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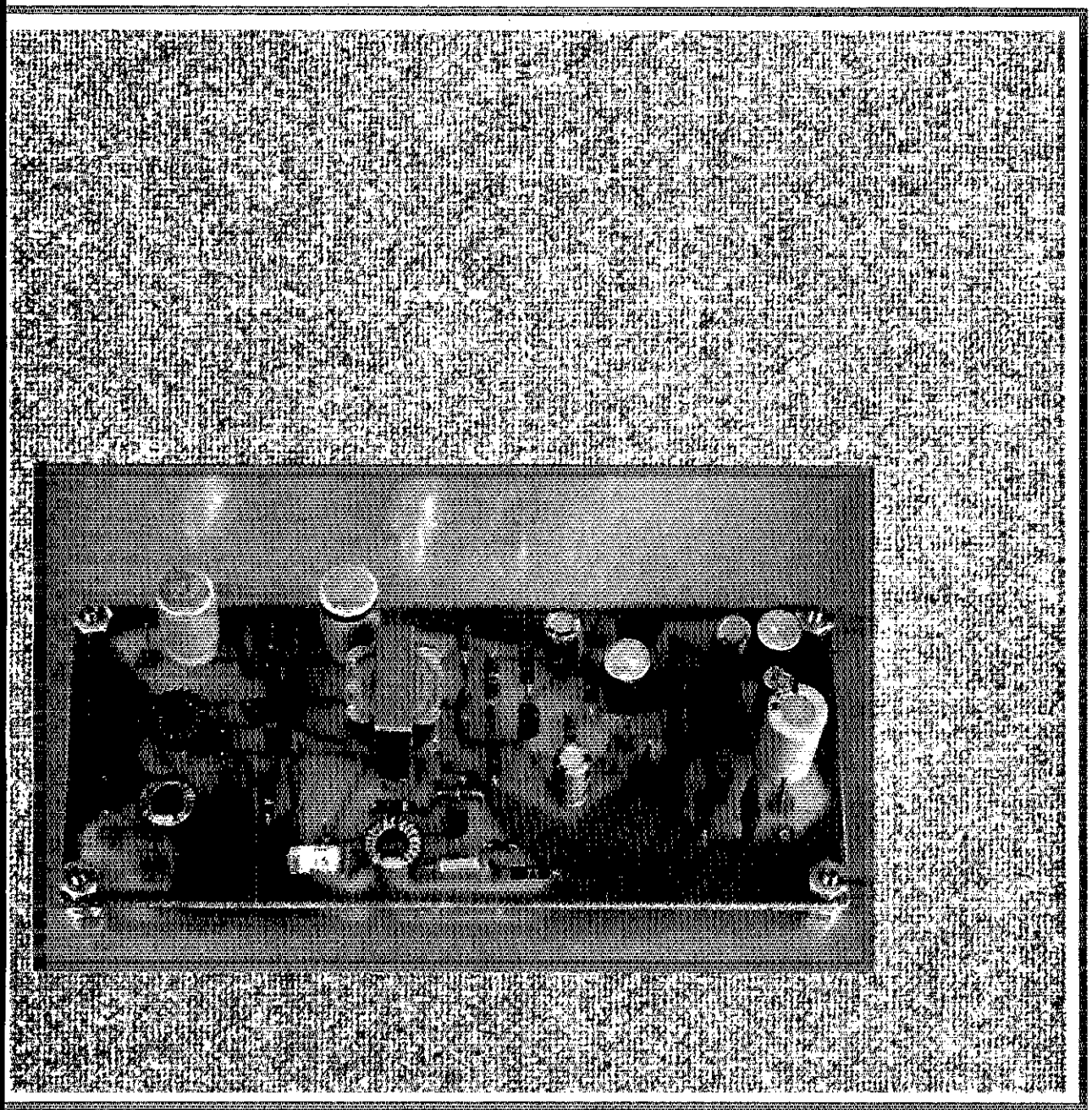

A 20-meter receiver on a circuit board! You can build it.

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WE DON'T KNOW OF ANOTHER TRANSCEIVER OFFERING ALL THESE FEATURES AS STANDARD EQUIPMENT

- **Hybrid digital frequency presentation . . . built-in**
- **AC and DC VDC power supplies . . . built-in**
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- **Microphone . . . included**

When you buy the Tempo 2020 you don't have to spend a bundle on accessories . . . just hook up to a power source and an antenna and you're on the air. A truly fine transceiver at a modest price.

The Tempo 2020 features a phase lock-loop (PLL) oscillator circuit that minimizes unwanted spurious responses. It is an advanced solid-state unit with only 3 tubes, including 2 rugged 6146-B final amplifier tubes. It covers all bands 80 through 10 meters, USB, LSB, CW and AM. Additional features worth noting is the 2020's crystal calibrator and WWV receiving capability, dual RIT control, fixed channel crystal control on two available positions, RF attenuator, adjustable ALC action, phone patch in and out jacks, separate PTT jack for foot switch, extraordinary receiver sensitivity (.3u S/N 10 db) and oscillator stability (100 Hz 30 min. after warm-up).

The TEMPO 2020 ..... **$759.00**
Model 8120 external speaker **$29.95**
Model 8010 remote VFO **$139.00**

Send for descriptive information on the fine transceiver, or on the time proven Tempo ONE transceiver which continues to offer reliable, low cost performance. Both are available at select dealers throughout the U.S.

Henry Radio

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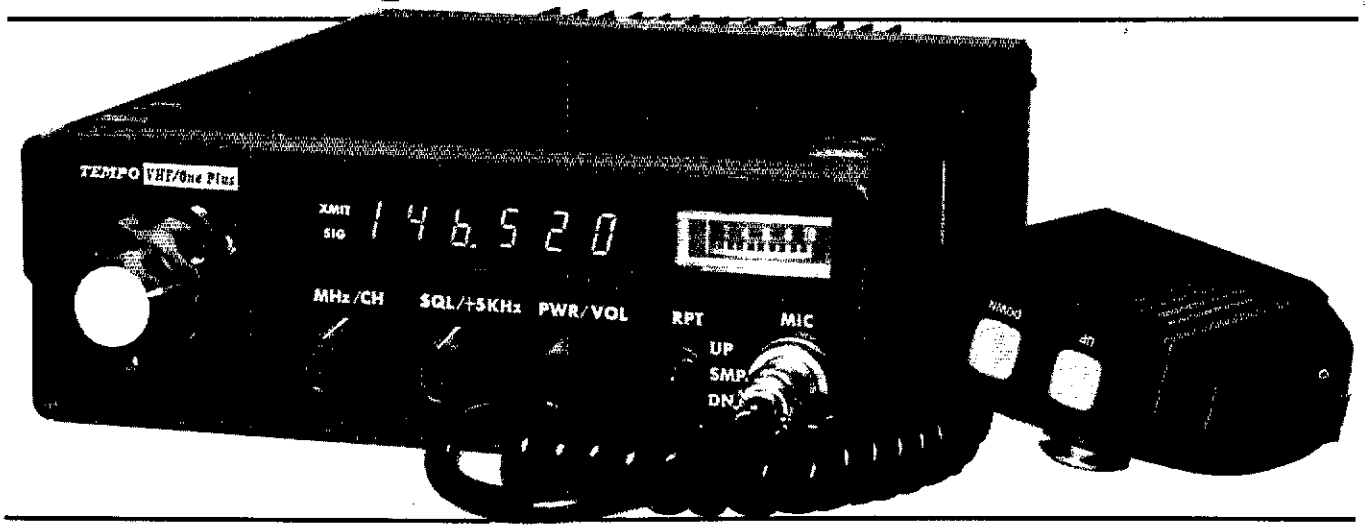
TEMPO

VHF/ONE PLUS



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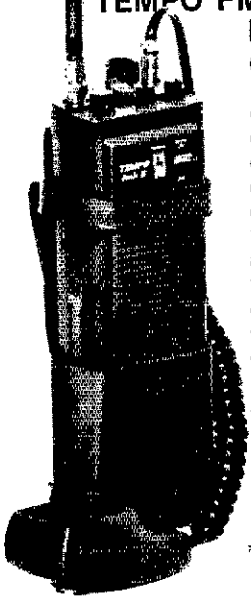
SIDEBAND OPERATION WITH SSB/ONE ADAPTER / MARS OPERATION CAPABILITY / 5 KHz NUMERICAL LED

The Tempo VHF / One Plus is a VHF / FM transceiver for dependable communication on the 2 meter amateur band • Full 2 meter coverage, 144 to 148 MHz for both transmit and receive • Full phase lock synthesized (PLL) • Automatic repeater split—selectable up or down • Two built-in programmable channels • All solid state • 800 selectable receive frequencies with simplex and +600 KHz transmit frequencies for each receive channel.



TEMPO FMH-2, FMH-5 & FMH-42 (UHF)

6 channel capability • selectable 1 or 2 - 1 or 5 Watts output • Solid-state • Battery level meter • Earphone jack • Built-in charging terminals and separate charging jack for Ni-cad batteries • Flex antenna • Carrying case standard • Excellent frequency stability allows use with booster amplifier for high power output over 100 Watts • 8 AA batteries or 10 AA Ni-cads.*

*Not furnished.

FCC Type accepted models available.

TEMPO VHF & UHF AMPLIFIERS

VHF (135 to 175 MHz)

Drive Power	Output	Model No.	Price
2W	130W	130A02	$199
10W	130W	130A10	$179
30W	130W	130A30	$189
2W	80W	80A02	$169
10W	80W	80A10	$149
30W	80W	80A30	$159

UHF (400 to 512 MHz)

Drive Power	Output	Model No.	Price
2W	70W	70D02	$270
10W	70W	70D10	$250
30W	70W	70D30	$210
2W	40W	40D02	$180
10W	40W	40D10	$145
2W	10W	10D02	$125

FCC Type accepted models available.

TEMPO POCKET RECEIVERS

MS-2, 4 channel scanning receiver for VHF high band, smallest unit on the market. MR-2 same size as MS-2 but has manual selection of 12 channels. VHF high band. MR-3, miniature 2-channel VHF high band monitor or paging receiver. MR-3U, single channel on the 400 to 512 UHF band. All are low priced and dependable.

Sold at Tempo dealers throughout the U.S. and abroad. Please call or write for further information.

Prices subject to change without notice

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IC-211, the 2meter Maximizer

FULL 4 MHz MULTI-MODE TRANSCEIVER

ICOM's new **IC-211** maximizes band coverage, speed, performance and convenience like no other transceiver in the 2 meter world. This Maximizer's single-knob dial provides all 4 MHz in a flash, right to your single fingertip! The **IC-211** maximizes read-out speed with positively no time lag or backlash in display stability, even in modes using 100 Hz steps. The **IC-211**'s freewheeling dial, with its superb inertia clutch, is instantly coordinated with the high speed, computer circuitry controlled synthesizer's seven digit read-out using an optical chopper. There is absolutely no mechanical connection between the smooth, bearing mounted flywheel knob and the **two dual-tracking VFO's,** which come built into your **IC-211.**

- **Single knob frequency selection:** The **IC-211** is synthesized with convenient single knob frequency selection over the entire 4 MHz. No more fussing with two or more knobs just to check what is going on around the band. One easy spin of the dial does it all.
- **Two VFO's built in:** The second VFO, which is an optional tack-on with most other transceivers, is an integral feature in every **IC-211.**
- **Variable offset:** Any offset from 10 KHz through 4 MHz, in multiples of 10 KHz, can be programmed with the LSI synthesizer.
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- **FM stability on SSB and CW:** The **IC-211** synthesis of 100 Hz steps makes SSB as stable as FM. This extended range of operation is attracting many FM'ers who have been operating on the direct channels and have now discovered SSB.

The new **IC-211** is the very best and most versatile 2 meter transceiver made: that's all. For more information and your own hands-on demonstration, see your ICOM dealer. While maximizing performance, the **IC-211** minimizes impatience: yours is ready for delivery now.

Maximize the new repeater band: both the **IC-211** and the **IC-245/SSB** now operate the new FCC repeater spectrum with no modification.

All ICOM radios significantly exceed FCC specifications limiting spurious emissions.

Specifications: [ ] Frequency Coverage: 144.00 to 148.00 MHz [ ] Modes: SSB (A3J), FM (F3), CW (A1) [ ] Supply Voltage: DC, 13.8V ± 15%, AC 117V ± 10% [ ] Size: 141mm(h) x 241mm(w) x 264mm(d) [ ] Weight: 5.8 Kg [ ] TX Output: A3J, 10W (PEP), A1 & F3, 10W [ ] Spurious Radiation: -60 dB below Carrier [ ] Microphone Impedance: 500 Ohms [ ] Sensitivity: A3J & A1, 0.5 microvolt (0 dB S + N/N, F3, 0.6 microvolt for 20 dB quieting [ ] Spurious Response: -65 dB or better [ ] Synthesizer Frequency Range: 144.00 MHz to 148.00 MHz [ ] Synthesizer Step Size: 100 Hz or 5 KHz for SSB, 5 KHz for FM

Supplied with hand held microphone, AC cord, DC cord, fuses and owner's manual.

VHF UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

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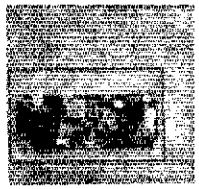
THE COVER

This direct-conversion 20-meter receiver is simplicity itself. See page 11.



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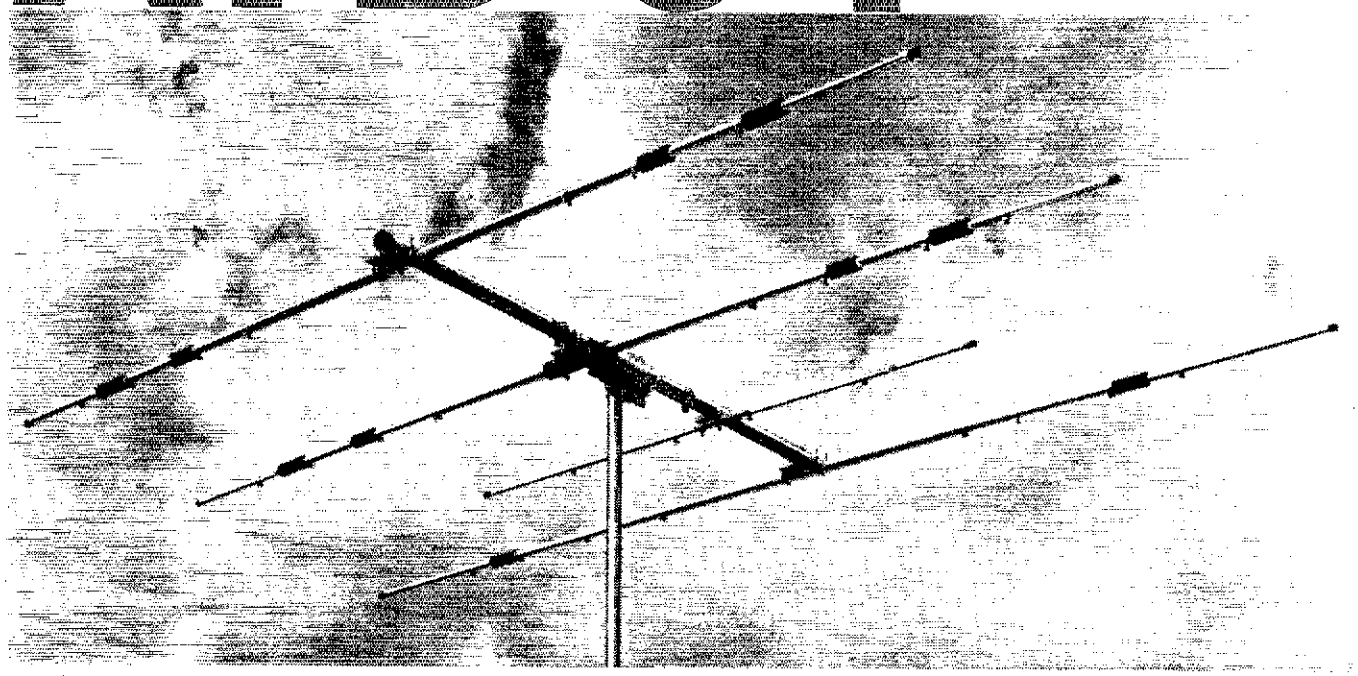
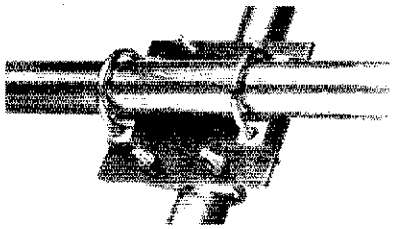
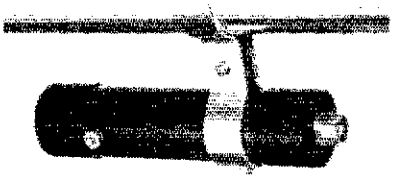
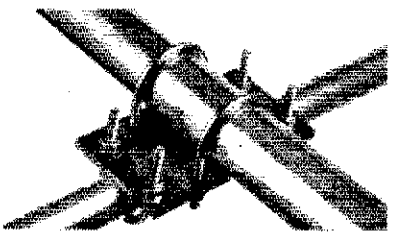
ATB-34









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Cushcraft engineers have incorporated more than 30 years of design experience into the best 3 band HF beam available today. **ATB-34** has superb performance with three active elements on each band, the convenience of easy assembly and modest dimensions. Value through heavy duty all aluminum construction and a price complete with 1-1 balun.

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SPECIFICATIONS

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F/B RATIO -	EXCELLENT	WEIGHT -	42 Lbs.
VSWR -	1.5-1	WIND SURVIVAL -	90 MPH.
POWER HANDLING -	2000 WATTS PEP		
BOOM LENGTH/DIA. -	18' x 2 1/8"		
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TURNING RADIUS -	18'9"		

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THE 7500 FEATURES AN EASY TO READ LED DIGITAL FREQUENCY DISPLAY ... unlike the difficult to read mechanical displays on many mobile units.

ALSO, A SINGLE KNOB CHANNEL SELECTOR makes the TR-7500 one of the most convenient units to operate while driving.

Its output is a full 10 watts and it offers ±600 KHz offset, along with other worthwhile features.

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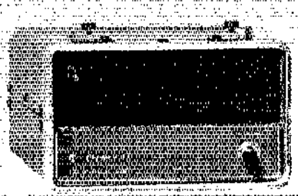
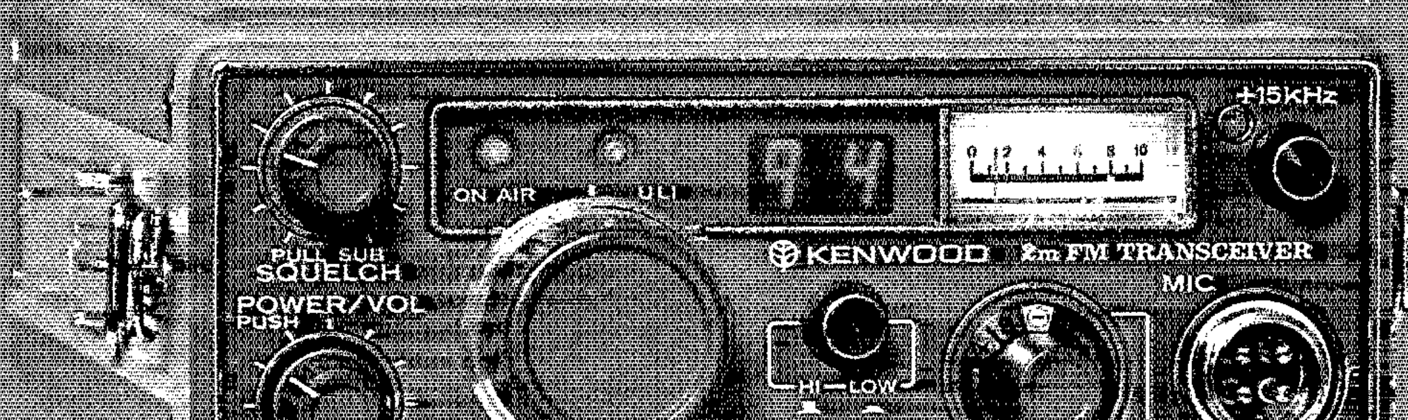
THE TR-7500 IS AN ADVANCED 2 METER FM TRANSCEIVER OFFERING EXCITING FEATURES AND EXTREME RELIABILITY AT A REASONABLE PRICE

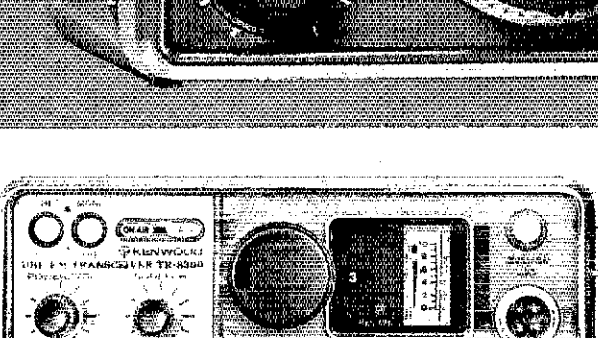
TR-7500



AND PS-6

... matching power supply for the TR-7500. Regulated 13.8 VDC @ 3.5 amps ... built in speaker. A perfect companion for home use of the TR-7500.





TR-8300

The luxury of 450 MHz at an economical price. The TR-8300 is capable of F_3 emission on 23 crystal controlled channels (3 supplied). The transmitter output is 10 watts. It incorporates a 5 section helical resonator and a two-pole crystal filter in the IF section of the receiver for improved intermodulation characteristics. Receiver sensitivity, spurious response and temperature characteristics are excellent.

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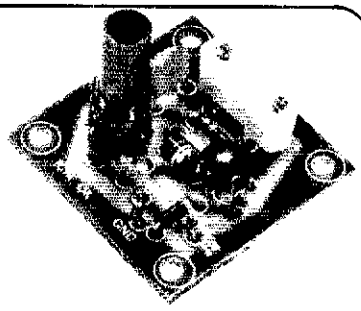
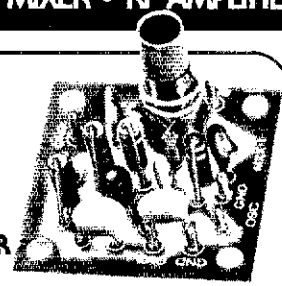
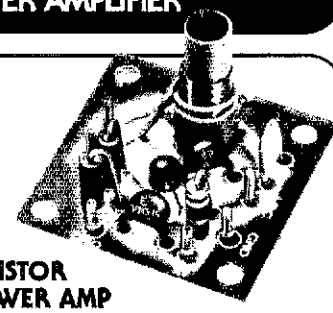


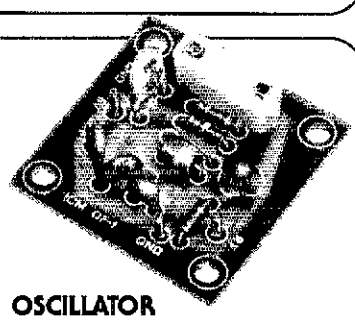
OX OSCILLATOR
Crystal controlled transistor type. 3 to 20 MHz, OX-Lo, Cat. No. 035100. 20 to 60 MHz, OX-Hi, Cat. No. 035101
Specify when ordering.
$4.95 ea.



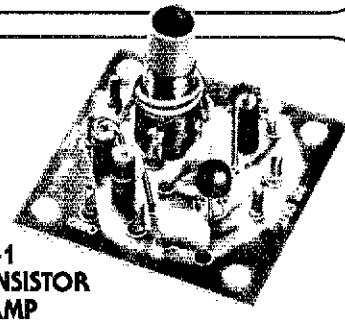
MXX-1
TRANSISTOR
RF MIXER
A single tuned circuit intended for signal conversion in the 30 to 170 MHz range. Harmonics of the OX or OF-1 oscillator are used for injection in the 60 to 179 MHz range. 3 to 20 MHz, Lo Kit, Cat. No. 035105. 20 to 170 MHz, Hi Kit, Cat. No. 035106
Specify when ordering.
$5.50 ea.



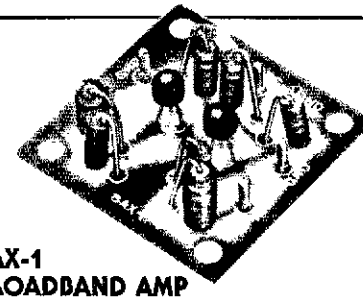
PAX-1
TRANSISTOR
RF POWER AMP
A single tuned output amplifier designed to follow the OX or OF-1 oscillator. Outputs up to 200 mw, depending on frequency and voltage. Amplifier can be amplitude modulated. 3 to 30 MHz, Cat. No. 035104
Specify when ordering.
$5.75 ea.



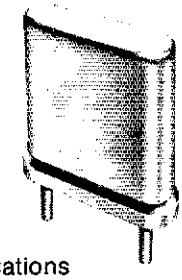
OF-1 OSCILLATOR
Resistor/capacitor circuit provides osc over a range of freq with the desired crystal. 2 to 22 MHz, OF-1 LO, Cat. No. 035108. 18 to 60 MHz, OF-1 HI, Cat. No. 035109
Specify when ordering.
$4.25 ea.



SAX-1
TRANSISTOR
RF AMP
A small signal amplifier to drive the MXX-1 Mixer. Single tuned input and link output. 3 to 20 MHz, Lo Kit, Cat. No. 035102. 20 to 170 MHz, Hi Kit, Cat. No. 035103.
Specify when ordering.
$5.50 ea.



BAX-1
BROADBAND AMP
General purpose amplifier which may be used as a tuned or untuned unit in RF and audio applications. 20 Hz to 150 MHz with 6 to 30 db gain. Cat No. 035107
Specify when ordering
$5.75 ea.



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Cat. No.	Specifications	
031080	3 to 20 MHz — for use in OX OSC Lo *Specify when ordering*	$5.95 ea.
031081	20 to 60 MHz — For use in OX OSC Hi *Specify when ordering*	$5.95 ea.
031300	3 to 20 MHz — For use in OF-1L OSC *Specify when ordering*	$4.75 ea.
031310	20 to 60 MHz — For use in OF-1H OSC *Specify when ordering.*	$4.75 ea.

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THE AMERICAN RADIO RELAY LEAGUE, INC.

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

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

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

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

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

"It Seems to Us..."

Simple Equipment, and WARC

One of the major obstacles to the growth of amateur radio in the less-developed countries is that inexpensive equipment is not readily available in most of them. Indeed, such gear is not common in most of the developed countries!

In some circles, a picture of our avocation has developed which suggests that one needs expensive manufactured equipment to gain enjoyment and to learn from amateur radio. Many of us know better, but we have not managed to convince some government officials, telecommunications administrators, and even some of our fellow hams, of a basic truth: that modern technology has given us not only sophisticated equipment, but *also* the ability to build simple gear which will perform far better than anything similar which could have been built just a few years ago.

To address this problem, several months ago W1VD of the League's Technical Department drew the assignment to design a simple direct-conversion receiver with the following features: a minimum of discrete components; easy to construct without special skills or knowledge; coverage of the 14-MHz band, with good rejection of out-of-band nonamateur signals; and adequate sensitivity to receive worldwide amateur signals with a simple wire antenna. Total cost of the components was to be in the neighborhood of $25. You can see the results on pages 11-13 of this issue.

The project was completed in time for K1ZZ to carry the completed prototype to Monrovia, Liberia, for the First IARU Region 1 West Africa Conference in December. The purpose of bringing the receiver to Africa was twofold: to confirm that it would operate satisfactorily in the African environment, and to see if there was any interest in such a unit in the part of the world for which it was intended. The demonstration was an unqualified success. Considerable interest was shown by the delegates from the nine African countries which were represented at the conference. The general feeling was that such homebrew equipment filled a definite need, and would be very helpful in promoting amateur radio in Africa. This was demonstrated on the closing day of the conference, when the receiver was shown in an interview on Liberian television to illustrate that amateur radio need not be a rich man's hobby.

Heartened by such a response, W1VD began work on a companion transmitter. The result is a unit which costs about the same as the receiver and delivers six watts of clean cw output on 14 MHz. The transmitter will be detailed in an early issue of *QST*. The two units, together with a key, headphones, antenna, and 12-volt battery or other supply, comprise a complete station capable of intercontinental communication. Coincidentally, one of the first stations worked with this rig during testing at K1ZZ was EL2ET in Monrovia, who had seen the receiver there and had been most enthusiastic about the project!

The prototype equipment is now at 4U1ITU, the International Amateur Radio Club station at ITU headquarters in Geneva, where it can be seen and operated. Already, some of the amateurs visiting 4U1ITU have discovered that it is more fun to use this simple gear than the fine commercial equipment at the station! More important, the display, located as it is at the world's telecommunications headquarters, shows visitors from many countries that today's Amateur Service is not just a collection of "black box operators."

To assist in promoting amateur radio overseas, the League, as Headquarters Society of the International Amateur Radio Union, is making available free of charge one kit of parts for the transmitter and receiver to each IARU society or responsible group in a less-developed country. Additional kits will be available at cost for use in the same countries.

The *Deutscher Amateur Radio Club*, IARU member-society in the Federal Republic of Germany, has made the fine offer to package kits for additional distribution in Africa. We do not have the personnel or facilities to make parts kits generally available, but the components are not difficult to obtain in the U.S. and Canada and, if enough interest is shown, commercial suppliers undoubtedly will want to sell parts kits here.

It would be fun to try working 100 countries with such simple gear. But there is a greater objective: to put the indigenous people of countries which are now lacking in amateur activity *on the air* with such equipment. By demonstrating that the Amateur Service is relevant to the less-developed world, and that it can be a useful means of technical self-training, we will earn the support of these countries in 1979 and in the years to come. — *K1ZZ*

League Lines...

If its launch and first few hours of life are any indication, OSCAR 8 should enjoy a long and successful career. First reports from both its telemetry beacons indicate that all is well. See page 47 for a pre-launch photo and an account of the March 5 launch and first few orbits.

The ARRL-sanctioned equipment insurance program is underway at last. Brochures were sent to all ARRL members in February; if for some reason you didn't get your copy, please send Hq. a self-addressed envelope marked "Insurance."

And while we're mentioning insurance, the Administrator's inward-WATS line, 800-423-6597, is located in California -- Easterners should wait until noon before calling with their questions on the program!

Until Docket 21135 is acted upon, clubs unable to obtain club station licenses and callsigns may still set up a station. These stations may be operated by any licensed radio amateur under the terms of his or her license as a portable operation. Such operation must be logged as portable.

U.S. citizens residing in western Europe take note: The FCC sends an examiner to Ramstein Air Base, Kaiserslautern, West Germany, for one week each March and September. Amateur and commercial exams are conducted on a walk-in basis. Contact Ramstein Education Center for details.

There are now 125 manufacturers and retailers who have volunteered to support the League's Code of Ethics. We've given everyone we know of, advertiser and non-advertiser alike, an opportunity to support you and amateur radio. Most of those who have not signed up say they're afraid of legal involvements in refusing to sell to unlicensed persons. We believe that the companies who have the courage and determination to support amateur radio deserve to be recognized by all of us. Retail establishments now display counter plaques bearing the Code, and all firms have been supplied logos to identify their support in advertising, flyers, and catalogs. Within a few months you will begin to see the logo appearing in advertising. Look for it. Encourage the firm you are talking with to support the Code. As a membership association, we also believe that you deserve to know which firms have declared their support of the Code of Ethics. Accordingly, we plan to publish, in an early issue, the list of firms who support you and the Amateur Radio Service.

Did you know that nearly half of all U.S. amateurs are CBers, too? This is one of the interesting findings of ARRL's 1977 survey of radio amateur opinion. Look for a comprehensive report beginning on page 52.

Nominations are now being accepted for the ARRL Technical Merit Award for 1977. Anyone with a candidate for the award should send full particulars about the individual or organization deserving of the award to Director Gant (address on page 8, of this issue). The award will be conferred at the summer Board Meeting, so nominations should be sent in as soon as possible. This award should not be confused with the Pewter Cup which is awarded by the Technical Department for the best technical article for a given year in QST.

Where can you find most of the important statistics about amateur radio and ARRL? Where can you find useful but little-known facts about our hobby? Where can you find a detailed financial statement of your only national amateur radio membership organization? The Annual Report of the Officers and Directors, that's where! Send $1 plus a large s.a.s.e. (45¢) for May delivery of 1977 edition.

The Canadian DX Association has created a DX information net on 14173 kHz at 1900Z every Sunday. Net controls are VE3BMV and VE3FSA. Net members plan to listen on 14205 kHz for interested U.S. DXers.

A 20-Meter High-Performance Direct-Conversion Receiver

Looking for a homemade receiver design that's nearly guaranteed to work the first time? Assemble this radio and enjoy hours of listening from your home QTH or "in the field."

By Jay Rusgrove,* W1VD

"Ho hum. This looks like another direct-conversion receiver. Well, let's flip the page and see what the next article is."

Chances are, if you're not a dc-receiver enthusiast this is what you are thinking. "After all, who would want a dc receiver? They all suffer from excessive hum, BFO pulling, drift, are microphonic and susceptible to a-m broadcast pickup." To that, we not-so-politely say BUNK!

A well-designed, direct-conversion receiver suffers from none of those maladies and in fact will provide a certain, pleasing clarity and depth of sound that is not possible with highly filtered and age'ed superhets. Signals seem to stand out against a nearly noiseless background. Since the circuitry is simple, the cost is low and the chances of the receiver working "first time" are excellent.

Circuit Description

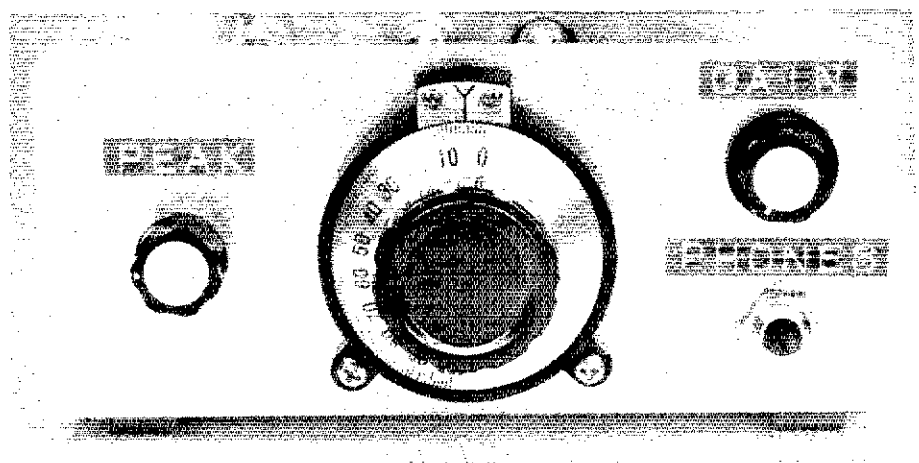
There are two main areas where the performance of most dc receivers is compromised — the product detector and the BFO. The product detector is responsible for mixing the input signal to the receiver with the BFO (the frequency difference being audio) and provide as its output an audio signal.

Many designs make use of a single device for the detector, quite often a dual-gate MOSFET. While the MOSFET is reasonable as far as IMD, blocking and cross modulation are concerned, it is poor in the way it handles a-m signals. This is of particular concern in the amateur 40-meter band where many commerical broadcast stations share the same spectrum. Also, it is not uncommon to have standard a-m broadcast stations in the 525- to 1625-kHz range completely overunning a dc receiver. Both of these problems can be considerably reduced by using a balanced product detector, as is done in this design. If careful attention is paid to circuit balance, the detector should function very well. For this reason the two FETs should have matched characteristics (I_{DSS} and $V_{gs(off)}$). Matched, for this application, is within 10 to 15 percent.

The product detector is preceded by a sharp-tuning (high Q) preselector. C1 tunes the circuit to resonance, with links L1 and L3 used to couple signals in and out of the resonator. L3 feeds L4/L5, a broadband toroidal transformer, which in turn drives the gates of the FETs. BFO energy is injected through the center tap of the transformer. The FET drains are connected directly to an audio transformer, T1. C4 and C5 function as bypass capacitors shunting rf drain currents to ground, allowing only the audio information to be fed to T1.

Q3 and associated components comprise an audio preamplifier which boosts the output of the detector to a level suitable for driving the audio-output stage. U1 is a low-voltage audio power amplifier featuring high gain, low distortion, and a reasonable price tag. There is even sufficient output from U1 to drive a small speaker! The gain of the IC is adjustable by varying the elements connected between pins 1 and 8. As the amplifier is presently configured, the gain is approximately 50.

It is interesting to note that the only selectivity in the receiver (aside from the preselector) is that obtained through shaping of the audio channel. As shown, the receiver was primarily designed for ssb reception rather than cw. A bandwidth



The front panel of the high-performance receiver is simplicity itself.

*Senior Assistant Technical Editor, ARRL

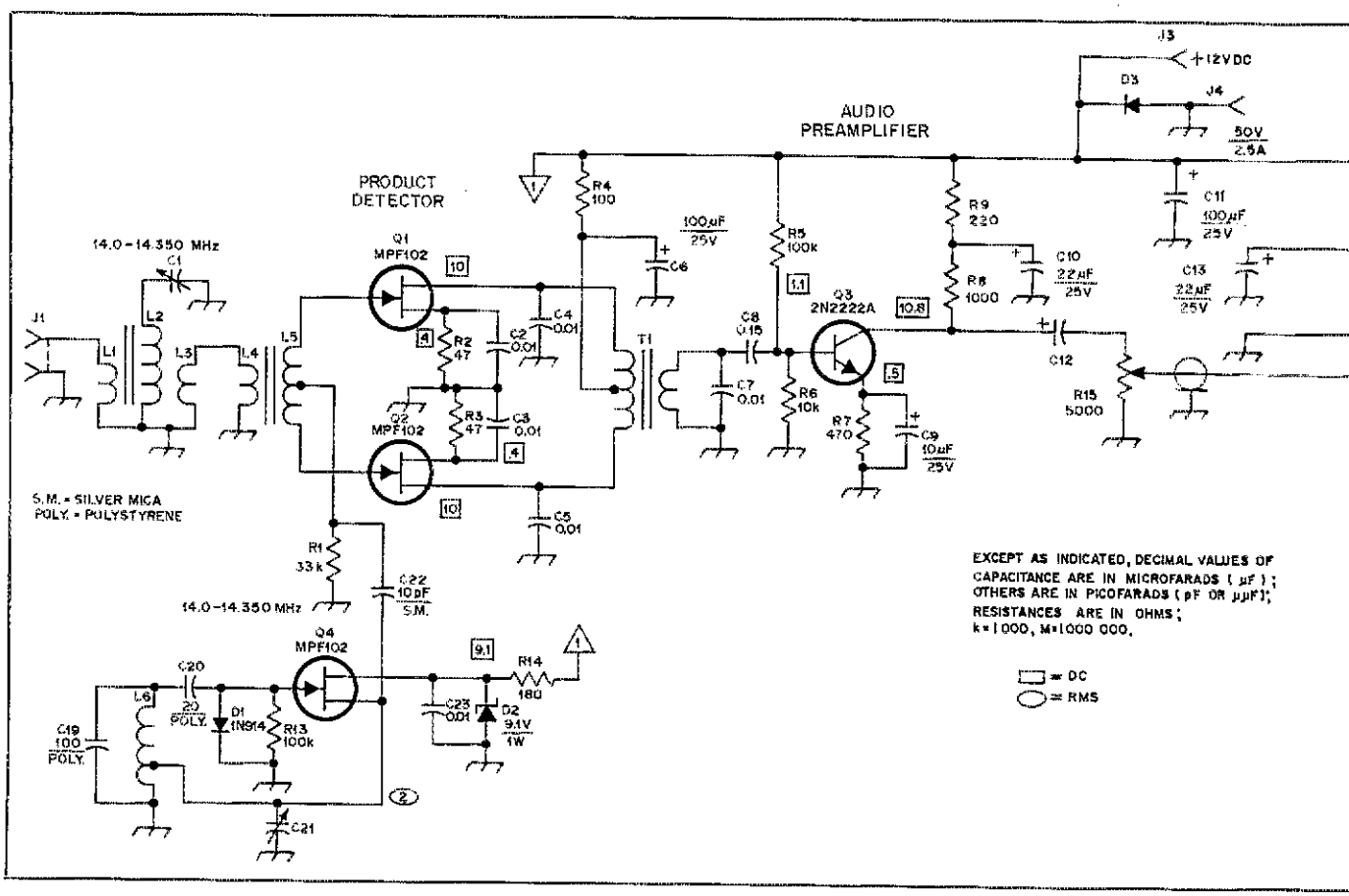


Fig. 1 — Schematic diagram for the high-performance, direct-conversion receiver. Numbered components not appearing in the parts list are for text reference only.

C1, C21 — Variable capacitor, 35 pF maximum.
J1 — Coaxial connector.
J2 — Headphone jack.
J3, J4 — Binding post.
L1 — 2 turns no. 28 enam. wire on L2.
L2 — 40 turns no. 30 enam. wire on a T-37-6 core.
L3 — 4 turns no. 28 enam. wire on L2.
L4 — 4 turns no. 28 enam. wire on L5.
L5 — 16 turns no 28 enam. wire on an FT-37-63 core. Make center-tap connection.
L6 — 19 turns no 28 enam. wire on a T-37-6 core. Tap at 7 turns above ground end.
Q1, Q2, Q4 — JFET, MPF 102, HEP F0015.
Q3 — Silicon npn high-speed switching or rf-

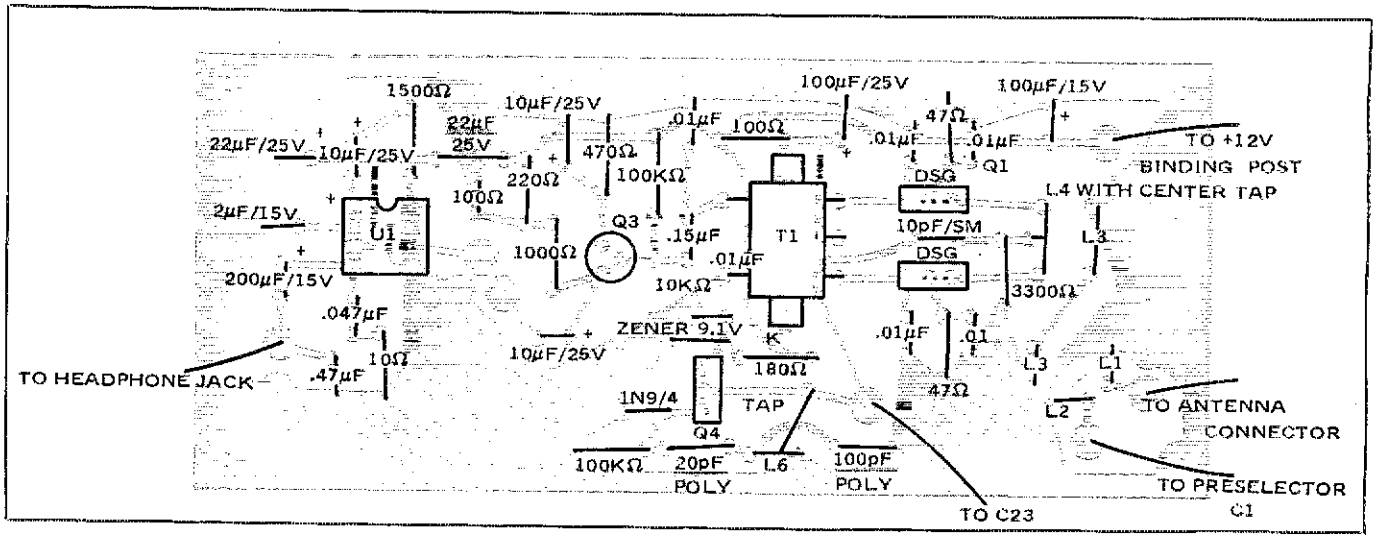
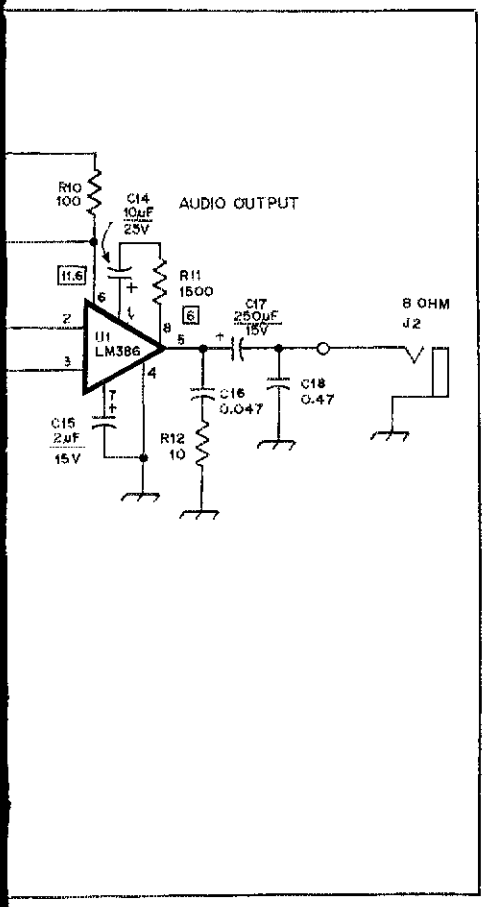


Fig. 2 — Shown here is the foil side of the circuit board with parts layout. Grey areas represent unetched copper. Drawing is to scale.

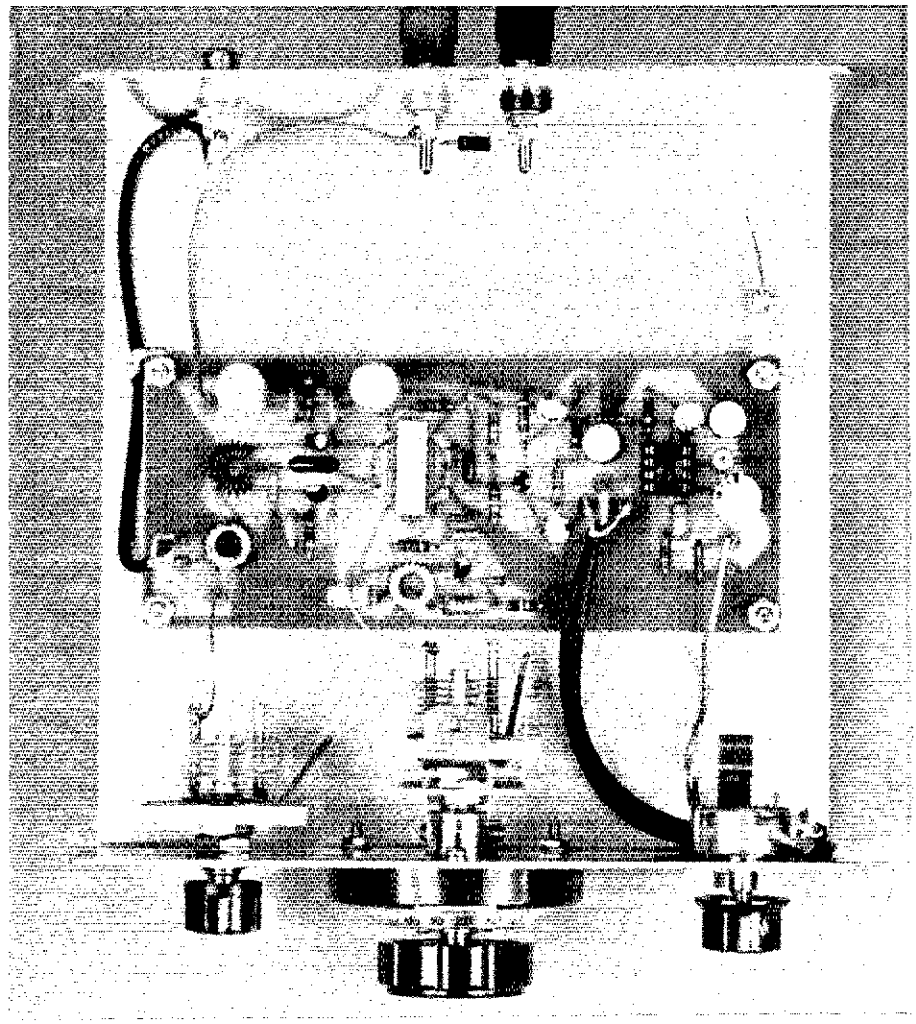
more appropriate for cw work can be had by increasing C7 to 0.02 or 0.047 μF.

As we mentioned earlier, one other area of compromise in many dc receivers is the BFO. Since most design criteria call for simplicity of design, a BFO buffer is seldom used. In many receivers this omission results in excessive frequency drift. For optimum stability the designer must carefully choose the frequency-determining components and pay particular attention to the manner in which power is extracted from the circuit.

The BFO circuit shown in Fig. 1 is very stable, drifting only a few tens of hertz from a cold start. Also, the oscillator does not pull when the preselector is peaked or when strong signals are being received — an inherent problem with some circuits. Many designs have the output taken through a small-value capacitor connected



amplifier transistor, 500 mW, 2N2222A or equiv.
T1 — 10-kΩ to 2-kΩ ct. Stancor TAPC-35, UTC/TRW SO-8.
U1 — Audio-amplifier IC, LM-386 (National Semiconductor).



Inside the dc receiver. Note that D3 is mounted directly across the power supply binding posts. Also, an IC socket is used for U1 to simplify replacement should that be necessary.

to the gate of the FET, a point of very high impedance. Oscillator stability can be improved by removing the necessary energy from the source — a somewhat lower impedance point in the circuit. Polystyrene capacitors and a Zener-diode regulator both go a long way in helping the oscillator "stay put."

Construction

The majority of the circuit components are mounted on a circuit board that measures 2-1/4 × 5-1/4 inches (57 × 133 mm). The foil pattern and parts layout information for the board are shown in Fig. 2. Components not on the circuit board are mounted directly on the front or rear apron, with the exception of the main tuning capacitor. Since a vernier dial is used for this control, the capacitor must be mounted back one-half inch or so from the front panel. A small, L-shaped bracket was fashioned from a piece of scrap aluminum for this purpose.

All rf wire runs, except those to the variable capacitors, are made with RG174/U miniature coaxial cable. The short lengths of wire to the variable capacitors are ordinary, solid hookup wire. Connections to the headphone jack and power supply binding posts are made with covered hookup wire. A piece of aluminum bent into the form of a "U" is used to house the receiver. Its dimensions are 5-3/4 × 2-1/2 × 6 inches (146 × 63.5 × 152 mm).

Alignment

The receiver is designed to tune the entire 20-meter band. Only one adjustment is required, and this involves setting the BFO to the proper frequency range. Several different methods of alignment can be used. If a calibrated signal generator or transmitter is available, simply couple a very small amount of energy (through a one- or two-turn coupling loop) to the antenna terminal. Set the main tuning capacitor for full mesh, and adjust the vernier dial so it reads "0." With the frequency of the transmitter or signal source set to 14.000 MHz, spread or compress a few turns of L6 (near the ground end) with an insulated tool. As this is done the signal should be heard in the headphones. Careful adjustment of the turns will allow the received signal to be placed exactly on frequency.

If a calibrated receiver is available the adjustment can be made in a different manner. Couple a small amount of energy from the direct-conversion receiver BFO to the calibrated receiver by means of a piece of wire placed in the vicinity of the BFO. While listening on the calibrated receiver at 14.000 MHz, adjust the turns of L6 as outlined above until the BFO signal is heard. This completes the alignment of the receiver.

For the builder who wishes to use this receiver on bands other than 20 meters a few simple modifications will be required. Appropriate changes of the preselector and in the frequency-determining components of the BFO will allow the receiver to work on any of the hf bands. Oscillator stability on the higher bands will likely be degraded compared to 20 meters, although it may be suitable for portable operation.

It is interesting to note that when K1ZZ took the receiver home for a shakedown, the first signal he copied in the phone portion of the band was SMØAGD/S2 in Bangladesh, which he promptly worked for a new country. Everyone should have such luck!

The State-Variable Filter

With a single filter network, your receiver can have low-pass, high-pass, band-pass and notch-filter responses simultaneously. Prescribe one for your station now! The facts and figures are here!

By Howard M. Berlin,* W3HB

In a previous article[1] I presented the design of multiple-feedback active filters. Using a single operational amplifier, I illustrated how the basic multiple-feedback circuit could be used to establish low-pass, high-pass or band-pass audio filters suitable for cw and ssb reception.

There are several disadvantages or limitations in designing multiple-feedback active filters, however. Two of the major drawbacks are to be mentioned. The Q of a multiple-feedback, band-pass filter is generally limited to the range of 10 to 15. In addition, because of the interrelationships between the five frequency-dependent resistors and capacitors, it is difficult to smoothly change the filter center or cutoff frequency easily without changing other parameters, such as the damping factor and passband gain.

The State-Variable Filter

To overcome the two points just mentioned, we can use a state-variable filter, which is also called a universal filter. As shown in Fig. 1, such a filter is made up of several different functions. These consist of one summing block, two identical integrators, and one damping network.

Because of the manner in which these functional blocks are connected, we are able to have simultaneously the following filter outputs — a second-order low-pass filter, a second-order high-pass filter, and a single-pole band-pass filter. For this type of filter, the cutoff frequencies of the low-pass and high-pass responses are the same, and, in turn, are equal to the center frequency of the band-pass response. In addition, the damping factor is the same for all three responses. However, to do all of this, three operational amplifiers are required as compared with a single op-amp for the multiple-feedback design.

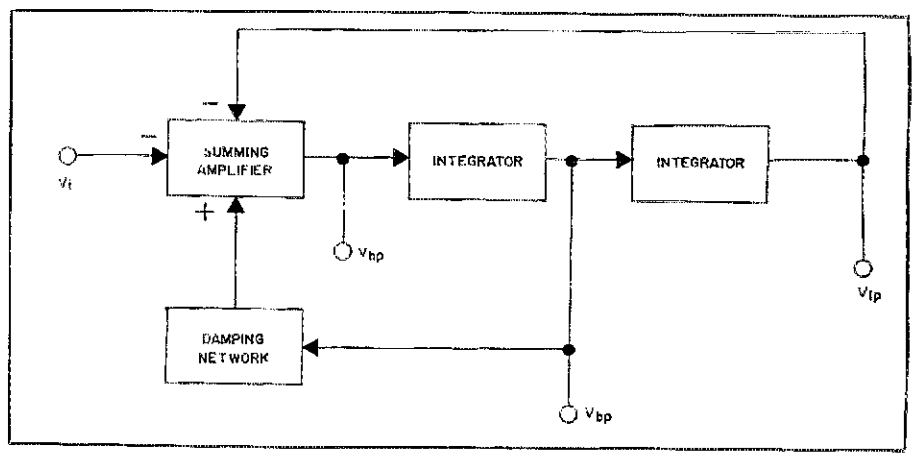
The Three Op-Amp S-V Filter

As shown in Fig. 2, a circuit using three operational amplifiers replaces the block diagram of Fig. 1. U1 is the summing block (really a difference amplifier) for the input, low-pass and band-pass signals. In series with this summing block are two identical op-amp integrators, U2 and U3, which determine the filter cutoff frequency f_c, and the center frequency f_o by the formula:

$$f_c \text{ or } f_o = \frac{1}{2\pi RC} \qquad \text{(Eq. 1)}$$

The damping network is composed of

Fig. 1 — State-variable filter block diagram.



*519 Dougfield Rd., Newark, DE 19713
[1]References appear on page 16.

resistors R_A and R_B. Depending on the value of the filter damping factor α, the following relationship holds

$$R_A = \left[\frac{3}{\alpha} - 1\right] R_B \qquad \text{(Eq. 2)}$$

This relationship *in no way affects the cutoff or center frequency of the filter.* For both the low-pass and high-pass outputs to exhibit a second-order Butterworth, or "maximally flat" passband response, the damping factor must equal 1.414, which is the same as a Q of 0.707, inasmuch as $\alpha = 1/Q$.*[2]

When we make the damping factor equal to 1.414, however, the response of the band-pass output suffers terribly since the Q is 0.707! On the other hand, if we have a Q of 10, the damping factor for the low-pass and high-pass responses is 0.1, which is definitely not a Butterworth response. *Consequently, there is no possibility of obtaining optimum performance with all three outputs simultaneously, and we have to compromise. We then design either for a second-order Butterworth low/high-pass response* (Q = 0.707), or for a high-Q, band-pass response (Q < 500).

Using the circuit of Fig. 2, the low-pass and high-pass responses will both have a passband voltage of 1.0 (unity), so that

$$\frac{V_{LP}}{V_i} = -1 \text{ for } f < f_c \qquad \text{(Eq. 3)}$$

$$\frac{V_{HP}}{V_i} = -1 \text{ for } f > f_c \qquad \text{(Eq. 4)}$$

The minus sign in Eq. 3 and Eq. 4 tells us that the output signal for both the low-pass and high-pass responses, in the passband, is inverted with respect to the input signal, or has been subjected to a 180° phase shift.

For the band-pass section, the voltage gain at the center frequency will be numerically equal to the filter Q, or

$$\frac{V_{BP}}{V_i} = Q \text{ at } f = f_o \qquad \text{(Eq. 5)}$$

and the band-pass output signal will be in phase with the input.

Because there are only two components required to determine the cutoff or center frequency (Eq. 1) of the filter, we can use the simple graph of Fig. 3, which utilizes standard resistor and capacitor values.

The above equations are applied in the design of a unity-gain, second-order, low-pass or high-pass Butterworth filter with a cutoff frequency of 700 Hz. From Fig. 3, we see that the best combination for R and C is R = 6800 ohms and C = 0.033 μF. For a second-order Butterworth response, the Q must be fixed at 0.707 and from Eq. 2, R_A must be 1.12 times R_B. By selecting R_B equal to 2700 ohms, then R_A may be considered to be 3000 ohms with the use of 5 percent resistors. As another

*The parameter α is referred to as the "damping factor," and is numerically equal to 1/Q.

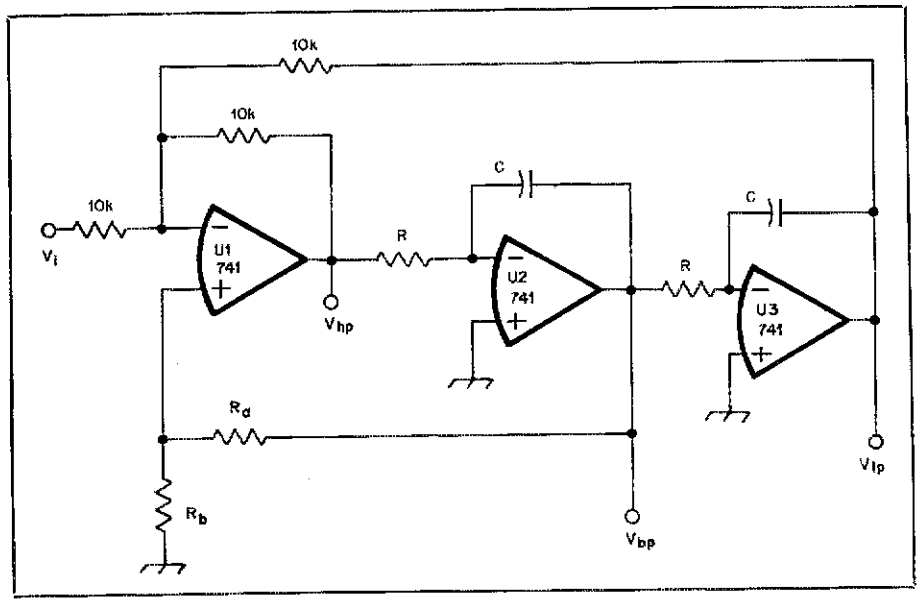


Fig. 2 — Basic unity-gain, state-variable filter employing three operational amplifiers. Linear integrated circuits U1-U3 are general-purpose operational amplifiers such as Texas Instrument type μA741. Resistors are 1/4 watt.

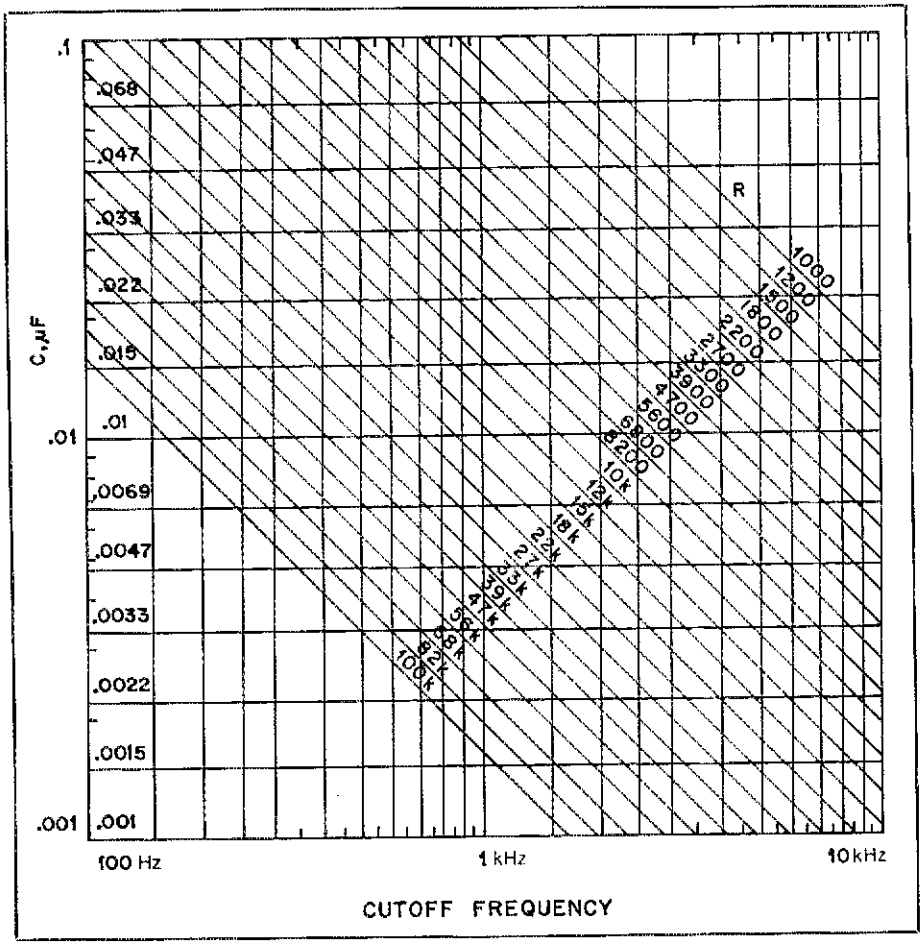


Fig. 3 — Graph for determining values of R and C.

example, suppose we are interested in designing a 700-Hz band-pass filter with a Q of 50. Well, everything remains the same except R_A and R_B. Again applying Eq. 2, R_A must now be [(3) (50) − 1] or 149 times that of R_B. By using a 1000-ohm resistor for R_B, we can then use a 150-kΩ resistor for R_A, which is close enough for practical purposes.

An S-V Notch Filter

One very nice feature of the S-V filter is that we can simultaneously add the low- and high-pass outputs equally to obtain a notch or band-reject filter. For the notch filter, what is needed is a dual-input, summing amplifier with equal gains, similar to the one shown in Fig. 4.

As an example, we wish to design a 600-Hz notch filter with an approximate Q of 100. From the graph of Fig. 3, we can determine the appropriate values of R and C, so that R = 27 kΩ and C = 0.01 μF. Then, from Eq. 2, R_A is 299 times R_B. If R_B is chosen to be 1000 ohms, then R_A is 300 kΩ resulting in the final circuit of Fig. 5.

Simple, economical and effective well describe the S-V, a single network that simultaneously has the capability of providing low-pass, high-pass, band-pass and notch filtering. Indeed, it is truly a universal filter! QST

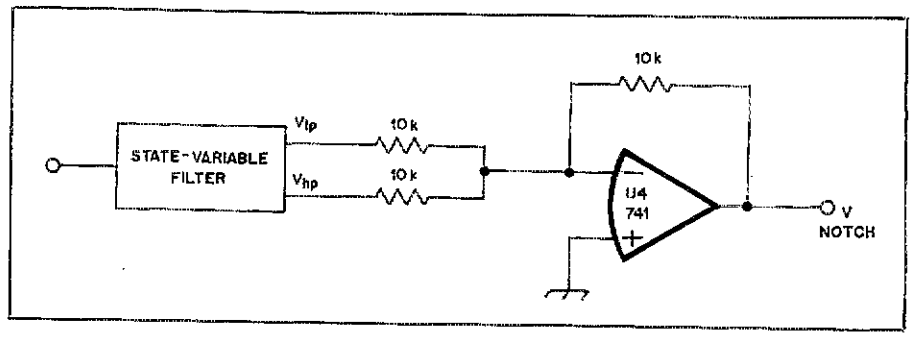


Fig. 4 — Formation of a notch filter by addition of a summing amplifier. U4 is the same as U1-U3.

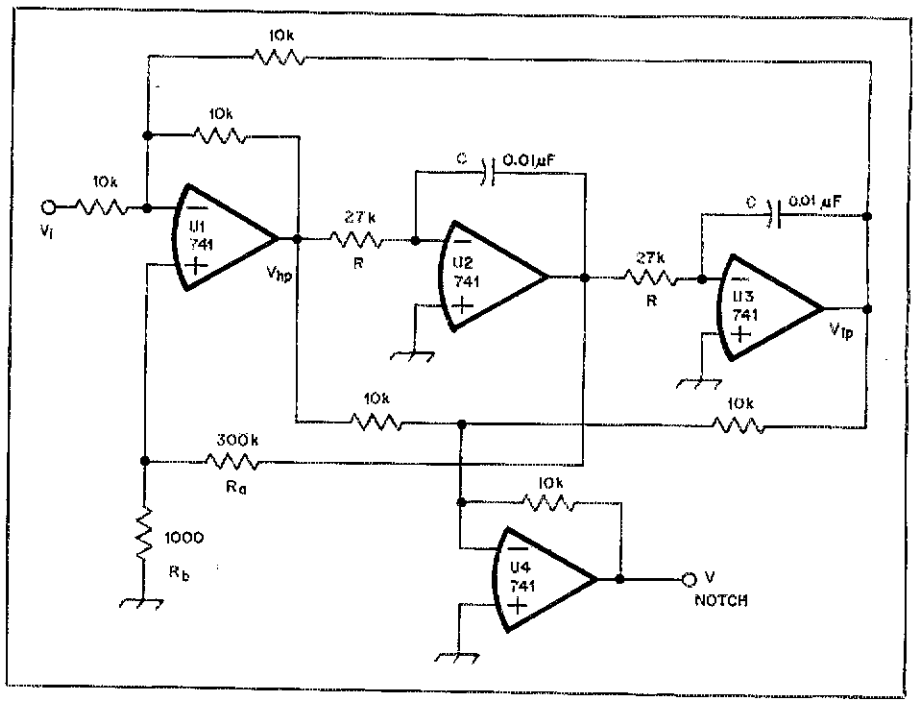


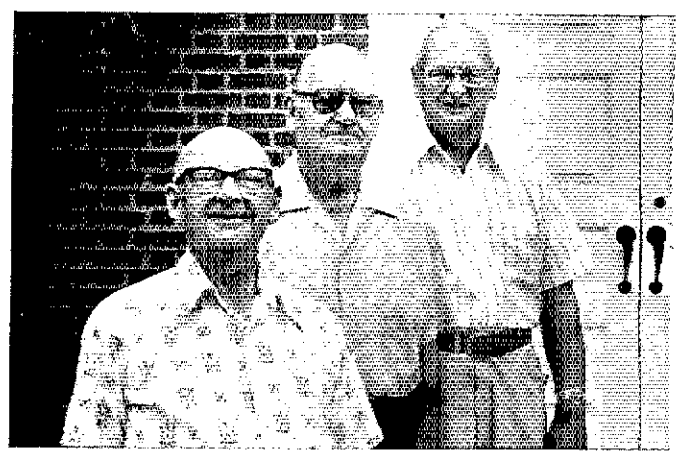
Fig. 5 — Completed design of a 600-Hz notch filter with a Q of 100.

References

'Berlin, "Design Your Own Active Audio Filters," *QST*, June, 1977.
'Berlin, *The Design of Active Filters, with Experiments*, E & L Instruments, Inc., Derby, CT, 1977.

Strays

R. H. G. Matthews (right), ex-9ZN and Bruce Kelley (left), W2ICE, were well qualified to discuss the merits of an early C.R.L. receiver at the recent National Historical Radio Conference in Dearborn, MI. "Matty," an ARRL director in the early '20s and again in the mid '30s, manufactured the receiver. Bruce is the curator of the Antique Wireless Association Museum in Holcomb, NY. — *W1DX*



Gathering in front of the York (PA) Chapter, American Red Cross, these three amateurs represent 154 years of amateur radio experience: (l-r) Paul L. Stumpf, W3AQN, 50 years; Albert E. Gibson, Jr., W3ABN, 51 years; and Edward J. Dillmeir, Jr., W3LMA, 53 years. All are still active on the air and in the York ARC.

Collecting a Ham's Tools of the Trade

Use your knowledge, test gear and calculator as ham "tools," but don't forget that a good set of hand tools is also necessary. If the contents of your toolbox look like leftovers from a scavenger hunt, consider purchasing these essentials!

By Jim Bartlett,* WB9VAV

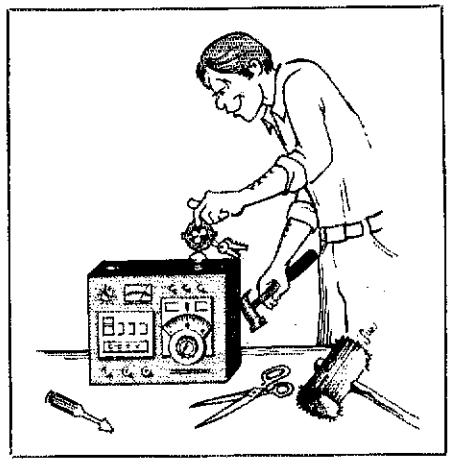
As I poked my head through the door of my friend's ham shack recently, John greeted me with the familiar "howzit-goin?" I had begun to expect.

Sidestepping the rat's nest of wire on the floor, I entered the room as John fished his key ring from his pocket. He proceeded to tighten the last screws on his latest project with his "lucky charm" pocket screwdriver. "Whew, all done!" he beamed as I approached the workbench. Strewn across the bench top were John's "tools" for electronics: the kitchen scissors, an ice pick, and numerous other items, all looking only remotely like the tools I was accustomed to using. Not that John couldn't afford the *right* tools for the job, he probably never discovered the idea of using *real* tools instead of "make-dos." So this is for John, and those of you who, like John, are still "making do!"

When a new ham first joins the ranks after having spent time previously as an audio buff, SWL or certified tinkerer, he soon finds that, as a ham, he must do a considerable amount of "tinkering and fidgeting" with his equipment to become fully accepted and respected by his fellow radio operators. Along with this required activity comes the need for certain tools to make the task easier. Let's look at the more common tools first.

A soldering iron, a pair of needle-nosed pliers, diagonal cutters, and a screwdriver make up the most basic tool kit for the ham. Of course, you can purchase many other "more advanced" tools, but for now let's consider those to be accessory and luxury items; the ones listed above are *essential*!

If any of you have had the misfortune of having to replace broken tools, you will agree that the old proverb, "You only get what you pay for," is good advice! So remember, buy the best tools you can afford, and buy them *as you need them* instead of trying to cover every square inch of pegboard with goodies on your first trip to the store! Do some shopping. A number of excellent brands are available; some manufacturers offer lifetime guarantees on tools and replace them when they break.



John pulled out his "lucky charm," four-way pocket screwdriver and began tightening the last screws.

Numero Uno

Probably the most used (and abused) tool in the ham's workshop is the soldering iron. This hot little number comes in configurations ranging from miniature pencil and cordless battery-operated types, to the larger "guns" and monster irons notorious for their secret use as cigarette lighters and for the large scorch marks they leave as signatures on workbenches. For all-around radio work, however, a 40-watt pencil type is probably the best choice. Though large enough to handle joints of heavy gauge wire, it won't cause copper pads to separate from pc boards if you're careful. The soldering technique won't be discussed in this article, as that subject is well-treated in other ARRL publications. However, you should remember that a heat sink attached between a sensitive component and your 40-watt iron will protect the device from heat damage while soldering. Fig. 1 shows several types of soldering units and accessory items.

If you've ever fried your fingertips while juggling five wires, solder and iron, all at the same time, you know what it's like not to have needle-nosed pliers. Although probably dozens of different types of pliers are in use today, the most useful to the ham is the needle-nosed variety. Despite their nasty-looking appearance, they can really be quite friendly as long as you keep your flesh out of their jaws! (This is not always as easy as it sounds!)

When you shop for this tool, keep in mind the size of the parts you work with. Many times the impulse is to buy a large pair of pliers that fit your hand rather than a small pair that would be more suited to electronics. Going back to tool quality for a minute, when shopping for pliers, you should check the "bite" and alignment of the jaws for proper fit. A good pair of pliers will grip evenly from front to back and side to side. One way to examine a prospective purchase is to hold it up to the light and look for places where the light sneaks through. Let's face it, some tools are going to be better than others, and you might as well have the best you can find! (If light sneaks through, so could thin component leads.)

Needle-nosed pliers also come in two versions — with or without a wire cutter on the side. The prices are about the same, and since the wire cutters can come in handy and save you time, the pliers *with*

*Basic Radio Editor, *QST*

Fig. 1 — In this photo (l-r) are a pencil-type iron with stand, a soldering gun, and a large iron with cradle. Near the bottom of the photo are a solder sucker, vacuum bulb, soldering tool and 60-40 solder.

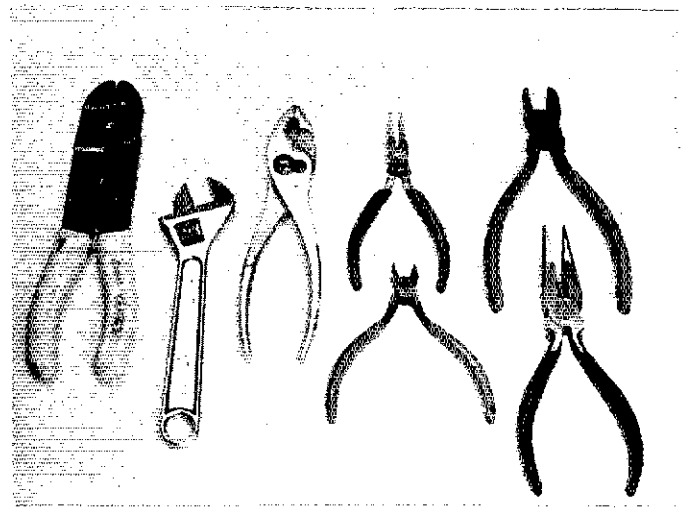


Fig. 2 — Shown here are (l-r) wire strippers, adjustable wrench, adjustable pliers, small set of diagonal cutters (dikes) and needle-nosed pliers, larger set of diagonal cutters and needle-nosed pliers.

the side cutters are probably the better buy. See Fig. 2.

Cutters and Strippers

Another tool you can "quality check" with the light-bulb technique is a pair of diagonal cutters, sometimes known as "die cuts" or just "dikes." These jewels are indispensable when you are nipping off protruding wires and leads from a soldered pc board. They can also function as miniature bolt cutters if you don't mind their getting dull. Again, try to resist the urge to buy the largest pair. Settle instead for the more dainty variety if you plan to do a lot of circuit-board work. With one exception, your diagonal cutters can also double as wire strippers. In fact, with practice, you may find that they can be used as skillfully as bona fide strippers. The exception is Teflon-covered wire. When stripping wire coated with Teflon, you must use regular strippers or a knife because of the toughness of this insulation.

Screwdrivers

If you're like most hams I know, you've probably dreamed of owning all the necessary sizes of screwdrivers in both regular-blade and Phillips-style tips. With these, you could rule supreme — and no screw, large or small, would escape your grasp! Fortunately, several types of interchangeable-shaft screwdriver kits offer a reasonable economic alternative. You just pick the right blade for the job, and pop it into a common handle, thus giving the effect of having separate tools. This system of sharing a common part not only makes the kit less expensive than individual tools, but also makes it more compact and easier to fit in the tool box. For those screwdrivers you use most frequently, you may want to purchase separate tools of good quality to eliminate having to change screwdriver shafts in the middle of a delicate operation. (You wouldn't want to lose your patient!) Fig. 3 shows several options you can take in purchasing your screwdrivers.

Expanding Your Capabilities

These tools are essential for the beginning ham's toolbox. However, many other tools can make the difference between simply repairing or converting ham gear, and actually *building!* Ironically, these are the more destructive tools: those which cut, punch, rip, bore holes in, or otherwise make mincemeat of those shiny new chassis boxes.

For many years the electric hand drill was considered an expensive luxury by a number of hams. Today the prices are quite attractive. This is especially true when the prospective builder visualizes the hundreds of pin-sized holes that must be drilled in an individual pc board. It wasn't like that in the days of point-to-point wiring. Today, without an electric drill the builder is destined to a world of broken bits and frustration. This is not to say that a hand-crank drill isn't a wise investment; in fact, many times it can be a lifesaver! But in the long run, a 1/4- or 3/8-inch electric drill is hard to beat.

Good drill bits are just as important as the drill itself. In fact, it is usually helpful to know what type of bits are going to be used *before* buying the drill. Why? Because drills vary, and one thing that doesn't stay constant is the drill-bit holder, or *chuck.* For the average guy who's only using 1/8-inch bits and larger, this shouldn't present a problem. But for the ham who builds lots of circuit-board projects, a chuck that doesn't squeeze down narrow enough to clamp a no. 60 drill bit firmly just won't do the job. (I didn't find out that my drill wouldn't hold a no. 60 bit until a year after I had purchased it!) If you want to be sure that your new drill will accommodate small-size drill bits, take along your smallest bit when you go shopping. You may find that very few 3/8-inch drills will handle a no. 60 bit. But if you can find one that *will* take a no. 60, get the 3/8- rather than a 1/4-inch drill. That way you can also get some good-sized (half-inch or larger) bits with reduced shanks into the chuck.

Once you start drilling holes you'll find that drills leave burrs and sharp edges behind, and sometimes the hole you drill isn't quite large enough to clear the part to be inserted. Here's where a reamer and a couple of rat-tail files come in handy! A reamer is a conical tool with cutting edges down the side. It can be twisted into a hole by hand or inserted into the drill chuck and used as a large drill bit to remove burrs, enlarge holes, and smooth rough edges easily. Rat-tail files can help with very small and very large holes by rounding off sharp edges and filing notches or clearance grooves in chassis boxes when necessary. Fig. 4 shows a drill, drill bits, reamer and other metal-working tools.

With some oversized drill bits, an electric drill, and a reamer, you can cut holes up to about an inch with ease. And if your poor aluminum chassis box doesn't die from these gaping wounds, you can finish it off by chopping out a two- or three-inch hole and inserting a panel meter. This can be easily accomplished using chassis punches, or a "nibbling tool." See Fig. 5.

Chassis punches are really big artillery, and thus cost big dollars! But if you find yourself hacking out the same-size holes week after week, the investment might be worth it. Chassis punches can punch square or round holes anywhere from about 1/2 inch to over three inches in diameter. They consist of two pieces that fit one inside the other, and a bolt used to pull the two together. A small hole is

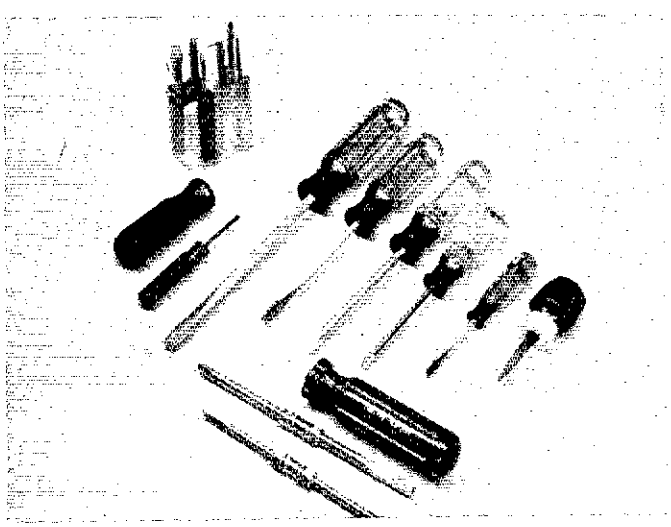


Fig. 3 — Several options are available to the ham who is purchasing screwdrivers. Shown here are two types of "kit-type" screwdrivers, and a standard set of individual tools.

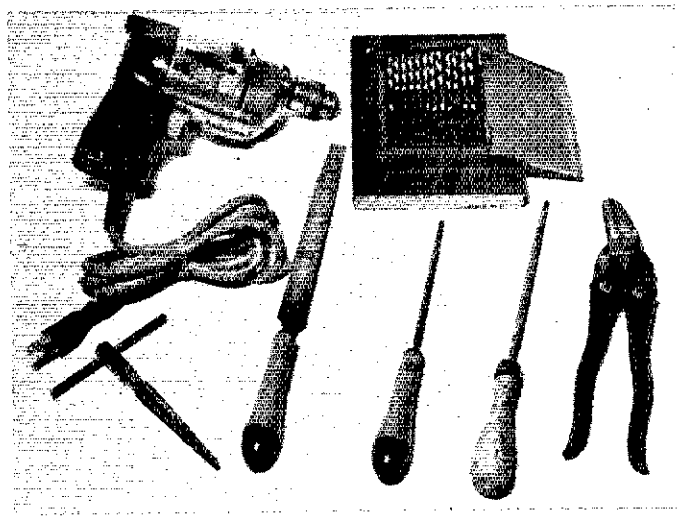


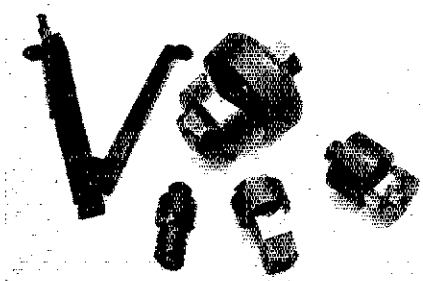
Fig. 4 — A 3/8-inch drill capable of clamping very small bits is a desirable tool if you plan to work on pc boards. Also shown below the drill and bits are (l-r) reamer, files and sheet-metal shears.

drilled in the chassis first. Then the bolt is pushed through one side of the punch, inserted in the hole, and the other punch half is attached. The two halves are then pulled together by turning the bolt until they cut through the metal between them.

If buying a separate punch for each size of hole sounds like an expensive proposition, you're absolutely right! But there's still another way to knock out those mammoth holes in a professional manner: the nibbling tool. This gadget is probably one of the handiest items to have around, if building is your bag. It can be used to chop holes of any size or shape in aluminum, copper or thin-steel sheet metal — even pc-board material. To use a nibbler, you must first drill a small starter hole. Then the tool is inserted through the hole and small bits of metal or material can be cut out piece by piece by squeezing the nibbler's handle.

In addition to the tools already mentioned, there are others which can save you time and money if properly used. Some are items that you most likely have around the house, and others are simply accessories and "niceties." The household items include a hacksaw, hammer, ruler, scribe or pencil, and pocket knife. The accessory items fall into several groups, the first being those used with the soldering iron.

Fig. 5 — With a nibbler and an assortment of chassis punches, you could cut holes of any size or shape in aluminum stock. Shown here are a hand nibbler and several sizes of chassis punches. Note the different shapes of holes these punches can cut out.



Many good joints can be made using just a soldering iron and a roll of 60/40 solder, but there will be times when you'll want to reverse the process. Several items can make desoldering a more pleasant operation. See Fig. 1. A cheap method of removing molten solder is to apply Solder Wick or a similar substance to the joint while heating with your iron. The wick is made of braided wire, similar to the braided shield around coax, except that it is flat. It "attracts" or actually absorbs solder when placed on top of a heated solder joint. When all of the wick becomes completely saturated with solder, it is discarded, and a new supply purchased. (Sometimes the old wick can be used for common bus strips in breadboard projects.)

When larger quantities of solder must be removed from a joint or from a pc-board foil, a solder vacuum bulb, or solder sucker is probably more expedient. These devices quickly apply a strong vacuum to a hot solder joint, and pull the molten metal from the connection.

Tuning tools are indispensable if you plan to do any tuning of i-f cans, slug-tuned coils, and the like. Fortunately, they are also quite inexpensive and can be purchased in kits or individually. Most tuning rods have stepped ends which will fit several sizes of slugs, and some wands will even count the number of turns as the rod is twisted.

One last invaluable accessory tool is the Vise-Grip pliers. These pliers allow you to clamp any part, small or large, tightly and quickly for drilling, painting, grinding, soldering, or what have you.

To review the tools discussed so far in this article, see the list in Table 1. Of course, many other tools can be useful to the ham, but those described here should prove to be more than adequate for most jobs the newcomer encounters in his "fidgeting."

