647	5002
1 AREA			TRAFFIC	
2 FUNCT			OUT-OF-NET	
- 3 % SUC	CESSFUL		TRAFFIC	

TCC Roster

The TCC Roster (December): Eastern Area (VE3SB, DIr.) — W1s KX NJM QYY, K1s BA EIR GN PAD SSH XA, WA1ZAZ, W2s CS FR GKZ MTA RQ, WA2ICB, N2GM, W3s PQ YQ, K3KW, N3HR, W4s SQO UQ, K4s BKX KNP, N4KB, W3s LTA/2 PMJ, K8KMQ, VE3s GOL SB Central Area (W5GHP, Dir.) — W4ZJY, WB4SKI, W5s GHP RB, K5s GM MC TTC, N5s TS YL YX/Ø, W4Ss HNN IQU, W9s CXY DND FC NXG, N9TN, W9s AM HI, KØEYH, WAØTNM. Pacific Area (K5MAT, Dir.) — N5MR, W5s JOV KH, K5MAT, N6GW, W6s EOT MLF OA RSP

VZT YBV, K6HW, WA6VBS, KH6IQU, W7s DZX EP GHT KZ VSE, K7s HLR IWD, Wøs ETT FG FV IW LQ, KØs BN DJ TER, WBØTAQ, VE7ZK.

Public Service Honor Roll December 1977

This listing is available to amateurs whose public service performance during the month indicated qualities 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; (6) 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 enter month, 5 points. This listing is available to Novices and Technicians who achieve a total of 20 or more points.

67 K4BKX W5KLV 66 WB5NKD 65 N5TC 64 WA1UWF WB2IDP N2YL N5TS K6JT WA6UAZ 63 WB5NKC 62	W2MLC N2TW WB4JMM WB4OXT N4WA K5DG N5ES W7GHT W8IQ WD9AUD WB9ZAL 55 WA1TBY WB3AOB WBHXB 54 WB5RLR	WB5OOM WB6UZX WA7MEL WBVPW WBY1Q WA8ZNC K9LGU WØFT WØOYH WBØVEZ WBØVHN VE3DPO VO1GW 48 AA4CK WA5JWD WA4OEM K5OWK	WB8YVI WB9KPX W9MR W9NXG K9SAO WB9SOH WBRFF VE1HJ VE1HJ VE1LCR VE5XU 43 M6RD WB8KWD 42 N1RP
N3HR	53	WB6FTY 47	WAIZXB
WA9OCF NØOF	WAØQIT 49	KSTTC WSUYH	WB4VIM/T
57 K1PAD	WA1POJ W1RWG	WA7IHS WA7JRC	WB4FAS/N WA4QGV/T
56 WA2BMI	WB4GHU WB4NJU	WD8AVY N8CW	WB7TAZ/N 20
			WA4VKD/N

Independent Nets (December)

1	2	3	4
Amateur Radio Telegraph Society	31	827	534
Gentral Gulf Coast Hurricane	31	265	3135
Clearing House	31	754	699
Empire Slow Speed	28	76	246
Hit & Bounce	62	1515	525
Hit & Bounce Slow	18	68	31
IMRA	27	482	948
North American SSB	23	295	243
North American Traffic and Awards	31	160	1264
Southwest Traffic	31	508	1308
Washington Region PON	18	56	380
75 Meter ISSB	31	1250	1206
7290 Traffic	46	936	2874
1 - NET - 3 - TRAFFIC 2 - SESSIONS 4 - CHECK-INS			

Brass Pounders League December 1977

BPI. Medalflons (see December 1973 QST, p. 59) have been awarded to the following amateurs since last month's listings: N1CC, WA1MJE, WB4QBB.

The BPL is open to all amateurs in the United States, Canada and the 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 monthall messages must be handled on amateur frequencies within 48 hours of receipt in standard ARIRIL form.

all messages mus within 48 hours of	receipt	in stand	amateu iard ARF	r treque RL form	ncies
1 W3CUL	2 556	3 1639	4 1932	5 39	6 4166
WØWYX	54	357	1216	859	2486
WA4JDH W4MEE	26	901 658	887 639	8 38	1796 1361 1207
W5KLV W3VR	9 401	650 259	527 497	21 13	1207 1170
WASZHY	35 471	259 521	509 310	40	1105
K3NSN W7DZX	25 160	310 525	515 497	8	1091 1073 1032
WB4QBB WB6EIG	160 16	525 355 503	497 488	20	1032 1009
Weill	49	478	21	457	1005
KØYFK W7VSE	4	496 472	440	496 26 42	992 942
WA2SPL WB5NKD	6 10	472 453 475	429 426	42 16	930 928
K1BCS	113	325 437	447	32	917
W7GHT WB5NKC	27 54	437 359	424 464	13 20	901 897
WA1TBY W5REG	23 3	366 417	429 440	68 9	886 869
WAGAUX	29	449	386		864
N3HR AA4NC	16 23 41	375 381	355 400	92 16	838 820
WA1UWF WA8MCR	41	379 404	387 356	4 19	811 7 82
K4TH	3 22 3 30	362	210	174	768
WA6VBS WAØRWM	30	395 368	351 24	15 338	764 760
WB6PVH W9ZGQ	77	335 565	320. 1 81	26	758 746
N5YL	5	378	357	1	741
W4FOE W4EAT	18 2	359 356	329 373	33 2	739 733
WAØVGJ K6HW	24 16	350 345	15 345	335	724 70 6
WB2IDP	ĭ	389	304	8	702
W4SQQ K3KW	10	330 338	3 63 330	12	694 690
K7VWA VE3SB	53 1	350 386	80 271	20 3 1	686 659
W8PMJ	5	333 319	316	5	655 654
W6OA K4BKX	4	311	330 308	9 7	632
WB8KWD W5GHP	1 19	314 294	309 306	7 4	631 623
VE3GOL	12 17	294 269 267	306 314 300	22 27	623 617
K3NGN WA4PFK	246	67	255	37	611 605
W9DND W2RQ	5 3 47	285 279	301 250	4 59	595 591
WASUAZ KØDJ	4 <u>7</u>	243	290	17	591 587
WBØSND	16 30	265 254	274 275 253	13	572 572
VE4PG W1KX	45 3	270 268	253 292	3	568 566
WB4WYG NSTC	18 13	28 2 249	242 298	3 23 3	565 563
WA5HNN		262	276	21 12	559
VE7ZK N4MD	49 4	256 245 212 287 210	242 295	12	559 556
WB2KIH W2ÇS	61	212 287	237 253	40 6	550 546
WAØVRE WAZERT/1	125 50 2	210 221	253 210 249	-	545
N2YL	30	294	234 136	53	543 532 532
WA4CNY NØOF	10 170	196 132	223	190 7	532
W7EP WA3WQO	3 16	236 244	263. 247	27 19	529 526
WB8WTS	21	234	268	3	526
WB2BKC/6 WA3ATQ	49 276	213 132	130 110	131 3 7	523 521
WB8YMJ K6JT	44 8	229 236	241 199	7 75	521 518
K4SCL	6	262	237	12	517
N5TS WB4MXG	142	275 [13	231 200	5 55	512 510
WA1ZXB WBØVHN	70 10	212 214	106 242	118 36	506 502
WASTHT WAGRWM (Nov.)	51	193 715	144 36	112	500 1441
WA1ZAZ (Nov.)	t	301	241	690	543
Multioperator sta	tions				
W1TKZ W2ZQ	1275 250	489	1275 403	143	2550 1285
W1YK	293	38	317	4	652
BPL for 100 or moi		ations-p	lus-deliv	eries	
WD4IIO W7DAN	291 253		B7CAG INE		†14 113
VE4UL	201	Wi	35LBR		111
W7TZK K7NTS	182 175		165 T 49NEW/*	1	111 109
WA4OZT	158 151	V.	7FB I6BZF		108 105
N1NH WA6JDB	148	K9	MX		103
W8VPW W7SQT	133 123		42EQW 42JKG		102 101
WAØQIT	121		30WSQ (Nov.)	104
Multioperator sta WB4TOP	tions 117		4DW		100
	117				100
1 CALL. 2 ORIG.		4 5' 5 D 6 To	EL.		
3 RECD.		6 — Ti	JTAL		

1977 CAN-AM Contest Results

Plan ahead for the 1978 CAN-AM on August 19-20.

By Yuri Blanarovich,* VE3BMV

e are pleased to announce the results and winners of our first CAN-AM contest. Top-ten honors go to Lee Sawkins, CY7CC, for winning the combined phone and cw category, as well as high Canadian phone and high Canadian cw scores in the single-operator category. Lee also had the highest number of contacts: 1366 on phone and 723 on cw. So our first Canadian Champion Trophy goes to the overall winner, CY7CC. The American Champion Trophy was won by Gary Caldwell, WA6VEF, who also won both phone and cw categories as well as the combined. Gary has been known also as an operator of VE7WJ.

Runners-up getting the trophies in phone and cw categories were Canadian Phone Trophy, VA7BGK and Canadian CW Trophy, VE5DX. American Phone Trophy goes to K6XO and American CW Trophy to K6MM. The Multioperator Trophy was won by runner-up VC9UM, the University of Manitoba RC, and the Special Plaque for high multiop score goes to VE3BMV, with VE3IXE being the second engine.

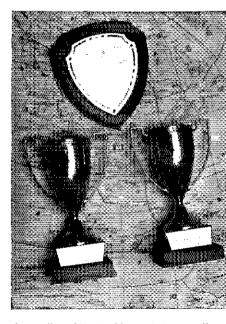
In the club-competition category, the Toronto DX Club wiped out Murphys Marauders. (First and last time? Where are the PVRC and Frankford RC?) Many contestants indicated on their logs their club, but according to the rules the club secretary has to submit the calls and scores of the club members competing for the club colors.

All together we received 210 logs, which is not a bad turnout for a first-time event. A number of stations that were in there with high QSO numbers did not submit their logs. For those that did we have drawn five one-year, free subscriptions for our bulletin — Long Skip. The five top Canadians and Americans after the trophy winners will also receive one year's

*CANADX Contest Committee Chairman, Box 292, Don Mills, ON M3C 2S2 subscriptions to Long Skip. We hope they will like the bulletin and this should be the small reward for their "suffering" in the contest. Most of the comments were very positive and considered this contest as one of the best domestic ones. One operator with about 15 QSOs prefers the VE/W contest format better. Well, that one is still around and it is everybody's choice which one he prefers to operate. We hope that in the years to come we will have lots of short skip on the higher bands, and this should make it even more interesting.

The propagation was not as good as predicted by our propagation experts. On Saturday there was a super opening between the East and West Coast on 15 meters. It was a real pipeline. This helped the West Coast boys to jump ahead of the East Coast because probably 70 percent of the contestants were east of the WØs. The skip was quite long and that helped the West to make the top scores. On Sunday propagation improved a little, and there were good openings with short skip on the higher bands. Participation was slightly less on the cw portion, which was reflected in the number of cw contacts made. Sixty-four logs were received from the VE participants and 146 from W stations. For the record, the highest multiplier score attained in the single-op category was WA6VEF with 181 on phone and 161 on cw., while the Canadian record is CY7CC with 166 on phone and 165 on cw. In the multiop category VE3BMV had 169 on phone and 185 on cw.

High-scoring stations in each multiplier area and mode will receive beautiful certificates. We would like to ask you for a little patience. It will take us a while to get them printed, so they could be a little bit delayed. Trophies, though, are already done and they will be in the possession of their winners long before you read this. We will be also mailing the packages containing the results and the new rules for



A sampling of the trophies and plaques offered by the CANADX Contest Committee for the CAN-AM Contest.

Trophy Winners

Canadian Champion Trophy CY7CC, Lee Sawkins American Champion Trophy WA6VEF, Gary Caldwell

Canadian Phone Trophy VA7BGK, Sld Kemp

American Phone Trophy
K6XO, Alan Brubaker

Canadian CW Trophy VE5DX, Jim Bearman

American CW Trophy
KØMM, Fred Minnis
Multioperator Trophy

VC9UM, University of Manitoba ARC

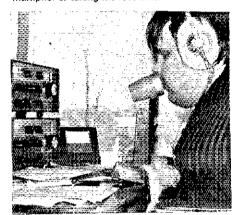
Special Plaque (Multiop Champion) VE3BMV, Yuri Blanarovich Club Competition Plaque

Torento DX Club



Jim, CY3EDC, came in third in Canada even with a considerable gap in operating time due to a power blackout.

Udo, CY3FFA, is either smelling the new multiplier or taking his rest time.



the 1978 contest, together with the sample forms: log sheet, summary sheet and dupe sheet.

We hope that you enjoyed the first CAN-AM Contest and that you will plan to participate in the next one in August, 1978. If you have any comments and suggestions for improvement, please let us know.

I would like to express appreciation to the contest committee members, especially Udo, VE3FFA, for help with compilation of the results and work around the contest. Also to my XYL, Sonya, who put up with all this and kept the junior ops off my back. Hi! We hope to see you all in the next one and wish you good luck in the contest.

		· · · · · · · · · · · · · · · · · · ·				
Top Ten						
Phone			CW			
VE	W	Multi	VE	W	Muiti	
CY7CC VA7BGK VE5UA CY4SW CY3BBH VE3KZ VE6MP VE7AV VE8RO/6 VE3MR	WA6VEF K6X0 N4UF KØMM WA6NEL W6OKK K8MR WBØPYD WDØBRJ WA4NTP	VE3BMV VC9UM CY1NN VE1AWN W< WA3UKY W4NVU VE8ML W9WI WB3GPR	CY7CC VE5DX CY3ED0 VE3KZ VE1AIH VE3HP VE2HY VE7AV CY1AJF VE7DS/	K5NW N6MU K1ZZ W5JW N5CT W2SC	VE3BMV VC9UM VE2BPT W8LT WA3UKY N4UF WD8KDR W4NVU CY1NN	
Top Ten Co	mbined Phone	+ CW				
VE - Single	Op	VE - W Muli	tiop	W - Single Op		
CY7CC VA7BGK CY3EDC VE3KZ VE5UA CY4SW VE5DX VE1AIH CY3BBH VE7AV	1,008,527 570,222 382,566 356,156 350,106 308,716 288,982 225,901 222,219 210,697	VE3BMV VC9UM W8LT VE2BPT WA3UKY CY1NN VE1AWN W4NVU N4UF VE8ML	822,527 628,385 242,834 194,680 192,199 180,351 145,262 124,212 - 74,470 72,312	WA6VEF KØMM K4BAI K6XO K5NW N6MU W5JW K1JZ N4UF W6OKK	695,756 303,871 189,230 187,293 165,447 159,619 149,030 144,508 132,209 130,475	

Sandary (Carlotte	MEN PROPERTY NAMED IN	MANAGE AND STREET																	
Line scores	s list: C	Call, state/	provin	ce, scot	re, Q\$Os, mul	típlier.													
Canadian I	PHON	E			AESICA AESICA	ON ON	16,578 13,122	111	54 54 45	WA4HRG/7 N7AM K8MR	OR WA OH	3,402 3,302 50,948	64 61 242	27 26 94	NEMU	GA CA CA	239,998 147,136 88,530	440 306	169 152 130
Single Open	ator				VE6ASI CY3BBH CY3FEA	AT ON ON	11,520 7,059 3,978	89 65 56	39 26	KSDL WB9OEC WB9NME	WI WI	7,602 26,892 24,924	80 232 164	42 54 67	W6OKK K6NA	CA CA CA	63,600 34,232 33,200	387 176 180	120 88 83
CY7CC VA78GK VE5UA CY4SW CY388H	BC BC SK MB ON	665,162 570,222 350,106 308,716 215,160	1366 1233 871 945 623	166 158 138 113 120	VOIAW/ VE3 VE3AKG VE3IRN VE3FHZ	0N 0N 0N 0N	3,105 1,368 240 18	42 26 10 3	27 19 8 2	WBQWM WBB2DII KBMM WBQPYD	LZ L	5,049 2,860 1,020 116,521 48,180	66 48 25 508 317	33 26 17 109 73	K6XO NAGSJR WAGORJ WAGOWJ	CAAAAAAA	19,229 3,726 3,240 1,530 360	132 54 47 33 15	83 67 23 30 18
VE3KZ VE6MP VE7AV	AT BC	167,400 163,562 136,395	479 583 445	124 98 105	Multi Oper	ator				WOOBRJ WBOOUH WAQAGN	KS MN NE	44 250 9 430 8 892	374 105 228	59 41 39		OR OR MT	48,720 26,057 15,602	258 177 123	87 71 58
VERRO/6 VE3MR VE1AIH CY3EDC VE7DSA	BC AT ON NS ON BC	123,840 120,435 113,918 103,056 66,960	440 383 388 316 271	96 111 103 113 85	VE3BMV VC9UM VE2BPT CY1NN	ON MB PQ NB	367,410 231,256 194,680 28,611	700 585 543 196	185 137 124 51	WBØRET WBØNOU WØWUU	KS MO SD	8,151 5,301 2,244	116 80 39	33 31 33	N7AM W7XZ W08IZX K8DL K8MR	AW VA VA HO HO HO	9,361 7,052 36,280 26,025 13,888	120 71 235 155 115	71 58 37 43 70 75 56
CYGAGV VETAGR VESIKN	AT BC ON	64,960 53,690 34,136	282 310 177	80 59 68	American	PHON	ΙE			Muiti Opera	i ter OH	123,799	549	107	WD8CIE WD8CIE	SH SH	10,580 6,825	111 76 21	46 39
VESSTQ VESDUS ÇY4JV	ON ON MB	27,060 22,230 21,164	235 126 175	66 65 44	Single Ope	rator				WAJUKY W4NVU W9WI	DE FL WI	109,354 77,682 31,160	483 362 170	107	WSIQ W9HR WB9SXX W9QWM	WI	1,020 14,040 10,452 8,601	113 118 80	46 39 20 39 67 47
CYANI CYJELA CY7AZG	MB ON BC	20,520 15,444 9,040	183 141 78	38 39 40	WIGG KIWJ	MA CT CT	25,326 25,276 18,928	187 163	63 71	WB3GPR	PΑ	25,631	157	82 71	Wanu	7772	2,632 676 513	40 20 27	26 13 19
VE3FHZ VE3COR VEIANH	DN ON NB	6,440 5,247 4,440	6 4 55 63	35 33 24	NIJW KIZZ WAJJGK	či či Vi	18,928 3,510 3,450	171 60 58	631675318 2522318	Americans	CW				WD9AEW WD9AEW WD9AEW	A1 OM	187,350 47,223 29,346 24,505	573 265 194	150 81 67
VEIABU VESCEF VESAKG	PE ON ON	3,385 2,016 1,311	47 35 36	25 21 19	KIIN KIZK WZGD	ČŤ CT NJ	2,461 2,184 6,650	48 50 85	23 21 38	Single Oper	ator				WBOPYO WBOOUH WBOUCP	SD IA MN	24,505 19,668 13,310	207 139 111	65 66 55 18
VESCXI CYSFEA	ON ON	1,278 1,128	25 35	18 12	WAZEJZ KBUA NBRL	NJ PA MD	288 19,092 15,900	15 163 120	8 43 60	K122 W1GG K1ZX	CT MA CT	140,998 29,100 19,116	453 176 150	143 75 59	WEGAWO WEGNOU WEGNOU	IA CO MO PC	1,422 816 4,988	*36 22 82	18 17 29
Multi Opera	ator				WB3ÖHA K3DZB W3PYZ	MD MD	10,088 4,020 3,567	29 64 56	16 30 29	WALIKG WALECN	VI CT	16,638	130 106 72	59 56	Multi Operate		4,566	O.E	e v
VE3BMV VE9UM CY1NN VE1AWN VE8ML	MB WB WB ON	455,117 397,129 151,740 145,262 72,312	917 1067 576 670 367	169 127 90 74 69	WESEKD WESDKT WESHN! NAUF WAANTP	PA PA PA FL VA	1,892 1,184 705 132,209 40,581	36 32 22 516 226	22 16 15 119 81	KITN WAIZDW WICNU WZSC WZEVS WZSO	222200	5,146 4,480 1,407 104,619 82,017 29,756	59 378 318 153	31 32 21 129 117 86	WBLT WA3UKY N4UF WD8KDR W4NVU	OH OE OH OH OH OH	119,035 82,845 74,470 47,802 46,530	414 356 307 514 240	133 105 110 93 90
Canadians	CW				K4TVC W4KMS WB4AFH	ŘÝ VA KÝ	10,994 7,954 3,840	104 87 43	46 41 30 20	WASEYA WASEYA WSEY	422 422 112	12 052 11 286 7 850	80 89 72	46 57 50	Check Logs:				
Single Oper	ator				K4BAI N4MM WA4PSL	QA VA NC	2,920 2,574 2,511	66 48 40	22	WA3YMA K3UA	MD PA	360 76,027 39,973	15 317 213	109 71	NALS K5DE0				
CY7CC VESUX	BC	343,365 288,982	723 643	165 158	WA4WXT W5JW K5NW	TN NM TX	1,386 29,792 13,923	32 291 160	18 49 39 42	N3AX K3DZB W3ARK	MD PA PA	39,973 24,336 16,744 11,679	150 136 100	71 72 56 51 41	OYTNN - (VE JJAWP,RJ)		•		
CŸŠEDO VESKZ VETAJH	ON ON NS	288,982 279,510 188,750 111,983	623 444 349	154 151 113	WASTYX WBSPDQ WSWMU	TX TX LA	13,923 7,518 4,185 2,340	74 55 60	31 18	W83BKD W83BKD	MD PA PA	10,701 7,410 4,736	141 89 57	41 39 37	VEIAWN (+	VELA	WV,VEIAI	וטא	
VESTR VESHY VETAV	ON PQ BC	111,983 108,416 86,724 74,302	301 285 272	128 108 97	WAGVEE MAGVEE KGXD	NM CA CA	2,090 455,758 158,064	41 1204 611	19 181 128	WB3DKT WB3DHA K48AI	PA MD GA	216 144 186 310	12 8 546	8 155	VE8ML - (Da CY9UM - (VE VE2BP1 - 1+	vid,Ke E45 G VE2F	en) V.VV,OY,U U)	(O)	
CYTAJP VEZDSA VEZYU	NS BC PQ	72,819 65,736 59,892	288 240 200	87 97 93	WAGNEL WGOKK WAGSJR	CA CA CA	87,740 56,875 19,909	400 426 152	107 125 62	K4TVC W4OMW K4OAQ	NC SC	18,126 12,760 1,080	154 101 29	53 55 18	WA3UKY (I WB3GPR • (+ N4UF - (+WA	WE3F	-WŻ}		
VE3DUS VE3IDE CY2EOH	ON ON PQ	50,025 45,675 39,438	200 214 219	87 75 63	NEMU KENA WEUQF	CA CA CA	12,483 5,054 3,276	100 60 48	57 38 26	K5NW W5JW N5CT	TX NM NM	151 524 119,238 105,885	503 354 419	138 119 117	WANVU (K EMC,VET,Y KRZ,FDI) W8LT - (WB8	ŧKQ,Ϋ JE,ΑU	W40BA,WA IR,ANH,WE	4LJZ, 14s JCI	WB4s B
VEATV VEADRE VEOMP	MB ON AT	37,459 37,000 30,624	300 178 188	47 74 58	MADW1 NAXX	CA CA WA	972 5 38,356	27 214	12 1 86	WSKLB WSWMU WSVGX	TX LA TX	51,085 28,016 19,260	269 201 150	85 68 60	WSLT - (WBS WOSKOR - (+ W9WI - (+WB	FWB9.	TBH)		

Rules, ARRL International EME Competition

One unusual feature of this Earth-Moon-Earth contest is that we *want* to see listener reports.

he first ARRL International EME (moonbounce) Contest will be held April 15-16 and May 20-21, 1978. Contest rules are detailed below. Putting an EME station together isn't quite as simple as getting on the "low bands," but it can be done by almost anyone. In fact, all the components for a competitive 144- or 432-MHz EME station are commercially available. You'll have more fun and save some money if you do it yourself. Headquarters has a listing of QST articles relating to EME available for a businesssized s.a.s.e. Ask for the "Moonbounce Bibliography." Hard-core technical information, including some OST reprints, is available from Varian, EIMAC Division, 301 Industrial Way, San Carlos, CA 94070. Ask for their "Everything You Wanted to Know about Moonbounce" package. It's free.

One unusual feature of this contest is that we'd like to see listener reports. If you can get four or more Yagis, quagis, or what have you together to total about 20-dB gain, a good converter or multimode rig with preamp, and some way to point the array at the moon, you stand a good chance of hearing other stations via EME. Some of what you hear may be terrestrial propagation, but if you live in California and are copying K2UYH on 432 MHz, it's safe to assume it's EME! Note the calls of the stations you hear, the time in UTC and the approximate frequency, and mail the info to the Contest Desk at Hq. By the way, if you can hear EME echoes, you have a system capable of working moonbounce. All you need now is a transmitter capable of running a kW and some perseverance. Of course, in order to hear echoes, your antenna must be pointed at the moon. To help determine lunar position you'll want a Nautical Almanac, available from marine-supply stores. Be sure you get the 1978 edition. A BASIC-language computer program for plotting the lunar orbit in terms of azimuth and elevation is contained in the EIMAC package, You'll need to know your latitude and longitude. That information is available from your town or

county engineer's office or library. Of course, if the moon is visible you can point the antenna with ease.

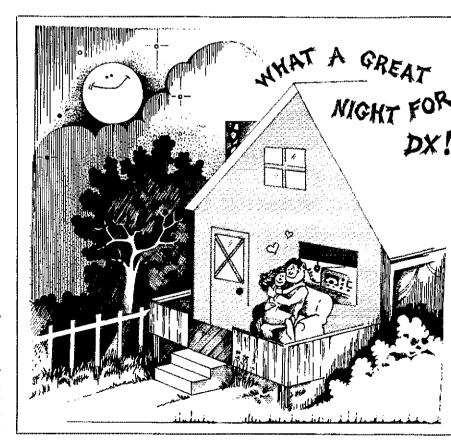
Most activity will be from 144.0 to 144.1 MHz, and 432.0 to 432.1 MHz. Cw is the dominant mode but you may hear the better-equipped stations running usb.—WIXZ

Rules

- 1) Eligibility: Amateurs worldwide are invited to participate.
- 2) Object: Two-way communication via the earth-moon-earth path on any authorized amateur frequency above 50 MHz.
- 3) Time: All contacts must be made during the contest period starting at 0001

UTC on April 15 and ending at 2359 U on April 16, resuming at 0001 UTC May 20 and ending at 2359 UTC on M. 21. Entrants may operate as much of t 96-hour period as they wish.

4) QSOs: For a valid contact to occeach station must send and receive be call signs and a signal report in a mutually understood format, plus a coplete acknowledgement of the calls a report. Partial and incomplete QSOs not count. Contacts may be made on or ssb. However, no station may ela credit for any repeat QSO with the sa station on the same band, even if the s ond contact occurs on a different mode a different weekend during the contest, partial or incomplete QSOs are made,



dicate them in your log.

No station — single or multioperator — may radiate more than one signal per band at any time during the contest.

Fixed or portable operation is permitted. Stations outside their licensed call area *must* sign portable, identifying the call area of the operating site.

A transmitter, receiver or antenna used to contact one or more stations under one call sign may not be used subsequently under any other call sign during the contest, even if more than one call is assigned to one location by the licensing authority. The intent of this rule is to recognize the difficulty of achieving EME capability and to prevent any entrant from gaining an unfair advantage by working the same station more than once for credit.

Stations using equipment that is not amateur (such as a dish antenna or lab equipment owned by an institution or a government agency) may participate in the event, but their scores will be listed separately from those that are fully amateur owned and thus eligible for awards.

There is no specified minimum terrestrial distance for contacts, but all communications must be copied over the moonbounce path, regardless of how strong (or weak) a nearby station's terrestrial signal may be. You MUST hear the other station's call, report and acknowledgement via moon echoes.

5) Entry Classifications: Entries will be classified as single operator where all operating, equipment adjusting, and antenna alignment during the contest period are performed by one person. However, automatic tracking equipment may be used without losing single-operator status.

The multioperator class includes those stations where two or more persons operate, adjust equipment or align antennas. It is also open to teams of neighboring amateurs within one call area, but with EME facilities for different bands set up on different team members' premises, as long as no two of the operating sites are more than 50 km (30 miles) apart. Multioperator, neighborhood groups can not use the same call signs at each location. Multioperator listings in the results will list all call signs (i.e., W1XZ-K1ZZ-K1WJ-WA1TZK).

6) Scoring: Each completed EME contact is worth 100 points. The final score is determined by multiplying the number of QSO points by a multiplier consisting of the total number of DXCC countries and U.S. and Canadian call areas worked via EME on each band. Example: K2RTH works 12 stations in four U.S. and Canadian call areas and three other DXCC countries on 144 MHz plus three stations in two U.S. call areas on 220 MHz. He has

15 QSOs (times 100) for 1500 QSO points times a multiplier of nine (seven on 144 MHz and two on 220 MHz), for a total score of 13,500 points. Contacts with KH6, KL7 and so on, carry multiplier credit as DXCC countries but not as "call areas." No contact may be counted for more than one multiplier.

7) Reporting: Entries must be postmarked no later than June 5, 1978 (two weeks after the contest) and must set forth the call sign, report and time of completion for each contact claimed. An accompanying summary sheet must list the total number of QSOs on each band, multipliers on each band, and final score. Please send along any details of your transmitter, receiver and antenna used on each band, with a picture if possible.

