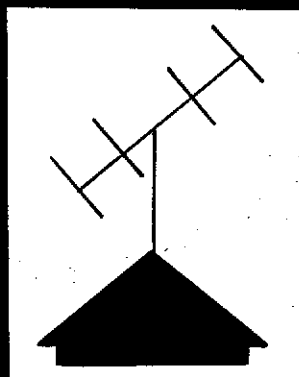


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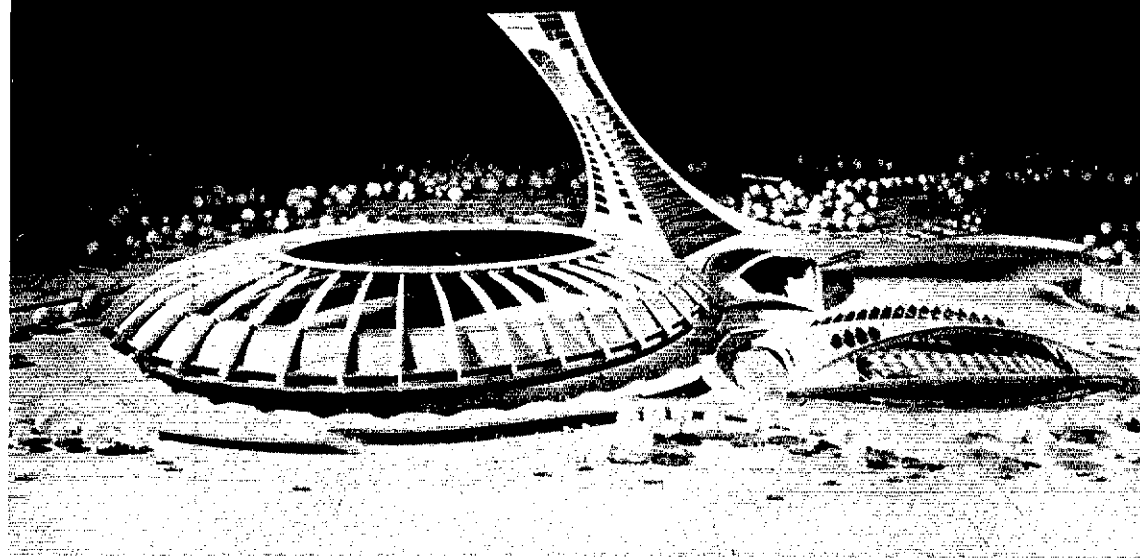
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June 1976

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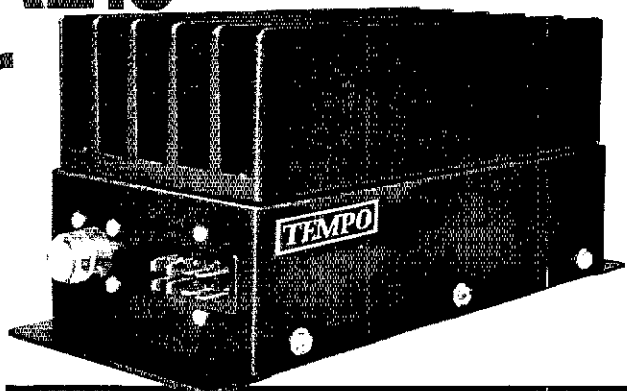


New Twist to Phone Patch Regulations

Page 47

If you own a VHF ONE, a TS-700A or an FT-221

...Tempo's 100AL10 solid state linear is just what you need



Double your pleasure with the first truly linear solid state power amplifier available. The 100AL10 guarantees increased range and clarity in your VHF communications under all operating conditions. It operates in the frequency range of 144-148 MHz with power output of 100W (nom) with 10W (nom) in. Modern solid-state technology is used throughout, along with conservatively rated components to assure the highest possible reliability. Microstrip design on glass epoxy circuit boards give added resistance to damage from shock or prolonged vibration.

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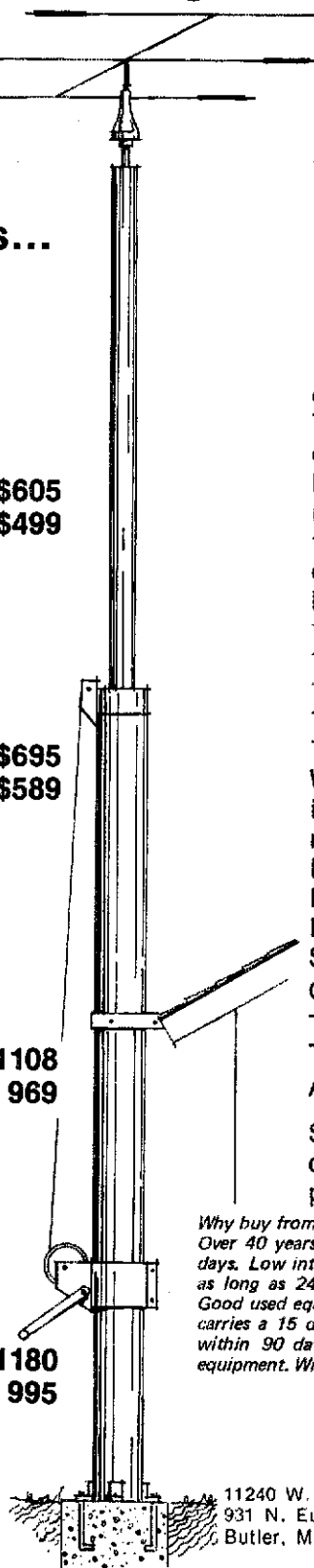
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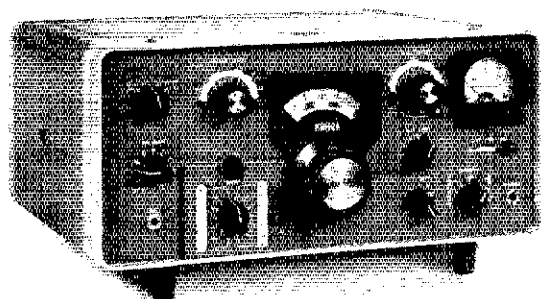
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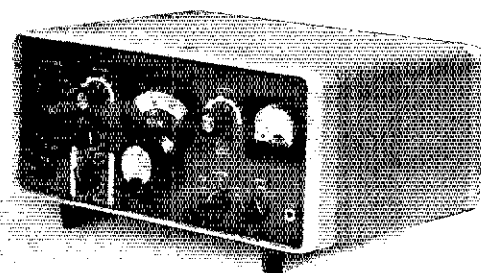
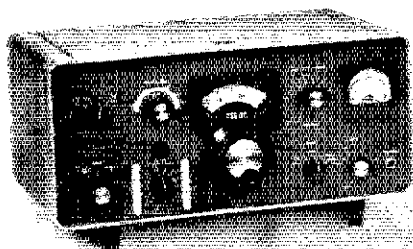
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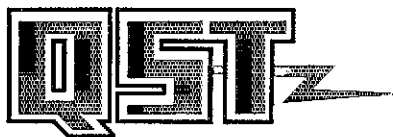
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THE COVER

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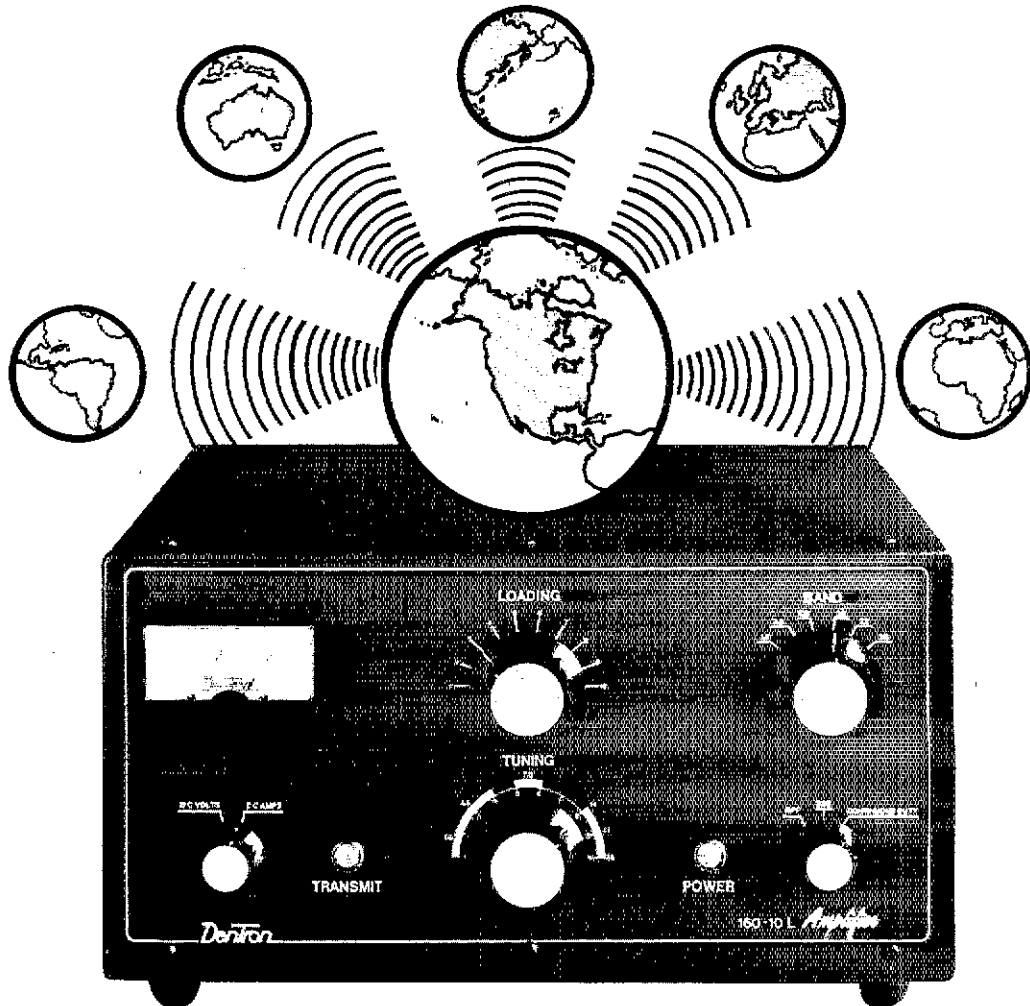
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7 MHz (6.0-9.0) 14 MHz (11.0-16.0)
21 MHz (16.0-22.0) 28 MHz (28.0-30.0)

Power Input: SSB 1200 P.E.P. Continuous
CW 1000 watt DC Continuous
SSTV 1000 watt DC Input 25 minute continuous
RTTY 1000 watt DC input 25 minute continuous
TUNE 1000 watt DC input 15 minute continuous

Output impedance: 50-75 ohms PI network wide range
VSWR not to exceed 2 to 1

Third-order Distortion: Down at least 30 db

Meter Selector Switch-plate, voltage, Plate Current
Built-in Antenna change over relay
Dual-speed Cooling System
AC Input Source 110V or 220V AC, 50-60 Hz
Automatic Circuit Breaker Protection

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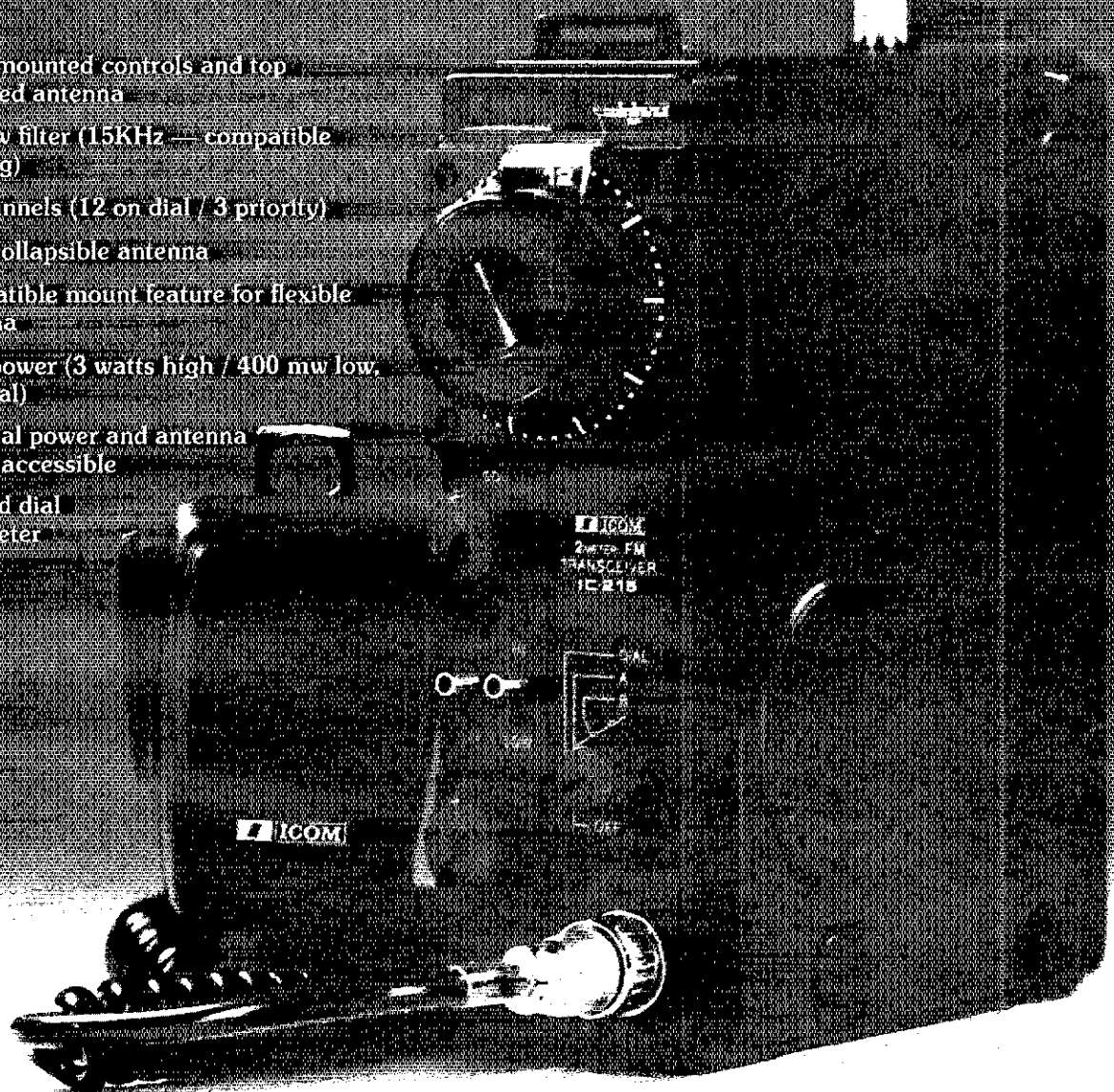
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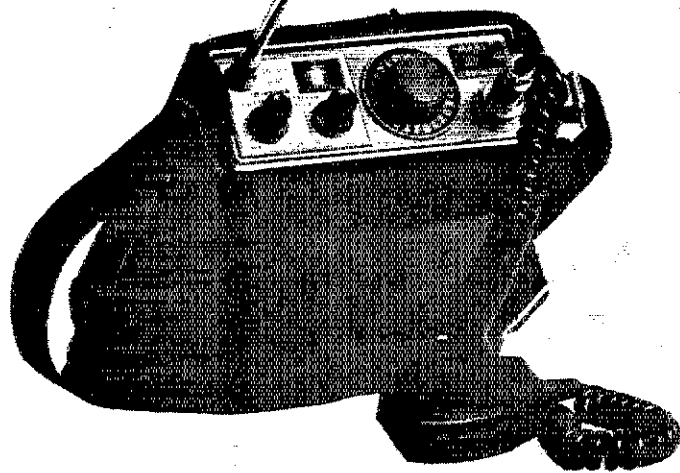
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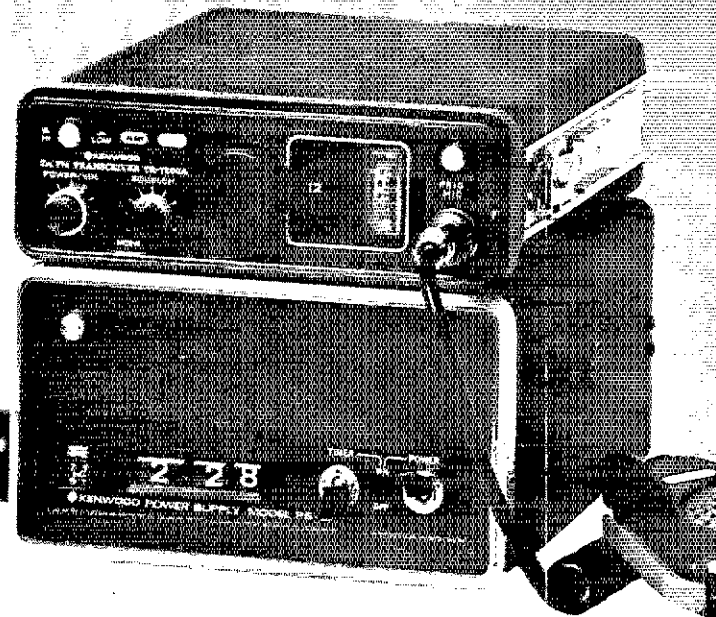


the TR-2200A

Kenwood's high performance portable 2-meter FM transceiver... completely transistorized, rugged and compact.

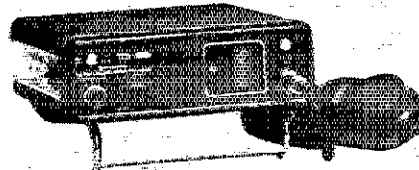
12 channel capacity. Built in telescoping antenna can be easily replaced, or stored in carrying case. Connector for external antenna also. External 12 VDC or internal ni-cad batteries, complete with 120 VAC battery charger. 146-148 MHz frequency coverage. 12 channels, 6 supplied. Battery saving "light off" position. Hi-Lo power switch (2 watts - 400 mW). Sensitivity: 0.5 uV or less/26 dB S+N/N. Built-in speaker. Size: 5-3/8" x 2-5/16" x 7-1/8" 3-3/4 lbs.

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Complete with dynamic mike, DC power cord, mobile mount, mike hanger, auxiliary connector and external speaker plug. Amateur net... \$249.00.

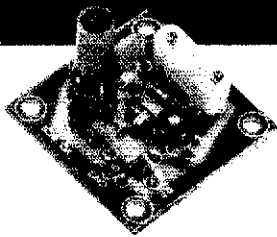
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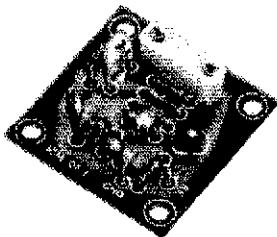
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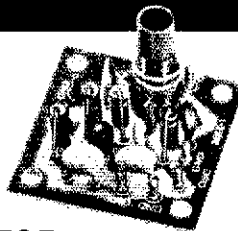
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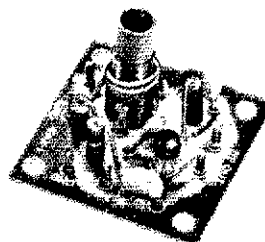
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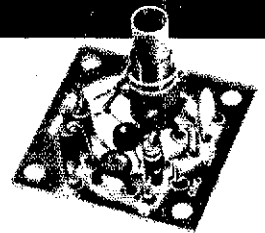
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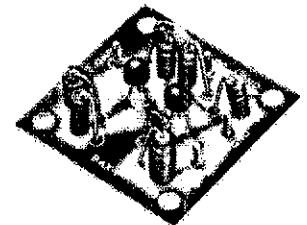
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Reports Invited: All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports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

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THE AMERICAN RADIO RELAY LEAGUE, INC.



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

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

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

Inquiries regarding membership are solicited.

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

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"It Seems to Us..."

Onward and Upward

What's the most pressing problem in amateur radio today? It depends on where you sit, perhaps. Out along the West Coast, one of the most pressing problems is that of deliberate interference to WESCARS and the fact that complaints to the League, to the FCC, and to the courts don't seem to bring any relief.

If you're a traffic handler, life's most pressing problem is getting enough good traffic to keep the nets busy.

If you're a DXer, the most pressing problems may relate to Rule 9, or the fact that there are either too many or not enough new countries to keep the pot boiling.

Or if you're concerned with WARC preparation, you're worried about whether the Amateur Radio Service can continue to justify occupying space in the spectrum. And, sitting where we do, that does indeed appear to be one of our more pressing problems. An Advisory Committee for Amateur Radio is now immersed in the project of establishing a solid position for amateur radio here in the United States, and obviously many of our arguments on behalf of the Amateur Radio Service have to be based either on what happened in the past or what is happening now. In some areas we are in good shape — in other areas we could stand some improvement.

It seems to us that we amateurs need to make a good deal more use of the uhf and above. We have large chunks of spectrum up there that are being used by only a small number of hardy experimenters. What is needed is a more vigorous expansion into the higher reaches of the spectrum.

The upward move is inevitable. Two meters will soon be overloaded from one end of the band to the other, an overloading that has been enhanced by the massive growth of fm the past few years. The 220-MHz band is fast becoming overcrowded, particularly in the

larger metropolitan areas. The same for 420. There is, literally, no space left in those three bands in many areas of North America.

This same situation exists in other radio services. It is obvious from what we learn during preparations for WARC-79 that other services would like spectrum space in or around 140-150 MHz. But the space just isn't available. There are a number of us who believe that the only real and long-term solution lies in a move to 900 MHz for a number of the mobile services. There's just no use in postponing the inevitable.

The same goes for the amateur service. Now is the time to head for 1215 and above. There's no sense in postponing the inevitable. The quicker we make the move, the quicker we'll take some of the pressure off our bands at 144 and 220 and 420, and the better we'll be able to justify our retention of our bands at 1215 and above.

How to go about it? Well, why not consider what they have done in Europe. Different groups or societies there have "adopted" various bands and have made a determined push to see to it that experiments are conducted on those bands, that equipment is developed for those bands, and that communication takes place on those bands. The way we hear it, 10 GHz, for example, is a veritable hot bed of activity in the United Kingdom. Today's experiments on that band are going to make it possible tomorrow for hundreds of stations to operate there with ease and success.

So, all you uhf and microwave groups and enthusiasts out there, adopt a band! Tell us about your experiments and your successes; let us know what we can do to help; let's tell everyone else what you're doing; let's stir up some more activity in the higher reaches of the spectrum, now. — W1RU

League Lines...

Olympic fever -- even governments get it! The Canadian Department of Communications reports that special agreements will permit the handling of third party messages during the Olympic Games in Montreal July 3 through August 15. Messages will be permitted between Canada and the following countries (prefixes in parentheses): Bahamas (C6A), Belize (VP1), Bolivia (CP), Cameroon (TJ), Chile (CE), Colombia (HK), Congo (TN), Costa Rica (TI), Cuba (CM and CO), Dominican Republic (HI), Ecuador (HC), El Salvador (YS), Ethiopia (ET), Fiji (3D), Ghana (9G1), Guatemala (TG), Guyana (8R), Honduras (HR), Hong Kong (VS6), Israel (4X), Ivory Coast (TU), Republic of Korea (HM), Mexico (XE), Nicaragua (YN), Niger (5U), Peru (OA), Philippines (DU), Trinidad & Tobago (9Y), United States Uruguay (CX), Venezuela (YV), and Zambia (9J). Listen to WIAW bulletins for possible additions to the list.

Individuals or groups contemplating ten-meter repeater installations are again cautioned to avoid the Oscar downlink passband from 29.40 to 29.55 MHz when selecting input/output frequencies. (FCC recently made 29.5 to 29.7 MHz available for repeaters.) The 29.50 to 29.55 MHz segment will be available for repeaters when Oscar 6, already 3-1/2 years old, ceases operation.

The Library of Congress advises that the recording of the 1975 edition of How to Become a Radio Amateur is now ready for distribution to the blind through their system of regional libraries.

To kick off the ARRL National Convention in Denver, a one-watt balloon-borne repeater on 146.16/146.76 will be launched on Friday morning, July 16. The balloon is expected to reach an altitude of 100,000 feet before beginning its descent. Special convention station NCØARL will be giving out contacts through the repeater, which should have a range of several hundred miles. Three co-channel repeaters have agreed to cooperate by shutting down for the day. Reports should be sent to Ken Kopp, WØOQM, Box 242, Longmont, CO 80501.

A vacancy exists in the Public Service Branch of the ARRL Communications Department, applicants with NTS and/or AREC experience preferred. Interested? Write Hq., with qualifications and background.

Still tuned in to tubes? Does solid-state pose a barrier to you? Let's Talk Transistors, a reprint of a popular QST series, is available from Hq. in pamphlet form for \$1.00, postpaid.

FCC says they received 11,458 amateur applications in February, up 58% from a year ago. But 480 had to be returned because the incorrect fee was sent: 160 sent \$9.00 (present fee for new or renewed license is \$4.00); 160 sent nothing; 80 were Novice applications (the Novice is free); and 80 were for special calls from ineligible applicants or from applicants who didn't pay the special \$25 fee.

FCC counted 263,896 amateur operator's licenses as of the end of February, with all classes up except Conditional and General. Most encouraging is the number of Novices, now 24,154. Others: Technician 51,664, Conditional 25,633, General 80,313, Advanced 67,636, Extra 14,496.

Now available: the Spring issue of Radio Club News, free to any club officer. This issue contains valuable information on Field Day, ham radio PR, licensing classes, and more. Write Hq. for your copy today.

A new service from the Club and Training Department: any affiliated club that gives us two weeks notice and the Zip codes for their area may request the names and addresses of ARRL Associate Members in their vicinity. This should really pay off for those licensing classes you're planning for this summer and fall!

Quoted from a report of the WARC Advisory Committee for International Broadcast, adopted at its May 4 meeting as a part of its justification for greatly-increased spectrum: "Two consequences of this severe congestion have been, first, the use of multiple transmitters to carry the same program, and, second, the introduction of increasingly greater power." Presumably, broadcasters use these techniques to lessen the effect of interference from other broadcasters. But others would say that the sentence would be more correct if the word "consequences" were replaced with "causes"!

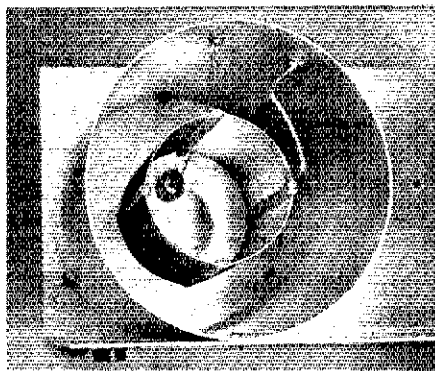
Helical-Resonator Design Techniques

W1DTY offers some simple design notes for solving spurious responses with helical resonators at vhf and uhf.

James R. Fisk,* W1DTY

Because rf interference is present throughout the spectrum, high-performance communications systems require the use of high- Q , low-loss band-pass filters. At frequencies up to about 30 MHz or so, this can usually be accomplished with lumped-constant, inductance-capacitance tuned circuits or crystal filters. Above 50 MHz, however, it is difficult to build practical, low-loss band-pass circuits with conventional LC components, and crystal filter, if you can find some that meet your exact requirements, are expensive.

Although some amateurs use quarter-wavelength coaxial cavities on 50, 144, and 220 MHz, the helical resonators shown in Fig. 1 are usually a better choice as they are smaller and



easier to build. In the frequency range from 30 to 100 MHz, where it's difficult to build high- Q inductors, and because coaxial cavities are very large, the helical resonator is an excellent choice. At 50 MHz, for example, a capacitance-tuned, quarter-wavelength coaxial cavity with an unloaded Q of 3000 would be about 4 inches (10.1 cm) in diameter and nearly 5 feet (1.5 m) long. On the other hand, a helical resonator with the same unloaded Q is about 8.5 inches (21.6 cm) in diameter and 11.3 inches (28.7 cm) long. Even at 432 MHz, where coaxial cavities are common, the use of a helical resonator will result in substantial size reductions.

Often considered as vhf devices, helical resonators are also suitable for many amateur applications on the lower frequencies, as demonstrated by the 15-, 20-, and 40-meter helical filters described in *QST* by W1FBY and WA1JLD.¹ High performance helical resonators have been built for frequencies ranging from less than 2 MHz, in a shield 8 inches (20.3 cm) in

diameter, up to 5000 MHz, in a shield 0.5 inch (1.3 cm) in diameter. Unloaded Q s ranged from 500 to 3000 or more, depending upon size and operating frequency (see Fig. 2).

The helical resonator has often been described simply as a coil surrounded by a shield, but it is actually a shielded, resonant section of helically wound transmission line with relatively high characteristic impedance and low axial propagation velocity. The electrical length is about 94 percent of an axial quarter wavelength or 84.6 electrical degrees. One lead of the helical winding is connected directly to the shield and the other end is open circuited as shown in Fig. 1. Although the shield may be any shape, only round and square shields will be considered in this article.

*Editor-in-Chief, *Ham Radio Magazine*, Greenville, NH 03048

Fig. 1 — Round and square helical resonators, showing principal dimensions. Diameter, D (or side, S) is determined by the desired unloaded Q . Other dimensions are expressed in terms of D (or S) as described in the text.

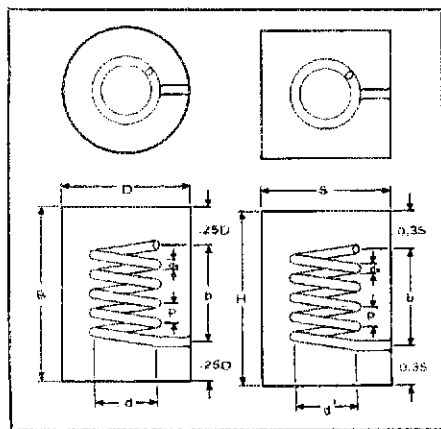
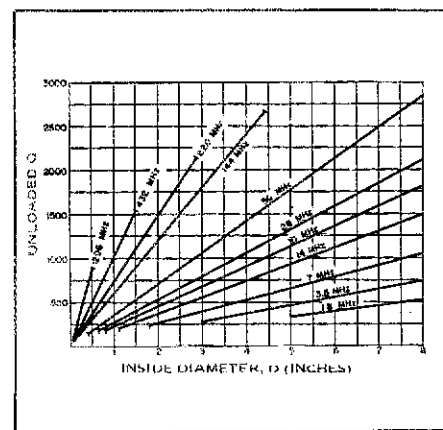


Fig. 2 — Helical resonator unloaded Q vs shield inside diameter, D , for the amateur bands from 1.8 to 1296 MHz. Diameters greater or smaller than those indicated by the plots should not be used. This essentially limits the use of this type of resonator to the amateur bands below 450 MHz.



¹ This and subsequent footnotes will appear on page 14

The fringing capacitance at the open-circuited end of the helix is about 0.15D pF [i.e., approximately 0.3 pF for a shield two inches (5.1 cm) in diameter].

Design

The unloaded Q of a helical resonator is determined primarily by the size of the shield. For a round resonator with a copper coil on a low-loss form, mounted in a copper shield, the unloaded Q is given by:

$$Q_u = 50D \sqrt{f_o} \quad (\text{Eq. 1})$$

where D is the inside diameter of the shield in inches and f_o is the frequency in MHz. If the shield can is square, assume D to be 1.2 times the width of one side. This formula, which includes the effects of losses and imperfections in practical materials, yields values of unloaded Q which are easily attained in practice. Silver plating of the shield and coil will increase the unloaded Q by about 3 percent over that predicted by Eq. 1. At vhf and uhf, however, it is more practical to increase slightly the size of the shield (i.e., increase the selected Q_u by about 3 percent before making the calculation).

Once the required shield size has been determined, the total number of turns, N , winding pitch, P , and charac-

teristic impedance, Z_o , for round and square helical resonators with air dielectric between the helix and shield, are given by:

$$N = \frac{1908}{f_o D} \quad N = \frac{1590}{f_o S} \quad (\text{Eq. 2})$$

$$P = \frac{f_o D^2}{2312} \quad P = \frac{f_o S^2}{1606} \quad (\text{Eq. 3})$$

$$Z_o = \frac{99,000}{f_o D} \quad Z_o = \frac{82,500}{f_o S} \quad (\text{Eq. 4})$$

In these equations dimensions D and S are in inches, and f_o is in MHz. The design nomograph for round helical resonators in Fig. 3, which can be used with slide-rule accuracy, is based on these formulas.⁷

Although there are many variables to consider when designing helical resonators, certain ratios of shield size and length, and coil diameter and length, will provide optimum results.² For helix diameter, $d = 0.55D$, or ($d = 0.66S$). To determine helix length, $b = 0.825D$ or ($b = 0.99S$). For shield length, $B = 1.325D$ and ($H = 1.60S$).

Calculation of these dimensions is simplified by the design chart of Fig. 4. Note that these ratios result in a helix with a length 1.5 times its diameter, the condition for maximum Q . The shield is

about 60 percent longer than the helix — although it can be made longer — to completely contain the electric field at the top of the helix and the magnetic field at the bottom.

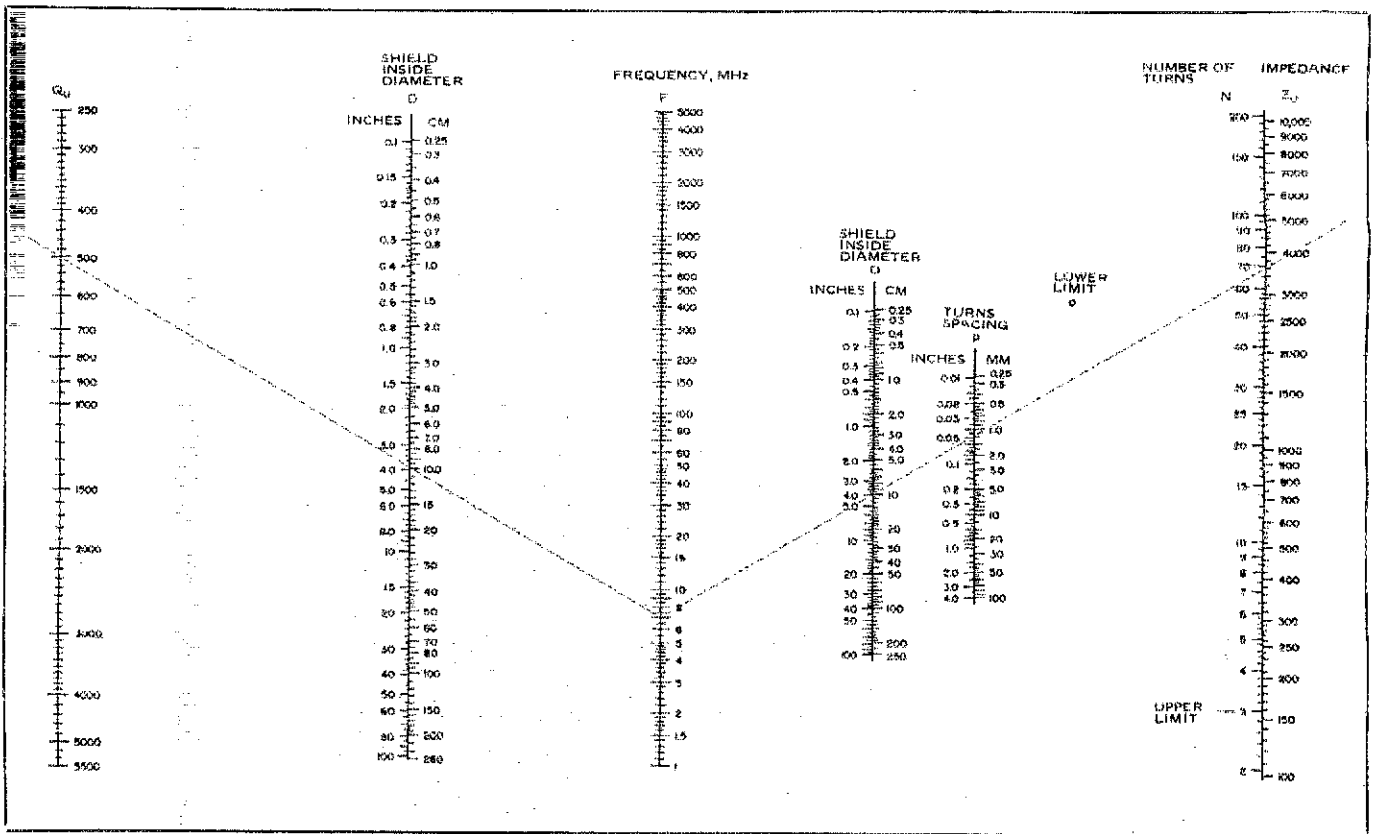
It should be mentioned that the winding pitch, P , is used primarily to determine the required conductor size. During actual construction the length of the coil is adjusted to that given by Eq. 6. Conductor size ranges from $0.4P$ to $0.6P$ for both round and square resonators and is plotted graphically in Fig. 5.

Obviously, an area exists (in terms of frequency and unloaded Q) where the designer must make a choice between a conventional cavity (or lumped LC circuit) and a helical resonator.³ At the higher frequencies, where cavities must be considered, the choice is affected by shape factor; a coaxial resonator is long and relatively small in diameter while the length of a helical resonator is not much greater than its diameter. A second consideration is that point where the winding pitch, P , is less than the radius of the helix (otherwise the structure tends to be nonhelical). This condition occurs when the helix has less than three turns ("upper limit" on the design nomograph of Fig. 3).

At the lower frequencies a lumped-constant tuned circuit is preferred over

Fig. 3 — Design nomograph for round helical resonators. After selecting unloaded Q_u , required shield diameter is indicated by index line from Q_u scale to frequency scale (dashed index line shown here indicates a shield diameter of about 3.8 inches, 9.7 cm, for an unloaded Q of 500 at 7 MHz). Number of turns, N , winding pitch,

P , and characteristic impedance, Z_o , are determined by index line from the frequency scale through previously determined shield diameter on right-hand side of the chart (index line indicates $P = 0.047$ inch, 1 mm, $N = 70$ turns, and $Z_o = 3600$ ohms). A similar design chart for square resonators is available from the author.



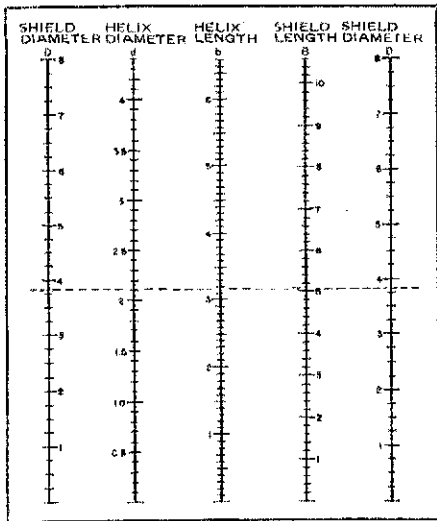


Fig. 4 — Helical-resonator design chart. After the shield diameter has been determined, helix diameter, d , helix length, b , and shield length, B , can be determined with this graph. Index line indicates that a shield diameter of 3.8 inches (9.7 cm) requires helix mean diameter of 2.1 inches (5.3 cm), helix length of 3.1 inches (7.9 cm), and shield length of 5 inches (12.7 cm).

the helical resonator when the diameter of the helical inner conductor is less than five times the skin depth ("lower limit" on the nomograph). Between these two limits, however, the helical resonator provides superior performance.

Design Examples

A round helical resonator with an unloaded Q of 1000 is required for 50 MHz. From Fig. 3 or the formulas, $D = 2.8$ inches (7.1 cm), inside diameter; $N = 13.6$ turns; winding pitch, $P = 0.17$ inch (4.5 mm); helix mean diameter, $d = 1.5$ inches (3.8 cm); helix length, $b = 2.3$ inches (5.9 cm); and shield length, $B = 3.7$ inches (9.4 cm). The conductor diameter may be any size between 0.07 and 0.10 inch (1.7 mm to 2.6 mm).

A square helical resonator with an unloaded Q of 2000 is required for 29 MHz. From the formulas, the dimension of each side, $S = 6.2$ inches (15.7 cm); $N = 8.9$ turns; winding pitch, $P = 0.69$ inch (1.8 cm); helix mean diameter, $d = 4.1$ inches (10.4 cm); helix length, $b = 6.14$ inches (15.6 cm); and shield height, $H = 9.9$ inches (25.2 cm). The conductor can be any size between 0.28 and 0.41 inch (7.1 mm to 10.4 mm).

Construction

To obtain as high an unloaded Q as possible, the shield should not have any seams parallel to the axis of the helix. This is usually not a problem with round resonators because large-diameter copper tubing is used for the shield, but square resonators require at least one

seam and usually more. However, the effect on unloaded Q is minimal if the seam is silver soldered carefully from one end to the other.

Best results are obtained when little or no dielectric is used inside the shield. This is usually no problem at vhf and uhf because the conductors are large enough that a supporting coil form is not required. At lower frequencies, where the wire size is smaller and a coil form is required, a very thin form can be made from a strong, low-loss dielectric such as Teflon. B&W Miniductor coil stock is also a good choice (note that a tinned conductor can be used up to about 100 MHz without seriously affecting the unloaded Q of the resonator). The lower end of the helix should be soldered to the inside of the shield at a point directly opposite from the bottom of the coil.

Although the external field is minimized by the use of top and bottom covers, the top and bottom of the shield may be left open with negligible effect on frequency or unloaded Q . If covers are provided, however, they should make good electrical contact with the shield. In those resonators where the helix is connected to the bottom cover, that cover must be soldered solidly to the shield to minimize losses.

Tuning

A helical resonator designed from the nomograph of Fig. 3, if carefully built, will resonate very close to the design frequency. Resonance can be adjusted over a *small* range by slightly compressing or expanding the helix. If the helix is made slightly longer than that called for in Fig. 4, the resonator can be tuned by pruning the open end of the coil. However, neither of these methods is recommended for wide frequency excursions because any major deviation in helix length will degrade the unloaded Q of the resonator.

Most helical resonators are tuned by means of a brass tuning screw or high

quality air-variable capacitor across the open end of the helix. Piston capacitors also work well, but the Q of the tuning capacitor should ideally be several times the unloaded Q of the resonator. Varactor diodes have sometimes been used where remote tuning is required,⁴ but varactors can generate unwanted harmonics and other spurious signals if they are excited by strong, nearby signals.

When a helical resonator is to be tuned by a variable capacitor, the shield size is based on the chosen unloaded Q at the operating frequency. Then the number of turns, N and the winding number of turns, N , and the winding pitch, P , are based on resonance at $1.5f_o$. tune the resonator to the desired operating frequency, f_o .

For example, assume you want a round helical resonator with an unloaded Q of 1200 that will tune over the entire two-meter band ($f_o = 146$ MHz). The required shield diameter, from Fig. 3, is 2 inches (5.1 cm); from Fig. 4, helix mean diameter, $d = 1.1$ inches (2.8 cm); helix length, $b = 1.65$ inches (4.2 cm); and shield length, $B = 2.65$ inches (6.7 cm). The remainder of the design is based on resonance at 1.5 times the center of the desired tuning range: $1.5(146 \text{ MHz}) = 219 \text{ MHz}$. From the nomograph, the number of turns, $N = 4.4$ (use 4.5) and winding pitch, $P = 0.38$ inch (9.5 mm). Conductor diameter ranges from 0.15 to 0.23 inch (3.8 to 5.8 mm), so 3/16-inch (4.5 mm) diameter copper tubing would be a good choice.

The required tuning capacitor is computed by using transmission-line equations. From the nomograph, the characteristic impedance, Z_o , is 226 ohms. As noted previously, the electrical length of the conductor, θ , is 84.6 degrees. The reactance looking into a short-circuited line is given by: $X = Z_o \tan \theta \therefore X = 226 \tan 84.6^\circ = 226(10.579) = 2391$ ohms. This is equal to the reactance of the fringing capaci-

Fig. 5 — Helix conductor size vs winding pitch, P . A winding pitch of 0.047 inch (1 mm), for example, dictates a conductor diameter between 0.019 and 0.028 inch (number 22 or 24 AWG).

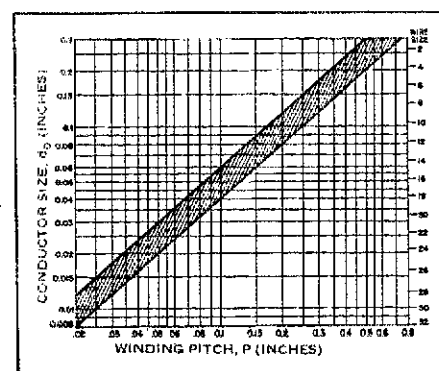
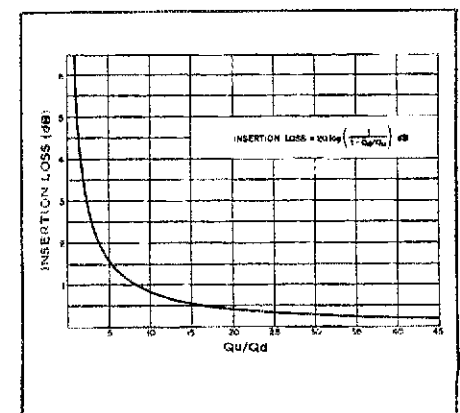


Fig. 6 — Insertion loss of all tuned resonant circuits is determined by the ratio of loaded to unloaded Q as shown here.



tance, C_f , at 219 MHz and equals 0.3 pF. At 144 MHz: $\theta = (144/219)84.6$ degrees = 55.6 degrees, $X = Z_o \tan \theta = 226 \tan 55.6$ degrees = 330 ohms, and $C_f = 1/2\pi fX = 1/2\pi(144 \cdot 10^6)(330) = 3.35$ pF.

At 148 MHz: $\theta = (148/219)84.6$ degrees = 57.2 degrees, $X = Z_o \tan \theta = 226 \tan 57.2$ degrees = 351 ohms, and $C_f = 1/2\pi fX = 1/2\pi(148 \cdot 10^6)(351) = 3.07$ pF. When the fringing capacitance, C_f , is deducted, the required tuning capacitance, C_t , is 2.7 to 3.0 pF to tune from 144 to 148 MHz. This capacitance can be provided with a 1/4-inch (6.5 mm) brass tuning screw mounted in the center of the top cover.

Insertion Loss

The insertion loss (dissipation loss), IL, in dB, of all tuned resonant circuits is given by:

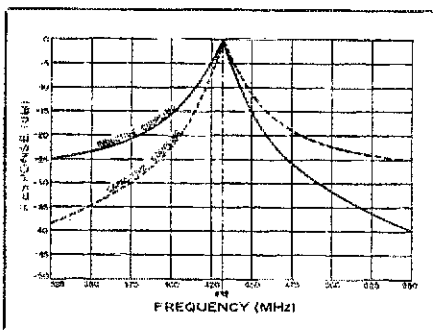
$$IL = 20 \log \left(\frac{1}{1 - Q_d/Q_u} \right) \text{ dB (Eq. 5)}$$

where Q_d is the loaded Q , and Q_u is the unloaded Q . This is plotted in Fig. 6. For most practical cases ($Q_d > 5$) this can be closely approximated by: $IL \cong 9.0 (Q_d/Q_u)$ dB. The selection of a loaded Q for a tuned circuit is dictated primarily by the required selectivity of the circuit. However, to keep dissipation loss to 0.5 dB or less (as is the case for low-noise vhf receivers), the unloaded Q must be at least 18 times the loaded Q . Although this may be difficult to achieve in practice, it points up the necessity of considering both selectivity and insertion loss before choosing the unloaded Q of any resonant tuned circuit.

Coupling

Signals may be coupled into and out of helical resonators with inductive loops at the bottom of the helix, capacitive probes at the top of the helix, direct taps on the coil, or any combination of these. Although the correct tap point

Fig. 7 — Response curve for a single-resonator 432-MHz filter showing the effects of capacitive and inductive input/output coupling. Response curve can be made symmetrical on each side of resonance by combining the two methods (inductive input and capacitive output or vice versa).



can be calculated easily, coupling by loops and probes must be determined experimentally. When only one resonator is used, the input and output coupling is often provided by probes. For maximum isolation the probes are positioned on opposite sides of the resonator.

When coupling loops are used, the plane of the loop should be perpendicular to the axis of the helix and separated a small distance from the bottom of the coil. For resonators with only a few turns, the plane of the loop can be tilted slightly so it is parallel with the slope of the adjacent conductor. Helical resonators with inductive coupling (loops) will exhibit more attenuation to signals above the resonant frequency (as compared to attenuation below resonance) whereas resonators with capacitive coupling (probes) exhibit more attenuation below the passband as shown for a typical 432-MHz resonator in Fig. 7. This characteristic may be a consideration when choosing a coupling method. The passband can be made more symmetrical by using a combination of coupling methods (inductive input and capacitive output, for example).

If more than one helical resonator is required to obtain a desired bandpass characteristic, adjacent resonators may be coupled through apertures in the shield wall between the two resonators. Unfortunately, the size and location of the aperture must be found empirically, so this method of coupling is not very practical unless you're building a large number of identical units.

Since the loaded Q of a resonator is determined by the external loading, this must be considered when selecting a tap (or position of a loop or probe). The ratio of this external loading, R_b , to the characteristic impedance, Z_o , for a quarter-wavelength resonator is calculated from:

$$K = \frac{R_b}{Z_o} = 0.785 \left(\frac{1}{Q_d} - \frac{1}{Q_u} \right) \text{ (Eq. 6)}$$

For the tunable two-meter helical resonator described earlier ($Q_u = 1200$) with a loaded Q of 100: $K = 0.785 [(1/100) - (1/1200)] = 0.0072$. This loading factor is to be divided equally between the generator (input) and output load. Assuming a 50-ohm generator, the correct tap point is θ_1 degrees from the shorted end of the helix:

$$\sin \theta_1 = \sqrt{\frac{0.5KR}{Z_o}} = \sqrt{\frac{0.0036(50)}{226}} = 0.028$$

$$\theta_1 = 1.6 \text{ degrees (Eq. 7)}$$

Ratios are used to find the tap point in terms of the number of turns, N_1 , from the short-circuited end of the helix: N_1

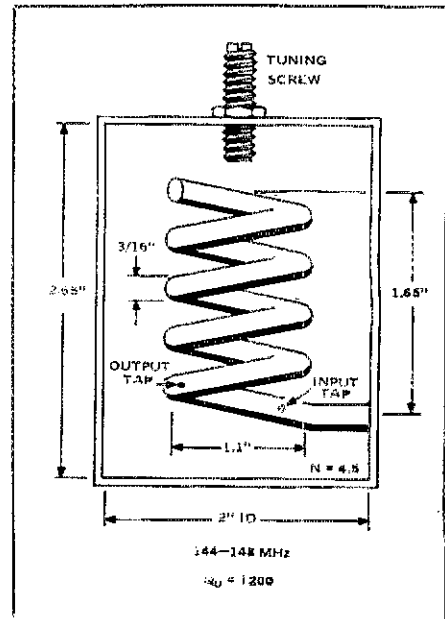


Fig. 8 — Tunable helical resonator covers the entire two-meter band with loss of slightly greater than 0.5 dB. Complete design procedure is discussed in the text.

$= N(\theta_1/\theta) = 4.5(1.6^\circ/55.6^\circ) = 0.13$ turn. Since the length of one turn of the 1.1-inch (2.8 cm) diameter helix is approximately 3.5 inches (7.6 cm), the 50-ohm tap point is about 0.45 inch (11 mm) from the shorted end.

The tap point for a 1000-ohm load (such as the drain of an FET), is located θ_2 degrees from the shorted end:

$$\sin \theta_2 = \sqrt{\frac{0.5KR}{Z_o}} = \sqrt{\frac{0.0036 \times 1000}{226}} = 0.126 \text{ (Eq. 8)}$$

$$\theta_2 = 7.2 \text{ degrees}$$

$$N_2 = N(\theta_2 + \theta) = 4.5(7.2^\circ + 55.6^\circ) = 0.6 \text{ turn}$$

The completed resonator is shown in Fig. 8.

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Your Radio Signal — Short May It Wave

Frequency, wavelength, mega, kilo, oscillators, cw and ssb are all things that you will need to know for your Novice exam. Better brush up!

By Margaret Koerner,* WBØBEM

In any basic study of radio theory we find many similarities between electricity and water — similarities of terms and similarities of activity. Both water and electricity have current flow which depends for the most part on the pushing force behind it and the resistance it encounters. Water seeks its own level, and electrical currents seek to even out their respective voltage levels between connected points. Both water and electricity can be stored. Here in semi-arid Colorado, water is stored in reservoirs and released through ditches and pipes to irrigate the land, supply water for homes, and provide for a multitude of other uses. Electrical energy can be stored on the plates of capacitors or in storage batteries of various kinds. In addition to these and other similarities, water and electrical phenomena, including radio, exhibit energy in the form of waves.

Water waves are familiar to all of us, whether they are giant ocean waves set in motion by wind and earthquakes or are nothing more than tiny ripples spreading out behind the webbed feet of ducks on quiet ponds. The height of a wave's crest above the water surface at rest, or the depth of its trough below that surface, is called its *amplitude* and indicates the amount of energy which created it and is still contained in it. The distance from peak to peak of either its adjacent crests or its adjacent troughs is called its *wavelength*; the movement from the start of the wave at the level surface, through a crest peak, a trough peak, and back to the level surface is called a *cycle*. The number of such

cycles that it makes in a given period of time is called its *frequency*. See Fig. 1.

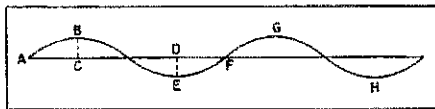


Fig. 1 — At A, water surface at rest. A to F = 1 cycle. The number of cycles in a given period of time = frequency of the wave. B to C or D to E = maximum amplitude of wave; B to G or E to H, or A to F = wavelength.

Radio waves, too, have amplitude, wavelength, cycles and frequency, though they are not created by earthquakes, wind or any web-footed birds (Drakes and Swans excepted). Instead, they are created by a rapid back and forth flow of current between capacitors and coils, by the equally rapid mechanical vibrations in quartz crystals, or by the electronic activity associated with tubes and transistors. The basic radio wave generated in the transmitter is called a *carrier wave*. Until it is changed in some way it contains no information, and having been radiated from an antenna will emerge as a single tone from receivers designed to receive code and sideband-voice transmissions. You may hear this tone when someone, somewhere, is "tuning up" his transmitter. At the same time you may hear another ham say (and sound annoyed as he does so), "I missed the last half of that transmission. Someone threw a carrier right on frequency."

Carrier waves are represented in illustrations as *sine* (pronounced sign) waves.



Fig. 2

with the height of their lines indicating their amplitude or strength. Refer to Fig. 2.

The cycles of the carrier wave are considered to be the movement from the point of no-current flow to a peak in one direction, to a peak in the opposite direction, and back to the no-current line. This reversing routine takes place not at a leisurely 60-cycles-per-second rate as does household current, but at frequencies which in the amateur bands vary from 1,800,000 to more than 148,000,000 cycles per second. For the sake of convenience, measurement of such frequencies is usually expressed in terms of *kilohertz* (kilocycles per second), or *megahertz* (megacycles per second). The word "hertz" (Hz) was coined to honor Heinrich Hertz, a German physicist who discovered electromagnetic waves sometime between 1886 and 1888. Hertz is not a synonym for the word "cycle" but is a synonym for three words, "cycles per second."

Kilo and *mega* are prefixes used in the metric system, a system of measurements used by scientists throughout the world. As a beginner one should become familiar with the metric terms used by hams. The prefix *kilo* means *thousand*, so a kilohertz (kHz) means 1000 cycles

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per second. Mega means *million* and a megahertz (MHz) equals one million cycles per second or 1000 kHz. When you are taking your license exam, it is important to note whether Hz, kHz, or MHz are designated in the question or involved in its answer. It is also important to know how to change any one of these measurements to another. If you already know how to do this, skip the following detour.

Detour

To change Hz to kHz, or to change kHz to MHz, or MHz to Hz, etc., involves moving the *decimal point* either three places or six places to the left or right from where the decimal stands in the stated number. Remember that for a number which has no decimal indicated, the decimal point is *implied* at the end of the number. Moving the decimal to the *left* changes the amount of small units contained in any given number to the amount of larger ones in that same number; moving to the *right* changes the number of large units to the number of smaller ones. Suppose, for example, that 7200 kHz must be changed to hertz or MHz. Since a kHz unit is a thousand times larger than the Hz or cycles-per-second unit, move the decimal three places to the right and you'll find that 7200 kHz equals 7,200,000 hertz. To change 7200 kHz to MHz, however, move three places to the left and get 7.2 MHz.

Changing from one metric measurement to another is similar to changing feet to inches or yards, or changing from quarts to cups. If your 10-gallon aquarium springs a leak in the middle of the night, you can express the amount of water you'll have to mop up as any one of the following: 10 gallons, 40 quarts, 80 pints, 160 cups, or 2560 tablespoons. The 2560 tablespoons may look like a much larger amount than 10 gallons, but they stand for the same amount of water because gallons are simply larger *units* of measurement than tablespoons. Similarly, 7,200,000 Hz may look like more than 7200 kHz or 7.2 MHz, but they represent the same frequency. Repeating, then: To change a given frequency from a larger unit of measurement to a smaller one, move the decimal point to the *left* (5,000,000 Hz = 5 MHz; 7000 kHz = 7 MHz). To change from a smaller unit of frequency to a larger one, move the decimal point to the *right* (0.7 kHz = 700 hertz; 20 MHz = 20,000 kHz; 5.5 MHz = 5,500,000 Hz).

While we are thinking about this, we might as well mention that in measuring *current* we do a similar moving of decimal points. Ohm's Law states that $E = IR$, with the *I* standing for current measured in *amperes*. Amperes, however, are usually too big to use in

measuring radio current, so *milliamperes* (mA) are used instead. The prefix *milli* means one *thousandth*, not one *thousand* as kilo does, so a milliampere is 1/1000 of an ampere. Again, we move the decimal three places to the left to change the number into larger units of measurement and three to the right for changes to smaller units. Thus one ampere = 1000 mA; 5 mA = 0.005 amperes, and 0.3 mA = 0.0003 amperes. Practice working out measurements such as these until you can do them without error, and watch out for them if you have to work through Ohm's Law problems on a license exam.

Frequency and Wavelength

Amateurs refer to radio waves in one of two ways — by *frequency*, which is measured in hertz or cycles per second, or by *wavelength*, which is measured in meters. Beginners often have trouble keeping these two things, and the relationship between them, straight. The following discussion may help to lessen the confusion.

Radio waves, as well as light and heat waves, are examples of *electromagnetic waves*. The name indicates that they are a combination of electrical waves which form an electrical field, and magnetic waves which form a magnetic field. Our eyes are built-in receivers for light waves and the nerve endings in our skin receive heat waves, but to make radio communication by radio waves possible we must build, buy or borrow our receivers.

All electromagnetic waves are capable of traveling through space at the speed of light, 300,000,000 meters or 186,000 miles per second. We have already indicated that the wavelength of radio waves is the distance from the peak of one wave to the peak of the next, or from the beginning of one wave to the beginning of the next, and that this length is measured in meters, a meter equaling approximately 39.4 inches. According to mathematical formula (a formula you must know for the Novice exam), *wavelength in meters multiplied by frequency in Hz equals the speed of the wave's travel or 300,000,000 meters per second*. This in turn means that to obtain the wavelength in meters of a given frequency, you divide 300,000,000 by that frequency. To obtain the frequency, you divide 300,000,000 by the wavelength. If you know one of them, you can find the other. Remember, though, that when you use this 300,000,000 number, the frequency must be in hertz and not in kHz or MHz.

The entire spectrum of radio frequencies has been divided by the Federal Communications Commission (FCC) into *bands* or groups of frequencies assigned to different communications services. The frequencies allotted to

radio amateurs are further divided into *subbands* which are assigned according to class of license. At the present time, Novices can operate on parts of four bands — 80, 40, 15, and 10 meters, but not on 160, 20, 2 meters or any of the other amateur bands that higher class licensees can use. Fig. 3 indicates eight amateur bands and their respective frequencies. The wavelength *names* we apply to these bands indicate only their *approximate* wavelengths.

From this illustration, one can see that the higher the frequency, the shorter the wavelength and the lower the frequency, the longer the wavelength. Still confused? Try this: Walk the length of a room, taking long steps and counting them. Walk the length of the same room, taking short steps and counting those also. You will see that the longer the steps, the fewer the times you have to step; that is, the less their frequency. The shorter the steps, the greater their frequency will be. In the same way, the longer wavelength means a lower frequency and a shorter wavelength means a higher frequency.

Learn the Novice frequencies so you can match them up with their proper bands. If you are studying for your General, learn the General allocations also. Learn frequency and wavelength both ways, so you can state, automatically, the approximate frequency if you know the band and can state the band if given the frequency.¹

Oscillators, Fundamental Frequencies and Harmonics

Radio waves of given frequency and wavelength are produced by *oscillators*, which create back and forth current movements or *oscillations* at a definite rate. Clock pendulums, metronomes and swings are examples of *mechanical* oscillators. The radio frequency or rf oscillator in your equipment is most likely controlled by either a *quartz crystal*, which is plugged into your transmitter and which vibrates at a definite number of cycles per second, or by a component called a variable-frequency oscillator (VFO) which can create current at various radio frequencies as desired. This VFO may use a coil and capacitor combination, along with transistors or vacuum tubes. In the past, Novices were restricted to crystal-controlled trans-

¹ FCC Regulation 97.7 lists a frequency allocation for Novices which is often overlooked but might be important for you to know for your license exam. This regulation states that Novices should transmit on 7050-7075 kHz, instead of 7100-7150 kHz, "when the terrestrial location of the station is not within Region 2." According to International Regulations, Region 2 consists basically of North and South America.

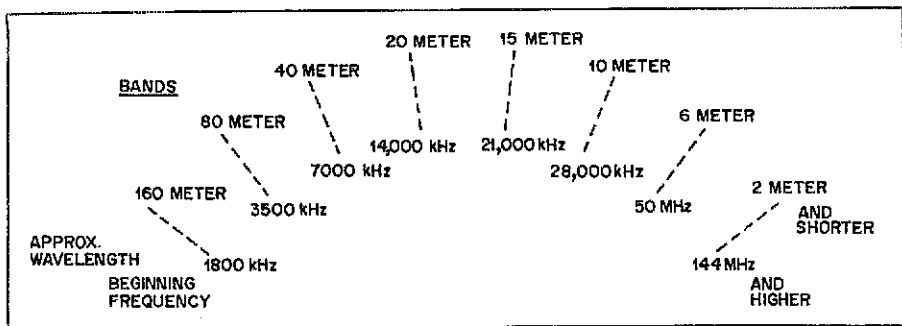


Fig. 3

mitters. At the present time they can use either crystal-controlled or VFO-controlled transmitters.

The lowest, strongest and primary frequency which an oscillator produces is called its *fundamental frequency*, but additional frequencies called *harmonics* are also generated by the transmitter. Harmonics are always at a frequency which is an integral (whole number) multiplier of the fundamental frequency — two or three times that frequency, for example. Harmonics may be produced purposely or their appearance may be unwanted. An 80-meter crystal which vibrates at 3560 kHz, for example, can be multiplied by two in a transmitter designed to do this, and the signal sent out will be on the 40-meter amateur band at 7120. Often, the harmonics you hear, or hear discussed, are undesirable ones caused by a part of the transmitter oscillating when it shouldn't. Unwanted harmonics, as well as *key clicks* (unwanted additions to the signal made when opening or closing the key for cw) and *chirp* (unwanted changes in frequency on cw), are circuit weeds that must be eliminated.

Modulating the Carrier Wave

The purpose of amateur radio is communication, but a steady carrier wave is useless for that purpose since it carries no information (intelligence) and

must be changed in some way if information is to be added to it. This change is commonly achieved in one of two ways: (1) the carrier is broken up into segments to form code characters or (2) sound waves are added to the carrier so voice communication is made possible.

1) *Cw, Code, A-1 or "Telegraphy on a pure, continuous wave."* FCC regulations restrict Novices to international Morse code for their amateur transmissions. The dots and dashes of this code are formed by a "key" which, when pushed down, causes a transmitter to send out a continuous carrier wave but when in an open position (key let up) cuts off the carrier. The action of opening and closing the key, when done correctly, breaks the carrier up into very small segments or dots, and three-times-larger segments, the dashes, to form letters, numerals and punctuation. This method is designated by the FCC as A-1 emission, with "A" referring to amplitude. Hams call it code or cw, with the letters cw standing for "continuous wave." Don't try to figure out how a wave that has just been broken up can be said to be continuous. You will be wasting your time.

2) *Voice modulation.* Amateur licenses holding a higher class license than that of Novice can use either code or voice transmission. Note that the word used is *transmission*. FCC regula-

tions apply only to the transmitting or sending out of radio signals. Anyone in the U.S. can operate a receiver, and thousands of people are active Short Wave Listeners. Some of them send out SWL cards to contact amateurs whose signals they have heard.

Voice transmission is achieved by use of a microphone which adds an audio or sound wave to the carrier. Audio waves have a much lower frequency than the radio-frequency carrier wave and when they are superimposed on the carrier, or mixed with it by a modulating process, the wave which results is still at radio frequency but has the form or "envelope" of the audio wave as far as amplitude is concerned. We call this *amplitude modulation* or a-m. *Single sideband* (ssb) is a form of amplitude modulation which has been modified in a way that makes it a much more efficient means of communication than the old standard a-m mode. Another form of modulation created by the addition of an audio wave is known as *frequency modulation* or fm. Here the addition of the audio changes the frequency of the carrier wave according to voice characteristics. By each of these methods, cw, a-m, ssb or fm, communication by amateur radio is made possible.

A radio wave begins its existence within the transmitter, where it is carefully shielded from contact with the outside world, modulated with information, and amplified until it is strong enough to travel on its own. From the transmitter it goes to an antenna, and there a miracle occurs. Unseen except by the eyes of theory, silent until it reaches its destination, its ports of call unknown, the wave leaves the antenna and is radiated out into space at the speed of light, the incredible speed of 186,000 miles every second. No longer can we call it merely a carrier wave. It is a courier now, a wave with a message. A radio wave — *your signal*. QST

Strays



RCA TO CLOSE RECEIVING TUBE PLANT

□ An RCA Corporation news release announced the closing of the Harrison, NJ, tube plant by July 30, 1976. This shutdown will affect approximately 1,100 employees there. The reasons given for the closing included figures indicating that "since 1966, industry sales of tubes have declined almost 80 percent . . . in the face of the continuing shift to solid-state devices in con-

sumer, industrial and defense electronic systems."

Efforts are underway to assist the affected employees, and to the maximum extent possible, RCA plans to meet all outstanding orders for tubes for which it is sole supplier.

□ Please note that the September VHF QSO Party, originally scheduled for September 4-5, has been changed to September 11-12. Rules will appear in August *QST*.

QST Congratulates . . .

□ Francis T. Cassidy, awarded the Veteran Wireless Operators Assn.'s top award, the Lee DeForest Gold Medal Audion Award. Holder of a number of patents in communications, Mr. Cassidy's award is based on his quarter century of research and developmental work in the field of wireless radio communication.

□ Frank Hannum, W8QAO, recipient of the first annual "Ham of the Year" award presented by the Muskegon (MI) Area Amateur Radio Council for extraordinary service to the cause of amateur radio.

Linear Loaded 20-Meter Beam

Build this novel minibeam for 20 meters . . . it works!

By Cole Collinge,* WØYNF

Full-sized antennas are fine if you have the height and room for them. But much of the advantage is usually lost with average installations. So why bother with a sad-looking monster a few feet atop the house when a trim smaller model will do the job. This article deals with a method that eliminates the messy and expensive loading coils as well.

Having built an HW-32A transceiver, my 20-meter activity was restricted to the phone band. A home-made vertical antenna did a fair job in the states, but not for DX. My thoughts ran to a beam and the aluminum tubing that I could obtain for full-size construction. A two-element beam was constructed, using a gamma match and information found in the *Handbook*. The beam worked electrically, but the mechanical construction left much to be desired. It flopped in the wind like a wounded butterfly. I tried to correct this with a wooden framework, but it was just as bad. I wanted something with shorter elements, something that was rigid and would still perform well. But all of my research only turned up loading coils or other methods involving a loss compromise.

My aluminum supply included four 12-ft. lengths of 7/8-inch diameter tubing. This would give me two elements of 24-ft. length and a minimum of sag. The problem was how to mount them and make up the difference in physical and electrical length for a half-wave length. Loading coils were ruled out. The possibility of folding wire

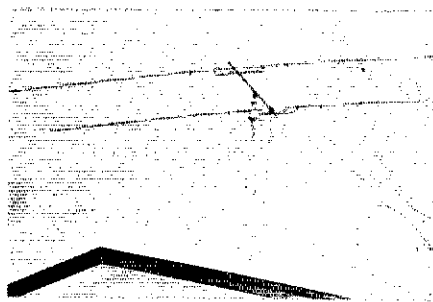
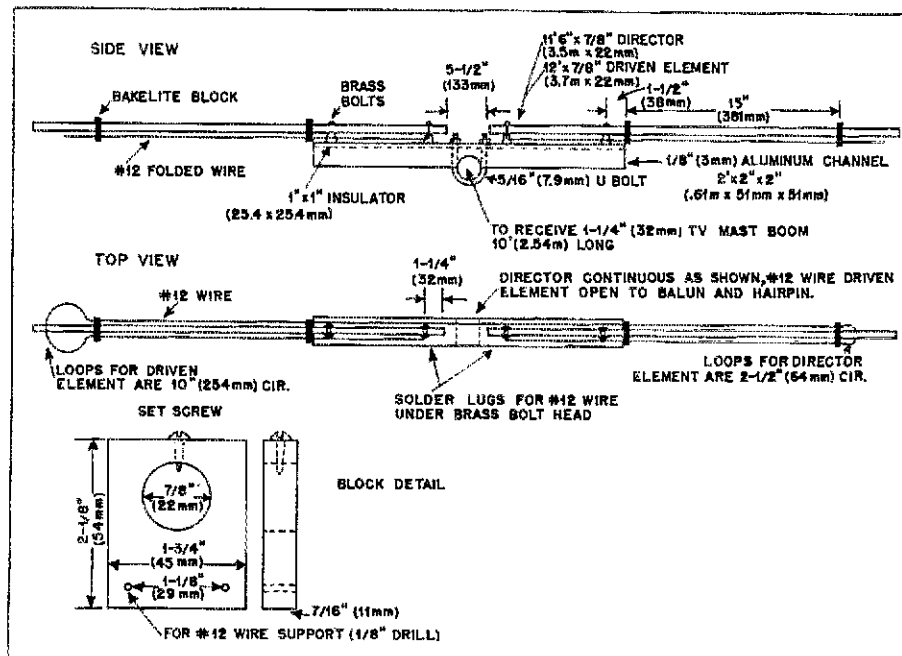


Fig. 1 — Construction Details of the loaded beam.

under the elements seemed to have merit. (I later found this to be called linear loading.) This dictated a split element and standoff supports for the tubing.

Two 2-ft. lengths of aluminum channel were obtained for the element supports (Fig. 1). Each 12-ft. section was attached using 1-in. ceramic standoff insulators. A 3/4-in. birch dowel was used to stiffen and prevent crushing of



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the tubing where the attachment was made. Element supports were grooved and attached to a 10-ft. TV mast section using a single 5/16-in. U bolt.

The folded additional loading wire was No. 12 copper house wire with the insulation stripped off, and was supported by two bakelite blocks on each element section. The blocks were anchored to the tubing by small sheet metal screws. Ends of the wire sections were formed into a loop to hold their position.

Tune-Up and Adjustments

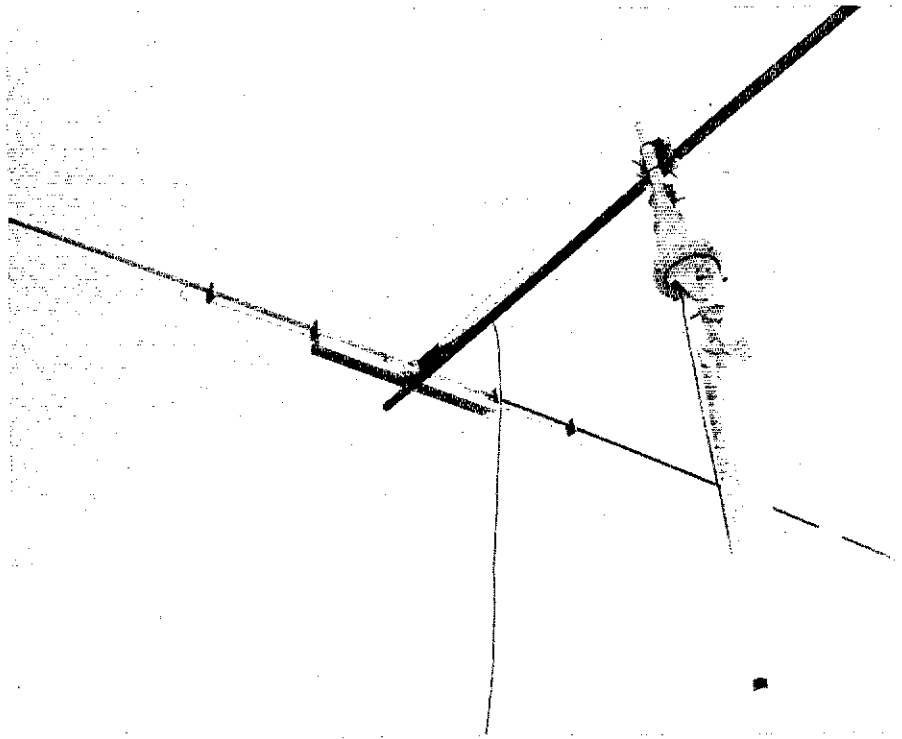
My thinking in regard to coaxial-cable-fed dipoles is that they should use a balun or matching device of some kind. This beam, having a split driven element, seemed to call for a 1:1 balun since it was to be fed with RG-58/U (Fig. 2). Formulas found in handbooks for beam-element lengths did not seem to work for the linear-loading design, so cut-and-try was used many times. In final tests, a grid-dip meter was utilized with a calibrated receiver to determine the driven-element total length of 35 ft. A reflector with 10-ft. spacing was used.

I found that adding a reflector of 5-percent greater length lowered the frequency (with the beam near the ground) but on raising the beam to rooftop, the frequency had increased. The 10-ft. spacing gave a 3:1 VSWR which was very difficult to reduce. Testing this arrangement on the air seemed to indicate more gain in the back direction than in the front. After many tests and much rebuilding of the wire lengths, the director element approach seemed to give the most encouraging results. The VSWR was down to 1.5:1 and the 5-percent shorter director raised the frequency to the phone band. Spacing was reduced to 7 ft. 6 in.

More research brought out the possibility of inductive matching to get the VSWR down to a more reasonable level. Many hairpin lengths and widths were tried with varying results. The final hairpin was 23-in. long by 1-1/2 in. wide with a slight fan shape to fit the balun connections. This reduced the VSWR at 14,200 kHz and 14,350 kHz with a flat response in between.

On-the-Air Tests

The help of other amateurs in tests for front-to back ratio was very helpful. Average reports have been 2.5 S-units in

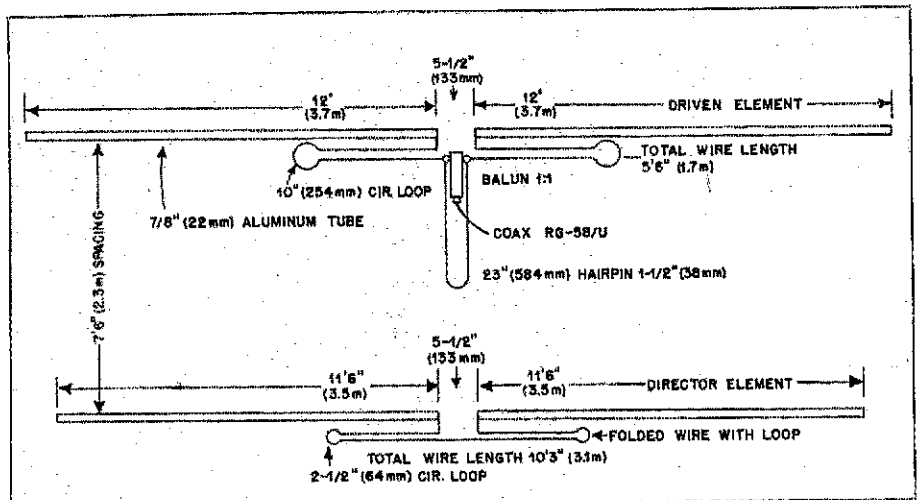


Photograph of the beam atop the author's tower.

the forward position over the back position. I did not have a reference dipole for gain tests, but I have heard and worked more DX than in the past twenty years. The beam is mounted on a

rooftop 10-ft. steel tower 38 ft. above the ground. It weighs around 20 pounds and is rotated by an older-type TV rotator. Total cost including balun is \$33.00. QST

Fig. 2 — Critical electrical dimensions.



Strays

STOLEN EQUIPMENT

□ Regency HR-2A, Serial No. 04-09948.

stolen from auto. Richard G. Moldt, 1011 Utterback Store Rd., Herndon, VA 22070.

□ Standard SR-C826MA Serial No. 205190. Stolen from carryall in Wood-Ridge, NJ, on Jan. 15. Benjamin F. Tillson, Jr., W2WBV, 139 Orchard Place, Ramsey, NJ 07446.

□ Stolen during break-in at South Fork Electronics Corp., without essential accessories,

on January 26 or 27; SBE-Linear Systems SB 36, Serial No. 71128; Courier COP 50 HL and COP 75, serial numbers unknown, South Fork Electronics Corp., 36 Hampton Road, Southampton, NY 11968.

□ Heath HW202, Serial No. 07429. Dick Cullen, WBØAGT, 1515 Newcastle St., Colorado Springs, CO 80907.

Learning to Work with Integrated Circuits

Part 6: So far we've examined only digital ICs in detail. But linear ICs are not to be ignored, not by a long shot. How do they differ from digital ICs? Let's find out.†

By Jerry Hall,* K1PLP and Charles Watts,** WA6GVC/1

Linear integrated circuits have achieved a level of complexity and reliability which rivals that of their digital counterparts. There are linear ICs with names like multiplex decoder, remote control, Chroma demodulator, and even a TV signal processor. But we also find more standard functions performed in linear ICs, too, such as i-f systems, audio amplifiers, and a-m and fm receiver circuits. As we learn about linear ICs we will be avoiding high-level mathematics, chemical analyses of the IC chips and all that. What we will be doing is looking at some down-to-earth practical uses of linear ICs.

Linear Integrated Circuits — Some Simple, Some Not So Simple

The array type of IC is the simplest and perhaps the most neglected building block available to the experimenter/builder. As the term *array* suggests, a group of objects (either or both diodes and transistors in this case) is formed on a single substrate to produce one IC unit. The two most common types of IC arrays are the diode and bipolar transistor. The diodes or transistors on the array-IC chip may be formed as Darlington or differential amplifiers, or can be formed individually to permit their elements (anode, cathode for diodes, and emitter, base and collector for transistors) to be brought out to separate leads on the IC package. Examples of transistor- and diode-array ICs and of some practical applications are shown in the *ARRL Handbook*.

The use of array ICs offers several features that make them an attractive

alternative to circuit construction with discrete devices. In general, an array IC-based design will be more compact than its discrete device counterpart. Also the characteristics of the transistors or diodes on a common substrate are nearly identical. This results from their being formed at the same time, and for the most part under identical manufacturing conditions. Thus, when one desires matched semiconductors for such applications as balanced modulators or mixers, the diode array is ideal. Similarly, an active mixer or modulator of the balanced or doubly balanced type can be constructed around a suitable transistor-array type of IC. Since the devices on the chip are of identical characteristics, external balancing techniques are not always necessary, but probably would be if one employed discrete diodes or transistors that had not been carefully matched for electrical likeness.

IC broadband (video) and differential amplifier, and a-m/fm communications circuits are the next step up from array ICs. Some differential transistor arrays, such as the RCA CA3049, are also contained in this group of ICs. But most ICs in this group contain built-in *R* and some small *C* components that rule out the circuit flexibility which is possible with the CA3049. Broadband and differential ICs are used most commonly in a variety of applications such as rf, i-f, and audio amplifiers, with usable upper frequency ranges to 2 GHz. But they are also usable as balanced and doubly balanced mixers, product detectors, balanced modulators, dc-voltage amplifiers and, in fact, just about any circuit requirement can be met by ICs from this group. Within this group of ICs we have our first peek at multifunctional ICs.

RCA's CA3065 and Motorola's MC1358 are good representations of multifunction ICs designed for use in fm receiving equipment. They contain an i-f amplifier, limiter, fm detector, electronic attenuator, and an audio pre-amplifier. Those familiar with Motorola's 41V and GE's Progress Line fm receivers probably have a smile on their lips when they think about how much real estate was occupied by vacuum valves (tubes?) to do the same job! Needless to say, the development of multifunction ICs and high-power vhf/uhf transistors has revolutionized communications equipment design. Multichannel shirt-pocket-sized vhf/uhf transceivers and receivers half again as small are available to users of both amateur and commercial radio services.

The Not-So-Simple Group

Some ICs from both of the groups of ICs we just finished talking about can fit into the not-so-simple group, but this group also contains by far the most complex types of linear ICs one would be likely to use in amateur construction projects. We've already mentioned ICs with the names *multiplex decoder*, *remote control*, *Chroma demodulator*, and the *TV signal processor* IC called a "jungle" circuit, as well as the "standard" function ICs such as i-f systems, audio ICs, and a-m and fm receiver circuits. Explanation of all the possible uses for these ICs is beyond the scope of this series. However, information covering specifications and applications are contained in manufacturers' data sheets and application notes.

Function generators are also found in this covey of complex ICs. One of these function generators, the 566, is used in the voltage-to-frequency con-

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†Parts 1 through 5 appeared in *QST* for January through May, 1976.

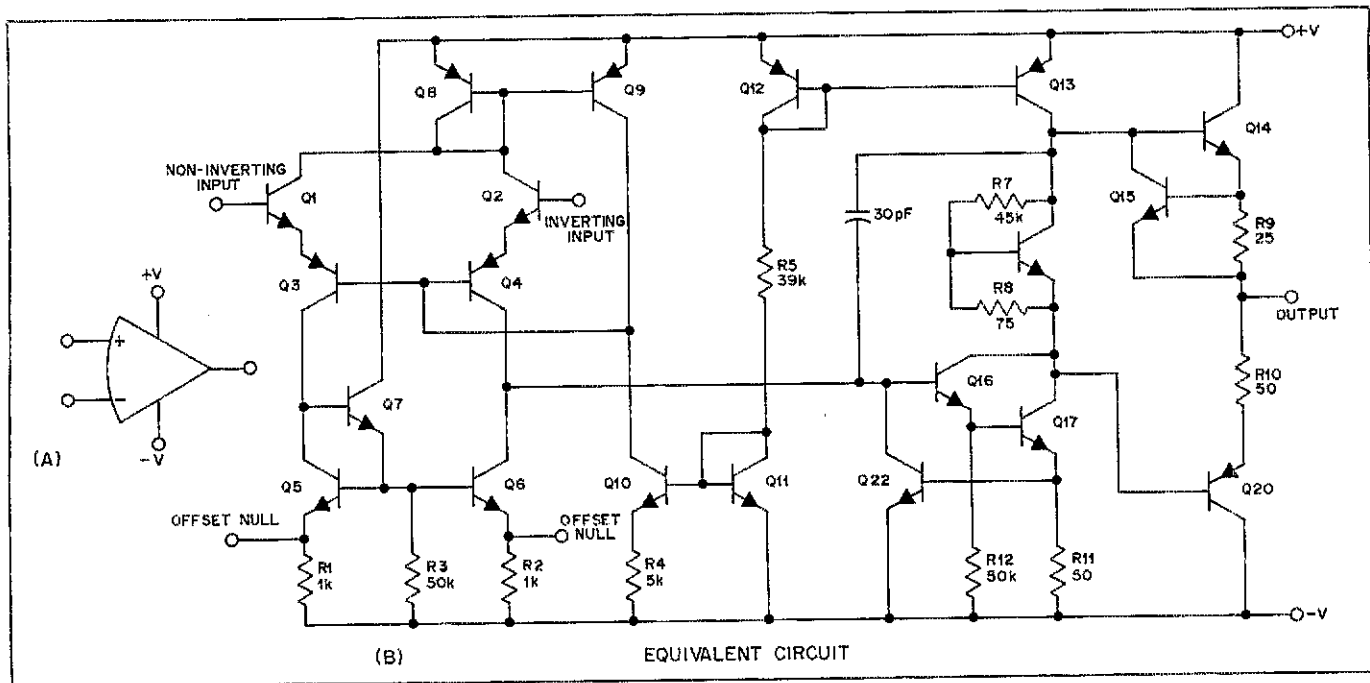


Fig. 20 — At A the schematic symbol for an operational amplifier (op. amp), and at B the circuit of a 741 op amp. Indicated component values are typical.

verter of the digital voltmeter. This is a voltage-controlled oscillator, and provides highly linear frequency modulation. We'll be looking into this IC in more detail later.

Operational Amplifier IC — Versatile Building Block

Operational amplifiers (op amps) comprise the largest single group of linear ICs. Since the acceptance of the $\mu A702$, introduced by Fairchild Semiconductor in the early 1960s, there has been an almost unbelievable proliferation of op-amp types. This makes the task of describing how an op-amp IC functions an impossible endeavor to undertake. Op amps have always been the most versatile building-block linear IC type, and have been used for such applications as R-C active audio band-pass filters, bridge amplifiers, and low-power audio amplifiers. To give a complete developmental history for all the different op amps and to place each type in perspective would take a book. Several books which go very deeply into op amp design, theory and applications are available and are recommended reading for any serious experimenter.¹⁰

One of the most popular op-amp ICs is the 741. The 741 is a general-purpose, high-gain operational amplifier which meets a variety of circuit requirements in industrial and commercial manufacturing applications. Using the representative circuit of the 741, Fig. 20, let's talk about some op-amp basics. There are two ways in which one can investigate the operation of op amps, a theo-

retical approach and how op amps actually perform. At this point we'll use the theoretical (sometimes called the *ideal*) approach to examine the basic operation of the circuit, and later on when we talk about our use of the op-amp ICs we can see how they perform in actual applications. "Boy!" you say, "I hope this doesn't turn into one of those articles with a lot of math in it." And to that we reply, "So do we!" But we will be giving you some symbols used to represent op-amp parameters and only the few equations necessary for a valid discussion of op-amp theory.

Shown at B in Fig. 20 is the internal circuit of a 741 operational amplifier, and at A is the standard symbol which represents the op amp. Assume that this is our idealized amplifier we mentioned above, and that it is connected to a power supply which provides +V volts and -V volts, as shown in Fig. 20A. V in this case could be 12, representing +12 and -12 volts, each referenced to ground or common. Thus a voltmeter connected between +V and -V would indicate 24 volts. Sometimes such a power supply is called a dual 12-V supply, the word *dual* meaning that it provides 12 volts in dual polarity from ground.

Now assume that we have a sine-wave input, E_{in} , across the + and - input terminals. A positive-going signal at the - or *inverting input* produces a negative-going signal at the output. And the same signal at the + or *noninverting input* produces a positive-going output signal. With this amplifier, E_o (output voltage) = A_{vo} (voltage gain of the amplifier $\times E_{in}$ (differential input volt-

age). Regardless of the application, both input terminals of the IC will always be used as far as internal circuit operation goes, because the output is a function of the *difference* in potential between the + and - input terminals. The output, however, is single-ended, but note that with a dual-polarity power supply it may be *bipolar*, meaning the output voltage may go either positive or negative from ground potential.

The ideal properties of this amplifier can now be defined, providing we keep the functions of the input and output as described above in mind: 1) The voltage gain $A_{vo} = \infty$; 2) the input resistance $R_{in} = \infty$; 3) the output resistance $R_o = 0$; 4) the bandwidth $BW = \infty$; 5) there is zero input offset voltage, or $E_o = 0$ if $E_{in} = 0$. These definitions also reveal that 6) the differential input voltage is zero and 7) there is no current flow into either input terminal. The above idealized properties are universal to the design analysis of all op-amp circuits, but some slight departures from the ideals will be encountered in actual circuits. A simple analogy is the case of the semiconductor diode, which theoretically (ideally) exhibits no resistance during forward conduction, and conducts current in only one direction. But of course we're all aware that there is some amount of voltage drop across the diode when it is conducting, and some small amount of reverse leakage current when the diode is "cut off."

The Basic Op-Amp Circuit — Upside Down or Right Side Up

In this series we're not going to attempt to conduct you through an

¹⁰ See references listed at the end of this article.

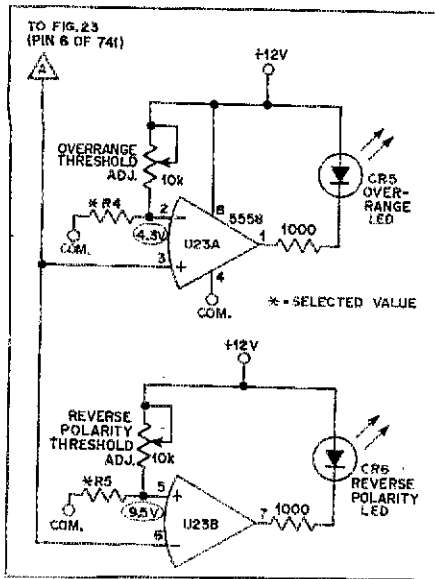
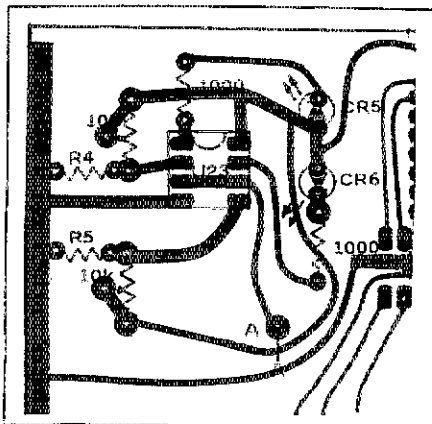


Fig. 21 — Circuit for overrange and reverse polarity indicators. The biasing diagram for U23 is the same as for U21 and U22 (see Fig. 23). Parts required are listed below.
 CR5, CR6 — Light-emitting diode (LED), Archer (Radio Shack) 276-041 or equiv.
 R4, R5 — Selected value; see text.
 U23 — Dual operational-amplifier IC, type 5558.
 Linear-taper controls, 10-k Ω , pc-mount, Mallory MTC14L1 or equiv. (2 req'd.).
 Composition resistors, 1000- Ω , 1/4- or 1/2-watt (2 req'd.).
 IC socket for 8-pin dual in-line package (sometimes called mini-DIP), Cambion 3772-0416 or equiv. (1 req'd.).

in-depth look at operational amplifiers, but we will show you a few of the basic principles of op amps and how to use them. If you'd like to know more about op amps than is presented here, we urge you to follow up by reading some of the reference literature on the subject.

Operational amplifiers may be connected to form two basic amplifying circuits, the *inverting* and the *noninvert-*

Fig. 22 — Parts placement guide for the overrange and reverse polarity indicator circuit, not shown at actual size. These views show the component side of the board. With reference to Fig. 4 (Part 2), these components go on the left portion of the board. Note



ing configurations. No matter what the function of a given circuit may be, it is a derivative of these two basic configurations. A third basic circuit which is the result of the combination of the first two is the *differential amplifier*. The DVM project uses inverting and non-inverting amplifiers.

You remember, in our earlier discussion of Fig. 20 we mentioned that a dual-polarity power supply could be used. But this is not an absolute requirement for an op-amp IC. Instead of voltages of +12 and -12, we could use a single 24-volt supply. And with other suitable circuit changes we could then simply ground the -V power supply terminal of the IC package. (The "other suitable changes" have to do with biasing the input terminals, which we'll get into momentarily.) Or because linear ICs will operate properly over a wide range of power supply voltages (unlike digital ICs), we can supply them with something other than 24 volts. In the case of the linear ICs in our digital voltmeter, we supply them with a single 12-volt supply.