Recommended reading for the beginner are the "Construction Practices" chapter in *The Radio Amateur's Handbook*, and the chapter on "Workshop and Test Bench" in *Understanding Amateur Radio*. These describe in detail such things as care of tools, chassis working, circuit-board etching, and soldering. QST

Table 1

Recommended Tools

Soldering iron — 40-watt pencil type.
Solder — use 60/40 rosin-core solder only.
Needle-nosed pliers.
Diagonal-cutting pliers.
Screwdriver set (interchangeable blades).
Screwdriver — regular blade tip, 3/16 inch.
Screwdriver — Phillips tip.
Electric drill — 3/8- or 1/4-inch chuck.
Drill bits — from no. 60 to 3/8 inch, various sizes.
Hand reamer with T handle.
Rat-tail files, small and medium (triangular and flat files useful also).
Chassis punches — buy only as needed!
Nibbling tool.
Hacksaw — with metal working blade.
Hammer — Ball-peen, one-pound head.
Ruler — metal edge is best.
Scribe or pencil.
Pocket knife (Boy Scout or similar).
Solder Wick or similar material.
Vacuum bulb or solder sucker.
Tuning tools — buy as needed, or in kit.
Vise-Grip pliers.
*Nut drivers.
*Adjustable wrench.
*Center punch.
*Combination pliers.
*Stripper-crimper pliers.
*Channel Loks pliers.
**Emery cloth, electrical tape, cement.

Items with * are not mentioned in article text, but are additional tools that may be of use to the ham. Items with ** are shop materials.

Frequency Memory for Receivers with Digital Readout

If you're tired of trying to remember the operating frequency you've departed from while you temporarily scan the band, read this suggestion! Let your digital display be your memory, and give that old "noggin" a rest.

By Wes Hayward,* W7ZOI

Does your communications receiver use digital frequency readout in place of a mechanical dial? Among the numerous advantages of digital display is excellent resettability. This is of great advantage to the DXer or contester. He can return exactly to the frequency of a station with relative ease. There are, however, some operational problems. With a simple digital readout it is necessary for the operator to note the frequency of a station, either mentally or on paper, before tuning away from the frequency where the receiver is set.

A convenient feature for a receiver would be a "memory" switch on the front panel. If a frequency is to be "remembered," the switch is activated and a departure from that frequency is electronically displayed. This would be analogous to a memory in a pocket calculator. Ultimately, one can envision receivers that use frequency synthesizers under microprocessor control. With such a system a large number of frequencies could be "remembered." Pushing a recall button would automatically retune the receiver to the desired frequency. A system with this versatility must be designed with such features in mind from the beginning. The memory described here can be added to many existing receiver readouts.

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

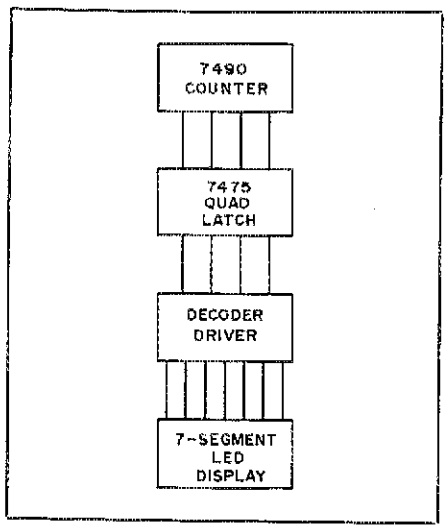


Fig. 1 — One decade of a typical digital frequency counter.

Some Details

Shown in Fig. 1 is one decade of the typical digital counter used in a receiver. There will be one such block for each digit of front-panel display. The frequency counting is performed with a decade divider such as the SN7490. The BCD output of the counter is applied to a quad latch, typically an SN7475. This is a memory element. When the control lines to the latch are high, whatever information present at the input is transferred to the output. A low input to the control line causes the last information presented to the input (when the control line was high) to be remembered and be presented at the output. Four of these elements are contained in the 7475 package. The BCD output of the latch is applied to a decoder driver that, in turn, drives the seven-segment LED display.

Shown in Fig. 2 is a simple memory system that has been added to the writer's receiver.[1] The key to this system is the exclusive-OR gate. This component is remarkably versatile for the digital designer. The output of the exclusive-OR gate will be high if one of the two inputs is also high. However, the output will be low if both inputs are low or if both are high. The truth table of the exclusive-OR gate can be paraphrased by stating that the output will be high only when the two inputs are *different*.

With reference to Fig. 2, the output of an existing latch is routed to a second quad latch, U1. When switch S1 is closed, all information present in the latches prior to switch closure is remembered. The binary outputs and inputs to the latch are compared in an SN7486 quad exclusive-OR gate, U2. Any difference, which would result from tuning the receiver to a different frequency, produces a high out-

[1]Hayward, "A Competition-Grade CW Receiver," in two parts, *QST*, March and April, 1974.

put at one or more of the output pins of U2. The four outputs of the 7486 are applied to U5A, half of a dual 4-input NOR gate (SN7425). This yields a low output whenever any frequency difference occurs. The low output turns on a small light-emitting diode. The diode is mounted just above the corresponding seven-segment readout digit.

In the writer's receiver, memory was applied only to the two right-hand digits. The complete circuit is shown in Fig. 2. While it would be handy to have an error indicator for the third digit, this would have added to the complexity and cost. It was necessary to add only five ICs to the existing system.

Fig. 2 shows just one method of implementing a memory. There are many other techniques that could be used. A second set of display elements could be activated to record the "remembered" frequency. Alternatively, binary word comparators (SN7485s) could be used instead of the exclusive-OR gates. This would allow LEDs to be activated that would inform the operator if the receiver was tuned above or below the remembered frequency. While separate LEDs have been used to indicate a frequency change in the writer's receiver, other indication methods could be used. For example, the intensity could be reduced on digits where an error exists.

The author has used this memory for routine hf communications. However, a number of other applications are suggested. The system would be especially useful for measuring Doppler shift in a satellite, active or passive. Of greatest significance, it offers a glimpse at some of the operating features that will be available in equipment of the future.

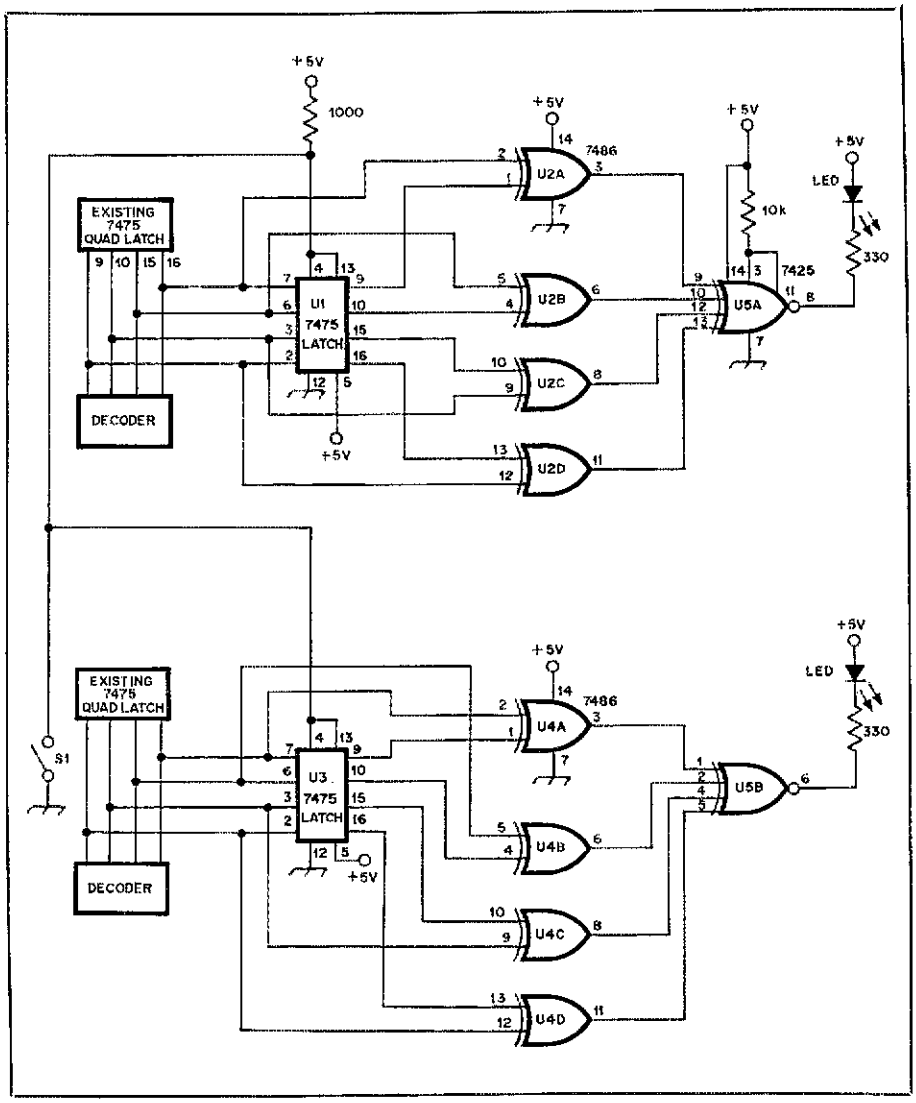


Fig. 2 — Diagram of the simple memory system which the author added to his homemade receiver.

Strays

UNCONFIRMED QSLS

☐ Yacht *Exodus* was lost on a reef off the coast of Santo Domingo on March 16, 1977, and all logs were destroyed. There is, therefore, no way of confirming QSOs from W4AMG/MM, K4DL/MM, OZ1BAA, ZB2CU, 9H3K, K4DL/KV4 and K4DL/KP4 for that period. — *K4DL*

HAMS-SPELUNKERS UNITE

☐ From responses received as a result of my July, 1976, "Stray," I have found these hams who are also spelunkers: WA3DGE, K3OWN, WB4DWP, WB4WBH, K8DOC, WA8QZZ and WB9SIN. I thought I was the only one! — *WB4AZY*

CALL FOR PAPERS

☐ Amateur Computing 78 microcomputer festival will be held July 22-23 at the Sheraton National Motor Hotel, Arlington, VA. Especially welcome will be topics concerning amateur radio applications of microcomputers. Those interested in presenting a paper, participating in a panel discussion, displaying an amateur computer system or sponsoring a tutorial should submit a letter of intent along with a one-page abstract or outline *by April 15* to John Wall Miller, Program Chairman, 6921 Pacific Lane, Annandale, VA 22003, 703-256-5702. Authors will be provided with instructions for preparation of camera-ready papers, which are due by June 1.

Information on Amateur Computing may be obtained by writing AMRAD, P. O. Box 682, McLean, VA 22101.

IT'S THE FIRST

☐ The first ARRL-affiliated club located outside the U.S. and Canada received its certificate of affiliation recently from Brigadier General John Maurer, military community commander at Wiesbaden, West Germany. Aside from sponsoring a Novice class, the club operates DA4FB, a 70-cm repeater. A DXpedition to Liechtenstein (HBØ) and an American-style hamfest are planned for May.

WE'RE ALL OVER!

☐ Teaching English to foreign students at Georgia Tech, Dr. Ed Richmond, W4MGN, was surprised to learn that his students included YV5YA, HI8XIM and HI8GMN. He remembered a 20-meter QSO with the latter because of the similarity of their calls.

ILLUSIONS OF CW

☐ *The Cleveland Press* reports that an amateur in Dallas, TX, started to hear messages at odd times. The sender — a mockingbird perfectly imitating the Morse code rhythm. — *W8FLD*

Go ATV with This Transceiver

Get into the amateur television picture! Operate portable, mobile or airborne with fast-scan TV. Assembly from commercially available parts takes less than an evening and doesn't require paying the king's ransom!

By Henry B. Ruh,* WB9WWM

Many ham operators rationalize their failure to participate in television by indicating a lack of equipment. In prior years such reasoning could be considered acceptable. Recent developments in solid-state products, however, make such rationalization today as weak as jail-house coffee. Now, in this semiconductor age, there is little difficulty in obtaining essential components,[1] nor does one have to worry about putting the arm on a rich uncle to pick up the tab. Why an amateur television station can even be assembled in an evening.

How Sweet Can It Be?

If you have had a latent desire to branch into communicating by television, now is the time to get involved. Based on my experiences, I sincerely believe the best approach is by way of ATV. "What is ATV?" you might ask, provided you are relatively new to ham radio. Let me explain that by recapping the trend in amateur communications.

When widespread interest in television sprouted after World War II, bandwidth technicalities required a split of TV operations in the amateur bands. Slow-scan television (SSTV) is used in the hf bands where interference must be minimized. Fast-scan TV (ATV) is permitted on the bands above 420 MHz where wider bandwidths needed for this mode can be accommodated. This article is concerned with the latter method.

A Converter for Reception

Understandably a station that transmits well but is deficient in receiving for want of a good receiver leaves much to be desired. Efforts by some amateurs to modify the home-TV uhf tuner have proved rather disappointing. Others have geared up homemade devices that failed to live up to expectations. What is the alternative?

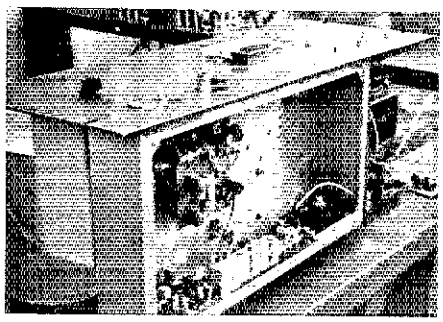
P. C. Electronics, which produces the units one needs for an ATV station, has resolved the matter of providing a means for obtaining excellent reception. The TVC-1 converter, available in ready-made form, is tailor-made for the 439-MHz enthusiast. You simply wouldn't want this device to be more compact than it is. It fits nicely inside a TV set and presents no problem if one wishes to mount it on the antenna.

The TVC-1, sensitive and selective, performs exceptionally well, yet it is an example of simplicity. Performance is enhanced by a commercially manufactured, double-balanced mixer and a voltage-

*Publisher, *Amateur Television Magazine*, Rte. 1, Box 12, Effettsville, IN 47429

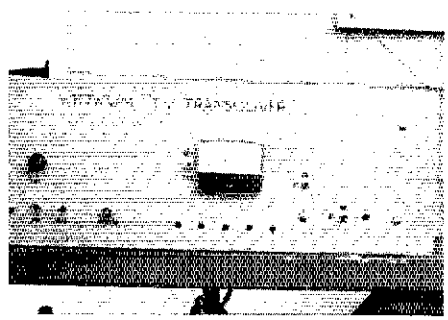
[1]Footnotes appear on page 26.

The front panel and bottom assembly of the ATV transceiver. Nestled in the channel of the back edge of the chassis is the TX-432 transmitter. To the right of the TX-432 is the MHW-710 power amplifier. Above the transmitter are the 4.5-MHz subcarrier audio generator and the agc amplifier as well as the video modulator. The area at the upper right is for the video i-d unit. Note that the TX-432 i-f cans have been soldered on the sides and tops to improve shielding.



Front panel of the nearly finished WB9WWM transceiver. Holes are for the video i-d board controls for positioning the i-d horizontally or vertically, changing the luminescence level from black to white, keying on the i-d, and for setting the sync-triggering level as well as the flash rate.

The Calectro 0-100 mA meter has been recalibrated to work with a Bird power sensor. Range of the scale is 0-16 watts cw.



Top view of the ATV transceiver. The power supply is at the left. A coaxial relay and bird power sensor are near the center of the back apron. The TVC-1 tunable converter has been placed atop a Janel converter box for size comparison. A 12-V regulator chip has been provided for the converter because the main supply furnishes 15 volts to enable the power amplifier to reach full output.

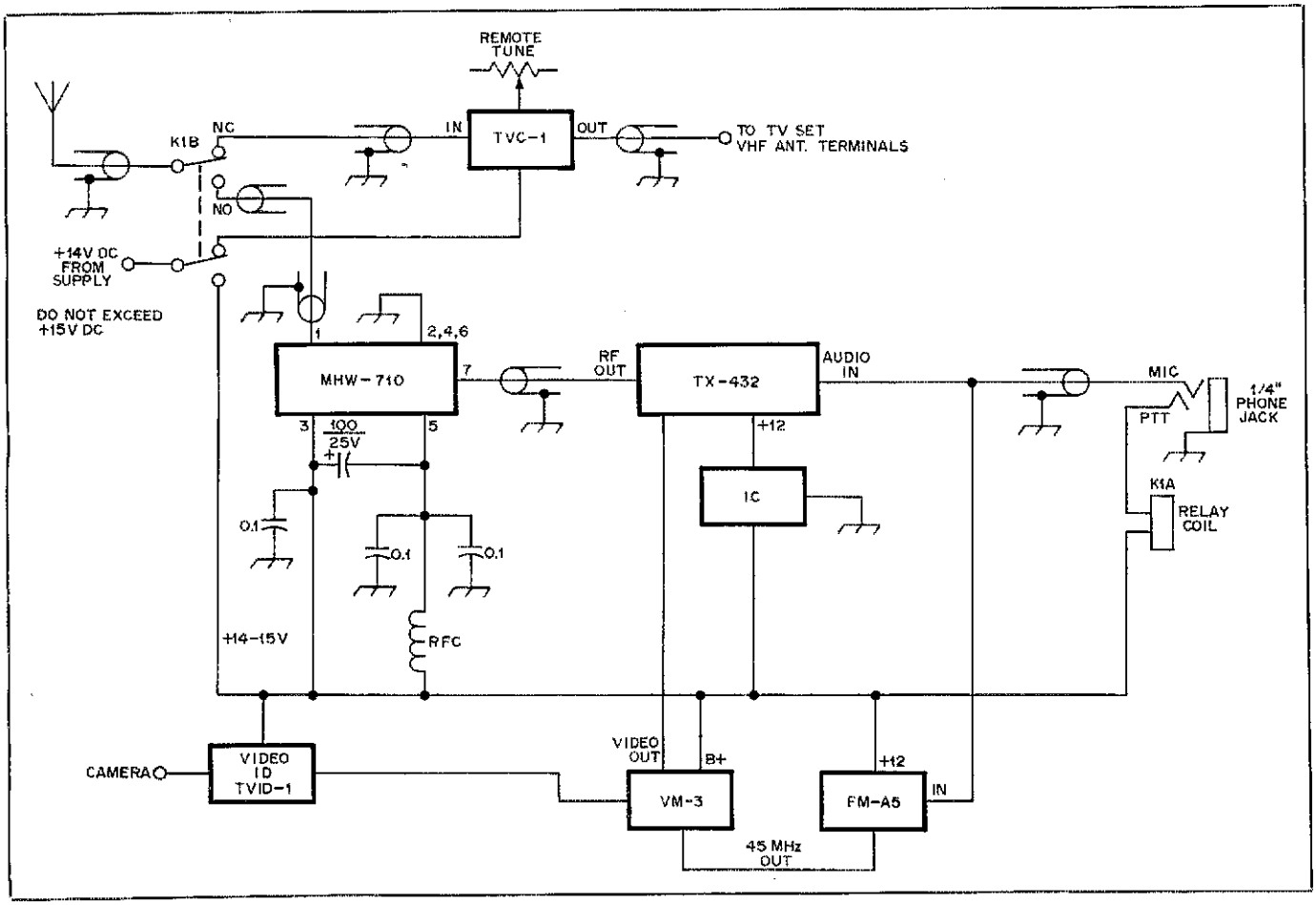


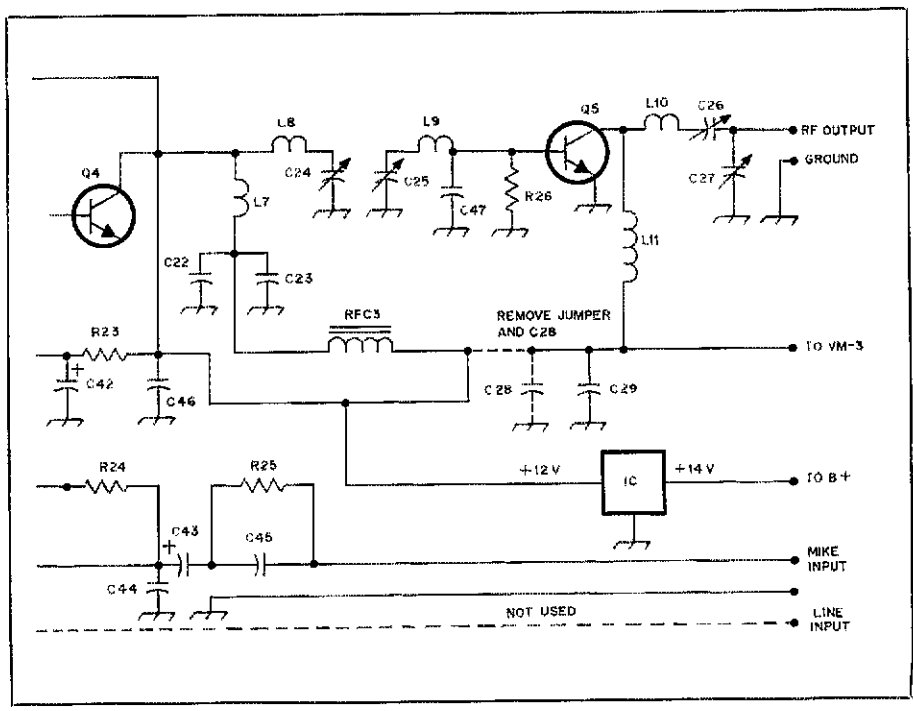
Fig. 1 — Block diagram of the ATV transceiver. Principal units of the circuit are the VHF Engineering TX-432 transmitter. Motorola MHW-710 amplifier, P.C. Electronics TVC-1 converter, VM-3 video modulator, FM-A5 audio subcarrier unit, and video i-d generator. Output of the converter is connected to a standard TV set. The IC is a type 7812 12-V dc regulator.

controlled oscillator that is tuned by a 10-kΩ potentiometer. The latter feature enables the converter to be tuned remotely by a similar potentiometer. Such remote-control operation would be useful if the converter is to be mounted on the antenna or some location apart from the operating position.

One of the goals in designing the TVC-1 was to obtain a high degree of stability. That goal was achieved. The converter would have been unsatisfactory without it. Physically, the TVC-1 components are mounted on a very small pc board. There is a choice of a 50- or 75-ohm input. A coaxial-cable connector is provided for the output on channel 3. The output signal may be fed to an ordinary television set for viewing the picture and hearing the sound. No modification of the TV set is required. Therefore the TV receiver may be used in the normal manner for home entertainment without any inconveniences.

As manufactured, the converter module is supplied pretuned and ready to connect to the ATV system. The TVC-1 should be installed in a shielded chassis or enclosure. Power for the module is to be supplied by

Fig. 2 — Two minor changes are all that need be made to modify the TX-432 transmitter for ATV. C28 and the jumper connecting it with RFC3 are removed. The line input at the lower right of the diagram is not used.



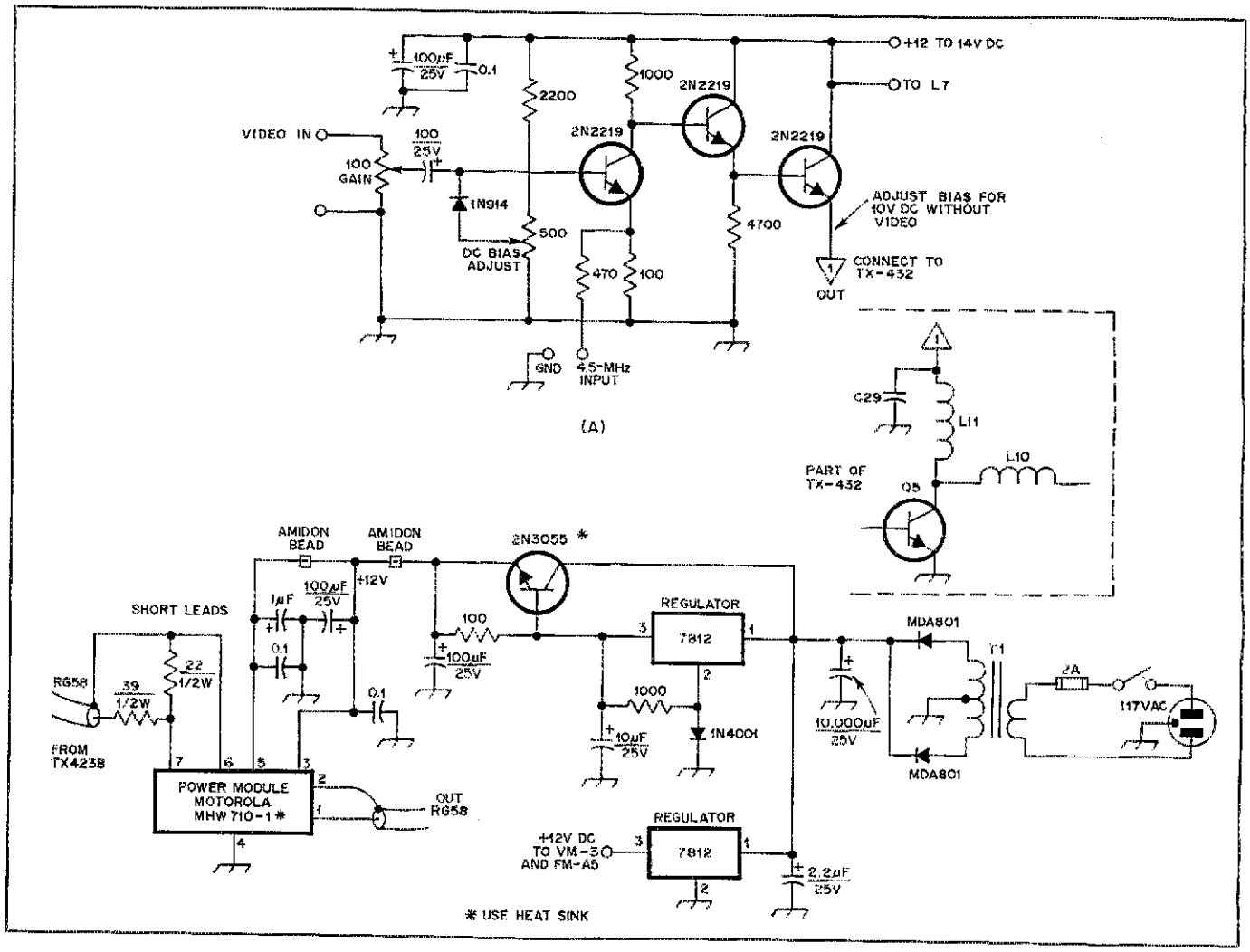


Fig. 3 — The VM-3 solid-state video modulator. The wide bandwidth capability of the modulator enables it to resolve 64 character-per-line signals from TV typewriters and microcomputers. The 3-dB-down point is typically 8 MHz, more than enough for color and sound plus greater resolution than broadcast. The upper portion of the drawing illustrates the modulator circuit. The lower portion covers the power source and the MHW-7-10-1 amplifier. T1 consists of two 25-V ct filament transformers with primaries paralleled and secondaries paralleled. Triad no. F-41X or Radio Shack no. 273-1512 may be used.

a regulated 12-V source. The power supply must be turned off when transmitting.

Special precautions are to be taken when connecting the TVC-1 converter to some TV sets. If the TV receiver does not have a power transformer the TV-set chassis may be "hot" being connected directly to the above-ground side of the 117-V ac line. Such a condition presents a serious shock hazard as well as the possibility that fuses will be blown when the ATV antenna is connected, provided that there is a ground on the antenna system.

Where the television receiver lacks a power transformer, an isolation transformer is *urgently* recommended for installation between the television receiver and the 117-V ac line. A thorough check of the television receiver must be made to determine if a 117-V potential does exist between the chassis and ground before proceeding with the installation.

A length of 50- or 75-ohm cable should be used for connecting the converter to the TV tuner. Remove or unclip the twin-lead at the tuner. The coaxial-cable shield is then connected to one of the antenna terminals. The other terminal is left open.

To adjust the converter, tune the television set to either channel 2 or 3 (whichever is not used locally). Fine-tune the selected channel to minimize any signals from a commercial TV station. Then connect the ATV antenna and swing the converter across the band to locate a nearby ATV station. After the station has been found by tuning with the 10-kΩ potentiometer, fine adjustments are made with C1. When the latter is properly set, tuning will be good for ±10-MHz. For installations where the converter is mounted on the antenna, the 10-kΩ frequency control on the VCO may be replaced by the remote tuning circuit shown in Fig. 4. Use of this arrangement allows the tuning adjustments to be made from the operating position. Shielded cable is recommended for the connection between the VCO and the remote 10-kΩ potentiometer.

Transmitting Equipment

Basic units for transmission of ATV include a video modulator, a sound-subcarrier device, a transmitter and a power amplifier. The VHF Engineering TX-432 and Motorola MHW-710 rf-module power amplifier serve as the rf strip. Both have been adequately described in other articles which appeared in *73* for August, 1976 and in *A-5 Magazine* for March, 1977. The circuits, in articles by Bruce Brown, WB4YTU, are presented here for the convenience of *QST* readers.[2,3]

Video modification of the VHF Engineering TX-432 strip is simple. One capacitor, C28, and the 12-V dc bus jumper to the pad connecting C28, C29 and L11, are disconnected. The strip is supplied with +12 V for all stages except

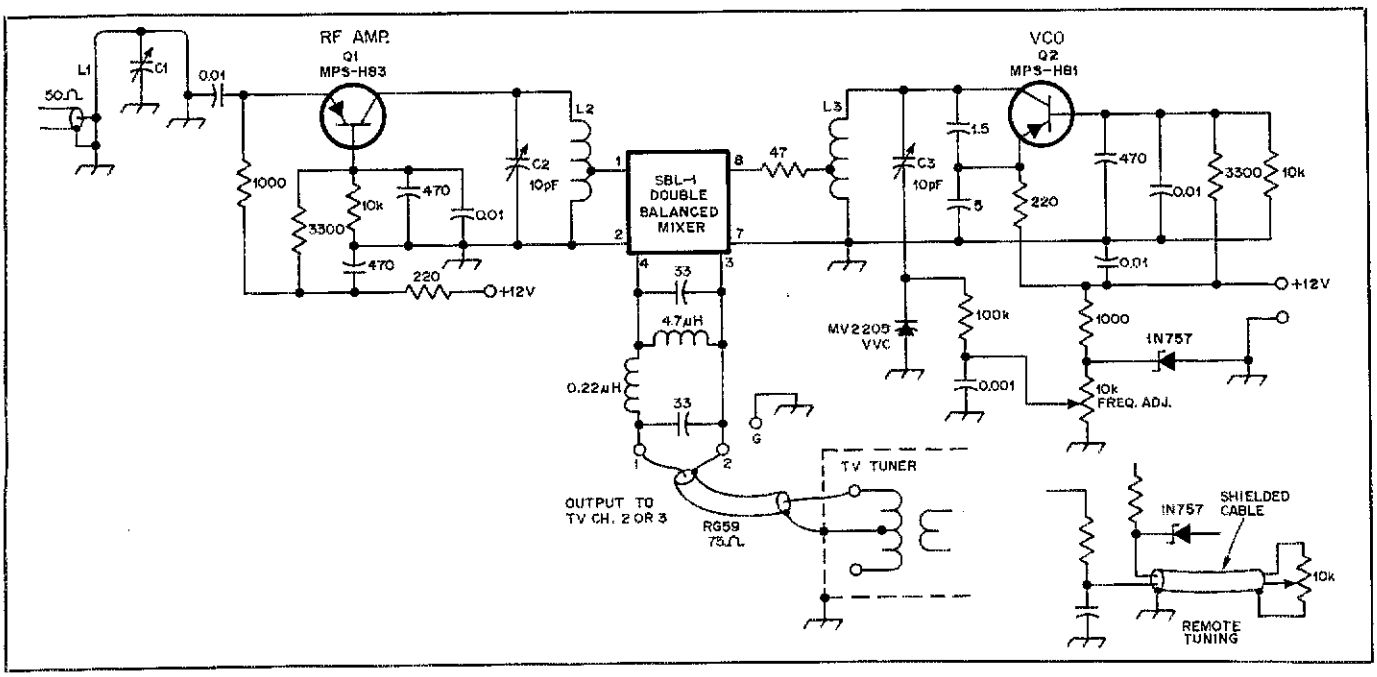


Fig. 4 — The circuit of the TVC-1 converter consists of a low-noise, high-gain, rf amplifier, a doubly balanced mixer and a Varicap-tuned VCO. Remote tuning of the converter permits it to be mounted on the antenna if desired. For remote operation, the remote tuning circuit replaces the 10-kΩ potentiometer shown below the oscillator transistor, Q2. C2 and C3 are Arco 400, 1-10 pF, capacitors. L2 consists of 1-1/2 turns no. 22 wire, 1/4-inch diameter, tapped 3/8 inch from the lower end. L3 is a hairpin loop, 1/2 inch across the bottom and 5/8-inch high. It is made with no. 22 bus wire.

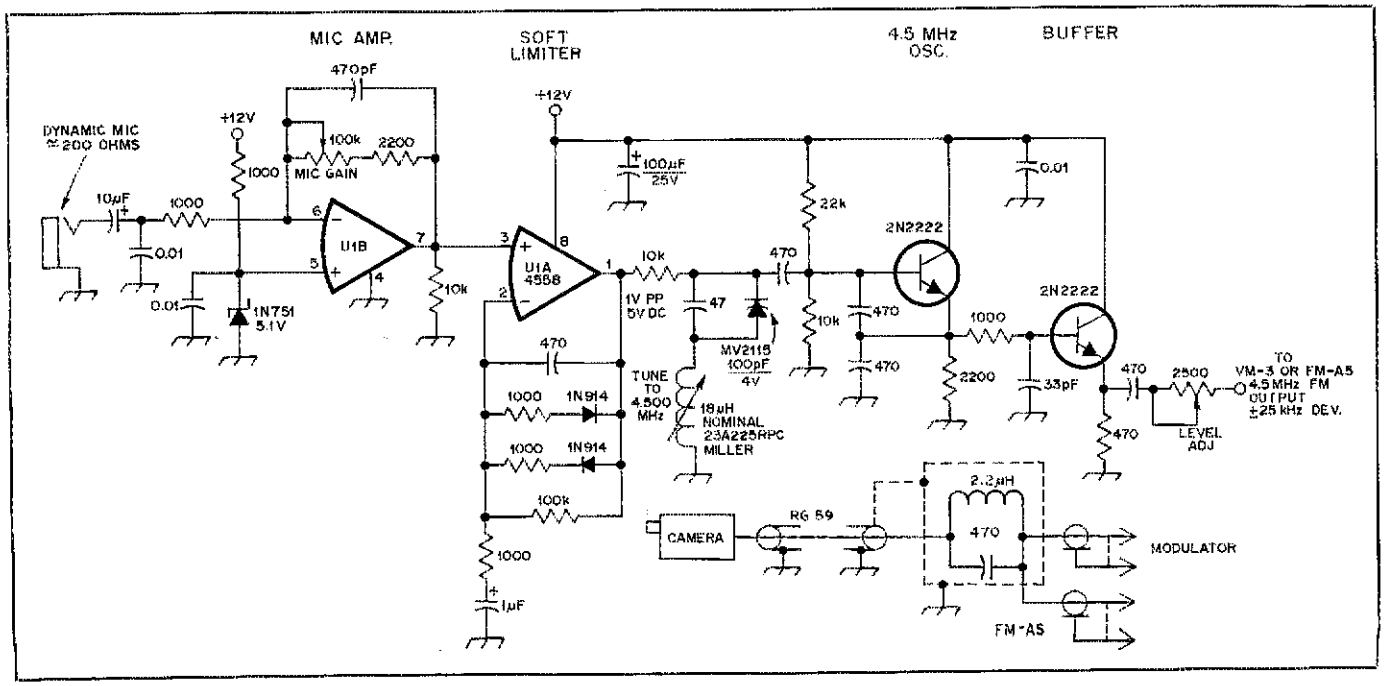
the final. L11 is the final-stage rf choke which is connected to the B+ line and is the feed point for the video/audio signals. C28, an electrolytic capacitor on the TX-432 pc board, is not used. C29 is a small disk capacitor that is retained for rf decoupling.

When tuning the TX-432 for operation below 444 MHz, one may find substitution of Arco no. 402 compression capacitors for the Arco no. 400s desirable. Improved heat dissipation may be achieved by replacing the thin metal heat sinks furnished with the TX-432. The solid-aluminum TO-5 heat sinks sold in the Motorola HEP line are better suited for the purpose.

Fast-Scan Modulator

The VM-3 fast-scan modulator, another P.C. Electronics unit, was developed to be used mainly for supplying video to the TX-432B exciter. Because of the wide bandwidth of the VM-3, it has the capability of resolving 64-character TV typewriters and microcomputers. The 3-dB point is typically 8 MHz which is more than enough for color and sound plus greater resolution than found in broadcast TV. Another feature is a

Fig. 5 — This ATV sound-subcarrier generator module permits both voice and video to be transmitted. The trap shown in the diagram is necessary to isolate the capacitance of the long coaxial cable from the FM-A5 output. The capacitance would act as a bypass to the 4.5-MHz signals without the trap. U1 is either a Motorola MC1458CP1 or Raytheon RC4558DN operational amplifier.



separate input for 4.5-MHz subcarrier for sound transmission. An ATV operator will appreciate this advantage. Figs. 2 and 3 illustrate the connections to be made for adding the modulator to the installation. Price-wise, the VM-3 is sold for about $20.

Subcarrier System for Sound

One of the better subcarrier systems available is also produced by P. C. Electronics under the guiding hand of Tom O'Hara, W6ORG. The FM-A5 utilizes a stable 4.5-MHz oscillator that is fm modulated by a Varicap diode driven from an IC audio amplifier. The unit has sufficient gain to fully modulate the transmitter to 25-kHz deviation even with an inexpensive microphone placed at a distance of 25 feet or more. Provision is made for microphone sensitivity and subcarrier rf level control to customize the operation according to the operator's liking. Moreover, the FM-A5 incorporates a soft limiter to prevent overdeviation. Distortion is extremely low, providing broadcast-quality sound to accompany video pictures.

This subcarrier module is designed for feeding the VM-3 video modulator directly or it may be connected to any 75-ohm video coax line with the addition of a 4.5-MHz trap. The trap, as shown in Fig. 5, is necessary for isolating the capacity of the long coaxial line from the FM-A5 output. That capacity would act as a bypass to the 4.5-MHz signal without the trap.

Output from the FM-A5 is adjustable to match the camera video level. Nominal subcarrier level is 0.5 to 1.0 V peak-to-peak. In some cases there may be other band-pass attenuation in the transmitter and modulator that could require more adjustment.

Under operating conditions, the oscillator should be adjusted to within 10 kHz. The receiving station should be tuned to the high-frequency side of a signal for best sound with picture. The transmitter should also be peaked to the high side.

Frequency response of the FM-A5 is rolled off just short of 300 Hz and just above 3000 Hz for best voice communication. Deviation is fixed at the 25-kHz broadcast standard. P. C. Electronics has priced this subcarrier generator in the $25 class.

The MHW-710 Module

To give the transceiver an energy boost, the rf amplifier uses a Motorola MHW-710 rf module. As mentioned earlier, only a few parts (as indicated in the drawing) are needed to complete the amplifier stage. The module may not be a stock item at some Motorola parts dealers, but it can be ordered from the source indicated in Table 1. It is sold for about $54.

Video Call Identifier

For the amateur who wishes to go a step beyond the basic installation, there is the PCE TVID-1 video call identifier which superimposes call letters or any six alphanumerics over the camera video. Controls are provided to place the letters anywhere vertically or horizontally on the screen. Black and white intensity may be varied, but white usually shows up best. Sync is taken from the input video. Therefore, no external sync generator or connection is needed. Color call signs may be used by means of phase shifting.This module requires a regulated 5-V source rated at 350 mA.* Video from the camera is applied directly to the module input. The level should be the standard, 1-V peak-to-peak. The video signal goes to a sync separator and to a video mixer inside the TVID-1. The input provides a 75-ohm termination for the line. There is a bias adjustment at the input which may have to be adjusted, depending on the camera being used.

A programmable read-only memory, programmed to contain the call letters of the station, supplies the binary data to superimpose the i-d on the picture picked up by the camera. The composite video comes out of a video mixer through a 75-ohm line driver. RG59/U coax should be extended from the TVID to the transmitter or monitor. The termination for the cable should be resistive 75 ohms. Capacitive coupling should not be used.

In my opinion, the video call identifier adds a nice touch to the ATV station. It is available from P. C. Electronics for about $79.

Some Final Thoughts

If the fast-scan TV enthusiast chooses this essentially ready-made path to get on 439-MHz ATV, consideration of the power supply and a few possible refinements are all that need to be mentioned in conclusion. Refinements might include a good transmit-receive relay for transferring the B+ and switching the antenna from transmit to receive and vice versa. A good coaxial relay, such as one from a cast-off Motorola 80-D (part no. 80D83252G02) can be salvaged from a retired 80-D or other commercial two-way unit. Alternatives would be to buy a Dow Key coaxial relay, or simply use diode switching. Transfer of the B+ may be accomplished through the auxiliary contacts of the 80-D.

In the photographs of my unit you will notice some additional knobs, a meter and an additional pc board. These are for the purpose of enhancement. If the ATV station is to include the video call identifier, there could be a set of controls provided to turn the i-d on or off, and move the position of the call sign left or right, or up and down.

The TV transceiver pictured in the photographs uses a surplus 12-V dc supply originally intended for powering a portable video recorder. The manufacturer rated this supply for 2 amperes but the supply easily furnishes twice that. A single internal conversion provided more than 6 amperes. Godbout Electronics, on the other hand, has a good regulated supply that also would serve well to power the ATV station.

Note that in my unit some additional "on-card" regulators have been added. These are inexpensive three-lead, 12-V regulator chips from Poly Paks. The purpose of the regulators is to provide protection should the main supply "go bananas." Another reason for these devices is for protection during mobile operation where the 12-V supply varies from +11 to +16 V. Because the ATV equipment I have described is designed for 12-V dc operation, it will operate conveniently as a portable, mobile or airborne station. In fact it will even operate from a balloon, thanks to the NiCad battery!

Table 1
Where to Buy Components

Component	*Source*
Audio subcarrier unit FM-A5	P.C. Electronics, 2522 S. Paxson, Arcadia, CA 91006
Tuneable converter TVC-1	
Video ID generator TVID-1	
Video Modulator VM-3	
MHW-710 power amplifier	Motorola parts dealers or Regency Electronics, 7701 Records, Indianapolis, IN 46226
Power supply	Godbout Electronics, P. O. Box 2355, Oakland Airport, CA 94614
Regulators	Poly Paks, Box 942R, Lynnfield, MA 01940
TX-432 transmitter	VHF Engineering, 320 Water St., Binghamton, NY 13902

*[Editor's Note: Space limitations prevent us from publishing a schematic diagram of the TVID-1 identifier in *QST*. This diagram and a brief circuit description are available separately upon receipt of a stamped return envelope. (IRCs are acceptable from outside the U.S.) Address your request to ARRL, Dept. TD-ATV, 225 Main St., Newington, CT 06111.]

Footnotes

[1]See Table 1.

[2]For more information about amateur TV, read *Amateur Television Magazine* (Amateur Television Magazine, Box 1347, Bloomington, IN 47401).

[3]P. C. Electronics is now producing the TXA5-2 ATV exciter, designed to drive the MHW-710-1 power module directly with no instability or attenuator. Included with the exciter is a high-resolution video modulator with dc restoration to insure transmission of black blacks as well as maximum power on sync tips regardless of picture contrast. The TXA5-2 is sold, wired and tested, but less the crystal, for $69, postpaid.

Mycoder

Update that Micoder! Try this modification for stable tone generation and positive results. It's a change the autopatch can't refuse!

By George K. Fallenbeck,* K1HQW/4

A blinding rain sweeps the highway. You're 10 miles from the nearest town and more than 30 from home where dinner awaits your usually punctual arrival. Then it happens. You feel the engine miss. It chugs and then stops dead. That gas tank you neglected to fill is drained of the last drop. "Tonight just had to be the night," you grumble to yourself. "Better let the spouse know and have some gas brought out."

On goes the mobile rig. You punch the pad to bring up the autopatch at the Washington Mountain repeater, some 18 miles to the northeast. Dutifully, the equipment on the mountain responds to your signal, but the autopatch remains inactive. You try again and again in vain. And so. . .

A hypothetical situation? Yes, but discovering that a tone encoder fails to put an autopatch system into operation is not uncommon. I was curious about the difficulties some amateurs have experienced while attempting to trigger an autopatch with a Micoder, so I investigated the device.

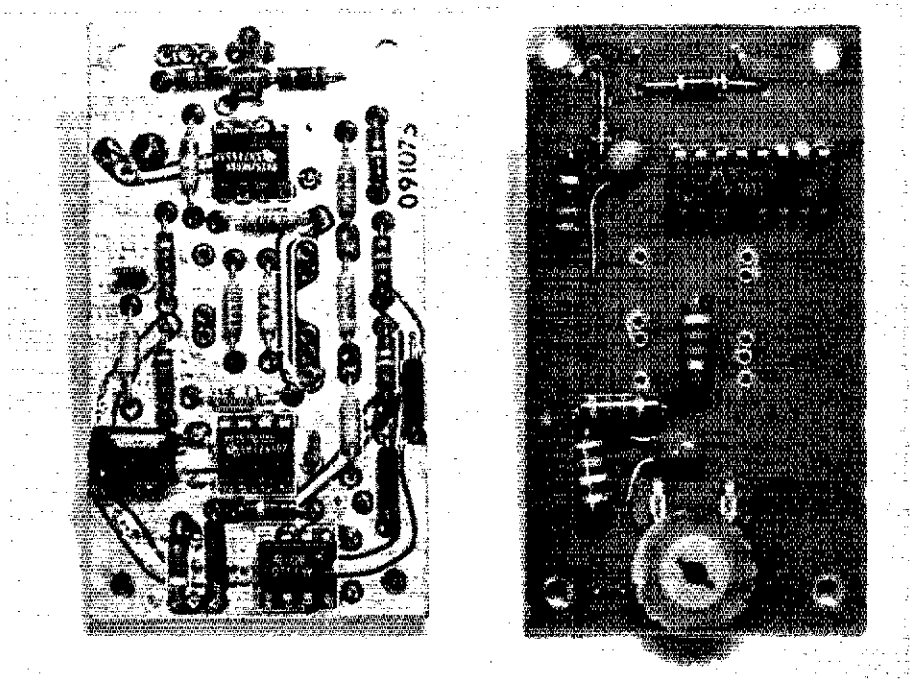
As the investigation began, I harbored the feeling that the design of the Micoder could be improved. The feeling was just that. I had not been dissatisfied with mine. As a matter of fact it had worked quite well.

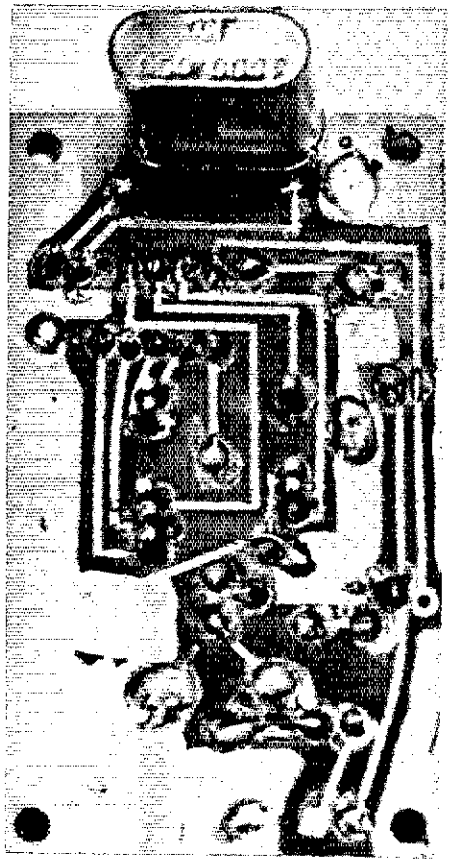
My analysis disclosed, for one thing, that while operating in a mobile environment, the Heath tone pad appeared vulnerable to drifting. Tones did not always fall within the 1.5-percent tolerance needed for correct autopatch operation. To perform frequency and level adjustments seemed tedious, requiring disassembly of the unit. In addition, the tone adjustment controls face each other from the board underside. The level adjustment is also on the lower side of the board and facing downward. A frequency counter is required in order to obtain correct settings.

A main reason for the drift, I contend, is the use of two NE555s and seven RC circuits which are employed to generate the Touch-Tone frequency pairs. Such RC circuits are known to be temperature sensitive. With the desires of a perfectionist, I

*1008 Pine Lake Dr., Niceville, FL 32578

Heath Micoder board (left) versus Mycoder board (right). Notice simplicity of the Mycoder board. The Heath version has nine components hidden on the opposite side of the board.





Reverse (foil) side of Mycoder. The etching pattern is a crude prototype.

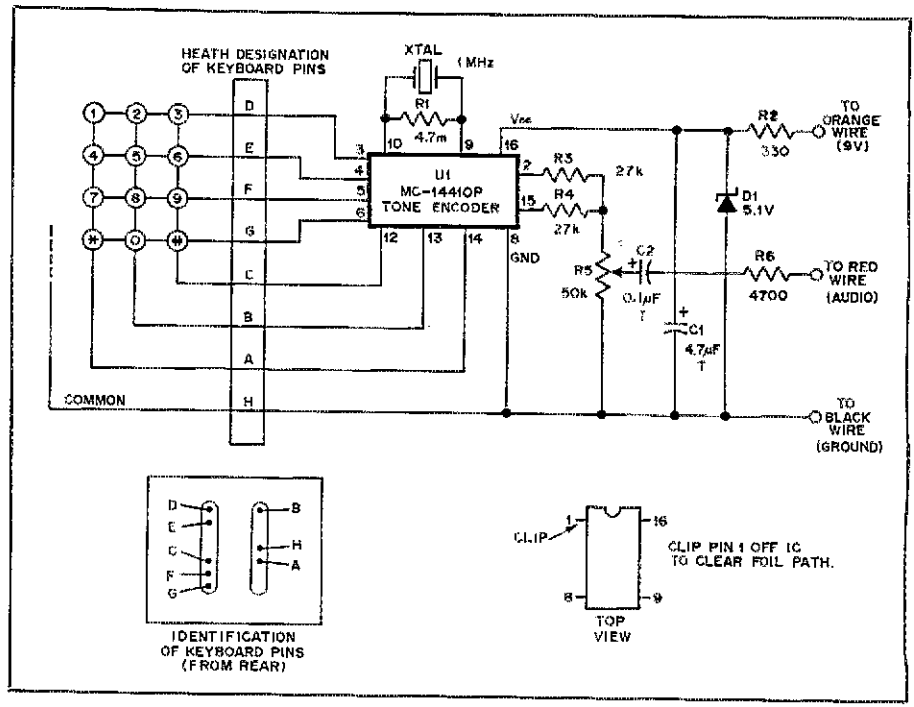


Fig. 1 — The Mycoder schematic diagram. Resistors are 1/4 watt. R3 through R6, as shown in parts list, are for low-impedance operation. The main ingredients are the Motorola IC tone encoder, and the 1-MHz reference crystal. For clearance remove pin 1 of U1.

C1 — Tantalum, 4.7 μF. A higher value may be used.
C2 — Tantalum, 0.1 μF.
R1 — 4.7 MΩ.
R2 — 330 ohm.
R3, R4 — 27 kΩ.
R5 — Potentiometer, 50 kΩ, linear taper Radio Shack no. 271-219.
U1 — Tone encoder IC, Motorola MC-14410P. Available from Poly Paks ($10.50).
Y1 — 1-MHz ±0.005 percent freq. standard HC-33/U crystal. Available from JAN Crystals or Poly Paks for about $5.
Optional: 8-pin sockets, Heath no. 432-932.

began my search for better tone generation.

From the drawing board came plans for the prototype. Design requisites were to include a unit with no frequency adjustment. All tones would be frequency synthesized and held within a tolerance of 0.2 percent. Drift would be inexcusable. The level adjustment must be externally accessible. And for the appearance? Well, that would be just like the original Micoder. Not too bad an arrangement, if I may say so. The end results fulfilled those requirements elegantly. For that reason I am indeed happy to share my ideas.

Let's consider the features of my new unit, which I have elected to call the Mycoder. At the heart of this device is a Motorola MC14410P CMOS tone-encoder chip.[1] The circuit is that of a digital synthesizer requiring only a 1-MHz reference crystal, four resistors, a couple of capacitors, a Zener diode, and a potentiometer. An example of simplicity it is, but nonetheless effective. Furthermore, this redesign represents a considerable reduction in parts count from the Heath version. The latter uses 21 resistors, three ICs, three potentiometers, one capacitor, a transistor, and an LED. Except for the IC and the crystal, other components are commonly available.[2] See the parts list.

From Micoder to Mycoder

Modifying the Micoder requires normal workmanship care. Caution should be exercised in detaching the Heath keyboard which is supported only at the corners. The board is a plug-in type. Also one must avoid static damage to the CMOS. Careful handling procedures of this IC are essential.

The microphone may still be used as usual during the modification because the circuit board and the microphone are electrically independent. The microphone element and amplifier are not disturbed in the reconstruction process. All that is required is to unsolder the red, orange and black wires from the board, tape the ends, and tuck them away. The battery should be taped on to prevent it from rattling around inasmuch as the circuit board will not be restraining it. The latter, once removed, may be consigned to the infamous junk box.

The suggested pc layout for the Mycoder is critical only to the extent of the location of the four corner holes, keyboard pins, and overall dimensions. The dimensions must be observed closely to avoid physical interference between the keyboard and the microphone case. I purposely left extra copper on the circuit board for shielding, even though the MC14410P is supposedly immune to RFI. Besides that, it saves etchant. My board was laid out with the use of narrow graphics tape and a bit of the XYL's nail polish. Technical showmanship is not essential.

Obtaining a small potentiometer for the level control did pose a problem. I was able to use a Radio Shack no. 271-219 potentiometer, which I modified by bending all pins at right angles to the body and toward the metallic side of the pot. In order to make the profile thinner, it was necessary to file the plastic top of the knob. This effort provided a flush-mount control that could be nestled under the keyboard.

To retain the plug-in keyboard features, I purchased and installed eight extra pin sockets from Heath (part no. 432-932). These cost only 20 cents each, but are not strictly necessary for the modification.

Words of Advice

Soldering to the Chromerics keyboard is not recommended. Also, because the keyboard overlays most components, any

[1]References appear on page 29.

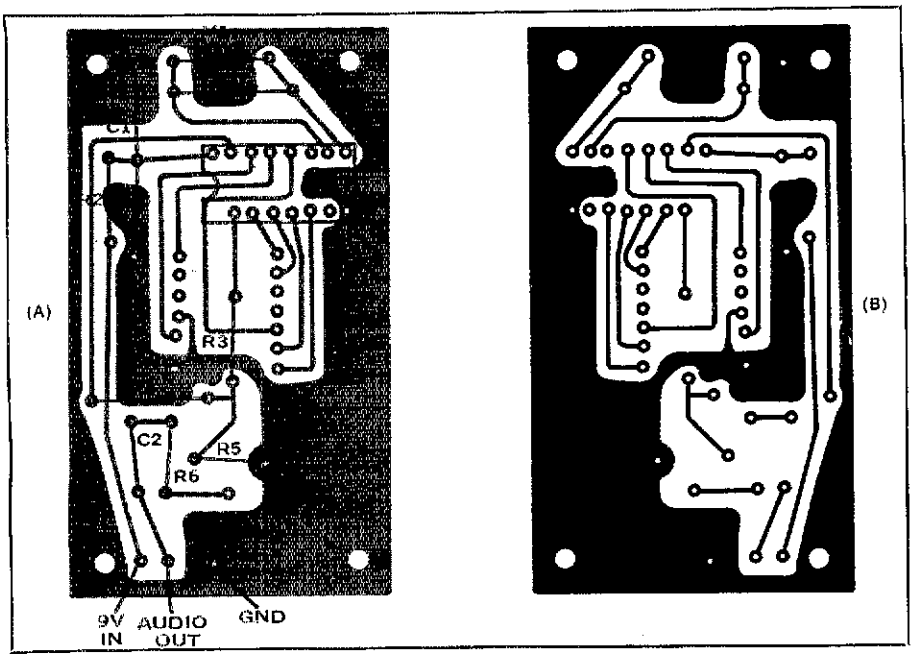


Fig. 2 — The component side of the Mycoder pc board is illustrated at A. Keyboard mounting holes are drilled to 1/16-inch diameter and Heath sockets are installed. A foil-side view of the pc board at actual size is shown at B, with black representing copper.

necessary removal of the keyboard would require a nasty desoldering job. There could be a need to replace parts or to make an adjustment at a future time. For instance one might desire to accommodate equipment having a different impedance from that currently in use.

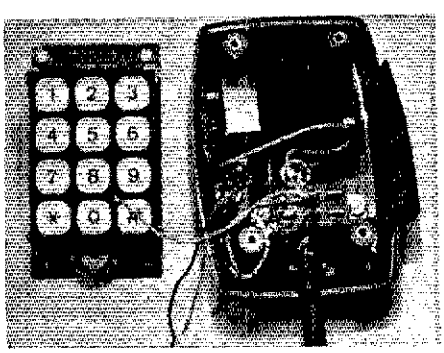
Because of the narrow clearance between the pc board and the keyboard, the installation of an IC socket is not recommended. Only space-saving, 1/4-watt resistors should be employed. To prevent static damage to the IC, that device should be mounted only after all other components are aboard. The CMOS IC is supposedly diode protected, but I have had bad experiences with other protected devices. Therefore, use normal CMOS handling procedures until the keyboard installation is complete.

Other than being careful with the IC, assembly is straightforward. Temporarily line up the board and mic case. Note where the level-potentiometer adjustment control falls, and carefully drill a hole in the microphone case (the keyboard half) at the appropriate location. Solder the existing Micoder red, black and orange wires to the indicated locations. Assemble the unit, including the 9-V battery. The Mycoder should be ready for action.

The encoder is designed to match the Micoder microphone low-impedance output. Should the output not be sufficient for a particular rig, R3 and R4 may be changed to 4700 ohms. I doubt that the Micoder microphone has enough output to drive high-impedance sets using high-output ceramic microphones such as the Regency HR-2B. If one so desires, R3 and R4 may be changed to 47,000 ohms and R6 to 470,000 ohms. In any case, the only adjustment is the externally accessible level control. To set the level, I suggest the enlistment of an aide via the repeater. Without the help of such a person, the alternative is to feed the tone signal at a low level (full ccw) and increase the level until the repeater autopatch is brought up.

I feel positive that those who try this modification will be pleased with the results. The tones appear to be more accurate than the repeater decoder. I've been told, furthermore, that the Heath autopatch encoder for the HW-2021 handheld radio uses the same components as the Micoder. The Mycoder conversion, therefore, should be applicable to this set, also. QST

Finished Mycoder board ready for installation. Three existing wires are evident; see text.



References

[1]See Motorola specification sheet ADI-311 (1975).
[2]Touch-Tone encoder kit information is available from Poly Paks, Box 942M, Lynnfield, MA 01940.

[Editor's Note: For additional information about the application of the MC-14410P IC, see the following articles: DeLaune, "Digital Touch-Tone Encoder," *ham radio* for April, 1975. Lowenstein, "Hand-Held Touch-Tone," *ham radio* for September, 1975.]

Feedback

☐ There were two typographical errors in the article, "Calculating Capacitor Values," by Doug DeMaw (February *QST*, pages 28-29). In Fig. 2, the lower formula should have been shown as

$$C1 = \frac{1}{2\pi f X_{C1}} = 0.095\ \mu F$$

In addition, radical signs were omitted over the ratios in Eq. 2. The corrected formula is

$$I_{rf} = \sqrt{\frac{W}{Z_p}} = \sqrt{\frac{600}{4000}} = 0.39\ A.$$

☐ Group tours of the Jet Propulsion Laboratory can be arranged through the Public Education Office, 4800 Oak Grove Drive, Pasadena, CA 91103, Tel. 213-354-4321. The JPL Amateur Radio Club does *not* arrange the tours (February *QST*, page 24).

Tours are booked several months in advance. On the last Sunday of every month from 1 to 4 P.M., there is an open house for the general public. The amateur radio shack is not normally open to the public for either tours or during the open house. — *K6PGX*

☐ The secretary/treasurer of the QRP Amateur Radio Club International (February *QST*, page 82) is Joe Szempias, W8JKB.

☐ N5EE, the shortest U.S. call sign, is actually held by William Wageman of Los Alamos, NM (February *QST*, page 27). Fredrick Walworth, N5ET, of Dallas, applied for the shortest call, but was beaten to it. He and N5EE have met on the air and exchanged their notable QSL cards.

☐ The call sign of Albert C. Quinn (Silent Keys, February *QST*) should have read W1OGF.

☐ The call sign of the person who discovered an armed robbery in New Orleans (February *QST*, page 70) should have read W5ZPA.

Strays

STARTING EARLY

☐ Recently, Jerry Lloyd, WA1TCA, of West Haven, CT, entered an ARRL family membership for his son, Peter Lee, commenting, "He does not have a license yet, but I am sure some year he will get one. . . ." Peter is seven months old.

Short Ground-Radial Systems for Short Verticals

When is a ground not a ground? Should my radials be buried? How deep? How many? Will my vertical work without a ground? Let W2FMI give you the answers.

By Jerry Sevick,* W2FMI

How do you engineer the performance of ground-radial systems under vertical antennas? There isn't much engineering design information available, particularly for conditions where space is limited and cost is an important consideration.

The often-asked questions which need answering are (a) Do four quarter-wavelength radials constitute an adequate ground system? (b) Must radials be buried deeply in the earth? (c) Must the thickest copper conductor available be used? And while we are at it, how about the mistaken notion that short verticals can never compete in performance with a full-sized quarter-wavelength antenna?

This paper presents experimental evidence which answers these questions in a clear and concise way. Investigation shows that short verticals over very small radial systems of almost any kind of thin wire on the ground's surface can perform surprisingly well. On-the-air comparisons with much larger verticals over extensive ground systems show performance reduced by only a few decibels.

Introduction

Vertical antennas have enjoyed considerable popularity on the 80- and 160-meter amateur bands because of the difficulty of erecting horizontal antennas at heights sufficient for low-angle radiation. Optimum heights, which are in excess of a half wavelength (λ) on these bands, are impractical for most amateurs. In many cases short verticals are used since they have been shown to compete favorably with 1/4-λ vertical antennas.[1] This is true if losses in the ground system, matching networks and loading elements are small compared to the reduced radiation resistances of the short antennas.[2] Considerable information is available describing the effects of buried radials on the efficiency of 1/4-λ verticals in the mf and lf bands as a function of length and number of radials, and conductivity of the soil.[3-19] But little is available on radials lying on the ground's surface, particularly in connection with short verticals.

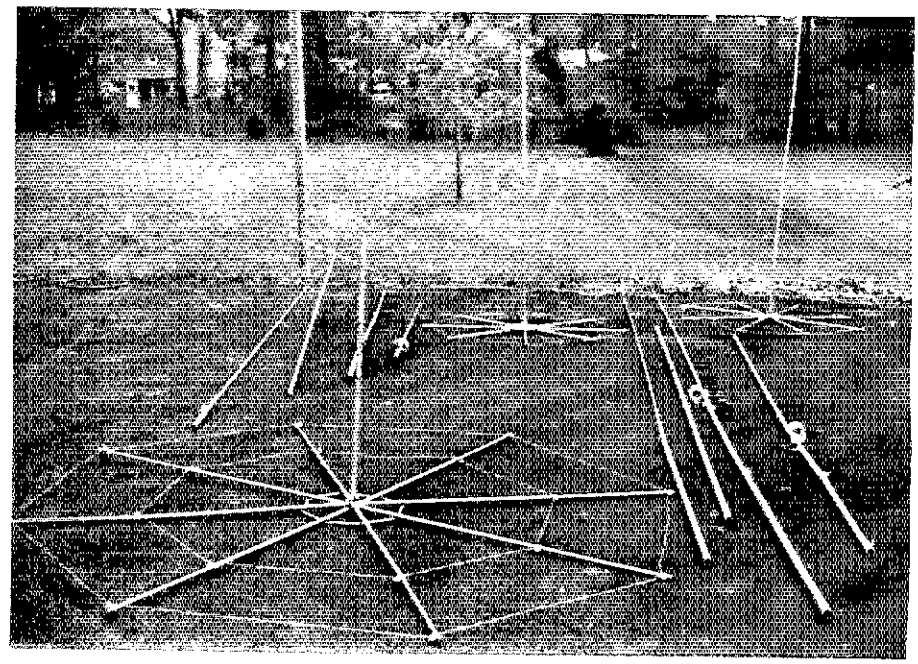
During the author's experiments, various antenna heights from 1/4 λ to 1/8 λ were included. Also developed and described here is a simple method for measuring an important parameter for vertical antennas — soil conductivity. The conductivity of the soil under and in the near vicinity of the antenna is most important in determining the extent of the radial system required and the overall performance. As will be seen, short verticals with very small radial systems can be surprisingly effective.

Soil Conductivity

Most soils are nonconductors of electricity when completely dry. Conduction through the soil results from conduction through the water held in the soil. Thus, conduction is electrolytic. Dc techniques for measuring conductivity are impractical because they tend to deplete the carriers of electricity in the vicinity of the electrodes. The main factors contributing to the conductivity of soil are

1) Type of soil.
2) Type of salts contained in the water.
3) Concentration of salts dissolved in the contained water.
4) Moisture content.

Elements of the 10 vertical antennas used on 20 and 40 meters to experimentally determine the efficiency of shortened verticals with abbreviated radial systems.



*Bell Laboratories, Murray Hill, NJ 07974
[1]References appear on page 33.

5) Grain size and distribution of material.
6) Temperature.
7) Packing density and pressure.

Although the type of soil is an important factor in determining its conductivity, rather large variations can take place between locations because of the other factors involved. Generally, loams and garden soils have the highest conductivities. These are followed in order by clays, sand and gravel. Soils have been classified according to conductivity, as shown in Table 1. Although some differences are noted in the reporting [20,21] of this mode of classification because of the many variables involved, the classification generally follows the values shown in the table.

Table 1
General Classification in Conductivity

Material	*Conductivity (millimhos/meter)*
Poor Soil	1-5
Average Soil	10-15
Very Good Soil	100
Salt Water	5000
Fresh Water	10-15

Since conduction through the soil is almost entirely electrolytic, ac measurement techniques are preferred. Many commercial instruments employing ac techniques are available and described in the literature.[22] But rather simple ac measurement techniques can be used which provide accuracies on the order of 25 percent and are quite adequate for the radio amateur. Such a setup was developed by a colleague and neighbor, M. C. Waltz,[23] W2FNQ and is shown schematically in Fig. 1. Fig. 2 shows the conductivity readings taken over the last three months in 1976. It is interesting to note the general drop in conductivity over the three months as well as the short-term changes due to periods of rain. The results presented in the following sections on antenna efficiencies were obtained in the period October 10 to November 10, 1976, when the conductivity varied between 22 and 25 millimhos/meter.

Antenna Efficiency Considerations

The antenna efficiencies to be discussed are based upon the losses which appear in series with the radiation resistance of resonant verticals. Although this approach does not give a comparison between the very low angles of radiation (i.e., less than 15 degrees) of various radial systems, it does allow for comparisons in the 15- to 30-degree range which is important for sky-wave transmission on the 40-, 80- and 160-meter bands. Mathematically this definition for antenna efficiency can be written as

$$\text{Antenna efficiency} = \frac{R_{rad}}{R_{rad} + R_g + R_A}$$

where R_{rad} = radiation resistance
R_g = ground loss
R_A = ohmic losses due to loading and the antenna itself.

With high-Q loading coils and practically any size of aluminum tubing for the antenna, R_A can be minimized and therefore eliminated from the relationship above.

An example of this technique for determining antenna efficiency uses the results shown in Fig. 3. The input impedance of a resonant quarter-wavelength vertical is plotted as a function of the number of radials. Two lengths of radials (0.2 λ and 0.4 λ) were considered. Since the radiation resistance is 35 ohms for the thickness of the verticals used in this experiment, it can be seen that with 50 radials, losses were about 2 ohms and with 100 radials, 1 ohm. This amounts to efficiencies of 94 and 97 percent, respectively. Also, it can be seen that the efficiency with only four radials is less than 60 percent. This poor efficiency exists even for a location with a soil conductivity that can be considered average.

Further, the efficiency of a radial system employing small numbers of radials is quite dependent on the moisture content of the soil. Fig. 4 shows this result with a resonant quarter-wavelength vertical on 20 meters while the number of radials varies from one to eight. As can be seen, the difference in efficiency between wet and dry conditions becomes less pronounced as the number of radials is increased. The antenna system also becomes more independent of soil conductivity as the number of radials is increased.

In order to determine the efficiencies of shortened verticals over abbreviated radial systems, input impedances were compared with similar antennas over a near-ideal radial system. Fig. 5 shows the experimental results[24] obtained by the author on a near-ideal image plane (100 radials on the ground, about 50 feet long, and terminated in 10- to 12-inch nails). The top-hat loading consisted of an eight-spoked wheel with several rings of aluminum wire to improve its effect. This family of curves has been very useful to the author in designing verticals since it predicts the value of the input impedance of shortened verticals using various loading methods. In particular, it was noted that a simple rule of thumb existed for top-hat loading. That is, a top hat with a diameter D is equivalent to an electrical height of 2D. Further, top-hat loading yielded the highest impedance and bandwidth for a particular height.

Since the investigations reported here involved short radials on the surface of the ground, a study of the effect of the length of a spike terminating the radials was necessary. The efficiency for resonant 1/4-λ verticals with small numbers of

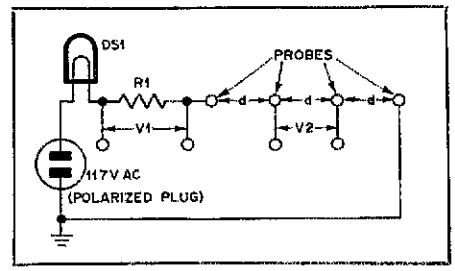


Fig. 1 — Schematic diagram of four-point probe method for measuring earth conductivity.
DS1 — 100-watt light bulb.
R1 — 14.6 ohms (5 watt).
Probes — 5/8-inch dia (iron or copper); spacing, d = 18 inches; penetration depth, D = 12 inches.
Earth conductivity = (21) × $\frac{V1}{V2}$ (millimhos/meter).

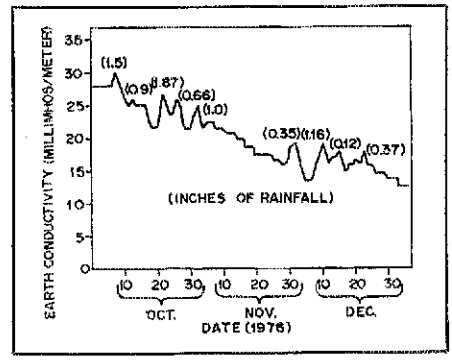


Fig. 2 — Earth conductivity at author's location during last three months in 1976.

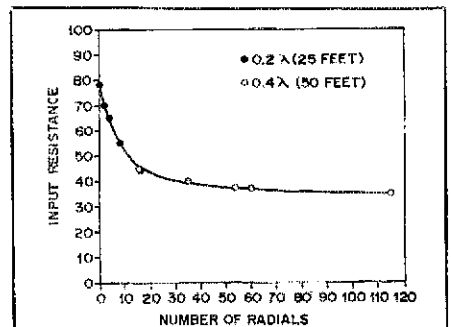


Fig. 3 — Input impedance of resonant quarter-wavelength vertical as a function of the number of radials.

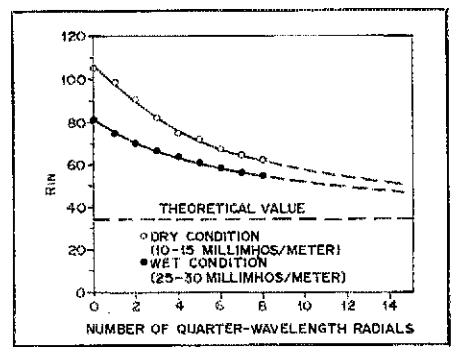


Fig. 4 — Input impedance of resonant quarter-wavelength vertical as a function of the number of radials and the condition of the soil.

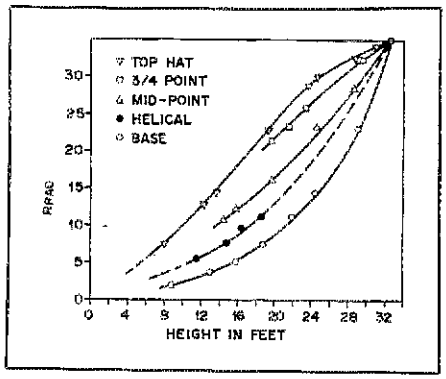


Fig. 5 — Experimental results of radiation resistance as a function of height of antenna for various methods of loading.

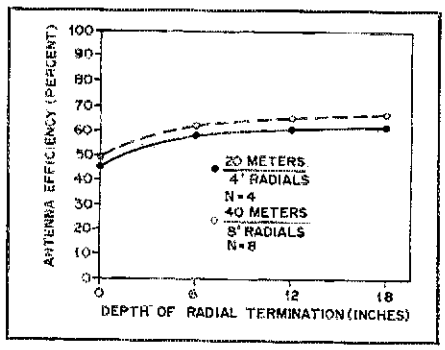


Fig. 6 — Efficiency of resonant quarter-wavelength verticals on 20 and 40 meters as a function of the length of spike terminating the radials.

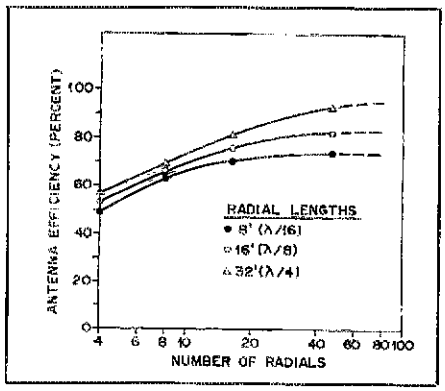


Fig. 7 — Efficiency of resonant quarter-wavelength vertical as a function of the number of terminated radials with three different lengths.

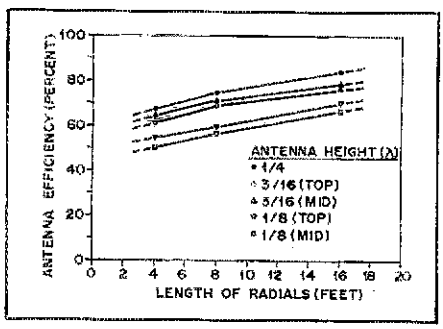


Fig. 8 — Efficiency of short verticals as a function of the length of the terminated radials, with the number kept constant at 48.

shortened radials was measured on the 20-and 40-meter bands. The radials were four and eight feet long (1/16 λ) respectively. Fig. 6 shows the results for four different depths of termination. As can be seen, depths of 10 to 12 inches should be sufficient for the soil conductivity at the author's location for 20 and 40 meters, and most likely for 80 and 160 meters as well. Incidentally, the effectiveness of radials of a 1/4 λ or longer did not change appreciably as a function of the depth of the termination. Therefore, terminations for long radials are primarily used for mechanical reasons.

Abbreviated Radial Systems

In order to determine experimentally the efficiency of shortened verticals with abbreviated radials on the surface of the ground, five verticals of different heights and loading schemes were used on the 20-and 40-meter bands. The results were then compared with similar antennas on a near-ideal image plane as shown in Fig. 5. The five resonant verticals selected were

1) 1/4 wavelength.
2) 3/16 wavelength, top-hat loaded.
3) 3/16 wavelength, midpoint loaded.
4) 1/8 wavelength, top-hat loaded.
5) 1/8 wavelength, midpoint loaded.

One of the photographs shows the elements for these 10 antennas.

A radial system with various lengths of 17-gauge steel electric fence wire, terminated with 10- to 12-inch nails, was employed. A picture shows the 12-inch aluminum base and the input connection arrangement. The antenna system was erected in the front yard about 50 feet from the house, and it offered an opportunity for on-the-air comparisons with verticals mounted on the near-ideal system in the backyard.

The results are shown in Figs. 7 and 8. Only the 40-meter data is presented since little difference was noted on 20 meters. Fig. 7 shows the effect on the efficiency of a resonant 1/4-λ vertical on 40 meters as a function of the number of radials using three different lengths of terminated radials. Although these curves were taken on a 40-meter system, the relationships are generally valid for all other frequencies in the hf range if the same fractional wavelengths are used for the radials. As can be seen the longer radials (1/4 λ) yielded the highest efficiency. But it is interesting to note that this improvement in efficiency with length decreases as the number of radials becomes smaller. At four radials, the efficiency with eight-foot radials is not much poorer than that with 32-foot radials, i.e., 50 percent compared to 56. Further, other interesting trade-offs exist with various lengths and numbers of radials. Fig. 8 shows that 16 1/4-λ radials are equivalent to about 35 1/8-λ radials, and 8 1/4-λ radials are equivalent to only 12 1/16-λ radials. Obviously other equivalences can be obtained from the figure.

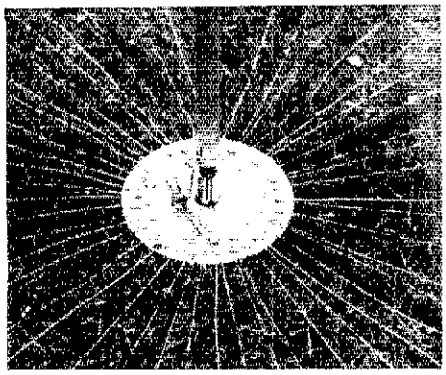
Fig. 8 shows the results of antenna efficiency for short verticals as a function of the length of radials, with the number of radials kept constant at 48. As expected, 1/4-λ verticals, with their higher radiation resistance, have the highest efficiencies. Surprisingly, the efficiency of the 1/8-λ verticals does not suffer proportionally. That is, the 1/8-λ vertical with midpoint loading still has a 67-percent efficiency compared to the 84-percent efficiency of the 1/4-λ vertical, even though its radiation resistance is only about one-third as large (12.5 ohms compared to 35 ohms). A further comparison with a 1/4-λ vertical over an ideal image plane predicts that this 1/8-λ vertical with 48 1/8-λ radials (terminated) should show a reduced performance of only 1.7 dB.

On-the-Air Comparisons

As was shown in the previous section, short verticals with a sufficient number of abbreviated radials that are terminated should yield performances only a decibel or two poorer than 1/4-λ verticals over extensive ground systems. Several on-the-air comparisons were made to confirm this prediction, which was based upon efficiency considerations.

The first comparison involved a 40-meter, 1/8-λ, top-hat-loaded vertical with 48 1/8-λ radials (17-gauge steel wire on the ground and terminated with 10- to 12-inch nails). The input impedance of this vertical was about 25 ohms and it was matched to the 50-ohm transmission line with a highly efficient 2:1 step-down transmission-line transformer. This antenna system was compared with a 29-foot vertical using a 13-1/2-foot-diameter top hat in the backyard. The ground system for this larger antenna consisted of 100 radials of no. 15 aluminum wire, each about 50 feet long. Each radial was on the surface of the ground and terminated with 10- to 12-inch nails. This larger antenna was resonated by a small variable capacitor in series at the base. Over 100 contacts on 40 meters plus about 200 observations on reception showed that the differences between the two systems were generally negligible. A few reports showed a 1- to 2-dB difference in favor of the larger system but these were in the minority.

An even more interesting comparison was made on 80 meters. A 20-foot vertical with an 8-foot top hat was erected over the same image plane of 48 16-foot radials in the front yard. It required a base-loading coil of about 20 turns of 12-gauge wire, 2-1/2-inch diameter, 6 tpi to resonate it. The input impedance was about 12 ohms and a 4:1 transmission line transformer was used for matching. This antenna configuration represents a radiation resistance of about 5 ohms and a loss in the ground system and loading coil of about 7 ohms. The 29-foot vertical with the 13-1/2-foot diameter top hat needed



The 12-inch aluminum base and input-connection arrangement. Shown are 48 radials of 17-gauge steel electric-fence wire.

about eight turns on a powder-iron core (T200) at the base to resonate it on 80 meters. Its input impedance was 15 ohms (showing negligible loss in the ground system and base loading coil), and matching was accomplished with an efficient transmission-line transformer having a 3.33:1 step-down impedance ratio. Again about 100 contacts were made on the air and another 200 observations were made on reception. The average difference between these two systems amounted to only about 5 dB in favor of the much larger system in the backyard. This is quite noteworthy since many previous contacts with the larger antenna established it as a very competitive antenna system.

Concluding Remarks

Quarter-wavelength vertical antennas over an extensive radial ground system have been known to be efficient, low-angle radiators. Even short verticals over the same large ground system have been shown to lose little in the way of performance. With low-loss matching and loading techniques, short verticals over a large ground system suffer only in bandwidth. But full-sized verticals and radial ground systems are beyond the reach of most radio amateurs on the 80- and 160-meter bands. This investigation was undertaken because little information was available on limited radial systems, particularly for short verticals.

As was shown, short radials over soil of average conductivity can perform quite acceptably for verticals of all heights. The results of this investigation now allow one to predict quite accurately the operation of verticals with heights less than a quarter-wavelength and with radials as short as 1/16 λ in length. The simple soil-conductivity measurement scheme described also gives one a tool for comparing a given location with others, as well as predicting the performance of a vertical antenna system.

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[23]Private communication.
[24]See Ref. 1.

Strays

YLs on the air are younger than ever. In Ravenswood, WV, Katrina Stewart (l), WD8NXU, got her Novice ticket at the age of eight so she "could talk to people like daddy (AMSAT area coordinator W8TN) does." Although she learned the code in record time, she had to wait for her writing speed to catch up. She may just be the youngest YL in the U.S. and Canada! At the age of 13, Joni Orange (r), of Jeanette, PA, may be the youngest licensed broadcast personality with a regular show. Holding a Third-Class Radiotelephone license with broadcast endorsement, she is the daughter of W3ZDF.

HAVING TROUBLE FINDING PARTS?

☐ As an aid to the parts-procurement problem discussed in our December 1977 *QST* editorial, it is worth mentioning that the J. W. Miller Company is discussing ways to add specific small-parts items to their inventory as an aid to amateurs. Their consultations with the League in this regard are appreciated.

Those who have experienced difficulty in obtaining pc boards, pc-board negatives and component parts for *QST* projects over the past two years should check with WA0UZO of Circuit Board Specialists, Box 969, Pueblo, CO 81002. Complete parts kits for many *QST* projects are available from that source. — *W1FB*

POSTAL WARNING

☐ Effective April 1978, new postal regulations require post cards (QSLs) to be 3 1/2" × 5 1/2" or a surcharge will be made. Undersized cards have got to go. — *WB2FHN*

Technical Correspondence

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

ADDITIONAL BANDS FOR THE QUAGI

☐ A number of amateurs have written the author inquiring about the use of the vhf quagi (*QST* for April, 1977) on frequencies other than the three amateur bands for which dimensions were given (144, 220 and 432 MHz). Within the vhf spectrum, mathematically scaling the quagi to other frequencies is a relatively simple matter. To do so, take each dimension given for the amateur band nearest the desired frequency and apply this formula:

$$\text{New dimension} = \frac{\text{original dimension} \times \text{original frequency}}{\text{new frequency}}$$

Thus, the driven element for the ATS-1 and ATS-3 weather satellites at 135.6 MHz would be computed as follows:

$$DE_{135.6} = \frac{82 \times 144.5}{135.6} = 87.38 \text{ in. } (2.22 \text{ m})$$

Each element length and interelement spacing dimension should be scaled to the new frequency, using the same formula. Between about 100 and 500 MHz, this mathematical scaling procedure will produce an antenna delivering substantially the same performance as the original design. However, the builder should bear in mind that a given element diameter "looks" three times as large at 432 MHz as at 144 MHz, for instance. Unless the diameter is reduced as the frequency increases, the element lengths must be adjusted accordingly. Example: When 1/8-inch rod is used for the directors, the 432-MHz quagi requires directors fully 1/4-inch shorter than the mathematical scaling from 2 meters would suggest, and the dimensions given in *QST* included this correction.

In scaling a quagi to a frequency reasonably close to an amateur band, the calculation may be made from the nearby ham band and this variation in element diameter-to-length ratio may be ignored. But for a frequency far removed from 144, 220 or 432 MHz, it would be best to calculate from amateur bands above and below the desired frequency and then interpolate between the two sets of dimensions.

For frequencies significantly higher than 500 MHz or lower than 100 MHz, construction techniques would typically vary so much from the original design that the correct element lengths may be expected to deviate substantially from those mathematically derived. The best approach in such a case would be to experimentally determine the correct element lengths. — *Wayne Overbeck, N6NB, Pepperdine University, Malibu, CA 90265*

NARROW-BAND MODULATION

☐ The purpose of this letter is to raise some questions regarding narrow-band modulation schemes and related matters. Bandwidth as a measure of quality in a communication scheme is straightforward in the clear-channel case. Cutting the bandwidth in half doubles the number of clear channels, obviously a gain. However, the following will show that this simple test is not sufficient in situations where there are *no* channels, but instead random positions of signals. The test is also not sufficient if channels are shared, i.e., where there is mutual interference between stations. Since amateur operations involve the last two items, it seems that we need a way of evaluating the gain or loss involved in narrow-bandwidth plans.

Since random location and shared channels both involve interference, it seems reasonable to use interference produced as a measure. The most common measure is the spectral power density, the output power divided by the bandwidth. As usually used by the CCIR (International Consultative Radio Committee), this is a transmitter quantity, the bandwidth being of the emitted signal. It can also be used as a system quantity, with the bandwidth being that of the receiver. Where systems of radically different types are sharing, the CCIR has also used the audio bandwidth and the resulting spectral power density multiplied by transmitted bandwidth, which is just the total power radiated.

Change in system design can yield a gain or loss in communication capability. At present there is no standard for this. One I have used is based on the fact that the measure should increase as transmitted information power increases, and also increase as the receiver input needed to give a fixed output signal-to-noise ratio decreases. This leads to the ratio of transmitted information power divided by required receiver input (for standard output S/N) as the measure for communication potential.