8) Awards: The high-scoring single- and multioperator stations in each U.S. and Canadian call area and each DXCC country will receive a certificate. In addition, each station that successfully completes at least one moonbounce contact during the contest period will receive a certificate commemorating his achievement.

Final results will appear in QST, in a special section along with the ARRL DX Competition results. This is, after all, a real DX contest!

9) Information on disqualification criteria is on page 83 of QST for February, 1978.

April CD Party — All ARRL Members

he April "Open" CD (Communications Department) Party is for all ARRL members. This is the time you can meet some of the more than 4000 people with CD appointments — such as official relay stations, intruder watchers, official bulletin stations — along with many of the elected ARRL officials, such as section communications managers, directors, some of the Headquarters staff. But most of all it is a time to meet other ARRL members on the air.

In this event, the same station may be worked on each of the bands but section multipliers count just once. (Maximum multiplier is 75.) Transmit your "status" plus ARRL section. Nonappointees transmit Member (MBR), Life Member

(LM) or Charter Life Member (CLM) — whichever is applicable; plus ARRL section. Appointees, officials and advisory committees send usual designation. Score five points per QSO. To this figure add your highest ARRL code-proficiency credit; multiply by the total number of sections worked.

Suggested frequencies are cw, 35 kHz up from the bottom edge of each band; phone, 3870-3900, 7200-7235, 14265-14285, 21340-21360, 28600-28630. Try 10 on the half hour and 15 on the hour from 1500-2100 UTC. Try 160 at 0430 and 0530 UTC and again during the last five minutes of the party. Don't forget 6 and 2 and the Novice bands.

Reports should be on ARRL CD Party

report forms or a reasonable facsimile. Send an s.a.s.e. now for your logs, requesting form CD-136. Entries must be RECEIVED at Headquarters by May 22nd. All participants will receive copies of the CD Bulletin containing the results.

CW

Starts 2300 UTC April 7

2300 UTC April 14

Ends

0500 UTC April 9

Phone

Starts Ends

0500 UTC April 16

(You may operate any 20 hours out of the 30-hour period. Times out must be 15 minutes or more to count as off-time.)

Coming Conventions

March 18-19 South Carolina State, Greenville, SC April 1-2 Roanoke Division, Charlotte, NC April 8* Great Lakes Division, Muskegon, MI April 22-23 Missouri State, Kansas City, MO May 5-7 Delta Division, Baton Rouge, LA Alabama State, Birmingham, AL May 19-21 New York State, Rochester, NY Wisconsin State, Lake Delton, WI May 27-28 Tennessee State, Knoxville, TN Jone 3-4 Georgia State, Atlanta, GA July 1-2 West Virginia State, Jackson's Mill, WV September 1-3 West Gulf Division, El Paso, TX September 22-24 ARRL National, San Diego, CA October 13-15 Midwest Division, Kansas City, MO October 14-15 New England Division, Boxboro, MA November 11-12 Hudson Division, McAfee, NJ *November 25-26 South Florida Section, Clearwater, FL

Hamfest Calendar

*Date Change

Connecticut: The Pioneer Valley Repeater Associa-Connecticut: The Pioneer Valley Repeater Association's flea market/auction is Sunday, April 9, from 10 A.M. to 5 P.M. at Newington High School on Rte. 174 (Willard Ave.). Setup at 9. Admission \$1, tables \$5, auction commission 10 percent. Available are planned family activities, food and free parking. ARRL's Club and Training Department will have a Novice information booth. Tour the new League hq. building at 2 P.M. (Please give advance notice of number in party.) Talk-in on 52, 04/64 and 19/79. Contact Arnie DePascal, K1NFE, 20 lowa Pl., Bristol, CT 06010.

*Florida: The eighth annual North Florida Swapfest

*Florida: The eighth annual North Florida Swapfest "Florida: The eighth annual North Florida Swapfest is March 11 and 12 at the Fort Walton Beach City Fairgrounds. Sponsored by the Playground ARC, proceeds support the club's scholarship fund. For more information, write PARC, P. O. Box 873, Fort Walton Beach, FL 32548.

Georgia: The Columbus ARC holds its annual hamfest on April 8-9 at the Columbus Municipal Auditorium at the Jairgrounds. Featured are FCC exams. flea market, prizes, luncheon. Saturday night

ams, flea market, prizes, luncheon, Saturday night banquet, prizes and a spacious, air-conditioned ex-hibit area. Contact Eddie Kosobucki, K4JNL, 5525

SOUTH CAROLINA STATE CONVENTION

March 18-19, 1978, Greenville, SC

The 1977 South Carolina State ARRL Convention, sponsored by the Blue Ridge Radio Society, will be held March 18 and 19 in Greenville at the Memorial Auditorium.

This year's show will be the biggest and best yet with more commercial booths than ever before. The flea market will also be on the inside. Doors will open at 8 A.M. Saturday, March 18 and Sunday, March 19. Registration tickets will be \$3 each, which includes entrance to the auditorium and parking for both days. Convention forums will include ARRL, Army and Navy MARS, and many more.

The FCC will be giving exams at Greenville TEC at 8 A.M. Saturday, March 18. There will be talk-in on the local repeaters. Frequencies will be 52/52, 22/82 and 01/61.

ROANOKE DIVISION CONVENTION

April 1-2, 1978, Charlotte, NC

The 1978 Roanoke Division Convention and Metrolina Hamfest will be held April 1-2, at the modern Charlotte Civic Center.

With over 100 commercial booths and a tremendous flea market, you will be treated to the ultimate in indoor hamfest enjoyment and comfort. Manufacturers will host technical programs throughout Saturday and Sunday.

DXers will find many prominent DXnedition leaders discussing their adventures, and the 10-X groups will be able to meet with Clint Paine, K4EKX, fourth district manager. Other programs will be held covering repeaters, traffic nets, OSCAR, MARS and ARES.

FCC exams will be given Saturday morning. No appointment is necessary.

On Sunday, attend the FCC forum conducted by Jerry Freeman, W4JJ, district engineer from Norfolk, and participate in several ARRL forums. While in the Civic Center you won't go hungry. For only \$3 you can enjoy a good fried chicken and barbecue plate. There will be a number of exhibits, a ladies program, and best of all, free bingo.

Radio Society will hold its first Lamarsfest on Sunday, March 12, from 9 A.M. to 5 P.M. at American Legion Hall Post 711 in Gurnee, located at the intersection of Rtes. 21 and 132, just east of the Great America park. Free parking, door prizes, refreshments and no charge For setup. Advance tickets \$1, or \$1.50 at the door.
Talk-in on \$2 and \$94, contact W. H. "Bill" Stumphy,
WB9PGQ, 504 W. Hawley St., Mundelin, IL 60060.

quet, this year sponsored by both the Washington and Northern Virginia Chapters of the QCWA, will be held at the Washingtonian Motel and Country Club, Gaithersburg, on Saturday, March 11, beginning at 6 P.M. The featured speaker will be Herbert Morrison, who will give his graphic description of the Hindenburg disaster. Tickets, at \$12 per person, may be obtained from Sam Newman, W3HN, 2921 Terrace Dr., Bethesda, MD 20015.

Convention headquarters will be in the adjoining Radisson Plaza Hotel. Special "hamfest rates" are available \$26 for one double bed, \$32 for two double beds per night, Contact the Radisson immediately for reservations at 2 NCNB Plaza, Charlotte, NC 28202, or telephone 704-377-0400.

Registration for the convention/hamfest is \$2/person for one day, or \$3/person for two days. Children 12 and under free. Top prizes again this year, including a complete station,

Come early and enjoy Charlotte Friday night. There will be an attitude-adjustment party at nearby Slugg's Tower Suite on the top floor of the First Union Building, beginning at 6:30 P.M. Come back to Slugg's Tower on Saturday night for a fabulous banquet. Get your banquet tickets early. Only \$10/person.

For a hamfest brochure, write Metrolina Hamfest, 2425 Park Road, Rm. 023, Charlotte, NC 28203, or call 704-376-4162.

GREAT LAKES DIVISION CONVENTION

April 8, 1978, Muskegon, MI

The Muskegon Area Amateur Radio Council will sponsor the Great Lakes Division Convention and Hamfest at the Muskegon Community College, April 8, 1978.

This is the 19th year this event has taken place in Muskegon.

Technical forums, manufacturers' exhibits, net meetings, and swap and shop are some of the day's events.

Parking is available, free, for over 1500 cars. The college dining room is open all day.

Saturday evening there will be a dinner program, advance reservations are required,

Friday evening, April 7, at the Muskegon Ramada Inn, the hospitality room will be open for all with courtesy libation. The annual Woulf Hong initiation takes place at midnight.

Tickets to Saturday's event are available at the door, \$2.50. Registration starts at 8 A.M.

For additional information, write MAARC, Box 691, Muskegon, MI 49440 or call Convention Coordinator H. Rickels, WASGVK, 616-722-1378.

Missouri: The Jefferson Barracks ARC will hold its annual hamfest and auction on March 10 at the Electricians Hall, 5850 Elizabeth Ave., St. Louis. Prizes.

tricians Hall, 5850 Elizabeth Ave., St. Louis. Prizes. Contact Carl H. Hohenberger, WBØBZP, 5266 Parker Ave., St. Louis, MO 63139.

*Nebraska: The second annual Midwest Spring Convention, sponsored by the Midway ARC, will be held on Saturday, April I, at the Holiday Inn Holidome in Kearney. Events include a flea market, auction, ARRL forum, technical symposiums, "Ladies Day" and an evening banquet featuring John McKinney, WØAP, FCC Monitoring Division. Door prizes and top exhibitors. For further details, contact Chuck Kemery, WØCRK, Midway ARC, RR 3, Box 232B, Kearney, NE 68847.

New Jersey: On March 11 the Cherryville Repeater Association holds its annual hamfest from 10 A.M. to

Association holds its annual harmfest from 10 A.M. to 5 P.M. at the Hunterdon High School field house, located north of Flemington on Rte. 31. Informative seminars will be conducted throughout the day, Over 20,000 square feet of heated area. Major manufac-turers. Admission \$2, plus an additional \$1 for sellers. Details from Cherryville RA, Box 338-Main St.,

Quakertown, NJ 08868.

New Jersey: The Knight Raiders VHF Club, K2DEL, auction/flea market is at St. Joseph's Church in East Rutherford on Saturday, March 18, starting at 10 A.M. Free admission and parking, refreshments available. Reserved tables available. Talk-in on 52. Call Bob Kovaleski at 201-473-7113 (evenings only), or write Knight Raiders VHFC, P. O. Box 1054, Passaic,

Ohio: The 23rd annual Toledo Mobile Radio Association auction/hamfest is March 19 at the Lucas County Rec Center from 8 A.M. to 5 P.M. Advance

NJ 07055

Perry Ave., Columbus, GA 31904.

Illinois: The Libertyville and Mundelin Amateur

Indiana: The Company B 1st Battalion 293 Infantry Military Recreation Amateur/MARS Club will host its first hamfest on March 18-19 at the Winchester Armory. Swap, buy, sell and trade. Table space available. Contact SFC John Stanley, administrator or SSG Al Carey, custodian, WIGBN, at 317-584-5991.

Maryland: The annual Washington QCWA ban-

Maryland: The Greater Baltimore Hamboree is Sunday, April 2, starting at 8 A.M. at Calvert Hall College in Towson. Take exit 28 from 1-695 (Beltway), and go one mile south to Goucher Blvd. and La Salle Rd. Admission \$2, with 250 tables in gym and cafeteria. Food service, prizes, giant flea market. For information and reservations, write Bro, Gerald Malseed, W3WVC, Calvert Hall College, 8102 La Salle Rd., Towson, MD 21204. Tel. 301-825-4266.

tickets \$2, or \$2.50 at the door. Talk-in on 01/61, 34/94, 87/27 and 52. Write to TMRA, P. O. Box 273, Toledo, OH 43696.

Oklahoma: The 33rd annual Lawton-Ft. Sill ARC hamfest is April 8-9 at the Montego Bay Motel com-

hamtest is April 8-9 at the Montego Bay Motel complex in Lawton. Events include the famous flea
market, ARRL officials, MARS and the QCWA
breakfast. Banquet on Sunday. Address inquiries to
Lawton Hamfest, P. O. Box 892, Lawton, OK 73501.

Pennsylvania: The University of Pittsburgh
Amateur Radio Association's (W3YI) second annual
hamfest is Sunday, April 2. Festivities are from 10
A.M. to 5 P.M. in the Student Union Building across from the Cathedral of Learning (free meter parking!). Check-ins on 69/09 and 52. For details and a map, send an s.a.s.e to UPARA, W3YI, Box 304, Schenley Hall, Pittsburgh, PA 15260, or call Mark Bell, WA3VIL, at 412-624-7768.

Texas: The Midland ARC will have a swapfest on March 18 and 19 in the County Exhibit Building on U.S. 80 east of Midland. Preregistration is \$3.50, or \$4 at the door. Prizes. Send fees to Midland ARC, Box 4401, Midland, TX 79701.

Wisconsin: The Tri-County ARC hamfest is March

19 at a new and larger location in the Jefferson County fairgrounds activities building at the west end of ty largrounds activities billiding at the west end of Jefferson on Highway 18. Limited number of reserved tables for \$2 in advance, or loads of room for your table. Door prizes. Tickets \$1.50 in advance, \$2 at the door. Write Glenn Eisenbrandt, WA9VYL, 711 East St., Atkinson, WI 53538.

Wisconsin: The sixth annual Madison Swapfest is Sunday, April 9, at the Dane County Expo Center

Youth Building. Rain or shine, doors open at 8 A.M. Equipment and components for hams, arts and crafts, movies and delicious food for all the family. Excellent overnight camping accommodations, \$3 hookup. Advance tickets (by April 1) \$1.50, at door \$2. Tables—Advanced \$2, at door \$3. Talk-in on 16/76. Write to MARA. Box 3403, Madison, WI 53704. MARA, Box 3403, Madison, WI 53704.

*ARRL Hamfest

Club Notes

Are your club members thinking of incorporating your club? That seems to be a favorite topic in local club bulletins, lately. Members often assume incorporation automatically relieves individuals from responsibility when suit is brought against the club for carclessness or negligent actions. This just IS NOT so. Any member or officer can be assessed money when court judgments go beyond assets of the group. In fact, the club's assets are more easily assessable in a court case when the club is incorporated. If your club has under \$2000 worth of assets, why not, instead, check into liability insurance to cover special events, such as Field Day, auctions, hamfests, flea markets and even regular meetings. This insurance can be ob-tained whether or not the club is incorporated. Give several area agents a list of all of the possible club events and ask them to tell you their rates. Then choose the best deal. Our opinion is that incorporation is not worth the time, effort or expense, for the negligible benefits a club may gain. We have a few more "pro and con" details; please send an s.a.s.e. to Club and Training Department. Hq. also has a list, that you may request, of attorneys who are hams, if you need more advice. Incorporation rules are different in every state; you must check with your state officials. Most state governments have a toll-free information number to put you in touch with the corporation-chartering agency.

Another related topic - the club may also be interested in becoming a nonprofit, scientific, educa-tional organization. This will exempt the club from paying federal income tax. It will also give the club the privilege of nonprofit club bulletin mailings. (Contact your local post office for publication 13, "Mailing Permits.") Because you are an affiliated club, and the ARRL is a 501(C)3 nonprofit, scientific, educational organization, you can automatically qualify as a 501(C)3. Our sample club constitution is sufficient for the requirements of this classification. Also take a look at category 501(C)7 requirements and privileges.

WAISTO

Strays 🦇

PRECISE TIMING

During some recent casual operating on 15 meters, Peter Rempel, WB6DWH, of San Bruno, CA, answered a CQ from Taroh Yagi, JH1WIX, of Tokyo, Japan. Checking the log out of curiosity, Rempel discovered that they had last worked precisely five years and three hours earlier. Yagi was first licensed in 1924 as JIZB and is still active at age 68.



At the Washington Hospital Center in Washington, DC, something that's getting to be contagious is the WHC Radio Club, Besides the 11 staff hams already in the club, other staff members, CBers and patients have shown a keen interest. Ken Williams (left), WB3ELV; Jim Gant (right), WA3WKX and Ed Hand. WA3ZHM, are all in the Radiology Department where an idea for a backup emergency communications center developed into the club. They are working on ways to use amateur radio as therapy for the hospital's population.



A month's vacation in Poland enabled Ted Witowski, W1RLV, to operate portable and deliver personally an ARRL award. On July 29, 1977, Ted was received at the Warsaw Radio Club station, SP5PWK, where he presented Jerzy Stanisz (left), SP3BQD, with his newly earned 5-Band DXCC award plaque. Jerzy is only the second SP amateur to receive this distinction.



In just one year's time Ronald Moorefield. W8ILC, accomplished ssb DXCC — with only 1 watt of input power. The Dayton, OH, PRA and EC actually worked 151 countries for trophy no. 1 from QRPp International, and he already has WAS on 75-15 meters.



Over the past few months many trade publications have alerted consumers about the very real dangers of installing antennas and antenna supports. Warning laws are being proposed by the United States Consumer Product Safety Commission. Meanwhile, Unarco-Rohn of Peoria, IL, is continuing the safety education effort with such means as this warning label, which they affix to various products. Before doing antenna work, look around!

)perating News

European Coverage for W1AW

For many years the big problem with WIAW coverage has been the western areas of the U.S. and Canada. In 1938 we started using the rhombic, aimed at the USA's West Coast. Even the dipoles and zepps used on other bands were oriented westward. The rhombic incidentally covered Australia and South Africa very well. Reception in Europe and the Northeast in general has never been exceptional, if even good, and nothing spectacular in the Northwest, South or Southeast either.

This is not to say that WIAW has been delinquent in its coverage of the ARRL sphere the U.S. and Canada. Generally speaking, it has been adequate and has greatly improved with the addition, last year, of superior radiators on 40 and 20, the two bands we rely on most for far western coverage. But it has been suggested that WIAW can serve not just as the Headquarters station of ARRL, but also as that of the IARU since IARU headquarters is also located in Newington. In this the year before WARC, with preparations continuing at a stepped-up pace, is there validity to the argument that we should take steps to improve our coverage worldwide, and especially to Europe where the greatest concentration of political influence exists and where we would be most likely to get a listening audience?

Well, maybe. Maybe not. It's worth a try. isn't it? We don't want to sacrifice our western coverage, but there aren't too many listeners on the West Coast during the morning and early afternoon period, and maybe we could swing our top 20-meter beam northeast occasionally during those transmissions to see if anybody in Europe is interested in copying W1AW. For ex-

*Communications Manager, ARRL

ample, the 1400Z code practice hits the West Coast at 6 A.M., but in Central Europe it is 3 P.M. The 1500Z cw bulletin is at 7 A.M. and 4 P.M., respectively. The 2100Z code practice is at 4 P.M. here and 9 P.M. in England (prime time!). After that it starts getting close to European bedtime, so we can swing our beams back to 280° and resume our western coverage.

Suppose we try this on a part-time basis for a few months, see if we get any response. The biggest problem, of course, is that most of Europe is not English-speaking, but both our bulletins and code practice are in English. But then, there are so many different languages spoken in Europe that even if it were practical to use a different language, any one language would cover only a relatively small area (except, maybe, Russian!). So, let's stick to English,

Starting April 1 (this will give most European readers a chance to get this issue of QST), we'll aim our beams on 20, 15 and 10 meters at Europe (45°) for WIAW transmissions on those bands at 1400, 1500, 1600 and 2100 UTC. on Mondays, Wednesdays and Fridays only. Sorry, we can't swing the 40-meter beam around. For the remainder of the schedule, the beams will be returned to, or remain in, their normal positions, oriented westward or slightly north of west.

Now you folks in Europe (including UK) let us know if you're copying us - because if you're not, we'll knock this off after a few months.

What about coverage of the rest of the world? Europe may be the cradle of modern civilization, but there are many up-and-coming countries elsewhere, too. How about South America? How about Central Africa? Oceania and Asia are pretty far for consistent coverage, but we might even have a try at them if the European experiment is successful. Who knows, the not-too-distant future may make it possible to provide worldwide coverage with one transmission through OSCAR X and XI!

MEET YOUR SCM

Michigan SCM Stan Briggs, W8MPD, was first licensed in 1953 and as this photo reveals has been ac-tive almost ever since! Stan teaches electronics at the Henry Ford Community College and was formerly a station engineer at various a-m/fm/TV stations. This Extra Class licensee holds the post of assistant director and is a former SEC, EC, assistant EC, and OBS. In addition to being regular net control for several Michigan nets, Stan has been 8RN rep for QMN. This ARRL Life Member is active in Wayne County ARPSC/RACES, a member of the Detroit Area Repeater Team, and member and club station trustee for the Motor City Radio Club. W8MPD has worked actively on emergency preparedness at both state and local levels. Favorite operation these days is 300 milliwatts on 40-meter cw. When time permits Stan is involved with the Y-Indian Guides, camping and swimming.



Michigan SCM Stan Briggs, W8MPD.

P ST 6 A.M.	CST	EST		MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDA
о А.М. ?	8 A.M. 9	9 A.M. 10	1500	Slow	Fast ⁴	Slow' Cw Bulletins'	Fast'	Slow'		
8 1 P.M. 2	10 3 P.M. 4	11 4 P.M. 5	1600 2100 2200	Fast'	Slow ⁴	Fast* Cw Bulletins*	Slow:	Fast:	Slow ¹	Slow
3 4 5	5 6 7	6 7 8	2300.	Slow,	Fast'	Slow' Cw Bulletins'	Fast ^r	Slow ¹	Fast'	Fast [*]
3 5:30	8 8:30	9 9:30	0200 °	-		Phone Bulletins				
,	9 10	10	0300 0400	Fast:	Slow	Fast' Cw Bulletins'	Slow ¹	Fast'	Slow ¹	Slow.

'Slow code practice on cw bulletin frequencies, 8 minutes each session; 5, 5, 7-1/2, 7-1/2, 10, 13, 15 wpm.
'Fast code practice on cw bulletin frequencies, 8 minutes each session: 35, 30, 25, 20, 15, 13, 10 wpm.
'Gw bulletins, 18 wpm. on: 1.835, 3.58, 7.08, 14.08, 21.08, 28.08, 50.08, 147.555 MHz.
'RTTY bulletins 60 wpm/170-Hz shift on 3.625, 7.095, 1.095, 21.095, 28.095 Hz.
'Phone bulletins on 1.835, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

Normal W1AW visiting hours are Monday through Friday, 8 A.M. to 5 P.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. Mar. 24, 1978. Staff: Chief operator/Asst. Communications Mgr. C. R. Bender, W1WPR; Chris Schenck, W1EH; Stan Gibilisco, W1GV.

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 0300 practice from the issue of QST two calendar months past: Mar. 3, It Seems to Us; Mar. 7, World Above; Mar. 13, League Lines; Mar. 23, Public Service; Mar. 27, Happenings; Mar. 29, Operating News.

KEEPING IT LEGAL

With 1979 WARC looming ever higher on the horizon, it behooves all us amateurs to keep looking closely at our signals and operating to maintain the highest possible profile. Alas, we hear of much that goes on in our bands that could come up at WARC to haunt us. The few bad apples in the barrel can spoil

the whole schmear.

ARRL official observers are working harder than ever to call attention to discrepancies, and controver-sies resulting have been numerous. Sometimes the observer was indiscreet, more often the person observed was too sensitive. Headquarters and the SCM are almost always involved, and sometimes directors get into the act. It's all so silly! An OO's only job is to notify; once he has done that, his job is fin-ished — at least, insofar as that particular observation is concerned. OOs are advised not to become involved is concerned. Ous are advised not to decome involved in arguments concerning the observations, but it's pretty difficult to resist the urge to "reply in kind" when someone calls you an idiot, or words to that effect. OOs are instructed nor to take an observation to FCC, not to send notices concerning operations in which they (the OOs) are personally involved. There are almost as many don'ts as dos, and admittedly all OOs do not follow all of them.

One OO has calculated that the average amateur will be the recipient of an OO notice once every 50 years; so if you get one, chances are that you are defying statistics. No one likes to hear that his signal is bad or that there is something wrong with his operating, and if you have a tendency to react negatively and a strong desire to feel that the observer is an idiot, you are only being human. Maybe the observation is incorrect. Maybe the OO is an idiot. But much more likely is that the observation was made in good faith and with good intentions, and all you are doing by reacting negatively is making yourself look foolish. The only thing expected of you is to take the matter into consideration. If you decide that the observer is in error, okay! You don't have to prove it or convince anybody of it, except yourself. And if you do that, it will be because there is just that one little part of your inner self that is asking: "Could he be right?"

Anyway, from time to time we cover some observer topics in this column. If we are sometimes technically

inaccurate, excuse this, if you can, and feel free to correct us. Here is the latest crop of OO topics for the

average ham:

1) Keep in your segment. FCC recently told us that the most common operating discrepancy is operation outside your licensed segment. Maybe this is because so many amateurs feet they can get away with this — and maybe they can, for a while, but it doesn't do anything for our law-abiding image.

2) Recently an amateur asked a three-step question regarding the handling of third-party traffic interna-tionally. Here are the three questions, with the

a) Is it illegal to ask if there is any third-party agreement between the countries concerned? No, it is never illegal to ask

b) Is it illegal to agree to handle such traffic, under the same circumstances? No, still no violation

up to this point.
c) Is it illegal to accept the traffic, even if you don't deliver it? Ah, when you accept it, then it becomes illegal. It is the on-the-air handling that is illegal. Like most crimes, it is the act that is illegal, not the disposition of the act. You can threaten robbery, but not until you commit robbery can you be prosecuted, and then you can be prosecuted regardless of the disposition you make of the goods.

3) Watch your sidebands. Many of us continue to

3) Watch your stocoands. Many of its continue to operate too close to the edge, forgetting that our sidebands stick out. If you operate is on the low end or usb on the high end, be sure your center frequency is 3 kHz inside the band; the only way to be sure. Even if your sidebands are on the inner side, your modula-

tion products could be outside the band if your un-wanted sidebands aren't being fully suppressed.

4) Clicks, chirps, etc. Many amateurs still have the complacent feeling that because they are using "name" equipment they paid a lot of money for, they are immune from clicks, chirps, ac modulation, audio distortion and such other very common problems. Some say that they monitor their signals constantly, and hear no such problems so they know the OO is in error. The only sure way of knowing what your signal sounds like is to listen to it from some distance, yourself. Don't depend on reports from others. Before you determine that the OO is wrong, have someone operate your station while you listen from afar. Even if this checks out, you may have an intermittent problem of some kind. Yes, the OO may be wrong, but why bet your license or amateur radio's

reputation on it?

Please accept OO reports in the spirit of the program, regardless of what you may to wish to think of the observer offering them. Nobody is perfect.

AMSAT-OSCAR7

Ref. Orbit	Date	Time (UTC)	Long. W	Ref. Orbit	Date	Time (UTC)	Long. W
15050A	1 Mar.	0023	62.1	15439B	1 Apr.	0137	80.9
15063B	2 Mar	0117	75.7		2 Apr.	0036	65.8
15075B	3 Mar.	0017	60.5	15451B 15464A	3 Apr.	0130	79.4
15088A	4 Mar.	0111	74.1	15476B	4 Apr.	0030	64.2
15100B	5 Mar.	0010	59.0	15489B	5 Apr.	0124	77.8
15113B	6 Mar.	0105	72.6	15501A	6 Apr.	0023	62.7
15125A	7 Mar.	0004	57.4	15514B	7 Apr.	0023	76.2
15138B	8 Mar.	0058	71.0	15526B	8 Apr.	0017	61.1
15151B	9 Mar.	0152	84.6	15539A	9 Apr.	0111	74.7
15163A	10 Mar.	0052	69.4	15551B	10 Apr.	0011	59.5
15176B	11 Mar.	0146	83.0	15564B	11 Apr.	0105	73.1
15188B	12 Mar.	0045	67.9	15576A	12 Apr.	0004	58.0
15201A	13 Mar.	0140	81.4	15589B	13 Apr.	0058	71.5
15213B	14 Mar.	0039	66.3	15602B	14 Apr.	0153	85.1
15226B	15 Mar.	0133	79.9	15614A	15 Apr.	0052	70.0
15238A	16 Mar.	0033	64.7	15627B	16 Apr.	0146	83.6
15251B	17 Ma r.	0127	78.3	15639B	17 Apr.	0046	68.4
15263B	18 Mar.	0026	63.2	15652A	18 Apr.	0140	82.0
15276A	19 Mar.	0121	76.7	15664B	19 Apr.	0039	66.8
15288B	20 Mar.	0020	61.6	15677B	20 Apr.	0134	80.4
15301B	21 Mar.	0114	75.2	15689A	21 Apr.	0033	65.3
15313A	22 Mar.	0014	60.0	15702B	22 Apr.	0127	78.9
15326B	23 Mar.	0108	73.6	15714B	23 Apr.	0027	63.7
15338B	24 Mar.	0007	58.5	15727A	24 Apr.	0121	77.3
15351A	25 Mar.	0101	72.1	15739B	25 Apr.	0020	62.2
15363B	26 Mar.	0001	56.9	15752B	26 Apr.	0115	75.7
15376B	27 Mar.	0055	70.5	15764A	27 Apr.	0014	60.6
15389A	28 Mar.	0149	84.1	15777B	28 Apr.	0108	74.2
15401B	29 Mar.	0049	68.9	15789B	29 Apr.	0007	59.0
15414B	30 Mar.	0143	82.5	15802A	30 Apr.	0102	72.6
15426A	31 Mar.	0042	67.4				

- 1) All time and date references are in UTC.
- 2) The times and longitudes are for OSCAR's first equator crossing each day, which is called the reference orbit.
- 3) A-O 7 will operate Mode A only on days of the year fully divisible by three (March 1, day number 60, for example), and the other two days in between will be Mode B.
- 4) All Monday orbits are reserved for QRP use only. Use a maximum of 10 watts erp. Wednesdays are reserved for special experiments: authorized users only. This includes Tuesday evenings for the Western Hemisphere.
- 5) The Mode B transponder inverts signals. Upper sideband on 432 MHz becomes lower sideband on 145 MHz.
- 6) A-O 7 progresses an average of 28.737348 degrees west per orbit in a period of 114.945170 minutes for the month of March,
- 7) A-O 6 has been permanently removed from active service.