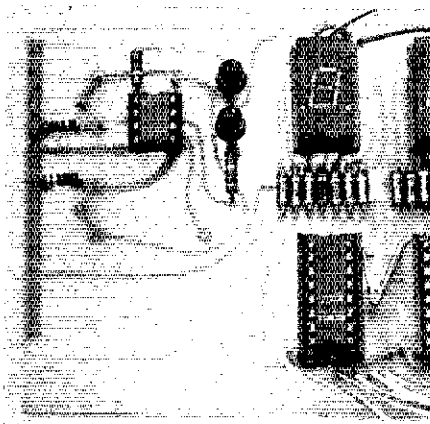
Take a look now at U23A in the diagram of Fig. 21, and you'll see what we mean. The positive power supply terminal of this IC, pin 8, is wired to +12 V, and the negative terminal, pin 4, is connected to common. Using a single-polarity supply instead of a dual means that we do not now have the capability of obtaining a bipolar output from our op amps, as the output level will always lie between the levels applied to the supply terminals — in this case between 0 and +12 volts. But the fact that we cannot obtain levels which are negative with respect to common is of no consequence in our application here. Even if we had negative output levels available, we could not use them at the inputs of any TTL ICs in the DVM. We take

advantage of this fact to simplify the requirements for the power supply in the DVM.

In Fig. 21, U23A is a very close approximation of the noninverting amplifier configuration. In this circuit, pin 2, the inverting input, is biased with a fixed voltage divider (made adjustable for calibration purposes). This bias is at a level between 0 and +12 volts, at approximately 4.3 V in this case. The input signal is applied to pin 3, the noninverting input. Remember, the output level is a function of the *difference* between the input levels. If the voltage at pin 3 was *exactly* the same as at pin 2, 4.3 volts, then the output of the op amp at pin 1 would be 6.0 volts, just midway between the two levels applied to the supply terminals. (You'll recall one of our idealized conditions about zero offset. Well, that situation applies here, except that by shifting from a dual- to a single-polarity supply, we've shifted our "zero" reference point as far as the internal workings of the op amp go. That reference point will always be midway between the levels applied at the supply terminals.) So how does this circuit work to give us an overrange indication with that LED? Well, consider this. Any time the input level at pin 3 exceeds 4.3 volts, the output will go in a positive direction — to nearly 12 volts if the input difference potential is great enough. Under such conditions there is little or no difference in potential across the LED indicator, and it does not conduct. But if the voltage at pin 3 goes below 4.3 volts, the output level of the op amp goes down. And because of the extremely high gain of the op amp (infinite, ideally), it doesn't take much of a voltage difference to cause a significant voltage drop across the LED. So it conducts and glows. The 1000- Ω resistor serves to limit the current which flows. When everything is properly calibrated, this glow indicates that we have an overrange condition at the input section of the DVM.

Next take a look at U23B of Fig. 21. Other than the values of voltage dividers, do you see any differences in those two circuits? You don't? Take a closer look! Ah, yes, our draftsman interchanged the positions of the inverting and noninverting inputs to the section, didn't he! At U23B the fixed bias is applied to the + or noninverting terminal, whereas at U23A it is applied to the - input. (There is no rule which says a particular input must be drawn above the other on the diagram.) With 9.5 V of bias applied at pin 5, what happens at the output as the input level changes? The inputs are wired in an inverting configuration, so that if pin 6 goes below the 9.5-volt level, the output at pin 7 goes above 6 volts. Ordinarily, the input level is

that the two pc-mount controls are assembled from the *foil* side of the board. If you obtain ready-made circuit boards, it may be necessary to enlarge the mounting holes for these controls. A 1/16-inch drill bit may be used.



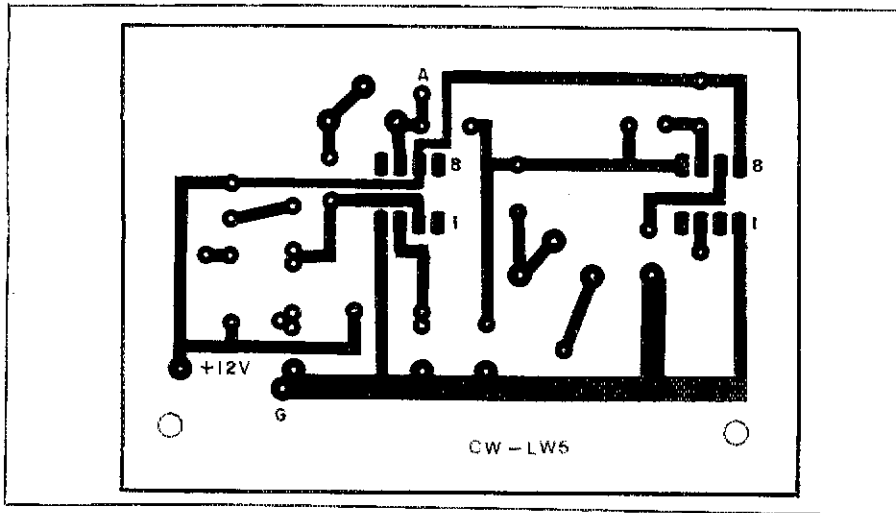


Fig. 25 — Etching pattern for the voltage-to-frequency converter. The pattern is shown at actual size from the foil side of the board with black representing copper.

strongly suggested for the integrated circuit.

Values for R4 and R5

R4 and R5 are shown in Fig. 21 as being of selected value. Their actual resistances will depend in part upon a couple of things — the excursion range of the input signal, and the absolute magnitude of the regulated 12-volt supply potential. The range is a function of the next circuit we'll be looking into, and the power supply potential is a function of the individual regulator IC used at U2 (Fig. 1, Part 1). "Gosh!" you exclaim, "Are the values *that* critical?" No, it's not that the values are particularly critical, but just that all of the various factors may combine to require a different set of values in your instrument as compared with one your neighbor or a friend may be building. "How can that be?" you ask. Because of the extremely high gain of the op amps. Consider this. A differential input potential of just a few millivolts at the op amp will cause its output to swing from nearly 0 to almost 12 volts. The two 10-k Ω controls will allow us to make some degree of adjustment of the input bias level during calibration, but only if the fixed-value resistors give us the correct range of adjustment. For the moment, leave plenty of lead length and install a 2700- Ω resistor for R4 and an 18-k Ω resistor for R5. We may find it necessary to try other values during calibration.

The Voltage-to-Frequency Converter

Fig. 23 is the schematic diagram of the voltage-to-frequency converter. As far as dc voltage measurement goes, this circuit might be considered the heart of the entire DVM project. As a matter of fact, it can be used with any existing frequency counter that a person may have, turning that counter into a digital

voltmeter if all but the last three digits of the display are ignored.

We've already mentioned briefly the 566 multifunction IC, U22, which is a voltage-controlled oscillator. If wired as shown in Fig. 23, this IC will provide simultaneous square-wave and triangle-wave outputs. We use only the square wave from pin 3. This IC has a maximum usable frequency of 1 MHz. The frequency range of operation for the oscillator is determined by the values of an external resistor (pin 6) and an external capacitor (pin 7). The exact frequency of oscillation in the range is determined by the control voltage applied to pin 5. If the control voltage is within a volt or so of the supply potential, the frequency of oscillation will be at the low end of the range. As the control voltage decreases, the frequency of oscillation increases linearly until the voltage reaches a potential of about 3/4 of the supply level. Beyond that the response is nonlinear. What this means in our instance, then, is that the control voltage on the 566 must stay within the range between 11 V and 9 V, going to the 9-V end of the range to give us an increased output frequency.

The range of operation is established by the capacitor and resistor mentioned above to provide an oscillation frequency of 1000 Hz when the input to the converter is grounded (no input). Selection of the appropriate value of resistance for R3 (use 56 k Ω for now) and adjustment of the fine and coarse zero controls will put this frequency right on the nose. When our DVM is operated in the mode to measure voltage, the counter portion is preset to 9000. When we count this 1000-Hz signal the count starts from 9000 and goes up. We end at 10000 to be indicated on our display, except that the 1 at the left overflows and never appears. Our counter is thus fooled into thinking

that it is displaying zero (which it is). If we apply +1 volt at the converter input, the oscillation frequency of U22 goes up to 2000 Hz. This appears as 1000 on the display of our DVM. A voltage divider will be placed ahead of the MPF-102 input amplifier to divide the full-scale voltages of 1000, 100, or 10 down to this basic 0- to 1-volt range. The frequency at the output of the 566 will follow the voltage linearly, with the display tracking from 00 to 1000. We'll wire our range switch to place a decimal point in the appropriate position.

The MPF-102 is connected as a source follower. Connected at the source you'll see what may look like a maze of resistors. This resistor network provides bias for linear tracking of the input voltage at the source output, and provides a suitable excursion range of voltage for the input to the op amp, U21. Remember from the discussion of the 566, the control voltage must go *down* in order to cause the frequency to go *up*. And yet we want the frequency to go up when the input voltage goes up. What this means is that we need an inverting amplifier between our input and the 566. Of course, our old friend again, the inverting op amp. This circuit (U21) is basically the same as that of U23B but for one little difference. Note the series resistors connected from the output, pin 6, to the input, pin 2. These resistors form a *feedback* loop. And because they are connected to the inverting input, the feedback which results is negative or degenerative. In effect, when the output goes more positive, these resistors, through the inverting input, tell the op amp, "Hey, guy, don't go so far positive." In this way, the gain of the op amp is controlled. We'll see how this works out when we get into the calibration of the circuit. Here again, we'll want to select the optimum value of fixed resistance in the voltage divider. For now, use a value of 2700 ohms for R2.

The parts placement for the voltage-to-frequency converter board is shown in Fig. 24, and the etching template for the board is shown in Fig. 25. In Part 7 of this series we'll get into the final assembly of the DVM and its calibration. Part 7 will appear in a subsequent issue of *QST*.

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NBS—Ears for Your Ham-Band Receivers

Not all receivers can hear the National Bureau of Standards WWV signals. Add this receiving converter to bring propagation bulletins your way.

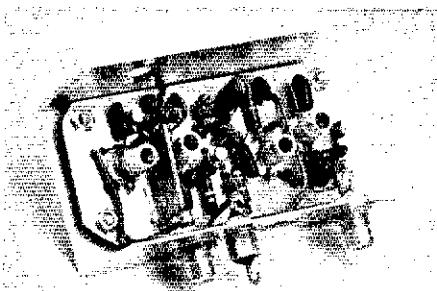
By Charles Watts,* WA6GVC/1

Radio amateurs are becoming worshippers of the sun, constantly peering at projections of the surface for signs of black spots; "sun spots," they call them.

Why has interest in sun spots suddenly turned many amateurs into solar astronomers? The answer is becoming more obvious each day. The state of the earth's ionosphere and geomagnetic field, and therefore radio propagation for a given time, is directly related to conditions on the sun. Sun-spot activity will soon be on the increase, and geomagnetic activity is constantly changing. As a result, unexpected, often undetected, band openings are occurring. But clouds and other weather phenomena can make it impossible for observers to see the sun, much less any spots that might otherwise be visible. That geomagnetic disturbance business — how can one tell when such an event will occur? Well, one way is to consult your Ouija board, or maybe a better way is to consult the "DXer's Crystal Ball."

If you don't have a Ouija board at your disposal, the National Bureau of Standards (NBS) stations WWV and WWVH offer an alternative source of information on solar and geomagnetic activity. Propagation bulletins are broadcast hourly by these NBS stations, and the referenced articles in *QST* have shown several ways in which this information can be put to work in helping amateurs make better use of their air time.¹

Some amateurs may have a problem using this information source because a large portion of amateur gear manu-



WWV converter as nested in the chassis. The shield shown in the photograph was found to be unnecessary since stray coupling between the input and output of the rf amplifier proved not to be a problem.

factured in recent years is for ham-bands-only reception. Some receivers do

offer an "extra" band, usually 15 MHz, which is useful sometimes, in some areas of the world, but not in others. An inexpensive solution to the problem for those who want to receive the NBS stations' transmissions, but don't want to spend the money for a general-coverage receiver, is a converter which uses one of the amateur frequencies for an i-f output. Selection of the proper component values allows the potential user to build a converter that will cover the WWV or WWVH frequency most usable at his location.

The converter described here, when used with an amateur-bands-only receiver, provides for reception of 10-, 15- or 25-MHz NBS stations WWV or WWVH. The receiver, when tuned to 4,

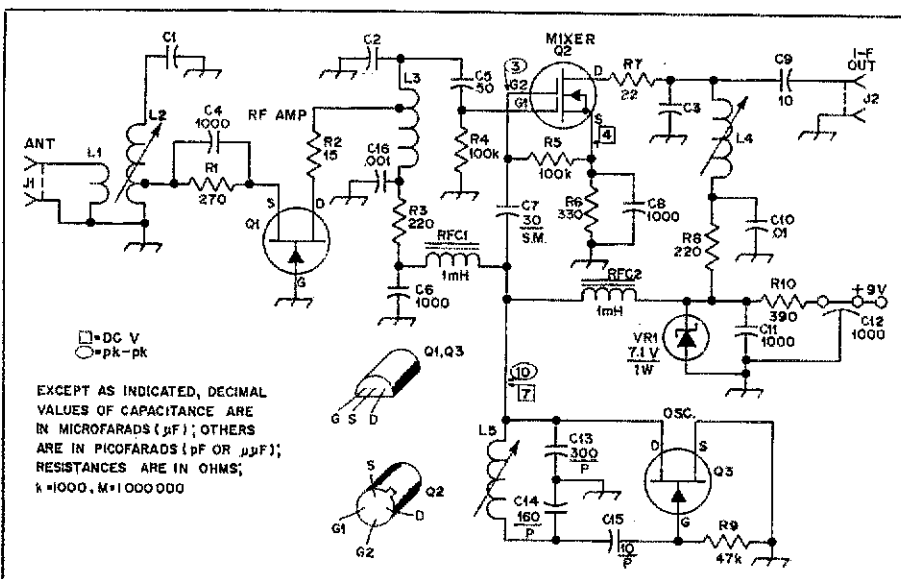


Fig. 1 — Schematic diagram, of the WWV-to-ham bands converter. The oscillator output frequency of 11 MHz was chosen to provide the reception of the three most commonly used WWV frequencies, (10, 15 and 25 MHz), without the need to change the oscillator frequency.

*Editorial Assistant, *QST*

¹Tilton, "The DXer's Crystal Ball," Parts 1 through III, *QST*, June, August and September, 1975.

14 or 21 MHz, serves as the i-f amplifier, detector and audio stages. The low current drain of the converter (15 mA typical) lends itself to operation from a 9-volt transistor-radio battery and to use with QRP equipment.

The Circuit

The schematic diagram of the converter is given in Fig. 1. With the exception of the Miller coil forms, nearly all of the components used can be purchased from Radio Shack or Lafayette Radio Electronic stores. For coverage of the 10-, 15- and 25-MHz WWV frequencies, component values of the three tuned circuits in the rf-amplifier and mixer stages must be selected from Table 1. This approach reduces the complexity of the converter by eliminating hand-switching circuitry, but restricts the converter to use on only one NBS frequency at a time.

A common-gate JFET rf amplifier provides 8 dB of gain in this converter and has good IMD and overload immunity. A 40673 MOSFET is used as the mixer in the converter. The output circuit of the mixer uses a low value of coupling capacitor as an alternative to an rf voltage divider or other output coupling technique. This was done as a parts-saving step and does not seem to degrade the performance of the converter significantly.

VRI provides adequate regulation of the V+ to the converter pc board. The regulator diode is placed on the V+ line for the entire circuit of the converter; the converter, therefore, is operating at 7.1 volts. Any voltage from 9 to 18 volts will power the converter.

The converter is housed in an alumi-

Table 1

	C1 - C2	C3	L1	L2 - L3	L4
10 MHz	90 pF	22 pF	2-1/2 turns No. 24 enamel over L2.	Same as L5*	Same as L5*
15 MHz	43 pF	300 pF	1-1/2 turns No. 24 enamel over L2.	Same as L5*	5.5 μ H (nom.) Miller 46A566CPC
25 MHz	22 pF	48 pF	1-1/2 turns No. 24 enamel over L2	1.8 μ H (nom.) Miller 46A186CPC	Same as L5*

*L5 - 2.42-2.96 μ H, Miller 46A276CPC

num Mini-box; dimensions of the box are 4 X 2-1/8 X 1-5/8 inches. Radio Shack part number 270-239 is suitable. As can be noted from the photograph, the converter pc board was laid out to facilitate 1/2-watt resistors, but 1/4-watt resistors are acceptable since power con-

sumption for the converter is very low. Silver-mica or polystyrene capacitors should be used for C7, C13, C14 and C15 because they aid stability in the oscillator circuit. Disc-ceramic capacitors are suitable for use in the remainder of the converter circuit. QST

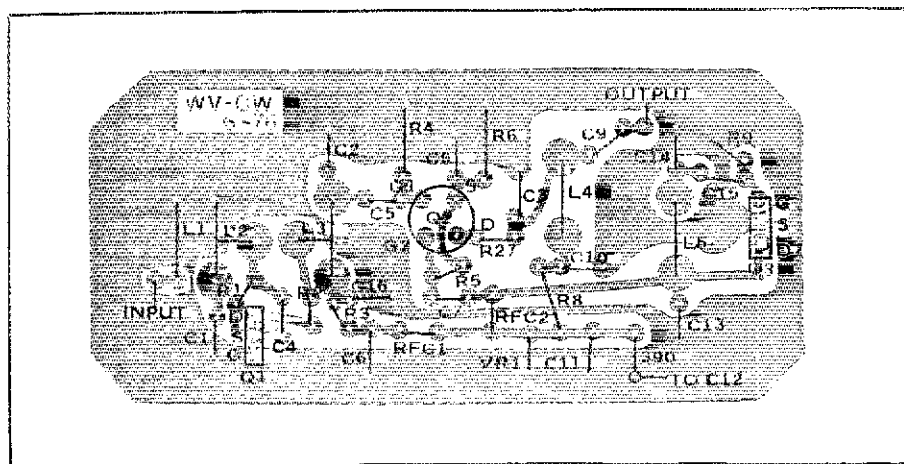


Fig. 2 - Etching pattern and parts-placement guide for the converter circuit board. 1/2-watt resistors were used throughout, but 1/4-watt resistors may also be used if preferred.

Strays

□ The British are going to help us celebrate our Bicentennial! According to G4CZP, amateurs in George Washington's ancestral home of Warton will operate a special station, possibly under the call sign GB2USA (for Bicentennial Celebration), between June 26 and July 4. Special QSL cards will be produced bearing a photograph of Washington House, a village landmark. The group would be pleased to host American visitors during the observance.

□ Many opinions as to the origin of the telegraphic term 73 have been ventured. Telegraph authority and historian, Louise Ramsey Moreau, through her research has determined that the belief 73 was devised as a telegrapher's toast to Andrew Carnegie on his 73rd birthday was erroneous. Though the telegraphers

did hold a celebration to honor his 73rd birthday, the term 73 was already in use.

The story that 73 was a secret sign used by members of the Railroad Telegraph Union is, likewise, false. Operators had been using 73 for years before 1909, the date of the Union's beginning.

Nor is the tale putting its origin in the early days of the old West true. That account states that allegedly a man needed three things to survive: A good horse, a good wife, and a Winchester 73 rifle. This was condensed, it was said, by the telegraphers to signal 73 when wishing the man "the best." Research proved, however, that Winchester at the time 73 was in regular use in telegraph circuits didn't even make a 73 type of gun.

Another tall tale dates the origin of 73 to the lumber camps when supposedly falling 70 trees marked a good day's work for a lumber jack. So, the tale goes, wireless operators in one camp would wish those in another "Seventy trees."

Mrs. Moreau's search led her through such authentic sources as the "National Telegraph Review" and "Operator's Guide" (1853). She found that even in 1853 the signal 73 was used, but it then stood for "My Love to You." In the 1859 Western Union "92 Code," a list of numerals from 1 to 92 indicating prepared phrases for operator use, 73 meant "Accept my Compliments." In the years, thereafter, the term underwent various changes but by 1908 the Dodge Institute of Telegraphy Manual listed 73 as "Best Regards."

Mrs. Moreau concludes that she has yet to pinpoint the origin of 73, a term whose beginnings are still shrouded in doubt.

His Eminence—the Receiver

Part 1: No piece of amateur equipment holds greater sway over our communications pastime than the station receiver. Herefrom, let there be dynamic range!

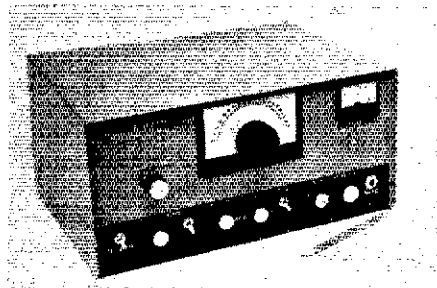
By Doug DeMaw,* W1CER

Are you slave to a receiver which unleashes its fury like a many-headed monster in the presence of strong signals? If your receiver shows a will which is most incorrect for an expensive commercial ham-shack trapping, then you and I are kindred souls! Being a long-term urban dweller amid a barrage of strong local signals, I have had a long-existing need for a receiver with an “uncrunchable” front end. Numerous commercial receivers have been tested at my station, and most provided appallingly dismal performances when W1AW was operating — just two blocks away — and during contests when seldom-heard, nearby stations seemed to pop out of the void to inundate reception. This case for nail biting led to a special-application design which cured my receiver cross modulation, desensitization, and IMD maladies. Some of the design notes offered here should be of interest to amateurs who build station receivers for use in areas of high signal density.

Most of the principles described are well-known ones, but they have been ignored by some designers of imported and U.S.-made receivers. Emphasis seems to be on impressive appearance, high receiver “sensitivity” (whatever is meant by that term), and myriad other features. Along the way somebody forgot the real name of the game . . . *dynamic range*. At least one amateur (W7ZOI) has emphasized the need for careful attention to these matters.¹ Reasonable immunity to front-end collapse is not expensive or difficult to achieve. The results are measured easily in terms of operating convenience and clean reception.

Front-End Features

Although the circuit treated here is for a one-band receiver (1.8 to 2.0 MHz), the design procedures are appli-



The receiver is built in a homemade aluminum cabinet. A two-tone gray and flat-black paint job has been applied. Black Dymo tape labels are used for identifying the controls in the black area, and gray labels are affixed to the gray portion of the front panel. A cut-down Jackson Brothers vernier dial mechanism (two-speed) is used for frequency readout.

cable to any amateur band in the hf spectrum. In my case, I employ “down converters” to cover 80 through 10 meters. They are founded on the same concepts to be discussed here.

Fig. 1 shows the rf amplifier, mixer, and post-mixer amplifier. What may seem like excessive elaboration in design is a matter of personal whim, but the features are useful, nevertheless. For example, the two front-end attenuators aren't essential to good performance, but are useful in making accurate measurements (6, 12 or 18 dB) of signal levels during on-the-air experiments with other stations (antennas, amplifiers and such). Also, FL2, a fixed-tuned 1.8- to 2-MHz band pass filter, need not be included if the operator is willing to re-peak the three-pole tracking filter (FL1) when tuning about in the band. The fixed-tuned filter is my preference when the down converters are in use.

The benefits obtained from a highly selective tunable filter like FL1 are seen when strong signals are elsewhere in (or near) the 160-meter band. The rejection characteristics can be seen in Fig. 2. Insertion loss was set at 5 dB in order to narrow the filter response. Part of the circuit was inspired by Sabin's informa-

tive *QST* article, where he employed a three-pole Cohn filter with a 4-dB insertion loss.² In this example the high-*Q* slug-tuned inductors are isolated in aluminum shields, and the three-section variable capacitor which tunes them is enclosed in a shield made from pc-board sections. Bottom coupling is accomplished with small toroidal coils.

Rf amplifier Q1 was added to compensate for the filter loss. It is mismatched intentionally by means of L10 and L11 to restrict the gain to 6 dB maximum. Some additional mismatching is seen at L12, and the mixer is overcoupled to the FET tuned output tank to broaden the response (1.8 to 2 MHz). The design tradeoffs do not impair performance. The common-gate rf stage has good dynamic range and IMD characteristics.

The doubly balanced diode-ring mixer (U1) was chosen for its excellent reputation in handling high signal levels, having superb port-to-port signal isolation, and because of its good IMD performance. The module used in this design is a commercial one which contains two broadband transformers and four hot-carrier diodes with matched characteristics. The amateur can build his own mixer assembly in the interest of reduced expense. At the frequencies involved in this example it should not be difficult to obtain performance equal to that of a commercial mixer.

In discussing this circuit with Hayward (W7ZOI), he suggested that I include a diplexer at the mixer output (L13 and the related .002- μ F capacitors). The addition was worthwhile, as it provided an improvement in the noise floor and IMD characteristics of the receiver. The diplexer works in combination with matching network L14, a low-pass L-type circuit. The diplexer is a high-pass network which permits the 56-ohm terminating resistor to be seen by the mixer without degrading the 455-kHz i-f. The low-pass portion of the diplexer helps reject all frequencies above 455 kHz so that the post-mixer

¹This and all subsequent footnotes will appear on page 30.

*Technical Editor, *QST*

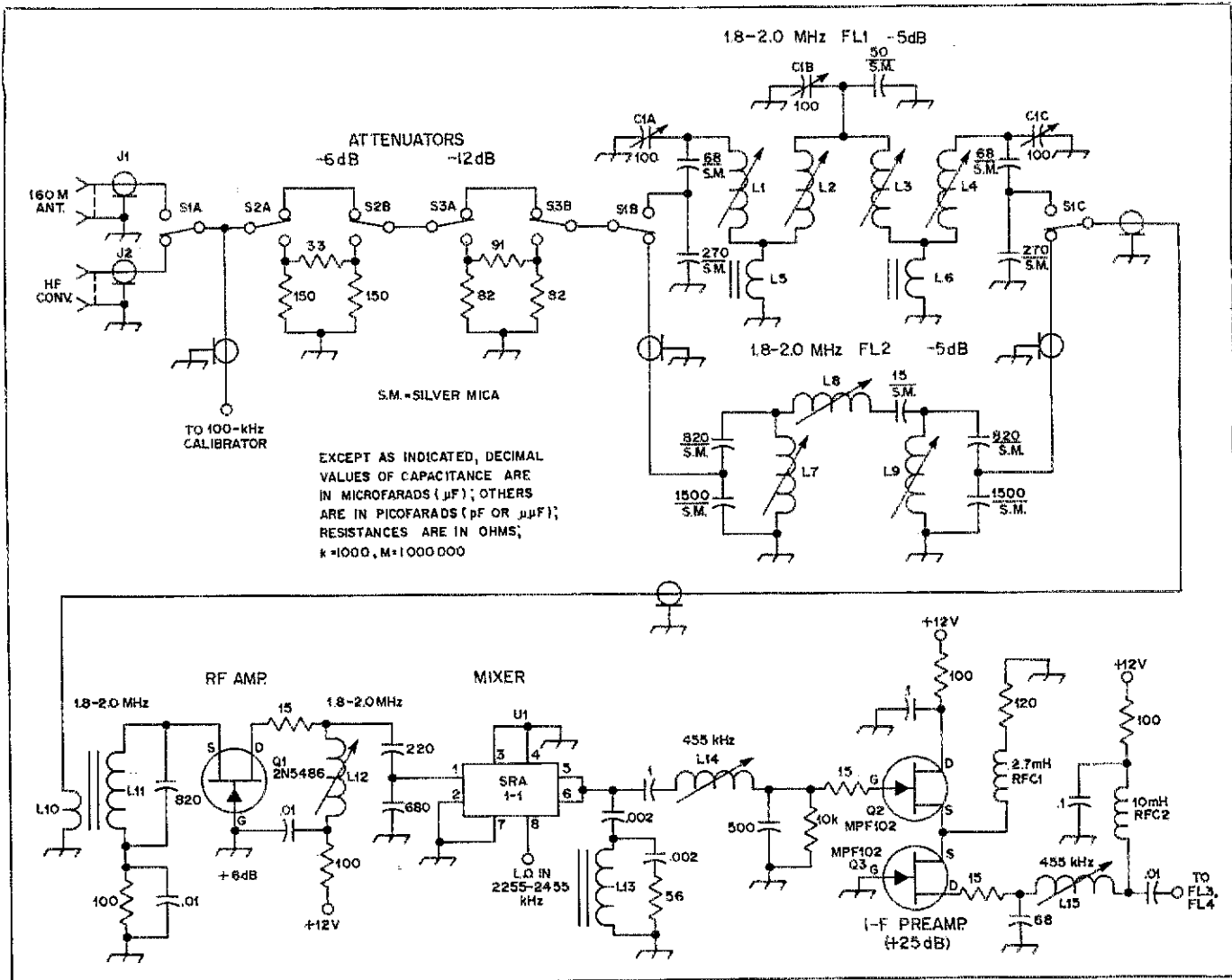


Fig. 1 — Schematic diagram of the receiver front end. Fixed-value capacitors are disk ceramic unless otherwise noted. Resistors

are 1/2-W composition. All slug-tuned inductors are contained in individual shield cans which are grounded.

- C1 — Three-section variable, 100 pF per section. Model used here obtained as surplus.
- J1 — SO-239.
- J2 — Phono jack.
- L1, L4 — 38 to 68 μ H, Q_u of 175 at 1.8 MHz, slug-tuned (J. W. Miller 43A685CB1 in Miller S-74 shield can).
- L2, L3 — 95 to 187 μ H, Q_u of 175 at 1.8 MHz, slug-tuned (J. W. Miller 43A154CB1 in S-74 shield can).
- L5, L6 — 1.45- μ H toroid inductor, Q_u of 250 at 1.8 MHz. 15 turns No. 26 enam. wire on Amidon T-50-2 toroid.

- L7, L9 — 13- μ H slug-tuned inductor (J. W. Miller 9052).
- L8 — 380- μ H slug-tuned inductor (J. W. Miller 9057).
- L10 — 16 turns No. 30 enam. wire over L11 winding.
- L11 — 45 turns No. 30 enam. wire on Amidon T-50-2 toroid, 8.5 μ H.
- L12 — 42- μ H slug-tuned inductor, Q_u of 50 at 1.8 MHz. (J. W. Miller 9054).
- L13 — 8.7- μ H toroidal inductor. 12 turns No. 26 enam. wire on Amidon FT-37-61 ferrite core.
- L14 — 120- to 280- μ H, slug-tuned inductor

- (J. W. Miller 9056).
- L15 — 1.3- to 3.0-mH, slug-tuned inductor (J. W. Miller 9059).
- Q1, Q2, Q3 — Motorola JFET.
- RFC1 — 2.7-mH miniature choke (J. W. Miller 70F273A1).
- RFC2 — 10-mH miniature choke (J. W. Miller 70F102A1).
- S1 — Three-pole, two-position phenolic wafer switch.
- S2, S3 — Two-pole, double-throw miniature toggle.
- U1 — Mini-Circuits Labs. SRA-1-1 doubly balanced diode mixer (2913 Quentin Rd., Brooklyn, NY 11229).

amplifier receives only the desired information. The high-pass section of the diplexer starts rolling off at 1.2 MHz. A reactance of 66 ohms was chosen to permit use of standard-value capacitors in the low- Q network.

A pair of source-coupled JFETs is used in the post-mixer i-f preamplifier. The 10,000-ohm gate resistor of Q2 sets the transformation ratio of the L network at 200:1 (50 Ω to 10 k Ω). An L network is used to couple the preamplifier to a diode-switched pair of Collins mechanical filters which have a charac-

teristic impedance of 2000 ohms. The terminations are built into the filters.

Gain distribution to the mixer is held to near unity in the interest of good IMD performance. The preamplifier gain is approximately 25 dB. The choice was made to compensate for the relatively high insertion loss of the mechanical filters — 10 dB. Without the high gain of Q2 and Q3 there would be a deterioration in noise figure.

Local Oscillator

A low noise floor and good stability

are essential traits of the local oscillator in a quality receiver. The requirements are met by the circuit of Fig. 3. Within the capabilities of the ARRL lab measuring procedures, it was determined that VFO noise was at least 90 dB below fundamental output. Furthermore, stability at 25°C ambient temperature was such that no drift could be measured from a cold start to a period three hours later. Mechanical stability is excellent: Several sharp blows to the VFO shield box caused no discernable shift in a cw beat note while the 400-Hz i-f filter was

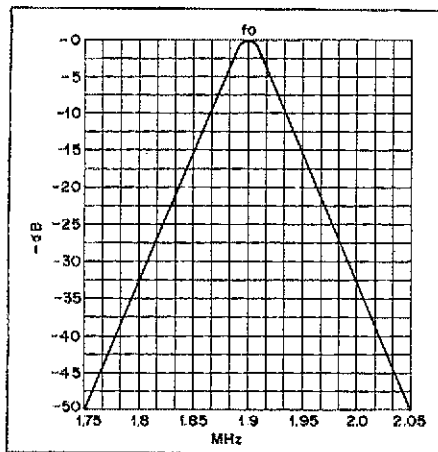


Fig. 2 — Response curve of the tunable front-end filter, centered on 1.9 MHz.

actuated. VFO amplifier Q14 is designed to provide the recommended +7-dBm mixer injection. Furthermore, the output pi tank of Q14 is of 50 ohms characteristic impedance. Though not of special significance in this application, the measured harmonic output across 50 ohms is -36 dB at the second order, and -47 dB at the third order.

Filter Module

In the interest of minimizing leakage between the filter input and output ports, I elected to use diode switching. The advantage of this method is that only dc switching is required, thereby avoiding the occasion for unwanted rf coupling across the contacts and wafers of a mechanical switch. Type 1N914 diodes are used to select FL3 (400-Hz bandwidth) or FL4 (2.5-kHz bandwidth). Reverse bias is applied to the nonconducting diodes. This lessens the possibility of leakage through the switching diodes. Because the Collins filters have a characteristic impedance of 2000 ohms, the output coupling capacitors from each are 120 pF rather than low-reactance .01- μ F units, as used at the filter inputs. Without the smaller value of capacitance the filters would see the low base impedance of Q4, the post-filter i-f amplifier. The result would be one of double termination in this case, leading to a loss in signal level. Additionally, the 120-pF capacitors help to divorce the input capacitance of the amplifier stage. The added capacitance would have to be subtracted from the 350- and 510-pF resonating capacitors at the output ends of the filters.

The apparent overall receiver gain is greatest during cw reception, owing to the selectivity of cw filter, FL3. To keep the S-meter readings constant for a given signal level in the ssb and cw modes, R7 has been included in the filter/amplifier module. In the cw mode, R7 is adjusted to bias Q4 for an S-meter reading equal

to that obtained in the ssb mode. Voltage for the biasing is obtained from the diode switching line during cw reception.

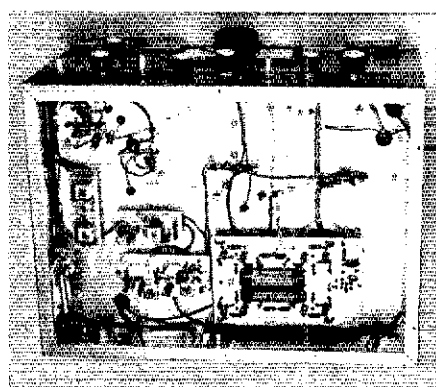
Although a 2N2222A is not a low-noise device, the performance characteristics are suitable for this circuit. A slight improvement in noise figure would probably result from the use of an MPF102, 40673, or low-noise bipolar transistor in that part of the circuit.

Performance Notes

The remainder of the receiver circuit will be discussed in Part 2 of this article. However, the reader may want to know just how well *His Eminence* performs, and how the characteristics compare to those of some modern commercial receivers. It seems fitting that the high points be covered in Part 1.

The tuning range of the receiver is 200 kHz. This means that for use with converters the builder will have to satisfy himself with either the cw or the ssb band segment. The alternatives are to increase the local oscillator tuning range to 500 kHz, or use a multiplicity of converters to cover the cw and ssb portions of each band. Because 160 meters is my primary band for DXing and casual QSOs during the winter season, the bandwidth feature of 200 kHz was adopted.

Some severe lab tests were undertaken with the completed receiver, aimed at learning how "crunchproof" the front end really was. A quarter-wavelength end-fed wire (inverted L) was matched to the receiver 50-ohm input port. The far end of the antenna



Considerable space remains beneath the chassis for the addition of accessory circuits or a set of down converters. At the upper left are the adjustment screws for the tunable filter, plus the bottom-coupling toroids. At the left center is the fixed-tuned front-end filter. To the right is the rf-amplifier module. A 100-kHz MFJ Enterprises calibrator is seen at the far lower left. Immediately to its right is the mixer/amplifier assembly. The large board at the lower center contains the i-f filters and post-filter amplifier. Most of the amplifier components have been tacked beneath the pc board because of design changes which occurred during development.

was situated 3 feet away from the WIAW end-fed Zepp antenna. A pk-pk voltage of 15 was measured across the 50-ohm receiver input jack by means of a Tektronix model 453 scope while WIAW was operating. Now, that's a lot of rf energy! With that high level of rf voltage present, a 10- μ V signal was fed into the receiver and spotted 2 kHz away from the WIAW operating frequency. No evidence of cross modula-

Fig. 3 — Circuit diagram of the local oscillator. Capacitors are disk ceramic unless specified differently. Resistors are 1/2-W composition. Entire assembly is enclosed in a shield box

- C2 — Double-bearing variable capacitor, 50 pF.
- C3 — Miniature 30-pF air variable.
- CR1 — High-speed switching diode, silicon type 1N914A.
- L18 — 17- to 41- μ H slug-tuned inductor, Q_u of 175 (J. W. Miller 43A335CBI in

- Miller S-74 shield can).
- L19 — 10- to 18.7- μ H slug-tuned pc-board inductor (J. W. Miller 23A155RPC).
- RFC13, RFC14 — Miniature 1-mH rf choke (J. W. Miller 70F103A1).
- VR2 — 8.6-V, 1-W Zener diode.

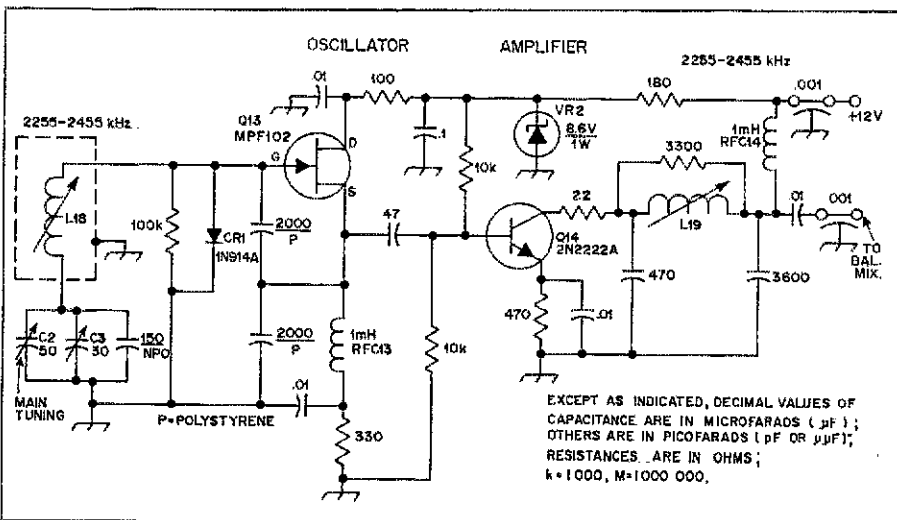
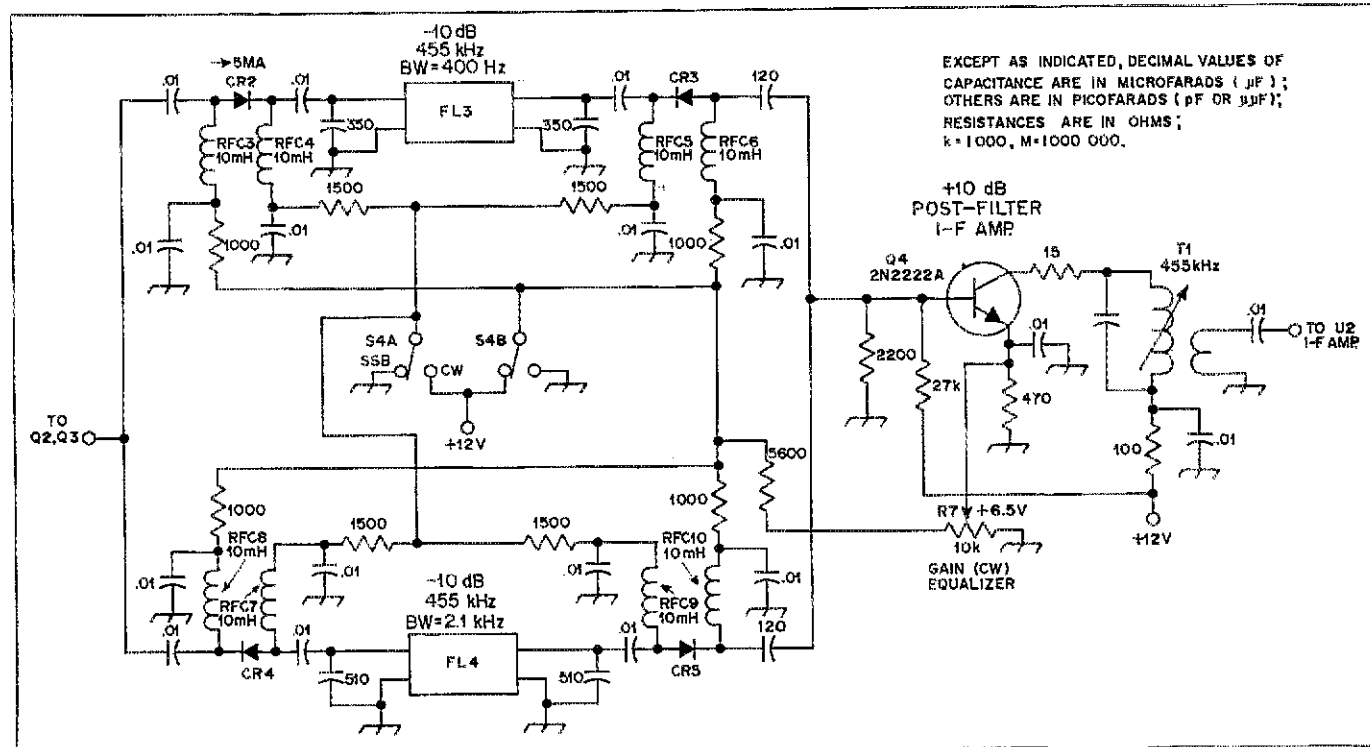


Fig. 4 — Schematic diagram of the filter and i-f post-filter amplifier. Capacitors are disk ceramic. Resistors are 1/2-W composition.

CR2-CR5, incl. — High-speed silicon switching diode, 1N914A.
 FL3 — Collins mechanical filter F455FD-04.
 FL4 — Collins mechanical filter F455FD-25.

RFC3-RFC10, incl. — 10-mH miniature rf choke (J. W. Miller 70F102A1).
 R7 — Pc-board control, 10,000 ohms, linear taper.

S4 — Double-pole, double-throw toggle or wafer.
 T1 — Miniature 455-kHz i-f transformer (J. W. Miller 2067, 30,000 to 500 ohms).



tion could be observed, and desensitization of the receiver could not be discerned by ear. The spread from 1.8 to 2 MHz was tuned, and no IM products were heard.

Dynamic range tests were performed in accordance with the Hayward paper in *QST* for July, 1975. Noise floor was -135 dBm, IMD was 95 dB, and 1 dB of blocking occurred at some undetermined point greater than 123 dB above the noise floor. The latter measurement is inconclusive because blocking did not become manifest within the output capability of the model-80 generators used in the ARRL lab. The resultant receiver noise figure at 1.8 MHz is 13 dB, which is more than adequate for the high atmospheric noise level on 160 meters.

Table 1 shows measured characteristics for numerous current-model commercial amateur receivers. Brand names can not be listed, but the same test equipment and procedures were used for all checks. It should be kept in mind that the higher the noise-floor figure in $-$ dBm, the better the performance. Similarly, the higher readings for IMD and blocking indicate best performance.

Mute testimony is seen in Table 1. It seems incredible that the three best receivers for IMD and blocking are homemade or modified commercial stock models! It is worth adding that

the worst performers are not necessarily the least expensive receivers available. You figure it out, eh? Part 2 of this article will appear in a subsequent issue of *QST*.

Footnotes

¹ Hayward, "A Competition-Grade CW Receiver," *QST* for March and April, 1974.

² Sabin, "Solid-State Receivers," *QST* for July, 1970.

Table 1

RECEIVER	IMD TWO-TONE DYNAMIC RANGE (dB)	BLOCKING ABOVE NOISE FLOOR (dB)	NOISE FLOOR ($-$ dBm)
W7ZO1 Rcvr. from <i>QST</i> March 1974	95.5	123	141
W1CER Rcvr. from <i>QST</i> June 1976	95.0	123+	135
Import 1 (modified by ARRL) WA1LNQ Same Rcvr. before modification	92.5	136	145
USA Box 1	79.0	110	136
USA Box 2	89.0	116.5	146
USA Box 3	86.0	116	143
USA Box 4	86.0	112	135
USA Box 5	84.0	112	135
USA Box 5 (modified)	76.0	114	137
Import 2	83.5	129	141.5
USA Box 6	79.5	112	139
Import 3	79.5	92	123
USA Box 7	79.0	110	136
USA Box 8	74.5	100	139
Import 4	70.0	97	139
	59.0	102	141

All receivers tested were equipped with 400-, 500-, or 600-Hz i-f filters. Tests were made on 20 meters. Sig. spacing = 20 kHz.

W1CER rcvr. with W7ZO1 20-meter converter attached
 88 123+ 133

CER-verters

A family of high-performance hf-band converters for the W1CER 160-meter "His Eminence" receiver in this issue.

By Wes Hayward,* W7ZOI

If big signals are taking "pot shots" at your collapsing receiver front end, some design changes are probably needed. Here are some guidelines for amateur and professional designers who are interested in improving receiver dynamic range — a sore point with respect to the performance of many modern-day commercial receivers.

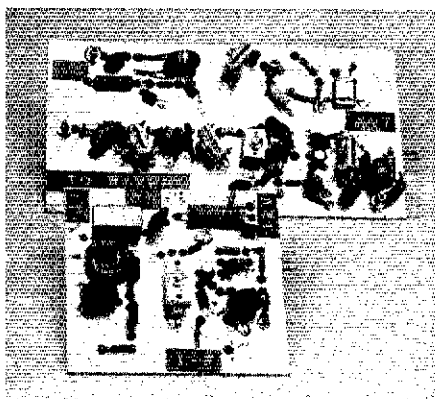
This issue of *QST* contains an article describing some recent receiver efforts at W1CER.¹ That receiver was built to serve two purposes. First, it provided high quality performance on 160 meters. Secondly, and of more significance, it was part of a continuing campaign by W1CER and this writer to develop receivers which meet the classic performance goals of sensitivity, selectivity and stability, while still maintaining a suitable dynamic range.^{2,3} As DeMaw pointed out in his two-part article, the amateur can do a much better job than the manufacturer in this regard.

As exciting as the 160-meter band can be, predominant interest is in the hf spectrum. As a result, a group of crystal-controlled converters was needed for the W1CER receiver with an i-f output in the 1.8- to 2-MHz region. Such a family is described here. The primary criterion for their design was to maintain a large dynamic range in a *dual-conversion* system, while still realizing a noise figure that was low enough to be acceptable on the various hf bands.

The information provided to the writer by W1CER was that the minimum discernable signal (MDS), also

*This and all subsequent references will appear on page 35.

*7700 S.W. Danielle Ave., Beaverton, OR 97005



called the equivalent noise floor of the receiver, was -135 dBm with a 400-Hz bandwidth. Further, the two-tone dynamic range of the receiver was 95 dB.

Information of this type can be related to other more fundamental specifications with a fairly simple set of equations. The noise figure of a receiver is related to the MDS by Eq. 1:

$$\text{MDS(dBm)} = -174 \text{ dBm} + \text{NF(in dB)} + 10 \log_{10} B_n \quad (\text{Eq. 1})$$

where B_n is the noise bandwidth of the receiver. The noise bandwidth is well-approximated by the 3-dB bandwidth when steep-skirted filters are used, which was the case for the W1CER receiver.

Similarly, the two-tone dynamic range of the receiver is related to the input intercept, P_i and the MDS by Eq. 2:

$$\text{DR(indB)} = (2/3)(P_i - \text{MDS}) \quad (\text{Eq. 2})$$

where both P_i and MDS are given in dBm. This equation is easily derived from the definition of the intercept concept and the observation that third-order IMD products are proportional to the cube of the strength of the input signals.

A final equation of significance is that which relates the noise factor of two cascaded stages. This relationship, which would apply to a crystal-controlled converter ahead of a receiver, as well as a preamplifier preceding a receiver, is given in Eq. 3:

$$F_{net} = F_1 + \frac{F_2 - 1}{G_1} \quad (\text{Eq. 3})$$

In this equation, F_1 and F_2 are noise factors which are algebraic ratios. Noise figure is just the decibel equivalent of this factor. G_1 is the gain of the first stage, again as an algebraic ratio. F_{net} is the noise factor of the combination of a given receiver with a preamplifier or converter with noise factor F_1 , and gain, G_1 .

From Eqs. 1 and 2, it may be shown that the W1CER receiver had a noise figure of 13 dB and an input intercept of +7.5 dBm. Eq. 3 may be used to infer the overall noise figure when various converter noise figures and gains are considered. The input intercept of a combination will merely be the input intercept of the basic receiver less the gain of the converter. This assumes that the converter is strong enough that minimal IMD occurs within the converter when compared with the following receiver. This implies explicitly that the output intercept of the converter should be much larger than the input intercept of the following receiver.

Converter Designs

After a bit of number "crunching" with the foregoing equations, it was concluded that the converters should have a net gain of about 10 dB and an output intercept of approximately +17 dBm or higher. For work on the bands up through 14 MHz, a noise figure of 13 to 16 dB was deemed acceptable. On the higher bands some compromise in

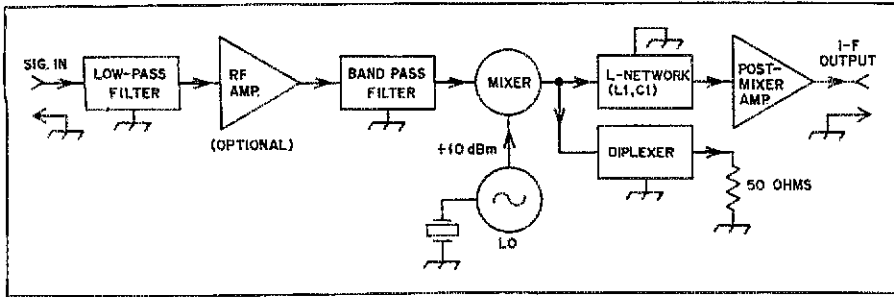


Fig. 1 — Block diagram of the CER-verters.

dynamic range would be tolerable in order to achieve lower noise figures. In studying the available circuit combinations it was decided to base the front end of the converters on a diode-ring mixer. The mixer would be preceded by a band-pass preselector filter and followed with a diplexer and a dual-gate MOSFET amplifier at 1.9 MHz. A block diagram of the system is shown in Fig. 1.

The original intention was to construct separate converters for each band, 80 through 10 meters. However, after reviewing the design requirements, this was found to be redundant. Diode-ring mixers are inherently broadband and do not require tuned circuits. Further, the post-mixer amplifier would be identical for all of the bands. Only the front-end preselector networks and local oscillators need be changed between bands. The final configuration chosen was to use a master board which contained the diode-ring mixer and a post-mixer amplifier. A family of boards was then constructed, each containing a suitable local

oscillator and the preselector network for the band of interest.

Mixer and Post-Amplifier Board

The circuit for the mixer and the dual-gate MOSFET amplifier is shown in Fig. 2. There are a few departures from the standard in this design. First, a diplexer is used between the mixer and the "post-amp." This network serves a number of purposes. First, the inductor (L1) and capacitor (C1) driving the FET form an L network which provides an impedance transformation to the gate of the amplifier. A 2200-ohm resistor at the gate assures a termination, causing the mixer to see 50 ohms in the 1.9-MHz frequency range. The other part of the diplexer (C2, C3 and L2) is a high-pass filter designed for a cutoff frequency of 5 MHz. This filter provides a constant i-f termination for the diode ring at virtually all frequencies. This is important if the IMD properties of the diode-ring mixer are to be preserved. Such a mixer will create sum-and-difference frequencies from the LO and

rf inputs. The difference frequency is used to drive the WICER receiver. However, a termination must also be provided for the sum frequency.

In order to simplify the band switching, +12 volts dc is supplied through the local oscillator port of the mixer. This is realized with an rf choke and suitable capacitors.

The output of the amplifier was designed for broadband performance. In order to obtain large bandwidth, the output transformer (T1) was wound on a high-permeability ferrite toroid. A powdered-iron core should not be used for this transformer. Indeed, it was found that a ferrite core with a permeability of 1,25 was not suitable in this position. Much better bandwidth and impedance matching was obtained with the core specified which has a permeability of 2000. The 2200-ohm resistor in the drain circuit ensures that the output impedance presented by the amplifier is close to 50 ohms. This is important in order to keep the input filters of the WICER receiver terminated properly.

A ferrite bead is used on gate 2 of the amplifier. This may not be necessary in some cases. However, it was included to lessen the possibility of uhf oscillations occurring within the amplifier.⁴ A Fairchild FT-0601 or RCA 40673 dual-gate MOSFET can be used at Q1

Front-End Sections

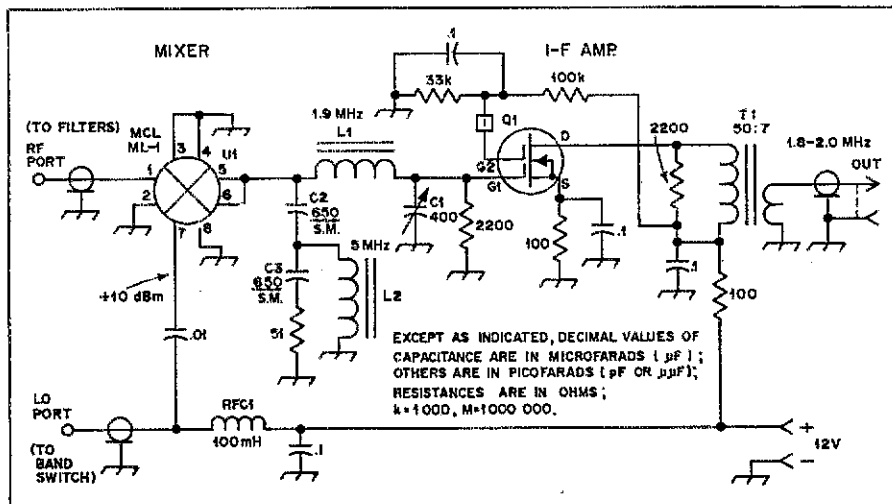
Shown in Fig. 3 is the circuit used as the front end for each of the lower-input bands (3.5-3.7, 7.0-7.2 and 14.0-14.2 MHz). Component values are given in Tables 1 and 2.

The local oscillator for each of the converters uses a bipolar transistor and is designed to provide an output from +10 to +13 dBm. This level of LO injection was found to be near optimum for the diode-ring mixer that was used.

The preselector filters are fairly elaborate. However, the results are well worth the extra expense and effort. Predistorted filter-synthesis methods were used to write a computer program for design of the band-pass filters. The coils were wound prior to filter design. Their unloaded Q values were measured with a laboratory Q meter, and the results were then inserted into the program in order to arrive at the capacitor values. All band-pass filters were designed for a three-pole Butterworth response.

One problem with multisection filters using capacitors as coupling elements between the resonators is that the stopband attenuation may degrade in the vhf spectrum. This is due to slight amounts of lead inductance in the tuning capacitors, and the fact that the capacitive-intersection coupling method degenerates toward a high-pass filter

Fig. 2 — Schematic diagram of the master mixer and amplifier circuit. Fixed-value capacitors are disk ceramic unless noted otherwise. Resistors are 1/2-W composition. See Tables 1 and 2 for component values not marked. U1 is a Mini-Circuits Lab ML-1 doubly balanced diode mixer.



response away from the passband. In order to suppress these responses, should they occur, a 5-pole low-pass filter is included at the antenna terminal.

Two methods were used for evaluation of the filter designs. First, after initial calculation of the component values, a computer program was used to determine the frequency response of the filters over a wide range. In this analysis, resistors were placed in the circuit to simulate the distortion effects caused by the losses in the cores.⁵

After the filters were built and aligned in the home shop, they were checked with laboratory instrumentation. In this case a Tektronix 7L13 spectrum analyzer and TR-502 tracking generator were used. The measured results around the passband corresponded very well with the computer simulation (which is always encouraging to see). The stop-band attenuation was measured, with one exception, to be over 100 dB for all three filters evaluated. The exception was for the 80-meter filter. At about 70 MHz the attenuation degraded to roughly 95 dB, but returned to the better values at frequencies up through 200 MHz.

One of the reasons a Butterworth response was chosen was that this filter shape is aligned easily with simple test equipment. Alignment is performed by driving the filter with a 50-ohm signal generator and terminating the output in a sensitive 50-ohm detector. The generator is set at the center frequency of the filter and the variable capacitors are adjusted for a maximum response. Experimentally, it was not found necessary to readjust the filters when the swept instrumentation was available.

The converter for the 15-meter band was built using the circuit in Fig. 4. On this band it was felt that a better noise figure might be useful. This was provided by inserting an rf amplifier between the low-pass filter and the band-pass circuit. The low-pass circuit was modified. The input section is a symmetrical pi network with a Q of 1. This is followed by a pi network with a Q of 10 and an impedance transformation from 50 to 2000 ohms. A 3300-ohm resistor is used in the drain circuit to ensure proper termination of the band-pass filter. In the unit built, the drain was attached directly to the hot end of the resonator (L10). However, it would be desirable to reduce the gain somewhat. This would be realized easily by tapping the drain down on the tuned circuit. The terminating resistor should remain across L10.

One problem that the builder may encounter is in obtaining capacitors for the coupling elements between resonator sections of the filter. These values are critical and should not be changed

BAND (MHz)	L3, L4, L8 (TURNS-CORE)	L9 (TURNS-CORE)	L5, L6, L7 L10, L11, L12 (TURNS-CORE)	T2, T3 (TURNS-CORE)
3.5 to 3.7	19, No. 22 T50-2	none	35, No. 24 T68-2	25, No. 24 T50-2, 2-t. link
7.0 to 7.2	15, No. 22 T50-2	none	20, No. 22 T68-6	25, No. 24 T50-2, 2-t. link
14 to 14.2	12, No. 22 T50-6	none	12, No. 22 T68-6	28, No. 24 T50-6, 3-t. link
21 to 21.2	10, No. 22 T50-6	21, No. 22 T50-6	10, No. 22 T50-6	19, No. 24 T50-6, 2-t. link

Coil and transformer data. Toroid cores are Amidon Assoc. powdered-iron type. Y1, Y2, Y3 and Y4 for 3.5 through 21 MHz, respectively, are 5.6, 5.2, 12.2 and 19.2 MHz. (International Crystal Co. type GP, 30-pF load capacitance.)

casually. However, the capacitors may be replaced by a more complicated equivalent network. The basis of this equivalent circuit is to replace a desired capacitor with a series combination of two capacitors with a value which is more than twice the original value. A third capacitor is then placed from the junction of the series capacitors to ground. This configuration is shown in Fig. 5 along with the equations for picking the proper values. As an example, consider the 14-MHz filter, where 3.3-pF coupling capacitors are used. This single capacitor could be replaced with three 10-pF capacitors.

Those building the converter for 80 meters may wish to cover also the 75-meter phone band. While the filter shown could probably be realigned for a range about 100 kHz higher, the shape of the filter would no doubt deteriorate if it were moved further. A better approach would be to change the value

of the inductors. Proper results should be obtained by reducing the coils from 35 to 32 turns, keeping all capacitor values the same. A 5.8-MHz crystal would be required for tuning the range from 4.0 to 3.8 MHz.

Additional Design Notes

The reader should note that the tuning will be "backwards" for the 80-meter band. This was done for two reasons. First, difficulty was encountered in making the oscillator shown operate properly with the 1.7-MHz crystal that was tried. Of greater significance was the fact that the mixer balance was not especially good at this frequency. As a result, a strong 1.7-MHz signal would have appeared at the input to the post-mixer amplifier. This could have resulted in IMD products. Furthermore, for the 75-meter band the crystal would have been at 2.0 MHz if low-side injection were used. This would have

Fig. 3 — Diagram of the filter and crystal oscillator used on 20, 40 and 80 meters. Numbered fixed-value capacitors are silver micas. Resistors are 1/2-W composition. See Tables 1 and 2 for parts values.

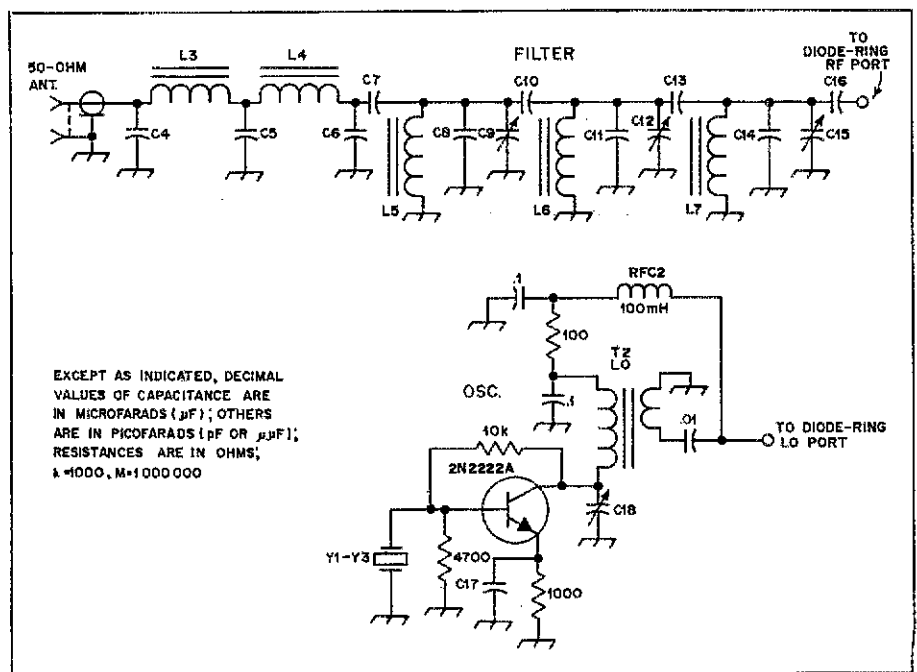


Table 2

BAND (MHz)	C4, C6, C19 (pF)	C5, C20 (pF)	C7 (pF)	C8 (pF)	C9, C12, C15 (pF)	C10 (pF)	C11 (pF)	C13 (pF)	C14 (pF)	C16 (pF)	C17, C31 (pF)	C18, C32 (pF)	C21 (pF)
3.5 to 3.7	790	1580	130	—	90 to 400	12	—	10	—	91	100	400	—
7.0 to 7.2	450	890	43	—	90 to 400	4.7	—	4.7	—	52	100	400	—
14 to 14.2	220	450	33	90	20 to 90	3.3	90	3.3	90	22	47	20 to 90	—
21 to 21.2	150	300, 345	—	51	20 to 90	1.2	51	1.2	51	12	47	20 to 90	20 to 90

Fixed-value and trimmer capacitors. Fixed-value capacitors are silver-mica or similar high-Q, stable types. Trimmers are mica compression type. See text for obtaining precise non-standard fixed-capacitance values.

placed a strong signal within the tuning range of the main receiver. If it is desirable that all hf bands tune in the same direction, the builder should pick high-side crystals for all of the bands.

The approach used for the 15-meter converter in order to obtain low-noise performance could also be applied to the 10- and 6-meter bands. The image rejection might be a little poor with such a low i-f in the 6-meter case.

Another revision that many builders may consider would be the construction of a high-performance 80-meter receiver with converters for the higher bands. The converters described would be suitable for this situation. The crystal frequencies would change accordingly. The diplexer between the diode mixer and the "post amp" should be redesigned. This could be done easily by halving the inductance and capacitance values used in the diplexer circuit. The broadband output circuit in the drain of Q1 should work equally well at 3.5 MHz. The 15- and 20-meter band-pass filters were designed with enough bandwidth

to cover the total band. This was done in order to keep the insertion losses at a reasonable level. A slightly wider filter would be required for the total 40-meter band.

The converters are built on rather large circuit boards. This was done in order to ensure a reasonable level of stopband rejection in the filters, and to ease construction. Those interested in a more compact format should consider the inclusion of shields between the sections of the input band-pass filter and between the filter circuitry and the corresponding oscillators. It is fun to build miniature equipment when there is a good need for small size. However, for high-performance home-station equipment, where considerable experimentation may be required, a larger format is often desirable.

Because the pc boards shown in the photograph are quite large, the builder will probably elect to lay the circuits out for a more compact format. For this reason there are no pc-board templates and layouts available.

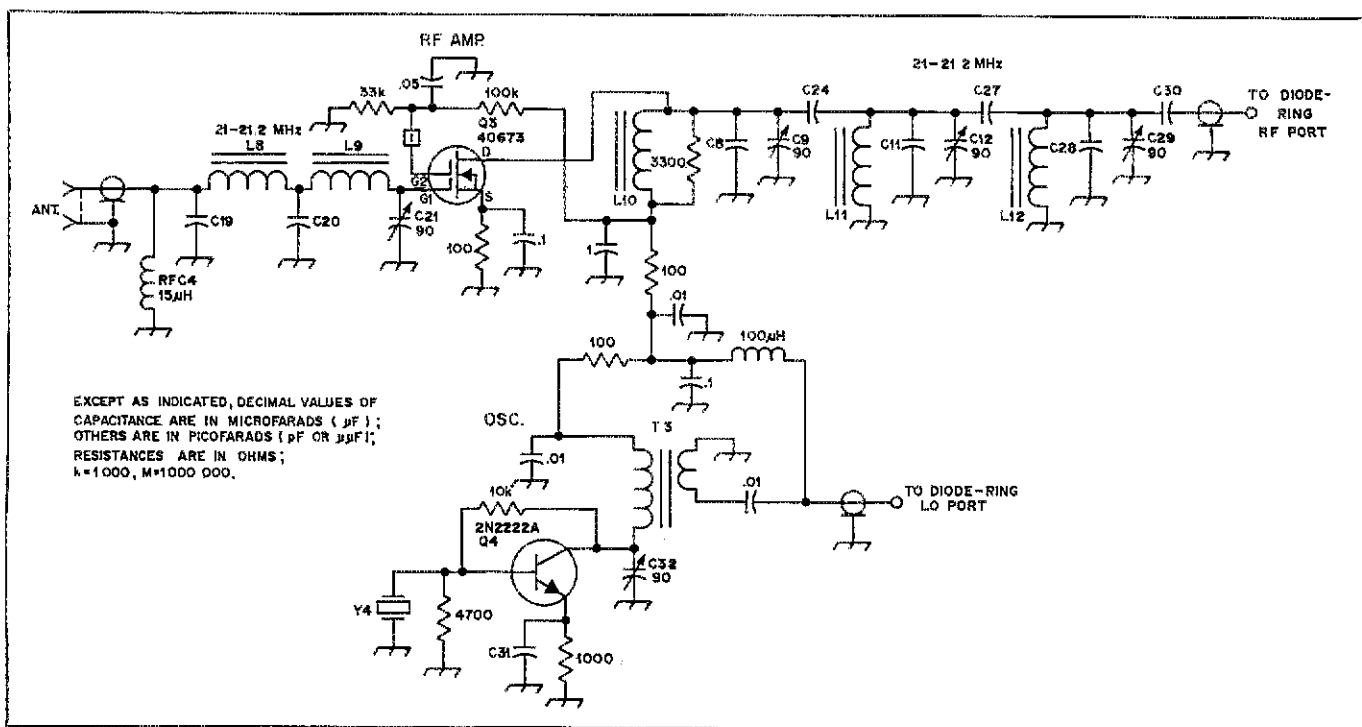
Great care should be taken when the front-end sections are band switched. Shielding between switch wafers should have over 100 dB of isolation. Diode switching is not recommended unless the builder has equipment to evaluate the effects on IMD.

Evaluation and Performance

This project was in some ways quite frustrating, for the W1CER receiver was 3000 miles away. This is the first piece of receiving gear that the writer has built which could not initially be evaluated "by ear." However, a suitable substitute was available for laboratory evaluation. This was a Tektronix 7L5 Spectrum Analyzer. This instrument was extremely convenient to use for this purpose, since it is synthesized with a 250-Hz accuracy, and has resolution down to 10 Hz. The dynamic range is excellent.

The only converter evaluated for IMD was the 14-MHz unit. Two-tone IMD measurements were performed and it was found that the output intercept of the converter was +22 dBm. This is

Fig. 4 — Diagram of the 15-meter front end circuit. Numbered fixed-value capacitors are silver micas. Resistors are 1/2-W composition. See Tables 1 and 2 for other parts values.



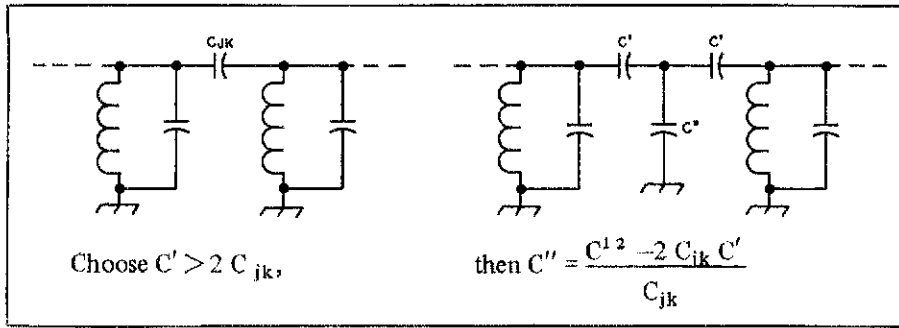


Fig. 5 — Method for obtaining filter coupling capacitors of computed values.

more than sufficient for the application, since it greatly exceeds the input intercept of the WICER receiver, +7.5 dBm.

The gain and MDS were measured for all four converters. To remove the effect of the high noise figure of the 7L5 (19 dB), a low-noise MOSFET preamp was built at 1.9 MHz. This unit had a noise figure under 2 dB, allowing meaningful measurement of converter MDS. The signal generator used was an HP-8640B. On the three lower bands, the resultant noise figure of the converters was 12 dB, plus the loss of the input filters. Similarly, the gain of the converter was 12.5 dB, minus the loss of the input filters. It was found that the gain and noise figures could both be improved by removing the 2200-ohm resistor at the gate of Q1. There was a slight reduction in the output intercept, but not enough to cause problems.

However, the low-pass part of the diplexer became much sharper in frequency response. This would make a front panel trimmer control necessary.

The 15-meter converter performed differently. The net gain of this unit was 32.5 dB and the noise figure was about 3 dB. This is actually too much sensitivity to be usable at this frequency. It is highly recommended that the builder move the drain tap on the band-pass filter as outlined.

On the basis of the measured results and the published data for the WICER receiver, the system results may be calculated. Shown in Table 3 are the predicted system noise figure, MDS for a 400-Hz bandwidth, input intercept and two-tone dynamic range for the converters operating into the DeMaw receiver. Also shown are the measurements that were obtained for image rejection and i-f

feedthrough for the four converters.

It is interesting to note that the dynamic range of the system has decreased from 95 dB on 160 meters to 87 dB on the hf bands. This decrease is to be expected in any multiconversion system. Note also that the dynamic range is constant on the three lower bands. This results because the only variation between bands is in the insertion loss of the preselector filters. This difference is the same as would be obtained by adding attenuation to the front end of the receiver. An attenuator will change both the MDS and the input intercept by the same amount, leaving the two-tone dynamic range as a constant of the system. While front-end attenuators are useful accessories for the receiver, they will not improve the dynamic range as is sometimes implied.

A more careful application of attenuation can, however, result in an improved dynamic range. Consider the effect of switching in the 6-dB input attenuator of the WICER receiver, after the converters. The input intercept of the 160-meter tunable i-f will now increase to +13.5 dBm and the noise figure will become 19 dB. If the net result is evaluated using the earlier equations, the 20-meter MDS will degrade by only 0.7 dB, but the system input intercept will move up to +5 dBm, leaving a net dynamic range of 90.6 dB. This is a dramatic demonstration of the effect of gain distribution upon dynamic range, especially in multiconversion receivers.

QST

Table 3

BAND (METERS)	NFIG. (dB)	MDS (dBm)	P _i (dBm)	DR (dB)	IMAGE REJ. (dB)	I-F FEEDTHROUGH (dB)
80	14.8	-133.2	-2.5	87.1	-90	-110
40	16.3	-131.7	-1.0	87.1	-110	-94
20	16.3	-131.7	-1.0	87.1	-95	-112
15	3.1	-145	-25.0	80.0	-100	not measured

References

- DeMaw, "His Eminence the Receiver," QST, June and July, 1976.
- Hayward, "A Competition-Grade CW Receiver," QST, March and April, 1974.
- Hayward, "Defining and Measuring Receiver Dynamic Range," QST, July 1975.
- Reisert, "Low-Noise 29 MHz Preamplifier for Satellite Reception," Ham Radio, Oct., 1975.
- Hayward, "Bandpass Filters for Receiver-Preselectors," Ham Radio, Feb., 1975.

Strays

QST congratulates . . .

- John McKenna and Russell A. Langdon, honored with Marconi Memorial Gold Medals of Service from the Veteran Wireless Operators Assn.
- William A. Leonard II, recognized with the Marconi Memorial Gold Medal of Achievement by the Veteran Wireless Operators Assn.
- Arthur C. Goodnow, presented with the Marconi Memorial Gold Medal of

Honor for research and development of broadcasting transmitters.

- Deane B. Blazie, WA3TRP, with the U.S. Army Human Engineering Laboratory at Aberdeen, MD, for being selected by the U.S. Jaycees as one of America's Ten Outstanding Young Men for 1976. He was cited particularly for his invention of an electronic braille calculator for the blind.
- Seymour Krevsky, W2JBI, upon his election as a fellow of the American Association for the Advancement of Science (AAAS).
- Bill Thomas, W4OHH, now serving as mayor of his city, Thomaston, GA.

□ At 12:01 A.M. local time on January 1, 1976, a new centennial net was called by Manny Blondo, W0ZXH. There were twenty-one first-time check-ins. W0ZXH advised all that the net would be called next at 12:01 A.M. local time on January 1, 2076. Anyone failing to check in would be automatically dropped from the net.

□ WIPNB spotted this one on page 2 of *The Bristol Press* (CT) for March 19, 1976: ". . . a wave trap filter may be purchased for CB equipment, or residents may purchase a T.V. eye filter for their television sets. . . ." It has been suggested that ear and nose filters be developed, also.

Technical Correspondence

LONG-DELAYED ECHOES ON EME CIRCUIT

Long-delayed echoes have been reported by the amateurs at high frequencies for a long time.^{1,2,3} More recently Hans Lohmann Rasmussen, OZ9CR, reported receiving echoes delayed an additional two seconds after his normal EME echoes at 1296 MHz were received from the moon. Hans sent me a copy of his findings and after I circulated them to Dick Turrin, W2IMU, and Bob Burns, WA3HVA, both of Bell Laboratories, and James H. Trexler of the Naval Research Laboratory, the response was unanimous that he should report this unique event in one of the scientific journals. It later appeared in *Nature* magazine.⁴ Since then he has received a letter from Alan Goodacre on behalf of the Ottawa Canada Moonbounce Group, VE3OMG, reporting echoes of one second or so delay after the moon's echoes at 144 MHz.

OZ9CR's 1296-MHz equipment consists of a 26-foot-diameter parabolic antenna with a circularly polarized feed horn and 500 watts cw from the transmitter. The receiver has a noise figure of 2 dB and a passband of 500 Hz. The transmitter had a distinctive note because of a spurious frequency near the fundamental. On the EME circuit it was very easy to identify the signal because of this unique characteristic. The following is the report Hans originally sent me. — *Howard O. Lorenzen, W3BLC, 3713 Bangor St. S. E., Washington, DC 20020.*

GHOST ECHOES ON 1296 MHZ

In the middle of the summer of 1974, I had a very queer experience while working moonbounce on 1296 MHz. Now I am curious to know if any vhf or uhf amateurs have ever observed anything similar, because this was such a strange happening that I could hardly believe my own ears. Here is how it all came about.

I had been told that there was some chirp

on my signal so I thought that it would be a good idea to listen to a few moon echoes before I started to work on the power supply. Then I would have something for comparison later on. It was late in the afternoon with the sun about straight west and the clear moon southwest at 30 degrees elevation. I had been drawing echoes for some time and just stood and pondered about that chirp, when out from the speaker came a second echo signal. It was a hoarse whispering signal with the true characteristics of the signal that I had just received from the moon. I was so surprised that for some time I stood stiff and listened for what would follow. But nothing more came, so I keyed a new signal and waited. In came the moon echo, and the ghost echo about two seconds later — with my transmitter chirp and everything.

Again and again I drew echoes, and apparently there was no doppler shift and certainly no beat tone on the signal. The hoarse characteristic of the echo reminded me of a sun-noise signal. My first impression was that this was a double echo from the moon, and the time elapsed could very well fit into the picture. I was aware that this was something unusual and should be recorded, but my little recorder had been dropped on the floor and was badly damaged, so I thought the next best thing would be to keep on and see what happened. For twenty minutes I kept working both echoes and this sinister signal kept coming in without any change. By and by, my neighbor's big birch tree came into the way and the signals became weaker, and when half the dish was covered I could hear no more. After this, I happened to think that for a while during the observations I had neglected to aim the dish and the moon echo came in very weak while the ghost echo came in as usual. This would suggest that the sky away from the moon could perhaps reflect a radio signal, but this possibility did not appear to me at the time and I still thought it was a double echo.

The next day we had a regular radio blackout, which lasted several days. In the papers I read that a violent eruption had taken place on the sun; a large sunspot had appeared and it could be seen without glasses. This at once gave me the idea that the eruption had something to do with my ghost signal. And why not? I realized that the sun three hours earlier had been very close to the

position that the moon had at the time when the echoes were heard. A large streamer of gas from the corona of the sun on its way toward the earth could perhaps be highly ionized and be able to reflect a radio signal. If this streamer approached with a speed of 1000 kilometers-per-second with a front like a shock wave, it might possibly be a good radio reflector. What other mechanism could have reflected a radio signal from 800,000 kilometers out in space, in four to five seconds? Very large radar stations can draw echoes from the sun but there seem to be no records of other reflectors. This is perhaps one of those rare occasions when conditions were just right and some happy-go-lucky radio ham happened to be present when queer things happened. — *Hans Lohmann Rasmussen, OZ9CR, Aasum, DK-5000 Odense, Denmark.*

MORE GHOST ECHOES

Rasmussen's recent report of ghost echoes while conducting moonbounce tests (ref. 4) reminded me of an experience I had in the late 1960s in connection with moonbounce tests on 144 MHz. My equipment at VE3BZS/2 consisted of an array of sixteen four-element Yagi antennas fed with approximately 500 W of rf power. The receiver noise figure was about 3 dB and the bandwidth about 30 Hz. Pulses of one second duration were transmitted every 10 seconds. With the equipment parameters used, I would only occasionally receive lunar echoes.

One time while playing a tape recording of my efforts to another amateur radio operator, he remarked that he could hear a few weak echoes; I replied that I didn't hear any. Upon replaying the tape it turned out that the energy was not being received in the lunar time slot of 2.5 to 3.5 seconds, where I had expected it, but somewhat later, one second or so as I recall. These nonlunar echoes were too weak and transitory to document properly in the scientific literature at that time but I mention them now as there seems to be increasing evidence of long-delay echoes of nonlunar origin.

Rasmussen's observation is of considerable interest as it appears to be one of the few cases when *persistent* long-delay echoes have been observed and related to some physically reasonable mechanism. — *Alan Goodacre, VE2AEJ, 1286 Woodside Dr., Ottawa, Ont. K2C 2G9.*

¹ Dellinger, "Observations on Long-Delayed Radio Echoes," *QST*, August, 1934.

² Villard, Graf and Lomasney, "Long-Delayed Echoes — Radio's Flying Saucer Effect," *QST*, May, 1971.

³ Villard, Fraser-Smith and Cassam, "I.D.E.S. Hoaxes, and the Cosmic Repeater Hypothesis," *QST*, May, 1971.

⁴ Rasmussen, "Ghost Echoes on the Earth-Moon Path," *Nature*, 257, 36 (1975).

Feedback

It happened — an error in Learning to Work with Integrated Circuits. Sorry about that, chief! In Part 5, May *QST*, page 19, the boo-boo appears in the parts list for Fig. 17. In the 3rd column, the third item should be listed as four 0.68- μ F capacitors, disk or rectangular ceramic.

■ Murphy did it again! In the Zener diode

article for April, 1976, *QST*, a slip-up occurred in Fig. 4. Power dissipation through RS is not 0.258 W. Rather, it is based on the voltage drop across RS, squared, which is divided by 173 ohms. Thus: $P_D(RS) = 4.9^2/173 = 0.13878$ W. W4LDB spotted the error.

■ Riley has informed us of some errors in his schematic diagrams which appeared in *QST* for November and December, 1975 (Riley, "A Morse Code to Alphanumeric Converter and Display," *QST* for October through December, 1975).

In the November issue, schematic diagram, Fig. 4: U1 and U2; pin 11 should be shown as pin 1. And in the December issue, schematic diagram, Fig. 6: (a) U17; pin 14 should have been shown as pin 4. (b) U8; pin 16 should have been shown as pin 14. (c) U11; pins 11 and 12 should be tied to +5 V and not to ground as shown. (d) The common connection symbols BB and DD, were omitted from the schematic at the outputs (pin 12) of U8 and U9 respectively. (e) Page 18, parts list. U1 is described as a "programmable modulo-N decade counter." The device is actually a voltage-controlled oscillator.

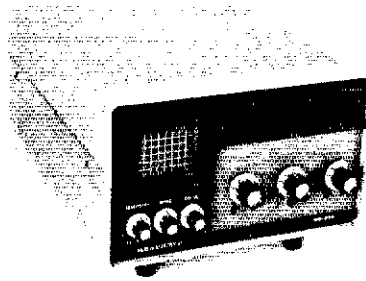
Product Review

Heathkit SB-614 Monitorscope

Along with the SB-104, Heathkit introduced a brand-new line of station accessories designed to match the new "SB" styling. The SB-614 represents the second revision of Heath's original monitorscope, model HO-10. The first revision, model SB-610, was electrically almost identical to the HO-10 but quite different in appearance. Its styling matched the decor of the original SB series receivers, transmitters and transceivers. "Classy" perhaps best describes the new SB series look. Unlike the '610 and its predecessor, the innards of the '614 bear no resemblance to that of its ancestor. The '614 is all solid state except for the CRT. This is quite a design change from the earlier units as they were of the "valve" variety.

The 42 FETs, diodes, transistors and Zener diodes along with most of the other components are contained on two circuit boards — one large and one small board. Demodulator circuitry and a portion of the clamper circuit are housed on the small board. On the larger board are the vertical amplifiers, sync, sweep and blanking circuits, horizontal amplifier and all of the power supply components other than the power transformer. The only circuitry that is not contained on these two boards is the front and rear panel control wiring and the step attenuator. The kit went together smoothly owing to the fact that the assembly manual was complete and free of mistakes. Assembly, check out and alignment time were on the order of 11 hours. In the accompanying table some of the important specifications for the '614 and '610 are compared.

The assembly manual contains approximately 40 patterns that one might typically observe on the monitorscope. These include displays of cw, trapezoid, RTTY cross and transmit envelope patterns. The displays show properly tuned and operating transmitters along with misadjusted and defective ones. Each of the improper waveform displays offers one or more possible causes for the problem.



The writer found two potential problems in the operation of the Monitorscope. Since the scope is usually in the line at all times, the operator must pay attention to the setting of the vertical-gain control when changing power levels. The vertical-gain control is the step attenuator that adjusts the height of the display. If the attenuator is set near minimum attenuation (which it would be for 100-watt levels) and an amplifier is switched into the line, the operator must reset the attenuator

control to a position near maximum attenuation. If the operator fails to reset the control, even if the Monitorscope is turned off, and operates the transmitter and amplifier in the key-down mode for 10 seconds or more, resistor R201 on the demodulator board will go up in smoke. The preventative measure is simple — make sure that the attenuator is in the maximum attenuation position whenever switching from low to high power.

The second potential problem is the increase in SWR presented to the transmitter with the Monitorscope placed in a normally flat line. On 80 through 10 meters the increase is only slight. On 6 meters the SWR rises to 6:1 with the vertical-gain control set for maximum display.

Aside from these two potential problems, the Monitorscope would be a worthwhile addition to any shack not equipped with such a unit, especially in these days of "speech processoritis." A 'scope is about the only sure way of telling if your speech processor is operating correctly. The price class of the Monitorscope is \$140 and is available from the Heath Company, Benton Harbor, MI 49022. — WAILNQ

COMPARISON

	SB-610	SB-614
Rf sampling section		
Rf frequency coverage	160-6 meters	80-6 meters
Rf power limits	15-1000 watts	10-1000 watts
Insertion loss	negligible	negligible
Vertical amplifier		
Input impedance	100K Ω	1 Meg Ω , 75 pF in shunt
Frequency response	10 Hz-6 MHz	10 Hz-50 kHz
Horizontal amplifier		
Input resistance	1 Meg Ω	1 Meg Ω
Frequency response	3 Hz-15 kHz	10 Hz-3 MHz
Sweep generator		
Frequency range	15-200 Hz	10 Hz-10 kHz
General		
Built in two-tone test osc.	yes	no
Power requirements	105-125 or 210-250 V ac, 35 W	110-130 or 220-260 V ac, 35 W

IC OP-AMP COOKBOOK

Walter Jung has written an outstanding book about op-amp theory and applications. There are 591 pages, inclusive of the index. It is available in soft-cover format, measuring 8-1/2 x 5-1/4 inches.

The first 135 pages give an in-depth rundown on op-amp theory, and in the kind of language that an amateur or professional technician can digest without laboring over endless equations and unheard of electronics terms! Furthermore, the aft end of the book carries 24 data-packed pages of cross-reference material, enabling the reader to equate one company's op amp to that of several other manufacturers' brands.

The practical applications section is the real meat of the book. Working circuits are presented with specified component values, and nearly every conceivable op-amp application is treated in complete form. Equations are provided in many areas of this section, enabling the designer to derive particular component values for his design project.

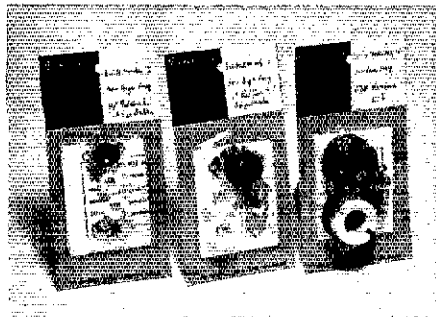
No progressive amateur should pass up this fine book. It appears to be the op-amp enthusiast's bible and should become a daily reference for those who labor amid the fumes of hot rosin in the ham workshop. Cover price is \$12.95, and the publisher is Howard W. Sams & Co., Inc., NY, NY. Jung has written two additional smaller books on the subject of op amps — *Unique IC Op-Amp Applica-*

tions and Audio IC Op-Amp Applications, also by Sams. — WICER

POT-CORE KITS

J. W. Miller Co. has added ferrite pot-core kits to their ever-expanding line of products. Various sizes and styles are available in both low- and high-frequency ferromagnetic material. Some of the kits contain adjustment slugs for precise tweaking of the inductance. Bobbins are supplied with each of the kits.

Complete magnetic specifications are included with each of the nine kits. Also provided on the data sheets is information about the representative inductance and *Q* over the frequency range of the core material.



Simplified equations are given for enabling the designer to determine the wire size and number of turns needed for a particular inductance.

A primary advantage of pot cores (also called cup cores) is that the inductor is shielded by the ferrite cups which enclose it. Pot cores have high permeability, which lowers the resistance of the coil windings (fewer turns needed) to assure high Q . Since the number of coil turns is lower than in an air-wound inductor, greater miniaturization is possible. With one of the kits tested at ARRL Hq., it was learned that an 88-mH inductor could be wound with an unloaded Q of 210! The surplus telephone toroids in the 88-mH family have unloaded Q s from 30 to 50, according to our tests.

The price of the kits runs from \$2.88 to \$8.63, depending on size and type. Contact J. W. Miller Co., 19070 Reyes Ave., Compton, CA 90224, for complete data on their cores. — WICER

NEW QUAD OP-AMP FOR SINGLE SUPPLY VOLTAGE

RCA is now producing its new CA3401E and CA3401G IC. It contains four op amps and operates from a single voltage source of +5 to +18 volts. It comes in a 14-pin dual-in-line plastic package. The difference between the E and G suffix designator means that the E version is in a standard package, but the G model is in a hermetic gold-chip plastic package.

Unity bandwidth is rated at 5 MHz, input bias current is 50 nA, and open-loop gain is 2000 V/V. The chip is internally compensated. Closed-loop stability in each of the four amplifiers is assured by means of a 3-pF on-chip capacitor. The '3401E should be ideal for RC active filters, oscillators, multichannel amplifiers, and numerous other amateur applications. *RCA Data File 630* gives full particulars on these chips. — WICER

NEW SUPPLIER OF AIR VARIABLES

Cambion has added a line of five air variable capacitors to its product line. Part of the series is sold under the 563-7625 to 7626 numbering format for straight-line capacitance miniature trimmers for single-hole mounting.

Series 536-7637 is available for moderate power levels in a range from 3.5 to 98 pF. These should be suitable for use in homemade amateur transmitters and receivers.

The remainder of the line contains butterfly variables and miniature pc-board-mount trimmers. Information of price and specifications can be obtained from Cambridge

Thermionic Corp., 445 Concord Ave., Cambridge, MA 02138. — WICER

ADJUSTABLE THREE-TERMINAL REGULATOR

A three-terminal IC regulator has been developed by National Semiconductor Corp. It is labeled the LM117, and provides over 1.5 A of output current from 1.2 to 37 volts. It is easy to "heat sink" and use.

Line regulation is said to be 0.1 percent/V, and no-load regulation is 0.1 percent for a 1.5-A change. Ripple rejection is rated at 80 dB at any output voltage. Full overload protection is included on the IC chip. Output current is limited to approximately 2.3 A.

The LM117 comes in a TO-3 package. Information on price and specifications can be obtained from Bob Dobkin, Director of Advanced Circuit Info., National Semiconductor Corp., 2900 Semiconductor Drive, Santa Clara, CA 95051. — WICER

TOROIDS AND BEADS

Amateurs who construct their own equipment will be interested to know that Amidon Associates has added ferrite toroids to their well-known line of powdered-iron cores. A wide variety of ferrite beads is also available from the supplier. Ferrite cores are available in permeability amounts from 40 to 5000 and in a wide selection of diameters.

The company has produced a new catalog which lists the product line, prices, and technical data sheets for the designer. Further information can be obtained from Bill Amidon, Amidon Associates, 12033 Otsego St., N. Hollywood, CA 91607.

TEKTRONIX 2701 STEP ATTENUATOR

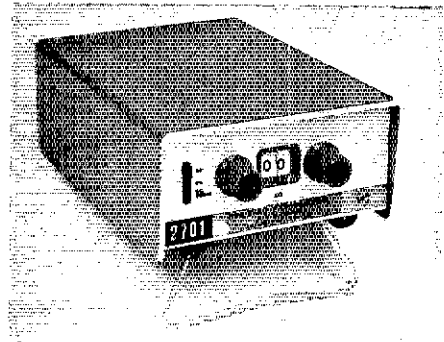
One of the neatest items to land on the ARRL test bench during 1976 is the new Tektronix 50-ohm step attenuator. So what's so great about an attenuator? Well, maybe nothing is spectacular about the everyday variety that hams find as surplus or obtain from manufacturers of low-cost test gear. In fact, not many inexpensive attenuators are worthy of the amateur state of the art when it comes to making precise measurements especially at vhf and uhf!

The Tektronix model 2701 has a fairly "rich" price tag, but for the kind of testing being done by many of today's amateurs, an accurate attenuator would be highly coveted. The 2701 has features which make it appealing to those who need reliable data when measuring preamplifiers, antennas, and a host of other precise circuits.