Suppose we apply these concepts to a simple "narrow-band phone" system, in which the modulation is folded to give a signal of just half the usual bandwidth. With no power change, the spectral power density will double, so the interference potential has increased by 3 dB. At the receiver, the information power is the same, but the receiver noise will be less by a factor of two because of the decreased bandwidth, so the communication potential also increases by 3 dB. Using the ratio of the two measures as the net effect, there is no overall gain or loss.

With respect to standard receivers, the total power radiated is the same, so there is no change in relative interference. Assuming the signal can be read, there is no change in communication potential. However, if two stations should be introduced to take advantage of the apparent gain due to decreased bandwidth, the interference would increase by 3 dB. The increase, however, is because of the increase in number of stations, and not because of the modulation scheme.

This analysis is obviously simplified, both in assumptions as to the system employed and in neglect of such factors as changes in subjective interference with pitch changes, etc. However, I believe the analysis does show the dangers of using emitted bandwidth as the only measure of improvement.

It is instructive to apply these principles to other situations. For the old argument of ssb versus a-m, we find a reduction of interference potential of about 16 dB for ssb, but a loss in communication potential of 3 dB (due to the fact that there is no second sideband to add coherently). Overall, there is a net gain of about 20:1, but this is caused by the elimination of the carrier, and not by the reduction in bandwidth.

Many stations are using speech processors. These increase the average radiated power, typically by 6 to 10 dB. Under weak-signal conditions this increases the communication effectiveness; subjectively, the gain may be very great. However, the processor also increases the interference potential by the same 6 to 10 dB, and, under strong signal conditions, the processor may actually reduce the subjective communications potential. Overall, the processor is worthwhile only if kept switched out unless needed.

Because it occupies the same bandwidth, slow-scan TV has been placed in the phone segments of the amateur bands. However, since its carrier is on 100 percent of the time, SSTV has about 16-dB greater interference potential than ssb. If slow scan were sharing with cw, assuming 200 Hz as a practical receiver bandwidth, slow scan would have about 10-dB less interference potential than a cw signal of equal strength.

These examples seem to say that we need to reexamine the principles of sharing in the Amateur Service. In particular, they do seem to indicate clearly that bandwidth alone is not the proper criteria for making decisions. — *R. P. Haviland, W4MB, 2100 S. Nova Rd., Box 45, Daytona Beach, FL 32019*

FURTHER NOTES ON THE MORSE KEYBOARD

☐ For the benefit of the many amateurs who are building the "Inexpensive Morse Keyboard" described in *QST* for January, 1978, these corrections have been furnished by the author. In transposing the article for publication, the data inputs to U9 and U10 were reversed. These exchanges should be made.

IC	*Pin*				*IC*	*Pin*
U9	12	Change	lead	to	U10	11
U9	11	"	"	"	U10	10
U9	10	"	"	"	U10	9
U10	11	"	"	"	U9	12
U10	10	"	"	"	U9	11
U10	9	"	"	"	U9	10

U1B 15 Connect to pin 13 of U2B (not pin 3).
U6 6 & 7 Connect to ground.

Other changes:
A8 is connected to pin 14 of U12 (not pin 13).
E goes from A7 to B5.
F goes from A5 to B3.
Comma goes from A8 to B4.
Period goes from A9 to B5.
Connect a 100-kΩ resistor from pins 5 and 6 of U11 to ground.
U14 is a type 4001 (not 4011 as shown).
The pinout for the type 4051 IC should indicate pin 1 as I/O-4.

Several builders who have constructed their keyboards from the *QST* article with the aid of these corrections now have working models which verify the basic design. The keyboard runs best from an 8- to 13-volt supply. If a relay is used, it must be suited to the supply voltage. A series resistor may be added to the coil circuit for those cases where the supply voltage is higher than the rated voltage of the relay coil.

My advice for those amateurs who may be unsure of the keying method provided in a particular transmitter is that a reed relay should be used in the keying circuit rather than some solid-state method. If the transmitter is a vacuum-tube type, relay sticking may be avoided by placing a 100-ohm resistor in series with the relay contacts.

This keyboard will not send a seven-dot error character. I use the question mark to correct errors, which, incidentally, seldom occur with a Morse keyboard. One could program a six-dot character for errors by connecting the switch from pin 4 of U12 to B7. The board is capable of sending Morse code faster than human fingers can move. If it does not perform fast enough to suit the operator, then the 0.1-μF capacitor between U3D and U3C should be lowered.

There is no easy way to add a weight control or vary the ratio of dots to dashes. The ratio is set to a perfect three-to-one relationship. I don't know why anyone would want to change it.

No pc boards have been made to date. Radio Shack has a universal DIP board similar to the one I used. The part no. is 276-152. As for keyboard sources, here are the names of some suppliers who have sold them: John Meshna, Box 62, E. Lynn, MA 01904; Formula International, 12603 Crenshaw Blvd., Hawthorne, CA 90250; James Electronics, 1021-A Howard Ave., San Carlos, CA 94070; Band F Enterprises, Box 619, Lynnfield, MA 01940 (their stock no. 6M1A 60202 appears to be exactly like mine); Radio Shack recently has had a closeout on a beautiful keyboard.

I'm confident that those who follow the corrected information will find the keyboard they build to be a source of real operating pleasure, as mine has been. If you continue to have difficulty with your board, do write to me, giving as much information as you can. An s.a.s.e. will be appreciated. — *Al Helfrick, K2BLA*

BUYING SURPLUS GEAR

☐ I think that two articles recently published in *QST*[1,2] have made some statements which need to be elaborated upon about military surplus receivers. The general impression that military surplus receivers are "boat anchors" with wide bandwidths and little bandspread is not necessarily true. I do think that beginners with little technical knowledge or without a person with that knowledge to help should be steered away from surplus. Even the so-called, "checked-out" receivers arrive misaligned and frequently without the crystal filters working. Restoration is always required. However, the military surplus receiver is an excellent buy if the ham with a little technical knowledge is willing to allow a few months to bring it to top performance.

The receiver that K2CBY refers to as "what went over big in a B-17" is a winner on cw today. This receiver, the BC-348, is "hot" and boasts a crystal filter. But one of the most widely distributed models, the BC-348-Q, has the crystal in the filter mounted in a plastic holder, and over the years I have always found that the nuts on the bolts giving pressure to the crystal have sunk into the soft plastic, releasing the pressure on the crystal.

The best way to cure this is to clip the four leads to the crystal (actually they are two leads to each of two terminals), then soak the unit in paint thinner to remove the encapsulating wax on it. Then open the unit by removing the two nuts and bolts. Soak the holder and crystal in more paint thinner and reassemble. Put the unit back in place in the radio by soldering the leads in place, but be sure to arrange it with the heads of the bolts up so that in the future they may be tightened again, if necessary. It is not necessary to reencapsulate the crystal.

My BC-348-Q has been running for five years without the crystal being encapsulated and without retightening of the nuts. With the crystal filter I have no trouble separating stations on cw and have found the tuning ratio very satisfactory as compared with many commercial receivers costing much more.

It is necessary to build a power supply for the BC-348, which I did by using the dynamotor chassis within the receiver itself. The dial markings are a little coarse but I have not found this to be a handicap for cw use. I do not recommend the radio for ssb on the air, but it is satisfactory for just listening to ssb. The main problem is just that the BFO is not as stable as one would like, requiring occasional retuning.

K2CBY also states that the R-392 has a bandwidth of 10 kHz; not true. The R-392 has selectable bandwidths of 2, 4 and 8 kHz with extremely sharp skirt selectivity drop-off. It is a world better and functions on ssb with a dial that has markings to 200 Hz and dead-stable calibration. It does have a problem on ssb because of some instability in the BFO. Audio filters are desirable for cw use (although not entirely necessary) since the 2-kHz position is a little wide. This receiver operates on 28 V dc for both the filaments and plates. An external power supply is necessary.

One receiver overlooked by both articles was the Collins R-390, an excellent radio. This receiver operates directly on 120 V ac and needs no conversion. It supplies most everything a ham could want in a receiver. Unfortunately, it is still fairly high priced.

It is true that there is junk on the surplus market, but the above receivers are, I believe, excellent buys. This is particularly so if one realizes that once the radio is restored to initial operation, one is using a radio which cost the government thousands of dollars, let alone the historical interest of being able to say you are using a receiver from a Jeep, a flying fortress, or a PT boat.

Here are some general notes for people who are new at the game of restoring military surplus equipment: Most troubles result from old age. Common maladies are bad tubes, bad switch contacts and dirty controls. [These problems may be found in any equipment, not just surplus. — Ed.] The best procedure is to clean everything with paint thinner (which works wonders). Spray all switch contacts and wiping contacts on variable capacitors with TV-tuner cleaner. On controls which are sealed and are still noisy when rotated, drill a small hole in the control, spray the tuner cleaner into the hole, and then seal the hole with a piece of tape.

All rotating components, particularly dials, should be lubricated sparingly with household oil (3-In-1). One drop is more than enough in most cases. Keep the oil away from switch contacts and wiper contacts on variable capacitors. A great improvement in appearance can be had by spraying the front panel with clear spray paint. Either mask off the control knobs or remove the entire front panel (which is quite easy on some radios).

With the recent letters in *QST* on the high prices of equipment, I am distressed that more articles on surplus have not appeared, especially since military ssb equipment is starting to show up on the market. I think it is important that members who have had experience in converting and restoring equipment write in so that others may profit from that experience. How about it? — *Joe Stephany, K2KSJ, 950 W. Lake Rd., Williamson, NY 14589*

References

[1]DeMaw, "Your First Receiver — How to Choose It," *QST*, May, 1977.
[2]Anderson, "Technical Correspondence," *QST*, September, 1977.

FURTHER NOTES ON THE ULTRA-MODERN LINEAR AMPLIFIER

☐ In the "Technical Correspondence" column of September 1977 *QST*, I read a letter from W6SAI regarding my "Ultramodern Linear Amplifier" article (*QST* for May, 1977). I am indebted to Mr. Orr for pointing out my drafting error, i.e., the 0.25-A fuse should be placed just ahead of the 4500-ohm, 50-watt, bleeder resistor. Those building a similar screen supply should do so.

Regarding the screen supply, any similarity to the Collins KWS-1 supply was coincidental; I designed mine from an old Aerovox "Research Worker" bulletin, Vol. 20, No. 9, September, 1950. I specifically tailored both the screen and bias supplies to accommodate both the 4CX1000A and 4CX1500B tubes, since these are often available to amateurs.

As for not mentioning parasitic problems and means of suppressing them, I assumed that anyone who would consider building a high-power amplifier such as I described would certainly want to read the data sheets and bulletins provided by the manufacturer regarding the behavior of tetrodes, particularly when using a high-priced tube like the 4CX1500B. — *Carmen F. Moretti, W2AIH, 1619 Boulevard, Peekskill, NY 10566*

Strays

I would like to get in touch with . . .

☐ hams using solid tubes in the Heathkit SB series of transceivers. Lloyd Gosa, WB8TNC, 1423 Upland Drive, Kalamazoo, MI 49001.

☐ other Hewlett-Packard employees for the purpose of creating an active club. Pete Olin, WA2IZP, HP, W120 Century Rd., Paramus, NJ 07652.

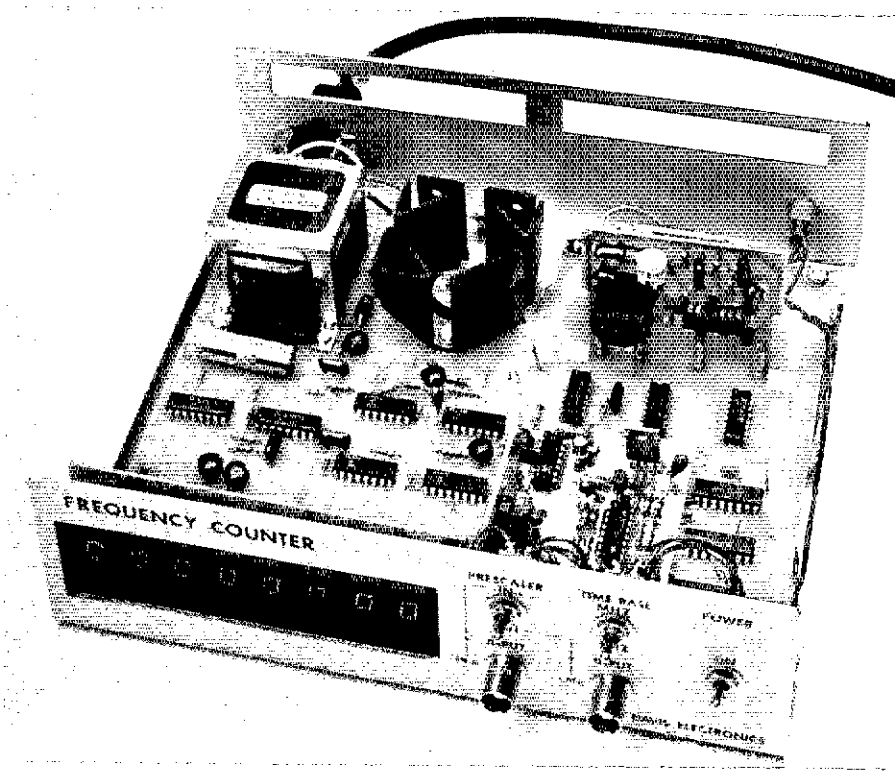
☐ members of a technical net that assists people with troubleshooting and other technical problems. Sandy Walch, WB4DTS, Box 615, Williston, FL 32696.

☐ cw operators in the state of South Dakota, to complete my WAS. Antonio Villano, CX7BBB, Box 37, Montevideo, URUGUAY.

Product Review

The Davis CTR-2-500 Frequency Counter

Ask the man who owns one and invariably he will admit that his frequency counter is one of his most useful troubleshooting instruments. Amateurs who realize the advantage of having a counter and who are in the market for one will do well to consider the Davis Electronics CTR-2-500 kit. This is a wide-range frequency counter developed especially for communications, engineering laboratories, and general electronics work. A built-in prescaler extends the frequency coverage to 512 MHz.



This view shows the neat appearance of the Davis counter. The time-base oscillator is visible at the right rear on the vertically mounted board.

The Package

The CTR-2-500 is available as a kit or may be purchased completely wired by the manufacturer. Optional equipment includes a precision, oven-controlled, time-base oscillator board for greater stability. Other options include 0.43-inch, seven-segment-readout LEDs instead of the 0.3-inch size, and a 10-second readout delay for extending the display time.

A contemporary style enclosure of heavy-gauge metal not only makes this counter attractive, but also rugged. Measurements for this 3-pound, 10-ounce (1.64 kg) device are (HWD): 8 × 8.8 × 8.0 inches (71 × 223 × 203 mm).

Two signal-input BNC connectors are mounted on the front panel for access to a 1-megohm, low-frequency feed point and a 50-ohm, high-frequency input for the prescaler. Power is applied at the rear of the chassis. For units having the 12-V option, a four-contact Jones receptacle accommodates both the 12- and 117-V supply lines which are separate, detachable cables made to connect to each respective voltage source. Selection of either of two time bases and the engaging of the preselector are controlled by front panel switches. For units with the 10-second option, a delay switch is rear mounted.

Other Considerations

When selecting a counter, the prospective purchaser should not only consider the frequency range and sensitivity of the device, but thought should be given also to such specifications as resolution, accuracy and stability. In these areas the CTR-2 performs very well.

For frequencies of 50 MHz and below a resolution of 1 Hz may be achieved with the time-base switch in the kHz position and utilizing the 1-megohm direct input but not the prescaler. A resolution of 0.1 Hz is possible with the 10-second option. By placing the time-base switch in the MHz position and again utilizing the 1-megohm input, signals can be measured with a resolution of 1 kHz. The latter position is useful for reading the output of a signal generator while searching for a specific frequency. With the built-in prescaler, the CTR-2 will measure over 500 MHz with a resolution of 10 Hz or 10 kHz depending upon the position of the time-base switch.

Sensitivity is rated at 10 mV at 25 MHz, and 150 mV at 500 MHz. Accuracy has been established at ± 1 count ± the time base accuracy. Temperature stability for units with the standard TCXO oscillator is ±2 ppm for 15° to 55°C. For those units having the oven-controlled crystal option, the temperature stability is ±0.5 ppm, 0° to 60°C.

Although a special probe is not required for use with the CTR-2, some users may find using a 10:1 oscilloscope probe or the Davis Electronics counter probe advantageous where a higher input impedance may be required. Another aspect of the CTR-2 that users will appreciate is the provision for expansion and options; the prescaler and time-base oscillator are designed as plug-in modules. Diode protection provides a maximum safe input rated at 120-V rms up to 10 MHz, and 2.5-V rms at 500 MHz.

A Builder's Comment

Kit builders with proficiency in doing close work on printed circuits requiring numerous ICs should be able to assemble the CTR-2-500 over a weekend. Working at a less experienced pace, I spent two weekends being extra cautious with my efforts. Work, nevertheless, must be performed carefully while following the step-by-step procedures detailed in the manual. Calibration by using WWV as a standard was easily performed. Laboratory tests confirmed specifications provided by the manufacturer with the exception of not being able to quite reach 10 Hz on the lower-frequency limit.

With regard to the manual, I would have appreciated an enlarged overview at the beginning. This could include a brief summary of the options available and their relation to the instrument being constructed. A separate category for information pertaining to units powered only by 117 V and another for information applying to those with the 12-V option could avoid a measure of uncertainty. Mention might also be made of the need to remove a jumper in the dividing chain when the 10-second switch is to be installed. The latter point, however, is obvious at the time of installation.

Information about the CTR-2-500 may be obtained by contacting Davis Electronics, 636 Sheridan Dr., Tonawanda, NY 14150. Tel. 716-874-5848. The kit price class is $250; assembled, $350. Davis also makes both high-impedance and low-impedance probes, available at a price class of $15. In addition they manufacture a prewired, preamplified probe. — *WIJEC*

THE L-TRONICS LITTLE L-PER VHF DIRECTION FINDER

If your interests lie in fm and repeaters, civil defense, or just hidden-transmitter hunting, you've probably wished some company would market a direction finder for vhf or uhf. Aside from "bunny hunts" and the tracking of repeater jammers, such a device would be useful in emergency work where it might be necessary to find a disabled vehicle carrying a vhf transmitter. The L-Tronics Company of

Santa Barbara, CA, has recently introduced a radio direction finder suitable for use from between 100 and 470 MHz.

Direction finders basically consist of a receiver with some type of analog indication of signal strength or phase, and a directional antenna. The Little L-Per is no exception. The dual-conversion fm receiver is equipped with a dual-function meter which indicates either signal strength or the phase difference between two dipole antennas. Separate rf decks may be installed, allowing operation on any two of the ranges shown in the table. Operation on up to four crystal-controlled frequencies is possible.

We requested the review model be supplied with a crystal for 146.52 MHz, the most popular 2-meter-fm simplex frequency in the Northeast. Also supplied was a dual-dipole array mounted on a collapsible wooden frame. A switching circuit mounted between the antennas is used in the direction-finding mode, to alternately select the antennas. In use, the function switch is first placed in the REC position and the antenna rotated until the signal is strongest. The SENSITIVITY control is adjusted so that the meter indicates about half-scale deflection. When the function switch is placed in the DF position, rotating the antenna will cause the meter to indicate from minimum to maximum as the target is scanned. At two positions the meter will be at center scale. Target position is then perpendicular to the antenna plane. This might seem to provide ambiguous results as target location could be in either of two directions. If the operator is properly oriented, turning the antenna counterclockwise as viewed from above (operator turns to his left) will cause the meter to deflect to the right. If turning to the left causes the meter to deflect to the left, the operator is oriented 180 degrees from the target. This simple memory requirement is the most difficult part of operating the Little L-Per.

A built-in speaker and volume control are provided but a separate headphone may be used if desired. Because the Little L-Per was designed for use by nontechnical persons, the manufacturer elected to delete the squelch control commonly found on fm receivers, fearing that an inexperienced operator would advance the control too far and effectively degrade the sensitivity. The circuit diagram of a suitable squelch circuit is provided in the instruction manual for those desiring this feature. Power for the receiver is provided from two 9-volt batteries installed in the case. The batteries are connected in parallel, indicating that limited operation from one battery would be possible in an emergency. Internal voltage regulators allow operation from an external source of 10- to 30-V dc. Power consumption with fresh batteries varies from 20 to 130 mA, depending on the position of the volume control.* Receiver sensitivity was measured at 0.17 microvolt for 10 dB of quieting.* Despite the tiny speaker, audio quality is quite good. The meter is illuminated with a switched red lamp for night use.

As supplied for the review, the Little L-Per is intended for handheld, portable operation. A dual-dipole antenna with a shorter mast is available for use in densely wooded areas. L-Tronics originally designed the unit for use in detecting aircraft emergency-locator transmitters (ELTs), and a variety of antennas are available for mounting on fixed-wing airplanes and helicopters. Aircraft-type antennas may also be mounted on the metal roof of a car or truck. Also available is a combination line-operated power supply and tone-operated squelch circuit. The tone-operated squelch responds to the modulation of an ELT and allows continuous monitoring without hearing the receiver hiss.

*Measured in the ARRL lab.

Table 1
Available Frequency Ranges and Services

MHz	*Band*
100-136	Vhf aircraft
136-160	Amateur, business, marine
160-190	Business, TV
190-235	TV, amateur
270-320	Uhf aircraft
320-400	Uhf aircraft
400-470	Amateur, business

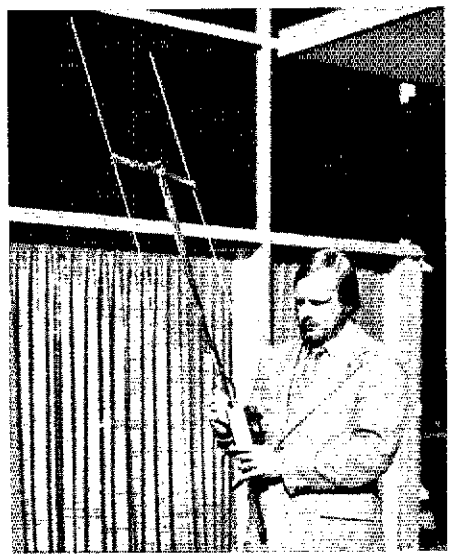
The 44-page instruction manual supplied with the Little L-Per may be described in one word: complete. A thorough description of the receiver is provided in simple terms. Once the unit is unpacked, a few minutes spent reading the first chapter of the manual will allow the operator to begin direction finding. A large, fold-out schematic is provided, as well as a complete parts list. Should service ever be required, a full-page pictorial of the circuit board is given, showing test points. Another page is devoted to listing the correct voltages at the test locations. Installation and operation instructions for the various antennas are given a thorough treatment. A separate 12-page chapter on direction-finding techniques rounds out the manual. This has to be one of the best instruction manuals the reviewer has ever seen. Anyone who has struggled with a tiny, poorly printed schematic diagram or wrestled with the confusing jargon of some technical manuals will surely appreciate this book. Indeed, it amounts to a short course in direction-finding techniques, with experiments.

The receiver portion is enclosed in a 3-5/8 × 4-5/8 × 2-1/4-inch (9.2 × 11.8 × 5.7-cm) die-cast aluminum box. Combined weight of the receiver and antenna is about 2.3 pounds (1 kg).

After reading the manual and getting used to the operating techniques, the reviewer decided to do some hunting. Assuming the station remained on the air long enough to allow a few trial "fixes," it was possible to determine the direction to any station heard. The reviewer lives on top of a mountain and driving around in the valley below sometimes caused loss of signal or confusing results due to the shielding and scattering caused by the New England rocks. This condition probably simulated that which would be experienced in an emergency. In any case, moving to a new location always allowed a fix to be taken which resolved the ambiguity. Potential owners of Little L-Pers are hereby warned that nonamateurs usually react in a negative fashion when they see the direction finder in use! Except when an emergency exists, it would be wise to avoid trying the unit out in residential neighborhoods after dark.

The Little L-Per is the only direction finder currently manufactured with the nonprofessional market in mind. As such, it fills a need which has existed for some time. The unit is available from L-Tronics, 5546 Cathedral Oaks Rd., Santa Barbara, CA 93111. Price class is $180. — *W1XZ*

The Little L-Per with antenna attached is tested by W1XZ. In use, close proximity to reflecting surfaces, such as the League headquarters building in the background, should be avoided.



The fm receiver and indicator circuits of the Little L-Per are enclosed in a die-cast aluminum box. Approximate size may be determined by reference to the BNC connector mounted on the top of the case.

INFO-TECH M-150 AND M-75 RTTY UNITS

Tired of the clatter produced by your pressroom sound-effects generator? (That's a Model 15, 19, 28 or the likes for those of you not afflicted with the RTTY "green-key" craze.) Info-Tech models 150 and 75 offer a silent alternative at a reasonable price!

There are many times when printed copy of a radioteletype transmission is not needed, or wanted — especially with the cost of teleprinter paper continually increasing. Current state of the art in this mode connotes the use of solid-state keyboards and terminal units, video character generators, and TV-style video display which seem to spit out little white letters without expending any energy. Desirable as these systems are to some of us, the retail prices of most video setups are still not within the means of the average RTTY buff.

One of the lower-priced video RTTY arrays currently on the market is the M-150/M-75 combination from Info-Tech. With these two units, a video monitor, and a transceiver, you can RTTY till your fingertips turn blue, and not make a sound (or use up any paper)! That's why video is so neat. Your family will think so too!

The Info-Tech model 75 is an RTTY-to-video, receive-only converter that can transform the audible "beedle-eedle-deedle" emanating from your receiver's speaker into a composite video signal to drive a video monitor. The receiver is tuned to the incoming signal so that the tones at the speaker are between 1200 and 3000 hertz. This 1800-hertz-wide window is the passband of the RTTY converter. Teleprinter speeds can be selected by a knob on the front of the unit. The M-75 is capable of copying 60, 66, 75 or 100 words per minute in the baudot (five-level) code, at 170-, 425- and 850-Hz shifts. The receiver section, which takes the place of the decoder in a regular terminal unit, also contains *mark* and *space* indicators to aid in tuning. Audio-limiter and normal/reverse switches also are present on the M-75 front panel, giving the RTTY man (or woman) maximum control over the decoding of the received signal.

In addition to the on/off switch, power indicator, and controls mentioned above, the M-75 also is supplied with a CLEAR button which wipes the video screen clean, instantly.

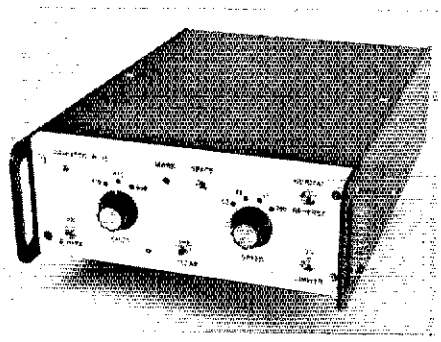
Info-Tech's Model 150 is a solid-state RTTY keyboard and generator with audio (afsk), fsk, and loop-keying outputs. The M-150 is capable of operating at all speeds and shifts mentioned above for the M-75. It also has a provision for cw identification while in the RTTY mode. Typewriter format is used in the M-150, making data entry much easier than on a standard teleprinter. If in the middle of a sentence, for example, you wish to type a number 9, on a teleprinter you must first type *figures*, and then the numeral 9. On a typewriter-style keyboard, you can simply type the 9 and the *figures* character is generated first, automatically! The same is true when returning to the *letters* mode.

When a complete line is typed (either 64 or 72 characters), a *carriage return* (CR) and *line feed* (LF) are sent automatically. The M-150 will not break up words less than six characters long, going through the CR-LF sequence whenever a space is sent within six characters of the end of a line. The keyboard also contains a 64-character, running-buffer memory that allows you to type ahead of the machine's output.

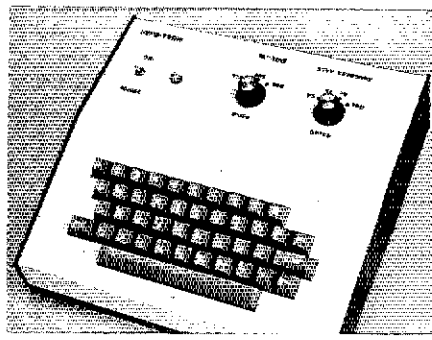
Double-sided, plated-through, glass-epoxy boards are used in both Info-Tech units, and the ICs are socket-mounted. The Model 75 video-generating unit also has automatic-carriage-return, line-feed and unshift-on-space capabilities. These help keep the copy on the screen even when the received copy lacks the proper end-of-line signals, or is being affected by fading. Unshift on space is very helpful when fading is encountered on an RTTY signal, because it keeps your display from spitting out lines of gobbledegook just because a *letters* command was missed during the QSB. Video output from the Info-Tech M-75 also features automatic scrolling, with each new line appearing at the bottom of the screen and old lines moving up and eventually off the top of the screen. For specific data on both units, refer to the table.

A video monitor is also necessary with the M-75/M-150. However, many inexpensive black-and-white television sets can be easily converted to serve as monitors.

For more information on these items, write Info-Tech, Inc., 20 Worthington Dr., St. Louis, MO 63043, or call 314-576-5489. — *WB9VAV*



The Info-Tech M-75 pictured here is an RTTY-to-video receive converter. This single piece of equipment decodes the audio tones received from the station receiver and generates video characters to be viewed on a monitor or TV screen.



With the Info-Tech M-150, the typewriter-style keyboard not only generates the baudot code, but also the audio tones to be fed into the transmitter. Word speeds and frequency shifts are shown on the two knob switches.

Info-Tech Model 75

Description: Audio RTTY-to-video converter.
Input: Audio, 8- to 600-ohms impedance, 1200 to 3000 Hz (from receiver).
Output: Composite video signal, 1.5 V peak to peak, negative sync., horizontal frequency — 15,750 Hz, 75-ohm impedance, 16 lines, 5 × 7-dot matrix, 32 or 72 characters per line (price difference).
Shift select: 170, 425 or 850 Hz.
Speeds: 60, 66, 75, 100 wpm (45, 50, 57 and 74 baud).
Tuning indicator: Two LEDs for mark and space tuning.
Audio limiter switch: Selectable — in or out.
Clear feature: Push button for instant screen clearing.
Norm/reverse switch: For inverting signal when desired.
Size: 3 × 9 × 13 inches (76 × 229 × 330 mm) (HWD).
Weight: 6.25 lbs (2.83 kg).
Power requirements: 115-V ac, 50/60 Hz, 15 watts (230-V ac available).
Price class: $325 (32-character video) or $350 (72-character video).

Info-Tech Model 150

Description: Solid-state RTTY keyboard/generator.
Speeds: 60, 66, 75 and 100 wpm.
Shifts: 170, 425 and 850 Hz.
Identification: Built-in cw i-d provision.
Keyboard: Automatic CR and LF, 64- or 72-character line (specify when ordering), 64-character running buffer.
Rear panel connections: Loop/fsk keying, afsk audio (3.5 V peak to peak), TTL/MOS compatible serial output.
Size: 3 × 12 × 11 inches (76 × 305 × 279 mm) (HWD).
Weight: 4 lbs (1.81 kg).
Power Requirements: 115-V ac, 50/60 Hz, 10 watts.
Price class: $290.

ANTENNA SPECIALISTS HM-187

One of the more common complaints concerning magnetically mounted mobile vhf antennas ("maggie mounts") is that they will not remain on the car at expressway speeds — or in windy weather. Antenna Specialists Co. appears to have mastered this problem in their new 5/8-wave, 2-meter mobile whip antenna. The model HM-187 boasts a very strong magnet secured within a high-quality chrome base. The tapered heavy-duty chrome spring attached to the base mates with a ball-tipped whip which is also quite easy to store in a suitcase, for those traveling by air.

Although the base carries a label reading "138-154 MHz," the data sheet offers a convenient chart for cutting the whip to resonance within the 144-MHz amateur band. The antenna is supplied with 17 feet of RG58/U coax attached to a PL-259 connector. Price class is $32. The HM-187 is manufactured by Antenna Specialists Co., 12435 Euclid Ave., Cleveland OH 44106. — *WA6IDN*

NEW BOOKS

Saga of the Vacuum Tube

Saga of the Vacuum Tube, by Gerald F. J. Tyne, 1st edition. Published by Howard W. Sams & Co., Inc., 4300 West 62nd St., Indianapolis, IN 46268. Soft cover, 5-3/8 × 8-1/2 inches, 494 pages, $9.95.

It isn't often that a reviewer can become ecstatic over a book but it is certainly easy to do so over Tyne's *Saga of the Vacuum Tube*. Gerry Tyne, who is a research associate of Smithsonian Institution worked under a grant from them and the Antique Wireless Association in writing this epic history of the vacuum tube. Tyne has a great deal of expertise in the field of vacuum tubes, beginning his research in the early twenties. The book consists of 22 chapters, starting with electrical developments prior to 1880. Considerable space is devoted to the era of 1910 to 1920 when the military demands served to create many of the advances of the time.

The early days of broadcasting and the roles played by the manufacturers are covered in detail. Not only are manufacturers of the United States treated, but those of most of the major nations of the world as well.

The book is profusely illustrated with photographs of tubes and early equipment. Hundreds of photographs are included — and we do mean hundreds!

If you are "into" antique radio as a hobby, then you certainly need this book for references. If you just happen to be an electronic enthusiast, then we can promise you many hours of enjoyable reading. — *WIICP*

Hints and Kinks

IDEAS FOR BEAM ANTENNAS

Many radio amateurs seem to have coaxial feed lines that eventually break away from the beam assembly of their antennas. My illustrations show how I relieved this problem as well as that of water getting into the cable.

The drawing at lower right is a "plumber's delight" plastic adaptor that can serve as a top bearing for beam antennas. These plastic plumbing components are readily available at many hardware stores. The top cap or bolt and lower sleeve fit or screw together very nicely, making a fine adapter for holding and centering a mast to be installed in an X-type tower. The O ring may be omitted if desired. — *John Kassay, VE3FDK*

COLOR CODE BY ALPHABETIZING

Ever attach a handful of wires in a multiconductor cable to a terminal strip, seal the work off, and then neglect to write down the colors at each terminal? An easy way to eliminate this type of mishap is to always attach wires in alphabetical order. For example if you have four wires, black, red, green and white, you would put Black on terminal 1, Green on terminal 2, Red on terminal 3 and White on terminal 4. If you don't get around to wiring the other end of the cable for a week or two, this method will allow you to easily determine which wires were attached to which terminals.

With larger multiconductor cables containing several wires, use the same approach, but expand the alphabetical order. Consider this example:

BLAck	Pink
BLUe	PUrple
BRown	Red
GREEn	White
GREY	Yellow
Orange	

Where there may be two shades of the same color such as dark blue and light blue, they would be listed as D-BLUe and L-BLUe with D appearing before L. With striped wires, such as blue with red stripe, or white with orange, use this order: BLUe-R, White-O.

Non-striped wires of a particular color should come first, followed by striped. Alphabetize by color of the stripe. Hence:

Code	*Term No.*
D-BLUe	1
D-BLUe-R	2
L-BLUe	3
L-BLUe-O	4
BRown	5
D-GREEn	6
L-GREEn-Y	7

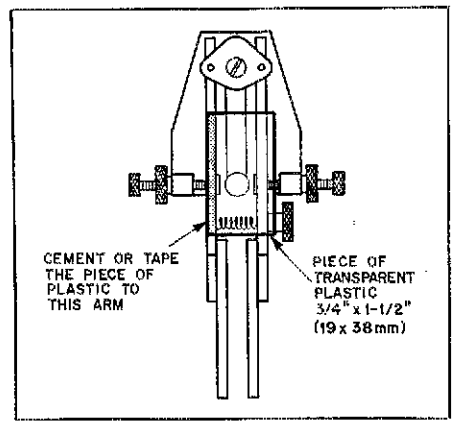
and so on.

Try this next time and avoid a real construction headache. — *WB9VAV*

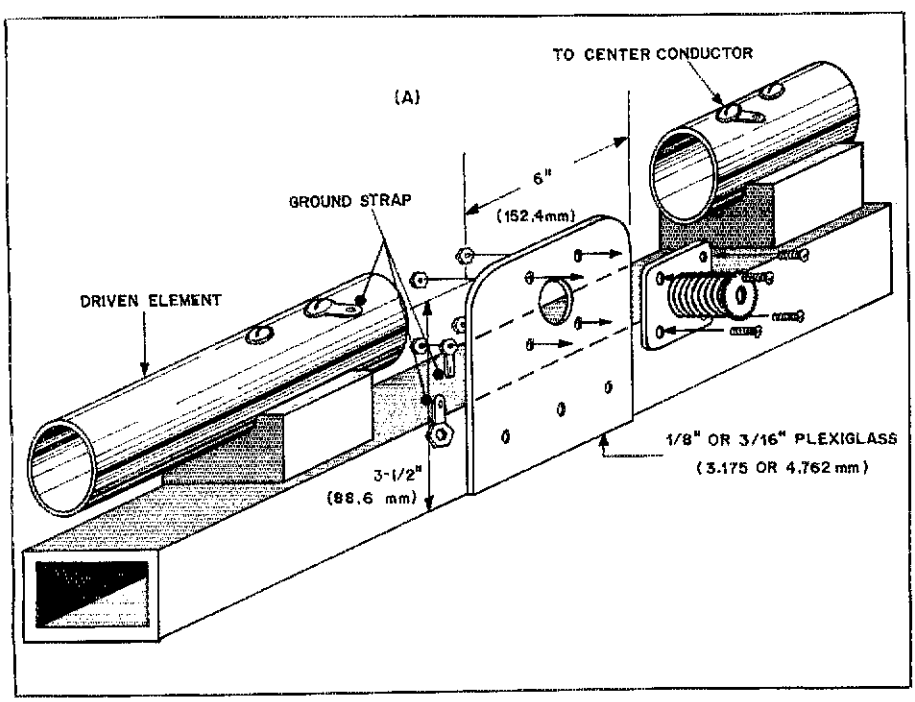
KEY PROTECTOR

The contacts of some keyer paddles are exposed, resulting, in time, in an accumulation of dust and dirt on the contact surfaces. Contact resistance increases when this occurs and greater force often must be applied to the paddles to overcome the condition. Poor contacts also present the risk of missed elements of code characters.

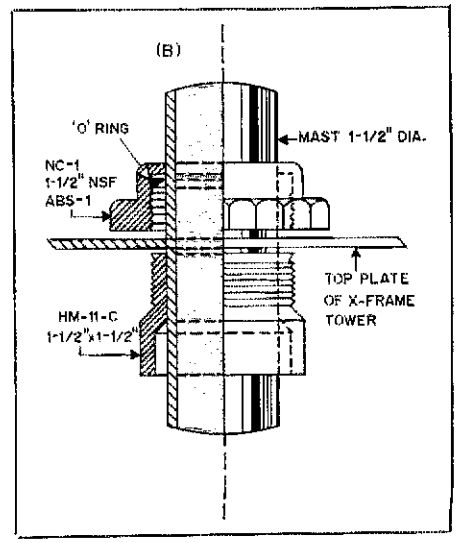
I use the following adaptation on my ham key which prevents such a buildup at these crucial points. A piece of transparent plastic measuring 3/4 × 1-1/2 inches (19 × 38 mm) is cemented to one, and only one, of the paddle arms. Use of double-sided Scotch tape makes removal and remounting of the cover easy when access to the contacts is needed. — *Jose M. Armengol, WA2BNM*



Keyer contacts can be protected from dust and dirt by cementing or taping a plastic cover to one of the keyer paddle arms. Double-sided tape makes removal and remounting easy.



A beam-antenna cable-protecting connector bracket is shown at A. It may be used with the TA-32, TA-33Jr., TA-33 and other beam antennas. A plumber's-delight plastic adaptor for 1-1/2-inch center top bearing for beam antennas is illustrated in B.



INACTIVE S METER

A Heath SB-101, brought to me recently for repair, had an inactive S meter that was most perplexing. The grids of V3 and V4 were found to have a constant positive 11 volts after I disconnected the various branches of the avc circuit in an attempt to isolate the problem. I found that removing the associated relay eliminated the undesired voltage. Ohmmeter pin-to-pin checks indicated that there was no leakage and visual inspection did not reveal any contamination. However, by scraping the ceramic around the pins I chipped away a grey coating which solved the problem. The relay apparently had previously been sprayed with one of the popular contact cleaners, leaving a conductive residue. — *Otho C. Lindsey, W5FR*

CHIPS FROM THE WORKBENCH

☐ If you are good at lettering, you can use typewriter correction paper for making panel labels. Place a small piece of correction paper over the section to be labeled. Use a ball-point pen for lettering the paper. The label is automatically transferred to the panel and should be treated with clear spray lacquer for protection. I use white correction paper to produce a very professional appearance for black panels. Other colors are also available at stationery stores. — *Duane Meyer, W9PVY*

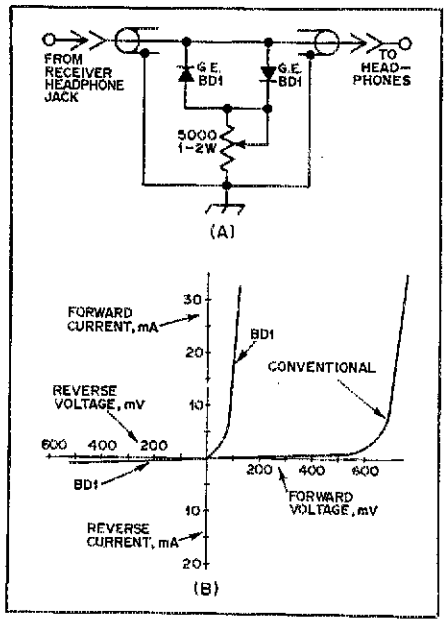
☐ Need a source for small enameled wire such as no. 30? TV yokes offer a lifetime supply of such wire for winding toroids and other small coils. To disassemble such salvaged coils, place them in a sealable container that has been located in open air. Pour in about a half-pint of acetone. Close the container and shake it vigorously. Then allow the coils to remain in the container for five to 10 hours. Remove the coils one at a time and unwind. One yoke will provide about 1000 feet of usable wire. — *H. O. Cantrell, WB5LOT.*

☐ Any screw can be temporarily attached to the blade of a screwdriver for application in hard-to-reach places by first filling the slot in the screw head with dial cord dressing or similar material. — *D. W. Kraeuter*

EFFECTIVE NOISE REDUCER AND HEARING PROTECTOR

With the recent advent of germanium "black diodes" that exhibit very low forward voltage drops compared to conventional germanium and silicon diodes, an exceedingly effective combined noise clipper and hearing protector can be built which plugs into the earphone jack of any receiver. The circuit makes use of two rather expensive General Electric type BD1 germanium back diodes costing about $11 each in small quantities (less in group purchases), and a 5000-ohm potentiometer. The extraordinarily low forward voltage of the BD1 diode as compared with that of a conventional silicon signal diode is illustrated.

Just 10 mA of forward current flows in the BD1 at a forward voltage of only 90 mV, whereas a voltage of over 600 mV is required to obtain the same current flow with a conventional diode. Note also that the BD1 has excellent reverse characteristics with the leakage current being only 1 mA at 440 mV. Taken together, the BD1 characteristics are well worth the $22 cost for this application.



A noise-reducing and hearing-protector circuit for use with receivers is shown in A. Drawing B illustrates the forward characteristic of the BD1 diode versus a conventional diode. The reverse characteristic of a conventional diode is not shown.

When employed as shown in the diagram and set for maximum effectivity, the circuit will clip off excessive peaks of positive and negative noise bursts symetrically without noticeably affecting the amplitude or readability of the desired signal. Also, strong, unwanted signals and "white noise" hiss will be reduced automatically in amplitude to a point where one no longer may be deafened by these assaults on the human ear. Amateurs constantly listening for hours on end to signals of varying amplitude, especially when using earphones, can cause themselves permanent hearing damage unless foolproof protection is provided against excessive signal bursts and noise. This new noise reducer and hearing protector is a dream in actual use. Signal-to-noise improvements of about 10 dB are easily obtained without any adverse difference whatsoever in the readability of very weak DX signals. Actually the weak ones are easier to copy. The absence of adjacent-channel splatter and ear-deafening bursts is almost eerie but indeed a joy to behold. — *Dr. Robert L. Rod, K6FZ*

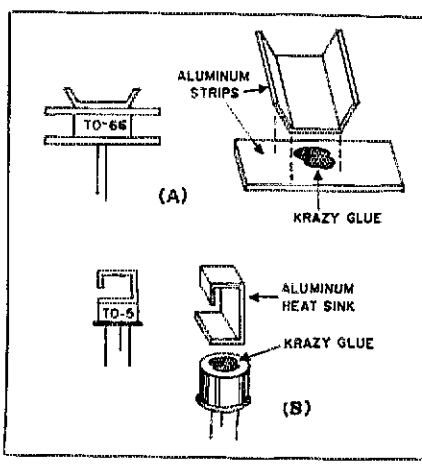
MORE ABOUT AC GROUNDS

While looking through some back issues of *QST*, I came across an item in a July, 1976, copy that drew my attention. The "Hints and Kinks" contribution from B. H. Hansen, W6HOZ, commented on an article by Howard M. Berlin, W3HB (ex-K3NEZ), entitled "Grounding AC Lines." W6HOZ wrote, "When a receptacle is properly mounted in a wall box, the pin-hole GROUND is at the bottom." While this configuration has merit (a power-cord ground pin will be last to break contact when the connector is being disengaged), it also may present a potentially dangerous situation. For example, if a bare wire or screwdriver should drop across the exposed terminals, the resulting short circuit could not only produce unwanted firewor but under hazardous conditions it might tou off a catastrophe.

For some time now, there has been a sta dard practice on new installations, or wh replacing old receptacles, to mount the grou pin at the top as a means of protection agai accidental contact with live pins. Such an in dent recently took place in my medical el tronics department at the Nashville Memor Hospital. — *Dave Miller, WA4ZKZ*

SIMPLE HEAT SINKS

A strong adhesive available at many hardwa stores as Krazy Glue (originally developed f use by NASA) simplifies the mounting of he sinks. Small pieces of aluminum may be c and bent according to the user's needs. Su faces should be as straight and clean as pos ble. Once the heat sink is formed, it may glued directly to the transistor. This can handy for use in places where a convention heat sink is either too difficult to mount, or i sufficient for radiating heat. *The glue shou be used very carefully.* It can be harmful to t skin and can glue one's fingers together. *Patrick K. Garrett, WA4SMU*



Where conventional heat sinks cannot be mounted easily or do not radiate enough heat, simple homemade heat sinks like these can b effective.

FOR THE KENWOOD TS-520

Recently my Kenwood TS-520, when in th receive cw mode, would occasionally jump fr quency. The problem was apparent after I ha tuned in a cw signal and keyed the transmitte Upon returning to the receive mode, the fr quency of the other station appeared to hav changed. This condition did not affec transmission from the Kenwood.

The manufacturer furnished me with thi solution. Remove the cover from the TS-52 Locate the carrier board (X50-0009-01) on th underside of the transceiver. Solder the end c a piece of braid to the lower sideband crysta case (X3). Solder the other end of the braid t the case of T1 which is situated close to th three crystals on the carrier board. The crysta case and T1 should be scraped at the points o connection to assure proper soldering. — *Ro Johnson, WB4GWA*

The Lure of 2 Meters

Part 3: Seven 2-meter enthusiasts tell how and why they operate on the most used of all amateur bands in this conclusion to the series.†

By Paul E. Phelps,* WA8ZLJ/DA1PP, Fred Bonavita,** W5QJM, Jefferson Boyce,*** W7INR/6 and Edward Braddock,**** WB2BAY/W1XV

Whether you're on the road, enjoying another hobby, or just getting back into amateur radio, no type of operating can compare with 2-meter fm. Paul Phelps uses it in Europe to get a feel for the traditions and people of each country he visits. A Texas ham laments the lack of wallpaper for 2-meter operating, a sentiment many of us will share, while an OT tells us how he found new excitement in amateur radio that he'd somehow missed over 36 years of operating. A cross-country train ride is a perfect way to spend time on the most popular amateur band, according to Ed Braddock. This article recounts these adventures, and others, to whet your appetite.

2-Metering Through Europe

Having had the privilege of living in the Federal Republic of Germany for the past four years, I've traveled around much of western Europe with a 2-meter rig. If you're planning a trip, I'd strongly recommend bringing yours. You'll have a ball, and the local folk will thoroughly enjoy your presence. Because of your amateur gear, you'll get to see and do things the average tourist never runs across. I know; it's happened to me.

While in Bergen, Norway, on a Scandinavian vacation, an LA6 was kind enough to help my wife, WA8ZHS and me around the city — on 2 meters. He lives on one of the mountains that surround it and could see us much of the time. Whenever we made a wrong turn or failed to turn where we were supposed to, he politely chewed us out. In so doing, he saved us hours of trial-and-error hunting to find the sights we wanted to see and good parking places. We also obtained local repeater information from our amateur friend. If you should be lucky enough to get invited to a club meeting or other ham function, you can expect to have a great time and meet some great people you wouldn't ordinarily see.

After we had spent five days winding through mountainous country, another friend and his wife stopped at our campsite in Oslo to say hello and provide a repeater map of Norway and Sweden. It's a good thing he did, as he saved us a great deal of time by directing us to a good road north to the Arctic Circle. There's very little 2-meter activity in northern Scandinavia, by the way.

But Stockholm is another story. Every time I got on the air I would finally have to say "73" and just stop operating. And even then I knew there were hams who wanted to contact us but could not because we had to move on, or whatever. As I write this only a short time later, I have already gotten a couple of QSLs from Sweden through direct mail.

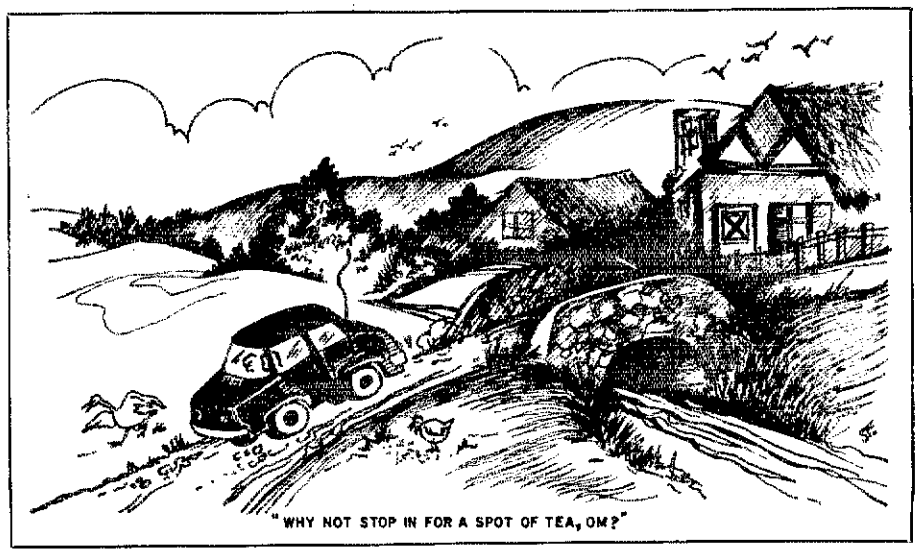
On a 1976 trip to the British Isles, I found that fm is well-established. Most of the amateurs we contacted while wandering around the English countryside were courteous, friendly and more than willing to provide mapping guidance. We were often invited in for a pot of tea or a pint of the local brew. Because our ham friends were kind enough to share their lives with us, we learned and saw things in England that most visitors never find.

"Most Helpful"

While there aren't a great many repeaters in Britain, the local folk are most helpful and anxious to let the traveler use them. While using the North Wales repeater, for example, I was told to "use the machine all you wish to; we can use it any time, but you are only passing through." Now that's courtesy!

I came across some pretty sophisticated gear, too. Some repeaters tell you when you are high or low in frequency or over- or underdeviating. All seem to access with a 1750-Hz tone burst (as do all European repeaters I have used). There is no such thing as a closed repeater in England or the rest of Europe!

Every place we have visited I've met with at least some on-the-air success. There were times I called CQ several times



"WHY NOT STOP IN FOR A SPOT OF TEA, OM?"

*USAH, Nuerenberg, Office of the Chaplain, APO NY 09696
**P. O. Box 12072, Capitol Station, Austin, TX 78711
***360 Sharry Lane, Santa Maria, CA 93454
****P. O. Box 305, Haddonfield, NJ 08033

†Parts 1 and 2 appeared in *QST* for February and March, 1978.

Table 1

European Repeater Frequencies

R0: 145.600
R1: 145.625
R2: 145.650
R3: 145.675
R4: 145.700
R5: 145.725
R6: 145.750
R7: 145.775
R8: 145.800
R9: 145.825

Simplex Frequencies

S0: 145.000
S20: 145.500
S21: 145.525
S22: 145.550
S23: 145.575
S24: 145.600

Note: Repeater frequencies are outputs; inputs are 600 kHz lower. Also, note that simplex frequency S0 is used in some countries as a repeater input frequency.

Table 2

European Countries Holding Reciprocal Agreements with the U.S.

Austria
Belgium
Denmark
Finland
France
Germany (Fed. Rep.)
Ireland
Luxembourg
Monaco
The Netherlands
Norway
Portugal
Sweden
Switzerland
United Kingdom

before someone got the courage to try out his (usually excellent) English on me. But I have never returned from a trip without at least a few contacts — and have always ended up with a batch of QSL cards as well.

A friend accuses me of "license collecting." Since I have nine so far, I suppose there's some truth to it. But every operating experience has been rewarding, and has opened up new places and sometimes new ideas as well. I have been lucky enough to have been enriched by each and every one of them. You'll no doubt feel the same way.

How to Set It Up

The first problem is often the easiest to solve: licensing. With the advent of reciprocal licensing agreements between the U.S. and various other countries (see Table 2), there are few places in western Europe that won't allow a U.S. amateur to operate. The ARRL can furnish licensing data for each country and a quick note to the proper foreign agency will usually result in a speedy response, often in English, and a complete set of application forms. These may need FCC validation, so leave plenty of time.

Fees are low or nonexistent. Many U.S. banks will sell you a check in the appropriate currency. For a $5 maximum fee, you will have invested in a better trip and will gain a deeper appreciation of the people and their way of life.

Language may seem like another drawback; you may feel that there's no use bringing the rig if you don't speak other languages. But it's not so. There are many records and cassettes on the market that will teach you enough to have a simple QSO in most European languages. My experience has been that English is spoken just about everywhere in the world, and many European hams will gladly practice their excellent English with you. You may be the first W/K they have ever spoken to (even if you are "portable DL"). Germany has a version of the Technician class license, as do most countries, and these operators will especially appreciate the "DX."

All 2-meter activity in Europe is between 144 and 146 MHz. Under no circumstances may a ham there operate in the 146-148 MHz part of the 2-meter band. There are 10 repeater and six simplex frequencies. If you know where you will be going, you can obtain a frequency list beforehand from the country's amateur radio society. Repeater maps of many countries can be obtained from the ARRL.

If you've got a synthesized rig or one that is VFO-operated, you're in business. Just throw it in the suitcase, equip it for 220-V ac, add a simple quarter-wave whip, and you're on the air. If you're crystal-controlled, see Table 1 for repeater and simplex frequencies. Handhelds will require recrystalling and, perhaps, retuning.

No Trouble Importing Gear

All European repeaters I've come across are offset 600 kHz down, so there is no need for a +600 offset. I have never had difficulty importing radio gear (although it may make a difference that my car is clearly labeled USA and the license plates read "US FORCES PERSONNEL"). Only in England did a border guard ask me for an operator's license.[1]

In some countries one simply goes to the Post Office, presents his original license and pays the fee to operate. With countries that have reciprocal licensing agreements with the U.S., there is no reason not to have your license in order prior to the trip, however.

Although my wife holds U.S. and German licenses, she is not licensed in other lands, on the theory that one ham at a time was enough. Sometimes we wished it had been otherwise, though, as many people had wanted to speak to her as well.

Keep in mind that third-party traffic is prohibited in most of Europe — persons not holding a valid license in a country cannot talk over the air in that country.

England requires a specific address where you can be reached and a description of the type of equipment you will be using to ensure frequency stability. The inspectors felt that my Heath IM-4100 frequency counter without a scaler was sufficiently accurate.

It might be helpful to carry a letter stating that you are a member of the ARRL. A simple one-line note from your local police precinct to the effect that you are not wanted for a criminal offense may also come in handy when entering Scandinavian countries. — *WA8ZLJ/DA1PP*

Wallpaper for 2

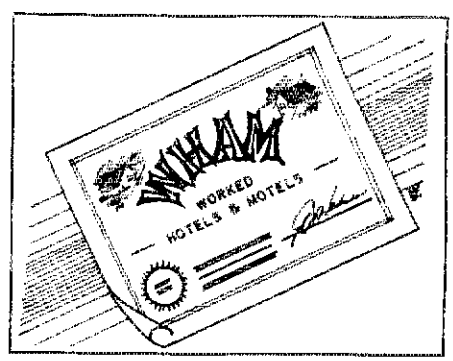
In all the flurry over awards for having worked "X" number of stations in various locations or under varying conditions, the vhf bands have been shortchanged. The staggering number of operators chasing wallpaper these days is ample proof of the interest in and need for more awards.

Where better to begin than the vhf bands? The following list of possible certificates and awards was concocted over lunches of chili-laced hamburgers by members of the Austin Repeater Organization. Although they are all centered around the local repeater, they can easily be adapted to suit local conditions.

As a starter, there is the WASP Award — Worked All States Passing. It is awarded for snagging QSOs with operators from each of the other 49 states who happen to be passing within shouting distance of the local repeater. Motorists from less-populated states might be able to parlay a confirmed WASP contact for a place to sleep during a vacation.

Next is the WHAM Certificate — Worked Hotels and Motels. It cites the long-overlooked early riser who responds to 5 A.M. calls from sleep-laden hams who are about to face yet another day of driving with mom and the kids. To qualify, a local must have worked at least one station at each hotel or motel around the city; a list of them can be obtained from the local tax office.

PAWN goes to those who have Participated in All Weather Nets, particularly those which hit the air every time there is a sudden rain squall to demand that the repeater be cleared for weather-related traffic.



[1]CB is illegal in Britain, and they are trying to keep 27-MHz gear off the island.

The TOTO Award can be won for participating in a QSO (usually one-way after initial contact) with long-winded types who consistently Talk Out the Time-Out on a repeater. Endorsements can be based on the length of time on the time-out: 90 seconds, two minutes, etc. Special endorsements go to those who, after the repeater has recovered, hear from the other end of the QSO: "Golly, Old Man, guess I talked the thing out, but as I was saying . . ."

To stations which Survive All Direction-givers, goes the SAD Certificate. To qualify, one must have asked directions on how to reach a given location, only to have been confronted by contradictory answers. Additional points are earned for each station that replies to the request, with bonuses for on-the-air arguments over the best way to get there. If the original caller reaches his intended destination in spite of the help offered, he wins a special prize.

The Hilltoppers' Award goes to mobile operators who are out-bound from a repeater and who continue to trip it and identify themselves each time they top a hill.

Finally, there is the NCWP Certificate for those Not Chasing Wallpaper. Probably the rarest and most difficult to win, it goes to those hardy souls who establish contact through a repeater and then move to a simplex frequency for an old-fashioned ragchew with no thought to winning an award for the contact. To qualify, of course, both operators will need to exchange NCWP numbers, which can be obtained from. . . . — *W5QJM*

Interest Reborn

"Good morning! Would anyone care to watch this magnificent sunrise with me?" Is that any way for an old-timer with 36 years of cw-only hamming to look for a QSO?

As it has for others, amateur radio has been an up-and-down hobby for me. As children came along, time and interest waned before I'd take occasional excursions back. It was always cw, though, until I finally placed an order for a compact, mobile, ssb rig.

Before it came, I met an ex-cw operator while on a business trip, and my outlook changed abruptly. All this time I had thought 2 meters was only for talking from the top of one hill to the top of another. Was I ever surprised to find myself talking to someone 70 miles away with my new friend's 1-watt handheld. And this from the first floor of a motel in a gully!

I was suddenly excited with ham radio again. The evenings away from home were no longer boring as I explored the capabilities of 2-meter fm and the marvelous repeater system.

After more and more QSOs, I was hooked. A nearby mountaintop provided access to three repeaters and hundred-mile QSOs, all with 1 watt. Why hadn't someone told me about this before? My enthusiasm carried over after my return home, to the point that my wife actually suggested that something like that might be nice for the vacation trip!

After a great deal of helpful advice from the local 2-meter community, I was equipped with a 2-meter mobile rig, complete with autopatch. I suspect that in the beginning I sounded just as green as back 36 years ago when I first hit the key on 40-meter cw. But just as in the old days, the experienced operators were very helpful, and it shortly became routine. But not before the "alligator" had gotten me for talking too long a couple of times and I had inadvertently ended up paging the repeater manager by holding down the last access digit too long.

Only on 2

Our trip provided some memorable experiences that could only have happened on 2 meters. Early one morning (ours began at 4 A.M.), an "anyone up this early?" call on the local repeater brought an immediate response. We were climbing up the deep green west side of the Cascades, and an 18-wheeler came back. As we talked, we realized that we had QSOed the previous week in eastern Washington. Since we were only a few miles apart, and heading in opposite directions, we went to a simplex frequency and kept an eye out for one another. A friendly half-hour QSO kept us both alert and got us through the mountains safe and sound.

We've been on the road three weeks now, and have traveled close to 3000 miles across mountains, over deserts and through corduroy patterns of wheat and alfalfa. Above all, the people have been great: the YL with her wrist in a cast having difficulty operating the mic with the wrong hand; the forest ranger using 2 meters as a link with the outside world; the old-timer who couldn't remember whether he lived north or south of town; the YL who thought 2 meters was a lot more fun than housework; and finally, the 2-meter journeys with so many fine truckers.

There's a feeling of camaraderie on 2-meter fm that seems to exude from everyone on it. And by the way, I did get a response from my "sunrise-watching" call. It came from about 90 miles away, where it was overcast and raining: "Enjoy it for me, OM." — *W7INR/6*

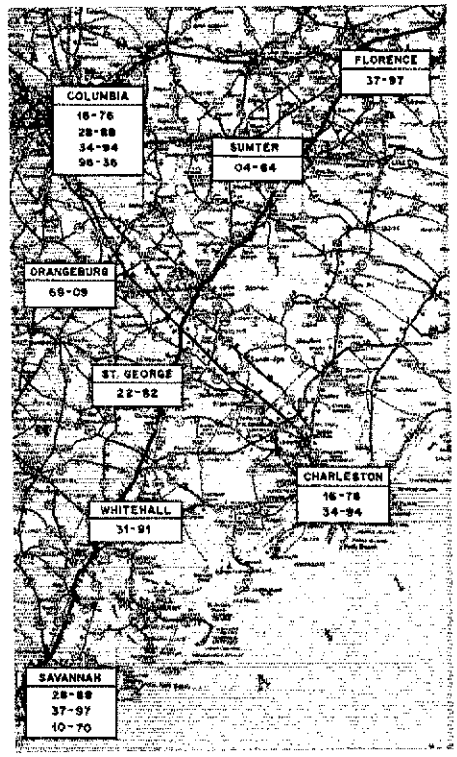


Fig. 1 — Marking off nearby repeaters before you leave makes it a snap to operate on 2 meters while traveling. *(Basic map reproduced by permission of the American Automobile Association, copyright owner.)*

2-Meter Mobiling Made Easy

For years, mobile operators have carried the *ARRL Repeater Directory* on vacations and other long trips. But there are easier ways to plot repeaters on your intended route.

One, suggests Bill Tucker, W4FXE, is to sit down with the *Directory* and state maps before you leave and mark each repeater you'd like to work directly on the map. It's easier to read if white correction fluid used by typists is dabbed just below the repeater location. After it dries, the frequency pairs can be written in. Highlighting the town with a felt-tipped marker makes it stand out even more.

Another handy piece of information is the range of the most popular repeaters in a state, with weight given to those with common frequency pairs.

After traveling the length and breadth of the state of New Mexico, testing the range of 12 repeaters and talking to people who use them, Alex Burr, W5QNQ, drew contours on a state map that would provide the visitor with a guide to where various repeaters can be worked. He admits that your rig, your definition of Q5 and local conditions can all affect the range of a given repeater, but the map is a useful tool just the same. Perhaps residents of other states will do the same, and make such a map available to visitors. — *WA1ZUY*

HAMTRACKING, Coast-to-Coast

Traveling coast-to-coast by train is a way to see the countryside, and bringing

along a 2-meter rig makes it all the more enjoyable. I found that out during a recent trip from Philadelphia to Oakland, CA, for my daughter's wedding.

The happy coincidences that were to continue throughout the trip began upon boarding the *Broadway Limited*. Spying my copy of *QST* from across the aisle, Norm Peterson, W8KSZ, became the ideal companion. His vhf receiver provided a perfect combination: What I missed, he heard.

After a few QSOs through a variety of Pennsylvania repeaters, I talked with "Doc," W3FNT, who remembered the Thanksgiving weekend football game between Penn State and Pitt in 1929. He had been a dental student at Pitt, and I had been cavorting on the field as a member of the Penn State squad.

During a five-hour layover in Chicago the next morning, I left the NiCad battery pack to charge in the AMTRAK service office and proceeded with Norm to the 103rd floor observation deck on the Sears Tower, 1350 feet above the city. Someone had thought to provide 117-V ac outlets at the windows, so I plugged in the rig and worked a local station and a mobile operator across Lake Michigan, 40 miles away.

Upon boarding the *Zephyr* for California, I found that my rig worked fine operating on the 117-V ac outlet in my roomette. I resisted the urge to operate until reaching Denver, where the real thrill came. Who should I hear through the Boulder machine but Walt, W2EA/MØ, a long-time friend who was returning to our home QTH, Haddonfield, NJ, from a visit to his daughter in Denver. There couldn't have been two more surprised hams as we made contact 2000 miles from home.

The longest DX of the trip occurred at Colfax, CA, when WA6EMU advised me he was 125 miles from the train. Many of those I spoke to during the trip were surprised to hear that I was "railway mobile" but most took it in stride.

Still another surprise awaited my arrival in California. It seems my daughter had a CB groundplane on the roof with a convenient RG8/U connection to my room. Although I knew the SWR would be horrible at 146 MHz, I was tempted to try it anyway, as my rig's final stage transistor was fully protected against open or shorted loads (infinite VSWR).

I was able to key up all the Bay-area repeaters I had crystals for, and spent many enjoyable hours on the air. It was a fitting conclusion to a thrilling experience. — *W2BAY/W1XV*

Thrill on 76

"QRZ. This is K8NQN mobile 4, on the Auto Train."

"K8NQN, this is WA4PVT. Welcome to Jacksonville. Name here is Tom, and we just got our Tech ticket a few days ago. You're solid into the repeater. Would you like to hear our 73 tape?"

"WA4PVT, this is K8NQN on the Auto Train. Thanks for the welcome, Tom. Name here is Dave. We're northbound coming into Jacksonville now. I have the handheld on low power, running 2 watts into a rubber duck. We're just starting across a long bridge. I'd appreciate hearing the tape, Tom. Back to you."

"I can see the train! You're crossing the bridge now, and I'm on a 30-foot sailboat, also with a handheld. This is our main repeater, 800 feet up on a bank building. Here's the tape."

Tom punched 73 on his tone encoder and I received an official welcome from the Jacksonville Range Association and WR4AAF. Tom also accessed their 79 tape, and I had a complete rundown of their other repeaters, complete with autopatch codes and an invitation to use their facilities. Recorded southern hospitality was complete even to a meeting invitation.

Tom, I learned, is 16 years old and president of his radio club at Ed White Senior High. We cleared frequency and QSYed to 28/88, their ragchew repeater, which did a similarly fine job for us. As it moved slowly through the city, the train was within range of the repeaters for 20 minutes or so. Needless to say, the novel QSO, Auto Train to sailboat, through two repeaters, rated a QSL card to commemorate an experience to be recalled with pleasure. — *Dave Dobbs, K8NQN*

Strays

RAISING AN ANTENNA CIVIL WAR-STYLE

Many suggestions for putting a random length wire into a tree have appeared from time to time in *QST*. I tried them all without success. Neither the rubber ball nor the arrow seemed to have enough momentum to pull a light nylon string above the 50-foot treetop. So, being a Civil War cannon buff, I thought of a surefire way of doing this. A homebrew, three-inch Coehorn mortar replica was recruited immediately and my arboreal frustrations began to change to a certain, devilish glee as I imagined a look of doubt crossing Murphy's face.

After careful preparation, including attachment of one end of the wire to the house and 200 feet of 3/16-inch nylon cord to the insulator at the other end, I loaded the mortar. The charge was 500 grains of double F black powder to be ignited by a 12-inch safety fuse, followed by five full sheets of newspaper as a driving wad. A one-pound eyebolt and two nuts attached to the cord were placed loosely on top of the wad, and the cord was laid in long zigzags next to the mortar. The gun was set for about 45 degrees of elevation and located 50 feet from the base of the tree.

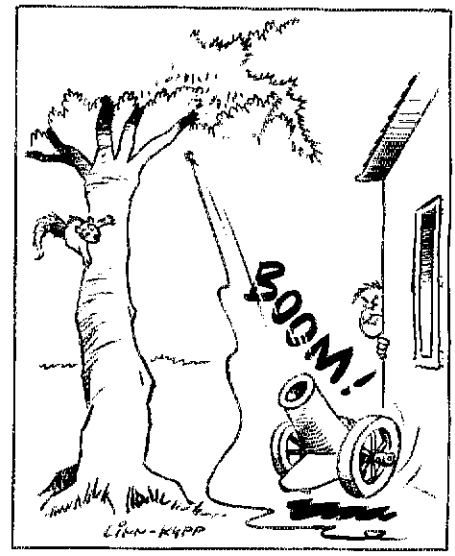
With a twinge of jitters that I remembered from my first QSO, I struck a match, lit the fuse, and retired rapidly to a spot shielded from the mortar but in view of the antenna wire. The 30 seconds between lighting and blast are very much like those just before the code tape begins at the FCC examiner's office. The results are also equally dependent on previous preparation.

I'd strongly recommend to anyone about to take the test that he or she is able to copy at least five words per minute faster than the requirement and copy it solid. This margin of copying ability helps to calm nerves considerably and there isn't a one of us who can lay claim to being utterly calm before a code test. I wasn't utterly calm waiting to have my antenna raised, either.

You're probably wondering what happened to the mortar. Well, the loud boom came and went and the eyebolt went sailing defiantly into the blazing blue Minnesota sky, carrying the line with it. The cord and wire stretched taut, darn near pulling the house down. Everything held, though. The only thing left to do was remove the bolt and tie the rope around the base of the tree.

This skyhook stayed with me for one season — until Murphy had the last laugh by engaging a squirrel to chew through the rope, sending my hard-won victory crashing to the ground.

The moral of the tale? "Never build a squirrel feeder right next to your antenna anchor ropes." — *Carl B. Rayman, WAØRLY*



His Computer Does the Operating

No, Randall Smith, VE3SAT, isn't lazy — far from it! But he's put together a labor-saving, automated station that's years ahead of its time.

By Charles J. Harris, * WB2CHO

It was a typical family meal. An extra place had been set for the dinner guest (me), but otherwise the scene was the same as countless other evening meals. The older son was itching to get back to his bicycle repair, and the younger son was prowling through the kitchen cabinets. My host was leaning back, lighting his ever-present pipe, and his wife was making sure everyone had enough to eat, younger son did not get into anything harmful, older son actually ate his vegetables, and husband did not set fire to the tablecloth with his pipe.

This peaceful scene was disturbed by the soft ringing of a bell in the next room, the radio shack. Immediately, fans came on, pilot lights lit, and there was the clicking of an antenna rotor overhead. Although there was no sound except the bell, one had the impression of great power being unleashed. Suddenly, it was over. The fan turned off, the pilot lights dimmed, the radio shack returned to its former state of inactivity. Throughout the whole procedure, my host never turned his head to glance at the equipment, nor did he interrupt his narrative. It was my first glimpse of a 100-percent-automated amateur radio station!

We were in the small resort town of Barrie, ON, about an hour's drive north of Toronto. My host was Randy Smith, VE3SAT. The automatic station was old hat to Randy; his satellite command station has been completely automated since early 1974.

Dedicated, resourceful, concerned, involved, helpful. Randall Smith, VE3SAT, relaxes with his ever-present pipe. *(WB2CHO photos)*

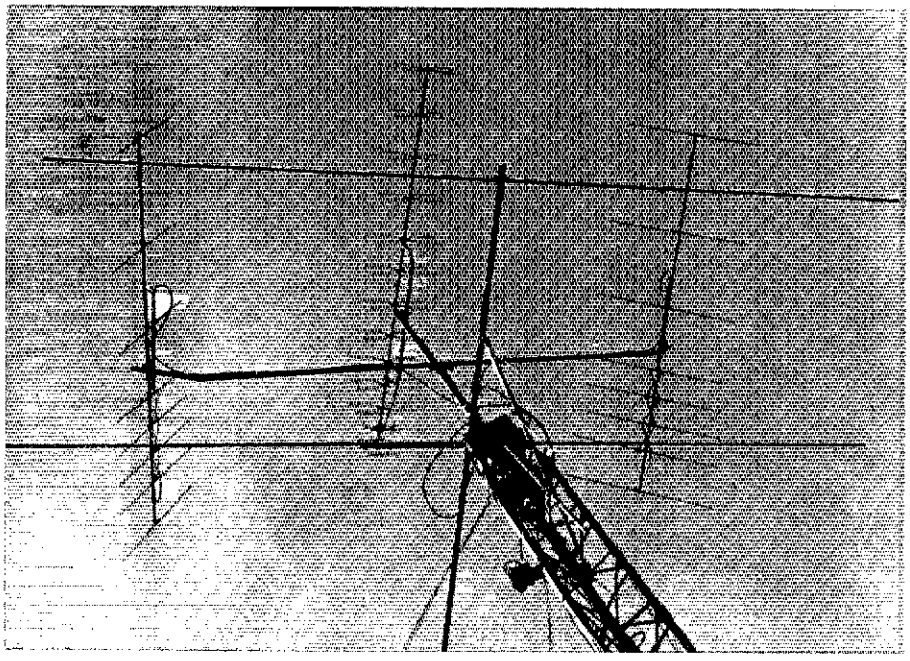
The last two years have seen a great increase in interest in microprocessors and personal computers. And, as with any technical advance, amateur radio operators are among the first to explore and exploit this field. The dream of a completely automated station dances through many an amateur's mind, but Randy Smith took a much more practical viewpoint and automated his station long before the word microprocessor entered the amateur vocabulary. Randy was the North American command station for OSCAR 6 during its lifetime and now serves as the world command station for OSCAR 7. The daily commanding requirements, and Randy's computer-science teaching background, led him to produce one of the first, if not the first, completely automatic amateur stations in regular use.

In a Tiny Corner

The radio shack is located between the kitchen and the living room, but the computer which runs the station hides in a tiny corner of the basement. A large rack with the traditional blinking lights and the usual keyboard is linked by wires and relays to the radio station. But here in the basement is where the real action is. Every piece of equipment is homemade. Even the standard circuit boards are modified, time and again. Heathkit would never recognize their low-band twins, now modified for remote control. Even the standard rotors (donated by a local electronics outlet) overhead are controlled by the computer; the rotor control box is nowhere to be seen.

What does the station do? As a minor part of its work, it keeps track of time,

*Club and Training Manager, ARRL



The antenna farm, since upgraded to az-el mounting: Note circular polarization on the 2-meter antennas.

and thus the position of the satellite through a tracking program. When a command must be sent to the satellite, the equipment is turned on before the satellite comes into range and the antennas are rotated into position. When the satellite rises above the horizon, the commands silently race out. The receiver automatically tracks the satellite's beacon, compensating for Doppler shift, and determines if the command was successful. If not, it is repeated. These commands change the mode of the satellite, load special messages into the Codestore memory, turn the satellite on and off for special purposes, and do just about anything else the AMSAT team decides could and should be done. Careful monitoring of the telemetry and judicious commanding probably added years to the lifetime of OSCAR 6.

All this is handled through the use of software, not hardware. "Most computer hobbyists have not yet touched the possibilities inherent in their system," Randy says. "They want more memory, more cpu capacity, more I/O devices; in short, more hardware. The key to the use of microprocessors is sophisticated software. It's easier to generate audio tones through a computer program, for example, than to devise a mechanism to allow the computer to control a signal generator."

Moonbounce Station to Come

When I queried Randy about his operating habits, as opposed to those of his computer, he smiled. "It's really too much work to break down the remote-control devices and operate manually. And I always forget to hook up at least one wire when finished, so I pretty much let the computer do the operating." Sounds like what happens when a second ham license appears in the family, I thought to myself. Meanwhile, work on the 432-MHz moonbounce station continues.

Despite all his sophisticated equipment, Randy is no stranger to manual operation. His satellite achievements alone are outstanding, once you penetrate the mantle of modesty which prevents his blowing his own horn. "I have 62 countries and 49 states confirmed through OSCAR," he says. "Hawaii simply is not in range of Barrie. I guess I'll have to wait for Phase III.[1] Any memorable firsts? I completed the first North America-to-Europe contact via OSCAR 6, the first NA-to-Russia contact on the same satellite, the first access of a computer via amateur satellite, and I was the first North American station to hear OSCAR 7."

Randy's amateur career includes more than satellites. His active involvement in vhf activities dates to his VE6AHE days in Alberta. "The latitude of the military base was so high that we were behind the aurora most of the time," he recalls. "Still have that problem here, as a matter of fact. That reminds me of one of Wayne Overbeck's (N6NB) boondoggle vhf DX-peditions to Alaska.[2] The aurora was strong, and stateside stations were making maximum use of the fluttery signals. But K6YNB/KL7 could not penetrate the auroral curtain to hand out Alaska contacts to the 6-meter gang to the south. Instead, he gave me contact number 13 with a KL7 on 6 meters!"

What kind of person devotes three to four hours each day to a voluntary activity such as satellite commanding? The way he approaches his job as a computer-science teacher for the Canadian Armed Forces gives us some hints. He carries the unique attributes of the good teacher: patient and understanding, always helpful, even late at night, and always helping the student find the answer himself, rather than just telling him. This shows in his home life as well.

During our interview the phone rang several times with requests for advice or parts procurement from local amateurs. One stopped by with his attempt at matching sections for an array of 432-MHz antennas. Randy quietly and smoothly pointed out the errors, and using *The ARRL Antenna Book*, showed the visitor how to find the correct information.

Software Takes Precedence

His resourcefulness was put to a test when he was putting the final touches on his computer. "We are faced with a very difficult parts-procurement problem up here," he explains. "The only solution is to look at the ultimate job and see other ways of achieving that goal. For example, I needed a real-time clock to control the computer. The only clock chip I could find was a rejected Radio Shack one that ran 30 seconds a day fast. After talking the Radio Shack people out of this chip, which they could never sell anyway, I just wrote a program to shut the clock off for 30 seconds every day. Again, that's the value of software over hardware."

Picking up a small desk lamp built out of a coffee can, he adds, "Here's another example of the same thing." I was about to mention that I, too, had made lamps out of coffee cans, but Randy continues. "I needed a PROM (programmable read-only memory) eraser. This is a fancy ultraviolet lamp and housing well beyond the reach of my budget. So I searched around and found a lamp which produces the same wavelength ultraviolet light. A bulb used in electric clothes dryers to sterilize the laundry fit the bill. But it needed an expensive ballast resistor. Fortunately, a standard 40-watt light bulb has the correct resistance."

The device I had thought was a lamp doubles as a PROM eraser! The can blocks the eye-damaging ultraviolet light.

Randy couples this resourcefulness with an unmatched dedication. Not only has he given literally thousands of hours of his time to the satellite program, but he also takes the daily nature of his duties very seriously. When a fire in some equipment

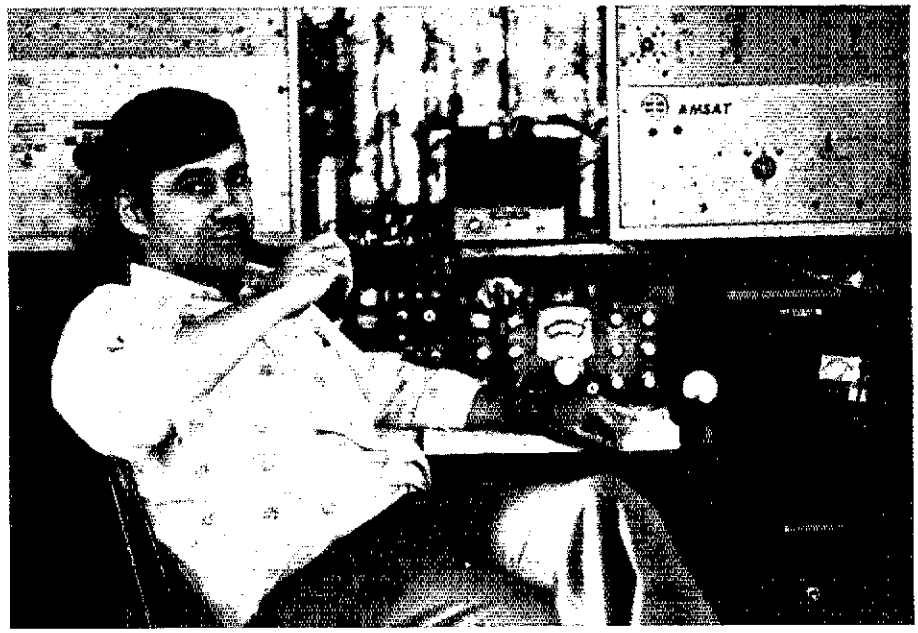
[1]Kleinman, *Getting to Know OSCAR — From the Ground Up*, ARRL, page 31.
[2]Overbeck, Wayne, *Moonbounce Boondoggle*, *QST* for February, 1977, page 45.

knocked him off the air, his first concern was for the command schedule.

At the same time, he stays on top of the complicated and rapidly changing Canadian amateur politics, while keeping up with the latest developments in the World Administrative Radio Conference preparation.

How does a person like this relax? Watching "Wonder Woman" on the tube, and with his family. No, his younger son is not named Oscar. His name is Heath, universally known to visiting hams as Heathkit.

In spite of years of commanding satellites, contending with equipment fires, and thousands of hours developing and debugging equipment and programs, Randy has yet to produce a gray hair. But he has gained a real appreciation of what it takes to be a satellite command station: "After four years of commanding, I am thoroughly convinced that satellites have minds of their own, and they work in conjunction with Murphy's Law."



Surrounded by banks of homebrew equipment, Randy lets the computer do the operating.

Strays

CLOUDS PART, OSCAR 8 FLIES

☐ It had rained in southern California for weeks, and the weather wasn't promising on March 5, the scheduled launch date of amateur radio's newest piece of space hardware, OSCAR 8. A couple of hours before zero hour, however, the clouds parted and the rains stopped. OSCAR 8 was launched from Vandenburg Air Force Base, CA, without incident at 1754 UTC. Rain clouds again appeared soon afterwards.

The first stations to report hearing the satellite's telemetry were G2BVN and GM8BVE, only 12 minutes after it had separated from the launch vehicle. It was smooth sailing from then on. When the 10-meter antennas were deployed by North American command station VE3SAT on orbit 5, the Mode A telemetry beacon was heard by tracking stations around the world, and vital data were relayed to AMSAT and ARRL officials.

During the critical hours followed launch, W1AW relayed bulletins to amateur radio operators worldwide as each milestone was reached during the exciting first hours of OSCAR 8's lifetime. NBC-TV News Commentator Roy Neal, K6DUE, informed the general viewing audience on the Sunday evening news. With all systems "go," it looks as though OSCAR 8 will be in the skies for years to come. For further information about OSCAR 8, see "A Brand-New OSCAR," January *QST*, pages 55-57, and "Tracking the Next OSCAR," February *QST*, pages 38-40.

When can you listen for OSCAR 8? Drop a line to ARRL Satellite Coordinator Bernie Glassmeyer, W9KDR, and ask for the OSCAR 8 reference orbit schedule and overlay for your OSCARLOCATOR. Please enclose a business sized s.a.s.e. for the schedule and a 9 × 12 s.a.s.e. for the overlay.

For updated reference orbit data, tune in W1AW bulletins. After a precise determination of orbital data can be made, the OSCAR 8 reference orbit schedule will appear in the "Operating News" section of *QST*.

Five days before launch, OSCAR 8 was "mated" to the second stage of the Delta rocket. ARRL Satellite Coordinator Bernie Glassmeyer, W9KDR (at far right), and Southwestern Division Vice Director Jay Holladay, W6EJJ, stand by as a solar array protective cover is mounted on the tiny bird by Project OSCAR's Lance Ginner, K6GSJ, and AMSAT's Jan King, W3GEY. *The cover was* removed prior to launch. The mating operation was supervised by a McDonnell Douglas crew headed by Ed Sage, WB6ORS. *(W3PK photo)*

Two Sides of the Public Service Story

Will you be ready if your emergency drill turns into the real thing? These two operations taught their participants valuable lessons.

By Shelby Ennis,* W8WN, George LaVere,** K8ZIS, D. I. Lorenzen,*** VE3CZL and Stan Horzepa,**** WA1LOU

Two recent, simulated emergency drills demonstrate how the same goal — to test the emergency capabilities of amateur radio — can lead to divergent results. Many spirited hams operate in emergency tests to prepare for the real thing. Goals are set and some are achieved. Some are not. And sometimes a real crisis coincides with a drill and new goals are created.