Haven't listened to OSCAR yet? Try this: If you live in the eastern half of Canada or the U.S., listen to the reference orbit given in the chart (don't forget times are in UTC). If you live in western North America, listen about one hour and 55 minutes later. Give OSCAR plenty of time to cross your QTH's horizon — a pass lasts a maximum of 25 minutes. There are several other passes each day that you'll be able to hear or talk through, both in the morning and in the evening. Consult your OSCARLOCATOR to determine their times and directions. (Note: A complete A-O 7 reference orbit schedule for 1978 is available from ARRL headquarters for an s.a.s.e.)

To keep abreast of the latest developments, tune in to the regular phone and cw bulletins over W1AW, AMSAT bulletins transmitted around 29.440 MHz on Mode A, 145.960 MHz on Mode B, during A-O 7 reference orbits, and AMSAT nets (East Coast at 0100 UTC Wednesdays on 3850 kHz Isb; Mid States at 0200 UTC; West Coast 0300 UTC).

Spacecraft Frequencies

Spacecraft A-0 7	Uplink	Downlink	Beacon
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.502 MHz
Mode B	432.125-432.175 MHz	145.975-145.925 MHz	145.972 MHz

This schedule of orbits for AMSAT-OSCAR 7 is a regular feature of QST. Further information on the radio amateur satellite program can be obtained free of charge from ARRL hq. Also, the popular and Informative series of QST articles for the beginner has been reprinted in book form. Getting to Know OSCAR - from the Ground Up covers QSCAR 6, OSCAR 7, the newest satellite, A-O D, to be launched in early March, 1978, and the exciting Phase III program scheduled for late 1979. It includes the OSCARLOCATOR, a tracking device that lets you know which passes you can access and where the satellite is in the Northern Hemisphere at any given moment. The book is available for \$3 postpaid (\$3.50 outside the U.S.), from the ARRL.

Operating Events

MARCH

4-5: DX Competition phone (Dec.), YL/OM Contest cw*

8: West Coast Qualifying Run**

11-12: Commonwealth Contest cw, Trieste DX Contest*

16: W1AW Qualifying Run**

18-19: DX Competition cw (Dec.)

19: High-Speed Code Test (W1NJM)**

20: W1AW Qualifying Run**

24-Apr. 2: Royal Naval ARS Activity Period**

25-26: BARTG Spring RTTY Contest,* WPX SSB*

APRIL

1-2: Tennessee QSO Party, SP DX Contest cw,** Florida QSO Party***

1-3: QRP QSO Party**

6: West Coast Qualifying Run**

8-9: "Open" CD Party cw,* Swiss Contest (H-22)**

9: International Gagarin Cup Competition**

12-13: DX/YL to Stateside YL Contest cw**

14: W1AW Qualifying Run**

15-16: "Open" CD Party phone,* SP DX Contest phone,** EME Contest (first part)**

22-23: Zero District QSO Party,*** Bermuda Contest,*** County Hunters***

26-27: DX/YL to Stateside YL Contest phone**

29-30: Dutch Contest (PACC)***
30: W1AW Qualifying Run

MAY

3: West Coast Qualifying Run

6-7: Russian Contest (CQM), Vermont QSO Party, Georgia QSO Party***

13: Frequency Measuring Test

16: WIAW Qualifying Run

20-21: EME Contest (second part)

23: WIAW Qualifying Run

June 10-11: VHF QSO Party

June 24-25: Field Day

July 8-9: Radiosport Competition

Aug. 5-6: UHF Contest

*Detailed last month

**Details this issue

***Details next month

MARCH

S: West Coast Qualifying Run (W6CWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z (Universal Coordinated Time, abbreviated UTC, with Z used as a time designator) on approximately 3590/7090 kHz. This is 2100 PST the night of March 7 (9 P.M. PST). Please note that the dates are always shown at least two months in advance and times are always the same local "clock time." Underline one minute of the highest speed copied, certify that the 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, self-addressed stamped envelope

will help to expedite your award/endorsement.

16: W1AW Qualifying Run at 0300Z, 10-35 wpm, transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 and 147.555 MHz. This is 2200 EST (10 P.M. local Eastern time) the night of March 15. Underline one minute of the highest speed copied. Certify that the copy was made without aid and send it to ARRL per instructions above.

19: High-Speed Code Test. W1NJM will transmit simultaneously on 3636 and 7085 kHz, K6DYX or W6OWP on 3690 and 7025 kHz, starting at 0115 UTC Mar. 20 (Mar. 19 by local time). This is a Sunday evening, Instructions at 0130, speeds of 60, 55, 50, 45 and 40 wpm follow, in that order, exactly five minutes of plain English at each speed. Copy one minute consecutively solid to qualify for certificate. Send copy to George Hart, W1NJM, 66 Highland St., Newington, CT 06111.

26: W1AW Qualifying Run, 1400Z (9 A.M. EST). All other details per March 16 listing.

24-Apr. 2: Royal Naval ARS Annual Activity Period, from aboard HMS Belfast (which is situated in the River Thames between Tower Bridge and London Bridge). Call used: GB3RN. Activity will take place on any of the following frequencies: 1827 1837 1875, 3515 3535 3660 3780, 7020 7060, 14020 14035 14065 14160 14220 14310, 21020 21035 21250 21350, 28020 28035 28150 28580. If any W/VE amateurs are in Great Britain during the period, they would be very welcome aboard. This is their last surviving "big ship" and is now being preserved as a museum.

APRIL

1-2: Tennessee QSO Party, from 2100Z April 1 to 0500Z April 2 and from 1400-2200Z April 2. There will be a bonus period from 0500-0600Z April 2 for out-of-state stations only to work Tennessee mobiles and portables on 75. TN stations send signal report and county. Others send report and state, province or country. You may work the same station on different bands or on the same band if a county change. Cw and phone are separate contests. One point each contact. Tennessee mobile or portable stations count 3 points per contact. TN stations multiply sum of OSOs by the number of different states worked (including TN) plus the number of different TN counties worked, plus different provinces. Out-of-state stations use the number of different TN counties for their multiplier. Bonus points: 200 extra points to mobiles and portables for each county operated from outside the home county (10 contacts). Portables must use emergency power. Suggested freqs.: 3550 7050 14050 21050 28050 3980 7280 14280 21380 28580. Log date/time in UTC, stations, bands, modes, exchanges and score. Use a separate log sheet for each band over 25 contacts. (Contestants with 100 or more QSOs must submit a check sheet similar to ARRL CD-77). Logs must be legible to avoid disqualification. Plaques to TN top phone and top cw, to winning mobiles, portables, to top score out-of-state. Certificates to every station sending a log noting 15 valid contacts. Repeater contacts not allowed. Mobiles compete against mobiles, portables against portables. CQ TN or CQ Tennessee OSO Party. Variations to encourage contacts from noncontestants will result in disqualification. Mailing deadline May 1, Send s. a. s. e. (legal size) to Dave Goggio, W4OGG, 1419 Favell Dr., Memphis, TN 38116. SP DX Contest cw, 1500Z April I through 2400Z April 2 (phone weekend April 15-16). Each mode represents a separate contest. Transmit report plus consequity action by the proper plus consequity action by the contest of the contest o consecutive serial number starting with 001. In lieu of consecutive serial number SP stations will transmit a two-letter indicator denoting the province. Each QSO with an SP/SQ/3Z station on each band counts 3 points. Each different SP province counts once only as a multiplier (maximum number possible is 49). The sum of QSO points on all bands multiplied by the sum of SP provinces gives the final score. Categories are single op multiband, single op single band, and multiops or club stations multiband. Log entries for each mode. Usual log style, plus signed summary, Special awards. Three percent disqualification criteria. SP DX Contest Committee rules are final. Send entries to Polski Zwiasek Krotkofalowcow, PZK, SP DX Contest Committee, P. O. Box 320, 00-950 Warszawa, Poland.

1-3: QRP QSO Party, sponsored by the QRP Amateur Radio Club International, from 2000Z Apr. 1 through 0200Z Apr. 3, open to all. Members transmit report, state, province or country and QRP number. Others use power in lieu of QRP number. Stations may be worked once per band for QSO and multiplier credit. Each member QSO counts 3 points, inonmember QSOs count 2 points. Non-W/VE QSOs count 4 points. Multipliers: more than 100 watts input × 1, 25-100 watts × 1.5, 5-25 watts × 2, 1-5 watts × 3, less than 1 watt × 5. Score equals QSO points × total of states/provinces/countries per band × power multiplier. Suggested freqs.: cw 3540 7040 14065 21040 28040, sb 3960 7260 14300 21360 28600, Novice 3720 7120 21120 28040. All frequencies approximately plus/minus 5 kHz. Call CQ QRP. Awards. Full log data, including name, address, bands, equipment, etc. must be received by May 30. Send to E. V. Sandy Blaize, W5TVW, 417 Ridgewood Drive, Metairie, LA 70001.

6: West Coast Qualifying Run, W6OWP prime, W6ZRJ alternate, 10-35 wpm at 0500Z (Universal Coordinated Time, abbreviated UTC, with 2 shown as a time designator). The run will take place at 9 P.M. PST the night of April 5. All other details per the March 8 listing.

8-9: Swiss Contest (H-22 Contest) sponsored by the URE, the Swiss Union of Short Wave Amateurs, from 1500Z April 8 to 1700Z April 9. Use all bands 160 to 10, cw to cw or phone to phone. Send RS(T) plus a three-figure serial starting with 001. Swiss stations will send an additional two-letter designation of their canton (AG AR BE BS FR GE GL GR LU NE NW SG SH SO SZ TG TI UR VD VS ZG ZH). Each HB QSO counts 3 points. Each station can be worked once per band (either cw or phone). The multiplier is the sum of Swiss cantons per band (a possible 22 per band). Final score will be the sum of QSO points multiplied by the sum of cantons worked on each band. Awards. Postmark logs no later than 30 days after the contest and send to: TM USKA, HB9AHA, im Moos, 5707 Seengen, Switzerland. For the H-22 Award, send confirmations for each of the 22 cantons (worked on cw or phone) to Walter Blattner, Box 450, CH 6601 Locarno, Switzerland.

9: International Gagarin Cup Competition, sponsored by IARU Region 1 and held once every three years, cw only, the full 24-hour period UTC. Categories are single op all band, single op single band, multiop all hand (single transmitter). Call CQ GC (CQ Gagarin Cup). Contacts between stations on the same continent count 1 point, between stations on different continents 3 points. The multiplier is the sum of ITU zones from all bands. Exchange RST plus ITU zone number. (The ITU zone map appeared on page 85 of May 1977 QST.) Awards. Logs follow usual format indicating the first time a new multiplier is worked. Mail no later than May 9, 1978. Send logs to the Krenkel Central Radio Club, Box 88, Moscow, USSR. 12-13: DX/YL to Stateside YL Contest cw, sponsored

by the Young Ladies' Radio League, starts/ends 1800Z. It is open to all licensed YLs; OM contacts do not count nor do net contacts count. Call CQ DX YL, all bands, no crossband. A station may be worked once on each band. Exchange QSO no., RST, country or state. Separate logs for phone and cw (phone Apr. 26-27). DX YLs including KH6 may contact all of the North American continent which includes the states and VE provinces. Alaska YLs will be counted as DX but may not contact the western Canadian provinces (VES, 6, 7, 8). KL7 YLs may contact KH6, the states and the Eastern Canadian provinces. Contestants in N.A. may score contacts with DX stations to include KH6/KL7 except as previously noted. VE5-VE8 may not count Alaska as DX. Score one point per QSO, multiplier equals the no. of states/countries. Inputs of 150 watts or less on cw and 300 watts ssb PEP or less may use a multiplier of 1.25. (Note power on entry.) Postmark logs within 3 weeks and send promptly to Phyllis Shanks, W2GLB, 3 Honey Ln., Miller Place, NY 11764.

14: W1AW Qualifying Run, 0300Z. This is 10 P.M. EST the evening of April 13. All other details shown in the March [6] isting.

Station Activities

CP SA-1 OPR SECS DXCC SCLUBS SRM SOPS SRCC SPAM SWAS

CANADIAN DIVISION

ALBERTA: Sydney T. Jones, VE6MJ — SEC: VE6XC. PAM: VE6AFO. Edmonton and area amateurs will be using the prefix CG for 1978 to help promote the Commonwealth Games which will be held in Edmonton from Aug. 3 to 10. The Northern Alberta Radio Club will be very much involved with the communications part and will put on a good show. VE6WV visited his daughter and son-in-law in Saskatoon during Xmas season. VE6ABC and XYL VE6BBC are collecting ten-ten numbers when 28 MHz is open. VE6XG surprised everyone on the Alberta Net recently by checking in on Phone. VE6AAT and his XYL were recent visitors in Edmonton. VE6ANV is sporting a fine antenna system and a new Atlas 350. Watch for the code practice on 3740 each Mon. Wed. and Fri. Traftic: VE6FS 288, VE6HO 82, VE6AAT 61, VE6AWV 13, VE6BAT 4, VE6CE 4, VE6MJ 4, VE6YW 3, VE6EC 2.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — The best to you all for 1978 and thanks for all the support you have given our Section. There was a great Increase in traffic flow for Christmas. Even the SCM made his first SPL for traffic out, also VE7ZK. VE7TT our active OO between Bagpipe playing claims he will be more active on the nets this year. Prince George ARC put out a real fine paper and have a real active club. Christmas Party of the paper and have a real active club. Christmas Party of the Northwest Passage. It was the first showing in North Northwest Passage. It was the first showing in North America. When one saw that ice and a little sailboat you had to wonder why man would do it. We must thank VE7ZQ who was in amateur radio contact all the way and he was Harry's guest at the dinner. Traffic: VE7ZK 559, VE7FB 186, VE7DFY 122, VE7COA 117, VE7CM 36.

MANITOBA: SCM: Steve Fink, VE4FQ — Asst. SCM: VE4FG, FIM: VE4UL. PAM: VE4UP. Dec. was a busy time for all nets. The MTTN RTTY net still active. The new Manitoba Morning Phone Net very active and well attended. We regret the passing of VE4AQ. He will be missed. Other activities, as two (2) meters, meetings, any other items of interest would be appreciated for this column. MEPN, 31 sess., 1353 QNI, 16c. 95. MMN 19 sess., 315 QNI, 16c. 84. MTN 31 sess., QNI 260, 1fc. 276. Traffic: VE4PG 568, VE4UL 435, VE4QU 111, VE4YE 83, VE4EA 65, VE4HR 49, VE4IZ 47, VE4JA 43, VE4WE 274, VE4MB 19, VE4LU 17, VE4NM 16, VE4U 17, VE4NM 16, VE4U 17, VE4NM 18, VE4IR 18, VE4IR 11, VE4PA 10, VE4LP 9, VE4AAD 8, VE4AAD 8, VE4IR 8, VE4IR 8, VE4MD 8, VE4XB 2, VE4EG 2, VE4ZE 2, VE4EX 1.

WARITIME-NFLD.: SCM, Aaron D. Solomon, VE1OC—Asst. SCM: VO1FG, SEC: VE1DI. PAM: VO1JN, RM and APN Mgr. VE1AUL. RM and Nth Mgr.: VO1GW, Sient Keys: VO1EB, ex-VE1SI; XYL's of VE1GX & VE1RG. Hospitalizations incl. VE1ALB VE1BM VE1RN. Public Service high-lights activities in Dec. VE1AQP rendered assistance twice on NS highway 101. VE1BKA & DI assisted in tractor-trailer accident. VE1AKU & OM alerted EM. network during telephone black-out in Kentville. A ground search team from HARC found lost funter in woods. NSARA reports successful year with 389 members. VE1PG, pres. new PEI Am. Radio Assn. VX1CR Spec. Event Station act. with 551 contacts. VO1MB awarded Queen's Jub. Medal for community work. APN — sess. 31, QNI 148, QTC 204. NTN — sess. 22, QNI 114, QTC 41. Traffic: (Dec.) VE1AGU 309, VE1LCRIRO 253, VO1GW 108, VE1AMR 60, VE1HJ 52, VE1IG 44, VE1OC 39, VE1CH 35, VE1EJ 31, VE1ASGW 34, VE1BJG 12. (Nov.) VO1HL 3.

VE1IG 44, VE1OC 39, VE1CH 35, VE1EJ 31, VE1ABG 30, VE1AMB 17, VE1ASW 14, VE1BJG 12, (Nov.) VO1HL 3.

ONTARIO: SCM, Larry Thivierge, VE3GT — Asst. SCM: Noreen Nimmons, VE3GOL. VE3FRG was presented with the ARRL Certificate of Merit for his dedicated work and service to others. Bill has been active with the NTS, ARPSC, the Oakville ARC and he was instrumental in obtaining a grant and getting VE3XSC on the air from the Extendicare Senior Citizens Home. The presentation was made by A/SCM VE3GOL at a recent Oakville Club meeting. Thunder Bay amateurs, under the direction of VE3AXL transmitted 152 Christmas messages for local senior citizens of Grandview Lodge, Dawson Court and Cumberland Hall, to their relatives and friends in Canada and the United States. The OPN, Laurentian Net, CJ Net and the MEPN relayed most of the traffic. Thanks to all those who assisted. Westside ARC celebrating their 40th anniversary will be using the call VA3JJ throughout 1978. The club meets Sun. at 16002 on 7192 kHz. There will be special QSLs for contacts. VE3CAF Ont. Section winner in the Washington OSO party. VE3GWP has moved to VE7-Land. VE3ILN in a new location and back on the air with an 18AVT vertical. VE3AJN and GNW have a new TS-820S. VE3OA is a member of the DX Advisory Committee. VE3SB earned a Public Service Award for his role in reporting and fighting a forest fire near his cottage. Details of the fire were reported via repeater VE3STP. VE3DSW is an RSO delegate for the Hamilton district. VE3OBC is on the air from Hensall on 146.31/146.91 MHz. To help promote the Annual RSO Convention in London on Oct. 13, 14 and 15, the LARC is offering a special award for working 10 different club members while they are using the call vE3LON. Send you cards to the club's secy. One VE3LON Send you cards to the Club's secy. One VE3LON Set Card is worth a discount of \$1.00 from the advanced registration. Windsor ARCs Gooddellows Drive, under the direction of VE3HAR was a huge suc-

cess, VE3ETM new PRS for Windsor and southwestern Ont. Ontars, who are celebrating their 6th anniversary, saddened to hear of the passing of VE3AXR, VE3IVO has his Advanced. New calls are VE3s KDA JNA and JIK. Traffic: (Dec.) VE3SB 659, VE3GOL 617, VE3HGJ 374, VE3ISW 265, VE3GFN 217, VE3DVE 214, VE3DPO 184, VE3DV 132, VE3GJG 126, VE3GT 125, VE3CNK 105, VE3EWD 87, VE3ATR 78, VE3FZG 72, VE3CK 66, VE3DUK 47, VE3BDM 41, VE3EBC 28, VE3FGV 27, VE3GNW 26, VE3JRT 26, VE3FHQ 25, VE3FGP 27, VE3HGS 20, VE3GCC 14, VE3APK 11, VE3IDL 8, VE3DH 6, (Nov.) VE3APK 1.

QUEBC: SCM, Ed Sieb, VE2BAQ — VE2SV back on the air after a lapse of a few years, reports he and XYL VE2DY active on slo-scan, 14.330. Maurice also works CW, and SSB on the low end of two. VE2DLH new voice on two meters FM. Steve is eager to get on HF. VE2REP repeater has been moved to provide better coverage, and reduce intermod. VE2FCA is now VE2DQT. VE2WT reports that ECN meets daily, 0045 UTC on 3652 kHz and again at 0230 UTC; VE2WT is net Mgr., very active in NTS. New repeater on UHF, VE2AIF, 444.3/449.3, located on top of Marconi building, Town of Mt. Royal; VE2's AS BIT calls heard there. VE2DHF visited here recently, has a new XYL and now lives near Chicago. VE2QL VE2LZ very busy with their joint project; everyone seems to sport ID'ers on their 2-meter rigs. Traffic: VE2EOH 233, VE2BP 52, VE2EC 23, VE2BAQ 2.

SASKATCHEWAN: SCM, Percy Crosthwaite, VE5RP — I would like to congratulate VE5UA for contacting 101 countries on 75 meters. President Dennals has announced five ARRL committees for 1978. Our Canadian representatives are Contest VE5TT, VHF Repeater VE1AKT, DX VE3QA, Emergency VE5CU and the VHF/UHF VE3AIB. I would like to congratulate the Outlook area for setting up their repeater VE5RPR on 13.73. This repeater is on battery power using the wind to recharge the batteries. Traffic: (Dec.) VE5AAE 168, VE5EC 71, VE5XU 54, VE5WM 38, VE5DF 36, VE5DN 32, VE5DN 32, VE5DN 32, VE5DN 32, VE5DN 32, VE5DN 30, VE5VG 6, VE5UX 64, VE5EX 32, VE5BN 3, VE5BD 3, VE5IM 2. (Nov.) VE5AAE 73, VE5EK 32, VE5XU 16, VE5WM 16, VE5ABN 7, VE5NJ 6.

ATLANTIC DIVISION

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3P-Q. PAM: W3WD. RM: W3QQ. PSHR: WASWPY 50, W3PQ 44, K33L 41. New Castle Co. EC K3JL has appointed WB3ENF and WB3FOE as Assistants. A personal thanks to all who voted in the SCM election regardless of your choice of candidate. WB4YIU and XYL WD4IJY are signing i3 from Lewes for the next 3 years after 15 months as Y01 at Argentia, Newfoundland. Welcome to the "1st State." WB3BNZ received a PSHR for work during the Johnstown Flood. WB3DPJ holding theory classes at 3208 Concord Pike (Rt. 202) Wilmington. The Wed. Class times are: Novice 6-8 and Gen. and Adv. 8:15-10:15 local time. Enter at rear of building. DEPN ONI 95, QTC 18. DYN 351, QTC 124. Tratfic: (Dec.) W3PQ 341, W3QQ 185, WA3WPY 147, WA3WIY 62, K3JL 33, W3DKX 32, W3WD 17, WB3DUG 11, WA3HFL 5, WA3DUM 2. (Nov.) K3JL 12, WA3DUM 4.

17, WB3DUG 11, WA3HFL 5, WA3DUM 2. (Nov.) K3JL 12, WA3DUM 4.

EASTERN PENNSYLVANIA: SCM, George S. Van Dyke, W3HK — SEC: W3FBF. RMs: K3NGN K3KW. PAMs: W3FZO W3AJJ. Net reports: EPA ONI 554, QTC 487; PFN ONI 415, QTC 961; PTTN QNI 398, QTC 233; EPAEP&TN QNI 321, QTC 162; CMSN QNI 26, QTC 2. Nov. EPAEP&TN QNI 321, QTC 162; CMSN QNI 26, QTC 2. Nov. EPAEP&TN QNI 321, QTC 162; CMSN QNI 21, QTC 2. OBS reports: K3NSN W3ID W3VA W3CL. OO reports: WA3TMP K3NSN WA3RPG W3KEK W3RJ. OVS reports: WA3TMP K3NSN WA3RPG W3KEK W3RJ. OVS reports: WA3TMP K3NSN WA3RPG W3KEK W3RJ. OVS reports: WA3NDO WA3BJQ W3CL W3OOA WA3THT. PSHB: N3HR K3YL K3NGN WA3YPZO K3FD W3RJ. New officers PARA: N2GL, pres.; W3BSQ vice-pres.; WB3EAO, rec. secy.; K3NVC, corr. secy.; K3GKB, treas. Southern Chester Co ARC.: K3WAC, pres.; WB3EMB vice-pres.; WB3HOZ, secy.; W3FM, treas. WSKT mem. at large. York ARC: WB3BLM, pres.; WA3UCH, vice-pres.; WB3EZO, secy.; WB3GQC, asst. secy., W3EDO, treas. ECARS: K3TPA, pres. W3LMP, vice-pres.; K3FC, secy-treas.; K4BX, dir. PTTN welcommes W3DP & WB3HPV. K3WHC has new 432 EME dish. WB3AWJ & WA3ZYR building 10-mtr rpt or York area. K3YL can beat the 20 sec limit on my phone recorder and get her Tfc and PSHR report in one shot! W3CUL & W3VR sporting new RTTY gear. N3HR pushing the top guys with his rfc totals. WA3ATO says not much snow but plenty of ice. The late nets still report poor condx. W3ADE handled lots of tfc from Harrisburg East Mall. W3FD says DX is good. ARED(2) N12 missed above. W3VA in his 47th year as Haml W3BUR reports RF HIII ARC grinding out the Novices and Generals. WA2CKA says 6 perking up a bit. Traffic: (Dec.) W3CUL 4166, W3VR 1170, WA3ZRY 1105, K3NSN 1091, N3HR 838, K3KW 690, K3NGN 611, WA3WOQ 526, WA3ATO 521, WA3HD 521, WA3HD 20, WA3CKA 99. W3AMF 19 00, W3AFR 21, W3BUR 10, WA3CKA 99. W3AMF 15, W3ATJ 77, W3BBF 21, W3ADE 22, WA3VDQ 2, WA3TMP 2, K3IAZ 1, W3EU 11, W3GOA 1, W3GMK 1, WB3CTU 1, W3KEK 1. (Nov.) N3HR 607, WA3CHQ 4, WB3AZE 19, WA3NDQ 9.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — Congrats to all the traffic handlers for



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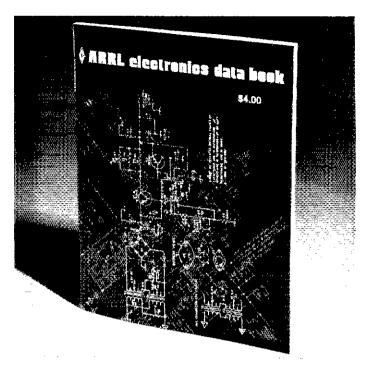
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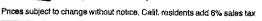
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the Dec. '77 deluge. SEÖ N3II renews ECs W3DFW WA3UTC WA3IHW WA3ZAS and W3HJH. WB3CUM is the new EC Carroll County. Congrats. Oo reports from WA3KCY WA3JSZ W3WBY and W3ASK. WA3FYZ made the overseas trip with President Carter. BARC dues are overdue! W3CDO spent a quiet month at home. W3BHE reflects on a very good year for the Mountain ARC. WA3FVZ B a new General, congrats. New verticals for WA3DEN and W3WBY. W3JFT has a regular sked with son WB3EZV U of Mass. W3JZY renews his OHS/OPS. WB3JYD is looking for a Novice net. Help? WA3UYF busy with maintenance after Murphy's visit. WA3EOP reports the new Antietam ARA line up: WB3BXH, pres.; WA3ZYW, vice-pres.; K3MVL, secy; WB3DNW, activity; K3UMV, repeater. W3HJH is putting 5t. Marys back on the active list. WB3ClO has all the stats on the AARC. WA3KCY got his last card for WAZ. congrats. The Voice of America put on a program about ham radio. Involved were W3ETX WB3DBU and W33FYZ. N3IT garnered a good traffic count. N3RC visited 5-Land for the holidays. WB3AOB wonders how W3CUL does it! K3KU had his biggest ever NCS night Dec. 21, the shortest day. With the nets. Netflygr sessions/ifc/oNi average. MEPN/WA3PRW 22/176/22.1. Topper W3LDD. Others W3ADQ W3HWZ WA3PRW K3RIJ WA2YFM and WA3ZRY, and K3ORW. WR PON/W3DFW B/86/E1.1 MDC PON/W3OYY 5/23/25.2. WBBZY/3 and MDCTN meet at 6 PM local time 3920 kHz. MDD daily at 7 and 10 PM on 3643 kHz. Traffic: WB3AOB 374, WBSZY/3 39, N317 10, WB3ZYZ SEC M2DCHEN NEW BASEWY 56, KSKU 68, N3QA 44, K3ORW 25, N3RC 4, W3BHE 2, W3CWC.

44, K3ORW 25, N3RC 4, W3BHE 2, W3CWC.