Notable among the features of the 2701 are the selectable 1-dB steps from 0 to 79. The frequency range is specified as dc to 1000 MHz. Accuracy is pinpointed as +0.1 dB to -0.1 dB units error from 10 to 1000 MHz. Maximum error in any switch position is stated as +1 dB to -0.7 dB from 10 to 1000 MHz.

Insertion loss is listed as -0.5 to +0.14 dB/100 MHz, or better. With regard to return loss - 20 dB from 10 to 300 MHz (1.22 VSWR), 17 dB > 300 to 600 MHz (1.32 VSWR), and 17 dB at 1000 MHz (1.32 VSWR). Maximum safe average input power to the attenuator is 1.5 W at 65° C.

A switch is located on the front panel for



selection of dc, ac, and dc-terminated (precision 50 ohms) modes, at port No. 1 only, which is the input port of the unit.

The manufacturer states that the attenuator can be used up to 2000 MHz with slight degradation of attenuation accuracy and with the VSWR specifications given for 1000 MHz. Type BNC connectors are used for the input and output terminals.

Thick-film hybrid attenuation chips are used in the instrument and are selected by means of two cam-type switches which have gold-plated contacts. This technique permits easy changing of attenuator chips in the event one is damaged through misuse.

A 75-ohm model of this attenuator is available for slightly greater cost - \$295. It has a total dB range of 109. The model number is 2703.

Amateurs who are engaged in making precise receiver sensitivity, IMD, and blocking tests should feel secure regarding accuracy of measurements when using an attenuator of this kind. Of course, the 1-dB steps offer acceptable resolution for most applications an experimenter may be involved with. — WICER

Specifications

Size (HWD): 2-1/2 x 4-1/2 x 7-1/2 inches.

Weight: 2 pounds.

Maximum power: 1.5 W.

Range: 0 to 79 dB in 1-dB steps.

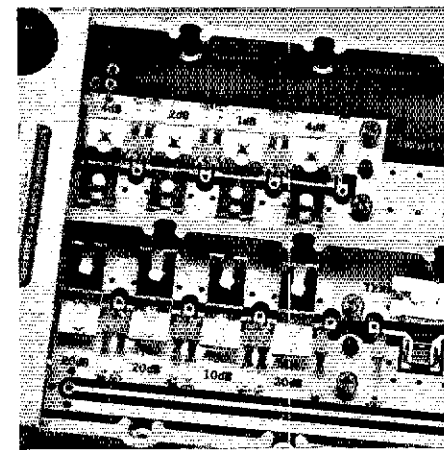
Impedance: 50 ohms.

Color: Blue and satin aluminum.

Price class: \$245.

Manufacturer: Tektronix, Box 500, Beaverton, OR 97077.

View of the snap-in thick-film attenuator chips. Field repair is easy with this format.



peak detectors in standard field measuring equipment. While the values so obtained have a definite subjective relationship for a-m broadcast systems, there is little evidence that such measurements apply to conventional fm broadcasting services.

In more recent measurements, the Institute for Telecommunications Sciences and Aeronomy (ITSA) and the General Electric Company (GE) used a narrow-band receiver, the output of which is fed to a group of level detectors that record the number of times given voltage levels are exceeded. The amplitude distortion of the noise is computed from this data. The average noise power can be computed from the amplitude distribution because the narrow bandwidth of the receiver makes the noise pulses essentially constant in width.

The present survey, consisting of limited noise measurements, was made to augment and verify existing data at hf and vhf and to obtain basic data at uhf. The survey was conducted in a number of carefully chosen sites in the New York City-New Jersey metropolitan area. Measurements were performed at

three selected frequencies: Hf at approximately 20 MHz, vhf (very high frequency) at approximately 109 MHz, and uhf at 800 MHz. The exact frequencies were determined by the absence of intentionally generated signals around the above frequencies. The noise parameters measured were true root-mean-square (rms) and weighted rms voltage from the detector output of an amplitude modulated receiver. The weighted rms values were measured because indications are that such measurements provide a true indication of the subjective effect of certain types of noise. In addition, an experiment was performed that simultaneously monitored the true rms output (and then the weighted rms output) from the a-m receiver and the output from a high quality consumer fm receiver. Both dipole and directive antennas were used in the vhf and uhf measurements. The dipole allowed an equivalent noise factor (noise temperature) to be determined. The directive antennas were used to determine whether signal-noise discrimination could be obtained by virtue of directivity. Antenna positions were: Horizontal and 45 degree elevated with

horizontal polarization, and horizontal with vertical polarization. A calibrated whip antenna was used in the hf range. The calibration allowed the equivalent noise factor to be calculated.

The survey was divided into three phases. The first phase consisted of preliminary field measurements during which data collection techniques were established. The second phase was the formal field data gathering tests. The third phase consisted of the data compilation and reduction to a usable form. The results of the test show that a wide range of noise levels can be encountered in populated (urban, suburban and rural) areas. While noise levels, in general, increase as the population density increases, the relationship appears to be weak. Noise level is more closely allied to nearness of main and secondary thoroughfares than to the number of people living in a given area. The data can be used to determine the effect of man-made noise on the reception of any radio communication. The measurement method can be used to determine man-made noise at any site. — *NASA Tech Brief 69-10665*

Washington Mailbox

Q. I was in ham radio many years ago, but let my license expire. I recently became interested again, and now have my General ticket. But the FCC issued me a 2 by 3 call. Is there any way I can get my old 1 by 3 call back?

A. If you were the last holder of your old call sign, you may request that it be reassigned to you. Also, if your old call was assigned to someone else after you let your license expire, but is currently not held by anyone, you may have it reassigned to you if it has not been under license for at least five years. (97.51)

If your old call is not available, the fact that you once held a 1 by 3 call qualifies you for another 1 by 3 call, but the FCC will choose the call sign. (97.53)

Application is always made on FCC form 610. If you are requesting a specific call, an additional \$25 fee is required. If you are requesting a 1 by 3 call, but are letting FCC choose the suffix, only the usual three-dollar fee for modifications is necessary. In either case, you should submit some form of proof that you did, indeed, once hold a 1 by 3 call. A photocopy of a *Callbook* listing, or of your old license, will suffice.

Q. While tuning across 40 meters last night, I heard broadcast stations above 7.1 MHz approximately every 5 kHz. Isn't this supposed to be a ham band? Why are the broadcast stations there, and what can be done about them?

A. It is true that in North and South America (Region II) 7.1-7.3 MHz is exclusively an amateur band; however, in the rest of the world these frequencies are shared with broadcasting stations. This is all legal and spelled out in the international (ITU) regulations. Although broadcasting stations should take measures to avoid interfering with amateurs in this part of the world, it is virtually impossible for a multi-megawatt broadcast station not to be heard in the Americas at all times of the day. Plus, some broadcast stations beam toward the Americas, in direct violation of international treaty.

There is a strong record that hf-band sharing with the broadcasting service has been detrimental to amateurs. The amateur working group, which is studying the future needs of amateurs in order to determine what position the U.S. should adopt at the 1979 World Administrative Radio Conference, is recommending that the 40-meter band be expanded and that sharing with the hf broadcasters be eliminated. This is a recommendation, and the official U.S. position has not been determined at this writing.

Q. I just moved to a new home. Can I get on the air immediately, or do I have to wait until I modify my license to show the new station location?

A. Yes, you can operate right away, but in a portable status and with the portable identifier (97.87 & 97.95). First, you should notify the FCC Engineer in Charge in your district of the intended portable operation (97.97). ARRL, for an s.a.s.e., will supply you with a handy form with which to do this, and it includes the appropriate FCC addresses. Then you should apply for a license modification on form 610. A three-dollar fee applies.

You don't have to report to the FCC portable operation that is intended for fifteen days or less, and FCC is considering a proposal that would eliminate the requirement for reporting portable operation at all. If this is approved, then you could simply operate portable until your modified license arrives and not notify your FCC Engineer in Charge. Keep your eyes and ears open for news of this docket.

Q. I am a Novice. I recently took and passed my General test, but moved before my General ticket arrived. Should I notify FCC of the new address to which the license should be sent, or would that slow things up?

A. It probably would slow things up to notify the FCC of your new address at this time because it would interrupt the normal routine processing of the license. Your best bet is to leave a forwarding address at your old post office, and have the General ticket forwarded to you. That way as soon as you

get the General license you can start using General privileges at your new location (portable, of course) and apply for a modification of your General ticket to show the new station location.

Q. I just received my Novice license. But a week or two before the license arrived, I received some promotional literature from a ham radio dealer, and the mailing label included my call sign, which I didn't even have at that time. How can this be?

A. Your amateur license is processed and printed by computer. After this step, it goes to the outgoing mail room where it is placed in an envelope and mailed. Due to the huge flood of CB applications during the past months, it takes two to three weeks for the license to hit the mail.

At the same time that your license is printed, a computerized list is created. Pursuant to the Freedom of Information Act, Public Law 89-487, the information on this list is available to the public. This list is obtained by a commercial duplicating center that handles the reproduction and distribution of FCC's records. Ham radio dealers, such as the one whose advertisement you received, arrange through this duplicating center to receive mailing labels for the newly licensed amateurs. This completely bypasses FCC's mail room and is much quicker.

FCC is currently considering printing CB licenses on "self-mailers," which could then go directly into the mail. This would speed up the processing of all licenses, including amateur.

[Note: Send your FCC questions to Hal Steinman, K1FHN, ARRL, Newington, CT 06111. Questions appearing in this column are typical of those frequently asked of the FCC and other agencies. Answers, prepared at ARRL, have been approved by FCC staff. Interpretations contained herein concur with those of the Amateur and Citizens Division of the FCC. Numbers in parentheses refer to specific sections of the FCC rules.]

Odyssey

Eve tempted Adam with an apple. Now can "Adam" entice "Eve" with a transceiver?

By Linda S. Cleveland,* WB4CTR

As so many things do at our house, the First Hundred Society started as a joke. Then, one rainy Friday my ticket arrived. The OM was excited; I was still sleepy. He went out into the pouring rain to remove from his car his precious new ICOM 22-A for me to use. Next, he went for the ladder and climbed up to mount his 5/8 magnetic on the mobile home roof. Dripping all over the carpet and grinning from ear to ear, he presented me with a log book, filled in the required information, and had me sign it. Then he sat by beaming as I made my first few contacts.

Once I got started, I just kept on going. I began to seriously aim for 100 contacts in 24 hours. As word got around, several nice hams monitored other frequencies in order to send contacts my way. When I mentioned that I had a bet with W4IZI, they redoubled their efforts to help me. With time out for a dinner meeting, a "Ticket Celebration" with some other hams, and a few hours of sleep, I met the deadline with an hour and ten minutes to spare.

The OM has never learned that an open-ended bet with me is a dangerous thing. As I got the 100th contact, he said, "Well, you did it. What do you want?" I instantly replied, "An ICOM 22-A for me. Pay up!" He bought it that afternoon. With the assistance of WB4ZIN (a neighbor and a printer as well as a ham!) the certificates were made. They were sent as a sincere 'thank you' to 100 great hams who helped me win my rig!

Where does the story of love that has no end begin? If my love of ham radio does have an end, it is buried in

the far reaches of the future, just as the beginnings stretch deep into the past.

A book read in early childhood provided my first glimpse of the Magical Land of Ham. That land was divided into mysterious segments called Areas, and each Area had a number and a letter associated with it. The mystical significance of these numbers and letters was revealed only to the Initiated — those who had endured great ordeals and passed The Exam. Many privileges accrued to those who passed. They could use the secret language to talk to other Initiates anywhere in the world. They could exchange squares of paper decorated with symbols of deep meaning. They could match skills with other Initiates in stylized competitions called Contests. And they could attend the yearly rite called Field Day, so named because it was usually held in a relative's field. In performing their ceremonies on this important day they used lots of wires, tents, radios and coffee.

The Land of Ham was ruled by the International Telecommunication Union, the wisest Hams of all. In some Areas they were assisted by the Federal Communications Commission. Under the gentle guidance of these two ruling bodies, high standards were maintained and Hams lived in harmony with all men.

The Land of Ham was ruled by the International Telecommunication Union, the wisest Hams of all.

In harmony with all men, perhaps . . . but not with all women. My beloved husband had a set of magic number/letters; he was on intimate

terms with the FCC, having received from them a ticket Advance; wires, boxes, dials and gauges filled his mobile home; he could even whistle in the secret language. And yet, requests that he empty the garbage resulted in the generation of static. Eventually, the Law of the First Harmonic prevailed, and as we walked together to the garbage cans, he dropped gems of information along the way. I learned that "Z" is not "Zee" but "Zed"; that we live in the fourth of ten U.S. call areas; that Arthur Godfrey is a ham. I learned that "shack" is a traditional as well as descriptive word, and that hams are universally nice folks. The Magical Land of Ham became merely the Mysterious Land of Ham, as stray words and phrases were eagerly trapped and misfiled in my brain. ("The resonant resistance of a reactor is in reverse ratio to the recycled response of the R-meter.")

The Garden Path

The fall of one tiny snowflake can trigger an avalanche. The new 2-meter rig settled into our household as quietly as a snowflake, but the avalanche still threatens to bury me. Much of the snow came from an intentional snow job. The rig was praised for its compactness; the clarity of fm was favorably contrasted to the squeals and pops from "the other rig"; "They love to talk to ladies, and you can listen all day while I'm gone." When the drifts reached the level of the kitchen table, this fantastic piece of ham gear was sledged into position. From that moment on, I had to be careful to put the sandwiches into the red lunchbox and leave the gray one alone.

After a week or so the beetle-brow of the Aerotron no longer reminded me of Frankenstein's creation, but in the secret recesses of my heart I was still planning to cancel out that awful gray

*P. O. Box 3325 Burlington, N. C. 27215

with a few well placed pink polka dots. I need not have worried — or rather, I should have worried more. Within weeks, one pair of crystals was not enough. First aid teaches about pressure points; so does marriage. The bait was meals out. Suddenly we were attending radio club dinner meetings in 3 different towns. Meeting so many people in such a short time was enjoyable, but for my every comment on our new acquaintances, the OM's response was ready. If Bill was charming, he was on the 22/82

First aid teaches about pressure points; so does marriage. The bait was meals out.

machine; if Joe was interested in wild foods, I could talk to him if we had Reidsville crystals; if Alice was lovely or Ann had a lively wit or Ed was a good organizer, they could all be reached if only we had more crystals. The simple solution was more crystals. The expensive solution was a box to put them in — a Genave GTX-10. But standing in the snowdrifts had numbed my senses so that only token objections were advanced. Besides, I was beginning to like ham radio. I had begun to anticipate those times when things settled down and the OM reached toward the rig.

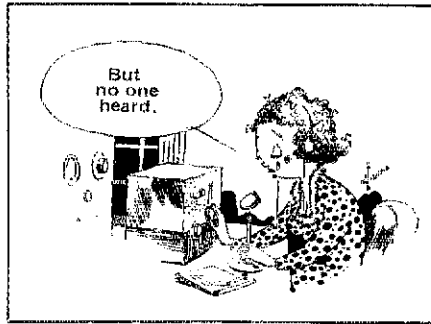
Then one day he said, "Here. You talk." With me and The Mic it was love at first touch! I talked with my first cup of coffee in the morning, I talked over my dinner plate and I talked all weekend. My theme song became, "Please don't go to bed yet — I want to talk." "Please come home early — I want to talk." "Let's put the rig in the car — I want to talk." I, who used to sleep 'til noon, got up at 6:30 A.M. to get into

"Here. You talk." With me and The Mic it was love at first touch!

the activity, as hams were driving to work. I looked forward to the chatter, and especially to the jokes built on previous jokes that formed a day-to-day serial of humor. After everyone was at work and the repeater was quiet, I'd go back to bed for another forty winks.

Problems in Paradise

But there was trouble in paradise. It erupted late one night. I had found another night owl on the air and was happily engaged in what promised to be a long, late QSO. Lindsay, who had not had the benefit of an afternoon nap, was ready to get some sleep and was insisting rather emphatically that I terminate the QSO. In frustration and disappointment



I uttered those fateful words, "Dad-gummit, I'm gonna' get my own ticket so I can talk when I want to!" Had I known then what I know now. . . .

I enrolled in the local club's Novice class, but attended only two sessions before other obligations began to conflict with classes and study. Several months later I tried again, attending one session in Greensboro. That night, the worst ice storm in several years hit our area. Class was dismissed early, and as I slid and prayed the 40 miles back home, I concluded that this was not the time. "In the spring," I resolved. "In the spring I'll do it."

By this time ham radio had become an integral part of our lives, and our living patterns reflected the change. The day normally began at 6:30 A.M. with me dragging into the kitchen where a cup of coffee awaited me. I'd light a cigarette and reach for the mic, enjoying a few good QSOs while the OM fixed breakfast. (He had discovered long ago that cooking breakfast himself was ultimately less trouble than having a zombie stagger around spilling grease, burning herself and dribbling egg yolks down the cabinet doors.) So he cooked and I talked. Then he would make a few comments just before going mobile.

The Plot

But even my sleep-befogged brain began to register a subtle difference in the other hams. Always, before, they had offered warm encouragement and had seemed very interested in my sporadic efforts. True, they had teased me about a lack of discipline when I dropped the classes — but this was different.

With Machiavellian skill they dissected my favorite interests, baiting me, bugging me, and laughing because I could not answer them!

Conspiracy reared its head. Each morning, just after the OM went mobile and I could no longer push the magic button, they started to work. With Machiavellian skill they dissected my favorite interests, baiting me, bugging me, and laughing

because I could not answer them! On Monday it was women's lib:

"Women are biologically suited to the tasks of housework."

"Sure," my mind answered. "I was born with a dusting mitt instead of a hand, and my fingertips are really Brillo pads!"

Tuesday was reserved for wild foods: "Did you know Euell Gibbons was hospitalized after eating that stuff?"

"No, no," I murmured softly. "He had a reaction to medications prescribed by his physician! Wild foods are safe and fun."

On Wednesday the topic was my pets.

"Anyone with ten cats has got to be insane."

"Where does she keep her broomstick?"

"Let's barbecue that goat this summer."

"Did you know she raises fighting cocks?"

Despair set in. Lacking a license, I could not get on the air and explain the joys of cuddling a purring cat, the endless fascination of watching each cat's relationships with nine others, the exuberant antics of the crazy goat, or the indescribable beauty of our one gentle gamecock's iridescent plumage.

On Thursday I heard, "I've never read those books by Velikovsky — his theories don't hold water." Five cats fled in panic as I shouted aloud, "How do you know WHAT his theories are if you haven't read them?" Even my church work was not immune: "When Linda and Eddie count the offerings, they pull the drapes, get out the green felt cloth, and use eyeshades."

By Friday I was exhausted. When someone said, "This business about Atlantis is baloney," I could only murmur weakly, "Have you seen the pictures from this year's expedition?" But no one heard.

Saturday was greeted with anticipation. At last I could have my say, because the OM was here. I could now use the rig! John was to be the first target. For all his big talk, I knew that he washed dishes, hung out clothes and bathed the kids. And Phil's wife was at the vet's last week, spending a fortune on a stray mongrel she'd adopted. And Ray could not possibly be against wild foods, because he ate ramps and creasy greens! My arguments were ready. I picked up the mic. But wait! Ray owned the pup, John's wife ate creasy greens, and Phil believed in helping around the house. No. John's wife had the pup, Phil ate creasy greens, and Ray bathed the kids. No, John ate. . . . I dropped the mic, turned off the rig, and walked away.

Bright and early the next Monday, they started in again. By Wednesday my

frustration reached new heights, and I was tempted to push that button, regardless of the consequences. I now believe in mental telepathy, because on Wednesday night I learned a new ham radio definition. "Control Operator" can be defined as the person who says, "If you endanger my ticket, that is grounds for divorce!"

"If you endanger my ticket, that is grounds for divorce!"

An incident on the following Saturday sealed my fate. Lindsay was ensconced at the kitchen table merrily QSOing along. I was in the shower shampooing my hair. The sound of laughter came down the hall and I paused to listen. The topic was women's lib, and eight male minds were bent exclusively toward mocking my Ideals. It was too much. In a flash I was standing by the table saying, "You rats! I demand equal time!" A glob of shampoo hit the table and realization dawned. In that instant I knew that I was hooked — on ham radio as well as women's lib. I knew then that when the jokes were flying fast and furious, when the mobile from Oregon passed our way, when Antarctica was rolling in, I wanted to be there.

In that instant I knew that I was hooked — on ham radio as well as women's lib.

But when could I study? I was hauling sawdust and manure to improve the mud plot we called a garden; I was in the middle of setting up a wild-foods course at the technical institute and arranging 8 club programs to follow it; the flower beds at the nursing home were a disgrace, and that was my responsibility. The week after Mother's Day was for picking strawberries; blueberries came in on July 4th. I'd promised myself as maid to a friend the week her baby arrived. And even a notoriously sloppy housekeeper must occasionally vacuum the carpet and wash a load of clothes.

Gradually the tasks were either handled or avoided. Bad weather ruined the strawberries — there were none to pick. Two days of phone calls netted several hundred plants for the patio. A few all-night sessions took care of the wild-foods programs. The blueberries were going to be late maturing; the garden was tilled and planted. I sat by

the phone awaiting the call that would say, "Take me to the hospital."

Resignation

It snowed again on July 12. Knowing that Martha's husband was home, I felt free to leave the telephone and spend that bright Saturday outside. Lindsay was busy tweaking his recently acquired National 300 receiver. ("It's a good price, and the National is better than the rig I have.") At 11 P.M. he finally abandoned the shack and came in to find me energetically doing chores. Like any self-respecting night owl, I was just going into high gear.

"I'm through. All 7 bands. 160 was the hardest; I had to replace the loop," he said, as I loaded the dishwasher.

"Uh huh," I responded.

"The National doesn't have slug-tuned coils you see. That means there is no screw to turn. You just have to wiggle the little wire loop that is across the center of each oscillator coil," he explained, as I folded the laundry.

"Uh huh. Martha's baby is due tomorrow."

"Yeah, I know. The dial is a linear scale, but the tuning isn't truly linear," he called as I escaped to feed the cats.

"I left an interesting article on your desk, dear. Why don't you read it?" I breathed hopefully.

"OK. Thanks. Anyway, that means that you have to run the dial to the low end of the band, adjust the loop, then run the dial to the top of the band and adjust the capacitor," he continued enthusiastically.

"Uh huh."

"When you adjust the capacitor you throw the low end off, so you have to go back down and readjust it," he shouted over the roar of the vacuum cleaner.

"You're standing on the cord," I said.

In desperation I sought that last bastion of privacy, the shower. But there was no escape. Above the pounding of the water I heard his voice: "I'll tune 2 and 6 when I get a converter. Just might build one — with a FET front end."

By the time the water ran cold, my plan was devised. Obviously, he could not be silenced, but could he be redirected? It was worth a try! Ten minutes of dedicated digging yielded the *License Manual*. "Here, dear, ask me a question from the Novice section." And thus it began.

The Ordeal

We agreed that nothing would take precedence over study. The dishes could pile up and the laundry go undone; we could survive on Kentucky Fried Chicken, pizzas and TV dinners; Lindsay would feed the animals and take out the

garbage; he was to make code-practice tapes at the speeds I requested, so that I could copy code at any time. I was to have a *License Manual* and a *Handbook* of my very own, so that I could underline to my heart's content. I was to be tutored whenever I hit a snag, regardless of what was on TV that night. Above all, nothing was to upset my Psychological Well-being! I could be irritable and illogical; he must be patient and kind. I could frown, but he must smile and comfort me, because I was about to endure Great Ordeals, on the way to becoming a Ham.

I descended into the world of pentodes, parasitics and plates; of ssb and VFO and TVI. Lissajous figures surrounded me, and sinusoidal envelopes made my head hurt. I learned that not all filters are in air conditioners, nor all conductors on trains; that tolerance has no relation to personality, and that unbalanced filter circuits don't need a "shrink." I realized that *Q* is more than a letter of the alphabet and Beta more than a club; that capacitance is more than drinking ability and reactance is not political. Skin effect has no connection with *Playboy* and ground can be in the air. Ohm has nothing to do with yoga meditation. Rocks are not worn on one's finger, and a standing wave can never sit. The measure of plate power is watts instead of calories, and Kc does not refer to Edgar. Flat-topping is not a haircut, congestion is not pulmonary, and exalted carriers aren't royal pigeons.

Marvelous vistas opened before me. I began to study all night. If I collapsed before the OM got up, I'd leave a note on the bathroom mirror: "A, B and C amplifiers???" When I awoke I'd see his answer: "P. 97 in *Understanding Amateur Radio*, p. 65 the *Handbook*, but start reading on p. 61." During the day I'd struggle with it, then greet him in the afternoon with questions. When I could no longer absorb new information, he would quiz me on topics already covered. Then he would hear, "Please record some code."

Code proved to be the worst problem. Two hours of sending was lost because the cassette was no good. The OM would be recording at one speed when I wanted to use the tape recorder to receive at a slower speed. A tape broke, so I lost another 2 hours of work. With each problem I'd shrug and return to theory.

During the second week of study another pressure point was used. How well a mate knows one's weaknesses!

"All the way," he urged.

"What do you mean?"

"Go for Advanced. You can do it. Two-thirds of the Advanced questions are things you have to know for the General anyway."

"I can't."

A wicked smile spread across his face as he said, "You could strike a blow for women's lib."

"Sound the bugle! Hoist the flag! For my sisters throughout the world I'LL DO IT!"

At the end of three weeks, most of the questions were checked off and I turned again to code. At least I knew the alphabet. That was a start. Knowing my propensity for talking about doing things instead of actually doing them, I had taken a vow of silence. No one was to know that I was studying. It proved to be a powerful spur toward finishing. Every erg and joule were directed toward study. Capacitors chased resistors through my dreams, and coils unwound into coax. I knew not when nor what I ate. The phone stayed off the hook. Nothing existed except radio.

As I returned to studying the code, new problems arose. The tape recorder broke. We borrowed another. It played but would not rewind. We borrowed another one. Hours of straight-key recording took their toll on the OM's nerves. He borrowed an electronic keyer. Then we ran out of tapes . . . and underwear . . . and dishes.

"I don't have any clean socks."

"So wash some, dear. I'm studying."

"Before or after I make your tapes???"

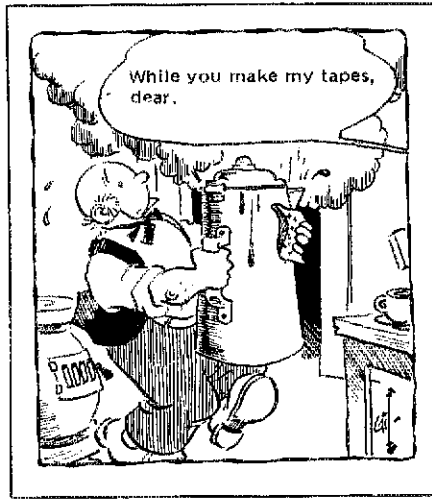
"While you make my tapes."

I was gobbling up tapes the way the Cookie Monster gobbles cookies.

I was gobbling up tapes the way the Cookie Monster gobbles cookies. The boundaries of hours and days dissolved. Life became one continuous cycle: 20 minutes of code; stand up and stretch; 20 minutes of code; 5 jumping jacks; 20 minutes of code; smoke half a cigarette; 20 minutes of code; walk to the garden and back to clear the head for another 20 minutes of code; pour a cup of coffee; 20 minutes of code. . . . I diligently tapped out words in my sleep, until the twitching of my hand awoke me. The pursuit of theory had been a quiet activity, but now the sound of code shrieked through the house at 3 A.M. Each morning the message on the bathroom mirror was the same: "More tapes! I need more tapes!"

"Use WIAW; copy QSOs; use your tapes several times," he begged.

"WIAW is very noisy; and besides, they don't transmit practice every hour. There's no way to check QSOs, and I don't know all those TNX and SRI things. I tried reusing the tapes, but it



doesn't help. Anyway, the goal was maximum learning in minimum time, and you promised to help in any way I asked. Please, can I have more tapes now?"

That night he made 3 hours of tapes at 9 wpm, and I gobbled them up while he worked the next day. "More tapes?" I said, as he entered the door that afternoon.

"I know you can use them twice," he insisted.

We had patterned my practice so that I would move to a new speed for a few tapes, then have a brand new tape at the previous speed for review. The idea was that if I was working at 9 wpm I should be able to copy 30 minutes of new text at 7 wpm virtually perfectly. There was also at least one advance tape — a short one at a speed higher than the one I was tackling.

"Load the 9-wpm tape. Copy while I watch you."

After 15 minutes I stopped. The copy was virtually perfect.

"You've got it at 9," he smiled. "Very good."

"No, I've heard that tape before. That's why it looks so good."

"It can't make that much difference." He reached for a short tape at 13 wpm. "Heard this yet?"

"Once. Yesterday, when I was feeling cocky," I admitted. "I got about every fifth letter. That's fast!"

"Start copying."

"Yessir."

Ten minutes later, my paper was covered with short perfect strings of characters separated by long gaps. "Enough," he said. "I see the problem. You are writing down words, but you're not copying code; you've memorized the tape."

"Sorry, dear. What do I do now?"

"Cipher groups! Let's see you memorize those."

And I did! The harder I tried not to,

the more I remembered. It was beyond comprehension — I'm the type who loses eyeglasses and forgets if the electric bill is paid. But I remember cipher groups.

When simple requests failed to produce the quantity of tapes I desired, I resorted to blatant manipulation. "You're my one and only Love. If I cannot depend on you, my whole world will shatter into tiny pieces. You're my anchor in this sea of chaos — my hero, my guiding light, my superman. Just one more tape???"

The new baby was the only thing that enticed me to leave the books and tapes. And even then radio was with me. Into that tiny ear I poured the wondrous mystery of radiation patterns, then sang lullabies in code.

I had settled on August 28 as the date to go to Norfolk. Weeds had destroyed the garden; blueberry season was over; obligations were piling up. It was then or never.

As we entered the last week, the strain began to show. I was suddenly terrified that I'd forgotten all the theory while working on the code. Waking in a panic one night, I cried aloud, "Lindsay! Wake up! I don't understand superhets!"

"What time is it?" he mumbled.

"Four A.M. BUT I DON'T UNDERSTAND SUPERHETS!"

With infinite patience he explained it all again, and to this day does not remember doing it.

Our dialogue became nerve-wrackingly similar day after day.

"I need more tapes."

"I'm sleepy."

"You slept last night."

"Only 4 hours."

"So what? I only slept 3."

"It's your ticket — I've already got mine."

"That's a lousy attitude. We're supposed to be a team."

"Good. You can pull the wagon while I sleep." In desperation I hauled out the Ultimate Weapon. "I stayed up 54 hours straight to help you meet your thesis deadline!"

Silence. Cold, stony silence. I had gone too far. There would be no tapes tonight!

The next afternoon was a little better. I raced to the door to greet him. "Come look! I've got long strings of characters — 150 to 200 in a row — at 14 wpm! I'm going to make it!"

Then the deadly dialogue began again.

"I need review. Ask me a question."

"What is Ohm's Law?"

"I know that. Ask me a hard question."

"You know the hard ones, too."

"Don't be sarcastic. Ask me a question."

"Wife, you're driving me insane."

"You can have a nice rest in the psycho ward after my exam. Ask me a question."

The glint in his eye compelled me to add, "You can't store up grievances to be settled later. After the exam my slate is clean."

"Maybe," he gritted, and took refuge in the shack.

Four days before the exam, the OM dropped a bombshell. "How is your sending?"

"What do you mean, 'how's my sending'??? You said that sending speed increases as receiving speed increases. Buster said so, too; so did Jack."

"You mean you haven't been sending?"

"I sent a whole tape at 5 wpm. It was easy."

"Good grief! Start sending!"

Tap. Tap. Tap.

"How am I doing?"

"Lousy. Keep at it."

Tap. Tap. Tap.

"How am I doing?"

"You've got to cut that fingernail."

"Never."

"Then use the bug."

"If I use the bug, then I'll never learn straight key. I'll stick with this."

Tap. Tap. Tap.

"How am I doing?"

"Use your arm, not your wrist. And will you cut that blasted fingernail?"

"Oh, alright."

"Honey, why did you cut the right-hand nail? You're left handed!"

"I know that! But I'm learning to send with the right, so I won't have to put my pencil down. It's only a little harder that way."

Tap. Tap. Tap.

"How am I doing?" I looked up to discover that he had fled.

Test Day minus 1! I dashed from suitcase to tape recorder to *License Manual* to key. One moment I was singing the Hallelujah Chorus; the next I was moaning the St. Louis Blues. Determined to be at my best, I shampooed my hair and polished my nails — 9 good ones and one non-matching stub. A new dress had been reserved for the big day. The OM arrived at noon. I, Linda, the girl who had been late for her own wedding, was packed and ready.

Tap. Tap. Tap.

"How's my sending?"

"Ragged. Practice in the car."

With seat belt and shoulder strap fastened and a briefcase on my lap, I was in that seat to stay. My left hand anchored the key and the oscillator was on the floor.

"I can't move my right foot, dear."

"Then QLF! Just practice!"

There was simply no place to put a book from which to send, so for most of the five-hour trip I furiously tapped out,

"EXXON . . . Texaco . . . Do Not Enter . . . Holiday Inn 10 mi. Ahead . . . Quaker State Motor Oil," and finally, "Norfolk Traffic Use Right Lane."

I refused to eat or check into the motel until we located the examination center. We narrowed it down to a three-mile stretch, then spent an hour going up and down, peering through the darkness at businesses with glaring signs and no numbers. Everyone we asked had heard of it, but no one knew exactly where it was. And of course there was no one on the radio. Finally someone said, "I think it's in a bank." So back we went. The bank was at the far edge of a large shopping center, isolated from the other buildings. We circled it without spotting a number or a sign.

I, Linda, the girl who had been late for her own wedding, was packed and ready.

for resonant frequency! It could be derived from the other formulae, but I might make a mistake. I'd better look it up. Three hours and countless cigarettes later, I put down the *License Manual* and turned off the light.

The breakfast eggs refused to go down, so I settled for toast and 6 cups of coffee. Sloshing along to the examination center, I commented that the

"There should be a directory inside," the OM said with perfect logic.

"But we're not inside," I responded, with equal logic.

"We can look through the glass," he said.

So there we stood, noses flattened against the glass door of the bank, the flashlight beam barely penetrating the gloom within.

"What if someone thinks we're robbers?" I quaked.

"Don't be silly. There's the directory — on the far side. Can you read anything?"

I squinted. "It says F . . . B . . . FBI! What if someone thinks we're SPIES?" I ran back to the car. After all, someone had to stay out of jail and find a lawyer.

He ambled over, grinning. "C follows B. The FCC is on the second floor."

By 11 P.M. we were fed, bathed and dressed for bed. "Don't piddle around. Get into bed and go to sleep," came the OM's sage advice.

"OK. Just one cigarette." A gentle snore told me that he had himself already followed the advice.

As I reached for the ashtray panic struck again. I'd forgotten the formula

world looked rather peculiar this morning.

"How would you know?" the OM asked. "You've never seen it at 9 A.M."

The Reckoning

The next few minutes were a jumble of questions, forms, instructions; then suddenly I was sitting with pencil poised waiting for the code. The code came. Did it ever! Didit. That's an I. Whoops, I missed 2. Oh well, plenty of time. Dididahdit. Got it. Didah, didit, didah-didit. The sounds flew by. Concentrate! Dit, dahdidit. So many gaps. Dadadadadah. That's a zero. Uh oh! ?? or 2? Curses on reverses. Dahdididit, didah; dahdidit. My brain is like molasses! Dahdahdah.

"Time!" And it was over.

"You failed to qualify for 13 wpm," the examiner said.

There it was — the truth I had known the moment I handed in my paper, the truth I had struggled for several minutes to avoid. Without that code, I could not even attempt the Advanced exam. My third full week of study had just gone down the drain.

The examiner continued, "However, you do qualify for 5 wpm. Since you hold no license, you will be permitted to take the first written exam if you choose to. If you pass that exam you will receive a Technician class license. Do you wish to proceed?"

"Yes, please," I mumbled weakly.

An hour later the examiner said, "You passed. Your license will be mailed. . . ."

The trip home was agony. I cried, ranted and brooded; I refused reason, consolation, excuses and food. I had failed myself; I had failed women everywhere! I had lost my garden and probably my friends. Seven weeks of my life — half of my summer — was irretrievably gone. And for what? For a license I could have gotten at home!

The OM deserves a medal for tolerating that emotional orgy. A lesser man would have dumped me into the Chesapeake Bay. But he cuddled and consoled me, dried the tears and tucked me into bed.

Sunlight and birdsongs awakened me, and a line by Houseman came to mind: "Others, I am not the first. . . ." I cataloged my blessings. Just a little more practice would get my code speed up to 13. Intermediate theory was passed, once and for all; I did not have to worry about being called before an examiner. The learning for Advanced was still in my head; learning is never truly lost or wasted. I had the world's best Elmer and the world's best husband all rolled into one. And I had a ticket on the way. "Technician." The word had good vibrations. I smiled, hugged my pillow and went back to sleep. QST

Joint-Effort Communications Development

A wrist-worn speaker and pocketed code key open new horizons for deaf-blind individuals.

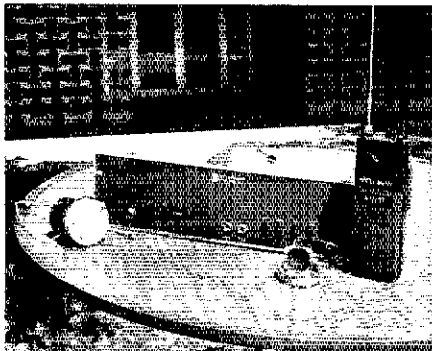
By Elmo Knoch,* K5YWL

A new communications package has been designed for deaf and blind individuals who have never before been able to communicate with anyone more than five feet away from them. They will be able to communicate rapidly and accurately, without effort, over distances that easily exceed forty miles. This has been made possible by a new package put together at Arkansas Enterprises for the Blind, with the cooperation of a number of manufacturers.

The system consists of a standard walkie-talkie and a one and one half-inch speaker which is mounted on a watchband worn by the deaf-blind

*Director of Training Services, Arkansas Enterprises for the Blind

Repeater, telephone dial which allows the deaf/blind individual to dial deaf friends in Little Rock who have teletype receivers, tactile output device, and mobile two-way communications unit.



Using the long cane and electronic equipment described here, the deaf/blind individual is both mobile and communicative.

individual. It further extends to a miniaturized Morse code key which is mounted in the person's pocket. With these two devices, the individual has two-way communication.

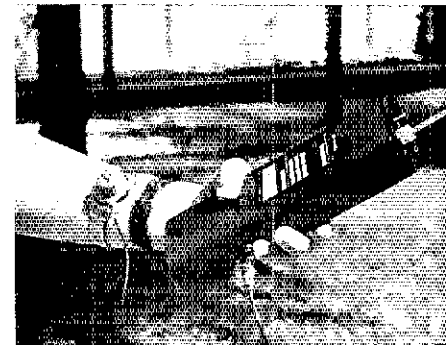
The base station consists of two units: One a repeater crystallized up on

the Air-Force Mars frequencies and the other a separate transmitter on 143.95. Cooperation of Mars officials has made it possible, through the usual training routines, to utilize frequencies for the not-yet-licensed deaf-blind individual to communicate.

These handicapped people, thanks to this program, have had new and exciting horizons opened to them. The Air-Force Mars program (which now has 4 people in training) is one way in which the handicapped individual is being aided in his striving for a useful and meaningful life.

QST-

Tactile output device worn on the arm allows the deaf/blind individual to "hear" code messages. A converter unit allows the person originating a message to simply type the input. The deaf/blind individual's response in code is also converted into print through the converter unit.



Strays

I would like to get in touch with . . .

□ members of the 40th Mobile Communications Squadron during WWII for

purposes of a reunion. The squadron furnished communication for the 21st Weather Squadron in the European Theatre. Contact Irvin J. Kirch, W9YFG, 34 Hoss Rd., Indianapolis, IN 46217.

□ anyone interested in corresponding in Esperanto. Francisco Jurandir de Melo,

BANCO DO BRASIL S.A., Av. Santo Antonio, 420, 55.300-Garanhuns Pernambuco.

□ active and retired Coast Guard amateurs to compile a list for traffic and general communication purposes. Eugene C. Kucik, WSTWM, Box 342 Columbus, NM 88029.

Phone-Patch Rules, 1976 Style

A first glimpse for hams of new rules governing phone patches and other "terminal devices"

By Gordon Orelli,* W1OR/W6LER

Phone patching for amateurs came out of the closet in 1968 when the Carter-phone case paved the way for consumer-owned attachments. From then until now, it has been necessary to rent a coupler from the phone company for your patch to be legal. Now, FCC rules provide for even the protective device to be owned by the customer. Here's a peek at the "new look."

"The registration procedure permits the combining of the present connecting arrangement with the hybrid coils into one unit."

For several years the FCC in its Docket 19528 has been investigating methods of inter-connecting customer-provided terminal equipment. On November 7, 1975, a First Report and Order was released establishing procedures and standards. Since that date, the FCC has additionally issued three more Orders modifying the original Order. These documents create a new Part 68 of the FCC rules with an effective date of May 1, 1976. It is not the purpose of this article to describe the entire proceeding, but rather to address the point of how the new Part 68 might affect phone patching.

The principal impact of Part 68 is that the Voice Interconnection Arrangements (couplers) described in the 1976 ARRL *Handbook* (Table 1), now provided by the telephone companies under a monthly recurring charge, can be owned by the ham if of a type registered by the FCC. The FCC term "registered protective circuitry" describes devices designed to perform the same protective functions as the telephone-company-provided connecting arrangements. Although the FCC Part 68 rules do not

preclude "one of a kind" homebrew registered protective circuitry or registered terminal devices, the FCC procedures and registration fees will probably render this approach unattractive. In addition to the administrative portion of Part 68 of the Rules, there are technical-standards requirements as follows: Section 68.302, Environment Simulation (includes Vibration, Temperature and Humidity, Shock, Metallic Voltage Surge, and Longitudinal Voltage Surge tests); Section 68.304, Leakage Current Limitations; Section 68.306, Hazardous Voltage Limitations; Section 68.308, Signal Power Limitations; Section 68.310, Longitudinal Balance Limitations; Section 68.312, On-hook Impedance Limitations; and Section 68.314, Billing Protection.

To obtain registration under Part 68, the manufacturer or vendor of a device intended for direct connection to the

telephone network must submit the measurement data obtained from the tests he conducted. In addition, the test

Although the rules do not preclude homebrew devices, FCC procedures and fees render this approach unattractive.

methods and procedures used to obtain the data must be fully described. FCC Form 730 must be used to submit the information to the FCC. The following is a quotation from the instructions for completing the Form 730:

General Information and Instructions

FCC Form 730 is to be used for the following purposes: (a) To register new equipment to be connected to the public switched telephone network; (b) To

Table 1
Voice Interconnection Arrangements of Interest to Amateurs

APPLICABLE BELL SYSTEM PUBLICATION	ARRANGEMENT SERVICE CODE	ARRANGEMENT DESCRIPTION
PUB42101	QKT	Provides manual connection of transmitting or receiving equipment to an exchange line by means of a telephone set; uses a 30A or L-7049-A voice coupler. Telephone handset transmitter cutoff is optional. Connection to the coupler is made with a 1/4-inch tip-sleeve plug, provided by the user. Impedance, 900 ohms.
PUB42208	STC (QX or VS)	Provides automatic (unattended) call origination and answering for one exchange line. Connection to the unit is made with a special plug to be supplied by the user. Required is a Cinch Co. No. 231-15-61-133 plug equipped with a hood, No. 239-13-89-069. Impedance, 600 ohms. AC power is required.
PUB42402	CD8	Provides automatic (unattended) call origination for up to 14 trunks. Impedance, 600 ohms. AC power is required.

NOTE: Publications are made available through the telephone company in local areas. Consult your telephone company about the use of these service arrangements.

*8 Sunset Drive, Weston, CT 06880

modify previously registered equipment; and (c) To file notification of modification which does not require prior Commission approval; (d) Short form registration; i.e., registration of equipment connected to the telephone network as of May 1, 1976.

Before this application is prepared, the applicant should refer to Part 2, Subpart L and Part 68 of the Rules and Regulations of the Commission, copies of which may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Applicants should make every effort to file complete applications in compliance with the Rules. Failure to do so can result in rejection and return of the application or a delay in the processing of the application.

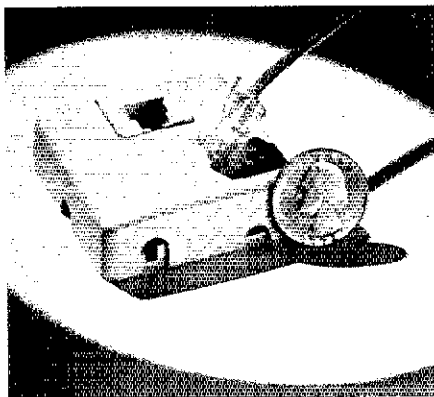
Enclose appropriate fee with application. Do not submit cash. Make check or money order payable to the Federal Communications Commission. See Part I of the Rules to determine the amount of the fee, if any.

"The recent FCC action in the area of interconnection will give the ham additional options in implementing phone-patch operation."

All entries on the form shall be typed or legibly printed in ink. A separate application must be submitted for each type of protective circuitry or terminal equipment. Submit an original and two copies of the application to the Federal Communications Commission, Washington, D.C. 20554. The original must contain original signatures.

Generally speaking, the FCC's Form 730 Registrations Applications Process removes the connecting devices described in Table I from being considered as home-made projects. However, the registration procedure permits present (or future) manufacturers or vendors to register and sell such devices to the ham. It also permits the combining of the present connecting arrangement with the hybrid coils (2 wire to 4 wire receive-transmit functions) into one unit. If this approach is used, the entire unit must meet the total Part 68 requirements; however, it might still be cost effective.

As part of the overall program, the standard interface between the telephone network and the registered device will be a telephone-company-provided miniature jack, not the current 4 prong device. This new miniature jack is rapidly becoming the standard interface for new telephone-company installations. The registered phone-patch unit must be equipped with a plug compatible with this new jack.



This new miniature plug is fast becoming the standard connector for telephones. It should be furnished with all registered attachments in the future.

Section 68.312, On-hook Impedance Limitations, of Part 68 includes technical requirements necessary to avoid false tripping of the incoming ringing signal. Generally, the resulting impedance is a function of the telephone ringer or other audible/visual signaling devices. As part of the registration program, a ringer equivalency number will be assigned to the device. It requires that this information be supplied to the telephone company in advance of installation as part of the notification process.

The telephone-company notification methods are provided in Section 68.106 as follows: "Customers connecting terminal equipment to the telephone network shall, before such connection is made, give notice to the telephone company of the particular line(s) to which such connection is to be made and shall provide to the telephone company the FCC Registration Number and the Ringer Equivalence Number of the registered terminal equipment or registered protective circuitry."¹

The QKT Service Code Arrangement of Table I is presently employed in conjunction with a telephone-company-provided telephone set. It should be noted that Part 68 of the Rules provides for customer ownership of telephone sets; however, the telephone instrument must be of a type registered with the Commission. Unless the telephone set is of a type illustrated in Fig. 15F-1 of the 1976 Handbook, the use of a QKT

¹The ringing circuit includes an inductor and capacitor, so it has a finite impedance. The requirement for a "ringer equivalency" assumes that "foreign attachments" will present an impedance in the ringing circuit. If any such impedance is equal to the ringer impedance, the equivalency number will be one; if the "foreign attachment" is open, like many phone patches, the number will be zero. In any case, an amateur should discuss this with the local company when he installs a registered device.

connecting arrangement presents potential "out-of-service" complaints arising from "false off-hook" conditions. The "exclusion-key" concept minimizes this risk. If the registered equivalent of the QKT voice coupler is provided by the ham and the telephone set is provided by the telephone company, a special "series" jack must be installed rather than the standard miniature jack previously mentioned. This example is given only to illustrate different interfaces that can result from divided ownership and point out the need for new equipment designs to minimize the problem.

"With the new registration provision goes the responsibility for the user to employ registered protective circuitry or registered terminal devices."

Although AT&T's Interstate Message Toll Tariff FCC No. 263 will be revised to comply with Part 68, specific charges (such as revision of internal house wiring to provide for the miniature jack) will be provided for under the state tariffs of the local serving telephone company.

Another caution still necessary is the avoidance of energy in the 2600-hertz region. This is well explained on page 479 of the Handbook under "Filters" and in Table 2. These energy levels are now in Part 68 of the FCC Rules. Additionally, the conditions set forth in the Appendix on pages 482 and 483 of the Handbook are still valid although not all of these are mandatory under Part 68 of the Rules.

As can be seen, the recent FCC action in the area of interconnection will give the ham additional options in implementing phone-patch operation. It is important that the ham understand the significance of the manner in which the new Part 68 interconnection program is being addressed. In establishing the registration procedure, the FCC set forth specific technical standards which must be met before registration can be obtained. Hams should bear in mind that with this new registration provision goes the responsibility for the user to employ registered protective circuitry or registered terminal devices.

[Editor's Note: Author Orelli, an engineer for one of the big phone companies, points out that Docket 19528 is a "can of worms," and the little critters haven't stopped squirming yet. So this article is an introduction, rather than the final word, on "foreign attachments." For instance, at the moment there is no fee for getting a device registered, but there will be — as soon as the fee can be determined in yet another docket. Meanwhile if you have some specific questions on how the rules change will affect you as an amateur please send them along to Hal Steinman, ARRL's "Washington Mailbox" editor, and we'll get the answers.]

Terremoto – Ayuda!

Radio amateurs instantaneously answered the call for help from earthquake-ravaged Guatemala.

By Robert J. Halprin,* WA1WEM

Shortly after four A.M. EST on February 4, 1976, one of the worst natural disasters in the history of the Western Hemisphere occurred in Guatemala. The earthquake registered 7.5 on the Richter Scale, but this was only the beginning of the tragedy. For many days afterward, Guatemala suffered through a series of Dog Day Afternoons, in the form of deadly aftershocks rolling through the country. Before it was all over, the entire country had been brutally smashed; 25,000 people believed dead and close to a million homeless. Needless to say, normal communications facilities were disrupted.

(Guatemala is approximately the same size as the state of Ohio. Assuming that a similar earthquake occurred in Ohio, the equivalent damage in the state would cover an area south to the Ohio River, west to the Indiana line and east into West Virginia.)

During this emergency, amateur radio received outstanding publicity in the local and national media for providing outstanding communications. This occurs at a time when it is very important that the general public have a favorable impression of amateur radio. As a matter of fact, almost every individual or group effort reported in this article received excellent coverage by the print and broadcast news organizations. Hams handled emergency traffic, sponsored and coordinated relief-fund drives (definitely an "above and beyond" activity) and, for the most part, were able to provide fellow citizens with peace of mind about loved ones in the disaster zone.

In the Beginning

K7PPQ/5, of Las Cruces, NM, radiated an excellent signal on 40 meters, using phased verticals he installed to run

phone patches with the Antarctic. On the morning of February 4, he and W8HXR, Washington Court House, OH, were casually ragchewing after a successful patching session.

Suddenly, their conversation was interrupted by a breaker frantically shouting "Terremoto, Ayuda!" (earthquake, help!). The breaker was TG9CP in Guatemala City, running emergency power. Just 20-or-so minutes earlier, his country had suffered a devastating earthquake. Amateur radio was the only contact left with the outside. TG9CP had desperately tuned first 20, then 40 meters, hearing only one signal, that of K7PPQ.

K7PPQ made contact and then called the local Red Cross and Red Cross Hq. in Washington with the first news that a disaster in Central America had taken place. K7PPQ endeavored to reassure TG9CP and he put a local Spanish-speaking telephone operator on his patch so she could ascertain TG9CP's immediate needs. W8HXR telephoned the State Department, the Ohio Disaster Services Agency and the news media. Their frequency on 40 meters shortly attracted a lot of attention. As the skip changed, several W4s and VP1JW assisted in maintaining communication with TG9CP. The authorities had been notified, relief efforts started moving and around-the-clock amateur radio communications effort had begun.

Communiqués

Immediately after the earthquake, the Guatemalan Consulate in San Juan requested Puerto Rican amateurs' assistance for emergency communications with his country. A traffic net was established from the relief center at Plaza Las Americas by KP4HG and KP4BSQ. Hundreds of messages were relayed via WR4AIE to TI2PTS/KP4, who passed them on the Guatemalan

emergency net on 20 meters. Other KP4s involved were: BBK BDL BRI CK DBK EDP.

South Florida Section Emergency Coordinator W4IYT alerted his organization in the Miami area to help him man the Red Cross Hq. station, K4IWT. This station served as net control for TG9KA and K6GSW/TG9 on 14,325 kHz. Also active on the frequency were TG9s AD LL MP. Emergency and priority traffic was handled for many government agencies. When this type of traffic subsided to some degree, Guatemalan stations began to accept health and welfare inquiries from the states. Predictably, an overload situation resulted. Thousands of these inquiries were being originated and it was just too much for the Guatemalan stations to handle entirely on the air. A plan was devised by the Miami group in which area hams would get on 20 meters and accept health and welfare messages. Mobiles would pick up the traffic at each operator's home.

K4IWT, Red Cross Hq. station in Miami, was active for 12 days following the Guatemalan earthquake. Forty-six operators put in 1500 hours handling 3000 messages. Pictured here (l. to r.) sharing net control duties are WB4CCP, WA4GHR and K4EBK. (W4IYT photo)



*Communications Assistant, ARRL.



WA4OQO (front) and WA4BZY, assisted by Salvation Army personnel, running traffic to Guatemala from WA4BZY.

K4KQ made an arrangement so that the stacks of messages would be sent by jet to Guatemala City. Some of the operators at K4IWT were: W4FWV, W4WYR, K4EBK, WA4s GHR HSM ZXO, WB4s CCP FGL NAZ PWR. K4IWT was on the air continuously for 12 days, running traffic to Guatemala. Amateurs active on 20 meters were: W4GOG, W4UUI, K4s BLM CAG CRU ILC KIC KQ, WA4VEE, WB4CBP and W6FVK/4.

WB6HXY, Lompoc, California, handled emergency traffic and this picture made the front page of the local newspaper. (WB6QLY photo)



Two-meter fm was used as an intercom.

□ The Sociedad Internacional de Radio Aficionados, also based in Miami, opened up shop on 14,205 kHz, spearheaded by WA4ZZG, WB4RSE and WB4WGW. SIRA's bilingual capability was the most vitally needed commodity. Accordingly, much emergency traffic and many official government dispatches were handled around-the-clock.

□ The Guatemalan government put the Radio Club of Guatemala in charge of all shortwave communications for the duration of the emergency. They contacted the outside world concerning their desperate need for internal communications. Soon after, ARRL purchased a portable repeater and many vhf transceivers and shipped them to SIRA in Miami. SIRA then coordinated the shipment of the gear to the Radio Club of Guatemala in Guatemala City. This repeater provided much-needed communications between Guatemala City and the smaller outlying villages which were completely cut off from transportation and communications.

□ LU7BD/W2 relayed several emergency medical messages on the SIRA net between doctors in Guatemala and doctors at the University of Rochester (NY). He also handled more than 150 H & W inquiries with TG9DF and TG9LL. The Florida College ARC, WA4STZ, relayed traffic from the Florida Middy Net on 40 meters directly to Guatemala City on the SIRA frequency. Traffic was sent to TG9MP and special station TG9SIRA. Operators at WA4STZ were WA4CNK and WA4UFM. Others reportedly serving as net control on the SIRA net were HK3CEM/W4 and VE3DPQ/W4.

□ The Salvation Army's Atlanta, GA, regional office asked WA4BZY to handle health and welfare traffic and phone patches in order to ascertain the status and whereabouts of Salvation Army personnel in the stricken country. He was also asked by the "Guatemala Council of Atlanta" to transmit H & W messages. The traffic load was so heavy that he had additional phone lines installed in his home and had WA4OQO come in to help him run the station. As of the first week of April, 1,052 messages had been handled on ssb and RTTY by WA4BZY and company.

□ In Texas, W5ONL and K5LZA went on the air as soon as they heard about the disaster. Within a few hours, they were handling official medical traffic and acting as a diplomatic channel for Guatemalan government officials and relief organizations in the U.S. One such message, an announcement from the Guatemalan Office of National Emergency, stated that the earthquake was the worst national disaster ever in the Western Hemisphere. They recorded this message and relayed this grim news by telephone to Guatemalan consulates in the states.

□ With an assist by YV5AXU and WA5ZTY/TG5, the Guatemalan ambassador to Venezuela spoke on 14,280 kHz to members of MARCO (Medical Amateur Radio Council) concerning the desperate need for medical supplies in the more remote areas of his country. As a result, these needed supplies were shipped. Several MARCO members played dual roles at the disaster scene, those of doctor and radio operator. They were TG9EP, WB4IHM, W7RDA and WA7RPR.

□ WB4KNT, the club station at the Ballistic Missile Defense Systems Command, Huntsville, AL, acted as one of the first communications links to the disaster area. A local citizen, Mrs. Veronica Rodriguez Mullins (formerly of Guatemala City), assisted station operator W4ITQ with communications. As the Guatemalan hams spoke of their needs, Mrs. Mullins translated them into English. Then W4ITQ relayed these requests to nearby Red Cross Emergency Centers. Officials at these centers acknowledged that the translated traffic enabled them to collect the most needed supplies and equipment first.

□ Following extensive coverage by the local and national media, the Hall of Science Radio Club in New York City (WB2JSM) was swamped with calls from Guatemalans in the metropolitan area. Additionally, the NYC Red Cross and the city's Guatemalan Consulate were referring anxious callers to the club. WB2JSM handled traffic with TG9s EW LW PE PK and K6GSW/TG9. An overload situation resulted and, as in the Miami area, messages were collected by

the WB2JSM crew and flown by airplane to Guatemala City. In one week, over 3000 inquiries were dispatched in an unceasing effort. Operators were W2EPZ, WA2s MXI NXX PCY PFY QHF ROD VOS YXB, WB2s FGB FHN ROF TBC TFS.

□ The huge overload/backlog of H & W inquiries caused W5GHP, central area director of the National Traffic System's Transcontinental Corps, to activate his "gateway city" program. He and his NTS colleagues in New Orleans collected traffic from NTS circuits and, with the help of W5KSI and TI2MAG/W5, the traffic was funneled by RTTY to TG9AD in Guatemala City. An excellent response to the inquiries was garnered. W5GHP was assisted by W5UGE, W5UJJ, WA51QU and WA5ZZA, gathering traffic from daytime and evening NTS net sessions. On the east coast, W3CUL (with W3CVE and others) handled large amounts of formal traffic destined to the disaster area.

□ Northern New Jersey Section Emergency Coordinator WB2PBO activated his section's NTS/AREC organization to handle H & W traffic through the National Traffic System. The press was provided with phone numbers of amateurs who were volunteering to take the traffic and these hams were soon inundated with calls.

□ The husband and wife team of W6GBF/WA6HXB handled over 200 messages of medical and H & W nature, mainly with TG9HS. Another husband and wife team, WB6CFI and WA6HXZ, relayed over 500 messages with the disaster area and assisted with about 400 others. W6AM, participating in the ninth major disaster operation in his amateur career, handled many messages for his community. WB6YID, in Los Angeles, handled official/diplomatic traffic between the Guatemalan government and the Los Angeles Consul General. The Lockheed ARC relayed consular and medical traffic. W6HJP, W6RUS and WB6OZJ respectively were at the mike. In the Santa Ana area, W6WRJ provided the media and the Red Cross with information via TG9DF. He also assisted in keeping the frequencies clear for emergency nets on 20 meters.

□ WB3AFY, in Baltimore, was able to handle traffic into Guatemala on behalf of the World Health Organization in Washington, DC. K4MM managed to set up a schedule between Washington's Guatemalan Embassy and an official of OAS. W4CHT at the controls of W4USN ran phone patches with TG9LL for embassy personnel. Members of the Department of State ARC, W3DOS, participated in the communications effort, among them W3SWD, W3YBV, WA3SJY, W4HU, WA4USB and W9SZR/3. WA3VEO and WA3YVN put

their bilingual talents to excellent use and sent and received extensive amounts of traffic on the SIRA net.

□ In suburban New Orleans, the Jefferson Parish c.d. called upon W5GAD, Jefferson ARC, for assistance. W5GAD provided the Guatemalan Consul with direct communications to his country, via Bella, TG9HS. A large amount of donated emergency supplies was picked up in Jefferson Parish and flown to the disaster area. Coordination of these shipments was directed by TG9HS and W5GAD. TG9MH, Bella's husband, was in charge of the civilian side of the airport and he was able to insure that the vital supplies were routed to the proper channels. Through Bella, he was able to advise W5GAD that the goods had arrived. W5GAD then notified the stateside relief committees. Diplomatic traffic was also handled by the W5GAD crew: W5FMO, W5WZE, K5IZD, WA5ATM, WA5OVX, WB5s EKU GFM LCB MUL QBO. TG9HS handled traffic for 19 days, despite being in constant danger from tremors and aftershocks. Many amateurs assisted her on 14,322 kHz, notably W4RFA, K5GDX, WB5GTB, W6DSD/4 and W7JZV.

□ W2CHL conducted phone patches with TG9FP and TG9WD on 15 meters concerning required medical and food supplies. W2CHL has been licensed since 1930, but in his letter he admitted that the two weeks following the disaster had

been the most satisfying period of his amateur tenure.

□ Reports received indicate that VE1ASJ, VE1AZX, VE2UN, VE3AUM, VE3GOS and VE6UM were prominent in the emergency communications effort. Canadian hams were publicly praised for their service by government officials.

□ Priority traffic involving pharmaceutical supply shipments and a flight of surgeons from Santa Barbara, CA, were transmitted by W6POU, K6TZ and WB6HXY.

□ The Fort Wayne, IN, Red Cross chapter asked W9PRO to handle H & W traffic for the area. He, in turn, contacted W9SWH for backup. Messages were passed to TG9LW on 20 and TG9EK (running battery power!) on 15. K2AI assisted W9SWH in relaying messages from stations who were unable to copy TG9EK. This included six messages received from KC4AAC at the South Pole. Some return messages were routed through the local repeater to WB9FPK, en route to the Indiana Phone Net.

□ Milwaukee (WI) Emergency Coordinator WB9NNJ activated the Red Cross Hq. station following a call from the news director of a local TV station. After handling emergency/priority messages for the Red Cross coming out of the disaster area, H & W inquiries were accepted from citizens in the vicinity.

W4ITQ, at the controls of WB4KNT, was aided by Mrs. Veronica Mullins who interpreted messages from Guatemalan hams.



WR9ADU was used as an intercom by the various AREC stations on 20 meters.

- K4AGZ (formerly TG9HT), supervisor of Duke University's Medical Electronics Department in Durham, NC, flew down to Guatemala to provide radio communications between physicians at a Guatemala City hospital and their counterparts in the states. He also supervised the distribution of a 19-ton food shipment contributed by Durham residents.

- Shortly after the disaster, the Hillsborough (FL) ARC, WA4GJJ, established a message center at a nearby shopping mall, so that the public could submit inquiries about loved ones in Guatemala. Traffic was dispatched from the message center on a 2-meter link to W4UIHF; WA4UVG or WB4VHY who were in contact with Guatemalan stations on 20 meters. The University of Kentucky station, W4JP, handled messages with TG9LW for concerned members of the university community.

- VE2AQV/6 and other members of the Mount Diablo Radio Club manned that station for 11 days. They provided status reports from the disaster zone to the Red Cross, the Guatemalan Consul in San Francisco and other authorities. Included in Art's staff were volunteers who spoke Spanish, which greatly improved communication with callers from the area's Spanish community. Art estimates that over 1000 telephone inquiries were handled, along with more than 200 pieces of traffic. Some other members of the Mount Diablo club contributed to the effort from a local high school, using the call sign, WA6WGB.

- The Wichita ARC station W0SOE located in the Red Cross building processed many emergency and H & W formal messages. The principal agency served was the Midway-Kansas chapter of the Red Cross. Contact was maintained with K6GSW/TG9, seconded by WB4ICJ (Kennedy Space Center ARC).

- The Kirkwood (MO) High School ARC, K0AZV, was inundated with priority and H & W traffic from the St. Louis Red Cross and for local citizenry. Operators WB0OIZ and WB0PIH (assisted by several unlicensed club members) handled traffic with K4IWT, TG9KA and K6GSW/TG9. At times, K0AZV relieved K4IWT of net control duties.

- Three Shreveport, LA, amateurs were extremely active in the emergency. They were K5WWR, WA5ARJ and WB5FVI. WB5FVI conducted traffic for Shreveport's Guatemalan relief fund organization, coordinating shipments of supplies. WA5ARJ communicated with Guatemala for several church groups in the area.

- W3EDU, York (PA) ARC, was operated for seven days by W3EDO,

W3LMA, K3BWB and WA3UQH. They also put in time from their home stations.

- WA4PWF/6, operating from Santa Fe Community College, transmitted H & W messages for students and faculty at the school. Elsewhere in California, WB6HXY and WA6LBO were very active relaying emergency traffic.

- W9JUV conveyed quite a number of H & W inquiries for residents of the Chicago area. His activities were mentioned in the newspaper column of nationally renowned journalist Irv Kupcinet (Kup's Column). W9RUK and K9AAH were also reported to be active in the Chicago area.

- WIMD, of Hingham, MA, provided the newspapers with information he received from TG9LW just hours after the earthquake. He handled a huge amount of traffic, especially on behalf of the Guatemalan Rotary Club. Others in the area participating were WIDMS, WIDXQ and WA1HXQ. In Connecticut, members of the Meriden ARC - WIYY, WA1QZQ - handled inquiries for the community. In Manchester, WISBK served the same function and WIWY did it in Stamford.

- The Huntsville (AL) ARC mobilized to collect food, clothing and money for earthquake victims. Announcements were made by the local broadcast stations that club members would pick up donations and deliver them to the Red Cross. The two-meter repeater was used to coordinate this effort.

- K4CJZ and other members of the Greensboro-Guilford Co. Civil Preparedness Repeater Association (NC) handled official requests for relief supplies and several H & W inquiries.

- Space limitations prevent us from describing every facet of the amateur operation during the Guatemalan earthquake. However, here are some of the call signs of stations known to have played a part: TG7BD, TG8AI, TG9s FP GI KD LM MY PF OK RS SQ, WA4WBG/TG9, WA7VVB/TG9, VE6CGA/TG9, K1ALP, W2APF, K2s KUZ MFF, WA2s CPK DIW KOU SMW WIW, WB2s MIC QMQ RMK VTT, W3s HLW LGY YKC, K3YHR, WA3s VUE WFA WUL, W4s BUG EWR PR WXZ, K4s DQ FRX WC, WA4IRG, WB4s GBI HWM LXX NFI RCF, W5s LVX YJ YK, WA5OOA, WB5s DWN JBP LWB, W6s HTS PN QIE VPZ VRF, K6s CUK KH VT, WA6s EJO MBZ WRM, WB6QVD, W7OHR, WA7s HUR YTE, W8TH, WB8s LTN OGB, K9GHR, WB9NLQ, W0s ENA GQ IQZ, K0s PIN SPR ZUV/6, WA0s HPW UUC, WB0FHH.

Feedback

The following was excerpted from a letter written by ANRC Chairman Frank Stanton to President Ford:

"The American Red Cross and other

agencies owe a special debt to hundreds of amateur radio operators in this country and Guatemala for their around-the-clock efforts to provide assistance to Guatemala. With communications in chaos in the first hours following the disaster, these men and women, most of whom are members of the ARRL, were a primary source of information not only for the Red Cross, but for the State Department, the Guatemalan embassy here, the U.S. embassy in Guatemala and for other agencies and organizations. Today, they continue their work day and night transmitting health and welfare inquiries for worried Americans with relatives and friends in the ravaged country. The Red Cross has long had an agreement with the ARRL and its membership not only assists us on foreign but domestic disasters as well."

The following was taken from a thank you note written to WB6CFI/WA6HXZ:

"I want to thank you for the great effort you made in contacting our daughter . . . in Guatemala City last Friday. I can't sing the praises of you and the ham operators loud enough having experienced your great humanitarian effort . . . You must derive a great amount of personal satisfaction from your radio contacts especially knowing you have relieved the anxieties of a great many people like ourselves. Please thank Mrs. Hurst for giving us a call offering your service - you are two great people."

Another appreciative citizen publicly thanked WA0UCC for his help, by writing to the *Kansas City Star*:

"I'd like to speak out in favor of the ham radio operators in and around Kansas City. I'd like for Mr. and Mrs. Public to know we have several and how much good they do. I call them the angels of the airways. I have two small grandsons living in Guatemala City. You can imagine the agony I went through, not knowing about my babies. A friend gave me the name and phone number of a ham operator . . . He took my message and did not build up my hopes, but he said he would try . . . by 10:30 Saturday morning my message was in Guatemala. What more could I ask?"

In about two hours the message was answered and I knew my babies were safe. God bless this man and all others like him."

In thanking hams for their help, ironwoman TG9HS concluded one traffic session by saying to the multitude on frequency: ". . . And may you never know the sorrow and pain that you feel when your country cries. This is TG9HS, clear."

Guatemala cried for help and radio amateurs answered immediately, opening the door between hope and despair.

Westward Ho — to the ARRL 1976 National Convention

Last month, I told you a little about Colorado and the Convention. In the meantime, I got hold of a ham friend of mine to ask permission to use his picture in our ads — only to find out that he was working with one of the convention committees himself. So, I asked him to write me a letter about what was going on — and here it is, in his very own words. Incidentally, he does a little prospecting, ranching, and a lot of observing . . . Sincerely and 73 — Harry, WØJGI.

Dear Friend Harry,

Been wantin' to git off a hen scratch 'r two fer the last 8 or 9 months, but all the stirrin' 'bout this big ARRL convention done took all my time away. Ya know, I live in Colorado, 'n after going thru all them programs fer the hams 'n their families, I got so durned interested that I signed up fer a few more things to do with the family. Ain't no way that I kin get ta all the stuff, but by golly the bride of 20 years told me she was gonna get to see some people least once every five years — an by golly she was gonna win that big trip we're givin' ta a lady — or at least, the necklace. Oh, that's right, I ain't told ya about all the prizes fer the ladies. Well, guess ya know now 'bout the Drake-line first prize fer one of the hams . . . That's the one that Drake are makin' special fer ARRL '76. Well now you just listen to what them guys and gals done cum up with fer the ladies . . . mind ya, ladies only gonna git a crack at this un. Any time durin' the rest of the year before Dec. 15, the lady who wins this wants ta, she can just call up and make 'rangements fer an all-expense-paid trip to Mexico City. She gits on Mexicana Airlines at any one of eight cities, arrives in Mexico City where she spends six days and five nights. But that ain't all — not by a darnsight — she's gonna stay at a deluxe hotel, and she can take a friend. It 'curred ta me that ifin that friend was her ever lovin' so much the better.

But mind ya, she don't have to . . . my XYL probably'll take her old lady,



but then I ain't much fer travelin' anyhow.

Ol Slats, the guy whats doin' all the work at the convention (he likes we should call 'im general chairman . . . he sure got moved up from private fast) . . . was tellin' me that even ifin ya don't win the free trip, the airline done got a real special fixed up ta go to Mazatlan right after the convention. XYL's bin pikin' at me 'bout that, too. Ya know, I don't think she's gonna win thatun . . . but, even ifin she don't, she done got 'er name in the hat fer any one of the other goodies just fer the ladies. Now ya take that necklace ('n she'd-a-like ta). It's that beautiful blue turquoise with all that hand cut silver — why I'd be most afraid ta keep it in the house fer fear it might walk away . . . and ya oughta see the other stuff they got fer the ladies ta win. Course, the Convention ain't all prizes, but ya know 'bout some of them trips they got goin' all round the state, and big doings fer Friday night with the live Mariachi band 'n people singin' 'n jumpin' round, 'n everybody dancin' . . . why I might

even kick the 'dobe off my boots 'n prance a bit.

My neighbors, Mrs. Council and Mrs. White, done fixed up all the stuff fer the ladies, and they done a good job, too. Jim White (he ain't no relation) got himself more program goings-on then any two men could take in, in twice the time. He done talked them telephone fellers inta comin' out all the way from New Jersey to tell us 'bout fiber optics, 'n a lot of new things they're doin' out ta Bell Labs. And ya know what else he done? He got him one of those vhf engineering radios, 'n he's gonna tie it to a weather balloon 'n just let 'er drift — all the time poking out a signal on 2 meters. He even gotem to turn off all the 16/76 repeaters in three states while that thing's a goin'. By golly, I got so much ta tell ya that I don't think I'm gonna giter all in, but cain't forgit things like the bus trips to the Bureau of Standards in Boulder, or Hewlett Packard where they make all them test goodies — 'n ya otta see the ham prizes they donated. Well, anyhow, all that stuff's in the ad in this issue.

Well, now, cain't think what I might a missed tellin' ya. The family's all good — growin' up fast — 'n just as 'cited as can be 'bout this convention in July . . . so em I, ifin the truth were told. Anyhow, near time ta git outside, but I'll see ya July 16, 17 and 18 in Denver. Cumon up 'n make yurself neighborly . . . ya'll see me there . . . I'm the feller in the white pants and that bandanna red coat. As always, yer friend — Joe

Registration Details

Amateur registration(s), \$4.00 (\$5.00 after July 1); ladies registration(s), \$2.00 (\$3.00 after July 1). Ladies Saturday Tour — Air Force Academy, Garden of the Gods and luncheon at the Broadmoor, \$18.00 (\$20.00 after July 1). Saturday evening banquet, \$18.00. For further details write to: ARRL National Convention, c/o Slats Council, 2450 South Quitman, Denver, CO 80219.



Canada Update, II

Our March column met with approval north of the border, and triggered some additional contributions. We'd like to hear directly, from W/K and VE/VO members alike, as to your interest in the items used here, together with your contributions for future columns. Space is limited, and we may not be able to use all the items right away, but the greater the choice, the livelier and more useful these pages will be.

DOC Terminal Attachment Program

The Department of Communications has issued standards which will permit the direct attachment of certain customer-provided terminal devices — phone patches? — that have been certified by the department to the communications networks of federally regulated common carriers. Under the attachment program, the public will be able to purchase devices certified by the department rather than having to lease the equipment and a coupler from the carriers.

The first terminal devices eligible for certification are automatic telephone-answering machines, recorders, and plugs and jacks. These will be followed by such items as acoustically coupled devices, alarms and other network non-dialing devices. The standards are intended to stimulate development of a wider range of communications devices and encourage development of the industry.

The Minister of Communications, Jeanne Sauve, praised the industry, users, provincial governments and the common carriers for their cooperation in developing the standards. Details are available from regional DOC offices or the Telecommunications Regulatory Service, 300 Slater Street, Ottawa. The rules were effective April 30. (Stateside rules for registration are reported in a separate story by Gordon Orelli, W1OR, elsewhere in this issue.)

VO1LU Wins Honors

Harold Maxwell Mercer, VO1LU, of Corner Brook, Newfoundland, was recently presented with the C. A. Pippy Memorial

THE "WANT LIST"

A number of petitions has been filed with the Federal Communications Commission, requesting changes in its rules for the Amateur Service.

George B. Smith, W5ZFW, requested an amendment of Section 97.7(c) to permit Technicians to operate with Morse code in the present Novice cw bands — RM-2636. ARRL's filing in Docket 20282, restructuring, made a similar request.

A request for a negative action — to prohibit slow scan in 14.2-14.275 MHz — was filed by Rufus Taylor, W1OCO, who would rather have SSTV in 14.0-14.05 MHz. The file

* Assistant Secretary, ARRL



Dave Lloyd, VE3AW, right, receives a Certificate of Merit from Canadian Vice Director Bill Loucks, VE3AR, on behalf of Director Hesler and the Division, for his leadership in establishing a program of helping the blind to become amateurs. This program, originally sponsored by the Radio Society of Ontario, has spread across Canada as an integral part of the services offered blind people by the Canadian National Institute for the Blind. Well over 300 "White Caners" are now on the air in Canada. It's unbelievable from the photo, but Dave holds the number 1 certificate for radiotelegraphy; he was the first person to pass the amateur test when it was introduced in 1919!

Award to the Handicapped Citizen of the Year. The award was presented by the Honorable Gordon A. Winter, O.C., LL.D., Lieutenant Governor of Newfoundland, at a February ceremony in St. John's.

Max entered the field of photography in 1958, and in 1968 went to work for the weekly newspaper *The Compass*. Four years later he became blind from glaucoma and a detached retina. Quickly, he enrolled in the Canadian National Institute for the Blind and completed its Blindness Orientation Course. He also discovered amateur radio, achieving the Advanced Certificate in December 1973. The following summer, Max and his wife

number RM-2637 has been assigned.

Another proposed prohibition of a-m operation on amateur bands below 30 MHz is contained in RM-2639, filed by Keith Olson, W7FS.

RM-2664 would propose definition of a "Remotely controlled base station," and some rules for operation of such stations by control operators authorized in the license of a "remote base." The petitioners are Gordon Schlesinger, WA6LBV, and William F. Kelsey, WA6FVC.

Nick Leggett, WA3YFU, would like to see all applicants for amateur and commercial radio operator licenses get an exam report with the numerical grade and, if they fail, some indication by general subject matter of

made a camper tour of five states and five provinces, meeting many of their ham friends and a number of "white caners."

He's also continued his career despite the handicap (and despite another round of physical trouble including a heart attack and kidney disease), selling advertising for a group of weekly papers, distributing wholesale *The Compass*, representing CBC Television, and producing 16 mm color movies (with the filming done, of course, by a sighted assistant).

Max is a member of the Board of Stewards, Barence United Church; Official Board at Clarke's Beach; vice president of the Fisherman's Museum, Hibbs Cove; CNIB Board of Management and a number of additional organizations.

Our congratulations to Harold Maxwell Mercer, VO1LU, an inspiration to all of us!

The Last Holdout

The fifty United States, the District of Columbia, and all the provinces of Canada except one, have granted to radio amateurs the privilege of "Call Letter License Plates." Now the last holdout, Ontario, has joined the ranks! The license plate in the adjoining photo is really a sample sent us by R. G. Gammon, VE3ACL, who has been working for Ontario plates and who also has an extensive collection of plates from all the other jurisdictions. Nevertheless, the new markers will be issued soon by the Ontario Ministry of Transportation and Communications, Toronto. The battle lasted 17 years. VE3ACL says, but look Ma, we won!



where the failure occurred — RM-2665.

Our last petition for this installment, RM-2666, comes from Robert L. Bingham, K9WMP. It asks that amateurs be relieved of the requirement for possession of the original operator license whenever controlling an amateur station. He suggests, instead, use of the Verification Card already used for commercial operators, or perhaps a notarized photocopy of the amateur license.

Although the time for commenting on these petitions has technically expired, in practice the Commission finds that letters from interested parties, pro or con, are useful right up to the time official action is taken: Mention the number and send your comments to FCC, Washington, DC 20554.

MODES AND BANDWIDTHS

A new look in amateur radio — especially additional freedom to experiment — is promised in a new Notice of Proposed Rule-making Docket 20777, released by FCC on April 22. Those interested in the matter will have to act fast, because comment deadline is June 23, 1976.

The Commission had eight petitions for rulemaking on hand from amateurs and amateur organizations — including ARRL's RM-2550 for "RTTY lib" — relating to facsimile, wide-band fm, and techniques using the American Standard Code for Information Interchange (ASCII) for radioteletypewriter or similar use on the air. "Rather than further complicate the present rules," the Commission said, "with additional provisions to accommodate the petitioners' requests, we are herein proposing to delete all references to specific emission types in Part 97 of the Rules. "We propose, instead," the Commission continued, "to replace the present provisions with limitations on the permissible bandwidth which an amateur signal may occupy in the various amateur frequency bands. Within the authorized bandwidth limitations, any emission type would be permitted."

Four levels of bandwidth would be set: Less than 0.35 kHz, accommodating, for instance, Morse code and teleprinter; 3.5 kHz, for telephony, facsimile and slow-scan television; 35 kHz, for double sideband a-m, fm, and any other emissions which would fit in the space; and bandwidths wider than 35 kHz, for, e.g., fast-scan television.

Note especially that double sideband a-m would be barred below 28.5 MHz and wide-band television below 121.5 MHz if these proposals are adopted. See Table 1 for proposed bandwidths for popular frequencies.

Bandwidth would be redefined for amateurs: "97.65 Bandwidth of emissions.

(a) Occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

(b) The authorized bandwidth is the maximum occupied bandwidth authorized to be used by a station."

And so would the clean signal rule: "97.73 Purity of emissions.

Table 1
Proposed bandwidths for popular frequencies are:

kHz	BANDWIDTH IN kHz
1800 — 2000	3.5
3500 — 3775	0.35
3775 — 4000	3.5
7000 — 7150	0.35
7150 — 7300	3.5
14000 — 14200	0.35
14200 — 14350	3.5
MHz	BANDWIDTH IN kHz
21.0 — 21.25	0.35
21.25 — 21.45	3.5
28.0 — 28.5	0.35
28.5 — 29.7	35.0
50.0 — 50.1	0.35
50.1 — 54	35.0
144.0 — 144.1	0.35
144.1 — 148, 220 — 225, 420 — 450 MHz,	35 kHz bandwidth

The mean power of emissions on any frequency removed from the upper or lower limit of the authorized bandwidth, by more than 250 percent of the authorized bandwidth, shall be attenuated at least 40 decibels below the peak output power of the transmitter.

Amateurs under FCC jurisdiction living in ITU Region 3, amateurs wishing to do voice communications in Alaska on 4383.8 kHz during emergencies, and anyone wishing more detail on this matter should write: "Bandwidths", ARRL, Newington, CT 06111; a self-addressed, stamped envelope will speed your request.

Members wishing to help ARRL arrive at its position on this docket should write immediately to W1UED at Hq. or direct to the Division Director (see page 8). Anyone wishing to comment to FCC should write to Amateur and Citizens, FCC, Washington, DC 20054, mentioning Docket 20777. An original and 11 copies are required for formal participation, but a lesser number will still be read and included in the file.

EXTRA CLASS CALL SIGNS

The long-awaited results of Docket 20092, dealing with the right to request specific call signs of the 1 x 2 variety (that is, like W1AW) are now with us, effective July 1 and various other dates, depending upon one's seniority. FCC flatly states in its order:

"We will not accept prematurely filed applications." Applications are to be made on Form 610 with a fee of \$28 if no renewal is desired or \$29 with renewal. Applicants should include documentation of earlier holdings: Original license, photocopy, or photocopy of a recognized listing or source, such as the *Radio Amateur Callbook* with a photocopy of its title page as well. All of these, with a list of desired calls in order of preference, should be sent to FCC, Box 1020, Gettysburg, PA 17325.

The docket also dealt with memorial call signs for radio clubs: Those having such calls may renew them, but no more will be issued. The docket originally dealt with 1 x 3 calls as well, but a decision on that portion will come later — when Gettysburg is less "snowed" by license applications!

Briefly stated, the rules are changed so that beginning July 1, 1976, a person holding the Extra Class license and presently holding a 1 x 2 ticket may turn it in for a specific 1 x 2 call of his choice; also, a person holding Extra, who was first licensed at least 25 years ago may request a specific 1 x 2 call.

Beginning October 1, 1976, a specific 1 x 2 call sign will be issued to an Extra Class licensee who held that class of license prior to November 22, 1967 (the starting date for the return to incentive licensing).

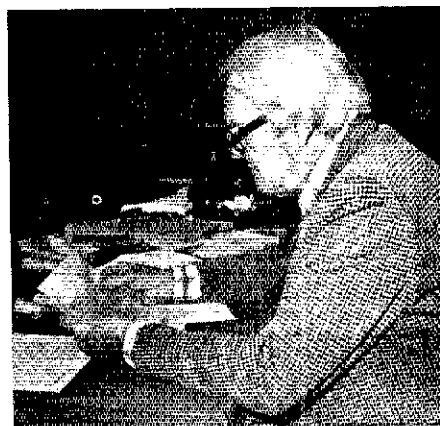
Beginning January 1, 1977, a person who acquired Extra Class prior to July 2, 1974, (the date this docket began) may request a specific 1 x 2 call sign.

Beginning April 1, 1977, a licensee who got Extra before the effective date of this order, July 1, 1976, may ask for the 1 x 2. Finally, after July 1, 1977, all Extras will be eligible.

Copies of the complete First Report and Order are available from ARRL; an s.a.s.e. will speed your request. Be sure to mention Extra Class Docket.

BEHIND THE DIAMOND

"Whiter than new snow on a raven's back . . ." Yes, you have to quote Shakespeare to describe accurately the silvery locks of our featured subject for this month. Some know him as "The Silver Fox." We know him as "Connie Mac." His given name is *Harry A. McConaghy*; his call is W3SW; and since 1970 he has been representing League members in Delaware, Maryland, Pennsylvania, Southern New Jersey, Washington, DC, and Western New York as director for the Atlantic Division.



Connie Mac was first bitten by the ham radio bug when he was eight years old. Originally licensed in 1934 as W3EPC, he has since held the calls W3IOD and W2PKC. He now holds the Extra Class ticket, and is a member of several amateur radio organizations, including the Antique Wireless Association, Rock Creek Amateur Radio Association, Potomac Valley Radio Club, National Capital DX Association, and the Quarter Century Wireless Association. His shack is equipped for cw, RTTY, ssb, and a-m on 80 through 2 meters, and fm on 6 and 2 meters. With a tribander and 40-meter beam atop a 100-foot tower in the backyard, he puts out more than a modest signal.

Connie Mac is a retired professional engineer (electrical, electronic and mechanical). He was a broadcast engineer back in the 20s and 30s, and was an electronic engineer for the Department of Defense for 30 years. After his professional retirement he became owner and operator of the H. R. Rudolf Company providing marine engineering services. He divested himself of this responsibility in 1970 to devote all available time to League matters.

Connie Mac resides in Bethesda, MD, with his wife, Rae. Oddly enough, through the years he has at one time or another lived in every section of the Atlantic Division. His hobbies include golf, sailing, and auto and boat racing. He has a little bit of the daredevil in him; in fact, he was a pioneer in outboard motor racing in the 30s. And this, after all, explains why his hair turned white.

You can meet him at the Atlantic Division Convention this July 24-25. Coinciding with the nation's bicentennial celebration, and in the historic city of Philadelphia, the convention promises to be a whopper! — *KIFIN*

Coming Conventions

June 11-13
Southeastern Division, Atlanta, GA

July 2-4
West Virginia State, Jackson's Mill, WV

July 9-10
Central Division, Milwaukee, WI

July 16-18
ARRL National, Denver, CO

July 24-25
Atlantic Division, Philadelphia, PA

July 31-August 1
Roanoke Division, Norfolk, VA

August 20-22
Maritime Section, Halifax, NS

September 3-5
Pacific Division, San Jose, CA

September 10-12
New England Division, Boston, MA

October 8-10
Midwest Division, Omaha, NE

November 6-7
South Florida Section, Clearwater, FL

November 13-14
Hudson Division, McAfee, NJ

WEST VIRGINIA STATE CONVENTION

July 3-4, 1976, Jackson's Mill, West Virginia
The 18th annual West Virginia State Radio

Convention, sponsored by the West Virginia State Amateur Radio Council, will be held at Jackson's Mill State 4-H Camp the weekend of July 3-4. Program highlights include the ARRL Forum Saturday evening, with President Harry J. Dannals, W2TUK; First Vice President Victor C. Clark, W4KFC; Division Director L. Phil Wicker, W4ACY; and Atlantic Division Director Harry A. McConaghy, W3SW.

Technical Forum will be conducted by Tom McMullen, W1SL from ARRL. The FCC Forum will feature John Johnston, K3BNS, Chief, Amateur & Citizens Division. Also highlighting the Saturday evening program will be a presentation by Herb Morrison, who was on the scene at Lakehurst, NJ, when the Hindenburg crashed. Other activities include Wouff Hong initiation at midnight, Saturday; phone-cw net meetings; pizza party; cw copying contest; free swimming in the new Olympic-size swimming pool; and a large flea market both days. Prizes include a Drake TR-4C with power supply and a Clegg FM DX 2-meter transceiver and many more.

This convention is truly a fun-filled family weekend at beautiful, historical Jackson's Mill. Registration tickets are \$3 each, or 2 for \$5. This fee entitles you to participate in many of the convention activities, but does not include any food or lodging. Full registration tickets include meals, lodging and all convention activities. Pre-registration, \$14; at the Mill, \$16. Children under 8, \$8. Full registration tickets available from Dorothy Morris, WB8LAI, 1136 Morningstar Lane, Fairmont, WV 26554. \$3 tickets from George Puzzuole, K8QEW, 3616 Morgan Drive, Weirton, WV 26062. Brochures were mailed in early May by the Tri-State Amateur Radio Association. If you are not on their mailing list, write to the West Virginia State Amateur Radio Council, 1136 Morningstar Lane, Fairmont, WV 26554, for further details. See you there.

CENTRAL DIVISION CONVENTION

July 9-10, 1976, Milwaukee, Wisconsin

The West Allis Radio Amateur Club, W9FK, will host the 1976 ARRL Central Division Convention in Milwaukee at the Red Carpet Inn and Exposition Center. The convention will be occurring during Milwaukee's two week "Summerfest" celebration, and will feature dining, swimming, bowling, motion picture theaters, tennis, nightclub, and a discotheque serving the *Gemutlichkeit* that made Milwaukee famous.

Activities Friday evening will include meetings, a "dutch-style" buffet dinner, the W.A.R.A.C. hospitality C.O.D. bar and the Wouff Hong initiation to induct ARRL members.

There will be an exhibit and display area and a large indoor flea market in the air-conditioned 28,000 square foot Exposition Center beginning at 8:00 A.M. Saturday. Talk-in will be on 146.52 MHz. Parking is available for over 1000 cars.

Technical forums and programs begin at 9:00 A.M. Saturday morning at the Red Carpet Inn, and cover many facets of amateur radio such as ATV, Amsat, MARS, DX, Traffic, ARPS/AREC, Beginners (featuring Lew McCoy, W1ICP), Public Relations (featuring Don Waters of ARRL) and an ARRL Forum, to name a few. Activities have been planned for the ladies (or husbands) who attend. Saturday's activities will be closed by a grand buffet banquet, with guest speaker Armin "Hank" Meyer, W3ACE.

Advance registration general admission, covering both meetings and/or flea market, is \$2.50 per person, \$3.00 at the door. Advance (only) banquet registration is \$7.00. Special package price for general advance admission and banquet is \$9.00.

Hotel registration cards and further convention information are available by writing to: "1976 Convention," P. O. Box 1072, Milwaukee, WI 53201.

Hamfest Calendar

California: The Mission Trail Net's 39th annual roundup is June 18-20 at the Concord Inn, Concord. The banquet is Saturday, June 20. Contact Betty Amos, WA6IPI, Pleasant Hill, for reservations.

Honolulu*: The Honolulu Amateur Radio Club's hamfest/swapfest is July 3-4. The swapfest is at the Kaimuki High School, 2707 Kaimuki Ave. from 8 A.M. till 3 P.M.; \$2 per stall. On July 4 the hidden transmitter hunt is from 9 A.M. on 146.52 MHz. Participants meet at the Pancake House, Ala Moana Center, prior to 9 A.M. for contest instructions. Registration fee, \$1 per vehicle. The HARC Bicentennial Dinner is at the Flamingo Chuckwagon Restaurant, 1015 Kapiolani Blvd., on July 4. Activities include equipment displays. Cost per person, \$10. Write George Stillman, KH6AN, P. O. Box 7111, Honolulu, HI 96821.

Illinois*: The Starved Rock Radio Club annual hamfest is Sunday, June 6, at Princeton, IL.

Illinois*: The Six Meter Club of Chicago *ARRL Hamfests

will hold its 19th annual hamfest, Sunday, June 13, at Sante Fe Park, 91st St. and Wolf Rd., in Willow Springs. Food and drinks available, and special area for manufacturers, as well as Swap n' Shop section. Advance registration is \$1.50; gate \$2. Write Don Marguardt, K9SOA, P. O. Box 79, Lyons, IL 60534.