Failure!

In St. Catharines, ON, a test was conducted to coordinate area medical personnel with an emergency situation via amateur radio. The plan for the drill was to set up an emergency communications center at the general hospital linking portable 2-meter stations at a simulated disaster site to local emergency and medical personnel. Simultaneously, the center would be in contact with all hospitals in Ontario through the Medical Amateur Radio Council hf net.

Snow fell on the day before the drill, and gale-force winds caused severe drifting that stalled traffic and stranded people in the outlying areas. A real emergency was unfolding, providing an excellent opportunity to test the capabilities of amateur radio. Hams, who volunteered for the drill, now could participate in an actual emergency.

Meanwhile, the phone rang at the coordinator's home and, one by one, volunteers withdrew from the drill because of the weather. The attrition was such that the 2-meter net was abandoned and CB was used! The hf net operation worked well, but the communications center station was dismantled after the drill due to a lack of participants — and the weather grew worse.

The Niagara Peninsula was paralyzed for three days; communications were nonexistent. Police forces performed without supervision and had no communications link with idle doctors and hospitals. There were poorly coordinated snowmobile rescues and transportation of medical supplies, while the airwaves were alive with hams and CBers who sat at home relaying goodwill messages.

A simple portable antenna was mounted on the roof of the St. Catharines' (ON) hospital. "The simpler — the better" is the rule of thumb for both drill and real emergency operations. *(VE3CZL photo)*

Success!

In May 1977, the Flint, MI, airport and hospital officials simulated a plane crash to test their emergency preparedness. The size of the drill was so large, with hundreds of volunteers, that the participating agencies couldn't handle the communications. Amateur radio was summoned to perform that task.

The plan called for a network of hams to be stationed at the disaster site, at each hospital and at the headquarters of the police, fire, c.d., Red Cross and other emergency groups. Two stations were set up at the airport's fire-rescue center — one to receive communications from the "crash site" on 146.52 simplex, the other to relay into the emergency net via a local 2-meter repeater.

When a fireman tossed a torch into a pit containing jet fuel, a red alert was issued. ". . . there's fire and smoke on the field and a DC-8 with a full load of passengers has crashed on takeoff." Firefighting forces, quickly alerted by the ham radio network, extinguished the fire and began extracting 200 student "victims" from an old bus body which acted as the fuselage of the wrecked plane.

Triage teams (medical personnel who give first aid to casualties at disaster sites) grabbed their equipment and called for police cars to transport them to the

*214 Old Street, Clio, MI 48420
**2408 Calumet, Flint, MI 48503
***Suite 6, Pen. Centre, St. Catharines, ON, Canada L2T 2K9
****Communications Assistant, ARRL

In a field full of air crash "casualties," a Flint, MI, ham strains to hear over the QRN from ambulances, helicopters and fire trucks. *(W8WN photo)*

Amateur radio was the center of attraction when emergency personnel wanted to contact their supervisors for instruction during the Flint, MI, operation. *(W8WN photo)*

"crash." As ambulances arrived to transport "victims," the Amateur Radio Emergency Service (ARES) net operators ascertained which hospitals could accept the variety of injuries, dispatched ambulances to the proper hospitals, directed police cars to strategic locations and performed numerous other tasks.

When a student suffered heat exhaustion, the drill was terminated. The triage teams and "victims" departed and the ARES net was shut down; the hams' job was completed. Afterward, those who planned the drill praised amateur radio's involvement. "It couldn't have been done without the hams' participation," one official said.

Analysis

After reading these two accounts, one may conclude that the Michigan drill was a success, while the Ontario operation was a failure. Such a conclusion is simplistic.

Much planning preceded the Flint test. The potential questions and problems concerning the hams' involvement were answered beforehand. The drill was successful because the planners left little room for failure.

Planning also went into the St. Catharines' operation and the planners thought they had covered all bases. However, one thing that had not been planned for did occur — a real emergency. When it came right down to the nuts and bolts of emergency operating, the tools were lacking. Something was amiss.

The planners had prepared for an operation under ideal conditions; there was no planning for the weather that Murphy blew in. The participants volunteered to operate in a test, not to participate in a real emergency, particularly one involving severe weather conditions.

Building a Nucleus

When organizing a drill, one must consider whether the volunteer, who is ready, willing and able to participate, will be as willing if a real emergency occurs. Alone, the apparent willingness of any volunteer is suspect; an organizer must do some research before including a volunteer in a key position in his plans.

One thing to consider is the past record of the volunteer. Has he or she been active in past emergencies? If the answer is yes, you have a prime candidate. Does the volunteer participate in any public service activities on a continuing basis; is he involved in ARES, NTS or RACES? Such continuing participation is a good indicator of interest in serving the public in emergency situations.

If the organizer chooses key people using the above criteria, the organization will have a strong nucleus and other volunteers can be accepted into the ranks to fill positions of lesser importance. And, if some volunteers later step down in a real emergency, the nucleus of the staff will still be actively participating and can attract other operators, who answer the call when a real emergency occurs.

If the St. Catharines' drill had a nucleus of two or three operators, others would have joined them and ham radio would have played an active role in that emergency. As it was, there was no active nucleus, so, there was nothing to attract others to participate.

No Snags This Time

One year later, the St. Catharines' ARES conducted another drill which simulated blizzard conditions. This time there were no snags. The drill was so organized that if a real emergency had occurred, the drill could easily have swung into a real emergency operation.

A nucleus of operators was set up at local broadcast radio stations with 2-meter equipment. These base stations asked for check-ins and over 50 hams responded. If an actual emergency had occurred, the base operators would be set up and ready to accept all check-ins — volunteers and victims in need of assistance.

Evidently, the difference between failure and success is the key personalities of those who lead the operation. When the core of the group is well organized, it will hold the rest of the organization together in times of stress — in emergency situations. And organizing this core is a prime function of all volunteer coordinators.

Strays

SWL? PSE QSL!

☐ Many countries require that prospective amateurs spend time as an SWL (shortwave listener). The only way these hopeful-hams can prove to their governments that they have logged the required hours/contacts is by submitting the QSLs of the stations they copied.

The ARRL urges all amateurs to respond to QSLs from SWLs. You will not only smooth the way for excellent international relations, but foster friendships and help these men and women earn the license they need to get on the air.

***QST* congratulates . . .**

☐ George A. Morris, VO1MB, recipient of the Canadian Silver Jubilee Medal commemorating the 25th anniversary of the reign of Queen Elizabeth. He is manager of Canadian National Telecommunications, and is active with Scouting and other community activities.

☐ Collier County (FL) ARES/RACES, recipients of a certificate of appreciation from the Joseph P. Kennedy, Jr., Foundation. During the South Florida Special Olympics held last spring, amateurs conducted nets among the various competition sites.

"George, the TV Is Acting Up Again"

The FCC has announced a new approach to the handling of interference complaints. Hams and their neighbors should benefit.

By Charles J. Harris,* WB2CHO

"George, the TV is acting up again."

"Is it that CBer down the street?"

"Well, it's all lines and bars and stuff, and I can hear what sounds like squawking sounds. Is that the CBer?"

"That's him. That new single-sideband rig means we can't even listen to what he is saying. All he does is mess up channels 2 and 5. I've talked to him about this several times, but it doesn't seem to do any good. Not even that expensive filter for the set helps. I guess I'll have to go to the FCC."

Sound familiar? Interference has been around almost as long as radio. The problem has escalated rapidly in the past few years with the advent of power boosters and other illegal amplifiers for 11 meters, but even properly functioning transmitters can get into other electronic devices.

*Club and Training Manager, ARRL

Complaints to Be "Automated"

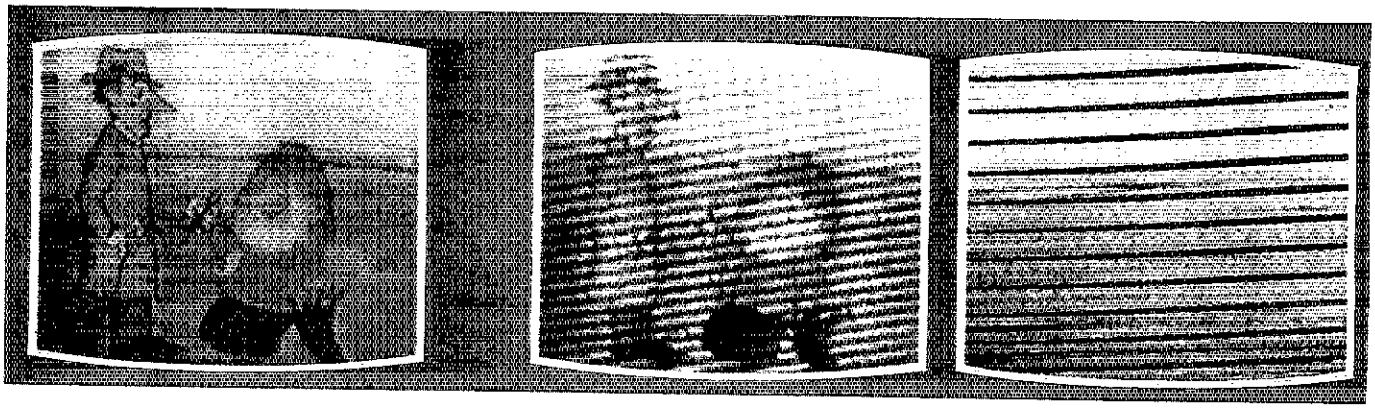
The Federal Communications Commission has recently announced a new policy for handling TVI and RFI complaints. The Field Operations Bureau, which is charged with responding to interference complaints, received more than 140,000 of them in the last year alone. About 85 percent of these were due to CB. In an effort to serve the public without greatly increasing staff size (which Congress has not authorized), the FCC has turned to "automating" interference complaints.

In the past, interference problems have been tossed into the lap of the transmitter operator. When an interference complaint was received by the FCC district office, the amateur or CBer involved was sent a form letter asking for assistance in clearing up the problem. The complainant also received a form letter. The licensed operator then had a limited period of time to attempt to resolve the problem and report back to the FCC office.

With cooperative amateurs, this system worked well. Most hams were sympathetic to the problems of TVI and RFI, and anxious to maintain good relations with the neighbors.

But the increase in illegal operations in the 27-MHz citizens band and the overall increase in the use of both home-entertainment devices and radio transmitters has seriously reduced the effectiveness of this procedure. Now the FCC is going to respond to RFI complaints with sugges-

Like fingerprints, each type of TVI has its own distinctive pattern. The picture at left is normal, but the other two clearly are not. A series of nearly horizontal lines (center picture) means your TV is picking up the transmission of CB, amateur, police or other radio transmitters. It will normally affect vhf channels only. You may notice that the interference pattern changes or moves as the transmitter operator talks. This is not a horizontal control problem. When your set requires adjustment of the horizontal hold control or replacement of a bad tube or component, the pattern shown at right will appear. The sound, if affected, may contain a high-pitched tone.



tions for home remedies contained in a new government publication, *How to Identify and Resolve Radio-TV Interference Problems.* The well-illustrated booklet includes color photos to assist in the diagnosis of the problem, a compilation of simple home remedies and the ARRL RFI Assistance List. Suddenly it is the complainant who must act, rather than the transmitter operator.

Why this switch? According to latest statistics, more than 80 percent of all interference problems are due to deficiencies in the audio or other home-entertainment device; not in the transmitted signal. Many of these can be solved with relatively simple "cures" while others require major alterations of the equipment. In these cases, nothing the transmitter operator can do will help (except stay off the air!).

In some difficult cases of interference, the FCC office might call on local hams or CBers to assist with the problem. The district office will supply a copy of the booklet to the licensee providing such voluntary help. The ham will not ordinarily be required to act or respond in a given time; the burden is now on the complainant to follow up on the problem.

The booklet contains an information form which can be filled out and returned to the FCC office, if the initial remedies do not work. This form will help FCC engineers suggest alternative approaches to the problem. In severe, repeated cases of obvious harmonic interference, where the transmitter is clearly at fault, the FCC can still require action on the part of the licensee (such as the installation of the low-pass filter). This would be the exception, rather than the rule, however.

Irresolvable Problems

Not every interference problem can be amicably solved. Some require the direct involvement of government personnel. How are these handled? When all else fails, the FCC considers the problem to be an enforcement question. The information is placed in a "trip file" along with complaints about illegal operation, and other problems. The region with the most complaints qualifies for the next visit by the FCC enforcement team. With log information (most radio operators have regular operating habits), the FCC engineers can make good use of the data in the trip file in locating and identifying illegal operators. The limited personnel and available time restrict immediate action in most cases not involving safety of life or property. But the FCC does not forget, and the next time they are in town, they'll be looking for the chronic offender.

This enlightened approach on the part of the Commission toward interference, coupled with stricter harmonic suppression requirements on new CB radios, should help curb the growing interference problem.

For your copy of the new booklet, *How to Identify and Resolve Radio-TV Interference Problems,* send $1.50 to Consumer Information Center, Dept. 051F, Pueblo, CO 81009.

Possible Solutions

Aware of the difficulties that RFI can cause, League headquarters has resources that will assist you, whether you are a victim or a cause of RFI. A packet of information containing an updated manufacturer's list, reprints of RFI articles, and a variety of other pertinent information is available free of charge. Just send a 9 × 12 stamped (35 cents) envelope to Special Requests, ARRL hq., for your copy of the ARRL RFI Packet.

A comprehensive booklet covering RFI basics — public relations aspects, technical details, types of interference, and suggestions of what to do if the problem should strike your home or shack — will be available from League hq. and outlets that sell ARRL publications later this year.

If after searching through published material you haven't found a solution, write the Technical Information Service at League hq., including as much detail as possible. A knowledgeable staffer will research the problem and suggest specific solutions or sources of further information.

Combined with the FCC's increased attention to the problem, a greater awareness of RFI and all its facets will do a great deal to reduce its effects.

What to Do If YOU are Accused of Causing RFI

1) Check your log. Were you operating at that time? (A complete log, although no longer required by the FCC, is very useful in interference situations.)

2) Check with *your* nonamateur equipment. If you are not interfering with your own TV set, chances are the problem lies with your neighbor's *receiver* and not your *transmitter.*

3) Solicit the cooperation of your neighbor in testing to determine the exact cause of the interference.

4) Check with your local radio club for a TVI committee or other assistance.

5) Request RFI assistance from the manufacturer of the home-entertainment device. (See "RFI Assistance List," February 1978 *QST,* page 43.)

6) Refer to the ARRL *Radio Amateur's Handbook,* chapter 16, "Interference with other Services," for technical information.

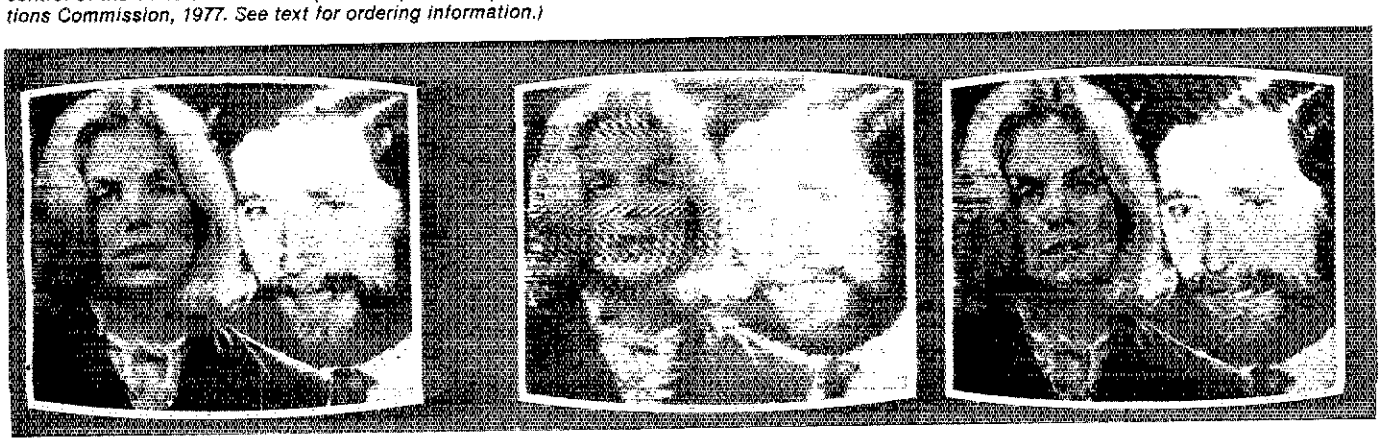
7) Write your Washington representative requesting support of the pending RFI bills: S-864, sponsored by Sen. Goldwater; HR-8079, sponsored by a group of representatives; and HR-8496, sponsored by Rep. Vanik of Ohio.

8) If the fault is in your transmitting equipment, refer to the *Handbook,* the equipment manufacturer or other technical assistance for advice.

9) Be prompt, courteous and helpful; amateur radio's reputation is at stake, as well as your own.

10) For further assistance, write Technical Information Service, ARRL hq. Include as much detail as you can.

Again, the normal picture is at left. At center is an example of interference from a nearby fm broadcast station. Although it normally will affect TV channel 6 only, one additional vhf channel may occasionally be affected. It may affect both picture and sound. A fine-tuning problem is shown at right. Although it looks similar to fm interference, you will note that the pattern changes with the sound of the TV program. Readjust the fine-tuning control of the TV to eliminate the problem. *(Photos reprinted from* How to Identify and Resolve Radio-TV Interference Problems, *Federal Communications Commission, 1977. See text for ordering information.)*



Not Just Bigger — But Better Than Ever

That's how hams feel about amateur radio today according to the results of the League's 1977 survey of amateur opinion. Here are some highlights.

By Don Waters,* WB1CUJ

"In the past I preferred 15 and 20 meters, cw and ssb. For me, amateur radio's primary interest lies in operating challenges. That's why I have always enjoyed DX and contest work and why my principal technical interest lies in antenna design. I intend to become active on 160 meters, and I will probably do a little experimenting on 6 and 2 meters."

As this response indicates, not only are there many more amateurs today than there were a few years ago, but today's hams are on the air more and participating in more activities. That is just one of the conclusions to be drawn from ARRL's 1977 Survey of Radio Amateur Opinion in which more than 3300 amateurs responded to a questionnaire mailed to a statistically random cross section from the *callbook* listing of all licensed U.S. radio amateurs — ARRL members and nonmembers alike. The questions asked were the same in many instances as those asked on a similar survey conducted by ARRL in 1974, so some interesting comparisons can be drawn.

*Public Relations Consultant, ARRL

CBers Plentiful in Ham Ranks

One new question introduced in the 1977 survey sought to determine how many of today's amateurs are or have been CB operators. We've all known that the big recent influx of new hams has included a lot of CBers graduating to our ranks. But how many are now among us has never before been documented. Now we know. A somewhat surprising 49 percent of our survey respondents indicated that they are or have been CB operators; in fact, 44 percent say they presently hold a CB license!

Hams clearly welcomed the survey and the opportunity to register their views. Many supplemented completed questionnaire forms with often-lengthy written comments. "Thanks for a chance to express an opinion," one said. "This is the first survey from the ARRL that I have been asked to respond to," noted another, "and I greatly appreciate the opportunity." A W6 wrote, "Personally, I am pleased to have this opportunity to participate. It shows you are interested in the hams you represent." "Keep sending out surveys," urged another respondent.

Respondents to the latest survey are not only on the air more than ever — they're actively pursuing their interests at hamfests and exhibits, such as Radio Expo '77 in Chicago, which drew 4300 amateurs and potential amateurs.

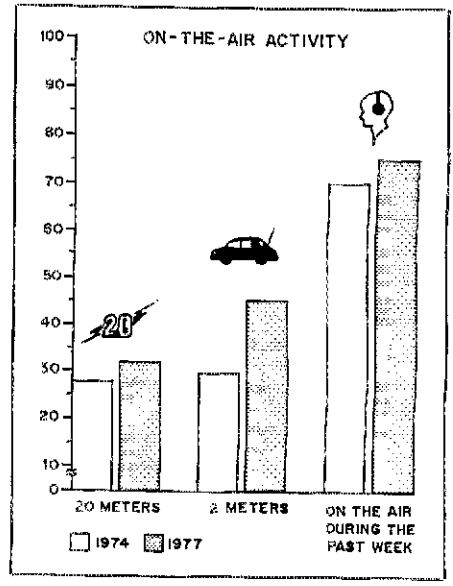


Fig. 1 — As anyone who has been active lately knows, on-the-air activity is up! Three of four respondents now report they spent time on the bands during the previous week, while nearly half of all amateurs operate on 2 meters. Twenty-meter activity is up as well.

"As you know most hams do not sit down and write letters to you expressing their views."

Time on the air — what amateur radio is all about — is up. And more hams are on the air. The proportion who reported that they had spent some time operating during the past seven days was up from 70 percent in 1974 to 75 percent in 1977, and those who said they operated for six or more hours were up from 24 percent to 27 percent. The biggest jump in on-the-air activity, as might be expected, was on 2 meters — 45 percent said they had operated on this band during the past week as compared with only 29 percent in 1974. The increase is due, no doubt, to the increasing popularity of fm and repeaters. Activity on 20 meters, the next most popular band, was up from 27 percent in 1974 to 31 percent in 1977. Also up was use of vhf/uhf, 10 meters, 15 meters and 40 meters. Holding their own or down slightly in usage reported were 6 meters, 75/80 meters and 160 meters. (There may be a seasonal difference in this pattern; the two surveys were taken at different times of the year.)

Three of Five Pound Brass

Cw seems either to be enjoying a renewed surge of interest or to be more popular still than some of us have thought. Fifty-nine percent of those replying to the survey said they use cw — surpassed only by the 62 percent who use ssb. Forty-five percent said they use fm; 15 percent a-m; 7 percent RTTY, 3 percent RC and 1.4 percent each opted for SSTV and ATV. These figures add to somewhat more than 100 percent because most hams, of course, use more than one mode. Favorite on-the-air activities, in order of their popularity, are ragchewing, still virtually universal with 79 percent of those responding naming it; DX for 40 percent; public service for 32 percent; traffic for 16 percent; contests for 14 percent; and QRP for 11 percent. Again, the figures total to more than 100 percent because most hams engage in more than one activity. The survey questionnaire covered just on-the-air activity so interest in and time spent on just listening, building, club meetings, hamfests and other nonoperating facets of amateur radio are not reflected in the survey results.

Some of the hams, at least, who are not on the air have plans to change that situation. One recently licensed Novice wrote, "For various reasons I have yet to get on the air. But a ham friend has loaned me his old Heath Novice rig and I have just purchased a vertical antenna, so with the help of the hams who worked with me in getting my license, I expect to be on the air this month."

It will come as no surprise to any ham that expenditures in pursuit of amateur radio have jumped since 1974. Sixty-three percent of our 1977 respondents said they spent more than $100 on ham gear and supplies in the past 12 months as compared with only 41 percent who had spent that much in the 12 months preceding the 1974 survey. According to the 1977 survey, 56 percent of U.S. amateurs have $1000 or more invested in their stations; only 42 percent were in that category in 1974. Equipment costs are an obstacle for two groups of hams in particular: the retired and those still in school. One commented, "Ham radio has gotten too expensive for me on retirement. I just cannot scare up enough dollars to get back on since the shift to ssb." A young ham wrote, "I have been an amateur radio operator for three years, but because I have been in high school it is impossible for me to afford the type of radio equipment I desire. In college, money will be even more important."

Average Age Down Three Years

Ham demographics, the characteristics of the amateur population, appear to be changing somewhat too. The influx of new hams has dropped the average age about three years since 1974. Thirty-two percent are now under 35; 27 percent between 35 and 50; 29 percent between 51 and 65; and 12 percent over 65, according to the 1977 survey. Four out of 10 amateurs report they are employed in electronics-related occupations; five out of 10 in other fields; and one in 10 is retired. More than half of those surveyed attended college; nearly one-third reported family incomes of $25,000 or more, and more than half $20,000 or more — just about double the numbers in those brackets in 1974. Fifteen percent of the survey respondents have become licensed since 1976; about half were originally licensed before 1960; nearly a quarter before 1950 — and more than a third were teenagers (or less) when they were first licensed. As always, early ham experience is often a first step toward a career. "Both jobs I have held are due to my ticket. My father also owes his two civilian jobs to his ham license," one respondent told us.

There are two basic reasons why surveys are particularly useful to organizations like the League. One is to provide demographic information and documentation in areas of interest pertaining to the group involved. Using the results, ARRL can, for example, supply answers to questions about its membership and the amateur population to government agencies, legislative bodies, advertisers, publications, journalists and so on. That helps us to support and advance the amateur cause in many ways.

The second, and in some ways more important reason, is to provide direction and guidance to those responsible for League operations — its elected representatives and the Headquarters staff — to help them better serve the amateur community

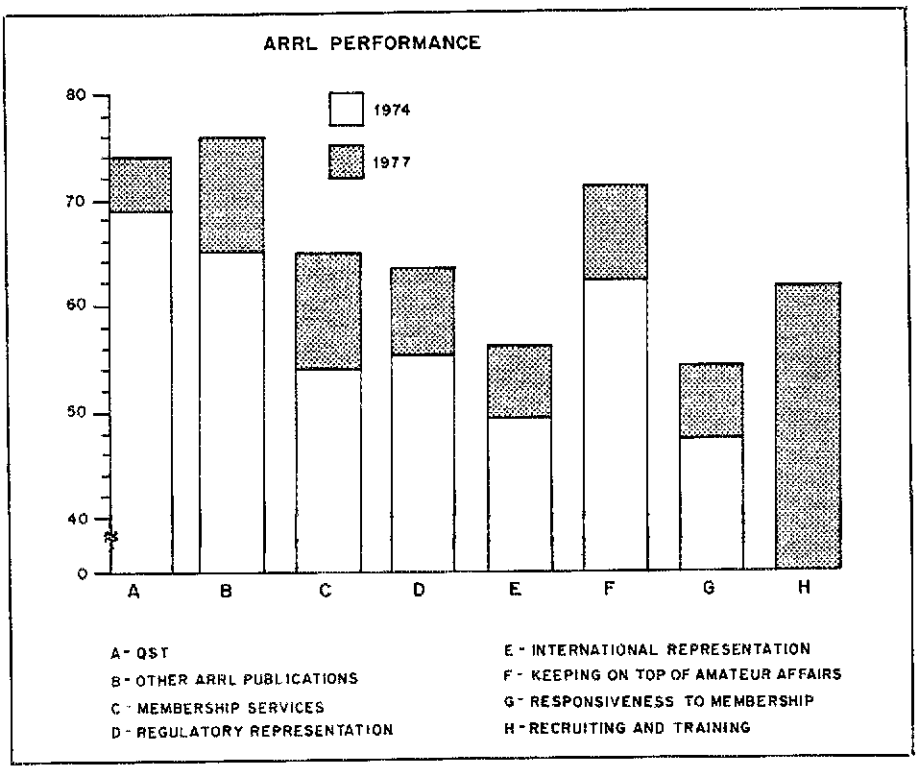


Fig. 2 — We're doing better, but still have room for improvement. The figures show the percentage of respondents who feel the ARRL is doing a "good" or "excellent" job in eight areas. The *unshaded* portion of the box represents figures from the 1974 survey, while the *shaded* area reflects the improvement in the latest one. For example, 74 percent now agree that *QST* is good or excellent, compared to 69 percent who felt that way in 1974. Note: Recruiting and training did not appear on the 1974 survey questionnaire.

and reflect its interests. It is naturally satisfying for directors and staffers to be told that they are doing well so far as rank-and-file amateurs are concerned. But in fact it is much more useful to discover what can be done better. Surveys are especially valuable in putting such things in proper perspective. The proportion of members, for example, who write or phone — or corner a League official at a hamfest or club meeting — is actually quite small. What's more, there is always the possibility that a person's gift for expression will gain an immoderate amount of attention for a particularly strong letter or phone call, favorable or unfavorable (although this is also an important form of direct personal contact).

"A Giant Leap Forward"

The 1977 survey respondents — ARRL members and nonmembers alike — give those elected and hired to conduct the League's affairs generally good marks on the job they are doing: "The League has taken a giant leap forward recently by making it easier to get a first license and easier to upgrade . . . The technical articles in *QST* have been very good. Many are beyond my current understanding, but I store them and go back to them as need arises . . . Love your recruiting efforts. Now give clubs more support with training aids. Lots and lots of training aids."

The returns, however, were by no means uniformly uncritical: "*Handbook* is too condensed. Covers too much material with not enough detail on specific items . . . Let's go *QST*, publish some construction projects aimed at allowing those on a small budget to enjoy ham radio . . . I would like to see a lot more solid-state theory . . . ARRL, turn on your radios. The world is changing, and CB is not the only service that has problems."

U.S. amateurs indicate an approval of the League's performance that is significantly more favorable than it was in 1974. Seven out of 10 respondents — ARRL members and nonmembers as well — rate the job the League is doing as "excellent" or "good" with respect to *QST*, other League publications, and staying on top of amateur affairs generally. Six out of 10 respondents give a similar high rating to the League for its job with respect to membership services, representation with regulatory agencies, and recruiting and training. More than half give the same rating for international representation and responsiveness to the membership. Interestingly enough, 25 percent of those responding expressed no opinion about international representation and 21 percent had no opinion about responsiveness to the membership — which suggests at least that a better job of information is in order in those two areas.

This is just one popular use of handheld vhf gear: Bringing Santa directly to kids at a shopping mall display. *(WØCHJ photo)*

Three-quarters of all respondents — ARRL members and nonmembers — said that ARRL "always" or "usually" represents what they conceive to be their interests, their point of view, in its actions and efforts — just about the same vote of confidence recorded in 1974. The FCC, on the other hand, is viewed somewhat less critically than it was in 1974, though the amateur opinion is still quite negative. The question was whether the FCC in its actions is moving in directions more favorable to amateur radio. "More favorable" responses jumped from 5 percent in 1974 to 16 percent in 1977 and "less favorable" dropped from 58 percent in 1974 to 45 percent in 1977.

Among amateur radio magazines, *QST* has long been preeminent in circulation and in the opinion of readers (Table 1). On the basis of readership preference generally and as a source of technical information, operating news, posting on regulatory matters, amateur radio chitchat and advertising, *QST* is number one by a wide margin. And the preference increased in 1977 over 1974 in all those areas except one. As a source of technical information, *QST* is still clearly number one but by a smaller margin than in 1974 (Table 2).

An Opportunity to Improve

U.S. amateurs have in this survey registered an unmistakable vote of approval for what the League is doing in their behalf and the directions in which it is moving. That approval, however, is not a blanket approval or is it unqualified. The survey also points up ways in which ARRL has an opportunity to improve or broaden its services and to respond effectively to the changing needs of amateur radio today and tomorrow.

"More *QST* articles on radio basics . . . Let's eliminate the state-by-state listing of operating news . . . Don't try to turn every CBer into a ham . . . More ham frequencies . . . Expand 80, 40 and 20 to accommodate the new hams . . . Get a Washington office . . . More PR with the nonradio public . . . Do something about frequencies for amateur radio satellites."

Is this survey really what hams think? Is it really a true reflection of current amateur opinion? We know that the people who responded to the survey are different from those who did not in at least one respect: They responded. But they differ in other respects as well. More of them, for example, are League members and hold higher-class licenses. It seems likely, therefore, that they include the more active amateurs and those more favorable to the League. However, these biases are not large and their effect is minimal in assessing changes since 1974, as that year's survey had essentially the same biases.

The 1977 survey data have now been collected, but analysis is by no means complete. A number of questions remain to be answered, such as: How do members and nonmembers differ in their opinions, operating interests, and other characteristics? How do the interests of new hams differ from old-timers? What is the percentage of League membership among *active* hams? The answers to these and other interesting questions can be gained by sorting the data in different ways by computer. We plan to share further highlights with you in the months ahead.

Table 1

Magazine or Magazines Read Regularly	*Percent Response*	
	1974	*1977*
CQ	28	20
73	22	34
Ham Radio	28	30
Ham Radio Horizons	—	16
QST	67	74
Worldradio	—	6
Other	7	7

Table 2

Magazine I Personally Like Best for:	*Percent Response*								
	1974				*1977*				
	CQ	*73*	*HR*	*QST*	*CQ*	*73*	*HR*	*HRH*	*QST*
Technical information	8	10	17	51	4	18	19	4	43
Operating news	6	4	1	58	5	6	2	3	67
Posting on regulatory matters	3	6	1	62	3	9	5	2	66
Amateur radio chitchat	8	10	3	43	6	17	3	7	46
Advertising	8	9	7	46	4	20	6	3	49

Happenings

Conducted By Peter O'Dell,* WB8NAS

Secondary and Special-Event Licenses Abolished, Others to Be "Systematic"

February 8 the FCC acted on Docket 21135 to abolish secondary station and special-event station licenses. The Commission stated that this move was to eliminate "an unnecessary drain on its (the Commission's) limited resources, especially in view of the fact that a licensee could do no more or less with a secondary station than with a primary station."

Pointing out that the average member of the public could not possibly distinguish a special-event call sign from a typical amateur call sign nor understand the significance of a special-event call, the FCC stated that operation of an amateur station at a special event could be conducted just as easily under the authority of an ordinary amateur license.

Under new rules, all call signs will be issued on a systematic basis, i.e., sequentially in alphabetic order. However, if an amateur moves out of his present call-sign district, he will now have the option of retaining his current call sign even though he no longer maintains a residence or station in that district!

Amateur Extra Class licensees will continue to have the right to request a "preferred call sign," that is a 1 × 2 or a 2 × 2. They will not have any choice of what specific call sign they receive, however. Additionally, the FCC is considering a similar program to allow Amateur Extra Class and Advanced class licensees the opportunity to request a *nonspecific* 1 × 3 call sign.

The FCC will now assign all new licenses outside the continental U.S. in the Pacific area call signs with the distinctive prefix "KH" followed by a digit denoting the island or group of islands where the station is licensed. The system for stations in the Atlantic area will be similar except that the prefix will be "KP." All of the above will take effect March 24.

The FCC also proposes substantial changes in the licensing of club, military recreation and RACES stations. Under the proposed rules, clubs would have to meet certain, yet unspecified, eligibility criteria. In essence, these requirements would make the club demonstrate a compelling need for the license. All club call signs would be in the 2 × 3 format with the prefix "WK."

The FCC proposed to revise the eligibility requirements for RACES licenses to allow the issuance of a maximum of one RACES license per civil defense organization. The current practice of issuing 2 × 3 call signs with the WC prefix would be continued for these stations. Any primary station license would be permitted to be used at a RACES station, in lieu of a RACES station license.

In addition, the FCC proposed that all new military recreation stations be issued 2 × 3 call signs with the prefix "WM." Until action is taken by FCC on club, RACES and military recreational stations, there is a freeze on the submission of applications for those stations till further notice.

Comments on the proposed rules are due by June 2, with replies due by June 30.

*Public Information Officer, ARRL

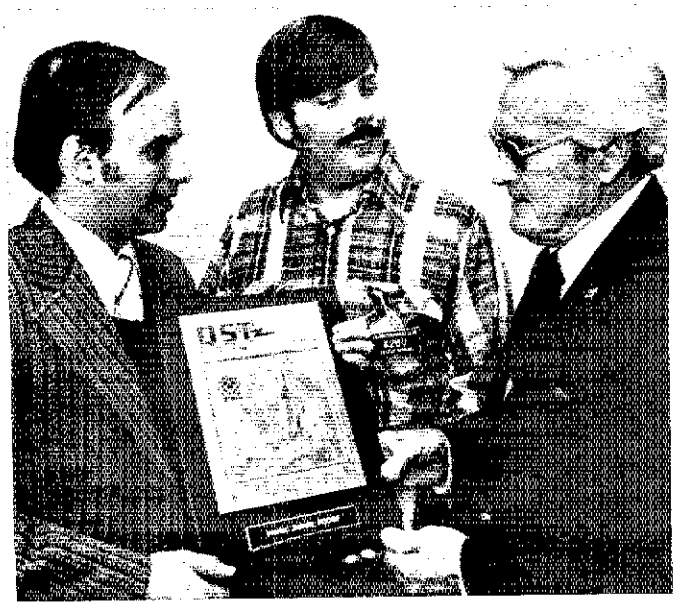
FCC DENIES "TWO-LETTER CALL" APPEAL

The FCC denied Clifford G. Moore's (Arcadia, CA) request for review of the staff assignment of K6KI to another operator. Moore contended that the FCC committed prejudicial error in failing to issue that call sign to him. He sought to have the FCC withdraw K6KI from the applicant to whom it was issued and assign it to Moore.

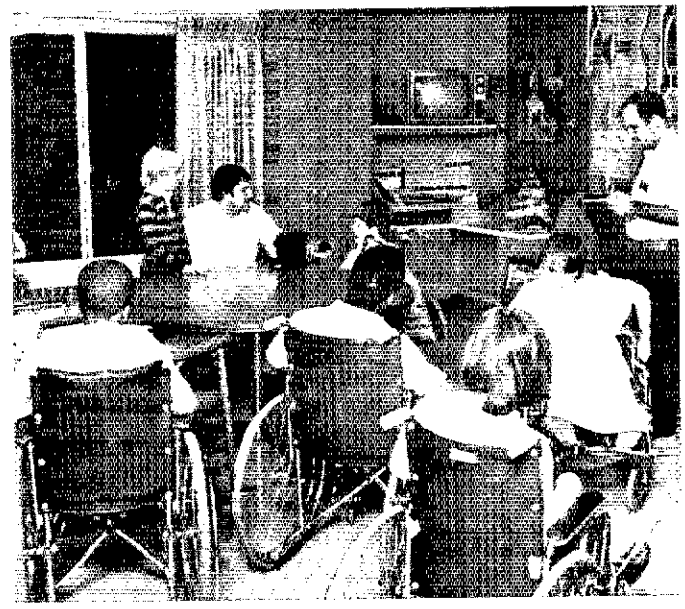
Moore applied specifically for K6KI in January. The call sign was not available at that time so his application was returned. He applied again in April but that application was directed to the private post office box of a Commission employee in Gettysburg, resulting in there being no record of it.

He then reapplied on June 27 but was turned down on the ground that K6KI already had been assigned to another applicant.

Presentation of the *QST* Cover Plaque Award for May, 1977, to Walter Schulz, K3OQF, at a meeting of the Frankford ARC. (Left to right) Walter Schulz, K3OQF; Charlie Gyurina, K2BU, vice president of FRC; "Connie Mac," W3SW, director of Atlantic Division. *(W3YFV photo)*



The Grand Rapids Repeater Association (MI) provided a link between the children at Mary Free Bed Hospital and Santa Claus via 2 meters during the holiday season. *(photo courtesy Jay Abbott)*



Moore asserted that because the former holder of K6KI died several months before his first application was made, the call sign should have been available for reassignment at the time he first applied.

He also questioned the FCC's procedures for processing two-letter call sign requests. He said the failure of the Commission to update its records on a regularly scheduled basis and to delete expired licenses from its data base within a reasonable period was contrary to the rules, which require that call signs unassigned for more than one year be available for reassignment. Asserting that the FCC's procedures and policies were arbitrary and capricious, Moore said he should not be penalized for his own diligence.

With respect to the April application, the Commission said it was extremely unreasonable to expect it to have acted on an application it never received. Even if it had been received, it would have been returned because K6KI did not become available until June.

The FCC said its failure to delete obsolete call signs for over a year after the expiration of the station licenses with which the call signs were associated was based on two fundamental considerations. First, it carries all expired call signs for at least one year since the rules provide that an expired station license may be renewed during a one-year period following its expiration. The former holder could therefore have renewed his license at any time up to December 1976. (The Commission had no way of knowing he had died.)

Secondly, after the one-year period is over, the FCC eliminates obsolete call signs on an irregular basis, as resources and work load permit. The rules do not guarantee the availability of amateur call signs. The Commission conceded there is an element of luck involved in the two-letter call-sign program.

The FCC felt that Moore's complaint seemed to be that he was unlucky in not obtaining K6KI, and this was insufficient ground on which to base reversal of the staff's action. Even if it were arguable that the staff should have granted K6KI to Moore, another consideration precluded the relief sought. It said in order to modify the license of the holder of K6KI by changing the call sign, the rules state that the public interest must be served by such action. The FCC said it could not make such a public interest finding and, therefore, must decline to modify the station license of the current holder of K6KI.

The Commission concluded that no error was committed in the processing of Moore's applications, and whatever imperfections may exist in the FCC's call-sign assignment system were not sufficient to justify assigning K6KI to Moore.

ARRL Membership as of December 31.

Division	*1977 Total*	*1976 Total*
Atlantic	16,547	14,505
Central	13,935	11,352
Dakota	3,450	2,970
Delta	6,780	5,842
Great Lakes	15,537	13,412
Hudson	11,938	10,402
Midwest	8,223	7,308
New England	10,398	8,870
Northwestern	7,570	6,252
Pacific	8,776	7,529
Roanoke	9,338	7,882
Rocky Mountain	4,118	3,598
Southeastern	12,636	10,719
Southwestern	12,839	11,065
West Gulf	10,114	8,683
Total	152,199	130,389
Canada	7,030	6,072
Totals	159,229	136,461
Foreign	7,785	7,458
Grand Total	167,014	143,919

(The listings above include, for 1977, subscriptions without membership for 4,182 companies, libraries and clubs; for 1976, this figure is 4,194.)

REPEATER RULES WAIVED

Until such time as the controversy surrounding Docket 21033 is resolved and further action is taken, the FCC has waived sections 97.40, 97.43, 97.88 and 97.126 to permit any licensed amateur operator to operate a station as a repeater, auxiliary link, control and remotely controlled station without prior approval of the FCC. The licensee, of course, must observe the frequency limitations of his primary station license. In other words, Novices are not permitted to operate repeaters nor are Technicians permitted to operate repeaters in 10 meters.

Stations operating in the repeater mode must identify with their call sign followed by the word "repeater" on voice and their call sign followed by "/RPT" on cw. Auxiliary link stations will say "auxiliary" on phone, and "/AUX" on cw. This waiver will terminate upon the release of a memorandum opinion and order in Docket 21033.

RULEMAKING PETITIONS FILED

The following rulemaking petitions have been filed with the FCC by the individuals indicated. If adopted, they would have an impact on amateur radio.

RM-2999, filed by Paul Lee, N6PL, requests an increase in the frequencies available only for use by Amateur Extra Class operators. It is similar to proposals put forth by the League.

RM-3000, filed by R. J. Switz, W6LPP, proposed a new "family" class of amateur license under which the holder would be permitted to engage in communications only with a regularly licensed member of the same family or household. Normal amateur operations would not be permitted by these special licensees.

RM-3001, filed by Frank C. Carman, W7KBF, would grant Amateur Extra Class licenses to all pre-1925 amateur licensees.

FCC INSTITUTES NEW DOCKET NUMBERING SYSTEM

After going through 21520 docket numbers since 1934, the FCC has introduced a new system of numbering dockets which will give an indication as to when the docket was introduced and the general area of involvement. The new format consists of a code at the beginning to indicate the bureau involved (if it involves two or more bureaus, GEN for general will b used). This code is followed by the wor "docket number" and two numbers indicati the year, e.g., 78 for 1978. Finally, there another number indicating the sequential i troduction for the year regardless of nature subject.

This all sounds rather confusing but shou prove simple and easy to track. Most of t dockets of concern to amateurs should Safety and Special Radio Services proceeding Thus we might expect to see something like t following during the year: "SS Docket Numb 78-4" and "SS Docket Number 78-12."

ILLINOIS BANS HEADPHONE USE IN MOTOR VEHICLES

The state of Illinois has amended its vehic code to prohibit the use of headphones b anyone operating a motor vehicle in any plac open to the use of the public for vehicular tra fic. The only exception to headphone-typ devices is that of a hearing aid. Law enforcement personnel on duty and certai research efforts are also exempted. The act ca ries rather stiff penalties for violators.

FCC DENIES POWER-INCREASE REQUEST

In late January the FCC denied Vanc Hawley's request to raise the power o WR7AFH, located on Mount Harrison, ID and operated by the Idaho Society of Radio Amateurs. Hawley had argued that WR7AFH was intended to serve the southern Idaho northeastern Nevada and northern Utah area for civil emergencies and other amateur radio activities but the repeater could not cover th entire area with an erp of 100 watts. Therefore he had requested authorization to raise the erp to 1000 watts.

Briefly, Hawley contended that there were no other repeaters in the area that could be linked to WR7AFH. He also contended that since there are no other repeaters within "hundreds" of miles using the same pair, then there would be no harmful interference due to increased power.

In rejecting his arguments, the FCC stated that it felt that small, local repeaters were a more efficient use of the spectrum. The FCC went on to recommend that those amateurs in the deep fringe areas of WR7AFH consider building their own repeaters, which could be linked with Mount Harrison when wide coverage is needed. The FCC also noted that the relay system of handling traffic is an alternative to a super high-power repeater and that that system has proved successful for years.

CALIFORNIA HAM GOES TO THE TOP

One autumn evening in 1975, John Schroeder, W6UFJ, answered a knocking at his door. Upon answering, a city police officer served John with a criminal complaint for violation of a local ordinance. The city attorney, acting upon complaints by John's neighbors, charged

him for operating his antenna more than 35 feet above ground in violation of the city of Cerritos zoning laws.

Undaunted, John hired attorney Fred Lawson, K6JAN, and took his case to court. When the municipal court ruled against him, he appealed to the local superior court. Another adverse decision led him to seek relief from the appellate court. The appellate court recognized that the state and local authorities have no jurisdiction over matters of radiocommunication interference; however, it held the Cerritos zoning ordinance to be valid on other grounds.

In the meantime, Schroeder's battle attracted the attention of members of the Personal Communications Foundation and the American Radio Relay League's General Counsel, Robert Booth, W3PS. Both organizations pledged their support and began helping with the strategy.

Disappointingly, the California Supreme Court ruled against Schroeder. However, it affirmed that part of the decision which held that matters of radiocommunication interference were under the exclusive jurisdiction of the federal government. Schroeder's advocates were encouraged.

In January 1978, Schroeder made an appeal to the highest court of the land, the United States Supreme Court. In his appeal, he attacks the constitutionality of municipal zoning ordinances regulating antenna height on three grounds: (1) This area of regulation is preempted by the federal government; (2) This regulation is an infringement of his rights under the first amendment to the Constitution, i.e., his freedom of speech; and (3) The regulation is an invalid exercise of a state's police power.

To answer questions concerning this appeal, the Personal Communications Foundation has released a paper entitled, "The Schroeder Case Goes to the United States Supreme Court." PCF hopes to release further articles describing in detail the issues of federal preemption, first amendment, aesthetics, and a state's police power soon. — *WA3NLO*

VERMONT HAMS TRY DIFFERENT APPROACH

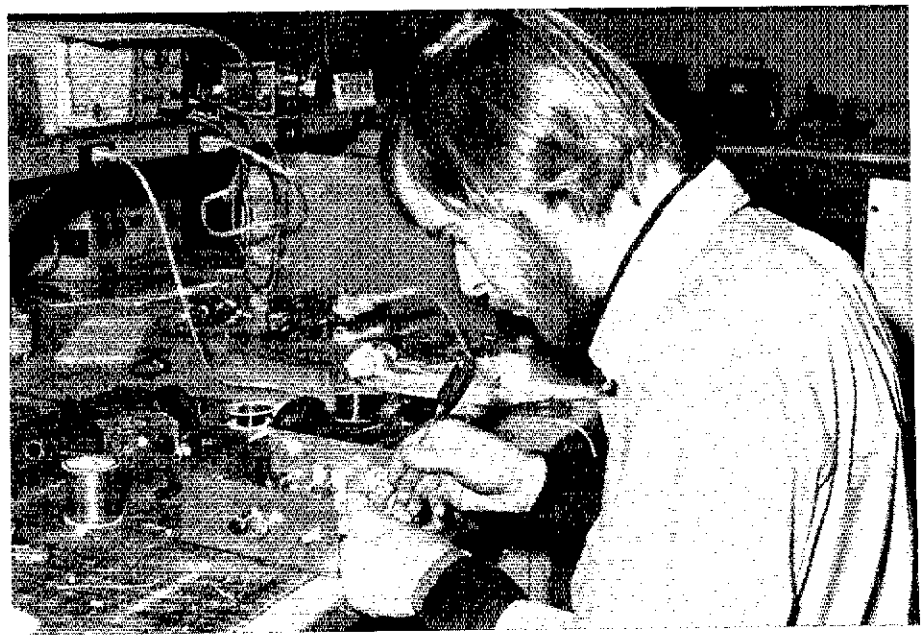
Vermont amateurs are the first to try a new route of attack against unfair antenna tower restrictions. James Harrison, WB1CZB, RFD 2, Barre, VT 05641, and State Senator William Doyle are working on legislation which would relieve amateurs from zoning restrictions throughout the state, except for safety factors. Senator Doyle introduced this legislation on February 15, and it is designated Senate Bill 223.

If passed, Senate Bill 223 will add the following to the Vermont Statutes (24 V.S.A. Section 4409):

"(d) A municipality may regulate federally licensed amateur radio service antennas and their supporting material only to the extent that the municipality's legislative body reasonably finds that the installation presents a safety hazard to life or property."

Vermont amateurs should write to their state legislators urging that they vote for Senate Bill 223. Anyone wishing further information should contact WB1CZB or League hq.

Vermont hams, the rest of the amateur fraternity are counting on you. Passage of this legislation could start a nationwide trend bringing uniformity and fairness to local laws affecting radio amateurs. — *WA3NLO*



An experimenter and contester, builder and DXer, Jay Rusgrove, W1VD, is as active as any ham at Hq.

MARYLAND HAMS JOIN FORCES TO STOP COUNTYWIDE ANTENNA BAN

A coalition of amateur radio operators, citizens band operators, and representatives of commercial broadcasters organized a strong opposition to a zoning proposal brought before the Montgomery (MD) County Council. The proposal sought to ban any antenna which could land outside the owner's property if it fell. The two main proponents of the restriction said their neighbor's 90-foot amateur radio tower fell into their backyard.

The Council heard testimony from only 20 of 48 scheduled speakers when the Council Chairman and his colleagues decided they had heard enough. Addressing the 200 or so persons crowded into the hearing room, he said, "I think we should try to back up on this and proceed in some other direction." The Councilman received a standing ovation.

Members of the Rock Creek Radio Association helped represent the amateur radio viewpoint. — *WA3NLO*

BEHIND THE DIAMOND

One of the most important functions of the American Radio Relay League is the dissemination of technical information gathered through research and development. The main focal point for this effort is the Technical Department. Within the Technical Department is the ARRL laboratory, surrounded by arrays of test equipment, where the actual R&D work is performed. To oversee the day-to-day operation of the Lab requires an individual with technical skill and competence. Jay Rusgrove, W1VD, is such a person.

Lab supervisor as well as senior assistant technical editor, Rusgrove not only insures the work gets done but also finds time to create his own projects, like the complete modification job he did on his Kenwood R-599A receiver. ("One of my hobbies is building high-dynamic-range receivers," he said.) Jay edited the newest edition of *Understanding Amateur Radio* with Doug DeMaw, W1FB, and George Grammer, W1DF. He has also written several articles for *QST*, including "Learning to Work with Semiconductors" (co-authored with DeMaw) which appeared in six parts from April to October 1975.

He is an active contester and DXer. During the 1976 Field Day, Jay and Bob Myers, W1XT, shared 40-meter cw responsibilities. Their reward for scoring the most points per band segment i.e., phone vs. cw was a six-pack of Coors. Needless to report said beer suffered a speedy demise. Rusgrove enjoys the 80- to 10-meter bands of course. However, he experiments with lf gear and microwaves, too. This experimentation included a 189.5-kHz transmitter/receiver combination and a 10-GHz QSO with W1XZ and WA6GVC/1, complete with QSL card. For a real challenge, Jay fired up the IARU prototype 20-meter cw transmitter/receiver with less than 10 watts going to an 80-meter dipole. His contacts raised more than a few eyebrows — including his own, we suspect.

Rusgrove, born in Bristol, CT, attended local schools there. Following high school, he attended Worcester Polytechnic Institute (where it is rumored he built color organs from Poly Paks kits) and the University of Hartford. Summers he worked in the Lab at League hq.

Now residing in Burlington, CT, Jay also enjoys his four cats (Fred, Sylvester, Spider and Sambo), home remodeling and car maintenance. "I like performing my own maintenance. I generally do not trust the work of others on my personal equipment," said Rusgrove.

With a good hilltop location for W1VD, and a good flair for things technical in *QST* and the *Handbook*, you'll be hearing from Jay Rusgrove for a long time to come. — *WA1TZK*

Canadian NewsFronts

Conducted By Ron Hesler,* VE1SH

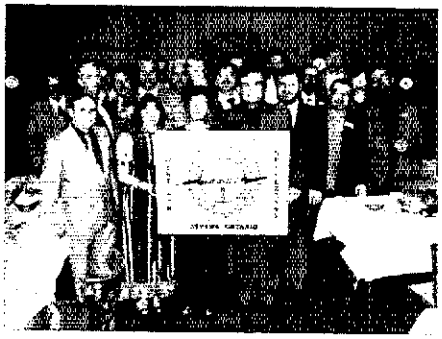
Duty Relief in Prospect?

Within the past several decades the Canadian Division has made two formal submissions to the Tariff Board, pleading for relief in customs duties for ham radio equipment. In both cases the submissions were denied. Two years ago, as previously reported, CRRL Counsel Benson was given the project to prepare a new submission. Although this may appear to be a long period of time in process, on delicate matters such as this there do not appear to be any short cuts, due to the immense amount of research data required. Simultaneously one solicits support from influential quarters and in this regard, CRRL officials have not been unsuccessful! In addition other groups of unrelated but somewhat similar causes have also been active. As a result, we are pleased to advise you that the Tariff Board has now scheduled an Inquiry (Reference no. 156) to consider special tariff provisions and *amateur radio* is one of the named classifications to be examined. Hearings are expected to commence in May. CRRL, of course, shall be represented by Counsel Benson and other League officials as required. In the interest of a fully coordinated appeal, we respectfully urge all interested amateur organizations and individuals to get in touch immediately with Counsel Benson. His address: Suite 804, 1010 St. Catherine Street West, Montreal (Phone: 514-866-7851). Individual submissions, not coordinated, could possibly militate against the desired results.

DOC PAPER — 406- to 960-MHz BAND

DOC has released a discussion paper concerning spectrum allocations in this band. Copies may be obtained from any DOC office. In essence, the paper proposes a reduction of 10 MHz in our present shared allocation to 430-450 MHz; however, in accordance with *the CRRL request*, it is proposed to allocate 902-928 MHz, on a secondary basis, to the Amateur Service. This allocation would provide for new types of use, such as digital and packet radio techniques. CRRL has filed a brief in objection to the proposed loss of 420-430 MHz.

*Director, Canadian Division



On November 18, 1977, a gala dinner was held in Ottawa to celebrate the 20th anniversary of the Ottawa Valley Mobile Club (an ARRL affiliate). Pictured here is the group of members attending, with Doreen and Ed Morgan, VE3CGO and VE3GX, holding the club crest. Doreen and Ed were honored at last year's ARRL National Convention as RSO (Radio Society of Ontario) Amateurs of the Year.

VE/VO 20-METER NATIONAL CALLING FREQUENCY

On December 27th, 1977, VE3ATW of Burlington, ON, established a Canadian National calling frequency at 14.140 MHz. Although this is the same frequency used by the Trans Canada Net, it is not expected that there will be any conflict. This frequency will not be a controlled net as such as the objective is to have this one frequency which Canadian stations may monitor and make specific calls and then move to another frequency. The CRRL congratulates VE3ATW for his efforts in helping to improve communications between Canadian stations. Tnx Hamilton ARC.

IARU REGION 2 CONFERENCE

September 3-8, 1978, has been set as the dates for the IARU Region 2 Triennial Conference to be held in Panama, with the Liga Panamena Radioaficionados serving as the host society for this important conference which shall deal primarily with WARC-79 preparations. The CRRL as the Canadian IARU member-society will be represented by Director Hesler and it is expected that more than 25 Region 2 countries will be represented. Now is not too early for Canadian clubs, provincial and other amateur organizations to begin planning on what they may wish their official representative, the CRRL, to present to this conference. Please advise CRRL headquarters not later than August 15, 1978.

DOC PHONE/CW SUBBAND PROPOSAL

The DOC has stated that they would welcome recommendations from clubs concerning a proposal to *eliminate* present phone/cw subband allocations. The CRRL is in the process of submitting a fully documented presentation in favor of and supporting the retention of these allocations. We urge all Canadian clubs, associations and other interested parties to make their views known to DOC at the earliest possible opportunity. Write to Department of Communications, Telecommunication Regulatory Service, Ottawa, ON K1A 0C8.

VE/W PHONE/CW SUBBANDS TO BE ELIMINATED?

Not on your life as long as the CRRL has anything to say about it . . . which it most certainly will and has! At the recent Symposium, one group session recommended that DOC could follow the codified and amended regulations which CARF recommended to DOC last spring. Among the suggested changes, by that organization, was the recommendation to consider *the elimination of Canadian cw and phone subband frequency allocations.* On January 27, 1978, the CRRL formally advised the DOC that they could not support this recommendation in any manner whatsoever and were, in fact, strongly opposed. If any further action is proposed by the Department, you will be advised through this page in order that you may make your feelings known to the Department. In the meantime we suggest that no individual action be taken and thereby burden down the Department when perhaps there is no necessity, at least at this time.

POTPOURRI

☐ Following are the new affiliated clubs: Queens County Amateur Radio Club, Orillia Amateur Radio Club, and the University of New Brunswick Amateur Radio Club.

☐ During 1978, all VE7 amateurs may use the prefix VC7.

☐ Due to an oversight, the name of Albert Daemen, VE2IJ, was missed in the listing of CRRL assistant directors, in this January page.

☐ The Prince Edward Island Amateur Radio League, which has been inoperative for several years, has been replaced by a new provincial association: the P.E.I. Amateur Radio Association. President is Jack Garrett, VE1PG, who hopes to soon initiate League affiliation.

☐ New CRRL appointments: Gordon Steane, VE3BMG, assistant director; Tom McKee, VE3ETM, public relations assistant.

☐ Dr. George B. Nesson, VE3BDM, has been appointed medical director of Syncrude Canada, assuming his new duties in January and relocating in Fort Murray, AB. Syncrude Canada is the Canadian project to recover oil from the Alberta Tar Sands.

At a recent meeting of the Oakville Amateur Radio Club, Bill Gouthro, VE3FRG, was presented with the CRRL Award of Merit for his many substantial contributions to amateur radio. Shown presenting the award are Oakville Club President Jim Goodman, VE3FZG and League Assistant Director/SCM Noreen Nimmons, VE3GOL, acting on behalf of Director Hesler.

FM Repeater News

Conducted By Lew McCoy,* W1ICP/WR1ABH

Summertime DX Possibilities

If you spend any time on fm, you know that stations several hundred miles away are frequently heard as well as the locals. Users of repeaters may find themselves keying up machines they never heard of. Here in the Northeast we are often surprised to hear Southern drawls riding over the top of our Yankee twang. If you're quick on the PTT switch you can often chalk up a few new states or provinces during these band openings. Activity in the Caribbean area is on the rise and you might even work some new countries. Here are a few tips to help you get the most out of the DX season.

Tropo

Tropo is another way of referring to a condition weather forecasters call a "thermal inversion," or just an "inversion." We normally expect the atmosphere to become cooler at higher altitudes. Sometimes a warm-air mass moves on top of a cooler body of air. As the layers sort themselves out, there is a region where the air actually becomes warmer as we go higher in altitude. If the temperature change is great enough within a small area, the boundary layer will bend vhf radio waves back toward the ground. Instead of traveling out into space, your signal will be refracted down again, hitting the ground at a point as much as several hundred miles away! Long-distance tropo openings are generally found in the vicinity of large, stationary high-pressure systems. These can be found with the aid of weather maps printed in the newspaper and shown on TV weather forecasts. Watch the maps closely. When a high-pressure system comes within a few hundred miles there's an excellent chance of a tropo opening, especially if another weather system acts to slow down or stop the high.

In coastal regions it's not unusual to have two tropo openings a day! In the morning, the water has cooled off a little from the day before. As the sun comes up, it warms the upper layers of the atmosphere. The lower layers are kept cool for a while, because of the cooling effect of the water. Under the right conditions a tropo opening will occur along the coastline. After sunset, air over the water cools at a different rate than that over land. With a little help from the wind, another tropo opening takes place. The body of water need not be the ocean. If you live near the Great Lakes or the Mississippi River the chances for some exciting tropo DX are very good.

Sporadic E

Tropo isn't the only DX mode available to fm ops. Sproadic-E propagation, abbreviated Es, while not as common as tropo, can make for some interesting contacts. The ionospheric E layer is about 60 miles (100 km) above the earth. Occasionally, small clouds of ionized molecules are formed in this region. Radiation from the sun is thought to be responsible for dislodging an electron from each of the air molecules, causing them to become ions. If the ionized molecules are clumped together into a cloud of sufficient density, they will reflect vhf radio signals. No one is really sure how the clouds are formed, or why. All we care about is that they will cause openings on 2 meters that defy description. Stations as far away as 1500 miles (2400 km) may be worked with only a few watts and a small antenna. Maximum distance for a single hop is determined by the height of the cloud. Six-meter operators have found it possible to work "double hop" — from one cloud to another and back to earth. This condition has not been verified on 2 meters but it's not impossible. Who'll be the first to work coast-to-coast on 2?

Formation of ions into clouds is a process not completely understood. It seems that turbulent upper-atmospheric conditions associated with strong low-pressure systems may be one cause. These weather systems often result in large thunderstorms and tornadoes. If the weather maps show a line of thunderstorms, the chances for a sporadic-E opening are good. In the Northern Hemisphere, the clouds travel in a northwesterly direction at about 180 mi/h (260 km/h). If you have a beam you can track the clouds as they move. Because the clouds are small in size, your buddy a few miles away may be able to work stations you can't even hear. Your signal may be reflected back to earth at a point miles from where your friend is working. If there's no one on where your signal is hitting, you'll think you aren't getting out. Wait a few minutes until the cloud moves a little and you'll probably find you've started a pileup!

By the way, in a sporadic-E opening the signals are *strong*! This is due to the high density of ionization in the cloud. Don't be surprised if a station 1000 miles (1600 km) away is stronger than someone only 15 miles (25 km) away. The nearby signal has to travel through trees and over 75,000 feet (24,000 m) of lossy earth to reach you. The Es signal went straight up to the cloud and down to you, with no trees or ground in the way. Go ahead and work the station — he's probably as amazed as you are!

There are a few tricks to help you know when a sporadic-E opening is possible. If you can listen on 6 meters, sideband preferably, you'll notice many Es openings. The gang may be working other stations out to several thousand miles. If it's your lucky night, the "skip distance" will suddenly begin to shorten. While DX stations may still be heard, you'll start hearing stations only a hundred or so miles (150 km) away that a few minutes ago were inaudible. This is a sure sign that the density of the clouds is starting to increase. Start listening on the fm broadcast band. As the cloud density rises you'll start hearing stations popping up which are several hundred miles away. If you can, make a note of their location. This will give you an idea of where the clouds are forming. When you've copied stations on the high end of the band (108 MHz) you can switch to TV channels 6 and above. If the opening is a good one it's possible for a distant station to come in over the top of a local but you'll have better luck watching channels that aren't used locally. If you see any action on these channels, get on the air, quick! If you have a beam, point it in the direction of the broadcast stations you heard and, if the frequency isn't in use, make yourself heard. If you don't have a 6-meter rig, keep an eye on TV channels 2-5. They span the frequency range of 54-88 MHz and will tell you if the maximum usable frequency (muf) is starting to rise.

Working an Opening

Needless to say, it's considered in bad form to start calling DX on top of another QSO. If .52 is in use, try .55 or .58. Whatever you do, don't hog a repeater during an opening. Whether the machine is a local one or a thousand miles away, other users of the repeater will probably resent your intrusion. In order to actually count as a state/country worked, both you and the other station must be receiving and transmitting on simplex. If you work some DX through a repeater, you've only worked the repeater! If you're on a repeater when an opening begins, move off to a simplex frequency to make your contacts. Because of the ability of a slightly stronger station to completely bury weaker ones, it can get pretty hectic during an opening. Keep your transmissions short. An exchange of signal report and state is all that's needed. QRM may make it necessary to repeat the exchange several times before the other station rogers you. Be patient. Give other stations a chance to work the DX too. When the opening is over and things have settled down a bit, don't forget to report your activity to Hq. Let us know who you worked, and the dates and times of your contacts. The information will be forwarded to W3XO for possible use in "The World Above 50 MHz" in *QST*.

Final Thoughts

A directional antenna is a definite asset for the 2-meter DXer. If you have a choice between an amplifier and a beam, choose the latter. It'll make your signal stronger, just as the amplifier will, but it will also sharpen your beamwidth to cut down QRM and increase the strength of received signals. Tropo and Es will provide long-range QSOs on fm, but the grass is greener below 146 MHz. Ssb and cw are better suited for DX contacts and the band is much less crowded. If a new rig is in the offing, think about a multimode transceiver and give ssb and cw a shot. Most activity may be found near 145.1 MHz for everyone, or 144.1 MHz if you've got your General. In the meantime, if you've got an old 2-meter converter kicking around, listen on these frequencies, even if you can't transmit there yet. When you hear the sidewinders working DX, slide up to fm simplex and try your luck. Good hunting! — *W1XZ*

*VRAC Liaison, ARRL hq.

Coming Conventions

April 1-2
Roanoke Division, Charlotte, NC
April 8*
Great Lakes Division, Muskegon, MI
April 22-23
Missouri State, Kansas City, MO
May 5-7
Delta Division, Baton Rouge, LA
May 13-14
Alabama State, Birmingham, AL
May 19-21
New York State, Rochester, NY
May 20
Wisconsin State, Lake Delton, WI
May 27-28
Tennessee State, Knoxville, TN

***Date Change**

June 3-4
Georgia State, Atlanta, GA
July 1-2
West Virginia State, Jackson's Mill, WV
September 1-3
West Gulf Division, El Paso, TX
September 22-24
ARRL National, San Diego, CA
October 13-15
Midwest Division, Kansas City, MO
October 14-15
New England Division, Boxboro, MA
November 11-12
Hudson Division, McAfee, NJ
November 25-26*
South Florida Section, Clearwater, FL

MISSOURI STATE CONVENTION

April 22-23, 1978, Kansas City, MO

The PHD Amateur Radio Association, Inc. of Liberty, MO, will sponsor the Missouri State Convention (9th annual Northwest Missouri Hamfest) on Saturday and Sunday, April 22-23, in the Trade Mart Building at the downtown Kansas City, MO, Airport.

There will be a complete program of forums both days, a large number of commercial exhibits, swap tables, YL-XYL program — all inside a one-level, 35,000-square-foot, air-conditioned building. Unlimited free parking is immediately adjoining the site. (RVs can be accommodated.)

Doors open from noon to 6 P.M. on Saturday, April 22 and from 9 A.M. to 5 P.M. on Sunday, April 23. Setup time for commercial exhibitors and swappers will be from 10 A.M. to noon on Saturday. FCC exams will be given on Satuday at 9 A.M. Form 610, with copy of amateur license, must be sent to the PHD Amateur Radio Association, Inc. by April 15.

There will be a Saturday night banquet at the world-famous Gold Buffet, with W1CW, Bob White and W1YL, Ellen White from ARRL hq. as guests.

Pre-registration is $2, admission at the door will be $2.50. Pre-registration, including banquet is $9. Those desiring banquet tickets are urged to order them in advance. All pre-registrations will be held at the door. Talk-in on 146.34/94. For information and pre-registration write to PHD Amateur Radio Association, Inc., P. O. Box 11, Liberty, MO 64068.

DELTA DIVISION CONVENTION

May 5-7, 1978, Baton Rouge, LA

The sparkling new Riverside Centroplex, on the banks of the Mighty Mississippi, will be the site of the Delta Division Convention/Hamfest '78. Only sprinting distance from hotel accommodations, air-conditioned comfort will prevail for forums, commercial displays, swap tables, FCC exams, and the greatest array of ladies' activities yet seen at a Baton Rouge Hamfest.

Heading the list of dignitaries expected to attend are President Dannals, W2HD; Director Arnold, W4WHN; Perry Williams, W1UED; and Gerald Hall, K1TD.

A special treat is in store for members of the Royal Order of the Red Stick. As you may know, the Red Stick (*baton rouge* in Cajun talk) pre-dates the Wouff-Hong by several hundred years, and boasts a devoted following. Holders of the Red Stick Award (submit logs showing QSO with 10 Baton Rouge amateurs) will be guests of the BRARC at a special cocktail party. Of course, there will be the traditional Saturday night banquet, and as previous attendees can attest, Cajun hams don't need much excuse to organize an impromptu crawfish-eating expedition.

Forums are planned on topics from ARRL to Yagis, with plenty for the computer buff, plus a style-show/luncheon and a microwave-cooking show for the ladies (might be fun for OMs too!). Prizes will be in evidence also, from a microcomputer to a microwave oven, and a bundle of radio gear that will make your heart pound.

FCC exams (Tech and up) will be given Sunday morning by personnel from the New Orleans office. Please indicate your intent to take an exam when you pre-register.

Come early and stay a while so you'll feel right at home next year — in July of 1979 you'll want to be right back in Baton Rouge for the ARRL National Convention.

Hamfest '78 is sponsored by the Baton Rouge Amateur Radio Club, Inc., with talk-in on 3910, 28/88, 19/79, 34/94. All details, and pre-registration forms are available from Hamfest '78, 10715 Waverland, Baton Rouge, LA 70815.

ALABAMA STATE CONVENTION

May 13-14, 1978, Birmingham, AL

With the move to the beautiful, new, air-conditioned Birmingham-Jefferson Civic Center, the Alabama State Convention/BirmingHAMfest '78 will be one of the largest events of its kind in the country.

A highlight will be forums by nationally known amateurs such as Doug DeMaw, W1FB, from the League hq., and Larry Price, W4RA, the Southeastern Division Director. Other guests include Wayne Green, W2NSD/1, publisher of *73*. Hundreds of square feet of exhibit space, manufacturers and distributors from all over the country, and a huge, covered, flea-market area will go toward making the event spectacular. Exhibit space is approaching a sellout and the Saturday night banquet is sold out now. Write for details on group meetings, family activities, and other events.

Accommodations at Hyatt, Holiday Inn-Airport, and Ramada Inn-Airport are best handled by hotel toll-free numbers. For information, write BirmingHAMfest, Box 603, Birmingham, AL 35201. The Civic Center is at Interstate 59 and 21st Street North, convenient to the airport and all highway connections. BirmingHAMfest '78 will be bigger than ever, but will remain the country's friendliest amateur radio get-together. See you there! QST

Hamfest Calendar

Alabama: The Mobile Amateur Radio Club will hold its annual hamfest and computerfest at the University of South Alabama in Mobile on April 15-16, from 9 A.M. to 5 P.M. Activities are planned for ladies and children, and campsites will be available. Write Ed Coker, WA4VPI, 7650 Ashley Court, Mobile, AL 36619 for more info.

Arizona: The Tucson Hamfest is scheduled for April 28-30 at the Ramada Inn in Tucson (just north off I-10). Technical sessions, demonstrations, microprocessors, solar power, QRP, FSTV/SSTV, RTTY, and other activittes are planned, in addition to prizes, ladies' programs, a banquet, and swap meet. Sponsored by Old Pueblo Radio Club, who will provide more info. Write them at 1361 East Edlin, Tucson, AZ 85711.

California: The Fresno Amateur Radio Club's 36th Annual hamfest will be held May 5-7 at Airport Holiday Inn in Fresno. Details available from W. David Phillips, WA6WLJ, P. O. Box 783, Fresno, CA 93712.

Connecticut: The Pioneer Valley Repeater Association flea market and auction will be held on Sunday, April 9, from 10 A.M. to 5 P.M. at Newington High School, Willard Ave., Newington. Free parking will be provided. The flea market and auction will run concurrently in separate rooms. ARRL hq. Club and Training Department will host a Novice information booth to answer questions and provide information on the ARRL. A guided tour of ARRL hq. will start at 2 P.M. Talk-in on 19/79, 04#64 and 52 simplex. Admission is $1, and tables are available at $5, with an auction commission of 10 percent. For additional info and guaranteed flea-market space, contact Arnie DePascal, K1NFE, 20 Iowa Place, Bristol, CT 06010.

Illinois: The DeKalb County Amateur Radio Club and Kishwaukee Amateur Radio Club will present the DeKalb County hamfest on May 7 from 8 A.M. to 3 P.M. at the Notre Dame School (3 miles south of

DeKalb between Rte. 23 and S. 1st St., on Gurler Rd.). Tickets are $1.50 in advance and $2 at the door. Talk-in on 94 simplex and 13/73. Write to Howard Newquist, WA9TXW, P. O. Box 349, Sycamore, IL 60178.

Illinois: The Rock River Radio Club hosts its 12th annual hamfest on April 23 at the Lee County 4-H Club Center in Amboy (1 mile east of junctions of Routes 52 and 30, south of Dixon). Breakfast will be served, with free coffee and donuts from 8-9 A.M. Camping available. One free table is allotted per party, with additional tables available for $5 each. Talk-in on 52 simplex and 37/97. Advance tickets are $1, or $2 at the gate. Full details from Walt Marpman, WB9UFC, 1218 Brigadoon Dr., Dixon, IL 61021.

Indiana: The Cass County Amateur Radio Club hamfest will take place on Sunday, May 7, from 7 A.M. to 4 P.M. at the 4-H Fairgrounds (north of Logansport on highway 25 approx. 1 mile; turn right and follow signs). Outside set-up is free, with undercover facilities going for $1. Bring your own tables. Advance tickets are $1, or $2 at the gate. Talk-in on 52 simplex and 78/18. Write to Dave Rothermel, K9DVL, RFD 4 — Box 146G, Logansport, IN 46947.

Indiana: The Lake County Amateur Radio Club's 25th silver anniversary/Herbert S. Brier memorial banquet will begin at 6 P.M. on April 22 at the Griffith Knights of Columbus Hall, 1400 S. Broad St., in Griffith. Festivities begin with a cocktail hour, followed by family-style "all you can eat" dinner. ARRL Central Division Director Don Miller and Chicago radio personality Clark Weber, W9FFB, are to be the guest speakers. Dancing and "Ham of the Year" award will top off the evening. Tickets are $8 and must be purchased in advance from Joel G. Iacono, WA9DJP, 634 Osage Dr., Dyer, IN 46311.

Maine: The Mid-Coast Amateur Radio Repeater Club will sponsor a spring hamfest from 9 A.M. to 8 P.M. on Saturday, May 6, at the Camden Snow Bowl Lodge. This is at the base of Ragged Mt. Swap space is available. Activities include tour to 385/985 repeater site, catered chicken barbeque, prizes, guest speaker and dancing. Tickets purchased before April 26 are $5 (includes meal and chair lift ride), or $2 without meal. Early arrivals, campers and RVs should go to Camden Hills State Park. Send check and s.a.s.e. to Wendell B. Lewis, K1RPE, 208 Talbot Ave., Rockland, ME 04841.

Maryland: The Potomac Area VHF Society will hold its 7th annual hamfest on Sunday, May 7, from 8 A.M. to 5 P.M. at the Howard County Fairgrounds (approx. 15 miles west of Baltimore, at intersection of I-70 and Rte. 32). Registration fee of $3 includes flea market or tailgate sales. Professional food and beverage catering and unlimited parking will be available. Talk-in on 52 simplex. For further info, contact Paul H. Rose, WA3NZL, 25116 Oak Dr., Damascus, MD 20750.

Massachusetts: The Framingham Amateur Radio Club will be holding its second annual flea market on April 29 at the Framingham Police Drill Shed in downtown Framingham. Take Rte. 9 to Rte. 126 and head south on Rte. 126 approx. 2.5 miles. Doors open for setup at 9 A.M., and for public at 10 A.M. Tables are available at $5, half-tables at $3 from the club at P. O. Box 3005, Framingham, MA. Tel. 617-879-7456 or 617-653-6398.

Massachusetts: The Hampden County Radio Association is hosting its annual flea market on Friday, May 5, at the Feeding Hills Congregational Church in Feeding Hills. Doors open at 7:30 P.M. Free table will be given to members of ARRL-affiliated clubs. $1 will be charged for nonmembers, $2 for commercial. For more information, contact Jeffrey I. Duquette, K1BE, P. O. Box 346, Southwick, MA 01077. Tel. 413-569-6739.

Massachusetts: The Wellesley Amateur Radio Society is conducting its annual auction on Saturday, April 15, beginning at 11 A.M. Talk-in on 96/36, 04/64 and 52 simplex will guide you to the Wellesley High School Cafeteria on Rice St. in Wellesley. Doors open at 10 A.M. Write to Kevin P. Kelly, WA1YHV, 7 Lawnwood Place, Charlestown, MA 02129.

Minnesota: The Rochester Repeater Society will hold its hamfest on April 15 at St. Johns Grade School, 420 West Center St. in Rochester (take I-90 to Rte. 52 or Rte. 63 and go north). Doors will open at 9 A.M. with plenty of parking available. Admission is $1, tables $2.50 each. Talk-in on 22/82 and 52 simplex. Advance ticket sales and info available from Joe Fishburn, KØTS, 2514 Fourth Ave. N.W., Rochester, MN 55901 (tel. 507-288-2676) or Gary Sharp, WD8AMA, 1610 34th St. N.W., Rochester, MN 55901 (tel. 507-282-5119).

Missouri: The P.H.D. Amateur Radio Association will host a hamfest on April 22-23 at the terminal building of the Old Airport in Kansas City. Tickets are $2. Full info available from Charles Collins, KØMAT, 6816 N. Askew, Kansas City, MO 64119 (tel. 816-454-4775) or Chuck Miller, WAØKUH, P. O. Box 11, Liberty, MO 64068 (tel. 816-781-7313).

New Jersey: The annual Delaware Valley Radio Association flea market and auction will be held on Sunday, April 30, from 9 A.M. rain or shine. The Villa Victoria Academy in West Trenton is the site, located adjacent to Rte. 29 near the junction of Rte. 29 and I-95. Talk-in on 07/67 and 52 simplex. Refreshments will be available. Advance registration is $1, or $1.50 at the door. For additional information or tickets, write to DVRA, P. O. Box 7024, West Trenton, NJ 08628 with s.a.s.e.

New Jersey: The Shore Points Amateur Radio Club will hold its first hamfest on Sunday, April 16, at the Stockton State College in Pomona from 9 A.M. to 4 P.M. More than 200 indoor heated table spaces available at $4 each, or 400 tailgate spaces at $2. Food, picnic area, ample seating, and unlimited parking will be provided. Many prizes and commercial gear. Registration is $1.50 at the gate, or $1 in advance (children under 12 are free). Talk-in on 34/94 and 52 simplex. Tickets and info available from SPARC, P. O. Box 142, Absecon, NJ 08201. Tel. 609-641-8795.

New Mexico: The Mesilla Valley Amateur Radio Club holds its 14th annual beanfeed and swapfest on Sunday, April 30, at the country fairgrounds 13 miles east of Las Cruces (I-10 at exit 127). Mexican meal will be served, along with beverages. Talk-in on 04/64 and 16/76. Parking and electrical hookup will be provided for early arrivals beginning at 4 P.M. on Saturday, April 29. Tickets available for $5 each (children are $1). Prizes will be given away following noon meal on Sunday. More info from Karl F. Larsen, K5DI, Box 74, Mesilla Park, NM 88047.

New York: The Southern Tier Amateur Radio Clubs will host their 19th annual hamfest and dinner on May 6 at the Lutheran Fellowship Recreation Center in Johnson City (3.7 miles N. of Rte. 17, exit 71N on Stella Ireland Rd.). Four acres of flea-market parking is available, and tech talks, prizes, displays, exhibits and refreshments will be included. Tickets are $2 general admission or $7 for the banquet (including admission). No extra charge for flea-market parking. Inside tables are available at $5 each by reservation only. Additional info or tickets obtainable from STARC, P. O. Box 11, Endicott, NY 13760.

North Carolina: The Raleigh Amateur Radio Society will present its hamfest on April 22-23 at the Crabtree Valley Mall (covered parking lot) in Raleigh. FCC exams will be offered on April 22 only. Admission is $3. Info available from Jack Kenny, WB4MCU, 712 Pebblebrook Dr., Raleigh, NC 27609. Tel. 919-876-0998.

Ohio: The Miami Valley FM Association of Amateur Radio Operators will hold its ninth annual fm B*A*S*H on Friday evening, April 28, at the Dayton Convention Center, Main at Fifth Sts., Dayton (across from Stouffer's Hotel). The event runs from 8 P.M. to midnight, and admission is free to all hams and their friends. Sandwiches, snacks and bar will be available. Live floor show to be presented by TV personality Rob Reider, WA8GFF and his group. Drake UV-3 and many other prizes. For further info, write to Miami Valley FM Assn., c/o Sue Hagedon, WB8GWQ, 1340 Brainard Woods Dr., Dayton, OH 45459.

Pennsylvania: The Crawford Amateur Radio Society will hold its fourth annual hamfest on Saturday, May 6, at the Crawford County Fairgrounds. The proceeds from the hamfest are used to provide an emergency communications system for the Crawford County area. Write to Brian W. Teasdale, P. O. Box 653, Meadville, PA 16335.

Puerto Rico: The Radio Club de Puerto Rico will host its annual convention and hamfest on April 28-30 at the Hotel El Conquistador in Fajardo. Details and info from GPO Box 693, San Juan, PR 00936.

Texas: The Texas Traffic Net and 7290 Traffic Net will jointly sponsor a picnic on April 28-30 at Kerrville State Park in Kerrville. Activities include ARRL forum, horseshoe pitching, dominoes tournament and ladies tour. Talk-in on 3967 or 7290 kHz. Wiener roast will be held on Friday evening, while Saturday will feature a catered meal. Registration is $3.90 per person, payable before April 20 to Will Thompson, W5TYS, 9656 Lanward, Dallas, TX 75238.

Washington: The Inland Empire VHF Radio Amateurs are holding their Spokane swap-fest on Saturday, April 29, at the Interstate Fairgrounds in Spokane. A flea market, auctions, contests, picnic and unusual exhibits will be featured. Write to Swap-Fest, P. O. Box 3606, Spokane, WA 99220.

Washington: The Skagit Amateur Radio Club will conduct its hamfest at the Bryant Grange Hall in Bryant on April 22. Full info is available from Bill Maris, 364A Yokeko Dr., Anacortes, WA 98221. Tel. 206-293-3960.

Wisconsin: The St. Croix Valley Repeater Association will sponsor a hamfest on Saturday, April 15, at the Community Center in Roberts. Easily accessible via I-94; Exit 10, N. on Rte. 65, following signs. Talk-in on 93/33 and 52 simplex. Doors will open at 9 A.M. Plenty of free table space is available along with free parking. Donation is $1 in advance or $1.50 at the door. All facilities are easily accessible to the handicapped. All proceeds go to the support of repeater WR9AFQ. Info from St. Croix Valley Rptr. Assn., 121 13th St. South, Hudson, WI 54016.

Strays

I would like to get in touch with . . .

☐ computer programmers for BASIC who are willing to exchange programs. I have access to a Wang 2200B, 8K computer; later, perhaps a PET. Also, willing to discuss high-level languages and amateur radio computer applications on cassette tapes. Rik Faith, WD4JAE, P. O. 5934, Sarasota, FL 33579.

☐ hams interested in starting a Christian net. John McKelvey, W5VON, 605 A Nelray, Austin, TX 78751.

☐ persons who have devised an 80- and 40-meter antenna for a mobile home. Only a ground rod is allowed on the ground. Captain Eldon Van Arkel, A Btry, OFF STU BN, Fort Sill, OK 73503.

☐ any ex-HS3 who operated in the Udorn area between 1967 and 1970. Marshall "Bud" Johnson, WB4HIJ, ex-HS3MJ, 3606 Cambridge Dr., Bradenton, FL 33505.

☐ hams under the age of 21 who hold a General or higher license, to start a net on 14.293 MHz at 0200 Z on Wednesday and on 14.087 MHz at 0230 Z on Thursday. Bill Penner, WB7DPF, Rte. 3, Box 525, Astoria, OR 97103.

☐ anyone involved in solar-electric energy conversion as a profession. Michael Kicinski, WA1UBV, 25 Highland Ave., Westerly, RI 02891.

☐ anyone interested in scheduling long-distance hot-air balloon flights using amateur radio. Tom Rosica, W2GIR, 125 Grandview Terrace, Batavia, NY 14020.

☐ amateurs worldwide interested in forming an AMATEUR RADIO SOLAR FLARE NETWORK for the purpose of monitoring SEA and SES activity at lf and vlf ranges (21.4 and 73.6 kHz) using solid-state receivers and recording interfaces built by the members themselves with plans and schematics furnished by me. Amateurs with expertise in the fields of scaling, lf design, radio propagation and indirect flare monitoring methods are needed, but membership is open to any amateurs or experimenters who have a genuine interest in these fields. Carl M. Chernan, WA3UER, 1135 Constitution Drive, Tarentum, PA 15084.

☐ amateur radio operators who plan to attend the National Model Railroad Convention (NMRA) in Dearborn, MI, in July, 1978. I'm especially interested in contacting those who'll be working portable. David R. Marlowe, KL7IVS/7, 18945 S.W. Willow Creek Terrace, Beaverton, OR 97005.

☐ hams interested in the use of balloons to raise antenna arrays for portable operation. Robert Ford, WA4YMO, 2500 Caldwell Avenue, Apt. 6, Birmingham, AL 35205.