SOUTHERN NEW JERSEY: SCM, Raymond R. Clancy, WBZGTE — SEC W2HOB reports WA2EMY EC for Salem Co. WB2EVO WAS on 100W Ph. K2BG Is Asst. Dir. of Div. WA2MMA WAZZND have a Woodbury Repeater on 52.14 K2UL eyeballs Singapore, Indonesia, Hawaii in Dec. K2OKA joins ARES. WA2JAZ is Advanced. New Extras: WB2KMP WA2LVZ WB2SLW WA2OMP WZYZ. WB2LCI INEW Tech. 10 years old. WB2NBM has WAS. WZZI WA2DUE have new rigs. W2PAII NCS accomodates any mode on 2M Net. Former W2OSO now signs WD4MIW. Gloucester Co. ARC: WB2BZY, pres; WA2AXJ. vice-pres;; WA2TWC, CS; WZTDI, RS; NZRE, treas. Also new 10 wk Novice class at Wash. Two H5 started Jan. 23. SCARA: WB2ASB, pres; WB2AIQ, vice-pres; W2CQ, reas; K2MB. secy. West Jersey RA: WB2LCC, pres; WA2VSL, vice-pres; WA2AWU, secy-treas, Club sponsored Santar/Children visits via 2M In local Hospitals. SJRA: W2GJS, pres; N2GL, vice-pres; WA2NBL, CS; WA2VYA, treas. WZTDN, RS; speaking of 'AA', when N1JW, Johnny Walker QSO's K2AA said he was the cause and we were the cure 'AA' SPARC club hosts in structor on CPR. Club will hold tirst Hamfest at Stocton State College in Pomona Apr. 16 WR2ADKs 350W can be heard on 52.05. Salem Co. ARC: K2ZWS, pres; WB2LIJ, vice-pres; WA2JSG, secy.; WB2KMR, act. Delaware Valley RA: WA2YA, reas. Glub sponsors flea market Apr. 30 at Villa Victoria Academy on Rte. 29. Traitic: W2ZO 1288, N2HF 145, WB2LCC 134, WA2AWU 72, WZZREI 1. WB2REI 1.

WAZWSV 21. N2UT 18, KZBG 14, KZNE 10, WZZI 2, WBZREI 1.

WESTERN NEW YORK: SCM Joseph M. Hood, KZYA — Asst. SCM: WZMTA. SEC: N2JC. WAZAIV reports a very successful special exercise to handle over 150 Christmas messages for the Batavia VA Hospital. The effort was coordinated by WBZCZC and WZSRP and resulted in excellent public relations for amateur radio. Thanks to all who helped with this project. The Empire Slow Speed Net ESS which meets on 3590 kHz at 6PM local time is looking for a Fri. NCS. Contact net manager WZWSS if interested. Also ESS are eager to have newcomers check in and promise unlimited patience. Also WZWSS will issue certificates to those who QNI 75 times during the year. The Hochester VHF Group planned another all out attack for the Jan. VHF Contest with impressive awards for several categories including those who submit logs. Regret to report that WEXKGE became a Silent Key in Nov. Congratulations to: WB2CL elected BARRA pres., to WB2CQK ARATS 1977. Outstanding Amateur, to WAZPEA WAZPUJ and WZJJ who received Civil Defense citations on the OCERCC net, to WBZWUB and WB2DNQ cited for their amateur radio work in the walk for hunger by the Niagra Council of Churches, and to WAZAWK RAGS Amateur of The Month. WB2UJAD recently passed the Extra and will apply for a two letter call. We welcome the Oneonta ARC to the list of ARRL affiliated clubs. WAZELD and NZTW made BPL in Dec. Finally, a quotable quote from ARATS. A good NCS is one who can step on your toes without messing up your shine. Traffic: WAZELD 723, NZTW 686, WAZPEA 431. WZCE 430, WZMTA 279, WAZZJP 163, WZPZI 138, WAZKOJ 120, WBZKHT 108, KZGJC 105, WZPR 1, WAZSMM 9, WAZUMRA 7, WAZSMM 9, WAZUMRA 7, WAZSMM 9, WAZUMRA 7, WAZSMM 9, WAZUMRA 7, WAZSMR 9, WAZUMRA 7, WAZSMM 9, WAZUMRA 7, WAZSMR 9, WAZUMRA 11, WSZELB 10, WZSMM 9, WAZUMRA 7, WAZSMM 9, WAZUMRA 7, WAZSMR 9, WAZUMRA 11, WSZELB 10, WZSMM 9, WAZUMRA 7, WAZSMM 9, WAZUMRA 7, WAZSMM 9, WAZUMRA 7, WAZSMR 9, WAZUMRA 11, WAZSMB 11, WAZSMM 9, WAZUMRA 7, WAZSMR 9, WAZUMRA 11, WZSMBE 11, WZSMBE 11,

WZUYE 10, WAZSMM 9, WAZUAR 7.

WESTERN PENNSYLVANIA: SCM, Donald J. Myslewski, K3CHD — SEC: WA3VUP, Asst. SECs: K3SMB WA3LUW. PAM: K3SMB. VHF PAM: W3GQJ. RMs: K3AT W3NEM W3KUN. Net.kHz.Time/Days;WPA CW Traffic,3585.0,7:00 PM Dy;WPA Phone Traffic,3583.0,6:00 PM Dy;Pa. Traffic & Training,3610.0,6:30 PM Dy;WPA RACES,3990.5,9:00 AM Su. All appointments currently held by WPA Section members are endorsed and updated with League records. If you have not received an endorsemmt, it can be assumed that your appointment has been cancelled due to inactivity and no monthly reports. There are openings for ORS and OPS appointments. Washington Amateur Communications (WACOM) demonstrated an HF station and donated a set of ARRL publications to the Upper St. Clair Library. Crawford ARIS recently completed a Novice code and theory class. WB3INJ has upgraded to Extra Class; WB3CEL to General; WB3KNN WB3JZZ WB3KJH are new Novices. Indiana County ARC officers for 1978 are: WB3DUD, pres.; WB3EUQ, vice-pres.; W3FVU, secv-

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For both balanced and unbalanced output, Swan's new ST-1 and ST-2 Antenna Tuners put a reliable 50 Ohm source between your 160-10 meter transmitter... and virtually any type antenna system.

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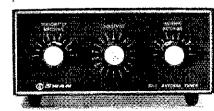
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ANTENNAS

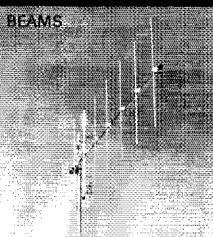
146-220-440 MHz



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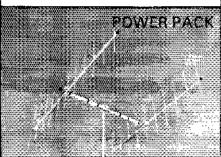
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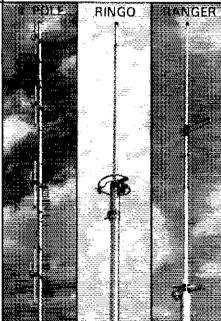
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treas. The Butler County Traffic Net had 26 sessions with 203 ONI and 34 QTC. The WPA (Pgh) 2-Meter Traffic Net had 29 sessions with 419 QNI and 144 QTC. The WPA Phone & Traffic Net had 29 sessions with 362 QNI and 141 QTC. The WPA CW Traffic Net had 31 sessions with 467 QNI and 345 QTC. PSHR: W3YQ 44. Traffic: N3FM 290, W3YQ 290, K3AT 285, W3EGJ 245, WB3HGL 178, K3CR 182, WB3DKT 107, WA3YEO 107, W3GQJ 105, W3RUL 96, WB3CDA 77, K3HCT 72, W3KUN 63, WB3EYH 49, K3SMB 48, K3CHD 41, WA3YKJ 39, WA3ONT 37, W3SN 31, WB3EQK 27, W3AS 24, K3YQV 18, WA3ZAO 12, W3IDO 11, W3ATQ 10, W3TTN 10.

CENTRAL DIVISION

CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Meztzger, W9PRN — Asst. SCM: Harry Studer, W9RYU., SEC: W9AES. PAM: WASKFK. RM: W9NJP. Cook County EC: W9HPG. Net, Freq., Time/Day, Ifc, Sess.; ILN, 3690, 2330/0300, 416, 62; III Phone, 3915, 2245 Dy, 326, 31; NCPN, 3915, 1200/1700 M-S, 363, 54; IEN, 3940, 1400 Su, 11, 4; Our sympathy to the families and many friends of W9WIC WA9MPG W9IBC W9RGL and K9UMV who have joined the ranks of Silent Keys. W9EWX is now recuperating at home from his serious Illiness. W5KLV reports that CAND handled 995 messages during its 62 sessions and that the 9RND was 98.4 per cent represented. K9MX has received his WAC certificate. W9PE was presented a new TR-7400A for Christmas. K9KH Is now W9YY. Willis Sutherland has fully recovered from his stroke of last year and is again active on the bands. WA9BHH W89ACG W89NUL and W9KPC were elected officers for the coming season of the Joliet Amateur Radio Society, W9PRN was the leatured speaker at the Dec. 21st meeting of MARK in Bruce. The Sterling Rock Falls Amateur Radio Society will hold their Hamfest Mar. 5 at the Sterling High School. The Peoria Area Amateur Radio Club is sponsoring a special fund to help in the law suit to declare the shelly 4 foot antenna ordinance unconstitutional. A new net on 50.55 MHz in the A.M. called the Round Table Net is beling tormed in Galesburg and surrounding area. WD9AFB advanced from Novice to Tech: W89YJE from Novice to Advanced and W89YJF from Novice to General L Advance is being formed in Galesburg and surrounding area. WD9AFB advanced from Novice to Tech: WB9/JE from Novice to Advanced now Novice to Advanced and WB9YJF from Novice to General to Advance and WB9YJF from Novice to General. K9UAA WB9PDG W9RSV WB9LW K9PAJ KB9YA K9RCN K9CQV K9GFY K9SEM WA9MED and WB9YOI are the newly elected officers of the Suburban Amateur Repeater Assn. WB9LFD and WB9SCD are now Advanced licenses. The new officers of the Starved Rock Radio Club are K9BK WD9ARO and W9QLZ. Their Hamfest will be June 4th at Princeton. K9KH is now W9YY and WB9POW is N9BI. The McLeansboro Amateur Radio Society which is a new radio club is sponsoring a repeater in their area and has been given IRC coordination for 147.90 in/147.30 out. Now is the time to plan to attend the Central Division Convention to be held in the Milwaukee area. Dates and events will be announced later. WB9NHV WB9OTP WB9EDZ and WB9UPA are the new officers of the Southern Illinois University Amateur Radio Club. Dr. Mike Hoshiko, W9CJW is the SIU sponsor of the club. WD9DOU now a Technician. K9EWB formerly of Greenville, and chief operator of K9BJV is now A6EE and active in the San Diego Section. Metro Amateur Radio Club's newly elected officers are W9CJ WB9UPA (W9IV) N9CF and W9FO, W9JIJ is the only BPL recipient for this month. Traffic: W9JIJ 1005, W9NXC 480, W9NTN 393, W9HCT 373, K9MX 303, K9DAC 281, WA9KFK 181, W9NK 171, WB9JSR 101. K9EEA 96, N9BT 91, N9MX 85, W9KR 80, W89YAS 66, W9N OG 52, W9OYL 36, WA9AON 34, W9HPC 29, W99ZED 18, W9PRN 18, WBSPHM 6, WBSUFY 6, W9PE 4.

WB9UFY 6, W9PE 4.

INDIANA: SCM, M. P. Hunter, W9LF — SEC: W9UMH. Lake Co. ARC Short Skip has taken on a new face—very professional looking. Accoring to the CAN bulletin, W9ULW has the distinction of the highest number of NCS for CAN at 882. Figure the total years of service at the rate of one per week. Several new rigs and accessories were reported to have been received from some fat gut in a red suit. WB9OTX reports he was interviewed on WRBI FM. Very good PR for ham radio. Congrats to W9UMH and K9LSB for their ECAC and VHF Repeater appointments. The Indy DXers were challenged by the No. Illinois DX Assn. for a little contest during the CQWW fracas and the Indy DXers promptly stomped them. W9OBF proudly announced this fact and is giving some thought to the PVARC. Net Tric ICN 47, QIN 501, TIN 685, INTN 169, IPON 4, Hoos VHF 77. Traffic; (Dec.) W9FC 518, WB9YXN 370, WB9PIR 344, W9OLW 312, W9SWA 312, W9EJ 258, W9LTU 226, WA9CCF 212, W9MR 204, W9ZW 173, W9HUF 159, WB9SQH 139, WB9HHP 93, WB9TOW 82, K9YBM 68, K9TKC 61, K9WWJ 59, K9ECT 47, WA9TUS 46, K9FG 43, WA9OHX 40, W9PMT 36, W9ENU 33, W9DLF 33, WB9DIX 26, W9BDF 12, K9CGS 12, W9RTH 11, W9CMT 10, K9RPZ 8, WB9HCH 7, WB9OTX 4, (Nov.) WB9RXV 6, WB9HCH 2.

WISCONSIN: SCM, Roy A, Pedersen, K9FHI — SEC:

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: WISCONSIN: WBAYK WBIEM KUTQ. RMs: WB9ICH K9KSA K9LGU W9SFL K9EN. Nets, Freq.; Time, QNI, QTC, Mgr.: BWN, 3985, M-Sa, 627, 563, W9AYK. BEN, 3985, 1800 Dy, 829, 215, W9IEM, WSBN, 3985, 230, W9AFL. WIN-L, 3662 Dy, 1304, 396, K9UTQ. WNN, 3725, 2315 Dy, 62, 0, WB9ICH. WIN-E, 3662, 0100 Dy, 358, 231, W9SFL. WIN-L, 3662 Dy, 138, 70, K9I-GU. WSSN, 3662, 2330 M-WF, 42, 7, K9KSA. WRN, 3662, 0400 Sa. 16, 8, K9EN. WI EX PO, 3925, 1801 M-F, 642, 75, WASNIX. WSBN certificate to WB9ULJ WASWYI WB9UKQ WB9ULD, BEN certificate to Georgia on 2 meters running 3 watts. WB9ZBS XYL of General. WD9CYV now on 2 meters. Don't forget WNA picnic July 9 at Oshkosh. K9RLP has extra. WBSCQP ow K9UU, WBSSVL passed General. Make plans for the ARES conference next tall, this is very informative. WB9TXE now N9TD. W9HWQ is putting up a repeater for RTTY only. WD9FWU XYL of K9EP has General. WD9HMM new Novice from Reedsburg. ARRL station convention in Lake Delton at the Dell View Resort May

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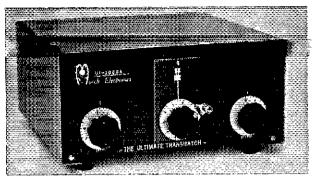


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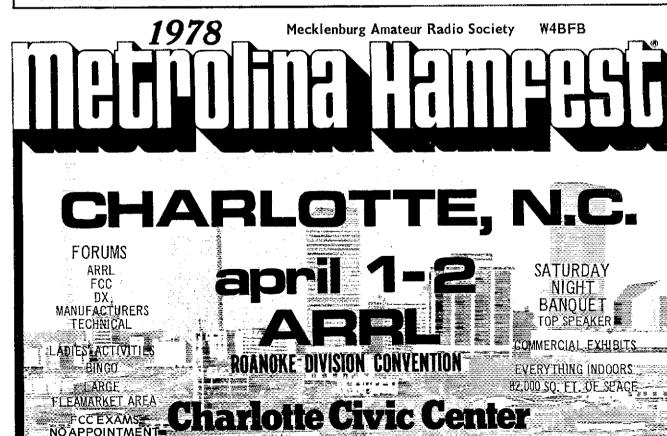
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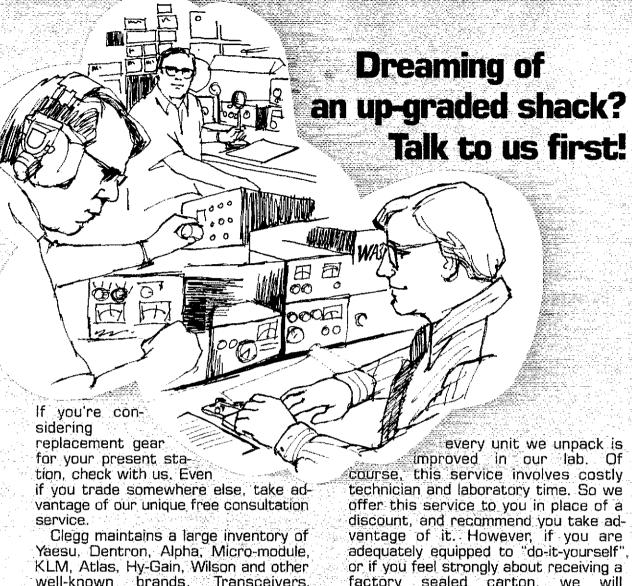
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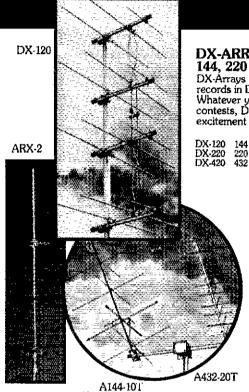
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20 1978. WB9NRK now a General as is WD9BCN. WB9O-OU has Advanced. WD9BFV has Tech. WD9HOX new Novice. WB9MHI is in West Indies. Net training on 3885 2nd and 4th Sun. of each month, 1700Z and 2200Z, respectively. Would appreciate your check-ins and contributions to this training. BPL to W9DND W9ZGQ. Traffic; (Dec.) w9ZGQ 746, W9DND 555, W9CXY 383, W9FSC, 282, WD9COC 271, W9IEM 205, WD9AUD 203, WB9KPX 882, K9FHI 111, K9LGU 71, W9IHW 69, W9NQ 67, WB9ICH 62, WB9UJJ 61, WB9YXV 81, K9UTQ 58, W9UW 56, K9AKG 63, WB9YJY 47, W9AYK 46, K9JPS 44, N9CP 43, WB9RRU 40, K9SAO 31, WB9BRE 30, K9KSA 30, K9RTB 28, WA9VYI 28, WB9MPF 28, W9YW 23, WB9YUH 22, WB9DHF 18, N9TD 18, K9ANV 15, WB9IDH 44, W9UT 12, WB9LKC 11, WB9ROD 9, WB9NRK 5, W9RTP 2 (Nov.) WDBDTM 34.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WB\$NOX — SEC: W\$SA. Net, Freq., Time/Day, QNI, QTC, Manager; MSN 1, 3885, 6:30 PM, 276, 219, N\$pOF; MSN 2, 3889, 10:15 PM, 398, 5:30 PM, 276, 219, N\$pOF; MSN 2, 3889, 10:15 PM, 398, 198, WB\$JYT; MSPN 1, 3945, 12:05 PM, 849, 198, WB\$JYT; MSPN 1, 3945, 12:05 PM, 849, 198, WB\$JYT; MSPN 1, 3945, 12:05 PM, 849, 198, WB\$JYT; MSPN 1, 3925, 5:45 PM, 626, 208, W\$pUW; PAW, 3925, 6:15 PM, 111, 77, WB\$PKG; We welcome to amateur ranks WD\$EFE WD\$EFF and WD\$EK. Congrats. Sincere sympathy is extended to WA\$ODF on the recent death of his mother. S.W. Minn. upgrades are: Gen. to Extra, WB\$QNX WB\$ROL. Novice to General WD\$EJG and Tech. to General, WD\$BJL WB\$BMM and WC\$CTY. Calls that were are now K2SLQI\$ is K2SVI\$; WB\$LSI is N\$DL, WB\$HKU is K\$BY and WB\$pOFO is N\$OF. Since the middle of Sept. WB\$USL went to WD\$ETM then to WD\$FJZ now and finally K\$TS. Recent appointments: WB\$UIP and WB\$ZAL are CRSs, WA\$OIT as OPS. WB\$UID during the time I was off the air because of my sick rig. WA\$pologies to WD\$BXD on his call not being correct twice, since rectified. Please note change of the MSPN E. Traffic: N\$OF 532, WA\$QIT 258, WB\$JYT 219, N\$HY 203, WA\$VYT 189, WB\$POX 132, WB\$RU 113, K\$PIZ 108, WB\$POX 118, K\$PIX 118, K\$PIX 129, WB\$PUX 187, WB\$PIX 118, K\$PIX 129, WB\$PUX 131, WB\$PIX 141, WB\$PIX 129, WB\$PUX 131, K\$PIX 130, WB\$PUX 118, K\$PIX 130, WB\$PUX 131, K\$PIX

WBBONK 4, KBIK 4, WGUMX 4, WBBURJ 4, WABEZQ 3.

NORTH DAKOTA: SCM, Mark J, Worcester, WABWIP—

W\$DM had a fail, is in the hospital but doing well.

WA\$CRH received his Advanced. WA\$CRH also made mention of a possible Repeater by Carrington. New Bark Club Officera: WBBYIB, pres; W\$CZR, V.P.; W\$CTU, secv-treas. New hams in Mandan, WTFG and XYL WATV-QJ. WB\$SJG suffered heart attack, is back at work and Bark had ARES Net on Dec. 2 and 27 to prepare for SET on WP\$ACJ. Both Bis. and Minot had annual parties on oril. Jan. 13. Minots Novice classes began Jan. 12. WD\$FUY new Novice at Minot. WB\$WIG and WB\$YDA injured in a toboggan accident. WB\$LFK broke his ankle while working on antennas. Net controls are needed for the DATa Net, contact WB\$WSQ. Nets, kHz, CST/Days, Sess., CNI, QTC, Mgr; DATs, 3996.5, 1703 C-S, 1800 M-F, 44, 427, 255, WB\$WSQ; YL Wth, 3996.5, 1703 C-S, 31, 808, 855, WA\$RWM; Emergency YL Wth Dec. 73998.5, 1, 54, 19; Goose River, 1990, 0900 Su, 4, 35, 2, W\$CDD; Traftic: WA\$RWM 760, WA\$SUF 85, W\$W\$CD 91, WA\$CRH 89, WB\$WSQ 86, WA\$SUF 85, W\$W\$VSD — The SD

WBØWSQ 86, WAØSUF 85, WØWWL 31, WAØJFT 11.
SOUTH DAKOTA: SCM, Ed Gray, WØSD — The SD Hamfest is scheduled July 1 and 2 at the Surbeck Center, School of Mines, Rapid City. Rapid City area activities reported are WBØADM upgrading to Advanced, John Larribeau. Tech. WAØVPY has an excellent vertical up and is on HF. KØCX has WAC award. WBØMWJ awarded 5BWAS No. 317 which is the second one ever earned by a SD amateur. WAØARS WDØCMF and KØSD all have new TH6DXX beams up. The Hub City ARC of Aberdeen permitted local hospitalized youngsters to talk with Santa via 2 meters. KØRVD and Lee retired and are back in SD living at Lennox. Lincoln Co. amateurs help Ed with antenna work. They also held a Christmas party at WØBLZ. WBØTUK recently upgraded to extra. WØVP recently finished a 432 transverter and has a TS-700 for Oscar operation. WAØLYO is the Signal Hill TS-700 for Oscar operation. WAØLYO is the Signal Hill TS-700 for Oscar operation. WAØLYO is the Signal Hill TS-700 for Oscar operation. WAØLYO is the Signal Hill TS-700 for Oscar operation. WAØLYO is the Signal Hill TS-700 for Oscar operation. WAØLYO is the Signal Hill TS-700 for Oscar operation. WAØLYO is the Signal Hill TS-700 for Oscar operation. WAØLYO is the Signal Hill TS-700 for Oscar operation. WAØLYO is the Signal Hill TS-700 for Oscar operation. WAØLYO is the Signal Hill TS-700 for Oscar operation. WAØLYO is the Signal Hill TS-700 for Oscar operation.

DELTA DIVISION

ARKANSAS: SCM, S. M., Pokorny, WSUAU — SEC: WASVNV. PAMS: W5POH WASZWZ K5MEA. RM: W5MYZ. Nets, kHz, Time/Day, QNI, QTC, Mgr. ARN, 3995, 0030 Dy, 923, 27, W5MYZ. K5MEA. QZK, 3760, 0100 Dy, 192, 27, APN, 3937, 1200 M-S. 900, 65, W5POH. M-Bird, 3928, 2230 M-F. 701, 36, WA5ZWZ. Regret to report W5GTN as Silent Key, our sympathy to his family. Craighead Co. Emer. WX Net QNI 91, QTC 10, WB5QOR. Jonesboro ARC officers, WB5AXX, pres.; WA5ZWJ, vice-pres.; WA5SLQ, secy. Welcome new Ark. hams: W5E-pres.; WA5SLQ, secy. W6E-pres.; WA5SLQ, 200, W6E-pres.; WA5HNN 49, W5E-POH 39, W5EWWA 22. OBS; W5MEA 12, W5E-W4. 2. WA5HNN made BPL with 559. Traffic: WA5HNN 559, WB5NBC 60, K5MEA 58, W5BPL 42, W5EIJ 29, W5POH 29, W5LNI 20, W5EL 19, W5KL 16, W6EWWA 13, W6EGWU 9, WB5GQH 5.

LOUISIANA: SCM. Robert P. Schmidt, W5GHP — Asst.

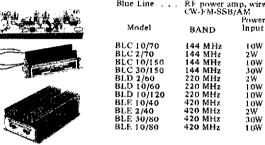
LOUISIANA: SCM, Robert P. Schmidt, W5GHP — Asst. SCM: John Meyer, N5JM. RM: N5TS. PAM: K5TL VHF PAM: W5VBX. WB5NEZ now K5TL. Tom also reports that LTN is continuing its growth with 452 QNI in Dec. Regret to report the passing of WA5MHV. License up grades in the LaFayette area are WD5GWM to Extra, WD5DBU and WB5UTM to General. WB5TPG and WB5TPH report 10

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THE WORLD'S MOST COMDUE

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RX28C W/T. RX50C Kit. RX50C W/T. RX144C Kit. RX114C W/T. RX220C Kit.	MHz crystal filter 64, same as above—wired & tested 117. 140-170 MHz crystal filter 74, same as above—wired & tested 119. 210-240 MHz rcvr w/2 pole 10.7 MHz crystal filter 74, same as above—wired & tested 117. same as above—wired & tested 117.	95 95 95 95 95 95 95 95	RXCF accessory filter for above receiver kits gives 70 dB adjacent channel rejection). } }
RX432C W/T FX50 W/T . TX144B Kit . TX144B W/T TX220B Kit .	transmitter exciter, I watt, 6 mtr. 44. same as above—wired & tested . 64. transmitter exciter - I watt-2 mtrs 34. same as above—wired & tested . 54. same as above—wired & tested . 54.	TRANSMITTERS	TX220B W/T same as above—wired & tested 59.95	
PA2501H Kit	. 2 mtr power amp—kit 1w in –25w out with solid state switching.	POWER AMPLIFIERS	Blue Line Rf power amp, wired & tested, emission-	

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	except 10w and 432 MHz	54.95
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11.11.0/30 11/1	Sou int-140m out-2 intl this,	107.73



15 amp-12 volt regulated power sup-ply w/case, w/fold-back current limit-ing and overvoltage protection. 94.95 same as above-wired & tested. 124.95 25 amp-12 volt regulated power sup-ply w/case, w/fold-back current limit-ing and ovp, with meter . 154.95 same as above-wired & tested. 179.95 PS15C Kit . . . PS25M Kit. PS 25M W/T. .



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RPT50 Kit	repeater-6 meter	499.95
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RPT432 Kit		499.95
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	wired and tuned to frequency. , ,	379 99
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	20w out, 10 channel scan with case
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TR X220 Kit .	same as above except for 220 MHz 234,95
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PRC-1	transceiver case only 29,95
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2 mtr synthesizer, transmit offsets programmable from 100 KHz-10MHz, (Mars offsets with optional

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students in their current class, W5MD reports that the "Long-Wire" group still meets on Sat. mornings on 1980 kHz (160 meters). This group, although not a formal net, has been meeting for over ten years. All who can work this band are encouraged to check in. The Baton Rouge Club reports a very weil attended Christmas meeting. BPL: WBSLBR NSTS and NSYL DRN-5 Mgr. reports W5YZL NSTA K5TTC WASTQA NSYL K5TL and W5GKV all active on DRN-5. Also K5TTC and NSYL very active on Daylight CAN. N5DP reports inactivity due to TVI problem. N5JM reports good activity on 2-meter SSB, SDPG again active on LAN. NET, Freq. Time/Days, QTC, QNI, Mgr.; LAN, 3915, 7 å 10 Dy, 405, 480, NSTS;LTN, 3910, 830 PM Dy, 181, 452, K5TL; LSN, 3703, 8:30 PM M-F, 25, 71, WB5OOM; LRN, 3587-5, 6:30 W-S, 2, 12, NSRB; Traftic: NSYL 741, W5GHP 623, N5TS 512, KM5TQU 272, K5MC 242, WBSLBR 241, N5RB 145, N5ES 130, WB5OOM 97, K5TL 87, N5DP 28, W5YN 12, WBSIKT 6.

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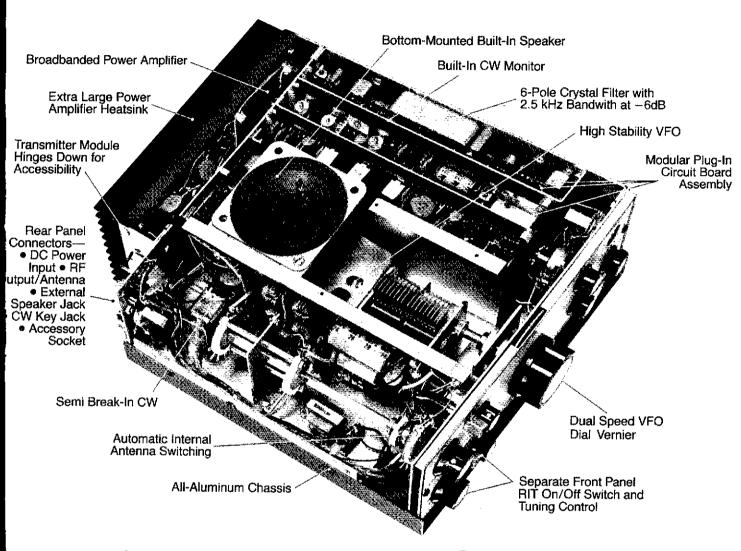
8, W5LL 5, K5VXV 5.