Illinois: Egyptian Radio Club, Inc., W9AIU, will hold a hamfest, Sunday, June 13, at the club house located north of Granite City (1/4 mi. south of the Old Chain of Rocks Canal Bridge). Swapper row, games for the fiddies, lunch served, cold drinks, ladies' white elephant sale and bingo. Talk-in on AF9ACA, 146.76. Admission free.

Indiana: The Midwest Repeater Assn. with the Indiana Dunes Amateur Radio Club's hamfest is June 20 at the Lake Hills Senior Citizens picnic grove, 8100 Austin Rd., Schererville, from 8 A.M. to 5 P.M. Food, drinks. Talk-in WR9ADK 31/91, .52, .94. Tickets or more info send s.a.s.e. to I.D.A.R.C., P. O. Box 5, Dyer, IN. Tickets advance \$1.50; gate \$2.

Iowa: The 4th annual Des Moines Hawk-eye Hamfest is Sunday, June 13, in the Varied Industries Building at the Iowa State Fair Grounds, Des Moines. Plenty of free parking. Flea market, display booths available. Dealer displays, KYL activities. Camping available, small charge. Advance registration \$2; gate \$2.50. Open 8 A.M. to 4:30 P.M. Write Des Moines Radio Amateur Assoc., Box 88, Des Moines, IA 50301.

Maryland*: The Maryland Mobileers Amateur Radio Club's sixth annual hamfest is Sunday, June 13, at Anne Arundel Community College, Arnold. Gates open at 9 A.M. Registration \$2; tailgaters \$3, plus registration in full. Talk-in on 146.10/.70; .52; 16/76. Write Frank A. Youell, WA3WAN, 558 Brightwood Rd., Millersville, MD 21108.

Michigan: Southeastern Michigan Amateur Radio Hamfest "76" is Sunday, June 6, from 6 A.M. - 4 P.M. Ann Arbor swap n' shop. Michigan's largest open trunk sales. Ladies invited. To be held at Wayne County Fair Grounds, Belleville 1-94, Belleville Road exit. Indoor exhibits; booths also available. Reserve early. Tickets \$2 advance; \$2.50 at gate. Talk-in 37/97 RPT 52 simplex. Info and tickets write to Hamfest, Box 1976, Belleville, MI 48111.

Mississippi: The Hernando Mississippi Repeater Assn. is holding an ARRL hamfest, June 19-20. Details from the chairman, Walter Hopper Jr., P. O. Box 217, Hernando, MS 38362.

New Jersey: The fifth annual flea market hamfest of the Raritan Valley Radio Club, the W2QW/WR2ACS group, is Saturday, June 19, rain date, Sunday, June 20, at Columbia Park, Dunellen. For info phone WB2MNE at 201-356-8435 or write RVRC, Rte. 3, Box 317, Somerset, NJ.

New York: The Hall of Science Radio Club third annual auction flea market is Saturday, June 5, at the World's Fair

Grounds, Flushing, L. I. Admission \$1, sellers \$2. No seller's commission but 10-percent fee on auctioned items. Zoo, boating, children's farm, art and science museums adjacent. Field Day goodies galore. Box 1032, Flushing, NY 11352.

New York: The Rome Radio Club's 24th consecutive Ham Family Day is Sunday, June 6. 5000 sq.ft. of indoor display area and a large flea market. The Beeches Resort and Motor Lodge in Rome will be the location. Write Box 721, Rome, NY 13440.

Ohio: The Goodyear Amateur Radio Club, WA8UXP, of Akron's 9th annual Father's Day hamfest-picnic is June 20 at Wingfoot Lake Park, (located east of Akron, one mile west of Suffield on County Rd. No. 87 and near County Rd. No. 43). Talk-in on 146.04, 146.64. Akron repeater WR8ACG. Huge flea market, displays, swap n' shop, picnic tables available, children and adult play area all day, 10 A.M. to 6 P.M. Prepaid admission \$2; \$2.50 gate. For details write Floyd Gilbert, WB8ALK, 1976 Newdale Ave., Akron, OH 44320.

Pennsylvania: The Penn-Central Bicentennial Hamfest is Sunday, June 6, Union Township Volunteer Firegrounds, Winfield

(11 miles south of I-80 on Rte. 15). Contests, auction, flea market start at noon. Registration \$2; XYL and children free. Free parking. Contact W3GPR.

Pennsylvania: The Harrisburg Radio Amateur Club's annual hamfest is Monday, July 5, at the Indian Echo Caverns, between Harrisburg and Hershey just off Rte. 422-322. Registration is \$2; free tailgate space.

South Dakota: The Sioux Falls Amateur Radio Club, Inc., and the Sioux Valley Repeater Assn.'s 1976 South Dakota Ham Picnic is in Sioux Falls on June 12-13. Located at the Sioux Empire Fair Grounds on Sioux Falls' west side (1/2 mile east of 129 and the 12th St. off ramp; follow the QST signs). Activities start Saturday afternoon with an eyeball session, followed by a family-style meal that evening at sunset. A two-meter transmitter hunt will begin; for those not in the tox hunt, a program "for all ages" finishing the evening. Sunday's events: Church service, seminars, contests, transmitter hunts (80 and 2 meters), lunch. A talk-in on 3950 kHz by the club, W0ZWY. Facilities are nearby. Sites on the fairgrounds are available for campers and tents. Write Sioux Falls Amateur Radio Club, Inc., P. O. Box 91,

Sioux Falls, SD 57101. Include s.a.s.e.

Texas: MARCO, Medical Amateur Radio Council's 10th annual convention at the Sheraton-Dallas Hotel in Dallas, TX, June 25-26.

Virginia: The Roanoke Hamfest is in Prince William County Fairgrounds sponsored by the Ole Virginia Hams with food concession by the Woodbridge Wireless, Inc. \$2.50 at gate; \$1.50 advance.

Virginia: The Virginia Phone Net Hamfest is June 19-20 in Wytheville. Check in 2 P.M. Make reservation to Holiday Inn, \$22; mail to No. 44 Doug Slough, RFD 2, Box 19 A, Wytheville, VA 24382, by May 20th. Twin beds, cots can be added. Swimming and fun park for children. Social hour 6 P.M. XYL and children invited. Buffet dinner, dutch treat \$3.50; children \$1.50. Movie feature and business at 9 P.M. 9:30 A.M. Sunday. 325 acres of beautiful fishing and boating.

West Virginia: The Tri-state Amateur Radio Assn. (TARA) 14th annual hamfest, Sunday, June 6th, 11:30 A.M. Camden Park, Rte. 60 West, Huntington. Talk-in W8VA/8, 04/64 and 34/94. For info and tickets write TARA, P. O. Box 1295, Huntington, WV 25715.


Strays



◻ In hunt of Lions, Camille Maillette, VE1RO, a blind ham and PRA for the Halifax (NS) ARC, operates the club's Carl Sorge Memorial Station with encouragement from Halifax Lions Club President Earle Hoare (left) and Vice President Ray Colp. Sponsored by the Lions Club of Rio de Janeiro, Brazil, the contest is an annual event in which Western Hemisphere Lions Club hams accumulate points by working each other.

◻ The W3DOS gang took some liberties with the official ARRL bicentennial QSL design to come up with their own version tracing the history of the Department of State.

◻ Identical plates, different states! Both of these cars; equipped for ARPS use, are owned by Rick Thomas, WB0KWY, of IL, now stationed at Minot AFB.




AC3DOS

Washington, D. C. 20520

1775—Committee of Secret Correspondence
 1777—Committee of Foreign Affairs
 1781—Department of Foreign Affairs
 1789—Department of State
 1968—Department of State ARC
 1971—W3DOS
 1976—AC3DOS

CONFIRMING CONTACT

NAME	GAIL	DATE	
PHZ	MODE	EST	YALTS



**DEPARTMENT OF STATE
 AMATEUR RADIO CLUB
 c/o VO, SA-2**



Silent Keys

It is with deep regret that we record the passing of these amateurs:

- WIABY, Harold E. Powers, West Brookfield, MA
 W1AYN, Martin K. Jenness, Whitman, MA
 Ex-WA1DDO, John L. Hooker, Jr., Whitman, MA
 WIDN, Alvar J. Kent, Carlisle, MA
 WA1JPK, Philip C. Howard, Saco, ME
 W1MNF/WB4YPO, Earl F. Dunham, Orleans, MA
 K1MYV, Peter D. Black, Franklin, NH
 W1NAV, L. H. Flanders, Needham, MA
 W1VDV, Roy F. MacLeod, Wakefield, MA
 W2AEG, Z. Gabriel Kassakian, Ridgefield Park, NJ
 W2AEW, Walter L. Holt, Glendora, NJ
 WB2ECS, Anton F. Blazy, Egg Harbor, NJ
 W2FG, Clarence H. Pfeifer, Upper Montclair, NJ
 K2GOS, Stephen A. Rovensky, Fair Lawn, NJ
 W2HRP, Julius F. Geitenkirchen, White Plains, NY
 W2JGY, James F. Wemmlinger, Greenlawn, NY
 K2MGH, Nicholas J. Morace, Ocean, NJ
 WB2MOH, Harold N. Schauer, Scarsdale, NY
 W2POL, Marvin S. Seimes, Wappingers Falls, NY
 WB2PPE, Michael J. Hagen, II, Waterloo, NY
 W2QZX, Joseph S. Prosman, Endicott, NY
 K2UTM, Lynwood Bradley, Pelham Manor, NY
 W2VVR, Brooks E. Faison, Buffalo, NY
 K3AO, Alfred G. de la Croix, Bethesda, MD
 K3AWD, Hobart A. Hill, Philadelphia, PA
 W3OSX, Donald G. White, State College, PA
 K3OWH, Charles V. Toth, McKeesport, PA
 WA3TSG, John W. Fulmer, Havertown, PA
 K3VNR, Bernard T. Ring, Riverdale, MD
 W4DEO, James E. Smith, Birmingham, AL
 K4EBA, Fred H. Graening, Pompano Beach, FL
 W4GZB, Merwin O. Kittle, Cooperstown, NY
 WA4JSP, Andrew M. Gent, Delray Beach, FL
 K4KUV, Phelim J. O'Neill, Columbia, SC
 W4KY, John H. Wainwright, Ft. Lauderdale, FL
 W4TNK, Leland W. Hutchison, Deltona, FL
 W5BNK, Tom H. Blackstone, Athens, TX
 W5CKQ, George Ande, Oklahoma City, OK
 W5ETT, John H. Aggers, Ponca City, OK
 WB5GBA, Thomas D. White, San Angelo, TX
 K5LTT, Ray E. Winters, San Antonio, TX
 WB5NAZ, Charles G. Lindow, Beaumont, TX
 W5OFF, Ben R. Freeman, Jackson, MS
 W5TY, Andrew E. Crockett, San Antonio, TX
 K6BB, William S. Moody, San Marino, CA
 W6GVF, Edwin G. Baumann, Canyon Country, CA
 W6HSB, John J. O'Brien, Roseville, CA
 WA6ICX, Robert C. Hird II, San Diego, CA
 W6ISI, Arnold F. Dumetz, San Francisco, CA
 W6RT, Arthur H. Smith, El Cajon, CA
 WB6WJP, James H. McCauley, Calimesa, CA
 WA7ILG, Emmett F. Brown, Jr., Phoenix, AZ
 Ex-WN7OQE/Ex-K7JVK, Charles J. Wilkerson, Ogden, UT
 WA7PUM, Eric C. Chandler, Seattle, WA
 W7TOV, Clyde E. Peters, Milwaukie, OR
 W8DXH, Floyd A. Davis, Grayling, MI
 W8EMC, James Wheeler, Iron Mountain, MI
 K8GMV, William T. Wilson, Huntington, WV
 W8QUX, William D. Noel, Maumee, OH
 WA8VIR, Oliver E. Pienkowski, Cincinnati, OH
 K9CBR, William J. Meier, Muncie, IN
 K9DHz, Robert T. Wilson, Washington, IL
 W9IHE, Cletus L. Woodard, Granite City, IL
 WN9MDW, Craig Fontechia, Homewood, IL
 W9NOK, Russell E. Manship, Hardinsburg, IN
 W9UCG, Dr. William B. Shaw, Streator, IL
 K9VSN, Harold G. Stevens, Roselle, IL
 W0DDT, Von A. Brown, Sioux City, IA
 WA0EXC, Hal Menken, Webster Groves, MO
 K0E2I, Robert J. Hanson, Adrian, MN
 W0IPN, Anthony T. Fehr, St. Paul, MN
 K0JMF, Merton Uhlig, Topeka, KS
 W0IYE, Clay Taylor, Olathe, KS
 W0KCK, Larry V. Donnelly, Omaha, NE
 W0LRD, Henry B. Ray, Denver, CO
 W0MEL, Alvin J. Swaney, Grand Junction, IA
 W0QXE, Marvin E. Gaines, Fort Madison, IA
 VE1AQS, Stanley Arthur Smith, Halifax, NS
 VE1DU, Charles MacDonald, Bathurst, NB
 VE1GK, Harry L. Johnson, Truro, NS
 VE1PZ, Robert H. Wicks, Lower Sackville, NS
 VE1RY, Capt. William H. Hawkins, Mahone Bay, NS
 VE1TH, Bernard N. Sieniewicz, Halifax, NS
 VE1TS, T. G. "Sully" Sullivan, St. John, NB
 VE6AUL, Gordon E. Clayton, Vulcan, AB
 VE6AXV, Stanley B. Wiseman, Edmonton, AB
 VE7AOR, O. A. Nelson, Penticton, BC
 VE7CA, J. B. W. Russell, Vancouver, BC
 VK3OZ, Perry Evans, Victoria, Australia
 OA4J/W2UD, Uda B. Ross, Lima, Peru
 Ex-SP9CU, Ladyslaw Jakubowski, Krakow, Poland
 W1SZB/VE1, Joseph E. Ayers, Kinkora, PE

50 Years Ago

June 1926

- The now-you-tell-me approach is taken by 9BHR in his "Of, By and For the Beginner" article. A welcome change of pace for the Old Timer and a humorous, informative account for the neophyte.
- Fear is expressed that WWV may suspend its standard frequency transmissions on the ground that the Radio

Section of the Bureau of Standards feels the work is no longer necessary. Technical Editor Kruse feels the loss of WWV would be serious. All ARRL members using the service from WWV are asked to notify the Bureau.

- Allan T. Hanscom gives readers a design for a convenient portable oscillator without battery or transformer. A first-hand account of the author's discoveries while in China results in the Taurenwerfer Beam.
- The anticipated addition to the short-wave family arrives: It's the new Grebe receiver that has been christened the CR-18. A new twist to an old friend.

□ The Arctic expeditions arouse latent pioneer spirit. *QST* readers are updated on the perilous adventures in the high Northland: The Detroit Arctic (Wilkins) Expedition, the Byrd Expedition, and the Amundsen-Ellsworth Expedition. All depend on short-wave amateurs for their contact with civilization. It looks to be a great summer, and we are there!

□ Wells and Tillyer explain the construction of a crystal controlled transmitter in which a thick crystal is used to control a low-power tube. Amplification is carried on through two low power stages operating on harmonics of the crystal oscillator.

25 Years Ago

June, 1951

- Temporary military use of the amateur 3.5-Mc band for maneuvers brings forth a call for cooperation from WIBUD.
- Board decisions dictate that a section of *QST* be devoted to YL activities. This new column will debut no later than next January.
- Aurora and magnetic storms are the

topic of scientific investigation by W2SNY of Cornell University. He probes the effect of these still bewildering phenomena on radio communications and gives us a look at some spectacular photos. Readers are asked to send propagation reports to W1HDQ at Headquarters.

□ Technical Editor Grammer outlines the method for arriving at suitable operating voltages and currents for double-sideband reduced-carrier telephony using grid modulation. A 75-meter transmitter using a pair of 807s illustrates his design.

□ "The Novice One-Tuber" by Don Mix, W1TS, gives *QST* readers construction details for a power supply to accompany the 80-meter Novice transmitter offered in May. The problems of an antenna and transmitter tuning are also discussed.

□ Dallas amateurs beset with critical TVI problems that forced them off the air adopted a positive course of action. Two Texan amateurs summarize for readers the approach that netted results. An example of strength through coordinated effort.

Correspondence

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

ANOTHER LOOK AT CB

□ The ex-CBers gone amateur, that I know, are darn good operators. They know, without a doubt, what a privilege it is to operate away from the 11-meter chaos. The potential amateurs are there; they are begging for an Elmer; it may be a long time before amateur radio again has such an opportunity to bolster its ranks so easily. — Gary R. Purcell, WBSLOZ, Lawton, OK

□ WIRU's candy-coating of the all-new CBER was just too much to believe. It is probably true that most 18-wheelers use their radios to spare them the road boredom, but few fail to take advantage of the illegal fringe benefits. I agree with all attempts to swell amateur ranks. However, I cannot believe that CB radio is as glorious a hobby as WIRU makes it out to be. — Paul J. Jones, WB9HEG, Hinsdale, IL

□ Perhaps because of the common interest, now is the time to integrate into your public service column CB happenings. One significant difference between Parts 95 and 97 is commercial use. Perhaps in the long run the FCC may have to reconsider whether it is necessary to draw a strict line. These are attitudes that can be explored and changed in the interest of better personal communications and public service. — Ray Heimberger, W8VRZ, Shaker Heights, OH

□ We already lost 11 meters. CBers have contributed nothing to the radio art. They have, however, given a big headache to the FCC and to amateurs who have to wait three months for their tickets. — William J. Ferrante, WN2AXA, Poughkeepsie, NY

□ Your editorial was, indeed, a breath of fresh air in a stuffy room of myths. Having been one of those "frustrated amateurs" I can speak with some knowledge. In CB, there are a number of potential amateurs who need only a little help from a friendly amateur. So smile and take a CBER under your wing. There may be a pleasant surprise in store for you. — Mike Meany, WN2YOF, Moorestown, NJ

□ It seems to whom? Is there not one dissenting voice in Newington? The scofflaw CBER of five years ago showed the scofflaw trucker how powerless the FCC was to enforce its regulations. Now the trucker has crowded out the CBER. So where does he run for more room? To the same place he stole his first frequency — amateur radio. — Edward Jones, WN2PVC, Somerset, NJ

□ Is there a place for the CB operator? Is there a place for the disenfranchised CBER in amateur radio? "Yes" to both questions. I applaud your attitude and your editorial. Sign me as one who has been there and now is here. — William R. Adams, WB8RZJ, Sciotoville, OH

□ Slow down, there is a hill ahead and WIRU needs to down shift before his brakes get hot. Let them ask for help; then give it. But, don't paint a pretty picture because this ain't no easy run and they can't miss a gear or they

will never top the hill. Let's keep our rpms up and don't forget to double clutch. — Norvell E. Godsie, W4AUM, Staunton, VA

□ Frankly, I don't like CB because of the extraordinary number of people playing "radio operator." But, 14 years ago I started in this hobby through 11 meters. If nothing else, the hopelessly chaotic conditions gave me the impetus to upgrade and I now hold an Advanced class license. — Bill Allen, W4ZPAU, Saratoga Springs, NY

□ Usually, I can spot the April Fool article right away. I must admit your editorial comments in QST for April, 1976, really had me going, but hopefully nobody will take that one seriously. Such dynamite as "Great! We're ready for them" and "largely be controlled." Genius — or was it? — Bill Rogers, K0ZPN, Elkhart, KS

□ Don't back down when you are right. The time has come for the amateur fraternity to stop treating CBers as second-class citizens. Rather, they should be cultivated as potential converts. Your April editorial is the first step toward a new and rewarding era, not only for the ARRL, but the entire fraternity of amateurs. — Donald L. Stoner, W6TNS/7, Mercer Island, WA

□ You are either a nut in need of a head job or a secret lobbyist for the radio and, I stress, appliance manufacturers. Are you so naive to think club members would waste their time on a bunch of nitwits who are happy doing their thing? My wish is to keep them in the hole they dug for themselves. — Charles Kleinz, W3DAJ, Rostyn, PA

THE ULTIMATE FILTER

□ With great excitement I undertook Tih Eheres super-selectivity project (QST, April, 1976) and would like to report that I met complete success in eliminating not only my cw selectivity problems, but all other QRM problems as well.

Now if Mr. Eheres could carry his design one step farther, that of eliminating local QRM in the shack; e.g., telephone calls, salesmen, TVI complaints and so on.

I am confident the Old Man himself would have been equally pleased with this remarkable project — the best thing for amateur radio since the on-off switch. Why, with my newly modified headset I am unable to hear the WCARS jammers or interference to ARRL code practice. — Stanley O. Coutant, WB6WFI, Pasadena, CA

HAMS, NEIGHBORS AND RFI

□ Congratulations to Tony Dorbuck, W1YNC, and the QST staff for the excellent "RFI Primer" (QST, March, 1976). Most appropriate are comments about the shielding adequacy in present day commercial equipment.

Commercial amateur radio manufacturers now appear to concentrate on external "eye

appeal" rather than of "weather-stripping" to make an rf-tight enclosure around harmonic generating stages. It is up to radio amateurs to reverse this trend with the help of QST. — O. W. H. Johnson, W1JY, Bristol, NH

□ All hams should write to their senators in support of Sen. Barry Goldwater's RFI bill, S. 3033. This is the Senate version of HR 7052, by Rep. Vanik. It has not gotten much publicity, but is just as important as the House bill.

Remember, only five percent of the bills in Congress actually become law. The rest die in committee because of lack of support. Write your senator and Sen. Warren Magnuson of the Senate Committee on Commerce in support of S. 3033 so we can operate in peace with our neighbors. — Nikolaus Leggett, WA3YFU, Washington, DC

FIELD DAY — BE PREPARED

□ After only two years of operating Field Day, I have come to a strong conclusion: Hams are losing sight of what Field Day is supposed to be — an emergency preparedness exercise. One often tries to pass traffic, but the other station either tells you no or doesn't want to because "it's not part of the contest."

Is this what FD was set up to be? A contest? Well, if it is, either I am misunderstanding it or it is now unimportant to pass traffic during an emergency. If this is the case, we are in bad shape if something does arise. No one will be able to handle traffic because he never had to under the conditions confronting him. When are we going to realize what Field Day really means and our responsibility to those whom we will be serving if and when a disaster hits?

Ponder a bit. — Henry G. Eveland, WB2SXD, South River, NJ

PCB DANGERS RE-EXAMINED

□ K4CFG is certainly right about PCB (poly chlorinated biphenyls) dangers (QST, April, 1976). However, the electrical industry uses two different fluids for cooling and electrical equipment insulation.

One is refined light mineral oil, commonly known as transformer oil. The other is a nonflammable, synthetic, chlorinated hydrocarbon called "askarel," the PCB referred to. This compound might be labelled "Pyranol," "Chlorotextol," "Inerteen," or other trade names and used where nonflammability is desired. It may be distinguished from regular transformer oil by its pungent odor and density greater than water unlike any oil form. The "Cantenna" has a greater cooling capability with transformer oil than the more viscous drugstore mineral oil.

I certainly would not recommend askarel for such use although it is likely to be present in most oil-filled capacitors, as noted. When a person asks for a gallon of transformer oil, he should receive oil and not the more hazardous askarels. I recommend that anybody using these compounds carefully identify the type he is using and handle it accordingly. — Robert E. Morgan, WB5AOH, Amarillo, TX

FM Repeater News

Conducted By Lew McCoy,* W1ICP/WR1ABH

Autopatch and Third-Party Traffic

We keep getting questions about the use of autopatch and third-party traffic. Should it be logged? By whom? How long should the third-party log be kept?

Simply, when an amateur accesses a repeater and activates the autopatch and makes a call, he must enter into his log a notation that includes the names of all participants and a brief description of the message content. Some amateurs will argue that FCC does not

require an amateur to keep a log while operating mobile so this means he does not have to log third-party traffic. This is incorrect. If you conduct third-party traffic, it must be logged, and the log or record must be kept for one year. Some amateurs will argue that the repeater station tape logs all autopatch calls and because of that, the amateur does not have to log the traffic. This is also incorrect. The third-party traffic *must* be

logged by the amateur initiating the traffic and the repeater station. (And both records must be kept for one year.)

Then you get the argument from the ham who accesses the autopatch, calls his wife and gives her a message. He argues that because his wife is also a ham there is no third party involved. Not so. The repeater station is an identity and he is talking to the repeater station, which in turn is talking to his wife.

KEEPING THE TROUPES LEGAL

Bob Drete, K7VOR, writes, "Did we ever come up with an idea to reduce the abuses on our autopatch. We are taping all the calls and then playing back 25 to 30 of them at every club meeting!

No calls to business offices are being permitted, just to stay on the safe side. No calls to hamburger joints either. If human welfare is involved, such as a call to a parts store for a fan belt or for a stranded motorist — that's OK, and encouraged!

If the call sounds inappropriate, the reason for the call is stated beforehand. Work for a charity can easily sound commercial, so we cover that by so stating over the air (and thus onto the tape) before completing the call.

So far, we caught two bootleggers by reading the tape back into a Touch-Tone decoder. Some trick, huh?"

FREQUENCY COORDINATOR

Duke Harrison, K2QPF, is the frequency coordinator for the Tri-State Repeater Council. This includes coordination for lower New York State and Long Island, northern New Jersey, and the entire state of Connecticut. Duke coordinates all repeater bands. His address is: MR 179, Cove Edge Rd., Oyster Bay, NY 11771. Phones: Home, 516-922-7046; work, 516-922-5108.

THINK ABOUT IT

Bob Thornburg, WB6JPI, chairman of the Southern California Repeater Assoc. writes:

"As something to think on, consider the following observations which seem to be holding here in Southern California. A ham, usually for selfish ego reasons, decides to put up an open 2-meter repeater. When first up with his buddies as his users, his ego is fed and his attitude is one of 'see what I did.' As his users increase bringing large numbers of people that don't know him and he doesn't know, the general attitude of the system changes to one of conversation with new people meeting for the first time and new cliques and friendships happening independent of the owner/trustee. Above about 100 users he must really hustle to keep up with what's going on. Above 250 users he can't keep up and over 500 no one can be involved in all that's going on, much less devote the time necessary to keep it on the air. Suddenly (at about 300 users), the ego toy is a service. The users depend on it to be there and little thought is given as to who or what is going on to keep it there. How often do you think of Alex Bell when you dial your phone? It's a service and the general attitude is that it comes with the ham ticket. If the repeater is off the air for an hour, 100 of the 300 users

gripe about it or ask, 'What happened to WR6---?' on another repeater. If it's off more than a week, the owner's a bum and totally derelict in his duty. No longer is it a toy and a significant responsibility is imposed on the owner. The maturing effect is astounding. I have seen 30-year old children turned into 25-year old adults in just a few months.

Also, the ego thing remains. When the owner breaks in, a hallowed silence follows and his traffic usually passes unbroken. If the owner mumbles something about wanting a new dingbat for the machine, he is soon swamped with dingbats from guilt-ridden users. Give them a reason and a place to send money and almost anything can happen (WR6--- raised \$1,800 in 18 days merely 'cause he mumbled something about wanting a new antenna and duplexer; WR6--- raised \$3,000 in 6 weeks for a new MICOR, etc.). But more than simple ego feeding, the owner is trapped. He doesn't want to shut it down 'cause then everybody gets mad at him. The ego drive is replaced by a different drive, more related to fear. Think about it."

AUTOPATCH GUIDELINES

The Southern California Repeater and Remote Base Assoc. (SCRRA) does the frequency coordination for the 10-, 6-, 450- and higher bands. In their recent bulletin, they laid down some guidelines for the use of autopatch that are well worth repeating here:

"The SCRRA is aware of concern on the part of regulatory agencies about the abuse of automatic amateur radio system-telephone system interconnections, specifically in the area of the use of vhf/uhf amateur autopatch stations to avoid payment of long-distance telephone tolls. The SCRRA proposes that the following guidelines concerning the use of autopatches be followed:

- 1) Base stations should not use autopatches to circumvent telephone company toll charges.
- 2) The telephone dialing area of an autopatch machine should be roughly equal to the radio access area of the machine.
- 3) Use of the autopatch should be strictly limited to calls of a non-commercial or non-business nature, as per FCC Rule 97.114(c).
- 4) Autopatch telephone calls should not be concurrently transmitted on simplex channels, except in emergencies."

JUNIOR G-MEN TAKE NOTE

WA1WVK informs us headquarters has received reports of incidents where radio amateurs took it upon themselves to pursue suspected felons, while using their mobile rigs to give position reports to the police. In one case, the suspect left the scene after his truck

ran into several cars. In another, a ham chased a kidnap suspect and his victim.

Our responsibility as hams is to be communicators, not law enforcement officers. A mobile whip gives your car the appearance of an unmarked police car, and a person who has just committed a felony may not be above taking a shot at a person he thinks is a policeman. Stick to communication, and leave the chasing to those trained and equipped to do so.

METROPOLITAN AREA NEW YORK REPEATER COUNCIL FORMED

On the 6th of December, 1975, over 100 repeater owner/operators assembled to form a council for the purpose of mutual aid, closer frequency coordination, and to provide a vehicle for the exchange of information and help in the metropolitan New York City, northern New Jersey, and southwestern Connecticut areas. Initial instigation was provided by Stan Zak, K2SJO, ARRL Hudson Division director, and by George Diehl, W2IHA, vice director. The group agreed on the need for such a council, and without further ado elected a temporary slate of officers consisting of Dave Minott, WA2EXP, president, Derwin Stevens, WA2DHA, vice president, Steve Mendelsohn, WA2DHF, secretary, and Sid Lieberman, WA2FXB, treasurer. First order of business was to draft a constitution. After lengthy discussion, it was agreed that the board of the council should have the additional input from area directors, and the group broke into caucuses divided by telephone area codes to elect a director and alternate. The elected officers and directors would form the board of the council.

At the executive board meeting on March 7th, 1976, a constitution was drafted and a band plan developed for 450 Mhz, which was circulated to the ARRL Repeater Advisory Committee, as well as the adoption of recommended interim technical standards for the machines.

The general meeting of March 20, 1976, provided a formal adoption of the constitution by the members and the temporary officers were elected to fill the first term. Also, action was taken setting up a technical and frequency coordination committee. Membership was opened to all repeater owner/operators in the tri-state area, and an associate membership to those who had filed, but not received, their WR calls yet.

The council welcomes those who would want to join, suggests those who want to find out about frequencies in the area contact Duke Harrison, K2QPF, and welcomes correspondence from other interested councils throughout the country. Requests and correspondence should go to: Tri-State Amateur Repeater Council, Box 402, Amityville, NY 11701.

*VRAC Liaison, ARRL Hq.

International Traffic: Threat to Our Existence?

Radio amateurs like to think of themselves as public-spirited people who are always ready to lend a hand to their fellowman. Indeed, history is replete with examples of lives and property being saved as a result of prompt action by hams. Within North and South America, public service communications of the kind which took place during the Guatemala earthquake emergency are responsible for much of the favorable feeling which exists toward amateur radio. But everything has its limits, and in the case of international third-party traffic, the limitations are more severe than many hams realize.

In short, the Radio Regulations of the International Telecommunication Union state that the passing of information across international boundaries by amateur radio, on behalf of anyone other than the licensed amateur operators, is *absolutely forbidden*, unless the governments concerned have agreed between themselves to permit such traffic. And even if such an agreement exists, the messages must be limited to "remarks of a personal character for which, by reason of their unimportance, recourse to the public telecommunications service is not justified." The ITU Radio Regulations carry the force of a treaty which has been signed by the U.S., Canada, and scores of other countries.

Canadian Amateurs May Handle Third-Party Traffic With:

Bolivia	Israel
Chile	Mexico
Costa Rica	Nicaragua
Dominican Republic	Peru
El Salvador	Trinidad and Tobago
Guatemala	United States
Guyana	Uruguay
Honduras	Venezuela

(as of April, 1976)

Amateurs in the U.S. and Canada handle messages rather freely, at least within their

own countries. Why are the international restrictions so severe? The answer lies in the structure of the telecommunications organizations in most countries. Unlike the U.S., most countries maintain a government monopoly on communications, both domestic and international, whether by mail, telephone, or telegraph. Many of these governments feel that to permit radio amateurs to handle messages would deprive the telecommunications services of revenue. Other governments reason that to permit unbridled non-commercial communications services from remote areas would retard the development of

U.S. Amateurs May Handle Third-Party Traffic With:

Argentina	Haiti
Bolivia	Honduras
Brazil	Israel
Canada	Jordan
Chile	Liberia
Colombia	Mexico
Costa Rica	Nicaragua
Cuba	Panama
Dominican Republic	Paraguay
Ecuador	Peru
El Salvador	Trinidad and Tobago
Greenland (XP prefixes only)	Tobago
Guatemala	Uruguay
Guyana	Venezuela
	4U1ITU, Geneva

(as of April, 1976)

commercial services into these areas. Therefore, not only do these governments object to international amateur traffic, they place similar restrictions on domestic traffic as well.

Whether or not the FCC or the DOC (in Canada) has similar objections, they must enforce the international restrictions which have been voted into the regulations by the

other ITU members. Furthermore, if we amateurs choose to ignore the wishes of other countries, we can hardly count on their support at the 1979 World Administrative Radio Conference! With this in mind, consider the following story, unfortunately a true one, which was related in a recent letter to Hq.:

"Thank you for responding to my inquiry about countries with third-party agreements with the United States. After reading this list I was in a condition of mild shock to find that [a country in Africa] was not on this list. Recently I had a contact with a station in that country who identified himself as being with an embassy there, and he asked me to run some traffic, which I did. It got me to thinking about who we have agreements with, and who we don't. Do you think I erred in handling this traffic for an embassy employee - if he was, in fact, an embassy employee?"

Unfortunately, we had to answer that it certainly was an error. Imagine what the telecommunications administrators in that country think about amateur radio when we show such disregard for their regulations! There are fewer than two dozen amateurs in the country in question, so on a percentage basis even one violator is a significant number! We shouldn't be too harsh in judging the ham on this end - he's new to amateur radio and thought he was doing a good deed - but how nice it would have been if he had been able to set the fellow in Africa straight!

If this sounds as if we're making a mountain out of a molehill, find a copy of October, 1971, *QST* and read the editorial on page 9, which explained why one African delegate voted against amateur radio at the 1971 Space Conference. Members frequently ask us what they can do to help in the WARC preparatory effort. Well, here's a good place to start! If the Amateur Radio Service is to enjoy the support of telecommunications administrators at WARC-79, it is vital that we maintain a positive image as a disciplined, responsible radio service. Strict adherence to regulations, both international and domestic, must be a cornerstone of our overall WARC strategy.

AUSTRIAN HAMS CELEBRATE 50TH YEAR. PLAN FESTIVAL.

This year marks the fiftieth anniversary of the Oesterreichischer Versuchssenderverband (OeVSV), the national society representing Austria in the International Amateur Radio Union. Austrian amateurs are celebrating at a festival from 17 to 20 June, 1976, at Kiems an der Donau (near the Wachau, Lower Austria). Sightseeing, foxhunting and other competitions, a memorial ceremony, and other activities highlight the event. Special

station OE50/3XKW will be active. Visitors from other countries will be made to feel most welcome.

Time is short, but further information may be obtained from P.O. Box 27, A-3550 Langenlois, Austria.

WAC AWARD INTEREST UP IN 1975

Interest in the Worked All Continents award, issued by the International Amateur Radio Union for contacts with the world's six inhabited continents, increased during 1975 despite generally poor propagation conditions during the year. A total of 1,658 basic WAC

awards was issued, including 760 endorsed for single-sideband, 31 for phone, 13 for slow-scan television, 6 for RTTY, 44 for 3.5 MHz, and 24 for 1.8 MHz. The total for 1974 was 1,243.

During 1975, 35 five-band WACs and one six-band WAC were issued. The 5BWAC and 6BWAC rules require all contacts to be made after January 1, 1974.

Applications for WAC awards are made to the IARU society in the applicant's country. In the U.S. and Canada, this is the ARRL. Applicants in countries where there is no IARU member-society may send their applications and supporting QSL cards to ARRL/IARU Hq.

*Assistant Secretary, ARRL



The YL Bulletin

One of the major ties that holds a club together is the bulletin. Throughout the YL clubs in this country and around the world, these bulletins range from a single-sheet newsletter advising members of club activities and announcing the coming meeting, to multipage publications of the major national and world-wide organizations.

In South Africa the *YL Beam* covers activities of the ZS and ZE gals, includes announcements of club projects, and occasionally probes into the YL history in the SAWARC. CLARA's *Clarion* reports on the work of Canadian women, while the older VE

YL bulletin, *TOT-Topics*, devotes itself to news of the members of the Ontario Trilliums and their many varied activities. Both the bimonthly *YL Harmonics* of YLRL, and YLISSB's annual *Voice*, not only include information on members in the United States, but also report the news of their global memberships.

A major project of YLRL and CLARA is the sponsorship of tape programs that record their club bulletins, summarize *QST* "YL News and Views" and present affiliate club news so that blind YLs may share their information.

Our club publications bring us news of members, activities, results of club-sponsored contests, and information on new certificates and changes in requirements. They ask for our opinions in matters of club policy, introduce new members, and announce club meetings.

The member who edits these bulletins probably works harder than any other official for she is her own reporter, editor, printer and mailing department. Each member who receives her copy on time should send a silent thank you to the very busy club editor. YL News and Views salutes these very hard-working gals.

YLISSB 1976 CONVENTION

Phyllis Shanks, W2GLB, YLISSB 1976 president, announces that the System's 1976 convention will be in Plainville, L.I., NY, at the Kings Grant Motel, June 24 through 27, 1976. As in former conventions there will be a series of forums covering the many activities of the System, presentation of awards, a banquet and luncheon, with representation from YLRL and ARRL, as well as from many other YL clubs. Reservations should go to Gordon Etherington, WZ2MXZ, 7 Liberty Lane, Holbrook, NY 11741. See you there.

ACTIVE PY YL STATIONS

PY1FI, Therezina Cardoso, custodian of the newly created "Brazilian YL Award" which was announced in *QST*, YL News and Views,

Christine Haycock, WB2YBA, 1975 president of YLRL, was presented the YLRL Past President Plaque at the NYC YLRL Meeting. Left to right, back row, WA2BAV, W2GLB, Helen (associate member) WA2RST, WA2LWG, W2EUL, W2EEO; seated W2RAO, WB2YBA, W2RIX. (WB2YBA photo)



*YL Editor. *QST*. Please send all news notes to W3WRE's home address: 305 N. Llanwellyn Ave., Glenolden, PA 19036.

May 1976, has forwarded a list of the most active YL stations in Brazil to facilitate those who are interested in BRYLA. They are: Phone, PY1BQ, PY1EN, PY1BQI, PY1DNU, PY1DVQ, PY1ETA, PY1EGJ, PY1FI, PY1MEN, PY1OM, PY1BEE, PY2JY, PY2PE, PY3AVE, PY4AKL, PY4DY, PY4MS, PY4VL, PY5ACW, PY5BZN, PY5CCY, PY5CFO, PY5XM, PY6ACL, PY6ARI, PY6BQ, PY6CG, PY6OZ, PY6WZ, PY7AL, PY7AVN, PY7BDL, PY8JO, PY9NH, PY9LQ, PT2EQI, PT2HQ; cw, PY1DUJ, PY1EUL, PY1SJ, PY2ATL, PY2DHP, PY5ACW, PY5XM, PY7CGV, PY9UC/2, PT2SV.

ATLANTIC DIVISION CONVENTION YL PLANS

The program for women at the Atlantic Division Convention, July 23, 24, 25, 1976, will be for both licensed YLs and the ladies who accompany their OMs to Philadelphia. Carolyn Currens, W3GTC, chairman, and the PJYL Club have planned a luncheon, tours of places of historical interest, a continental breakfast before the YL Forum and, as a special treat, entertainment by one of Philadelphia's famous "Mummers String Bands."

BUCKEYE BELLES OFFICERS INSTALLED

The Buckeye Belles, Ohio's state-wide club, announces the installation of the following women as officers for the coming year: president, Ella Russell, W8EBS; vice president, Shirley Rex, K8MZT; secretary, Ruth Rickett, W8LGY; treasurer, Elizabeth "Zip" Isham, K8UKM; editor, *Buckeye Burr*, Lillian Abbott, K8CKI; Buckeye Belles certificate custodian, Marge Farinet, K8ITF; custodian Buckeye Belles Memorial Station, Jean Blakesley, W88FC.

WAS YLRL CUSTODIAN

There have been a number of requests for information on the custodian of YLRL's WAS Award. The custodian is Agnes Helsinki, WA3GBJ, RD No. 4 McClain/Timms Lane, Belle Veron, PA 15012.



Carrie Lynch, WA4BVD, editor of *YL Harmonics*, receiving the YLRL Certificate of Appreciation from Marguerite Martin, K4ZZS. This award is given in recognition of Carrie's outstanding job with the giant YLRL Directory issue and as thanks for her term as editor. (WB2YBA photo)

How's DX?



Conducted By Rod Newkirk,* W9BRD

Australia on Less than One Watt!

All the way from Ohio and no solid-state to help. Counting the ancient triode's four-volt filament drain this cw stunt's total juice demand was 0.567 watt. Real state-of-the-art receiver at the Aussie end, though, as you might surmise. We hear it was a basic oscillating detector and one or two stages of audio. Can't report any superdooper antennas, either. Just handy old pieces of wire.

One thing that was plentiful in the middle '20s we don't have right now is lots of spots

under 5BG, later VK5BG. Loren has been an amateur radio newsmaker and QST author many times since. We hear he's still in Ohio enjoying the sport. This writer clinched Asia for his own WAC using W8GZ's favorite skyhook design of long ago, the Windom wire now indexed in any respectable hf antenna handbook. And still active are many other OTs who were there when all our adventurous short-wave thrills began. Happy golden DX anniversary to 'em all!

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FROM QST's DX MAILBAG

Asia: After two years of aeronautical-mobile hamming in Europe, Africa and Asia I'm back in the States for a breather. No HZ call was possible but I was allowed to second-op HZ1s SH and TA through the kindness and courtesy of Princes Faisal and Talal. Prince Faisal graciously accepts telephone calls from visiting U.S. amateurs, Jeddah 54321, and I also recommend phoning Rhiyadh 28606 where Abu Yousef Bucari is most receptive. (WB4IUT) . . . Sure appreciated QST during my seven years in VS6 and 9M2 areas. (W4DXF) . . . JY9s CS and MS, OM and XYL Mary, catch U.S.A. openings in Amman on 21-MHz ssb. (WB4FOT) . . . MADXA, Middle-Aged DXers' Association, is our new and growing organization of mature Japanese DX enthusiasts. (JA1JIO) . . . UH8DL seeks Nevada, South Dakota and Utah to meet ARRL's WAS challenge, active almost daily near 14,040 kHz at 0130 UTC. UA0BBN of Cape Chelyuskin heads for his Bicentennial WAS on the same band, usually at 0200 or so. (WB0LBI) . . . VS6FE returns to Hong Kong after a few U.K. years as G3HCL. Stan will be tuning for old cw friends. (W2TO) . . . Managed 218/201 countries worked/confirmed over a 15-month KA6DE DX career. (K5DED/0) . . . OM and XYL OD5s CS and JJ are settling down in Fresno where Varooj hopes to become a Six. (W3HNK) . . . Working fixed-portable in the Middle East is just great, almost 2000 contacts from Egypt and Golan Heights since last July. If QSLs come through I should have DXCC from each location. (VE1VE/SU/4X) . . . Ex-EP2DX should be firing up with a Turkey ticket this month or next. (W5QPX) . . . Some two hundred stations have qualified for our Cyprus Award since its inception in 1962. The first went to G3FXB in '63, and 4X4MH is the only vhf winner so far. Only two W/Ks have qualified. It's somewhat easier now with nearly a hundred licensed 5B4s. Self-addressed envelope and appropriate International Reply Coupons will bring CA details from our awards manager at P. O. Box 1267, Limassol, Cyprus. (CARS) . . . More from the orient via literature of clubs, groups and individuals: 4W1ED closed Saudi shop for return to G3XAX. . . . SB4CD, who signs SM5EII back home, expects to infest 20 cw's lower reaches for months to come. . . . CR9AJ, lately on 15 sideband with an FT400 and dipole, intends to hang on in Macao. . . . North Dakota, Rhode Island and Wyoming on 75/80 will conclude JA1IYJ's five-Band WAS quest. . . . OE6DK/YK, who relieved OEs 2SCL/YK and 5CA/YK, regularly volunteers Syria near 3795, 7050, 14,245, 21,300 or 28,550 kHz. . . . Wrangel Island is ably represented on 20 cw by

UA0KAH and UK0KAA around 0730 UTC. UK1PAA continues Franz-Josef Land output near 14,025 kHz. . . . HS0HS was a joint April bash by RAST members. . . . JT1s AO AS AT and KAA chorus M.P.R. music on 20 at 0700-1300 UTC. . . . TA2MM was G3IAD's 100th SSTV country. Ws 8YEK and 4MS have 110 and 105 slow-scan countries respectively.

AFRICA: At present ET3PG and I are the only active licensees in Ethiopia where there is little chance of additional authorizations in the near future. I'm quite QRL setting up a teletype network but occasionally operate from ET3PG. (DK5EC/ET3) . . . ZS6s DW and LK keep busy all the way down through 160 meters. Bill and XYL May are often heard QSOing North American friends on 3778 kHz around 0300 UTC. (W4OKL) . . . My FT200 and 5-element triband beam are used mostly on 14,100-14,300 kHz at 1800-1900 UTC. I'm still in need of a reliable Stateside QSL manager. (FL8KP) . . . ARRL's most recent Ten-Meter Contest proved that undernourished 28 MHz can

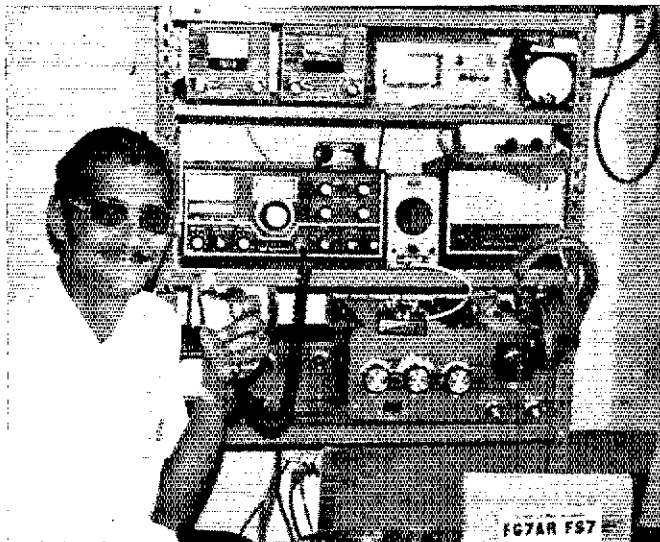
produce DX contacts when sufficient activity sets in. I worked fifty W/Ks. (9J2CL) . . . African addenda via the vine: DK1AS/5A and DJ8LP/5A supply long overdue Libyan action on 20 sideband, usually 0600-0800 UTC . . . 9Q5s DM and EP radiate Zaire on 15 ssb, the former with an FPM300 and two-element quad. 9Q5QR likes cw on 40's low edge around 0200. . . . SM4CNN of A2CNN, 7P8AH and recent 3D6 pileups should be vacationing near Milwaukee about now. . . . TR8JCV finds TN8 licensing prospects discouragingly dim. . . . WN3SHX has an Atlas going as VQ9HS with a scientific group in the St. Brandons region. . . . D2s ALB ARM and AZB keep Angola alive on 15 sideband. . . . FR7ZL may generate more Europa excitement this month. . . . K6BW of NCDXC suggests a DXpedition to Farquhar in connection with next October's total solar eclipse. If clouds move in there's still old 20 meters.

OCEANIA: New Zealand 160-meter buffs now can use 1803-1813 kHz on a trial basis. Much better for DX work than their old

For years and years KV4AA has done more than his share to keep St. Thomas on the DX map. Dick's Vesto tower is slightly visible in center left of this view of Charlotte Amalie, your QTH of the Month, snapped from the thousand-foot hill lying between KV4AA and the U.S. mainland. Despite the hurdle Dick collected some six thousand AJ3AA contacts in the first three months of our Bicentennial year.



*c/o ARRL, 225 Main St., Newington, CT 06111



FG7AR/FS7 has been offering welcomed DXCC credits in the Caribbean for several years. Alain is in no position to gripe about local line-voltage problems because he runs the St. Martin power plant. (W4GSM photo)



VP5GS (W4BRB) was a recent Turks & Caicos DXpeditionary visitor to the Third Turtle Inn, May's QTH of the Month. Here Gene rattles off another 40-meter contest string. (WA4DRU photo)

1875-kHz spot. (W1BB) . . . KX6MJ and I hold the latest Marshalls calls at this writing, both available on mic and key. KX6MJ is former OX5BW. (KX6LX-WA7TWD) . . . Pleasant visit near Melbourne with long-time DX favorites VK3s XB and KS, Ivor and wife Mavis, in February. (W9DH) . . . Wrapped up two delightful DX years on Guam last month. Now it's back to good old PA. (KG6JEU-WA3DYP) . . . After our VR1Z-VR8B venture we logged some 7500 QSOs with 113 countries as 3D2KG in January-February, dividing activity about equally between voice and code. Ten and 80 meters performed well only during the ARRL DX Contest. TU2GA, IQIJ, ZPSLX, JA7SGV, KS6FF and W7TX gave us our quickest "WAC," a 28-minute job. Already twenty kiloQSOs on our current Yasme Foundation tour with Kenwood and Heath gear - C21NI and FK0KG next. (W6s DOD KG) . . . KJ6DL should be active on Johnston for about a year on 10 through 160 with a gallon, tribander and various lower-frequency wires. Oscar also is on Marv's DX agenda. (WB5HVV) . . . More Pacificana, courtesy the DX press: LZQP/mm, two intrepid Bulgarians en route Fiji from Peru in unkeeled sailboat *Dju V*, appear on 14,073 and 14,273 kHz at 1800-1830 UTC for schedules. Should take Julia and Doncho about four months to make it. . . . ZL4NH is an avid collector of telegraph keys, all shapes and sizes. . . . WB7ABK notched 1600 ZK2AQ contacts, then 2750 A35NN QSOs before heading toward VK9X-land in April. W4BPD intends to join Bill in Asiatic DXpeditionary endeavors.

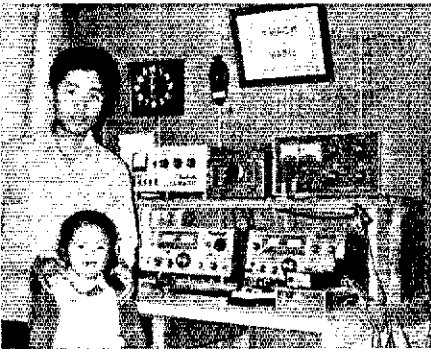
EUROPE: Radioteletypists W3EKT, Ks 6WZ SIDE and VE2JR were high North American scorers in that order among participants in our '75 WAE RTTY Contest. IIPYS, WA3JTC/ZPS, VK2SG and ZS6BFN were other continental highs. WIMK led the world-wide multiop contingent. (IARC) . . . West Germany's DARC aided in obtaining operating authorization for 364 reciprocals last year, 39 W/Ks among them. (W5QPK) . . . After a two-year layoff OY7JD aims Statesward again with a fresh TR4C on 20. (W3HNK) . . . Sorta figured my 3A0GY cw work on 40 last month would tickle 5BDXCC aspirants. (WB2EZG) . . . I've added 14,220 kHz to my usual 14,305-kHz hangout, working Stateside steadily at 1600-2000 UTC. May try more QSOs from a portable QTH on Thera in the Cyclades. (SV0WZ-WB4IRD) . . . In August I plan an extensive cw-only visit to Monaco, 3A0 call as yet unknown. (I2ZGA) . . . I particularly enjoy meeting fellow hams throughout the world via radiotelegraphy. The key is much more challenging to me than the mic and I think it's important

for radio amateurs to keep aware of cw's basic supremacy as our best weak-signal heavy-interference communications mode. Started out on 14 MHz in '59 with an indoor dipole and homemade QRP. Now I prefer 40 and 80 with a TSS15. (OH2BN) . . . HB0XAA, Wiesbaden ARC's DXpedition to Liechtenstein, will be active on 160 through 2 meters well into this month, according to DA1DM-WB5KEA. (K5CM) . . . Interesting long-path 7-MHz work with W7IWY beginning last November with Vee beams on both ends. K6AQV and W6MBA also participate. (F8ZF courtesy W1HDQ) . . . GW3NWS, scene of successful test efforts by our Gwent Contest Group, suffered devastating antenna damage in 100-mph winds. (GW4BLE) . . . Write HAIKSA for Pannonia Award rules, a certification based on specified QSOs with Hungarian stations since 1965. (HA1SD) . . . Really enjoyed thirty months as SV0WJJ. Now to cajole QSLs from the 186 countries worked. (WA2AMY) . . . GB2ATG of BARTG transmits RTTY DX bulletins at noon UTC Sundays on 3590 kHz with 170-hertz shift. (DXNS)

SOUTH AMERICA: CE3AOX, Chilean Amateur Youth Association club station, radiates ham news bulletins at 1900 UTC each Saturday on 7150-kHz ssb, also at 1800 the second Saturday of each month on 14,200. Some fifty member hams are engaging in code courses, expeditions, emergency drills, etc. (CAYA) . . . After numerous contacts with PY8ZAK who works with the Wycliffe Bible Translators in Brazilian jungles, I was happy to have Glen drop into the shack for an eyeball QSO. (VE3GCO) . . . Enjoyed visits with YV5ANS, PY1s BLN and YP on recent travels southward. I found 3775-3800 kHz good for a DXCC's worth of ssb countries in the past year. (WIUF) . . . Outstanding 28-MHz QRP sideband signals from OA8V (two watts) and PZ1AE (ten). (K2YFF) . . . 'Tis said that PY1DB is certified at a code speed of 65 wpm for an hour or so. (RSARS) . . . Fine holiday visit by 8R1CB, one of my QSL managerial clients who provides "first Guyana" for so many. (W2MIG) . . . VP8OB has been contributing South Georgia at 0900 UTC on 14,300 kHz. (WCDXB) . . . PY7PO surmounted techie line voltages to score six kiloQSOs from Fernando de Noronha as PY0PO in March. (DXNS)

NORTH AMERICA: W4QCW, bearing down hard on 160 lately, is only about a dozen countries short of Six-Band DXCC. VR1AA, ZL2BT and 9H1AV were new ones for Bob. (DXNS) . . . Your April Novice notes I found most interesting. Caught VQ9R and

SV0WEE on 21 MHz with my HW16 and 15-foot-high dipole in March. (WN2CMX) . . . Any chance for a sked with elusive Alaska? (WB2FIG) . . . After two years in Tennessee I'm 104/84 on ninety watts and dipoles. DX is much easier here than from my old Colorado QTH, especially for Europe and the Caribbean. (K4KCK) . . . Static is 80-meter king in Bermuda but I've eked out QSOs with WH6s INE IOP and IOZ on the band, also VK3s BZ MA OP XV, ZLs 1FF 1PQ 1VD 2OM 2SA 4AV and 4ML. Russian marine QRM blankets this area with key clicks, parasites, etc. (K4BR/VP9) . . . Inquiries to my address are welcomed regarding this year's New England DXCC Banquet scheduled for October 2, 1976, at Waltham's Holiday Inn. (W1JFL) . . . Glad to find me some new ones on 40 cw during the ARRL DX Test. March was a pretty good multiband DX month in old St. Louis. (WB0NOU) . . . Third Turtle Inn's tun facilities and outstanding cuisine tended to subtract from my VP5GS DX score. (W4BRB) . . . Following DXCC memberships as W4GSM, DL4GS, PJ5MO, FP8CQ, VP2s MAH and EEA I hope to snatch No. 7 as an FS7 this fall. (W4GSM) . . . Wish more could have been accomplished during my five years with ARRL's DX Advisory Committee. I still enjoy DX from Wisconsin or Florida depending on the season. (W9NN) . . . Now it's back to Holland and retirement after fine DXing in Nicaragua. Watch for a new and very active cw PAQ! (YN9JMP) . . . Raised 28 countries on 75 meters as a moving mobile last season. A center-loaded whip does the job. (WA2EAI) . . . Thirteen more 80-meter QSLs will clinch my Five-Band DXCC. (W1OR) . . . VF3MJ of VX9A-VY0A was featured speaker at a recent Arkansas DX Association meeting. WA5VDH, K9OTB and WASYMW are this year's ADXA president, veep and secretary-treasurer. (WA1STN) . . . An HW16, converted per last November's QST, digs up plenty of multiband DX. Plan to add a full-wave 7-MHz loop and 80-meter dipole to my Missouri antenna farm. I also keep busy as president of University of Missouri ARC at Rolla, W0EEE. (WB0GRJ) . . . Bands are in punk DX shape but I catch a few on 40 cw between schedules with my dad, K4KOM. (W5VE) . . . I'm looking forward to at least a year as VP5DF on Grand Turk after DX-intensive C6ADF sport. Also applied for an Antigua ticket. (K4VMA) . . . WAS at last - now for my last few DXCC QSLs. (WA1UAW) . . . I suggest the traditional "73" ham signal be modified to "76" for our Bicentennial year. (WNBVNW) . . . If all goes well VE3s BGX EGS and I will be concluding a St. Paul DXpedition early this month. (VE3GUJ) . . . Hams outside the contiguous



JA7NI, shown with his junior operatrix, is in the forefront of Asia's massive 160-meter DX boom with WAC and 32 countries on the band. Other high Japanese top-band country totals include JAs 7AO with 37, 3ONB 34, 2UEO 34, 2GQO 32, 3AA 30 and 5DQH. 27. (W1BB photo)

48 United States are invited to qualify for Northern California DX Club's special '76 Bicentennial California Award, details available from W6UZ.X. (NCDXC) . . . With very little prior contest experience WA8SEV and I managed some 4300 contacts as VP2MEV on a single ARRL DX Test weekend. Irene then invaded St. Lucia as VP2LCJ. (WB9IWN) . . . Yes, there certainly seems to be lots of confusion surrounding the present sunspot situation. Just where are we? (W7HPI) . . . Grabbed ZL2GH on 15 in March. Now for Asia, Africa and WAC! (WN4NDO) . . . With DX so spotty on higher frequencies I'm hitting 160 pretty hard, 20 countries so far. Our Michigan DX Association has grown to 32 members. (WA8TDY) . . . Bicentennial WAS seems to be bringing rarer states out of the woodwork. Never heard so many signals from Idaho, Montana, Utah, etc. (YN1s KG RWG) . . . Departed CX6CT in favor of Salvador where my first Argonaut QRP contact was OASV. (YS1WLE) . . . Winter's minus-20s weather was a far cry from the balmy breezes at my old HSIADQ QTH. (W0OC/KL7) . . . Now up to 91/74 on my little six-watter. (W1WJ) . . . UJ8AH made it 235 countries confirmed on 80, long after I had given up on QSLing a QSO with UJ8AC in '66. (W1SWX) . . . I work sideband on 10 through 80, mostly around 14,200 kHz. It's my policy to ignore excessively long calls. (6Y5HJ) . . . Flattening conditions sure bring out the linears on 20 and 40 along with persistent phonies signing weird prefixes. Eighty cw turns up occasional goodies. (VE3CUI) . . . WB2LOF milked 28 MHz for 35 countries in little more than an hour of ARRL Test action. (WCDXB) . . . Mark your shack calendar for DXPO-76, a gala DX happening slated for September 25-26, 1976, near the nation's capital. Attendance information is available through WA3NGS. (National Capitol DX Association) . . . For a substantial share of its monthly material "How's" gladly credits Canadian DX Association Long Skip (VE1AL/3), Columbus Amateur Radio Association CARAScope (W8ZCQ), DX News-Sheet (G. Watts, 62 Belmore rd., Norwich, NR7 OPU, England), International Short Wave League Monitor (E. Chilvers, 1 Grove rd., Lydney, Glos., GL15 5JE, England), Japan DX Radio Club Bulletin (JA3KWI-JR3BHW), Long Island DX Association Bulletin (WA2RJZ), Newark News Radio Club Bulletin (M. Witkowski, Rt. 6, Box 255,

Strays

Of interest to sunspot watchers, *Our Sun*, by Donald Menzel, W1JEX, of the Harvard Observatory, is still among the best sellers in this field. Any amateur interested in the relationship of sunspots and propagation

DX Century Club Awards

Administered by R. L. White, W1CW

The following listings show DXCC Awards issued by Headquarters during the period from March 1, through March 31, 1976.

New Members

CW/F

257 K3GYD	PA0MAR WA1UAD	JH1DVZ K9KGA	105 K4TYU WB9KLB	102 C31GN VE3DJF	YU3ZY DK3QY	W0LS 100 K4IPO	VE6KY W1HGT W1LF
231 ZP5AL	113 YU3CY	109 JA0JR	104 WB4LWA	W2JBG WA3OSJ	OE2BZL SM7BPM	K6WZ K6YYQ	WB2S2S WA4CTA
141 OH1KF	112 VE4UM	108 YU5XSX	WB9EQP WB9NIB	WB4EOW	WB9JOV	VE2BLW VE3HGM	WA4HDD WB0HOG
114	110						

Radiotelephone

190 W4UL	145 ZP5AO	16EFP 111	108 A9XBD	107 WA1UAD	106 9K2DR	P29EM WA9ZKN	JA11Z 100
153 W1GKN	126	IS0NZA	K9KEV	WB9JVP	103	101	WA4HDD

CW

120 W9BG	DL8AN 105	104 W9SZR/3	YU2RTW 101	JA8AA JR1NRP	K2TQC YV4AGP	100 DK5AD	K9WEH W9LNM WB9LHI
107	OZ1LO						

5BDXCC

#478 DL8FL	#479 SM5AWO	#480 K2SHZ	#481 I3ASE	#482 I1ASM	#483 W1ZW	#484 ZP5AL
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Endorsements

In the endorsement listing shown, totals from 120 through the 240 level are given in increments of 20, for 250 through 300 in increments of 10, and above 300 in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

CW/F

355 W9LNM	W1FTX 320	W7LZF 290	JA3EMU K5YMY	220 I0ZG	JA1TNV K6AG	K6QHC K9HQM	G3RYV K1RQF
350 W9FKC	JA1GC K8QHS	OH2SF WA9VOL	PY2DBU VE3MZ	IT9WGI K5ETA	OE3EVA SM6VY	SM7ABL W1JAA	K4SV WB2FYS
345 W5FFW	W2AEX 315	280 K3OTY	W3TVB WA6FTM	K5KLA W3TVB	VE5CJ W4FLA	WB5IYB WA6TLA	W4NZR
340 W5QK	W2AEX 315	280 K3OTY	W91T W9VBV	K5YUR W2QXA	W4LPX WB4TUP	160 DJ2YE	120 K4KFH
330 JA1BN	W3CRE W9ABA	260 K6K5	240 K4TBN	WA3DMH W7AWH	WB8FOS W9JOE	W6HJ W9JAE	WB2QCF W4TYZ
325 W6GNA	W5NBI W5ZWX	250 F8OP	W1WQC/4 W5TWI	WB9BGJ YU2RTW	200 JA1QXY	180 K6BAZ	WB4MAI WA6DEI
							W6JOT WA6DEI W9NGA WB9DDR

Radiotelephone

340 W9LNM	PY3APH 305	VE7WJ W6OBH	260 W2GA	W1WQC/4 W5TWI	DK5AD VE3FJE	G4DJC K6EDA	K6BAZ K9HLW
320 K5QHS	JA1BN W3CRE	280 JA1GC	WA2EJS	220 I0ZG	W4GKF W6BWG	K9HQM OZ5EM	VE3DU
315 W6CCB	300 IT9SEZ	270 DL9VS	W7LZF	HC2TV K4UAS	180 WA1EUO	SM7ABL WA1SSH	120 K0UBP
310 W6PFS	290 OE3WWB	240 K4FJC	240 K4FJC	WB9BGJ K5YMY	200	W47UVO ZP5RS	W2AND W4UW
	OZ6RT	WB5DJA			160	140	WA4OTA WB8HLI

CW

160 OZ1VY	140 K6VY	120 K9KEV
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Correction: In QST for February, 1976, JA1EMK was listed as a New CW DXCC Member; his call should have been JA1EMX.

Stevens Point, Wisconsin, 54481), Northern California DX Club DXer (VE3DXV/W6), North Florida DX Association News (WA4UFW), Southern California DX Club

Bulletin (WA6KZI), VERON's DXpress (PA0TO), West Coast DX Bulletin (WA6AUD) and Western Washington DX Club Totem Tabloid.

QST

should become acquainted with this book.

I would like to get in touch with . . .

anyone interested in converting old CB gear and getting on ten mobile. David P. Weik, WA7PDW, 2637 West Ocaso Circle, Mesa, AZ 85202.

other amateurs who collect beer cans or who are members of the B.C.C.A. John

Pilson, B.C.C.A. No. 3718, WN1UZK, Box 27, Saundertown, RI 02874.

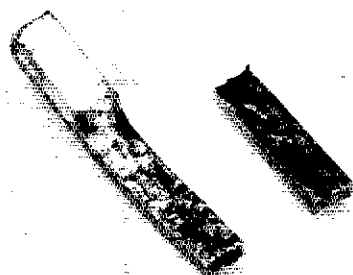
a U.S. ham who is a specialist in applied linguistics (mathematical methods on linguistics, terminology, statistical comparison of American and Russian technical terminology, retrieval systems). Languages: Russian and English. Serge P. Kushneruk, Subscribe Box 34, Tuyen, U.S.S.R.

5-Band DXCC

Awards issued January 1, 1969 — March 31, 1976.

1 1 W4QCW 2 DL7AA 3 W1EVT 4 W8GZ 5 W8BT 6 W4IC 7 W1AX 8 W4BRB 9 K2BZT	61 EA4JL 62 VO1FB 63 W2FR 64 W3NU 65 W7MB 66 VE2NV 67 W2HH 68 W9BZW 69 W3KT	121 OK1MP 122 W6DZZ 123 W3WPG 124 VK6HD 125 W3WJD 126 W2LWI 127 W6MAR 128 W3MWC 129 G3TXF	182 CT1UE 183 DL1JW 184 W1FTX 185 K2BK 186 W2PN 187 W1AA 188 K1KNQ 189 EP2DX	243 PA0INA 244 KZ5JF 245 W0EXD/4 246 KP4DLW 247 YO3AC 248 CT1MK 249 V56DO	304 K4THA 305 CE8AA 306 HB9KB 307 W2AO 308 W3GRS 309 I4ZSQ	365 W9VNE 366 SM6CVX 367 W0IS 368 GM3CFS 369 VP2AAA	425 JA1JRK 426 K4CFB 427 K5GDH 428 W6TCQ 429 W9DWQ
10 10 LA7Y 11 W4AQW 12 OH2YV 13 K4HXF 14 K6KA 15 W6NJU 16 W3MFW 17 W4GK 18 W2PV 19 I1AMU	70 70 W6EJJ 71 W3NZ 72 W4DQ5 73 DL7HZ 74 K4BVD/6 75 K4CIA 76 F9RM 77 K2BKU 78 W7SFA 79 K4IEK	130 130 K3LGJ 131 W9JT 132 IT1ZGY 133 K1KDP 134 VE7BDJ 135 W3HGV 136 W4SSU 137 K8UDJ 138 W3CRE 139 W4CRW	190 190 K5PFL 191 W8QXQ 192 W2CUC 193 K6SDR 194 W5RUB 195 W3QOR 196 W0GNX 197 W8DCH 198 WA4LDM 199 F2IU	250 250 W2YY 251 SM6CKS 252 W2GUH 253 DK1FW 254 W5SBX 255 W9LT 256 WA4DRU 257 PZ1CU 258 SP3DOI 259 WA2HSU	310 310 K6WR 311 JA3UI 312 YU2HDE 313 DJ0YD 314 WA5VDH 315 W2FPM 316 W7QK 317 W4HOS 318 SM6CKU 319 OK2BOB	370 370 W3JXH 371 W2DXX 372 G2TA 373 K4ELK 374 I1BGJ 375 YU2BHI 376 W9DD 377 DK5PR 378 WA8ZDF 379 K4OD	430 430 W9QLD 431 W4QAW 432 W9OHH 433 F9Y Z 434 DK9WB 435 K4CYU 436 DJ0JY 437 OZ7HT 438 I2PHN 439 W4EEE
20 20 I1ZY 21 K3JH 22 HB9J 23 DL9OH 24 W8JIN 25 HK3WO 26 W6ANN 27 W9HUZ 28 W2NQ 29 DL3RK	80 80 W6WX 81 K4DJC 82 K4EZ 83 W4ZXI 84 F3AT 85 W2TP 86 DL7PR 87 W5WZQ 88 W2FXA 89 W8BDO	140 140 W2APU 141 UQ2AO 142 VE3KZ 143 EP2TW 144 DL1RK 145 PZ1AH 146 W9RER 147 DL7HU 148 WA3IUJ 149 W6CN	200 200 W1CT 201 VE1AJH 202 W4NJF 203 DL1MD 204 YV1KZ 205 W4WSF 206 OZ5DX 207 G3UML 208 DL0WW 209 HR1KAS	260 260 OZ8KR 261 W9WYB 262 K1ZND 263 WB2IEC 264 W9CH 265 YU1BCD 266 W9SFR 267 W8VHY 268 WA2BLV 269 K1NOL	320 320 W4HHN 321 G13OQR 322 OZ6MI 323 W9L KJ 324 WA5RXT 325 W4WRY 326 DL8NU 327 VK2EO 328 F9MD 329 G3KMO	380 380 W9ZTD 381 EA8CR 382 K4BBK 383 DL7OK 384 K5ABV 385 W5UR 386 W2UJKP 387 YU2CBM 388 W5UDK 389 OE1ZGA	440 440 WA6JVD 441 DK5EZ 442 W6RKP 443 K9PQG 444 DJ4AX 445 K4KJN 446 DJ85W 447 WA4FDR 448 YV4AGP 449 G3HTA
30 30 SM0AJU 31 OZ1LO 32 I1KDB 33 W9BGX 34 ZL3GQ 35 G3HCT 36 K4ZCP 37 W1WQC 38 OK1ADM 39 KV4FZ	90 90 K4JC 91 LX1BW 92 SM5BHW 93 SM3BIZ 94 VE7ZM 95 W5FL 96 WA2IZ5 97 K4II 98 W3TV 99 W4SYL	150 150 K1AGB 151 K4BBF 152 W2HO 153 ZS5LB 154 OK2DB 155 W1FZ 156 W4REZ 157 DL6EN 158 W0NGJ 159 EA6BN	210 210 PY2FIQ 211 XE1J 212 JA1MCU 213 W6VD 214 OK1ADP 215 OH3Y1 216 VE3CDP/W9 217 DM2DTO 218 VP9BK 219 I6FLD	270 270 SM0CCE 271 DL1KB 272 DL6QX 273 W9HJ 274 WA2IDM 275 YU1EXY 276 W4MCM 277 I5FLN 278 YU2NFJ 279 W3NB	330 330 K4UAS 331 OE1CP 332 W4QQN 333 SM7CMC 334 K1LBB 335 K1VTM 336 W2LV 337 W8PAH 338 W0GYH 339 OK1FF	390 390 DJ0UP 391 PJ2VD 392 WB2AMO 393 HC2TV 394 HK0BKK 395 K8IFF 396 G2BOZ 397 WA6AHF 398 4X4NJ 399 WB8EUN	450 450 W5GTW 451 OEGMKG 452 CR4BC 453 DK5WL 454 KZ5JM 455 ON5KD 456 K9WEH 457 K6GA 458 WA0CPX 459 W8LBM
40 40 YV4UA 41 DJ7ZG 42 G3FKM 43 W6JKR 44 LA7TH 45 XE1KS 46 LA9AD 47 WA6GLD 48 CT1BH 49 W2QD	100 100 YU3EY 101 VO1AW 102 YV5BPG 103 W3AZD 104 OK2RZ 105 I1AA 106 G3KDB 107 KP4CL 108 LA5HE 109 W7SGN	160 160 W2PDB 161 K4CEF 162 CT2AK 163 W1BIH 164 F2MO 165 K6HN 166 W4BFR 167 W3WGH 168 K1HSN 169 K2TQC	220 220 WA2FCA 221 DJ2BW 222 K4KQ 223 K4MQG 224 KIOME 225 HB9AHA 226 EL2CB 227 OA8V 228 K1LPL/3 229 SM5EXE	280 280 JA2AAG 281 K6SSN 282 K4YFQ 283 DK3PO 284 K6RM 285 W9JA 286 YU4EBL 287 I8YRK 288 VE2WA 289 DL8LH	340 340 W8UM 341 CR4BS 342 W8II 343 W8JW 344 OZ6RT 345 WA8NYB 346 W2MB 347 W9KYZ 348 PA0LOU 349 YO2BB	400 400 K9YXA 401 W5PD 402 DL7PH 403 WA1SSH 404 K8MFO 405 DJ4PI 406 W9DY 407 KH5RS 408 WA6MWG 409 WA9IVL	460 460 LUBAJG 461 I1UW 462 F2VX 463 9L1JT 464 W1WQC/4 465 DL3VX 466 KZGIL 467 OZ7JZ 468 W48AA 469 UK2PAF
50 50 W2SSC 51 W2JVU 52 OE1NY 53 OZ3SK 54 W6AM 55 DK2BI 56 DL7EN 57 DL1CF 58 W2DCA 59 HP1JC	110 110 WB2YQH 111 OZ3Y 112 DL8PC 113 EP2BQ 114 PA0XPQ 115 W9XGL 116 DJ7CX 117 W3ZUH 118 G3NLY 119 6W8DY	170 170 W1GL 171 K8YBU 172 DK1YK 173 K4PUZ 174 DL7NJ 175 DJ6RX 176 YU3OV 177 W3AXW 178 VE3AAZ 179 OZ3PO	230 230 PY3APH 231 W2HUG 232 I0JX 233 WB6UDC 234 OH1VA 235 W9KS 236 W2ZZ 237 W6ISQ 238 YU2DX 239 W5KC	290 290 K6VX 291 UW9AF 292 DM2BJD 293 SM4CAN 294 G3TJW 295 DK4TP 296 WA3ATX 297 OK1AWZ 298 W4UQ 299 PJ2CW	350 350 W8FAW 351 W9MAF 352 W1FJJ 353 K8DYZ 354 WA5ZWC 355 WA4LCO 356 W5KJG 357 DJ3HJ 358 K4FN 359 W9AG	410 410 JA1GTF 411 CP1EU 412 G3RUV 413 JA1NEC 414 W7YTN 415 SM5CMP 416 K4KQB 417 SM6CWK 418 W3YSH 419 K8HBN	470 470 W0AO 471 WA6KZI 472 SM2EKM 473 W1VV 474 F5VU 475 K4TIG 476 G3ZBA 477 VE3BMB 478 DL8FL 479 SM5AWO
60 60 W2YT	120 120 K2KTK	180 180 W6DQX 181 W9EXE	240 240 W3YIK 241 VK6CT 242 WA2EAH	300 300 DL9DY 301 EA4LH 302 W2BXA 303 W3GL	360 360 SM5CBN 361 SM5CAK 362 G2MI 363 K4MPE 364 W5KFL	420 420 DK3HL 421 K2BT 422 YU2BQR 423 WA4BQY 424 W1NU	480 480 K2SHZ 481 I3ASE 482 I1ASM 483 W1ZW 484 ZP5AL

Strays



□ You think you have problems. As the antennas get bigger and higher, the wind forces get larger. This was the key that locked the drive gear to the shaft of a large commercial rotator. After the winds had subsided, it was determined that the applied torque had sheared the key. This was from your average contest station installation, a 3-element 40-meter beam 180 feet high at W2PV.

□ Paul Fish, K6CYP, (right) accepts congratulations from Fred Kullitz, WB6EJG, president of the San Fernando Valley Radio Club. The occasion was to honor K6CYP for his week-long round-the-clock emergency communications duties during the initial week of the Guatemalan disaster. Since retiring in 1975, Paul has run phone patches at his Van Nuys station from the many portions of South and Central America where amateur radio is the sole outside communications source.



The World Above 50 MHz

Conducted By
William A. Tynan,* W3KMV



The Specter of HIRAN

On March 16 the FCC approved use of the 420- to 450-MHz band by HIRAN, a pulse-ranging radar navigation system, despite vigorous objections by the League, a number of radio clubs and many individual amateurs. The principal application of HIRAN is for position location in connection with off-shore exploration for oil and gas. The FCC order states that the use of our 70-cm band for HIRAN is to be temporary and that the service is to move to the 2900-3700 MHz band by 1981. If this move really occurs, it might be one thing, but we have all witnessed examples of temporary measures becoming permanent.

The Commission's order further specifies that HIRAN is to be a service secondary to the Amateur Radio Service; that is, it must accept whatever interference it may receive from us and, even more important, it must *not* interfere with our operations. If it does, corrective action is to be taken by the HIRAN operator. It is essential, therefore, that we report all *valid* cases of interference which we have reason to believe are caused by HIRAN operations. Such interference complaints should go to the Engineer-in-Charge of the local FCC district in which the interference is received, unless it is known that it originated in another district. The address of each district office can be found in the *License*

Manual. Copies should also be sent to the Office of the Chief Engineer in Washington and to League Headquarters so that a compilation of HIRAN interference cases can be assembled.

What should we look for in trying to determine whether or not interference we encounter is HIRAN-caused? First, the system is to be used over water. Thus, it would seem that coastal areas would be more likely to be subject to interference than would inland sections. Antennas, directed out to sea, should help also. Of course, extended range propagation can be expected to widen the area of interference at times. The Mode-B transponder of Oscar 7 is also a possible recipient of HIRAN interference. HIRAN is a pulse system with a PRF of 931 Hz and a pulse width of 0.75 microsecond. Transmitted power is up to 12 kW. Two land stations with elevated directive antennas are used with a group of mobile stations which may be on boats or in aircraft flying at altitudes of up to 10,000 feet. Pulses transmitted by the fixed stations are *returned* by the mobile stations. Each station in the system operates on a different 9-MHz wide channel so a substantial portion of the 420- to 450-MHz band could be affected.

We must remember that we share the

70-cm band with government radars. In this case, we are the secondary service. So we can't assume that anything we hear that sounds like a radar is HIRAN. Having suffered considerable interference, most of those who have some experience on 70 cm know the characteristics of the government radars which already inhabit the band. They will probably be able to distinguish readily between these radars and HIRAN, once they hear our new fellow band occupant. Any interference complaints which we do submit should be as complete as possible giving full details as to time, beam headings, polarization, modulation characteristics, signal strength, etc.

Just how much interference HIRAN will cause to the various modes of operation which are popular on our 70-cm band is not yet known, but indications hint that it may be significant. Those commercial companies pushing the use of the navigation system in our band have told FCC that *no* interference should result to amateurs as a result of HIRAN operation. If this should prove not to be the case, let's see to it that we let the proper authorities know about it, loud and often. Otherwise, in the years to come, we will probably be living with HIRAN, and who knows what else, on 70 cm and possibly other bands as well.

AMATEUR RADIO ASTRONOMY

Radio astronomy is a subject which should be of interest to many amateurs, particularly vhf-ers. In fact, it was a radio amateur who is credited as being the father of the science of radio astronomy. Grote Reber, W9GFZ, working in his backyard in Wheaton, IL, in the late 30s, constructed equipment specifically intended for receiving signals from extra-terrestrial radio sources. Now, 40 years later, radio astronomy is catching the attention of both licensed radio amateurs and others. To serve this interest group, a new publication, the *Radio Observer*, is being published quarterly by the Peterson Press, 657 Circle Dr., Santa Barbara, CA 93108. The subscription price is \$3.00 per year in the U.S. and Canada, and \$4.00 elsewhere. The current issue contains several interesting articles including one by two British amateur astronomers on tracking the plasma emitted by solar bursts and calculating its velocity. Another describes a detector/integrator circuit. A regular feature is a solar-flux calendar. The *Radio Observer* should provide a fine forum where amateurs interested in radio astronomy can share their ideas and results and where newcomers can obtain help in getting started in this exciting and worthwhile facet of our hobby.

Illustrative of what licensed radio amateurs are accomplishing in radio astronomy today, W3GYK passes along information on the work of Ken Sheers, WA3VZW. This Columbia, MD, high school student recently won top prize in the physical sciences category in the 21st annual Baltimore Science Fair at Johns Hopkins University. His entry

was entitled "Jovian Decametric Radiation" and involved the use of a homebrew beam built to intercept rf energy emitted by the planet Jupiter.

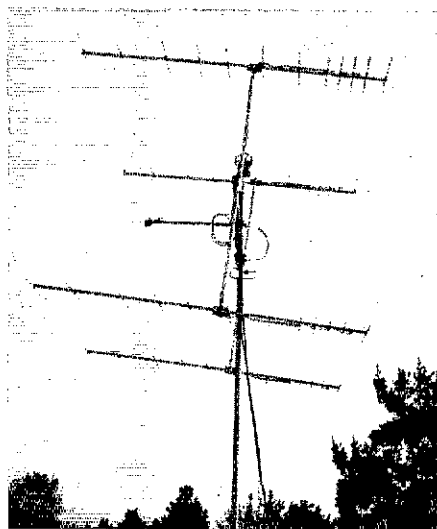
ON THE BANDS

6 Meters — Except for the aurora at the end of March, our lowest frequency vhf band was



Wyn, ZK1DX, makes operating more exciting for a number of the Oscar 2 to 10 gang.

*Send reports to Bill Tynan, W3KMV, Box 117, Burtonsville, MD 20730 or call 301-384-6736 and record your message.



WA6UAM believes that this shot of his 2-meter EME array demonstrates that success at 144-MHz moonbounce does not require monstrous antennas. Paul uses four 12-element KLMs. Note the simple elevation mechanism.

practically devoid of anything but normal range propagation during March and the first half of April. An example of what aurora can produce is provided by WA7VLY of Port Ludlow, WA, near Seattle. Jim notes that, while the aurora of March 31/April 1 was in progress, he had a fast exchange with K2CBA near Troy, NY, on what sounded like E_s. There are numerous examples of long-haul 1⁹ signals occurring during auroras as witness the many 10-meter contacts which occurred between North America and Europe during the Jan. 10 sessions. More conventional aurora contacts with stations in Washington, Oregon and Idaho were also reported by WA7VLY. Another buzz-mode report from the Pacific Northwest is filed by K7ZCB of Boring, OR. Dave observed fluttery signals on WWV's 5-MHz transmissions on the evening of March 31 and started calling CQ on 6 meters. Beginning at 0430 UTC, he was rewarded with contacts with WA7VLY, WA7RIB, K7CAI, K7QFW, W7KFS and W7DBR all WA. W7DBR was running only one watt at the time. Other stations worked were W7JLH near Roseburg, OR, K6RNO, WB6KAF, W6YKM/6 and VE7BLE. From Smith Center, KS, an OVS report filed by WA6TRO lists 3 Minnesota stations, WB0RFM, WA0QPA and K0DBK, along with 2 Wisconsin stations, WA9DOT and WA9KVS, as being worked during the same aurora. A few days earlier on March 26 at about 0420 UTC, WA1VAI of South Portland, ME, found aurora to be outstanding with numerous good ssb signals on 6 meters, but no cw activity. Stations worked included WA1VUW CT, K2PXF, WA2ZBG and WA2ZGA NY, WA3EM PA, K9ERG IL and WA9KYS and WB9QQN WI.

Be on the lookout for some DX from Newfoundland this season. A letter from VO1MO tells us that he is on 6 meters with an SB 110 as well as 60 watts of fm on 52.525. Bill says that he was on the band 25 years ago and thought that it was time to give it another try. Watch for a big signal from the other end of the country. W6KQG's OVS report tells of having a Johnson 6N2 Thunderbolt operating into a 6-over-6 at 97 feet. The same final feeds four, 14-element arrays at 80 feet for 2 meters. Bruce also tells us that WA6STS is established in a new QTH and expects to fire up on all bands from 6 meters through 23 cm soon.

K7ICW informs us that he has learned via a 20-meter QSO with W8CNL that a group from northern Michigan is contemplating a DXpedition to VE8 this summer. Plans include 600 watts out on 6 as well as Oscar 2 to 10 operation. From far-off Guam, K2IRT fills us in on activity in that part of the world.

Two-Meter Standing

Figures are states, call areas and best DX in miles.

K1WHS	39	10	10749	WB5BKY	29	9	1407
WA1FFO	39	10	2624	W5SXD	25	6	1265
K1JHT	37	9	2616	W6PO	32	10	8000
K1ABR	35	8	1478	K6QEH	18	7	5500
W1AZK	34	8	1412	W6KLO	18	5	1326
WA1OUB	30	8	1825	W6WSQ	16	4	1300
K1UGQ	30	8	1370	K6HRA	13	4	2580
W1JSM	30	8	1290	K6JYO	13	4	1240
K1PXE	30	8	1207	K6HMS	11	4	1258
W1VTU	29	8	1296	WB6NMT	10	4	1250
K1BKK	29	8	1275	W5IRA	5	4	1276
W1FZA	29	10	2750	K6GAO	5	4	1276
W1AAJ	28	7		WA7KYZ	30	10	6000
K1MTJ	26	7	1250	K7N1J	30	8	2289
W1HDQ	24	7	1040	W7JRG	28	6	1320
K1RJH	22	7	1450	WA7BJU	27	10	2600
K2RTH	41	10	11000	WA7FBM	27	7	2175
W2AZL	38	9	2500	K7ICW	18	4	1278
W2CUX	38	8	1334	W8KPY	42	10	2050
W2NLY	37	8	1300	K8AXU	38	8	1275
W2CXY	37	8	1360	K8HWW	36	8	1100
W2ORI	37	8	1320	W8IDU	36	8	1150
W2BLV	36	8	1150	W8YIO	36	8	1100
WA2CJL	35	8	1160	W8IDT	36	8	1150
W2FZK	33	8	1240	K8REG	35	8	1200
WB2WIK	32	8	1080	W8SPIE	34	8	1100
WA2BIT	31	10	10000	W8NOH	31	8	1165
W2CRS	30	8	1230	W8LLY	28	8	820
K2EYV	29	8	1232	W8HTL	27	8	1102
K2CEH	29	8	1200	W8TIU	24	7	1000
W2CNS	27	8	1350	W8KBC	24	7	900
K2DNR	27	7	1200	K8ZES	22	8	875
WA2PMW	26	7	1245	K9UIF	45	10	1874
WB2SIH	25	6	1000	K9HMB	43	10	1827
WA2UDT	24	7	1020	W9YYF	43	10	4500
W2EMB	23	6	1335	K9UGD	42	9	1300
K2BWB	23	7	1350	WA9DOT	42	9	1303
W2YVW	23	7	1350	W9ACG	41	9	1200
W2DWJ	23	6	860	K9AAJ	41	5	1200
W3BHG	40	10	2488	W9OII	37	8	1075
K3CFJ	37	8	1250	W9BRN	36	9	1260
W3RUE	36	8	1250	WA9WHJ	36	9	1260
K3QCQ	36	8	1000	K9UNM	35	8	930
WA3QVN	33	10	2500	W9CAW	35	8	881
W3BDP	32	8	1275	W9ELJ	34	8	820
W3TMZ	30	9	2410	W9PBP	34	8	820
W3LNA	27	8	970	K9KQR	31	8	1105
W3OMY	26	8	800	W9VWY	30	8	1052
K3CFY	25	8	1200	K9UYK	29	9	1600
WA3UFU	24	8	1060	W9JDJ	29	8	1000
W3ZSD	22	8	950	K9OXY	24	8	1082
W3KMW	22	7	1000	K9MQS	48	11	10605
W3TFA	21	8	1342	WA9CHK	45	10	1650
K3OBU	21	7	930	W0LER	44	9	1440
K4GL	42	10	2340	W0DGY	41	9	1300
K4IXC	40	10	4850	W0RLI	39	9	1293
W4HJQ	39	9	1150	W0EMS	35	10	1320
WA4CQG	39	8	1350	W0PWF	35	9	1360
WA4WNH	38	9	1350	W0ENC	35	9	1360
W4HHK	38	9	1280	W0LCN	35	9	1100
K4EJQ	37	8	1125	W0PMN	34	9	1285
K4QIF	36	8	1225	K0DAS	33	8	1052
W4VHH	36	8	1125	W0DRL	27	9	1295
K4VW	35	8	1440	W0MJS	26	8	1118
W4DFK	34	10	12000	W0JLU	26	8	1290
W4FJ	34	8	1150	K0HNS	3	2	600
W4ISS	31	8	1000	VE1ZN	7	2	500
W4AWS	29	8	1350	VE2DFO	41	10	10600
WA4GPM	26	8	1150	VE2YU	32	8	1200
WA4MVI	20	7	1100	VE2HW	18	6	800
W5RRH	45	10	1715	VE3FO	38	9	2140
K5BKK	44	10	4380	VE3BQN	38	9	1290
W5UGO	43	10	1398	VE3ECC	33	8	1283
W5SUNL	42	10	1725	VE3AIB	29	8	1340
W5RCI	42	9	1289	VE3EYV	29	8	1100
W5WAX	39	10	1370	VE3DSS	28	8	1200
W5SLUA	39	10	1870	VE3EMS	27	8	1070
K5RXX	38	10	1450	VE3FKX	23	7	1076
K5HFY	34	10	4380	VE7BQH	7	2	720
K5VWV	33	10	5200	SM7BAE	12	7	1055
W5AJJ	33	9	1360	VK3ATN	4	4	10417
W5UKQ	33	9	1290	VK5MC	7	7	10000
W5LO	33	7	1325	ZL1AZR	2	2	11055
K5PTK	29	9	1350	SM6CKU	4	4	4200

Bill, whose Guam call is KG6JFT, reports that 6 has been dead since last October. The winter E_s season did not materialize for the gang in the western Pacific. They have not lost hope, however. Beams are being refurbished in readiness for the onslaught of JAs this summer. KG6JDX faithfully calls several long CQs on 50.125 almost every evening. Other 6-meter-equipped stations on the island are KG6APP, KG6JCM and W1CCO/KG6. An attended beacon signing KG6JFT has been in operation on 50.1 for some time.

Speaking of DX, many have asked for the QTH of WB2RLK who operated from C6A last January. Bob's other call is WB4PXW which is OK in the *Callbook*. Incidentally, don't be surprised to find Bob operating from some more exotic places this summer. Another QTH sought by quite a few of the gang is that of 8P6EN. Allen is no longer operational from Barbados but should be reachable at his VK5IR address listed in the latest foreign *Callbook*. Vince, KL7HLE/K8REG, wants it known that he is on 6 from

his new QTH of Juneau. His 8-element KLM has a relatively clear shot to the southeast despite 5000-foot mountains which dot the area. Address is R. R. 6, Box 6073, Juneau 99803 and phone number is 907-789-0592.

2 Meters - The big news this month is, of course, the auroras which burst forth in the wee hours of April 1, as well as a less intense one which occurred March 26. This was no April fool joke for those with sufficient stamina to stay up most of the night to pound brass or talk very slowly and distinctly into microphones. Indeed, some complained that they went to sleep at the key. Sounds like the old days of radio. Perhaps the greatest single feature of both auroras was their widespread nature. In this country, stations as far south as Alabama and Georgia were able to take part. AC4ISS of Augusta, GA, reports his first aurora contact came on the April 1 opening to W2AZL, NJ. Frank went on to work WA1FFO and K2RTH, all between 0516 and 0545 UTC. Equipment consists of a Johnson 6N2 putting out 70 watts to a 6-over-6 Telrex beam. Another 2-meter regular without much chance to capitalize on aurora as many of the rest of us do is W4LNG in Atlanta. After a phone call from W9CAW awoke him at 1 A.M. on March 26, Ruddy got on and worked his nocturnal caller as well as K9UYK, WB9GCS, W9BOZ, W9MAL and WA9WHJ all IL; WA0RJA and W3RUE PA. He finally went back to bed at 4 A.M. tired but happy, as the well-worn cliché goes. Another southerner who made good use of conditions uncommon to his area was WA4CQG of Auburn, AL. Alerted to the March 26 affair by a phone call from WB4JGG at 3 A.M., Dale managed contacts with WB9GCS, W9MAL and WA9WHJ all IL, as well as W3RUE and W3OMY PA. Dale says that he welcomes phone calls at any time, day or night, informing him of 2-meter band openings. His number is 205-821-7313.