☐ any hams who play the organ. Al Kaufman, W1JVQ, 73 Frank Street, Bridgeport, CT 06604.

Correspondence

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

HOW 'BOUT

☐A foreign radio publications subscription service? I am curious to know whether other ARRL members feel that ARRL might act as subscription and purchasing agent for overseas magazines and books about amateur radio. I have found it easy to have a narrow point of view by reading only American magazines. The New Zealand Association of Radio Transmitters handles subscriptions. — *John Jensen, KC6JJ/KH6GPC, Caroline Islands*

☐More on SSTV? Many of the USA ARRL SSTV amateurs tell me repeatedly you do recognize SSTV, yet you won't consider a DXCC certificate with 2 × SSTV endorsement. A great pity. *QST* should ask for articles by W9NTP, WØLMD, WB9LVI and others. All of us in the UK eagerly await publication of WØLMD's SSTV microprocessor and WB9LVI's new model s/f and f/s scan converter. — *Richard Thurlow, G3WW, March, Cambs, England*

☐An "Upgrade to General" column? — *Andrew Pliszka, WB8YDP, Newton Falls, OH*

☐An Amateur co-op? This might solve the components dilemma (December 1977 *QST*). It would be "nonprofit" but self-sustaining. Members might invest $25 to $100 for stock to start and $10 or so per year as membership dues and operating capital. — *Royce Carl, WB7SDL, Kirkland, WA*

☐A "call-letter brain buster"? When you send for your new QSL cards put a little humor into it. It is unbelievable the comments one gets on return QSL cards when one uses unusual and funny titles. — *Walter Naef, WB9YMJ, Madison, WI*

☐A survey questionnaire clip-out page in *QST* once or twice a year to let members express their feelings on different topics? — *Martin Brunzlick, WA2JCP, Sparta, NJ*

☐A "Back to Basics" article in *each* issue? — *Eugene Terwilliger, WB1ALF, Gorham, ME*

DOCKET 20282

☐I read with much sadness, information regarding ARRL's petition to open up hf bands for Advanced class and Novice operators as well as opening up vhf bands to the Technician and General classes. ("League Lines," February 1978 *QST*) Although ARRL's support and organization of incentive licensing has been beneficial to amateur radio, I ask myself, "What has this *really* done for and to the General class ham?" According to the 1978 *callbook* there are 94,452 General licensees, a good statistical reference that the General class license is the most popular class. By opening up the vhf bands to Technicians (specifically 144-145 MHz) and giving the Novices more room you are taking away some of the last strongholds of General privileges. — *H. A. Arsenault, K1PLR, West Haven, CT*

☐I support this effort. I've always felt that Technician class licensees have been treated like second-class hams. Anyone listening to 80-meter cw at night knows that our newcomers as well as our "Techs" need additional cw portions of that band. — *"Bunky" Botts, K4EJQ, Blountville, TN*

MOBILE PUBLIC-SAFETY RECEIVERS

☐In reference to the criminal statute concerning the installation or operation of a public-safety-frequency receiver in any automobile ("League Lines," January 1978 *QST*), it should be made known that the statute presently in effect does make provision for an individual to obtain a permit for a mobile receiver from his county or municipal police chief. Application for this permit affords an excellent opportunity for the public-service-minded amateur to meet with the local police chief and explain the valuable volunteer services which amateurs are willing to provide during public events and emergencies. The advantage of being able to monitor public-safety transmissions from the mobile station enhances the amateur's ability to be of service to the community. — *Kenneth Brown, W2KB, Bayonne, NJ*

AMATEUR RADIO EXTENDS BROTHERHOOD-SISTERHOOD TO ALL

☐Biochemists may be rare in your columns, but here I am to thank you for your article, "The Women Among Us" (January 1978 *QST*). I agree that very little discrimination exists in amateur radio, in fact, some hams seem to especially enjoy talking to women. I can't say that amateur radio was an offshoot or a parent to my career. One electrical engineering course convinced me that molecules are more captivating than circuits, but radio has helped me meet an interesting, varied group of people and I feel richer for it. Women or not, both equality and a source of lifetime enjoyment lie in amateur radio. Speaking from the often-too-masculine science fields, amateur radio is far ahead in extending brotherhood-sisterhood to all. I thank you for the article which illustrates this. — *Barbara Jackson, WD9ERI, West Lafayette, IN*

☐When on the air ALL females are YLs be they 6 or 106; married, widowed, divorced or single. YLRL adopted the term YL for all female hams in 1944. No married female joins the amateur radio ranks as her husband's wife. She joins as herself. *She* has to pass the exam. Why is it necessary that the female tell her contact that she is "John Doe's wife." None of the male ops say, "I'm Jane Doe's husband." — *Gloria Pflughaupt, WB9KQM, Grayslake, IL*

☐Ms. Gorski's articles were both entertaining and informative; and certainly pointed up some of the problems faced by women in the amateur ranks. I agree that women amateurs are taken for granted. They are a valuable part of the hobby. Their resources and expertise have been overlooked and neglected too long. If amateur radio is to continue to grow, we must all pull together for the common good of all participants. Women need to become more involved in the off-the-air activities of their hobby. Clubs should actively recruit women amateurs and get them involved in club activities. I'm sure they would have some fresh ideas for some otherwise boring meetings. — *Stephen Ballo, KN3TFM, Plymouth, PA*

LET US NOT FORGET

☐I must comment on the pleasure I received when listening to KM1CC. It took me back to the "good old days" of WCC and those other fine shore stations. Of course WCC had more power and it needed it. If we proved anything, it was the advantage of a pure dc signal over a wide, modulated one. We can get several modern signals in the portion of the spectrum occupied by that lovely 240-cycle note. This no doubt accounted for a good deal of the QRM on KM1CC. Earl and the others did a fine job and are to be congratulated. — *"Doc" Westermelt, W4NO (ex-VE8ZD), Charlottesville, VA*

☐Reference the QRM on W1AW's code practice sessions ("Operating News," December 1977 *QST*): Since reading your article, I noticed that fully 50 percent of the sessions have been ruined by QRM which starts with the main text. I wonder if these people understand how much effort is made just to be free at the time of the practice and how frustrating it is to have gone through that much trouble only to have a very important training aid ruined. If the stations causing the QRM are simply exerting their rights at unknown cost to others, I suggest they re-examine their sense of values and review the reasons for the existence of the amateur radio service. — *James Mabrey, Jr., WD8LCN, Tecumseh, MI*

☐As an ex-CBer I'd grown tired of the "good buddies" who showed flagrant disregard for the proper use of their radios. There are some gentlemanly CBers, but most are overrun by the loud-mouth types. Now I hear a few made it into the amateur ranks. Thanks to those people who try to prevent others like myself from getting a little code practice from W1AW, my code copy skills have actually improved! I now copy 80 to 90 percent. Sorting out W1AW from them is a real challenge and has made my code copy of other hams much easier and more enjoyable. — *Robert Miller, Wolcottville, IN*

☐DXers argue with traffic handlers, experimenters are at odds with appliance operators, ragchewers complain about DXers, and me, I argue with anybody. In December 1977 and January 1978 *QST*, amateurs were chided for not having a proficient organization during an emergency. Let's keep in mind that some folks' interests are different. If we all were professional traffic handlers, DXers, design engineers, etc., ham radio would have to be renamed "The Professional Radio Communications Service." Perhaps the next time a call is made for voluntary assistance it should be worded: "NEEDED: Volunteer hams for emergency assistance. Only those with *xx* years experience need apply. Send resume." The bottom line is that we all have to remember — public service is the reason we are allowed to pursue our hobby. — *Dick Quick, WB3HHS, Johnstown, PA*

☐With the CB influx reaching its peak, I would like to pass along these helpful suggestions to newcomers: (1) Read the Amateur's Code printed in the front of any ARRL *Handbook*. (2) On 2 meters avoid using the word "break" or "break-break" unless time is critical or you have a very special situation (see *FM and Repeaters for the Radio Amateur*, page 220). (3) Please stop using amateur radio for information on the locations of police in order to break the speed limit (FCC Regulation 97.116). (4) Please stop discussing on amateur frequencies, any past ssb activity conducted illegally, especially those conducted between 10 and 11 meters. — *Breckinridge Smith, K4CHE/5, Shreveport, LA*

ODE TO A DEAD BAND

☐Spawned from abject despondency, a lifeless
totally apathetic FT 101-EE, and a cold,
deserted, unresponsive band. —
Day has gone, and soon the night
Will fade like all the rest . . .
Into a gray and cavernous dawn
And deeds and tasks are stressed . . .
And kitchens warm and steaming brews
Are poured in every cup
As lazily we stir and stretch . . .
It's so hard to get up.
Tho still fatigued, not quite awake,
You stumble to the shower . . .
And lather creamy foam and scent
Bemoaning, still, the hour.
Too long you sat, too long you stared
Into that metal box
That gives you naught but QRN
(So, wish it plagues and pox).
Unanimated, lacking heart and
Filled with wires and tubes,
It dominated half your night
And left you with the blues.
No friendly voice, no message dear
No clicking key inspired
No soul out in that vast beyond
Cared that you grew tired.
And yet you sat and plied yourself
With coffee hot and strong
And cigarette stubbed cigarette
And night moved yet along.
No DX rare, no isle remote
Nor tongue exotic speaks
To liven up the dreary night . . .
It's been like this for weeks.
It folded up, this fragile band
And left you with the "blahs" —
So, nightly, now you softly pray:
"Please, someone — DIT SOME DAHS"!
—*Jan Gould, WA6YQW, Anaheim, CA*

Washington Mailbox

Conducted By Harold M. Steinman,* K1FHN

Some Thoughts on Autopatch and Phonepatch

In "FM Repeater News" for February we ran the ARRL guidelines for autopatch and phonepatch use. Both the FCC and ARRL frequently receive questions on these topics, indicating a great desire among amateurs for more information on what types of communications are permitted to be interconnected to the public phone lines. The fact of the matter is that the FCC rules make no specific mention of phonepatch or autopatch; rather, they are considered to be simple cases of "third-party traffic."

Let's explore the ARRL interconnect guidelines a little further.

Q. What exactly is autopatch or phonepatch?

A. Autopatch and phonepatch fall under the general category of "interconnects," because that is exactly what they do. They allow the radio amateur to interconnect his station with the public telephone system. Phonepatching has been in use for decades, and has allowed, for example, people stationed in places as remote as Antarctica to talk to their families over amateur radio. Phonepatching requires the presence of a control operator to actually make the interconnection (equipment is available to facilitate this), and this control operator is responsible for assuring that all parties involved understand the third-party regulations. He is also responsible for shutting the station down should an infraction occur.

Autopatch is an automatic form of phonepatch, as the name implies. It has become popular with the advent of repeater stations. Repeaters have greatly increased the utility and reliability of mobile communications from one's vehicle, and autopatch goes even further in that it allows the operator to actually place a phone call from his car. The amateur uses a Touch-Tone pad which emits audio tones over the air, causing the autopatch (usually located at the repeater site) to dial the required number.

Q. Why are guidelines for autopatch and phonepatch use necessary?

A. Guidelines are necessary for two reasons: (1) to assure that amateur radio is not used for business purposes or for material compensation, and (2) because there are no examples in the FCC rules illustrating what constitutes legal or illegal use of interconnect facilities.

The need for guidelines is further emphasized by the following quote from Docket 21033: "In our 1972 Report and Order in Docket 18803, however, amateur licensees were warned about the use of autopatch equipment in violation of Section 97.114 of the rules, to facilitate the regular business affairs of any party. Since 1972, the abuse has become, if anything, more widespread. We again warn the Amateur Service of unlawful use of telephone interconnection facilities and stress that unless voluntary compliance with our third-party traffic regulations increases significantly, we may have to take action to curb the transmission of *all* third-party traffic in the Amateur Service."

Q. Well, I definitely don't want to see the FCC abolish all third-party traffic, but if there is such a problem with autopatch abuse, why doesn't the FCC initiate rulemaking to clarify what is and is not allowed over autopatch?

A. The FCC will make rules if it has to, but prefers not to unless absolutely necessary. The reason is that a rule can only place constrictions on what is now allowed, and is bound to make no one happy. Far preferable is for the amateur community to voluntarily observe practices which will end the Commission's concern about abuses.

Another reason that voluntary guidelines are preferable to an FCC rule is that throughout the history of amateur radio the primary enforcement tool has been the individual amateur's good judgment. No rule could possibly take into account the multitude of situations that could arise in an autopatch situation. Every day amateurs must make judgments as to what constitutes proper operating procedure, and amateurs have met that responsibility well. As long as amateurs demonstrate such responsibility, further rulemaking is not necessary.

Q. What constitutes business communications?

A. According to Section 97.114 of FCC's rules, business communication is anything that facilitates the regular business or commercial affairs of any party. Under this rule an organization like the Red Cross could use amateur radio to coordinate disaster activities but not for its day-to-day functions.

Many amateurs, unknowingly perhaps, continue to abuse autopatch privileges by transacting business on the air. The prohibition against business communications is quite broad. The ARRL guidelines say, "Calls to place an order for a commercial product must not be made, nor may calls be made to one's office to receive or to leave business messages." The ARRL guidelines have been reviewed by the Personal Radio Division of the FCC, but this does not give them the force of law. Perhaps we can gain some insight by looking at a couple of examples of how the prohibition against business communications is interpreted.

Suppose someone asks, "Is it all right to use autopatch facilities to place an order for a pizza so I can stop to pick it up on the way home?" A pizza is a commercial product, so the ARRL guidelines say no. Indeed, it can hardly be argued that ordering a pizza over autopatch facilities satisfies in any way the basis and purpose of amateur radio! It facilitates, although in a small way, the day-to-day functions of the pizza parlor; and it could not be classified as an emergency communication.

Now compare this to a parallel but different situation: You and your family are driving through a strange town, and a sign in front of the motel you intended to stay at says "No Vacancy." You are tired, your family is tired, and the kids have to go to the bathroom. Is it permissible to use autopatch to call another motel to make a reservation (which in effect is ordering a commercial product), or must you find a phone booth from which to place the call? Even though you would probably rank this situation on a level of importance greater than that of ordering a pizza, in the absence of an actual emergency the same rules still apply. Use of autopatch to aid in securing a reservation at another motel would not be permitted. Of course, should a member of your family be ill, use of autopatch to obtain medical aid *would* be permitted.

An FCC rule prohibiting the use of autopatch as the means to curb the above abuses could end all other uses, also.

Q. How about using autopatch to call a service station to have a tow truck come out to remove a disabled vehicle from the shoulder of the highway. Isn't this facilitating the day-to-day functions of the service station?

A. Calls made concerning highway safety in cases where there is an immediate threat to the safety of life or property are permitted. In fact, this ability to eliminate delay in reaction time is exactly what makes autopatch so useful in emergencies. The ability to call the police, or an ambulance, or a tow truck directly from the scene of an accident, without having to depend on the necessary condition that another amateur is monitoring the frequency, can save precious minutes. Autopatch, when used responsibly, is a valuable asset to the community.

Q. What is the FCC's thinking in regard to "reverse autopatch," that is, accessing a repeater station through the telephone lines by dialing a special number?

A. In all cases of reverse autopatch that have come to the Commission's attention, the potential for abuse has been enormous. The fact of the matter is that amateur radio is designed primarily to allow amateurs to communicate with other amateurs. Third-party traffic, important as it may be, is a privilege granted amateurs to improve their ability to perform in the public interest. But reverse autopatch would allow a nonamateur to initiate amateur radio communications in the absence of a control operator. This is an abuse. It is hard to conceive of a situation, other than an emergency, where this would be permitted.

[Editor's Note: ARRL guidelines for autopatch and phonepatch use appear on page 60 of February 1978 *QST*.]

[Note: 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 Personal Radio Division of the FCC. Numbers in parentheses refer to specific sections of the FCC rules.]

*Deputy Manager, Membership Services, ARRL

YL News and Views

Conducted By Louise Moreau,* W3WRE

YLs Do It Themselves

Sister M. Lauren, WAØRRJ and the licensed YLs in Rochester, MN, are busy ladies working with the Handi-Hams to, as they put it, "open a window on the world" for handicapped people through classes and additional assistance to help them qualify. This busy group is among many women who are doing these things themselves as with most of their amateur activity.

Across the country gals like Lillian Abbott, K8CKI and Esther Gardner, WA6UBU, as well as many YL clubs here and in Canada, sponsor classes in theory and code for beginners.

The PJYL, GAYLARK and HAYLARC not only enjoy Field Day, they plan and set up the stations, put up antennas, and do all the work themselves. They say it is a lot more fun to do everything and not be dependent or asking for help. The same is true with the women who not only designed and built the all-YL repeater in western Pennsylvania, but set out on a special fund-raising campaign in flea markets and selling handicrafts to earn enough money to acquire the necessary parts.

A majority of YLs in this country include a special safety checklist with their spring cleaning chores to make sure that the shack, whether it is shared by the family or their private domain, is free from hazards.

We do it ourselves because we want to or because we find a need for our assistance. Few of us are electronic specialists. We find about everything we need in *The Radio Amateur's Handbook* and other ARRL publications, then we just dig in and do it ourselves, whether it is organizing a club, helping the community, or just adding a little interest of a different kind to our amateur radio activity and increasing the YL versatility a bit more.

YLISSB QSO PARTY

The annual YLISSB QSO Party has been scheduled for May 19-21 this year. With the ever-increasing membership the system frequencies should show one of the largest lists of participants so far. The ssbers emphasize that winning is not so important as having a good time while supporting the major system objective of enhancing international friendship.

1978 TYLRUN OFFICERS

The TYLRUN members have elected the following women to serve as 1978 officers: Myrtle Stinnet, WB5FGM, president; Nina Wallis, K5TEY, vice president; Cory Needles, K5UKK, secretary-treasurer; Mary Lawrence, K5MPI, publicity; Bertha Watson, W5JCY, *Grapevine* editor. TYLRUN meets Thursday mornings at 8 A.M. Central Time, on 3.940 MHz.

MIRIAM ELLIS, WB4TTJ

Miriam Ellis is called the "mainstay" of her radio club, the Western Carolina Amateur Radio Society. A former CBer, she found her radio activity too limited and as soon as she received her amateur license she joined WCARS and was elected secretary, a job she has held for the past three years.

A gal who is always looking one step ahead she helped organize the club's first hamfest in 20 years, then spent most of her waking hours there to make sure that everything went as planned to ensure its success.

During the 1977 Sweepstakes Miriam dropped her contest activities in the early hours of the morning to act as NCS when a flood emergency necessitated activating disaster communications. Later she relieved exhausted stations at the communications center, taking over the net control spot and working in such a manner that the officials were impressed with the effective communications that were provided them.

As a result of Miriam's dedication to duty she was asked to serve as radio officer for the Civil Preparedness Agency. Here, she put together a communications plan for future amateur radio procedures in similar emergencies that has resulted in a second appointment as emergency coordinator for two counties.

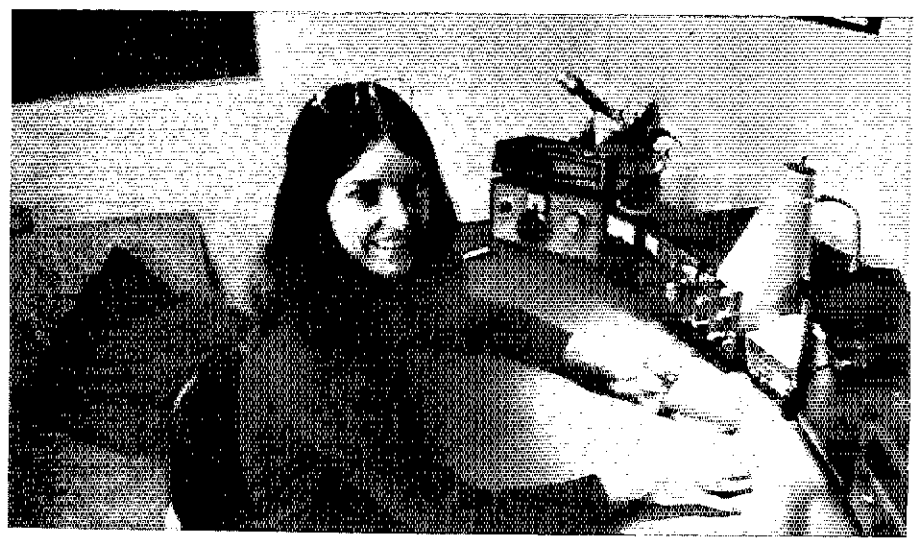
A member of ARRL and YLRL, Miriam holds OBS, ARS member, EC/RO appointments, as well as member of YLISSB, RCC, A-1 Operator Club, and MARS. When not involved with her WCARS activities or the Civil Preparedness Agency she teaches a Novice code class. QST

*YL Editor, *QST*. Please send all news notes to W3WRE's home address, 305 N. Llanwellyn Ave., Glenolden, PA 19036.

Sharon Toal, WB9RNF, has both WAS and the Bicentennial WAS awards. She can be found mainly on 10 or 15 meters hunting DX, but also gets on cw for the more rare prefixes toward her DXCC award. Both she and the OM are active in Field Day.

A member of YLRL and ARRL, Linda Fuller, WD5GJY, has climbed through Novice and Technician to General class, because she wanted to overcome that "block" in learning code at higher speeds. Now she is hunting DX on any and all bands on both phone and cw.

Miriam Ellis, WB4TTJ, active member of WCARS and dedicated operator in Civil Preparedness activities in her state.



International News

Conducted By Bruce A. Johnson,* WA6IDN/WA1ZQP

African Amateur Radio: Common Roots

Monrovia, Liberia, was the venue for the first IARU Region 1 West Africa Conference on 10-11 December 1977. Nine West African countries were represented at the meeting, which was designed to provide encouragement and assistance to the national representatives of amateur radio in those countries in their efforts to gain the support of their national administrations. Delegates from Gabon, Gambia, Ghana, Ivory Coast, Liberia, Mauritania, Nigeria, Senegal and Sierra Leone spent many hours both in formal session and informal discussions. The IARU WARC position was adopted as the basis for any presentations made on behalf of amateur radio in these countries. Especially encouraging was the report of the Ghana Amateur Radio Society, which stated that the IARU position, including the new bands at 10, 18 and 24 MHz, enjoyed the full support of their administration.

IARU Assistant Secretary David Sumner, K1ZZ, represented Headquarters and delivered the opening address on behalf of President Noel Eaton, VE3CJ. The mayor of the City of Monrovia, the Honorable Edward A. David, welcomed the delegates to the city. The mayor was familiar with amateur radio from the activities of the Liberian Amateur Radio Association and from attendance at the convention of Sister Cities International in California last summer, where a special amateur station was on display. Representing the Liberian Telecommunications Corporation was the Honorable Samuel H. Butler, EL2L, its managing director. Mr. Butler pledged continued cooperation between his administration and LRAA/IARU. In attendance as observers were the presidents of the West German and French IARU member-societies.

K1ZZ demonstrated a simple and inexpensive receiver which has been developed in the ARRL lab especially for use in developing countries. The receiver, a direct-conversion, 20-meter unit employing a minimum number of components, proved to be entirely suitable for the African radio environment and generated considerable interest. It is hoped that the development of this and similar equipment will help close the gap between the high cost of manufactured equipment and the desire of those in developing countries to get on the air. A similar cw transmitter has been designed (VXO-controlled, 10 watts cw on 20 meters). These pieces of equipment will be sent as kits to the national amateur societies of developing countries.

One of the key results of the conference has been the improvement of understanding and intercommunication by the amateurs of West Africa. As always, the problem of languages is a difficult one: Most West African amateurs speak either English or French, but not both. However, the need for special efforts to overcome this problem was recognized, and the next West African conference is tentatively scheduled for the Ivory Coast, a French-speaking country, next year. The existing nucleus of African amateurs appears ready, willing and even anxious to work for the promotion and advancement of the Amateur Radio Service in this important part of the world.

*International Services Officer, ARRL

One of the newer member-societies of the IARU is the Sierra Leone Amateur Radio Society in West Africa. Shown here is Margie Clay, WA4UDG, presenting 20 copies of the ARRL *Radio Amateur's Handbook* to SLARS President Vidal Johnson and Secretary Cassandra Davies, 9L1YL. *(SLARS photo)*

REPEATERS IN CENTRAL AMERICA

Many ARRL members travel to Central America, and ask for assistance from ARRL hq. in obtaining reciprocal operating permits. We are pleased to assist wherever we can (see January 1978 *QST*, page 71), and we can now offer a list of all vhf repeaters operating in Nicaragua, El Salvador, Panama, Honduras, Guatemala and Trinidad & Tobago. Information is available by sending an s.a.s.e. to International Services Officer, ARRL Hq., Newington, CT 06111 USA.

The President of the Jamaica Amateur Radio Association (Lloyd Alberga, 6Y5LA) recently suggested to the Jamaican Ministry of Industry, Trade and Tourism that radio amateurs were by and large a mobile lot, who do a great deal of traveling. Interested in his argument, the ministry sent a team of their own representatives, along with 6Y5LA, to the ARRL Southeastern Division Convention in Miami in January. A booth was set up, and an all-expense-paid vacation to Jamaica offered to amateurs and their families registering for a drawing. ARRL International Services Officer Johnson, WA6IDN (back to camera, left photo), visited the booth and learned from 6Y5LA (right) that the experiment was an outstanding success. With a banner emblazoned across the booth reading "Jamaica 6Y5 is DX Country!" — along with, shall we say, some revealing poster propaganda, convention attendees displayed their sincere interest. Many useful exchanges took place between American and Latin amateurs with Jamaican guests. But best of all, the whole affair did much to enhance international goodwill. And that's one of the big reasons why we have amateur radio! *(W1HDQ photos)*

50 Years Ago

April, 1928

☐ Clyde Darr's cover portrays amateur communication during emergency — in this case a complete station with generator power aboard an anchored scow, antenna hitched to a nearby tree!

☐ Our major bands have been reduced considerably by the recent international conference, and the Editor offers a sort of "band plan" with band segments for North America, Europe and "the rest of the world," to avoid chaos in DX work.

☐ rIWX of the U.S.S.R. reports on some 1925 tests with short waves from that country, achieving considerable DX in 80-100 meters (although using a specially made 25-kw. amplifier tube!).

☐ The A.R.R.L. Board met for two days in February, a major problem being the division of bands between voice and c.w. use, especially because of effects of the reduced 40- and 20-meter bands. (W1BDI is the only surviving member of that meeting.)

☐ If you're handy with a slide rule, Replogle's (of Raytheon) treatise on iron-core reactances will help you design a good filtering system. A bit less demanding of math knowledge is Hitchcock's (of Westinghouse) paper on design of fixed resistors.

☐ Downtown portions of many cities still have d.c. mains, and F. I. Anderson shows how to get filament, plate and bias supply power for next to nothing — if you're lucky enough to live in such spots.

☐ Perhaps portending their later accomplishments, we note articles by Bev Dudley, 9BR, of the Chicago *Evening Post*, on keying master-oscillator circuits; and by James J. Lamb, 3CEI, on the design of a portable receiver.

☐ Samples of a new UX-250 tube are in distribution, but even R.C.A. seems confused on what the specifications will be — though almost certainly not the 25-watt rating currently rumored.

☐ League financial operations show a "profit" of $555 for the fourth quarter of 1927.

25 Years Ago

April, 1953

☐ Security measures from the "cold war" have prompted the institution of conelrad, and amateurs will be required to monitor the b.c. band for forewarning of any alert or shutdown.

☐ W6QYT and W6POH of Stanford outline potentialities for extended-range communication on 15 and 20 meters using the new meteor-scatter techniques. You need plenty of power, though, and a good receiver. C.w. is the only practical mode.

☐ Remedies for TVI caused by transmitters operating above 50 Mc. have their own special quirks, and W1HDQ illustrates low-pass filter and other techniques for that portion of the spectrum.

☐ Folded dipoles are hardly new, but W4UCW thinks more "folding" can be done with other antenna configurations, making them especially useful for mobile and restricted-space situations.

☐ Also in the mobile field, W6EI wants substantial power but not all the required weight, and so uses a linear amplifier rather than modulating the final.

☐ W2NJR presents some circuit tricks for improving performance of sideband reception.

☐ We've been using diodes as rectifiers or detectors for years, and now W1DX points out their uses as modulators, particularly balanced circuits for sideband operation.

☐ With civil defense again the theme, more than 3000 of us turned out for the League's Simulated Emergency Test.

☐ Revision of the League's governing instruments are now complete, with the adoption and publication of new rules for the Communication Department.

☐ One-third of the 50-member Hq. staff has been in League employ 10 years or longer. — *W1RW*

Club Notes

One of the most common comments that we hear from clubs is that they could use a lot of help with writing their club bulletins. It is tough to think of enough copy to keep the bulletin interesting and fill the pages every month. Club members never seem to have the time to write for the bulletin, leaving the editor with all the writing tasks as well as the editing. Of course, some will argue that a club bulletin should be little more than a meeting notice; if you tell the members everything in the bulletin, why would they bother to come to the meetings?

Many club bulletins contain regular columns on such subjects as last meeting's minutes, FCC and ARRL news, new members, calls and upgrades, future club events and nearby auctions and hamfests, and tech puzzles and cartoons. Sometimes a little preaching appears: operating habits, emergency preparation, participation in club activities, or motivation to homebrew. But month after month, the editor's pen slowly begins to run dry.

As we read about 400 club bulletins every month, we have pulled together a collection of general-interest and timeless articles which should enhance any club's paper. Topics include operating, humorous stories, technical articles, cartoons and anything else which catches our eye. If you would like a copy for use in your club paper, send a business-sized, self-addressed, stamped envelope AND YOUR CLUB'S BULLETIN to ARRL hq. — *WA1STO*

Strays

I would like to get in touch with . . .

☐ anyone with information about Joseph F. Jacobs, who operated radio station 7TF in Vida, MT, in 1925. James D. Peterson, 409 Fifth Avenue N., Wolf Point, MT 59201.

☐ someone to bring a dead language back to life by working Latin cw. Mike Vaia, WB8VBW, 275 E. 15th Ave., Columbus, OH 43201.

Silent Keys

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

WIAOA, Richard C. Sterling, Woodstock, VT
WB1BUU, Martha P. Gauthier, Newton, MA
W1ISE, Paul S. Ramsden, Warren, RI
W1KOK, William A. Maude, Trumbull, CT
Ex-W1MVQ, Ernest W. Franklin, Dunedin, FL
Ex-W1NCB, Bert Horvath, Worcester, MA
W1NN, Wendell P. Turner, Melrose, MA
WA1QWI, Richard D. Kelleher, Agawam, MA
K1REW, Edward M. Sprague, East Sandwich, MA
K1SGO, Rupert A. Nock, Newburyport, MA
K1SNT, Jesse W. Chase, Kingston, NH
W1YQH, Edward C. Corliss, Chichester, NH
WB2ACP, Louis E. Furtaw, Townbank, NJ
WA2FFB, Reginald D. Bogert, Wyckoff, NJ
WB2KGE, Clarence A. Cook, Williamsville, NY
W2PLA, Gerald J. Marks, Palisades Park, NJ
WB2PZN, Stephen F. Krall, New Hyde Pk., NY
W2RJ, Henry A. Shelleday, West Milford, NJ
WB2WFB, Walter H. Ketz, Beach Haven, NJ
W2YPW, Elmer O. Wangerin, Rochester, NY
W3KYI, Harry Fine, Silver Spring, MD
W3KZW, Gerald D. Coleman, Saxonburg, PA
K3LZX, Ivon H. Blackman, Jr., Silver Spring, MD
W3MGU, Kenneth C. Stormer, Brookville, PA
WA3TXT, Harold R. Abbott, E. Stroudsburg, PA
W4CAL, Virgil E. Blackwell, Morrow, GA
K4EYP, James D. Espy, Summerville, GA
WA4GCY, William Kerlin, Marathon Shores, FL
W4LNF, James W. Litton, Kingsport, TN
W4MNJ, George A. Wentz, Columbus, GA
W4NE, John H. Webb, Coral Gables, FL
WA4VKK, Karl H. Schmidt, Morganton, NC
W4WEP, Sarah A. Bancroft, Mobile, AL
WA4ZZT, Howard G. Cooper, Nashville, TN
W5AVE, Harry F. Mathewson, Coppell, TX
WA5FNB, Louis J. Breaux, Crowley, LA
W5GVF, Hans U. Hiltpold, Markham, TX
K5ICV, Walter E. Stevens, Dallas, TX
W5MLQ, Kenneth E. Maxham, San Antonio, TX
K5QXV, Richard W. Miller, Ville Platte, LA
WB5RFJ, Ed O. Davis, Jr., El Paso, TX
W5RPB, C. Russell Gaddy, Pine Bluff, AR
W5UV, Rudolph Langhoff, Port Arthur, TX
W5VQA, Russell F. Crenshaw, Garland, TX
W6AOD, Vernon Gebhart, Watsonville, CA
*W6BK, Jack P. Burke, Lancaster, CA
W6CPX, Roy F. Williams, Pasadena, CA
W6CQW, George L. Fleming, San Diego, CA
W6CWO, N. Vince Parsons, Calimesa, CA
W6FWN, Frederick W. Brocksieper, LaCrescenta, CA
K6GDS, Carmen L. Niemann, Sacramento, CA
WB6IAW, Clyde B. Derby, Sacramento, CA
WA6JLI, Lester W. Herman, Redwood City, CA
W6JWV, Hervey G. Austin, San Jose, CA
W6NLY, Robert M. Coyner, San Diego, CA
K6OIJ, John C. Bumgarner, Richmond, CA
W6OXB, Kenneth H. Hamilton, Stockton, CA
W6QN, Walter T. Mills, Oakland, CA
W6RBY, Roscoe J. Burke, San Diego, CA
W7EAA, Lloyd S. Hale, Tekoa, WA
W7IMM, Alfred B. Ziegler, Vancouver, WA
WA7JKD, Vernon W. Pelkey, Seattle, WA
W7KOQ, Everett D. Oliver, Federal Way, WA
W7LDS, Edwin B. Hale, Phoenix, AZ
W7NIJ, Harlan Napier, Boise, ID
Ex-8BH, James E. Adams, West Falls, NY
W8DED, Russ Sakkers, Holland, MI
WA8HSZ, Carl G. Johnson, Huntington, WV
WA8HVM, John W. Norris, Huntington, WV
WD8JPY, William F. Balman, Bloomfield, MI
W8KC, Werner K. Sauber, Cleveland, OH
WA8MCC, Richard N. Freeman, Kirtland, OH
W8OBG, William G. Blaha, Cleveland Heights, OH
K8QLD, Robert C. Chapman, Bay City, MI
WB8WLM, James W. Dawes, Adena, OH
K9DKR, Sam Furr, Newark, NJ
WD9FDT, Samuel P. Hascek, Downers Grove, IL
WB9GIW, Jon Scudieri, Gardner, IL
W9HJX, John M. Hausman, Fosterburg, IL
W9JBU, Joseph C. Lotter, Seymour, WI
W9MNO, Al A. Walters, Hammond, IN
W9NKG, Chester L. Baker, Granite City, IL
W9ODB, Vernon Wright, Mauston, WI
W9TTS, Otto J. Lukes, Skokie, IL
W9ZIM, Donald W. Johnson, Wilmington, IL
KØDVN, Kenneth A. Breaker, Wichita, KS
WØHZM, Donald J. Anderson, Grand Forks, ND
KØPOF, Mina Osier, Clarion, IA
WØRTY, August Hogenson, Cooperstown, ND
WØVOX, Arthur L. Gumm, Columbus, NE
VE1AJ, J.A.R. "Dick" Geddes, Florence, NS
VE1VR, M. "Bud" Abraham, Cape Breton, NS
VE2ABJ, Florian Thibault, Shawinigan, PQ
VP2SN, Joe Bohla, St. Vincent, West Indies

*Life Member

How's DX?

Conducted By Bill Lowry,* W1VV

An Easy Way to Work DX?

Do you ever tire of struggling in the pileups to work that elusive DX station? Have you ever thought, "Just once I would like to be the rare one — to be the station everyone else is trying to work?" So what are you waiting for? It's not that difficult a dream to realize. Just make a DXpedition. Many hams have gone on them in the past, and as the improving sunspot cycle encourages more ham activity, it is likely that increasing numbers will launch major efforts in the future.

Where to Go?

It's not necessary to visit an exotic location, although some expeditions have activated locations that, for one reason or another, were previously very rare. Places like Mt. Athos and Kingman Reef come immediately to mind. Such expeditions draw worldwide attention, but also can be very costly and time consuming. Their logistics are difficult, and usually a group effort is needed. But expeditions don't have to be that complicated. In fact if you have never made one before, consider trying a simple, easy trip to gain the experience of operating away from home in a foreign country before tackling a more complicated venture. If you know hams in a well-developed country, perhaps you could borrow their equipment during your visit. That will greatly simplify logistics and eliminate problems with customs. Another simple approach, and one that will give you a more exciting call sign to use, is renting a QTH on one of the islands in the Caribbean. Some cottages, complete with equipment, towers and beam antennas, are occasionally advertised in our Ham-Ads. In either case, some very pleasant sightseeing can be blended with radio operating. If you are married, that should help gain support from your spouse, who will undoubtedly insist on going along!

Expedition to Senegal

Chod Harris, WB2CHO and Bob Halprin, K1XA, made a DXpedition to Senegal last October during the CQWW Contest. Chod had previously made an expedition to Bermuda (February 1977 *QST*, pages 48-50), and had so much fun that he was anxious to try another one. His enthusiasm overwhelmed Bob, who agreed to accompany him. According to Chod, "We picked Senegal because it was the cheapest place to visit at that time. A group had chartered a flight there on a 'Roots' expedition to trace their members' ancestry, and we were able to book with them. At first I wasn't sure where Senegal was, but I soon learned it was on the most western point of Africa.

"Local hams are the key to success on this type of DXpedition," says Chod. "It is simplest to borrow equipment instead of bringing it. In our case, the local 6W8 hams were wildly enthusiastic about our visit. They provided an operating location and equipment, and supported us with food during the contest. For radio gear, we had to bring only some spare parts, tools and wire for antennas."

One of the toughest parts of the pre-trip preparations was the medical immunization. Smallpox re-vaccinations were required, plus yellow fever and cholera shots. Antimalaria pills — bright purple and as big as candy drops — also had to be taken before, during and after the trip. "Their effect was so bad, I felt the prevention was worse than the disease," Chod recalls.

It is obviously essential to have a license and operating permission, and steps to obtain these should be taken many months in advance of the proposed trip. Bureaucracies can operate with glacial slowness, but friendly local hams may be able to speed the process. In the case of Bob and Chod, 6W8s DY, FP and LF were a big help. In general, the International Services Branch at ARRL hq. can tell you if a foreign country will license you as a visiting ham.

"Don't forget about customs, both U.S. and foreign," Chod advises. "We sent a letter to U.S. Customs at Boston's Logan Airport — our departure and re-entry point — telling them what we were taking and bringing back. Normally you would also prenotify the customs office at the foreign entry point, but we didn't because we had no equipment with us. Another important point — don't let obtaining a passport and any necessary visas go to the last minute."

Many Vivid Memories

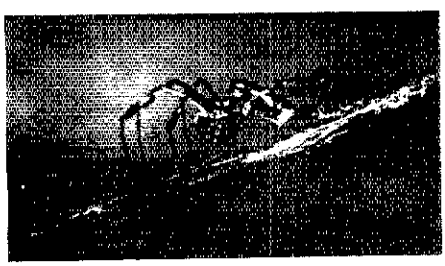
The contest itself gave Chod and Bob ample opportunity to work DX stations. After calling their first CQ on 10 meters, a loud roaring noise appeared. But it wasn't power line noise; it was the QRM caused by countless stations calling them! With only 35 watts output, they maintained a rate of over 200 contacts per hour on that band, and worked over 1700 stations in 78 countries and 23 zones without ever calling another CQ. By the end of the contest, they had made 4,371 QSOs for a total score of 4,942,539.

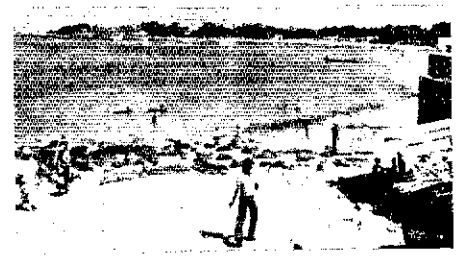
Senegal's saucer-sized black and yellow spiders, 18-inch lizards, and known presence of poisonous snakes deeply impressed the two of them. The spiders and lizards were highly visible when Chod hacked his way through the brush around the shack to put up the dipole antennas, making him complete the job in world-record time. He didn't dare work in the fields at night.

A more pleasant memory was provided by the bathing beauties on the beach, who went topless under the scorching African sun. And neither Bob nor Chod will ever forget the friendly, enthusiastic help of the amateur community in Senegal.

DXpedition Checklist

- ☐ DO plan ahead, especially for the license.
- ☐ DO contact customs in both countries before leaving. The foreign country's consulate is best for the initial contact.
- ☐ DO ask local amateurs for advice and assistance.
- ☐ DO check with International Services at ARRL hq. for detailed information and hints about operating in foreign countries.
- ☐ DO leave some non-operating time to see the country.
- ☐ DO listen in the Novice and General portions of the bands.
- ☐ DO take an ample supply of logs, and dupe sheets if you plan to be in a contest.
- ☐ DO learn about local propagation conditions and anomalies, and beam headings.
- ☐ DO contact the country's National Amateur Radio Society (IARU). Remember, it represents amateur radio in that foreign country.
- ☐ DON'T forget to take spare parts, fuses, tools, coax, etc.
- ☐ DON'T operate in violation of local rules concerning power limits, third-party traffic, etc.
- ☐ DON'T go where you are not welcomed by the local hams.
- ☐ DON'T try to set up a station from scratch unless you have a lot of time and experience.
- ☐ DON'T neglect sending word of the trip to this column and to DX newsletters.
- ☐ DON'T forget to take your written operating permission.
- ☐ DON'T forget that you are a guest in a foreign country, and our temporary representative of amateur radio there!





Scenes in Senegal — left to right: Menacing spiders spun eight-foot webs in the brush. A native in traditional dress. A view taken from near the 6W8MM shack.

*c/o ARRL, 225 Main St., Newington, CT 06111

THE DX SCENE

A6XB has never operated cw, and WA5YMW is not his -- or anyone else's QSL manager. Genuine ssb QSOs with A6XB may be confirmed by QSL manager K1DRN. (K4KPH)

California International DX Meeting is scheduled for April 15-16 at the Holiday Inn in Visalia, just south of Fresno. The Clipperton crew, VE3FXT/H5, and Ted Henry of Odyssey 77 fame are part of the exciting program. For details, contact Fred Cuevas, W6AOA, at the Los Angeles branch of Henry Radio.

CE0X, San Felix, is a definite possibility in April. N4WW has applied for a license, and a big multiband effort seeking 20,000 QSOs is being planned. (LIDXA)

CX5RV is G5RV, Louis Varney, who is on an extended visit to Uruguay. (CX7BBB)

CZ3 is a Canadian prefix assigned to members of the Quinte Amateur Radio Club in commemoration of the Centennial Year in Belleville. An award is available to North American stations working four of the CZ3 calls, and to stations in other continents working three of them. To apply, send a copy of the logged contacts and two IRCs to Box 206, Belleville, Ontario K8N 5A2, Canada. (VE3HON)

DU6RH, who has sent logs for the fall of 1977 to QSL manager W7HPI, works for the UN fisheries development program. He hopes to operate portable from various places in Southeast Asia. (W7HPI)

DX bulletins are broadcast by W6TI, the Northern California DX Club memorial station, each Sunday at 1800 UTC, or Monday at 0200 UTC on 14.002 MHz. (NCDXC)

FB8WM will be operated by F6EAY, ex-FL8BH, for a year. QSL to W4LZZ.

FO8, Clipperton, seems almost certain to be activated during late March or April by a French and Swiss team. The U.S. representative, Charles Singer, WA9INK/6, is seeking financial support for the costly effort. Urgently needed contributions may be sent to 2120 28th St., Sacramento, CA 95818.

GU5CIA is Dale D. Jones, K5MM, to be on Guernsey for a year. Most activity will be on 14.025 to 14.030 MHz, although on occasion other bands, 160 through 10 meters, will be used. QSL via N6MA. (K5MM)

HF0POL is the special call sign of a Polish scientific team working on King George Island in the South Shetlands until the end of March.

HH. After legalization of amateur radio in Haiti, the Haitian Amateur Radio Club was formed, with Mario Craan, HH2MC, as president. Visitors wishing to operate in Haiti should send a copy of their passport and license at least two months in advance to HARC, Box 501, Port-au-Prince. (NFDXA)

HS. Fred Laun, K3ZO, well known previously as LU5AFH and HS5ABD, may begin another long stay in Thailand during May.

International Police Association Radio Club 1977 contest winners were DJ8RK (IPA member), DA2DC (nonmember) and HE9ILN (SWL). (WB4QJO)

JA on 80 and 40. JA9BE, working for 5B-WAS, operates on those bands from 1100-1300 and 2130-2230 UTC daily. He needs ME and RI on 40, and those plus DE, NH and VT on 80. For a sked, write to Hisanobu Mori, 34 Shimoiino, Toyama-City, Toyama 931, Japan.

KH6RE, active on 20 cw, has reported good long-path openings to the East Coast from 1900-2100 UTC. The U.S. continental stations used beam headings around 120°.

KM6 on 160 can be scheduled with KM6FC, Box 100, Naval Facility, FPO San Francisco, CA 99614. (LIDXA)

LA award. A "Worked All Norwegian Communes" award is issued by the Vadso section of NRRL for those working 25 Norwegian communes (counties). Award Manager S. J. Schmidt, LA1QK, Box 3, N-9801, Vadso, Norway, has the details.

Pacific Northwest DX Convention is scheduled for the first weekend in August in Portland, OR. Contact Clyde Sylvester, W7KSA, Box 555, Portland, OR 97208.

PZ1DR was operated by W3YB/K7YB only during the cw portion of the 1976 ARRL DX Contest. QSL for any other QSO with the station should go direct to Surinam. (K7YB)

S8, Transkei, will be kept on the air until 1981 by WA6QFO, Geri, and WA6QFN, Al. Look for them around 14.210-14.225 MHz from 1900-2300 UTC. Geraldine often appears on the YL ISSB Net on 14.333 MHz around 2000 UTC. (LIDXA)

St. Paul Is., Canada, may possibly be activated by a Canadian group in late May or early June.

TJ2P is operated by G4EDN, who is ex-9H1HX.

VR3 may be heard more often, now that KX6BU is headed there with plans to erect a tall tower topped with a big 20-meter Yagi.

VR6TC is sometimes heard on 14.224 MHz around 1730 UTC on Fridays.

W7XA, Al Koblinski, received the 1977 Arizona DXer Award, presented each year by the Board of the Arizona DX Club to an outstanding DX operator. (W7IR)

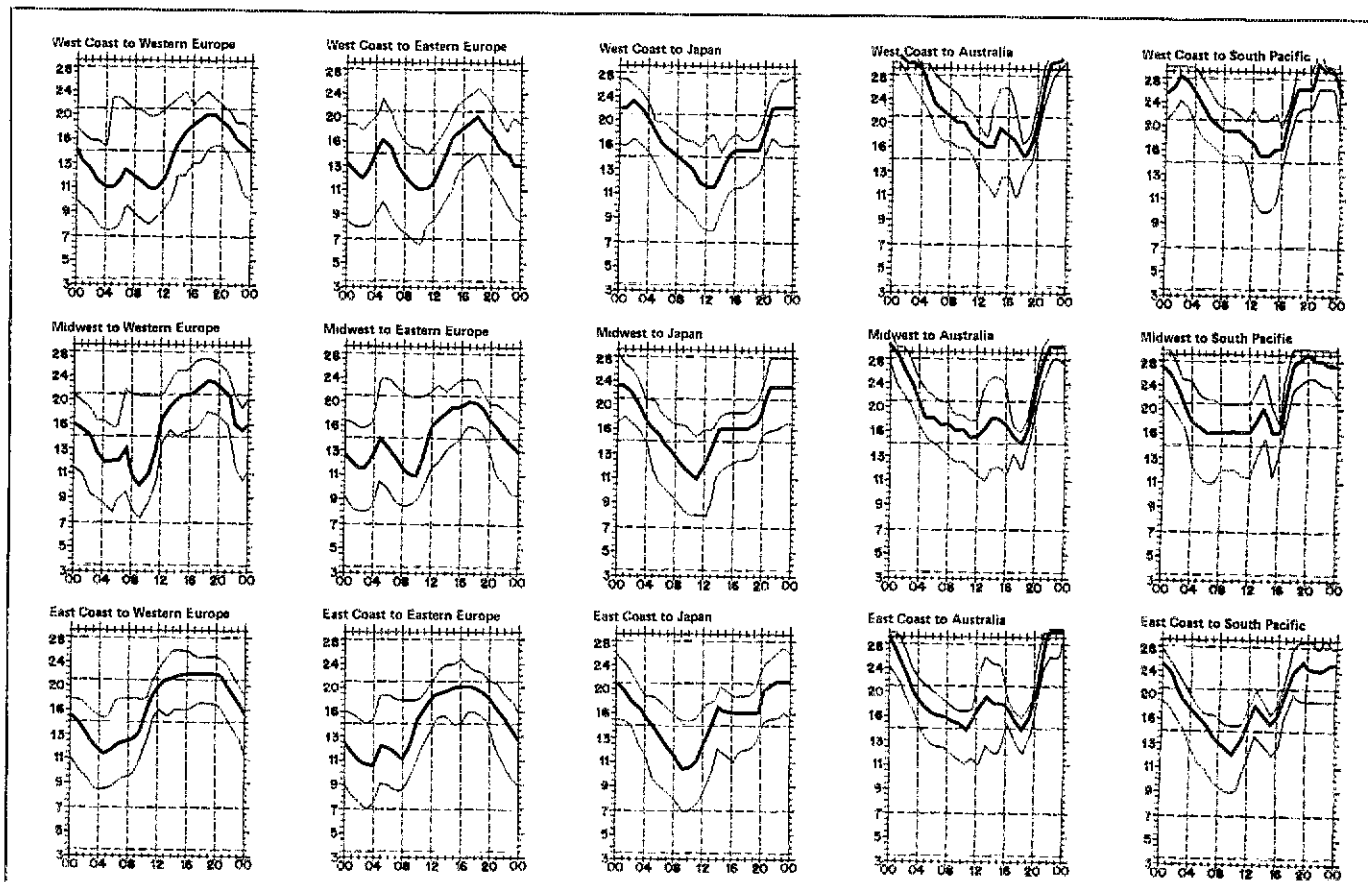
W9BRD, who now has a chance to relax, is thoroughly enjoying DXing, QRP style. Look for him on the low end of the cw bands.

XF4JJ QSLs without RST report are perfectly acceptable for DXCC credit if the mode is specified on the card.

YV0, Aves Is., may possibly be put on the air around March 20 or shortly thereafter by the Venezuelan Radio Club.

ZF2AH, well known for his big signal on 160 during last November and December, now has new QSL cards available with manager WA6VNR.

3C1X/SM6CSB. QSL manager SM6PF has become a Silent Key. For now, send QSLs direct to Harald Lofhede, SM6CSB, Nordgardsvagen 5, 430 50 Kallered, Sweden, for QSOs made with Harald.



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or hpf). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or muf). On 90 percent of the days of the month, it will be at least as high as the

5U7AG may be the only active DXer in Niger Republic now. QSL manager K1VSK will help you with a schedule.

7X2FL logs have not been received yet, reports QSL manager K1VSK.

8Z4. A9XBD is reportedly looking into the possibilities of activating this rare one later this spring.

160 DX window. Stateside hams are asked to observe the operating convention that leaves 1.825 MHz free for ragchewing, as that is the frequency on which DX stations transmit. (WA4JQS)

POTENTIAL QSL MANAGERS

These hams want to serve: WA1GXE, WB2YIP, K4YSF, WA4UQM, WD4BVR and WB9UKE.

Many of you have worked Victor, UVØEX, who operates from Sakhalin Is. with a 200-watt transceiver and two-element quad.

Erick, XE1QH, is a licensed operator at the age of eight. Proud parents are the mother Hertha, XE1DB, and father Nayo, XE1V.

QSL Corner

Administered by R. L. White, W1CW

One of the regular features in *QST*, every other month, is the list of the ARRL DX QSL system bureaus and the addresses. This being the month for that feature to appear, it will; following a few words about making use of the bureaus.

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 (and even those not so active) should keep several 5 × 7 1/2-inch envelopes on file with the bureau of his home district. Place your call sign in large letters (about 1/2-inch high) in the upper left-hand corner of the envelope and attach a single first-class stamp (13 cents). If you normally receive more cards than can be covered by the single ounce of postage, then, put an extra 11-cent stamp with the envelope, attached with a paper clip in case it isn't necessary to be used. Thirteen cents will cover the postage for about five cards. Twenty-four cents will cover the postage for about 16 cards. You can glue both stamps on the envelope, but it may mean you will wait three times as long before the cards are sent out from the bureau. Most of the bureaus hold the envelopes until there are enough cards to justify the postage on the envelope.

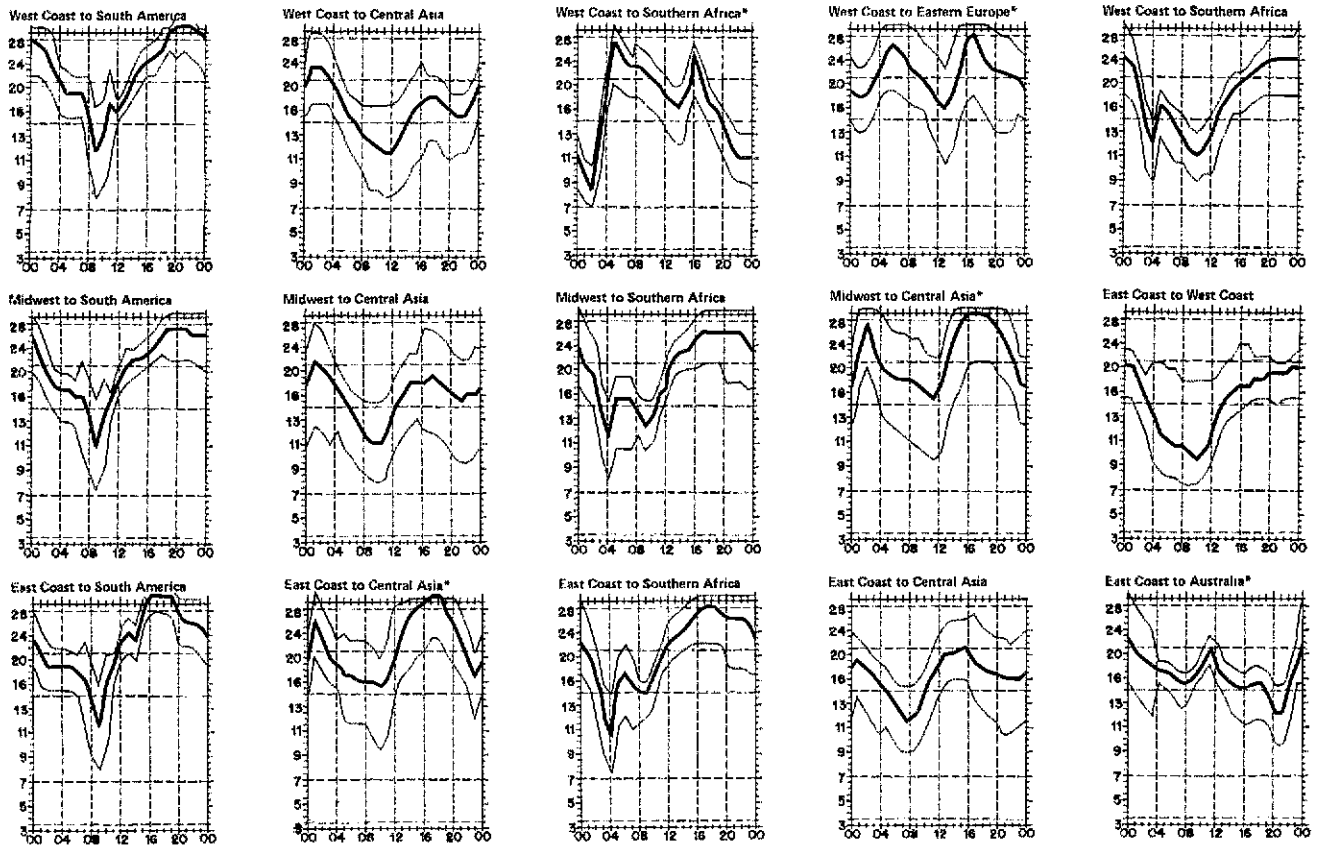
The DX QSL bureau system is, basically, a self-supporting system. The recipient furnishes the envelopes and postage for his cards. The people who do the work in seeing that your cards are sent to you are all volunteers who receive no pay for their work in the bureaus. There are about 250 volunteers in the U.S. and Canadian bureaus. In order to help keep the system self-supporting and to let the volunteers do an even better job of helping you get your DX cards, here are some points to follow when using the system:

1) When requesting information from the bureau, include an s.a.s.e.

2) When mailing envelopes to the bureaus (you should keep a supply of stamped envelopes on file with the bureau), be sure to use enough postage so it doesn't arrive at the bureau with postage due.

3) If you should hold more than one call, and operate under more than one of your calls, send the bureau separate envelopes for each call.

4) The DX QSL bureau system is for incoming DX cards only. QSLs for stateside to stateside contacts or Canadian to Canadian contacts cannot be handled by the bureaus.



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, and September 1977 *QST*, page 35, for a complete explanation. The horizontal axis shows Universal Coordinated Time (UTC); the vertical axis, frequency in MHz. Asterisk indicates long-path circuits. Data are provided by the Institute for Telecommunication Sciences, Boulder, CO. These predictions for April, 1978, assume a sunspot number of 70, which corresponds to a 2800-MHz solar flux of 119.

5) If you should change your call for any reason, you should still keep envelopes with your old call at the bureau for at least one year after you start using your new call. Even two years would not be unreasonable, as many cards sent via QSL bureaus are for contacts made 12 to 18 months before they are put in the system for forwarding.

6) If you should operate portable outside your home call district, don't send envelopes to the district bureau in which the operation took place. If you operate portable under your home call in a foreign country, make arrangements with the QSL bureau in the foreign country to claim your cards.

These are things the QSL bureau personnel tell me that people don't do; and if they did, it would help them to get your cards.

Here are the addresses for the ARRL DX QSL system:

THE ARRL DX QSL BUREAU SYSTEM

☐ First Call Area: all calls* — Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.

☐ Second Call Area: all calls* — North Jersey DX Assn., P. O. Box 8160, Haledon, NJ 07508.

☐ Third Call Area: all calls* — Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.

☐ Fourth Call Area: K4, N4, W4 — National Capitol DX Assn., Box DX, Boyce, VA 22620.

☐ Fourth Call Area: AA4, WA4, WB4, WD4, WN4 — Sterling Park Amateur Radio Club, P. O. Box 599, Sterling Park, VA 22170.

☐ Fifth Call Area: all calls* — ARRL W5 QSL Bureau, Box 1690, Sherman, TX 75090.

☐ Sixth Call Area: all calls* — ARRL Sixth (6th) District DX QSL Bureau, 2814 Empire Avenue, Burbank, CA 91504.

☐ Seventh Call Area: all calls — Willamette Valley DX Club, Inc., P. O. Box 555, Portland, OR 97207.

☐ Eighth Call Area: all calls — Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.

☐ Ninth Call Area: all calls — Northern Illinois DX Assn., Box 519, Elmhurst, Il 60126.

☐ Zero Call Area: all calls* — WØ QSL Bureau, Ak-Sar-Ben Radio Club, P. O. Box 291, Omaha, NE 68101.

☐ Puerto Rico: all calls* — Radio Club de Puerto Rico, P. O. Box 1061, San Juan, PR 00902.

☐ U.S. Virgin Islands: all calls — Graciano Berlardo, KV4CF, P. O. Box 572, Christiansted, St. Croix, VI 00820.

☐ Panama Canal Zone: all calls* — KZ5 QSL Bureau, Box 407, Balboa, CZ.

☐ Hawaiian Islands: all calls* — John H. Oka, KH6DQ, P. O. Box 101, Aiea, Oahu, HI 96701.

☐ Alaska: all calls — Alaska QSL Bureau, 4304 Garfield St., Anchorage, AK 99503.

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

☐ QSL Cards for Canada (VE and VO) may be sent to: ARRL Central QSL Bureau, P. O. Box 663, Halifax, NS, Canada, B3J 2T3. Or, QSL cards may be sent to the individual bureaus.

☐ VE1* — L. J. Fader, VE1FQ, P. O. Box 663, Halifax, NS B3J 2T3.

☐ VE2 — A. G. Daemen, VE2IJ, 2960 Douglas Avenue, Montreal, Quebec H3R 2E3.

☐ VE3 — The Ontario Trilliums, P. O. Box 157, Downsview, Ont., Canada, M3M 3A3.

☐ VE4* — W.A. Stunden, VE4BJ, 578 Oxford St., Winnipeg, Man., Canada, R3M 3J9.

☐ VE5* — A. Lloyd Jones, VE5JI, 2328 Grant Road, Regina, Sask., S4S 5E3.

☐ VE6* — G. D. Holeton, VE6AGV, 4003 1st St., N.W. Calgary, Alta T2K 0X2.

☐ VE7* — Howard Martin, VE7AFY, No. 45-9960 Wilson Road, Ruskin, BC V0M 1R0.

☐ VE8* — Al Sturko, VE8NS, P. O. Box 72, Fort Smith, NWT X0E 0P0.

☐ VO1, VO2 — William Coffen, VO1KM, P. O. Box 6, St. John's, Nfld., A1C 5H5.

*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.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmation for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 20-country increments through 240, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from January 1 through January 31, 1978. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

K2JMY/329	JA6OKK/128	JA1QOF/108	W6SMS/104	YU3DZ/101
W3ZDW/311	JA1AUC/122	WB4UFF/108	DF1FX/103	DL4LA/100
AA4CJ/298	VE7CHK/120	JA8BLD/107	JA4GXS/103	JA3CKW/100
PY2DFR/253	WBØGZR/120	OA4BZ/107	WA4NHP/103	K1FR/4/100
JA7GBS/246	JF1SEK/117	WA6AWF/107	WB5EIN/103	KH6DLJ/100
YU3TU/235	JA1GYT/116	DK7JK/106	W6CRE/103	N2ME/100
WA6EKL/222	DK6OR/115	N4SX/106	WBØNAA/103	N4OQ/100
N4XZ/219	K1EM/115	K1KNM/105	WBØSEU/103	OE1KJW/100
JA1JKG/213	HAØLM/112	WB4KSE/105	WA2OJK/102	VE2CSJ/100
YU1MV/194	WB2RTF/111	WB6BPZ/105	WA4FTJ/102	W1GWM/100
JA2DMO/176	DF7FH/110	WØSI/105	ZL1KB/102	W2YC/100
WA2WSX/169	DK9CZ/110	HB9BAR/104	4X4JW/102	WA4FMX/100
JA6GYG/149	N4YM/110	HB9BBB/104	VE3CPU/101	W6MUS/100
G8PX/137	DK2PB/109	WA2VCZ/104	WB6NJW/101	W7KVV/100
HM2JN/133	WA4WYN/109	W6RPK/104	WA9CZI/101	WBØQWX/100

Radiotelephone

AA4CJ/253	I6RME/125	K1KNM/109	WB6RMN/9/104	N2BJ/101
W2SY/222	I6ZAJ/120	JA1QOF/108	EP2TY/103	WB8KLC/101
W7DSZ/207	I8ZTE/117	WA4GQA/107	CP1AT/102	W6MUS/100
N4XZ/170	KG6JIA/117	WB4UFF/107	W4MNZ/102	WB6BPZ/100
W6PMT/156	VE3FZW/116	6Y5MC/107	WA4PDI/102	WB6KVR/100
JA6GYG/143	I6DBY/110	WB7EUT/106	K2JP/101	WBØQWX/100
G4BHE/140	JF1SEK/110	W2IJB/105		

CW

PY2RG/175	DF3KT/112	W1IQ/104	HB9BBB/101	W6CLM/101
JA2DMO/138	DL6VW/112	W1WA/104	JA1ILN/101	W7EEJ/101
K3TZV/120	JA1QER/110	I4RNL/102	VE3ECP/101	WA1QNF/100
JA6OKK/119	JA1JKG/108	N4YM/102	N3RJ/101	W4NGT/100
K5OR/113				

160 Meters

W4YWX

5BDXCC

N4BP	WB2NUU	W4KA	W7VRO	W9LF
DK2BL	K6DT	F6ARC		

Endorsements

Mixed

ON4DM/349	W6TC/282	N6VR/240	K7KH/181	WA5NDV/159
W2BHM/347	WAØOMA/281	N8JW/240	K6KII/180	WA1KUL/158
W8ZD/337	K9FN/280	W4JFE/240	WA4UVG/180	WA9TAA/158
W5RDA/334	W9PIO/279	WA4ENJ/239	VE6HT/179	W1ERW/152
W4OO/333	OH2LU/278	I2AY/232	WB4ASV/179	JH1LMG/151
W9FD/330	W4KA/273	YU3NR/232	K1NG/177	W4OUN/151
W4BRE/324	JA6EYD/270	WA4GQJ/231	K2SP/170	KH6GI/148
I2DEZ/321	K5DUT/270	VE3BZ/227	N7UT/170	KØAM/144
K5RC/321	SM7DMN/270	K5BDS/222	W7TS/163	N3US/143
K6XW/316	W7DH/270	W2GWT/222	W4ZC/162	VE3FZW/143
WB4KZG/315	K6WD/264	K5CSK/220	K9APW/161	VE3GFN/140
W3KA/314	K4IE/262	W2HAZ/220	W2PK/161	W3UJ/140
W5HTY/313	WØTRF/261	K1VSK/212	W6PMT/161	N5CB/139
W5NBI/311	K9WJU/260	OZ9PP/210	WØDP/161	WB9MFC/129
ZS6RM/309	W7DV/260	HB9HT/205	K7AOZ/160	K5EJO/126
WA2HIN/305	W4CZU/259	W6CLM/205	W1PV/160	K9BOL/124
WA4FFW/305	W1IKB/258	KZ5EK/204	W2RQH/160	W4QO/123
W4JD/303	N4NX/256	N6CN/204	WA2KWP/160	WA4YDK/123
W9KQD/302	IØZG/254	WA9MAG/202	WA4HDD/160	K8MNP/122
SP3DOI/301	K4UEE/252	KH6HG/201	WA4OUF/160	W1BL/122
W9LNQ/300	JA1ILN/251	WØMHK/201	W7ISG/160	WD8EOJ/122
WØHBH/300	W9UO/251	JA2IU/199	W9RJM/160	K6WJ/121
W7MVC/299	K6AG/250	K4JYS/199	WØMJA/160	W2VAV/121
PAØTAU/292	WA4JTI/250	WB4EQQ/199	K4KBL/159	WA6DVE/120
K5JZY/290	W7IYW/241	W8BIP/199	K4KKJ/159	WA7RKJ/120
W7XA/285	N4RR/240	YU2AAU/198	W1YRO/159	WB2AWL/119
N9MM/284				

Radiotelephone

ON4DM/349	CP1FW/281	K6PO/235	W3KA/183	K9APW/158
K2JMY/328	WA5DAJ/274	N4NX/230	WA4TLI/180	W3IOA/152
W4BRE/320	K9FN/270	K4NJS/228	WB4QWM/180	WA4AKU/148
I2DEZ/317	WB8CTA/269	I1ZFT/223	W6ORD/180	WA1KUL/140
DK2BL/315	W7MVC/261	WAØPVW/220	WA3YYW/179	N3US/138
W5HTY/313	K2POA/260	W1WXZ/219	K2SP/168	EA3OD/132
K6XW/310	W1JJ/259	W4EBO/208	WA7TTM/168	WA6DTG/132
ZS6RM/308	IØZG/252	JA3CHO/201	WB4VBL/164	W6TPP/124
WB2VEG/306	WA1EUO/252	WA4SSU/201	I1LNU/160	W2YTO/123
WB4KZG/304	KH6BZF/250	WB9CGL/200	WA4HDD/160	W1PV/120
OZ3PZ/290	PY6CN/242	N8JW/188	WB4ASV/159	WA4QMQ/120
WA6FPB/286	OZ7OP/241	WB5CBJ/184	K1NG/158	K4FKB/105
N4YD/283	W9XM/240			

CW

K9MM/266	W7LR/196	N4NX/149	W4OUN/124	K4FJ/120
K2TQC/251	N9MM/164	K4UEE/148	N1AC/140	K6KII/120
K6AC/200	W6JD/162	W9FD/145	WB9CGL/126	KØRP/120
N4MM/200	N7UT/160	W8RT/140	KH6HC/125	N2AC/120
W2NC/200	N8JW/160	DL1ES/137	DL1QT/120	W2LMO/120
WA4FDR/199	W7WN/150			

Corrections

December Listing Mixed: JA1BK/341, F2AT should be F3AT/341. Phone: LU9DAH should be 342.

The World Above 50 MHz

Conducted By
William A. Tynan,* W3XO

Mysterious 144-MHz Conditions Continue!

The January column reported the epic contacts made in late October between YV5ZZ and several Argentine stations including LU1DAU which set a new 2-meter terrestrial record of 3150 miles. This mark didn't stand for long, however. At 0030 February 8, YV5ZZ was at it again. This time Edgar hooked up with LU5DJZ, Mar del Plata, Argentina, about 250 miles farther than LU1DAU. Spurred by a desire to work stations even farther north, a number of Argentine stations began regular five-minute transmissions on 145.1 MHz beaming north at 0000, 0030 and 0100 UTC each evening.

Thus the stage was set for the next act in this fascinating drama of vhf DX. The following account from KP4EOR of what happened next tells the story much better than I can so I will depart from the usual policy, made necessary by space limitations, and reproduce his letter essentially in its entirety.

"Dear Bill:

"I have been a vhf experimenter since 1952 when I was CE3QC in Santiago, Chile, operating mostly on 6 metres and a little on 2 metres.

"From 1955 to 1960 I was active as CO2VY from Havana, Cuba, on 2 metres, from where we made the first contact between the U.S. (Miami, FL) and the island of Cuba in 1957 on that band.

"Since 1970 I was very active on 6 and 2 metres as VP2VAI/KP4 from San Juan, Puerto Rico.

"Early in 1977 I became KP4EOR and have been quite active mostly on 2-metre ssb/cw and fm, working regularly in HI8 and KV4 areas.

"In January of this year we started keeping daily schedules with stations in Florida on 145.100 MHz at 2300 GMT, and south towards South America at 2400 GMT on the same frequency.

"Yesterday at 0003Z while in QSO with KP4FAI on 145.1 MHz I heard a station on cw with T6 note calling on our frequency about S3-4, I immediately called QRZ on ssb with my beams pointed N.W., but had no response.

"I then swung my beams south to 170° approx. and called QRZ again on ssb and was answered immediately by LU3AAT, Hugo in Buenos Aires, Argentina, on ssb exchanging 5 × 6 and 5 × 7 reports. LU3AAT informed me that another station from Argentina was calling me 2 kHz lower in frequency.

"At 0012Z I called QRZ on ssb on 145.098 MHz and was answered immediately by LU5DJZ, Ramon, located in Mar del Plata, Argentina, about 400 km south of Buenos Aires, on ssb. LU5DJZ was 5 × 5 in San Juan, and he gave me a 5 × 7 report.

"I then asked LU5DJZ to listen for KP4FAI who was running about 10 watts output, but they could not make a two-way QSO as signals were too weak, although both stations heard parts of each other's transmissions.

"At around 0018Z we lost contact with the LU stations, however continued calling CQ on cw and ssb for quite some time, but I did not hear any other stations from South America.

"Today (Feb. 13) at 0003Z I called CQ on ssb beaming south, and was again answered by another Argentinian station in Mar del Plata, LU8DIN, Jorge (George), who was 5 × 5 in San Juan, and reported me as 5 × 9 in Argentina. This station was only running a Kenwood TS-700 at 10 watts output! Really fantastic.

"Although there were another 5 KP4 stations listening at the time that I worked LU8DIN, only one, KP4AAN, was able to hear him well enough to call him; however, the signals started going down into the noise at around 0009Z and a two way was not accomplished.

"After 0009Z I could no longer read LU8DIN's modulation as he was too far down into the noise.

"I continued to call CQ south till about 0130Z but heard no other signals that I could copy that evening.

"My equipment consists of the following: Antennas: Four Hy-Gain model 814 8-element Yagis at 55 feet over the ground, stacked 13 feet horizontally and vertically, coaxial baluns and RG-11 foam harnesses, fed with Andrews 1/2-inch Heliax, 80 ft. Receiver: Janel QSA-5 preamplifier into a Drake SC-2 converter into a Drake TR-6 transceiver as i-f. Transmitter: Drake TR-6 into TC-2 combination. Amplifier: Henry Tempo 6N2 running at approximately 600-watts dc output.

"My location is on the very northern tip of Carolina, a suburb of San Juan, about 1200 yards east of the San Juan International Airport. Exact position is 66° west and 18°30′ north latitude.

"It seems quite strange that during both these evenings when I was working Argentina on 2 metres, there were absolutely no signals of any type on 6 metres as we have checked 50 MHz constantly.

"Also it seems very strange that even though LU3AAT and other LUs were listening today when I worked LU8DIN, they did not hear me, and I heard no other stations from South America.

"The method of propagation is unclear, however the cw signals are very rough-sounding like a buzz saw and are T6 or T7, with flutter quite similar to TE scatter as heard on 6 metres. The ssb signals sound rather like distorted a-m with flutter and echo on occasions.

"We shall continue to investigate this propagation phenomenon and see if it can be repeated often, or if it is something sporadic in nature.

"Another interesting fact is that I have to aim right thru the island of Puerto Rico south, towards Argentina, and Puerto Rico is a very mountainous island with a row of hills and mountains extending east and west that are on an average about 2,000 feet high.

"I shall keep you advised of any future developments from time to time.
Very best regards,
73s and DX from
David S. Ternent, KP4EOR/VP2VAI,
Ex-CE3QC, CO2VY"

According to my calculations, the distance between KP4EOR and LU5DJZ is approximately 3943 miles. Certainly, spanning of such distances on 2 meters without the benefit of moonbounce must be considered a very noteworthy accomplishment. Our hats are off to all of the fine vhf operators who have taken part in opening up this new chapter in the world above 50 MHz. Their discovery of this exciting propagation phenomenon has already forced a few experts to rethink some of their previously held theories. I know of one case in which a book on ionospheric propagation had to be revised just as the manuscript was going to the publisher as a result of the news of these contacts.

As this column is being written, the nightly transmissions by the Argentine stations continue in hopes of making it all the way to the continental U.S. With this intense effort and these strange conditions prevailing, it's anybody's guess as to how long the KP4EOR/LU5DJZ record will stand. A tantalizing indication that greater distances are possible was given by WA4JID and WA4OWC of Fort Lauderdale, FL. These fellows report hearing a station on 145.1 cw signing an LU call between 0130 and 0230 UTC January 20. Despite the appearance of the signal over a period of an hour, they could not identify the rest of the call because of the fast flutter and echo effect present.

What next? Still higher bands is one possibility. At 0000 UTC February 13th YV5ZZ heard, for about 30 seconds, a weak fluttery signal from LU3AAT on 432 MHz! Schedules on that band are continuing.

K5MB TRIP TO HI A SUCCESS

That much-talked-about jaunt to our 50th state by Marshall Williams, K5MB, went off as scheduled in mid-January. Operating from the QTH of KH6HI, 20 stations were worked via 2-meter moonbounce. The antenna, which obviously did the trick, consisted of sixteen 9-element F9FT Yagis in a box arrangement, 24 feet in each dimension. The array was completely assembled and checked out before departure with able assistance from Jay, K5JL/W5ORH and Lucky, K7CNK. Another contributor to the cause was Frank, K9HMB, who loaned a kW amplifier on short notice. In the actual operating and supplying of additional needed equipment, Marshall was aided by Bert, KH6HI, and Steve, KH6IHP. The stations who were able to climb another notch up the state ladder by vir-

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730 or call 301-384-6736 and record your message.

The attractive QSL for the JA SMIRK group's DXpedition to Ponape last September. *(K5ZMS photo)*

tue of an EME contact with KH6HI are K1WHS, K1FO, K1MNS, WA4GPM, WA4MVI, K5CM, W5FF, K5FF, K5GW, WB5LUA, K5MB, W5ORH, W6PO, WA7BJU, W7FN, WA7KYZ, K7NII, W8IDU, WA9DOT and NØJA. Unfortunately, others including W7UBI and K9CA who were in there trying did not quite make it. They, along with the rest of us, can take heart as KH6IHP became so fired up with 2-meter EME that he bought half of the antenna. He hopes to have it up and be in business soon. Very often the real payoff from DXpeditions such as this is not simply in the QSOs made but in the goodwill and enthusiasm left behind. It appears that this trip has been one of these cases. Our thanks to Marshall and all who helped him in this venture.

FOURTH ANNUAL EASTERN VHF/UHF CONFERENCE

Like those of past years, this year's Eastern VHF/UHF Conference promises to be a great affair. It will be held May 20 and 21 at the New England Center on the campus of the University of New Hampshire at Durham. This site is ideal for such gatherings as anyone attending past conferences held at this location can attest. A Sunday morning noise-figure competition will be flanked by numerous technical presentations aimed at the practical side with special emphasis on the higher bands. Add to this, good fellowship amid marvelous surroundings and you get a memorable occasion. Preregistration is $10 which will be increased to $15 later. For further information send an s.a.s.e. to Joe Reisert, W1JR, 17 Mansfield Dr., Chelmsford, MA 01824.

C U there!

ON THE BANDS

6 Meters — While we in this part of the world sit and wait expectantly for the forthcoming Es season, 6 meters has really been busting loose in the Pacific area. As an example, JA1RJU, on December 3, worked ZL4LV and ZL3AAN. The contacts, which took place about 0400 UTC, were the first ZLs for Kazu in 10 years. The same day brought contacts with VK and P29. Kazu's country total now stands at 13, more than enough to qualify for SMIRK's DXDC award. The Pacific basin is dotted with 6-meter activity signing interesting calls like YJ8KM, New Hebrides; P29DJ, Papua; 3D8AZ, Fiji; VK9NI, Norfolk Island; as well as several KG6s and U.S. calls/DU. Activity in Australia is at a high pitch as witness VK3OT's recent feat of working 600 stations in the most recent annual Ross Hull Memorial VHF Contest. According to VK5LP's vhf/uhf column in the January issue of *Amateur Radio*, substantial effort is being put into getting back the use of the lower 2-MHz portion of the band. This would be of considerable help during the upcoming solar peak. I am sure that Eric would appreciate letters of support on this from readers of this column. Address is Eric Jamieson, Forreston 5233, South Australia.

Pending the outcome of this effort, bear in mind that the VKs presently operate only above 52 MHz. It would be well to make sure that our equipment is capable of working up there. Also, anyone having influence with groups which may be putting fm repeaters on 6 meters might attempt to convince them to keep at least the first fm channel clear as its input is in the part of the band designated for DX in Australia.

Many are suggesting that one or more hf frequencies be set up for 6-meter liaison. What bands and frequencies are still open? WB2RLK/VE1 suggests 28.515. Note that a 6-meter net already meets each Tuesday evening at 2300 UTC on 3820 kHz.

One European actively pursuing permission to operate on 6 is EI6AS. He would appreciate letters of support which he can take to his authorities. Address is Albert Latham, 9 Thornville Pk., Omagh 4379, County Tyrone, Ireland.

From Shemya Island in the Aleutians, WA4TNV writes that he is on both 6 and 2. He regularly monitors 50.115 and 144.150. He has heard some JA7s and 8s on 6 meters but so far nothing on 2 meters. Also watched regularly is 28.640 MHz.

Back on 6 after a long absence, K6PHE reports quite a good band opening February 1 to TX and later to OR and WA. Bob even heard a KL7 but was unable to complete a contact because of QRM.

A correction to the information reported last month on the 6Y5RC beacon: The beacon frequency is 50.025 not 50.050 MHz.

Next month I will present a rundown on all of the known DXpeditions planned for the period of the June VHF QSO Party. There are quite a few, so it should be a lively time!

2 Meters — Remember that big tropo session in mid-December? We all knew that it was a good one but this item illustrates just how good, as well as what can be done with low power when conditions are right. Running just 3 watts, WB9IDU, Columbus, WI, worked stations in both TN and GA. Moral: If you are QRP, don't give up, keep pitching!

As an illustration of the growth of 2-meter ssb/cw activity, K7ICW, Las Vegas, NV, notes working 96 out-of-state stations during January. That's a new record for one month of activity for Al. Incidentally, K7ICW's EME project is progressing. He has his 80-element collinear up and has heard signals from K1WHS. A few more refinements and NV should be available on moonbounce.

K4GL submits a list of stations worked during the Geminids and makes a plea for help from fellow South Carolinians to handle the many requests for m.s. skeds which he receives before every shower. Incidentally, Jack's state total listed in the February column is in error. His total is still 44 not 41.

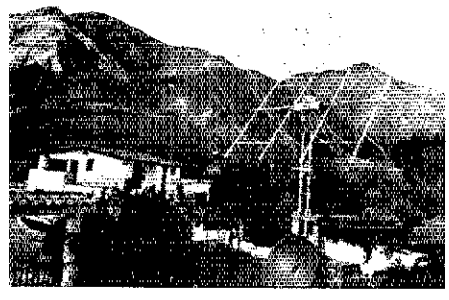
W5FF and K5FF, Edgewood, NM, are getting ready for next summer's Es season. Fred and Lee will monitor and call toward New England on 144.110 beginning about May 1. They have an 8877 going along with a big beam and are hoping for some 2000-mile E skip. They note that "local" activity is picking up. A new Albuquerque station is K5EFW, who has already worked IL on m.s. Hamp, well known to 6-meter operators, is holder of 50-MHz WAS certificate number 101. Another improvement in activity in the area is caused by more stations converting to horizontal polarization. This makes regular contact with the Denver area possible now whereas it was not previously.

In the Pacific Northwest, WB7BFK reports considerable activity on 145.1 and 145.025 at 1900 local time Monday, Wednesday and Friday evenings. The gang is particularly looking for contacts on the eastern side of the Cascades.

WAØDXZ, Iowa City, IA, has been having good success with aurora on the few times it has been present. Especially productive were the evenings of January 4 and 5. Bob is available for skeds. Call 319-351-1488.

1-1/4 Meters — W1JR says that he now has a 50-watt solid-state amplifier going on 220 which helps him a great deal during the regular Tuesday night activity sessions. A contact with W2EIF, NJ, in the January

The 70-cm EME array at YV5ZZ. Edgar's very consistent signal off the moon is produced by sixteen 21-element F9FT Yagis.



FIRST ANNUAL ARRL MOONBOUNCE CONTEST

EME-ers: Don't fail to participate in the first a nual ARRL Moonbounce Contest:

April 15 and 16 and May 20 and 21

Rules in March *QST*, Page 82

contest gave Joe state no 9. KØNG says he has 500-watt rig which he can put on 220 if there is enoug interest to make it worth putting up an antenna. A takers should contact Charles E. Conner, 1801 S. 48 St., Lincoln, NE 68506.

Following the plea made in the January column th some way be worked out such that the East and t West can get together on the same part of t 1-1/4-meter band, a suggestion has been made th both groups move to 221 MHz. It has been pointe out that this frequency has the advantage of allowin repeater inputs on one side and repeater outputs o the other side of the "weak-signal" segment. Th would appear to make the best use of the available fr quencies, especially considering the fact thi 1-1/4-meter repeaters use an input/output spacing o 1.6 MHz. Let's hear from the inhabitants of this ban concerning this or any other ideas.

70 Cm — This winter has been rough on moonbounc antennas in many parts of the country. Nevertheless many of the old-timers remained active while new sta tions join the ranks of a steady pace. Some of th newer ones mentioned in the *432 EME Newsletter* a WA7MIC, WA; W6ABN, K6ODV, WBØSBG, I and G3OUR at Oxford University. Others such a G3DGU and VE1OD were about ready to go whe weather damage set them back a bit. However, wit the arrival of spring their antennas should sprou again. Many have inquired as to how they can receiv the newsletter. K2UYH will be glad to send it to thos seriously interested in 432 moonbounce but he must b supplied with business-size s.a.s.e.s. Address to Dr Allen Katz, Engineering Technology Dept., Trento State College, Hillwood Lakes P. O. Box 940, Tren ton, NJ 08625.

23 Cm and Down — KØNG, Lincoln, NE, support the activity-night concept put forth in the Februar column. He is operational on 23 cm with 30 watts ou put and a 12-foot parabolic section at 50 feet. Receiv ing is helped with an MRF901. Best DX so far i WØZJY, about 175 miles. Chas is looking into th possibility of installing a remote base station at th 1350-foot level of a local TV tower. The rig would ru about one watt to an omnidirectional antenna. The in stallation could serve either as a linear repeater or con trolled beacon. It might be useful as a band-openin warning device and possibly turn up some interestin propagation information. Those wishing to express in terest in this project or arrange 23-cm schedules ca find KØNG's QTH in the 1-1/4-meter section of thi column.

1-1/4-Meter Standings

Figures are states, call areas and best DX in miles.