TENNESSEE: SCM, O. D. Keaton, WA4GLS — Net, Freq., Time(Z)Days, ONI, QTC: Manager: TPN, 3:980, 1140 M-F, 1245 M-F, 10000 M-S, 1499 SSUH,4717, 356, WA4EWW, WAPFP, WB4YPO; TN, 3:635, 0100 Dy, 257, 113, K4YFC;ETVHFN, 50:4, 0200 MWF, 103, 12, WA4WZJ; E1-YHFN, 145.2, 0200 Th, 82, 0, W84DZG; MTTMN, 28.8, 0200 TTh, 84, 0, W4EAY; WTVHFN, 146.37, 146.970300 Dy, 838, 477, WA4WX; MSVHFN, 146.34, 146.94, 0300 Th, 212, 14, WA4WHO; WMAHCN, 146.07, 146.67, 0100 WFS, 96. 0, W4TZG; QC2MSSBN, 145.1, 0200 F, W4XW; 1979N, 146.19, 145.79, 0100 F, K4QZF; The NARC graduated 9 Novice students and are now conducting a General class of seven. W84JGL and W84TPN have received Certificates of Merit for their very able assistance in a I-65 accident. Many thanks to the Ilaison stations WA4FMR WA4NIF and W84YUTK for their work in monitoring the Ark. Net, Miss. Net and La. Net for weather conditions and reporting to the IPN. Please refer to the ARRL restructuring of the field appointments on page 89 Jan. QST and contact me if you can serve in any capacity. Due to my being away at last reporting the traffic report is for the months of Nov. a Dec. 1977. Traffic: (Dec.) WA4CNY 532, (Nov. & Dec.) WA4CNY 798, K4CNY 352, WAZJY 248, WA4NIF 158, W84SRF 139, WB4PRF 137, K4WWQ 130, K4YFC 127, WA4VX 119, WA4DKC 113, W4PPP 102, K4BKC 83, N4UC 18, K8VOAJ4 17, WB4BKG 137, W4WJW 27, K4FSR 23, N4UC 18, K8VOAJ4 17, WB4BKG 17, WA4DSA 16, WB4WHE 4, W4SGI 4

GREAT LAKES DIVISION

KENTUCKY: SCM, Ted Huddle, WACID — SEC; WB4ZML. NET, GNI, QTC; KRN, 358, 35, MKPN, 1020, 170; KTN, 1338, 199; KPON, 76, 37; KNTN, 373, 214; KYN, 311, 188; CARN, 522, 9; 6DAREC, 87, 8; The Lexington Plug Horse Net going very well. Check in on 28.6 at 1900 EST. New Novices in Frankfort are WD4s JJM EJO HXE JBG and JDC. WB4NPD has been assisting RM WA4IGS WITH KSN management. QNI this net on 3600 at 0100Z if you want to bone up on your procedures. Congrats to WA4IGS and WB4IKF awarded "Hams of Year" by the KY Colonel ARS. Twenty five Owensboro ARES members recently provided search communications for alight plane crash. Send me your Hamitest Dates soon if you want them listed in this column by early spring. Traffic: W4RHZ 341, W4BAZ 271, WA4AVV 118, K4TU, SWA4JAV 84, WA4IGS 83, W4IQZ 74, WB4NPD 65, WB4AUN 52, N4GD 52, WACID 52, WA4JTE 45, WD4CQF 41, K4HOE 39I, W4DCA 29, WD4ITJ 25, WB4EAK 22, WA4AGH 22, WA4KKV 16, WA4FET 13, WA4FAF 11, K4JMN 10, WA4NOH 7, WD4LCX 5. WA4YTQ 4, WA4ROI 2.

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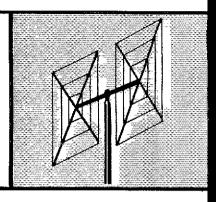
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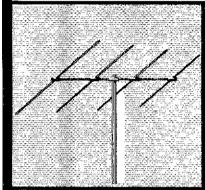
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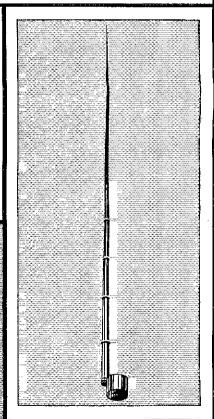
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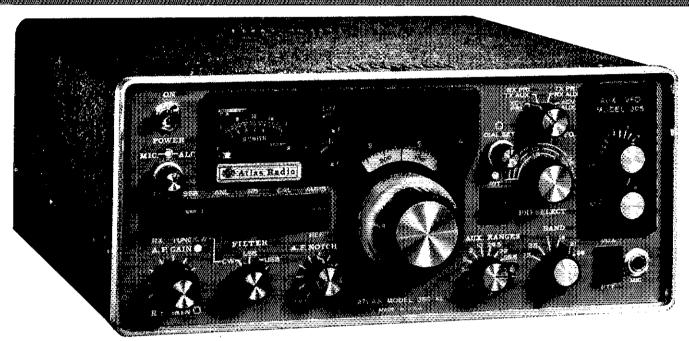
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Quite frankly, YOU USUALLY GET <u>WHAT</u> YOU PAY FOR — NO MORE! And, when PRICE is your only consideration, you may even get LESS!

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HAM RADIO equipment is complex in both nature and design. And, whether it carries a foreign or domestic label, it is <u>NOT</u> produced for a song. So, when you think about it, no matter how "LITTLE" you pay, you're still making a <u>sizeable investment</u> of your hard-earned dollars in a "HOBBY!" And, you EXPECT a certain amount of thrills, enjoyment and SATISFACTION in return — <u>NOT</u> grief, worry and hassles!

LET'S FACE IT! We COULD just as reasily offer liberal discounts or cash-and-carry incentives in order to attract more customers. BUT... if there's one lesson we've learned in our 40-PLUS YEARS of serving the nation's ham operators ... it's that THERE IS NO SUBSTITUTE FOR "GOOD" S-E-R-V-I-C-E! Long after the price you pay has been forgotten, WHAT really sticks in your mind is the kind of S-E-R-V-I-C-E you got — both BEFORE and AFTER the sale.

Therefore, our prices on new and used gear are "down-to-earth" in the sense that they FAIRLY reflect the "REALISTIC" VALUE of the merchandise — WHEN you take into account that WE STAND FIRMLY BEHIND WHAT WE SELL! And, we make every reasonable effort to insure your FULL and COMPLETE SATISFACTION with every purchase. S-E-R-V-I-C-E is not a problem with us — IT'S OUR POLICY!

Furthermore, you'll find our ATTITUDE in serving you MORE than REFRESHING. We don't follow the "Hard-Sell" approach and, in fact, we will lean over backwards <u>NOT</u> to sell you a particular item when we feel it's not <u>RIGHT FOR YOU!</u> And, we're <u>MORE</u> than happy to offer whatever practical or technical advice you need in setting up or operating your station.

Finally, 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 their undivided attention — NOT put you on "HOLD!"

In conclusion, HAM RADIO is our ONLY business. And, as such, we don't pretend to be "Big Operators" or "Wheeler-Dealers" but choose instead to offer FRIENDSHIP and PERSONAL S-E-R-V-I-C-E plus RELIABILITY to those who realize that there is <u>MORE</u> to a "GOOD <u>DEAL" than</u> just the lowest price available. In the final analysis, the true VALUE of the PRODUCT you select and your ultimate SATISFACTION with it depend on the REPUTATION of the DEALER standing behind it!

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Think about it. Ask the guy who's built a 101, then make your move to join the thousands of Amateurs who have turned to Heath for outstanding value, quality, and unparalleled performance. The HW-101—it's a transceiver you can grow with and a pretty impressive answer to getting on the air....without it costing an arm and a leg!

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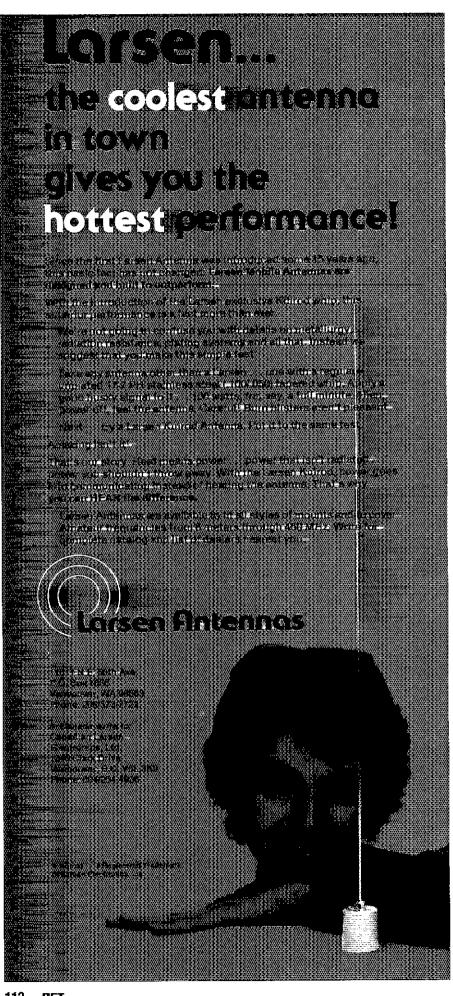
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EC Barry Co., KBAXL KBUPE WB8ZYC, OPSs, WB8MTD W8AP, ORSs. W8TBP completes 45 years of "many hapy hours of handling traffic" and he has been an ARRL member since 1924. The newest affilitated club, The Federal Brass Pounders ARC of Warren, Pres. WUBNIK reports the club is in process of requesting permission to operate a station from army missile plant. Amateur radio club classes are producing a large number of new operators this winter which is great! Upgrades: WD8IAF Tech, WD8LAT WDBMGG WD8MGK WD8MGJ and WD8NIK General Class. Congratulations! I am sorry to report the following Silent Keys: W8AGE W3APG and WB8INIK General Class. Congratulations! I am sorry to report the following Silent Keys: W8AGE W3APG and WB1G who was W8OCT. More call changes: WB8BY8 to K8FE, WD8DUJ to K8DQ, WB8PFO to K8GB, WB8UFU to K8DC, WASCZH to N8UM (also Ann Arbor!) WB8DMC to K8FC and WB8VFB to K8KC. SEMARA has ordered a new Spectrum SCR-1000 and will soon use it to serve the Mt. Clemens area. The Michigan Area Repeater Council will hold elections at the Muskegon Convention has peen changed to Apr. 8. Election results: Motor City Radio Club: K8GB, pres.; WA8LSS, vice-pres.; K8SIA, secy; WB8RNY, treas. SEMARA Bd of Dir. K8IEC WDB. JFS WD8JXQ WD8KUR WD8KXN and WB8VCT. W8BJZ is back on two meters after being off the air to ralmost 15 years! Top affiliated club 1977 Field Day scores for Mt. 2A South Lyon Area ARC, 3A Cherryland ARC, 4A 'Anse Creuse ARC, 8A Midland ARC, 9A Saginaw Valley ARA. Traffic: (Dec.) W8PW 442, K8LNE 252, K8FE 202, K8RV 194, WB8MTD 183, WB8ITT 158, WB8POL 151, W8SDY 199, K8WRJ 113, W8YIQ 110, WA8DHB 104, K8DYI 99, WA8TBL 79, WBSDY 199, K8WRJ 113, W8YIQ 110, WA8DHB 104, WBSCY 21, WBSDMX 17, WBCUP 18, WBSYIG 16, WD8CSA 14, WBSJIX 14, WBSAPN 13, WBSAYC 12, WBLYD 13, WBSCY 12, WBLYD 13, WBSCY 12, WBLYD 13, WBSCY 12, WBLYD 13, WBSCY 12, WBLYD 14, WBSAPN 13, WBSAYC 12, WBLYD 13, WBSCY 14, WBSAPN 13, WBSAYC 12, WBLYD 14, WBSAPN 13, WBSAYC 12, WBLYD 14, WBSAPN 13, WBSAYC 12, WBLYD 14, WBSAYD 15, WASCYC 12, WBLYD 14, WBSAYD 14

WDBNYN 16, K8AXL 13, WABMAM 11,WBBUUJ 8. (Oct. KBAXL 14.

OHIO: SCM, Hank Greeb, W8CHT/N8XX — Asst. Scm WABMCR. SEC: K8AN. RMs: WBBJGW WBBKKI W8TF WBBWTS: PAMS: W3DIL W8FU WABSSI, Net reports 11, 123, 200; 06MN, 50.16, 0200, 31, 355, 110; 0NN, 3,708 2330, 28, 95, 28; OSN, 3,577, 2345/0300, 59, 601, 337 OSSBN, 3,9725, 1530/2100/2345, 93, 3133, 1581; Ohic Council of Amateur Radio Clubs meets March 11. Con act WBBVLR for details. BPL made by WABMCF W8PMJ WBBVLR for details. BPL made by WABMCF W8PMJ WBBKWD & WB8WTS.Hamilton County ARES had 50 members assisting lost child hunt in Alexandria KY. OSN certificates issued to WDBCOS W8GGX N8JF WDBKDR WDBLIU WB8YBJ WABZNC. Fulton Co. ARES Net sess. 4, QNI 32, QTC 1. Code/theory classes an beginning in Cincinnati, Greenville, Dayton, and elsewhere. W8IM received DXCC award. W8LT par ticipated in 160-Meter Contest and lost kytoon antenna WBDYF received TR-33C, T4X & H4C for Christmas WDBMGP is new General Class. WB8VCR & WDBLLO Advanced; WDBBVQ, WDBARK, WDBLLR, General/Advanced class. New ECs are WB8TRK Guernsey-Nobel Counties; WABEHF, Muskingum Morgan; K8ZES, Crawford. BRTN (Cleveland) QNI 181 QTC 65 in 30 sess. TSRAC (Belmont Co.) QNI 372, QTG 11 in 16 sess. Traffic: WABMCR 782, WBPMJ 55 WBBKWD 631, WBSWTS 526, W8IQ 414, WA8HGH 34 WB8YVI 347, WBSKKI 249, KBPR 238, WBENJ 367, WBBMYZ 347, WBSWKS 526, W8IQ 414, WA8HGH 364 WBBYVI 347, WBSKKI 249, KBPR 238, WBENJ 361, WBBWYZ 347, WBBWX 348, WBSCP 77, WBBBCD 78, NSIM 78, WBBWZ 37, WBBWZ 38, WBSCI 38, WBSCI 37, WBBWZ 31, WBSCI 37, WB

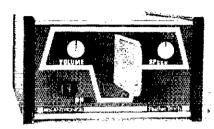
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EASTERN NEW YORK: SCM, Guy L. Olinger, K2AV —
SEC: WB2VUK, Asst. SEC: K2AYO, RMs: W2CS K2OYO
W2WSS WB2IXW. PAMS: N2YL WB2QEI. Apologies to
all who wondered what happened to your cor
respondence in Dec. Please accept work as lame ex
cuse. Santa brought WA2MKQ a 15700S & WB2COY
HAL DS300KSR. (Santa's rich). A mob of new license:
a upgrades — congrats to all. To Extra: WA2YYM WA2
JPS, K2TTG now K2UF. To Advanced: K2GBH, WA2
JPS, K2TTG now K2UF. To Advanced: K2GBH, WA2
JPS, K2TTG now K2UF. To Advanced: K2GBH, WA2
JPS NZTTG NEWS2 GOJ JHW JPF YAZ KNN. T
General: WA2's BSS JQK KCL KMY TJE LUD LUV; WB2
JQB ROM AXF. To Tech: WA2's JKV LHN; WB2TTU. T
Novice: WB2S TSF TJE TUZ TYU. Most of the above fron
Pnughkeepsie & Albany courses. PARC received Na
tional Certificate of Merit for FD publicity. New ARAR of
ficers: W2UU WB2PUH WA2WNJ WB2COK WA2WNI
WZM WB2BDX W2GFP. WB2AIH broke sending arm —
now sending with the other hand. That's QLH. New
App'tees: W2WSS RM, WA2SPL ORS, WA2EQW OPS
Traftic at usual Dec. peak. Congrats for first BPL te
WA2SPL & WA2EQW. PSHR: N2YL WA2SPL W2CS
Reports not above: W2DW WA2PAU WB2COY W2CO.
K2SHB. Traffic: (Dec.) WA2SPL 930, W2CS 546, N2Y

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Mobile 2 Antenna

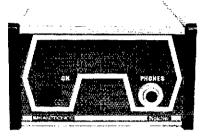


The Kantronics Mobile 2 Antenna offers a reasonable alternative to the high priced VHF antenna! The Mobile 2 is a high-quality, quarterwavelength antenna that is quickly

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All these features . . . for a low, low price!

Trunk Mount



Notcher CW Filter \$34.95

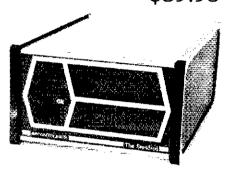
Make your CW receiver selectivity razor sharp with the Kantronics Notcher Audio CW Filter. This filter makes sense out of the biggest pileups! The Notcher funnels down to 150 Hz @ -3dB to separate signals that appeared to be on top of each other before.

Your Notcher will operate portable with a 9 volt internal battery, or from your 5-15 volt DC power supply.

Designed to look sharp too, the Notcher is one in a growing family of Kantronics quality products. Our quality is more than skin deep. One look inside will tell you the Notcher is built to perform!

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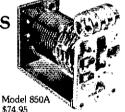
You may substitute Johnson style 154-507 and 154-10 capacitors (Model TJS) for the same



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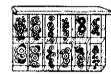
Model 851 \$55,00 500 W, CW/SSB, 2500 VDC 250 MA, 7"x3"x34" (LWH), Single tabe 4-125A, 4-250A, 4-400A, 813. Parallel (2 or 4 tubes) shunt fed 807. 837, 6146, 811, 6DQ5.

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MBZKHK 9, WB2GOJ 7, K2DN 2, K2DW 2, WA2MKQ 2 (Nov.) WA2OTC 18.

NEW YORK CITY-LONG ISLAND: SCM. John Smale K2IZ — SEC: K2HTX. PAM: WA2ECO. RM: WB2IDP. The following are major AREC/RACES Nets, join one, please Bronx 28.64 MHz, 50.35 MHz, 146.88 fm. Kings: 28.56 MHz, 50.35 MHz, 146.88 fm. New York 28.5 MHz, 146.88 fm. New York 28.5 MHz, 146.88 fm. Richmond 146.88 fm. New York 28.5 MHz, 146.88 fm. Queens 29.5 MHz, 50.52 MHz 145.62 am/fm., Nassau: 28.72 MHz, 145.68 am. Suifoli (west): Hunt.: 28.73 MHz, 145.59 am. Smithtown: 28.85 MHz, 147.21 fm. Babyton: 21.430 MHz, 146.085/885 fm Hsilip: 28.65 MHz, Suifolk (east) 146.82 fm. Brookhaven 18/76 fm. Riverhead: 3730 kHz cw. Note: net times bet ween 2000 and 2100 local on Mon. Just in case nobody has checked the heading on the column yet, WB2CHY is now K2IZ, also, WA2HWD is now N2DO and I tinik it will be some time before the comments about IZ and DC subside. WB2IDP is the new RM for the section, please give him all the help and assistance that you gave to WB2LZN. Welcome to new YL Novice in the NYC area WB2TWU. New officers for American Red Cross ERC are WA2AHF, pres.; WA2CNU, dir., and they are setting up their station at a new location, and should be back of the air soon. W2GKZ reports his new ant. system working just fine. Congrats to WB2JAY who passed his following change for the town of Babylon ARES, the Sabylon-Isip AAES. Net Is now on 21.430 and WB2PRI is the NCS, and they meet at 1930 local. Now is the time to start making plans to attend the 1978 HARC Convention, it will be held at the Playboy Club in Great Gourge NJ in Nov. Congrats to WA2YEI who passed the test to his 2nd class "fone" license, he also reports working a W7 on a 5 watt C.B. radio he converted for 10-mete operation. WB2FHN is back from FL, he attended the persecution of the Shelter Island RC who upgraded: WA2YEC wa2HNF WB2FQU to Tech. Officers for Radio Central ARC are K2GMF pres.; WB2AIL, vice-pres.; W2ECD, recey; K2RPZ, corsey; WA2NOD, treas. N2CY made it from Novice to Extra in 8 mos. ESS mgr

W2HAI 65, K2TV 8, W8ZY 8, W2DBQ 20, WAZYE
14, N2LI 10, K2TV 9, W2XY 8, W8ZFJX 1, (Nov.) W2GK;
84, W2HXT 59.

NORTHERN NEW JERSEY: SCM, Gob Neukomm
WAZMVQ — Net, Mgr, Freq., Time, Days, Sess., CNI
QSP; NJN, W2ZEP, 3695, 7:00 P, Dy, 31, 329, 84;NJN
W2ZEP, 3695, 10:00 P, Dy, 31, 128, 27; NJSN, N2MW
7303, 8:15 P, Dy; NJPN, W8ZLCC, 3950, 6:00 P, Dy, 31
8:10, 475; NJPN, W8ZLCC, 3950, 6:00 P, Dy, 31
8:10, 475; NJPN, W8ZLCC, 3950, 9:00 A, Su, 4, 39, 12;N
JRTTY, W2PSU, 147-51, 7:00 P, Dy, 223, 34/224, 94, 8:00 P
Dy; PVTN, WAZOPY, 145-7, 8:00 P, Dy; 550 Club o
Oakland elections: K2BJG, pres.; W8ZARS, vice-pres.
WAZUPK, secy.; K2DEG, treas.; Fairlawn ARC W8ZRLO
W8ZOPG, pres; WAZWYW, vice-pres.; WAZOFI, secy.
W8ZEGT, treas; W8ZUVU, act. W8ZTLZ new Novice
with FT-101B. Following are now Advanced WAZIMS
WAZKPU and W8ZPD, WAZFBP now K2JU, W8ZLP
now N2WM. K2JU has a new Linear. W2RD has DXCC
QRPP and is also a Little League tootball coach. K2ET
and WA2MVQ teaching Novice and General courses a
Ridgewood Adult School. WAZMVQ graduated 2.
students in the General course just concluded. N2SI
W2PA and W8ZELF home from college over holiday
and active in nets. Next Novice class at Wayne Adul
starts Mar. 7th. K2AM started a Novice class in Jan
KZTJ active on D8ARC Net. Two new amateur Extra
Class are WA2VUN and W82LPX. N2ZM had an interesting experience working K2ZM W2ZM and K1ZA
within minutes of one another. W2RQ was active on 16i
and 10 test. N2GJ had a score of 209K on 10-meter Test
Class are WA2VUN and W82LPX. N2ZM had an interesting experience working K2ZM W2ZM and K1ZA
within minutes of one another. W2RQ was active on 16i
and 10 test. N2GJ had a score of 209K on 10-meter Test
Class are WA2VUN and was active on 16i
and 10 test. N2GJ had a score of 209K on 10-meter Test
Class are was a server of 209K on 10-meter Test
Class are was completed and mar. In Spain and Portuge
Observing Ham activity there. Ice storm Dec. 19 1coClass are Wa2VUN and the Advanced
Advanced and earned WAC. WA3
was a new tower and beam and upgraded to Ad

MIDWEST DIVISION

IOWA: Max R. Otto, W@LFF — SEC: WØIYW, RM: KØEVH PAM/HF: KØLKH. PAM/HF: WBØAVW. Cedar Valler ARC Gen/Tech class has 23 pupils with WØNTH WBØVVZ and NØII as instructors. WAØDVN now WØSYO Minneapolis. New rig dept: WBØEG WBØSFZ and WØSDV all have F1221R. WBØYRQ has F1101EE WBØYMV and WBØYMX will share a TR-7400A. KØIIR has Ciegg FM-DX. WØIO a TS-820. IMA Radio Club at Bloom ington and the Siouxland ARC are now duly affillated societies. Congrats Dept: WDØFBA, WBØVMX and WBØVMV new Techs. WBØYUI Dew General and has 13 countries already. WBØJEU new Extra Class, WBØSE has 140 worked and 101 confirmed for DXCC, New low City ARC officers: WBØVNG pres. WØZVU, weep. WAØDXZ, secy-treas. WBØOLJ is now KØZQ and WAØODH is KØEK and not WAØODB as previousli

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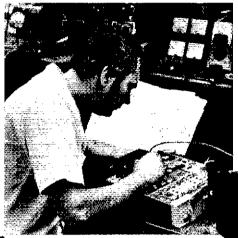
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Now that the possibility of class E CB use of 220 MHz has been dropped, this wide open, uncluttered band is available for amateur use. And Lunar brings you an inexpensive way to get on

LUNAR T-220-28 220 MHz TRANSVERTER

Receives 220 MHz and converts it to 28 MHz 2 dB nominal NF. Converts your 1 to 5 mW 28 MHz SSB/CW to 220 MHz at 10 watts.

Modularized construction for increased system flexibility and easy trouble shooting. Local oscillator output clean to below -50 dB. All harmonious and spurious signals on transmit in excess of -60 dB. Selectable 28 to 220 or 222.

External attenuators to decrease your transmitter output to appropriate level are available as accessories. Other IF's will be available soon.

Get ready now for the ARRL's June and September VHF contest, and the new UHF contest (220 MHz and up, only) in

Lunar Transverter models available for other VHF bands. See your dealer or write for complete information.

LUNAR'S HIGH POWERED Model 1.3M10-70P LINEARIZED AMPLIFIER

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Henry Radio, 931 N. Euclid, Anaheim. UA 92801 - Ham Radio Outlet, 999 Howard Ave.. Burlingame, CA 94010 - Ham Radio Outlet, 13754 Victory Blvd., Van Novs, CA 91401 - John Allen, RFD 1. Bowling Green, MO 63334

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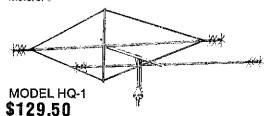




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Stated. WØIKT moved to Delaware with NCR. WAØAUX WBØPYD and WØTGQ gave lowa 100 percent on DTRN. EC WBØQCD looking for Cedar County amateurs. WØIYW wants nominees for OES from all ECS. Note: 1,75M, 3970, 1830Z MS. KØJVO Mgr., QNI 1841, QTC 235, Sess. 27. 2330Z KØRN Mgr., QNI 157, QTC 106, Sess. 27. Tall Corn (TLCN), 3560. Dy 0030/0400Z, WØYLS Mgr., QNI 365, QTC 176 sess. 60. lowa Code (ICN), 3713, 0045 T.Ts. WBØNRNWBØYRH Mgrs., QNI 44, QTC 4, Sess. 11. Tratic: WAØAUX 864, WØSS 288, KØEVH 203, WØYLS 178, WBØPND 183, NSYKWØ 183, WØECZA 29. WØURJ 77, WØJPJ 67, WØLJW 49, WBØNSS 42, WØLFF 26, WBØAVW 18, KØJGI 12, WØBW 7, WØIKT 6, KØDBW 5.

KANSAS: SCM, Robt. Summers, KØBXF, — SFC: WØKLThe first Hamfest of the new year for KS is at Pratt, to be held Mar. 11 at the KS Nat'l. Guard Armory im noon til midnight or there abouts. Registration includes a chance to sit down to a chili or soup dinner. Contact KØEZ (WBØHBM) for more details. Several clubs are rolding weekly and monthly cotiee type meetings in addition to the regular monthly club meetings. Please drop the SCM a note, telling of the regular and additional meeting dates, time and places of the meetings, for a listing at a near future date in this column. A fellow ham just might be interested and is likely to drop by if the into is known. The Kansas Amateur Repeater Council, formed at the Division convention at Wichtia last Oct., now publishing a quarterly bulletin to those who are formed at the Division convention at Wichita lest Oct., now publishing a quarterly bulletin to those who are members of the KARC. The council need the support of every group to pursue the goals of continued Amateur Cooperation and self regulation. Those repeater clubs just now being aware of the existence of the council may contact WBØITA, secy-treas, at 5024 Halsey, Shawnee kansas 66216, or WØBT, pres.: KØSWU, vice-pres. or WAØEDA, freq. coordinator KS. Traffic: WØRFF 418, WØAM 296, WØOYH 281, WØHI 271, WBØIZBR 191, KØLDJ 142, WBØVA 99, KØBXF 91, WØFT 89, WAØLBB 82, WBØKDE 75, WØFIR 73, WDØEDS 25, WBØKAK 48, WBØHGG 46, WBØLUN 38, WBØOOX 35, WBØBLI 35, WBØSZS 34, WAØUXI 34, WØERO 23, NØN 21, WØPB 20, WBØVIH 19, WØOOA 12, WØNYG 8, WØRBO 8, WAØSEV 6, NØLL 6.

WEBFKY 13, WABFKD 11, WABKUH 10.