The "April Fool" session netted ssb contacts with K2RTH NY and WA1FFO CT, as well as cw encounters with K1WHS ME, K3RYL and K3KEL PA, along with VE3FKX and VE3VN for W0OHU. Ed notes that fellow Rochester, MN, resident WB0SJJ received his brand new Yaesu FT-221 by parcel post just four hours before the aurora got under way. Immediately unpacking the rig, Terry proceeded to work W0PMN KN, WB9WHJ IL and W9CAW IN. Several reports attest to the long-haul propagation possible during the April 1 aurora. VE3FKX notes that VE3FKU worked Wyoming, call not given. What he feels may be an auroral DX record is reported by W0PMN of Wichita, KS. On the April 1 doings, Bill worked K2RTH on Long Island, a distance of 1282 miles. Prior to that, he completed a contact with WA2CJL/4 in Norfolk, VA, 1150 miles distant. Despite the fact that he could crank his tower up to only 20 feet, K1WHS of West Lebanon, ME, had 9 contacts over the 900-mile mark and 3 at 1100 miles or more. Dave had a near miss with K0WLU SD, 1300 miles away, which would have been state number 40 but he could not get an exchange of Rs. Stations that Dave was able to put in the log include K9UYK, WA9LEF, W9SUW, K9JUU, WA9WHJ, W9ROZ, W9YYF and K9KQR all IL, as well as K0DAS IA and WA9DOT WI, in addition to MN stations W0RLI, W0LER and W0OHU. Dave furnishes this fine description of the March 26 aurora as seen at his QTH.

"The aurora was definitely visible here. It began as a glow at 0200Z and slowly evolved into a thin band of light that rose in the NW and arced low across the sky to the NE. It was very pronounced at 0300Z and by 0400Z a curtain started extending upward from this ring. This is when the signals began to appear. Gradually the auroral curtain extended upward and soon a very pronounced curtain effect was visible. It was the best curtain I have seen. At 0800Z it was so spectacular I went in the house and woke up the XYL!! She was spellbound by the lights which by then had curved directly overhead and around to the south. The effect was similar to standing under a dome in a cathedral. The rays touched at the zenith and extended to all horizons. In the south, the rays were flashing and extended to within 15 degrees of the horizon!!! A brilliant display of bright green and fiery red swirled around from NW to NE. I spent as much time watching it as operating."

Public Service

Conducted By Robert J. Halprin, * WA1WEM

Way Stations

Most of the disaster communications during the Guatemalan emergency (see the write-up elsewhere in this issue) were handled on single sideband. Why? First, because most operators are more proficient at voice communications and secondly, because dits and dahs don't make it on the eleven o'clock news.

When emergency and priority traffic subsided to some degree, health and welfare inquiries began to be accepted from stateside individuals. Please bear in mind that a personal health and welfare message going into the disaster zone is not emergency traffic. This type of message is only handled when emergency/priority traffic loads have abated. Standard ARRL form designates inquiries as precedence Q. The best way to expedite Q traffic is to include a telephone number and use ARRL standard text number NINETEEN: "Request health and welfare report on _____ (name, address, telephone number)."

Despite the around-the-clock efforts of so many dedicated amateurs, thousands upon thousands of Q messages stretched the 20-meter phone circuits to the breaking point. On that band, net controls were assigning numbers to stations wishing to pass non-emergency traffic. One would have to sit on the frequency for hours and hours, waiting for his number to be called, as in a bakery.

Under these circumstances, W5GHP decided to activate his "Gateway City" plan for amateur radio communications during "offshore" emergencies. Bob knows what he's talking about because he serves the dual role of section communications manager for Louisiana and director of the central area Transcontinental Corps of the National Traffic System. In his words:

"The original idea was an attempt on my part to enlist the regular traffic handlers in NTS to provide a more reliable method of handling this foreign disaster traffic. A member of the U.S. State Department Disaster Services Team . . . told me that the State Department's Foreign Disaster Department would, in most cases, of a South American or Central American disaster, set up one location through which all relief supplies would funnel. He called it the gateway city . . . I then

discussed with him the idea that we as amateurs could set up some type of network using existing personnel, to funnel all traffic to this gateway city."

The State Department didn't name a gateway city during the emergency but it was necessary that New Orleans become the jumping-off point for amateur radio traffic. W5GHP and his NTS colleagues in that city collected traffic from NTS circuits and it was then funneled from there to Guatemala City, by way of TG9AD, swiftly and efficiently on RTTY. The results were outstanding. Inquiries netted a 75-percent return, which is hard to beat.

One of the stumbling blocks to the program is that interest in handling traffic by cw/RTTY among South American hams (whose countries have third-party agreements with us) in normal times is practically nonexistent. If regular liaison prevailed, TCC hotlines would be put into motion in order to convey emergency and priority, as well as inquiry, traffic. It would be a piece of cake. It would eliminate much of the demand on the 20 meter "bakeries." As Bob stated: "Upon the event of an emergency, the three TCC directors would get together on the air and make arrangements to set up special schedules (Headquarters would be notified) . . . The area that could provide the quickest outlet to the disaster area should receive prime consideration . . . The point is that trained, experienced operators would be in charge and traffic flow would be accelerated."

Nevertheless, we should be proud of the fact that during a disaster, ham radio is often the sole means of communications. Amidst the remarkable emergency activities, ham radio has to endure the inevitable rerun of "The Good, the Bad and the Ugly," or "Jaws." This is in reference to a few amateurs who resent the fact that emergency traffic is being handled on *their* frequency or those who don't respect the ongoing emergency frequencies. (Listen to W1AW's special bulletins for updates on the emergency frequencies.) Instead of turning the dial, these characters (who are in the minority) haggle over frequencies like a bunch of old women having a tug-of-war with a dress at a clearance sale.

Perhaps interference problems could be lessened if more emergency operations were oriented toward cw/RTTY and NTS circuits, rather than the "if it feels good, do it" spontaneity of 20-meter phone. Along these lines, we'll defer to WB4OBZ, in an excerpt from the Carolinas Net Bulletin:

"It seems that the amateur fraternity has become accustomed to think in terms of only phone operation in emergencies. True, for initial contacts and for some aspects of emergency service, phone does have its advantages. But whenever the traffic for which cw is best suited is handled by this mode, emergency operation has always benefited immensely. While the phone net controls are struggling to hold the eager beavers in check, handling all the check-ins of people who "want to help," fighting the QRM that is a way-of-life in the phone bands, while net members are spelling out names and repeating everything two or three times, while phone patchers are trying to find out if they can put a patch through, the cw net quietly goes its way, batting out the traffic at the rate of a message every two minutes or better, no fuss, no sweat. But heck, that ain't no way to run an emergency -- no fun in that -- it's just routine! And that's precisely when cw shines: It can absorb large volumes of traffic as a routine operation."

Before all those cards and letters start coming in, rest assured that we're not forgetting W3CUL's role. Mae handled most of the Guatemalan inquiries emanating from NTS nets in the eastern area. As part of her outstanding traffic operations, she has been for so long the only game in town when it comes to formal traffic destined to a foreign country.

One final point. The elders would be quick to point out (rightfully so) that we have enough trouble getting W/VE amateurs interested in emergency training, much less foreign amateurs. In this regard, ARRL has many hard-working leadership officials, exemplified by W5GHP, who look for and welcome your participation in public service networks. This way there will be more experienced, versatile operators on this side of the fence, available to run with the ball during the next emergency.

PUBLIC SERVICE DIARY

□ Decatur, GA - January 22. WA4BZY phone-patched a local doctor to a Coast Guard ship near Antarctica, to give medical advice for an injured crewman. (WA4BZY)

□ Derry, NH - February 10. WA1PSI received an SOS from a ship on fire in the Atlantic Ocean and notified the Coast Guard. (WA1PSI)

□ Oxnard, CA - February 13. WB6MXM summoned an ambulance when a camper was burned by an exploding gas lantern. (WA6DEI, SCM SBar)

□ Stoneham, MA - March 1. RACES members assisted the police and fire departments after an explosion and fire. (WA1QQV, EC Stoneham)

□ Riverside Co., CA - March 1-2. The Riverside Co. Amateur Radio Emergency Service provided communications for a rescue team during searches for a lost plane and two missing hikers. (W6KII)

□ Kent Co., MI - March 2-4. The county lost electrical and telephone service during an ice storm, and amateurs provided communications on behalf of local authorities. (WB8ESK, EC Kent Co., WB8NCD)

□ Owensboro, KY - March 9-28. Amateurs assisted in the search for a plane which

crashed in the Ohio River. (W4OYI)

□ Derry, NH - March 11. WA1PSI received an SOS from an ocean fishing vessel that had lost its navigation equipment, and notified the Coast Guard. (WA1PSI)

□ Illinois and Indiana - March 12. Amateurs in both states were active in relief efforts as a series of tornadoes struck the Chicago area. (W9NQW, EC Tippecanoe Co., IN, WB9HCH, EC Lake Co., IN)

□ Alliance, NE - March 15. A car driven by W0INR went into a ditch after an accident. W0UFZ answered his call for help and notified police and W0INR's family. (W0JCP, SCM NE)

□ Weirton, WVA - March 15. RACES mem-

bers assisted in the search for a missing woman. (K8QEW)

□ Cash, AR - March 20. WASCUU, the town mayor, requested aid from area amateurs when high winds knocked out power and telephone lines. (W5POH, PAM AR)

□ Glasgow, KY - March 20. After a tornado interrupted telephone service, WB8PHB provided communications for a local hospital. (WA4JZO)

□ Mississippi - March 20. Amateurs provided communications when tornadoes and severe thunderstorms struck much of the state. (WB5FXA, SEC MS)

□ Greene Co., MO - March 26. When a series of tornadoes caused extensive damage and loss of life, amateurs provided communications for the Greene Co. sheriff. (W0SIV, EC Greene Co.)

□ Cabot, AR - March 29. Several persons were killed and over 100 injured by a tornado. Area radio amateurs assisted relief operations (W5POH, PAM AR)

□ Redondo Beach, CA - April 2. WB6KCD pursued a truck involved in a hit-and-run accident, advising the police of his location through WR6ABB until the driver was stopped. WA6JOW contacted the police. (WB6KCD)

□ Repeater Log. According to reports received to date, repeaters were used for communications in connection with one plane crash, one search for a missing person, one ice storm, one fire, three tornadoes, five automobile accidents and related occurrences and to obtain assistance for one injured person. Repeaters used included WR2AJH, WR4AFK, WR5AID, WR6 ABB AFI, WR8ACN, WR9 ACZ ADK, WR0 ACU ADU AGZ.

□ For March, 37 SEC reports were received, with the number of AREC members totaling 11,576. Last year at this time, 40 reports covering 14,386 members were received. The following sections reported for March: Alaska, Alta, Ariz, Conn, Del, ENY, EMass, Ga, Ind, Ky, Me, Mich, Minn, Miss, Mont, NLI, NC, NFla, NNJ, NTex, Ohio, Okla, Oreg, Pac, SV, SDgo, SBar, Sask, SFla, SNJ, STex, Utah, Wash, WVa, WMass, WNY, WPa.

NATIONAL TRAFFIC SYSTEM

Two stalwarts of the daytime operation have been forced to resign due to job pressures; K7IFG (CTN) and WA1SQB (1RNd). NTS will be hard pressed to find leadership officials to replace them. W5KLV (RN5d) and WA5ZZA (CTN) produced FB bulletins this month. WA5IQU comments that RN5d is keeping excellent liaison with RNS. TEN needs more representation from Nebraska and the Dakotas. 1RN, 2RN and 3RN representation on EAN is down. Net certificate qualifiers: W2SWE WA2C1Y WA2DIW WA2RMZ WA2UYK WA2WIW WA2YAY WB2EMU WB2QCF WB2RUZ WB2TGL WB2UBW WB2VTT WB2WRT (2RN - all first timers), W4FOE W4WNY K4FTB WA4BAK WA4ECJ WA4NBE WA4WMB WB4OBZ WB4PZU WA9NEW/4 (4RNd), K4JSF WB4TPR W5EDT W5FW WA5JNL WA5SUD WB5CDX WB5LXX (RN5d), VE1AAO (ECN).

March Reports

1	2	3	4	5	6
EAN	31	1656	53.4	1.234	96.2
DEAN	61	460	7.5	.427	85.2
CAN	31	1022	32.9	.910	98.9
DCAN	59	166	2.8	.185	90.3
PAN	31	1087	35.1	.981	99.4
DPAN	62	160	2.5	.148	83.3
CTN	31	389	12.5	.422	100.0
1RN	59	620	10.5	.432	88.5
1RNd	31	134	4.3	.299	80.6
2RN	92	607	6.5	.575	94.6
2RNd	62	268	4.3	.342	94.5
3RN	62	318	5.1	.321	93.5
3RNd	31	137	4.4	.419	100.0
4RN	62	633	10.2	.420	97.9
4RNd	61	221	3.6	.254	46.6
RN5	62	712	11.5	.441	93.2
RN5d	31	114	3.6	.189	83.0
RN6	62	841	13.5	.497	91.3
RN6d	30	242	8.0	.215	84.0
RN7	62	270	4.3	.363	88.9
RN7d	48	45	.9	.107	32.4
8RN	57	335	5.8	.314	83.3

1	2	3	4	5	6
8RNd	31	92	2.9	.366	89.2
9RN	60	379	6.3	.333	83.0
9RNd	30	114	3.8	.228	90.3
TEN	58	386	6.6	.374	73.2
ECN	62	269	4.1	.368	88.8
TWN	61	527	8.6	.364	94.8
TWNd	23	72	3.1	.115	63.8
TCC					
Eastern	108 ¹	684			
Central	86 ¹	482			
Pacific	114 ¹	826			
Sections ²	3769	14604	3.9		
Summary	5212	28862	2.8		
Record	5565	34089	18.1		

¹ TCC functions not counted as net sessions.
² Section and local nets reporting (102): MTN (MB), GBN (ON), WGV/UHF (PQ), AENB AEND AENM AENW (AL), ASN (AK), ATEN HARC (AZ), NCN NEN SCN (CA), CCN (CO), CWN (CO, WY), CN CPN CTN (CT), DEPN DTN (DE), FAST FMTN FPTN GN NFPN SPARC TPTN (FL), GSBN (GA), IMN (ID, MT), ILN INN IPN (IL), I75MN TFCN (IA), QKS (KS), LAN LSN (LA), MSSN PTN SGN (ME), MDCTN MDD (MD), EMRI (MA, RI), WMPN (MA), MACS MNN M16M GMN WBSN (MI), MAWX MSN MSPN MSSN PAW (MN), MTN (MS), MTN (MT), NAM WNN (NE), NHVTN (NH, VT), BARTEN NJN NJPN NJSN (NJ), NLI NLI PN NLS NYS (NY), NCSB THEN (NC), BN BNR MASER ONN OSN OSEN O6MN (OH), OAN OFON OLZ OPEN OTWN STN (OK), BSN OSN (OR), EPA PEN PTTN WPA (PA), CNN PTX (SC), TEX TTN (TX), BUN UCN (UT), VN VSN VSN (VA), WVN (WVA), BWN WIN WNN WBSN (WI).

1 - NET	4 - AVG.
2 - SESSIONS	5 - RATE
3 - TRAFFIC	6 - % REP.

Transcontinental Corps

K5MAT issued TCC-Pacific certificates to WB5KSS, W6TYM, WA0KKR/7 and WB0QOT. In February QST, we meant to say that VE3GOL had earned a TCC-E certificate.

1	2	3	4	5
Eastern	124	90.0	1957	684
Central	93	92.4	995	482
Pacific	124	91.9	1668	826
Summary	341	91.4	4620	1992

1 - AREA	4 - TRAFFIC
2 - FUNCTIONS	5 - OUT-OF-NET
3 - % SUCCESSFUL	TRAFFIC

TCC Roster

The TCC roster (March): Eastern Area (W2FR, Dir.) - W1s NJM QYY, K1s EIR GMW, WA1s MSK WEM, W2s FR GKZ, K2H/VE2, WA2s DSA (CB PJL UWA), WB2s PYM RKK UBW, W3EML, K3MVO, W4UQ, K4KNP, WA4VFW, W8PMJ, K8KMQ, WA8HGH, WB8ITT, VE3s DOL SB. Central Area (W5GHP, Dir.) - WB4s GSN SKI, W5s GHP MI QU RB UGE UJJ, WA5IQU, W9s CXY DND NXG, WA9EED, WB9NOZ, W0s HH HI INH LCX QMY, K0s AEM CVD, WA0TNM. Pacific Area (K5MAT, Dir.) - W5RE, K5MAT, WB5KSS, W6s BGF EOT MLF TYM VZT, K6HW, WA6DEI, W7s DZX GHT KZ, K7s IWD NHL QFG, WA7WXY, W0s IW LQ LRL, K00RL, WA0KKR/7, WB0s DJY HCK QOT, VE7ZK.

Independent Nets (March)

1	2	3	4
Clearing House	27	310	597
Hit & Bounce	62	1240	448
Hit & Bounce Slow	17	107	224
IMRA	27	407	1092
Mike Farad	27	55	215
North American SSB	27	148	348
Washington Region PON	13	40	230
20 Meter ISSB	22	1005	270
7290 Traffic	46	687	1926

1 - NET	3 - TRAFFIC
2 - SESSIONS	4 - CHECK-INS

Public Service Honor Roll March 1976

This listing is available to amateurs whose public service performance during the month indicated qualifies for 40 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 10; (2) Checking into phone/RTTY nets, 1 point each, max. 10; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned liaison, 3 points each, max. 12; (6) Phone patches, 1 point each, max. 20; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly with a disaster area, 1 point each message; (9) Serving as net manager for entire month, 5 points.

80	56	49	44
WB5AMN	WA1FCM	WA3VBM	WA2DIW
72	WA2DSA	WB4EKJ	WB2EMU
WB5LWB	W2MLC	WB5EKU	WB2WZL
66	WB2UBW	WB5KQJ	WB2YKG
WB2VTT	WA2UYK	WB5NKD	K3OIO
65	WB5KQP	WA5PRI	WB4DUJ
WB0HOX	WA5TQA	K9LGU	WA4EUD
WB0OAG	WA5YEA	K9ZTV	WB4WQL
63	W6RNL	K0CVD	W6RFF
WB2RUZ	WA8HGH	K0MRI	W9IEM
WA5ZZA	VE3GJG	VE3FRG	W9NXG
52	48		VE3GOL
62	WA2PJL	WA4NID	VE3SB
W5KLV	WB2RMK	47	43
WA0GLI	W3YI	WB2RKK	WB4DXN
61	WB4OXT	WB2WKH	K4FTB
W2MTA	WB5MTN	WB0QOT	K4YRL
WB2PYM	WA6TVA	VE4UL	WB0OCT
WB2WRT	WA7MEL	46	42
W5GHP	51	WB9ICH	WA1MJE
WA5IQU	W4OGG	W5GSN	K9TKE
K5TTC	W7CCX	50	41
W30CX	50	K3IPX	41
W8IBX	W1BVR	K7UJU	WA2ZGR
WB8JGW	WA4EPJ	WB8NCD	W4WXZ
60	WB4TPR	K9KHI	WB5FMA
WA5RKU	49	WB0KPX	40
59	WAIUQY	W0OTF	W7LG
K1PAD	WB2LZN	K0RWL	K7NTG
58		KL7JDO	W9MFG
WB5NUM		VE3GT	WB0RWN
WB6BDL			KL7HDX
			VE4PG

Brass Pounders League March 1976

BPL Medallions (see December, 1973 QST, p. 59) have been awarded to the following amateurs since last month's listings: WA3UYF WA5IQU W8PMJ W8PTT WB0KVV.

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

Winners of BPL Certificates for Mar. Traffic

1	2	3	4	5	6
W3CUL	449	1271	1659	31	3410
KL7CUX	0	1200	1200	2	2402
W0WYX	57	883	411	472	1823
K9CPM	0	471	128	680	1279
WA0RWM	0	600	80	597	1247
W3VR	241	195	441	7	884
W3YI	341	66	357	39	803
AB0HOX	30	357	360	17	767
WB0MTA	0	335	364	0	699
K3NSN	174	248	200	48	670
K5HZR	1	309	327	1	638
WB0QOT	7	235	322	8	572
WA2UYK	61	206	237	56	560
WB6YID	27	263	32	258	580
WA2UYK	61	206	237	56	560
K6HW	18	265	264	1	548
WA0RWM (Feb)	0	508	36	498	1047

More-than-one operator station

K8LMF/8	420	6	416	2	844
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BPL for 100 or more originations-plus-deliveries

K0ZSQ	221	K7VWA	152
WA3ATQ	207	W5TI	148
W0FIR	187	K8KMQ	129
K0YFK	182	WA0GLI	103
W7ZFZ	169	WA3THI	101

1 - CALL	4 - SENT
2 - ORIG.	5 - DEL.
3 - RECD.	6 - TOTAL

Results, Sixth Annual ARRL 160-Meter Contest

More new records despite poor conditions.

By Jeff Maass,* WB8JXS and Jim Cain,** WA1STN

Although generally conceded that conditions were poor for the sixth ARRL 160 Contest, December 6-7, 1975, a new single-operator all-time record was still set by K1PBW. Coast-to-coast propagation for the U.S. and Canada was certainly worse than in past years. The number of foreign entries was down markedly, reflecting the rotten conditions around the world. 306 entries this year is less than 50 percent of the stations known to have been active in the contest, but is still a fair showing, although not when compared to 354 in 1974.

We present herewith a story about the Ohio State University Amateur Radio Club, W8LT, and their 160-Meter Contest exploits, narrated by Jeff Maass, WB8JXS, in hopes that you will find it (as we did) interesting reading. Good things seem to come in bunches. . . . K4DBZ sent us a story about his 160-Meter Contest expedition to Florida's No-Name Key, with W4OZF. We're saying that one, to print (we hope) in November QST, along with the rules for the 1976 160-Meter Contest. Just goes to prove one thing: Be careful what you send to the Contest Corner, because you just might end up seeing it printed in your magazine!

The 160 contest has long been a favorite of the operators at W8LT, since we usually do better, relatively, in this contest than most of the others. There's a bit of tradition, too. We were the number one multioperator station in the first ARRL 160 Contest, and we have been in the top ten each year since then, even though we have never again taken first.

The station has changed since that first contest: In 1970 we had a BC610E, 75A4, Ranger II, and a five hundred foot longwire up 100 feet. In 1974 we began our major station upgrades, powered by money loaned by several of the members. (The university pays our phone bill and insurance. No money for equipment whatsoever!!)

The station for the 1974 contest was a Drake C-Line, and WA1LKU's modified SB220.

Antennas, always a favorite subject on 160, have undergone a lot of development and trial at W8LT. The evolution has gone from a kite, which broke loose, never to be seen again; to a balloon, which couldn't cope with the

up-and-down drafts surrounding the football stadium which houses W8LT; to the now-famous kitoon. The kitoon is a small (12-foot long) dirigible which is filled with hydrogen and/or helium to support a wire. For two years (1972-73) the wire was a quarter-wave vertical over a groundplane at 110 feet, and in 1974 the antenna was expanded to a five-eighth-wave vertical.

Could You Play Football At Our Observatory?

The long wire was available for all of the contests, and several dipoles were tried at various times, supported by the flagpoles which top the stadium. But we weren't satisfied by the performance



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**Asst. Communications Mgr., ARRL

that we were getting in the contest: The noise level in the university environment is something to behold. We couldn't put a really good groundplane under the vertical for optimum performance and, worst of all, there was a football game scheduled for the stadium on the Saturday of each 160 contest! It was only a post-season game, but we were still required to remove all additional antennas from the top of the stadium by 7:00 A.M. on Saturday.

The thought of pulling down the kitoon and dipoles and storing them away for the remainder of Saturday for the 1975 contest started a search for a better location. (Have you ever tried to hide a 12-foot dirigible from 20,000 football fans, while it is still inflated? Not an easy job!)

We looked first at several facilities in or near the university complex. The antenna lab looked promising for antenna supports (two 80-foot towers space a little more than a half-wave at 160 meters), but the towers were aligned wrong for coverage and it was close to several roads and homes (still not a quiet location). The next prospect was a field formerly used for some optical (laser) research. There was a lack of antenna supports and shelter for our purposes.

The old saying goes something like "You usually find what you need in your own back yard," and we finally realized it. OSU has several resources available to those who know how to approach them. Two of the resources we found were W8ERD and W8JK.

JK to the Rescue

John Kraus, W8JK, needs no introduction — the JK array was named for him, he invented the helical antenna and literally wrote the book, *ANTENNAS*, used by most colleges for antenna

courses. Currently, he is the director of the OSU Radio Observatory near Delaware, Ohio, which he designed.

Bob Dixon, W8ERD, is also familiar to many. He is a former W8LT member and advisor, EC of the Central Ohio AREC, and father of the kitoon. He has also produced, for W8LT Field Day, a twenty-meter corner reflector supported from a firetower. He is a very active and innovative person, who happens to also be the vice director of the Radio Observatory.

We obviously had an "in", so we looked at what was available. The radio telescope at OSU is not a dish, but rather a flat three-acre aluminum groundplane with two reflectors. One of the reflectors is flat and tiltable, and it directs radio signals to the other reflector, which is parabolic. The signal is then focused and enters the "focus room" through a horn. The focus room contains parametric amplifiers, filters, receivers, various accessories, and a small computer for analysis of data. All in all, a very impressive setup.

What attracted us initially was the ground plane — three acres of aluminum foil over a concrete base. The idea of placing our kitoon-supported 5/8-wave vertical over a "perfect" groundplane was very pleasing. Further research revealed that the site was ideal in other ways — it was selected and maintained as a quiet radio location. Additionally, the location was exceptionally high for the central Ohio area. There was plenty of room for Beverage receiving antennas which we had been itching to try out. There was warm shelter with electricity and a refrigerator to maintain operator morale. Things were nearly perfect.

All we had to do was somehow get them to shut down the operation of the telescope for a few days and allow us to use the site. W8ERD liked the idea, but

insisted that we must contact W8JK; so we did. He was generally agreeable to letting us use the site, under certain conditions — we must go out to the observatory before the contest and perform some tasks for the privilege of using the facility. We jumped at the chance.

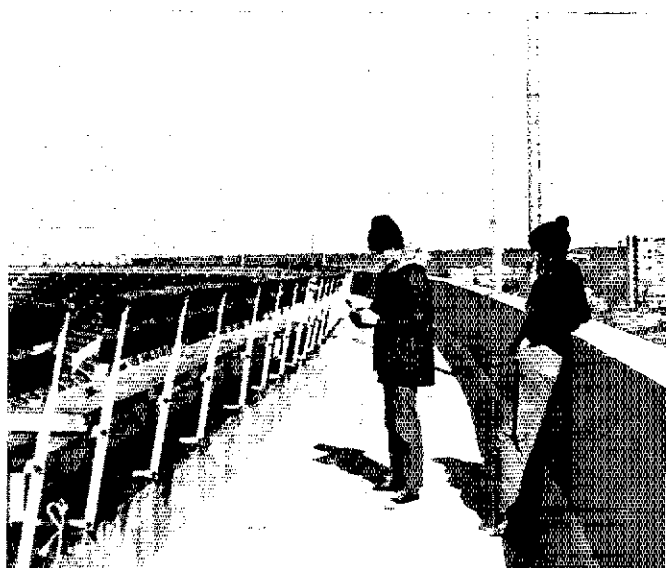
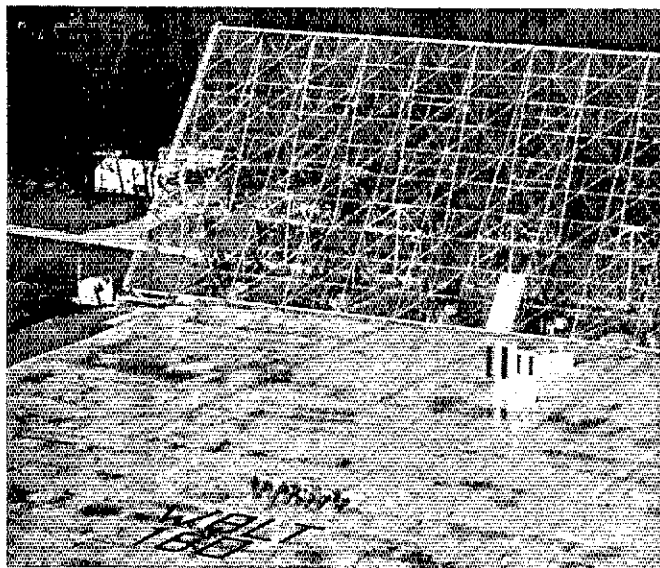
After two days of raking leaves, edging sidewalks, rearranging storage, recovering lost and/or stored objects and relocating them, replacing light fixtures and hauling trash, we finally got the final approval. The contest was ours.

It was decided to link to the ground plane inductively, and it was estimated how much aluminum foil would be required to get sufficient coupling to the groundplane. We finally decided that about 250 feet of aluminum foil, held down by nearly 100 bricks and boards would do the job. The vertical was mounted directly in the center of the groundplane, and the antenna tuner was grounded to the aluminum foil. It was a windy day and the kitoon was not staying perpendicular to the groundplane, but it was not enough skew to hinder its performance. It tuned well and heard very well.

Other antennas included a dipole at about 80 feet (supported at one end by the flat reflector of the telescope) and Beverage receiving antennas to the northeast, south, southwest and west. The fact that we were leaving our 500-foot longwire at the stadium caused some concern over the alternatives if something failed, but there was no way to bring it along. Besides, this wasn't Field Day — nothing was going to fail!

The Contest

Our statistics, like those of most of the regular participants of the 160 test, have been increasing at a steady rate, usually around a 30-percent increase in score each year. This year we were



shooting for 40 percent. Our contest committee, which consists of those people interested in contesting, is WA1LKU/WB8OSC, WB8JXS, WB8SWM and WB8IBZ. All of them were regularly into any available contest, and all had been improving steadily. Traditionally, we also attract some alumni for the 160 test — W8ERD and WA8VNP came out for this one. A stop-in visitor, WA1LAK, helped get the station set up. WN8TXE helped log and checksheet, as usual. WB8INY spotted, climbed and supervised. Dan Babcock executed our aerial photography.

The station setup went a bit slow, with a lack of available manpower on Friday morning, and the station was just barely set up before the beginning of the contest. The station was LT's C-Line, WA1LKU's newly modified SB220, W8ERD's FT-101 for spotting, and several accessories including an Accu-Memory, 100 dB step attenuator, pre-selector, etc. The attenuator was used to cut down some of the cross modulation and overload caused by the large amount of 160-meter rf coming out of Ohio during the contest. The SB220, partially filled with parts from the old BC610, glided along at 1000 watts during the day, and accounted for several daytime contacts that may not have been possible without it.

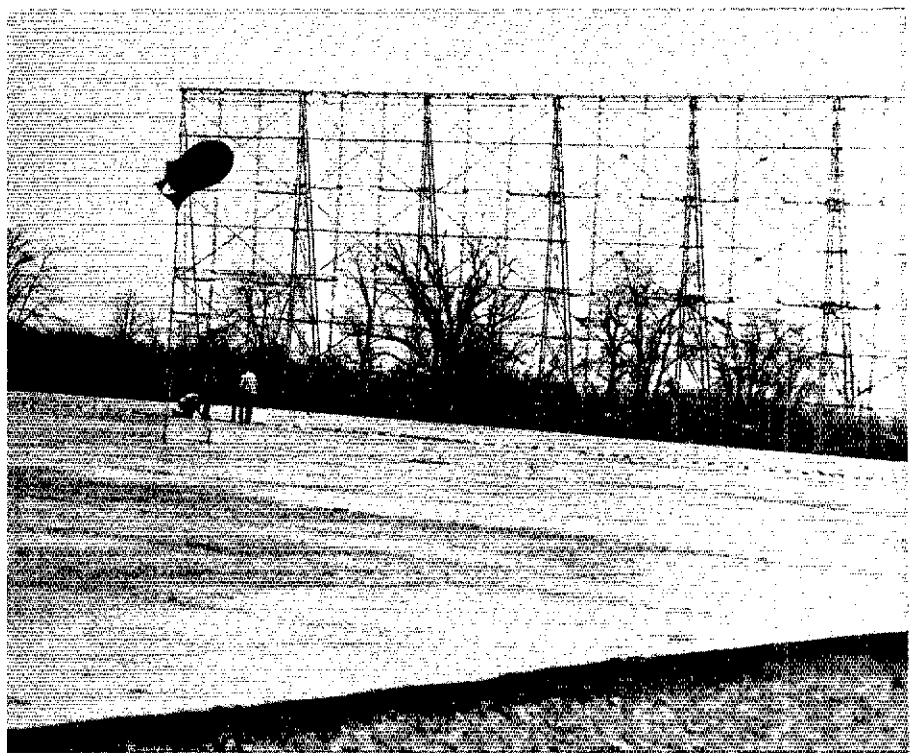
W8ERD started off, and operated for a couple of hours. The rest of the operators/staff attended to finishing up the Beverages and spotting. As the evening progressed, the card playing portion of the Annual 160-Meter Contest and Euchre Playing Convention was started, and kept the operators/staff busy when they weren't operating/staffing.

Conditions the first night were very poor, with storms moving into the area and generally noisy conditions, but we managed to work a few DX stations with the 5/8 wave. Contacts were coming faster than in previous years, however, and we were still looking for a greater than 30-percent improvement. It began to rain late Friday night and the noise level continued to rise. As the sun dawned on Saturday, the rain slowed and the wind picked up. An investigation of the kitoon indicated that the helium had been leaking out, that the surface was soaked with rain, and that it was flying at about a 50-degree angle to the ground. It was still working well, however, and we decided to wait at least until the sun made contacts nearly non-existent to fix it.

Disaster

The wind shifted and was coming from the north now.

John, WB8INY, saw it first. The kitoon had careened into the parabolic reflector in the shifting wind, breaking



off one of its stabilizing fins. It was looping wildly behind the reflector; the vertical caught in the metalwork of the structure. A tree placed, of course, in the path of the kitoon's wild flight, was taking cheap shots at the silk-covered rubber blimp.

The response was immediate. Everyone grabbed his coat and slopped through the mud and grass to the reflector 500 feet away. As we got close, the vertical broke, allowing the kitoon to loop away into the briar patches to the south of the telescope. We chased.

It was raining again and the temperature had dropped to nearly freezing as we fought honey locust trees and wild blackberries for possession of our beloved kitoon. Pitiifully looping in the driving wind, the kitoon was making a valiant effort to pull out of its death-dive, but eventually lost out when the antenna wire caught in a tree, forcing the kitoon to lodge in a honey locust tree.

We managed to pull it out and returned to the station, where WA8VNP had continued operating on the dipole, and we did an autopsy on the kitoon. The outer skin, graphite-coated silk, was amazingly undamaged, and we had renewed hope at the prospect of resurrecting it before evening. We opened the gas vent and pulled out the inner rubber gas bag — in several pieces. The kitoon was dead. (We could just hear K8KAS, WA81JI and W8LRL chuckling.)

Obviously, with our groundplane undamaged, we had to come up with an

alternative vertical to mount on the thing. Recently, the Central Ohio AREC Planning Committee (including W8ERD, WB8IBZ, WB8JXS, and WA1LKU just incidentally) had been discussing the possible use of 160 meters as a link frequency for some of our activities. In preparation for this, W8ERD had purchased a military antenna that we could put to use for the contest. He drove home and got it, and we erected it on the groundplane.

The short antenna had a top hat and was about 30-feet high, obviously a trade-down from the 5/8-wave vertical of the night before. Additionally, the antenna tuner would arch violently if we tried to run much more than 150 watts into the short vertical. We didn't have time to rebuild the antenna tuner, so some modifications were made and we used the dipole for the rest of the day.

The short vertical definitely did not perform as well as we had hoped, but it seemed to get out fairly well. Conditions the second night were much better than those of the first, and yet we heard no DX well enough to work it. Our multiplier count at the end of the contest was a decrease over the year before, and yet we ended up with a 12-percent score increase over 1974.

If anyone knows a source of kitoon(s), please, please, please let us know about it. They were apparently used as antenna supports for rubber rafts by either the Navy or Air Force. We got ours at the Dayton Hamvention.

We'll return next year, although we

aren't sure where we will be operating from yet. See you on 160.

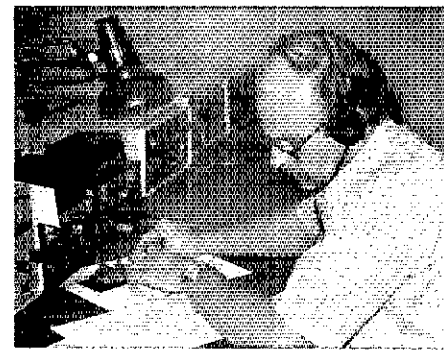
Sixth Annual 160-Meter Contest

Scores are listed by country within each continent, by province within Canada, and by section within each U.S. call area. The highest single-operator station in each ARRL section and in each country receives a certificate. The highest multiple-operator station in each section and country receives a certificate if there are three or more such entrants or, if, in the opinion of the Awards Committee, the entrant displays excep-

tional effort. Read the score listings as follows: Call, score, QSOs, multiplier, hours of operation. Asterisks denote Hq. staff members, who are not eligible for awards when operating their own station or that of another staff member.

Soapbox

Sounded like the 40-meter Novice band. — WA4WCG. Conditions very poor but if I had worked all I heard I would have been quite satisfied. — E19J. It didn't seem that there were as many signals as I was led to believe would be on. I don't think I missed more than a half dozen that I heard and I couldn't make 250



K3BSY, pictured here, teamed with W3IWT for Atlantic Division-leading multi-operator score. John is also known occasionally as FY7AK.

Continent/Country	Call	Score	QSOs	Multiplier	Hours
DX	Austria	108	9	6	
	Czechoslovakia				
	OK1ATP	936	26	18	
	OK2BUP	603	13	9	
	OK2BQU	76	5	4	2
	OK1HAS	72	6	6	
	OK2PGU	2	1	1	
	French St. Martin				
	FQ9CQV/FS(WA3HRV, W3ADT, K4GKD,opr.)	616	22	14	3
	Ireland				
	E19J	408	17	12	
	Japan				
	JA7NI	84	7	6	2
	Montserrat				
	VP2MIR(W7IR,opr.)	2350	47	25	
Panama					
HP3XWB(KZ5s AA,BB)	6829	83	39		
Peru					
OA8V	736	23	16		
VE	Maritime				
	VE1AXT(+VE1BCZ)	20,160	195	48	30
	Quebec				
	VE2BPT(VE2BTQ,opr.)	22,560	237	47	
	VE2WA	13,590	151	49	
	VE2OJ(multi-op)	17,664	189	46	24
	Ontario				
	VE3ECP	26,100	261	60	
	VE3EB	4620	70	33	17
	VE3HC(multi-op)	31,164	294	53	28
	Saskatchewan				
	VE5D	41,412	303	68	
	Alberta				
	VE6GCS	6438	87	37	7
	British Columbia				
VE7UZ	20,976	184	57		
VE7AZG	1806	43	21		
U.S.A.	1				
	Connecticut				
	WA1STN*	13,949	187	37	5
	W1CER*	11,628	150	38	8
	W1FEX*	11,289	163	34	6
	W3JUS/J1*	5670	81	35	3
	K1LGM	5280	88	30	6
	W1QV	4700	94	25	5
	WA3MAF/I	3640	70	26	7
	WB2GN/L*	3458	64	27	3
	W1UAD	3024	56	26	6
	W1VZ	1640	41	20	4
	W1LKD	704	22	16	2
	W1AW(WA3JUS,opr.)	336	14	12	1
	WA1TXZ/I(+WA1L ODX,FDV)	32,312	281	56	22
Eastern Massachusetts					
W1B0/I	16,984	95	44	12	
W1FJJ	16,650	225	37		
K1AGE	11,289	163	34	6	
W1GDB	11,022	167	33		
W1PL	6789	102	31		
W1FZY	4410	105	21		
W1GVN	1672	44	19	5	
W1RLI	1672	38	22	4	
W1DDC	810	27	15	6	
W1MX(multi-op)	57,997	360	73	28	
Maine					
K1RGE	23,816	202	52	12	
W1AIOG	9000	126	36	7	
W1AINMW	320	18	10		
New Hampshire					
W6MZW/1	23,598	194	57		
Delaware					
W3GL	15,160	188	40	7	
Eastern Pennsylvania					
W3GM(W3JSX,opr.)	85,092	466	84	28	
W3FRY(K3DZB,opr.)	37,980	312	60	13	
W3HUS	30,628	293	52	20	
W3AXX	14,969	137	40	9	
K3EF	14,350	175	41	6	
W3BGN	12,320	176	25		
W3ASJ	9768	132	37	19	
Maryland-D.C.					
W3IN	89,343	517	81	30	
W9SZR/3	61,408	386	76	24	
W3CJZ	24,969	233	56	19	
K3DI	24,688	219	49	13	
W1NIX/3	14,398	155	46	13	
W3USS(WA1FEQ,opr.)	9472	128	37	6	
W3MNE	4212	61	26	17	
Western Pennsylvania					
W3WIK(WA3SZZ,opr.)	21,264	220	47	22	
W3UHP	21,264	220	47	22	
W3ZUH	17,289	118	51		
W3HDM	12,584	188	44	9	
W3SN	8254	49	23	4	
K3BSY(+W3IWT)	22,090	235	47	17	
Alabama					
K4GTY	14,896	152	49	26	
W8FAW/4	9512	116	41	4	
Georgia					
K4DJC	57,256	415	68	24	
Kentucky					
K4FU	38,052	302	63	18	
North Carolina					
WB4VUP	41,160	366	66	26	
W4TMR	37,820	330	57	29	
W4NQA	3584	64	28		
Northern Florida					
K4YFQ	13,724	143	47		
WA4WCG	10,291	124	41	16	
W4QN	2160	45	24		
South Carolina					
K4CYU	36,661	296	61	25	
K4II	21,168	196	54	10	
W4YJS	672	24	14	6	
Southern Florida					
W4DQS	20,300	197	50	13	
W4MAN	1782	36	22		
W4GJL	1760	40	22	11	
W4OZF/4(+K4DBZ)	53,200	335	76		
Tennessee					
K4PUZ	77,996	521	74	26	
W4LPH	23,052	226	51	15	
W4FCJ	4620	66	35	7	
Virginia					
K4PQL	32,946	320	51		
W4WSF	26,652	271	52	15	
K4JIM	14,145	171	41	6	
W4KFC	7400	100	37		
K4JWD	7004	103	34		
W4GZM	6490	50	26	2	
K4FTO	2156	49	22		
W4KMS	1680	42	20		
W4LGM	928	29	16	2	
W4PRO(multi-op)	65,310	454	70		
Arkansas					
WA5RTG	54,531	366	73		
W5KL	9592	109	44	4	
Louisiana					
W5WMU	48,555	372	65	24	
W5YMX	144	9	8	3	
Mississippi					
K5AEL	25,500	211	60		
W5PWW	15,822	145	54	23	
WA5NYG/5	6120	85	38		
W5GWD	3660	61	30		
W5BIV	850	25	17		
New Mexico					
W5DQ	15,092	148	49		
W5UTV	7000	109	35	16	
W5MVA	2300	45	25	14	
Northern Texas					
W5USM	33,165	248	67		
K5JVF	24,361	185	54	22	
W5KYY	12,432	120	48	25	
W5CKM/5	12,240	136	45	18	
K5QNY	12,012	143	42	10	
W5LFO	6530	65	35	10	
WA5RKT(+WB5JLE)	39,908	289	68	25	
Oklahoma					
WA5VAP	14,408	132	47	22	
K6QNM(+WB5JFR)	6068	82	37	12	
Southern Texas					
K5DEG	28,424	227	61	17	
W5RJP	14,352	149	48	20	
W5QF	2142	51	21	12	
K5LZJ	1463	37	19	9	
W5KA(multi-op)	9555	121	39	11	
East Bay					
K6HII	34,432	269	64	25	
W6HJJ	22,568	197	56	24	
Los Angeles					
W5RTQ/6	24,339	200	57	16	
W6DQX	4814	83	29	4	
W6BVC	4368	78	28	10	
W6ZVC	3744	76	24	5	
Orange					
W5ANN	24,890	245	62	27	
WB6FNI	17,934	183	49		
Santa Barbara					
W6JU	4048	92	22	12	
W6JBP	1300	25	18	6	
W6TYR	840	30	14	11	
Santa Clara Valley					
K6ST1	19,900	199	50	31	
W6JZA	14,290	156	46		
WB6XQ	1558	41	19		
K6SLQ	500	25	10	2	
San Diego					
W6BLZ	1908	53	18	6	
K6JEN/6	1316	47	14		
San Francisco					
W6KQQ	34,224	276	62		
W6ZT	15,300	133	60	27	
W6RQZ	360	20	9		
San Joaquin Valley					
W6GWO/6	16,116	158	51	15	
W6BWS	2268	54	21	7	
W6JUC	1632	46	17	7	
Sacramento Valley					
W6ZGM	26,458	222	62		
W6NFR	9600	100	48	8	
W6VD	3374	109	43	17	
Hawaii					
KH6CHC	9888	87	47		
KH6JJ	3740	82	46		
7					
Arizona					
W7TB	28,387	176	61	18	
W7YU	7820	115	34		
Idaho					
K7NHV	16,744	161	52	7	
W7WLU	520	20	13	2	
Montana					
K7LTV	12,324	117	52		
K7CPC	2058	49	21	5	
W7B	811	33	16	2	
W7MKB	832	26	15		
Oregon					
W7AEF	29,000	250	58	30	
W7PEZ	13,112	149	44	18	
W7IMP	4050	75	27	11	
WA7IHN	2976	62	24	10	
W7LT	1632	51	16	7	
UTAH					
WA7OAU	13,275	143	45	10	
Washington					
K7IDP	23,744	212	56		
W7DQJ/7(WA7L O,opr.)	15,900	183	54	25	
WA7OPH	16,665	170	55	25	
K7MNT/7	7380	90	41	8	
K7UWT	1376	43	16		
Wyoming					
W7JAL	3102	47	33	14	
W7TO	2754	51	27	13	
8					
Michigan					
W8T8Z	21,828	214	51	16	
K8HWZ	17,760	185	48	14	
W8KAZ	16,884	193	44	15	
W8QNS/8	13,400	141	44		
W8BWM/8	957	34	14		
K8HLR(+WA8JLJ)	5676	60	430	66	
W8UM/8(multi-op)	49,164	357	68		
W8SJM/8(multi-op)	43,120	324	65		
W8YV(multi-op)	21,840	182	60	17	
W8ADI(multi-op)	18,060				

Division Leaders

SINGLE OP DIVISION		MULTI OP
W3IN	Atlantic	K3BSY
WA9MCC/9	Central	W9EI
W0HW	Dakota	W0AW
K4PUZ	Delta	---
K8CVV/8	Great Lakes	WA8JI
WA2SRQ	Hudson	WA2SPL
W0AIH	Midwest	W0IS/0
K1PBW	New England	W1MX
WB7AEF	Northwestern	---
K6HIH	Pacific	---
W8LRL	Roanoke	W4PRO
W0DK	Rocky Mountain	W0MS
K4DJC	Southeastern	W4OZF/4
W6ANN	Southwestern	---
W5USM	West Gulf	WA5RXT
VE5DX	Canadian	VE3HC

Top Ten

SINGLE		MULTI	
K1PBW	101,136	WA2SPL	90,320
W8LRL	90,470	WA8JI	83,360
W3IN	89,343	W4PRO	65,310
W3GM	85,092	W0AW	60,060
WA9MCC/9	81,822	W8LT/8	59,961
K4PUZ	77,996	W1MX	57,597
K8CCV/8	76,228	K8HLR	56,760
WA9BWW	71,188	W4OZF/4	53,200
WA2SRQ	68,068	WA8YEE	52,353
W2DXL	64,584	W8UM/8	49,164

QSOs. — W6ANN. [But he did take home the Southwest Division sticker. — Ed.] This represents my first 160-meter operation ever in thirty-eight years of hamming. Participants were truly tolerant and courteous, which added to the pleasure of operating. — W4FCJ. Couldn't even raise Delaware (17 miles away) on the landline. — W3HUS. Thanks to local station WHFB for loaning us their 234-foot tower from 5:30 P.M. to 7:15 A.M. — W8MAI/8. One good thing was that the contestants spread out over the available space in good shape, rather than bunching up like too many did in '74. — W0GK. Next year I'll sleep before the contest, *not* during it. — W7JAL. KZ5BB and I operated HP3XWB, station owned by Fr. William Baldwin and located at an elevation of 5,400 feet, in the Chiriqui Province of Panama. We found the best time for working DX was 2200 GMT until dawn local time, just like it is most places. We had a wonderful time, and may go back there again next year. — KZ5AA. QST

Strays

I would like to get in touch with . . .

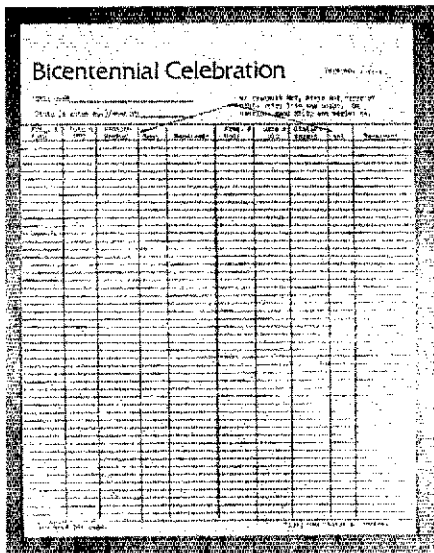
□ city engineers, service directors or any other hams involved in city government. Ned F. Foley, P. E., WB8KZE, 6710 Canterbury Dr., North Madison, OH 44057.

Bicentennial Celebration

Coming Soon: Amateur Radio's Biggest Weekend

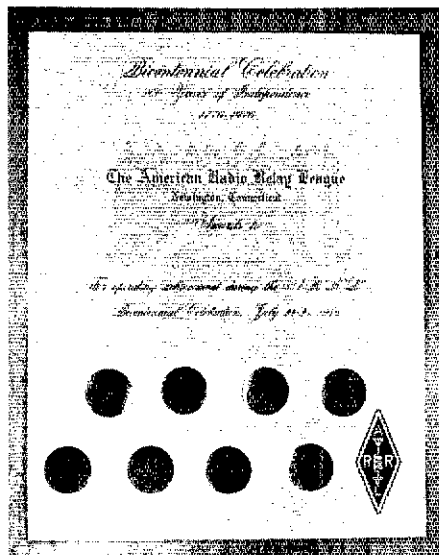
The log sheets and summary sheets are printed and ready for distribution. To give every interested amateur an amateur radio souvenir of the bicentennial year, the three-color certificates and silver achievement stickers are on hand and ready to be mailed. The countdown to July 24-25 has begun!

Complete rules for the ARRL Bicentennial Celebration appeared on page 45 of March *QST*. Read them over, decide how many contacts you are going

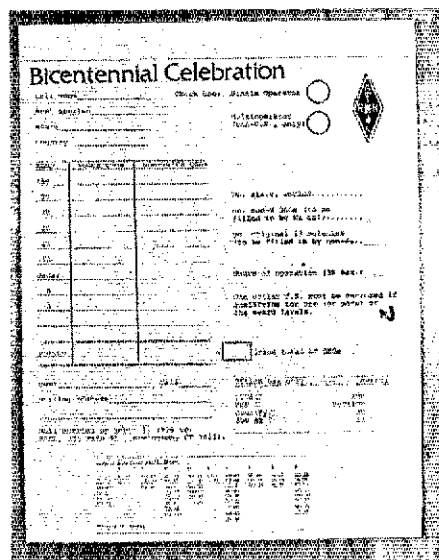


to try to make, and send an s.a.s.e. with plenty of postage to get log sheets and a summary sheet by return mail. The log sheets are for 200 contacts each, and thirteen-cents postage pays for five sheets of paper. Don't forget to ask for "dupe sheets" (Operating Aid No. 6) also. A typical request would be for one summary sheet, 2 log sheets (400 contacts) and 2 dupe sheets (one for cw and one for phone). Sample log and summary sheets are pictured, but it is so much easier to request some from headquarters.

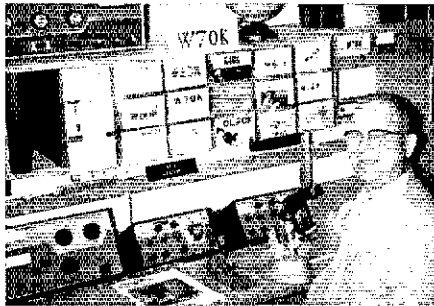
A complete report on the celebration will appear in *QST* early in 1977. A



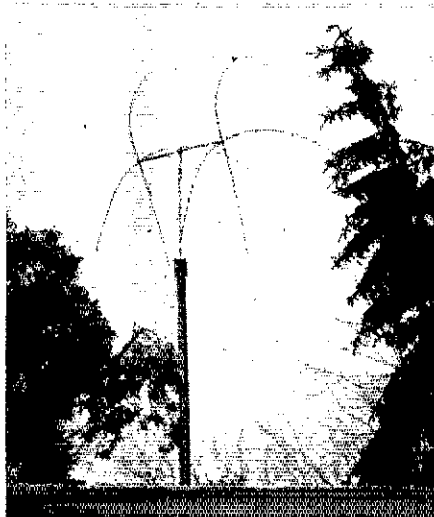
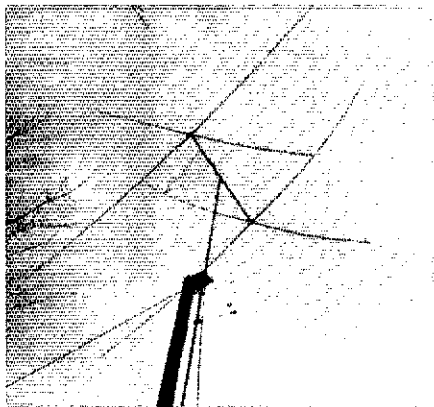
certificate (see photo) and appropriate stickers will be sent to each U.S. and Canadian entrant who qualifies and who requests one. Such requests must be accompanied by one dollar U.S., to help defray costs of printing, cardboard mailing tubes, and first-class postage. Good luck! — WA1STN



Strays



Six years, that's what it took, but Don Brickley, W7OK, has worked all *Callbook*-listed suffixes similar to his. Wallpaper above his equipment testifies to his feat. The W4SN is the former holder of W7OK. The two 70K QSLs in the lower right-hand corner date back to the original 70K operator from the 1920s, now a Silent Key. Dare we add this photo is A-OK?



The iceman cometh . . . and goeth! These before and after photos show W3YX's cubical quads in the last big ice storm in Erie, PA. No damage, though. After the melt, the quad flexed back to normal.

□ For hams, particularly those in homebrew work, a new publication from Compass Publishing Company, Pittsburgh PA 15222, contains 40 tables of all the conversion material needed to be comfortable. *The Metric Conversion Guide* is \$2.95.

I would like to get in touch with . . .

□ anyone interested in starting a Bicentennial WAS Net on 21.150 MHz on Saturdays at 1900 UTC. Mike Hartman and Perry Donham, c/o Terre Haute North Vigo High School, 3434 Maple Ave., Terre Haute, IN 47804.

□ hams who have or are using geodesic domes for their homes. Michael Taylor, WA1TBV, 2 Woodward Dr., Bennington, VT 05201.

□ youth associations and youth club stations worldwide for idea and experience exchanges through amateur radio. Arturo Urbina S., International Relationships, Chilean Amateur Youth Association, CE3AOX, Box 233, Santiago 1, Chile.

□ anyone interested in the peculiarities of pyramids. Thomas Giles, W7ZIJ, 400 Ellis Rd. East, Olympia, WA 98506.

□ any hams who operate maritime mobile on the Great Lakes and who will be operating near Greenland this summer. Don Opedal, KH6GRG/9, 655 E. Erie St., Milwaukee, WI 53202. Aboard the Coast Guard Cutter *Westwind*.

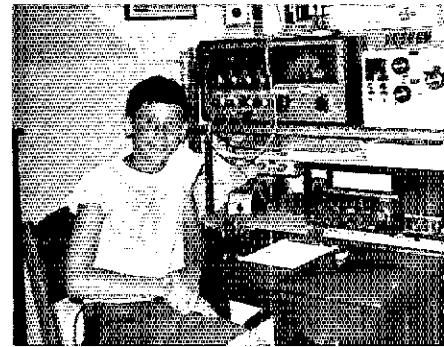
□ other hams who are telegraph operators by profession. L. W. Rice, G3XYT, 542 Chester Road, Wylde Green, Sutton Coldfield, West Midlands, England.

□ amateurs, former engineers, military people who worked on, or were just interested in, the development of airborne radio, particularly Command Sets, before or during WWII, interested in a 1977 reunion; possibly in Dayton, OH. Gordon White, 1502 Stonewall Road, Alexandria, VA 22302.

□ amateurs who breed racing pigeons. I. A. Iannone, M.D., WB0OAZ, 2833 S.W. Coulter, Des Moines, IA 50315.

□ amateurs, members of fire departments, who would be interested in setting up a U.S. Firefighters Net. Tom Meyer, WN5OLA, 3017 San Pablo N.E., Albuquerque, NM 87110.

□ a pen pal, preferably a YL, to correspond with an aspiring ham-to-be. Nick Trio, Bldg. 12, Apt. 226, Solomon Homes, Johnstown, PA 15902.



VE3HGM, Jim Korenev, is a determined young man who was first licensed at age 11, after attending code classes held by the Windsor ARC. At age 12 Jim took, and passed, his Advanced class examination. Now 13, VE3HGM is the youngest Canadian to hold the DXCC Award. He also holds the WAS, WAC and CP with 30 wpm endorsement. Jim's current objective, aside from working DX, is to teach himself to type well enough to put down on paper the 50 wpm he can copy in his head.

□ six-meter hams (preferably Conditional or Technician class) wishing to form a cw net for upgrading purposes on 50.160 MHz, Tues. nights, 0230 UTC at 10 wpm. Mark S. Starin, WA1TZK, 14 Bell Ct. (B3), Burnside Ave., East Hartford, CT 06108.

□ amateurs interested in field trial beagleing. Everett Hubbard, WB9ALI, No. 1 Stonebrook Est., Highland, IL 62249.



Voices of the past . . . still talking today on 40 cw. This is a 1933 station using the Collins 32B transmitter and National SW-3 receiver. It's the attic setup of Robert Cobaugh, W2AY, who operates yet another antique station of 1935 vintage from the basement of his home.

Third Annual ARRL Ten-Meter Contest

Coming down from a high.

By Jim Cain,* WA1STN

What goes up must come down, including the maximum usable frequency (muf). The 1975-76 operating season was not a good one for the 28-MHz band. Freak long-distance openings in July 1975 and in January 1976 for a few hours did not, unfortunately, coincide with any operating activities, and the openings could not be used to their full potential. Conversely, plenty of stations were standing by the weekend of December 13 and 14, 1975, for the third running of the ARRL 10-Meter Contest, only to discover little in the way of exciting propagation.

Things weren't quite as bad as we thought at the time, though. When the first 10-Meter Contest ran in 1973, the average score of the top ten W/VE entrants was only 56,000 points. In 1975, that average was 80K. (Shhh . . . don't anyone mention that last year it was 133K!) 628 hearty souls reported their results to Hq. this year, down from 720 in 1973 and 886 in 1974. The top scores are pretty hefty, though, considering.

Performance under stinko conditions on 10 takes more than a wire or a trap vertical, as a peek at some of the winners' antennas reveals. For your information, here's a rundown of hardware at the top-ten W entrants: K3OIO, TH6DXX; W4WSF, TH6DXX at 55' plus fixed 4-element Yagis pointed west and south; K9HMB, stacked 4-over-4; WA8ZDF, 8-element Yagi at 106' plus 5 at 88' and 4 at 60'; K9BGL, 3-element Yagi; WA3WIK, TH6DXX at 80'; K2GBC, stacked 6-over-6; W3RRX, 5-element Yagi; W9SZR/3, 3-element quad; K9EGA/2, TH6DXX at 75'.

Height seemed to be of the utmost importance, since much of what was worked was ground wave, backscatter and tropospheric bending. Fifty feet high wasn't bad, but a hundred was better.

There was some slight confusion about the scoring this year. Multipliers are counted only once, *not* once per mode. One suggestion found on several logs bears mentioning. What about specifying all cw operation to take place in or adjacent to the Novice segment on 10? Perhaps "28.085 and above," or something similar? That might get a little out-of-hand when the sunspots return and the band is packed with worldwide activity (sigh) but it could work while conditions are tough. Drop a note to Hq. with your feelings, and we'll see that the Contest Advisory Committee members all get copies. The ultimate recommendation will be theirs.

Speaking of worldwide DX, conditions were possibly better in the States and Canada than elsewhere. The lack of entries from Europe and the low scores of those who did report their activity reflect the problems they had. The only bright spots were the brief openings from England to the eastern half of North America both mornings of the contest (as far west as Michigan) and the tremendous signals from New Zealand to all parts of the states both afternoons around 1900Z. Things were so strange, though, that when ZD8LS showed up he was able to work only the Central U.S.; no East or West Coast at all. KC4AAC and others to the south were able to work all parts of the states, and FYØBHI even worked an Indonesian. Ron (BHI) worked 39 DXCC countries, counting the U.S. and Canada.

We're writing this just after the final weekend of the 1976 ARRL DX Competition, and conditions on 10 for three of the four weekends of that activity were mighty poor. One of the two 'phone weekends had some decent propagation; decent when compared to *no* propagation, that is. For our December 10-meter activity, the solar flux index declined for a solid week before and during the weekend; it ended up Sunday at 74, and 80 is usually considered the minimum necessary for F-layer east-west propagation on 28 MHz. That we at least had some tropo and multiple-hop E was a blessing.

Hold it a minute. Some new division records *were* set in 1975. Unbelievable? Maybe, but true. They are: K3OIO, Atlantic and W4WSF, Roanoke, both single-operator stations. New multi-operator record holders are: WB4ASA, Delta, W2SKE, Hudson, W1MX, New

When all else fails on 10, turn your antenna south and look for Argentina. This is LU1DZ, one of the "beacons" on 10 in 1975.



*Asst. Communications Mgr., ARRL



Logger Greg Hitchen and WA3YBT are "Waiting for an Opening" at multi-op station K2GXT.

England. The only record still standing from the first 10-Meter Contest of 1973 is single-operator, Hudson Division, held by W1BGD/2. We have come a long way in only three years.

Soapbox

The continually changing-band conditions made you work quickly for every contact before the band shifted. — (WA3ZTE) With strong openings to New Zealand, the thought of sunspots makes this contest a gangbuster. — (WB2LOF) Got up early and fired up the rig to a good opening, but after a short stint the rig blew up. — (W0YZZ) Frustration — only one signal on the band and he answers everyone except you! — (K4BZH) I have been a Novice for four months and today brought the first time I have heard anybody on the 10-meter Novice band. — (WN6CBY) I don't think that it was the band that was closed but more like the shacks were closed. — (WN7CBA) Luckily the Geminids meteor shower provided scatter contacts to go with the sparse F2 DX coming into this area. — (W0EKB) A pity propagation was so poor. The 10-meter band when open can be the most fruitful. — (PY2BU) Next year please have a few sunspots on hand. — (WN0PAT) I only ran a dipole but still got great reports from the East Coast. — (WB6FHC) More noise than signals. — (W0HW) The opening to Africa was a pleasant surprise. — (WA4FRJ) Conditions over the contest period were poor from central Africa but all in all it was

most enjoyable. — (9J2GJ) One minute you're working a W7, next minute the band dies. — (WN2TQE) About the only thing the old dipole heard was locals. Oh well, there's next year and maybe then my ol' 5-element beam. — (WA7PDW) I can only claim one out-of-state contact but that one was across the U.S. from here, Washington to Massachusetts. — (WN7BJZ) Discouraging to hear other locals working stations I can't even hear. — (K3IXD) Conditions terrible. Two hours into the contest I had contacted . . . 2 stations. — (WA6HXF) The office Christmas party was Friday night and, oh my head, with the phones on Saturday! — (WA4FXW) Big question was where oh where were all the Novices? — (WA8ZDF) Worked my first ZL on 10 during the contest. — (K2ARO) I could write a book on propagation or lack of it. — (WA4HOH) Worked the first six hours on Saturday with only 20 QSOs from Africa and South America . . . but worked the last four hours Sunday and made 90 QSOs — most all from the U.S. — (ZD8LS) Climbed the tower four times Saturday to turn the antenna but no climbing on Sunday because the wind was a little too strong, about 70 mph gusts! — (WB6PXP) QRP operation was lots of fun, not too productive, tho. — (K4KWW/0) Only European stations coming through were Gs. — (K1RQE) I heard a W4 at about 1435 and went out to wind the tower to its maximum height. I called all the Ws and VEs I could hear; not all heard me but 17

responded. — (G3IAS) Monday, the day after it was over, brought the best opening in months. — (WB5LOZ) I wish I had Oscar capability — I could use the multipliers. — (WB5LAL, op. at W5YG) Only reason for sending in my 18-QSOs log is that it was 17 better than my local competition. — (WB6IHU) For sure I will have a beam up for next year — a dipole doesn't make it. — (K7IEY) Conditions here were almost fair. — (WNITDN) A few exciting openings east-west to Africa and north-south to South America. — (K8YFM) Most unusual to hear signals coming into Missouri from north, south, east and west simultaneously — the rotator got a workout. — (W0ERZ)

Top Ten Single Op

W/VE		DX	
K3OIO	116,556	LU1DZ	92,114
W4WSF	103,340	LU2AFH	77,280
K9HMB	97,600	FY0BHI	74,102
WA8ZDF	95,160	YV5ZZ	66,504
K9BGL	71,280	YV5ENI	48,230
WA3WIK	71,036	KC4AAC	43,920
K2GBC	70,980	ZL3GQ	31,556
W3RRX	62,976	5L2AK	23,368
W9SZR/3	59,400	VP2LAW	14,208
K9EGA/2	57,780	H18MOG	10,944

Division Leaders

Single Op	Division	Multi Op
K3OIO	Atlantic	K3EST
K9HMB	Central	WB9KLB
WA0CPX	Dakota	—
WB4NDX	Delta	WB4ASA
WA8ZDF	Great Lakes	WB8OFR
K2GBC	Hudson	W2SKE
W0LGW	Midwest	WB0MCJ
K1RQE	New England	W1MX
W5QQQ/7	Northwestern	WA7LAG
W6KQG	Pacific	WA6UZA
W4WSF	Roanoke	WA4YBV
WB0MIV	Rocky Mountain	—
K4DJC	Southeastern	W4AQL
WB6PXP	Southwestern	K6SVL
WA5LES	West Gulf	—
VE3BVD	Canadian	VE3NCT

Third Annual Ten-Meter Contest

Scores are listed by section within each U.S. call area, by Canadian call area, and by country within each continent. The highest single-operator station in each ARRL section and country receives a certificate. The highest multiple-operator station in each section and country and the highest Novice score in each ARRL section receives a certificate, if there are three or more entries listed in that classification or if, in the opinion of the Awards Committee, the entrant displayed exceptional effort. Read the listings (left to right) call, score, QSOs, multiplier, hours of operation. Asterisks denote Headquarters staff members, ineligible for certificates.

DX

AFRICA

Table listing DX call signs and frequencies for Africa, including Ascension Island, Liberia, Ghana, Zambia, and Asia.

EUROPE

Table listing DX call signs and frequencies for Europe, including West Germany, England, Greenland, Denmark, and Yugoslavia.

NORTH AMERICA

Table listing DX call signs and frequencies for North America, including Dominican Republic, Costa Rica, St. Lucia, and Jamaica.

OCEANIA

Table listing DX call signs and frequencies for Oceania, including Australia and New Zealand.

SOUTH AMERICA

Table listing DX call signs and frequencies for South America, including Antarcitica, Argentina, Bolivia, and Brazil.

CANADA

Table listing DX call signs and frequencies for Canada, including Quebec, Ontario, and Alberta.

U.S.A.

Table listing U.S.A. call signs and frequencies by state, including Connecticut, Eastern Massachusetts, Maine, New Hampshire, Rhode Island, Vermont, Western Massachusetts, New York, and New Jersey.

Table listing U.S.A. call signs and frequencies by state, including Pennsylvania, Delaware, Maryland-D.C., Virginia, West Virginia, North Carolina, Kentucky, Georgia, Alabama, Florida, South Carolina, and Tennessee.

Table listing U.S.A. call signs and frequencies by state, including North Florida, Southern Florida, Texas, Louisiana, Mississippi, Arkansas, Missouri, Illinois, Indiana, Michigan, Wisconsin, Minnesota, Iowa, Missouri, Kansas, Oklahoma, Nebraska, South Dakota, North Dakota, Montana, Wyoming, Colorado, Utah, Arizona, Nevada, Idaho, Oregon, Washington, California, and Hawaii.

Table listing U.S.A. call signs and frequencies by state, including Alaska, Puerto Rico, and various international call signs like Santa Barbara, Santa Clara Valley, San Diego, San Francisco, San Joaquin Valley, Sacramento Valley, and Hawaii.


Straight-Key Night

The July 4 Declaration of Independence from Keyers.

By Ellen White,* W1YL

We warned you that this one was coming (back on page 49 of March *QST*). If you didn't take heed then it means you've only about a month to go to limber up your wrist and psych yourself up for the summer running of Straight Key Night. This event is a six-hour stretch starting at 0100Z July 4. (This is July 3, local time!) Rules require use of a straight key. Suggested

areas of operation on 80-40-20 are 060-080 kHz up from the bottom edge of the cw band; 10 kHz up from the bottom of each Novice segment. If you participate, please use SKN in lieu of RST, preceding the 3-digit report. This will clue in "tuners-by" to what is going on. Following SKN, send a list of the calls of the station you worked plus your vote for the best fist heard that night, not necessarily one you've worked. This is *not*, really and truly, a contest. This is supposed to be fun for

one and all (though not necessarily for your arm!). Speaking of fun, how about including an additional vote in your report — for the most interesting QSO of the evening. Come to think of it, it really is a contest — for the most interesting QSOs! So, how about including an extra vote with your report — for what you consider to be the best chat of the period. Reports, soapbox and photos must be in by July 12 to make the September *QST* report. CQ SKN! 

*Deputy Communications Manager, ARRL

Strays



THE ARRL DX QSL BUREAU SYSTEM

The ARRL DX QSL bureau system distributes cards free of charge from DX stations to amateurs within the League membership area (see page 8.) Every active DXer should keep several 5 X 7-inch envelopes on file with the bureau of his home district. Place your call sign in large block letters in the upper left corner, and attach a single first-class stamp, unless you normally receive more cards. Unclaimed cards are discarded after one year. For more details on the bureau system, write ARRL Hq.

- W1, K1, WA1, WN1* — Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.
- W2, K2, WA2, WB2, WN2* — North Jersey DX Assn., P. O. Box 8160 Haledon, NJ 07508.
- W3, K3, WA3, WN3* — Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.
- W4, K4 — National Capitol DX Assn., Box DX, Boyce, VA 22620.
- WA4, WB4, WN4 — Sterling Park Amateur Radio Club, P. O. Box 599, Sterling Park, VA 22170.
- W5, K5, WA5, WB5, WN5* — ARRL W5 QSL Bureau, Box 1690, Sherman, TX 75090.

- W6, K6, WA6, WB6, WN6* — ARRL W6 QSL Bureau, 2814 Empire Avenue, Burbank, CA 91504.
- W7, K7, WA7, WN7* — Willamette Valley DX Club, Inc. P. O. Box 555, Portland, OR 97207.
- W8, K8, WA8, WB8, WN8 — Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.
- W9, K9, WA9, WN9 — Northern Illinois DX Assn., Box 519, Elmhurst, IL 60126.
- W0 K0 WA0 WB0 WN0 — W0 QSL Bureau, Ak-Sar-Ben Radio Club, P. O. Box 291, Omaha, NE 68101.
- KP4, WP4* — Radio Club de Puerto Rico, P. O. Box 1061, San Juan, PR 00902.
- KV4 — Graciano Berlaro, P. O. Box 572, Christiansted, St. Croix, VI 00820.
- KZ5* — KZ5 QSL Bureau, KZ5OD, Box 407, Balboa, CZ.
- KH6, WH6* — John H. Oka, KH6DQ, P. O. Box 101, Aiea, Oahu HI 96701.
- KL7, WL7 — Alaska QSL Bureau, Star Route, Box 2401, Wasilla, AK 99687.
- VE1* — L. J. Fader, VE1FQ, P. O. Box 663, Halifax, NS.
- VE2 — A. G. Daemen, VE2LJ, 2960 Douglas Avenue, Montreal, Quebec H3R 2E3.
- VE3 — The Ontario Trilliums, P. O.

- Box 157, Downsview, ON, Canada M3M 3A3.
- VE4 — D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg MB R3N 0 E8.
- VE5* — A. Lloyd Jones, VE5JI, 2328 Grant Road, Regina, SK S4S 5E3.
- VE6* — D. C. Davidson, VE6TK, 1108 Trafford Dr., N.W., Calgary 47, AB.
- VE7 — Howard Martin, VE7AFY, No. 45-9960 Wilson Road, Ruskin, BC, VOM IRO.
- VE8* — Al Sturko, VE8NS, P. O. Box 72, Fort Smith, NWT X0E OPO.
- VO1 — William Coffen, VO1KM, P. O. box 6, St. John's NF.
- VO2* — Stan L. Parsons, VO2AS, P.O. Box 232, Goose Bay, LB.
- SWL — Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

*These bureaus sell envelopes or postage credits. Send an s.a.s.e. to the bureau for further information.

□ QSL bureaus for other areas can be found in the December, 1975, issue of *QST*, page 64.

STOLEN EQUIPMENT

□ Stolen from car on Jan. 15 in Wayne, NJ. Standard 826MA, Serial No. 305117. Heathkit Mobile Speaker Model HS-24, Serial No. 00450. Robert Weingaertner, WB2VUF, 4 Leddell Rd., Mendham, NJ 07945.

Contests Versus Emergencies

Suppose you are operating in a contest and someone interrupts your concentration on knocking off contacts by saying, in effect: "Hey, stupid, we're trying to conduct emergency communications on this frequency. Get out of here with your contest." What would you do, or say? Would you ignore him and continue knocking 'em off? Would you zero on him and show him who's boss? Would you tell him to get lost? Would you tell him that the contest was on before his stupid emergency, so let the emergency operation move?

Of course not. What you would do would be to listen to see what was going on; maybe you can help. If not, you'd steer well clear of the frequency as you continue in the contest, and as opportunity afforded, you'd pass the word to avoid using that frequency and listen to WIAW to see what other frequencies are being used for the emergency operation. Sure, you'd lose contest points. To an avid contester, that's a big thing, so let's not pooh-poo it. But is it a bigger thing than an emergency operation?

Believe it or not, contesters have been known to indulge in all four of the hypothetical activities reflected by the four questions above. It doesn't take many stations to cause intolerable QRM to emergency operation being conducted under difficult propagation conditions, and harassed operators of emergency stations are often inclined to be less than polite. This was the second time in the past few years that an emergency has occurred during the heat of an ARRL-sponsored contest. Critics have said that under such circumstances the contest should be called off. The matter has been referred to three ARRL advisory committees for study and recommendation: The Emergency Communications Advisory Committee because emergency communications are involved, the Contest Advisory Committee because a contest is involved, and the DX Advisory Committee because the contest involved in this

case was the DX Contest.

So far, no official committee recommendations have been made, but comments reaching headquarters from committee members seem to indicate that the ECAC is in favor of some restraint on contesters and some provisions for suspending contest operation should an emergency situation develop. CAC and DXAC comments, on the other hand, do not seem to indicate that this is felt to be a practical approach. Some have suggested standard emergency frequencies or segments to be set aside for such purposes only — something that has never been suggested or tried before!

To get the discussion started, the letter to the three committees contained "A Contingency Plan for Emergency Action" which provided for a headquarters person to be appointed by the general manager to coordinate all Hq. action, including a decision on whether or not to suspend a contest in operation when an emergency occurred, or to postpone or cancel one about to start while an emergency is in progress. The announcement would be made over WIAW, repeated frequently, passed along by stations copying it. Contest points made by participants who did not receive or who ignored the announcement would be deducted, and contestants observed to be causing deliberate QRM to emergency operation would be considered for disqualification.

Well, the contingency plan got the discussion started, all right. The biggest question raised was how do you cancel a contest about to start or already started? One comment likened it to canceling an avalanche. Some contesters complained that they were being erroneously maligned, that in the Guatemalan earthquake disaster most of the problem was caused by ragchewers, that in most cases contesters quickly vacated when requested to do so and that the DX Contest wasn't as large a factor in the interference problem as it is being made out to be.

Along with the proposal for special emergency frequencies comes a proposal for special contest segments, with disqualification for contesters operating outside the contest segment. The CAC has studied this in the past and has come up with recommended contest segments for some activities, but nothing with teeth. Do we need teeth? Yes, say the anti-contesters. No, say the contesters; and furthermore, it wouldn't work. If such a procedure *should* be put in effect (over the dead bodies of contest enthusiasts), it would be only fair for it to be reciprocal; that is, no contesting outside the contest segment, no non-contest activity *inside* it. How would you enforce something like that? How would you enforce *any* of the proposals? It's not so easy as it may look.

Another common comment is that emergency organizers should pick frequencies away from the most-used portions of the band. For example, in the Guatemalan disaster one of the most-used emergency frequencies was 14,205 kHz — right where the most activity was located in the DX Contest. Who picked that one, and why? Why not pick a frequency on the high end of the band where contest activity is practically nonexistent?

Does the problem have a solution? Not really. Every proposed solution only seems to raise more problems. The basic cause of the problem, let's face it, is selfishness and intolerance — not on one side alone, but on all sides. If we could get rid of those two personal characteristics, we'd have no problems — not just in amateur radio, but in the world. We would like to hear comments from contesters with ideas on how the contest program could be changed to benefit emergency operation or from emergency organizers with ideas on how the emergency preparedness program could be altered to give more consideration to contest operation. Now, *those* would be worth listening to!

WIAW OPERATING SCHEDULE

Operating-visiting hours are Monday through Friday 1 P.M. to 1 A.M., Saturday 7 P.M. to 1 A.M. and Sunday 3 P.M. to 11 P.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 details and the general contact schedule are available upon request. All frequencies shown are approximate. If you wish to operate, you must have your original operator's license with you. Please note that the station will be closed May 31 and July 5. *Staff:* Chief Operator/ARRL Asst. Communications Mgr. C. R. Bender, W1WPR; Alan Bloom, WA3JSU; Chris Schenck, WB2SE7.

Code Practice

Approximate frequencies: 1.805 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz. For practice purposes the order of words in each line may be reversed during the 5-13 wpm transmissions. Each tape carries check-

*Communications Manager, ARRL

ing references. Details on Qualifying Runs appear monthly in *QST* Operating News. The 0130Z practice is omitted four times a year on designated nights when Frequency Measuring Tests are sent in this period.

Speeds	EDST	UTC
5-7½-10-13-20-25	9 A.M. MWF 9:30 P.M. TThSSu	1300Z MWF 0130Z MWFS
10-13-15	4 P.M. M-F 7:30 P.M. Dy	2000Z M-F 2330Z Dy
35-30-25-20-15	9:30 P.M. MWF 9 A.M. TTh	0130Z TThS 1300Z TTh

To improve your list by sending in step with WIAW (but not over the air!) and to allow checking the accuracy of your copy on certain tapes, note the UTC dates and *QST* text to be sent in the 0130Z practice from the April issue of *QST*.

6/4 It Seems to Us	6/17 Public Service
6/8 Correspondence	6/23 World Above
6/14 League Lines	6/28 YL News

Bulletins

Columns indicate times in EDST-PDST-UTC(Z).

Phone Bulletins (1.82 3.99 7.29 14.29 21.39 28.59 50.19 145.588 MHz):

2100 Dy	1800 Dy	0100Z Dy
2330 M-S	2030 M-S	0330Z T-Su

CW Bulletins at 18 wpm (1.805 3.58 7.08 14.08 21.08 28.08 50.08 145.588 MHz):

1630 M-F	1330 M-F	2030Z M-F
2000 Dy	1700 Dy	0000Z Dy

CW Bulletins at 10 wpm (same frequencies as above):

0000 M-S	2100 M-S	0400Z T-Su
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RTTY Bulletins at 170-Hz shift are repeated at 850-Hz shift when time permits (3.625 7.095 14.095 21.095 28.095 MHz):

1730 M-F	1430 M-F	2130Z M-F
2300 M-S	2000 M-S	0300Z T-Su

Oscar Bulletins (18 wpm on cw frequencies):

0840 M-F	0540 M-F	1240Z M-F
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1400 M-F 1100 M-F 1800Z M-F
1600 Su 1300 Su 2000Z Su

Oscar RTTY:

1700 Su 1400 Su 2100Z Su
In a communications emergency monitor
WIAW for special bulletins as follows (times
in UTC):

Phone: On the hour.
RTTY: At 15 minutes past the hour.
CW: On the half hour.

SCM ELECTION NOTICE

To all ARRL members in the sections listed below.

You are hereby notified that an election for Section Communications Manager is about to be held in your respective sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been both the holder of amateur Conditional class license or higher (Canadian Advanced Amateur Certificate) and an ARRL full member for at least two years immediately prior to receipt of petition at Headquarters. Petitions must be received on or before 4:30 P.M. Eastern local time on the closing date specified. In cases where no valid nominating petitions were received in response to previous notices, the closing date

was set ahead to the dates given herewith. The complete name, address, zip code of the candidate and signers should be included with the petition. It is advisable that a few extra full-member signatures be obtained, to insure that it will be valid.

Elections will take place as soon after the closing dates specified as full information on the candidates can be obtained. Candidates names will be listed on the ballot in alphabetical order. The following nominating form is suggested. (Signers should be sure to give city, street address and zip code.)
Communications Manager, ARRL

(Place and date)
225 Main Street, Newington, CT 06111

We, the undersigned full members of the ARRL Section of the Division, hereby nominate . . . as candidate for Section Communications Manager for this Section for the next two-year term of office.

You are urged to take the initiative and file nominating petitions immediately.

George Hart, WINJM
Communications Manager

SECTION	CLOSING DATE	CURRENT SCM	PRESENT TERM ENDS
SK*	6/21/76		
P. A. Crosthwaite, VE5RP			4/10/75
WY*	6/21/76		
J. P. Ernst, W7VB			6/26/76

*Repeat Solicitations

SCM ELECTION RESULTS

Valid petitions nominating a single candidate were filed by members in the following sections completing their elections in accordance with applicable rules, each term of office starting on the date given.

W.I.	D. Novoa, KP4BDL	2/21/76
S.NJ	R. E. Clancy, WB2GTE	5/21/76
NE	C. R. Dyas, W0JCP	7/01/76
SJV	R. Saroyan, W6JPU	8/20/76
IA	M. Otto, W0LFF	9/11/76
MS	W. L. Appleby, WB5DCY	9/11/76
ON	L. P. Thivierge, VE3GT	9/12/76
AR	S. M. Pokorny, W5UAU	10/12/76

Balloting results: In the South Carolina Section, Mr. Richard H. Miller, WA4ECJ and Mr. Thomas L. Lufkin, WA4DAX were nominated. Mr. Lufkin received 266 votes and Mr. Miller received 122 votes. Mr. Lufkin's term of office began June 6, 1976.

In the Western New York Section, Mr. Scott J. Bauer, WA2LUC, Mr. Joseph M. Hood, K2YAH, and Mr. William W. Thompson, W2MTA, were nominated. Mr. Hood received 499 votes, Mr. Thompson received 441 votes, and Mr. Bauer received 139 votes. Mr. Hood's term of office began April 26, 1976.

In the Minnesota Section, Mr. Franklin B. Leppa, K0ZXE, and Mr. Casper H. Schroeder, WA0VAS, were nominated. Mr. Leppa received 495 votes and Mr. Schroeder received 245 votes. Mr. Leppa's term of office began April 10, 1976.

Operating Events

JUNE

1-30: 160-Meter Activity Period (trans-equatorial tests), daily from 0000-0030Z, extending into July and beyond 0030Z conditions permitting. The objective is to make use of the peak conditions that exist during June for N/S path QSOs on 160 meters. EUs transmit on 1825-1830 (DX window), SA on 1800-08 kHz. Other DX will use one or the other segment, depending on whom they call. Exception: ZS stations will transmit on 1930-1935 kHz. Keep QSOs short. Info. sent in by PY1RO and EI9J.

3: West Coast Qualifying Run, W6OWP prime, W6ZRI alternate, 10-35 wpm at 0400Z (Universal Coordinated Time, abbreviated UTC; Z used as a designator), on 3590/7090 kHz. This is 2100 PDST the night of June 2. Please note that dates are always shown at least two months in advance and times are always the same local "clock time," i.e. 9 P.M. local Pacific time. Underline one minute of the highest speed copied, certify copy made without aid, and send to ARRL for grading. Please include your full name, call (if any) and complete mailing address. A legal-size stamped addressed envelope will help to expedite your award.

5-6: Minnesota QSO Party, SOWP Bicentennial CW QSO Party, p. 67 May.

12-13: VHF QSO Party, p. 62 May. West Virginia QSO Party, sponsored by the state radio council, from 0100Z June 12 through 0059Z June 14, no time limits. The same station may be worked on different bands for additional points. Only one contact per station per band may be counted for scoring. Exchange QSO no., signal report, and county (if WVA); state or country. WVA stations may work each other. Other stations multiply no. of eligible WVA QSOs by the no. of different WVA counties worked. Then use power mult. WVA stations multiply QSOs by sum of WVA counties, states and countries worked. Then use power mult. as follows: Dc input of 200 watts or less X 1.5; dc input of

201-legal limit X 1.0. Only single operators eligible for awards. Committee decisions final. Logs must be received no later than July 17 and cannot be returned. Usual log info. Send to: West Virginia QSO Party, Box 299, Dunbar, WVA 25064. Suggested operating freqs. are 35 kHz inside each cw band and 10 kHz inside the general portion of each phone band.

16: WIAW Qualifying Run, 10-40 wpm at 0130 UTC transmitted simultaneously on 1.805 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz. This is 2130 EDST (9:30 P.M. local Eastern time) the night of June 15. Underline one minute of top speed copied, certify copy made without aid, and send to ARRL for grading. Please include your full name, call (if any), and complete mailing address. A large s. a.s.e. will help expedite your award/endorsements.

19: Ham Holler in Award, put on by the Cape Fear AR Soc., 9 A.M. to 9 P.M. Eastern time. 14180-7280-3980. NC4NHC will be operating from the National Holler in Contest grounds located at Spivey's Corner, NC. The theme for this year will be "Communication - the Old and the New." Certificates for contacting NC4NHC for \$1 (postage/handling) to the Cape Fear Amateur Radio Society, Methodist College, Box M-618, Fayetteville, NC 28301. Requests no later than Sept. 1, please.

19-20: All Asian DX Contest phone (cw Aug. 21-22), 30 hours from 1000Z June 19 to 1600Z June 20, using any band under 30 MHz. Classifications, single op. on 75-10 single band, single op. multiband, multi op. multiband. Exchange RS plus operator's age. YLs may use 00 in lieu of age. No crossband. Single ops. may not transmit two or more signals at the same time. Multiops may never transmit two or more signals at the same time on the same band (one signal per band OK). Multiplier is the no. of points (one point per Asian QSO) times the no. of different Asian prefixes (except for KA) worked under each

band. JD1 stations in Ogasawara (Bonin and Volcano) count as Asia. Minamitori Shima (Marcus) counts as Oceania. Scoring: Sum of contact points on each band times the sum of multipliers on each band. Awards. Please furnish complete band break-down showing calculations. Phone log deadline Sept. 30. Disqualification basis: Violation of contest rules, false statements, dupes in excess of 2 percent. Please note that JAs operate 75-meter phone on 3793-3802 kHz. Please include the usual contest declaration. "50th Anniversary Contest" of the Radio Club Dominicano Inc., the full 48 hours, phone only 80-40-20-15-10 meters. Only single op. single transmitter, all bands. Exchange report plus serial starting with 001. Multipliers are the different countries to be worked on each band and the 9 different districts in the Dominican Republic (HI) on each band. Contacts between stations in the same country worth one point on 40 and 80. Contacts between stations in the same country worth zero points on 10, 15 and 20 but good for multipliers. Contacts between stations in the same continent worth 2 points, regardless of band. Contacts between stations in different continents worth 3 points on any band. Final score equals QSO points times the sum of all multipliers. Trophies and diplomas to N. A. stations contacting 20 or more HIs and at least 10 different countries. Please use different logs for each band, and log in UTC. Include usual summary, equipment description, etc. Disqualification basis: Violation of contest rules and/or regulations of the licensing country, more than 3-percent dupes, non-indication of time/date in UTC. Postmark entries on or before Sept. 19 and send to: Concurso 50th Aniversario, Radio Club Dominicano Inc., Apartado 1157, Santo Domingo, Dominican Republic.

23: WIAW Morning Qualifying Run, 10-35 wpm, at 1300 UTC. This is 9 A.M. EDST, same frequencies/details as under the June 16 listing.

26-27: FIELD DAY, page 64 May.

JULY

1: British Virgin Islands QSO Party, sponsored by the BVI Radio League, the full UTC period, celebrating Territory Day. A colorful certificate signed by the Governor and the Chief Minister of the BVI for submitting proof of QSOs with three VP2V stations during the stated period. Information submitted by VP2VAW/VP2VBM.

3-4: Venezuelan Independence Contest, phone, full UTC period, (cw period July 31-Aug. 1) sponsored by the Radio Club Venezolano; 3.5 through 28 MHz. Categories: Single op. single band, single op. all band, multiop. single transmitter, multi-multi. (only one signal per band permitted). Exchange usual RS(T) plus QSO no. starting with 001. Multis.: One for each different YV call area on each band, one for each different country worked on each band. Contacts between stations in different countries are worth 2 points, between stations in the same country have zero point value, both do earn country multiplier credit. Final score equals QSO points times sum of YV zones and country multipliers. Trophies, medals, certificates. Log in UTC, indicate multipliers first time worked per band. Separate sheets must be used for each band. Disqualifications: Violation of regulations, violation of contest rules, non-indication of UTC, bands, modes; 3-percent or more dupes. Deadlines: Postmark no later than Sept. 15 for phone and Oct. 15 for cw; entries must be received by December 15. A remittance of \$2 U.S. for awards/handling/postage. Usual signed declaration with all info.

4: Straight-Key Night, rules this issue.

17-19: VHF Space Net Contest celebrating the U.S.A., Apollo II and the Apollo/Soyuz missions, from 6 P.M. Sat. to 6 P.M. Sun. each weekend (July 3-4, 10-11, 17-18, 24-25). Each QSO counts as two points. The same station can be reworked on different vhf/uhf bands/modes for additional points. All worked stations can be reworked again during the balance of the month's weekends for additional two points. Each different Zip code counts as one multiplier. Any contacts out of the U.S.A. will use the post office town or city in lieu of a Zip code. These will count as multipliers. Repeater contacts not valid, except for satellite or moon bounce. To score: Add all two-point contacts and multiply by the total of different Zip codes and post office locations. Trophy plaques for four power categories, Class I 100-1000 watts input, Class II 25-100 watts, Class III 5-25 watts, Class IV 1-5 watts. Additional plaques for club participation, note on logs accordingly. A club official should submit a club aggregate score. Mailing deadline August 21. Enclose an s.a.s.e. for results. Bicentennial calls also valid for scoring.

7: West Coast Qualifying Run.

10-11: VHF Space Net Contest, see July 3-4 listing.

15: WIAW Qualifying Run.

17-18: Colombian Independence Day Contest sponsored by the Liga Colombiana de Radioaficionados, the full UTC period. Classifications: Single op. single band, single op. multiband, multi-multi (one rig); 80-40-20-15-10 on phone and cw. Call CQ HK. Exchange usual serial (report plus QSO no. starting with 001). Each HK QSO worth 5 points, each QSO with a station in another continent counts 3 points, each QSO with a station in a DX country counts 2 points, with stations in the same country 1 point. The multiplier is the total no. of different countries worked in all bands. Score equals sum of points multiplied by the all-band multiplier. Log in UTC, separate logs for each band, note country first time contacted per band, include summary and signed declaration. A minimum of 50 QSOs must be shown in the log to qualify for any award. Only one contact per band with the same station. No cross-band or cross-mode. Club stations must submit in multi-multi single transmitter category only. In excess of 2 percent dupes grounds for disqualification. Entries must be postmarked no later than Sept. 30: Send to LCRA Concurso Independencia, c/o Contest Committee Mgr., Apartado Postal 584, Bogota, Colombia, SA.