K1PXE	16	6	781
WA1MUG*	15	5	450
W1YTW	14	6	860
K1FO	14	6	799
W1HDQ	13	5	450
K1JIX	12	4	600
WA1FFO	11	5	420
W1AZK	10	3	375
K1BFA	10	3	225
W1JR	9	3	270
K2CBA	19	7	2500
K2DWJ	16	5	740
W2GRS	14	5	600
K2RTH	13	5	960
K2DNR	13	5	600
W2SEU	13	5	325
W3UJG	14	5	460
W3HMU	13	4	300
WA3JUF	12	5	580
W3RUE	11	6	480
K3IUV	11	4	340
W4UCH	9	5	543
K4LHB	8	5	250
K4IXC	5	3	1115
K4GL	4	2	485
W5RCI	10	5	910
K5FF	8	5	1098
K5JL	6	4	1178
W5HN	6	4	1050
WB6NMT	10	6	2500
W6WSQ	6	4	1178
W7CNK	6	3	923
W7JRG	5	3	956
K7ICW	4	2	250
W7HSJ	3	2	400
K8HWW	11	6	550
W8IDU	10	5	635
K9HMB	23	10	1816
WØPW	14	6	1600
WAØQLP	4	2	923
VE2YU	8	3	300
VE2HW	5	2	325
VE3ONT*	16	8	420
VE3EMS	10	7	465
VE3AIB	7	4	450

*Club station

Public Service

Conducted By Robert J. Halprin,* K1XA

The Great White Way

The story "A Year Ago This Month," which appeared in this section in January 1978 *QST*, recounted the activities of hams in Allen County, IN, during the snow emergency which ironically struck the Midwest just in time for the 1977 Simulated Emergency Test.

As fate would have it, Ohio, Indiana and several other states were again paralyzed by an awesome blizzard just prior to the scheduled start of the *1978* SET. As Ohio SCM N8XX said, this year's SET was a disaster. And early February saw the East Coast shut down by the heaviest snows in decades. *QST* will feature the amateur radio performance during the blizzards of 1978 in an upcoming issue. In the meantime, here are the further adventures of the Allen County hams in the recent emergency, reported by Dave Sweigert, WB9VKO, a newsman for a Fort Wayne radio station:

No one was laughing when a killer blizzard hit Indiana. Four people died in weather-related incidents. The snow kept falling and 60-mi/h winds kept blowing. All roads were impassable.

Citizens realized a disaster had struck the Fort Wayne, IN, area by 4 A.M. Wednesday morning, January 25. Drifts were reported up to 10 feet. Automobiles were buried in snow; motorists were stranded. WC9AAM, the emergency operations center in Allen County, under the direct command of the sheriff, was activated at 5 A.M. Amateur radio communications were conducted on the 28/88 repeater, WR9ABN.

A state of confusion existed in the Fort Wayne metro area. The Red Cross center was already overcrowded with snow victims. Two-hundred emergency requests for medicine, rescue of motorists, and other related emergencies, piled up at WC9AAM within an hour. Members of the Four Wheel Drive Club soon reported to the EOC for assignment. Allen County Emergency Coordinator WB9PXT dispatched a ham with each driver on emergency runs.

As the snow continued, the state of Indiana was placed under emergency status by Governor Otis Bowen. The EOC emergency request number was given out by the local media and the phone lines began ringing nonstop. The National Guard and state police activated mass shelters and an amateur radio link was established at each center. Traffic handling was not forgotten. Messages were being originated on behalf of those stranded and then sent on the Indiana Traffic Net by K9VFE, W9FMJ and WB9UBF.

Assistant ECs WB9QEZ and WA9YOS worked closely with EOC Director N9IU in obtaining personnel. Four-wheel-drive vehicles were dispatched to pick up ham volunteers and as the situation grew more intense, 2 meters sounded as busy as a channel in the Citizens Radio Service.

In the early evening hours, panic reigned. People were stranded, at work, at home (in many cases without food), and in their cars. Medical emergencies were occurring everywhere. Hams worked around-the-clock and at times there were 22 ham-equipped 4WD vehicles out on the roads. WB9UDQ, among others, went without sleep for 36 hours, manning a 4WD the entire time.

Early Thursday morning, the requests began piling up for baby formulas, insulin and prescriptions. WB9PXT had to set priorities. "Medical-related emergencies first" was the order issued. An efficient filing system was put into effect to handle the almost 500 calls awaiting attention. And the local police had twice as many.

By Friday morning, Operation Dig-Out had begun. There were many dramatic rescues that you read about in every emergency. The mayor told the citizens to stay home and most people cooperated. Many of those that didn't had to be rescued, with the help of amateur radio. Everyone knew who the hams were and what they were doing.

Fort Wayne is a grateful community.

PUBLIC SERVICE DIARY

☐ Seattle, WA — November 2. The Boeing Employees ARS handled communications during the search for a missing hunter on the west slope of the Olympic Mountains. (K7GZO, EC BEARS)

☐ Vicksburg, MS — November 27. Eight members of the Vicksburg ARC participated in the search for a lost boy in a heavily wooded area. The child was found unharmed two hours after the search began. (WB5SXK and W5YTN, SCM MS)

☐ Waverly, NS — December 2. The Emergency Communications Team (associated with the Halifax ARC) provided communications for a missing-person search by the Waverly Search and Rescue Team. (VE1AMC and VE1OC, SCM Mar/NF)

☐ Yakima County, WA — December 2-10. Within one week, two floods caused millions of dollars of damage. And local hams spent many hours at base stations and in the field, participating in relief efforts through RACES and the Department of Emergency Services Net. (W7GZN)

☐ Reno, NV — December 4. Members of the Sierra Nevada ARS rented a plane and furnished radio communications in the search of the surrounding mountains for a missing fellow ham, W7FDZ. (W7YKN)

☐ Lester, WA — December 4-6. Communications support from Boeing Employees ARS was requested by the King County Sheriff and the Air National Guard for the flood control efforts in central Washington. (K7GZO, EC BEARS)

☐ Monroe County, MI — December 5 and 10. The Monroe County ARES Net relayed information about weather and road conditions as heavy snowstorms moved across the Midwest. (WB8KBZ, EC Monroe Co.)

☐ Miami, FL — December 7. Miami Springs Police Sgt. Robert Miller was observing ham radio at W4IYT's shack, when W4UUI broke into the Dade Emergency Net training session to report two explosions he had witnessed. Sgt. Miller relayed the report to headquarters and emergency equipment quickly arrived at the scene. (W4ZR)

☐ Riverview, NB — December 7. While driving in a blizzard, VE1BKA discovered a jack-knifed tractor trailer. Via 2 meters, he contacted VE1DI, who alerted the authorities. (VE1DI SEC and VE1OC, SCM Mar/NF)

☐ Payson, AZ — December 8. After the transceiver in the town ambulance was stolen, the driver, WB7CXO, used his 2-meter portable to keep in contact with the Payson Hospital via WR7AGT. (W7DQS, SCM AZ)

☐ Longview, WA — December 12. The Lower Columbia ARS provided communications for the Cowlitz County Emergency Service and the National Guard as a state of emergency was declared due to the rains which inundated the area. (WA7OMX)

☐ Evansville, IN — December 13. After the entire University of Evansville basketball team died in a plane crash, telephone lines were jammed. So, the Tri-State Emergency Net furnished communications to help coordinate the activities of the c.d., Red Cross, and Salvation Army. (WA9QCF, EC Vanderburgh Co.)

☐ Houston, TX — December 13. Many amateurs participated in emergency relief operations after a tornado swept through the region. The Houston EOC handled traffic through WR5AAA, while emergency phone calls went through WR5AFK's autopatch. Hams, with portables on 52 simplex, patrolled the devastation with sheriff's deputies until normal communications were restored. (W5SPD)

☐ Blackford County, IN — December 13-18. Local amateurs set up a communications link between the county's largest cities after a snowstorm blanketed the area and threatened to knock out normal communications. (WB9VJO, EC Blackford Co.)

☐ Kentville, NS — December 15. Fifteen minutes after local telephone service was disrupted, Canadian amateurs established a network on repeater VE1LHR and 75 meters to pass emergency traffic. (VE1BBO)

☐ Birmingham, AL — December 16. Via 146.46 simplex, WA4RRT reported a car accident to police and assisted an injured pregnant woman until the rescue squad arrived. (WB4ASV and W4LNN, SCM AL)

☐ San Diego, CA — December 18. After telephone service was disrupted by heavy rain in parts of San Diego, the Neighborhood Emergency Communications System was activated to provide residents of the affected areas with a means of contacting the fire and police departments, and other vital services. (WA6HJJ, Asst. SEC San Diego)

☐ Newberry, SC — December 18-19. WD4BYE was following a lumber truck which was trailing smoke. After alerting the driver, he contacted K4HIH on 146.52 simplex, who called the authorities to put out the fire. (WD4BYE)

☐ San Joaquin Valley, CA — December 20-22. Winds of 100 mi/h knocked out electric and telephone service in Arvin and Bakersfield. Local hams provided the only means of communications in the stricken communities. (WA6CTR and W6PDP, SEC San Joaquin Valley)

☐ Atlantic Ocean — December 21. The captain of the motorship *Louella* used the ship's amateur radio station (HK2NE) to break into a stateside QSO seeking relief for his damaged vessel. WA4GGL contacted the Coast Guard, which guided the *Louella* to safety in the port of Miami. (W8OGK)

☐ Desert Hot Springs, CA — December 26. California amateurs provided communications for the rescue of survivors of a private-airplane crash in nearby mountains. (W6LKN, EC Riverside Co.)

☐ San Diego, CA — December 29. The Happy Flyers provided homebrew direction-finding equipment for a downed-aircraft search. And, a 10-year-old girl was recovered from the plane equipped with an emergency locator transmitter. (WB6CQW and WB6ODQ)

☐ Tell City, IN — January 5. Evansville ARES

*Asst. Communications Mgr., ARRL

members provided communications for a downed-aircraft search in dense fog using 2-meter simplex and repeater WR4ACO. (W4OYI)

❑ *Repeater Log.* As winter storms swept through the Northeast and Midwest in January, the following repeaters activated weather emergency nets: WR1s ADD ADM AFU, WR2AKV, WR4s AGJ AKW, WR8s ABC ADV AGA. Repeaters were also used in conjunction with 463 automobile accidents and related occurrences, nine fires, six medical emergencies, five weather watches, three disturbances, three rescues, three burglaries, two suspicious persons and 13 miscellaneous incidents. Repeaters involved were WR1AAC, WR2s ADM ADZ, WR3s ABB ACE, WR4s AEX AGJ AKW ASC ASW, WR5s ABA ABY ACG ADP AIB AJG, WR6s ACE AGT AGU AHM ALP, WR7s ADN AFT, WR8ABC, WR9s AAA ABY ACX ADN AMU, VE1LHR, VE3DRW.

❑ For the month of January, 35 SEC reports were received, showing a total ARES membership of 13,916. Last year at this time, 32 reports were submitted, with membership totaling 12,765. Sections reporting were Alta, Ariz, Ark, Colo, ENY, EMass, Ga, Ind, Iowa, Kans, Me, Mar/NFld, Mich, Miss, Mont, NC, NFla, NTex, Ohio, Okla, Ont, Org, Oreg, Que, SDgo, SJV, SBar, SCV, Sask, SFla, Utah, Va, Wash, WVa, WMass.

NATIONAL TRAFFIC SYSTEM

Gang: your January reports should be *all inclusive*, that is, SET totals should be added-in to the overall monthly summary sent to Hq. A few reports did not contain SET info. Too late for this year, but keep it in mind for next year. Of course a separate SET report should be filed as well. NTS got a good workout between the blizzards and the SET. W3NEM reports that the 1978 SET was the biggest ever for 3RN-E. The Tenth region net report (below) is incomplete, as the daytime statistics not received by deadline. W7VSE says that liaison with Alaska is working out fine, via RN7-D. Certificates: CAN-D: WA5BHF WB5OYU W5REC W9JIJ W9NXG NØSN WBØVHN. 4RN-D: WB4QBB. RN5-D: WA4OEM K5QNE W5YZL. 8RN-E: N8TM W8TP.

January Reports

Area Nets
(evening sessions)
(daytime sessions)

1	2	3	4	5	6	7
EAN	37	2681	72.4	1.672	99.1	
EAN	63	1065	16.9	.715	93.5	
CAN	34	1763	51.9	1.224	100.0	
CAN	64	647	10.1	.365	100.0	
PAN	33	1625	49.2	1.167	99.6	
PAN	33	662	20.1	.424	100.0	
Region Nets						
1RN	99	1377	13.9	691	93.9	94.8
2RN	139	1128	8.1	.462	91.4	97.7
3RN	101	724	7.1	.497	98.7	99.2
4RN	130	1824	14.0	.527	70.9	99.2
RN5	99	1958	19.8	.619	89.4	100.0
RN6	97	1133	11.7	.438	90.8	98.5
RN7	124	818	6.6	.347	94.0	98.5
8RN	96	583	6.1	.407	90.6	98.5
9RN	92	848	9.2	.494	84.6	100.0
TEN	82	725	11.7	.525	92.1	100.0
ECN						97.3
TWN	97	982	10.1	.396	97.2	98.5
TCC						
TCC Eastern	141[1]	976				
TCC Central	97[1]	792				
TCC Pacific	125[1]	863				
Sections[2]	4755	19415	4.1			
Summary	6155	42589	6.9			
Record	5620	42106	19.1			

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (141): BCEN (BC), MMPN MTN (MB), APN (Mar/NF), CMN GBN GBSSN LN ODN OPN (ON), WQV/UHF (PQ), SATN (SK), AENB AEND AENM AENS (AL), ASN (AK), HARC (AZ), ARN AMBN CCEWN (AR), NCN NEN SCN (CA), CWN HHN (CO/WY), CN CORN CPN NVTN (CT), DEPN DTN (DE), FAST FMTN FPON GN NFPN PBTN SPARC TPTN (FL), CGVHFN CVEN GARES GCN GSSBN GSN (GA), IMN MTN (ID/MT), ILN IPN (IL), INTN ITN QIN (IN), ICN I75MN TLCN (IA), KPN KSBN QKS (KS), KNTN KSN KTN KYN MKPN 6DARES (KY), LAN LRN LTN NOVHF (LA), CMEN MSN PTN (ME), MDCTN (MDC), EMRI EMRI-SS EM2MN HHTN NENN RIEM2MTN WMN (MA/RI), MACS MWN QMN (MI), MSN MSPN MSSN PAW (MN), MLWN MSBN MTN (MS), MOSSBN PHD (MO), CN WNN (NE), NHVTN (NH/VT), NJN NJPN (NJ), NMRRN SWN (NM), WDN (NY), CN CNN NCSSBN THEN SCSSBN (NC/SC), BN ONN OSN (OH), OAN OFON OLZ OPEN OTWN STN (OK), BSN OSN WCN (OR), EPA EPAEP&TN PTTN WPA WPAP&TN WPA2MTN (PA), SDN SDSSN (SD), TNN TPN (TN), TTN (TX), UCN (UT), VFN VN VSBN (VA), NTN (WA), WVN (WV), BEN BWN WIN WNN WSBN WSSBN (WI).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVG.
5 — RATE
6 — % REP
7 — % REP. TO AREA NET

Transcontinental Corps

TCC-E certificates issued by VE3SB; WA1ZAZ N3HR; first annual: W8LTA; third annual: W2CS; fifteenth annual: W2FR.

	1	2	3	4	5
Eastern	162	87.0	2942	976	
Central	102	95.1	1563	792	
Pacific	133	94.0	1737	863	
Summary	397	92.0	6232	2631	

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (January): Eastern Area (VE3SB, Dir.) — W1s KX NJM QYY, WA1ZAZ, K1s BA EIR GN PAD SSH XA, W2s CS FR GKZ MTA RQ, WA2ICB, N2GM, W3s PQ YQ, K3s KW NGN, N3HR, W4s SQQ UQ, K4s BKX KNP, N4KB, W8s LTA/2 PMJ, K8KMQ, VE3s GOL SB. Central Area (W5GHP, Dir.) — W4ZJY, WB4SKI, W5s GHP RB, K5s GM MC TTC, N5s TS YL YX/Ø, WA5s HNN IQU, WB5FDP, W9s CF CXY DND NXG, N9TN, WØs AM HI, WAØTNM. Pacific Area (K5MAT, Dir.) — N5s MR NG, W5KH, K5MAT, N6GW. W6s EOT MLF OA VZT YBV, K6HW. WA6VBS, KH6IQU, W7s DZX EP GHT VSE, K7IWD, WØs ETT IW LQ, KØs BN DJ TER, WBØTAQ, VE7ZK.

Independent Nets (January)

1	2	3	4
Amateur Radio Telegraph Society	31	682	595
Central Gulf Coast Hurricane	31	259	3350
Empire Slow Speed	30	70	341
Hit & Bounce	62	1065	468
IMRA	26	496	964
North American SSB Traffic	22	119	182
Southwest Traffic	31	118	1234
Washington Region PON	18	54	428
75 Meter ISSB	31	805	1151
7290 Traffic	46	715	3025

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll January 1978

This listing is available to amateurs whose public service performance during the month indicated qualifies for 40 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 10; (2) Checking into phone/RTTY nets, 1 point each, max. 10; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned liaison, 3 points each, max. 12; (6) Phone patches, 1 point each, max. 20; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly with a disaster area, 1 point each message; (9) Serving as net manager for entire month, 5 points. This listing is available to Novices and Technicians who achieve a total of 20 or more points.

73
K8FE
69
WA5RKU
68
N5TC
67
WA9QCF
66
W7GHT
65
W8SOP
64
WB2IDP
WB5NKD
W7VSE
63
WA1TBY
62
K4BKX
W4OGG
61
K1PNB
W1RWG
WA1ZAZ
WA2ERT/1
N2YL
WA4CNY
WA5IQU
N5RB
59
WB2KIH
N2TW
W4FMN
WA4JDH
WBØHOX
VE5AAE
58
WA2BMI
W5KLV
WB5NKC
K5OWK
57
VE3GT
56
W1KX
W2MLC
WA2ZJP
N4WA
K5TTC
W6OA
W8DIL
W8IQ
WØHI
WBØZAL
VE4PG
55
WB8WTS
WB8YDZ
54
N5ES
K5TL
WBØSND
53
K1UZ
AA4NC
WA6UAZ
WB8MTD
WD9AUD
WD9CQC
WØOYH
52
N1RI
K3JL
W4MEE
WB4OXT
WØOTF
51
WA8RQQ
50
WA1HYN
WA2JKG
WA3WPY
N6GW
N7IT
49
WA1POJ
W1TM
K4YFC
W6RFF
WB6UZX
K7GXZ
WA7MEL
W8YIQ
WA8ZNC
WB9ICH
WB9OTX
KØEZ
NØOF
WBØVDO
WBØVEZ
WAØVGN
VE1WF
VO1GW
VE3DPO
VE7DKY
48
AA4CK
WA5JWD
N8CW
WB9KPX
47
WB1CPF
WA2SPL
K4YRL
K5DG
W5TI
46
WA2AIV
WBØUIP
45
K2SE
44
W1BVR
W1DOY
WA1MJE
N1RP
WA1VVA
WA1YMN
WA2YEI
WA3NAZ/4
W3PQ
K3YL
W3YQ
WB4EKJ
K4EV
W4LXB
WA4OEM
K4VHC
WB5LBR
K5MC
K6LKW
WA7JRC
WD8AVY
WB8VLR
W9JSR
W9NXG
WB9SQH
VE1AMR
VE1CH
VE1EJ
VE1HJ
VE1IG
VE1LCR
VE3GOL
VE4IZ
VE4QU
VE4YE
43
W9HOT
KØEVH
WBØLFY
42
W2CS
WB4TEK
WA5VBM
WB8KWD
W8VPW
WØMDT
VE4UL
41
WA1ZXB
WA2EPK
WB3DKT
K3HI
W3PD
WB4DHC
W4PIM
WB5LAT
KØOHU
N8IG
K9DAC
K9MX
40
N2CR
WA5JYH
WB5MTN
VE7GY
36
WA7ZAP/T
33
WD8IYO/T
28
WA4QGV/T
27
W4MHO/T
22
WA4MJT/T
WD8NYN/N
20
WA4VKD/N

Brass Pounders League January 1978

BPL Medallions have been awarded to the following amateurs since last month's listing: W1TR, WA3WQP WB5NKC, W9ZGQ.

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

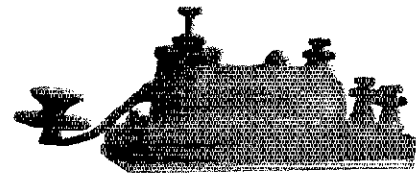
1	2	3	4	5	6
W3CUL	528	1586	1871	59	4044
K1BCS	934	273	1233	40	2480
WØWYX	55	1158	510	648	2371
K3NSN	588	412	400	12	1412
WA4JDH	2	661	623	2	1288
WAØRWM	63	800	17	585	1265
KØYFK		557		557	1114
W3VR	389	211	476	21	1097
W4MEE	8	484	442	25	959
WB2KIH	57	395	391	51	894
WB2IDP		373	474	3	848
WA3ZRY	29	378	382	18	807
W7DZX	26	383	391	6	806
W5KLV	11	440	333	17	801
W9ZGQ		471		319	790
K4SCL	2	394	268	17	681
KØONK	4	515	115	12	646
WD4KPG	42	276	303	15	636
W9JIJ	31	291	10	281	613
N5TC	57	243	292	18	608
W7VSE	3	295	270	18	584
N2TW	2	253	295		550
WA8MCR	6	288	241	8	541
W8SOP	35	266	173	64	538
W7GHT	5	254	268	11	538
K7VWA	56	283	79	118	536
WA1TBY	27	231	236	12	506
WB8KWD	9	241	241	12	503
N4PQ (Dec.)	1	531	547	1	1080
K5HZR (Dec.)	3	377	412	3	795
WA2ELD (Dec.)		356	365	2	723
K4ZN (Dec.)	24	356	317	7	714
N2TW (Dec.)	27	316	342	1	686
VE1ACU (Dec.)	19	226	247	17	509
Multioperator Stations					
W8VVL	30	251	260	41	582

BPL for 100 or more originations-plus-deliveries

WA3ATQ	232	K4KA	110
WDØBNL	173	WB9YXN	110
K5DG	162	W7TZK	105
W7SQT	147	WAØQIT	102
K4TH	140	K4VHC	102
WB5NKC	138	WB2BKC	102
WA7EBR	121	WA7EBR (Dec.)	188
VE4UL	119		
Multioperator Stations			
WD4JMS	240		

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Straight-Key Night



Results, January 1, or up the creek without a paddle.

By Bill Jennings,* K1WJ

What's the difference between 16 ounces of brass and a straight-key user? The brass weighs a pound and the straight-key user pounds away.

After the last QSO had ended, after the liniment had been applied to aching wrists, too long used to horizontal rather than vertical movements, and the old straight key had once again been relegated to a subservient position beside the "newfangled sending machine," another Straight-Key Night became history. The January 1, 1978, version of SKN brought in 112 reports, indicating 794 individual stations active from all 50 of the United States, each Canadian call area (except VE8), and 18 different DXCC countries, representing every continent but Africa.

By U.S. call area, the W6s reported the most activity at 102 stations, followed by the W8s at 88, and the WØs at 81 stations reported active, respectively.

The voting for "Best Fist" should more correctly be called "Bests Fists." Six operators, having received two votes apiece, share top honors. They are (listed by call area and suffix, alphabetically) WA2JAM/3, W2LYH, W4KFC, WB6DMM, W6FU and W9IE.

"Most Interesting QSO" honors go to W8NBK, who received three nominations. WA2JAM/3 and W4KFC share second place in this category with two votes apiece.

Seventeen operators received *at least* one vote in both of the categories and deserve mention. They are K2EKM/Ø, WA2JAM/3, W2LYH, W2TO, W3ADE, W4KFC, K4KQ, WB5NHH, W6CYM, WB6GJM/7, WB7ZRE, K9BK, W9GIL, W9TG, WB9YMF, WØGNV and ZL4AC.

An SKN report would not seem complete without a verse or two from our resident "Bard of the Brass Pounders," George, W5JOV.

"An old-timer once said very stiffly,
That his straight key he used somewhat swiftly.
His arm sore with pain
He tried to explain
It's the ups and the downs that get me."

Next Straight-Key Night — July 4, CU.

Sideswipes

Well, it was another fine SKN. I know that it isn't a contest and I agree that we should keep it that way. It is just a good old chance to rally around the old hand key. . . and ragchew . . . It said in *QST* to watch out for Scandinavians who wanted to get in on the SKN fun. So I did watch out for them. And hey! I worked Norway . . . But it was WB8SYA in Norway, MI. Does that count??? (K4CQA/8) Most interesting was having Pete, W6ZH, come back to a CQ just after midnite local time. Had met Pete when he was in Miami for a Red Cross convention last May after making the cross-country trip with his XYL on a motorcycle. For a few moments, I had forgotten that Pete now has Herb's old call and it kinda shook me. Such things should never happen at midnite on New Year's Eve! Shades of "The Old Man"! (K4KQ) All fists heard were so bad that "The Old Man" would have a fit, but all very friendly. In fact, never met a grouch on SKN. (W1DMH) Well, this year's SKN was the best ever. Started off on New Year's Eve on 40 meters and on New Year's Day, worked SKN on 20, 15, 10 and 80. Good fists on each operator that I worked. My old J-38 got a workout and so did I. I'm spoiled after using a keyer for so long, but sure was fun pounding the old hand pump. Gave myself the "Worked All Bands SKN Award." Don't get any ideas, hi! Let's not make a contest out of it. (K2IVG) This was my first SKN and while I did enjoy it, I was sorry that there was not more activity. I must have called CQ SKN a hundred times without an answer. (WD6CKR) It's surely nice to hear real brass pounders at work. Used my key while in the Coast Guard for Search and Rescue in the 1950s and have used it ever since. (W9LMO) During SKN, I renewed an old acquaintance with W6LFB. Would give him a vote except for the fact that he just got married and his fist was rather shaky. (WA6HAD) What a QSLing bunch this year! My normal QSL return is about one card for each 100 or so stateside QSOs. So far four out of the nine SKN stations worked have sent cards. (W2NZH) I neglected to limber up prior to the starting time. This coupled with a short bout with the flu gave me a rather shaky fist. Today is January 8 and the straight key is still "front and center" on my operating table where it will remain. I am going to get my fist back in shape and then keep it in shape. (W7ZMD) This time it's been a lot of fun, rehashing old times with some of my contemporaries (old goats). But WB7NVW was only 14 years of age and sounded like a real pro on the key. (W6CYM) The most interesting QSO was with W8NBK. It turned out that both of us had our start in radio, DXing on the bc band with one-tube receivers back in the middle 1920s. (W5DG) I've been pounding a straight key for all of my 40 years of hamming, so I feel right at home on SKN. (WØQNP) How about a "bug night" to show the keyer gang that there's an alternative to dropped dots? (K2GMF) If you'd like to know my secret for smooth cw, it's a piece of two-sided tape that I put on the knob of the key to keep my index finger stationary. (W8LXQ) Wish you would let me use my sidewinders. They're becoming rare, too! (WA2JAM/2) The people I met seemed much friendlier and willing to chat despite the fact that, for the most part, our sending was significantly slower than usual. I think that these noncontest type get-togethers like SKN and the Classic Radio Nights are good for amateur radio in that they promote a sense of fraternalism among hams — something which is in danger of becoming lost in the crush of activity on the hf bands. How about four SKNs per year? (WB3CJI) I don't have a strait key anymore (think I gave it to one of the grandkids) so I turned my bug on its side and used it as a strait key. A rubber band kept the dot side open and it worked fine as an "upper-downer." . . . My heavens, I noticed that I spelled straight as strait. Boy, it shows you that I am getting old. (WØEUT/WØMW) My transmitter (homebrew) was built in the 1930s. Driver is a war surplus BC696A with 150 volts reg. VFO — about 40 watts. (W1BDV) It is surprising how much conversation can be carried on with only a hand key. For one thing the electronic "stutter-boxes" make so many mistakes and consume quite a bit of time in correcting words. With a hand key, you can keep up a steady pace of 15 to 20 wpm and rarely make an error. . . . It is a real art form to be able to send on a hand key. For all those of us who appreciate all the facets of cw and the different kinds of personal skills, which one can acquire, SKN is a real blessing. (W4RHZ)

*Communications Assistant, ARRL

Results, Eighth Annual ARRL 160-Meter Contest

All-time division records topple in the wake of the largest turnout ever.

By Tom Frenaye,* K1KI and Bill Jennings,** K1WJ

The weekend of 2-4 December 1977 has come and gone and with it the eighth running of the ARRL 160-Meter Contest. The logs, received in record numbers, 373 to be precise, including those logs of 17 DX stations, have been processed. The "Top Band" which had filled to capacity with contest operators is once again the private domain of the "160 regulars." And the results of another 160-meter contest are history.

*Assistant Communications Manager, ARRL
**Communications Assistant, ARRL

The 373 formal entries from the 1977 contest, although a scant nine-log increase over the previous record of 364 in 1976, come in fairly even proportion from each of the U.S. and Canadian call areas, as well as eight DXCC countries. This slight increase in active participation is not unexpected, when one considers the recent flurry of interest in 160-meter operating. Most of the new commercially manufactured gear includes provision for 160-meter operation, if not as standard equipment, then as a transverter or plug-in, add-on feature. In 1977 (due to increasing interest and demand) the pages of *QST* carried several articles on 160 antenna systems, not to mention references to 160 operating techniques. All this, coupled with the increasing interest in 160-meter contesting, portends a long happy and active life for the 160-meter band.

The all-time Division Leaders Box appearing in this writeup, the first since the one incorporated in the results of the 1973 160-Meter Contest, shows eight total division records set in 1977, six single operator and two of the multioperator variety.

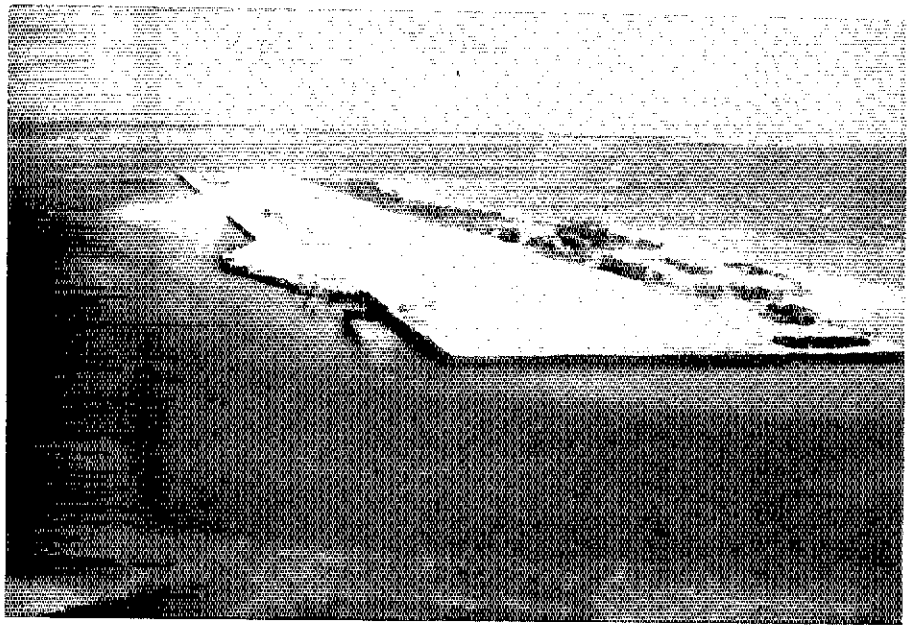
Those operators making the top-ten single-operator list had to post an average score increase of nearly 1100 points over the 1976 totals. With all the new two-letter call signs, it's hard to tell who has and who has not made the single-operator top ten before and we will suffice it to say congratulations to N4AR, the number-one, single-operator station and well done to the rest of the top ten as well as all section and division leaders.

The multioperator top-ten average scores were on the decline, the 1977 top-ten multiops averaging 67,494 to an average of 78,317 for the same group in 1976.

If participation in the 1977 160-Meter Contest is any indication of things to come, then the 1978 contest should be a real humdinger and should top 'em all.

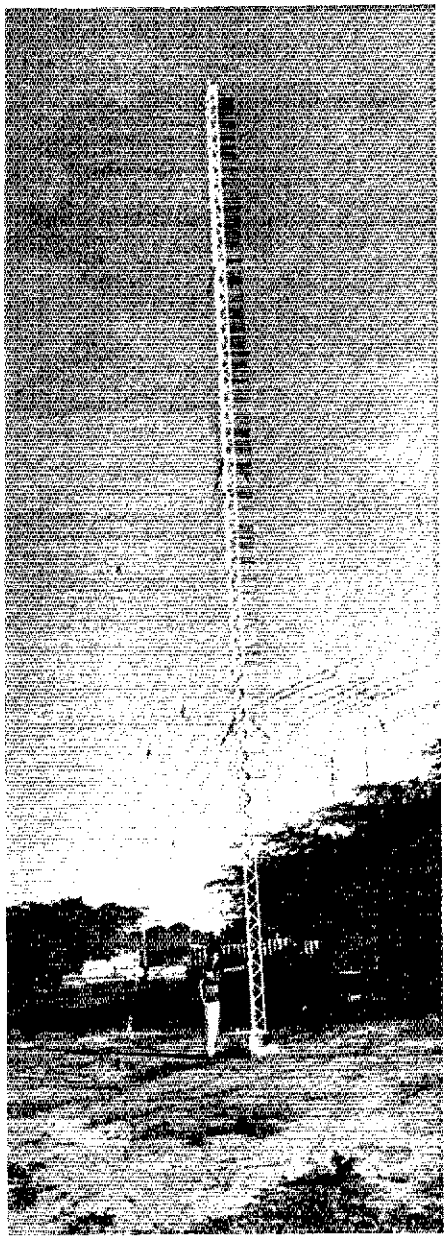
Soapbox

Enjoyed the 'test greatly. However, DX conditions were only fair the first night and very poor the second night. Operating was generally excellent, although 160 is not quite the "gentleman's band" it used to be, due to some "DX Window" squabbles. Some contest operators deliberately violate the "DX Window" thus gaining an advantage over their opponents. Should be a disqualification for operating in the window! How about it? (W1BB) Conditions to Europe were fairly disappointing, but seemed good to western USA plus a surprise QSO with a ZL. (VE1CD) The Colorado stations made LORAN sound QRPp. (K5WIQ) A separate phone session may prove interesting in future 160 'tests. (W9KEB) This was my first contest and I enjoyed it very much . . . On the first night of the contest, it took four hours to make 20 contacts . . . but on the second night the rate was much better . . . I didn't hear any other WD calls in the contest. (WD0CQW) Next year I will either stay up for the JAs or get up earlier to work them . . . The frustration of trying to raise Midwest and East Coast stations with very narrow filters or using loops almost got the best of me. (W7NCO) Sounded like 20 meters during Sweepstakes at times. Where do all the stations come from? (N6NE) I was pleased to work all the "lower 48" states this year, which attested to the wide popularity of the contest . . .



KH6ABH at the U.S.C.G. LORAN Station at French Frigate Shoals. Operator K1BT/WA1MHJ planned a big effort in the 160 contest, but as he says, "I got this loud pulse noise generator about 100 yards away from my antenna. Result: QSOs — 0, Multipliers — 0, LORAN-A WON."

And, this is great type of contest for us old grey-haired fuddy-duddies, who have trouble surviving a solid 48-hour weekend contest. (W9GT) I haven't work the graveyard shift in years. Almost fell asleep twice. (NØTT) This is the first 160 event that I've entered. As a matter of fact, this is the first time that I've been on 160 meters since way back about 1931! . . . One of the benefits of this contest was working some old friends such as W6BYB/7, whom I hadn't seen or worked in about 40 years. Also W6BYS. The three of us quite often get QSL cards meant for another of the trio. (W6BYH) Well, I have just worked the 160-meter contest for the eighth year in a row. Still worked about the same number of stations. I was all set this year with a new 130-foot vertical, insulated with 24 radials per Stanley's article in Dec. '76 *QST*. . . The vertical did the work fairly well. Managed to work California, a new state for me, but most of the old regular 160 guys couldn't be heard. W8JI had the strongest signal of them all. (W5GWD) I wonder how many contacts that Dick, Gary and I missed because of our calls on cw (K5QY vs. K5QNM)? (KN5TTN/-K5QNM) Power-line noise really made this a harrowing effort. (WØUA) It appears that my good friend and arch rival, K7OX, has outgunned me once again (Gary lives less than 10 miles from me), albeit by a narrower margin than last year. I take consolation, however, in the fact that my "footsteps" deter him from taking any breaks to watch weekend television (he missed the final episode of "Roots" for that very reason last year). In all fairness to K7OX, I must point out that I am a left-handed writer and can therefore send and log at the same time, while Gary just use his right hand to log and send. He is an exceptional operator despite this severe handicap. Any resemblance between a 160-meter contest and any other contest is purely nonexistent. The excitements and frustrations are unequaled on any other band. Noise and strong signal QRM can pound one into total insensibility by Sunday morning. Why do we love it? I don't know either,



Chas, YV1OB, beside his 66-foot aluminum tower, mesh grounded, vertical antenna.

On the left is Dave, KØJPX, and on the right is Steve, W5KI, two of the three operators of W5KI, West Gulf Division Leader and number eight nationally in the multioperator category.

Top Ten

Single Op		*Multiop*	
N4AR	108,621	W8JI	93,312
K1PBW	101,260	VE3BMV	88,275
W9RE	98,724	K8US	75,118
K3LR	97,251	W8LT	73,728
K5GO	95,628	K3BSY	68,401
K5NU/5	90,212	WA8YEE	58,870
K7ZZ/4	89,397	W9YH	57,486
K8CCV	88,011	W5KI	57,439
N4EA	84,392	W1MX	56,347
K6SE	84,000	KØJUS	45,968

Division Leaders

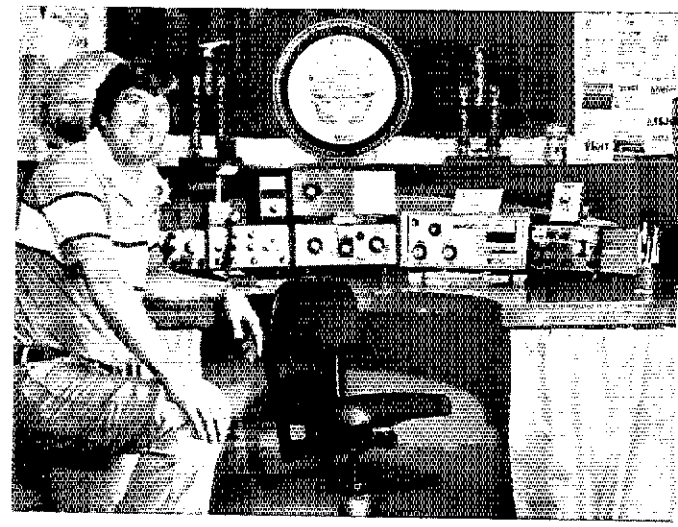
Single Op	*Division*	*Multiop*
VE5DX	Canadian	VE3BMV
K3LR	Atlantic	K3BSY
W9RE	Central	W9YH
WØDN	Dakota	NØEL
K5GO	Delta	
N4AR	Great Lakes	W8JI
W2GD	Hudson	WB2NEC
NØTT	Midwest	
K1PBW	New England	W1MX
W7FU	Northwestern	N7SC
K7OX	Pacific	
K7ZZ/4	Roanoke	N4PY
WØUA	Rocky Mt.	WØMS
N4PN	Southeastern	
K6SE	Southwestern	
K5NU/5	West Gulf	W5KI

All-Time Division Leaders

Single Operator				*Multioperator*		
Call	*Score*	*Year*	*Division*	*Call*	*Score*	*Year*
K3LR	97,251	77	Atlantic	WA2WLN/2	95,920	73
W9RE	98,724	77	Central	W9YH	84,916	76
WØAIH	61,028	71	Dakota	WØAW	86,250	76
K4PUZ	95,978	76	Delta	K4KIU	52,224	74
N4AR	108,621	77	Great Lakes	W8JI	93,312	77
W2DXL	94,836	76	Hudson	WA2SPL	97,193	76
WØAIH	69,560	74	Midwest	WØIS	52,920	76
K1PBW	111,972	76	New England	W1MX	57,597	75
W7FU	45,818	77	Northwestern	K7JCA	38,056	73
W6KQG	47,056	76	Pacific	W6NUT/6	41,820	73
W8LRL	93,808	76	Roanoke	WB8APH	84,777	73
KØZCM	65,817	74	Rocky Mountain	WØMS	53,868	74
KV4FZ	85,976	74	Southeastern	W4OZF	75,522	76
K6SE	84,000	77	Southwestern	WA6LXN/6	55,584	74
K5NU/5	90,212	77	West Gulf	W5RTQ	71,442	76
VE3BMV	85,941	74	Canadian	VE3BMV	88,275	77
ZF1TT	26,620	74	DX	HC1CW	16,224	74

Left to right: Jerry, WBØVVJ; K9DMR and WB9QPI, all of the NØEL multiop winning effort from the Dakota Division.

ZF2AH aka WA6VNR. A welcome DX multiplier in 207 logs.



Mike, K8US, of the multiop effort of the same call. K8US turned in the number-three multiop score in 1977.

but see you next year. (W7XZ) As newcomers to 160, we hope that we didn't annoy two many of the experienced operators with our operating technique. 160 *is* the band of gentlemen and ladies — even in the cut-throat competition of the contest. (K5GN/W5AC) Is there any hope to have 1.75 to 1.8 MHz in the WARC 1979 proposals? (VE2FH) As a "greenhorn" to 160-meter operation, this was the most enjoyable and competitive contest ever for me. (WA1NIE) This was my first effort on 160 since December 7, 1941. (K6TS) Called JA2GQO to no avail. Maybe next year a QSO with Japan? (WØA1H/9) Never heard so much activity on 160! Had 62 QSOs the first hour. (W4YE) With Tony, W2FJ, so active, I'm considering a suffix change. I kept getting "worked before." (K2FJ) Antenna was a shorted feed line to three-element, 20-15 meter quad at 70 feet. A top-loaded vertical I suppose . . . Did anyone hear any KH6s this time? (WØDN) My four-element Cubex 10-15-20 meter quad worked very well on 160 by disconnecting the shield on the 75 feet of RG8/U feed line. The noise wasn't too bad and most of the stations came back to me after the first call. (WB2BVV) Much fun to work the East Coast. Heard YV, KV4 and KH, but couldn't raise them. (W7JAL) Where were all the W6 and W7 multipliers? (K3OMI/4) Finally, after only two months of activity on 160, I've worked 40 states and the contest helped out with some of the rare ones. Missed KH6 though. Heard KH6CHC call CQ around local sunrise here, only to have him drop out completely one minute later. Oh well! (WA4LGK) Missed the first day of the contest after battling 90-km/h winds for

DX

Federal Republic of Germany

DJØYD	224-	14- 8- 3	

Republic of Ireland

EI9J	360-	18-10- 3	

France

F8EX	210-	15- 8- 2	
F8VJ	8-	2- 2- 1	

Japan

JA3ONB	896-	32-14-	
JH1LKH	144-	9- 8-12	
JA3AHQ	112-	8- 7- 3	
JH2IRH	24-	4- 3- 2	

Surinam

JA1PIG/PZ	4400-	88-25- 6	

Czechoslovakia

OK2PGU	154-	11- 7- 4	
OL4ATY	80-	8- 5- 1	

Venezuela

YV1OB	24,698-	233-53-20	

Cayman Islands

ZF2AH(WA6VNR,opr.)	21,942-	207-53-24	

U.S.A.

1

Connecticut

W1FB	25,774-	280-49-17	
K1RM	24,250-	238-50- 8	
W1BIH	17,157-	198-43- 6	
K1LQM	16,770-	215-39-17	
W1QV	16,497-	210-39-10	
K1ZZ	13,818-	163-42- 4	
K1DH	13,640-	155-44- 4	
W1BL	10,792-	142-38- 9	
K1THP	5824-	104-28- 7	
WA3BGN/1	4814-	83-29- 6	
WA1UAD	4060-	70-29- 6	
K1DW	2068-	47-22- 4	
N1JW	1344-	42-16- 3	

Eastern Massachusetts

K2YY/1	49,856-	373-64-25	
W1FJ	15,600-	200-39- 7	
K1VV	9590-	137-35- 8	
W1BB	8541-	84-39-12	
W1YN	8280-	115-36- 6	
W1AX	3120-	65-24- 3	
W1JR	2530-	55-23- 4	
W1PD	528-	22-12-	
W1MX(N1RC,WA1RJX, WA4TTG,oprs.)	56,347-	407-67-30	

Maine

K1AQ	11,152-	164-34-12	
W1HDC	2250-	45-25- 3	

New Hampshire

K1QX(K1IU,opr.)	71,060-	500-68	
W6MZW/1	11,748-	252-44- 8	
K1GQ	6856-	123-36-	
WA1NIE	2725-	53-25- 6	

Rhode Island

WA1KIP	1254-	33-19- 2	
N1QM(+WA1POJ,WB1EIE)	43,326-	369-58-29	

Vermont

K1IK	13,981-	169-41- 8	

Western Massachusetts

K1PBW	101,260-	544-83-32	
W1FZY	13,532-	199-34-10	
WB1FPX	12,402-	159-39-38	
K1KNQ	2200-	50-22- 5	

2

Eastern New York

W2IB	68,655-	484-69-24	
K2BG	45,680-	380-60-32	
WB2DXL	12,099-	162-37- 6	
WA9QHO/2	11,508-	137-42-17	
K2SD	6426-	93-34- 3	
WA2BSZ	6360-	106-30-10	
K2MN	3564-	66-27- 8	
W2FW	352-	16-11-	
W2IP	300-	15-10-	
WB2NEC(+WB2IKA)	11,286-	147-38-21	

N.Y.C. - L.I.

N2KA	25,824-	266-48-16	
W2KTU	15,504-	204-38-24	
W2GP	4536-	81-28- 6	
K2PHF	4234-	73-29- 4	
WB2AMU	4050-	81-25-10	
WA2ECI	1260-	84-16- 5	

Northern New Jersey

W2GD	69,160-	452-76-14	
W2FJ	33,984-	282-59-	
WB2RTF	20,746-	224-46-14	
W2RQ	19,165-	231-41-	
WA2RYC	15,732-	207-38-23	
W2HUG	14,663-	169-43- 9	
WA2GEZ	11,322-	153-37-13	
W2TO	6660-	90-37- 6	
K2VJ	5885-	92-32- 3	
WA2ZWH	5394-	93-29- 9	
N2IN	896-	29-16-	
WB2MGY	120-	10- 6- 7	

Southern New Jersey

W2REH	35,960-	278-62- 7	
N2LT	33,000-	279-55-	
W2PAU	5542-	80-34- 5	
W2EHN	4794-	69-34-	
WB2BVV(+WB2OSQ)	28,650-	235-50-	

Western New York

W2MTA	33,920-	317-53-	
WA2QKF	27,560-	257-53-20	
K2FJ	15,900-	152-50-11	
WA2IKR	8080-	101-40- 7	
WB2ABD	7800-	100-39- 4	
K2VV	6944-	107-32- 2	
WA2ECA	3150-	63-25- 3	

3

Delaware

W3GL	30,422-	275-53-11	

Eastern Pennsylvania

K3WW(K3VW,opr.)	56,374-	373-71-13	
W3AP	25,752-	213-58- 7	
W3TS	11,088-	132-42-	
K3QQF	9185-	135-34-12	
N3KR	8288-	112-37-10	
K5JZN/3	8034-	105-39- 6	
W3PC	7958-	85-46-11	
W3NM	2668-	58-23-	

Maryland - District of Columbia

N4IN/3	81,400-	520-74-26	
W3USS(WA1FEO,opr.)	18,890-	221-45-14	
N3RL	1292-	38-17- 3	

Western Pennsylvania

K3LR	97,251-	621-77-32	
W3QM	40,368-	342-58-26	
K3DR	3584-	56-32-	
K3BSY(+W3IW)	68,401-	452-73-34	

4

Alabama

K4TO	42,816-	333-64-10	
K4GTQ	21,224-	188-56-22	
WB4ASV	5202-	75-34- 8	

Georgia

N4PN	63,675-	417-75-12	
K4SB	60,775-	465-55-	
K4BAI	9963-	120-41- 7	
W4PDR	2112-	44-24-	

Kentucky

N4AR	108,621-	651-81-27	
K4FU	62,522-	435-71-15	
W4YOK	8588-	113-38- 4	

North Carolina

W4TMR	55,315-	462-65-29	
K3OMI/4	12,427-	143-43- 9	
K4JYS	11,524-	134-43-10	
K4JO	5670-	66-42-	
N4PY(+WD4HSG)	32,754-	306-53-30	

Northern Florida

AA4US	34,515-	261-66-23	
W4VQ	22,080-	181-60- 6	
WA4LGK	12,054-	142-42-24	

South Carolina

K4II	31,976-	281-56-23	
WB4SJG	21,228-	171-61- 6	
K4RV	8815-	101-43- 3	
K4OAQ	1974-	47-21- 3	

Southern Florida

W4QM	34,770-	279-61-16	
W4OO	33,240-	268-60-14	
W4GUU	9379-	80-33-12	
N4KB	5360-	63-30- 4	

Tennessee

K4PUZ	59,994-	450-66- 7	
K4XU	46,308-	336-68-19	

Virginia

K7ZZ/4	89,397-	564-77-39	
N4EA	84,392-	533-77-31	
W4DHZ	46,002-	335-66-33	
K4POL	44,014-	373-59-	
W4YE	27,930-	236-57- 6	
K4TS	27,335-	247-55-22	
K4RS	16,807-	167-49-11	
W4ZM	15,181-	160-47- 5	
N4NW	9,280-	116-40- 4	
W4XD	8970-	115-39- 9	
W4KMS	8400-	105-40-	
N4DW	6208-	97-32- 5	
W4KFC	5280-	80-33-	
W4DM	1020-	34-15- 2	
N4MM	528-	22-12- 1	

5

Arkansas

K5GO	98,628-	601-78-24	
W5KL	38,656-	302-64-12	

Louisiana

N5WA	71,532-	478-74-29	
K5KLA	15,640-	163-48- 6	

Mississippi

W5AQ	35,813-	299-59-22	
W5WX	20,950-	200-52- 7	
WA5NYG/5	17,155-	181-47-	
W5GWD	1980-	39-20-20	

New Mexico

N5EE	3200-	40-40- 6	

Northern Texas

K5NU/5	90,212-	571-76-29	
N5TP	46,505-	323-71-13	
K5QY	23,968-	211-66-13	
W5FIX	15,402-	151-51-17	
W5QF	13,867-	140-49-	
WB5RPU	12,201-	123-49-10	
K5SOR	8520-	105-40-10	
K5WIQ	6318-	81-39-10	

Oklahoma

W5KI(+WB5PUF,K8JPX)	57,439-	400-71-35	
K5QNM(+KN5TTN)	12,320-	140-44-14	

Southern Texas

K5NA	41,745-	298-69-12	
K5MA	34,645-	252-65- 9	
K5TM(K5ZD,opr.)	20,460-	169-60- 4	
W5MPX	5056-	78-32-	
W5AHC	748-	22-17- 2	
W5AC	36,790-	280-65-15	
W5AC(K5s GN MW VK,WB5AZI, WD5EGK,oprs.)	36,790-	280-65-15	

6

East Bay

K6HIH	27,720-	244-55-	
N6LU	(9,176-	201-47-	
WA6JUD	17,864-	219-41-	
W6LK	9321-	158-39-11	
K6TS	3900-	78-25-10	
WA6QXN	1462-	43-17- 7	
N6NE	1204-	43-14- 2	

Dave, K1THP, in his first foray into contesting on 160, managed 104 QSOs and 28 multipliers from Connecticut.

Carl, WA6JUD, relaxes in his well-appointed "shack" after a third-place finish in the East Bay Section.

three days, trying to put up my 1/2-wave dipole at my summer home on the shores of Lake Huron. Fierce and violent are the winds of Lake Huron. Everything must be tied down or it will be gone with the wind. Looking forward to the next contest. (VE3INQ)

Scores

Scores are listed by country, by province within Canada, and by section within each U.S. call area. The highest single-operator station in each ARRL section and in each country receives a certificate. The highest multiple-operator station in each section and country receives a certificate if there are three or more such entrants or, if, in the opinion of the Awards Committee, the entrant displays exceptional effort. Read the score listings as follows: call, score, QSOs, multiplier, hours of operation.

For those of us interested in the number of DX stations worked by each entrant, W3IN has come up with a nifty plug-'em-in formula to calculate the number of DX stations, strictly from the information given in the line score for each entrant. The formula is as follows:

$$N = \frac{\frac{A}{B} - 2C}{3}$$

where N = number of DX QSOs, A = total score, B = number of multipliers, and C = total number of QSOs.

Feedback

In the score listings for the 1976 160-Meter Contest, the entry of K4TE was not listed due to an oversight. The line score should read K4TE 35,258-289-61 and be first in the Alabama Section.

Los Angeles

K6SE 84,000- 521-75-30
WA6MBP 9680- 220-44-18
W7CS/6 1800- 50-18- 4
W6CN 988- 38-13-
N6GL 24- 4- 3- 1

Orange

W6RA 23,200- 200-58-16
K6XX 12,710- 155-41-14
W6AMO 11,680- 146-40-13
N6PE 11,092- 152-36-19
WB6AKR/6 5928- 114-26- 7

Santa Barbara

N6MW 13,464- 153-44-10
W6KPJ 4060- 71-28- 4
W6TYR 2200- 50-22-11
W6JEO 1800- 50-18- 4

Santa Clara Valley

WA6PGB 14,310- 117-53- 8
WB6NSF 14,160- 177-40-21
W6OKK 9612- 122-23- 6
W6BXQ 4212- 78-27-14
N6UW 294- 21- 7- 5

San Diego

N6CW 11,610- 129-45-
W6XM 1312- 41-16-

San Francisco

N6CT 44,730- 349-63-
AA6DX 20,430- 227-45-19
WA6DNM 4408- 58-38- 2

San Joaquin Valley

K6MO/6 23,490- 216-54-14
K6CNY 21,359- 199-53-25
K6YK 7744- 121-32- 6
W6BYH 3818- 83-23-
K6TQ 3082- 67-23- 5
W6MUV 1326- 39-17- 5
WB6TM 1230- 41-15- 2

Sacramento Valley

N6DM 28,084- 235-89-
W6VD 7392- 112-33-10

Pacific

KH6CHC 10,023- 99-39-
KH6IJ 1168- 39-16-
KG6DX 155- 31- 1-

7

Arizona

W7RV 45,952- 353-64-33
K7NN 29,673- 241-63-133
W7YS 6000- 100-30-

Idaho

N7SU 29,382- 446-59-
W7IWU 2088- 58-18- 6

Montana

W6BYB/7 27,900- 231-60-
W7LR 8988- 107-42- 4
K7CPC 1380- 46-15- 9
W7CBY 702- 27-13- 5

Nevada

K7QX 44,880- 341-60-26
W7XZ 41,595- 333-59-28

Oregon

W7NCO 23,352- 204-56-22
WA4HRG/7 6370- 135-31-12
W7IMP 1796- 42-19- 3
N7SC(+K7s OPR,TSV VIC,W7s LNG VSE,WB7s CBM RVE) 24,960- 228-52-

Utah

N7RU 21,944- 211-52-14
K7UM 4118- 71-29- 4

Washington

W7FU(K7RA,opr.) 45,818- 359-62-
W7DPW 29,040- 255-55-30
WA7GCI 24,963- 231-52-28
N7XX 16,215- 171-47- 7
N7AM 14,160- 174-40-
K7DZ 12,810- 180-35-16
W7BYK 8325- 111-37-16
W7NP 7004- 103-34-
WB7QWE 1232- 44-14- 2
W7DRA 1176- 42-14- 5
K7DU 624- 24-13- 2
K7II 270- 15- 9- 1
N7NC(+WA7UQV) 29,150- 272-53-

Wyoming

W7JAL 23,010- 195-59-26
W7TO 252- 14- 9- 1

Alaska

KL7GIH 858- 33-13-12

8

Michigan

W8CNL 45,648- 302-72-13
N8NA 13,960- 155-45- 7
K8LJG 11,622- 149-39- 8
W8VPC 7105- 100-35- 6
K8HPS(WB8s,JCD,UDL,oprs.) 17,952- 187-48-15

Ohio

K8CCV 88,011- 555-77-30
W8DB 60,060- 420-70-21
W8QK 49,302- 369-66-19
W8DJY 42,453- 396-53-28
W8IQ 32,913- 309-53-12
K8MN 28,611- 279-51-15
K8AC 25,599- 240-53-11
K8MR 21,006- 193-54- 7
WA4RIJ/8 12,020- 185-46- 9
W8RSW 15,910- 138-55- 9
K8BL 10,500- 125-42- 5
K8RYJ 10,296- 117-44-20
K8RH 6596- 97-34- 7
W8IM 3952- 76-26- 4
W8GRP 3124- 71-22-
K8DL 2550- 51-25- 2
W8JI(+K8KAS,W8FU,WB8TSO) 93,312- 555-81-20
K8US(+K8JK,N8DE) 75,118- 523-71-30
W8LT(K1LY,K8s LT NT,W8ERD, WB8s INY TXE,WD8s AMX NXC, oprs.) 73,728- 503-72-40
WA8YEE(+N8ET,W8s FN,XU) 58,370- 416-70-
W8VM(W8IDM,WA8YWX,oprs.) 21,800- 218-50-14

West Virginia

K8OQL 33,488- 299-56-18
W8JWX 4144- 74-28- 4
WB8VAZ 2640- 55-24- 5

9

Illinois

N4SU/9 68,376- 459-74-25
W9GT 63,360- 458-72-27
W9JVC 33,600- 297-56-
K9AB 33,432- 297-56-14
K9KD 30,030- 271-55-25
WA9PFB 25,575- 231-55-22
W9OA 24,400- 244-50-12
K9RS 20,200- 202-50-13
W9AG 17,650- 175-50- 9
K9JU 15,729- 159-49- 7
K9BG 14,168- 161-44-
W9QWM 12,925- 136-47-10
WB9CGL 12,848- 146-44-
W9NII 12,834- 138-46-
K9CW 9430- 112-41- 6
W9REC 7482- 87-43-
W9ABA 110- 11- 5- 1
W9YH(K9s GL VV,WB9JJV, oprs.) 57,486- 426-67-23
W9YCR(K9WA,WB9s FVV W&R W5T YTT,N9LA,WA9WNE,WB9s FQS QAA,oprs.) 28,851- 242-59-31

Indiana

W9RE 98,724- 639-76-32
W9&R 53,268- 383-69-28
K9DA 36,864- 285-64-21
W9LTU 27,240- 224-60-18
W9JOO 26,448- 225-58-19
WB9QCP 26,196- 222-59- 7
W9CG 16,416- 177-48-12
W9KEB 624- 24-13-
W9IQI 120- 10- 6-
W9EI(+W9NJD) 45,370- 346-65-25
K9ZUH(+WB9PXR) 24,840- 230-54-20

Wisconsin

W9AIH/9 75,000- 494-75-17
W9WQ 22,001- 223-49- 7
W9GIL 10,046- 104-32-

0

Colorado

W0UA 63,210- 447-70-26
WB9LLR 56,097- 399-69-17
K9PP/0 44,616- 338-66-20
K0ZK 42,490- 302-70-
K0GU 8514- 99-43-
W0RMA 2600- 50-26- 9
W0MS(+WB9CMM) 28,826- 244-58-18

Iowa

W0NFL 45,440- 316-71-24
WB9OLX 36,018- 309-58-29
WD9CQW 5084- 82-31-16
W0RPK 4158- 63-33- 6

Kansas

N0IN 45,156- 314-71-10
N0UU 31,350- 236-66-18
W0LNZ 15,816- 173-46- 7
K0LHE 3654- 63-28- 4

Minnesota

W0DN 47,996- 335-71-
W0RHI 3172- 61-26- 8
WA0QWY 308- 14-11- 5
K0SE 300- 15-10- 2
K0JUS(+K0SHO,WA0RSE, WB0HLS) 45,968- 335-68-32

Missouri

N0TT 66,360- 471-70-23
WA0FBQ 11,172- 133-42- 8
WB0JRM 7548- 111-34-
W0JRP 5040- 70-36- 7
W0BV 3840- 64-30- 5

North Dakota

W0ZTL 26,784- 216-62-13
K0FRP 3380- 65-26- 7

South Dakota

N0EL(+K9DMR,N9OK,W9AMF, WB9QPI,W9OJD,WB9VVJ) 44,288- 346-64-42

VE

Maritime-Newfoundland

VE1CD 37,860- 302-60-26
VE1AYG 3068- 59-26- 8
VO1HP 525- 26-15- 3
VE1AXT(+VE1BCZ) 16,146- 207-39-27

Quebec

VE2FU 42,075- 378-55-25
VE2TH 14,147- 163-43-10
VE2GS 4480- 80-28- 8
VE2OJ(+VE2DNW,VE3HJV) 26,016- 271-48-21

Ontario

CY3EDC 28,578- 215-66
VE3ABG 25,950- 258-50
VE3INQ/3 4080- 68-30- 7
VE3BMV(+VE3IXE) 88,275- 575-75-

Manitoba

CY4VV 1406- 37-19-
VE4OY 1116- 31-18- 3

Saskatchewan

VE5DX 46,620- 333-70-

British Columbia

VE7CC 9800- 140-35-
VE7CMK 4256- 76-28- 5
VE7AGN 2340- 65-18-
CY7AZG 1600- 50-16- 5
CY7BQF(+VE7s DCQ DFQ) 22,560- 235-48-25

Disqualifications

W2VV (N2NT, opr.), W3BUR, W3HXK, W4NVN, W4PRO (K3RUQ, N4DJ, W4HBK, W4PRG, WA4QIT, oprs.), WA8SJX (K8FC, K8JM, K8KA, WA8SJX, oprs.), W8V$K

Check Logs

W1HT W1RE K3TW K7BNN (+K7CR,K7MF,WB7ELG)VE2TH OK1ATP OK1DCF OK1DKW ZL3GQ

Operating News

Conducted By George Hart,* W1NJM

Making It Interesting

They call it "reading the mail," but what it really amounts to is listening to a conversation on the air between two or more parties without yourself being a participant. It is a perfectly legitimate practice, since our amateur bands are a medium open to the public. Sometimes we have a tendency to forget that our on-the-air conversations are not private. But that's another subject that we have discussed previously.[1]

As long as our on-the-air conversations are public, even though perhaps addressed to a particular party or group, why not make them interesting? Of course the casual tune-across listener can always twist his dial and listen elsewhere, but the poor guy you're in contact with is more or less a captive. Oh sure, he can ditch you if you bore him, but most of us like to be polite, so we hang on, sigh, twiddle our thumbs, read the latest issue of *QST*, wait until he winds down, then when he *finally* stands by, take our turn at boring *him*.

Why must we bore each other? Making conversation is an art, one which we don't all have. But even the most colorless of us can make our conversations on the air at least passingly interesting if only we follow a few simple rules — or at least keep a few basic principles in mind. Trouble is, if we follow such rules or principles rigidly, we have "formula" QSOs, than which there is nothing more boring. So the first rule: Don't follow any rigid rules. Make each QSO a little different. Decide what you would like to know about the other guy, and tell him those things about yourself. You want to know what kind of gear he is using? Okay, tell him what you're using. You want to know how old he is? Tell him your age. You'd be interested in his marital status, kids, family connections? Non-amateur radio interests? Tell him yours.

Now be careful, there is danger to this kind of approach. Most of us like to talk about ourselves, and the first thing you know you'll be boring the pants off your contact talking about yourself, kidding yourself that you're merely suggesting topics of conversation but actually monologing. Your contact will think, "This guy loves himself," and probably tell you that QRM has suddenly blotted you out, and end the contact.

The problem of what to talk about to an utter stranger is one that has been with us in amateur radio since the earliest days of the hobby. In order to discourage "formula" QSOs, we set up the Rag Chewers Club with a certificate to be awarded to anyone who conducts a QSO lasting a half hour or more with an amateur already an RCC member. Both the applicant and the member had to report the contact to Headquarters. We kept extensive records of RCC certificate holders and unconfirmed applications, using a whole array of file drawers in the CD. By 1967 these files had become so extensive and so space-consuming that they were unceremoniously dumped. We still issue RCC certificates, of course, to anybody who reports a QSO lasting a half hour or more, but it is not practical to keep records. The Rag Chewers Club certificate is the first acquaintance of many beginner amateurs with ARRL services. We estimate that over the years more than a hundred thousand have been issued, and this is probably conservative.

But a long QSO and an interesting one are not necessarily the same thing. The achieving of an objective and the desire to pass a pleasant few minutes with a new acquaintance do not necessarily coincide. How many times we have been asked if we have any record of the longest QSO! (No, we have not and don't even consider this an especially desirable objective.)

This piece is written by someone who is an expert in the conversational art, right? No way! On the contrary, the writer is one of the poorest of conversationists, and therefore has given considerable thought and attention to the problem. To those of us who are naturally outgoing, it is not a problem. Unfortunately, many of us are inclined to be shy, withdrawn, bashful or for other reasons unable to hold up our ends in two-way or group confabs. To those, and to the outgoing whose outgoingness drives away rather than attracts, we offer some basic principles to make the conversation interesting, both to your contact and the vast, unseen audience.

1) Avoid "formula" ruts. Try to make each contact different.

*Communications Manager, ARRL.

[1] *QST*, July, 1977, p. 96.

W1AW Operating Schedule (October 30, 1977-April 30, 1978)

PST	CST	EST	UTC	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
6 A.M.	8 A.M.	9 A.M.	1400	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]		
7	9	10	1500	←	←	Cw Bulletins[3]	→			
8	10	11	1600	←	←	RTTY Bulletins[4]	→			
1 P.M.	3 P.M.	4 P.M.	2100	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Slow[1]
2	4	5	2200	←	←	Cw Bulletins[3]	→	→	→	→
3	5	6	2300	←	←	RTTY Bulletins[4]	→	→	→	→
4	6	7	2400	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Fast[2]
5	7	8	0100	←	←	Cw Bulletins[3]	→	→	→	→
6	8	9	0200	←	←	RTTY Bulletins[4]	→	→	→	→
6:30	8:30	9:30	0230	←	←	Phone Bulletins[5]	→	→	→	→
7	9	10	0300	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Slow[1]
8	10	11	0400	←	←	Cw Bulletins[3]	→	→	→	→
9	11	12	0500	←	←	RTTY Bulletins[4]	→	→	→	→
9:30 P.M.	11:30 P.M.	12:30 A.M.	0530	←	←	Phone Bulletins[5]	→	→	→	→

[1]Slow code practice on cw bulletin frequencies, 8 minutes each session; 5, 6, 7-1/2, 7-1/2, 10, 13, 15 wpm.
[2]Fast code practice on cw bulletin frequencies, 8 minutes each session; 35, 30, 25, 20, 15, 13, 10 wpm.
[3]Cw bulletins, 18 wpm, on: 1.835, 3.58, 7.08, 14.08, 21.08, 28.08, 50.08, 147.555 MHz.
[4]RTTY bulletins 60 wpm/170-Hz shift on 3.625, 7.095, 14.095, 21.095, 28.095 147.555 MHz.
[5]Phone bulletins on 1.835, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

Normal W1AW visiting hours are Monday through Friday, 8 A.M. to 5 P.M. and Saturday and Sunday 3:30 P.M. to 1 A.M. (all local Eastern Time). The station address is 225 Main St., Newington, CT 06111 (about 7 miles south of Hartford). Maps with local street detail are available upon request. Please note that all footnoted frequencies are approximate. If you wish to operate when visiting, you must have your original operator's license with you. (Schedules can also be arranged to work W1AW.) *Staff:* Chief Operator/Asst. Communications Mgr. C. R. Bender, W1WPR; Chris Schenck, W1EH; Stan Gibilisco, W1GV.

In a communications emergency monitor W1AW for special bulletins as follows (times in UTC): *phone* on the hour, *RTTY* at 15 minutes past the hour, *cw* on the half hour.

To improve your fist by sending in step with W1AW (but not over the air!) and to allow checking the accuracy on certain tapes, note the UTC dates and *QST* text to be sent in the 0300 practice from the issue of *QST* two calendar months past: Apr. 5, It Seems to Us; Apr. 11, World Above; Apr. 17, League Lines; Apr. 20, Public Service; Apr. 24, Happenings; Apr. 28, Operating News.

2) Feel out the other guy's interests. Try to find some common ground on which you can both converse meaningfully. If this be an amateur radio subject, fine; but don't try to restrict it to that.

3) Don't enter into a ragchew unless you have time. "Calling CQ for a short QSO" is okay, but if you "CQ RCC" be prepared to carry the conversation.

4) On voice, use VOX and keep your comments brief, as in face-to-face conversation. This isn't easier, but it makes for faster progress. On cw, forget all but required legal formalities and keep transmissions brief.

5) In general, try to put yourself in the other guy's place. What does *he* want to talk about? What would you think if he were talking to you the way you are talking to him?

6) Don't try to impress him. Be yourself.

SCM ELECTION NOTICE

To all ARRL members in the Southern Florida, North Dakota, West Indies, Oklahoma, Minnesota, Connecticut, Idaho, Western New York, and Ohio sections: You are hereby solicited for nominating petitions pursuant to an election for Section Communications Manager. A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition.* No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

Petition forms (CD-129) are available on request from ARRL headquarters but are not required. The following form is suggested:

(Place and date)

Communications Manager, ARRL
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.
(Signature . . . Call . . . City . . . ZIP . . .)

SCM candidates must have been a member of the League for a continuous term of at least two years and a licensed amateur of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, June 9, 1978.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on July 3, 1978, returns counted August 22, 1978, and SCMs elected as a result of the above procedures will take office October 1, 1978.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition, for a two-year term beginning October 1, 1978.

If no petitions are received for a section by the specified closing date, such section will be resolicited in October *QST*, and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager.

You are urged to take the initiative and file a nominating petition immediately.

George Hart, W1NJM
Communications Manager

REPEAT SCM NOMINATING SOLICITATION

Since no petitions were received for the North Carolina and South Dakota sections as a result of notices in October and November *QST*, nominating petitions for these sections are herewith resolicited. See the above notice for details on how to nominate.

APPOINTMENTS

In the Manitoba Section, Peter Guenther, VE4PG, was appointed to complete the term of Steve Fink, VE4FQ (resigned).

In the Los Angeles Section, Perry Masterson, W6RHS, was appointed to complete the term of Stanley S. Brokl, K6YYQ (resigned). QST

AMSAT-OSCAR 7

Ref. Orbit	*Date*	*Time (UTC)*	*Long. W.*	*Ref. Orbit*	*Date*	*Time (UTC)*	*Long. W.*
15439B	1 Apr.	0137	80.9	15814B	1 May	0001	57.5
15451B	2 Apr.	0036	65.8	15827B	2 May	0055	71.0
15464A	3 Apr.	0130	79.4	15840A	3 May	0150	84.6
15476B	4 Apr.	0030	64.2	15852B	4 May	0049	69.5
15489B	5 Apr.	0124	77.8	15865B	5 May	0143	83.1
15501A	6 Apr.	0023	62.7	15877A	6 May	0043	67.9
15514B	7 Apr.	0118	76.2	15890B	7 May	0137	81.5
15526B	8 Apr.	0017	61.1	15902B	8 May	0036	66.3
15539A	9 Apr.	0111	74.7	15915A	9 May	0131	79.9
15551B	10 Apr.	0011	59.5	15927B	10 May	0030	64.8
15564B	11 Apr.	0105	73.1	15940B	11 May	0124	78.4
15576A	12 Apr.	0004	58.0	15952A	12 May	0024	63.2
15589B	13 Apr.	0058	71.5	15965B	13 May	0118	76.8
15602B	14 Apr.	0153	85.1	15977B	14 May	0017	61.7
15614A	15 Apr.	0052	70.0	15990A	15 May	0111	75.2
15627B	16 Apr.	0146	83.6	16002B	16 May	0011	60.1
15639B	17 Apr.	0046	68.4	16015B	17 May	0105	73.7
15652A	18 Apr.	0140	82.0	16027A	18 May	0004	58.5
15664B	19 Apr.	0039	66.8	16040B	19 May	0059	72.1
15677B	20 Apr.	0134	80.4	16053B	20 May	0153	85.7
15689A	21 Apr.	0033	65.3	16065A	21 May	0052	70.5
15702B	22 Apr.	0127	78.9	16078B	22 May	0147	84.1
15714B	23 Apr.	0027	63.7	16090B	23 May	0046	69.0
15727A	24 Apr.	0121	77.3	16103A	24 May	0140	82.6
15739B	25 Apr.	0020	62.2	16115B	25 May	0040	67.4
15752B	26 Apr.	0115	75.7	16128B	26 May	0134	81.0
15764A	27 Apr.	0014	60.6	16140A	27 May	0033	65.9
15777B	28 Apr.	0108	74.2	16153B	28 May	0128	79.4
15789B	29 Apr.	0007	59.0	16165B	29 May	0027	64.3
15802A	30 Apr.	0102	72.6	16178A	30 May	0121	77.9
				16190B	31 May	0021	62.7

NOTES

1) All time and date references are in UTC.
2) The times and longitudes are for OSCAR's first equator crossing each day, which is called the reference orbit.
3) A-O 7 will operate Mode A only on days of the *year* fully divisible by three (April 3 is day number 93, for example), and the other two days in between will be Mode B.
4) All Monday orbits are reserved for QRP use only. Use a maximum of 10 watts erp. Wednesdays are reserved for special experiments: authorized users only. This includes *Tuesday evenings* for the Western Hemisphere.
5) The Mode B transponder inverts signals. Upper sideband on 432 MHz becomes lower sideband on 145 MHz.
6) A-O 7 progresses an average of 28.737378 degrees west per orbit in a period of 114.945179 minutes for the month of April.
7) A-O 6 has been permanently removed from active service.

Haven't listened to OSCAR yet? Try this: If you live in the eastern half of Canada or the U.S., listen to the reference orbit given in the chart (don't forget times are in UTC). If you live in western North America, listen about one hour and 55 minutes later. Give OSCAR plenty of time to cross your QTH's horizon —a pass lasts a maximum of 25 minutes. There are several other passes each day that you'll be able to hear or talk through, both in the morning and in the evening. Consult your OSCARLOCATOR to determine their times and directions. (Note: A complete A-O 7 reference orbit schedule for 1978 is available from ARRL headquarters for an s.a.s.e.)

To keep abreast of the latest developments, tune in to the regular phone and cw bulletins over W1AW, AMSAT bulletins transmitted around 29.440 MHz on Mode A, 145.960 MHz on Mode B, during A-O 7 reference orbits, and AMSAT nets (East Coast at 0100 UTC Wednesdays on 3850 kHz lsb; Mid States at 0200 UTC; West Coast 0300 UTC).

Spacecraft Frequencies

Spacecraft	*Uplink*	*Downlink*	*Beacon*
A-O 7			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.502 MHz
Mode B	432.125-432.175 MHz	145.975-145.925 MHz	145.972 MHz
A-O 8			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.400 MHz
Mode J	145.900-146.000 MHz	435.100-435.200 MHz	435.095 MHz

This schedule of orbits for AMSAT-OSCAR 7 is a regular feature of *QST*. Further information on the radio amateur satellite program can be obtained free of charge from ARRL hq. Also, the popular and informative series of *QST* articles for the beginner has been reprinted in book form. *Getting to Know OSCAR — from the Ground Up* covers OSCAR 6, OSCAR 7, the newest satellite, OSCAR 8, launched in early March, 1978, and the exciting Phase III program scheduled for late 1979. It includes the OSCARLOCATOR, a tracking device that lets you know which passes you can access and where the satellite is in the Northern Hemisphere at any given moment. The book is available for $3 postpaid ($3.50 outside the U.S.), from the ARRL.

Operating Events

APRIL

1-2: Tennessee QSO Party,* SP DX Contest cw,* QRP QSO Party,* Florida QSO Party**
6: West Coast Qualifying Run**
8-9: "Open" CD Party cw,* Swiss Contest (H-22)*
8-16: Reggio Calabria Spring Award**
9: International Gagarin Cup Competition**
12-13: DX/YL to Stateside YL Contest cw*
14: W1AW Qualifying Run**
15-16: "Open" CD Party phone,* SP DX Contest phone,* Common Market DX Contest EME Contest (first part)* County Hunters SSB Contest****
21-30: Holiday-in-Dixie Festival QSO Party**
22-23: Zero District QSO Party, Bermuda Contest****
26-27: DX/YL to Stateside YL Contest phone*
29-30: Dutch Contest (PACC)**
30: W1AW Qualifying Run**

MAY

3: West Coast Qualifying Run***
4-5: Society of Wireless Pioneers CW QSO Party***
6-7: Russian Contest (CQM),* Vermont QSO Party,*** Georgia QSO Party,*** NY State QSO Party*****
13: Frequency Measuring Test,* World Telecommunications Day Contest phone*****
13-14: Massachusetts QSO Party***
16: W1AW Qualifying Run***
19-21: YL ISSB QSO Party***
20: World Telecommunications Day Contest cw***
20-21: EME Contest (second part),* Kansas QSO Party***
23: W1AW Qualifying Run***

JUNE

3-4: Ford QSO Party, PVRC on-the-Air Reunion
8: West Coast Qualifying Run
10-11: VHF QSO Party
14: W1AW Qualifying Run
17-18: West Virginia QSO Party, All-Asian Contest phone
21: W1AW Qualifying Run
24-25: FIELD DAY

JULY 4: Straight-Key Night
JULY 8-9: Radiosport Competition

***Detailed last month**
****Details this issue**
*****Details next month**

APRIL

1-2: Florida QSO Party, 13th annual, sponsored by *Florida Skip*, open to all. All bands, phone and cw are separate. No cross-band or cross-mode contacts permitted. FL stations may work other FL stations, but for QSO points only. Out-of-state stations work FL only. FL stations will be classified: Class A stations are those operating portable or mobile on emergency power and running 200 watts or less (cw or PEP phone) inside Florida, but outside of their home counties. Class B stations are all other stations operating in Florida. FL stations transmit RS(T), entry class, and county of operation. Out-of-state stations send RS(T) and U.S. state, VE province, or country; those out-of-state mobiles operating not within the jurisdiction of any country send report plus the ITU region (1, 2, or 3) of operation. Suggested frequencies: cw, 3555 7055 14055 21055 28028; phone, 3945 7278 14318 21378 28578. To score: FL stations count one point per QSO with all stations. Multiplier is the sum of states (49 maximum), provinces (12 maximum), DX countries (14 maximum) and regions (3 maximum) actually worked. Possible total of 78 multiplier. Out-of-state stations count two points per QSO with each Class A station, one point per Class B station. Multiplier is the number of different Florida counties worked (67 maximum). Score is the product of QSO points and multiplier. Class A stations *only* multiply score by 1.5. Awards. At the discretion of the contest committee, stations and/or operators may be disqualified for improper reporting, excessive dupes, errors in multiplier lists, unreadable logs, obvious cheating, etc. Those disqualified will be barred from participating in the next event. Report phone and cw separately. Usual log/summary format. FL stations note entry class and FL county (note power source for Class A entries). Enclose an s.a.s.e. for the issue of *Florida Skip* carrying the results. Entries must be received by May 30. Mail to Florida Skip Contest Committee, Box 660501, Miami Springs, FL 33166.

6: West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z (Universal Coordinated Time, abbreviated UTC, with Z used as a time designator), on approximately 3590/7090 kHz. This is 2100 PST the night of April 5 (9 P.M. PST). Please note that dates are always shown at least two months in advance and times are always the same local "clock time." Underline one minute of the highest speed copied, certify that the copy was made without aid and send to ARRL for grading. Please include your full name, call (if any) and complete mailing address. A large, addressed, stamped envelope will help to expedite your award/endorsement.

8-16: 4th Reggio Calabria Spring Award, sponsored by the Italian Association of Radioamateurs (the ARI), from 0000Z April 8 through 2400Z April 16. One point will be earned by making contact with a ham of Reggio Calabria town, any mode, any hf band. The same station may be worked again, but on different bands, different modes or on different days. The three categories are Italian ham, non-Italian ham, and Italian or foreign SWL. Awards. The town's spring diploma is earned by accumulating five points. Awards. The application, with summary, claimed score, 10 IRCs and a QSL for each QSO go to ARI Section, Box 120, 89100 Reggio Calabria, Italy. Entries must be received by May 15.

9: International Gagarin Cup CW Competition, sponsored by Region 1, IARU (held once each three-year period, starting in 1975). Cw only from 0001-2400Z April 9. Categories: Single op all band, single op single band, multioperator all band (single transmitter). Call CW GC (Gagarin Cup). Points: Contacts between stations on the same continent count one point, between stations on different continents three points. The multiplier is the sum of ITU zones from all bands. (See ITU zone map, page 85, May 1977 *QST*.) Scoring: total QSO points from all bands multiplied by the number of ITU zones on all bands. Exchange RST plus ITU zone number. Awards. Usual log format and summary (indicate new multiplier when worked on a band), and mail no later than mid-May to Krenkel Central Radio Club, Box 88, Moscow, USSR.

14: W1AW Qualifying Run, 0300Z, 10-35 wpm, transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 and 147.555 MHz. This is 2200 EST (10 P.M. local Eastern time) the night of April 13. Follow the additional instructions under the April 6 listing.

15-16: County Hunters SSB Contest, 7th annual, sponsored by the Mobile Amateur Radio Awards Club Inc. Periods: 0001-0800Z April 15, 1200Z April 15 to 0800Z April 16, 1200-2400Z April 16. Please note the two 4-hour rest periods. Suggested frequencies: 3920-3940, 7220-7240, 14275-14295, 21375-21395, 28575-28595. Note that again this year there will be a mobiles/portable "window" of 10 kHz as follows: 3925-3935, 7225-7235, 14280-14290. Mobiles will be in this 10-kHz segment and fixed stations are asked to avoid calling CQ Contest herein. Mobiles may be worked each time they change counties or bands. Mobiles worked from the same county on different bands count for point credit only. Mobiles worked on a county line count as one contact but two multipliers. Look for mobiles on 15 meters on even-numbered hours. Portables will be considered as fixed stations this year. Fixed stations may be worked by other fixed stations only once during the contests, regardless of band changes. Repeat contacts between mobiles are permitted provided they are on a different band or county. Exchange signal report, county and state (country for DX). Mixed mode is permitted provided that one station is on ssb. To score count one point for a contact with a fixed U.S. or Canadian station, five points for a DX station (including KH6/KL7), 10 points for a mobile. Multiplier is the total number of U.S. counties plus Canadian stations worked (take credit for a county only the first time it is worked while a Canadian station counts each time it is worked). Final score: total number of QSO points times the multiplier. Usual log data with claimed points and numbering of each new multiplier. Log sheets available from WØQWS (use an s.a.s.e.). Awards. Entries must be received by June 1. Send to John Ferguson, WØQWS, 3820 Stonewall Ct., Independence, MO 64055.

15-16: Common Market DX Contest, organized by the Belgium society, the UBA (Union Belge des Amateurs emeteurs), cw April 15 0600-2400Z, phone April 16 0600-2400Z, 80-10 meters. Call CQ CM on cw, CQ Common Market on phone. Categories: single operator all band, single operator low band (80 plus 40), single operator high band (20 plus 15 plus 10), multioperator single transmitter all band only (includes club stations). Exchange RS(T) plus consecutive QSO number starting with 001. For W/VEs, score as follows: a QSO with a Common Market country (CM) counts five points, with any other EU station two points; other QSOs zero points. ON4UB QSOs count 25 points. Multipliers are each call area of the nine CM countries (maximum of 69 per band). ON4, 5, 6, 7, 8; West Germany 1, 2, 3, 4, 5, 6, 7, 8, 9, Ø; Italy 1, 2, 3, 4, 5, 6, 7, 8, 9, Ø; Denmark 1, 2, 3, 4, 5, 6, 7, 8, 9; Great Britain 2, 3, 4, 5, 6, 7, 8; Luxembourg 1, 2, 9, Ø; Ireland 1, 2, 3, 4, 5, 6, 7, 8, 9, Ø; Netherlands 1, 2, 5, 6, 9, Ø; France 2, 3, 5, 6, 8, 9, Ø. Separate logs for each band, log date/time in UTC, exchanges, points and multipliers. Usual summary with signed declaration. Final score equals total points times total multipliers. Awards. Three percent or more nonindicated dupes may result in disqualification. Committee decisions final. Mail by May 31 to the contest committee: Michel Le Bon, ON4GO, Chee. de Wavre 1349, 1160 Brussels, Belgium.

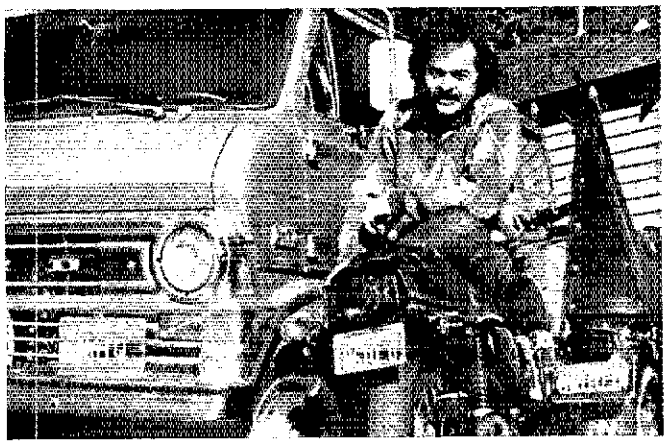
21-30: Holiday-in-Dixie Festival QSO Party, sponsored by the Amateur Radio Club of Shreveport, LA (ARCOS), from 1800Z Apr. 21 through 2400Z Apr. 30. Contact a station within 75 miles of Shreveport, exchange contest info, send an s.a.s.e. to ARCOS, Box 1485, Shreveport, LA 71164. The Festival was begun in 1948 to commemorate the signing of the Louisiana Purchase. Suggested frequencies are cw, 3555 3710 7055 7110 14055 21130 28130; phone, 3935 3975 7235 14280 21380 28575; vhf, 50.110 ± ssb, 52.525 ± fm simplex; 145.100 ± ssb; 145.015 fm simplex. Local coordination and contacts possible on 146.07/67 and 146.16/76. These will be used to demonstrate 2-meter ham radio to festival visitors. Stations may be worked once per band per mode.