NEBRASKA: SCM, Ed O'Donnell, WB\$GWR — The Pawnee ARC 2 M Net Columbus meet Mon. through Fri. 48:30 PM CST on 146:640. All stations in that area are cordially invited to check-in. Congrats to W\$VEA and WB\$VDR for the amount of traffic handling. Net report: 180M Wx Net, QNI 355, QTC 5; Cormhusker Net, QNI 395, QTC 105; Mid-Nebr. ARES 2M NEt, QNI 273, QTC 6; Morning Phone Net, QNI 1263, QTC 7; Nebr. ARES 75M Net, QNI 152, QTC 3; Nebr. Storm Net, QNI 1272, QTC 34, Platte Valley 2M Net, QNI 33, QTC 2; PM Net, QNI 282, QTC 70; Sandhills Wx Net, QNI 386, QTC 31; Western Nebr. Net, QNI 541, QTC 22. Traffic: W\$VEA 235, WB\$VDR 136, WB\$JIM 55, WA\$CVJ 33, WA\$PCC 25, W\$EUT 22, WB\$JIWQ 20, K\$BRS 18, W\$HOP 18, W\$JICP 16, W\$ZNI 16, W\$VYX 15, W\$HIX 14, K\$TUH 13, W\$GEQ 12, WA\$DXY 11, WB\$GMQ 11, K\$SFA 10, WB\$NFG 8, W\$NIK 7, WA\$PCQX 5, W\$YFR 5, K\$PODF 4, W\$IXB 2, WA\$PCQY 2. W\$RJA 2.

NEW ENGLAND DIVISION

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 — 3840,
1900/2200 Dy, 60, 387, 304; CPN — 3955, 1800 M·S, 1000
Su, 31, 599, 352; VHF-2 — 28/88, 21 30 Dy, 29, 327, 78;
CORN — 147.75/.15, RTTY 24 Hrs., 1, 4, 28; High QNI:
CN — W1KV K1GF WA1HYN & WB1CPF. CPN — W1NCO WA1ZVS & W1HMJ, VHF-2 High QTC: W1EFW, SEC
W1XX advises "Message Handling" and "Net Procedure" instruction is helpful to all club members during an emergency. Activity Managers should provide
for all clubs. Director W1HHR likes your bulletins, letters and comments, please keep him informed of your
activities. Conn. Phone Net report tabulated via computer by K1EIC & WA1HAD! Candlewood ARA in Danbury extends thanks to all who helped make their 16th
Annual Conn. QSO Party & success. Conn. Section
thanks them for this fine event. Southington ARA
Christmas Banquet an excellent finale for 1977. Their



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features which are found in only the most sophisticated and expensive aircraft and commercial transceivers. TRUE FM: Not phase modulation - for superb emphasized hi-fi audio

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signal-channel busy, and (2) Transmit. FULLY REGULATED INTEGRAL POWER SUPPLY: Operating

voltage for all 9v circuits independently regulated. Massive Commercial Hash Filter. 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. Internal switch connects receiver output to internal speaker when connector is not in use. MULTI-PURPOSE METER: Triple Function Meter Provides Discriminator Meter, "S" Reading on receive and Power Out on

Transmit RECEIVE: Better than .25uv sensitivity, 15 POLE FILTER as well as monolithic crystal filter and AUTOMATIC TUNED LC circuits provide

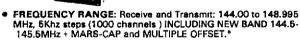
superior skirt selectivity - COMPAREI

HIGH/LOW POWER OUTPUT: 15 watts and 1 watt, switch

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offset, Duplex Frequency Offset Built in - 600 Khz PLUS or MINUS 5 KHz steps, plus simplex, any frequency.

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Specifications:

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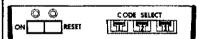
SIGMA RF-2000 SWR & POWER METER



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Cal PWR Scales 200W-2000W Freq Range 3.5-150 MHz. Please do not confuse the RF2000 with somuse the HACOO with similar appearing lower priced units. RF2000 is an individually calibrated professional quality instrument. Unequeled at many times the price. Size 7" (w) x 2 1/3" (d). GO PRIVATE! on 2 meters with the FMTD-1*

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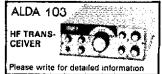
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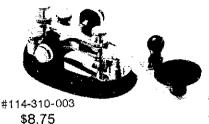


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"The Midwest's Fastest Growing Ham Dealer" *DX Bulletin via W1UCA is a boon to Novice operators. Stamford ARA "Squetch Burst" includes interesting coverage of W1LUH visit to 4X4-Land highlighting amateur activity there. Iri-City W1BML suggest retirees provide Club Bulletin with help from newcomers who in turn could benefit from Old Timers experience, good idea for all clubs. New officers Southington ARA: WA1UFO. pres.; W1UCA, vice-pres.; W1EFW, secy.; W1OB, treas. Congratulations to: WA1VUG Extra Class, and WA1WBT WA1VVA & WB1DHZ General Class! Now is the time to use the Green Keys — on the CORN RTTY Net — Happy Saint Patrick Day. Greetings to all! Traffic: (Dec.) WB1CPF 258. K1XA 248, K1GF 234, WA1VVA 229, WA1ZVS 177, WA1HYN 130, W1BDN 87, K1DFS 79, K1OOG 84, W1KV 41, K1SRF 39, WA1RUR 33, W1AW 28, W1TR 25, W1GVT 23, WA1UXA 21, WA1WIP 17, W1KAM 11, W1JA 10, WA1LOU 9, W1OV 8, WATTUH 6, WA1VUR 8, W1BDI 5, W1CUH 5, W1WEE 2.

23. WATUXA 21. WATWIP 17. WIKAM 11. WJJA 10. WATLOU 9, W10V 8, WATUH 6, WATVUR 6, W18DI 5, W1CUH 5, WIWEE 2. (Nov.) KIDM 14, WIWEE 2.

EASTERN MASSACHUSETTS: Frank Baker, W1ALP Asst. SCM: WATOWG. SEC: W1AOG. W1WUO EC for Rehoboth. W1TKZ OBS/OPS. W1TPB OBS. WATIFE now PAM for 2. Endorsements: W1WSN as EC, W1AYG as OO, WATIGL as EC, W1MJ as ORS, K1PAD as PAM for 75. W1AN W1AOG W1LE K1H-JQ now in FL. W1NN, ex-W1MAA, W1LED W1OGF are Silent Keys. W1ZE an old familiar cell is on in Ipswich. W1XR new in Norton. WB1FVD on 2 FM. WB8TGD, ex-W1JYC here on a vielt. K1FW is ex-K1P1JA. EASN had 77 QNIs, 24 QTC. EM2MN had 154 QNIs, 56 QTC. NEEPN had 14 QTC, 83 QNIs. K1SSP on 2 FM. WAIKJT has Extra. South Shore Club had a Xmas Party. EMRI had QNI 447, QTC 321. W1UKZ has Kenwood Twins. K1NIE back on air. WB1DGG wdd CR8AJ. WATWPN has Tri-Bander. K1LWI wkd H5IND, nr 340 DXCC. WA1ZXB made BPL, also WA1ZAZ SEC W1AGG received reports from WA1s RTR HPS IDA; W1BHD W1WUO K1CCW K1NFW W1BK W1PEX. K10BL teaching Novice course at Mass. Maritime Academy. Wellesley ARS, W1TXZ had a weeklong message fair at the Natick Mail and handled over 1,300 holiday messages. WA1TBY now Advanced. WB1FCV new in Shirley. N1DS is ex-W1TUP. K1PADs group helped police in Xmas parade. W1WSNK1SR our Stoughton EC has a very active group and doing a swell job. W1CT gave a talk at the Quannapowitt RA on "The History of the CW Mode." So Shore FlA had Xmas party at the Alamo. WA1YMD has a Tempo 1 & 5 band dipole. HHTN had 352 QNI. 130 QTC. WA1UWF is PAM for HHTN. Massasoit ARA held its anual "MARA Night" with the gals supplying the food. Capeway RC met at K1,0CF & WA1RNS now W1XH. A tine bulletin put out by W1FJI for our EMRIPN. Framingham RC held a meeting at the Federal Detense Civil Preparedness agency in Maynard. We are told that we MA hams will have new "Ham Plates" on Jan. 1, 1980. EMRI had 506 QNI. 432 QTC. W1GXT says activity on 220 MHz was good in Dec. EM2MN had 160 QNIs, 104 QTC. W1ROK had eye operation. This month has been our record number of stations han

MAINE: SCM, Bill Mann, W1KX — SEC: WA1YUW. PAM: K1GUP. RM: W1RWG. New OBS: WA1QFX. Hoss Traders Net 5th Annual Tailgate Swaplest May 13 at Deerfield, NH. Fairgrounds. Check WA1VB or K1RQG for details. Portland Amateur Wireless Assn. still offers Worked All Maine award. Send QSL from each of Maine's 16 counties to PAWA, P. O. Box 1605, Portland, ME O4104. PAWA officers: W1TUCLL, pres; K1SA, vice-pres.; WA1WRI, secy.; WA1DXS, treas.; W1MBR, chief op. Wa1do Co. ARA officers: W1TUGL, pres; W1CZM, vice-pres.; W1GBP, secy. FCC will be in Portland May 18 and 19. Plan now to upgrade! Maine neds more OOs. Contact W1KX for details. Dec. big traffic month. Nat.—Freq., Time/Days, Sess., Y1c., Ck-in.; PTN — 3596, 7 PM Dy., 31, 311, 294; SGN — 3940, 5 PM M-S, 27, 273, 1248; MSN M-S, 26, 37, 1001; Traffic: (Dec.) W1KX 566, WA2ERT/1543, N1RP 143, W1HDC 150, WA1QFX 145, W1ERW 140, WA1LOG 82, K1TZH 56, K1EF 39, K1GUP 39, W1AHM 37, K1TVT 37, W1GCB 33, K1GDI 24, W1CEV 19, WA1JCN 18, W1-TH 16, WA1SEY 9, K1BZ 8, K1GCM 8, K1JCX 7, W83HYD/1 7, WA1MUX 6, WA1YJY 5, WA2EMEQ/1 4. (Nov.) K1GUP 15, W81-DD 30.

NEW HAMPSHIRE:SCM, Robert C, Mitchell,

KIGUP 16. (Sept.) KIGUP 17. (Aug.) RIGUP 30.

NEW HAMPSHIRE:SCM, Robert C. Mitchell, WINH/WISWX — SEC: KIRSC. RM: NINH. Happy Easter to all. New officers Concord Brasspounders, WIOC — WIJY, pres.; WATFSZ, vice-pres.; WB1ASY, secy-treas. The NHYN Net had 195 check.ins & 220 tratic. K1ACL is SMD NH of Air Force MARS for another year. WAIUAW now KILL. WATVLF received the TAD Award. WAISOO is active in traffic work when not traveling. WIDO skils at Cannon Mountain, The GSPN had 386 check-ins & 180 traffic. WIWHP in FL. WIJY Checks into the NHYTN. WAIRGP is erecting new beams. WB1FNO passed his General. WAIFGD is state chrmn. of the Automotive Wholesalers Assn. of New England. Sad to report that K1RCS is a Silent Key. K1SHR's 100 watts and Inverted Vee worked 1352 CW stations for WAS on 15 & 20 plus 141 countries. W1VBX has his new Advanced ticket. Two BPLs: this month K1BCS & N1NH. Congrats to the Yankee Clipper Contest Club for their outstanding 1977 contest scores. Traffic: K1BCS 917, N1NH 401, W1TN 291, K1NH 60, K1ACL 37, WB1FNO 18,

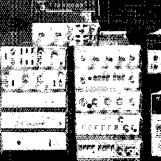
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	AN203	3.75	LA4032P	4.50	TA7061P	2.25	UPC1001H:	25.15
	AN208	4,75	LA4051P	4.65	TA7063P	2.25	UPC1008C	
	AN210	3.10	LA4400FR	3.80	TA7075P	4.90	UPC1020H	
Į	AN214	4.90	LA4400FS	3.80	TA7089P	2.90	UPC1025H	
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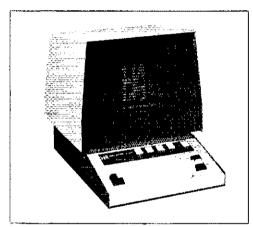
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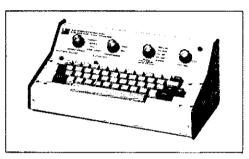


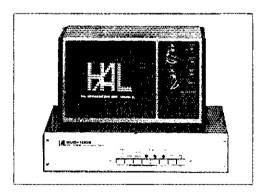
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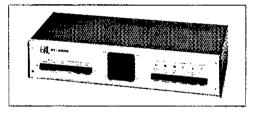
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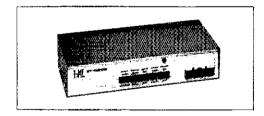
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RHODE ISLAND: SCM, J. Titterington, W1EOF — Our apologies to the new pres. of Fidelity ARC — His call, WA1SEI. W1XJ home and recovering after his accident. WA1POJ new call soon. K1UZ back in swing. WA1RXI likes EMRISS Net. W1OH busy with OO duties. WA1TFF chasing European DX on 75. Attended annual meetings of Hope Vailey and R.I. FM Repeater Associations. WA1POJ will have first newsletter of EMRISS Net out soon. We need more candidates for appointments. If interested, contact your SCM. K1ZER is Silent Key. RIEM 2-Mtr. Net. QNI 189, QTC 29, WA1CSO Mgr. Traffic: WA1POJ 92, K1UZ 50, W1EOF 47, WA1RXI 17, W1OH 4, WA1TFF 4, N1DB 1.

VERMONT: SCM, Bob Scott, W1RNA — SEC: W1VSA. WA1UCY has had to give up the job of VT SSB net mgr. due to his work of traveling for his company. Thanks Dan for a tine job for us & pleasant traveling, WB1AFY was sleeted by the VT SSB net mbrs. to fill Dan's shoes. Congrats Jake. WB1BZR is an NC on VT SSB, Jake has been on the air just a little over a year and Greg only a few months. It is very nice to have the new hams taking an interest and a part in such activities. We need more! Carrier 27/642/82, GMN 27/529/71; VT SSB 31/5/31/59; VT RFD 4/69/23; VT Fone 4/67/11. FCC at Burlington, VT Mar. 16 & 17. File your 6/10 3 weeks prior to then if you are taking an exam. Traffic: K1BQB 118, WB1AFY 61, WA1BZR 19, W1RNA 9.

WESTERN MASSACHUSETTS: SCM: Wm. T. Lowe, W1TM — SEC: WA1DNB. PAM: WA1MJE. SCM Temporary RM. Many thanks to W1BVR for his guidance and instruction on duties of the SCM. Congratulations to W1YK on BPL, and to WA1MJE on BPL Medallion. YCCC met in Chicopee last quarter 1977, now has 134 members, 93 two-letter cails. HCRC honored W1BVR at Dec. meeting: Notables present: W1BDI W1HHR W1NJM. New Extras: N1BA (WA1KFE), K1BE (WA1SNJ), K1NM (WA1BQV), WA1OLK, W1ZT (W1DKU), Several cubs advertising used equipment in their bulletins. W1KK reports use of new discone antenna on OSCAR BK. K1PUG hoping new 350-tt. long wire will survive through winter. WB1CHO rebuilding DX100, should be active soon. Traffic: W1YK 652, W1TM 208, W1DDY 102, W1BVR 99, W1ZPB 98, W1DVW 95, WA1MJE 89, K1JV 95, W1KK 52, WB1AUV 34, WA1OPN 31, K1PUG 28, WB1EHS 13, WB1CWH 11, W1OA 4.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davie, KL7CUK — In late Aug. the Anchorage Amateur radio Club is sponsoring a full ARRL. AK State Convention. We believe a first for amateur radio is the relay of an EKG for a patient from Gelena via HF radio to KL7JDI thence via phone patch to a doctor in Fairbanks. The patient was KL7MD. We would like to know if this has been done by amateur radio before? A new net is being formed for the YLS of AK contact KL7JDI for particulars. Also the Grubstake Net now on 3940 at 0700 GMT 7 days a week. The AK Snipers Net continues to grow every month. The AK DX Club net meets on 3835 at 0430 GMT. KL7JDH and KL7JDI husband and wife team turned in some real high traffic counts. SEC KL7ISB worked on SET plans for Jan, Please remember the AK disaster net available to all amateurs in AK is 4383.8 USB but must be crystal control, also only available to ractual emergencies and fests. Traffic: KL7JDH 108. KL7JDI 102, KL7AF 16, KL7JSH 6, KL7ISDI 102, KL7AF 16, KL7JSH 16, KL7ISDI 102, KL7AF 16, KL7JSH 16, KL7ISDI 102, KL7AF 16, KL7JSH 108.

IDAHO: SCM, Ed Hamlin, W7KDB — K7MIY & XYL are on tour of Ecuador & will visit HCJB at Quite. Pocatello ARC now inc. signers are W7CDA W7BDL K7AIA W7GGV & W7GCO. SEC W7JMH visited Pocatello ARC. The ISRA Boise Chapter had great Christmas Party with WA7KLY as guest speaker. W7CJC & W87TTF have new 2036 2-meter rigs. W7GHT qualified for BPL medallion, congrats. W7EYB back to work at TV station in OR. K7OID now retired. W7FOF caught in the big CA rain. W87RQO active on the ID CD Net. Also K7UBC, W87CBJ new ham in Emmentt. Southern ID hams met with state officials to discuss means for a more effective emergence communications. Present were WA7IBT K7CWX W7IWU W7EYR W7KDB & W7SC. Although WR7NYW Rpt is in Baker, OR, it is a great help to ID hams handling traffic.

 Net — Freq.
 Sess.
 QNI
 QTC
 Mgr.

 FARM — 3935
 31
 1572
 60
 W7CJC

 RACES — 3990
 42
 991
 28
 WAYWXI

 IMN — 3635
 22
 163
 125
 W7GHT

 Traffic: W7GHT 901, W7ASA
 170, W7GBO 84, W7LLM 81, W7KDB 21.

MONTANA: SCM, Robert Leo, W7LR — W7TYN built new Quagi antennas for 2 and 70 cm. IMN Dec. QNI 163, QTC 125. W7IXD says work cut into hamming. K7CTI busy with new son, GTH, & antennas. W7NEG busy with tic. WA7OBH says WB7SWH new Hardin Novice. WA7JIN has 2-page OO report. Says SSB operating practices bad. W7IDK busy in Havre with EC plan & radio clases. W7DB sends ARRL buildtins on MTN. WA7ZPQ reports MIBes City Novices, 2-meter activity, and club efforts. Bozeman formed Gallatin Ham Radio Club. W7LR QSO H5 CW & SSB; sailboat mobile; & W6AMfreewsy mobile. K7CPC moved to better QTH, & active in contests. Traffic: W7NEG 46, W7IXD 30, W7TYN 9, W7HAH 5, WA7ZPQ 3, W7LR 2.

OREGON: SCM, Dwight J. Albright, W7HLF — PAM: WA7GFE. RM: K7OUF. ARES, 3993.5, 7 PM. QNI 408, OTC 29, WA7RWM; WCN. 3702, 7 PM. QNI 226, QTC 94, K7UJY; OSN, 3385, 645 PM. QNI 170, QTC 132, N7NO; BSTN (BSN), QNI 506, QTC 147, QST 12, WA7GFE; ARES 3993.5, 5:15 (early), 242, QTC 67 23a W7HLF; ARES (2

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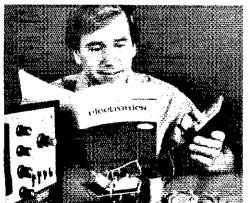
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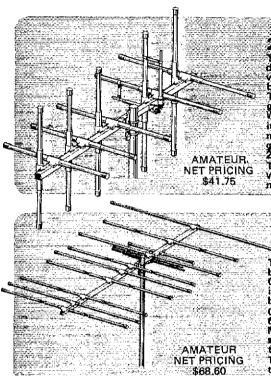
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FINCO STINGER A 2+2

2 Meter

The model Stinger A 2+2 is a ten-element, dual polarization 2-meter antenna designed for OSCAR communications or where switching from horizontal to vertical polarization is required. The A 2+2 can even be phased to operate on both horizontal and vertical polarization at the same time (circular polarization). This is not only ideal for OSCAR work but gives your station versatility for ground communications.

Wide, non-linear element spacing gives the A 2+2 superior gain. However, since it is a five element beam in one given plane, the half power beam width does not make satellite tracking difficult because of sharp directivity. The dual gamma match assemblies provide for a very low V.S.W.R. and will withstand 2,000 watts P.E.P.

The Stinger construction features make the A 2+2 extremely heavy duty. Provisions are made for mounting the antenna at the end of the boom — for azimuth control — or at the middle of the boom for normal applications.

FINCO STINGER A62

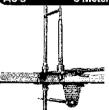
6 & 2 Meter

The model Stinger A 62 is a truly remarkable combination 6 and 2-meter beam designed for optimum performance on both bands yet only requiring ONE transmission line. This is accomplished through the use of exclusive phasing elements to accomplish dual band operation with no sacrifice to either band — NO SWITCHING REQUIRED!

On 2-meters, the A 62 has 6 colinear elements — equivalent to three 1/2 λ 6-element yagis stacked side by side — thus giving outstanding performance. Maximum forward gain is assured on 6-meters through the use of four wide spaced elements. The heavy duty Stinger construction is used throughout so that the antenna will withstand 100 mph plus wind loads.

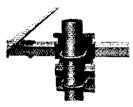
The A 62 is ideal for mounting on the same mast as your tri-bander or other antenna thus easily opening up the world of 6 and 2-meter V HF communication.

		ОТ	HER FIN	CO STINGER AM	ATEUR BE	EAMS AVAIL	ABLE:		
MODEL	AMATEUR	ELEMENTS	BOOM	AMATEUR NET	MODEL		ELEMENTS	BOOM	AMATEUR NET
	BAND		LENGTH	PRICING		BAND		LENGTH	PRICING
A10-4	10 Meter	4	16'	57.15	A2-5	2 Meter	5	5%	25,60
A6-3	6 Meter	3	6'	27.30	A2-10	2 Meter	10	10"	41.15
A6-5	6 Meter	5	13'	41.95	A1%-10	1% Meter	10	8′	29.65



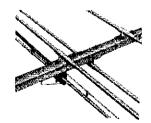
ENGINEERING FEATURES: All Stinger Series Amateur Antennas incorporate heavy duty fully adjust able gamma matching systems to allow for maximum power transfer.

incorporate heavy duty fully adjustable gemma matching systems to allow for maximum power transfer. The design provides for minimum V.S.W.R. and a wide bandwidth. A built in SO-239 type connector assembly is utilized plus the matching systems are power rated at 2,000 watts P.E.P.



A 4"x 6" x tull 1/8" thick heavy duty plated steel mast to boom mounting assembly is used on all Stinger Series of Amateur antennas. The bracket assembly locks permanently on the square boom and thus withstands high wind loads and torque without twisting or becoming misaligned. The assembly accepts mast diameters of up to 2" O.D. Provisions for mounting either in a vertical or horizontal plane is incorporated in several models.





Exclusive Stinger square boom construction is used on all amateur antennas. The 1½" square booms are of .064 wall high tensile strength aluminum which is many times strength aluminum which is many times strenger than its round counterpart. Also, special bracket assemblies have been developed to allow instant element to boom alignment — plus they stay aligned in the highest wind and ice loads. All elements are of thick wall high tensile strength aircraft quality aluminum.

Antenna design engineering is a specialty at FINCO. Top quality lab standard test equipment is used throughout the development and design of all antennas. The FINCO antenna test range has been carefully checked for erroneous reflection characteristics that could cause errors in antenna designs. Shown is the sophisticated stub and matching system that has been developed for the Stinger A62, 6 and 2-meter dual band beam. No traps or coils to burn out or detune, thus assuring you of the highest possible performance on both 6 and 2-meters.

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Group III Sales Co Dept. 51 P.O. Box 259 Little Neck, N.Y. 11362 mtr.) Linn-Benton, 645 QST 28 t.16 K7UGH. When K7VM called the shots for OR in the SET things happened almost that way — ice & log in the Portland area. Not to mention while planning committee was working on disasters to be in SET one actually happened when a pedestrian was killed just north of Ashland, All in all we hope things are now calmed down. The Beaver State net igives practice to newcomers from 5:15 PM to 6 PM with help from ARES for net stations.) Reps from QSN-MARS-DRN7 coming in with traffic. ARES 7 PM will soon pick up now as skip checks out. Many local ARES are using the 2-meter links out for deliveries or pickups. Congratulations to BPLs K7NTS W7VSE K7IFG W7DAN WA7SSO traded Chief PAM for OBS thank you for your help. Traffic: (Dec.) W7VSE 942, K7NTS 412, K7IFG 283, W7DAN 274, WA7IHS 275, K7VM 163, WA4HRGI7 73, WB7AAK 73, K7OUF 55, W7GFG 34, WB7DPI 32, WB7PNR 24, W7EMX 22, W7LT 21, WB7DPI 15, WA7ZAP 9, WB7TAZ 8, K7TM 4. (Nov.) K7IFG 178, K7VM 84, K7WW 22.

WASHINGTON: SCM. Bob Klepper, W7IEU — SEC: WA7RWK. Net reports: NTN QNI 1847, QTC 204; WSN QNI 304; QTC 188; NWSSB QNI 640, QTC 44; Clark Cty into Net QNI 45, QTC 6. Compliments to those who did their part during the Dec. emergencies. Kitsap Cty ARES had a successful search for a lost 2-1/2 year old. Whatcom Cty ARES members adding more portable units to supplement their present ARES circuits. Washington Section amateurs on Advisory Committees are: DXAC, K7UR; ECAC, W7DO; VRAC, K7CR; VUAC, W7FN. New officers for BEARS are: W7WS, pres.; WB7AZW, vice-pres.; WB7FE7, secv.; WB7FE7, treas. Gficers of Grays Harbor ARC are: WB7OOH, pres.; WB7NYL, vice-pres.; W7TZ, secv.; W7TZ, treas.: WB7NYL, vice-pres.; W7TZ, secv.; W7TZ, treas.: WB7EFG, act.: W7EQY WA7YFL K7AJT, trustees. WA7VBT WB7DFO K7GZO WB7PET received letters of appreciation and certificates for support of Washington Air National Guard during the Dec. floods. WWARA compiling list of repeaters available for use during S&R. WA7ATU teaching classes for the Clark Cty ARES on correct message handling. WB7PWZ WB7PMT WB7OCP WB7PKM WB7PYS K7YLM upgraded. W7JIE sent 731 IW rpts to Hq. and 44 alerts to FCC during 1977. Members of MBARC provided communications for Bellingham Christmas Ice Show, Tacoma ARC received 89 applications for membership in 1977. Mission Ridge Rptr's new ARES working on Commo plan for Coast Guard Auxiliary. DES in some counties are rebuilding and adding amateur facilities as primary emergency communications. Tacoma ARC museum to house the retired PSCARC traveling trophy. N7RV on with new keyer and filter. W7AXT putting bulletins on RTTY, New club is forming in Lewis Cty. W7ZEV active on NAMS as monitor control. Clallam Cty ARC had good turnout for General Class course. PSCARC revising Man of the Year rules. WA7TWB enjoyed a 3 week vacation away from the San Juan Islands. WA7TGR back on after losing antennas in big windstorm. K7MF worked hard for his call letter license plates. WB7TGR back on after losing antennas in big windstorm. K7MF worked hard

PACIFIC DIVISION

PACIFIC DIVISION

EAST 8AY: SCM, Bob Vallio, W8RGG/N6KB — SEC: W6IIH. BPL: N6NE K8HW W6OA. PSHR: W6OA W86UZX (Nov & Dec), N6NE. K6ARE is the only active OO in the Section based on reports received. The Alameda Co. Planning Commission still trying to come up with a less restrictive tower ordinance based on the information presented to if by a committee composed of local club representatives, and chaired by W8IIH. NCN meets daily on 3630 at 1900 and 2030 and on WF6ADC, 147.84/24, at 1930. NCN Honor Roll: N6CY W6JXK WB6MSU WA6NTI W8OA K6OE K6PMG WB6UZX WB6VEW W8VOM. New officers of IEBRC are WB6MSY, pres.; K6ZR, 1st vp; WA6DOO, 2nd vp; W86CDB, 3rd vp; WA6ZYE, secy; W46IMY, treas. WB6FJC edits their publication, "The Blown Fuse." MDARC officers are WA6OJT, pres.; WA6IRZ, vp; WB6FOA, secy; WA6TML, treas.; W6LKE, EC; W6PEW, Board. W6CU edits their publication, the "Carrier." SARS officers are W6WC, pres.; WA6THT, vp; WD6AYC, secy-treas.; W6HUY and K5OKO, Dir. NBARA officers are WA9RPWI6, pres.; WA6TMC, vp; WB6EU, treas.; WB6QVX, secy. WA6JVZ has been taking advantage of very good ten meter conditions. WB6FCM now N6SZ. WA6MZB passed the Extra and is awaiting his new two-letter call. W6ZF looking for the whereabouts of W6WL and still needs a Collins 312B-S. WA6DWM mending after recent surgery. Traffic: (Dec.) K6HW 706, W6OA 654, N6NE 233, WB6UZX 69, K6PMG 42, WA6JVZ 6, (Nov.) WB6UZX 26.

NEVADA: SCM, Leonard M. Norman, W7PBV — Asst. SCM: W7SK, SEC: K7ZAU, W7RVJ has a retreat in UT. W7WE W7OK W7JUO and W7MWF report good DXing. W7UIZ report new code and theory class filled within 3 days. W7FJN has new 2M rig. Sorry we ornitted W7HP and K7NVB among those attending the Santa Maria SW DIV. ARRE Conv. W7XZ new State Army MARS Dir. NARA officers, W7SK, pres.; WA7CZP, vice-pres.; WB7ELY, secy-treas.; W7XZ, sgt-at-arms. WA7CYC and W7MWP challenged one another in the 10M Contestwas quaranfined with various diseases according to signs posted on his front door. W7OK has earned DXCC Sband certificate No 7. SNARS elected WA7NHJ, Chmn.; W7AAA, vice-chmn.; W7UIZ, secy-treas; K7SES, pub-relations; W7YY K7SER and WA7KCD, dir. K7ZOK visiting in Washington, DC. Traffic: W7ILX 156.