VHF Space Net Contest, see July 3-4 listing. 17-19: CW County Hunters Contest, from 0000Z July 17 through 0600Z July 19. Call CQ CH. Exchange QSO no., category (portable or mobile, P or M), RST, state (province or country) and county (U.S. stations). Stations may be worked once on each band and again if the station has changed counties. Portables or mobiles changing counties during the contest may repeat contacts for QSO points. Stations on county lines give and receive only one no. per QSO but each county is valid for a multiplier. QSOs with fixed stations 1 point, with portables/mobiles 3 points. Multiply the no. of QSO points times the no. of U.S. counties worked. Mobiles/portables calculate their score on the basis of total contacts within a state. Suggested freqs.: 3575 7055 14,070 21,070 and 28,070 kHz. Awards. Logs must show category, date/time in UTC, stations, exchanges bands, QSO points, location and claimed score. All entries with 100 or more QSOs must include a check sheet of counties worked. Enclose a large s.a.s.e. if results desired. Logs must be postmarked by Sept. 1 and sent to the CW County Hunters Net, c/o Jeffrey P. Bechner, W9MSE, 673 Bruce St., Fond du Lac, WI 54395.

24-25: ARRL BICENTENNIAL CELEBRATION, this issue. VHF Space Net Contest, see July 3-4 listing.

31-Aug. 1: Illinois QSO Party, 14th annual, sponsored by the Radio Amateur Megacycle Society, from 1800Z July 31 to 2300Z Aug. 1 with a rest period from 0500-1200Z Aug. 1. All bands, cw/phone. The same station may be worked on cw and phone on each band. No repeater contacts allowed. Suggested freqs.: About 60 kHz from the low end of each cw band, about 35 kHz from the high end of each phone band (also 21375/28675), about 25 kHz from the low end of the Novice bands on the half hour. IL stations send RS(T) and county. All others send RS(T) plus state, province or country. To score: IL stations add the no. of IL counties + states + VE provinces + ARRL countries. Multiplier total by the no. of QSOs. IL mobiles add 200 to the score for each county of operation from which 10 or more contacts were made. Non-IL stations multiply total IL contacts by the county multiplier. For non-IL only, extra multipliers may be counted for working the same county. Each group of 8 QSOs with the same county equals one bonus multiplier. Awards plus Nov. SS club-type competition. Legible logs plus separate summary with all info. (and claimed multis.) no later than Sept. 15. Send with large s.a.s.e. to RAMS, K9CJU, 3620 N. Oleander Ave., Chicago, IL 60634. The RAMS continues its assistance in the renovation of the famed WW-II submarine the USS *Silverides*, and will again operate from aboard during the QSO Party. Each contact with the sub, K9CJU/9, will count as 5 regular contacts for scoring. YV Contest, cw, see the July 3-4 listing.

AUGUST

5: West Coast Qualifying Run.
7-8: CP Contest, YO DX Contest, Ten-Ten Net Summer QSO Party.
13: WIAW Qualifying Run.
14-15: WAE Contest, cw.
21-22: All Asian Contest, cw. New Jersey QSO Party.
28-29: Arizona QSO Party.

SEPTEMBER

11-13: VHF QSO Party, note this is a date change.

OCTOBER

8-10: CD Party, phone.
16-18: CD Party, cw.

NOVEMBER

5: Frequency Measuring Test.
6-7: Sweepstakes, cw.
20-21: Sweepstakes, phone.

Strays

Stolen Equipment

□ Swan 350, Serial No. C437334, with ac power supply 117X, Serial No. 0291720 and Turner mic 454 type, taken from home in Fairfield, PA. R. G. Hildenbrandt, W3TOO, 4015 Montpelier Rd., Rockville, MD.
□ SB144, Serial No. 62092, stolen from car night of January 9-10, stenciled with W5PJ. Dr. Shailer Peterson, W5PJ/KAHL, 5111 Keystone Dr., San Antonio, TX 78229.
□ ICOM 230, Serial No. 2403241; ICOM IC-3PA, Serial No. 1105929; Drake TR-22C, Serial No. 940898. Michael Mockler, 121 S. Oxford Ave., Los Angeles, CA 90004 or Wilshire Div. of LA Police Dept.
□ HRZA, Serial No. 04-08087, stolen in Windsor Locks, CT, from Jim Grant, WA1AZJ, 15 Hobson Ave., Windsor, CT 06095.
□ Swan FM1210-A, Serial No. 10258, and Autovon touchtone pad taken on Jan. 12

from the home location of Chuck Hunt, K9FXW, 1557 Irving Pk. Rd., Itasca, IL 60143.

□ Heath HW-202 2-meter transceiver stolen. Contact Doc A.L. Stigers, 2572 Beach Ct., Golden, CO 80401.
□ Clegg FM-27B, Serial No. 27114-5277 taken from auto at 1304 Highland Ave., Greensboro, NC 27403, on Dec. 25. Gwyn D. Stewart, W4AKU.
□ Theft from car on Jan. 16 in Winston Salem of a Clegg FM-27B, last four numbers of Serial no. are 2509. Dwight Jester, WB4SIW, 1821 Oakland Dr., Winston Salem, NC 27103.
□ Drake TR-22, Serial No. 720442, stolen from auto on Jan. 11 in Trenton, NJ. Contact Hamilton Twp. Police Dept.
□ Swan FM-2X, Serial No. 10053, taken from parked car in Fort Lauderdale, FL, on evening of Jan. 8. Contact Fort Lauderdale Police Dept., Case No. 76-2664.
□ Clegg FM-27B, Serial No. 27112-729B,

stolen from auto in Alexandria, VA, on Dec. 18. W.O. Eden, W7KXK, Rte. 2, Box 5166, Florence, OR 97439.

□ Heathkit HW-202, Series 11539, with microphone and Western Electric touchtone pad, taken from car in Boston, MA, on Jan. 9. Contact Frank Carroll, WA1EEJ, at American Red Cross, Greater Boston Chapter, 99 Brookline Ave., Boston, MA 02215.
□ An IC-30 A, Serial No. 380-3226 stolen on Jan. 5, near Wilmington, DE. Notify Delaware State Police, Troup 6, or owner, Greg Winner, WA3EIO, 1555 Springhill Dr., Aston, PA 19014.
□ Regency HR-2B, Serial No. 49-00-829 reported stolen. Contact Wyoming Michigan State Police, or Michael F. McNea, WA8RWI, 2531 Fox Run Rd. S.W., Wyoming, MI 49509.
□ Drake 1R-3, Serial No. 3247A, with Astatic mobile mic, stolen from car Feb. 4. Bob Smith, K9ESI, 504 Arlington, Elmhurst, IL 60126.

Station Activities

SCM AREC ORS OVS SEC OBS TCC OO NTS WAC

CP A-1 OPR EC DXCC CLUBS RM OPS FCC PAM WAS

CANADIAN DIVISION

ALBERTA: SCM, Don Sutherland, VE6FK — Asst. SCM: John Wilkinson, VE6ALR. SEC: VE6XC. ECs: VE6WJ VE6AW VE6CAS VE6AVU VE6ALV. OOs: VE6MJ VE6GO VE6TY. PAM: AP5N VE6AFO. PAM: UHF VE6CFK. regret to report to report the following Silent Key: VE6AFQ and VE6AMV. Ex-VE4RY, AF1, VE6FL back in Calgary sporting the call VE6AWD. SEC VE6XC toured Alberta, subject matter traffic. The Canadian Radio Relay League of ARRL is publishing a fine Newsletter. All affiliated clubs receive it. VE1SH, Director will place any legitimate club on his list on request. The annual Mearns affair was again successful. White-cane VE6BCZ and 26 other disabled skiers visited Japan. VE6XX VE6FV and VE6UW are in hospital. Propagation is poor for all nets but is hitting 75/80 the hardest. PAM VE6AFO could use some volunteers for NCS on A-1. Congrats to VE6ASL on appointment to EC. Traffic: VE6FK 141, VE6GS 72, VE6SN 11, VE6AFO 9, VE6VS 9, VE6AAT 8, VE6VM 6, VE6AFJ 4, VE6AFW 3, VE6BBU 3, VE6AMM 2, VE6HO 2.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — Asst. SCM, Merl Fordy, reports the increase of TVI Birds on 3650 kHz position of changing 3650 frequency. VE7QT after years of work on the amateurs behalf has retired because of health from the PEP and VE7UH has taken over the duties. Surrey ARC's officers, VE7CBM, pres.; VE7CJG, secy. VE7BK is in hospital. VE7SCR, Senior Citizen Radio Club, had a most fun party, and every one there took home a gift. All the girls received a letter rose. QCWA members in BC are forming their own chapter and looking for Charter members, contact VE7FB. Traffic: (Mar.) VE7CDF 116, VE7ZK 89, VE7BLO 63, VE7MW 8. (Feb.) VE7HQ 63.

MANITOBA: SCM, Steve Fink, VE4FQ — RM: VE4PG. PAM: VE4JP, ORS: VE4EA VE4UL VE4LG VE4TY VE4RO. OPS: VE4LU VE4JA VE4CR. OOs: VE4MG VE4HE. ECs: VE4NE VE4NW. OOs: VE4VV VE4SW. OVS: VE4AS. VE4QS and VE4OD passed their Advanced Class exams. Wedding bells recently rang for VE4AJ and for VE4EA, while new junior ops were welcomed at the QTHs of VE4ZF and VE4HE. New on MTN are VE4AAJ and VE4AAW. MTN (3660 kHz 1830 local time daily): 61 sessions, 276 QNI, 123 QTC, MEPN (3765 kHz 1900 local time daily): 31 sessions, 1154 QNI, 18 QTC. Don't forget Field Day June 26-27, and we'll see you all at the Peace Gardens Hamfest July 10-11. Traffic: VE4PG 155, VE4UL 123, VE4QW 41, VE4IX 19, VE4HR 7, VE4CR 6, VE4LN 6, VE4FG 5, VE4CA 4, VE4YR 4, VE4NE 1, VE4XQ 1.

MARITIME — NFLD: SCM, Aaron D. Solomon, VE1OC. Asst. SCM: Maurice Gladden, VO1FG. SEC: VE1CA. EC: SEC: VE1KM. RM and APN Mgr.: VE1AAO. New appointments: EC VO1MO and EC: VE1AYI; RM (Nfld.): VO1GW; ORS: VE1AAO VO1GW VE1BDT VE1BFV; OBS: VE1XG; PAM: VO1JN; OPS: VO1JN VO1MO. Recent hospitalizations are VE1CL VE1DD VE1NH VE1FD. VE1 Contest winners: CW: VE1AWN VE1MF VE1AAO; Phone: VE1KQ VE1CB VE1AMB; VHF: VE1AAW. Congrats: VE1AAO appeared on the 10pm ham on Amateur Radio. VE1SH, Can Director sending out very interesting Newsletter. VE7CCI and VE7DFJ operating portable VE1 from Halifax. VE1AMN passed Advanced Class exam. VE1BFV active from Sable Island, NS. VE1AAO editing Newsletter for APN Net. Reports heavy Mar. traffic. Make reservations now for ARRL convention: Hwy. 101M, Aug. 20-22, 1976. VE1PX and committees planning interesting program. VO1MO and VO1JN setting up 6-meter link. Congrats to VO1JT on winning Bob Lewis Award. VO1FG suggests getting brass keys ready for Fred Ezeckiel and Earnie Ash Awards. Another wind shield has been made and antennae in Nfld. VO1KM, GSL Mgr. very busy due to high cost of direct QSLing. VO1GW starting VO1 CW Net 3654 kHz 2200 UTC, daily. APN: sessions 30, QNI 130, QTC 151. Traffic: VE1AAO 204, VE1BDT 151, VE1RO 109, VO1GW 66, VE1BFV 37, VE1AMR 24, VE1AMN 18, VE1OC 18, VE1NEB 6, VE1ST 6.

ONTARIO: SCM, Holland H. Shepherd, VE3DV. Asst. SCM: N. Nimmons, VE3GOL. This month we hail the Public Service projects in Peterborough, Windsor and Ottawa. The Peterborough Ham is also a teacher at the Adam Scott Collegiate and Vocational Inst. With films and materials sent by ARRL, a reading room and small innade; poster, literature, and QSL card display exhibited; two films were shown during lunch periods and subsequent code and theory classes started. Any hams with used or spare gear might consider helping this school to realize their plans for building their own station. VE3GOL conducts a reading room and theory code and theory classes at Algonquin College, Ottawa. Gerry attracts many CBers and graduates 30 to 40 licensed hams per course. Fine work! Windsor hams VE3EWD VE3IE with inspiration from VE3HAR applied for and received a New Horizons grant to help them launch the Windsor Sun Parish Amateur Radio Retirees Club VE3RCR. The unique factors of their operating and storage rooms is the No. 1 Fire Hall, atop which stands their 65 ft. tower which will soon support 11 antennas. Being located in the Fire Hall means they have total emergency power making VE3WRC stand out as a key station for Southern ON. The Ottawa ARC reports pres. VE3CRX says the club has furnished and equipped a waiting room and small Hematology Lab at the Children's Hospital of Eastern ON. The Wheel Chair Olympics will be held in London, ON May 20 to 27. We expect VE3VPH's Allen McNaughton to add to his present six medals. VE3VPH's Linda Jane France is a busy VE3 QSL bureau volunteer. She has been working traffic on the OPN and providing the work for the Wheel Chair Roundup Net which follows OPN. A dedicated Ham who has just left the "unsung" ranks is VE3AGS recently named Amateur of the Year. Our congrats and thanks to Wes who continues to give his dedication and assistance to the field of Amateur Radio. We extend our sympathy to the families and friends of VE3IQ VE3AJT now Silent Keys. Traffic: (Mar.)

VE3GOL 311, VE3SB 158, VE3FRG 157, VE3DPO 105, VE3GFN 93, VE3GJG 82, VE3AWE 61, VE3DVE 56, VE3GCE 50, VE3EWD 47, VE3CDK 45, VE3BZB 37, VE3DZK 34, VE3GT 32, VE3EBC 29, VE3GNW 29, VE3ATR 20, VE3PHQ 12, VE3EKC 11, VE3DV 7, VE3GEG 7, VE3HJG 5, VE3BZR 4, VE3DH 3. (Feb.) VE3DZK 34, VE3DVE 23.

QUEBEC: SCM, Larry Dobby, VE2YU — VE2UY says that VE2XO spends many hours putting his phone patch to good use, it is with deep regret to report VE2EAR, ex-VE2YU as a Silent Key. We welcome VE2EAR and VE2EAS to the ranks of the amateur. Welcome also VE2EC. Congrats to the gang at Westminster School after successful completion of another year of code and theory classes under the direction of VE2BBP. The West Island Club held another record breaking auction. VE2RM group have plans for summer activities at the site which may include the erection of the second tower for use in contests(?). VE2PY moved to a new location but seems to be suffering from intermod problems. More amateurs are acquiring combined ssb, cw and fm rigs for 2 meters. This is sure to encourage more activity on the low end of the band. VE2IJ and crew still very busy with the plans for C220 at the Olympics. Traffic: K2HI/VE2 99, VE2WT 91, VE2DUB 45, VE2EC 34.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: K3KAJ. RM: W3EEB. PAM: WA3DUM, PSHR, AD3YHR 50, WA3DUM 49, K3KAJ 44, WA3WPY 44, AA3GAY 40. W3DQ received the sympathy of the DE amateurs at the passing of his wife. W3EGN, Army State MARS Director is organizing MARS members and other amateurs into a unit to provide communication for Wilmington 76 on the 4th. W3TCF is now active on the DTN. DE Ham Snowbirds W3EFC and W3WYO have returned from 74 in FL. WA3PCC had an interesting business trip to India. The annual Spring DE Ham Campout will be held June 4-6th at Tuckahoe Acres near Dagsboro. For more information contact K3YHR. DTN: QNI 443, QTC 70. DEPN: QNI 80, traffic 5. Traffic: WA3DUM 49, WA3WPY 67, W3EEB 64, K3KAJ 62, AD3YHR 5, W3DKX 33, AA3GAY 13, WA3UUN 13, W3WD 12, W3YAH 9, W3HGA 2, WA3WY 1.

EASTERN PENNSYLVANIA: SCM George S. Van Dyke, Jr., W3HR. SEC: W3FBF. PAMS: WA3PZO WA3VJ, M3, W3EML, K3MVO WA3OIM WA3PHQ WB2FW/W3. Net reports EPAEP&TN: QNI 302, QTC 75; PFN: QNI 500, QTC 460. BPLs: W3CUL W3VR K3NSN WA3ATQ WA3THT. PSHR: WA3PZO K3OIO W3IPX WA3QOZ. OVS reports WA3NDQ WA3KFT WA3BSV W3GOA K3TRM WA3BJQ W3CL. OO reports K3RDT W3NMC K3NSN W3VOI K3OIO W3EML W3KCM. OB reports WA3QOZ WA3EML W3CL W3VID K3BHU W3VA W3ZRG WA3LWR. A speedy recovery to XYL of W3EML, she had a nasty spill! WA3ATQ says spring not here yet, WA3PZO got in on the Guatemala traffic. K3MVO says condx are slightly better than a jamming signal! WA3THT tried for top op. in EPA by climbing his tower, W3ID says the RTTY net free and time is abating. K3ATJ pinch hitting for W3AVJ who is on vacation. WA3YMV learning of Murphy's talents! W3CL says BARCC is all set for the convention. Clarks Summit has a new repeater on 147.00. W3ZRG retired his old 813 boiler, now heating shack with new SB220. His antennas stayed up during the big blow, now consulting on wind proof sky wires. W3BNR just can't stay home, so he bought a new 2M FM rig! Many stations reporting their reports not listed and they have sent one in via msg. Let's not lose those msgs. WA3BSV has been getting repeater going. W3GMM says his W3EML still has to be rebuilt, can't get tubes anymore! W3EML still active on the net. Watch, WN3ZMC waiting for his big G to join traffic nets. W3GLP & WA3HZ got the big A. W3HYT & WA3QEF got the big E. LVARC has a counter as club project. WA3VEO rec'd certificate of merit for her fine work on Guatemala traffic and resulting favorable publicity. EPAEP&TN has nice news bulletin. The NE Phila ARC has a new home, Phila Naval Depot and a complete line of HF and VHF gear. They are looking for new members so contact WA3VVI. New officers: Delmont Radio Club WA3RMA, pres.; WA3VEA, vice-pres.; WA3NLT, 2nd vice-pres.; W3FB, secy.; W3UJ, treas. Lackawanna Valley Rptr Assn. WA3YDE, pres.; AA3LWR, vice-pres.; AA3FQX, secy.; WA3EUL, treas. Brant has renewed interest on 13-7 with auto patch and RTTY control. WA3JUI is trying to get enough activity to have exclusive RTTY Rptr. WN3BNY's rig weighs more than he does. Don't forget those net reports. Have a nice summer vacation and come home rested for the fall traffic season. Traffic: (Mar.) W3CUL 3410, W3VR 884, K3NSN 670, WA3THT 326, WA3ATQ 264, W3EML 156, WA3PZO 145, K3OIO 117, W3IPX 109, K3MVO 108, WA3CFU 62, WA3QOZ 50, W3WRE 48, W3ID 30, WA3QY 27, W3ADE 26, AA3GLG 23, W3AVJ 20, K3BHU 20, WA3YMV 20, W3CL 15, K3GJL 11, WA3MVP 11, WA3LWR 6, WA3MT 6, K3HS 6, W3HK 6, K3KNL 6, WA3WA 6, W3ZRG 4, W3BNR 3, K3NYX 2, W3VA 2, WA3BS 1, WA3BQ 1, W3GMM 1, K3KCM 1, W3KEK 1, WA3VDQ 1, W3GOA 1, WA3DGD 1, W3VOI 1, W3EU 1. (Feb.) WA3CFU 15.

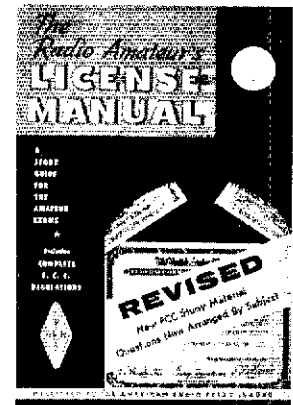
MARYLAND-DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — RM: W3FZV/MDD 3643 at 1900 and 2230 local daily. PAM: WA3EOP/MDCTN 3920 at 1800 TTSS. NCM: W3LDO/MEPN 1800 at 1800 MWF and 1300 SS. WR PON: W3DFW at 1715 on 3905 except Sun. MDD/MEPN/MDCTN Picnic Sat. Aug. 21 Patapsco State Park McKeldin Area No. 501. All in the family. WN3BOQ a new AREC man, age 12-1/2. New appointees W3FO WA3UHU W3EIL WA3KCY and WA3NSA as OOs. WA3UXU ORS. Congrats to WB3AOI WA3HEM upgrading to Advanced and to WN3YOH awaiting new prefix or call. AA3YKK successfully made the 25 wpm code run. W3GRF has special authorization for 3rd party tlc. with France during a reunion of WW II American Veterans. YL's WA3HEN busy with Bi-Cent. WAS.

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W3CDQ looking for a visit by Z56GH and WA3ZAK QRL on the HSSN. K3GJD puts the QRS and other goodies on 0767. M-F 7:30 AM thru WB3ZAU retransmitting on 34/94 M-F at 6:00 PM. Give a listen! W3DOS maintains a Sun. only Foreign Service Net on 14,315 at 1500 UTC and on 21,415 at 1530 reports WASSPI, QOS Club secy, WB2TJR/3 eye-hailed KVA4AA during recent vacation trip. Congrats to K3DI (precent award No. 166, W3JZ still all MARCS. Good EC reports from W3ZNW and W3JUH. WA3ZOR reports K3CMY averted a possible tragedy thru use of the MARC repeater and autopatch. WA3UXU looking for operators to start an East Coast RTTY net. Big winds Mar. 21 blew down 80-meter dipoles of W3HWZ WA3ZEE WA3ZAS W3NXX and others. News items reported lost. QY reporters on WA3KJ WA3SZZ WA3NSA and K3DI. W3BHE says the 28/88 repeater antenna is at 2900 feet MSL. W3QW is full power 80 thru 10 meters ssb and 2-meter fm. W3FCI enjoyed a few hours in the DX fray. W3MWD and WA1VMV/3 are MEPN NCM nominees. W3EOV QRT from home while traveling to So. Atlantic States with plans for YEL. VO for mid-summer. WA3SJV keeps right on plugging 20 meters and up. WA2QNT/3 new in Balto and active cw and fone nets. W3DFW busy NCS on the PON nets. AA3QIA manages NCS job on MDD besides the school load. W3CWC is manned by WA3EOP. W3LDD looking forward with pleasure to his replacement at NCM. W3ZVZ says DX test was rough. WB3AJQ building up the PSHR score. WA3JUF battled both flu and transmitter problems. WA3PRW almost lost his rig to thieves. Net/sessions/rtc/QNI average. MDD 59/218/6.9. MEPN 21/47/25.9. MDCNT 17/44/19. WR PON 13/40/17.7. Top brass WA3WY and W3FA. Toppers W3ADG offers W3FA W3HJN W3JQ W3JQ W3JQ W3JQ W3JQ W3JQ WA3ZEE. Top Honor Rollers WA3ZEE W3ADO W3OMN and WA3YKK. Traffic: W3FA 95, W3MWD 95, W3FVZ 89, WA3SJV 71, AA3YKK 71, WA1VMV/3 60, W3CWC 59, WB3AJQ 58, WA3JUF 50, WA3UXU 50, WA3UYE 44, WA3NSA 31, W3LDD 29, AA3QIA 22, WA2QNT/3, W3EOV 6, WA3PRW 6, W3BHE 2, W3QW 2, W3ZNW.

SOUTHERN NEW JERSEY: SCM, Charles E. Travers, W2YPZ — EC endorsement Burlington Co. is K2QIJ, who has done much in activating the AREC program in his area. Assistants are W2HOB and WA2OTJ. Regular exercises are held on the repeater AF2ADU on 147.75/15. Gloucester Co. Radio Amateurs reports W2ETVC is now the 2nd active repeater in the area. W2B2XD. A very interesting and instructive talk was given by WB2LGI at the DVRA on "Electronic Tools and Instruments for the Radio Amateur." Mgr. WB2VTT of the NJ Phone Net reports QNI 657, QTC 374/332 for the daily net meeting at 6 PM on 3950 kHz and on 21. QNI 657 on Mar. 24/25. Members are reminded to submit official appointment certificates for endorsement as soon as possible. These appointments should be kept up to date and remain in force for a period of two years. Traffic: WB2LCB 295, WA2AZU 40, W2IU 18, WB2OSQ 6.

WESTERN NEW YORK: SCM, Joseph M. Hood, K2YAH — I thank for the many congratulatory letters and messages. As new SCM I am reviewing section appointments and holding them until official appointment renewal or endorsement please advise me if you wish to retain or cancel the appointment. K2KIK renewed as ORS and CO. W2MTA reports that the new 6:30 PM session of 2RN working well. WB2UBW has a new tri-bander at 50 feet. WA2PEA, EC Onondaga Co., reports unannounced callup to AREC on Mar. 16 had 36 stations on 49.9 repeater in 45 minutes. WA2PEA announces WA2PUU and WA2LUF appointed asst. EC. WB2ZEA has returned from W5-Land. His new QTH Liverpool, NY. Regret to report W2FTF a Silent Key. WR2ACU now has cw time table. Newly formed Kodak Apparatus Division ARC finally set up on WA2EGL and is active on 38.5 and 2M fm. WB2GGM coordinated RARA and RRA support for Hike for Hope. K2OJU W2EMX W2ECH K2ZCU and WB2EDT provided critical communications when telephone service lost at Blossom Nursing Home on Apr. 7. WR2ABF auto-patch and WR2AEI used in hospital and medical supplies. Congratulations to WA2LYK for BPL and PSHR also to W2MTA and WB2UBW for PSHR. Traffic: WA2UYK 56, WA2UBW 294, W2MTA 145, W2RUF 120, WB2VND 64, WA2AIV 55, W2PZL 55, W2FZK 54, WA2TPC 38, WA2PEA 36, W2RQF 27, K2KTK 21, W2DRCC 19, K2OFV 18, W2RUF 17, W2EAF 9, WB2QIX 8.

WESTERN PENNSYLVANIA: SCM, Donald J. Myslewski, K3CHD — SEC: W3ZJUH. Asst. SECs: K3SMB WA3LJW. RMs: W2KAT/3 W3NEM W3LOS W3KUN. Net kHz Time/Days
WPA CW Traffic 3585.0 7:00 PM Dy
PA Phone 3960.0 5:00 PM M-F
WPA RACES 3990.5 9:00 AM Su

The appointment of Phone Activities Manager (PAM) is available and open to any WPA member who can quality. Contact me if you are interested in this important appointment. A reminder — don't forget the annual WPA picnic on Sept. 12 at Cook's Forest State Park. Mark your calendar now. Field Day is June 26-27. Oldtimers and newcomers together, let's all get out and make a good showing in the WPA Section. The SCM can be contacted thru W3GJN. Net W3GJN ARC. Congrats to W3NZYC, a new Novice: WA3ZYO and WB3AHC, General Class: WA3ZOX WA3MKT W3FVU and K3VDE Advanced Class. A new UHF repeater is operational in the Centerville area on 449.95/444.95 MHz as WR3AGK. The Univ. of Pgh. is sponsoring the special events call N3AS. A sponsored a NASA Forum with WA3PMT and WA3RVJ assisting. FBI WA3QJT is back from the Air Force. WA4IMS K3DJU K3DMG and K3ISO are active on 439.25 running fast scan A1V. WA3PIU and WA3UBJ will conduct code and theory classes at Penn State. The Nittany ARC "Ham of the Year" was awarded to K3RXK. K3LVO spent two weeks in E. West Virginia rig WA3WJ constructed a homebrew KW. The Penn State ARC has remodeled the club shack. W3ZX received the 30 wpm certificate. W3JUH is using a new HyGain 1BHT. WA3VJA will QSY to GA for the summer. W3VI made BPL. The WPA CW Traffic Net had 31 sessions in Mar. 366 stations checked in, and handled 221 messages. PSHR Net WA3EOP 49. Traffic: W3YI 803, W2KAT/3 287, WA3VBM 282, K3M1Y 106, W3KUN 58, K3CHD 51, K3KCT 37, W3SN 25, W3GJN 23, WA3AHP 20, W3IDU 19, W3SAY 17, K3CR 15, WA2UDS/3 13, W3ATQ 8, K3SJM 8, W3UT 8, WA3SFW 7, WA3MPT 4, K3RXK 4, K3VQV 4, W3YD 4, WA3VJA 3, K3OYB 2.

CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, AC39PN — Asst. Secy: Harry Tucker, W9RYU. SEC: W9AES. PAM: WA9KFK. RM: K9ZTV, Cook County EC: W9HPG.

Net	Freq.	GMT	Days	Tfc
ILL	3690	0300	2300 Dy	248
ILL Phone	3915		2245 Dy	247
NCPN	3915	1300	1800 MS	268
			1940	267

The cw gang invite you to check into the IL Section Net (ILLN) daily on 3690 kHz at 6:30 and 10:00 PM local time. WB9NVN net mgr. of the D9RN reports the IL was represented in 29 of the 30 net sessions in the Ninth Region Net. WB9NIO has passed his Extra Class exam and awaiting his certificate. From reports to this column, the second week end of the ARRL DX contest was great and many new countries were added to the DXers log. The fourteenth annual IL QSO party which is sponsored by the Radio Amateur Megacycle Society (RAMS) will be held on July 31 and Aug. 1st. See announcements in next issue of QST. The Starved Rock Radio Club's repeater station will be dedicated on June 6th and the new Victor C. Clark WA4FC, First Vice-president of ARRL assisted by Dir. Phillip Haller, W9HPG and Vice Dir. Edmond Metzger, W9PNR will be on hand for the festivities. W9ZTK wrote a featured article for '73 magazine. The Tri-Town Radio Amateurs Club held their annual dinner dance with an FB turnout. WB9TNA and WB9TNP are new Novices. A contest set for April 21 will be held in honor of the Lincoln Library (Springfield) by Vice Dir. W9PNR and the Sangamon Valley Radio Club with K9KRL W9HDZ and WA9FNB in attendance at the presentation. The IL amateurs were active in the handling of traffic between Guatemala and the states and those who participated will be listed in a future issue of QST. Please advise the editors of your activity. Anyone interested in an 80-meter cw net on Sat. afternoon, please contact K9LWR. WA9KFK and W9NXX have been keeping schedules with the families and friends of a boy who has been missing from a barge in the vicinity of Lacon, IL. Now is the time to finalize your file and be listed in the best this year yet in scoring. WA9IPZ has a new Yaesu FT 221 two meter rig. Traffic: WA9VGV 442, WB9NVN 259, W9NXX 246, K9KHI 164, W9NJP 149, WA9KFK 100, W9JXV 96, W9H0T 44, WA9JJE 76, K9ZTV 83, W9LNG 72, WB9NIO 87, W9HPG 62, W9OYL 51, WB9VY 57, WB9NAN 33, W9NXX 34, W9NCH 29, W9KR 17, W9PRN 24, W9RYU 14, AB9DED 12, W9VEY 10.

INDIANA: SCM, M. P. Hunter, WA9EED — SEC: W9UMH. Condx has been up and down. The last weekend of the DX test were good except for the storms. K9TFJ reports aural buzz on 2 meters. K9OTB was host to FP8DX and FP8HL for a week. K9LHO reported getting back on the air after several years. Whitewater Valley and Richmond ARC's held a joint meeting with W9UMH and WA9EED as guest speakers. Good PR with the newspaper and mayor in attendance. W9UMH will be giving a presentation at the Emergency Communications forum at the Central Div. Convention in July. WB9IHH has been reassigned in the Carolina area. WB9LHI has received his CWDXCC. April Fool's day brought a solar flare which closed the bands. WB9OMX is reported to be a regular jet setter with business and a little time for the nets. Due to vacation, this month's column was closed early. Any additional info received will be used in next month's column. Net traffic: ITN 481, INN 23, AREC 8. Traffic: W9ENU 272, WB9FO 148, WB9KTR 130, WB9OZV 116, WB9SUD 102, K9DCK 88, W9IOH 88, W9LNG 76, W9TJU 72, K9TKC 60, WB9NAQ 58, W9NHR 47, K9LQ 47, W9UMJ 40, W9NSKA 38, WB9DIX 33, WA9OKJ 32, WA9OHX 30, K9RPZ 21, K9YBM 21, WA9OKK 17, W9K1 16, K9RW 14, W9BUQ 12, W9KWB 12, W9RTH 10, W9WFH 9, K9LZN 9, W9LE 8, W9MCJ 7, W9BKR 6, K9RGF 6, K9TKC 6, W9RCHS 5, W9GGW 3, K9HMC 2, AA9UXP 2, W9JU 1.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: K9PKQ. PAMs: W9AYK WA9LRW K9UTQ. RMs: W9BIC W9MFG K9LGU K9KSA. Nets, Freq, Time, QNI, QTC Mgr.: BPL, 3985, 1245 M-F, 5:00, 4:15. W9NXX, W9LNS Dy, 7:17, 199, WA9LRW, W9N, 3725, 2315 Dy, 96, 8. W9BIC, W5BN, 3985, 2330 Dy, 1162, 224, K9UTQ; WIN-E, 3662, 0100 Dy, 273, 216, W9MFG; WIN-L, 3662, 0400 Dy, 145, 67, K9LGU; W5SN, 3662, 0030 M-W-F. No report K9KSA; Expo Net, 3925, 1801 M-F, 761, 56. WA9NIX, W5BN cert. to WB9OAL K9OAT Lite Member to Bear K9L of K9RZ. W9NHR, K9CPR, BPL for Feb. and Mar. BEN cert. to K9ANV. WIN-L cert. to WA9USA. W9NA working on 5BDXCC on 10, 15, 20, and 40 complete needs 12 on 80. ORS, OPS OVS endorsed for W9NA. Don't forget WNA picnic July 25 at Oschner Park in Baraboo. Central Division Convention July 10 at Red Carpet Inn in Milwaukee. Sorry to hear K9L of K9RZ passed away. Oshkosh ARC proposing a project to get new basis in their area. If your club is having any festivities for next year, please let K9FHI know as to where and when. Many fellows lost their antennas during the ice storm. WA9QVT working DX in the early morning hours during the Midwest contest. Novice Net Mon. thru Fri. on 7122 kHz at 230Z. W9VY handled health and welfare in Guatemala, and critical health and welfare phone patch to Univ. of WI Hospital. New Novices from W9YI are WN9TTQ WN9TTR and WN9TTS. W9BIC has Hawaii and VP4 on 80 cw. WB9NME working in K9LZG KC 174 and T3 on 20 cw. WA9GJU is making 2 in the Bi-annual Centennial WA5 cert. No. 141. ORS to WB9PYG. Traffic (Mar.): K9CPM 1279, W9DND 215, W9PKP/9 211, W9SFL 157, W9PWH 145, W9BIC 97, K9FHI 88, K9LGL 85, W9AYK 79, W9IEM 66, W9MFG 63, K9MZO 55, W9NXX 46, W9LNS 40, K9BPL 34, WB9LW 33, K9HDE 26, WA9QV 22, W9BHL 18, W9BQX 17, W9BLK 15, WB9NKC 15, WB9PYG 15, K9ANV 14, W9YFW 14, W9JWS 13, W9NA 7, W9OEC 4, W9NSHL 2, W9Y 2. (Feb.): W9Y 10. (Jan.) W9Y 10.

DAKOTA DIVISION

MINNESOTA: SCM, Frank Leppa, K0ZXE — SEC: WA9OFZ. PAMs: K0ZBI WA9GLI WA9VY AB9HX. RMs: K0CVD K0RYU WB9OAG. Chief ORS: WB9LOR. Chief OO: WA9PVS. MN net info Net Freq Time/Days Mgr
Piconet Aw 3925 9:15 M-F WA9VYV

MSPN (noon)	3945	1205 PM DY	K0ZBI
MN Slow Speed	3710	530 PM M-F	K0RYU
MSPN (eve)	3925	545 PM DY	AB9HX
MN Weather	3925		WA9GLI

TUNE IN
THE SPIRIT
OF '76

ARRL

NATIONAL CONVENTION

DENVER
JULY 16,
17 & 18

There's a lot happening at the
1976 ARRL National Convention.

Friday

- 0800 Registration
- 0800 Bus Tour to Hewlett Packard
- 1200 Hams Hospitality Room
- 1200 Exhibits
- 1300 Bus Tour to Bureau of Standards
- 1400 Microprocessors for Beginners
- 1400 Microprocessors for Advanced
- 1800 General Hospitality Rooms with Entertainment
- 1900 Microprocessor Sharing Session

Saturday

- 0700 QCWA Open Breakfast
- 0800 Exhibits
- 0900 10X Forum
- 0900 Powerline Noise Forum
- 0900 Introduction to Amateur Radio
ARRL Staff
- 1000 DX Forum
Jack Reed, VE3GMT (Member, 1975
Sable Island DXpedition)
- 1000 Ionosphere Modification Project
- 1100 Search & Rescue Emergency
Communications in N New Mexico
- 1100 Optical Communications in
the Atmosphere
Dr. Jack Baird (University of
Colorado)
- 1100 Contesters Forum
- 1200 Lunch
- 1230 Antenna Forum: Basics
- 1230 Antenna Forum: Advanced
- 1230 Advances in Antenna Matching
Jerry Sevick, W2NMI (Bell Labs)
- 1300 Amateur Radio for the Handicapped
- 1300 MARS Combined Seminar
- 1400 Fiber Optics Communications
Joe Mullins (Bell Labs, New Jersey)
- 1500 FM Forum
- 1600 Amateur Radio Talks to the Media
- 1600 Printed Circuit Board
Construction & Demonstration
- 1700 Free Time
- 1800 Banquet with Two Featured Speakers
"Father David L. Reddy, CEØAE,
of Easter Island fame"
"Gregory Bryson (Director of
Documentary Programming for BBC,
London, England)
- 2100 ARRL Forum
- 2100 Ladies Variety Show
- 2400 Wouff Hong Ceremony

Sunday

- 0530 Sunrise Service at Civic Center
(Multi-Denominational)
- 0700 Open Buffet Breakfast
- 0800 Registration
- 0900 Exhibits
- 0830 MARS: Army, Navy, Air Force
- 0930 National Bureau of Standards
Time & Frequency Service
(Time by Satellite)
- 0930 YLRL Forum
- 1030 FCC Forum
- 1200 Hotel Check-Out Time
- 1300 Lunch & The Great Prize Give-A-Way

Your family is going to love Colorado

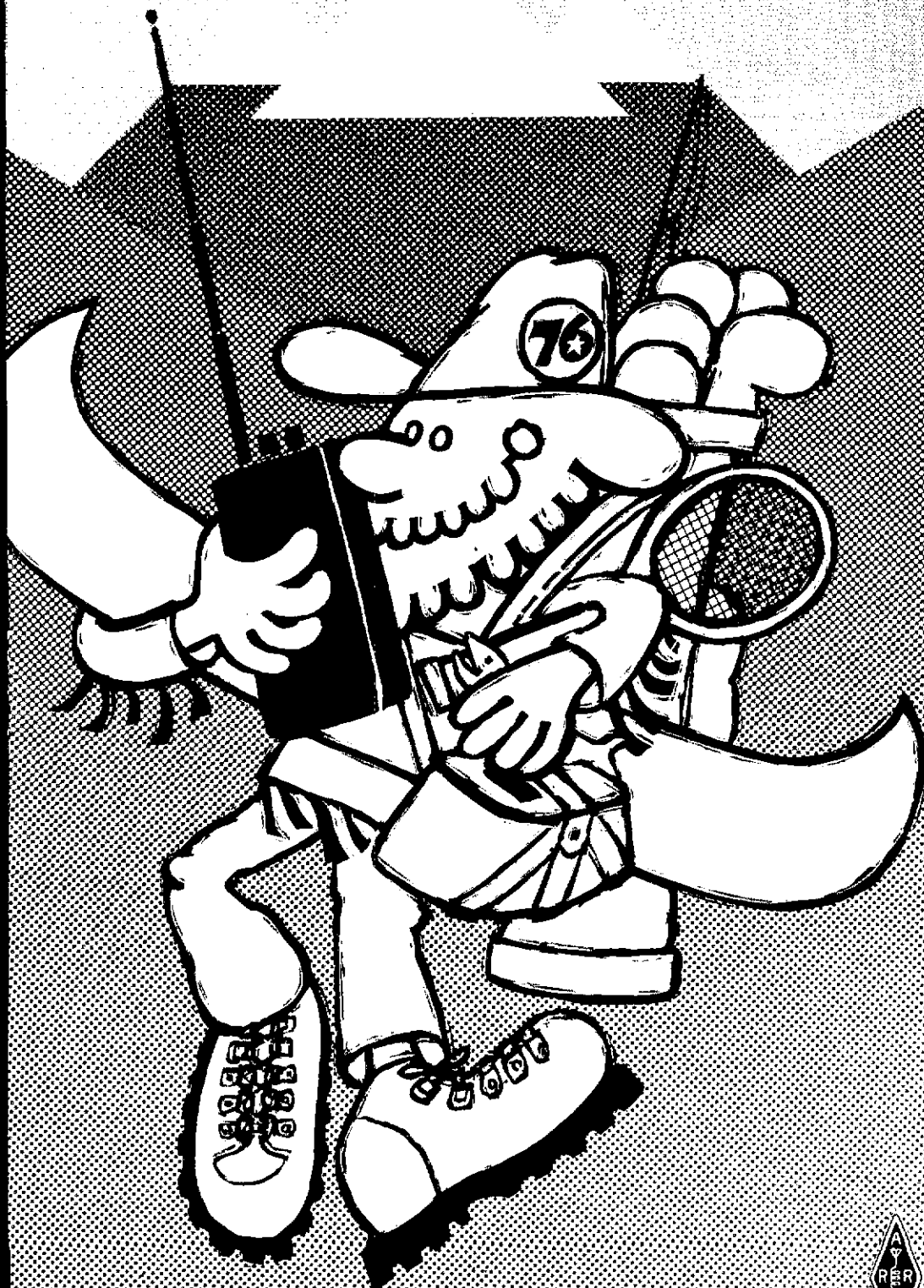
There's more for the family than just baby sitting services. We've planned things like family bus tours to nifty places and special entertainment for the ladies. And the State of Colorado would like to send you all the information you need to help make this summer's vacation the best you've ever had. Just write "Vacation," c/o State House, Denver, Colorado.

And there's more.

- Convention Stations: HF/VHF via NCØA
- FCC exams for all classes of licenses Friday afternoon and Saturday morning. (Contact Denver Field Office for reservations. First come, first served.)
- 2 Meter "Talk-In" via 146.34/94.
- Oscar demonstration by AMSAT.
- Propagation and tracking report on a balloon suspended repeater.
- And even more technical and operating sessions are being scheduled right now.

Come to Centennial Colorado.
There's more happening for you and your family than at any other Amateur Radio convention.

Send for your application now!
Write to: ARRL National Convention,
c/o Slats Council, 2450 South Quilman
Denver, Colorado 80219



ANNOUNCING!

The ARRL Southeastern Division Convention and Atlanta HamFestival 1976

WHEN: Saturday and Sunday, June 12th and 13th!

WHERE: Dunfey's Royal Coach Motor Hotel
I-75 at Howell Mill Road
Atlanta, Georgia 30318

Contact the Hotel directly for room reservations at special HamFestival rates: \$16 single, \$21 double!

- Airconditioned Exhibit Hall with nearly 100 manufacturers, distributors, and other exhibitors!
- Saturday Night Awards Banquet and Dance!
- Forums and meetings galore:
 - ARRL—DX—RTTY—VHF/UHF—Microprocessors—Digital Circuits
 - Antennas—Slow and fast scan TV
 - Contests—Novice/beginner—Mars—and many more!
- FCC Exams! Free Bus to FCC from Hotel Saturday Morning!
- Outdoor (but mostly covered) Fleamarket; space for more than 100 cars. \$5 per space, first come, first served!
- Activities for the wives and kids, too!
- See Six Flags Over Georgia, the Cyclorama, Stone Mountain, Lion Country Safari, Braves vs Pirates and more!

PRE-REGISTRATION: Individual \$3.00, at the door \$4.00
Family \$5.00, at the door \$6.00

You must be pre-registered to attend the Banquet.

You must be registered to attend Forums, Meetings, and the Indoor Exhibit Hall.

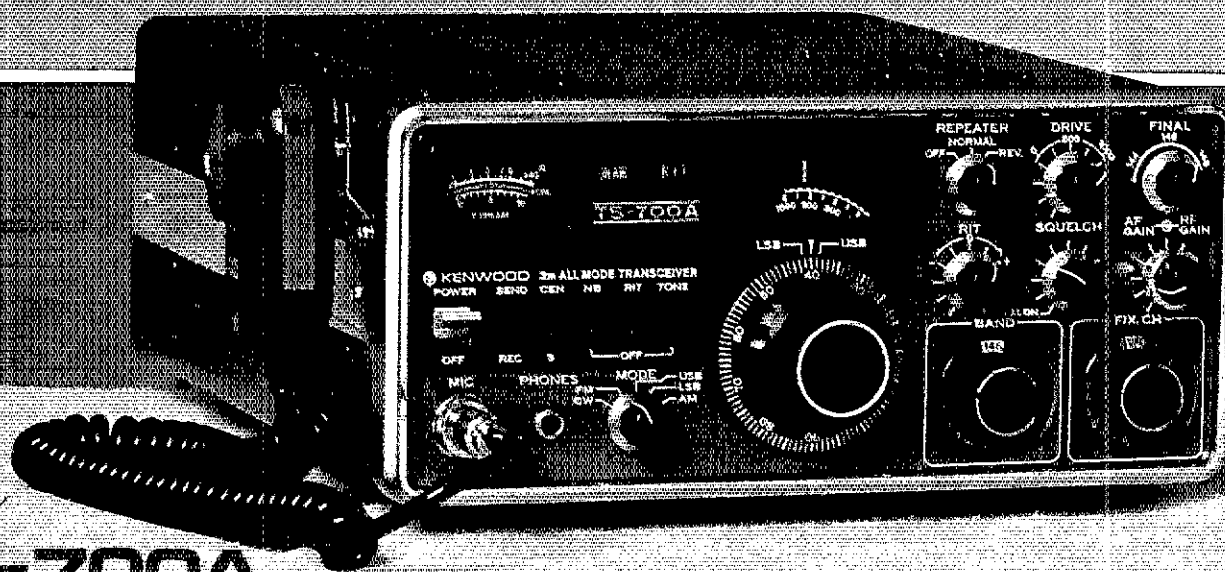
For pre-registration forms and additional information, send your name and address to:

Atlanta HamFestival 1976
53 Old Stone Mill Road
Marietta, Georgia 30062

or call Area 404/971-HAMS day or night. See You There!!

Presenting
KENWOOD

...the Pacesetter in Amateur Radio



the
TS-700A

Kenwood's TS-700A offers the ultimate promise of 2-meters... more channels, more versatility, tunable VFO, SSB-CW... and Kenwood quality.

Operates all modes: SSB (upper & lower), FM, AM and CW • Completely solid state circuitry provides stable, long lasting, trouble-free operation • AC and DC capability (operate from your car, boat, or as a base station through

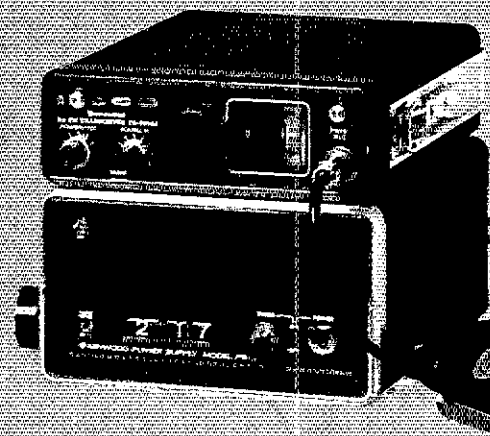
its built-in power supply) • 4 MHz band coverage (144 to 148 MHz) • Automatically switches transmit frequency 600 KHz for repeater operation. Simply dial in your receive frequency and the radio does the rest... simplex repeater reverse • Or accomplish the same by plugging a single crystal into one of the 11 crystal positions for your favorite channel • Transmit/Receive capability on 44 channels with 11 crystals

TR-2200A

Kenwood's high performance portable 2-meter FM transceiver... completely transistorized, rugged and compact. 12 channel capacity • Telescoping removable antenna • External 12 VDC or internal ni-cad batteries • 146-148 MHz frequency coverage • 6 channels supplied • Battery saving "light off" position • Hi-Lo power switch (2 watts-400 mW)

TR-7200A

Kenwood's superb 2-meter FM mobile transceiver. Designed to withstand the most severe punishment while providing consistently excellent performance. Packed with features like the PRIORITY function



The perfect companion to the TR-7200A is the PS-5 AC/DC power supply. Together they provide an efficient and handsome base station. Complete with a digital clock and automatic time control feature built in.

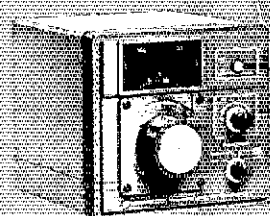
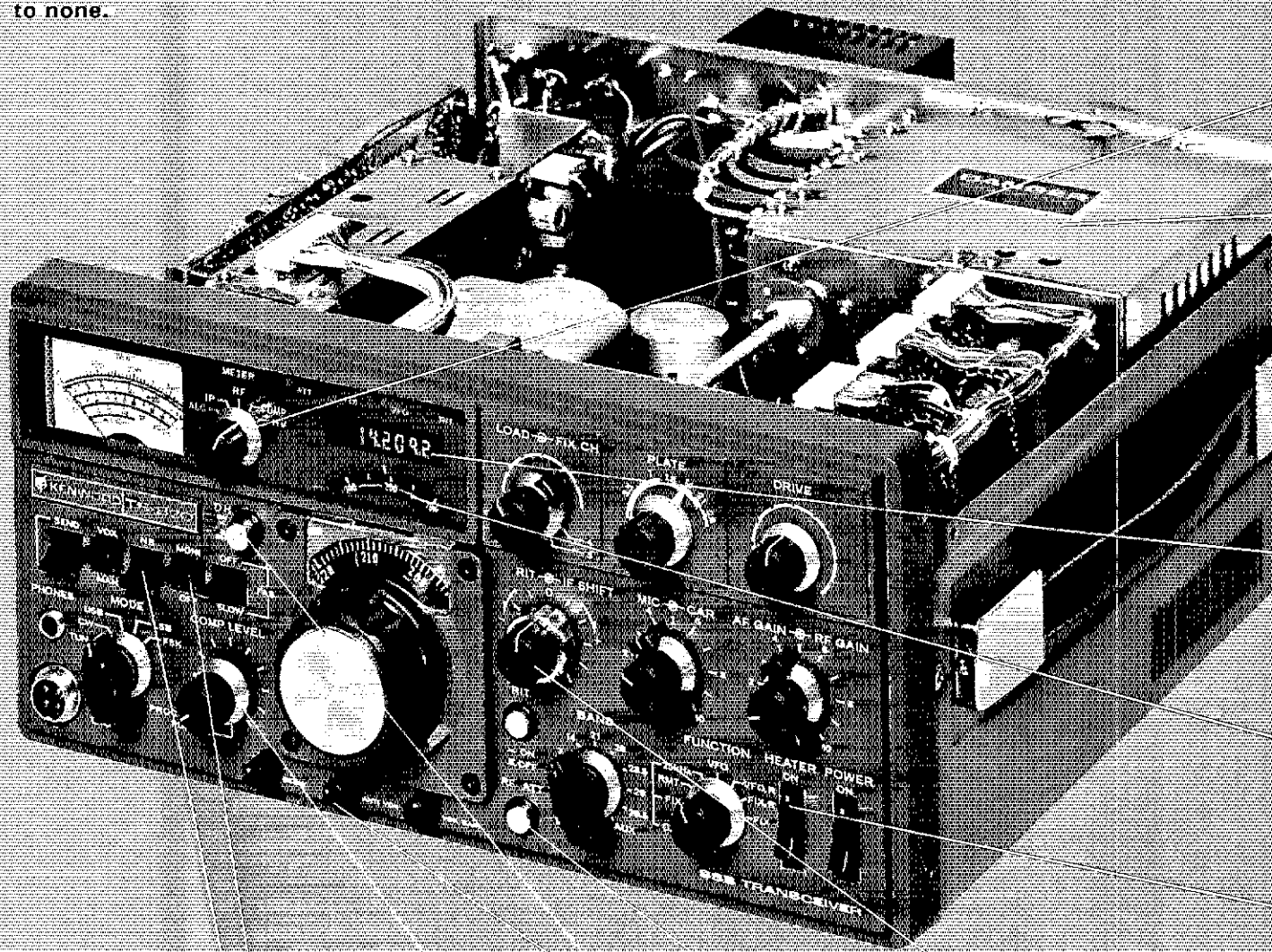
146-148 MHz coverage, 22 channels, 6 supplied. Completely solid state.

KENWOOD'S TS-820

the Pacesetter

Kenwood's well deserved reputation for fine craftsmanship and superb performance has never been more evident than in the TS-820. As a result of a host of innovative features being brought together, the 820 offers a degree of versatility, performance and pleasure second to none.

The Kenwood TS-820 is destined to be the world's new standard of excellence in amateur radio for years to come... a true "Pacesetter".



VFO-820

The VFO-820 is a solid state remote VFO designed exclusively for use with the Kenwood TS-820 Pacesetter. The VFO-820 has its own RIT circuit and control switch. It is fully compatible with the optional digital display in the TS-820. *The perfect extra to any Pacesetter station.*

RF MONITOR • Built-in monitor circuit allows you to hear your own voice by sampling the RF signal. Especially useful for adjusting the RF Processor.

NOISE BLANKER • The TS-820 uses an efficient noise blanker circuit, another Kenwood exclusive. A special crystal filter assures unsurpassed efficiency in eliminating unwanted pulse noises.

DIGITAL HOLD • A single pushbutton switch offers the operator unprecedented versatility. The digital hold circuit will lock the counter and display at any frequency, but will allow the VFO to tune normally. Ever wanted to return to a certain spot on the band and forgotten the frequency? That won't happen again with the new digital hold feature on the Kenwood TS-820.

SPEECH PROCESSOR • An RF circuit provides quick time constant compression using a true RF compressor as opposed to an IF clipper. Amount of compression is adjustable to the desired level by a convenient front panel control.

IF SHIFT • The IF SHIFT control varies the IF passband without changing the receive frequency. This "IF shift" control is located on the front panel and provides excellent unwanted signal reject control or "pass band tuning." The 820 moves the signal across the IF pass band not the pass band across the signal.

RF ATTENUATOR • Easy, one touch activation of the attenuator supplies 20 dB of padding on receive.

VOX • A voice-activated microphone circuit is built into the TS-820 with VOX GAIN, ANTIVOX, and VOX DELAY controls placed on the front panel for convenient adjustment at any time.

Features

PLL • The TS-820 employs the latest phase lock loop circuitry. The single conversion receiver section performance offers superb protection against unwanted cross-modulation. And now, PLL allows the frequency to remain the same when switching sidebands (USB, LSB, CW) and eliminates having to recalibrate each time.

BUILT METERING • During receive, an easy-to-read meter functions as an S-meter. The same meter displays ALC level, plate current, RF output, and plate voltage during transmit. Includes COMP setting for adjusting the compression level of the built-in speech processor.

FINAL AMPLIFIER • The TS-820 is completely solid state except for the driver (12BY7A) and the final tubes. Rather than substitute TV sweep tubes as final amplifier tubes in a state of the art amateur transceiver, Kenwood has employed two husky 6-2001A (equivalent to 6146B) tubes. These rugged, time-proven tubes are known for their long life and superb linearity. The input power of the TS-820 is conservatively rated at 180 W DC, 200 W PEP. Tubes run cool with the aid of a noiseless fan (standard) mounted on the rear panel. The above tube and power combination minimizes the possibilities of TVI and helps to maintain the Kenwood reputation for excellent audio quality.

DIGITAL READOUT DG-1 • (optional) A digital counter display can be employed as an integral part of the VFO readout system. Counter mixes the carrier, VFO, and first heterodyne frequencies to give exact frequency. Figures the frequency down to 10 Hz and digital display reads out to 100 Hz. Both receive and transmit frequencies are displayed in easy-to-read, Kenwood Blue digits.

DRS DIAL • Includes the same satinsmooth planetary drive found on other fine Kenwood models plus special, high-precision gears to add a new "monoscale" feature for easier frequency readout. LSB, USB, and CW operating frequencies can be accurately read from the same pointer.

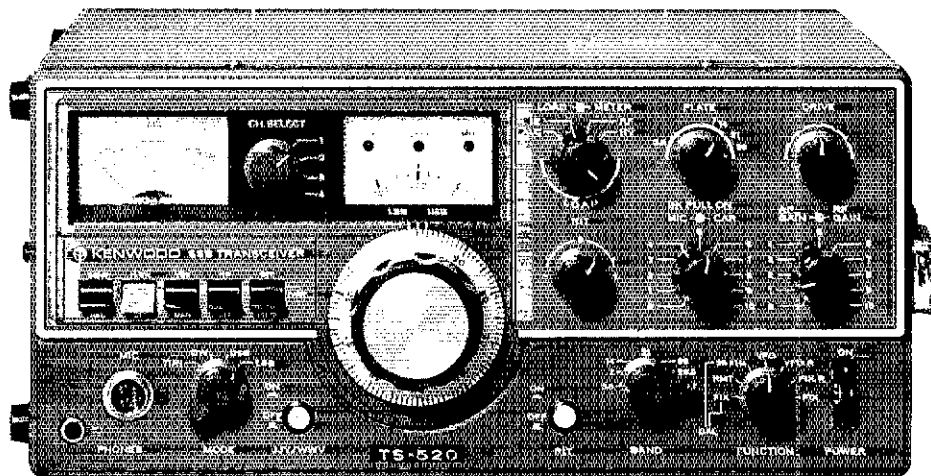
HEATER SWITCH • The filaments of the three vacuum tubes may be turned off during periods of "receive only".

CW AUDIO CHARACTERISTICS • During CW reception, a special filter is used to alter the audio frequency response to provide a more comfortable, easy-to-copy tone.

HIGH STABILITY VFO • The VFO, heart of any SSB transceiver, is an exclusive Kenwood design using FET technology.

Other features include:

- Built-in 25 kHz calibrator*
- Built-in speaker*
- CW Sidetone and semi-break in*
- Rear panel terminals for linear amplifier, IF OUT, RTTY, and XVTR
- Handy phone patch IN and OUT terminals



the TS-520

Why wait any longer for a rig that offers top performance, dependability and versatility... the TS-520 has proven itself in the shacks of thousands of discriminating amateurs, in field day sites, in DX and contest stations, and in countless mobile installations.

Superb craftsmanship is evident throughout... in its engineering concepts as well as its construction and styling... craftsmanship that is a Kenwood hallmark.

Maybe the Kenwood TS-520 is the one you have been waiting for.

*Fine accessories
designed to increase
the versatility of your
TS-520*



VFO-520

The VFO-520 is a solid state remote VFO designed to match the TS-520 perfectly. It allows VFO controlled cross channel operation when connected to the transceiver. A built-in RIT circuit, with an LED indicator, permits receiver incremental tuning.

SP-520

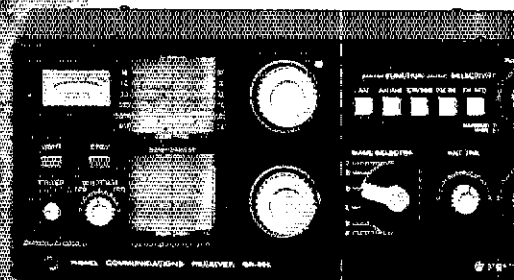
The SP-520 is an external speaker designed for use with the Kenwood TS-520. The SP-520 can be used in place of the transceiver's built-in speaker for better readability. The speaker's cabinet matches the TS-520 front panel to provide a clean looking integrated station.

TV-502

The TV-502 transverter puts you on 2-meters the easy way. Simply plug it in and you're on the air. Operates in the 144.0-145.7 MHz frequency range with a 145.0-146.0 MHz option. The TV-502 is completely compatible with the TS-520 and the TS-820.

KENWOOD'S

Swiss



*For the
very best in
world listening*

KENWOOD'S QR-666

Kenwood developed the T-599D transmitter and R-599D receiver for the most discriminating amateur.

The R-599D is the most complete receiver ever offered. It is entirely solid-state, superbly reliable and compact. It covers the full amateur band, 10 through 160 meters, CW, LSB, USB, AM and FM.

The T-599D is solid-state with the exception of only three tubes, has built-in power supply and full metering. It operates CW, LSB, USB and AM and, of course, is a perfect match to the R-599D receiver.

If you have never considered the advantages of operating a receiver/transmitter combination... maybe you should. Because of the larger number of controls and dual VFOs the combination offers flexibility impossible to duplicate with a transceiver.

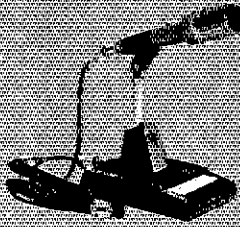
Compare the specs of the R-599D and the T-599D with any other brand. Remember, the R-599D is all solid state (and includes four filters). Your choice will obviously be the Kenwood.

- Solid state circuitry assures dependable operation and compact size.
- Frequency range: 170 KHz — 30 MHz
- Receives AM, SSB and CW with superb sensitivity
- 3-way power supply (AC/battery/external DC) allows you to take it anywhere
- Automatically switches to battery power in the event of AC power failure
- Built-in antenna and jack for external antenna
- Easy to read drum type dial for fast tuning
- Dials are not illuminated when operating on DC unless turned on manually (battery saving feature!)
- An optional SWL Bandspread drum is available
- The QR-666 is available at Kenwood Communications dealers throughout the U.S. (Batteries not included.)



HS-4

The Kenwood HS-4 headphone set adds versatility to any Kenwood station. For extended periods of wear, the HS-4 is comfortably padded and is completely adjustable. A standard phone plug is factory installed for instant "out-of-the-box" use. (8 ohms.)



MC-50

The MC-50 dynamic microphone has been designed expressly for amateur radio operation as a splendid addition to any Kenwood shack. Complete with P.T. and LOCK switches, and a microphone plug for instant hook-up to any Kenwood rig. Hi/Low impedance.

TRIO-KENWOOD COMMUNICATIONS INC.
116 EAST ALONDRA/GARDENA, CA 90248



...pacesetter in amateur radio



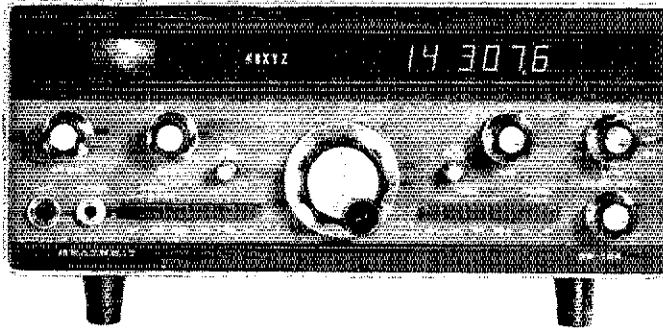
Here's the book you've been waiting for. Seven chapters cover everything from RTTY to laser fundamentals. The chapters on amateur fast-scan and SSTV contain practical ideas for cameras, transmitters, and receiving techniques. An entire chapter is devoted to facsimile, including conversion of Telefax transceivers and reception of weather-satellite pictures. RTTY is thoroughly covered with sections on equipment and hardware, AFSK, checking RTTY shifts, and much more. Space communication and advanced techniques, including digital communication, are treated in separate chapters. In this era of specialization, *Specialized Communications Techniques for the Radio Amateur* is hard to beat! \$3.00 U.S.A. and Possessions, \$3.50 Elsewhere

THE AMERICAN RADIO RELAY LEAGUE, INC.

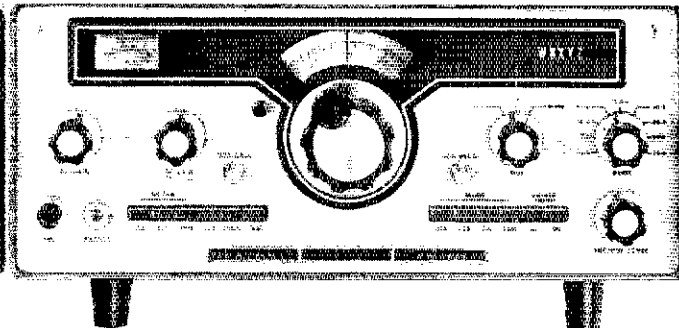
NEWINGTON, CONN. 06111

State of the Art...

Heathkit SB-104



Heathkit HW-104



Whether you choose the SB-104, or the HW-104, you're getting one of the finest Amateur transceivers you can buy at any price. And because you build them yourself, you get a feel for the equipment you simply can't duplicate with ready-made units.

100% solid-state construction including finals...totally broadbanded circuitry for instant QSY without pre-selector, load or tune controls...switchable 100 watts/1 watt out...0.6 μ V typical sensitivity...super-clean operation thanks to reduced cross-mod and IM distortion...specs that show what state-of-the-art is all about...and styling second to none!

The SB-104 offers true digital frequency read-out with resolution to 100 Hz on all bands, and complete frequency coverage from 3.5 MHz through 29.7 MHz without accessories.

Kit SB-104, Shpg. wt. 31 lbs. **\$669.95**

The HW-104, for \$170 less, brings you the same broadbanded circuitry as the SB-104, but it has an easy-to-read circular tuning dial, and 3.5 to 29.0 MHz coverage (to 29.7 MHz available with HWA-104-1 accessory). It's one of the best price/performance combinations available in Amateur Radio today.

Kit HW-104, Shpg. wt. 31 lbs. **\$499.95**

Reviews and articles in the major Amateur magazines have consistently praised the 104's because of their advanced circuitry, reliability and sheer operating pleasure! If you're serious about Amateur radio, you owe it to yourself to find out more about the 104's. For complete descriptions and specifications, order the new **FREE Heathkit catalog**. Send coupon today!



Station of the Art...

The SB-104 with sophisticated station accessories. Unquestionably, some of the finest Amateur gear you can own.



Clockwise from top:

SB-104 Transceiver:

SB-230 Conduction-Cooled Linear: 1200 PEP SSB; 1000 watts CW from less than 100 watts drive. Also 400 watts for SSTV and RTTY.

Kit SB-230, Shpg. wt. 40 lbs. **\$369.95**

SB-614 Station Monitor: CRT indicates signal quality. Also RF envelope and Trapezoid displays. For SSB, CW and AM to 1 kW; 80-6 meters.

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MSN 1st 3685 8:30 PM Dy K9CVD
 MSN 2nd 3685 10:15 PM Dy WB0OAG

*Starts after M5PN (eve)
 All nets meet at local time. A speedy recovery to WB0LOR. The Frequency Measuring Test is May 7. QOs and those people interested in this appointment please participate and report to the SCM. The MN amateur WX net daily reports are being examined in a feasibility study by the National WX Service for possible use by MN TV stations. More WX reports are encouraged. KRCC TV interviewed AB0HOX and later showed her in action handling Guatemala disaster messages. W0MJS packed hams to the rafters at club meetings in Duluth and Virginia, with a fantastic Oscar presentation. Huray! New Novices: W0NSGR and W0NSID; Generals: W0M0C W000C W0BPK and Extra W0GLI. FB gents. W0PXE is regrettably a Silent Key. K9CVD reports good conditions during the ARRL DX contest. W0QMY has implemented a first rate QSK system. W0BNGX and W0S,OC visited with the SCM and others in Duluth. BPL: W0AGLI and AB0HOX. Traffic: AB0HOX 747, W0AGLI 277, K9CVD 234, W0AVVT 36, K9CSE 129, K9ZXE 91, W0OAG 89, W0BMAO 77, K9ZBI 70, W0QMY 69, W0TFC 48, W0BNGX 47, W0CPC 46, AB0LDW 42, W0QCW 40, W0WVOV 33, W0LDO 25, W0OCT 25, W0OBB 24, W0NZB 20, W0HZU 16, W0ADX 11, W0JYT 9, W0BKH 9, K9FLT 6, W0JPR 3.

NORTH DAKOTA: SCM, Mark J. Worcester, WA0WLP - OBS: K9PVG, W0B0HJ again back on the air. W0NSHD new Novice. Galchuett has 20 participants in a radio class. W0DM received recognition from the Weather Service on Mar. 27. The award was presented over Amateur Radio with TV coverage both in Bismarck and Grand Forks. During the Storm Net on Mar. 11 W0RST stood by at the Weather Service Forecast Office to relay reports via 2 meters from the Weather Net. The YL Weather Net closed Apr. 15 for the summer. Our tnx to all who participated also FB to W0ABW on the W0JPR. W0QGN moved from CO to Fargo. W0CFU W0CNF K9GRM and W0OEL returned from vacations.

SOUTH DAKOTA: SCM, Ed Gray, WA0CPX - Plans are moving along smoothly for the 1976 SD Ham Picnic to be held June 12 and 13 at the W. H. Lyon Fairgrounds in Sioux Falls. Details on the SD nets. The Evening Session for the SD Phone Net will meet 6:30 PM Central Daylight Saving Time until the last Sunday in Oct. when it will be 6:00 PM CST. W0PHW Madison has received his Advanced Class license. A special prefix operation from Mt. Rushmore is being planned by the Black Hills ARC. A reminder to all amateurs who have two meter rigs in vehicles and boats to keep them locked to prevent unauthorized use and also to prevent your rig from being stolen. SD needs representation on Daytime NTS at 2000Z, 7:30 kHz. Net Reports received: NJD: 325 QNI and 39 QTC; YL Net: 31 QNI and 1 QTC; SD Evening Net: 1468 QNI and 41 QTC. Traffic: W0VRE 151, W0HOJ 132, W0JUN 112, W0VEG 62, K9DUR 45.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5U4U - PAMS: W5POH W5ZWZ. RM: W5MYZ. Net, kHz, Time/Day, QNI, QTC, Mgr.: ARN, 3995, 0630/DY, W5OHD; OZK, 3760, 0100/DY, 194, 35, W5MYZ; APN, 3937, 1200/MS, 861, 54, W5POH; M-Bird, 3927, 2230/M-F, 564, 12, W5AZWZ. Welcome to AR news hams. W5R RKG RLQ RMV ROG RPW RTI RTJ RTK RTN RWB; W5S RYK RYQ RYM RVG RVH RUV RVD RWB; W5S RMY RIK RND RUA. Jonesboro ARC officers; K5MEA, pres.; W5SPRG vice-pres.; W5SLQ, secy-treas. W5AKB 28/88, club sta. The Jonesboro ARC/Paragold (Greene Co.) ARC hamfest Aug. 22 at Crowley's Ridge State Park with canned ham sale. W5JUN, 21, more info from K5MEA or W5KGT. OPS to W5SGQ. W5SGQH/W5SGQI now active from Yellville. PSHR: W5POH 42, W5BED 25, W5SGQH 10. Traffic: WASHNN 72, W5POH 27, W5U4U 19, W5GWA 12, W5BED 17, W5MYZ 17, W5EJ 14, W5TXA 12, W5ZWZ 10.

LOUISIANA: SCM, Robert P. Schmidt, W5GHP - Asst. SCM: John Souvestre, W5NYY. SEC: W5TRI. RM: W5PRI. PAM: W5BEKU. VHF PAM: W5SKAX. Congrats to the Baton Rouge ARC on successful hamfest, under the leadership of K5VD. New club formed in the Ridder called the West Louisiana Amateur Radio Club. W5JZQ, pres.; K5LMU, vice-pres.; W5ZYM, secy/treas. A 25/85 repeater on the air soon as license is received, started first class for Novices. The LA Council of ARCs at their Lafayette meeting approved 3910 as the emergency weather net freq. Local stations should check this freq. on the net for statewide information. W5HGT will lose W5WJU W5BPC and W5BVE graduation in May. W5PM W5LBR active on LAN. K5TFG new LAN member in New Orleans. OBS W5AZZA sending bulletins on both LSN and LAN. W5CDX DRNS NCS on Mon. and Tue. W5PTO (ex-W5TQZ) finished an HW101 and now back on the air. McNeels on 5/10. In Lake Charles put on Oscar Demo during engineering week. Escouf Repeater Assn. held a fish fry with Vice dir. W5RUB attending. Monroe weather watch very active relaying weather info into MS.

Net - Freq.	Time/Days	QNI	QTC	Manager
LAN - 3615	7 & 10 PM Dy	401	113	W5PRI
LTN - 3910	6-8 PM Dy	6	6	W5BEKU
LSN - 3703	8:30 PM M-F	162	54	K5TTC
LRN - 3587.5	7:00 PM Su	18	8	W5GHP

Traffic: W5AZZA 248, W5LIQU 205, W5GHP 194, W5MI 143, K5TTC 138, W5VQE 54, W5CDX 42, K5TFG 36, W5SNVB 32, W5TQA 27, W5BEKU 25, W5N 22, W5BWR 21, W5SKJ 16, W5NWO 11, W5ASD 10, W5JZQ 8, W5QVN 8, W5NPK 7, W5GQJ 6, W5FHU 3.

MISSISSIPPI: SCM, W. L. Appleby, W5SDCY - over 125 MS amateurs provided communications for The American Red Cross and State CD Hq. during and after the tornadoes on Mar. 20 and 29th in Cleveland and Canton. Scotty's report K5YTA a site report. W5SRKW now on air thanks to W5BDNE & W5SKFN. JCARC will graduate 10-19 Novices. Enjoyed FB visit with Laurel ARC and JCARC. Yours truly finally on Oscar 7 B mode. W5SRKM in TX. W5BTO W5SOJA heard on whi-7m. W5HJY now E. TX. Class. call K5DA. W5LUG general. W5BTO W5BSTE Tech.: W5SUK Advanced JCARC call is W5WA. W5FDP turning out keys and code oscillators, copied W5RYW and W5NRY on hf. MCARA Novice class has 38, Laurel ARC 12, Hattiesburg ARC 32, VARC 14. DRNS cert. issued to W5EDT

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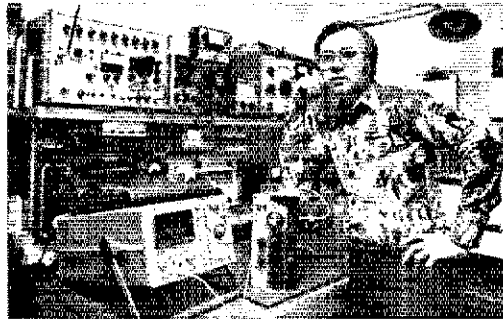
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WB5LXX, WB5OAV sporting new S line. OO W5UCY on Oscar 6 & 7. KP4DIS at Meridian N.A.S. W5RUB WB5OAV tops in Jan. CD Party. RTTY stations in Jackson Co WA55 DUV, RMS MPH DPO BNF; W 19-18. Welcome to new MS area: WB55 RVE, XKW RW5 RWL RMC RLI RLS RKD RME RPH RIL ROE RPV; WB55 RWZ RXB RWJ RXP RWY RKS RWU ROI RL5 RMW RIZ RJN RJK RKW RMM RJO RKV RLN RKT RJV RML RIN RKR RLA RMM and RPD. WR5ADP utilized for numerous public service activities. Hamfest planned for Hernando June 19-20. W5PTN active on hi. WB5OAV QSL mg. for 9Q5 DM. MTN has slo nite every Thur. (local) 10-13 wpm. MTN: 212 QNI, 86 QTC; MSBN: 1320 QNI, 162, QTC; MS: 45 QNI 6 QTC; CGCHN: 2011 QNI, 61 QTC; North MS FM Net: 272 QNI, 14 QTC. Traffic: (Mar.) W5EDT 268, WB5FHA 134, K5OAF 66, WB5UCY 49, WB5KJU 48, WB5LXX 36, W5WZ 34, W5WB 12, W5BHVY 9, W5BNJZ 8, W5YTN 5, W5LL 4, W5BEIN 3, W5BNSC 1, W5B5KM 2. (Feb.) WB5KJU 37, W5BNJZ 8.

TENNESSEE: SCM, O. D. Keaton, WA4GLS - SEC; WB5DVI PAMS; WB4PFE K4LSP; RM: WB4DUJ. Net - Freq. Time/Z/Days Sess. QNI QTC Manager
TPN - 3980 1040 M-F 73 3534 213
W4PFP
WA4EWW 1145 M-F
WB4YPO 0030 M-S
1400 SSUH
0030 M

TCN - 3980 4 71 12
WB4MPJ
ETVHFN - 50.4 1900 MWF 12 90 1
WA4WZJ
ETVHFN - 145.2 1900 TTh 8 43 2
WB4DZG
ETIMN - 28.7 0100 WF 8 78 2
WB4NFI
M1IMN - 28.8 0100 TF 8 75 0
W4EAY
WTVHFN 2000 S 12 317 92
146.37-146.97 0130 F
WA4VUX
WTVHFN 3 40. 2
146.10, 146.70
K4ER
INCDWN T 4 120 0
146.16-146.76
WB4HPQ
TN - 2635 0000 Dy 29 167 108
K4YFC

The Oak Ridge ARCS 1976 officers are: WA4DEP, pres.; WA45JK, vice-pres.; WA4CDH, secy-treas.; WB4UKF, tech chmn.; K4MOA, edtor. Get ready for Field Day June 26 & 27, let's make this a good one. ORARC had 9 students pass the code test. WA4IDN trying to revive the TN Novice Net. If interested contact him. It presently meets on 37.8 kHz at 1900 daily. The BRMC & KARC has 20 for General and 80 for Novice enrolled for their class. Good to know the TN Tech. repeater WR4ANW is being used for emergency work. The amateurs in the Athens area are in the process of organizing a club and have been holding training classes resulting in 7 new licenses and 16 others well on their way. Contact K4FKG for more info. PSHR for Feb. WB4DUJ 44. WA4DPF participated in 133 intercontinental phone patches in Mar. Traffic: K4CNY 239, W4OGG 154, K4YFC 81, WB4DUJ 63, K4KCK 49, W4RUW 40, K4J5 27, WB4Z5Z 27, WB4KJ 2, WB4KJ 16, W4YVY 14, K4YVE 1, WB4MPJ 11, K4WWQ 10, K4AMC 6, W4SGI 6, WB4YPO 6, WB4DDV 2, WB4VEN 1.

GREAT LAKES DIVISION

KENTUCKY: SCM, Ted Huddle, W4CID - SEC; WA4GHQ.
Net QNI QTC Net QNI QTC
KRN 370 29 KNFN 112 49
MKPN 960 56 KPON 56 11
KTN 1503 150 5DAREC 72 21
KYN 283 116 5DAREC 103 21
Owensboro held an ARRL Night Mar. 27 with ARRL Communications Mgr. as the principal speaker. The event was well attended with 68 persons. SEC WA4GHQ has been working with the London-Corbin ARC to organize AREC there. More meetings are planned with State Police and City Officials. The No. KY ARC Newsletter recently had an article on putting torpedoes. Contact them at PO Box 31 Ft. Mitchell for a copy. WB4KTR recently got DXCC and WAS. WA4KQB has his Advanced Ticket. No. KY ARC helped in cancer drive on Apr. 28. Along the same lines the Blue Grass ARC assisted with a walk-a-thon on Apr. 3. The Owensboro Hydroplane Regatta will be July 10-11. This is an FB display of ham communications as they provide all communications for this event. Traffic: (Mar.) K4TXJ 108, W4RHZ 90, WB4AUN 71, K4DZM 56, WB4QVS 51, W4CID 49, K4FUM 49, WB4EOR 46, K4UNW 44, WB4ZML 44, WA4RCD 31, WN4CAR 25, W4CDA 23, WA4AVV 22, WA4AGH 12, K4NOE 9, WN4JAZ 9, W4IQZ 4. (Feb.) W4BAZ 94. (Jan.) W4BAZ 96.

MICHIGAN: SCM, A. L. Baker, W8I2Z - SEC; W8MPD. RMS: W8JVA K8KMG W8VIQ KBAMU WA8RXI. PAMS: K8LNE W8JIX. VHF PAM: WA8WVV.
Net - Freq. Time/Days QNI Tfc Sess.
QMN - 3663 2300/0300/Dy 172 387 95
MACS - 3953 1600/Dy 885 33 36
EYEMEN - 3930 2130/Dy 634 116 31
WSBN - 3935 0001/Dy 759 88 30
MNN - 3720 2230/Dy 242 62 31
UPEN - 3922 2230/Dy 692 52 35
GLETN - 3932 0130/Dy 465 37 29
MIGM - 50.7 0000/Dy 272 23 27
W8AREC - 3932 2300/S 54 8 4
VHF PAM Rpt. 217 0 9

With Field Day looming on the horizon I will answer the annual Question - Field Day messages to the SCM should be routed via MACS WSBN or QMN. W8VOM is Amateur of the Month of Jan. and Feb. for MNN. New licenses: W8WVAJ WB8WDF WB855C and W8I1RK. Congratulations. New gear is reported at W8UFS, SB 104; W8BNCQ, GTX 200; W88VKR, ICOM; WA8WZF, Kenwood; W7KQU/8, Kenwood Rx. Novice classes are reported in progress at most clubs. W88RKF reports antenna up again - again. Several clubs report Bicentennial related activities. New appointees: W8DC QRS, WA8KWM OPS, W8IEH LC. From QMN Bulletin: "Slow Net had more check-ins and more traffic than any other sessions, could this be an indicator that speed is not as essential for efficiency as some people might tend to believe." Wolverine Net election results: Mgr. W88JIX, Asst. Mgr. W8UOQ, secy. W8POZ, South East MARRA reports new vice-pres. WB8LZX. Regrettably I report W8EMC W8RAI and K8ZSP as Silent Keys. Traffic:

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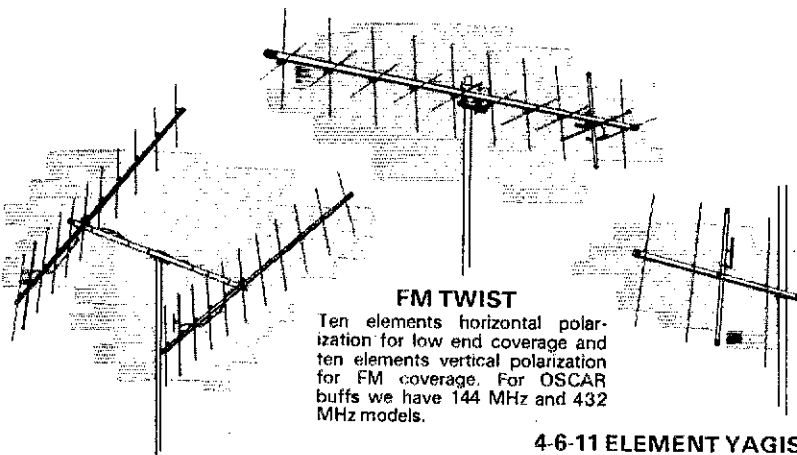
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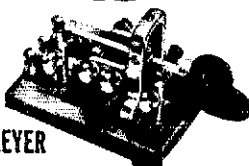
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(Mar.) K8KMQ 323, K8LNE 292, WB8ITT 286, K8DYI 162, WB8POL 137, K8WRJ 130, WB8MO 119, WB8WCO 103, WB8G 100, WK8H 98, WB8DKG 84, W8TZZ 79, WB8RXI 70, WB8LWV 59, WB8Q 56, WB8NOH 54, WB8NCD 51, WB8OIE 51, K8AMU 46, WB8EEL 40, WB8JIX 40, WB8RMH 40, WB8YQ 39, WB8RYB 38, K8JED 33, WB8OBR 32, WBDC 31, WB8VOM 31, K8PYN 29, W8IYA 26, WB8LFS 26, WB8W 25, WB8SB 25, WB8JQG 23, WB8DT 22, WB8UPB 17, K8VDA 17, WB8ZL 15, WB8L 15, WB8HX 13, WB8IUC 13, WB8RVG 13, K8GXV 13, WB8LOU 13, WB8JUP 13, WB8HL 12, WB8WV 12, WB8SUN 11, K8JHA 8, WB8MDK 8, WB8VP 8, WB8LDS 7, WB8VKR 7, WB8IKR 5, WB8LUE 5, WB8CLP 5, K8ZJU 4, K8DTG 4, WB8MTD 3, WB8KFX 3, WB8MI 3, WB8BOG 2, WB8JFJ 2, WB8VVL 2, (Feb.) WB8MTD 1, WB8W 1, (Jan.) WB8TBL 99, WB8MI 78, WB8UFS 21, WB8FBN 17, WB8S 9, WB8XM 7, WB8ZAV 2.

OHIO: SCM, Hank Greeb, AC8CHT - Net - Reg. Time(Z) QNI QTC 566, OSSBN - 3,9725 1830/2100/ 2547 981 93

OSN - 3,577 2310 139 55 30
BNR - 3,605 2300 124 193 31
ONN - 3,708 2330 5TH 62 26 13
ON - 50,16 0200 251 80 31
BN - 3,488/0300 430 299 58
BRTN - 146.46 0200 103 83 29
MASER - 146.94 0200 114 10 4

Apricot Net (Cleveland) made BPL for K8LMF/8 at Sportsman's Show, and communicated for St. Patrick's Day Parade. Central OH AREC has 5 repeaters, latest WB8AIL on 227.46/224.06. Montgomery CO. AREC has 15 different functions during Mar., including 3 forums. New appointments include QV5s WB8JUI WB8P50; ORS WB8LX WB8XQ WB8OZA; ORS-II WN8VLR; OP5 WB8DIL. New code-theory class started by Cincinnati Area Ten Tuners, WB8KOW, Instructor. WB8OWM enjoys handling traffic with 5 watt homebrew rig. Several groups are working with local CS groups to encourage hobbiests to study for their ham tickets. SW OH AREC communicated for St. Patrick's Day parade. Findlay ARC had 25 enrolled in code-theory class, WB8UKX instructor. Over 118 certificates issued to OSSBN members. Traffic: K8LMF/8 842, WB8PMJ 405, WB8HGH 351, WB8WZ 271, WB8T 256, WB8MCR 233, AC8IBX 200, WB8DIL 172, WB8KK 129, WB8J 81, WB8J 77, WB8LA 72, WB8T 72, WB8MRL 64, WB8TRK 64, WB8SS 62, WB8RQQ 56, WB8VWH 49, WB8HL 44, WB8LJN 43, WB8GPO 40, WB8WEG 40, AB8KGJ 34, WB8KPN 30, AB8KQI 30, WB8LZ 29, K8LGA 28, WB8CJU 27, WB8MLO 26, WN8VLR 23, AC8CHT 20, K8QYR 17, WB8L 16, WB8EM 15, WB8GGR 13, WB8XQ 13, WB8ARW 12, WB8BOV 12, WB8QY 11, WB8CJU 10, WB8IN 10, WB8PIY 10, WB8FGJ 9, K8BPX 7, WB8PGW 6, K8CKY 5, WB8IBZ 5, K8JPF 5, WB8DPW 4, WB8FSX 4, WB8FSX 3, WB8OWM 2, WB8WE 2, AB8LOL 1, WN8VKE.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Gary Ferdinand, WA2PIL - SEC: K2AYG, RM: K2OYG (RTTY), WB2IXW (CW), PAM: WB2GAI. New appointments for (renewals) WB2JUL, WB2JUL. Congratulations to: WN2EJB and WN2EBV for new tickets, WB2EKM for his new daughter, and W2FGJ on receiving the QCWA Golden Anniversary award for his being a licensed ham for 50 years. RM K2OYG reports that interest is growing in Westchester for using RTTY via the emergency communications repeater. RTTY is a FB mode for traffic handling - try it. SEC K2AYG reports that the Saratoga AREC/RACES group provided emergency communications for Red Cross during the Schoon River Dam problem. Stations reported as primary operators: WB2FV (EC), WA2AZB, WA2PCX, WA2QZV, WA2BSL, WB2CEP, WB2JZB and K2A 12. A new 80-meter dipole (?) exists at WB2GOJ with the help of WA2PIL and his bow and arrow. WB2GOJ also now active on 2-meter fm. Another 2-meter fan is WB2VVS who just got a new handi-talki. WA2YAW reports receiving an Asst. EC appointment from EC W2KHQ. Here's a good idea - The Albany ARA reports sponsoring a program of finding/leading a seat to their graduate Novices - FB! Add to last month's reporting of Novice Classes a class of 35 for the Saratoga RACES group. Field Day is being organized in the New Rochelle club - your SCM knows the plans but won't tell. Our own ENY-VHF is still going strong Mar. and Thu. 2:00 local on 50.7 MHz says WA2YLM. Code practice follows. PSHR to: WB2EMU, WB2RUZ, WB2WZL and WA2PIL. Net totals: NYR (QNI 138, QSP 43); NYS (QNI 734, QSP 265); ENYVHF (QNI 38). Traffic: (Mar.) WA2PIL 393, WB2EMU 218, WB2RUZ 136, WA2PAU 104, WB2WZL 69, WB2YLM 62, K2OJA 62, WB2TGL 35, WB2VVS 49, WB2IXW 43, K2OYG 30, WB2BIW 25, WB2EKM 19, WB2GOJ 18, K2DN 17, K2HNW 13, WB2QOH 13, WA2CJY 10, W2WSS 8, WB2ELA 2.

NEW YORK CITY - LONG ISLAND: SCM, John H. Smale, WB2CHY - Asst. SCM: Art Malatzky, WB2LZN. SEC: K2HTX, PAM: WB2PYM. RM: WB2LZN. The following are traffic nets in and around the section.