Local stations may work each other. Exchange RS(T), power, and ARRL section or country. Ask for a Holiday-in-Dixie number (club members only will have this, worth extra points).

22-23: Zero District QSO Party, organized by the Mississippi Valley Radio Club, from 2000Z Saturday to 0200Z Mon. (Apr. 24). Stations outside of the zero district will work zero stations only, zeros may work any station. The same station may be worked once on each band and each mode. Exception: stations in the special mobile class may be worked each time they change county. Exchange QSO number and section. Zeros must send county. Scoring for zeros is total QSOs multiplied by ARRL sections plus zero counties plus DX countries. For nonzeros total QSOs multiplied by zero counties plus zero sections. Suggested frequencies: 3560 7060 14060 21060 28060; 3900 7270 14300 21370 28570; Novice 3725 7125 21125 28125. Awards. Mail logs by May 31 to WBØUUA, 3518 W. Columbia, Davenport, IA 52804. S.a.s.e. for log forms (not required) or results. *Bermuda Contest*, sponsored by the Radio Society of Bermuda, the full 48-hour weekend period, UTC. Operate 36 hours maximum. Off-periods must be clearly logged and each off-period to be of not less than three consecutive hours. Single operator only, and operation must be from your own private residence or property. 1976 and 1977 top winners are eligible for area awards, only. Eighty through 10 meters, no cross-band or cross-mode contacts permitted. (No phone contacts between VE/W and G on 40 meters.) All contestants exchange RS(T) and U.K. stations will add county. U.S. stations will add state and VEs their province. Bermuda stations will transmit their parish. U.S. and Canadian stations must exchange reports with the U.K. and Bermuda only, while U.K. stations work U.S., Canada and Bermuda only. This is a mixed-mode contest and each completed contact (whether all cw or all phone) counts five points. Only one contact mode will score. That is, a phone contact and a cw contact with the same station on the same band is a duplication and will not count. Multipliers: for all stations outside of Bermuda the multiplier is the total number of VP9s worked on each band. (Note the same VP9 can be worked on all bands.) For Bermuda stations the multiplier is the total number of states, provinces and countries worked on each band. The usual VP9 Contest awards. Please log in UTC, check for dupes, compute your scores and furnish the usual declaration. Entries must be received before June 30. Send to Contest Committee, Radio Society of Bermuda, Box 275, Hamilton 5, Bermuda. (Parishes: Sandys SAN, Pembroke PEM, Southampton SOU, Hamilton HAM, St. George STG, Devonshire DEV, Warwick WAR, Smiths SMI, Paget PAG.

29-30: The Dutch Contest (PACC), sponsored by the Dutch Society, the VERON, from 1200Z Saturday to 1800Z Sunday, 160 through 10 meters. Cw and ssb, no cross-mode permitted. (Note: PAs on 160 are only licensed to operate between 1825-1835 and by mutual agreement use cw only in this small segment.) Call CQ PA. Exchange RS(T) and QSO number starting with 001. PAs will also add a two-letter abbreviation of their province (GR OV NH ZL FR GD ZH NB DR UT LB YP). Each confirmed QSO counts one point. A station may be worked only once per band either on cw or phone. Multipliers: for non-PAs, use the sum of the provinces on all the bands (maximum of 72). Suggested frequencies: 3525-3585, 7010-7040, 14025-14085, 21040-21100, 28050-28100; 3650-3750, 7040-7100, 14150-14300, 21150-21300, 28200-28700. Categories are single op, multiop and SWL. Awards. Usual logs, note new multipliers, statement. Send promptly to VERON Contest Manager, Schoutstraat 15, Nymagen 6805, Netherlands (postmark no later than June 15). QST

Strays



Cam Pierce, Jr., N6TQ, with his van and two motorcycles. The N6TQ and N6TQ 6 plates are California Environmental at $25 a crack! N6TQ is ex-K6TTQ and ex-KN6TTQ. — *K6RU*

W4TFB and WBØPZP were surprised when they answered a CQ from K1EJ. Enjoying an FB QSO was Wilma Rudolph, former Olympic track star and three-time gold-medal winner. It was Wilma's first try at ham radio. *(K1EJ photo)*

SSTV SKEDS SOUGHT

☐ SSTV fans: WA4OMX is operating from aboard ship and would like to set up skeds. Contact Richard L. Baker, Radio Officer, USNS KANE T-AGS27, FPO New York 09501.

STORK VISITS TWICE

☐ On Friday, December 30, 1977, the XYL of W4HG gave birth to a 9 lb. 7 oz. baby boy. Later that day, W4HG worked a DX from the Southern Sudan . . . STØRK.

QRP NET ON 7040 MHz

☐ K8IF, WA2JOC and W8MGF are resurrecting the Saturday 1800 GMT QRP net on 7040 MHz. The purpose of the net is to promote QRP activity, compare "war stories" and share common interests through good conversation. K8IF is NCS and calls "CQ QRP NET." All QNIs are invited.

TALK ABOUT COINCIDENCES!

☐ The first day that Jim La Porta, W5LA, showed up to work he visited all ARRL offices. On his trip through the Accounting Department where the mail is opened, he spotted an envelope addressed to him. Lo and behold — there was his new call, N1CC. — *W1YL*

HEARD CALLING CQ

☐ W6 Little Green Apples answered by W8 Better Take X-Lax.

QST congratulates . . .

☐ John A. Moseley, W6ERD, winner of the National Association of Broadcasters' 1978 Engineering Achievement Award.

☐ K3SME, who has been promoted to district manager at G. D. C. Medical Electronics, a division of Generator Development Corp.

☐ Fred Frank, KØMZZ, who recently marked 10 years with radio stations KCMO/KCEZ in Kansas City, MO, and serves as radio supervisor for the stations.

I would like to get in touch with . . .

☐ people having or using Squires Sanders equipment, specifically models SS-1R, SS-1BS and SS-1T. I am especially interested in finding a retro-fit notch filter for the SS-1R which was available shortly before the company went out of business. James R. Buchanan, K8WPI, 3701 East D. Avenue, Kalamazoo, MI 49004.

☐ teenage amateurs for a coast-to-coast and international sked. Send name, call and choice of frequencies to Pete, WB6SWV, 244 Minnewawa, Clovis, CA 93612.

☐ anyone who has tried vhf tropospheric bending propagation and anyone in North or South Texas who would like to set up skeds on 6-meter a-m. WD5BCI, 501 S. Marable, West, TX 76691.

☐ anyone who frequently works South America by phone to put me in contact with a ham in Quillota, Chile, for a sked. Mike Ruzicka, WD9EUM, 16150 Choctaw Trail, Brookfield, WI 53005.

☐ hams interested in producing microwaves by the laser/maser principles. Bill Copeland, WB6RVE, 2347 Bloomdale St., Duarte, CA 91010.

☐ other active Army drill sergeants. Dennis Watters, Sr., WBØTAX, Bldg. 4103, Room 207, Ft. Leonard Wood, MO 65473.

Station Activities

SCM ≤ AREC ≤ ORS ≤ OVS ≤ SEC ≤ OBS ≤ TCC ≤ OO ≤ NTS ≤ WAC ≤

CP ≤ A-1 OPR ≤ EC ≤ DXCC ≤ CLUBS ≤ RM ≤ OPS ≤ RCC ≤ PAM ≤ WAS

CANADIAN DIVISION

ALBERTA: SCM, Sydney T. Jones, VE6MJ — SEC: VE6XC. PAM VE6AFO. Congrats to VE6NI, as EC for the Calgary area. Earl and his gang were active in the recent SET and had a good write up in the local paper. Various groups around the province were also active during the SET NARC members were active in communications in connection with a cross country ski race. Members of the Lakeland Radio Club of Heinsburg attended the Feb. meeting of the NARC. VE6OQ and XYL have returned from trip to KH6-Land. Old timers in Alberta were saddened recently with the news of the passing of W7DSS. The Southern Alberta Radio Club are planning a repeater to cover Lethbridge City on 146.46-147.06 and plans for another repeater at Three Hills are in the gears. Traffic: VE6ABC 85, VE6HO 73, VE6ATT 56, VE6AFO 30, VE6AVV 24, VE6COJ 23, VE6OZ 21, VE6AMM 20, VE6AKQ 8, VE6BBL 8, VE6WV 6, VE6MJ 5, VE6YW 5, VE6AMN 4, VE6CE 4, VE6BIM 2, VE6CFQ 1, VE6CJT 1.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — SET is over and Net Mgrs., RMs and SCM are all very pleased with the increased activity and message flow. Many thanks to you all. VE7ACM and XYL celebrated sixty years of marriage. VE7AAT has swallowed the anchor and has retired ashore. VE7SE our PAM for BC has retired from work so we should hear more activity from Oyama. VE7AAJ EC for Kelowna has been heard after years of building. Fraser Valley DX Club pres. VE7AFY, QSL Mgr. ARRL; VE7XQ, secy-treas. Tony retired CP Air after 37 years Feb. '78. Traffic: VE7DKY 288, VE7ZK 111, VE7GY 50, VE7DFY 43, VE7BLO 34, VE7FB 23.

MANITOBA: SCM, Pete Guenther, VE4PG — RM: VE4YE. PAMs: VE4JP VE4TE. ARES activity a big success in Jan. All modes were used including RTTY. With the retirement of VE4FQ, yours truly holding the fort. VE4AAD has sponsored 4ADL, a white caner at Carberry and the Shilo gang helped install equipment and antenna. Propagation on 3765 fairly good. MEPN SESS. 31, QNI 1394, QTC 81. MMPN SESS. 29, QNI 482, QTC 42. MTN SESS. 31, QNI 290, QTC 125. Traffic: VE4UL 450, VE4PG 397, VE4YE 136, VE4RO 90, VE4QU 84, VE4IZ 52, VE4IX 51, VE4ABB 41, VE4AAU 34, VE4JP 25, VE4LB 15, VE4LU 15, VE4JI 14, VE4IM 14, VE4JK 11, VE4QJ 10, VE4-JA 9, VE4TE 9, VE4NE 8, VE4PA 8, VE4FK 6, VE4NM 6,VE4OD 6, VE4ADX 5, VE4XN 5, VE4MG 4, VE4CR 2, VE4EN 2, VE4NW 2, VE4PO 1, VE4VV 1.

MARITIME-NEWFOUNDLAND: SCM, Aaron D. Solomon, VE1OC — Asst./SCM: VO1FG, SEC: VE1DI. PAM: VO1-JN. RM and APN Mgr.: VE1WF, RM and NTN Mgr.: VO1GW. Silent Key: VE1AJ. Hospital: VE1AFA VE1AUF VE1TJ. SET best ever in Section. VE1 Contest held with good participation. MAARC held demon. Am. Radio in Champlain Mall. PEI ARC: VE1PG, pres.; VE1ANZ, vice-pres.; VE1BCN, secy-treas.; VE1UE, VE1BHP, VE1ATT, dir. CARC: VE1AIC, pres.; VE1BCN, vice-pres.; VE1EJ, secy. MAARC planning VHF Mini-conv. Moncton in Spring. NSARA holding Annual Meet. Hfx. Int. Airport. SONRA and SARC op. special event St. VO3CC and VX1CR comm. Marconi's 75th. Ann. trans-atlantic wireless. VO3CC cont. 1300 st. VX1CR 1100 stations. VE1AMZ rep. HARC & NSARA at DOC Ottawa symposium. APN-sess. 37, QNI 205/32, QTC 149/120. NTN sess. 23, QNI 103, QTC 18. Traffic: (Jan.) VE1WF 206, VE1OC 106, VE1HJ 91, VE1CH 89, VE1LCR/RO 68, VE1CH 89, VE1DI 57, VE1AMR 49, VE1EJ 42, VO1GW 26, VE1ASW 24, VE1ABG 16, VE1AMB 16, VE1KL 13. (Dec.) VO1KP 17, VO1HL 8, VO1KO 6.

ONTARIO: SCM, Larry Thivierge, VE3GT — Asst. SCM: VE3GOL. Another SET activity has come and gone, and hopefully all were able to recognize their strengths and weaknesses with a view to overall improvement for next year. Metro ARC held an excellent display publicizing amateur radio at the North York Library for five weeks. Thunder Bay amateurs provided 2 metre communiction parade co-ordination for the Lakehead Univ. Winter Carnival. The univ. station VE3LUE, acting as control was manned by VE3EUI with mobiles VE3s AXL AYZ HJS HHS JAR and JAA assisting. New excutive for the Algoma ARC has VE3BWL as prez and VE3s FGT GPM and JIT completing the slate. VE3KLH is the XYL of VE3ARS. VE3ISW has his 30 wpm endorsement sticker. VE3PBO has autopatch capability. For the Field Day early birds, VE3GOL has all the necessary forms. EC for Port Colborne K6GMU/VE3 has added VE3s AIO and CIW as assts. Scarboro ARC has introduced three new awards, contact VE3s GGO and HR for details. Congrats to VE3UD on being presented with the OARC's Award of Merit for Bud's many contributions to our hobby. Peel Co. ARC provided commuications for the Bee Hive cross country ski tour. VE3DHH new member of the Quinte ARC. VE3HGN has won the Wm. Thompson award. The KS QSO party, taking place in May has a few rule changes from previous years please consult QST for details. VE3CSB gave an interesting presentation to the KWARC, on computers, past and present. Oakville's "Hot Bananas" a most interesting and informative bulletin covering more than just amateur radio, thanks to VE3HGJ. Toronto FM CS have had two successful links between VE2MRC Montreal and VE3RPT Toronto. Regretfully VE3s AHT and ARJ have become Silent Keys. Mileage limit for WAS and 5 BWAS contacts changed from 25 to 50 miles. VE3IDM has his Advanced and welcome to newcomers VE3s KEM IZQ JUC JIV JIW JIX IJN IJJ IJK IJP and IJV. Traffic: (Jan.) VE3SB 485, VE3GOL 266, VE3HGJ 202, VE3DPO 195, VE3GT 175, VE3ISW 168, VE3GJG 151, VE3GFN 115, VE3DV 76, VE3EWD 64, VE3FGU 61, VE3FGV 58, VE3FHZ 56, VE3DVE 48, VE3GYD 48, VE3CYR 33, VE3ATR 32, VE3FZG 26, VE3BZB 4.

SASKATCHEWAN: SCM, P. A. Crosthwaite, VE5RP The University of Saskatchewan VE5US is back on the air. The group now have new equipment so there will be a lot of DX stations worked from VE5US. VE5UZ says the group are interested in putting some 220 MHz hand held units together, and had hoped the time would permit to install a 220 MHz repeater. VE5DN is hoping to go fast scan TV. Regina's Hamfest plans are coming just fine, its going to be a "Big One" so watch for further dates and details. Traffic: VE5AAE 169, VE5TT 54, VE5RP 44, VE5QI 40, VE5EK 37, VE5LN 26, VE5IM 22, VE5ABN 20, VE5KZ 20, VE5DF 14, VE5HE 14, VE5NJ 14, VE5QY 14, VE5ABQ 13, VE5OL 12, VE5KS 6, VE5RB 4, VE5YP 4, VE5AAG 2, VE5PM 2.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ. RM: W3QQ. PAM: W3WD. PSHR: K3JL 52, WA3WPY 50, W3PQ 44. The De. '78 SET was one of the best in recent years thanks to K3JL and all participants. The DEPN was called into Emergency Session Feb, 7th when the Governor declared a state of Emergency due to blizzard conditions. K3HBP made 5 BWAS No 357. General WB3ANC/6 is working Del. on 20. WB3EOU is a new asst. EC. WB3FOE conducting Emergency Training on 13-73 following the 0030Z De. 2 Meter Net on Mon. Nov. Army MARS "Operator of the Month" is WA3AVD. DEPN QNI 154, QTC 92. DTN QNI 435. Traffic: W3PQ 194, WA3 WPY 175, K3JL 74, W3DKX 60, W3QQ 59, WA3WIY 51, WA3DUM 39, WB3DUG 24, W3WD 16, WB3ENF 15, WB3FOE 6, W3YAH 5, W3HKS 4, K3KIB 4, WB3ANC 3, WA3YTB 3.

EASTERN PENNSYLVANIA: SCM, Geo S. Van Dyke, Jr. — W3HK —SEC: W3FBF. RMs: K3NGN K3KW. PAM: WA3P2O W3IAZ. Net reports: EPA QNI 667, QTC 435; PFN QNI 392, QTC 610; PTTN QNI 391, QTC 193; EPAEP & TN QNI 413, QTC 127; AREC (2) QNI 12.00 reports: W3NC W3CL W3KEK WA3TMP K3NSN. OVS reports: W3GOA WA3CTU WA3BJO K3IJ W3CL K3YD. OBS reports: WA3PZO W3CL W3ATJ. BPL: W3CUL W3VR K3NSN WA3ZRY WA3ATQ. PS HR: K3YL W3PD WA3PZO K3FD. Following stations sent SET msgs to SCM: K3PSO W3DP K3KW K3NGN K3RO K3YL W3JJZ WB3KCV K3TX K3ZFD WB3DJF K3KT. Big guns W3CUL & W3VR still in there! Our lady Marine is off to another Forum! (WA3ATQ). WA3WQP says 2M helped in SET. PFN listen for N3EG, he says he is trying to ck in! W3VA says 160 lots of fun. Apologies to Anthracite Rptr Assn: W3TB, secy.; K3YD treas;, K3UK, corr. secy. The Jan. SS didn't bring large scores but it did bring a lot of guys out of the wood work! K3IJ wants info on, interest in 6M rptr for RTTY, any takers? W3GMK has graduated up to super Pro rcvr! W3EU bought a mike, what will he do with it? WB3CTU reports lots of fun in VHF SS. Welcome aboard to WB3ATA Drexel Hill HS will soon be on 2M FM. W3BUR only one reporting heavy damage during recent storms. WA3UDS now W3QQ lost his QSL file would like replacements from anyone who worked him in past. 10-10 net looking for members, contact K3LBM or WA3INW. Club papers are really fine, caught one tho with Jan. 77! New officers: So Chester Co ARC: K3WAC, pres;, WB3EMB, vice-pres;, WB3HOZ, secy., W3FM, treas.; W3KT, member-at-large. Traffic: (Jan.) W3CUL 4044, K3NSN 1412, W3VR 1097, WA3ZRY 807, K3KW 499, WA3ATQ 405, WA3WQP 403, K3NGN 348, W3IPX 222, WA3THT 186, K3YL 124, WA3PZO 115, N3EG 107, W3AJT 104, K3FD 104, W3DP 57, WB3BKV 41, WA3YDC 35, W3ADE 32, W3PD 31, N3GP 22, W3VA 20, WA3CKA 18, K3NB 17, W3HK 15, K3YD 14, W3CL 12, W3ID 11, WA3TMP 10, WA3RPG 6, WA3VDQ 2, K3IAZ 1, W3KEK 1, W3GOA 1, K3IJ 1, W3GMK 1, WA3BJQ 1, W3EU 1, WB3CTU 1, W3BUR 1. (Dec.) W3PD 64, K3YD 8.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — Congrats to the ARES gang. Many VHF nets with liaison to the MEN. Well done for a big SET turnout. WB3AOB, W3DKX, K3AF, K3VVV, W3FT, W3FZV, WB3CGG,K3IS, K3EUG, N3II and WA3TAI thru WB9NZY/3 sent SCM msgs. Many others reported to SEC N3II via radio. From the BARC Modulator listen to K3RA send ham news at 7:30 AM, 07/67, and repeat at 6 PM. on 34/94. OO reports from W3IK W3MR WA3RSK WA3JSZ and W3WBY. W3ZNW and WB3CGG deserve double mention — I mislaid their Dec. reports. WA3ZTW is getting WB3DCA primed for the NR. The AARC Ham Arundel reports installation of N3FN, pres.; WB3CLO, vice-pres.; WB3FPB, secy.; K3CN, treas.; W3NAE W3GMI and W3AZV dir. Yeoman service by W3AZV to get this club a clubhouse. W3HJH is pleased with his battery powered emergency setup. WA3ZAS glad to be back on the air. W3FZV a regular in the CD parties. WA3WTK and WB3FTN represent the eastern shore. W8BZY/3 sporting a new rig. W3BHE finds 15 mtrs good for So. Amer. Phone Patches. K3ORW home from back

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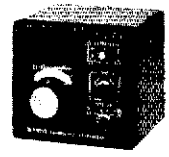

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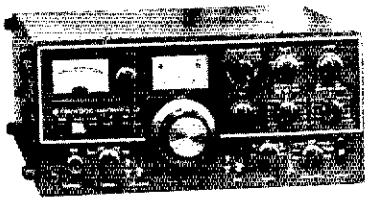

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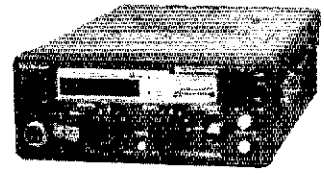

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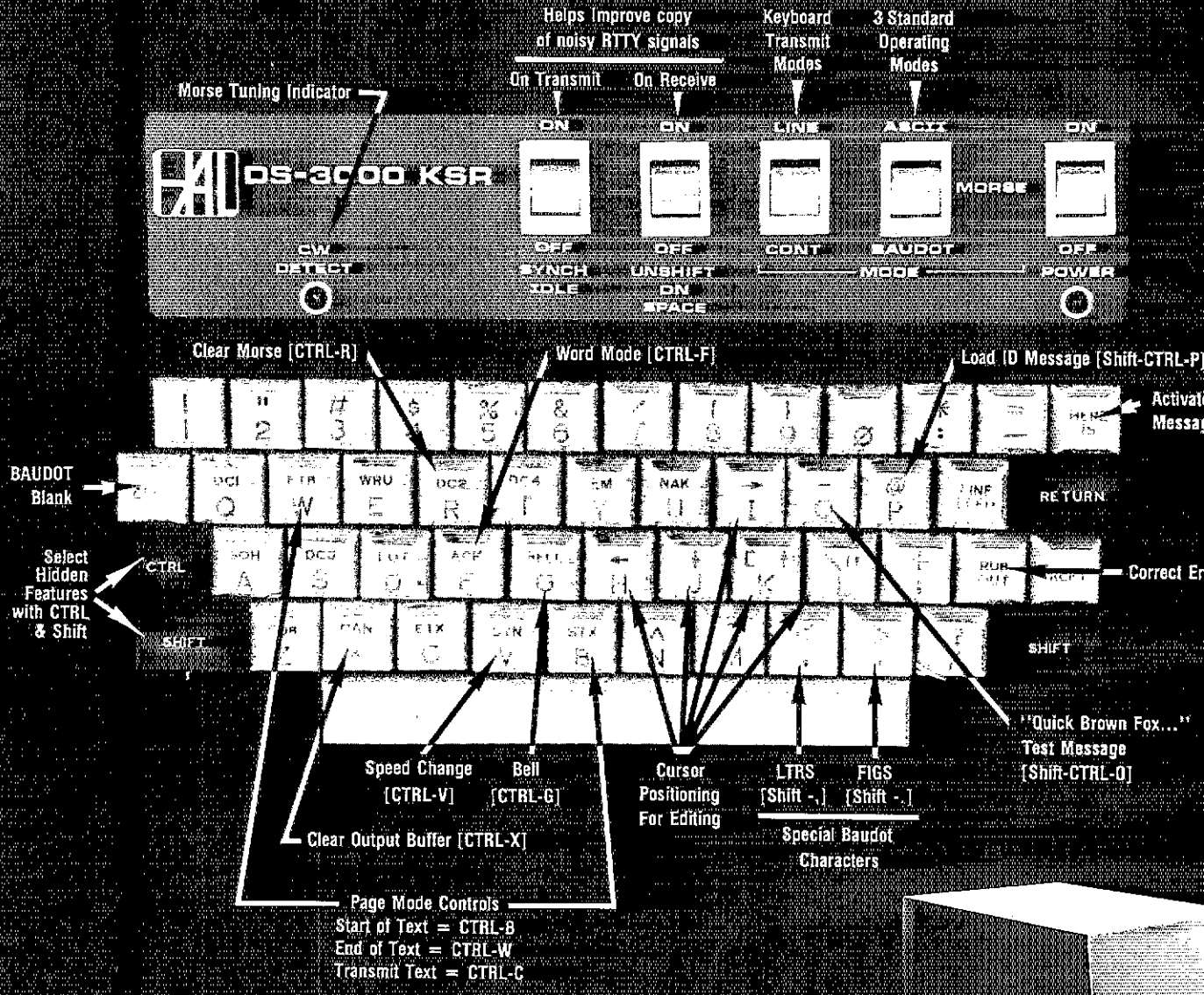

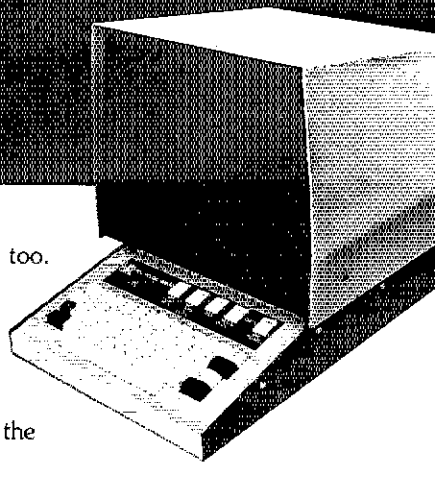

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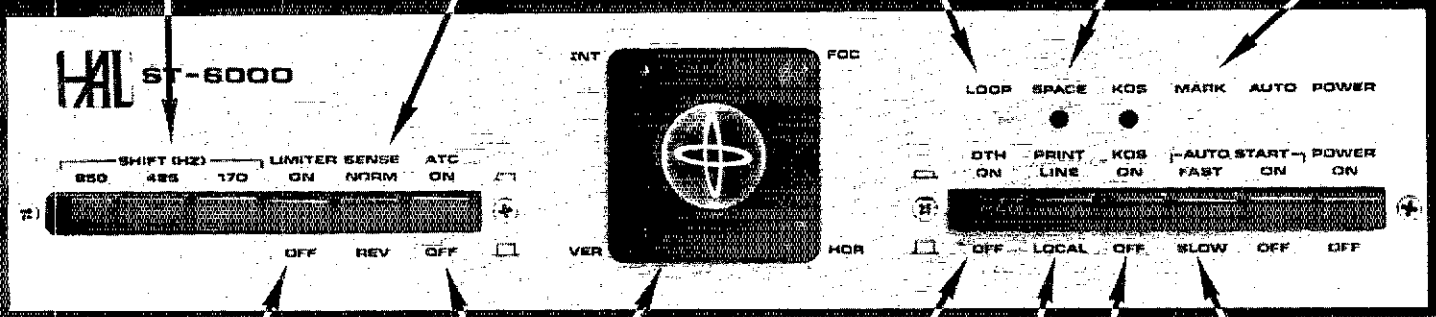

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surgery, and as sassy as ever. WB3CES led off the special SET sessions. N3CL has the keyer on hi-speed to lead the traffickers. W3CQ moved to Crystal River, FL. K3TNM made his first contact via OSCAR. Congrats. N3IT is on the early AM Nets. WA3FYZ was interviewed by VOA and supplied a nice tape; along with YF WA3TBZ they have a new 2-meter rig. K3YUC is making big noise on the nets. W3ZNW gave the SET a good workout. N3QA is back after a little rig trouble. Available time makes WB3CGG a regular on the VN. W3CDQ is looking to the QCWA dinner. With the nets: Mgr. Sessions/Tic/QNI avg. MEPN. WA3PRW, 20/85/26.2. 100% W3LDD WA3ZRY others WB3CES W3FA W3HWZ K3RIJ and WA2YFM, MDCTN, K3ORW, 16/65/18.7. Top Honors WB3AOB W3DKX WA3ZRY K3ORW and W3FA, WR PON, W3DFW, 18/54/23.7. MDC, PON, W3OYY, 4/18/28.2. MDD, (Dec.) W3QQ, 59/225/6.4. Top Brass W3QQ, WB3JSL/N3CL and WA3WPY. Traffic: (Jan.) N3CL 304, W3FA 163, W8BZY/3 81, W3FZV 51, W3ZNW 18, N3IT 17, WA3ZAS 16, WB3CGG 10, W3HJH 10, K3ORW 10, W3WBY 10, K3YUC 8, WB3CES 5, WA3WTK 3. Dec. WB3CGG 19, N3RL 2, W3ZNW 2.

SOUTHERN NEW JERSEY: SCM, Raymond F. Clancy, WB2GTE — Welcome Ocean Co. Amateurs. The Naval Research Labs in Washington, D. C. requests reports on Sonic Booms from amateurs in Ocean Co. and vicinity. Details mailed to Old Barney, Shore Area, Stone Harbour ARCs. K2SQS new rig. WA2PTQ WB2ICW WB2JBJ now Advanced. K2ODZ Silent Key. K2TJ new TS820. W2QKA new ARES. OO W2XQ reports signal quality improving. W2XN member of ARRL DX Committee. W2FYS now W2FY. WA2JDK needs UT for WAS. N2SL wins SJRA Pres. Award. SJRA scored 1,274,856 in SS. SCARA had successful club diner. West Jersey RAC's pres. WB2LCC faced TV cameras for ham radio. Novice classes start late in Feb. at WJRAC. SPARC's new pres. WB2VMU, VP WB2FUW; secy. WB2EYF, treas. WB2DRD; RS WB2UBG. WA2YAV holds open ARES meeting in Northfield City Hal. Burlington Co. ARC PRES. K2TD; vp K2UXB; treas. W2CSV; secy. N2VW. Gloucester Co. ARC's K2JF explains wave propagation in clubs Crosstalk. WB2LNR editor on vacation. W2ZQ, W2HOB report SET activity high. WA2PTQ reports pileup on KM1CC. Let us hear from Apple Pie Hill RC, Tuckerton, Ocean Co. Radio Assn. Lakewood NJ, Ocean Co. ARC in Bayville NJ, Old Barney ARC Manahawkin, NJ. NJPN sess. 31, QNI 627, QTC 298, QSP 249, mins. 759; Sun. sess. 5 QNI 99, QTC 29, QSP 28, Mins. 105 SET ARES Sess. 12, QNI 209, QTC 180, QSP 163, Mins 611. Traffic: WB2LCC 157, K2ADJ 86, WA2AWU 57, WB2EYF 53, N2HF 26, WA2PCF 12, WB2PTQ 10, WA2UNJ 4, K2TJ 2.

WESTERN NEW YORK: SCM: Joseph M. Hood, K2YA — Asst. ASCM: W2MTA. SEC: N2JC. WB2JWD reports that the Ithaca area had a real SET when an ice storm caused over a dozen amateurs to man the Red Cross shelter for a 24 hour period during the SET. RAGS reports SET activity was way up. Details when they arrive from WA2PUU. Rochester SET activity ws also up with a very sucessful demonstration of hospital communications coordinated by K2OIU. New 1978 NYSPTEN officers are: WB2VJB, pres.; WB2AER, asst. mgr; K2YJR, secy-treas. W2ISE, SEC. The Cornell U. Repeater WR2AJI now has auto-patch facilities K2GJC has started a licensing class at the Pioneer Middle School. WB2JLR reports that the Rochester VHF Group massed a record score for the VHF contest which is higher than last years winner and still climbing. Rochester VHF Group chmn. WA2WVL worked F9TC and PA0SSB via 432 EME in Dec. New officers for Tompkins Co. ARC: WB2JWD, pres. WB2DKL, vice-pres.; WB2IPX, secy-treas. WA2GIX reports that the Tupper Lake High School ARC have been active running licensing courses, public service projects and a ham radio demo for parents day. Nice going. WB2OWS won the RAWNY club logo contest. Ex-K2IQH is now W6TUR in San Diego. Congratulations to the Otsego County ARA on their recent ARRL affiliation. WA2KDL reports that the teenage globe net meets at 1500Z each Sun. on 21.4 MHz. Congratulations to N2TW on making BPL again this month. Traffic: N2TW 550, W2MTA 387, WA2HSB 325, WA2ELD 230, WB2KHT 179, W2PZL 106, W2FR 97, W2ZOJ 81, WB2WCE 78, WA2AIV 75, WA2ZJP 68, W2TZ 61, K2GJC 51, WB2JWD 36, W2RQF 26, K2DNN 17, K2VR 11.

WESTERN PENNSYLVANIA: SCM, Donald J. Myslewski, K3CHD — SEC: WA3VUP, Asst. SECs: K3SMB WA3LJW PAM: K3SMB. VHF PAM: W3GOJ. RMs: K3AT W3NEM W3KUN. Net, kHz, Time/Days: WPA CW Traffic, 3585.0, 7:00 PM Dy; WPA Phone Traffic, 3983.0, 6:00 PM Dy; PA Traffic & Training, 3610.0, 6:30 PM Dy; WPA RACES, 3990.5, 9:00 AM Su. New appointments: WA3ZYO as EC for Erie County, K3HI and WB3DKT as ORS and OPS. The First Annual Western Pennsylvania Amateur Radio Seminar sponsored by the Mercer County ARC was a big success. The Two Rivers ARC are sponsoring Novice & General classes with W3GUL as chmn. Get well wishes to W3PHD and W3UIR. Radio Association of Erie officers for 1978 are: pres. N3NR, vice pres. WA3CDL, secy. WB3DGD, treas. WA3UCP. W3AHH & WB3EVZ upgraded to Advance class. South Hills Brass Pounders & Modulators officers for 1978: WA3SRD, pres.; WA3WNT, vice-pres.; WA3ZWN, secy.; WB3AKK, treas. The Butler County Traffic Net had 28 sessions, 230 QNI, 32 QTC. The WPA (Pgh) 2 Meter Traffic Net had 30 sessions, 487 QNI, 94 QTC. The WPA Phone Traffic Net had 37 sessions, 439 QNI, 155 QTC. The WPA CW Traffic Net had 37 sessions, 567 QNI, 225 QTC. PSHR credits W3YQ 44, K3HI 41, WB3DKT 41, W3NEM 39, WB3GZR 22, WB3HGL 16. Traffic: W3YQ 236, N3FM 217, W3EGJ 194, W3NEM 171, WB3HGL 113, WA3YEQ 113, K3HI 93, W3YI 90, WB3DKT 80, WB3CDA 76, W3GQJ 73, W3KUN 50, K3CHD 41, WA3QNT 39, K3SMB 33, WA3ZAO 31, WA3YXJ 26, K3HCT 25, W3ATQ 24, WB3EKO 24, W3AS 22, WB3GZR 22, W3RUL 21, W3SN 15, K3VQV 9, W3IW 7, W3TTN 6, WB3EUM 5, W3IDO 3, K3CR 2.

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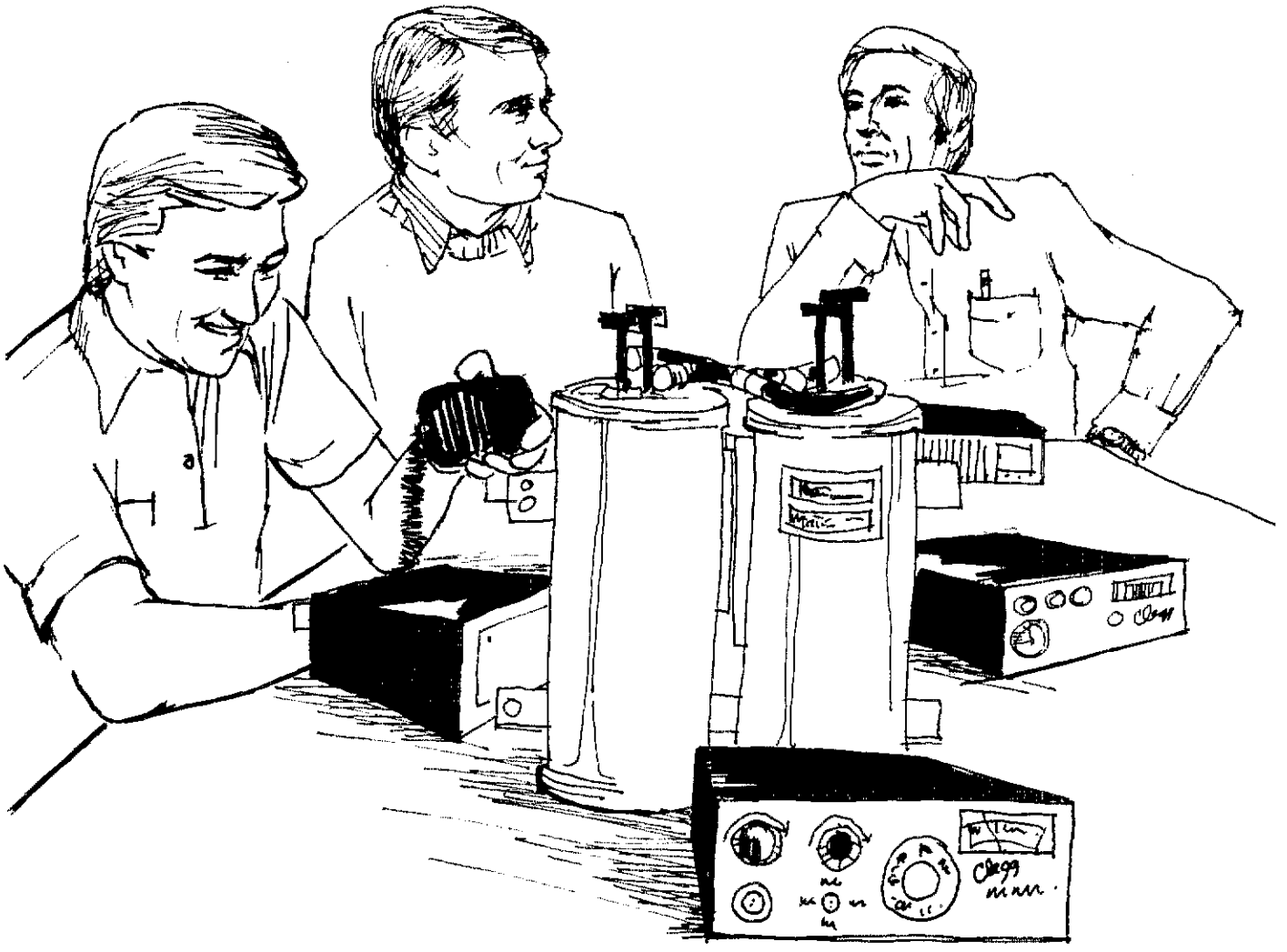

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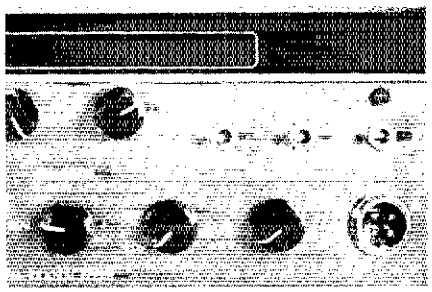

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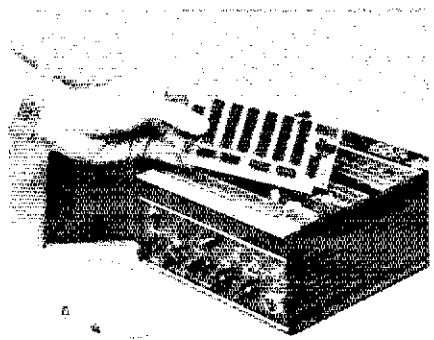

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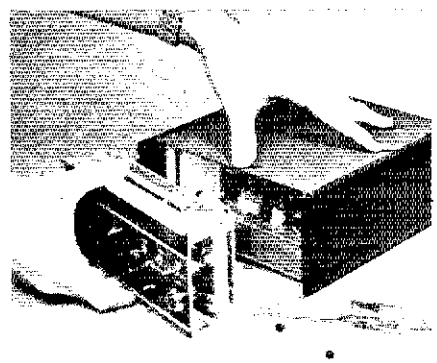

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CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst. SCM, W9RYU. SEC: W9AES. PAM: WA9KFK. RM: W9NJP. Cook County EC: W9HPG. Net, Freq., Times (Z) Days, Tfc., Sess.: ILN, 3690, 0030/0400 Dy, 389, 61;. Ill Phone, 3915, 2245 Dy, 211, 28; NCPN, 3915, 1200/1700 MS, 214, 52; IEN, 3940, 1400 Su, 22, 4; INTN, 3710, 1300 Dy, 38, 28. The Six Meter Club, Chicago will hold their annual Hamfest on Sun. June 11 at Santa Fe Park in Willow Springs. W9QLZ spent a few days in the Ottawa hospital, is now working on the Starved Rock Radio Club Hamfest set for Sun. June 4 at Princeton. Lew McCoy who recently suffered a heart attack was scheduled to be guest of honor at Princeton but Doctors have curtailed his travel and Dave Sumner, K1ZZ, Asst. General Mgr. of the League will substitute for him. WA9PVS has a new TS 8205 rig with FB reports. W9LNQ finally broke the 300 mark in DXCC after many years. K9EI visited Washington, D.C. and had eyeball QSOs with many AMSAT folks. K9DAC received his 35 wpm code proficiency award. W9HOT reports the daytime 9RN activities had 158 pieces of traffic and that the Ill. participation was 100% with W9NXG W9JIJ WB9JSR and K9MUH. WB8UUA now residing in Matoon with his old call WB9DJT. WB9VKZ WB9AZO WB9SVH and K9TXJ are new officers of the Crawford County ARC. Net Manager W5KL reports the CAND traffic was 647 with 100% Ill. representation. WA9KKU W9KRQ and K9MEK have moved to AZ. WD9BHM and WD9BKG have upgraded to General. The JARS new officers are: WA9BHH WB9ACQ WB9NUL and W9KPC. The Leagues executive committee has approved the applications of Ill. Wind Contesters and also, Macon County VHF Assn. and have declared them duly affiliated societies. K9GHR and WA9NEJ will soon take up residence in CA with call letters of W6JK and N6YL respectively. Our sympathy to the families and many friends of WB8MRR of Winnetka and also K9TAC of Rockford who recently passed away and have joined the ranks of the Silent Keys. The Ill. Section gang was out en masse in the emergency nets following the Jan. 26th snowfall. Hamtesters will hold their annual picnic and Hamfest on Sun. Aug. 13 at Santa Fe park. W9JIJ is the only BPL recipient for the month. Traffic: W9JIJ 613, W9NXG 383, K9MX 233, W9HOT 201, K9DAC 198, WD9BEX 195, WB9JSR 191, W9NJP 175, N9TN 144, WA9KFK 125, K9EEA 107, WA9VGW 91, W9OBS 84, W9LNQ 62, W9OYL 54, N9DR 54, W9KR 50, K9SW 50, N9MX 47, WB9YAS 32, K9UN 32, WB9RFC 23, W9PRN 22, WB9ZED 22, WB9SGK 20, K9DQU 11, W9KV 10, K9BK 9, WB9NEH 6, WB9PHM 5, WA9UHA 4, K9TXJ 4.

INDIANA: SCM, M. P. Hunter, W9LF — SEC: W9UMH, Lake Co. ARC has announced its 25th annual Silver Jubilee Herbert S. Briar Memorial Banquet to be held on Apr. 22. W9LF received the last of his 28 MHz QSL cards to qualify for 5BDXCC (and it sure is a relief to be finished!). The Indy DXers held their annual awards banquet with W9RE named Contester of the Year and N9MM named DXer of the Year. It was also announced that the Indy DXers soundly beat the No. Ill. DX Assn. in their competition in both the SSB and CW sections of CQWW. Welcome to Tioga Amateur Radio Society as an ARRL affiliated club. For the second year in a row, W9UMH has managed to blow SET. Again this year, IN was beseiged by a snow emergency. He should learn that SET does not mean Snow Emergency Test. The participation was good and cooperation for the most part was excellent. One point to be made is that during an emergency, it would seem logical that the SEC is in charge. This is what he is trained for and what his organization of EC stations are selected and trained. For a regularly scheduled net to operate as normal, complete with roll call, during time of called emergency is a total disregard of the situation, a waste of time, and grounds to questions the objectives and management of the net. There is plenty of time for this sort of thing when the situation does not dictate a more realistic mode of operation. Net Tfc: ICN 42, QIN 365, ITN 568, INTN 180, IPON 10. Traffic: WB9YXN 439, W9FC 368, W9UMH 351, W9LTU 309, W9QLW 245, K9TKE 164, W9HUF 159, W9ZW 154, W9EI 138, WB9SQH 116, WB9TOW 116, K9FG 86, WB9SOY 59, K9WWJ 58, WB9PIR 54, W9JUJ 48, K9EQT 43, W9NAA 34, K9YBM 29, WA9OHX 26, W9KT 25, WB9OTX 25, W9ENU 24, K9RPZ 23, WB9DIX 22, W9DLF 19, WB9ZHL 19, WA9GJZ 18, W9PMT 18, W9CMT 14, WA9QCF 14, K9CGS 12, K9DCX 11, WB9HCH 9, K9YFT 6, W9DPT 6.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9FZC. PAMs: W9AYK W9IEM K9UTQ. RMs: WB9ICH K9KSA W9SFL K9LGU K9EN. Nets Freq., time, ONI, QTC, MGR.: BWN, 3985, 1245Z M-Sa, 616, 523, W9AYK; BEN, 3985, 1800Z Dy, 866, 265, W9IEM; WSBN, 3985, 2300Z,1300, 300, K9UTQ; WNN, 3725, 2245Z Dy, 79, 4 WB9ICH; WSSN, 3662, 0030Z M-W-F, 43, 7, K9KSA; WINE, 3662, 0100Z DY, 339, 118, W9SFL; WIN-L, 3662, 0400Z Dy, 160, 91, K9LGU; WRN, 3662, 0130Z Sa, K9EN; ExPO, 3925, 1801Z M-F, 604, 45, WA9NIX. WSBN certificate to WB9ICH WD9AZF WB9ZCU. WD9EAQ is the first YL to be a certified member of the Wisconsin Nets. Congrats. WNN certificate to WB9QCC WB9RRU. Waupaca repeater on 147.93-.33. W9IEM has TS-820S and TR-7400A. Don't forget WNA picnic July 9 at Oshkosh. WB9JMQ now W9MV. New Novices Oshkosh area WD9HJT WD9HLL WD9HMP; Sheboygan area WD9HOQ WD9HOO WD9HOK WD9HON WD9HOP WD9HOL. WB9YMQ is Extra. WD9AJA Advanced. WD9ESV General (from Watts Snoo). Net training 3985 2nd Sun. of each month at 1700Z- 4th Sun. at 2200Z. Central Division Convention in Milwaukee 1979. WA9SQN has Kenwood twins and Cushcraft ATB-34. WD9BKR has TS-700S. New EC for Racine Co. K9UIT. New EC for Jefferson Co. N9TD. Neenah-Menasha area has 35 for their general class. WB9MSL is Extra. WB9WBK WB9IZT WD9BCP are Advanced. WB9WFC WB9WFH are Tech. WD9HJU WD9HJV are Novices (Thx KMRA). WB9TDV new General in Reedsburg. OPS to WB9RRU. W9ZGQ made BPL. SET went well in all respects. Traffic: (Jan.) W9ZGQ

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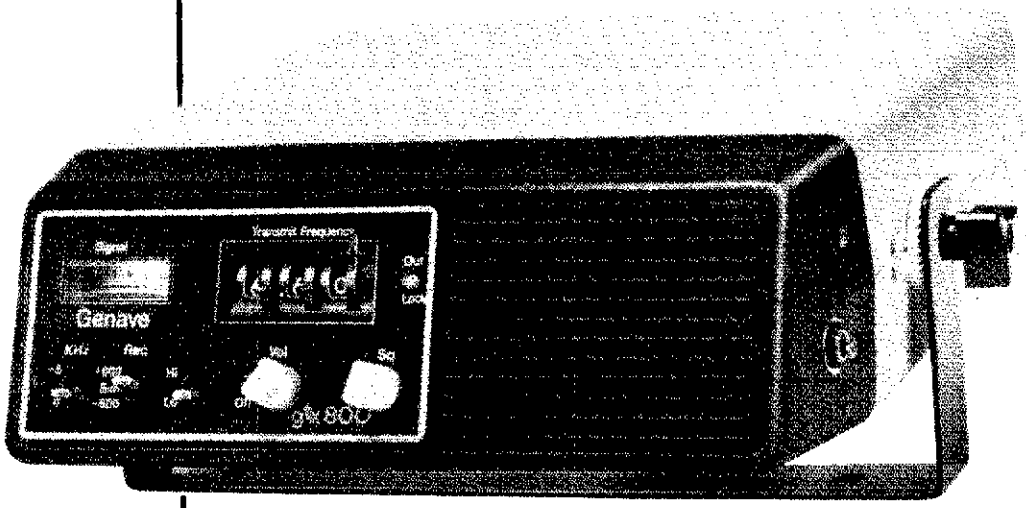

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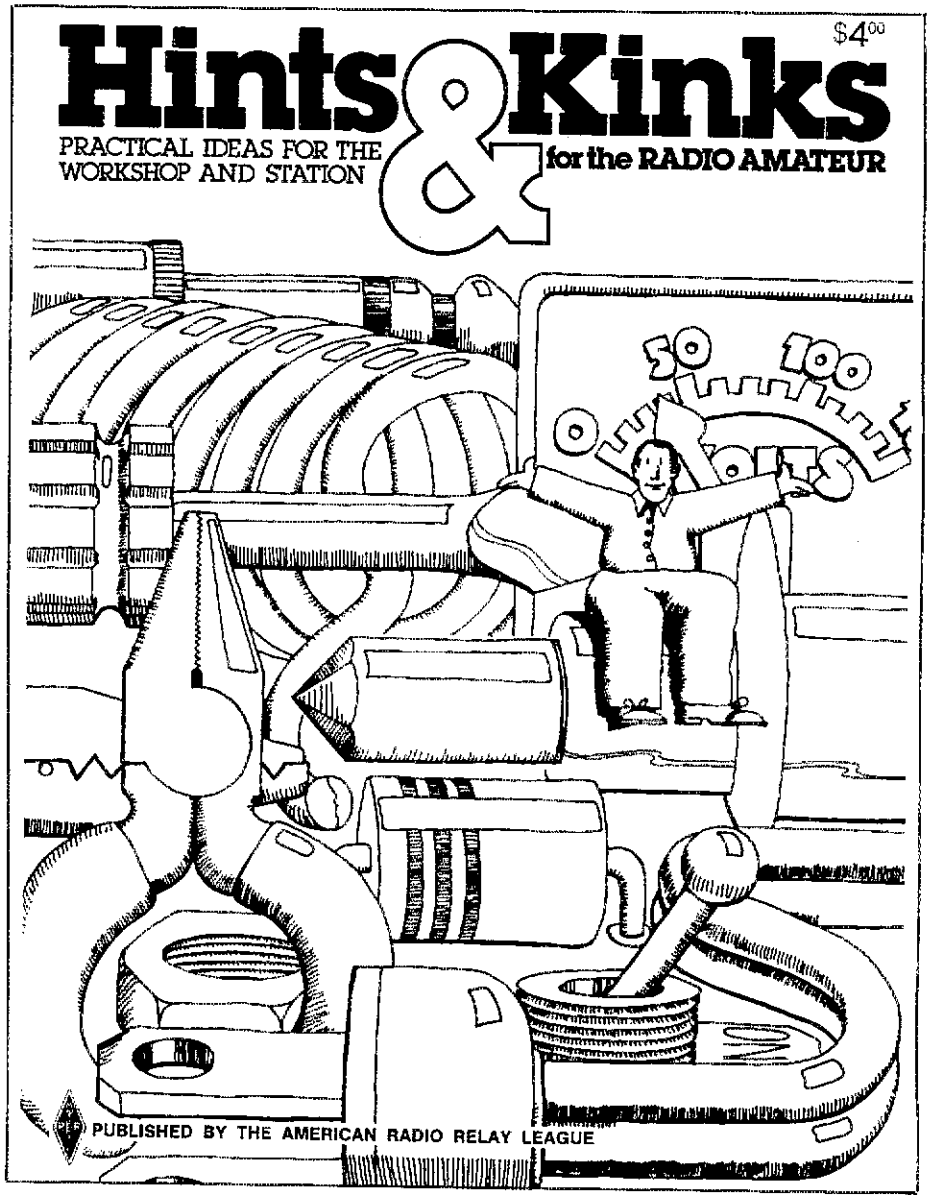

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TV-502 2m Xvtr 189
TS-700A 2m Xcvr 450
VOX-3 VOX 19
TR-2200A 2m FM Xcvr 139
TR-7200A 2m FM Xcvr 149
TS-600 6m Xcvr 450
MIDLAND
13-505 2m FM Xcvr $169
NATIONAL
NCX-3 80-20m Xcvr $169
NCXA AC supply 69
NCXD DC supply 75
AC-200 AC supply 65
NCL-2000 Linear 349
PEARCE SIMPSON
Gladding 25 2m Xcvr $ 69
REGENCY
HR-2B 2m FM Xcvr $129
HR-212 2m FM Xcvr 139
HR-312 2m FM Xcvr 169
HR-2S 2m FM Xcvr ac 149
HR-2MS 2m FM Xcvr 169
P-110 AC supply 39
ROBOT
80A Camera $249
61 Viewfinder 189
SBE
SB-450TRC 450 Xvtr $149
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PR-1 Panadaptor (as-is) $ 39
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2m FM synth Xcvr $395
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117B AC supply 59
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VX-2 VOX 29
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244 Dig display 139
276 Calibrator 19
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KR-5A Keyer 29
KR-20A Keyer 39
KR-40 Keyer 75
405 Linear 119
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251 AC supply 49
252 AC supply 69
210 AC supply 24
208 CW filter 19
S-30 Signalizer 29
VARITRONICS
FM-20BM 2m amp $ 39
PA-50A 2m amp 49
YAESU
FT-101B Xcvr $499
FT-101E Xcvr 599
FV-101 Remote VFO 59
FR-101S Ham Rcvr 359
FR-101 Digital 469
FL-101 Transmitter 425
FT-301D Dig Xcvr 649
FP-301 AC supply 99
DC-20B DC supply 75
FL-2100 Linear 349
FT-2FB 2m FM Xcvr 149
200R 2m FM Xcvr 189

2-22-78

(1) This list was prepared from an inventory taken on the date shown above. The quantities vary, in some cases there are several of one item, others, maybe only one. Due to the lead and distribution time of this publication some of the items may have already been sold by the time you see this ad. On the other hand, due to the number of trades we are involved in each day, some items are in stock that are not listed. When ordering state more than one choice, if possible. (2) AES reserves the right to sell power supplies and accessories only with matching transmitters or transceivers, depending on our stock situation. (3) To insure quality, our used gear is serviced and made ready for shipment **after** we receive your order. Please allow 5 to 10 working days delay in shipping your order. (4) No trades on used gear.

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BIRD		
4350 2kw Ham-Mate	$ 94	59
4351 1kw Ham-Mate	94	59
4352 VHF Ham-Mate	94	59
BRIMSTONE	reg.	NOW
Tone dial option	$ 39	9
CDE	reg.	NOW
CD-44 Rotor	$134	109
HAM-III Rotor	169	139
T-X Rotor	299	249
OT-1 3A 12vdc supply	49	25
CES	reg.	NOW
100 Digital display	$299	149
200V Touch tone pad	69	39
COMCRAFT	reg.	NOW
CPS-6 AC supply	$139	69
COMDEL	reg.	NOW
CW-1550 Wattmeter	$ 34	39
CUSHCRAFT	reg.	NOW
AM-147T 2m ant	$ 29	15
DENTRON	reg.	NOW
160-10M Monitor tuner	$299	259
80-10AT Wire tuner	59	55
Trimtenna 20 20m beam	129	99
EX-1 Vertical ant	59	45
4V 40-10m vertical	84	69
DRAKE	reg.	NOW
TR-4CW Xcvr w/no RIT	$649	549
4CQ Speaker/Q-mult	49	45
7075 Desk microphone	39	35
DSR-2 Hamtest display	3200	2495
AA-10 10w 2m FM amp	49	45
AC-10 12vdc supply	49	45
AN-5 Shortwave ant	8	5
DY-COMM	reg.	NOW
500C 10w/25w 2m FM amp	$ 69	35
GALAXY	reg.	NOW
2ZM Mobile floor mount	$ 6	2
R-1530 General cov Rcvr	1550	995
SC-1530 Speaker	60	39
FL-5306 6 KHz filter	80	60
RPA-1530 Rack adaptor	170	50
GENAVE	reg.	NOW
TE-1 Touch tone pad	$ 79	35
Ham Pak Portable case	39	9
GENTEC	reg.	NOW
PM50U 500w dummy load	$ 48	24
HAMMARLUND	reg.	NOW
Noise immunizer - HQ-170	$ 39	19
HICKOK	reg.	NOW
239 Color bar generator	$125	55
HY-GAIN	reg.	NOW
3750 160-10m Xcvr	1895	1495
3854 Speaker	59	49
3806 1w 6 ch 2m FM HT	189	149
ICOM	reg.	NOW
IC-230 Synthesized 2m FM	$489	299
IC-21 VFO Receive VFO	119	69
IC-22S 2m FM Xcvr	299	239
IC-21A 2m FM Xcvr	399	299
DV-21 Digital VFO	299	249

	reg.	NOW
KLM		
Force 5 80-10m Xcvr	1095	895
FSPS AC supply/spkr	249	199
Multi-2700 2m Xcvr	756	599
Multi-11 2m FM Xcvr	325	239
Multi-UII 450 FM Xcvr	379	299
MIDLAND	reg.	NOW
13-500 2m FM Xcvr	$169	139
13-505 2m FM Xcvr	229	189
MILLEN	reg.	NOW
90201 Transmatch Jr	$138	99
90651A Grid dip meter	173	139
MOTOROLA	reg.	NOW
T-1670A AC supply	$150	99
NEWTRONICS	reg.	NOW
48TV 40-10m vertical ant	$ 99	79
NYE	reg.	NOW
250-30-3 1kw w/relay, SWR	$355	249
PEARCE SIMPSON	reg.	NOW
Dopphin 100 Depth finder	$129	69
REGENCY	reg.	NOW
HR-212 2m FM Xcvr DEMO	$259	179
ACT-W-10 Whamo scanner	329	179
DFS-5K Dig freq selector	199	119
ROBOT	reg.	NOW
f/1.4 lens	$ 49	19
SBE	reg.	NOW
Hood for Scanvision		1
SONAR	reg.	NOW
D-1020 Depth indicator	$160	79
D-1060 Depth sounder	145	69
STANDARD	reg.	NOW
146A 2m FM hand-held	$314	229
SWAN	reg.	NOW
700CX 700w PEP Xcvr	$649	549
700CX/SS-16B	739	599
117X Basic AC supply	114	85
14XP DC module, pos gnd	90	29
PS-20 AC supply	179	149
P-1215A AC ps for monoband	75	39
ST-1 Antenna tuner	219	189
YEMPO	reg.	NOW
VHF/One 2m FM synth Xcvr	$495	279
TEN-TEC	reg.	NOW
261 AC supply DEMO	$109	69
216 Microphone	19	15
KR-1 Keyer paddle	18	15
YAESU	reg.	NOW
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FT-301 DIG 200w PEP digital	935	749

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DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX — SEC: WØSA. Minn. Nets: Net, Freq., Time/Day, QNI, QTC, Mgr.: MSN 1, 3685, 6:30 PM, 276, 109, NØOF; MSN 2, 3689, 10:15 PM, 86, 18, NØHY; MSPN N, 3945 12:05 PM, 774, 78, WBØJYT; MSPN E, 3929 5:45 PM, 543, 156, WØDUW; PAW, 3925, 9-12/1-5, 4454, 399, WAØYVT; MSSN, 3710, 5:30 PM, 191, 50, KØQW; MWX, 3925, 6:15 PM, 160, 141, WBØPKG. Congrats to new Novice WDØFPI; Novice to General WAØABC WBØVDN; Tech to General WDØWMP; Novice to Advanced WDØOFF; General to Extra WBØOHN; General to Advanced WBØYUA and WDØFFA. Novice to Advanced, who reports that the code was easy thanks to W1AW. WDØFUV who was presented with 2 tax exemptions (twin girls) has now gone from Novice to Tech with no interruptions. If you hear strange sounds coming from Rochester, it may be the Moon Bounce Antenna Farm, which is somethin to behold. Congrats to WAØQIT and his graduates for the planning and participation in their first SET. Reports have it that they did a lot of public relations for amateur radio. Our sincere sympathy goes out to the families of WAØVAS and WØMJJ in the recent loss of their loved ones. WAØVAS became a Silent Key Thur. Feb. 2. He was a past MN SCM, member of 3900 Club, Country Cousins, as well as other amateur organizations. Traffic: WBØHOX 492, WAØYVT 256, WBØZAL 207, WAØQIT 176, NØOF 167, WBØYUA 149, WØHY 146, WBØJYT 111, WØDUW 82, WØRIQ 79, WBØUIP 79, WBØUKI 70, WØHZU 64, WAØTFC 62, WBØTHZ 60, WBØNZB 57, KØPIZ 51, WBØQNX 51, WBØRIL 51, KØQW 50, WAØCCA 40, WØPNE, KØTS 29, WBØPKG 29, KØZBI 29, KØCSE 19, WAØRKV 8, KØFLT 7, WAØTGM 5, KØBDD 4, WDØBXD 4, WØOPX 4.

NORTH DAKOTA: SCM, Mark J. Worcester, WAØWLP — Amateurs upgrading in G.F.: Tech. WDØDKD WBØYKA. Gen. WDØECB. Adv. WAØLPV, KL7GFL/Ø now WDØEZQ. Officers: Fargo Rep. Club, WØDIV, pres.; WØCZ, v.p.; KØKAG, treas.; KØJOA, secy. Bismarck Rep. Club, KØYST, pres.; WBØNAD, v.p.; WBØMSJ, treas.; WBØSXC, secy. Minot Ham of the year WØGNS. WBØFUO WØHVA and WBØLPK received certs for their efforts in Novice and Gen. Classes at Minot. WBØFUO has new Harmonic. WØHVA had hand problems, is on the way to recovery. KØYST made DXCC. SET wasn't as elaborate this year in N.D. Note to all Clubs that are planning a repeater in ND, KØPVG is the Freq. Coordinator for CAN AM., contact him for the Freq. to be used in your area! Net, kHz, CST/Days, Sess., QNI, QTC, Mgr.: DATa, 3996.5, 1700S-S/1800 M-F, 47, 372, 149, WBØWSQ; YL Wth, 3996.5, 0730 S-S, 31, 663, 676, WAØRWM; Goose River, 1990, 0900 Su, 4, 36, 2, WØCDO; Emergency YL Wth Jan 17, 3996.5, 37, 35, WAØRWN: Traffic: WAØRWM 1265, WAØCRH 130, WBØOAJ 118, WØCDO 97, WØBHT 45, WBØWSQ 44, WØWWL 44, WAØREW 29.

SOUTH DAKOTA: SCM, Ed Gray, WØSD — WBØYQT has a new homebrew two meter amplifier on SSB and CW. WØSD has been successful on two meter moonbounce working K1WHS in Maine for state number 34. The moonbounce array consists of eight fourteen-element beams rotable in azimuth and elevation. Assisting in the project were WAØNRE WAØVPY WDØDYP KØAG KØOR WBØZZH WBØOMF WAØUFS WBØZLK WBØAFY KØGZ KØWLU WAØQLP and a couple of prospective amateurs. Make plans to attend the SD Hamfest at Rapid City the week end of July 1st and 2nd, at the School of Mines. Details available on the SD net or any Black Hills area ham. WBØVGN of Aberdeen has made the Public Service Honor Roll. Traffic: WAØTNM 366, KØFRE 189, WBØVGN 148, WØHOJ 126, WØDVB 83, WAØVRE 82, WBØEVQ 53, WØMZI 26, WBØTUK 26.

DELTA DIVISION

ARKANSAS: SCM, S.M. Pokorny W5UAU SEC: WA5VNV. PAMs: W5POH WA5ZWZ K5MEA. RM: W5MYZ. Nets, KHz, Time/Day, QNI, QTC Mgr. ARN, 3995, 0030/Dy, 1201, 104, K5MEA: OZK, 3760, 0100/Dy, 220, 30, W5MYZ: APN, 3937, 1200/M-S, 909, 50, W5POH; M-Bird, 3928, 2230/M-F, 855, 47, WA5ZWZ; CCEWN, 146.28/88, QNI 301, QTC 22, WB5QOR. SCERC 28.7 QNI 74. QTC 21, N5EL. CCEWN active during Wynne tornado. Several clubs and a large number of people active during SET '78. The SCM received 9 SET msgs. Officers of Ft. Smith area ARC, N5SD, pres.; K5YVX, vice-pres.; WB5NZP. secy-treas.; WD5DMT, act. EC Izard Co. WB5LWJ, renew EC of W5KL. New hams WD5HAQ HBQ HBT HBW HBZ HCG HDD HEA HEI HEK HEM HHF HHG HIL HIJ HIK HIM HJC HKN HME HML HMW HNB HNR HNV HOM HOP HOT. PSHR: WB5FDP 50, W5POH 43. Traffic: (Jan.) WB5FDP 270, W5ASD 88, K5MEA 75, W5LBT 61, WA5VNV 34, W5UAU 33, W5POH 28, W5BLP 27, WB5LWJ 25, N5EL 22, W5KL 22, K5DW 17, W5EIJ 17, WB5WOQ 16, WB5GWU 14, WB5WWA 12, WB5NZL 10, WB5GQH 4. (Dec.) W5BED 20.

LOUISIANA: SCM, Robert P. Schmidt, W5GHP — Asst. SCM: N5JM, RM: N5TS. PAM: K5TL. VHF PAM: W5VBX. A new club called SARA (Shreveport ARA) officers, K5TL, pres.; K5OB, vice-pres.; WB5KFY, secy.; WB5POB, treas. They are planning a Hamfest probably in July or Aug. W5FBO recovering from surgery. WB5LSH working 20-meter DX. WD5GJK upgraded to Tech. WD5DBT from Novice to General, WD5BCZ now Extra with call K5SD. K5BLV has new tri-band beam. Opelousas repeater

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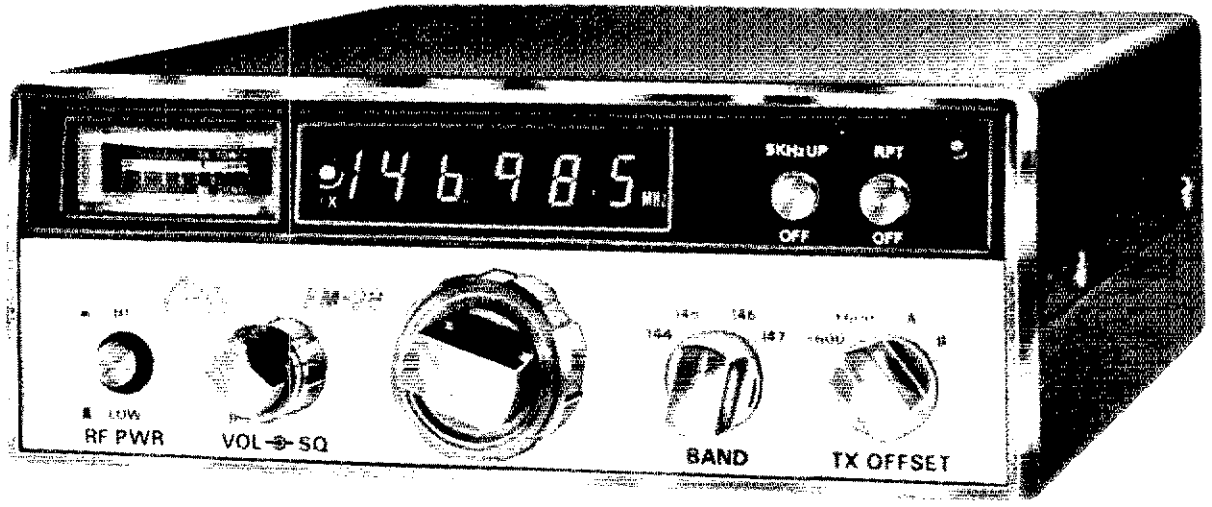


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WR5AWI on the air on 147.75/147.15. K5ARH active on RTTY net LRN. The Lafayette hamfest is a great success. Congrats to all who worked so hard to make it so. WB5UWI active on LAN. All members of the four LA traffic nets can take pride in their work during SET 1978. Special congrats to all stations that acted as liaison stations to the higher nets. A well done to our four net mgrs. N5TS K5TL WB5OOM and N5RB. Nets: freq time LAN, 3615 khz, 7:00 & 10:00 PM Dy, QNI 593, QTC 406, N5TS Mgr.; LTN, 3910 khz, 6:30 PM Dy, QNI 588, QTC 189, K5TL mgr.; LSN, 3703 khz, 8:30 PM Su-W, QNI 73, QTC 20, WB5OOM mgr.; LRN, 3587.5 khz, 6:30 PM Su-W, QNI 16, QTC 24, N5RB mgr.; Traffic: K5TTC 416, W5GHP 368, N5YL 319, WA5IQU 314, N5TS 184, K5MC 187, K5TL 137, N5ES 128, WB5LBR 107, N5RB 46, K5ARH 40, WB5ZDE 35, WB5OOM 29, K5BLV 19, W5YN 12.

MISSISSIPPI: SCM, E. Ed Robinson, W5YTN — SEC: WB5FXA. 1978 SET now history. A good showing for emergency preparedness as well as everyone having a fine time. K5MFX passed away Feb. 3. He will be greatly missed by all. Welcome to WD5BQY new General Class. Also congrats to W5MOJ now Extra and WD5AGW Tech. Heard on MTN-N5GW W5VSZ WA5HUV K5GY N5XA N5RN. Congrats to K5MK on receiving 5 BWAS and DX-CC awards. HELP! MTN and MSN need more attendance. You CW types get on it — and you Fone types come down and listen to me check in. You'll find they will take *anyone*. CAND. W5KLV, 44 sess. QTC 641 with DRNS Represented 100%.;DRNS, WB5CDX, 35 sess. QTC 481 with Ms represented 66% by N5RN WB5NGS WD5GNR W5QDC WB5NGF W5EDT WB5UVT K5QNE W5VSZ K5QKY WB5FHA WB5SUD; CGCHN, K5WOB, 31 sess., QNI 3350, QTC 259; MSBN, WB5SNB, 31 sess., QNI 2372, QTC 207; MTN, WB5FHA, 31 sess., QNI 165, QTC 62; Ms-Lou Wx Net, K5VXV, QNI 119, QTC 4.; SARN WB5TZN, QNI 6, QTC 0; MSN, N5WE, combined report for Oct., Nov., Dec.'77, QNI 66, QTC 15. Traffic: N5RN 272, W5EDT 198, WB5FHA 166, N5CW 108, WB5SNB 64, K5OAF 54, K5AKM 52, WA5OKI 49, W5YTN 43, WB5VFS 39, WA5JWD 26, WD5BVY 24, WA5GIT 24, K5GY 16, N5XA 11, WA5HUV 8, W5LL 6, WB5NGF 5, K5MK 2.

TENNESSEE: SCM, O.D. Keaton, WA4GLS —

Net	Freq	Time/Days	QNI	QTC	Mgr.
TPN	3.980	1140 M-F	4302	434	WA4EWW
		1245 M-F			W4PFP
		0000 M-S			WB4YPO
		0000 S			K4JSF
		1400 SuH			
TN	3.635	0100 Dy	256	104	K4YFC
ETVHFN	50.4	0200 MWF	99	4	WA4WZJ
ETVHFN	145.2	0200 TTh	36	0	WB4DZG
TNN	3.710	0030 MTh	78	32	WA4CNY
MTTMN	28.8	0200 TF	62	0	W4EAY
WTVHFN	146.37	0030 Dy	913	516	WA4VVX
	146.97				
TTIN	28.75	0030 TF	94	3	WA4PPY
TCDWN	146.31	0200 W	277	0	WA4BOC
	146.91				
MPSN	146.34	0300 Th	142	15	WA4WHQ
	146.94				

Do not forget the TN QSO Party on the 1st. & 2nd. The MSPSN meeting on WR4AEX is a combination public service and weather net for Memphis and Tri-State area. Short Mountain Repeater club, K4EEY, pres.; W4PFP vice-pres.; WA4QMM, secy-treas. George Lamberson ARC, W4CTA, pres.; WB4RWC vice-pres.; WA4CSI, secy.; WA4MXX, treas.; Crossville ARC, WA4IUZ, pres.; K4MJM, vice-pres.; W4HPG, secy-treas.; Bristol ARC, WA4TYS, pres.; WB4SJK, vice-pres.; WA4SCE, secy-treas.; Walnut Mountain ARC, W4TZG, pres.; WB4ENN, vice-pres.; K4KJS, secy-treas.; Jackson ARC, WA4PFJ, pres.; WA4WOZ, vice-pres.; WA4QDS, treas.; WA4NXI, secy.; WB4WBD SAR. Walnut Mountain ARC Novice Class started Feb. 1 with 15 students. Our appreciation goes to W4OGG for his devotion to traffic work, he acts NCS, RN5 Rep., DRN5 Rep. and the permanent chmn. for the TN QSO Party. Congrats to WA4CNY on BPL again this month. The 1978 SET was very successful. The first OES appointment given to WA4NIF. Send me any news items that you have. Traffic: WA4CNY 512, K4CNY 378, WB4DJU 228, W4OGG 214, WA4GLS 173, W4ZJY 159, WB4BKF 126, WB4TPT 85, K4YFC 82, W4TZG 75, WB4ZSZ 75, K4XE 64, WB4HOI 60, WA4DKC 57, K4VIG 46, WA4IQL 41, WB4GZF 38, WA4WVW 35, W4CYL 34, WA4WHQ 34, W4PFP 21, W4RUW 15, N4UC 12, W4VJW 11, W4PSN 8, W4TYV 8, W4EWR 7,WA4TYN 7, K4WOP 7, WA4BDL 4, WB4BGV 2, WB4WHE 1.

GREAT LAKES DIVISION

KENTUCKY: SCM, Ted Huddle, W4CID — SEC: WB4ZML. NET ACTIVITY:

Net	QNI	QTC	Net	QNI	QTC
KRN	675	42	KYN	306	191
MKPN	1212	104	KNTN	388	160
KTN	1625	180	KSN	179	22
KPON	89	4	CARN	378	11
5 DARES	89	12	6 DARES	67	7

Record snowfalls across KY in Jan. resulted in the SET meeting being cancelled and WX related activity in Owensboro, Lex, Lvl, and Ashland KY amateurs provided communications for fleets of 4-wheel drive vehicles to move medicines Doctors and ill persons. The No. KY jump team was moved to Markland dam for 3 dys. to monitor the Ohio River ice pack. What a month! EC districts in KY have been reorganized from 21 to 15 districts. If you want a copy of the new plan, send WB4ZML an S.A.S.E. K4TXJ reports 90 members in Louisville RACES. Traffic: WB4ZML 264, W4CID 224, W4BAZ 157, WA4IGS 148, WA4AVV 120, WA4EFG 118, WD4LXX 106, K4DZM 98, K4TXJ 97, K4UMN 75, WA4JTE 73, WA4JAV 66, WB4AUN 66, WB4NPD 54, W4RHZ 53, WA4AGH 44, K4HOE 42, W4CDA 28, WD4ITJ 27, WA4YPQ 22, K4YZU 22, WB4RRI 21, W4OYI 20, WA4FAF

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GENERAL SPECIFICATIONS

Semiconductors:	39 diodes, 23 transistors; 11 integrated circuits
Power Requirements:	Nominal 13.8 VDC input at 15 amps, negative ground only
Power Consumption:	Receive — 5.5 watts (includes dial and meter lamps); Transmit — 260 watts
Dimensions:	3-1/4" high x 9" wide x 12-1/2" deep (82.55 mm x 228.6 mm x 317.5 mm)
Weight:	8-1/4 lbs. (3.66 kg)

PERFORMANCE SPECIFICATIONS

Frequency Range:	80 meter band — 3.5 to 4.0 MHz 40 meter band — 7.0 to 7.5 MHz 20 meter band — 14.0 to 14.5 MHz
Modes:	CW; USB; LSB
RF Input Power:	SSB — 250 watts PEP nominal CW — 250 watts DC maximum (adjustable)
Transmitter:	
Antenna Impedance:	50 ohm, unbalanced
Carrier Suppression:	Better than −45 dB
Side-Band Suppression:	Better than −55 dB at 1000 Hz
Distortion Products:	Better than −26 dB
AF Response:	500 to 2500 Hz
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Microphone:	High impedance 3000 ohm
Receiver:	
Sensitivity:	Better than 0.5 watts audio output for 0.5 μV input
Signal-to-Noise Ratio:	Better than 10 dB S+N/N for 0.5 μV input
Image Ratio:	Better than −60 dB (typical with respect to 0.5 μV input: 80 meters — −130 dB; 40 meters — −100 dB; 20 meters — −75 dB).
IF Rejection:	Better than −70 dB (typical with respect to 0.5 μV input: 80 meters — 110 dB; 40 meters — 80 dB; 20 meters — 75 dB).
Intermodulation Intercept Point:	Better than 10 dBM
Selectivity:	2.5 kHz — 6 dB; 5.0 kHz — 60 dB
Audio Output Power:	More than 3 watts
Audio Distortion:	Less than 5% at 3 watts

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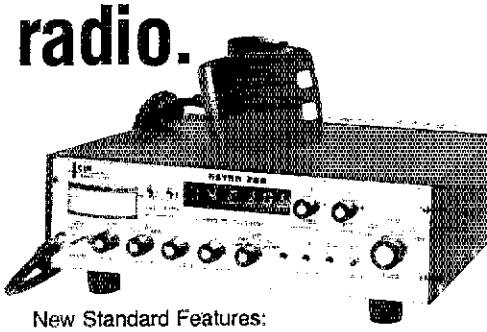

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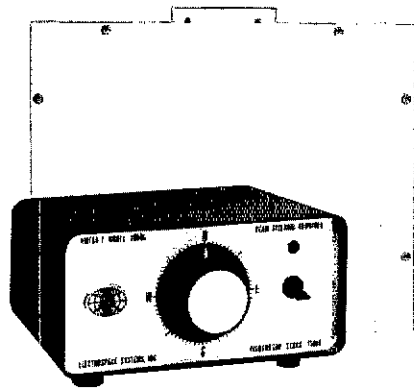

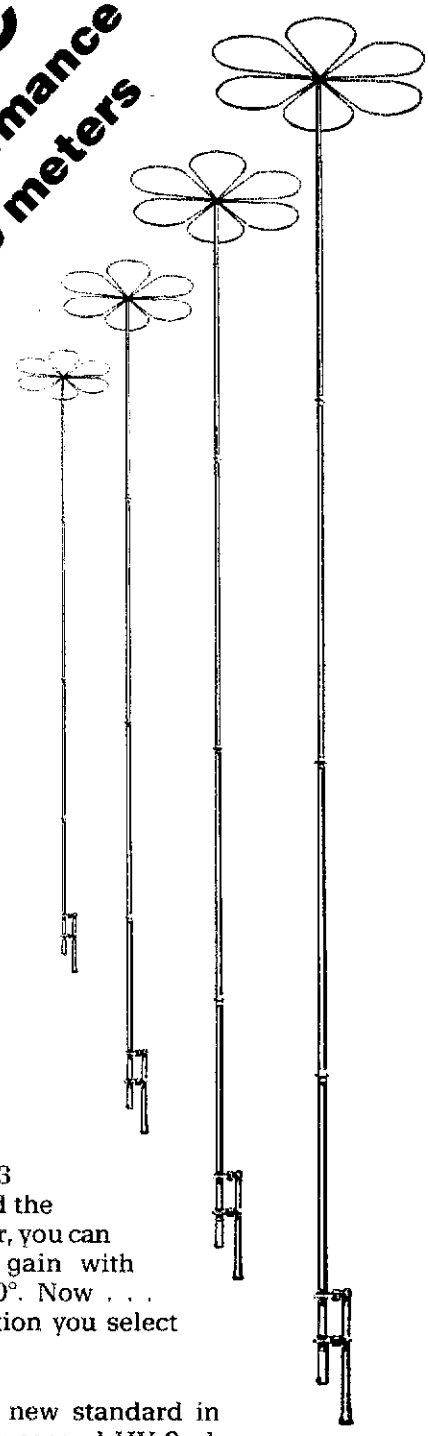

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16, WD4KIC 16, WA4RCD 15, WB4EHT 14, WD4CQF 10, WA4ROI 7, WB4ILF 5.

MICHIGAN: SCM, Stanley J. Briggs, W8MPD/K8SB — SEC: WA8EFK. RMs: W8JYA WB8NCD. PAMs: W8SOF K8LNE WA8WVV (VHF).

Net	Freq.	Time/Days	QNI	QTC	Sess.
MACS*	3953	1600 Dy	1254	475	31
OMN*	3663	2300/0300 Dy	1569	390	91
MWN*	3935	0000 Dy	1552	245	32
GLETN	3932	0230 Dy	524	48	29
BR Net	3930	2230 M-S	575	69	24
MEN	3930	1400 Su	144	5	5
UPEN	3922	2200 Dy	1152	81	36
Mi6M	50.7	0000 Dy	169	12	24
ARES	3932	2300 Su			

VHF PAM report: Number reports 7, 694, 113, 30; MI Emergency Calling Frequency: 3932 kHz. National Traffic System Net. As you read this we will have passed by the first day of spring, which is very hard to believe, because as I write this the state is still trying to dig out of the record Jan. blizzard. Hundreds of radio amateurs in MI did an outstanding job of providing emergency communications for Red Cross, CD, county and local police, and National Guard units. Complete reports will be presented at the ARPSC Forum at the Muskegon Convention. My nomination for the "Good Samaritan" award for work during the snow emergency goes to Al Baker N8RE(W8TZZ). Not only did he provide communications for over 250, he used his generator to power water pumps for 9 neighbors, ran furnaces for 2 neighbors on a rotating basis, in addition to assisting in the delivery of a baby by providing radio communications between the doctor and those making the delivery. This all took place on the Stony Point while they were without electric power for 81-1/2 hours. Field appointments: K8DTG EC Shiawassee Co., WD8AMZ EC Copper Co., K8OQB EC Kalamazoo Co.; WB8SIW EC Oakland Co., WB8DNQ EC Berrien Co. K8JH OO-I, WB8IKJ OO-II, K8RV and K8KMQ ORS WB8QJZ WB8RNY and W8WN OVSs. I regret to report K8SUU and W8ZNO as Silent Keys. Club Elections: Central Michigan Amateur Repeater Assn. (Midland) WB8RCR, pres., W8QOI, vice-pres:, K8KNY, secy:, WD8AUL, treas. Midland ARC: WB8WNF, pres; WD8JRL, vice-pres:, WD8AXR, secy:, WD8JZW, treas. Upgrades: WB8WGY to General, WB8ZCT Advanced, W8BNF Extra. Congratulations! New affiliated clubs: Central Michigan Contesters with W8HW, pres. Greater Lansing DX Group with WA8LTX, pres. and North Eastern Michigan Amateur Radio Society, WD8NMH, pres. Traffic: (Jan.) W8SOP 538, W8VPW 354, WB8ITT 245, K8KMQ 220, W8MPD 194, WB8YDZ 175, K8FE 172, WB8POL 150, K8RV 129, K8LNE 127, WA8DHB 105, K8DD 97, K8DYI 96, WB8MTD 90, WA8WZF 88, K8KC 88, WB8ZNS 82, WD8DMX 80, W8YIQ 72, WD8LRT 62, WA8TBL 60, K8ZJU 56, WB8JET 52, W8DT 46, W8SCW 46, K8CN 42, W8DSF 37, WD8BSE 37, W8JUP 35, WB8EEU 35, W8IHX 31, K8JP 31, WD8NYN 28, WD8CSA 27, WB8DJS 27, K8GXV 26, WB8ZYC 25, K8AXL 24, K8WRJ 23, WA8PIM 22, WA8QAF 19, W8VWY 19, WD8APM 17, W8UOQ 17, W8VIZ 17, K8JED 16, WB8SYA 16, WB8YIG 16, W8NOH 16, W8CUP 15, K8DTG 12, N8AG 12, K8UPE 12, WB8APN 12, W8LX 11, WB8VAI 11, W8LDS 10, WA8FJF 10, K8BZL 10, N8NA 10, W8WVL 9, WD8JYT 9, WD8DIB 8, W8SDB 8, WB8YRY 8, WD8JRX 8, WB8TTA 8, K8CIP 8, W8TBP 8, WD8NIK 7, WB8JIX 7, WA8AXF 6, WB8VCM 6,W8FSZ 5, WB8UUJ 5, W8HKL 5, WB8AFO 4, WD8DRI 3, W8JLD 3, W8RNQ 3, W8LOU 2, W8KJ 2. (Dec.) W8NOH 48, WB8UUJ 4.