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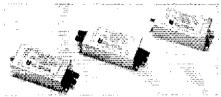
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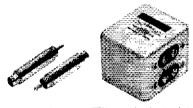
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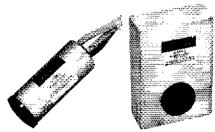
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PACIFIC: SCM, Pat Corrigan, KH6DD — SEC: KH6CKJ. RM: KH6JAC. OPS, OO, OBS, OVS KH6BZF. Several trips planned to Kure Isl early in the year. More end more Oscar Mode B KH6 stns., showing up. Some also preparing for AOD. Hawali now has a Ten-Ten Chapter. Contact KH6HIF. KH6JAC had nice mainland vacation as well as KH6EKQ. Don't forget EARC Mon. nite transmits on State Rptr system at 8 PM. Kaual ARC pres. KH6ZT was re-elected for 1978 along with incumbent V-P and freas. Only new officer was secy. now KH6JQO. Hawali SWOT meets at 0600 on 145.1. Also Tue. nite each week SSB Net on 14. Also, KH6BZE conducts a Moonbounce Net on 14.00 at 1800Z. KH6BAF FM Los Angeles recently visited back in KH6. New Div. Dir. W6ZM and spouse had pleasant visit to Pac. Sec. in Jan. Traffic: KH6ST 282, KH6BZF 210, KG6JAH 40, KH6DD 24.

SACRAMENTO VALLEY; SCM, Norman Wilson, N6JV—SEC: WSSMU. The River City ARCS and their class at the Easter Seal Center will be part of the Easter Seal Telethon in Apr. They have also started a net on Sun, at 8 PM on 28.550. WDBCFB is now imm with the Navy aboard the "USS Dixle." WA6NKQ has a general class program at Butte College. Congrats to new General Class licensees WA6ROZ WB6RPA and WB6PBS. WA6PAY now has his 2nd Class Radiotelephone ticket. WA6PAY now has his 2nd Class Radiotelephone ticket. WB6RDA back on the air with the Kenwood Twins, a 10/15 meter beam and a vert. WA6LXT hosted a film crew from KCRA for a demonstration of Amteur Radio complete with a phone patch to Chile and slow scan TV. The GEARS had a demonstration of a visual to tactical scanner for use by the visually handicapped. WA9INK/6 is trying to help organize an upcoming Dxpedition to Clipperton Island. GL I need it. Traffic: W6RSP 246, K6RPN 87, W6DEF 20.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — Asst. SCMs: WA6YAK W6TRP WA6HIN. SEC: WA6YAB. New officers of the Delta ARC are W86ICL, pres.; WA6WRP, vice-pres.; WD6AC8, secy.; W86FVG, treas. WA6WRP, vice-pres.; WD6AC8, secy.; W86FVG, treas. WA6WRP, vice-pres.; WD6AC8, secy.; W86FVG, treas. WA6DDB made BPL for Dec. Amateurs in the Kern Co. area are commended for their public service during the storm of Dec. 19-22, 1977. WA6RKI back on the air, WA6CPP actively hunting 92 counties. N6OZ teaches Novice class for the Stockton ARC. WA6CPP has a TR320. K6PBT moved to Stockton. W86CPP has a TR320. K6PBT moved to Stockton. W86CPP has a TR3400A. W6JPU W6OKP W6DCP W86DKR W6WZM W86OMD WA6CUZ W86TQL and W86OCW attended SAROC. The Turlock ARC 50th Anniversary hamfest will be June 3, 1978. All amateurs are invited W86PZW and WA6NRY are now Extras. WD6BJK a new Novice. W6XP fost all amateur equipment and antennas in a wind gust on Dec. 20, 1977. WA6NCA building circuit boards. All League appointees meeting at the Fresno Hamfest on May 5, 6 and 7, 1978. Traffic: (Dec.) WA6JDB 299, W86VJW 106, WA6KMW 54, WA6YAB 24, WA6GJV 2, (Nov.) W86VJW 32, WA6RXI 4.

32, WAGRXI 4.

SANTA CLARA VALLEY: SCM, Jim Maxwell, W6CF—SEC: WB6IZF, W86JNN WAGYXP- and others are building a new 2M translator for SSB/CW. A frequency pair below 146 is hoped for WAGTUF reports hearing numerous Europeans via Oscar 7 Mode A, but no two ways thus far. Don't forget the annual International DX convention on Apr. 15-18 this year, to be held at the Air port Holiday Inn In Visalia. N6BT has been active or Oscar 7 Mode B. Santa was kind to K6YKG, now sporting a new Atlas 350. YKG is also SCV trivia champion, after winning top honors in a San Jose Mercury cigar banc competition (No looling!) W6RFF now QRV from his new Cupertino QTH, and is again solid on NCN. N6VB making hay on 2M with a new yeasu FT-227R and eight element quagi. The SCCARC Short Skip (Santa Cruz reports W6EJ and K4GKI have had over 4000 GSOs over the past 30 years! Can anybody beat that? Congrats to SCVers N8AU W6NW WD6AVB W8RFF W8IQU W6YBW WA6JWK and K6YKG, all on the NCN Honor Roll fol Disc. The very active West valley ARA meets at 8 PM or the first and third Wed, each month at the Los Gatos Red Cross. New pres. W6SUJ sez visitors are always welcome. Old time radio builts shouldn't miss the up coming meeting of the Antique Wireless Assn. (AWA) to be held at the Foothill College Electronics Museum apr. 22. Editing and publishing of the popular Santa Clara County ARA SCCARA-GRAM is now in the capable hands of WD6CGZ and WD6CHA, after five years o dedicated work by WA6VKB and WA6VKE. New SC CARA officers for 1978 consist of WA6GBQ, pres. W6GOY WA6KUC WB6PRU and WA6VKE Traffic: (Dec W6FE) 364, W6AUC S9, W6KZJ S8, W6DI 42, W6RFF 27 N6VB 24, WA6HAD 2. (Nov.) N6VB 3. (Oct.) W6RFF 102 N6AU 8, N6VB 3.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Bill Parris, K4GHR — SEC W4EHF, PAM: W4OFO, RM: K4MC, VHF PAM: WB4VIM The traffic court in NC in Dec. set another Section record with 6117 points, up 30% from last Dec. — 44 station reports were received, also setting another record Keep up the good activity level on all the Section and local nets. Congrats to W4EAT, top NC traffic handler is '77 and to AAANC who was a close second. Hats off to the 5 BPL winners in Dec. — AA4NC W4EAT WB4MC WB4TOP & W4DW. The Cary and Raleigh clubs were again very successful with their shopping mail traffic exhibition stations in Dec. WB4VIM, Not Mgr. of the CNCTN reports a record 16982 check-ins and 802 places formal traffic logged in 1977. How about that for 2-meter net? See you on 13/73. Officers for the Cabarrus ARS, W4KUV, press; K4CEB, vice-press; WD4DTU, secy treas; WA4UPQ, act. mgr. New net on 37/97 each Wed nite at 7 PM tocal serving the ARES function in Surry Co WB4ULP continues with Novice & General classes a

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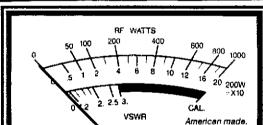
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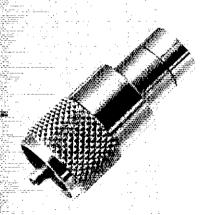
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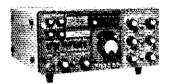


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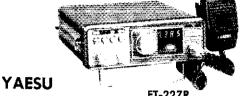
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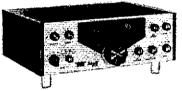
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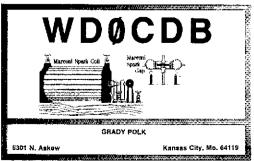
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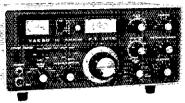
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Surry Community College. WB4OXT now active on 16t mtrs and WD4CNS busy homebrewing equipment Charlotte amateurs coordinated by WB4VIM provided communications for severall maratinon races including a 26 miler. New appointments this month include WA4FKY EC Union Co. K4QFQ EC Alleghany Co. WB4SGA EC Allamance Co., & WB4TTJ EC Buncombe Co. Traffic: AAANC 820, W4EAT 733, WB4MXG 510 W4FMN 349, W40FO 326, WB4MJH 256, K4MC 254 WB4T0P 251, K4FB 239, K4VHT 214, WB4ZIQ 202 W4DW 200, WA4FFW 186, K4EG 166, WB4ULP 152 WA4HG 108, W4FCN 82, N4ZH 81, WD4HCY 75, N4UE 75, K4GHB 76, WA4UTC 75, WB4DAR 70, WD4FJM 64 WD4JRS 63, WA4SRD 55, WB4VIM 53, WB4WII 44 WB4BBK 43, WD4DKF 38, WB4VHR 34, MXB 33 WB4RGD 32, WA4OQS 30, WB4OXT 25, WB4CYN 23 WD4CNS 22, WAIZI 14, W4WXZ 11, W4EHF 9, K4ZKQ 6 WD4CNQ 6, WD4CYV 6, K4BE 4.

SOUTH CAROLINA: SCM, Tom Lufkin, WA4DAX — Asst SCM: Gary Barnett, WA4MDP, SEC: WB4TNS. PAM W4MTK, Asst. PAM; WA4DZG, RM: WB4CAK, Dec. was a very active month for traftic men. N4PQ led the group with 1080 messages, that's an average of 34 a day! K4GL reports requests for S.C. during meteor scatter or 144 MHz keeps him very busy. SET preparation in full swing. K4ZN has monthly column in "Worldradlo" on inexpensive homebrew equipment. The Soluth Carolina State Convention will be Mar. 18 and 19 in Greenville This will be first state convention in a long time and hope to see everyone there. A good time should be had by all. Several South Carolina amateurs including N4PC and W4AMK received public service awards for their work during the Johnstown flood. Net Reports: SCSSBN ONI 1440, QTC 245; Anderson 2Mtr QNI 597 QTC 28; PX QNI 247, QTC 94; CNN QNI 282, QTC 126 (Nov.) CNN QNI 255, QTC 93; Traffic: N4PC 1980, K4ZN 144, W45KZ 367, W4NTO 154, W4AMK 131, W4MTK 62 K4FRX 53, WB4UDK 49, W4OCX 45, W4FMZ 44, N4EE 36 WB4CAK 34, W4FVV 29, WB4JNE 24.

KAFRX 53, WB4UDK 49, W4OCX 45, W4FMZ 44, N4EE 36 WB4CAK 34, W4FVV 29, WB4JNE 24.

VIRGINIA: SCM, Robert L. Follmar, N4RF — SEC: WB4ZNB, PAM: WB4DQZ, RMs: VN K4BKX; VSN AA4CK ARN WASHJ, Your SCM thanks vour FB efforts in the VA section during 1977 and extends his wishes for a Happy New Year! As announced in my last report, WB4DQZ has taken over the reigns of the VSBN; welcome! Much mas tric handled starting with W4SQQ's 933 total! He and K4BKX 632 made BPL; congrats men! K4GR rpts Computer-to-TV-interface, frustration month, Hi W4FTJ recd the following awards in Dec: Rhine River Baltic Sea; Atlantic Ocean; DUF-1; HEC and IARU region 1. FBI W4JK says the Mason-Dixon Belles is a YL net run by him which links the Winchester VA and Blueknob PA rpts. OPS/EC WA4YIU was active in demonstration station handling Xmas tic. NFM rpts holiday tic dwn tm last yr. Rptr WRATB began net operations in Jan. W4NWM sez tic vy hvy this month and a gud time was abd by all. He is still wrking on tower. WA4STO spending more time with Novices than XYL wud really like! Also has local rdo stn airing his announcements for Novice classes, FB! I see that WA4NYZ is "stirring around" on the eastern shore by handling Xmas tic. WB4WLJ handled the during the Wmsbg ARC day. Indicentally Mike is now the new EC for James Co, and Wmsbg City and tro. W4KMN for his help as EC before resigning. OC W4HU consistently rpts many 2nd harmonic violations. Tnx John for ur efforts to clean up the ham bands. VF W4KFC took part in 180 & 10 mtr contests. Also acquired a synthesized 2 mtr rig & enjoys unfamiliar riprs, FB K4DHB enjoys ham rdo via the Alex. VA rdo club route and Xmas tic abounding! K4LEF heads up the vy in teresting VSBN "magazine section" on 3947 KHz at 0130 local on Sun. Drop in fellows and gals! WB4BYC wrking in HW-202 & not much time for operating these days. W4LU3 enjoys wrking in many contests and more coming up in early 1978! K4KA says that Santa brought last word u readers. Traffic: IDec.) W4SOQ 694, K4BKX 832 WB4DBK 402, K4GR 299, W4LX B 277

WEST VIRGINIA: SCM, Donald B. Morris, W8JM—Cabell County CD Net, Huntington meets at 9 PM Sun on 18/76. New ORS II WD8JYM and WD8JYN. W88YM made BPL. Commissioner Roberts of BMV spoke at KRC dinner about license plate fees. New amateurs WD8PFC and WD8OVZ. 240 amateurs esked for W8WVA, New River Bridge cards. K8VNL and W8CNF have new transceivers. WB8PKF and WB8YMJ received Worker All Counties, certificates. WB8BBG now K8MJ. K8LGS now K8LG. WA8UUY now K8TN. now K8LG. WASUUY now KBTN.

Net	Freq.	Time(Z)	Çk-in	Tto	Sess
Hillbilly	14290	1700 Su	140	59	4
CW	3567	0000 Dy	172	75	30
CW-Novice	3730	2215 Dv	190	82	31
Phone	3990	1700 Dý	704	250	31
Phone	3990	2300 Dy	1286	364	31
Traffic: WE	SYMJ 5		W 103.	WEST	DĂ 99.
WB8VAZ 87					
W8JWX 61.					
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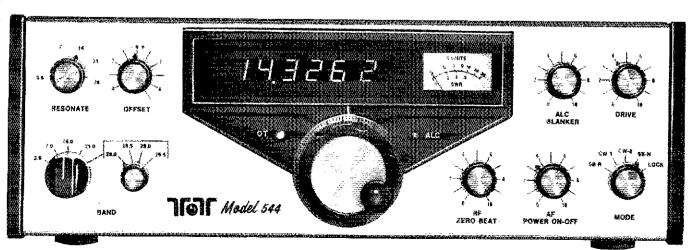
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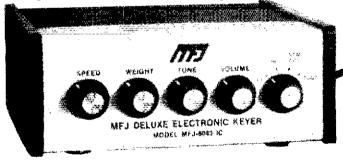
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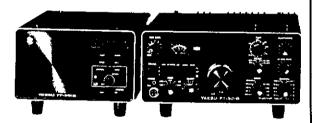
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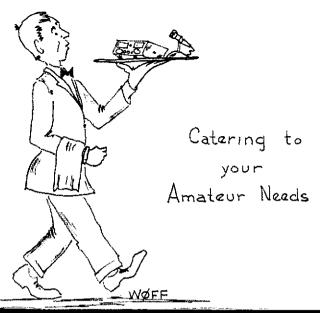
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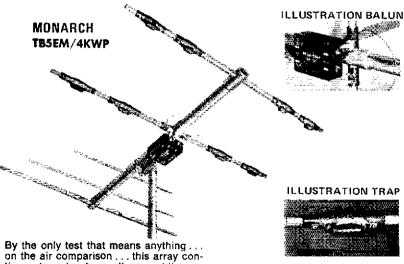


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ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Clyde O. Penney, WAØHLQ — SEC: KØFLQ. RM: KØTER. PAMS: KØCNV WAØYGQ. KØHPE has received his SBWAS award. No. 327, while WBØYKH has also received his WAS award. WBØPVT jost his mast has also received his WAS award. WB@PVT lost his mast & antenna during recent high winds in the Sterling area. WGCO is enjoying his new Triton IV gear. Congratulations to WB@QPO who passed Extra Class examination in Dec. Newly elected officers for the Boulder ARC for 1978 are W@PVS. pres.; WB@MMJ, vice-pres.; WB@ZID, secy.; WB@FPV, treas. Net Tic. for Dec.: Hi Noon QNI 1312, QTC 138, informals 206, QNF 1401, 29 sessions. SSN QNI 156, QTC 48, QNF 680. Columbine QNI 1192, QTC 229, informals 309, QNF 1685. Late Net Tic. for Nov.; Colo-Wyo Net QNI 32, Traffic; (Dec.) w@WYX 2486, K@YFK 992, K@DJ 572, WB@IBS 342, WBEJD 227, WBFV 172, WB@LFR 167, WBIW 159, WARE 118, WBHXB 105, WAGMED 257, WBFV 172, WB@LFR 167, WBW 159, WARE 118, WBHZB 128, K@CNV 20, WABPXF 20, WD@AIT 17, WBMDT 17, WD@CHX 16, WAGMED 18, WBGE 107, WBMPE 12, WB@MED 1. (Nov.) WBMLFR 118, WBRE 107, WMMYB 12, WB@DW 5.

NEW MEXICO: SCM, Joe T Knight, WSPDY — SEC: WSALR. PR: WSONR. PAM: K5IKL: RM: K5KPS. Southwest Net (SWN) meets daily on 3585 kHz, at 1915 local time and handled 360 msgs. with 309 stations reporting in. New Mexico Roadrunner Net (NMRRN) meets daily on 3940 kHz at 1800 local and handled 100 msgs. with 919 stations reporting in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 71 msgs with 549 check-ins. K5XY reports new rptr for the ol/84 in Las Cruces. Good news ltr im ARTS via WSJOV. W5KH rpts good vacation in OR. Congrats to WA5YTX on DXCC CW. W5SBT reports the new Socorro remote controlled ELT downed aircraft receiver is in service. FB. Traffic: WSJOV 408, N5NG 359, K5KPS 353, K5MAT 320, W5ENI 296, W5KH 281, WSUH 216, WD5AHH 79, WA5YTX 43, W5TWZ 16, WA5OHI 15, W5BWV 6.

WSWW 6.

UTAH: SCM, Carl R, Ruthstrom, W7GPN — SEC:
WA7ZBO, ORS: W7FYR K7HLR N7IE WA7MEL WA7OAU
W7OCX and W7UTM. ECs: WA7BEG WA7BWF K7CVB
WA7GTL W7MUG K7POB W7TWZ and K7VJP, OBSs:
W7LLH and K7UM. OC: K7JL. OVS: W7HKC. The Ogden
ARC elected WA7HOD, pres.; WA7ADK, vice-pres.;
K7ZOF, secy-treas; WB7DMI and WA7FVQ, dir.
K7ZOF, secy-treas; WB7DMI and WA7FVQ, dir.
Plano, TX on 145 MHz, ssb meteor scatter. Coordinated
allocations of repeater frequencies involve 2, 50 MHz;
24, 146 MHz; 3, 220 MHz, and 8 on 440 MHz, The latter includes a least scan TV allocation. The new EC for Weber
Co, is WA7GTL. W7OCX struggles with an indoor antenar, reporting the lowest traffic total he has had in many
months. N7IE says his new Atlas 350XL is tantastic.
Plan to attend the Utah Hamtest on June 17, 1978. More
details later, fraffic: K7HLR 354, WA7MEL 90, WA7JRC
87, N7IE 67, WB7DMI 41, W7OCX 24, W7UTM 14, W7BE
10, WB7RQP 4.

WYOMING: SCM, Chester C. Stanwarty, W7SDA — Asst, SCM: Tom Graham. W7KHH, PAM: WA7WFC, RM: K7KSA, WA7SPO has ioned the FM ranks with an ICOM 22S. K7IKO back on 2 meter FM after an absence of several months. WA7USI is proud owner of a new tower. WA6TQH and family spent the Holiday Season at their cabin in Sunlight Basin enjoying snow mobiling. The Carbon County Two Meter net meets Sun. at 7:30 PM MST on the Rawlins repeater on 145.16/146.76. K7SLM MST on the Rawlins repeater on 145.16/146.76. K7SLM 7154 ONI and 181 OTC. Traffic: K7VWA 586, W7TXK 383, W7SQT 356, W7YWW 46, K7SLM 21, W7SDA 13, WA7LEA 4.

SOUTHEASTERN DIVISION

ALABAMA: SCM, Frank S. Brown, W4LNN — RM: N4MD. PAM: K4JIE, SCM correct address is: Rite, 5, 8ox 489, Athens, AL. 35611. Good luck W84EKJ. Hope I can till those big shoes you wore as SCM for the past six years. Congrats to W4RA and W4ZD our Dir and Vice Dir, Appointment: K4JIE PAM. W84ZWF received certificate from the National Weather Service for his participation in a Weather Watch. ARRL certificate for Field Day work received by W44JWZ. WA4RRT W84ASV W84RFP reported auto accident via two mirs and assisted the incircul until help arrived, W44MOL now Advanced Class. OBS K4AOZ spread the word in Dec. with 105 announcements. W44JDH made 8PL each month in 1977. His tic. count for Dec. 1796. WOW!! Twin Base ARC Activities: Played Santa at five Montgomery hospitals with the aid of two mirs; W84UAY was Santa and W4HMV W40WB W84OZN W84BYG W84TKU WD4JRB, helpers; W84TKU selected "Amateur of the Year"; instructors W84KEA WA4ODG, graduated 92 with an additional 25 attending Advanced classes during the year, 45 local amateurs attended the "Pot Luck, White Elephant Dinner" MC'ed by WA8KLHIA! Valley ARC elected WA4ZNN, pres; WA4YAD, vice-pres, W44CZY, secy-treas, DSS appointments now available. See your £C. Traffic: WA4JDH 1796, N4MD 558, WA4RND 158, W84EKJ 150, WA4ZND 10, W84KSL 98, WA4RND 158, W84EKJ 150, WA4ZND 10, W84KSL 98, WA4RND 7, K4UMD 7, W4MHO 4, WA4RMP 3, K4HJM 2.

GEORGIA: SCM, A. H. Stakely, K4WC — SEC: K4YRL. RM: N4UZ, PAM, K4JNL. Congrats to W4F0E and WA4OZT making BPL! Congrats to WA3NAZ/4 K4EV K4VHC W4PIM WB4TEK WB4DHC and WB4FAS making

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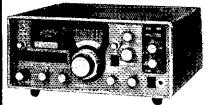
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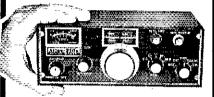
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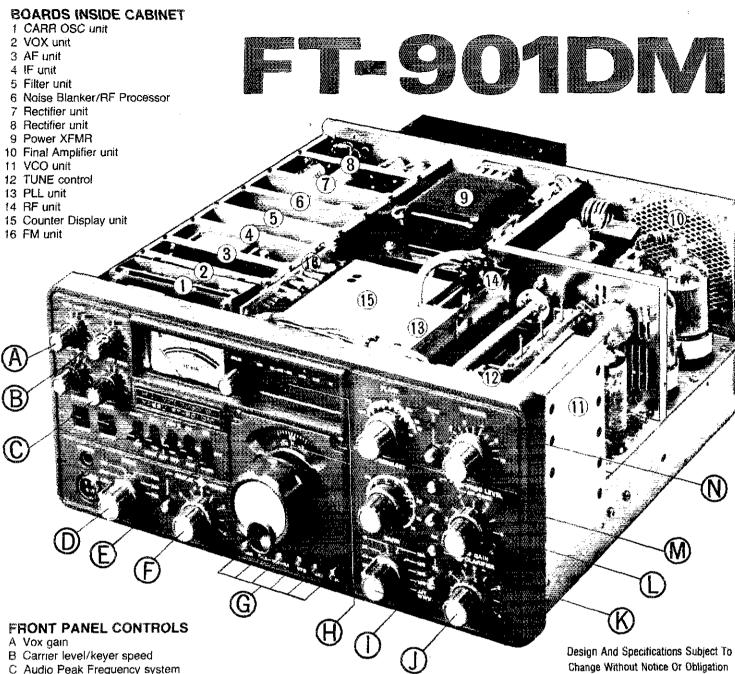
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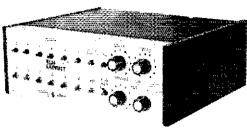
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PSHR. Congrats to WB4KYL making Advanced; to WB4DHC WD4IBO and WD4IBO for General; to WB4TYF to Tech.; and to WD4NQN for Novice at 10 yrs. of age. '78 officers of Confederate Signal Corps are WB4KYL, pres.; WA4RJD, veep; Nathan White, treas; WA4MIZ, secy.; K4MVL, act. mgr; W4KQS, Bugle Ed. GSN QN1 235, CTC 223, GTN QNI 113, QTC 53. GARES ONI 101, QTC 4. CVEN No. 2 QNI 1115, QTC 79, GSBN QNI 2325, QTC 556. CGVHFN QNI 70, QTC 5. NG Skywarn QNI 21, GSN and GTN both doing line, try 'em daily, GSN on 3.595 at 0000 and 03002 and GTN on 3.718 at 2303C. N4UZ enjoying 10 mtr cw during contest. WA4QZT got over 225K in SS at K4JPD. WJJM has 102tt flat-top at 75 feet working FB. W4BIA active on QSS receiving bulletins by teletype from W1AW. WD4DEV has Marine Corps station going at Atlanta NAS and teaching radio classes. WA3NAZ/4 likes cw tfc handling. K4VHC enjoying new tower and triand quad. W4ELO sent the to W4PIM from tourist attraction, and tour bus in FL with no trouble. WB4FLP got WA4QAT and W4PIM to help him avert a traintanker truck catastrophe by quick work with railroad dispatcher. Report of this came from WB4LOJ. WB4AEG very active VHF station reports working 13 states, 4 new, early Dec. His homebrew 432 MHz station shaping up. W4VO gearing up for VHF sweepstakes after new record in Sept. W4BTZ still sending out OO notices. WD4IBR got his last state for WA5. W4ATO has his 1952 TV W4FU 106, W4ELO 95, AA4GA 82, NUZ 81, WB4FAS 69, W46H 69, W4CZN 49, K4EV 47, WB4DHC 41, W4HON 41, K4WC 30, WB4TEK 26, W4BIA 20, WD4DEV 5, W4JM 4. (Nov.) WB4TEK 51. Automatic repeat mode adjustable from 0 to 2 minutes Individual message, auto repeat, and end of message lamp indicators Silent output for grid block and cethode

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RH — SEC: WA4WBM. RM: WB4GHU. PAM: WA4TNC/75; WA4TXMI40; WB4BSZ/VHF. WB4JMM appointed CRS/CPS. SNCs earned by WB4QBB on TPTN and by WB4DYF on AL Net "M." FMTN using new roll-cail procedure to equalize waiting time. WB4QBB named 1977 "Ham of the Year" in Pensacola. WB4SKI and K4HYV working HTTY on 146.58 AFSK; both have 24-hour autostart capability. WA4KST planning the first 220 repeater for NW FL — 223.34/224.94 MHz. W4BIM, now 3D2DM. worked several Pensacola stations from Fili. Playground ARC lost two of its most active members through transfers — WA4FMA and WB4FTA. WA4LGK, WN4IIV. KH6CRV (ex-9Y4CRV/EL2EC) gave a talk on Omega navigation system at roent Tallahassee ARC meeting. A new club has been formed at Leon High School: WA4RUR is trustee. WB4CAL conducting course for General Class upgrading, assisted by WA4DCN W4MNW and K4BHW. AA4US starting a DX column in TafC newsister. WB4FAJ active on FMTN; son Jim now W04JWK. Bolles HS ARS station WB4-QWH on the air; club conducting Novice classes. WB4S-QA now AAANA. W4FZX got a TR4CW and active on FMTN, WB4HKP new Editor of DBARA Groundwave; many thanks to retiring Editor WA4ZOW. WD4HCU and WA2ZTT new General Class. WA4GN has a new F1-301. Traffic: (Dec.) WB40BB 1032, NAPL 487, WA40EM 311, NAWLO 291, WA4KK 198, WB4DTS 197, K4DDY 179, WA4WBM 146, W4MGO 142, WB4FS1 114, WA4CRI 108, W4JL 102, WB4JMM 97, WB4YKY 75, WA4EYW 61, K4OER 48, W4FK 253, WASME 32, WA4TNC 31, WB4MJI 29, WB4WYX 25, WASME 32, WA4TNC 31, WB4MJI 29, WB4WYX 25, WASME 32, WA4TNC 31, WB4HRG 86, K4VFY 80.