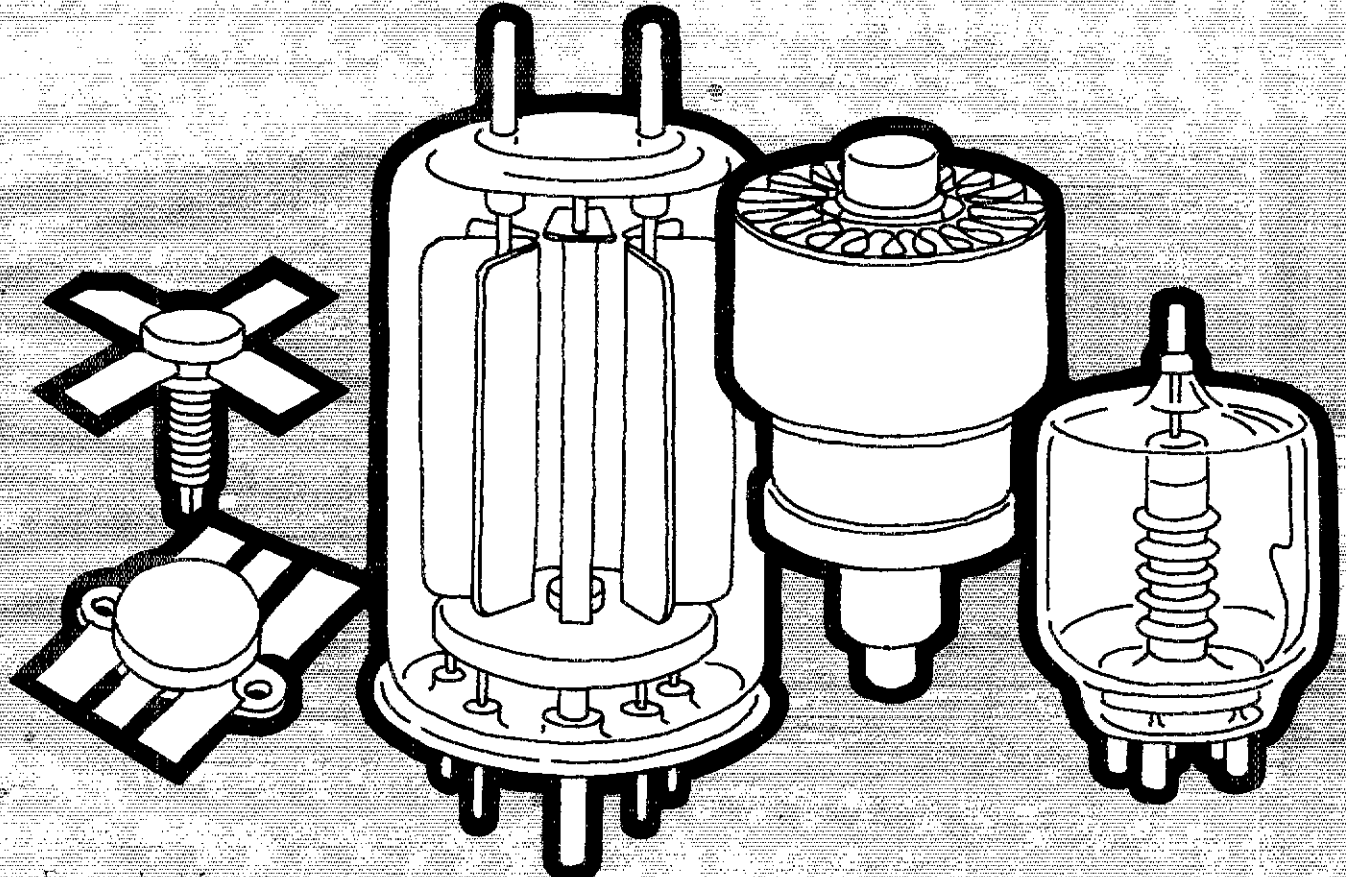
Net	KHz	Time/Day	Manager
NLI*	3630	1900/2200	DWBB2LZN
NLI PHONE*	3928	1730 Dy	WB2PYM
NLS*	3730	1830 Dy	WB2WRT
Clear House	3925	1300 Dy	WB2DDO
All Svc	3925	1300 Su	WB2OJ
MIC FARAD	3925	1300	W2OE

ESS 3990 MTWTFSS
NYSTPEN 3925 1800 Dy K2UIR
WA2RSP 1800 Dy

*Denotes section net, all times are local. Congratulations to WA2VE who graduated from Air Force Tech School, he has been assigned to base in KS. WB2WRT passed his Extra. The members of the Inter-County ARC wish their director, W2DMM a happy 50th birthday. WB2TBC holding Novice classes on Wed. nights at 7 PM., for further info call Fred at 712-427-335. WA2TQ now has a two meter setup as does WB2CHY. W2PF local on 50.7 MHz says to keep the NY ARC going by arranging a program for each monthly meeting. It is with deep regret to list as a Silent Key O44JW2UD who passed away in Lima, Peru on Mar. 27 '76. Uda was one of the founders of CCWA and Radio Club of Brooklyn. Don't forget Field Day this month. LIAARC has a Public Service Net every Mon. at 8:30 PM local on WR2ADM. Larkfield ARC had K2RIW as their speaker for the Apr. meeting. Please keep in mind and circle Nov. 13th and 14th, that's the date for the HARC convention in NJ, make your reservations early, the convention committee has a great program lined up

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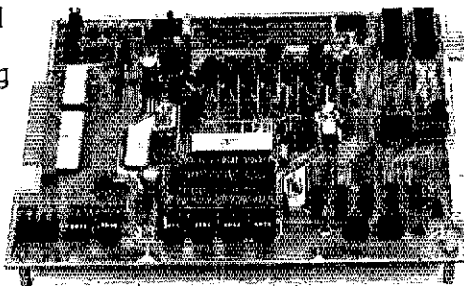
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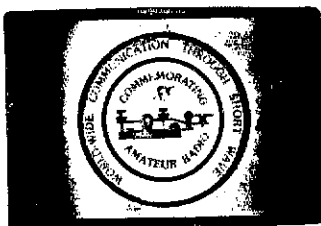


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for this convention. K2UAT was reelected pres. of the Grumman ARC. The following were operators at WB2JSB (Hall of Science ARC) who aided efforts in handling traffic during the Guatemala Earthquake: W2MXI, WB2TFS, WB2FGB, WB2PROF, WA2PCY, WA2VOS, WB2TBC, WA2QHF, WB2FHN, WA2YXB, W2EPZ, WA2NZX, WA2PFY, WA2ROD. The Hall of Science Club also has several construction projects in the planning, among the items being a 2KW linear and a speech processor, why not contact WB2TBN or rigs with ssb K2OVs reports increased activity on the low end of two, check 145.025 on Sun, mornings, K1PXE is the unofficial NCS. The Peconic Amateur Radio Soc. meets in the Marine Station of Southampton College the first Fri. of the month at 8 PM. K2GCE has returned to the air after a long layoff. The NLL section picnic will be Aug. 15th. Contact WB2OYV for further info, rain date if needed will be Aug. 22, plan now to attend. It is with deep regret that we list K2MOO as a Silent Key. Traffic: W2EC 302, WB2LZN 225, WB2WRT 203, WB2YKG 111, WA2WKH 73, W2MLC 53, WA2ZGR 41, WB2WV 35, W2PHK 31, WB2LTN 23, WA2ZLN 22, WB2ZPV 16, WA2CZ 16, W2ECC 16, WB2HTM 10, W2PT 10, WA2TGT 7, K2JFE 5, WA2JEI 5, WA2JZX 4, WB2OYV 3, WA2PLI 2.

NORTHERN NEW JERSEY: SCM, William S. Keller, III, WB2RKK — Net — Freq. Manager
 NJN — 3695 7:00 Dy 31 403 153
 WB2LCV
 NJN — 3695 10:00 Dy 31 197 52
 WB2LCV
 NJPN — 3950 6:00 Dy 31 697 332
 WB2VTT
 NJPN — 3950 9 AM Su 4 86 22
 WB2VTT
 NJSN — 3730 8:15 Dy 35 215 57
 WA2WIW
 PV1EN 145.71 8:00 Dy 31 160 20
 WA2OPY

SEC: WB2PBO. PAMS: WA2OPY (VHF), WB2VTT. RM: WA2WIW. OD reports received from WB2CST, WA2DNY, K2EK, WB2TEC, K2JFJ. Our regional AMSAT coordinator, WA2CBB, spoke at the New Providence RC meeting. The newly-formed Public Service Electric & Gas Co. Radio Club officers for 1976 are: WB2NJH, pres.; WB2WTJ, vice-pres.; WB2DCV, secy.; K2LSU, treas.; WA2ZBO, tech committee; WA2ALJ, act.; WA2FUI, trustee. Good luck and we hope you will soon become affiliated. Congrats to WB2YJQ now General Class. WB2VTT recently earned the CP 25 wpm award. WA2GZE recently added A35 to his list of countries worked. Congrats to the crews at W2YD and K2BMI on their recent high-scoring efforts in the ARRL DX competition. WN2EAK, WN2EAL and WB2SKD report adding a TR4C, Swan 350, and Tempo 1 to their stacks, respectively. The club at W2OBY added a new frequency counter to the stack. W2JDH building a homebrew KW linear, while K2JFJ is finishing up a solid state homebrew 1.7-30 MHz receiver. FB1 W2NKD and W2NR recently participated in the joint MARS/RACES drill—operation "5-11." WB2CAM working on setting up AREC in Little Falls. WB2ZM can be heard on RTT during school vacations. WB2SKD will be busy by the time you read this — and will help putting up his tower and antennas. The Thomas A. Edison ARA has graduated 40 Novices, will again be holding classes for prospective Novices in the Fall. WA2DIW also planning to hold a Novice course at the Wayne Adult School in the Fall. More dates on these courses and others will be forthcoming if you are planning an AR course, or know of any coming up, please let me know so that I can spread the word. The Mt. Carmel RC Net meets each Mon. at 0230Z on 145.854. Contact WA2IGO for further info. Don't forget to join in on the fun on Field Day — the 2nd weekend of June. Also don't forget to send a message to your SCM reporting your activity during the operation for extra points. Traffic: (Mar.) AB2VTT 295, WB2RKK 244, WA2DSA 228, K2BHL 132, AA2RMZ 96, WB2RKK 84, AA2WXM 86, AA2SZW 71, W2SWE 51, W2CJ 46, WA2WIW 42, WA2DIW 36, W2NPP 30, WB2HSG 2, K2ZFI 26, W2BLM 27, AB2CV 18, WA2SLF 18, WA2OPY 15, W2NKD 14, W2WHB 13, W2DZL 12, WA2YWK 10, W2ZEP 10, WA2CCF 9, WB2KGV 8, AA2YHJ 8, WA2FUI 7, WA2QUJ 5, WA2SRQ 5, WB2VVC 4, W2JDH 1, W2WOJ 1. (Feb.) WA2OPY 14, WA2YHJ 5, WA2UO 4, WB2TDI 3, WA2KFE 2.

MIDWEST DIVISION

IOWA: SCM, Max R. Otto, W0LFF. — New officers for Club Station Radio Clubs and repeater assn. WA0KHF, WB0DLC, p.; WA0YWD, vp.; WB0EID s/t; Fort Dodge: W0BSW, p.; WB0OJT, vp.; WB0HZK secy.; WB0ICF, treas.; K0ARA, pro. Cedar Valley: WA0VUJ, p.; W0GGO, WB0FNM, K0VQM, WB0KFB and K0DAS, dir. WR0AJF, WB0CAD, p.; WA0DWE, secy.; WA0GK, treas. WB0AGL, WB0EGL, p. WA0INC, secy. WA0CLN, treas. W0SWY new trustee for W0MME. 3900 Club and KTIV-TV making 30 minute tape for PR. W0FTI has new Midland 13-505 and a Ringo on 2M. K0BND has complete 5-line plus had eye surgery. WA0BWS new power supply went w/ast. A0BTOX says WA0ALX keeps IA hot on DTRN. WA0TAQ now in Hastings, IA and WA0NLK in Tipton. Iowa City welcomes W0S5BT. Novice class in Pella should produce 10 new hams, and IA-IL ARC will produce about 60 in Burlington, WA0ello and Mt. Pleasant area. W0VU on display at shopping mall signed 57 future Novices. Looks like a lot of QRM signed 5x-9AVU had heart attack while visiting W0CVU in Cedar Rapids hospital. Both resting well a last report. K0ELVH is ORS. New ECs: K0ZCA, W0ZYM, WB0NZA, W0QGI, W0FQW and W0DUN. W0Y0Y and W0PC looking for good Oscar location. Great River ARC provided 2M for in walkathon. IA W0M Net, 7302, QNI 758, QTC 129, Sess. 27, 2300Z. QNI 1200, QTC 51, Sess. 27, FLCN Net, 2430/0300Z, QNI 431, QTC 101, Sess. 62. IA 75M Net (Noon), QNI 1626, QTC 136; IA 75M Net (Eve), QNI 1053, QTC 46. Traffic: (Mar.) WA0ALX 302, W0UPX 122, K0EVH 102, K0AZ 93, W0YLS 73, W0QNV 30, WA0ELM 26, WA0KHF 23, WB0AVU 15, W0LFF 16, WB0RWN 15, WB0MCK 14, W0LCL 15, W0IO 7, W0MOQ 7, W0B 4. (Feb.) W0LXC 4, W0GOKA 11.

KANSAS: SCM, Robert M. Summers, K0BXF — RM K0BRI. PAMS: WA0SEY, WB0BCL, VHF PAM WA0EDA. With deep regret, we list K0JMF, 5EC to the list of Silent Keys. OBS, OPS, ORS, OO and OV appointees of our fair state will long remember the



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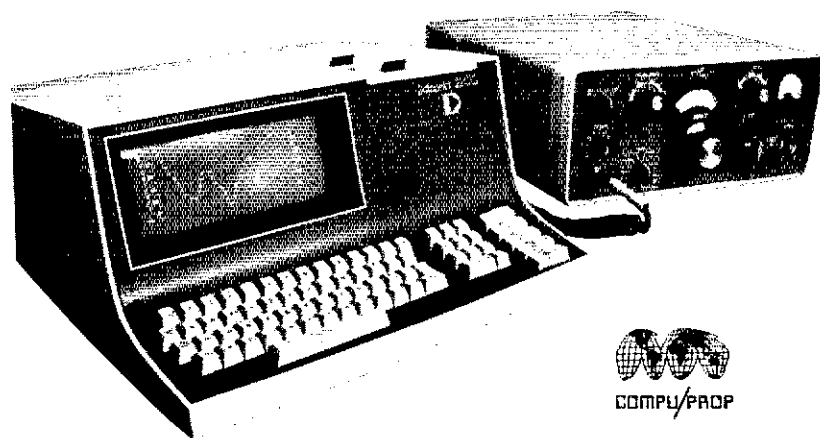


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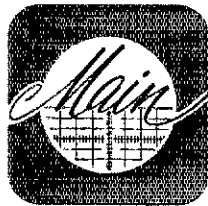
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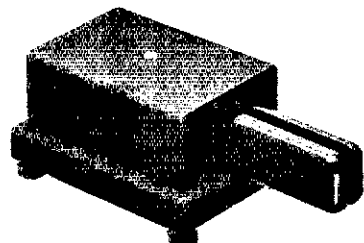


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voice of "Gravel Gerti", the ole politician from Topeka. A new club from Smith Central, KS - WB0HBM pres. More later. The Simko Valley, RC elected WA7VVT/9 pres.; W0CIN, secy-treas. WB0MRX, vice-pres.; K0TCS, board of dir. Parsons ARC going strong with 22 members and a 147.90-.30 repeater under construction. The Douglas Co. ARC recently provided communications for the Lawrence High School music Marathon from the local shopping center to the Administration center where pledges were phoned in for the band, who now will make their journey to Washington DC per invitation recently received. W0INH says having a time keeping antennas in the air during the spring winds. 10 AREC ZONES reporting with 351 QNI, 19 QTC in 448 sessions. Congrats to WB0HGG now General Class. KWNI: QNI 692, QTC 196, 31 sessions; CSTN: QNI 675, QTC 26; QKS: QNI 409, QTC 148 in 61 sessions; HBN: QNI 254, QTC 27 for Feb. and QNI 269 QTC 35 for Mar. Mid-States Mobile Monitor renewed service this month for QNI 517 and QTC 41. Traffic: W0FIP 207, WB0HBM 196, W0HJ 147, W0INH 132, W0CJH 109, K0MRI 77, W0LKA 56, W0CYH 54, W0MLE 41, K0BXF 40, W0LBB 35, W0NYG 30, W0ODJ 29, W0RBO 24, W0FDJ 18, W0PB 18, W0BLI 14, W0MCH 12, W0ERG 11, W0GSG 10, W0OCK 8, W0FCL 4, W0KWI 4, W0ATRO 4, W0GOWH 3, W0BKDE 2.

MISSOURI: SCM, L. G. Wilson, K0RWL - Asst. SCM: Joe Flowers, W0OTF. SEC: WB0DBW. New appointments: Besides the two shown above, W0HH as ORS, State Fair station KF0MO operating in Aug. will need operators. If interested, please contact WB0FND. New HARC officers: W0CDA, pres. WA0VW, vice-pres.; W0AZNL, secy. Silent Key, K0UHL condolences to family. New hams: W0NSEN W0NDS and W0NSDT, congratulations. W0NUB back on the air. K0ONK off the air due to rig problems. Hopes to have new rig shortly. New emergency plan for the state forthcoming, with copies to each EC soon. Still need ECs for several courses if interested, please contact WB0DBW. Jefferson City Club has graduated another large group of new hams along with taking part in walk-a-thon. Good work, group.

Net	QNI	QTC	Net	QNI	QTC
MOSSBN	1271	79	MSN	185	59
SCLN	64	2	PHD	61	9
MON 1	222	100	MEN	461	28
MON 2	117	53			

Traffic: W0HH 254, W0OTF 145, W0BV 80, K0RWL 72, W0FMD 62, K0ONK 56, W0EMX 47, W0FND 45, WB0DBW 43, W0NUB 43, W0ERI 40, W0MEO 40, W0LWW 36, W0UD 31, W0EPI 28, W0MCF 16, W0VEF 12, W0AKUH 12, W0LFY/9 7, W0MDZ 4, W0CKI 1, W0FKY 1.

NEBRASKA: SCM, Claire Richard Dvas, W0JCP - SEC: W0ASM. The Midwest Division Director was elected speaker at the Grand Island ARC on Mar. 18. At the Holdrege Area ARC meeting on Mar. 21, the Midwest Dir. presented the club charter and WB0IUT presented his fine Oscar slide presentation. The Crete ARC held its annual pancake feed on Mar. 18. The AK-Sar-Ben ARC held their annual auction on Mar. 26. They had lots of equipment and bidding was active from the large crowd that attended. The AK-Sar-Ben ARC Big Brothers/Big Sisters have served 79 Ham prospects up to Apr. 1. On Mar. 30, ham operators in the Central NE area provided emergency communications and also manned the Civil Defense Comm. Center. This was the result of a severe ice storm which took down all power and telephone lines. 160 MI Wx net closed Mar. 3 for the summer. NE Storm Net, QNI 1109, QTC 15; NE Storm Net II, QNI 586, QTC 8. Traffic: W0VEA 79, W0CBB 64, W0QB 30, W0LCE 30, W0EVS 24, W0MW 22, W0QCI 21, W0CSW 18, W0JWQ 15, K0SFA 13, W0JCP 12, W0QEX 11, W0HOP 6, W0NIK 6, K0TUH 6, W0NFG 5, W0QGX 5, W0DMY 4, W0GMQ 4, W0PCC 4, W0GAK 2, W0EQ 2, W0RJA 2, W0VYX 2.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, John McNassor, W1GVT - SEC: W1DGL. RM: K1EIR. PAM: K1EIC. VHF PAM: WA1ELA.

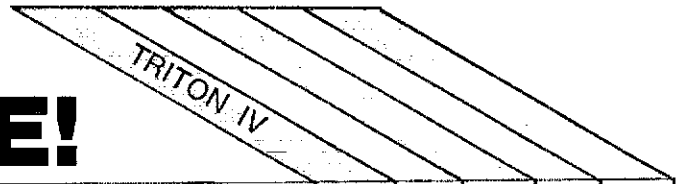
Net - Freq.	Time/Days	Sess.	QNI	QTC
CN - 3640	1900/2200 Dy	59	376	326
CPN - 3965	1800 M-S	31	586	241
	1000 Su			

VHF-2 - 28/88 2130 Dy 31 478 83
High QNI: CN - W1CTI WA1UAX and W1KAM. CPN - W1NGQ WA1UOU WA1UOT and WA1UR. SEC W1DGL appreciates monthly reports from all ECs, contact WA1WEM for info, on asst to National Weather Service. Director W1HHR needs Club info and member comments to convey our desires to other Board Members. Board Meeting covered in CD Bulletin. Hamden ARC extends thanks to all for a class presented by C1C on the new Armed Forces Day Radio on local Broadcast Station. Southington ARC provided Library with set of ARRL Books. Shoreline ARC has more Extra and Advanced Class members than General Class! Murphy's Marauders wants new members interested in Contests - contact new officers: W1GQD, pres.; WA1UQ, vice-pres.; W1ABW, vice-pres. WA0MG, secy. W1BEN invited to be guest operator at Norfolk Navy Station during Armed Forces Day Test. W1EFW & WA1URA new PR Assistants for W1HHR. W1FYG now W1YY very active with PY phone patch traffic. W1CDC will activate PJ9CDC in Aug. WA1SWJ has Novice Class at Storrs. W1B2EDW1 now WA1WA. Congratulations for W1UAF, W1AFH, W1LUDS, General Class; W1IWTB W1WKT W1WJ and W1W0X Novice Class; W1EFW Mar. High QTC VHF-2! Field Day is an opportunity to display Amateur Radio to CBers, invite them to your FD site and encourage them to join the Wonderful World of Amateur Radio! Traffic: (Mar.) WA1UAX 375, W1EFW 268, WA1EGH 245, WA1WEM 181, AA1RYL 173, WA1UR 141, WA1HP 66, W1AW 58, W1CTI 56, W1GVT 55, W1DGL 46, WA1UA 42, WA1RUS 41, WA1UO 41, W1KAM 38, W1B2EDW1 35, AA1SP 24, WA1UOT 22, W1BND 20, W1KY 20, AA1UDS 20, W1BDI 18, W1NVP 18, W1EATU 18, W1UAF 18, W1AFH 12, W1GQ 10, WA1ULT 8, WA1TZK 7, WA1PE 5, W1LXV 4, W1WEE 2. (Feb.) W1LXV 28, WA1URA 19.

COMPARE

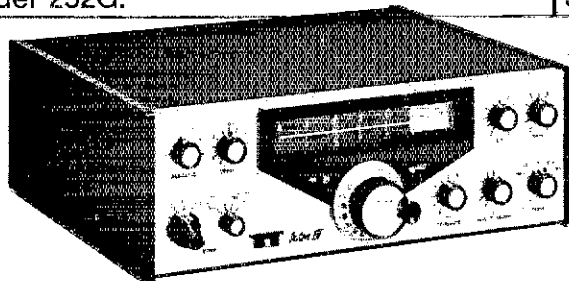
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3.	Covers all ham frequencies, 3.5 - 30 MHz.*	Yes				
4.	Power input, all bands, watts.	200				
5.	Sensitivity (10 dB S+N/N), micro-volts.	0.3				
6.	Stability. Max change for 1°F, Hz.	15				
7.	Selectivity, i-f shape factor, 6/60 dB.	1.8				
8.	Direct frequency readout to 1 kHz.	Yes				
9.	Pulsed crystal calibrator, kHz.	25				
10.	Built-in air loaded loudspeaker.	Yes				
11.	150 Hz CW filter option, \$25.	Yes				
12.	Incremental (offset) tuning.	Yes				
13.	WWV at both 10 and 15 MHz.	Yes				
14.	Separate receiving capability.	Yes				
15.	Automatic sideband selection, reversible.	Yes				
16.	Full break-in CW.	Yes				
17.	Keying rise/decay time, millisecc.	2.5				
18.	Sidetone level and pitch adjustable.	Yes				
19.	Pre-selectable Automatic Level Control.	Yes				
20.	Unwanted sideband suppression, min. dB.	60				
21.	Carrier suppression, min. dB.	60				
22.	Intermodulation distortion, min dB.	30				
23.	Harmonic radiation, min dB.	45				
24.	Built-in SWR bridge.	Yes				
25.	Provisions for driving all linears.	Yes				
26.	LED indicators for Offset and ALC.	Yes				
27.	Ten meter crystals for 28.0-29.0 MHz supplied.	Yes				
28.	Basic 12-14 volt DC operation.	Yes				
29.	Five year pro-rata warranty on final transistors.	Yes				
30.	Plug-in circuit boards.	Yes				
31.	Price, TRITON IV, less power supply.	\$699				
32.	Price, power supply Model 252G.	\$ 99				

*160 meter adapter available.



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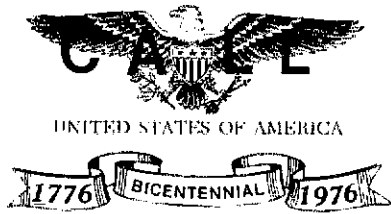
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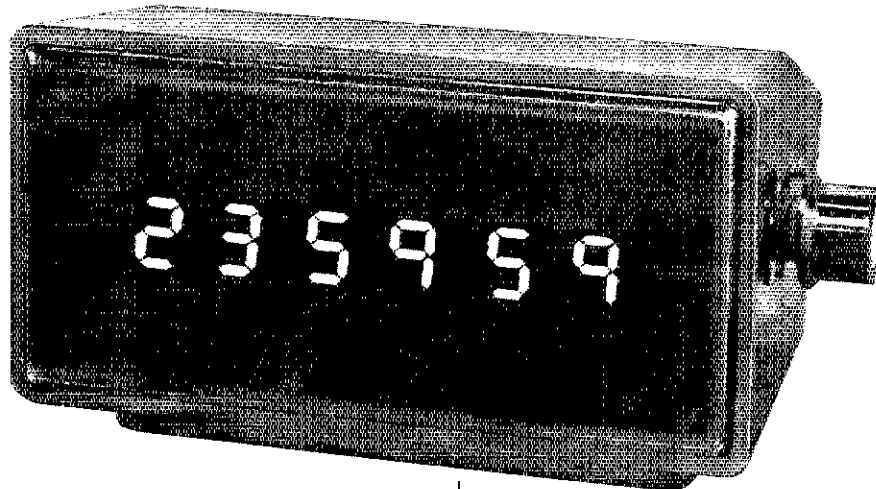
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EASTERN MASSACHUSETTS: SCM, Frank Baker, W1ALP — The First District now has a member on the Emergency Communications Advisory Comm., K1UAG, so lets all give him our support in this important part of our hobby. W1ACG home from FL and wants to thank all ECs for their reports received. W1AYN ex-W1AIDDO W1JOS K1VJT W1UXZ W1VDV W1MNF/WB4YPO are Silent Keys. W1EAD in hospital and on 2 fm. W1DMS now home from hospital. New Club Framingham High & Low, W1WRB, K1JCV on 2. K1PNC on air. W1GGA has a 15-20. W1AFC has Yaesu station, New 7d. W1AFC advanced: W1LVFY W1ACRI W1AFCO W1UFG has an 80-meter inverted Delta loop, works on 40 & 20. W1QJU has TS-520. W1WTT new in Lincoln. K1LOG spoke in Microprocessors at South Shore Club. W1LWS is training officer of MA-R area of Navy MARS. W1RML has Swan 500-c Mosley, KV-4. W1AFA teaching Novice class in Wellesley. W1RHD says they have a repeater on 29.520. W1RIGM, T9 Club met at W1LZF's QTH. W1ALP on 2 fm. W1NF has a Heath SB 540. W1MSK had a PSHR of 61 in Feb. W1GFO says he will soon be on the air from W. Yarmouth. W1JAA has a watt solid state 432 MHz converter, also Bicentennial WAS 2 DXCC 180 sticker. Clearing House Net on daily. W1NND had heart attack. W1TJG new EC for Westford. Endorsements: W1ANB QBS; W1PZ W1RJK W1DBY as ECs. W1LAV has an SB-620. W1POL has a new pace-maker. Our sympathy to W1DDC on the death of his wife. W1ICP from ARRL spoke about antennas at the Quannapowitt RA. W1NF working on 2 fm. W1RIGM is on the Committee for Assistance to Veterans. W1AGN/K1JOP moving to Phoenix, AZ. W1ELMN W1AIRTG will join rigs on 2. W1QAA/QAB on a trip in PA, visited a Club in Allentown. K1IIF W1AIRTK went to Mex. W1AIRK on 160; he and W1ARJU K1SOP W1NUL have 40-meter loops. W1QAA helping out in the Intruder Watch project. W1ISXU very busy new job. W1Wellesley group helped out in pre-Marathon road race. The QTC Net presented W1AEH a plaque for his 20th session as cw NCS, present were: K2NP W1AAU W1BY W1AUG W1AEH. W1LMO back on 160. W1CFL on cw & 6. Capeway RC had 3rd Night at Ridder's. Norwood has a good 3rd night, and classes are being held. W1BR spoke about 160 at the Middlesex ARC. Whitman ARC held a banquet. W1ATSL has his Advanced. EMRIP had 308 QNTs, 117 QTC. EM2MN 81 QNTs, 44 QTC. NEPN had 69 QNTs, 12 QTC. EMRI (Feb.) 319 QNTs, 239 QTC. W1PRL has Atlas 210K. W1AEB has a Clegg HT-146. DL2AA/W has a 20 cm repeater in Meadwood. W1ARLI has MA Bicentennial Award No. 63 for 8 bands. Reports received from ECs: W1AJSU W1FII K1FMM W1PEX W1EGH W1AION W1AJSU. Traffic: (Mar.) W1PEX 469, W1UX 195, K1PAD 129, W1AIDW 67, W1AUG 47, W1DMH 30, W1AJSU 25, W1ALM 22, W1DMS 19, W1AIEY 19, W1AIFW 18, W1AIRD 7, W1E 6, W1GJF 4, K1LCC 4, W1PAZ 2, W1EMG 2, W1NE 1. (Feb.) W1MSK 304, W1AJSU 16. (Jan.) W1AJSU 56.

MAINE: SCM, Ed Bristow, W1MUX — SEC: W1FCM. PAM: K1GUP, RM: K1MZB, ORS: K1RQE. Nets: M5SN QNT 95, QTC 17; NEBN QNT 891, QTC 8; M5GN QNT 95, QTC 15; PIN (Feb.) QNT 154, QTC 15. More classes by W1A18Z; W1T (Ellsworth AMA); W1YA (UMO ARC) New in ME. W1N1s WMP WMT WOC WOQ WOR WOU WPR WRG WRG WRI WRJ WSE welcome aboard. OVSs W1VAI & TRE both report good vhf during recent aurora. W1ATRE has new TR-4C on air, congrats. PSHR: W1AFCM W1AFCO W1RUC W1RUC passed General class exam, congrats. Ex-W1QDV now KP4EIX. Yankee ARC (W1AIDS) providing communications coverage for Waterville JCs "Walkathon" and for the Friendship "Snopod Homecoming" on July 29-31. W1KX will soon have a 40W amp. for his 100m 22A, 75 meters still works for emergency. W1RJA/41 broke the M5GN on Mar. 19 for car in-ditch he found on 195. NCS (W1MUX) assigned W1FCM who contacted State PD. PD & wrecker on scene within 12 min. of first call. Traffic: W1FCM 315, W1AIOU 108, K16IAC/1 80, W1A1H1 82, W1ERW 75, W1RWG 50, W1MUX 58, K1GUP 23, W1GU 13, W1OTQ 2.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1SWX — SEC: K1RSC, PAM: K1YSD, RM: W1AIGCE. The GSPN had 474 check-ins & 177 traffic. Welcome to WA1WCF WA1WON WA1WNM W1A1WQH W1A1WPM W1A1WGE WA1WSE WA1WSQ W1AJSU. The New Air Force MARS director is K1ACL. The Derry ARC planning for Field Day. A1RQT moved to NH from NY with 6- & 2-meter transverters plus RTTY. Seen on a NH auto plate OH2BA. K2SIL/1 spent 6 weeks in Hawaii. The Derry area hams held a going away party for W1AJSU, who is leaving for Mexico. W1PS assisted the Coast Guard in two SOSs. Both ships saved. K1LMS worked 4 new ones in the ARRL DX test with low power. W1AIFZ graduated from UNH, will be more active on VHF bands. Traffic: K1BCS 226, K1PQV 50, W1ATPN 43, K1LMS 34, A1RQT/1 5, K1ACL 5, W1SWX 5, W1BYS 4.

VERMONT: SCM, J. Breakstone, W1PSK — SEC: W1VSA. Nets: VT 558/Mgr. W1AJSU/2300 M-S. 1330 Su/3909/QNT 563/ QTC 106/sessions 31. VT RFD/K1BQB/2300 Su/3909/88/16/4. Carrier 2DSK/1400 M-S/3935/494/14/26. Green Mtn. W1LJL 2230 M-S/3932/435/30/23. VT Phone/W1KFM/1430 Su/3932/88/4 Gen. Pledge. W1AFCY/34-94. The Burlington ARC will host the annual International Field Day at the Old Lantern Campgrounds in Charlotte, VT, Aug. 15. Advance registration \$3.00, regular (at gate) \$3.50. Regency 2-M limited and many other door prizes to be awarded. Limited supply of special shoulder patches commemorating BARC 4th Anniversary/JULY Bicentennial available for \$2.00. Also Flea Market, Int'l Tug of War, Transmitter hunt, Antenna raising contest; all inquiries to Jack Trombley, W1ATEO RFD 4, Winooski, VT 05404.

WESTERN MASSACHUSETTS: SCM, Percy C. Noble, W1BVR — Worcester Tech W1CK now using secondary call, W1VVO. K1VPN moved to Luddenburg. W1ABY Silent Key, our sympathy to family. K1ICM moving to R. 1. W1IBZ using new KWM-2A transceiver. Many Mt. Tam ARA members provided communications for the St. Patrick's Day Parade in Holyoke. Two year end endorsements out to W1AIDNB SEC; K1RGO/W1BBI OPS W1ALLN W1AIME ORS, WMPN (3935 4:30 PM Mon-Fri) 23 sessions, total QNT 280, traffic 41. WMM (3562 7:00 PM daily) 31 sessions, total QNT 110, traffic 87. WMEN (3935 8:30 AM Sun.) 4 sessions, total QNT 104 (44 on 3935 & 60 thru liaison 2-meter repeaters).

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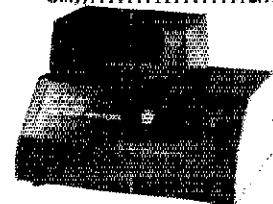
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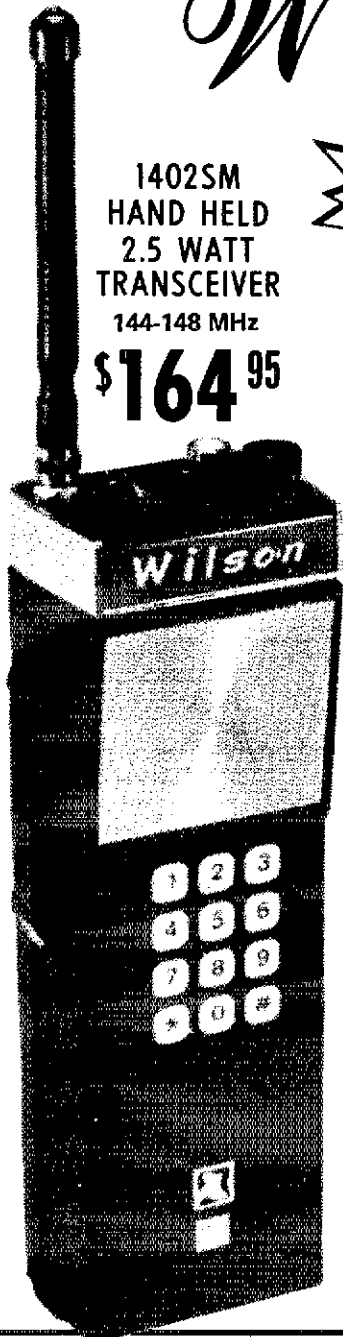
FEATURES

1402 SM

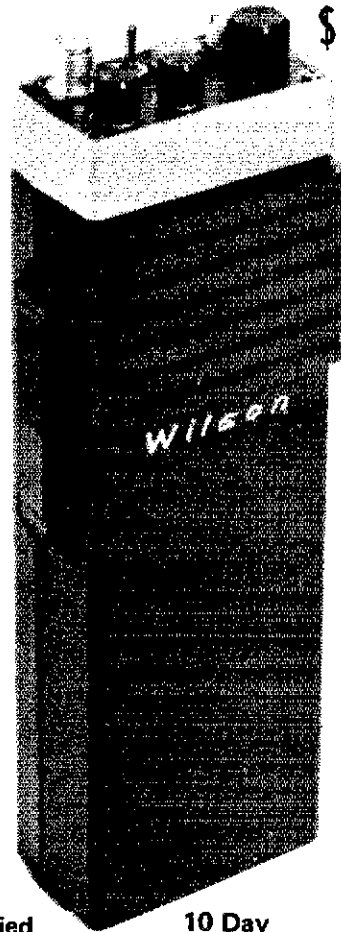
- 6 Channel Operation
- Individual Trimmers on all TX/RX Crystals
- All Crystals Plug In
- 12 KHz Ceramic Filter
- 10.7 IF and 455 KC IF
- .3 Microvolt Sensitivity for 20 dB Quieting
- Weight: 1 lb. 14 oz. less Battery
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- Current Drain RX 14 MA TX 500 MA
- Microswitch Mike Button
- High Impact Plastic Case

1405 SM

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- All Crystals Plug In
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- 10.7 and 455 KC IF
- .3 Microvolt Sensitivity for 20 dB Quieting
- Weight: 1 lb. 14 oz. less Battery
- Battery Indicator
- Size: 8 7/8 x 1 3/4 x 2 7/8
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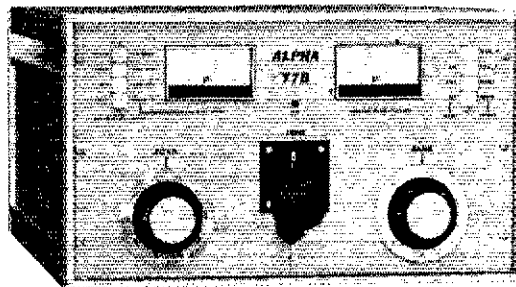
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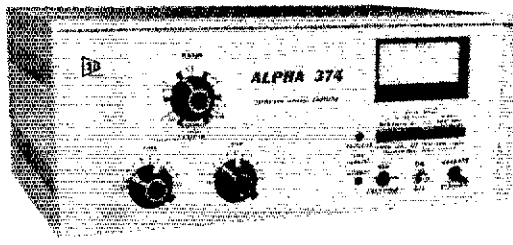
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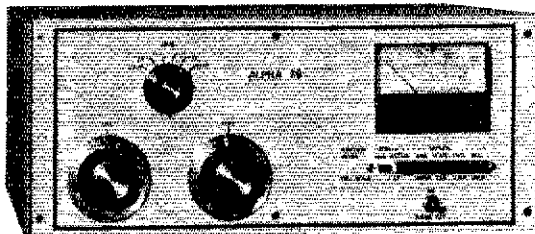
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traffic 5. Our county ECs: W1KZS Berkshire, K1RGG Franklin, W1STR Hampden, W1GQP Hampshire, K1SSH Worcester. Get in touch and sign up for the Emergency Corps. WM AREC Assn. (Mt. Lincoln) 23 sessions, QNI 169, traffic 8. For new hams who may not realize there is a club in their area please contact: Traffic: W1JW 108, AA1MJE 95, W1BR 82, W1DWW 77, AA1RLP 59, W1KK 24, K1RGG 9, K1ICM 6, WA1DNB 5.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davis, KL7CUK — Much appreciation for the thousands of hours the Amateurs of AK spent providing logistic and health and welfare communications for the longest sled dog race in the world from Anchorage to Nome. The Arctic ARC in Fairbanks reports up-coming activity on 6 meters. KL7IS using a rhombic on 2 meters and working Anchorage direct bouncing a signal off Mt. McKinley. KL7HOV PAM for ASN reports 31 sessions, 763 check-ins, 42 phone patches and 79 messages for the month. KL7HMK working on an emergency plan for Palmer area. KL7JDO is up to his neck with his business but finds time to meet many nets. KL7HDX turned in a very impressive traffic count for this month. KL7GCH in his new house but having a problem keeping it up in his area. KL7GCH handling lots of traffic these days with his QRP rig. KL7DG reports a good turnout for QGWA chapter meeting. Traffic: KL7CUK 2402, KL7HDX 104, KL7EKZ 37, KL7JDO 34, KL7GCH 10, KL7HMK 4.

IDAHO: SCM, Dale A. Brock, WA7EWW — SEC: W7JMH, PAM: WA7HDS, RM: WA9KKR/7. Net — Freq. Time/Days Sess. QNI QTC Manager FARM — 3.935 0200/DY WA7VOH IMN — 3.635 0300 M-F 23 184 54 W7GHT RACES — 3.99 1415 M-F W7KDB ID Silver — 3.93 0100 MWF W7LY WA9KKR/7 has accepted the position of Route Manager for ID. Congratulations to the Pocatello ARC, they report quite a few Novices as a result of their sponsored classes. W7JLJ and his scout troop utilized two meters to obtain additional miles when they encountered five feet of snow. W7GBO home from the hospital, hope you're feeling fine. Did WA7WXY's head swell when he found he'd tied for first place in the Jan. CW CD contest? Traffic: WA9KKR/7 180, W7CHT 141.

MONTANA: SCM, Harry A. Roylance, W7RZY — Asst. SCM: Berna Roylance, K7CHA, SEC: WA7ZR, PAM: WA7PZO. New slate of officers for the Laurel Radio Club are K7KOY, pres.; K7ELW, vice-pres.; W7IUN, act. mgr.; W7LBK, secy. New Novice in Laurel is WN7DPQ. Yellowstone Radio Club will host a picnic at Reed Point on July 10. K7BMT has resigned as EC because of illness. Hope you see better Jim. Helgate Radio Club is being reactivated. MTN had 927 check-ins, 20 sessions and 45 pieces of traffic handled. IMN had 23 sessions, 54 QTC and 184 QNI. Traffic: W7NEG 28, W7LBK 14, K7CHY 12, WA7OBH 4.

OREGON: SCM, Dwight J. Albright, W7HLF — Asst. SCM: Daniel T. O'Connell, WA9TDZ, SEC: WA7UHC, RM: K7OUF, PAM: K7RQZ. Net — Freq. Time(2) QNI QTC Sess. Manager AREC — 3993.5 0300 267 4 31 WA7NEO AREC PDX — 146.04/64 0330 M-F 508 18 44 K7WWR AREC JC 0315 MWF 173 5 9 W7LGE OSN — 3585 0245 Dy 39 83 26 K7IWD NSN — 3702 0300 343 103 31 WA7UJO BSN — 3908 0130 454 57 29 WA7MHP

K7IWD is filling in for K7OUF while he is in hospital. The flu bug cut down on attendance at RVRC dinner. Re-opening the CEC, Jackson Co. is nearly complete but the RVRC had to move. Meeting now at W7HLF QTH 1st Thur. The Beaver State Net (BSN) moving traffic in OR as is OSN. Limber up your cw fist fellows, for OSN. There are net control opportunities on AREC (State) contact net mgr. OBS stations in OR come to give service if you do not know when to listen or where send radiogram to W7HLF. High winds have damaged several antennas here on the west coast. W7GUL/EC Multnomah Co keeping tabs on the many activities in the State. Call Bill at PDX Radio if you need info. or WA7IDZ. Either can advise you. We counted 13 ARRL Clubs in OR. SORC Grants Pass; Tektronix; Salem ARC; OSU, Corvallis; RVRC, Medford; PARC, Portland; Pendleton ARC; WVDX, OR City; Mid WARC, Scio; Med SH, Medford; EARS, Eugene; CORA, Bend & Valley Club of Eugene. Traffic: (Mar.) K7QFG 156, K7NTS 121, K7IWD 108, W7VSE 78, K7OUF 57, WA7UJO 56, WA7MHP 42, W7DAN 26, WA7TXV 24, W7LT 14, K7WWR 2. (Feb.) WA7TXV 35.

WASHINGTON: SCM, Mary E. Lewis, W7QGP —

Nets — Freq.	Time	QNI	QTC	Sess.
WSN — 3690	19:30	348	74	31
W7LG				
NWSSB — 3945	18:30	709	56	31
W7DR				
NTN — 3970	11:30	1734	76	31
W7PWP				
WARTS — 3970	18:00	1960	81	31
W7QGP				
ESP — 3920	16:00	329	96	26
WA6GUK/VE7				

K7LRD E-VHF PAM has joined the rank of Silent Keys, he was loved and respected by everyone who had the pleasure of knowing him. A founding member of Dial Twisters Club in Spokane and active in all the activities. Our deepest condolences to his XYL. K7AW/K1 has arrived in his new home. He has worked on Oscar 7 Mode A. W7MCU has a new Echo 70-432 ssb rig and very active on Mode B. WA7KYX has 30 states on 144 MHz EME. W7FN running meteor/ ionospheric scatter on 144 MHz. WA7BBJ/MM2 has Mode B Oscar 7 bench tested and up but having trouble holding antenna position as vessel rolls. WA7RYA, WA7RUV and WA7NXP of W. Seattle ARC provided comm. for field events. WA7EBH K7YRQ

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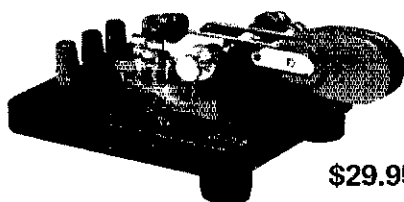
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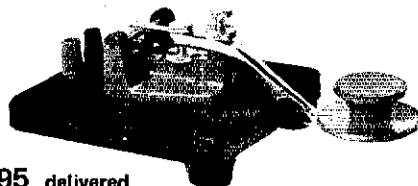
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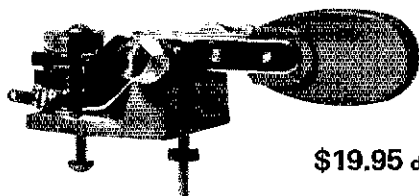


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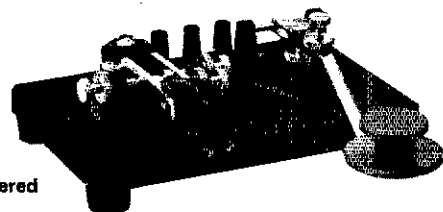
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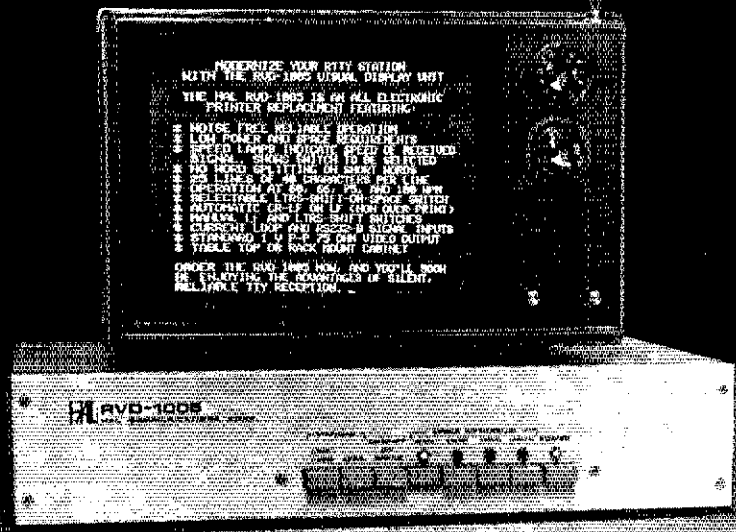
Model HK-4

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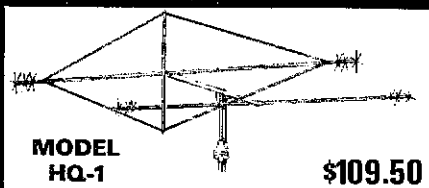
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K7OZA and WATDZL with W7QGP held a meeting with state CD; starting with Skagit Hamfest EC seminars will be on searching using topographic maps by grid numbers. Maps and instructions available by contacting SEC W7QGP, New Port City, WA/DKA, Clark City; WA/MSG Skagit City; and K7KXF Thurston City. Field Day should be busy from all the plans I have listened to at various club meetings this spring. See you FD operating with K7LED/7. Traffic: (Mar.) W7DZX 264, W7OZA 65, W7APS 52, W7BUN 41, W7PWP 39, W7JL 35, W7HAD 25, W7BDD 24, W7ATGVB 15, W7K6 15, W7AIB 13, W7IEU 8, K7VNI 1. (Feb.) W7DZX 271, W7BDD 24, W7IEU 14, W7AIB 9.

PACIFIC DIVISION

EAST BAY: SCM, Charles R. Breeding, K6UWR. Asst. SCM Ronald D. Martin; W6ZF. SEC: WB6RPH. Asst. SEC: WB6DSI. At a special meeting of the Northern CA Contest Club, Ellen White, W1YL, of League HQ made a long awaited announcement. The announcement was that the NCCC took first place in the club scores for the 1975 Sweepstakes. To the best of my knowledge this is the first time West Coast Club has ever taken first place in SS. The NCCC under the leadership of its pres. WB6CEP can stand proud. It was my pleasure to speak before the Mar. meeting of the East Bay Radio Club. My thanks to its members for such a warm welcome. Another BPL card goes to K6HW for his fine contest report. W6B8MV is doing a FE job with his new IC 22A. The new QRS appointments this month are W6EJA and WB6CUA. Congrats to both and good luck. The Pacific Division Convention will be held in San Jose on Labor Day Weekend. This should be one of the best ever. Watch for info and make plans now. From CCRG the following were listed as new calls in the section, WN6JDH WN6JDI WN6JDI WN6JCI WN6JCS WN6JDS WN6JDR WN6JDK and WN6JCR. Traffic: K6HW 548, K6JZR 463, W6TYM 273, W6IP 190, W6JXK 148, WB6JIK 50, WB6UZX 32, W6AVEW 17, W6B8MV 16, W6B8WB 10, W6ABC 4.

PACIFIC: SCM, Pat Corrigan, AH6GQW — SEC: KH6GMP. RM: KH6IU, ECs: Kauai KH6FMT; Honolulu KH6CKJ; E. Caroline Is. KH6DK; N. Marianas KH6SW; Maui KH6HHG; Hawaii Is. KH6EJ. W. Pac. Tlc Net meet daily 0700 UTC on 14110. Gus Browning and A7ABK are on way to exotic DX spots. AH6BZF reports W8GX & VE6P vacationing in KH6. W1ZPB/KH6 has been sneaking in some DX between tlc skeds. He and family had nice visit to Kauai. Don't forget ARRL MARC Hamfest July 3-4. Also, SAROC—Hawaii will be back Aug. 28 at the Kuliina. Emerg. Am. RC, Inc. operator of the majority of the state repeater system publishes news of hams each Mon. at 8:00 PM on the system and on Kauai rpt. People using rpters should support their local rpt group. K6GJES on his way to W6. He was big help on WPTN. Hon. DX Club host to VRIAC & SWA. 21 its last meeting. Contact KH6AN for info on Hamfest. Also, contact KH6BFU, KH6FNB sporting IC-230. KH6HLLU has new ramp. VHF-1, KH6IEU has tower up. KH6FEK vacationing in W6 this summer. KH6IAF had big spread in 73 and World Radio for part in the Guatemala emerg. comms. Traffic: KH6IEU 261, W1ZPB/KH6 193, KC6DK 191, K6GJAQ 135, KH6GQW 78, KH6JAC 76, K6GJES 12.

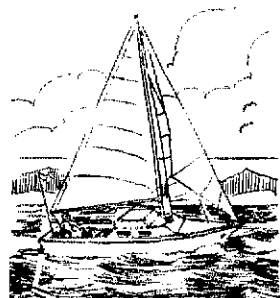
SACRAMENTO VALLEY: SCM, Norman Wilson, AA6JVD — SEC: W6SMU. The Northern California Contest Club accomplished the so called impossible and won the affiliated club competition in the 1975 Sweepstakes contest. W1YL presented the club its trophy at a special meeting which was supplied by K6SG with a case of his homebrew wine. Congratulations to K6RLY who recently received his CW-DXCC. The Mar. meeting of the John I. Sabin Pioneer RC was held near Grass Valley at the Wolf Creek Radio Complex. W6RLP was home in Sac. a few days before resuming his MM operations on the W5/UB5 run. K6BYR/6 is now W6ITE's flying days are over with the USAF so he hopes to spend more time with radio club business. WB6KFL is a new ham in Sac. and XYL of WB6HGS. The Radio Amateur Mobile Society held mobile tours to the Delta area and to Pataluma. The North Hills Radio Club meets the 3rd Tue. of each month at 0730 PM at the Fair Oaks Community Club, 7997 California Ave., Fair Oaks. Traffic: W6DEF 31.

SAN FRANCISCO: SCM, Rusty Epps, W6OAT — Congratulations to the No. Calif. Contest Club for its historic victory in the 1975 Sweepstakes club competition, the first time ever this honor has been won by other than an eastern club. In special ceremonies, ARRL staffperson W1YL presented the winners' gavel to the NCCC at a riotous meeting held at the SF QTH of WB6AIN. The Novice classes at Humboldt State U and College of the Redwoods each have had 7 students pass the 5 wpm code test and they await the written portion; MARC's classes have added 6 more — GI to all. Pataluma DX club. E. Sabin now meets every Thur. at 7:00 PM at Pataluma's San Antonio High School. W6GGR will be in Guatemala for 3 months assisting with Red Cross relief activities and temporary housing construction. W6EUG has been appt'd OBS. K6KWN moving to Ukiah while W6JED reports up for Las Vegas. SEC of WA6LIC W6FCQ WA6BXV plus EL WA6MGGK are busy working out an overall emergency preparedness program for Marin City. Welcome back to W6KYQ who returns to the air following a 20 year hiatus. AA6HPF worked 9 new countries this month. When complete, W6AJU's 160-meter dipole will be 140 feet up in the air. Traffic: W6BL 12, K6T 3, K6T 57, WB6BDL 30, AA6HPF 13, W6UPV 5, W6GGR 3.

SAN JOAQUIN VALLEY: SCM, Ralph Saroyan, W6JPU. Asst. SCM Charles R. Condit, W6CPD. SEC: WA6HNO. W6SMS has new tower and tri-band beam for 10-15-20. K6QDM on 2 meters ssb. K6ZMW on 6 and 2 meters ssb. WB6EHI working DX on 20 ssb. K6KDM on 2 meters ssb. WB6SNB is recuperating from an operation. W6AM was a speaker at the FARC, on Feb. 13, 1976. W6OV and W6FD were visitors at the FARC. W6JFU is a new Novice in Fresno. K6QXE is heading up FD for the Tulare County Amateur Radio Club. W6LD has an IC 202. WB6GT1 on 2 meters ssb. WB6DKR and WA6SCZ are also on 2 meters ssb. The new call of the Robinson School ARC is WB6EWW. WA6YAB has a new keyer. WA6VFU is on 20 ssb. K6LK operating on the 2-meter band, both ssb and fm. WB6JG passed his Advanced Class exam. The new officers of the Central CA Amateur Communications Inc. are WA6VFU, pres.; WB6JH,

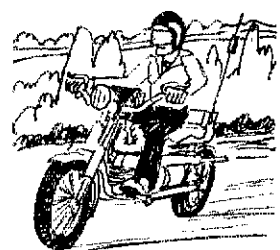
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Stacey Smith, WA2010, shown above, operates mobile from her bicycle with just her Atlas transceiver, a 12 volt portable power pack, and Mobile antenna. With this basic mobile set-up, Stacey has had many enjoyable QSO's on 20 and 75 meters while riding her bicycle. (Our congratulations to Stacey for her ingenuity in setting up this unusual mobile installation, and for getting her advanced class license five years ago at age 12.)



Bob Lengyel, WB6KDS, worked stations all over the world with an Atlas 210x transceiver installed in his sailboat while crossing the Atlantic single-handed. Bob's faith in the Atlas transceiver to maintain vital communications with the rest of the world is a real compliment to the dependability of Atlas equipment. During this month of June, Bob will be sailing from Portsmouth, England, to Newport, RI, in the single-handed Transatlantic race, again depending on his Atlas transceiver for communications. Dan Lepinski, WA7JUX, from Phoenix has just put 40,000 miles on his motorcycle, making hundreds of QSO's during his travels.



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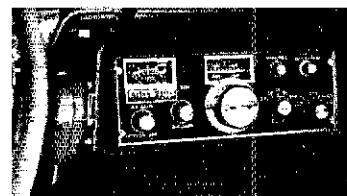
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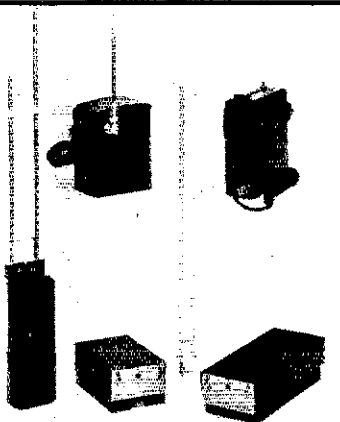
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vice-pres.; WB6JIT, treas.; WA6JII secy. AA6CPP has Bicentennial WPX No. 20, and WA5 No. 126. W6BXI has 4 1/2 states and 14 counties. AC6YKS K6AG, K6QZI, K6QF, K6AVA heard on ARRL CW DX contest. The Firebaugh Jr. High School WB6LRC is doing well. Traffic: (Mar.) WA6RXI 142, WA6JDE 18, WB6MGG 4, (Feb.) WA6JDB 9.

SANTA CLARA VALLEY: SCM, Jim Maxwell, K6AC — SEC: WA6RXB, RMs: W6BVB, W6RFF, W6GNB, W6RFF made PSHR. Welcome to new OPS WB6ESF, WB6JNV busy working on design and construction of a portion of a new AMSA/Oscar portable terminal. The terminal is a multi-purpose machine, for public and educational demonstrations, and for DX expeditions and emergencies. Congrats to Palo Alto ARA (PAARA) member WN6BCH for his new ticket. Those in the mid-peninsula region can keep up with the latest local ham news by reading the popular PAARAgaphs. — write to editor WA6NCK for details. Newest licensed member of Oak Grove HS ARC (San Jose) is WN6JHI. Meanwhile, the Oak Grove Club picked up WB6KGM as their call. W6OLO, a veteran from early Oscar days and the Moonray project, reports good progress on Project Starquest. Starquest members are searching for evidence of extraterrestrial life through radio astronomy. The Santa Cruz ARC recently presented a full set of ARRL publications to the local library. Other PR minded clubs please take note! The Northern CA Net (NCN) traffic count for Guatemala in Feb. exceeded 145. reports NCN Mgr. W6RFF. Want info on NCN? Then drop line to W6RFF or to NCN secy K6TP in SFO. W6AUC reports a total of 264 now enrolled in the Norcal Chapter of QCWA. WA6LMN holds forth on 2M down King City way along with WB6JZF (the King City area EC), WA6IIC and WA6IBV are QRV on both hf and vhf from Bradley. Flea marketers should check their calendars for 13 June 1974. Sell the lot of 50 CARA at the Quement parking lot in San Jose. 2M abounds with nets! Among the most active are the Monterey Bay area Emergency Net meeting Mon, at 8 P.M. local or 145.135 a.m. and the 5CV Section Net, 146.00 a.m. a 8 P.M. on Tue. Finally, don't forget the Pacific Division Convention. The date is 4-5-6 weekend. Will I be there — will you? Traffic: W6YBV 297, W6RFF 116, W6AUC 75, W6KJZ 31, W6WN 21, W6UOC 8, W6QNB 4, W6ZRJ 4, WB6FLD 1.

ROANOKE DIVISION

NORTH CAROLINA: SCM, C. H. Brydges, WA6XZ — SEC: W4EHF, PAM: W4QFO, VHF PAM: K4GHR, RM: K4MC, EC of the Month is WA4TLI covering Onslow Co. so give him your support. The annual Charlotte Hamfest sponsored by the Mecklenburg ARS ticketed over 1300, and had a large flea-market and WA5MP of Mt. Airy won the first prize award for FT101EX. Congrats to W4FMM on making BPL with over 100 originations this month. The Carolinas Novice Net, CNN, meets daily at 5:30 P.M. on 3718 and for Mar. had 202 check-ins, 84 pieces of traffic and ran 863 minutes. Novices try your luck on CNN. Congrats to WB4INB who passed Extra. Congrats to WA5NHW4, now serving as mgr. of Daytime Fourth Regional Net, D4RN in the region net. The daytime National Traffic System (NTS), D4RN meets a 1800Z-7240 and 2100A-3935 ssb so please check these channels when possible. The NCSSBN (3933 kHz) held their annual banquet in Burlington with 110 present for dinner with W4ACY, W4WXZ, WB4OXT, W4LWE and K4KTR speaking along with others giving out the annual "Tiger" awards and with WB4UWK winning the W4HUL Memorial Plaque. Many clubs are running classes with Raleigh, Charlotte, Burlington and Winston-Salem reporting totals of 30, 30, 20 and 41. Amateur radio is on the move in NC with many new calls coming forth. Cape Fear ARS (Fayetteville) turned out to meet for the Methodist College Fayetteville to Washington run with WB4FXM and WA8OAE following the runners while other club members manned the club station using 2, 40 and 80 meters, W4EYJ of Lincolnton holds WAS number 327 that goes way back. Hi. K4CIA continues working on 160 and country 200 on 80 meters. Bill also received Bicentennial WAS number 87. I wonder when he sleeps. Traffic: (Mar.) K4GCN 321, W4FMM 135, WA9NEW/4 133, K4FTB 119, W4OFO 118, WB4PZL 85, WB4INB 66, WB4DXT 52, W4WXZ 44, W4RWL 23, WB4FF 19, K4ME 13, WB4XKG 31, WA4CBE 28, WA4KSO 27, K4EZH 24, W4EHF 4, W4EYJ 4, WB4CES 3, (Feb.) WB4PZU 39, WN4SRD 13, WB4CES 4, W4TYE 3.

SOUTH CAROLINA: SCM, R. H. Miller, WA4ECJ — SEC: W4ZMZ, RM: WB4OBZ, PAM: WB4CGH, Camden ham picnic Aug. 1. On June 5 a new SCM will take office. Let us give our support. He has been elected to administer all League-sponsored operating activities within the Section, including Official NTS section Nets. Let us therefore acknowledge his jurisdiction in these matters, and help him maintain and expand the excellent Section structure already firmly established and still growing. The past year has seen remarkable progress in this respect, due to the efforts of those who have given unstintingly of themselves without thought of self interest or personal prestige. There is a real, live ARRL Field Organization in SC now. We have system, method and purposeful direction of effort. Activity and participation in NTS nets at all times is high. League membership is climbing, traffic totals are increasing rapidly, and ALL SC hams now have access to NTS. Just look at that Novice Net on CNE 189. CNE 79, CNN 84, PX 82. Traffic: WB4OBZ 398, WB4PQZ 150, W4NTO 106, WN4UKU 56, W4ANP 37, WB4CAK 28, WB4ARJ 21, W44ECJ 20, WB4NBS 3, WB6TZW/4 1.

VIRGINIA: SCM, Robert L. Foltmar, W4QDY — SEC: WA4YIU, Asst. SEC: WA4PBG, PAM: WB4YKM, V5BN 3947, RMs: K4JAF, VN 3680, WB2VYK/4 VSM 3680 (6:30 P.M.), W4SHJ 4RN 3567. Your SCM has been a guest speaker at the following meetings: Norfolk Friends & Relatives, at the board meeting initiated "Operation Magazine" whereby mags are procured for distribution to foreign merchantman. VA Bch ARC where 34 amateurs were present and W4NJF, a top DXer is the pres.; WA4EJ, vice-pres. Portsmouth ARC where Geo. Parsons is pres. and had fine turnout in Apr. have attended the QO meeting in Burlington NC where we had a busy time. Eighteen Motions/Resolutions were submitted to the ARRL board. Apr. 7th I was the guest speaker at the Norfolk Lions Club luncheon on the whys and wherefores of organized Amateur Radio. Club papers received containing much fine info are: Richmond; Lynchburg; VA Bch ARC; VA RF; VA RF; VA RF; VA RF; VA RF; Portsmouth and a number of out-of-state clubs.

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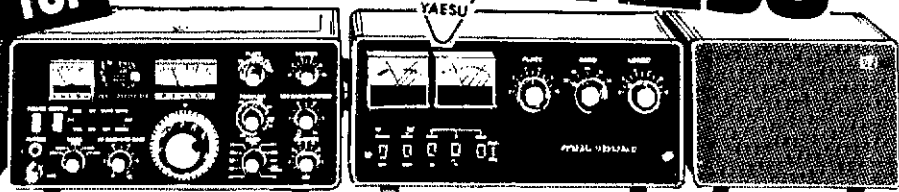
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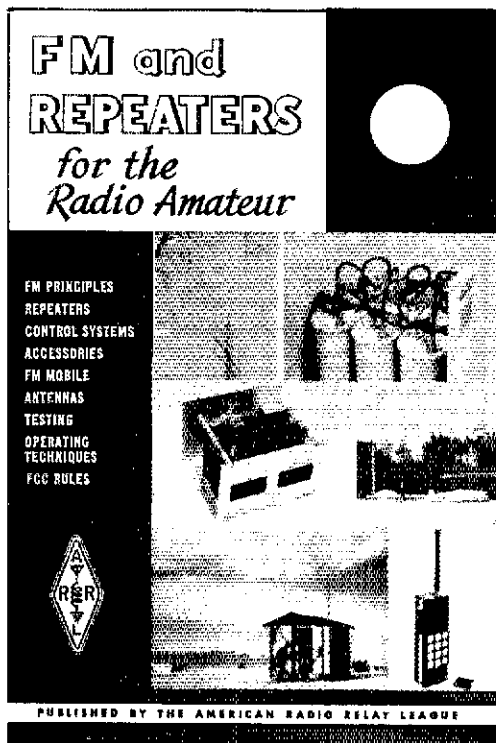
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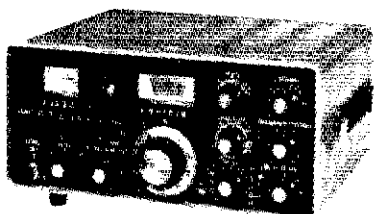
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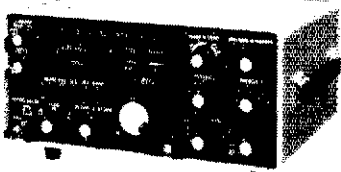
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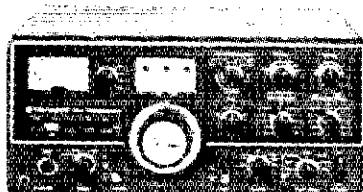
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Excuse the SCM if any were missed. WA4EPJ put up an inverted Vee on a tower and got real good rpts without asking. K4GR says that 2 weeks in Caribbean fouled up traffic count. WB4FDT is new pres. & trustee of the W&M Club; also will be working for FCC this summer. New appointee WB4DTG, recd PSA for his part in "Kluwan" rescue operations, congrats W4YZC reports W4BP modeling. New gear to be ordered soon. W4KFC continues to "stomp" the section. Attended Galthersburg QWCA & Radio Clubs of America banquets, ARRL Technical Symposium and visited Springfield/Annandale ARCS. Reports that K4GTS operated from 4J11TU. W4WRJ teaching amateur radio class at Gordon campus of VA Comm. College. W4AJF says both mobile and Hand-held rps on cw! WB4WUX EC assumed NCS of 4RN, just "plain hammin' it up" sez Don, HI, WA4BUE. Instructor at Norfolk Technical School reports starting class of 55 Novices and 20 Generals. Nice going! WB4DRB sporting a new HT 1446. W2TPV/4 getting used to his new Acekover. EC WB4ZNB activated Franklin-Southampton AREC and assist and provide backup communications for Franklin VA Bicentennial parade. ZNB & WB4MNJ K4SP5 and K4JA assisted with 2-meter mobile 94/94. WB8MKO/4 getting foot wet in VSN and liking it! W4LXB recd ORS-OPS and CTC at one time. Hopes to get air, up soon. WB4YXN QRP during net. W4THM reports rpts getting down two nice Russian rigs from someone using his sent em back to USSR! W4JUJ took active part in YLOM, TN & VA QSO Parties. Received award for 1st place in NC QSO Party, 3045 counties confirmed. Traffic: (Mar.) WA4VFW 394, K4KNP 226, WA4EPJ 167, W4UQ 163, K4MLC 161, K4GR 114, K4JM 105, W4VVO 97, W4VVO 82, K4EF 78, W4SUS 54, K4FEL 52, WB2VYK/4 52, W4SHJ 42, W4AJF 39, WB4DTG 35, W4YZC 30, W4KFC 22, WB4WUX 19, WB4DRB 17, WB4KIT 17, W2TPV/4 17, WB4ZNB 14, W4LGM 10, WB8MKO/4 9, K4GTS 9, W4LXB 9, W4HIR 8, W4MK 7, WB4FDT 7, WB4YXN 6, W4AHUB 4, W4ZM 3, K4ITV 3, W4TMM 2, W44-HIG 2, W4FBI 1, K4FEL 1, WB2VYK/4 63, K4GTS 25, W4ZDN 24, WB4FDT 19, K4KA 13, WB4ZNB 6.

WEST VIRGINIA: Kay Anderson, W8DUV and W8BLAI WB8BMV WABYCD W8DUV and W8DUV attended the LO meeting at Burlington, NC. Fairmont amateurs have formed the Airmont Repeater Assn. and will put 28.88 repeater on air. K8MYU moved to PA. WB4ZA has HW-8 on W/Vn and SRN nets. W8BLAI new Life Member of the League. Stonewall Jackson ARC of Clarksburg had Amateur Booth at the Clarksburg Home Show. Third amateur radio class started Charleston area with WB8TKH at the helm W/VN Net in 31 sessions and 179 stations passed 60 messages. WB8WVW W8AT. WB8DQX K8LSN WABYJT and W8BLAI, all YL operators have Net on 82/52. W8BYND newly licensed. WB8TDA, Novice Net Mgr. reports 123 stations handled 8 messages. Monongahela Wireless Assn. of Morgantown plan Hamfest for the spring of 1977. QSO Party, April 13-14. Chapter, now the WV Chapter and will have display at Jackson's Mill Convention. WB8OK and W8PZT now active on 2-meter fm. Traffic: WB4ZA 77, WB8DQX 60, WB8CX 32, W8EUE 25, W8PZT 14, WB8II 11, WB8PAV 8, WB8TDA 8, W8BRUZ 7, WB8CNN 6, K8EAW 6, WB8M 6, W4LFW 5, WB8SAW 4, WB8CYN 4, K8BYN 4, W8BYN 3, WB8YV 3, W8ETE 3, W8SAKR 3, WB8TEE 2, W8MNM 2, WB8HAX 2, K8AKJ 2, W8RMZM 2, WB8DXF 2, WB8IHA 2, WB8TJN 2, WB8TRK 2.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Clyde C. Penney, WA0HLQ - SEC; K0FLO, RM: W8OHC, PAM: K0CNU. WA0GCK. Congratulations to WB0NHA who passed his General Class in Feb. Congratulations to W9PLV on qualifying for 25 wpm code Proficiency Certificate. The CO Ten-Ten Chapter is operating a CW net on 28.150 MHz, every Sun, at 1800 local time (0100 UTC), and welcomes check-ins from everyone. Congratulations to WB0FQD, Chapter head of CO Ten-Ten Chapter, who received the "Chapter Head Award of Excellence" from International Ten-Ten of Southern CA. Net Traffic for March: HI-NW QNI 174, QTC 36, informals 196, 30 sessions, 1269 minutes. Columbine QNI 1301, QTC 62, informals 307, 23 sessions, 2205 minutes. Late Net traffic for Feb: 55N QNI 174, QTC 21, 27 sessions, 356 minutes. Traffic: (Mar.) W0WYX 1823, W0MTA 699, W0QO 572, K0ZSO 47, W0WYX 469, W0WYX 469, W0WYX 188, W0WYX 170, K0UTL 73, W0WJ 70, W0WPP 69, K0TIV 64, W0BBL 54, W0FJD 23, W0YGG 22, W0TMA 20, W0MYB 19, W0NHA 16, W0LAE 14, K0CNU 11, W0ZLO 9, W0WLD 7, W0GW 4, W0WYQ 4. (Feb.) W0LQ 71, W0BBL 58, W0WJ 54, K0TIV 54.

UTAH: SCM, Ervin Greene, W7EU - SEC: WA7ZBO. New EC for Salt Lake Co. WA7ITZ. Welcome aboard. UARC holding forth with another Novice class and report good progress. Much Teletype activity on /0 these days with the autostart stations being added almost weekly. Latest W7NMIK and W7KHY. The new 10-10 repeater should be on the mountain site by the time you read this. Sorry to hear W7UG is a Silent Key. W7MEL, K7CLO have WAS for Bi-Cent. K7CLO first in UT with No. 28. WA7MEL waiting for 5 cards for his all on 75 meters. W7UTM reports working MT station through the Mt. Harrison repeater near Burley ID. Hidden Peak repeater doing great. K7CLO is having a party at the Mountain High Community School. K7CLO has sent out over 300 QSL cards this year. W7OEX reports population explosion on BUN. Time to start thinking of W1MU at Macks Inn in Aug. This year hosted by UT. WA7ZBO in charge and will need lots of ideas and help. Contact Net Traffic: WA7RH 211, K7RH 126, WA7MEL 119, K7ZVT 56, W7OEX 32, WA7EJ 20, W7DKB 17, W7UTM 7, K7CLO 6, W7EU 5, WA7VNG 2.

WYOMING: SCM, Joe Ernst, W7VB - WY Hamfest scheduled for July 10 & 11 at the Meadowlark Ski Lodge, ten miles west of Powder River Pass, in the Big Horn Mountains. The banquet will be Sat. night at the Lodge. Space available for motorhomes, trailers and campers. The hike to near W7UG is a ticket. Reservations for Meadowlark Lodge and Deer Haven. Cody radio amateurs are sponsoring the event. A good many WY hams will be attending the National ARRL Convention in Denver, the following weekend. WA7WXG has joined the two meter ranks, with a Drake TR-22 and gets the Southwestern rps. He is also getting married July 17. During the solar flares the end of Mar. our nets had a difficult time. W7VEW worked 3 new states on Oscar 7 during that time. WB7CPV TV transmitter enqr. at the Boysen Repeater.

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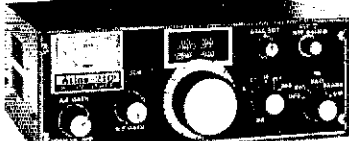


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SOUTHEASTERN DIVISION

ALABAMA: SCM, Jim Brashear, WB4EKJ -- The Mobile ARC had very good hamfest. Our Dir. W4DQD, conducted the ARRL Forum and provided latest info on plans, proposed changes, etc. Congrats to W4SGR on winning first prize. K4GJW was the 5th station to win the WAS award in recent RTTY contest. W4ZJP active on AEMM, AENJ and some KY nets. K4JL of FL. on the FL. on the WAS awards in Mar. caused most of our AL AREC members to provide communications during these periods -- clubs/areas heard from include Tuscaloosa (the West AL Emergency Net on WR4AE was activated 6 times during Mar.). Anniston: Huntsville: Decatur and Birmingham. WB4SVH reports the CD bought a new GT 200 for their EOC. K4HJM reflected as pres. of Southern Section of the Country Cousins; he also reports W4MHO organized and founded the "Golden Gabbers Club." K4UMD has new TR-4C. Sorry to hear of the accident of W4UQH. Appointed WA4MWF as EC. Welcome to WNAS HGD HGI HGM HHP HHC HHC HGL HHT HPH HPP HPP HQA HGD HGT HTW HVS HWS HWT IBX ICC ICF ICQ ICS ILI IR1 ISG JCH JER JEZ JFB JFD JFF JFH JFM JFN JIX JGG JLF JNC JNU JXH, WA4s HJT IDX, WB4s HOW HVO HVR HVX IAR IAP IJM JCS JNF JNL JUA, WB4JNL formerly K9OCC. Traffic: WB4EKJ 227, W4RCS 163, W4JNH 137, WA4TKM 102, WA4EUD 95, K4AGZ 43, WA4MVF 31, WB4RCD 20, K4CJL 15, K4UMD 14, WA4FMX 8, WB4TVY 8, WB4SVH 1.

GEORGIA: SCM, A. H. Stakely, K4WC -- SEC: K4KZP, PAM: K4JNL, RM: K4VHC. Congratulations to WB4WGL and K4YRL on making OADR. Welcome to W4N4GL, the KYL of WA4AE Georgia Valley net very active due to storms. WB4AEG reports 6 and 2 not good during Mar. After 24 years WB4TX works ND and is properly excited! VE3BZ visited WA4BAA enroute to FL. Argonaut Club being started by WA4BAA. 70 foot 40-meter dipole helping W4JM who has his 76 WA4 made. Current CBS appointments are W4RCS, W4EUD, W4JNH, W4RCD, W4JNL, W4BNTW, WB4VWY. Please contact SCM if you would like to be considered for an appointment. Official Observers needed, as only WB4TZ and WB4ACV are current. OVS currently include W4AAY and WB4AEG W4LRB, WA4NPJ, WB4NTW, W4REL. Traffic: WA4BAA 145, WB4WGL 102, WB4IGX 58, K4LJQ 49, K4YRL 45, WB4QGR 11, W4WYR 8, WA4LL 22, W4AAY 21, AC4HON 21, WA4AEL 20, K4N17, AD4BAI 16, K4WC 11, W4BTX 10, W4JM 6, W4CZ 5.

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RKH -- SEC: W4BWM, RM: WA4FB1, PAMs: WB4VDM/75, WB4S5Z/VHF, Net - Freq. Time(2)/Days QNI QTC Manager, NFPN - 3950 2330 Dy 1146 159 W44VDM, NFPN - 3651 0000/0300 Dy W44FB1, QFN - 3715 0100 Dy W44GRL, QFN certificate issued by W4JFN WA4NMK K4SRI & W4WYR, K4S5S appointed ORS. A fine ham radio exhibit was set up at a Pensacola mall by the FFARA and PFMRA. Officers of PFMRA: WA4IZM, pres.; K4SOI, vice-pres.; WB4PKR, secy-treas. WB4QB/4 is finally W4MUZ, WA20VA/4 now WB4JDR. Sorry to report W4SMM, a Silent Key. K4C provided comm. for a recent Walk-A-Thon. WB45TD back in town. K4VWE moved to Gulf Breeze. WA4MIG active on NFPN. K4QVL, an old-timer on the 7.5m nets, a Silent Key. The 34/94 repeater now IDs WR4AQB. TARC officially sponsors the 16/76 repeater; membership over 60. New licensing classes are underway. WA4NAY reports the F5C radio club provided WA4WOC upgraded to Extra Class; WB4GRK to General. GARS provided comm. for the special Olympics at UF. The Bolles HS ARS has been formed, with WA4NID as Pres. WB4DAD elected Asst. NM of FPTN. WB4MWW a Silent Key. Hampden College has renewed operations, thanks to WA4AQP & comm. provided. WA4QQG has NCS slot on QF TN and active on NFPN. WB4RQG returned to area from D.C. Traffic: (Mar.) W4WNY 208, WB4DXN 115, WB4TPR 114, W4JL 95, WA4WBM 89, WB4TZR 81, WB4DTS 75, WA4TXM 73, W4KIX 70, WB4NJR 54, W4RKH 47, K4IEK 43, W4DOMS 41, WA4BAK 37, W4AULJ 24, WB4WY 15, WB4GZ 12, K4AGZ 11, K4OER 8, WB4ADL 10, W4MJM 10, K4RZM 10, WA4EY 10, WB4VMP 8, K4RNS 6, WB4VAP 5, K4IKY 3. (Feb.) W4NID 57, K4DDY 41, W4HCS 7.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL -- SEC: W4R1A, Asst. SEC: W4SMK, RM: K4EBE, PAMs: WA4BE, W4GXC. New appointment: WA4JPV ORS. Endorsements this month: WB4BMR EC Hendry County, W4LK ORS. It is with much regret that we announce the resignation of W4IYT as SEC, effective Mar. 31st. Having served in this position for 23 years, Andy Clark's name and call are legendary in FL and most of the US. He will be succeeded in office by WB4ALH, Bill Johnson of Valrico. We are fortunate in having this capable, dedicated gentleman to take up this most important office. Give him the best possible support. Many of you noticed the absence of our station activity report in Apr. QST. W4JNL says this was an error at Headquarters where the report was not put in a contest log and laid it aside until too late for publication. He says this only happens once in 1000 times, so I conclude we should be OK for the next 83 years! W4DL continues to pound out very fine OB transmissions on 3655 at 2030 and 2230, Mon. Wed. and Fri. Try him on the practice. K4TH has new 1.5-5.2M. He reported checking into traffic nets 134 times in one month. Who can top this? W4UUV completed Bi-Centennial WAS. W4MEE received 4RN certificate. K4TH helped with SPARC Repeater Team public service event, yacht race, on Mar. 27 and 28. W4MML still busy working Guatemala disaster relief traffic while B4QGF is busy with phone patches. WB4QSN sends a nice QVS report from Margate. Listen for him on cw near 50.050 MHz. K4JPF is to be included in book "Notable Americans of the Bi-Centennial Era." WA4CTM reports Microcomputer Society of FL elected 4 hams as officers, including WB4IOA and W4GTH. Traffic: (Mar.) K4TH 140, K4SCL 319, WA4JPV 254, W4MEH 226, W4E 211, WA4NBE 137, W4DVO 133, W4AGYR 115, K4SJM 114, W4WYR 86, WB4AD 82, WB4ALH 68, W4CTM 52, W4QM 49, W4AEC 47, W4IYT 42, K4BLM 31, W4IRA 30, WB4WY 26, K4CFV 24, K4EJK 23, W4MML 12, W3EEB/4 10, W4VLE 8, K4WVJ 8, W4CQX 8, W4KGI 5, W4LH 5, W4MML 4, W4UUV 4, W4SMK 3, K4DRH 2. (Feb.) W44GT 71, WA4GNI 43, W4NTE 9.

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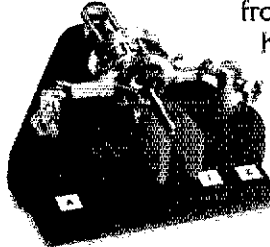
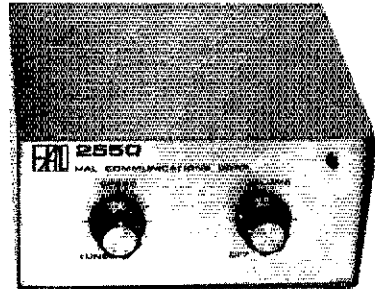
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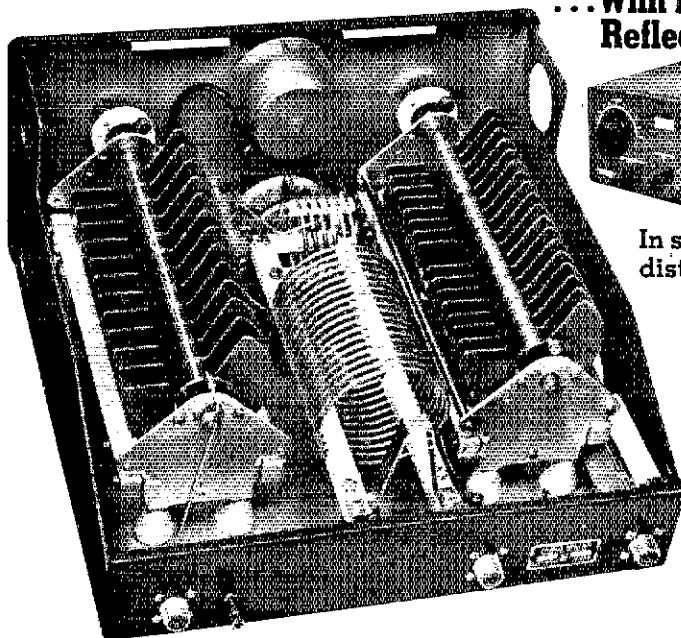
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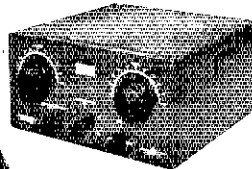
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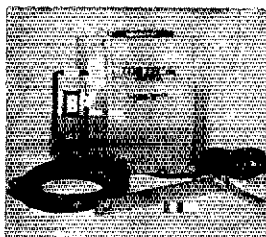
WEST INDIES: SCM, David Novoa, KP4BDL — New EC appointments: KP4AET, Arecibo district and KP4DHW, Ponce. AREC growing fast. Join us now! DXers are invited to check into the PR DX Club nets Thurs. 2230 AST, 3838 kHz and Sun. 1030 AST 7250 kHz, with KP4s BJM and RK as NCSs. KP4AST, EAJ and AN active on 160 m. KP4s EIC and APB DXing on 20 sb. WP4EKA active on 15 m Wed. afternoons. New stations on two meters as reported by GV3 KP4BSQ, KP4s EKL EKM EKN and EKW, KV4FZ and KP4MO DXing on 75. KP4DJE very happy handling patches for his YVs and HKs friends. New officers of the Radio Club de P. R. are: KP4BBK, pres.; KP4CV, vice-pres.; WP4EDE, secy.; KP4CGM, treas.; KP4s ABE, RK and GM dir. All appointees please report to your SCM using Form 1, by the first of the month. We need Class 1 and II OQ. Traffic: KP4DBK 26, KP4BSQ 22, KP4EBQ 11, KP4EJE 6, KP4DMI 2.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Marshall Lincoln, W7DQS — RM: K7NHL, PAMS; WA7KQE & W7UQQ. Members of the OPRC are to be complimented on sponsoring a well-organized coordinating convention in Tucson in Apr. W6KW, Division director, reported at the Convention ARRL membership has been growing rapidly recently. New officers of the OPRC are WB7BQN, pres.; WB7CZL, vice-pres.; WA7VTM, secy-treas. New officers of the Hualapai ARC are K7ZMA, pres.; W7JK, vice-pres.; WB7VV, secy-treas. W7KAX is conducting code and theory classes in the Kingman area, and W7YS is doing the same in the Flagstaff area. Prescott hams and amateur radio in general received very impressive publicity in an illustrated feature article in the AZ courier. WA7WZE and W7JXM were interviewed by the writer. W7LL and W7JXM are conducting licensing class in Prescott. WA7NX1 has resumed the job of advisor to Explorer Post 599 sponsored by the AZ ARC of Phoenix, replacing WA7ZOA. With regret, WA7OOJ is reported as a Silent Key. WB7CAG and W7CAF have been appointed OPS. WA7VCA has been appointed an ARRL public relations assistant for the Phoenix area. New traffic NCS: WA7NHL, 1,222, QTC 315, patches 162; A7EN GNI 627, QTC 36, no certificate; K7NMQ K7NTG W7RQ WA7NHQ WA7VTM W7CAF K7GLA; SWN GNI 279, QTC 188. Traffic: K7NHL 269, K7NTG 58, WA7VTM 50, K7UJV 41, WA7YKM 28, W7CAF 23, WA7KQE 20, K7NMQ 11, K7CC 8, W7DQS 4, K7GLA 2, WA7JCK 2, K7MNH 2, WA7NHQ 1.

LOS ANGELES: SCM, Eugene H. Violino, W6INH — Asst. SCM: Kevin A. Barsley, WB6OYN. Acting SEC: W6SPK. RMs: K6UYK, WB6PKA, WB6ZVC. There seems to be an abundance of radio classes in the area lately. The Rio Hondo College, 3600 Workman Mill Road in Whittier is sponsoring Amateur Radio license classes for Tech. and General. Contact WA6GEG or call (924-092) ext-286 or 218. The United Radio Club of San Pedro reports that WB6JFD is offering a 8-pack of 807s to the first URAC member to submit "funny ionetics" for JFD; Ray also has been very busy making out OQ reports. WB6JND is teaching a class over at San Pedro High on radio and TV repair on Tue. and Thur. nights. Congrats to WB6ROH on arrival of twins, not the radio type but the QRN type. Doug is one of the clubs many hard workers. Don't forget to bring your old magazines to the Lockheed RC, they send them all over the world. Sixty issues are worth a tree ticket to the May harvest if you're in time. Ham Radio and 73 issues and 1970 to 1976 issues of CQ and GST count double. WB6JY has been missed again on SCN, claims to be doing a lot of flying lately. Thanks for the many fine reports on the new KE trapped dipole, sure seems to get out on 80 meters, now for some reports on 40 meters. The Telco RC of the Los Angeles area is going to press with a new membership roster, they also report a fine program by WA6APW at a recent meeting. Plans are also planning on a Radio Training class for those who want to upgrade their license. The WR6ABE group has been sponsoring transmitter hunts with considerable success. Hopefully when the jammers start up again they will be able to track them down. The Hawaiian net is an established function of the Net, has been going on for over two months average traffic is increasing. I can report 87 percent maintenance of schedules and most of them on 80 meters. Those of you who have experienced jamming and interference on the WSCARS net might like to donate a small amount to their Jammer fund in an effort to eliminate continuation of these conditions. WB6VID has received a letter of thanks from the President of Guatemala for his help during the recent earthquake. WB6OYN/LWP has been elected pres. of the Caltech RC with WA6POA secy. They plan to move the club station WBUE to larger quarters this fall. K6ASK QRL due to boy scout activities this month. W6DII reports activity now on all bands with a Swan 550 from Loon Beach. He is practicing hard cw from W6GLE, going after his 30 and 35 wpm sticker. Hope to see you on SCN soon. Traffic: WB6VID 630, W6INH 269, WB6PKA 209, W6DEO 134, W6HUJ 104, WB6ETB 85, W6QAE 78, WB6TKR 49, W6USY 28, WB6AIT 22, K6UYK 21, W6NKE 17, KE6A 16, WA6EWW 14, WB6OYN 14, WA6ZKI 11, WB6EPS 8, WB6EWP 8, WA6TLV 8, WB6OYN 5, W6DGH 4, WB6JFD 3.

ORANGE: SCM, William L. Weise, W6CPB — Asst. SCM: Dick Birbeck, K6GCD. SEC: WA6VFA. RM/PAM: WB6AKR, WA6DBX and a CB buddy assisted Incal Gendarmes and FCC in apprehending a flagrant violator who was dealing in stolen rigs and operating a CB rig, with high power, without a license. Congrats to W6OYN for the time to get involved in the National Traffic System's systems operators on phone and cw and daytime and evenings. New-comers are always welcome. Mobile operators should get Form CD-209 which gives emergency reference information and fits on your car visor. This useful information gives you procedures and pertinent data for reporting accidents or other emergencies. Some Public Service Announcements regarding Amateur Radio and narrated by Dick Van Dyke are available from W6NAZ. Anyone desiring to get these tapes for transmission on the local FM station should contact Lenora. New EC-VHF for Orange Co. is WA6VMI. Welcome to the group F-red. New ODS appointment is WA6OYN. We come to the attention of the State being made to increase your Ham license state fees for your car. Look for action on this proposal and write to your representative in Sacramento opposing such increase. The proposal is in the plans to include all moving vehicles on the highway under the environmental action. We have had our standard license plate now for 20 years. Do not let them change it now. Traffic: WB6EIG 376, W6WRJ 26, WA6VFA 23, K6LJA 15, W6QBD 9, W6CPB 8, WA6YWS 5.



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SAN DIEGO: SCM, Arthur R. Smith, W6INI - SEC; W6GBF. San Diego County Board of Supervisors proclaimed Apr. as Amateur Radio Month. Clubs put on demonstrations in public places as part of month-long PR effort. New EC for Eastern District of SD Co. is WA6UFY. WB6LBM is chmn. and WA6GDC vice-chmn. for 1978 National Convention planned for San Diego. It will also be an international convention - probably a first! Time to check out Field Day gear and brush up on operating procedures for June 26-27 event. WA6JH spoke at special meeting of SD Community College Board to forestall curtailment of licensing classes. It worked! It was homecoming night at Palomar RC's Apr. meeting with W1YL renewing many old acquaintances. WB6HCF now holder of Section Net Certificate for SCN activity. WB6DFT and W6WCV made good use of amateur radio in assisting disabled motorists. W6ZVA has upgraded to Advanced. AREC drill at Colina del Sol Park found W6GBF, W6INI, WA6QVH, WA6JBM, W6QLJ, WA6UFY, WA6COE participating with stations on 160, 75, 10, 6, and 2 meters. WANTED: Operators to copy W1AW bulletin sheets on cw or RTTY. Traffic: (Mar.) W6SPVH 342, W6BGF 219, W6BGF 144, W6PZL 37, W6DEY 27, W6BERF 25, WA6IK 3, WA6UFY 1. (Feb.) WA6IHK 7.

SANTA BARBARA: SCM, D. Paul Gagnon, WA6DEI - The SW Division ARRL Convention held in Tucson in early Apr. saw several section amateurs in attendance who had no winning honors for us with the Atlas 210. Some others in attendance were W6KHH, HHG, PNM, PA, DOY, CDN, K6ELO, LHA, GHU, KCI, WA6DEI, QKC, TPL, WB6HJW, DHW. How is your club Novice class doing? The Satellite ARC produced 20 Novices. Every club should be helping to double our numbers by 1979. The Santa Barbara ARC number 40 members. Their strong repeater is WR6ANW. WR6AFI (60/00) is host for our weekly section AREC net on Wed. at 2030. W6KPS in charge of this net. Our HF net meets at 2000 Wed. on 3935. The Santa Maria AREC net meets on WR6AHZ (81/21) at 1930 Mon. The TRICAR Bulletin Net RTTY traffic changes meet on Wed. at 1730. If you are on RTTY and can help us notify WA6DEI. Dir. W6KW will host a League Officials meeting in Riverside on June 5th. In addition to I.O.s, each affiliated club is invited to send a delegate. W6HCO completed Bicentennial WAS. Two new hams in the W6GRW family are WR6IT (KY1) and W6ETJ (son). New TRICAR officers are WB6HJW, chmn., WA6BLS, vice-chmn.; W6SMJ, secy-treas. Does your club belong to the council of RCs? Traffic: WA6DEI 131, WA6MBZ 110, WA6VBS 85.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, L.E. Harrison, W5LR - Asst. SCM: Frank E. Sewell, WB1ZU. SEC: W5DWL. PAM: W5GSN. W5GSN may accept RM slot until suitable prospect is found. WA5ZZA River Ridge LA CAN Net Dir Feb. rpt shows 56 sessions, 212 GTC, 1068 minutes, rate 216.1 to W5FW and W6ETJ. Worth Forest sez 76 nominations include K5AH chmn., W5FLQ secy-treas.; WA5MHW pro chmn plus W5K5X, W5RFA, K5ARG new OD. W5GSN recommended man for Class 2 ORS appt. WN5OON ran up 30K points in 29.5 hours contest time. W5QPX N TX Sr OD has been under the weather. Regular meeting RWK sheet for 1st Bldg auction ham radio history when you read this. They charged 10 percent for each item sold. WB2DXC/5 reported his QTH as Rt. 3 Bx 164 Killeen TX 76541. WA2JRX/5 rpts W5YF SMU Engr School back on air. W5DWL NoTX sez rpts AREC members, 190 full 164 limit. (d)FB. Interest in us includes K5BK new EC Bell Co. and wants Denton Co. FB. Brunswick Bicentennial swapfest May 1-2. WA5IKU resigned his OVS appt. acct moving. Apr. issue CD Bulletin covers major points of Board Meeting so read QST carefully. Mar. minutes 1 to 96 inclusive. For into you guys bugging me about OD appt. in vhf/uhf area just keep it slow & easy. Will you give us time to get our ham radio wasn't 'come-by' over night as some of us seem to think. Likewise, this vhf/uhf deal only since WW-2. Oh yes, there are to be new SCM election procedures too. The St. Patrick's Day Hamfest held in Midland TX now history. The Director and SCM were there, as were some 1500 hams. There's a ham working group of W5DE, WA5ETE, WA5FD, WA5HP, WA5KT, W5BILG, K5PQK and K5BAJ. No net meetings were held so far as is known. Understood eye-ball contacts were better. Tyler GCWA participating in the annual Tyler Rose Bowl festival Apr. 10th. W5NFO formerly of Brownfield, now resides in Lubbock and lives at 2306 Boston Ave. 79410. W5RRI in process of preparing material for book called "QTH Dallas." If you have materials of significance to Dallas Ham History write Bill. K5SOR appt'd EC Bell Co. and W5BVN resigned as EC. W5B5WB new pres. DARC Dallas and a real traffic man. Makes BPL 1st time round. Hows that for ex-cb'er? Guatemala traffic: W5WFL, Traffic: (Mar.) W5TI 27, W5SHN 364, W5GLW 46, W5DLW 31, W5AKQ 25, W5MTN 18, W5YK 14, W5LR 11, W5AKQ 9, W5GSN 9, K5SOR 5, W5DXC/5 4. (Feb) W5DWL 31.

OKLAHOMA: SCM Leonard Hollar, WA5FSN - PAM: W5RE, W5AKQ. PAMs: W5AZS, W5SKGP, WA5OUV. Total traffic count for Mar. much better than last year at this time also above last month. GK Tfc. & WX Net averaging 8 Wx reports daily could use more. This information is used by the Weather Bureau. Recent upgrades include W5B5PVL, W5B5MT, W5B5COL, W5DRZ estimates he has helped 150 or more ops in last 4 years. W5FW has 49 Bicentennial states confirmed, also active. OJ, W5JJ, new AF MARS Public Affairs Coordinator. 30th Annual Lawton-Ft Sill Hamfest now history. GLF sending contest was very popular. WNS5AZ new call on the air at Altus. W5B5KGP, new PAM. W5B5WVW back in Tulsa after several months in NE. W5B5R will be in New Orleans for several months. Had FB visit with Broken Arrow Club. Hope to fill SEC vacancy filled by next month. Traffic: W5B5NKK 172, W5RE 177, W5RE 148, W5B5KGP 137, W5B5AZ 48, W5FKL 44, W5B5PVL 41, W5B5NKK 40, W5B5ELG 38, W5B5FN 33, W5FW 33, W5B5UG 20, W5B5ML 19, W5B5YU 18, W5B5RLR 18, WA5OUV 8, W5JJ 6, K5CAY 4, W5FW 4, K5B2D 4, W5B5NMZ 2.

SOUTHERN TEXAS: SCM, Arthur R. Ross, W5KR - SEC: W5TQP. PAM: W5AMN. RM: W5GCE. COs reporting this month: W5N6W, W5B5FMA, K5BHG. OVS reporting this month: K5LZJ. ORS WA5BZJ tied for first place in REECE student papers at Texas; has gone to New Orleans contest. Great! 6-meter sb/ops can look for Houston Area Six Meter Net on 50.110 MHz USB Tue, at 8 P.M. CST. OVS K5LZJ reports that new ops in Cleveland are WN5RUI

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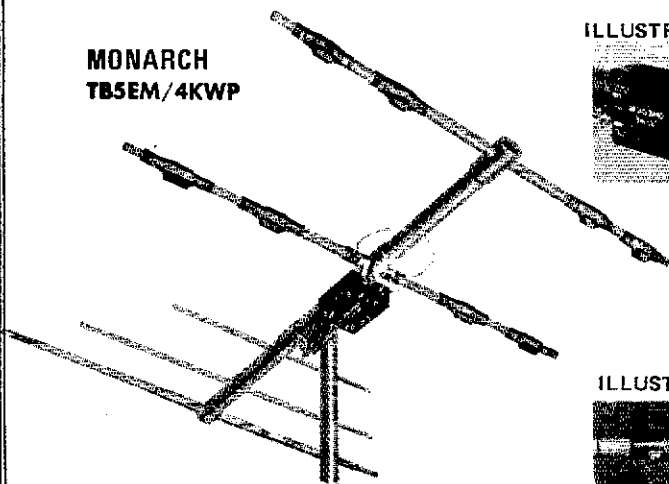


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and WNSRUJ, EC/ORS/OPS WB5FMA is new OO; he has three students ready for Novice and 2 more for Tech. PAM/OPS/ORS WB5AMN has new FM-144. EC W5TFW reports WB5QCV upgraded to General. OPS WB5LTV reports WB5MSZ has new tower and plenty active on 75; WA5TQV back from Odessa, Russia. OPS WB5 NUM has been appointed RACES Officer to Brazos Co. OD K5HGB busy with other Houston Amateur Ops during Mar. of Times Walkathon. From W5ES Bulletin, El Paso: Club asking for call-letter license plates to decorate their club house; K5PDT WB5HLO WB5QVQ WINBQ WA5RVX and Jim Shea conducting licensing classes; W5PN has retired from Police Dept. From The Beam, bulletin of Sun City ARC, El Paso: Code classes are sell-outs; WB5HLO upgraded to Advanced; WB5LGN is now on 220; K5HZH has 107 countries confirmed for DXCC. From HARC News, Houston: WA5RDO running an "upgrade to Extra Class" course; Huntsville ARC reactivated. From Coastal Bend Amateur Radio Digest, Corpus Christi: WNSMNG and WB5NLY earned General Class tickets; Novice and General Class courses being conducted at King High School by WA5PJE; WB5OLT and WB5OOQ Traffic; (Mar.) K5HZR 638, W5KLV 296, W5UGE 275, WB5AMN 136, WB5NUM 85, WA5YEA 85, WA5ZBJ 82, WA5RKU 62, W5TQP 61, WB5LTV 37, WB5FMA 29, WA5JYH 29, W5KR 27, W5QO 24, WB5GE 21, W5UX/9 20, W5TFW 18, WB5LJR 15, W5HNS 6, W5AC 4, K5ROZ 4, WA5CBT 1. (Feb.) W5AC 11.

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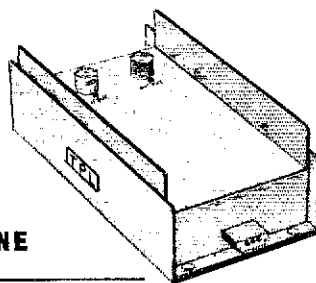
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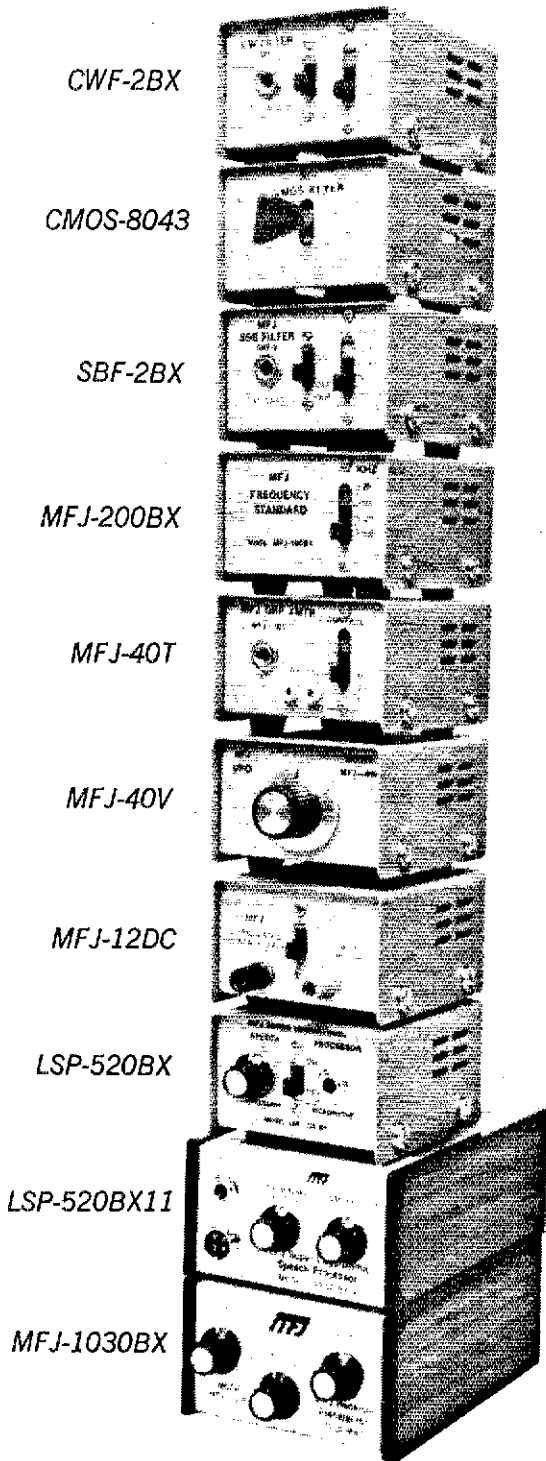
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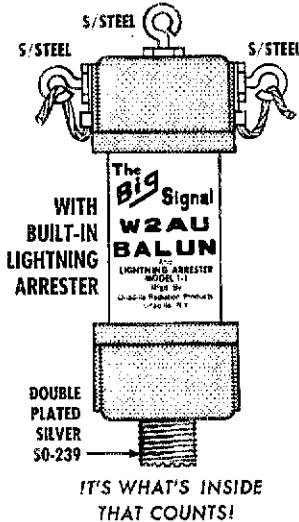


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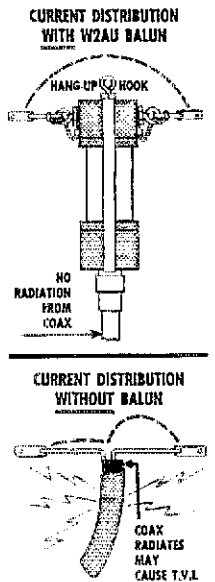
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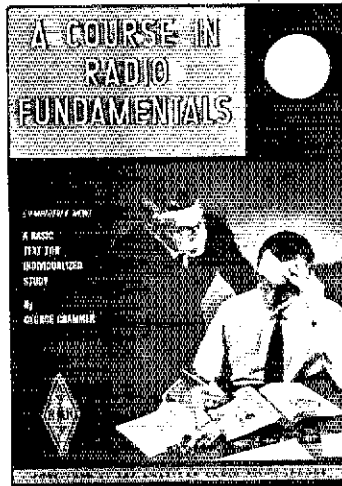
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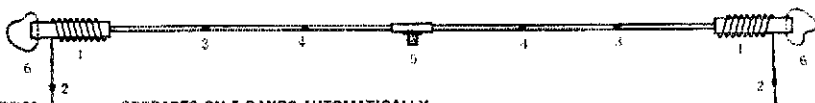


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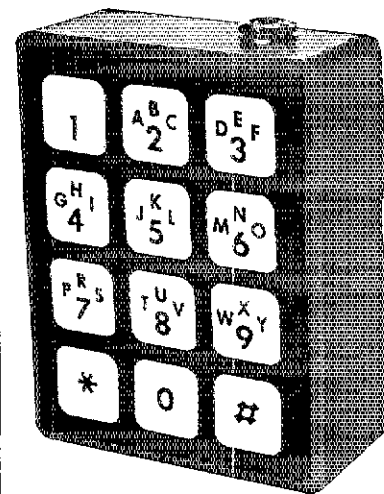
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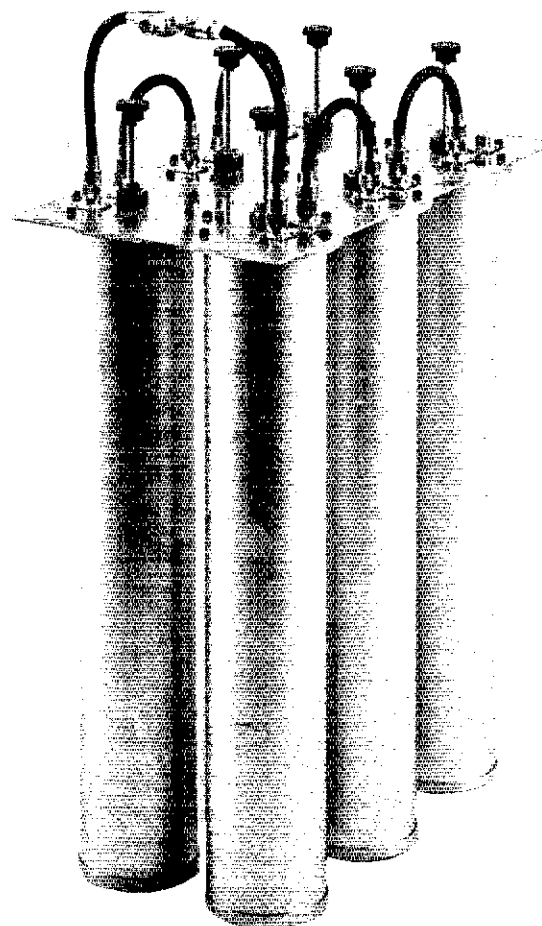
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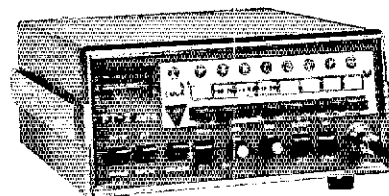
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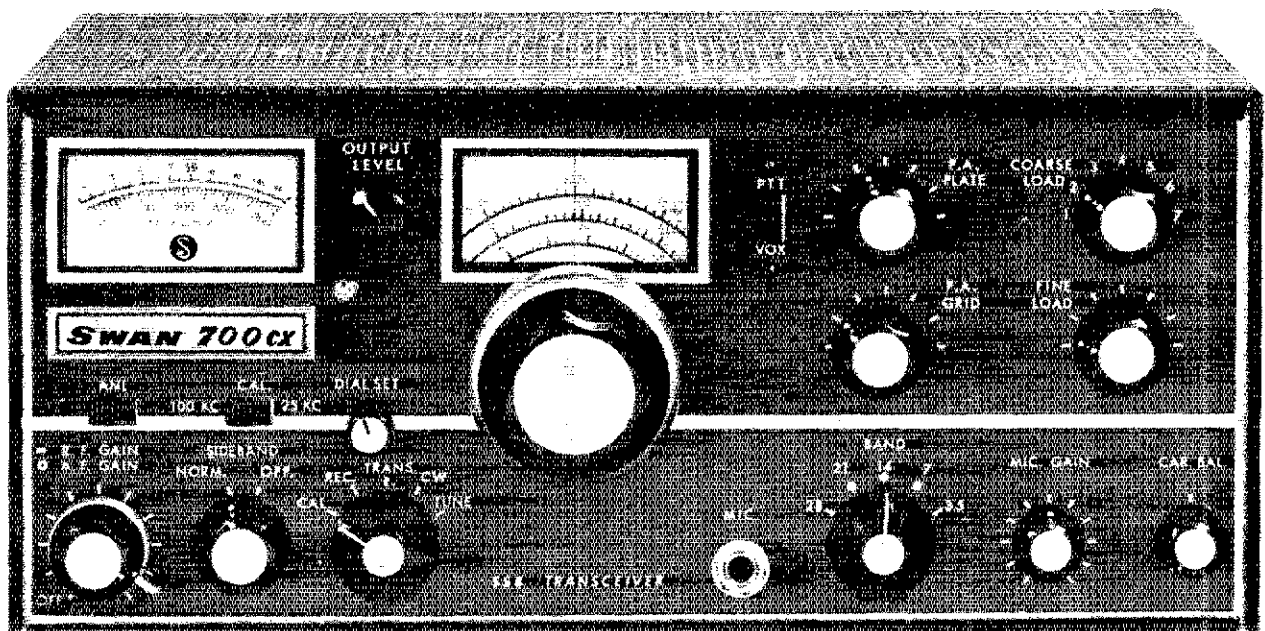
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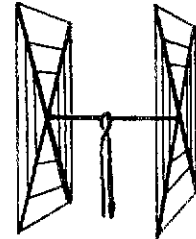
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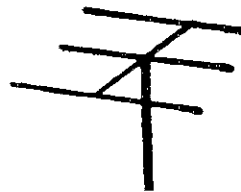
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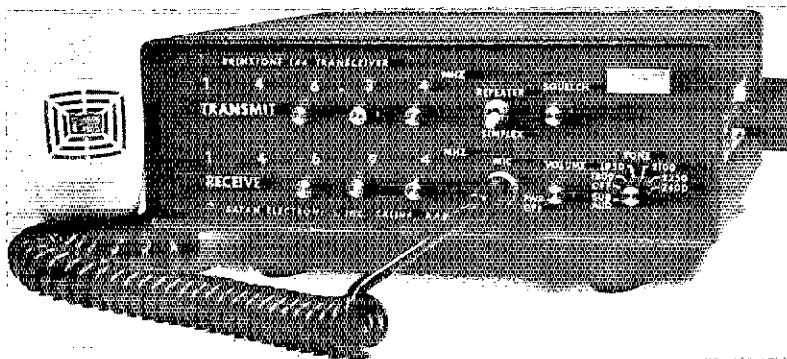
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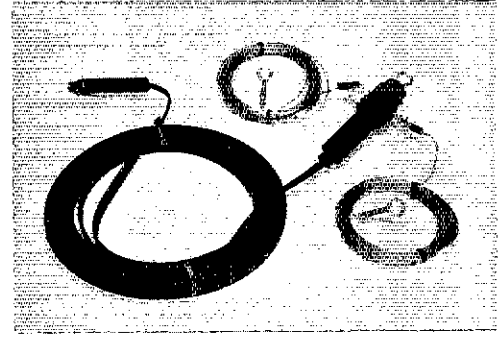
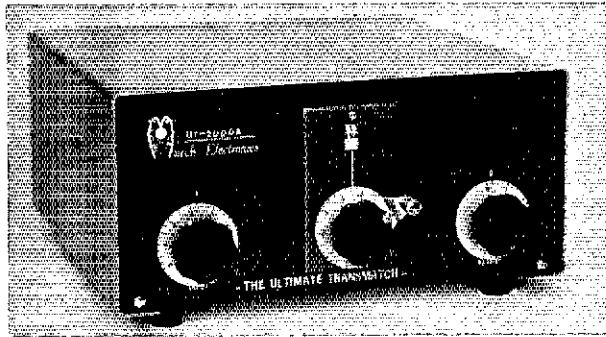


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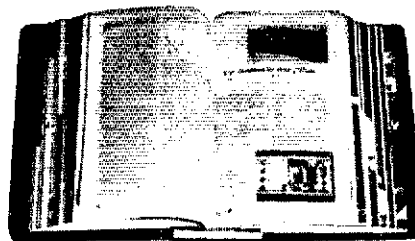
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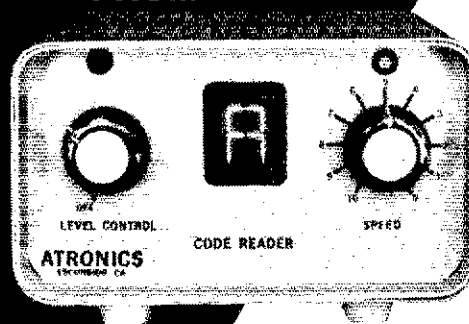
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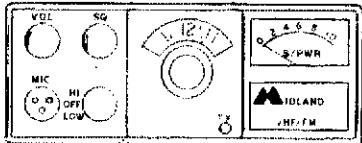
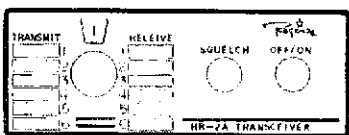
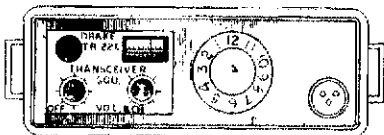
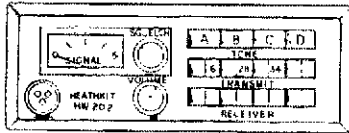
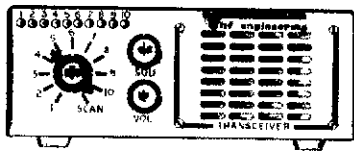
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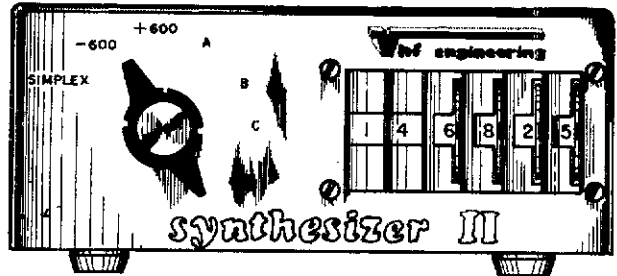
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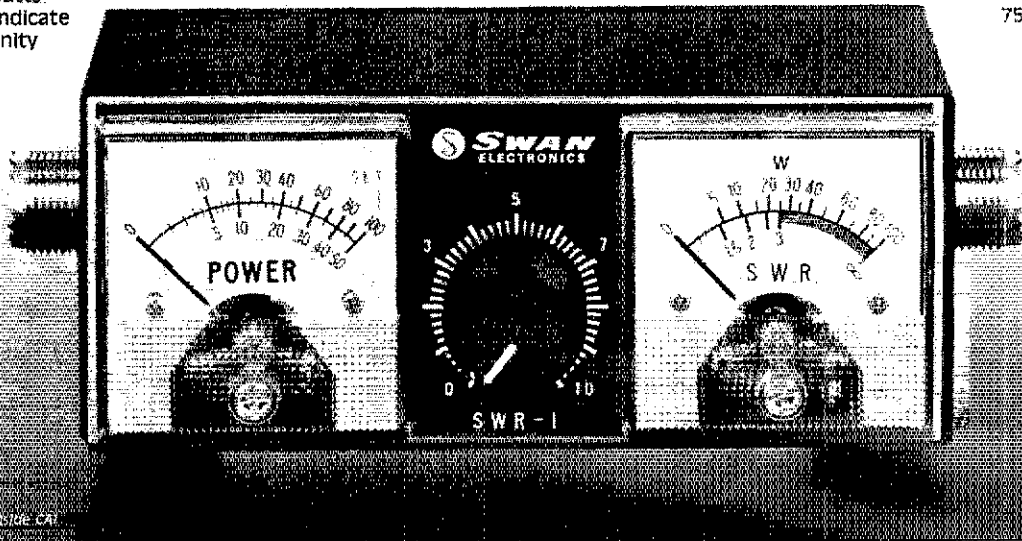
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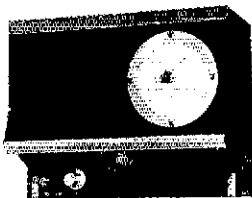
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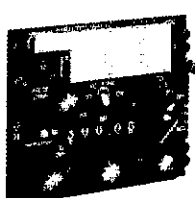
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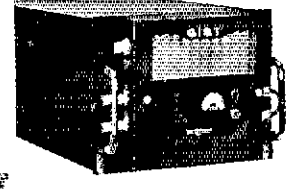
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RT-794/PRC-74 ARC-51 Transceiver



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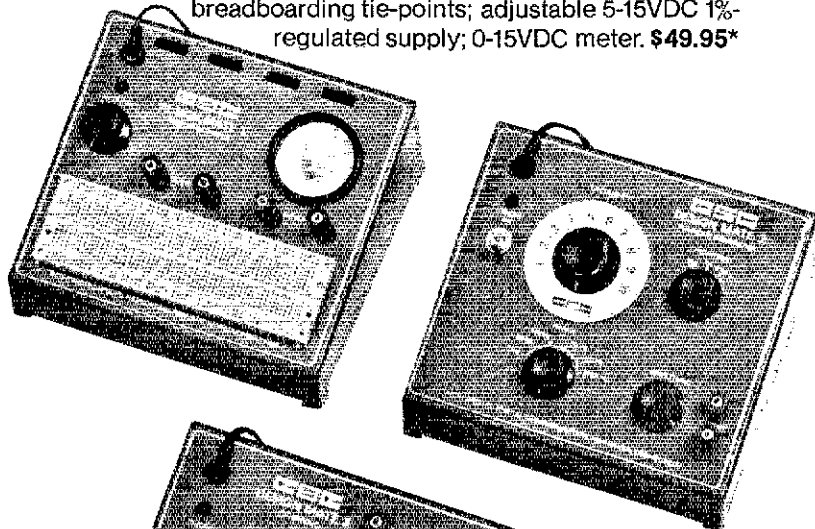
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Chart showing uH per 100 turns

CORE SIZE	MIX 2 5-30MHz u=10	MIX 6 10-90MHz u=8.5	MIX 12 60-200MHz u=4	SIZE OD (in.)	PRICE USA \$
T-200	120			2.00	3.25
T-105	135			1.86	1.50
T-80	55			.80	.80
T-68	57	47		.65	.65
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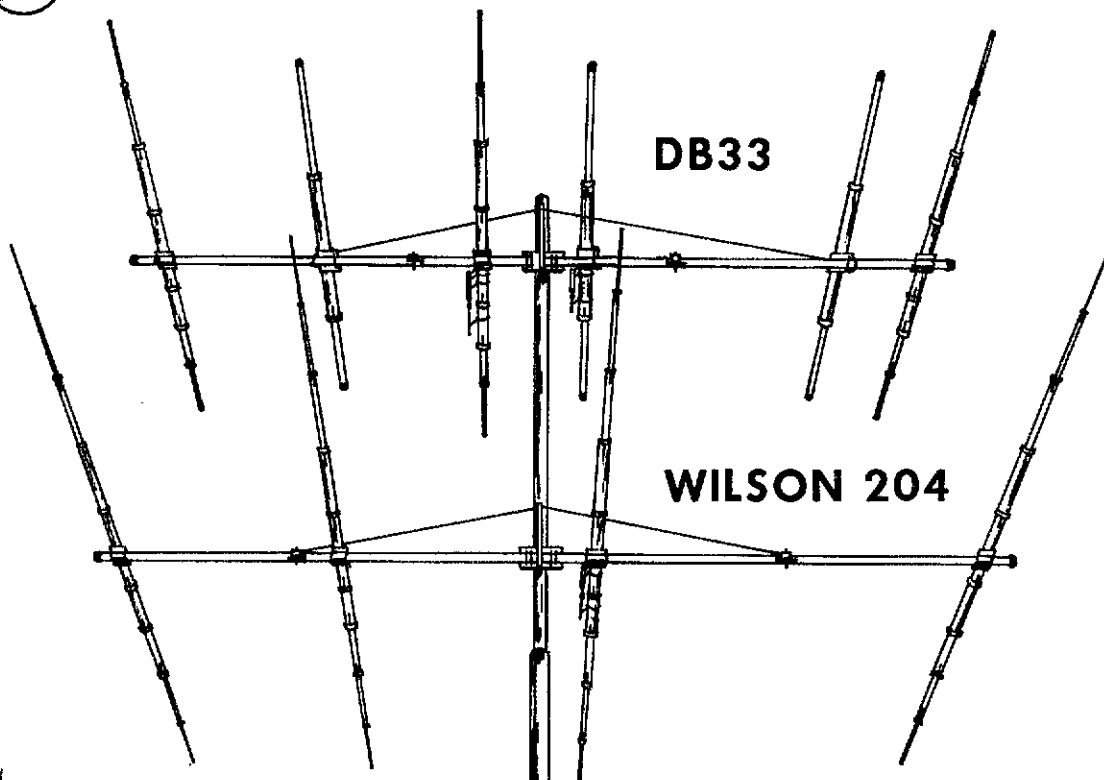
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WILSON AMATEUR ANTENNA SPECIFICATIONS

Model	Boom Length (ft)	Number Elements	Turning Radius (ft)	Surface Area (sq ft)	Wind load at 80 MPH (lbs)	Assembled Weight (lbs)	Shipping Weight (lbs)	Price
ME20	40	6	27'0"	5.0	125	90	96	269.00
M204	26	4	22'6"	3.9	100	46	49	139.00
M155	26	5	18'0"	3.7	83	41	44	138.00
M154	20	4	16'9"	3.0	75	30	32	89.00
M108	31	6	16'1"	2.9	73	34	36	99.00
DB54(20)	40	6	27'0"	7.9	198	105	119	299.00
(16)	4	4						
DB43(15)	19	4	15'3"	4.3	108	36	38	119.00
(10)	3	3						
DB33(15)	17	3	12'2"	3.8	95	31	33	89.00
(10)	3	3						

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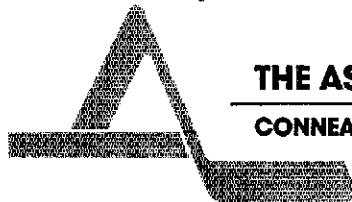
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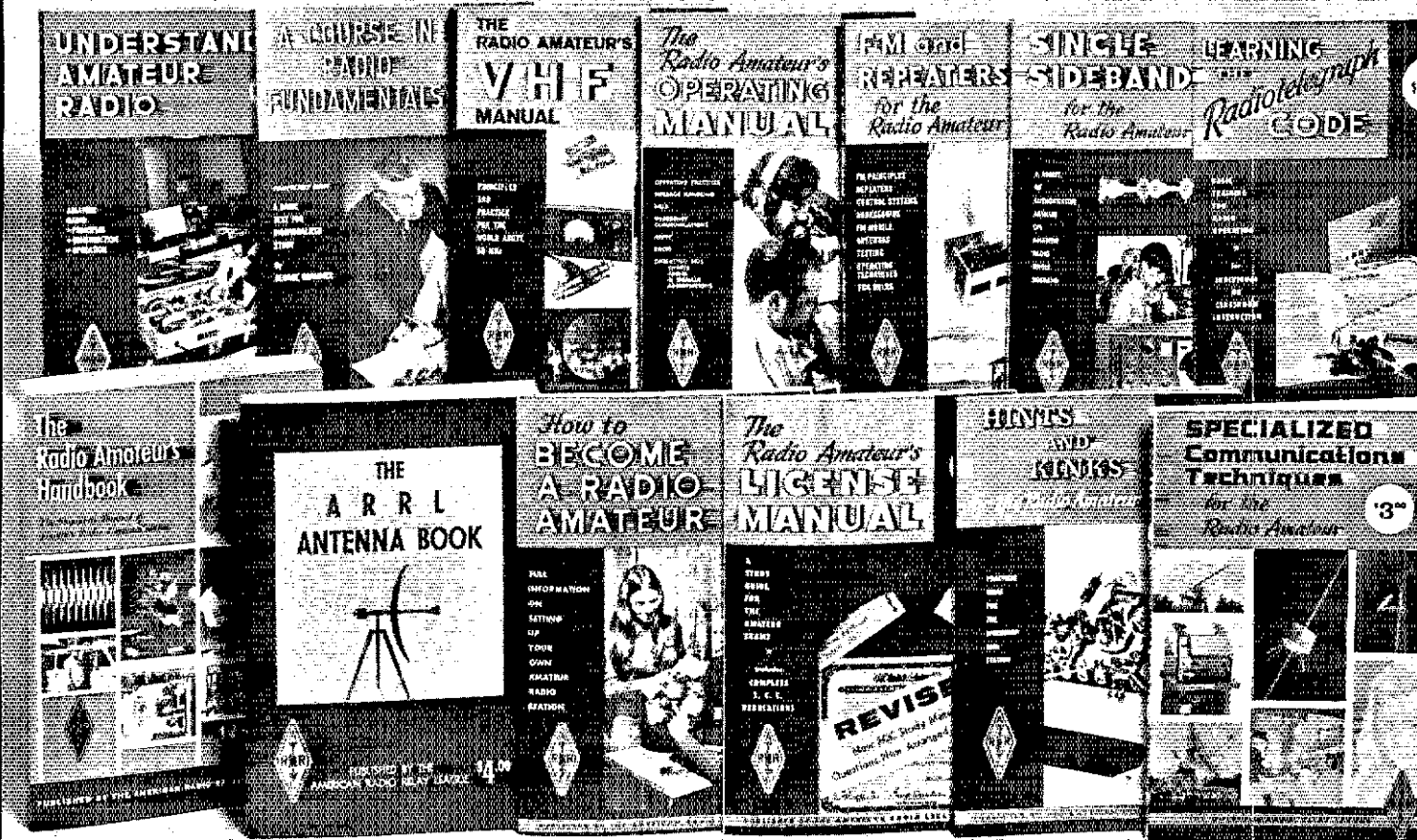
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Enjoy the new super versatility and convenience of Astatic's Silver Eagle microphone. At your dealer now.



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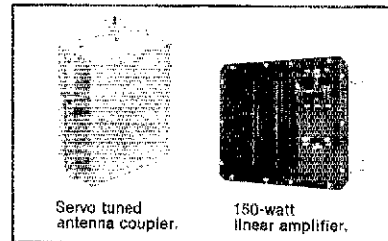
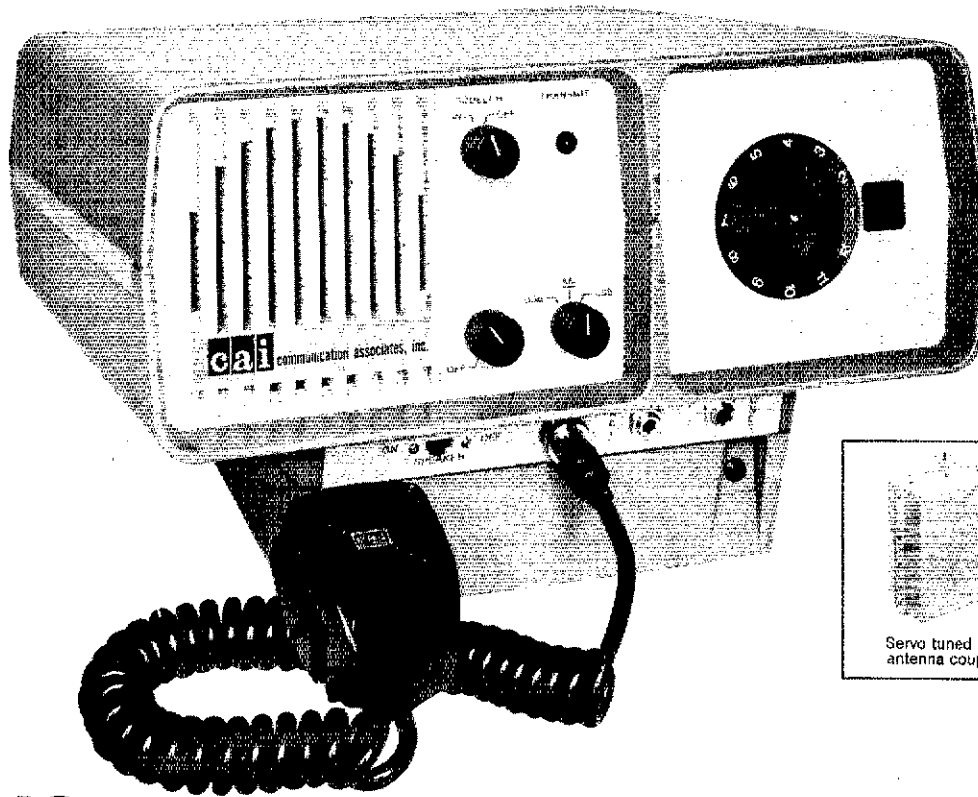
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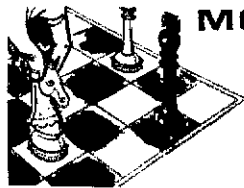
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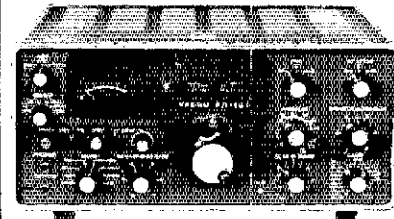
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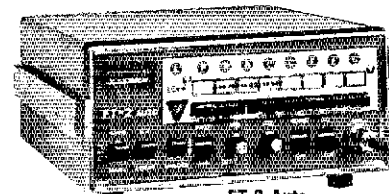
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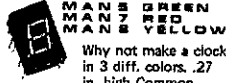
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\$\$\$ SAVE! 4-DIGIT ALARM CLOCK

KIT NO.1 \$13.95
(with PC Board)

FEATURES:
Direct drive display outputs. *Current control regulation-on-chip. *Low power brightness control-on chip. *RFI eliminating slowup circuitry. *Sleep radio feature. *24 hour snooze alarm. *Independent digit setting. *Non multiplexed output circuitry. 12VAC CT 1/2 amp transformer for Kit No. 1 **\$2.00**

***KIT NO.2**

Complete kit with components, PC Board, Transformer, wood grain case, and filter for display window. Includes .25 in. readouts. **\$21.50**



***KIT NO.3**

Complete kit with components, PC Board, Transformer, wood grain case, and filter for display window. Includes .5 inch readouts. **\$22.50**

*Components for Kit No. 2 or Kit No. 3 sleep radio feature, add **\$.55**

OSC 100

new Proto Board \$19.95
(Complete Kit)
(Allow 2 weeks for delivery)

We now offer a full line of Continental Specialties Proto Boards, Clips, Monitors, etc.

LOOK!

From Altaj to you, a special offer.
Power Supply Kit: 5 Volt 1 Amp. Reg. Line regulation .005% Load regulation 50mV
Kit includes Components, PC board, Transf., Fuse, Pilot Light
Nothing else to buy: **\$5.50**

GOT A CASE? HERE'S THE CURE!

Ideal for Frequency counter case, function generator, etc. Overall height 4", length 12", width 7 1/2".
(Includes top, bottom, and hardware.)

\$5.95

MASTER II

LIGHTS

MUSIC 60 WATT COLOR ORGAN

Completely self contained unit with 120 volt power cord included. **\$1.50**

ALTAJ ELECTRONICS
P.O. BOX 385448, Dallas, Texas 75238
TERMS: Check or money order. No COD. Telephone (214) 278-3561
Texas Residents Add 5%.

THE KING OF ALTAJ
INTRODUCING: DELILA
APPLIANCE STARTER



OPERATION: \$9.95
(Example) Set your alarm for 7: a.m., set timer for 15 min. At exactly 7: a.m., the appliance will start; at 7:15, your clock alarm will wake you.

Kit includes all components, PC Board and instructions for interfacing with THE KING 6-digit alarm clock. Addition Number 2

FATIMA \$19.95
4-DIGIT TEMP. KIT



Features 4-digit temperature display; fahrenheit or Centigrade; complete C-Mos application; uses 7002 4-digit counter.

Kit includes all components, PC Board and instructions for interfacing with THE KING 6-digit alarm clock. Addition Number 1

THE KING
6-DIGIT ALARM CLOCK



\$23.50

THE KING FEATURES:

- 1) 6 digit, 12 hr. 60 cycle or 24 hr. 50 cycle alarm clock
- 2) Time sharing capability for display of additional information.
- 3) Single 12v. supply and a minimum of interface components
- 4) AM-PM and automatic power failure indications
- 5) 10 minute snooze
- 6) Intensity control of LEDs.

Kit No. 70250-1R (Red readout)
Kit No. 70250-1G (Green readout)
Kit No. 70250-1Y (Yellow readout)
Kit No. 70250-2R (DL727 readout)... **\$28.50**
Kit No. 70250-3R (FND807 readout)... **\$28.50**

All kits include components, PC Boards, Transformer, case, and construction manual.

TTL		CMOS	
7400 - 16	7483 - .85	4000 - .24	4026 1.49
7402 - 18	7490 - .69	4001 - .24	4027 - .58
7404 - 16	7492 - .75	4002 - .24	4028 - .93
7406 - 24	7493 - .75	4006 - 1.49	4029 - 1.39
7408 - 16	7496 - .75	4007 - .24	4030 - .49
7410 - 16	7496 - .75	4008 - 1.15	4032 - .24
7413 - 49	74121 - .38	4009 - .59	4033 1.49
7420 - 16	74123 - .75	4010 - .55	4034 - 3.25
7427 - 24	74161 - .75	4011 - .24	4035 - 1.39
7430 - 16	74153 - .89	4012 - .24	4037 - 4.50
7437 - 39	74154 - .95	4013 - .59	4040 - 1.59
7438 - 35	74161 - .99	4014 - 1.49	4041 - .89
7440 - 16	74163 - 1.19	4015 - 1.19	4042 - .79
7442 - 69	74164 - 1.89	4016 - .58	4043 - .80
7447 - 89	74165 - 1.49	4017 - 1.29	4044 - .59
7448 - 89	74174 - 1.29	4018 - 1.49	4047 - .59
7453 - 16	74175 - 1.39	4019 - .58	4049 - .59
7473 - 37	74181 - 2.75	4020 - 1.59	4050 - .59
7474 - 37	74192 - 1.25	4021 - 1.49	4056 - .99
7476 - .65	74193 - 1.25	4022 - 1.19	4077 - .39
7476 - 39	74195 - .79	4023 - .24	74C92 - .29
	74197 - .79	4024 - .99	74C04 - .29
		4025 - .24	74C107 - 1.29

LSI INTEGRATION

- MM5316 - 4-6 digit alarm clock 40 pin dip w/spec..... \$ 4.25
- 7092 - 4 digit counter/latch decoder; 7 segment and BCD outputs. 28 pin dip w/spec..... \$12.50
- 7005 - 4 digit counter/latch decoder; 7 segment output only. 24 pin dip w/spec..... \$ 9.50
- 7007 - 4 digit counter/latch decoder with BCD output only. 16 pin dip w/spec..... \$ 7.00
- 70250 - 4-6 digit alarm clock 28 pin dip w/spec..... \$ 5.50
- PC Board for 70250..... \$ 4.25
- 70380 - 4 digit non-multiplexed radio alarm clock featuring direct drive display output 40 pin dip w/spec..... **\$3.50**
- PC Board for 70380..... \$ 3.75
- 8008 - 8 bit parallel CPU..... \$19.50
- 2102 - 1K static RAM for 8008..... \$ 2.25
- MM5203 - 2K UV erasable PROM..... \$12.25
- 75491 - segment driver..... \$ 0.35
- 75492 - digit driver..... \$ 0.45
- 7020 - 6 function calculator chip with direct segment drive. 8 digit..... \$ 2.25

LINEARS

- 555 Timer Mini dip 0.45
- 8038 Functional generator 4.25
- RCA 3043 FM IF, Aud. Preamp. 1.20
- 565 Phase Lock Loop 1.95
- 567V Tone Decoder 1.50
- LM723 Pos. Volt. Reg. 0.55
- LM309 5v. Lamp Reg. 1.10
- LM380 2w. Audio Amp. 8 pin dip 1.00
- LM741 Operational Amp. 0.25

Poly Pak's BUY 'EM FROM THE "BARREL" AND SAVE! 100'S OF BARRELS PURCHASED!

SMALL PARTS BARREL



THE BIGGEST INFLATION-FIGHTING VALUE EVER! TEST 'EM YOURSELF 'N SAVE!

For the first time anywhere, Poly Pak merchandisers introduce a new way in buying the economical way. Raw stock from the "barrel". Remember

the "good ole days"? They're back again. The same way merchandisers throughout the United States buy from various factories... their over-

runs in barrels. Poly Pak has done the same. Therefore you are getting the same type of material as the RE-TESTERS DO!

BARREL KIT #1
SN7400 DIP IC'S
75 for \$1.98
Mounted 14 and with 16 pin dips, may include gates, registers, flip flops, counters. Who knows? GUARANTEED SATISFACTION!
Cat.No.GM2415 Untested.

BARREL KIT #2
LINEAR OP AMPS,
DIP'S
75 for \$1.98
Un tested
May include 709's, 741's, 702's, 500 series, has factory marked and unmarked.
Cat.No.GM2416

BARREL KIT #3
2N4148/514
SWITCHING DIODES
100 for \$1.98
You never saw this before. Imagine famous switching diodes at these prices!
Cat.No.GM2418 Untested.

BARREL KIT #4
"4000" RECTIFIERS
100 for \$1.98
Untested.
These are the famous micro miniature rectifiers of the 1N4000 series. May include 40, 50, 100, 200, 400, 800, 800 and 1000 volters.
Cat.No.GM2417

BARREL KIT #5
SCRS, TRIACS,
QUADRACS
40 for \$1.98
All the famous plastic power triac type. Raw factory stock! All the 10 amp types.
Cat.No.GM2419 Untested.

BARREL KIT #7
VOLUME CONTROL
BONANZAI
40 for \$1.98
100% good
Singles, duals, variety of values, styles, big ones - small ones.
Cat.No.GM2421

BARREL KIT #8
SUBMINIATURE
IF TRANSFORMERS
100 for \$1.98
Amazing, includes 40kcs, ocs, antennas, who knows? From transistor radio manufacturers.
Cat.No.GM2422

BARREL KIT #10
ROMS-REGISTERS
50 for \$1.98
Untested
28 to 40 pin devices, unmarked, internal factory numbers, etc.
Cat.No.GM2424

BARREL KIT #12
POWER TAB
TRANSISTORS
40 for \$1.98
PNP, plastic TO20 type. Associated 2N numbers.
Cat.No.GM2426 Untested.

BARREL KIT #13
RESISTOR NETWORKS
60 for \$1.98
Untested.
No. 100000 class in 14 pin dip packs.
Cat.No.GM2427

BARREL KIT #15
MOSFET TRANSISTORS
60 for \$1.98
All 4 leading TO-18 case, includes UHF transistors too.
Cat.No.GM2429

BARREL KIT #17
LINEAR & 7400 DIP'S
100 for \$1.98
Untested
Marked and unmarked, internal numbers of raw factory stock.
Cat.No.GM2431

BARREL KIT #19
DIPPED MYLARS
60 for \$1.98
Finest capacitors made, shiny finish, amazing factory stamping, low in barrels.
Cat.No.GM2597 100% good.

BARREL KIT #20
LONG LEAD DISCS
150 for \$1.98
Factory distributor stock "action sale". Primes, popular only having leads.
Cat.No.GM2598 100% good.

BARREL KIT #25
METAL CAN
TRANSISTORS
100 for \$1.98
Untested.
Includes TO-6, TO-1, TO-18, etc. associated 2N numbers, includes 100's of varieties.
Cat.No.GM2603

BARREL KIT #26
PLASTIC TRANSISTORS
100 for \$1.98
Untested.
Type TO-18 (TO-18) all manufacturers, variety of 2N #'s.
Cat.No.GM2604

BARREL KIT #30
PREFORMED
RESISTORS
250 for \$1.98
We put barrels of 4 and 5 watt resistors for you. You'll save even amounts. Includes 100's of varieties.
Cat.No.GM2605 100% good.

BARREL KIT #31
METALLIC
RESISTORS
100 for \$1.98
100% good.
Made mostly by Conlog, the finest resistor made. Mostly 1/2 watters, 1/4 to 5/8 watt, a barrel of values.
Cat.No.GM2606

BARREL KIT #32
TRANSISTORS
WITH A HOLE IN IT
50 for \$1.98
Untested.
Can't name factory but we bought barrels of 26 varieties with hole in middle. PNP's and NPN's.
Cat.No.GM2610 Untested.

BARREL KIT #35
NEON LAMPS
40 for \$1.98
100% good.
Famous NE-2's. All primes, but factory made millions and barreled 'em. Your advantage.
Cat.No.GM2613

BARREL KIT #38
GERMANIUM DIODES
200 for \$1.98
Untested.
Famous maker, popular item. Never grows old. But this is the BEST the RE-TESTERS buy 'em from the factories.
Cat.No.GM2614

BARREL KIT #37
AMP "BULLET"
RECTIFIERS
100 for \$1.98
Untested.
Famous style, acid, cut-glass, silicon, actual factory stock. Includes 100's of varieties.
Cat.No.GM2615

BARREL KIT #39
2N3055 HOBBY
TRANSISTORS
15 for \$1.98
100% good.
From factory in you, these four are the best. Includes 2N3055. We have 10 barrels.
Cat.No.GM2617

BARREL KIT #40
PNP HIGH-POWER
TRANSISTORS
20 for \$1.98
100% good.
Popular germanium TO-3 case units, now available at "barrel" prices.
Cat.No.GM2618 100% good.

BARREL KIT #46
G.E. 3.5 WATT
AMPLIFIERS
25 for \$1.98
Untested.
Hobby type, factory faults, etc. we purchased them in barrels. These are unknown.
Cat.No.GM2624

BARREL KIT #53
SIGNAL SILICON
DIODES
200 for \$1.98
Includes many, many types of switching signal silicon types, all axial leads. Some may be better.
Cat.No.GM2628 Untested.

BARREL KIT #51
HOBBY OPTO
COUPLERS
40 for \$1.98
Untested.
We hot 1,000's unknown both the sensor and transistor may be good or both. We DON'T KNOW! We don't know the types. 1800V isolation.
Cat.No.GM2629

BARREL KIT #52
DISCS!
500 for \$1.98
Untested.
Cat.No.GM2030 100% good.
The bargain of a lifetime! First time ever offered by Poly Pak for the economy-minded bargain hunter.

BARREL KIT #55
JUMBO RESISTOR PAK
100-pc. \$1.98
Untested.
Assorted metal films, resistors, 1/2 watt, 1/4 watt, 1/8 watt, 100's of varieties, from 50 to 75 watts. Color coded 2 1/2 watt, good, worth \$10.

BARREL KIT #56
SLIDE SWITCHES
30 for \$1.98
Untested.
Aluminum, steel, apt. dip, momentary, etc. Includes 100's of varieties.
Cat.No.GM2726 100% good.

BARREL KIT #58
POWER TRANSISTORS
40 for \$1.98
Untested.
15 watt Hermetically sealed pellet transistors, from all good, purchased from 100's of varieties.
Cat.No.GM2727 100% good.

BARREL KIT #60
DTL'S IC'S
75 for \$1.98
Untested.
This is prime barrel material. Who wants DTL's? 540, 541, 940's. Your gain is our loss. They're marked too.
Cat.No.GM2728

BARREL KIT #61
POLYSTYRENE CAPS
100 for \$1.98
100% good.
Finest caps made. As a sample we bought 10 barrels from factory, colored variety all good.
Cat.No.GM2729

BARREL KIT #65
MIXED READOUTS
15 for \$1.98
Untested.
Factory returns - such numbers as MAN-2's, MAN-3's, MAN-4's, 11 barrels & so on to include all.
Cat.No.GM2733 Untested.

BARREL KIT #68
2 WATERS
100 for \$1.98
100% good.
Nobody seems to want 'em! So many suppliers don't count, but through 'em in the barrel. It's a good deal.
Cat.No.GM2735

BARREL KIT #71
CAPACITOR SPECIAL
100 pcs. \$1.98
Untested.
Emptied stockrooms into barrels of mylar, poly, etc. capacitors, plastic, germanium, discs, etc. Nifty 100% good.
Cat.No.GM2738

BARREL KIT #73
TRANSISTOR
ELECTROS
50 for \$1.98
Untested.
It "bugs" us why the factories dump 'em in barrels. We can't see it. We have wide ass varieties & values up to 310 mW.
Cat.No.GM2747

BARREL KIT #75
400MW ZENERS
150 for \$1.98
Untested.
Factory lot of best Amazing offers. A 40, 75 to 150 watt, 100's of varieties, physically, physical sizes & values. Big savings from distributor prices. Wt. 1 lb.

BARREL KIT #76
1-WATT ZENERS
100 for \$1.98
Untested.
Factory same as 400mw's. Never too cheap after 10, 10, 12, 15V under glass, double plug.
Cat.No.GM2741

BARREL KIT #77
"RED" BODY
TRANSISTORS
40 for \$1.98
Untested.
G-E D-10 series, has in-circuit, in-circuit, current, h-p, factory line discontinued. Power tabs.
Cat.No.GM2742 Untested.

BARREL KIT #78
"RED" BODY
TRANSISTORS
40 for \$1.98
Untested.
D-42 series, you test 'em into your own bin! High current, hi-V, PNP.
Cat.No.GM2743 Untested.

BARREL KIT #81
SUBMINI RESISTORS
200 for \$1.98
100% good.
PC, upright type, color coded, 1/2 watt, 1/4 watt values. Came to us in a barrel.
Cat.No.GM2748

BARREL KIT #83
15 for \$1.98
Untested.
LM-240T
REGULATORS
Factory rejected the length of leads, may include 6, 8, 12, 15, 18, 24 volts.
Power tab. Cat.No.GM2635

BARREL KIT #87
NATIONAL IC BONANZA
100 for \$1.98
Untested.
Includes 1400 series, 7400 series, 7410 series, DTL's, CMOS's, registers, etc. & 2N's, 2N's, 2N's, etc.
Cat.No.GM2660 Untested.

BARREL KIT #91
SILVER MICAS
100 for \$1.98
Untested.
For the first time silver mica so low in price! Axial, red case, variety of physical sizes & values. Big savings from distributor prices. Wt. 1 lb.

BARREL KIT #94
"BUBBLE"
READOUTS
12 for \$1.98
Untested.
IG-B5B bubble magnifiers. Sigs missing. Trulyfully no way to see 'em don't care. Untested, 2 or No.GM3046

BARREL KIT #99
PHOTO ELECTRIC
CELLS
10 for \$1.98
Untested.
Azed. GR types, CD8 types. Mixed by factory. Big job for us to separate. 100% good.
Cat.No.GM3052

BARREL KIT #102
CLOCK CHIPS
5 for \$1.98
Untested.
National is dumping MM-5816 - what's wrong with 'em, we don't know, but we got barrels. Hobby special, Wt. 2 oz.

BARREL KIT #104
SLIDE VOLUME
CONTROLS
10 for \$1.98
Untested.
Used in hi-fi, volume control maker makes. Aust. values, what a buy. Worth the price. 100% good.
Cat.No.GM3097

BARREL KIT #107
SQUARE OHMS
60 for \$1.98
Untested.
Factory people use sometimes "square" when they tangle prime square ohms with 'em up in barrels. Aust. values, Wt. 1 lb.

BARREL KIT #108
TO-5 PLASTIC
TRANSISTORS
40 for \$1.98
Untested.
Includes PNP, NPN, 2N's, 2N's, 2N's, etc. Includes 100's of varieties.
Cat.No.GM3101

BARREL KIT #109
TERMINAL STRIPS
150 for \$1.98
Untested.
Wide ass. of terminal strip connectors, from 1/2 contract up. Many manufacturers. Big savings from your gain. Wt. 1 lb. Cat.No.GM3136

BARREL KIT #110
SUPPRESSOR DIODES
50 for \$1.98
Untested.
Keeps ignition noises out and in. Includes 100's of varieties of your eqpt., car, industrial, etc. Double plug.
Cat.No.GM3137

BARREL KIT #111
MULTI DIGIT
READOUTS
8 for \$1.98
Untested.
Barrels of blended, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100. Unmarked, USA for "dummy". Untested.
Cat.No.GM3138

BARREL KIT #112
MICRO MINI LEDS
40 for \$1.98
Untested.
All the tiny leds, ass'd, uplight of Monochrome, broad variety of colors. Yield 50% or better.
Cat.No.GM3139

BARREL KIT #113
STABILIZERS
50 for \$1.98
Untested.
Regulator, sensing and computer priority. Actual double duty. 100% good. 100% yield. 100% value.
Cat.No.GM3140

BARREL KIT #115
MOLEX SOCKETS
300 for \$1.98
Untested.
Calculator makes 'em. We put a million of 'em. Used for IC sockets, etc.
Cat.No.GM3144

BARREL KIT #116
BUTTON'S IN
FEEDTHRU'S
100 for \$1.98
100% good.
Trulyfully worth a small fortune. Wide ass. of 100's of varieties. Includes HAM'S TABLE NOISE RED, etc. Wt. 1 lb. Cat.No.GM3147

BARREL KIT #117
20-MIL OPTICAL
FIBERS
200-Ft. \$1.98
Untested.
Fiber optic factory bank. Includes 100's of varieties. High quality. Big savings from distributor prices. Wt. 1 lb. Cat.No.GM3206

BARREL KIT #118
MINI SCRS
50 for \$1.98
Untested.
UNBELIEVABLE! TO-92 plastic SCRS in barrels. All right from factory, includes all voltages up thru 200V.
Cat.No.GM3151

BARREL KIT #119
MODULAR SWITCHES
25 for \$1.98
Untested.
Centralab "push-on" switches. TV-makers etc. used. Dpdt, 6pdt, etc. Brand new. Cat.No.GM3150

BARREL KIT #120
TRIGGER DIODES
25 for \$1.98
Untested.
Type ER-900, same type used to trigger scrs, triacs. Sometimes called "fuses". Untested. No.GM3150

BARREL KIT #121
"WINI" MAGNETS
100 for \$1.98
Untested.
Magnetically shielded and rectangular cuttings from a motor maker - for test switches & other circuitry.
Cat.No.GM3158

BARREL KIT #122
PLASTIC OPTICAL
FIBERS
500-Ft. \$1.98
Untested.
Poplr 10-mil size. Excellent for making tie pins, experiments, lamp arrays.
Cat.No.GM3159

BARREL KIT #123
CD-4002 C-MOS IC
15 for \$1.98
Untested.
metastable. But we have 200,000. Can never sell 'em out. YOUR GAIN! Their number is CD-6002.
Cat.No.GM3217

BARREL KIT #126
UPRIGHT
ELECTROS
40 for \$1.98
Untested.
Wide ass. of terminal strip connectors, from 1/2 contract up. Many manufacturers. Big savings from your gain. Wt. 1 lb. Cat.No.GM3226

BARREL KIT #127
AXIAL ELECTROS
40 for \$1.98
Untested.
Trulyfully the factories (by putting 'em in barrels) do all of 'em a favor. VOLT A BUI! Aust. capacitors and 'em. Wt. 1 lb. Cat.No.GM3227

BARREL KIT #128
MINI DIP IC'S
75 for \$1.98
Untested.
Large batch dumped 100's of 'em into barrels. Includes 741's, LM-290's, 709's, 585's, 588's - but who knows? Factory to you. All mixed. Wt. 1 lb. Cat.No.GM3248

BARREL KIT #132
CENTRALAB
ELECTROS
30 for \$1.98
Untested.
Mixed, marked prime, top grade. Includes 100's of varieties. Includes Centralab, etc.
Cat.No.GM3255

BARREL KIT #133
C-MOS IC'S
60 for \$1.98
Untested.
Inherently thermally stable. So we can't test 'em. The famous 130400 series. How good? Who knows? Who cares? It's only 60¢.
Cat.No.GM3257

NEVER BEFORE! U-TEST EM-N- CHOOSE EM IC'S

Order by Cat. No. and Type No.

7400 SERIES
Cat.No.GM3170

Type	Sale
SN7400	50 for \$1.98
SN7402	30 for \$1.98
SN7404	30 for \$1.98
SN7410	30 for \$1.98
SN7413	25 for \$1.98
SN7440	30 for \$1.98
SN7442	25 for \$1.98
SN7452	30 for \$1.98
SN7474	40 for \$1.98
SN7475	40 for \$1.98
SN7476	30 for \$1.98
SN7483	40 for \$1.98
SN7485	30 for \$1.98
SN7480	25 for \$1.98
SN7493	30 for \$1.98
SN74125	40 for \$1.98
SN74107	30 for \$1.98
SN74123	20 for \$1.98
SN74126	40 for \$1.98
SN74180	30 for \$1.98
SN74187	30 for \$1.98
SN74184	30 for \$1.98
SN74185	30 for \$1.98
SN74193	30 for \$1.98
SN74198	30 for \$1.98

LINEARS
Cat.No.GM3171

LM300H	30 for \$1.98
LM301V	30 for \$1.98
LM302	30 for \$1.98
LM308V	30 for \$1.98
LM311V	30 for \$1.98
LM312V	30 for \$1.98
LM319V	30 for \$1.98
LM324N	30 for \$1.98
LM329N	30 for \$1.98
LM331V	30 for \$1.98
LM358V	30 for \$1.98
LM377N	40 for \$1.98
LM380N	30 for \$1.98
LM390N	30 for \$1.98
LM393N	30 for \$1.98
LM398N	30 for \$1.98
LM399N	30 for \$1.98
LM300H	30 for \$1.98
LM301V	30 for \$1.98
LM302	30 for \$1.98
LM308V	30 for \$1.98
LM311V	30 for \$1.98
LM312V	30 for \$1.98
LM319V	30 for \$1.98
LM324N	30 for \$1.98
LM329N	30 for \$1.98
LM331V	30 for \$1.98
LM358V	30 for \$1.98
LM377N	40 for \$1.98
LM380N	30 for \$1.98
LM390N	30 for \$1.98
LM393N	30 for \$1.98
LM398N	30 for \$1.98
LM399N	30 for \$1.98
LM300H	30 for \$1.98
LM301V	30 for \$1.98
LM302	30 for \$1.98
LM308V	30 for \$1.98
LM311V	30 for \$1.98
LM312V	30 for \$1.98
LM319V	30 for \$1.98
LM324N	30 for \$1.98
LM329N	30 for \$1.98
LM331V	30 for \$1.98
LM358V	30 for \$1.98
LM377N	40 for \$1.98
LM380N	30 for \$1.98
LM390N	30 for \$1.98
LM393N	30 for \$1.98
LM398N	30 for \$1.98
LM399N	30 for \$1.98

MONEY BACK GUARANTEE PER PAIR!

Terms: Add postage. Rated: net 30
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MINIMUM ORDER - \$4.00

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400 Volt 2 Amp Silicon Rectifier RCA	15 for .99
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100 Volt	.25
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1N746 to 1N759 400 Mw ea.	.25	1N4728 to 1N4764 1w	.35
10 assorted zener diodes unmarked	.198		

2N2222 or 2N2907	107.99	TTL's	
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We quote on any device at any quantity. All items postpaid. \$5.00 min. order. Send stamp for catalog. NYS add tax.

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Ham-Ads

(1) Advertising must pertain to products and services which are related to amateur radio.

(2) The Ham-Ad rate is 60 cents per word. A special rate of 20 cents per word will apply to advertising which, in our judgment, is obviously non-commercial in nature.

(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and will stand by and support all claims and specifications mentioned in their advertising, before their ad can appear.

The publishers of QST are unable to vouch for the integrity or for the grade or character of the products or services advertised except those obviously commercial in character.

Clubs/Hamfests

QCWA Quarter Century Wireless Association is an international non-profit organization founded 1947. Any Amateur Radio Operator licensed 25 or more years is eligible for membership. Members receive a membership call book and quarterly news. Write for information. Q.C.W.A. Inc., 2012 Rockingham St., McLean VA 22101.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't, police, etc. invited to join Society of Wireless Pioneers - W7GAQ/6 Box 530, Santa Rosa CA 95402.

FREE sample copy Long Island DX Assn. bulletin. Latest DX news. Business size s.a.s.e. to the L.I. DX Assn., P.O. Box 73, Westbury NY 11590.

EDITING a club paper? Need public relations help? You should belong to the Amateur Radio News Service. For information write: Doris Dennstaedt, W3HEN, 303 N. Hammonds Ferry Rd., Linthicum Heights MD 21090.

WARREN, Ohio Hamfest, August 22, 1976. Moved to Trumbull Expo Center, north of city, bigger flea market, plenty of close-in parking. Displays, talk-in, \$2 door registration. Family recreation, nearby State Park. Arrowsigns lead from Interstates 80, 90, Ohio Rtes 5, 11, 305. Details? QSL WARA, Box 809, Warren OH 44482.

SAROC Second Hawaiian Convention, Kullima Hotel, August 28, 1976, exhibits, technical sessions, banquet. SAROC Twelfth annual convention Hotel Sahara, Las Vegas, NV, January 6-9, 1977. Details from SAROC, POB 945, Boulder City NV 89005.

NEW YORK CITY Third Annual Hall of Science Radio Club Auction Flea Market Saturday June 5 at Worlds Fair Grounds, Flushing L.I. Admission \$1.00 Sellers \$2.00. No sellers commission but 10% fee on auctioned items. Zoo, boating, childrens farm, art and science museums adjacent. Field Day goodies galore. Box 1032, Flushing NY 11352.

JUNE 6 - SRRC Hamfest - Same place as last year. Send long s.a.s.e. for info and advance registration. See display at this issue of QST. SRRC, W9MKS, RFD No. 1 Box 171, Oglesby IL 61348. Phone (815) 667-4614.

The 4th annual Des Moines Hawkeye Hamfest will be held on Sunday, June 13th, 1976 in the Varied Industries Building at the Iowa State Fair Grounds, Des Moines, IA. Plenty of free parking. Flea Market, display booths available. Dealer displays, KYL activities. Camping available, small charge. Registration, \$2.00 advance, \$2.50 at the door, 8:00 A.M. to 4:30 P.M. Write Des Moines Radio Amateur Association, Box 88, Des Moines IA 50301.

MANUFACTURERS, distributors, dealers! The Memphis Hamfest had 3,500 registrations last year. Expect more! Expect this year! Saturday and Sunday October 2 and 3, at State Technical Institute, Interstate 40 at Macon Road. Security, Motels, Restaurants. A great location for a great event! Contact Harry Simpson W4SCF, Box 27015, Memphis TN 38127. Telephone 901-358-5707.

HAMFEST July 25, Stark County Fairgrounds, Canton Ohio. Call 216-455-4449 or write WA8SHF Box 3 Sandyville OH 44671 for information.

PEORIA Hamfest - September 19, Peoria, Illinois. Same place as last year. For further details see Hamfest Calendar. Chuckwagon dinner Saturday, September 18, 6:30 P.M. at hamfest site - \$6 per person - reservation deadline September 9. For dinner reservations write Larry Pearsall, W9FDY, 2224 W. Herold, Peoria IL 61604. For hamfest tickets, \$1.50 advance (\$2 at gate), write Earl Kimzey, WA9SCA, RFD 1, Hanna City IL 61536.

SHANGRI-LA - ARRL Hudson Division Convention, November 13-14, Great Gorge Resort Hotel, McAfee New Jersey. Exhibits, Flea Market, FCC and ARRL Forums, Special YL Programs, Technical Sessions and a Saturday night banquet with Jean Shepherd, K2ORS, world traveler, columnist and famed radio personality of WOR. For information write to Al Piddington, WA2FAK, 4 Acorn Drive, East Northport NY 11733.

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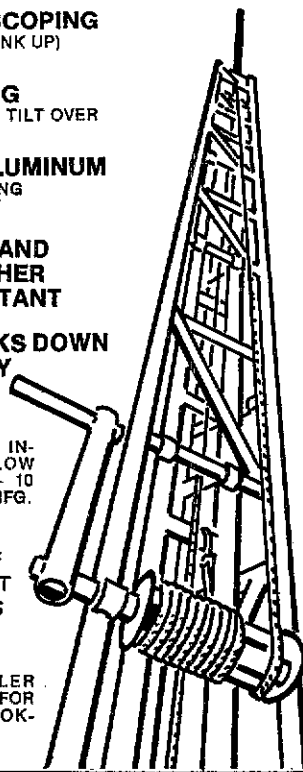
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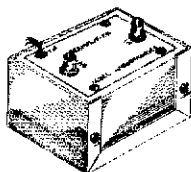
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Greatly improves the 10 meter satellite reception of most receivers. 12 VDC power, BNC connectors
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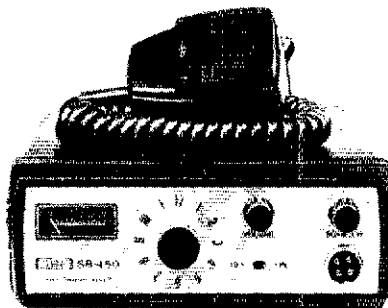
Order today or write for detailed catalog. All models are guaranteed and are postpaid in USA and Canada. Other converters, preamps, and accessories available for bands through 450 MHz.

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SBE SB-450 UHF Transceiver

There's a new enjoyment horizon waiting on 420-450 MHz FM (7½ times wider than 144-148MHz). The SBE SB-450, which can put you there, is beautifully constructed and compact. Silver-plated, brass-shielded type construction throughout, and double-sided circuit boards with all components accessible. 12 channels, 5 watts out. The excellent superhet receiver with 10.7MHz I-F and xtal lattice filter provides 20db quieting at .5 microvolt input. Receiver selectivity: 6db at 25kHz, 50db at 50kHz. Receive and transmit crystals each have their own frequency-setting trimmers. Meter shows relative power out and received signal strength. All solid state - No warm up! 12vdc. Attractive black case with leatherette bezel and satin aluminum panel. 6½" x 2¼" x 8¼" d. Maximum deviation ±15kHz. Phase modulation. Osc. freq. range: 24MHz. Supplied with 444,4R/449,5T and 446MHz Simplex. Operating power: Transmit 2amp. Receive .6amp. Receiver squelched 4amp.

Reg. \$399 - NOW Only \$249

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XF-30B AM filter	45.00
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DC-1 DC-DC converter for FT-101EX	57.00
Optional crystals..... each	5.00
FR-101S 160-2m solid-state SW Rcvr.	489.00
FR-101 As above, but digital readout.	629.00
FC-6 6m converter	30.00
FC-2 2m converter	40.00
FM-1 FM detector	20.00
Crystals For Aux/SW	each 5.00
XF-30B AM filter	45.00
XF-30C CW filter, 600 Hz	45.00
XF-30D FM filter	49.00
SP-101B Speaker	19.00
SP-101PB Speaker/patch	59.00
FL-101 160-10m solid-state Xmtr....	545.00
RFP-101 RF speech processor	89.00
FT-401B 80-10m tube Xcvr (AC only).	599.00
YD-844 Base station mic	29.00
YD-846 Hand microphone	16.00
FV-401 Remote VFO	99.00
SP-401B Speaker	19.00
SP-401PB Speaker/patch	59.00
XF-31C CW Filter, 600 Hz	45.00
FL-2100B 80-10m linear, 1200w PEP.	399.00
FTV-650B 6m transverter	199.00
FTV-250 2m transverter	229.00
YC-355D 200 MHz freq counter	229.00
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FT-221 2m FM/SSB/CW/AM Xcvr	679.00
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HONOLULU Amateur radio ARRL hamfest July 3rd and 4th 1976. First HARC hamfest in 10 years. KH6AN, Box 7111, Honolulu HI 96821.

RADIO Expo '76, September 18, 19, near Chicago. Exhibits, seminars, Giant Flea Market opens Friday night. Campers welcome. Advance ticket \$1.50. Box 1014, Arlington Heights IL 60006.

FIRST annual Elmira Hamfest, Sept. 29. For details, write WA2SMM, 320 W. Ave. Elmira NY 14904. Dealer inquiries invited.

30th ANNUAL Turkey Run Hamfest. New place! New day! Vigo County Fairgrounds one mile south of I-70 on U.S. 41 (south of Terre Haute). For overnight campers only - open Saturday July 17, 1976 1700Z. For general public - open Sunday July 18 1300Z. Midwest's finest flea market, XYL Bingo, Refreshments, valuable prizes. Vendor spots under covered flea market with AC service. \$10. Giant Shopping Mall nearby. Advance Adult tickets \$1.50 ea./4 for \$5. Day of event \$2. ea./3 for \$5. Children under 12 free. Talk-in 25/85 and 94 simplex. S.a.s.e. WVARA Hamfest, P. O. Box 81, Terre Haute IN 47808.

CHRISTIAN Ham fellowship now organized for Christian hams who wish fellowship with other Christian hams. Request free information on how to witness to other hams. Christian Ham Callbook \$2 donation. For free details write - Christian Ham Fellowship, 5857 Lakeshore Dr., Holland MI 49423.

QSL Cards
 TRAVEL-PAK QSL Kit - Send call and 25c; receive your call sample kit in return. Samco, Box 203, Wynantskill NY 12198.

QSLs, samples 20c. Fred Leyden, WINZJ, 454 Proctor Av., Revere MA 02151.

DELUXE QSLs, Samples 25c. Petty, W2HAZ, P.O. Box 5237, Trenton NJ 08638.

DON'T buy QSL cards until you see my free samples. Fast service, economical prices. Little Print Shop, Box 9848, Austin TX 78766.

QSLs - Variety, value, quality, custom. Samples and catalog 25c. Alkanprint, Box 3494, Scottsdale AZ 85257.

QSL catalog. Samples 35c. Ritz Print Shop, 5810 Detroit Ave., Cleveland OH 44102.

DISPLAY and protect your QSL's with 20 frame plastic holders. Seven for \$3.00, prepaid. TEPABCO, Box 1981, Gallatin TN 37066.

QSLs. Second to none. Same day service. Samples 50 cents. Include your call for free decal. Ray, K7HLR, Box 331, Clearfield, Utah 84015.

QSL's, Amateur Radio Commemorative Cup, Stein, Plate, Belt Buckle, Key Chain, Ladies Pendant, free catalog, Rusprint, Box 7875, Kansas City MO 64116.

QSLs "Brownie" W3CJH, 3035A Lehigh, Allentown PA 18103. Samples with catalog 50c.

BICENTENNIAL QSL Catalog! 36 pages, new designs, stock & ink samples. Twenty sample QSLs 25c. Cornillon's 321 Warren St., N. Babylon NY 11704.

QSL Cards - Something completely different! Nothing even close to it on the market! Samples: 25c W5UTT; Box 1171C, Garland TX 75040.

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QSLs?? QSLs?? "America's Finest!!" Samples 50c. DeLuxe 75c. Religious 50c. Bicentennial 75c. (Deductable). Sakkers, W8DED, Box 218, Holland MI 49423.

FREE Samples - Stamp appreciated. Samcards, 48 Monte Carlo Dr., Pittsburgh PA 15239.

General
 CANADIAN Surplus Catalog and flyers \$1. Etcoc Electronics, Box 741, Montreal Canada H3C 2V2.

VP2M Land 2 bedroom house constant sea breeze. HW101 5B 200 Hygain quad at 65'. DXer's paradise. \$90 weekly. TEL. 416-7552117 "Doc" 60 Amsterdam, Toronto, M4B 2C2.

DO-it-yourself DXpedition. Stay with ZF15B, Spanish Bay Reef Resort - Box 800, Gran Cayman Island, Brit West Indies.

WANTED: a used, single-band, 80-meter transceiver, either ssb or a-m, for a paralytic ham in Brazil. Write for shipping instructions. Donations only. James Hoffer, Caixa Postal 425, Florianopolis, SC, Brazil.

CASH paid for your unused tubes vacuum variables and good ham and commercial equipment. Send list to Barry Electronics, 512 Broadway, NY NY 10012.

CALL toll-free (800) 327-7798. Ask for Bob Hoffman (Jaro Electronics Corp.) We buy all types of tubes. Top prices paid for Varian, Elmac, Amperex. Address: 412 27th Street, Orlando FL 32806. In Florida call collect (305) 843-9551.

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We buy electron tubes, diodes, transistors, integrated circuits, semiconductor. Astral Electronics, 150 Miller Street - Elizabeth NJ 07207. (201) 354-2420.

MOBILE Ignition Shielding gives more range, no noise. Kits and custom systems. Literature. Estes Engineering, 930 Marine Dr., Port Angeles WA 98362.

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Many questions have been raised regarding speech processing. The desired end result, no matter what system is used, is to improve intelligibility of the transmitted signal during conditions that cause weak and or noisy reception with no significant increase in transmitted distortion products.

Speech processing modifies the voice waveform by increasing the low amplitude portions and retaining or reducing the high amplitude portions of your voice waveform without adding any significant distortion. The Matric, Model 60A does this and has a rising characteristic response to emphasize the high frequency components of your voice to aid in penetration during poor conditions.

These points should be followed for best results: Connections to and from the unit should be checked to comply with good practices for r.f. feedback prevention (proper shield grounds and tight connections). Tests should be conducted with the transmitter connected to a dummy load, and a receiver tuned to frequencies adjacent to the transmitter filter pass band to check for splatter. On the air checks should be done to adjust the maximum usable level of processing.

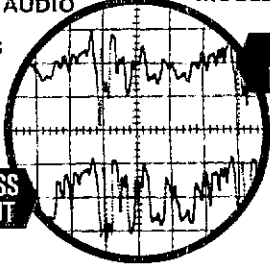
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COMPARE SPECS... COMPARE PRICES NO COMPARISON!

Hey! We started it all - with the Amazing Logarithmic SPEECH PROCESSOR



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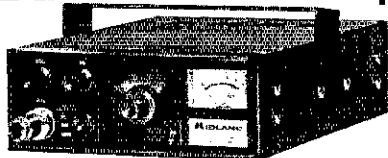
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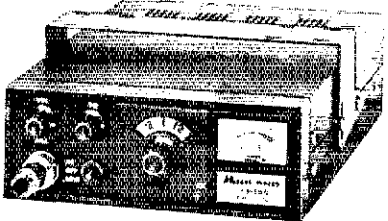
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29 Independence Ave.
Quincy, MA 02169
Phone (617) 6427



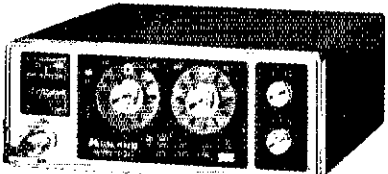
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13-505 2m FM Xcvr - 30w, 12ch w/16/76, 34/94,
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SALE Lafayette HA-460 6-meter xceiver excellent \$65., Hallicrafters SX-100 General coverage receiver good \$80. WB5DJC, 3631 Rue Colette, New Orleans LA 70114.

FOR SALE — UFO material — 120 paperbacks, 44 hard cover books, 45 magazines, estimate over 1000 clippings, many important documents, many collectors items. All \$250. or will swap for ham equipment. Wells Chapin W8GI, Box 176, Kingsley MI 49649.

COLLEGE bound. Must sell: Tristao 50 ft. tubular crank-up with winch, Mosley TA-33 with TA-40-KR converter, TR-44 rotor, HR-10B, factory tested. Mike, 2977 Mariposa Dr., Burlingame CA 94010.

RECEIVER, R-5007, 2.0 to 32.0 MHz a-m, cw, ssb \$150. Same as above, but 8.0 - 32.0 MHz, \$65. 4.0 - 8.0 MHz, \$45. 8.0 - 16.0 MHz, \$45. Schematic \$2.50 W6BKJ, Box 1633, Palo Alto CA 94302.

FREQUENCY meters. LM-21, \$25. AN6URM-32A, \$75. W6BKJ, Box 1633, Palo Alto CA 94302.

HEATHKIT HW-100 transceiver with both ac and dc power supplies, also mobile mount. Excellent condition. Will pack and ship UPS prepaid. \$250. Myron Steffy, W7JG, 10833 Brookside Drive, Sun City AZ 85351. 602-974-0851.

SELL — HW 1-1 HP23B HP-13B cw filter SB600 rjt package only \$500. Willie WA2DUV, Budd Lake NJ 201-347-1512.

TOWERS: 125 foot pyramid type. Manufactured by Blaw-Knox. Galvanized steel. Self-supporting. WB2AIO Dennis Bookmiller, 309 Roycroft Blvd. Snyder NY 14226.

DRAKE Station For Sale — excellent condition T4XB-\$280; AC-4-\$45; R4B-\$310; Shure No. 444 mike-\$25; or best offer. Tom Lasken, 1104 Santa Clara Avenue, Alameda, CA 94501. Home 415-523-7683, work 415-357-3403.

WANTED: Atlas 180 — WA5AAO, Box 335, La Grange TX 78945.

DRAKE R4B, \$325; T4XB, \$355; Genave GTX-200, with 8 xtals, \$175; Bob Mauro, 257 Center Lane, Levittown NY 11756.

FOR SALE: Heathkit TX-1 Apache, SB-10, Hallicrafters SX-101A, \$200. Mint. Not a scratch. 150 countries. Bruce McCoun, W2LWS, 2 Wren Court, Middletown NJ 07748. 201-671-0046.

TRADE one HW12A for one HW16, W2RSY, Box 503, Russel NY 13684.

SELL: One Mobile Ignition Shielding Assy, complete, for Ford 6 cyl. Mint. \$50. or trade for CB xcvr. WA9QPA.

R390 receiver factory cabinet book — mint condition \$300. W4SOX, Phone 904-772-0819.

BUSINESS opportunity: Profitable established ham mail order business for sale. Write P.O. Box 708, State College PA 16801.

HEATH SB-401 \$275, SB-200 \$260, SB-610 \$65, Drake R-4 with MS-4 speaker \$170, AR-22 rotator \$15, TA-33 Sr. \$40, Pick-up only WB2UJB, Stephen Wiener, 516-333-9580.

QST — 1952-1972 complete, Greenbaum W2FYP, 57 County Rd. Demarest NJ 07627.

SELLING out. All operating w/manuals. Technical material corp G2R 90 receiver W6G5B1 ssb adapter & speaker \$125, Johnson Viking Courier 990, Johnson KW matchbox W6SWR \$100, D-104 Astatic mike \$10, Bronn Bros paddle \$10, Vibroplex key \$5, Heath Q Multiplier \$5, Johnson LP filter \$9, Hallicrafters HA1 keyer \$10, Cash & carry. Some extras. W4IG, 703-549-8521, Alexandria VA 22301.

SR150 with ac supply — excellent — \$300 — Dick Franklin W2EUF — 201-232-7657.

WANTED: Mint FW Johnson Ranger II W4MGG 2941 Keadron, Winston-Salem NC 27106.

RECORDER Honeywell strip chart, ink pen, 0-100 millivolts, \$150. E. J. Smolarek, 32 Hempstead Rd., Spring Valley NY 10977.

COLLINS 4-2 wire Hybrid assembly (phone patch). Includes attenuators and 3 kc low pass filters and tone detector. \$12. each. W0QM, 7762 Brockway Dr., Boulder CO 80303.

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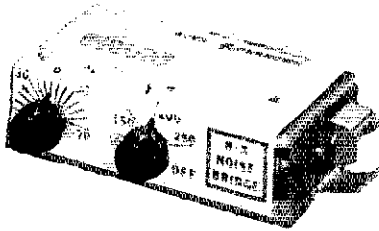
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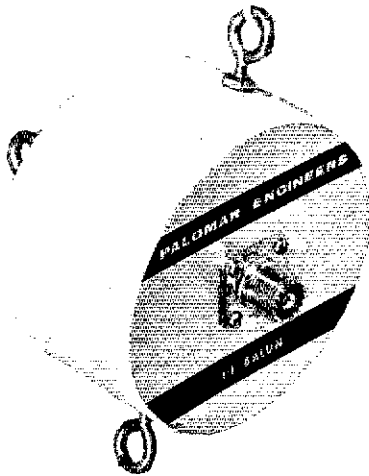
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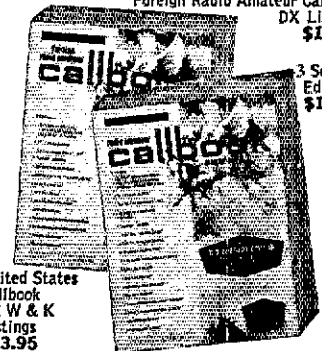
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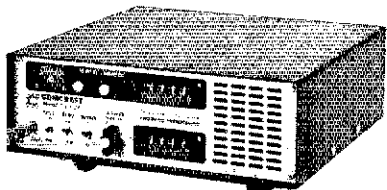
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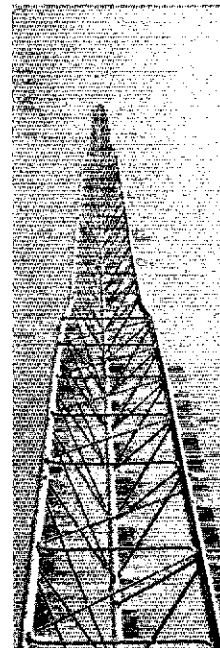
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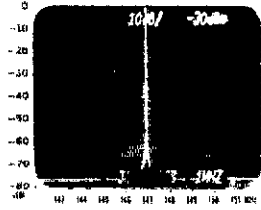
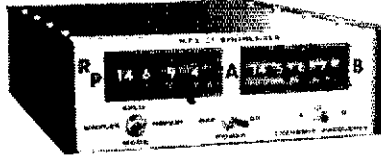
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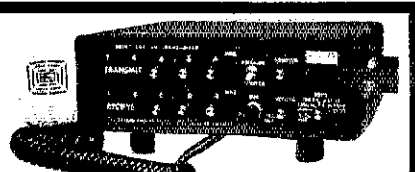
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FOR SALE: 62S-1 cables, manual, \$895. 51S-1, \$1095. 7553-B \$595. KW-1, "mint", \$1400. KWM2-A, \$165 (round), \$1250. KWM2 (round), PM-2, \$1200. 312B-5, \$450. 32S-1, \$395. 30L-1, \$425. CX7-A, \$1295. 312B-4, \$250. 75A-2, \$195. Viking kilowatt, desk, \$650. HQ-215, 0.5, 2.1 mechanical filters (Collins), spkr, \$325. CL-36 (new), \$295, prepaid. Typewriter (Olympia), portable, script, \$75. Sony TC-260 "Tapeorder", \$150. IC-230, \$429. IC21-A, DV21, \$700. Atlas 210-X (new), \$599. Raytract "Auto level" \$50. Clegg Interceptor, \$250; Zeus modulator/p. s., \$200. SB-200, \$210. KWM-2 Mount 351D-2, \$95. Want: KWS-1, No. 1000+, 75A4 No. 5000+, R388, 51J4, 75A4 Filters, 516F-2 James Craig, Box 615 Portsmouth NH 03801. 207-439-0474, 603-436-2884 (nites).

NOVICES: Heath HW-16 transceiver with HG-10B VFO, exc. cond. w/manuals, \$135; HW-7 QRP transceiver, exc. cond. w/manuals, \$60. WA6VZV, 5 Rita Way, Orinda CA 94563.

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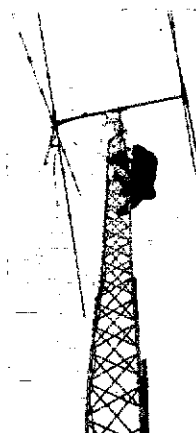
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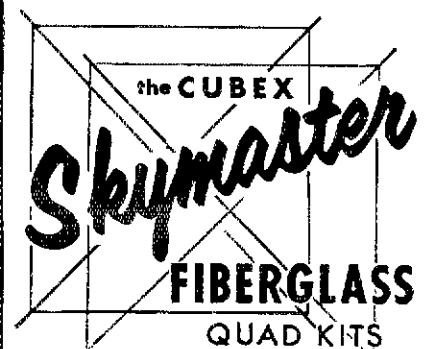
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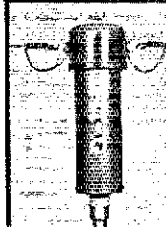
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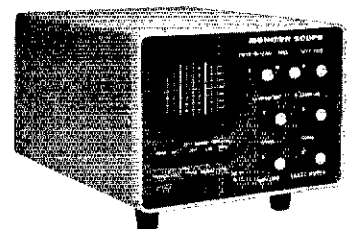
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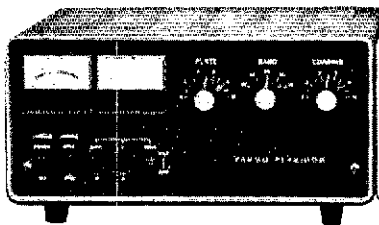
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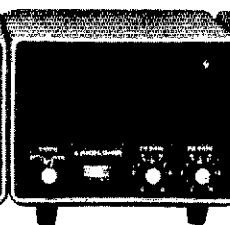
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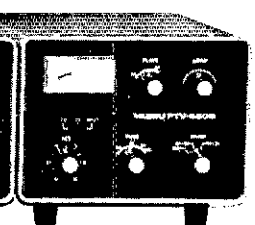
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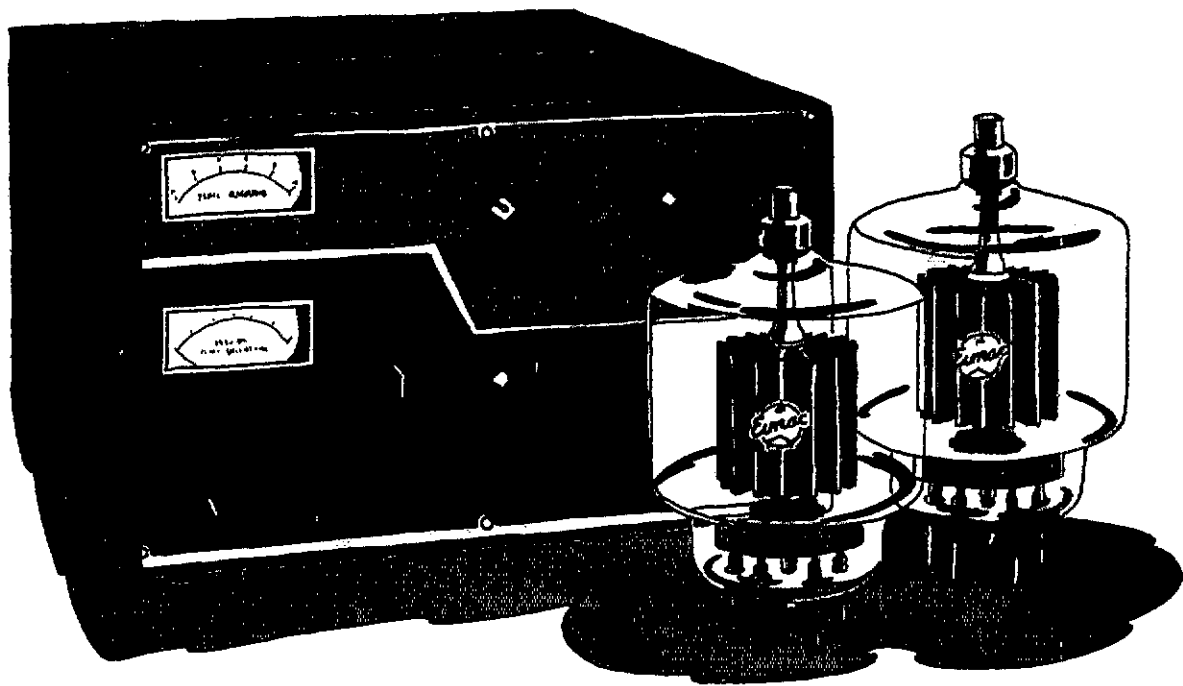
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Yaesu Musen USA Inc., Eastern Service Center • 613 Redna Terrace, Cincinnati, OH 45215

The Drake L-4B's not-so-secret ingredient.



EIMAC 3-500Z triodes.

The good guys at Drake are proud to tell you about their L-4B linear amplifier. They won't hide the fact that precision design insures continuous operation at one kilowatt power input on CW, AM and RTTY; and two kilowatts PEP on SSB. You won't have to ask twice about the L-4B's features like the transmitting AGC circuit to control exciter gain, the standby switch or the built-in RF directional wattmeter.

Our point? Drake doesn't keep it a secret that the L-4B's high efficiency class B grounded grid circuit uses EIMAC 3-500Z zero bias triodes. EIMAC's performance reputation is a much publicized plus. Use of the 3-500Zs simplifies the circuitry, provides 1,000 watts plate dissipation and turns driving power into maximum output power.

To find out more about the reason Drake's first choice is EIMAC, or to ask about our design flexibility to meet individual applications, drop us a line or call. We have no secrets.

Contact Varian, EIMAC Division, 301 Industrial Way, San Carlos, California 94070, (415) 592-1221. Or any of the more than 30 Varian Electron Device Group Sales offices throughout the world.