NBUY 12, WB4UNA 12, KARNS 11, WB4PNJ 5. (NOV.)
WB4HRG 86, K4VFY 80.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston,
K4SCL — SEC: WB4ALH. Asst. SEC: W4WYR. RM.
W4MEE. PAMS: WB4AID WA4NBE. We regret W4WYR
found it necessary to resign as Asst. SEC. Her fine work
on this for the past year is much appreciated. She is also
FPTN Mgr. and Tropical hamboree Chairman. WAANBE
relleved WB4ALH as FAST Net Manager Jan. 1. This will
give Bill more time for his SEC job. New OES appointments effective Jan. 1: WB4BNL W84DWU W4GPL
K5IHH/4 K4ISS WA4KCR WB4LXH W4OBL K8PXM/4
K4QCG K4SCL K4SJA K4URX. 00-lis reappointed under
new rules effective Jan. 1: WABK W4MML W4ROA W4ZR
and O0-III WB4SSP. The Florida "ARRL Information
Net", 3940 kHz at 8 AM Sat. going great, thanks to comanagement by WB4ALH and WA4WBM. Check in to
get latest info. AA4EE is new pres. of Broward ARC.
WR4AYY at Belle Glade is now operational on 147.60100,
W4BK flying to Chicago for OCWA meeting in Feb.
W4CSH having a ball on Oscar 7 with new KLM 2700,
W4RA now active on 220 MHz. WB4MEE now on 440
with new KLM antenna WB4LXH moved into new house
he had budit. N4TW now active from new CITH in Pompano Beach. Five BPLs issued this month— probably
the most ever. They went to W4MEE K4TH W44PFK
WB4WYG and K4SCL. (Dec.) W4MEE 1361, K4TH 768,
WA4PFK 605, WB4WYG 565, K4SCL 517. K4SJH 388,
W4GQR 373, W44NBE 314, W4NTE 310, WB4ALH 303,
WB4AID 300, WB4NJU 210, WA4LPV 190, WD4KPG 186,
WA4GCN 13, W4IRA 72, K4EUK 81, W44MNX 80,
WA4GCN 151, W4SMK 49, K8PKM/4 44, N4XH 48, WB4FVN
42, W4GDK 39, K4BLM 37, WB4AOC 34, W4TJM 32,
WA4COL 73, W4IRA 72, K4EUK 81, W44MNX 80,
WA4COL 73, W4IRA 78, WB4FON
42, W4GDK 39, K4BLM 37, WB4AOC 34, W4TJM 32,
WA4COL 20, W4KGD 25, WB4SNX 23, W44R 8, WB4FVN
42, W4GDK 39, K4BLM 37, WB4AOC 34, W4TJM 32,
WA4COL 27, W4KGD 35, K4SJA 40, W4IYT 37,
WA4HDH 26, W4DVO 24, W4BNE 13, K4GRM 8, K4RCP
7, WB

SOUTHWESTERN DIVISION

ARIZONA: SCM, Marshall Lincoln, W7DQS — RM: W7EP, PAMS: W7UQQ WA7KQE. The Old Pueblo RC will sponsor a hamlest Apr. 28-30 at the Tucson Ramada Inn. With regret, K7MTZ is reported as a Silent Key. WB7CZL

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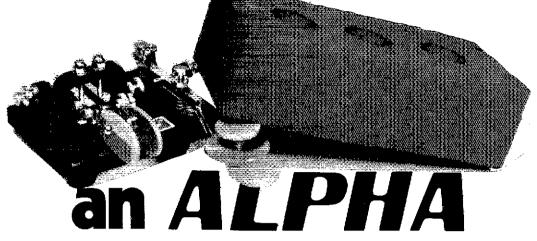
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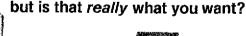
QST says it: ALPHA 374

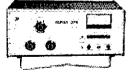
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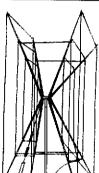
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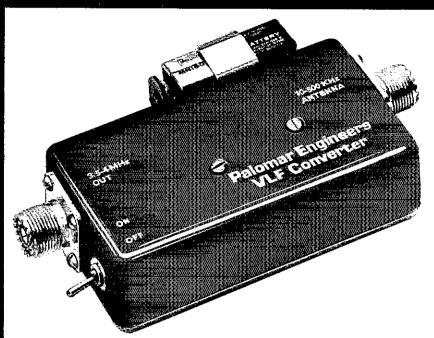
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has been appointed a public relations assistant for the Southwestern Div. New officers of the Tucson Repeater Assn. are W7HFR, pres.; W7UV, vice-pres.; WA7RWY, secy.; WB7CZL, treas.; K7PCI and K7OMR, board members. The Superstition ARC has breaklasts on the first Sat. of each month at Cobb's in Apache Junction. K7WJF has been appointed by the FCC to administer code and theory exams to handlcapped and shut-in applicants. Information ont the Ft. Tuthill Hamlest July 28-30 may be obtained from WB7NUV, or by writing Box 11642, Phoenix B5061, W7EP and WB7CAG made BPL in Dec. Nets: SWN 360, Cactus 323, QTEN 122, Traffic: (Dec.) W7EP 529, WB7CAG 334, K7UXB 183, WB7TPY 116, K7NTG 92, W7LVB 88, WA7IYG 61, WA7KQE 59, WB7ORT 61, K7GH 48, W7HFA 41, K7NMQ 16, W7RQ 11, K7JKM 8, WA7WEB 8, WB7CZL 4, W7DQS 3, K7GLA 1, WA7NHQ 1, K7RLL 1, (Nov.) WB7CZL 9.

LOS ANGELES: SCM, Perry Masterson, W6RHS — SEC: W86FHM. This is my first report as the new SCM for the Los Angeles Section. Due to the confusion in the rapid turn over of the SCM, I received few station activity reports. We all wish Stan Brokl, W8YYQ the best of luck on his new assignment in New Jersey, N6HE reports The United Radio Amateur Club held a nice banquet to install new officers. Officers are N6HE, pres.; W85SYN, vice-pres.: WASYBR, treas.; WA6TIU, secy. It is reported that W6DFM was the big prize winner. W6INH reports Dec. was a heavy traffic month. Some nets were running double schedules, with as many as 60 messages each net per night. K6EA also reports a heavy traffic load for Dec. He keeps busy with Novice education as well. K5DY/6 reports that he will be active in the L.A. area for sometime. He plans to get his Oscar antennas installed sometime during Jan. I would like all the areas of smateur radio to be represented in this report. To do that, I need activity reports. The SEC W86FIM is busy getting the emergency activities bofstered, if any of you want to get involved contact Ben. He can use the help! Traffic: W6INH 194, K6EA 88, K5DY/6-83, N8HE 4.

ORANGE: SCM. Wm Heitritter, WB6AKR/6 — Asst. SCM: K6KNC SEC: W6AOB. RM: K6JT. PAM: W6CPB. ECs: WB6ARK K6GGS W6LKN K6KNC W6WPP and WA6YES. Anaheim ARC reports W60SH has a new Icom 245 SSB. Congratulations to the Morongo Basin ARC (Yucca Valley) on approval of ARRL club affillation. South Orange ARC has the following upgrades: WD6AEI and WD6CXJ to Technician: WA6HVF to General; W6TNV WA6HJF and W66SXR to Advance class. Anaheim ARC reports the following assisted in the Anaheim Jr. Tennis Tournament: WA6HVF K6KNC WA6SFP WB6ULU WB6YXQ WB6DLF W6RQT K6MXL K6UUO W5RE WB6QCT N6RH WA6CVF WB6JJS WA6QWJ WB6QIO WA6FAH WA6WVJ WB6OQA WA6COX N5RI WA6MCT WA6HNQ K6TWK WB6CUB WB6ARK, Lake Elsinore ARC reports W6RBM WA6TIJ and WD6AUW installed 6-meter vertical at the OTH of WA6VII. Palm Springs ARC reports WA6HUB has new class for Novice and Generals at the College of the Desert. W6KIJ reports results of his Spring '77 Novice class: WD6AGUWD6AQV WD6AQW WD6AGX WD6AGX WD6AGR WD6ARR WD6ARR

SAN DIEGO: SCM, Arthur R. Smith, W6INI — NTS nets serving this section: Southern Calif. Net (SCN) 1830 and 2030 deily on 3598 kHz. Region 6 Net at 1230 daily on 7275 kHz. SCN 2030 session is 13 wpm or less. Most ARES nets have liaison with the NTS. To send a message via NTS check into any of the above, or give to a station regularly operating in NTS. These are: N6AT W2BCK W86FTY N6GW K6HAP WA6IJ K6JN K6LKW W86PVH N6RD WA6IJAZ WA6UFY WB6YVC. New club is San Diego Teleprinter Society with W6MNO, pres.; W6RUL, vice-pres, W86JNV, secy., Tuture ham Richard Youhill, treas. W6IJOF operates RACES station WC6AAV in San Marcos. K6PM active in WPSS, Pilgrim, ARES and QCWA nets, Upgraded: WA6CFE to Advanced, W86NIL to General, WA6HGA to Tech. 220 Club's charter for ARRL affiliation was presented at its Xmas meeting by SCM, W6INI, Licensing classes taught by WA6VYD meet Mon. and Wed. 6:45 PM at El Camino High School, Oceanside. Instructor W86BOD conducts Novice classes at 7:00 PM Thur, at Poway First Baptist Church. Traffic: W86PVH 758, WA6UAZ 567, W82BKC 523, W86FTY 441, N6GW 186, N6AT 139, N6RD 74, WA6UFY 60, W6DEY 26, W6UQF 16, K6LKW 16, K8JN 5, WA6COE 2, WA6CFE 1.

SANTA BARBARA: SCM. D. Paul Gagnon, N6MA — RM: WA6VBS. New appointments include W86BWZ as GO and WA6VBS as RM who made BPL in Dec. Congrats. We have lost OBS W8PNM who is moving to indio. W8POU now Asst. Dir. for ARRL. W86AGX now AA6AC/KA6NN is on 21450 Frl/Jsat. afternoons. W86MGY now Extra and is again teaching theory classes in Camarillo. W86QEV installed WR6ASJ (146.625/025) on Oak Hill, reports good coastal coverage. Ventura Cty ARES covered both Oxnard and Camarillo Xmas parades. SB North Co. ARES meets on WR6ASZ (34/94) at 1930 Mon. with N6GC NCS. Lompoc hams are invited to breakfast at Sambos at 8 on Sat. K5WI received a new IC 22S from Santa. The Section ARES Net meets on Sun. at noon at 3935. You should be QNI. Clubs were active with a combined Ventura CtyMike and Key Club Xmas dinner when W6NAZW6VGQ made

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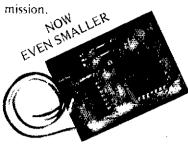
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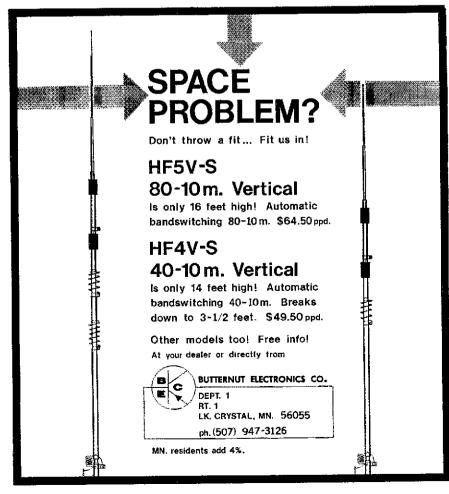
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a slide presentation on broadcasting. Central Coast ARC officers for '78 reelected WA6EBF, pres.; W6GMC, wce-pres.; W6LB, editor. Poinsettla officers are W46KYW, pres.; WA6TMC, vice-pres.; W69YKC, secy.; WD6ASF, treas. SB South ARES now has 75 members and 9 asst. ECs reports EC WA6TUO. PSHR: W46VBS 47, W46LBO 42, K6WI 35, N5MR 34. Traffic: WA6VBS 754, K5BNH 298, N5MR 246, K6WI 236, W46LBO 52, W46LBO 53, W66LBO 52, W46LBO 54, W66LBO 54, W66LBO 55, W66LBO 55, W66LBO 55, W66LBO 56, W66LBO 56,

WEST GULF DIVISION

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Ted Heithecker, WSEJ —
SEC: K5PC. RM: WSGN. Barry Merrill with Phil now working as ASCM also. W5LA has joined the League Staff as Deputy communications Manager. W5GSN PAM for North TX sent a fine operating report. Key City Afronewsletter reports on extensive club activities with complete skeds for traffic nets. DARC election completed with newly elected pres. WASZNZ at the helm. Novice classes are to start very soon. K5VIQ reports activities for 1977 which were heavy enough to make us blush. Irving ARC preparing for election of officers and word of mouth has it that the Christmas Party was one of the best ever. As always, W5PQX sends in the longest OD report, with nearly 100 friendly reminders of questionable operation issued, our congrats for all work well done. Fort Worth KC Club reports transmitter hunts popular, with W65QGH as top banana. There has been much difficulty in getting a slow-speed traffic net going in the North TX region. It appears now that we can get some activity going with W85IHY working together with K6DG to get this activity, going as an aid in — if you're interested in working with this activity, contact W5GN, lets get gg. Appointments in North TX are being overhauded and brought up to date. If your activity reports have not been sent its time to get busy. If you are interested in an appointment, write W5EJ or K5PC. NSCY reports that he will help with the NT traffic net (not existent) or an SS traffic net. The fled River Valley ARC bulletin reports that he will help with the NT traffic net (not existent) or an SS traffic net. The fled River Valley ARC bulletin reports that old W5GTM is working DX with his beam on the ground! W85PLD sports 64 countries confirmed with paper on the wall! and K17AHB was accepted into tull membership in the Club! Panhandle ARC honored by PARC as Operator of the Year, for 1977. The award is given for outstanding contribution to Amateur Radio. Club net is on every evening 3945 at 6 PM. Hurst ARC reported fline Thanksgivin

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Another year has gone by, a year, we feel has shown considerable growth in Amateur Radio in OK. In studying the Net Reports for the past year, we see increases in QNI and QTC, both However, I feel that we still need more participation in our CW nets. The National Weather Service speaks highly of our Weather Net, why not make arrangements to participate. On yes, are you ready for the spring storm season? Congrats to N5KW, our newest OVS. You will be hearing more from this XL. Officers, Chisholm Club, Duncan: WB5RAS, pres; WB5NMS, vice-pres; WB5EOR, secy-treas. This month, we polled all OK LOs for info getting ready for the changes in the LO format. At this writing have received better than 30% return, with all wanting to retain appointments some set the record straight on new calls and other changes. Thank you. 3 BPLs from OK this month. Traffic: WB5NKD 928, WB5NKC 93, WSFKC 869, WSRB 319, K50WK 219, WSUYH 114, KSKXL 99, WA5JGU 91, WB5ELG 90, WA5DUV 81, WB5OSN 74, WB5PC 71, WSSUG 62, WA5MLT 52, WB5OYD 51, WB5SLR 45, WB5UCM 45, WA5ZKI 35, WSFVD 33, WSSSCOR 100, KSCAY 26, WA5FSN 23, WSFKL 22, KSMBK 22, WA5LWD 15, WA5AOH 11, W5JJ 8, WB5TZZ 6, K5EA 2.

SOUTHERN TEXAS: SCM, Arthur R. Ross, W5KR—Asst. SCM/PAM: N5TC, SEC: W5TQP, RM: WASRKU COS: ptrg: N5ZZ W5VAH WB5CIT K5DL. OVS* prrtg WB5CIT W50CP. W5AC participated in Nov SS with ope WB5BPG WB5ITZ K5GN K5VK K5MW. New gear arriver and club will soon be in operation from 160 mtrs through 1.25 mtrs. OPS WA5RVT building new desk to rearrange equipment; reports W51YF has new T5-700S and enjoying 2 mtrs. EC/OBS WB5TNN rprts Brazona ARC officers for 1978: WB5TNN, pres.; WB5ONU, vice-pres. WB5AH, secy.: W51YF, treas.; also prits WD5HWO in new General Class with T5-820S, T5-700S and beams K50EW with 27 ops has been doing good liaison fron TTN to TEX CW. OD/OVS WB5CIT has suffered anothe attack of Oscaritis; will soon be working through Osca 7 on Mode A. N5ZZ moved to Colorado Springs, had to resign from OO appointment but will try in Zero-Land OVS WA5QCP doing extensive experimenting in the GHz range; requests any hints on how to revive a Elmac X-1020 TWT draws 70 mA with 2900 V but rt ou same as rt in and should be 20 W at 5.8-5.9 GHz and higher. Traffic: (Dec.) W5KLV 1207, N5TC 553, K5DG 253 WA55RU 207, W5HKD 193, WA5JYH 183, K5GM 137 K5CEW 122, W5KR 31, K5RQZ 4, (Nov.) W5AC 10.

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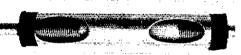
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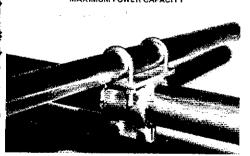
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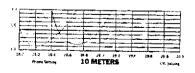
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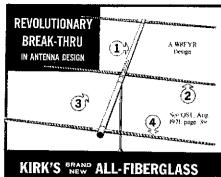
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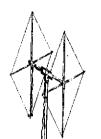
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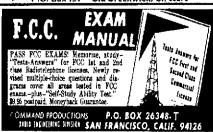
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SELL Collins 75A4 good \$300 excellent \$340, 75A3, excellent, \$275, 75A2, excellent, \$235, Gonset Communicator III with VFO, excellent, \$40, RCA ACR 111 and ACR 133, National SW3 and mod. 1-10 with coils, \$85, no pwr supplies. Many nice battery vintage radios. No rare brands, 914-679-8723, W2GHF, 45 Allen Dr., Woodstock, NY 12498.

SELL: Heath HX-10 xmtr in truly mint condition \$130. WA1UUF, 617-369-9060.

WANTED Collins cw filter, 500 Hz F555Q5, for 75S2. Seyffert, 1700 Church, Scotland Neck, NC 27874

DRAKE R-4B. T-4XB, AC-4, MS-4, all cabling, excellent condition with original manuals and packing materials. Also, homebrew transmatch, and accukeyer with paddle. Complete ham station, all for \$800. Scott Crumpton WB4JTB, 11130 NW9PL, Galnesville, FL 32601.

E. F. JOHNSON Air-Dux parts in good quantity. Send for list. S.a.s.e. please. W6RDL, 3057 so. Higuera, SP-94 San Luis Obispo, CA 93401.

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TR4, AC4, MS4, Mint. Best offer Richard Bernhardt, WB2OFS, 4475 Henry Hudson Parkway, Bronx, NY 10471.

SALE: Drake C-4 Station console. \$325 plus shipping. Gene Zepkin, K4SUH, Post Office Box 6610, Newport News, Virginia 23606. 804-595-9702.

FREE, well almost! Heath TX-1 transmitter (10-80 mtrs), mint condx, with manual: \$110 + shipping. National NC-77X general coverage receiver: \$30. Junk box sate misc. power supplies, tubes, transformers, components: send s.a.s.e. for particulars. T. White, 11230 Hillwood Drive, Huntsville, AL 35803.

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DRAKE TR-4C transceiver w/matching speaker. Excellent condition. \$430. Ron Fraser, 801 City View Dr., Minnetonka, MN 55343. 612-544-0723.

HA10, similar linear amplifier wanted, Swap, self Duo-Bander 84, 80 & 40 mtrs, SSB transceiver 250 watts, PS, manual, perfect condition. Fred A. Wright, Jr., K5HEF, Rt. 11, Box 311A, Tyler, TX 75709.

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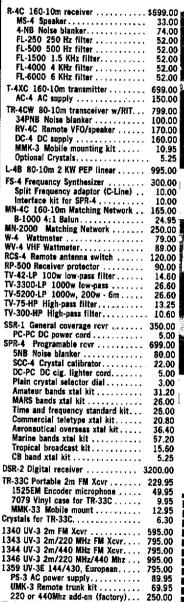
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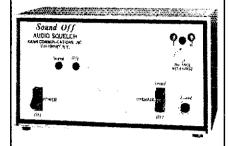
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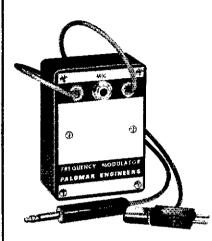
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SELL: Heath HW-202 with mike, excellent, Xtals 34/94 16/76, 07/67, 22/82, 28/88, 63/03, 52/52, 5/8 wave mobile antenna, Package \$190, WA3EEE, Charlle Doggett, P. O Box 35, Henryton, MD. 21080, 301-655-1706.

WANTED: 4CX250B/4BTV vert. W6RQZ, 1330 Curtis Berkeley, CA 94702.

WANTED: Tower, 40' to 60' crank-up and tolder-over Richard Schweizer, WB2PCF, 20 Highridge Road Monroe, NY 10950 914-782-0573.

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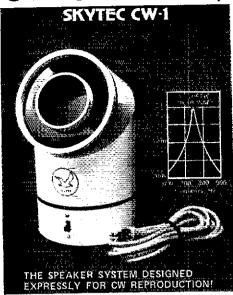
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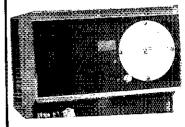
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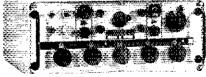
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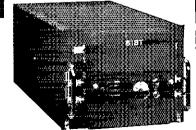
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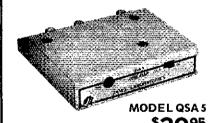
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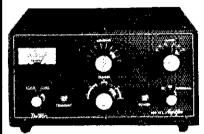


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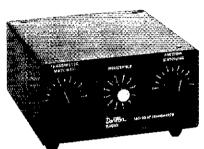




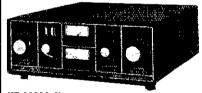
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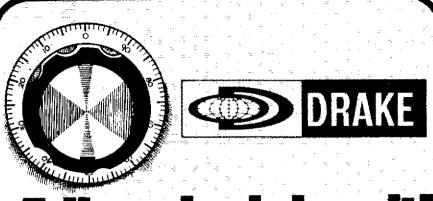




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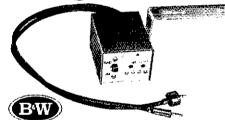


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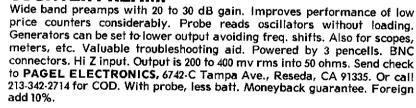
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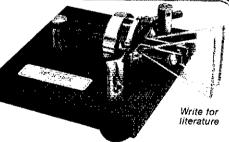
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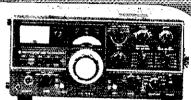


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YAESU FT-221R 2 meter FM - SSB - \$688. Call for Your Price!

IDICOM



FT-620B, 6 meter SSB \$365. Call for Your Price!



ICOM Transceiver 2M FM IC 245 \$499. Call for Your Price!

W51

Prices subject to change



KENWOOD TR7500 2M FM \$299 Call for Your Price!



KENWOOD DG-5 Digital Frequenc Display for TS-520 \$179. Call for

Your

Call for Your Price!





DENTRON MLA-2500 \$799.50. Call for Your Price!

WGUSUGI ROTORS CD44 \$154.95 NOW \$104.95 Ham III \$194.95 NOW \$124.95 NOW \$249.95 Ham X \$349.95 POPULAR DEMAND BACK BY



Towers

10% to

TRI-EX \$825

Sale \$709,95 TRISTAO

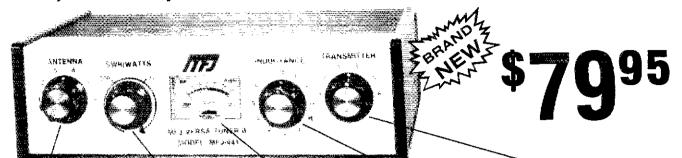
CZ-454 \$745. Sale \$634.9

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HOURS: 9 a.m. to 5 p.m. — Mon. thru En 1/49:30 a.m. to 5:30 p.m. — Sa

This NEW MFJ Versa Tuner II . . .

has SWR and dual range wattmeter, antenna switch, efficient airwound inductor, built in balun. Up to 300 watts RF output. Matches everything from 160 thru 10 Meters: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balance lines, coax lines.



Antenna matching capacitor. 208 pf. 1000 volt spacing.

Sets power range, 300 and 30 watts. Pull for SWR.

Only MFJ gives you this MFJ-941 Versa

Tuner II with all these features at this price:

A SWR and dual range wattmeter (300 and 30 watts full scale) lets you measure RF power output for simplified tuning.

An antenna switch lets you select 2 coax fed antennas, random wire or balance line, and tuner bypass.

A new efficient airwound inductor (12 positions) gives you less losses than a tapped toroid for more watts out.

A 1:4 balun for balance lines, 1000 volt capacitor spacing. Mounting brackets for mobile installations (not shown).

With the NEW MFJ Versa Tuner II you can run your tull transceiver power output — up to 300 watts RF power output — and match your Meter reads SWR and RF watts in 2 ranges.

Efficient airwound inductor gives more watts out and less losses.

Transmitter matching capacitor. 208 pf. 1000 volt spacing.

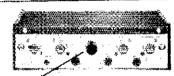
one existing antenna. No need to put up separate antennas for each band.

Increase the usable bandwidth of your mobile whip by tuning out the SWR from inside your car. Works great with all solld state rigs (like the Atlas) and with all tube type rigs.

It travels well, too. Its ultra compact size 5x2x6 inches fits easily in a small corner of your suitcase.

This beautiful little tuner is housed in a deluxe eggshell white Ten Tec enclosure with walnut grain sides.

\$0-239 coax connectors are provided for transmitter input and coax fed antennas. Quality five way binding posts are used for the balance line inputs (2), random wire input (1), and ground (1).

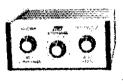


ANTENNÁ SWITCH lets you select 2 coax fed antennas, random wire or balance line, and tuner bypass.

transmitter to any feedline from 160 thru 10 Meters whether you have coax cable, balance line, or random wire.

You can tune out the SWR on your dipole, inverted vee, random wire, vertical, mobile whip, beam, quad, or whatever you have.

You can even operate all bands with just



\$59⁹⁵

WERAND &

MFJ-901 VERSA TUNER

New efficient air wound coil for more watts out.

Only MFJ uses an efficient air wound inductor (12 positions) in this class of tuners to give you more watts out and less losses than a tapped toroid. Matches everything from 160 thru 10 Meters: dipoles, inverted yees, random wires, verticals, mobile whips, beams, balance lines, coax lines. Up to 200 watts till output. I 4 balan for balance lines fone out the SWB of your mobile whip from inside your car. Works with all rigs. Ultra compact 5x2x6 inches 50-239 connectors 5 way binding posts. This Tec enclosure.



\$49⁹⁵

MFJ-900 ECONO TUNER
Same as MFJ-901 Versa Tuner, but does not have built-in

balun for balance lines. Tunes coax lines and random lines.



\$39⁹⁵

MFJ-16010 RANDOM WIRE TUNER

Operate 160 thru 10 Meters. Up to 200 watts RF output. Matches high and low impedances. 12 position inductor. SO-239 connectors. 2x3x4 inches. Matches 2b to 200 chms



\$49⁹⁵

S NEWS

MFJ-202 RF NOISE BRIDGE

This MFJ RF Noise Bridge tets you adjust your antenna quickly for maximum performance. Measure resonant frequency, radiation resistance and reactance. <u>Exclusive</u> range extender and expanded capacitance range (± 150 pl) gives you much extended measuring range.

you much extended measuring range.

Tells resonant frequency and whether to shorten or lengthen your antenna for minimum SWR. Adjust your single or multi-band dipole, inverted vee, beam, vertical, mobile whip or random system for maximum performance. I to 100 MHz. SO-238 connectors. 2x3x4 inches. 9 volt battery.

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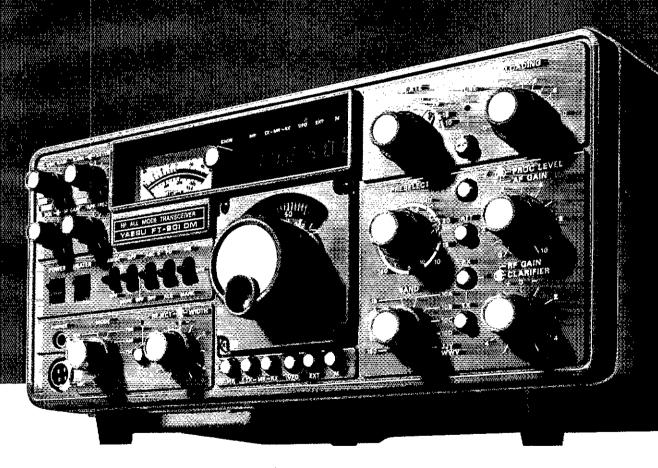
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SPEAK TO THE WORLD IN ANY MODE



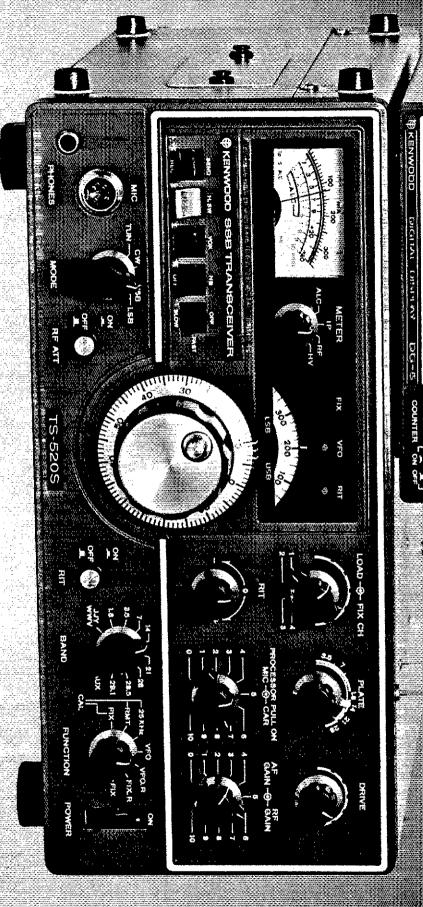
Price And Specifications Subject To Change Without Notice Or Obligation





The <u>smart</u> radio

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