OHIO: SCM, Hank Greeb, W8CHT/N8XX — Asst. SCM: WA8MCR; SEC: K8AN. PAMs: W8DIL W8FU WA8SSI RM: WB8KKI WB8JGW W8TP WB8WTS. Net reports (Jan.):

Net	Sess.	QNI	QTC	Freq.	Time(Z)
OSSBN	124	4715	1867	3.9725	1530/2100/2345
ONN	30	104	81	3.708	2330
06mN	39	430	81	50.160	0200
BN	82	770	368	3.577	0300/2345
BNR	29	119	119	3.805	2300
OSN	30	257	81	3.577	2310

For the second consecutive year, the SET was a disaster. Yes, on Jan. 26, Ohio and surrounding sections woke up to drifting snow, ranging from 6 to 12 inches, & more with drifts over 20 feet deep in places. Amateurs in all parts of the section responded to the emergency, sometimes plowing through drifts to get to Red Cross, DSA, National Guard, etc., headquarters. Over 2000 amateurs directly took part in the relief operations, so individual listing is impossible here. Early Wed. morning OSSBN spontaneously activated, and handled emergency, priority, and inquiry traffic for 10 to 18 hours per day through Jan. 29. Buckeye Net, Ohio 6 Meter Net, and Ohio Novice Net were activated to provide relief and overload channels, as needed. Local activities reports included those from Adams, Belmont, Brown, Butler, Clermont, Crawford, Cuyahoga, Delaware, Fairfield, Franklin, Greene, Guernsey Hamilton, Hancock, Highland, Jefferson, Lake, Licking, Logan, Lorain, Lucas, Monroe, Montgomery, Ottawa, Preble, Richland, Sandusky, Summit, Van Wert, Warren, Wayne, Wood Counties. Regarding the SET, the Miami Valley FM Association's "Scanner" sums it up as, "This is carrying verisimilitude a bit far!" Congrats to all who took part! Traffic: W8VVL 582, WA8MCR 541, WB8KWD 503, WB8WTS 374, W8IQ 339, W8PMJ 310, WD8CGR 301, W8DIL 244, WB8KKI 230, WA8HGH 196, N8XX 163, W8TP 161, WA8RQQ 148, WB8YVI 147, K8BYR 143, K8AN 122, N8TM 118, W8TH 115, W8QZK 105, WA6WBF/8 102, K8DL 96, WA8SSI 85, WA8TSX 84, WB8CJU 81, N8CW 81, WD8AVY 80, WB8VLR 76, WD8BTL 70, W8RG 70, WD8CDA 69, W8TP 69, WB8OMQ 68, W8GGX 66, WB8MRL 65, WA8VWH 62, WA8SED 61, WB8SIG 57, WD8AUJ 56, WD8BBQ 56, WA8ZNC 56, W8OUU 52, WB8TRK 46, W8CXM 43, W8EK 43, WD8LIU 43, WB8JSA 42, WA8VEC 41, WD8JTT 40, WB8PIY 40, WD8BZD 39, WB8OFR 35, WD8DDJ 34, WB8SEB 33, WB8TJS 33, WB8BGX 32, W8WEG 32, WB8UFB 29, WD8BMK 26, K8HF 25, W8LZE 24, W8MGA 24, WB8YGW 24, WD8DIP 22, WD8DQX 20, W8OE 20, W8UMH 16, K8CKY 15,

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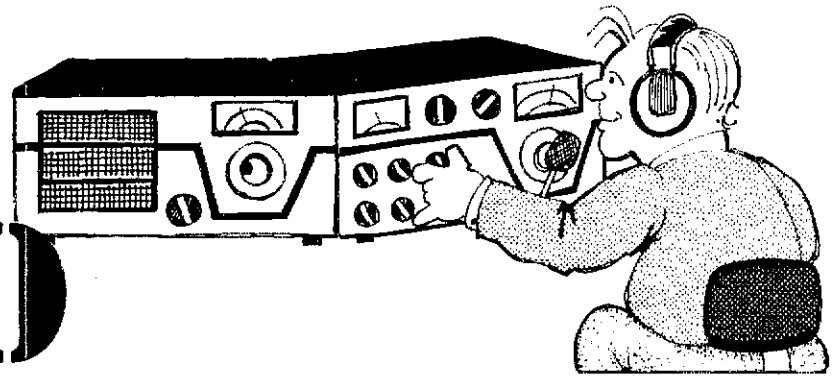

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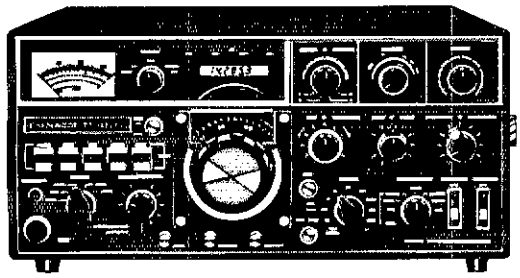

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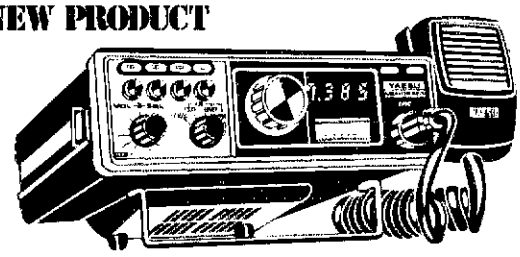

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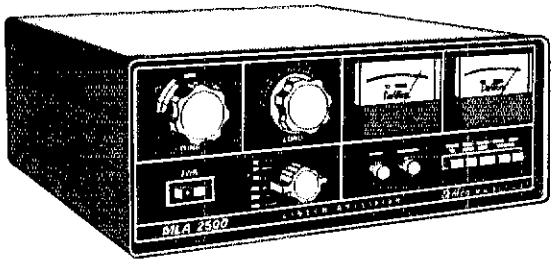

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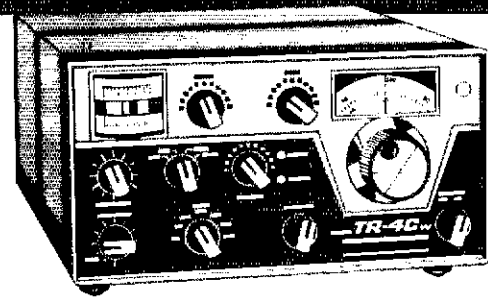

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HW-12 Transmitter	75
HP-23 AC Supply	49
HP-23B AC Supply	59
HW-202 2M FM Xcvr	159
SB-620 Spectrum Analyz	120
SB-102 Xcvr	369
SB-610 Scope	95
HA-20 6m Linear	125
SB-634 Console	175
SB-604 Spkr	29.50
SB-644 VFO	129.50
SB-230 Linear	359
SB-104 Transceiver	625

ICOM
IC-21 2M FM Xcvr	$299
IC-230 Demo	369
IC-22A 2M FM Xcvr	185
IC-30A 432 MC FM	269

Johnson
1-KW Matchbox/SWR	$195
Courier Linear	139
Ranger I Transmitter	85
Ranger II Transmitter	139
Valiant I Transmitter	129
Invader 2000 Xmitt	495

Kenwood
T-599 Transmitter	$289
R-599 Receiver	289
TS-520 Tranc	429
QR-666	259
QR-666 Receiver	239
TV 502 Transvertor	179

Knight
T-60 Transmitter	$ 39
r 100 Receiver	59
TR-108 Trancur 2M	79

Lafayette
HA-800 Receiver	$ 89
HP-350 Receiver	149
HE-45 Transceiver	49

Midland
509 H.T.	$149

Millen
92200 Transmatch	$149
90651-A Grid Dipper	95

National
NC-270 Receiver	$119
NC-300 Receiver	129
NCX-5 Transceiver	279
NCX-5MK11 Transcvr	299
NC-303 Receiver	199
AC-300 AC Supply	69
NCX-500 Transceiver	199
NCX-3 Transceiver	169
NC-190 Receiver	149
NC-105 Receiver	69

Regency
HR-2B 2M FM	$169
HR-220 FM 220 MC	185
AR-2 2M Amplifier	85
HR-25 2M FM	225
HR-6 Meter FM	189

SBE
SB-34 Transceiver	$249
SB-33 Transceiver	189
SB-144 2M FM	175
SBZ-1 P Linear	179

Standard
SRC-146 HT	$149
826 M Trnscvr	195
SRC-144	395
SRC-851T	250

Swan
700-CX Xcvr	$459
260 Cygnet	289
279 Cygnet	329
500 Xcvr	299
500 CX Xcvr	389
117-XC AC Supply	95
14X DC Module	39
MK II Linear	475
KK V1 6 Meter	550
250 C 6M Xcvr	349
FM 2X2M Xcvr	169
FM-1210A 2M	249
350 Transceiver	269
350C Xcvr	299
600R Receiver	339
600T Transmitter	399
410 VFO	79

Tempo
Tempo one Xcvr	$299
AC One Supply	79
FMH 2M H.T.	149
CL-220 Tincur 220 MC	179
FMH 2M w/Talkie	149

Ten Tec
PM-3 Trnsur	$ 49
Argonaut Xcvr	199
KR-40 Keyer	79
RX-10 Receiver	49
S-30 Signalizer	29
Triton II	479

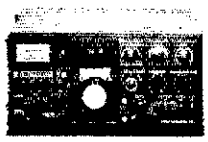
Yaesu
FT-401 Xcvr	$499
FRDX 400SD Rec	325
FT 2 Auto 2M FM	249
FT-101B Xcvr	549
FL-2100B Linear	295
FV-101 VFO	79
101E Xcvr Demo	695

Test Equipment Bargains
Boonton "Q" Meter	$295
Tektronix 5140	249
Tektronix 545A	950
5 3/54A Plug-in wide band preamp	75
Hickok 695 Generator	69
Bendix BC221 Freq Meter	39
Polarad Spectrum Analyzers A84T	1695
Hewlett Packard 400C	75
Precision E-400 Signal Generator	125
Electro Impulse Spectrum Analyzer	395
Dyna/Sciences Model 330 Digital Multimeter	195
Hewlett Packard 4905A Ultra Sonic Detector	550
Hewlett Packard 120A Scope	250
TS-323/UR Frequency Meter	175
Hewlett Packard 4910B Open Fault Locator	650
Bird Mod 43	80
General Radio 650A	150
Measurements Mod 80	195
Nems Clark 1400	495
Ballantine 300H	175
PACO Scope Mod-S-50	75
Singer FM-10C	3495
Simpson 260 V.O.M.	49.50

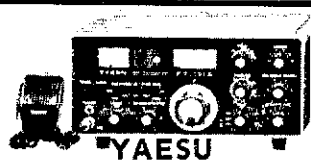
The inventory quantities of the items shown in this list vary. There may be one or several of any item. Some items may be sold by the time you read this ad. It is also likely that we have items in stock that are not listed, as a result of the many trades we make each day. We reserve the right to sell accessories and power supplies with matching transceivers and transmitters. Please allow up to 10 working days to ship your order so that we may check and service the gear you purchase.

KENWOOD TR-2200A
Regular $229, save $30; buy a Kenwood TR2200A for $229 (no trades) and take a $30 credit for another purchase.

MIDLAND 13-510
Regular $399, save $50; buy a Midland 13-510 for $399 (no trades) and take a $50 credit for another purchase.



KENWOOD
TS820 — $919.00
TS820S — $1098.00



YAESU
FT101E — $799.00
FT101EE — $759.00
FT101EX — $699.00

DRAKE
TR4CW — $799.00

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NEW LSI TECHNOLOGY

FREQUENCY COUNTER

TAKE ADVANTAGE OF THIS NEW STATE-OF-THE-ART COUNTER FEATURING THE MANY BENEFITS OF CUSTOM LSI CIRCUITRY. THIS NEW TECHNOLOGY APPROACH TO INSTRUMENTATION YIELDS ENHANCED PERFORMANCE, SMALLER PHYSICAL SIZE, DRASTICALLY REDUCED POWER CONSUMPTION [PORTABLE BATTERY OPERATION IS NOW PRACTICAL], DEPENDABILITY, EASY ASSEMBLY AND REVOLUTIONARY LOWER PRICING!

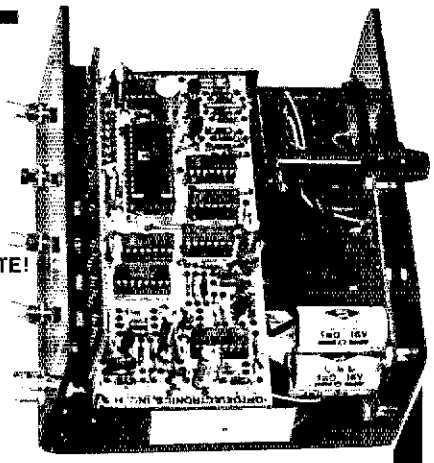
$119.95 COMPLETE!

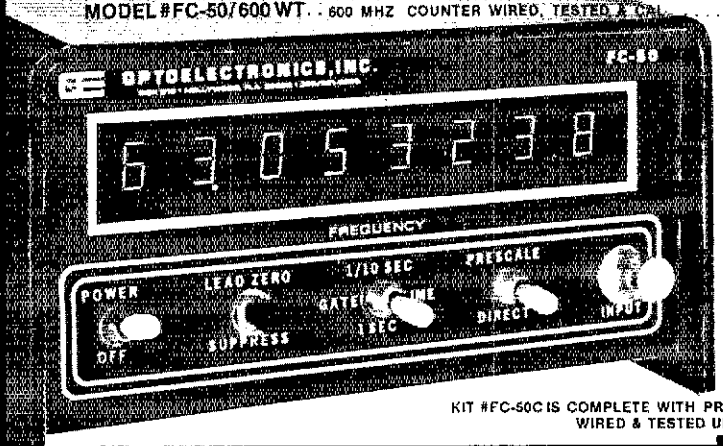
KIT #FC-50C . . . . . 60 MHZ COUNTER WITH CABINET & P.S. . . . . .

KIT #PSL-650 . . . . . 650 MHZ PRESCALER [NOT SHOWN] 29.95

MODEL #FC-50WT . . . . . 60 MHZ COUNTER WIRED, TESTED & CAL. 165.95

MODEL #FC-50/600 WT . . 600 MHZ COUNTER WIRED, TESTED & CAL. 199.95





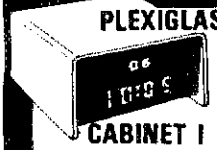
SIZE:
3" High
6" Wide
5½" Deep

FEATURES AND SPECIFICATIONS:

DISPLAY: 8 RED LED DIGITS .4" CHARACTER HEIGHT
GATE TIMES: 1 SECOND AND 1/10 SECOND
PRESCALER WILL FIT INSIDE COUNTER CABINET
RESOLUTION: 1 HZ AT 1 SECOND, 10 HZ AT 1/10 SECOND.
FREQUENCY RANGE: 10 HZ TO 60 MHZ. [65 MHZ TYPICAL].
SENSITIVITY: 10 MV RMS TO 50 MHZ, 20 MV RMS TO 60 MHZ TYP.
INPUT IMPEDANCE: 1 MEGOHM AND 20 PF.
[DIODE PROTECTED INPUT FOR OVER VOLTAGE PROTECTION.]
ACCURACY: ± 1 PPM [± .0001%]; AFTER CALIBRATION TYPICAL.
STABILITY: WITHIN 1 PPM PER HOUR AFTER WARM UP [.001% XTAL]
IC PACKAGE COUNT: 8 [ALL SOCKETED]
INTERNAL POWER SUPPLY: 5 V DC REGULATED.
INPUT POWER REQUIRED: 8-12 VDC OR 115 VAC AT 50/60 HZ.
POWER CONSUMPTION: 4 WATTS

KIT #FC-50C IS COMPLETE WITH PREDRILLED CHASSIS ALL HARDWARE AND STEP-BY-STEP INSTRUCTIONS. WIRED & TESTED UNITS ARE CALIBRATED AND GUARANTEED.

PLEXIGLAS CABINETS



Great for Clocks or any LED Digital project. Clear-Red Plexiglas Chassis serves as Bezel to increase contrast of digital displays

CABINET I
3"H,6¼"W,5½"D

CABINET II
2½"H,5"W,4"D

Black, White or Clear Cover
$6.50 ea.

RED OR GREY PLEXIGLAS FOR DIGITAL BEZELS
3"x6"x1/8" **95¢** ea. **4/$3**

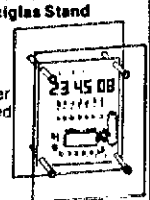
SEE THE WORKS Clock Kit Clear Plexiglas Stand

- 6 Big .4" digits
- 12 or 24 hr. time
- 3 set switches
- Plug transformer
- all parts included

Plexiglas is Pre-cut & drilled

Kit #850-4 CP

Size: 6"H,4½"W,3"D



$23.50 ea. 2/$45. Assembled **$29.95**

60 HZ.

XTAL TIME BASE
Will enable Digital Clock Kits or Clock-Calendar Kits to operate from 12V DC. 1"x2" PC Board
Power Req: 5-15V (2.5 MA. TYP.)
Easy 3 wire hookup
Accuracy: ± 2PPM
#TB-1 (Adjustable)
Complete Kit **$4.95**
Wir & Cal $9.95

SPECIAL PRICING!

PRIME - HIGH SPEED RAM

21L02-3 400 NS

LOW POWER - FACTORY FRESH

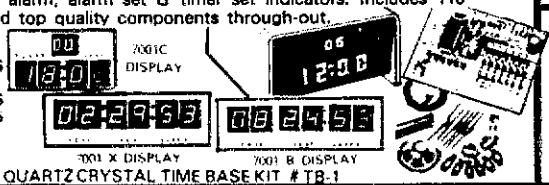
1-24	$1.75 ea.	100-199	$1.45 ea.
25-99	1.60 ea.	200-999	1.39 ea.
1000 AND OVER			**$1.29** ea.

6-DIGIT LED CLOCK CALENDAR KIT

DATE-TIME-SNOOZE ALARM & MORE... KIT 7001

FOR THE BUILDER THAT WANTS THE BEST. FEATURING 12 OR 24 HOUR TIME — 29-30-31 DAY CALENDAR. ALARM, SNOOZE AND AUX. TIMER CIRCUITS

Will alternate time (8 seconds) and date (2 seconds) or may be wired for time or date display only, with other functions on demand. Has built-in oscillator for battery back-up. A loud 24 hour alarm with a repeatable 10 minute snooze alarm, alarm set & timer set indicators. Includes 110 VAC/60Hz power pack with cord and top quality components through-out.



KIT - 7001B WITH 6 - .5" DIGITS $39.96
KIT - 7001C WITH 4 - .6" DIGITS & 2- .3" DIGITS FOR SECONDS $42.95
KIT - 7001X WITH 6 - .6" DIGITS $45.95

KITS ARE COMPLETE (LESS CABINET)
ALL 7001 KITS FIT CABINET I AND ACCEPT QUARTZ CRYSTAL TIME BASE KIT # TB-1

JUMBO DIGIT CLOCK

A complete Kit (less Cabinet) featuring: six .5" digits, MM5314 IC 12/24 Hr. time, PC Boards, Transformer, Line Cord, Switches and all Parts. Ideal Fit in Cabinet II

Kit #5314-5 **$19.95** **2/$38.**

JUMBO DIGIT CONVERSION KIT **$9.95** ea.

Convert small digit LED clock to large .5" displays. Kit includes 6 - LED's, Multiplex PC Board & Hook up info.

Kit #JD-1CC For Common Cathode
Kit #JD-1CA For Common Anode

PRINTED CIRCUIT BOARDS for CT-7001 Kits sold separately with assembly info. PC Boards are drilled Fiberglass, solder plated and screened with component layout.

Specify for 7001 **B, C or X - $7.95**

AUTO BURGLAR ALARM KIT

AN EASY TO ASSEMBLE AND EASY TO INSTALL ALARM PROVIDING MANY FEATURES NOT NORMALLY FOUND. KEYLESS ALARM HAS PROVISION FOR POS & GROUNDING SWITCHES OR SENSORS. WILL PULSE HORN RELAY AT 1HZ RATE OR DRIVE SIREN. KIT PROVIDES PROGRAMMABLE TIME DELAYS FOR EXIT, ENTRY & ALARM PERIOD. UNIT MOUNTS UNDER DASH - REMOTE SWITCH CAN BE MOUNTED WHERE DESIRED. CMOS RELIABILITY RESISTS FALSE ALARMS & PROVIDES FOR ULTRA DEPENDABLE ALARM. DO NOT BE FOOLED BY LOW PRICES! THIS IS A TOP QUALITY COMPLETE KIT WITH ALL PARTS INCLUDING DETAILED DRAWINGS AND INSTRUCTIONS OR AVAILABLE WIRED AND TESTED

KIT #ALR-1 $9.95
#ALR-1WT WIRED & TESTED $19.95

VARIABLE REGULATED 1 AMP POWER SUPPLY KIT

- VARIABLE FROM 4 to 14V
- SHORT CIRCUIT PROOF
- 723 IC REGULATOR
- 2N3055 PASS TRANSISTOR
- CURRENT LIMITING AT 1 Amp

KIT IS COMPLETE INCLUDING DRILLED & SOLDER PLATED FIBERGLASS PC BOARD AND ALL PARTS (Less TRANSFORMER) KIT #PS-01 $8.95

TRANSFORMER 24V CT will provide 300MA at 12V and 1 Amp at 5V. $3.50

MOBILE LED CLOCK

12/24 HR .4" DIGITS!

MODEL #2001 — 12 VOLT AC or DC POWERED

- 6 JUMBO .4" RED LED'S BEHIND RED FILTER LENS WITH CHROME RIM
- SET TIME FROM FRONT VIA HIDDEN SWITCHES • 12/24-Hr. TIME FORMAT
- STYLISH CHARCOAL GRAY CASE OF MOLDED HIGH TEMP. PLASTIC
- BRIDGE POWER INPUT CIRCUITRY — TWO WIRE NO POLARITY HOOK-UP
- OPTIONAL CONNECTION TO BLANK DISPLAY [Use When Key Off in Car, Etc.]
- TOP QUALITY PC BOARDS & COMPONENTS - INSTRUCTIONS.
- MOUNTING BRACKET INCLUDED

KIT #2001 COMPLETE KIT **$27.95** EA. 3 OR MORE **$25.95** ea.

115 VAC Power Pack #AC-1 **$2.50** EA.

ASSEMBLED UNITS WIRED & TESTED ORDER #2001 WT [LESS 9V. BATTERY] Wired for 12-Hr. Op. if not otherwise specified. **$37.95** EA 3 OR MORE **$35.95** ea.

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ORDERS TO USA & CANADA ADD 5% FOR SHIPPING, HANDLING & INSURANCE. ALL OTHERS ADD 10%. ADDITIONAL $1.00 CHARGE FOR ORDERS UNDER $15.00 - COD FEE $1.00. FLA. RES. ADD 4% STATE TAX.

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WB8SSR 13, WD8MTV 12, WD8IYO 11, WD8DDR 10, WBEMK 10, K8IOW 10, WB8SCI 9, W8DYF 8, WB8UNE 8, WB8TCZ 7, WD8CTX 6, K8JE 6, WB8LWY 6, N4VY/8 5, WB8UJL 4, WB8VYF 4, WB8WEK 4, N8AA 3, K8ONA 3, WB8BCG 3, WA8DBU 2, WB8AWM 1, WB8VZX 1.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Guy L. Olinger, K2AV — SEC: WB2VUK. Asst. SEC. K2AYQ. PAM's: N2YL WB2OEI. RM's: W2CS W2WSS K2OYG. Nets: NYPON 5 PM 3913, ESS (slow) 6 PM 3590, NYSPT & EN 6 PM 3925, NYS 7 & 10 PM 3677. Beginners wanting to check in: SSB listen then QNI; CW- try late NYS or ESS. All newcomers welcome. Many reports from SET. FB job folks. Also woes reported from Jan. storm, towers down, etc. Cheer up. As you read this it's spring & fix-it-time. Albany ARA running more license classes. See W2OOJ 52 St Clair, Delmar NY 12054. Also novice class at Linton Senior Hi. See WA2EOW 601 Penna. Av, Sch'dy NY 12303. Congrats to upgrades — General: WA2GJC WA2IUD WB2NFB WB2PZM WB2QMV WA2RNY WA2TLU. Tech: WA2MZJ WB2MZI WA2MZT WA2RNJ. Good luck to new officers CC New Rochelle WB2GMN K2LV WB2KAB WB2MOG N2SF W2YLE WB2ORK. Gray Berry now W4MGO alive & well on 14280 SSB 930A Sun's. W2SZ on nets manned by WB2ELF. Also WB2VVS manning Montrose VA station WB2ELA. W2IT now at new QTH in Yorktown. Hot tips for 2M are to be found on K2SHB's OVS report. Got list of antennas at WA2SPL. Starts with two-element quad on 3.5! WA2PAU has new freq meter. Tnx to WB2ZLB & HHRL for making me feel at home. Jan PSHR: W2CS N2YL WA2SPL. Traffic: WA2SPL 431, WB2KDC 277, N2JK 199, K2AV 157, N2YL 152, W2CS 135, WA2EOW 94, WA2YYM 90, W2IT 87, W2EFU 72, K2DN 64, W2BIW 60, WB2VJB 59, WA2CJY 44, WB2GOJ 38, N2EF 33, WB2ELA 30, WA20TC 24, W2SZ 23, WA2PAU 23, WA2MKQ 17, WB2KHK 12, WA2IQQ 10, WB2VVS 5, K2HNW 5, W200J 2.

NEW YORK CITY — LONG ISLAND: SCM, John Smale, K2IZ — SEC: K2HTX. PAM: WA2YEI. RM: WB2IDP. The following are traffic nets in and around the section:

Net	kHz	Time/Day	Mgr.
NLI*	3630	1900/2200 Dy	WB2IDP
NLI Phone*	3928	1730 Dy	WA2YEI
NLS*	3725	1745 Dy	WB2JAY
ESS	3590	1800 Dy	W2WSS
NYSTPEN	3925	1800 Dy	WA2RSP
Clear House	3925	1100 Dy	WB2AEK
Mic Farad	3925	1300 M-S	W1DFT

=Denotes section net, all times are local, please try to help by checking in, all the nets are in dire need of stations to handle traffic, in all parts of the section, please help out. Plan now for the 1978 Hudson Div. convention, the dates are Nov. 10-12 1978, the location is the Playboy club in McAtee, NJ at Great Gorge, additional info can be obtained from: Hank Wener, WB2ALW, 53 Sherrard st. East Hills, NY 11577. For those stations that wondered what happened to the SET, lets just say that after the ice storm and the two blizzards, everyone was kinda tired out to have a drill. For those of you in the Hunt. area who are wondering who was in the TELCO van honking "CQ" it was myself with WB2COO on the side, or the other way around, depending on who was driving, we were just part of the large crew who helped restore service. WA2YEI has been promoted to chief eng. at WQCC, and he now has his 1st tone. WA2ZHA is in the Hosp. and we wish him a speedy recovery. WA2JKG is now running an FT101E and has emergency power capabilities for 24 hr ops. W2DBQ reports that after 45 yrs using a Vibroplex he is now using a keyer with memory. WA2IVX is now N2KO. KCRA successfully completed their second novice class. Officers for Larkfield ARC are: W2DDZ WB2GUB WB2CIK, trustees; WA2TSF, secy; K2HTX, treas. This is the first time I've seen a club paper announce that the secy. was elected by a process known as "railroading." Congrats to WB2ABU who passed the Extra, WA2MDM and WB2KPL to General and WA2KIH on getting his Tech, also, K2QPF and WA2APJ passed their Extras. Welcome to new clubs: Polytech Inst. of NY ARC Farmingdale campus, Hunting HS ARC. Traffic: WB2KIH 894, WB2IDP 848, WA2JKG 108, WA2BMI 150, WB2HIQ 109, W2MLC 95, W2GKZ 76, K2GCE 66, WB2JAY 28, W2DBQ 21, WA2YEI 20, WA2KXE 13, K2UB 8, W2XY 8, K2JFE 4.

NORTHERN NEW JERSEY: SCM, Bob Neukomm, WA2MVQ —

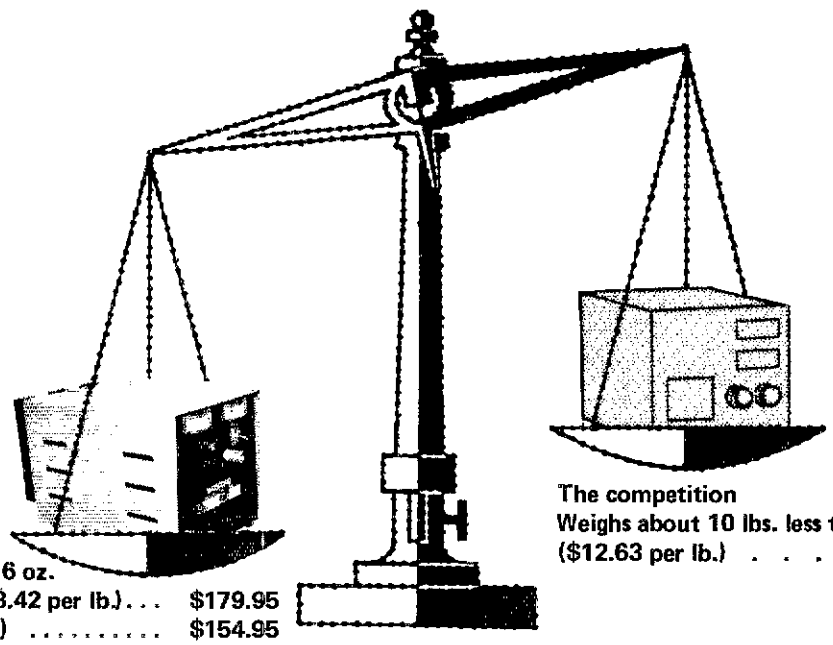
Net	Mgr.	Freq.	Time/Days	Sess.	QNI	QSP
NJN	WA2GAX	3695	7:00 P.M. Dy	31	405	153
NJN	WA2GAX	3695	10:00 P.M. Dy	31	405	153
NJSN	N2MW	3730	8:15 PM Dy			
NJPN	WB2LCC	3950	6:00 P.M. Dy	31	527	249
NJPN	WB2LCC	3950	9:00 A.M. Su	4	99	28
NJRTTY	W2PSU	147.51	7:00 P.M. Dy			
PVTN	WA2OPY	145.7	8:00 P.M. Dy			

SEC: WB2VUF. PAM's: WB2LCC and WA2OPY (VHF). RMs: WA2GAX N2MW and W2PSU. The following are new Advanced licensees: WB2LXS WB2MAE and WA2WXM. To General: WB2KPU WB2LNQ WA2LNM and to Technician: WB2KPS WB2POD and WB2HVF. All Novices and Techs that want to increase their speed and knowledge of traffic handling check into 3730 daily or 21.150 Sun. 8 PM or Fri. 830 PM. The fast frequency mentioned is the BARA Net. K2ZO gave a very interesting talk on RTTY at the January BARA meeting and followed it up at the February meeting. Mayor Sondra Greenberg of Englewood, NJ has declared June 18-24, 1978 as the "Englewood Amateur Radio Association" week. Look for "the gang" on Field Day. Got a very nice letter from N4UH, formerly W2JKA then W2MB. Hank says he can be heard on a Rhombic from his "spread" and says he misses all the traffickers and contesters from NNJ. WR2AHD's Mar. meeting will have the

Pound for pound. there is no match for the

Vhf engineering

PS-25M Power Supply



PS-25M — 21 lb. 6 oz.
Wired & tested ($8.42 per lb.)... $179.95
Kit ($7.25 per lb.) $154.95

The competition
Weighs about 10 lbs. less than the PS-25M
($12.63 per lb.) $139.00

25 Amp regulated power supply with fold back current limiting, over voltage and transient protection. Also, output voltage and current meters.

You might find a cheaper power supply, but you can't find one as well built with top quality components. Other power supplies with lighter weight transformers and components are no match for the VHF Engineering PS-25M. It is rated at 20 amps continuous duty (not 10 amps). This power means extra dependability and versatility when you need it.

Compare VHF Engineering's quality and specifications.

FEATURES

- Over-voltage protection crowbar.
- Electrostatic shield for added transient surge protection.
- A foldback output limiter operates for loads outside of the operating range.
- Isolation from ground. The circuit is isolated from the case and ground.
- 115/220 volt input — 50/60 cycle.
- Units are factory wired for 110 volt AC, 50/60 cycle power. A simple jumper will reconfigure the input for 220 volt AC, 50/60 cycles.
- Temperature range-operating 0 to +55 C.
- Black anodized aluminum finish.

SPECIFICATIONS

Voltage Output:
adjustable between 10-15V
Load Regulation:
2% from no load to 20 amps
Current Output:
25 amps intermittent
(50% duty cycle)
20 amps continuous
Ripple:
50 mV at 20 amps
Weight:
25 pounds
Size:
12¼" x 6¾" x 7½"

arma
amateur radio manufacturers association

Vhf engineering

VISA

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amateur radio manufacturer's association

This symbol is important to amateur radio... present and future. Watch for it.

ARMA STATEMENT OF PURPOSE

The Radio Amateur Manufacturers Association is an organization comprised of individuals and companies whose products are intended to be sold to amateur radio operators throughout the world.

As a representative group of importers exporters, manufacturers and dealers in amateur equipment, ARMA is the official spokesman for this highly specialized industry, and has a vested interest in the fostering of continued growth of the radio amateur service, worldwide.

To further these goals, ARMA disseminates information from its headquarters on various proposals and actions that may affect its members, represents the industry in meetings, and on various committees to develop a favorable public attitude toward amateur radio, directs and advises the industry as to its best interests, and interprets industry wide technical standards as required. ARMA supports amateur radio worldwide through club, government and industry liasons.

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73 MAGAZINE

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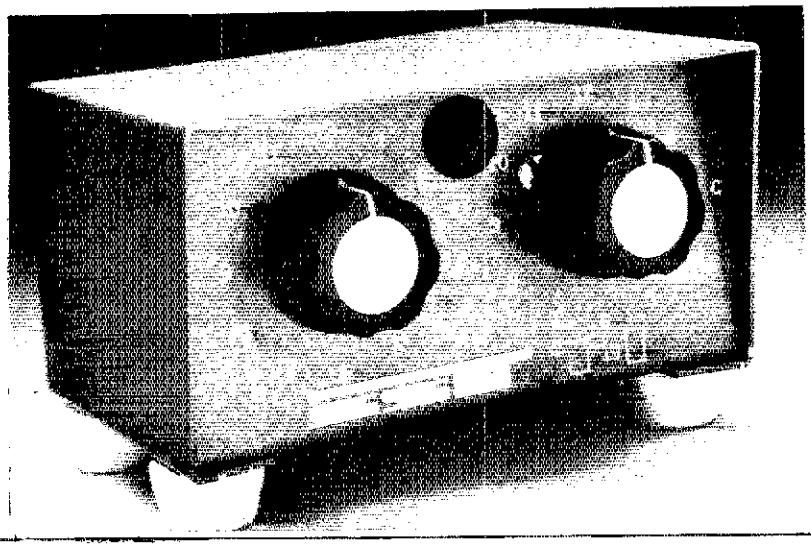
Comments and suggestions are invited from companies and individuals concerned with the present and future status of amateur radio. Such correspondence and requests for membership information should be referred to: Bernard Tower, Sec. Yaesu Electronics Corporation, 15954 Downey Avenue, Suite #19, Paramount, CA 90723

SST T-1 RANDOM WIRE ANTENNA TUNER



All band operation (160-10 meters) with any random length of wire. 200 watt **output** power capability—will work with virtually any transceiver. Ideal for portable or home operation. Great for apartments and hotel rooms—simply run a wire inside, out a window, or anyplace available. Toroid inductor for small size: 4-1/4" X 2-3/8" X 3." Built-in neon tune-up indicator. SO-239 connector. Attractive bronze finished enclosure.

only $29.95

THE ORIGINAL Random Wire Antenna Tuner. . . in use by amateurs for 6 years.

sst t-2 ULTRA TUNER

Tunes out SWR on any coax fed antenna as well as random wires. Works great on all bands (160-10 meters) with any transceiver running up to 200 watts power output.
Increases usable bandwidth of any antenna. Tunes out SWR on mobile whips from inside your car.
Uses toroid inductor and specially made capacitors for small size: 5¼" x 2¼" x 2½." Rugged, yet compact. Attractive bronze finished enclosure. SO-239 coax connectors are used for transmitter input and coax fed antennas. Convenient binding posts are provided for random wire and ground connections.

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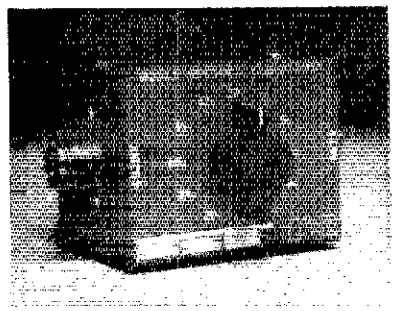
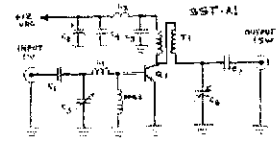
sst t-3 IMPEDANCE TRANSFORMER only $19.95



Matches 52 ohm coax to the lower impedance of a mobile whip or vertical. 12 position switch with taps spread between 3 and 52 ohms. Broadband from 1-30 MHz. Will work with virtually any transceiver—300 wattoutput power capability. SO-239 connectors. Toroid inductor for small size: 2-3/4" X 2" X 2-1/4." Attractive bronze finish.

GUARANTEE

All SST products are guaranteed for 1 year. In addition, they may be returned within 10 days for a full refund (less shipping) if you are not satisfied for any reason. Please add $2 for shipping and handling. Calif. residents, please add sales tax. COD orders OK by phone.



SST A-1 VHF AMPLIFIER KIT

1 watt input gives you 15 watts output across the entire 2 meter band without re-tuning. This easy to build kit (approx. 1/2 hr. assembly) includes everything you need for a complete amplifier. All top quality components. Compatible with all 1-3 watt 2 meter transceivers.
Kit includes:

- Etched & drilled G-10 epoxy solder plated board.
- Heat sink & mounting hardware. All components — including pre-wound coils.
- Top quality TRW RF power transistor.
- Complete assembly instructions with details on a carrier operated T/R switch.

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$49.95 wired & tested

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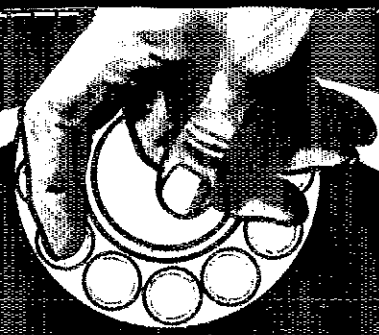
Director, Vice Director and ACM at their meeting. WA2JOC editor of QRP Amateur Radio International gave a talk of the 17th for the Garden State ARC. Welcome to club affiliate membership of the Hilltop Seekers ARC of Bridgewater, NJ. Special SET on Jan. 28-29 for NJPN was QNI 209, QTC 180, QSP 163, Total 611. Good activity this year with a nice turnout of emergency power. Good job by the SEC and a good turnout of traffickers. W2SQ is back at Cornell University. N2SU has new dipoles on 80 and 40. He worked ST2SA as highlight of DX on 20 CW. He also passed Second Class Commercial exam. The Morris County Traffic and Emergency Net meets every Sun. at 430 PM and 730 PM on 146.295/895 — all invited to join. Satellite receiver in Somerville operational for W2AJC. You can now pre-register for the HARC Convention at the Playboy Club now. Pre-registration is $3.50 with a check to Nancy Iscaro, P.O. Box 274, Bronx, NY 10463. A business size self addressed stamped envelope must be enclosed. Become a "big brother" to a new Novice and get him or her on the air with an assist on their antenna and other problems. Some are licensed but still await that "first" QSO. Traffic: W2RQ 366, W2WHB 281, N2NS 133, WA2EPK 102, N2CR 97, WA2NPP 78, WB2MSO 68, WA2MVQ 68, N2GJ 60, K2OP 45, W2LTP 42, K2SE 35, W2SWE 33, W2ZEP 30, N2SU 29, WA2IXB 25, WB2JVE 25, N2TM 24, WB2ELF 23, WA2WIW 20, K2ZFI 20, W2UH 19, K2AM 13, W2QNL 13, W2CC 9, WB2KAK 6, W2SQ 6, W2XD 5.

MIDWEST DIVISION

IOWA: SCM, Max R. Otto, WØLFF — SEC: WØIYW. VHF PAM: KØLKH. RM: KØEVH. HF PAM: WBØAVW. Repeater changes: Akron 6.31/91, Buckingham 7.72/12, Keokuk 7.90/30, Maquoketa 7.66/06, Solon 7.81/21 and Monona is 447.50-442.50. Congrats to WBØJFF on receiving Ham Of the Year award from Northeast Iowa Radio Amateur Assn. SEC WØIYW says Iowa had a good SET. WAØEFN gave his '77 callbook to other OOs. WBØJEU is now NØJE. New gear dept: WBØQHE has Yaesu 227R, WBØGQZ has FT221R, WBØYXR has TR7400A, WØFUW WØLJ and WBØOBL all have new ICOM 22s. KØZQ has new TH3 Jr. and a TR7500. KØLKH is trustee for Army Reserve WDØAYD. Congrats to WBØZPY for General and WBØPJU for Advanced ticket. WAØSSU is NØSM. WBØZXU WAØDXZ and WBØPJU having good luck with Oscar. Iowa again 100 percent on NTS-TEN because of WØSS WAØCZA KØEVH WBØPYD WØYLS NØSM N5YX WBØYRH WBØNSS KØJD and WBØRWN. Spring is here. Net, Freq., Time/Days, QNI, QTC, Sess., Mgr.: Iowa 75 Meter, 3970, 1830 M-S, 1790, 136, 26, KØIVO; Iowa 75 Meter, 3970, 2330 M-S, 1103, 58, 26, KØRN; Iowa Code (ICN), 3713, 0045 T-T-S, 47, 12, 13, WBØYRH, WBØNRN; Tall Corn (TLCN), 3560, 0030/0400 Dy, 474, 182, 62, WØYLS. Traffic: WAØAUX 667, N5YX/Ø 336, KØEVH 276, WØSS 184, WØYLS 181, NØSM 82, WAØCZA 58, WBØNSS 29, KØGP 24, WØLFF 14, WBØAVW 10, WDØFCI 7, WØBW 6, KØLKH 3, WØJAQ 2.

KANSAS: SCM, Robert Summers, KØBXF — Jayhawk ARS, KC area, WØAYL, pres.; WAØWZB, Vice Pres.; KØVQC, secy.; KØBXF, treas.; WØIXM and WBØIBZ, board. CKRC, Salina: WAØYML, pres. KØVGB, Vice pres.; WDØBSD, secy-treas.; WDØBNC, act. mgr.; WAØYMK, act. asst. for hamfest chmn.; WAØGNC, hamfest chmn. Douglas Co. ARC: WBØRPF, pres.; WBØZBR, vice-pres.; KØMOZ, secy.; WDØBNZ, treas.; WBØLKA, act.; WØAFQ, program; WDØAQH newsletter editor: WBØYPW, info. officer; WØRFF, training; WAØFEE, cd liaision officer; WBØVTK membership. The Kans. City DX club meets the last Tue. of the month at the TWA training center room, Kansas City, MO at 7:30 PM. If interested contact WØYR, pres.; WØJU, vice pres. or WBØEZQ secy/treas. Ex-WØHAW now AA6EE in San Diego. QKS ended 1977 with grand total of 5820 QNI and 2445 QTC. Why not join us on 3610 kHz daily at 7 and 10 PM. Net reports will be shown next month. Traffic: (Jan.) WBØOBH 292, WØOYH 273, WØKL 193, WØAM 178, WBØVEZ 146, KØEPC 132, KØEZ 125, WØHI 121, WØFT 118, KØBXF 94, WØCHJ 88, WØIX 78, WØFIR 75, WBØVVA 73, WAØLBB 71, WDØEPX 39, WBØHGG 34, WBØLUN 32, WBØSGI 31, WØRBO 25, WØPB 24, WBØBIY 23, WØBLI 19, WAØKVP 16, WØERQ 15, WØFDJ 15, NØIN 14, WBØKDE 11, WBØSZS 11, WBØZVA 6, WAØOWH 6, WØNYG 2, WBØCUY 2. (Dec.) WBØOBH 329.

MISSOURI: SCM, L. G. Wilson, KØRWL — Asst. SCM, WØOTF. SEC: WBØFKY. Officers for the HARC are WBØBMB, pres.; WBØLFY, vice-pres.; WBØZNY, secy.; WBØJXZ, treas. The PHD Hamfest will be held in Kansas City Apr. 22 and 23. Plan on attending. WØRR and the HARC are holding Red Cross Emergency nets each Mon. evening, 0200Z on 28.600 MHz. The PHD ARC once again holding Novice Classes. KØLCB again functional as OVS after a long absence. WAØJOG new EC. The WECOMO ARC participated in the SET in cooperation with the Lee's Summit Police Department. Net, QNI, QTC: MEOW, 339, 190; MSN, 94, 35; NEMOE 136, 39; MON, 279, 215; MON2, 120, 57; HBN, 327, 26; PHD, 39, 7; MOSSBN, 991, 160. SET messages received from KØONK WØOUD WBØLRX WØRR WBØNBY YE4UL WBØYKG WAØDKS WBØONM WBØQKZ and WBØMII. Our sympathy to the families and friends of WBØLKG and WØAAA who joined the ranks of Silent Keys. WRØAQL, the Ozark ARS has been off the air due to a power supply failure. Hopefully it will be functional again soon. WBØMTU has a nice article in the Aurora Advertiser concerning QSOs with an American Field Services student from Costa Rica during the holiday season. WBØVXV sporting a new Collins rig. WBØOMC and WBØPCG are sporting new Morse keyboards. Congrats to WØGCL upon celebrating his 72nd birthday. Congrats also to new licensees, WDØs FFS FFZ FGB FGP FGW FHM through FHO, FHS FHX FIG FIK FIN FIU FIV FJB through FJD, FJS FJX FKD FKM FKR FKV FLJ FLQ FLR FLT FMI through FMK, FMM FMT FNE through FNG, FNJ FNP through FNT, FOA FOC, FOH through FOJ, FOL FOQ FOT FPA, FPC through FPF, FPJ FPK FPM FPO FPT FPY FQB FVF FVM FWA FWL FWN FWP FWT



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• 5 MHz Band Coverage - 1000 Channels (instead of the usual 2MHz to 4MHz-400 to 800 Channels) • 4 CHANNEL RAM IC MEMORY WITH SCANNING • MULTIPLE FREQUENCY OFFSETS • ELECTRONIC AUTO TUNING - TRANSMIT AND RECEIVE • INTERNAL MULTIPURPOSE TONE OSCILLATOR • RIT • DISCRIMINATOR METER - 15 Watts Output - Unequaled Receiver Sensitivity and Selectivity - 15 POLE FILTER, MONOLITHIC CRYSTAL FILTER AND AUTOMATIC TUNED RECEIVER FRONT END, COMPARE! • Superb Engineering and Superior Commercial Avionics Grade Quality and Construction Second to None at ANY PRICE.

INTRODUCTORY PRICE

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Regulated AC/PS Model FMPS-4R . . . $39.95

FMMC-1* Microphone with Built-in Touch Tone Pad.

WHY BUY LESS?

THE FMMC-1 HAS IT ALL!

- New! Auto key up
- Snap Action Keyboard
- Adj. level and tone balance
- Use with any transceiver
- Only 3⅝" x 2"

$49.95

- **FREQUENCY RANGE**: Receive and Transmit: 144.00 to 148.995 MHz. 5Khz steps (1000 channels) INCLUDING NEW BAND 144.5-145.5MHz + MARS-CAP and MULTIPLE OFFSET.*
- **LED DIGITAL READOUT.**
- **4 CHANNEL RAM SCANNER WITH IC MEMORY**: Program any 4 frequencies and reprogram at any time using the front panel controls—search for occupied (closed) channel or vacant (open) channels. Internal Ni-Cad included to retain memory (no diode matrix to wire or change).
- **MULTIPLE FREQUENCY OFFSETS**: Three positions A,B,C, provided for installation of optional crystals: EXAMPLE - 1 MHz offset. Duplex Frequency Offset Built in - 600 Khz PLUS or MINUS 5 KHz steps, plus simplex, any frequency.
- **INTERNAL MULTIPURPOSE TONE OSCILLATOR BUILT IN**: 1750Hz tone burst for "whistle on operation" and sub-audible tone operation possible by simply adding a capacitor across the terminals provided. Internal 2 position switch for automatic and manual operation, tone burst or sub audible tone PL - adjustable 60-203Hz (100 Hz provided).
- **AIRCRAFT TYPE FREQUENCY SELECTOR**: Large and small coaxially mounted knobs select 100KHz and 10KHz steps respectively. Switches click-stopped with a home position facilitate frequency changing without need to view LED's while driving and provides the sightless amateur with full Braille dial as standard equipment.
- **FULL AUTOMATIC TUNING OF RECEIVER FRONT END AND TRANSMITTER CIRCUITS**. DC output of PLL fed to varactor diodes in all front end RF tuned circuits provides full sensitivity and optimum intermodulation rejection over the entire band. APC (AUTO POWER CONTROL) - Keeps RF output constant from band edge to band edge. NO OTHER AMATEUR UNIT AT ANY PRICE has these features which are found in only the most sophisticated and expensive aircraft and commercial transceivers.
- **TRUE FM**: Not phase modulation - for superb emphasized hi-fi audio quality second to none.
- **RIT CONTROL**: Used to improve clarity when contacting stations with off frequency carrier.
- **MONITOR LAMPS**: 2 LED's on front panel indicate (1) incoming signal-channel busy, and (2) Transmit.
- **FULLY REGULATED INTEGRAL POWER SUPPLY**: Operating voltage for all 9v circuits independently regulated. Massive Commercial Hash Filter.
- **MODULAR COMMERCIAL GRADE CONSTRUCTION**: 6 Unitized modules eliminate stray coupling and facilitate ease of maintenance.
- **ACCESSORY SOCKET**: Fully wired for touch tone, phone patch, and other accessories. Internal switch connects receiver output to internal speaker when connector is not in use.
- **MULTI-PURPOSE METER**: Triple Function Meter Provides Discriminator Meter, "S" Reading on receive and Power Out on Transmit.
- **RECEIVE**: Better than .25uv sensitivity, 15 POLE FILTER as well as monolithic crystal filter and AUTOMATIC TUNED LC circuits provide superior skirt selectivity - COMPARE!
- **HIGH/LOW POWER OUTPUT**: 15 watts and 1 watt, switch selected. Low power may be adjusted anywhere between 1 and 15 watts. Fully protected-short or open SWR.
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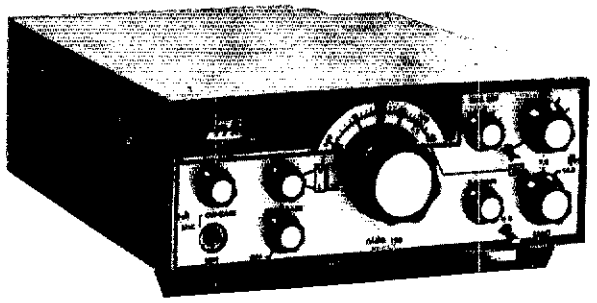

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- **250 Watts**
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- Dual Speed VFO Dial-Vernier
- Semi-Break In CW with Sidetone

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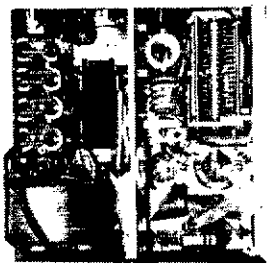
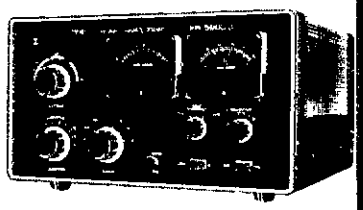




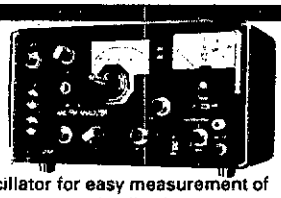
SPECIFICATIONS:

- Full band coverage 160-10 meters including MARS.
- 2000 watts P.E.P. SSB input. 1000 watts input continuous duty, CW, RTTY & SSTV.
- Two Eimac 3-500Z conservatively rated finals.
- All major HV and other circuit components mounted on single G-10 glass plug in board. Have a service problem? (Very unlikely) Just unplug board and send to us.
- Heavy duty commercial grade quality and construction second to no other unit at any price!
- Weight: 90 lbs. Size: 9½" (h) x 16" (w) x 15¾" (d)

NEW! SIGMA MODEL AF250L DEVIATION/MODULATION METER

Introductory Price

$169



FEATURES: Extremely stable local oscillator for easy measurement of HF, VHF, and UHF bands employing negative feedback, to insure extremely high stability ● Easy to read, accurate linear scale ● Direct off the air signal measurement capability. **OPTIONAL 12v DC Power Kit - $12.** ***FULLY CERTIFIABLE FOR COMMERCIAL USE.***

SPECIFICATIONS: Frequency: 1.8MHZ-520MHZ/3 range select (A,B,C,EXT), A range: 26.5 MHZ-40MHZ, B range: 48MHZ-60MHZ, C range: 140MHZ-156MHZ (generous overranges). EXT. range: 1.8 MHZ-520MHZ (Need Signal Generator) ● Input level: (1) Through type input level: 1W-200W (RF Input Terminal), (2) Direct input level: More than 80db/50ohm impedance ● Amplitude modulation: 0-100% ● Frequency division: 0-20KHZ ● Accuracy: +/-3% of full scale ● Intermediate frequency: 10.7MHZ ● RF Attenuator: 0-60db variable ● Audio Signal oscillator: (1) Audio Frequency—1,000HZ (1 KHZ), (2) Output level—More than 1V RMS (variable) ● Power Source: AC117 ● Dimensions: H-5¼" (140mm), W-10¼" (260mm), D-7¼" (184mm) ● Wt.: 7lbs.

SUPERB NEW WANZER Z-4 TRANSMATCH

- Roller Inductor
- Switchable Double-L or Pi
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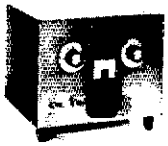
- Commercial Grade Construction
- 160-10 Meters
- 3KW

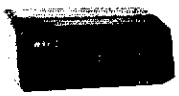


Introductory Price

$129

DSI

Fully Certifiable for commercial use



COMPARE!

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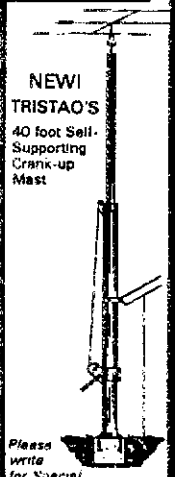
factory assembled not a kit

600 MHZ FREQUENCY COUNTER WITH CRYSTAL OVEN TIMEBASE

- Sensitive—No Direct RF Connection Required
- Accurate—.5PPM ● Selectable Resolution

NEW! TRISTAO'S 40 foot Self-Supporting Crank-up Mast



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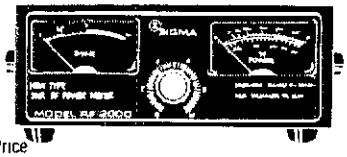
SIGMA RF-2000 SWR & POWER METER



Cal PWR Scales 200W-2000W Freq Range 35-150 MHz. Please do not confuse the RF2000 with similar appearing lower priced units. RF2000 is an individually calibrated professional quality instrument. Unequaled at many times the price. Size 7" (w) x 2 1/3" (d).

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SHIPPING ANYWHERE U.S. - $1

GO PRIVATE! on 2 meters with the FMTD-1*

SPECIAL INTRODUCTORY PRICE $75.00

Touch tone pad (encoder) actuated Quiets your receiver until other station sends private 3 digit code, selected from front panel. 999 Channels. Receiver can be muted or opened manually or remotely with a touch tone pad. Bright led's indicate muting and reset. State of the art digital circuitry. Works with the KDK FM2015R or any 2-meter rig. 5 pin din plug supplied. Size 5½"D x 6½"W x 1"H Wt. 12 oz.

FM2015R Accessories

FMSS	SUPER SCANNER 1000 Total Scanning Capability $99
FMPS-4R	Regulated AC/PS $39.95
FMMC-1*	Microphone with Built-in Touch Tone Pad..... $49.95
FMTD-1*	Private Call Decoder for use with and Programmed by any Touch Tone Pad..... $75
MARS-CAP	and Multiple Offset Kit* - Any Frequency, Any Split, No Crystals $5
FMAT-1	½ Wave Portable Antenna for Hotel, Motel or Apartment $7.95
	Extra DC Cord & Plug $4.00
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KDK SPECIAL SALE FM144 Accessories

FMOF-1	Offset Option Kit - 2 Extra Positions, Crystals Required ..$5
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MARS-CAP	Option Kit - Any Frequency Any Split $12

NEW!! ADD ½ CHANS (TOTAL 10) TO SRC-146A

- Simple 10 min. installation
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- Completely WIRED & TESTED
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New Standard 2 Meter FM Transceivers Model SRC 146A

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NEW!!! Touch Tone pad completely wired and ready to plug in - $59.95

Our Price **$289**

COMPARE!

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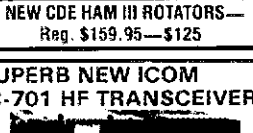

Please write for detailed information

FWV FWW FWX FXH, FXW through FXZ, FYC FYY FYZ FZA FZB FZG, FZJ through FZN and FZP. Traffic: (Jan.) KØONK 646, WØHH 354, WØBMA 208, WBØSND 205, WBØVDO 203, WØOTF 181, WØBV 94, WØOUD 84, KØSI 68, WBØSSB 66, KØSSN 65, WBØLFY 50, KØVBU 41, KØRWL 25, WBØNPC 17, NØGW 15, WAØJOG 12, WØRNG 12, WØEPI 6, WØQAU 3, KØLCB 2. (Dec.) WØQAU 3.

NEBRASKA: SCM, Ed O'Donnell, WBØGWR — WØJHT, a Silent key. Tri-County ARC newly affiliated, WAØSOP, pres. North Platte ARC reactivated, WØPKT, pres. A successful SET in Jan. coordinated by WAØASM state EC. Nets: 160 Wx Net, QNI 635, QTC 3; Cornhusker Net, QNI 1550, QTC 89; Mid-Nebr. ARES 2M Net, QNI 320, QTC 16; Morning Phone Net, QNI 1167, QTC 43; Nebr. ARES 75 M Net, QNI 237, QTC 5; Nebr. Storm Net, QNI 1254, QTC 42; Pawnee ARC 2 M Net, QNI 127, QTC 13; Platte Valley 2 M Net, QNI 41, QTC 0. PM Net QNI 375, QTC 48; QCWA Net, QNI 65, QTC 0; Sandhills Wx Net, QNI 439, QTC 5; Western Nebr. Net, QNI 447, QTC 3. Traffic: WØFQB 122, WØVEA 101, KØBRS 42, WAØMB 42, WØEUT 34, WAØCBJ 31, KØFJT 30, KØTD 27, WAØBOK 24, WAØPCC 22, WØVYX 18, WØYFR 13, WØGKK 12, WAØOQX 11, WBØGWR 10, WAØDXY 9, WAØQEX 9, WØHTA 8, KØODF 8, WØRNR 8, WAØLOY 4, WØNIK 4, WBØSYV 4, WAØGHZ 3, KØHNT 3, WBØROG 3, WAØEEI 2, WBØGMQ 2, WØRJA 2, WDØAAI 1, WØCVX 1, WBØLLL 1, WBØMKD 1, WBØQGE 1.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, John McNassor, WIGVT — SEC: W1XX. RM: KIEIR. PAM: KIEIC. VHF PAM: WA1ELA.

Net	Freq.	Time/Days	Sess.	QNI	QTC
CN	3640	1900/2200 Dy	57	444	322
CPN	3965	1800 M-S/1000 Su	41	785	455
VHF-2	28/88	2130 Dy	33	442	113
CORN	147.75/.15	RTTY 24 Hrs	1	5	259

Hi QTC: VHF-2 W1TR. SEC W1XX extends thanks to all Nets, Members, NCS & Repeater Clubs for cooperation & activity during the storms that replace the '78 SET — his plans, tho ready, were not needed — we had the real thing instead! Director WIHHR has visited many clubs bringing "Current Events in Amateur Radio." Keep him informed of your activities. Western Conn. Traffic & Emergency Net (WESCON) Mon./Fri. on Naugatuck WR1ADM 147.78/.18 at 0130. — Check-ins welcome! Danbury CARA Conn. QSO Party very successful. — WA1SQB Grand State winner. — County winners: WIJTD WA1ZVS WIEJI & KIMUJ. — logs from 30 sections. With deep regret we add the call of W1LLH to the list of Silent Keys. The '78 SET was superseded by Storm Ken and followed by Storm Larry both of which proved the need for continued SET operation. — All nets active as storms hit and continued with many extra sessions thru the duration. — Those who assisted in making this operation a success have contributed much to the good of Amateur Radio. Congratulations to: WBIDHZ WBICWT WBIELI WBIETN & WAIWIP for Advanced Class; WBIEUL & WBIFPZ for General Class! The CW bands will be clear the first of the month — bcnu there! Traffic: K1GF 249, WA1VVA 245, W1TR 228, WA1LOU 216, WA1TPF 193, K1DFS 174, K1XA 172, WB1CPF 170, WA1ZVS 155, K1ZZ 128, WA1HYN 98, W1BDN 57, W1GVT 56, W1XX 56, WB1AIU 55, W1AW 53, W1KV 39, WB1ASH 25, W1BDI 22, WA1UXA 22, W1XZ 22, K1SRF 19, K1UR 18, W1KAM 16, WA1RXL 16, W1HHR 14, WA1RUR 13, W1JA 12, K1OQG 7, W1CUH 6, W1GSO 6, W1QV 5, WA1VUR 5, K1DII 4, W1VS 4.

EASTERN MASSACHUSETTS: SCM, Frank Baker, W1ALP — Asst. SCM: WA1OWQ. SEC: W1AOG. WA1IDA endorsed as EC for Newton. All Appointments Require Monthly Reports. How about it, fellows! EM2MN had 111 QTCs, 36 QNCs. WA1YMN new ORS. K1RB is ex-W1IAU, K1BU is ex-K1MTH. New clubs: WB1FUN, Avco ARA inc. WB1FUD Belmont Hill ARS. Pilgrim AWC Taunton, Myron Hayward is secy-treas. WD4JZO is ex-WA1GRS, N1AO has a new pacer. WA1LMX moved to NH. N1RC is ex-WA1RLL. WA1SWX moving to Wareham. WB1FFB son of W1SHX. South Shore ARC had Kris Johnson's slides of trip to Sweden. NEEPN had 114 QNI, 37 QTC. Central Jr. High ARC, WB1DNH now affiliated with ARRL. WB1CGM is pres. Billerica ARS also affiliated with ARRL. N1RR is pres. I received many SET reports. W1AOG writes from FL WA1IDA W1MJ WA1WIS provided C.D & Red Cross with communications in the recent snowstorm. New Novice Net MMRA on 28.150 Sun. at 9 PM. WA1WPN has Tribander. WA1ZCG new tower. TS820S & KWM 2A. K1LWD has CB SSB rcvr on 10. WA1UZH has TS520. WB1AJY has SB614. Officers of Massasoit RA: K1PJ pres., WA1EZB, vice-pres., WA1IVN, secy.; W1ECK, treas. W1AN writes from FL. W1BCN bought a place in Alpine, TX. W1NF 2 weeks in FL. W1HGY moving to Hyannis area. K1KYB out in San Diego for a visit. WA1TBY made BPL. W1PEX in the hospital. K1PNB started a Shop/Swap Net, to help Novices in obtaining gear. WA1RVZ going over to Germany, back in the summer. WA1ZXB has phone patch, his dad taking Novice course. WA1ZGX new SS rig. WB1DMP new General. W1NF visited an ex-Beverly ham, WB4CZD. WA1PJJ is 2-meter asst. EC and WA1UQE for low band by W1XA, EC. WA1FNM back on the air. WB1BUP has new HW-8. Danvers AREC on during snow storm. W1MJ has KIM-1 micro-computer working as keyer. WA1BLG is the Public Service Comm. Chmn. for the MMRA. EC WA1ZLO had his group on standby during storm. WA1FBH on 6. W1CFU has Colpitts for 190 kHz. K1EMU has 15 watts on 40 cw. W1AYA has long wire up. The Low Freq. 160-190 kHz gang meet on 3907 kHz on Sat. morn before & after being on the LO Freq. W1OJ & W1ATO are NCS. W1DIU is NCS for the SOWP N.E. CW Net on Sat. at 10 AM on 7040 kHz. K1ES has Triton 4 Digital. WA1YOJ has TS-502. EASN had 41 QNI, 7 QTC. EMRI had 523 QNI, 376 QTC. NENN had 163 QNI, 79 QTC. WA1AXF is a Silent Key. Traffic: (Jan.) WA1TBY 506, WA1EYY 324, WA1ZAZ 206, WA1YMN 170, W1EMG 53, W1DMS 13, K1ES 68, K1PNB 56, W1DMH 46, N1EE 43, WA1RVZ 40, WA1ZXB 38, W1HL 33, W1ALP 29, WA1ZGX

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26, W1NF 24, K1BZD 22, WA1YMD 15, W1PL 15, W1MJ 12, W1XA 12, WA1QMZ 11, WA1FNM 8, WB1BUP 7, WA1YOJ 5, W1ZMO 4, WA1YWK 3, W1SR 2. (Dec.) WA1YMN 160, W1PEX 85, W1MJ 57, K1GK 18, K1PNB 15, K1LCQ 6.

MAINE: SCM, Bill Mann, W1KX — SEC: WA1YUW. New ORS W1BJ, OPS WB3HYD/1. All ME Section nets active in SET. Kudos to Litchfield rptr. gang for FB net activity in SET. Comms. for Sugarloaf ski races Feb. 3-4-5 by WA1JZP K1AXO W1HTG WA1QIK K1SEV. K1EF recd. 2nd Annual W1MTL Award from Ellsworth ARA. Mid-Coast AR Rptr. Club holds Spring hamfest May 6 from 0900 to 2000 at Camden Snow Bowl. Jan. reports: PTN sess. 37, QTC 248, QNI 306. SGN sess. 32, QTC 239, QNI 1351; MSN sess. 15 QTC 20, QNI 82; CMEN sess. 15, QTC 150, QNI 233; BYN sess. 26, QTC 37, QNI 1089. Traffic: (Jan.) W1KX 483, WA2ERT/1 268, W1RWG 221, WA1YUW 170, W1HDC 148, W1ERW 131, N1RP 121, WA1QFX 102, W1ISO 69, WA4UJJ/1 59, W1JTH 40, WA1PXD 38, W1GCM 28, K1JCX 27, WA1SEY 23, K1RQG 21, K1TZH 19, W1OTO 16, W1CTR 14, W1AHM 9, K1BZ 9, K1GDI 9, WB3HYD/1 8, WA1JCN 5, WB1FAK 2. (Dec.) WB1AOD 43.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1SWX/W1NH — SEC: K1RSC. RM: N1NH. PAM: W1TN. Preliminary reports from K1RSC indicate the SET was a success. RM N1NH says don't forget the NHVT Net moves to 3622 on May 1st, 1978. Appointments: N1JM EC for Strafford Co., W1WUQ as OBS & WA1VKM as ORS. Your new PAM is W1TN. John has been doing an excellent job of liaison between all the nets and is very versatile. WA1LXC moved to Wakefield, W1WHP in FL. WA1PEL worked 41 sections in the CD Party. W1LUD graduated 9 Novices in his Littleton class. K1LL has a new keyer and has worked no. 100 for DXCC. The GSPN had 449 check-ins & 449 traffic. Congrats — to WB1EXY who went from Novice to Extra in 4 months. WA1PSI received the SOS from the ship Magna off Cape Cod. The Coast Guard said "Job well done." WA1FSZ the only OES to send in reports. Your SCM & SEC attended meeting of The Port City ARC W1WQM. During the SET messages were exchanged thru W1ALE repeater WR1ABY. Traffic: K1BCS 2480, W1TN 432, K1ACL 70, K1LL 65, K1NH 53, W1JB 17, W1BYS 9, WB1FNO 8, WA1PEL 4.

RHODE ISLAND: SCM, J. Titterington, W1EOF — RIEM 2-Mtr Tfc. Net, QNI 215, Tfc. 51, WA1CSO, Mgr. EMRI SS Net, QNI 105, Tfc. 36, N1RI, Mgr. WA1POJ finally became N1RI. Congratulations! During Jan. storms, Ham Radio, Red Cross and Civil Defense all pitched in and did a great job! Particular credit goes to the 2-meter repeaters. Officers for 1978: PRA WA1TFF, pres.; WA1RKL, vice-pres.; W1OH, secy.; K1IVX, treas.; WB1DKM WB1EKA and W1KKE, dir. H.V. Rptr. Assn., K1CSQ, pres.; WA1ILT, vice-pres.; WA1YZD, secy.; WA1VIH, treas.; WB1ACT, comm. off.; K1GOX WA1ZOZ WB1CEP and WA1HAH, dir. RI FM Rptr. Assn., K1PNI, pres.; N1NA, vice-pres.; K1VOB, secy. — treas.; WA1MCJ W1MB WA1RBT & W1XJ, dir. Traffic: N1RI 164, K1UZ 136, WA1POJ 104, W1EOF 64, W1YNE 36, W1ZY 32, WA1TFF 4.

VERMONT: SCM, Bob Scott, W1RNA — SEC: W1VSA. It is said, "no news is good news". VT hams must be in excellent shape! Hi to WB1GFC from W1SOV. The NH — VT CW net will be on 3622 as of May 3, 1978. VT CW hams are more than welcome! Old or new VT phone nets: GMN 3934 M-S 2230 UTC; VTSSB 3909 Dy 2300 UTC; VTRFD 3909 Sun. 0400 UTC; Carrier 3935 M-Sat. 1400 UTC. Carrier 26/620/59; GMN 26/548/59; VTSSB 31/554/101; VT RFD 5/91/21; VT Fone 5/88/11. Traffic: K1BQB 175 WB1AFY 60 W1RNA 14 WB1BZR 12 W1BKZ 7.

WESTERN MASSACHUSETTS: SCM, Wm. T. Lowe, W1TM — SEC: WA1DNB. PAM: WA1MJE. RM: W1TM. SET activity very good. CD party action by W1DOY K1PUG W1TM W1YK. First qtr. meeting of YCCC in Auburn on 21st. K1NM and W1WF keeping daily skeds with W1ZT/MM1 enroute from ZB2 to EA8. Others that QSO are K1AU W1BS W1GG and W1TM. XYL and WA1GRS now in FL. WD4JZO and WD4JZP. WB1DGO pres. of new club in Ware. New ORS: K1PUG and WB1AUL. WB1AUV new NCS WMN Thur. WA1DNB enjoying new CW rig (Century 21). WA1MJE at new QTH near SCM. Congrats to new Opr's WB1s FRE FRS FRT FRW FSV FUV FVZ FWK FWQ FWZ FXF FXI FXJ FXL FXM FXX. Many stns. with official appt. not submitting monthly reports. Traffic: WA1MJE 359, W1TM 229, W1DOY 77, K1PUG 58, W1BVR 54, K1IJV 49, W1KK 48, WB1AUV 35, W1UD 26, W1ZPB 26, W1DVW 21, WB1EHS 21, WA1OPN 18, W1YK 13.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davie, KL7CUK — The big item this month was the SET. All of the reports are not in yet but this section had a wonderful turn out. Sorry that we could not get our traffic to the East Coast but a real emergency precluded that. KL7HMH and KL7IFD still striving for QSOs on 6 meters. KL7HOV now home after a stay in the hospital. KL7JDI and KL7JFJ are meeting the Pacific Nets and handling traffic in and out of AK. KL7AF reports condx. good during the CD party and he had had a ball. KL7HAC KL7IXT and KL7CUK provided communications for a cross country 300 mile sled dog race. This was a part of the SET. During this race the mushers become lost consequently a real emergency did exist. It is reported that a new Novice rag chew net may start soon on 3735: FR particulars contact KL7CC. If any one has historical items relative to the start of amateur radio in AK please contact the SCM. Traffic: KLK7JFJ 41, KL7JDH 35,KL7JDI 30, KL7CUK 19, KL7AF 14.

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☐ SN7423	.29	.30
☐ SN7426	.25	.26
☐ SN7427	.25	.26
☐ SN7430	.29	.30
☐ SN7432	.25	.26
☐ SN7437	.25	.26
☐ SN7438	.29	.30
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☐ SN7443	.89	.90
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☐ SN7447	1.25	1.26
☐ SN7448	1.35	1.36
☐ SN7450	.19	.20
☐ SN7451	.19	.20
☐ SN7453	.19	.20
☐ SN7454	.19	.20
☐ SN7455	.19	.20
☐ SN7460	.19	.20
☐ SN7462	.19	.20
☐ SN7464	.19	.20
☐ SN7465	.19	.20
☐ SN7470	.25	.26
☐ SN7471	.25	.26
☐ SN7472	.25	.26
☐ SN7473	.35	.36
☐ SN7474	.29	.30
☐ SN7475	.79	.80
☐ SN7476	.59	.60
☐ SN7478	.59	.60
☐ SN7480	.39	.40
☐ SN7482	.39	.40
☐ SN7483	.99	1.00
☐ SN7485	1.49	1.50
☐ SN7486	.39	.40
☐ SN7488	1.95	1.96
☐ SN7490	.69	.70
☐ SN7491	.79	.80
☐ SN7492	.45	.46
☐ SN7493	.49	.50
☐ SN7494	.69	.70
☐ SN7495	.69	.70
☐ SN7496	.69	.70
☐ SN7498	.69	.70
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☐ SN74107	.39	.40
☐ SN74112	.25	.26
☐ SN74113	.19	.20
☐ SN74114	.25	.26
☐ SN74121	.49	.50
☐ SN74123	.69	.70
☐ SN74125	.59	.60
☐ SN74126	.59	.60
☐ SN74132	1.25	1.26
☐ SN74140	.99	1.00
☐ SN74141	1.49	1.50
☐ SN74143	1.25	1.26
☐ SN74147	1.75	1.76
☐ SN74150	.99	1.00
☐ SN74151	.99	1.00
☐ SN74153	.99	1.00
☐ SN74154	1.75	1.76
☐ SN74155	.79	.80
☐ SN74156	.69	.70
☐ SN74157	.99	1.00
☐ SN74158	.99	1.00
☐ SN74160	1.25	1.26
☐ SN74161	1.25	1.26
☐ SN74163	1.19	1.20
☐ SN74164	.99	1.00
☐ SN74165	1.25	1.26
☐ SN74166	1.25	1.26
☐ SN74173	1.25	1.26
☐ SN74174	1.49	1.50
☐ SN74175	.99	1.00
☐ SN74177	.79	.80
☐ SN74179	1.49	1.50
☐ SN74180	.49	.50
☐ SN74182	.69	.70
☐ SN74190	1.49	1.50
☐ SN74191	1.75	1.76
☐ SN74192	.85	.86
☐ SN74193	.85	.86
☐ SN74194	1.25	1.26
☐ SN74195	.49	.50
☐ SN74197	.75	.76
☐ SN74198	1.75	1.76
☐ SN74200	5.50	5.51
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☐ SN74285	4.25	4.26

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☐ 10	CRYSTALS, many include CB, Ham & more (4M3250)	2.00	20 for 2.01
☐ 150	MOLEX IC SOCKETS, on a strip, cut to length (4M3144)	2.00	300 for 2.01
☐ 100	TERMINAL STRIPS, from 2 lugs up (4M3136)	2.00	200 for 2.01
☐ 30	NE-2NEON LAMPS, all 100% good (4M2613)	2.00	60 for 2.01
☐ 40	SHIELDED CABLE, 1 cond, mikes, phones (4M3577)	2.00	80 for 2.01
☐ 50	TRANSISTOR ELECTROS, assrtd values, styles (4M2747)	2.00	100 for 2.01
☐ 3	SOUND TRIGGERS, sound triggers scr w/amp (4M3625)	2.00	6 for 2.01
☐ 15	6V TEST INDICATORS, leads, grain-o-wheat (4M3526)	2.00	30 for 2.01
☐ 100	CAPACITOR SPECIAL, discs, mylar, lytics, more (4M2738)	2.00	200 for 2.10
☐ 30	MINI TRIMPOTS, to 1 meg, 1 turn, ¼W (4M3345)	2.00	60 for 2.01
☐ 10	VOLTAGE REGULATORS, hobby LM320, 340, TO-3 (4M3330)	2.00	20 for 2.01
☐ 30	PANEL SWITCHES, slides, rotaries, mod, etc (4M3268)	2.00	60 for 2.01
☐ 200	RESISTOR SPECIAL, ¼ to 1W, carbon, metal (4M3054)	2.00	400 for 2.01
☐ 200	HALF WATTERS, resistors, carbon, metal (4M3046)	2.00	400 for 2.01
☐ 100	NATIONAL IC BONANZA, linears, 7400s ROMS (4M2860)	2.00	200 for 2.01
☐ 40	HOBBY LEDS, assrtd types, mostly useable (4M2859)	2.00	80 for 2.01
☐ 15	LM340T VOLTAGE REGULATAORS, 5 to 24V, TO-220 (4M2635)	2.00	30 for 2.01
☐ 100	TWO WATTERS, resistors, carbon-metal marked (4M2735)	2.00	200 for 2.01
☐ 100	POLYSTYRENE CAPS, assrtd values, voltage, hi-Q (4M2729)	2.00	200 for 2.01
☐ 50	THERMISTORS, resistors that change with temp (4M4038)	2.00	100 for 2.01
☐ 20	BRIDGES, unmarked, 2, 4, 6, 10, amp, full wave (4M4022)	2.00	40 for 2.01
☐ 25	LAMP'N'SOCKET SETS, micro, 1.5V, T2 (4M3957)	2.00	50 for 2.01
☐ 15	MIXED READOUTS, hobby, untested, .127, .3, .5, etc. (4M3619)	2.00	30 for 2.01
☐ 150	QUARTER WATTERS, resistors, metal film, marked (4M3413)	2.00	300 for 2.01
☐ 100	PLASTIC TRANSISTORS, untested, RO-92 (4M2604)	2.00	200 for 2.01
☐ 200	PREFORMED RESISTORS, ¼, ½, 1W, marked, assrtd (4M2608)	2.00	400 for 2.01
☐ 200	PRECISION RESISTORS, ¼, ½, 1W, 1%, 2%, marked (4M2428)	2.00	400 for 2.01
☐ 60	DIPPED MYLARS, shiny finish, assrt values (4M2567)	2.00	120 for 2.01
☐ 30	VOLUME CONTROLS, audio, linear, assrtd values (4M2421)	2.00	60 for 2.01
☐ 5	7.5 VOLT ZENER DIODES, 1 watt (4M5187)	1.00	10 for 1.01
☐ 5	9.1 VOLT ZENER DIODES, 1 watt (4M5188)	1.00	10 for 1.01
☐ 30-FT.	WIRE WRAP WIRE, 30 gauge (4M3803)	1.19	60-ft for 1.20
☐ 5	TANTALUM CAPS, 2.2uF, 25V (4M5189)	1.00	10 for 1.01
☐ 1	TV GAME SWITCH, choose TV or game, 75 or 300 ohms (4M3970)	1.50	2 for 1.51
☐ 1	ALARM CLOCK CHIP, MM5316, 4-digit (4M1759)	2.95	2 for 2.96
☐ 5	PANCAKE PHOTOCELLS, 600 to 15K ohms (4M2939)	1.00	10 for 1.01
☐ 1	100KHZ MARKER CRYSTALS, approx for marker gen. (4M3896)	1.95	2 for 1.96
☐ 1	MOTHERBOARD EDGE CONNECTOR, 106 pins, .125" (4M3987)	3.50	2 for 3.51
☐ 1	48-PIN EDGE CONNECTOR, .156" spacing (4M3963)	1.95	2 for 1.96
☐ 1	JOYSTICK, two 10K pots, for computers, TV games (4M5037)	2.95	2 for 2.96
☐ 1	CHARACTER GENERATOR, 5 × 7 Mostek MK 2002P (4M3898)	4.95	2 for 4.96

READOUTS!

		ONE CENT SALE
☐ ¾" DIGIT LCD WRISTWATCH DISPLAY, (#4M3960)	3 for $1.19	6 for $1.20
☐ GE FLUORESCENT NIXIES, 7-seg, blue (#4M3684)	1 for 1.00	2 for 1.01
☐ SPERRY FLAT NIXIES, orange dual digit (#4M5014)	2 for 1.19	4 for 1.20
☐ SPERRY FLAT NIXIES, orange, .3", 1½-dig (#4M5015)	2 for 1.19	4 for 1.20
☐ MAN-3 BUBBLE READOUT, .18" red, com cath. (#4M3338)	6 for 1.00	12 for 1.01
☐ MAN-4 READOUT, bubble, red, com anode (#4M1503)	2 for 1.00	4 for 1.01
☐ FND-10 BLOCK READOUT, .122" com cathode (#4M2082)	2 for 1.19	4 for 1.20
☐ 8-DIGIT READOUT, led, com cathod, red (#4M5190)	1 for 1.95	2 for 1.96

SPEAKERS!

	Each	2 for
☐ 6" TWIN CONE SPEAKER, hi-fi, for car'n'home (#4M5059)	$4.50	$4.51
☐ 2¾ × 5" OVAL SPEAKER, 8 ohms (#4M2553)	1.49	1.50
☐ 2 × 8" OVAL SPEAKER, 8 ohms (#4M3454)	1.49	1.50

MICROPHONES!

	Each	2 for
☐ CONDENSOR MIKES, sensitive, 500 ohms, 1½V (#4M3178)	$4.95	$4.96
☐ COMMUNICATIONS MIKE, 500 ohms, CB-HAM (#4M4074)	4.50	4.51
☐ NOISE CANCELLING MIKE, Ham-CB, 500 ohms (#4M3902)	6.95	6.96

RELAYS!

	Each	2 for
☐ SPDT 12V BLOCK RELAY, 5A contacts (#4M4032)	$1.98	$1.99
☐ SPDT 12V REED RELAY, 1A contacts (#4M4094)	1.49	1.50
☐ SPDT 12V SENSITIVE, 2000 ohm coil (#4M3044A)	1.95	1.96

AMPLIFIERS!

	Each	2 for
☐ 8 WATTS ON A BOARD, with built-in preamp (#4M5040)	$5.95	$5.96
☐ 9 WATTS ON A CHIP, Toshiba TA7205 (#4M5057)	4.95	4.96
☐ 3 WATTS ON A CHIP, G-E PA 263 (#4M1522)	1.50	1.51

TRANSFORMERS!

	Each	2 for
☐ 12V TRANSFORMER, 300ma, pc leads, 110prl. (#4M3412)	$1.49	$1.51
☐ 12V TRANSFORMER, 1A, 110/220prl, open frame (#4M4040)	2.95	2.96
☐ 24VCT TRANSFORMER, 300ma, open frame, 110prl. (#4M3323)	1.95	1.96

DIP SWITCHES!

	Each	2 for
☐ 2 SWITCHES ON A DIP (#4M3668)	$ .77	$ .78
☐ 3 SWITCHES ON A DIP (#4M3669)	.88	.89
☐ 6 SWITCHES ON A DIP (#4M3671)	1.29	1.30

IC SOCKETS!

☐ 8-PIN MINI-DIP (#4M2123)	4 for $1.19	8 for $1.20
☐ 14-PIN DIP (#4M1308)	3 for 1.19	6 for 1.20
☐ 16-PIN DIP (#4M1309)	3 for 1.19	6 for 1.20
☐ 18-PIN DIP (#4M3378)	6 for 1.19	12 for 1.20
☐ 24-PIN MSI/DIP (#4M3886)	2 for 1.19	4 for 1.20
☐ 28-PIN MSI/DIP (#4M3887)	2 for 1.19	4 for 1.20
☐ 8-PIN TO-5 (#4M1307)	4 for 1.19	8 for 1.20

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	PIV	Sale Each	2 for
☐	50	$.59	$.60
☐	100	.69	.70
☐	200	.79	.80
☐	400	.89	.90
☐	600	.99	1.00
☐	800	1.19	1.20
☐	1000	1.29	1.30

FULL WAVE 10 AMP BRIDGE RECTIFIERS!

Order by Cat. No.4M2447 & voltage

PRV	Sale	2 for
☐ 50	$1.29	$1.30
☐ 100	1.49	1.50
☐ 200	1.69	1.70
☐ 400	1.99	2.00
☐ 600	2.25	2.26
☐ 800	2.50	2.51

RIBBON CABLE!

Order by Cat. No. 4M3939 and Conductors

Cond.	Sale	1¢ Sale
☐ 20	7-ft. $1.98	14-ft. $1.99
☐ 26	4-ft. 1.98	8-ft. 1.99
☐ 34	3-ft. 1.98	6-ft. 1.99
☐ 40	3-ft. 1.98	6-ft. 1.99

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☐ 100** ☐ 5K*	leads. Order by Cat. No	2 for $1
☐ 200** ☐ 10K*	and value	
☐ 500* ☐ 20K**	☐ No. 4M3863 25 turn upright, type 64*	
☐ 1K* ☐ 50K*	☐ No. 4M3866 single turn, flat, type 63*	
☐ 2K** ☐ 100K**		

10 AMP - POWER TABS!

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#4M1590 - QUADRACS

PRV	Sale	2 for
☐ 50	$ .35	$ .36
☐ 100	.69	.70
☐ 200	.88	.89
☐ 300	1.19	1.20
☐ 600	1.59	1.60

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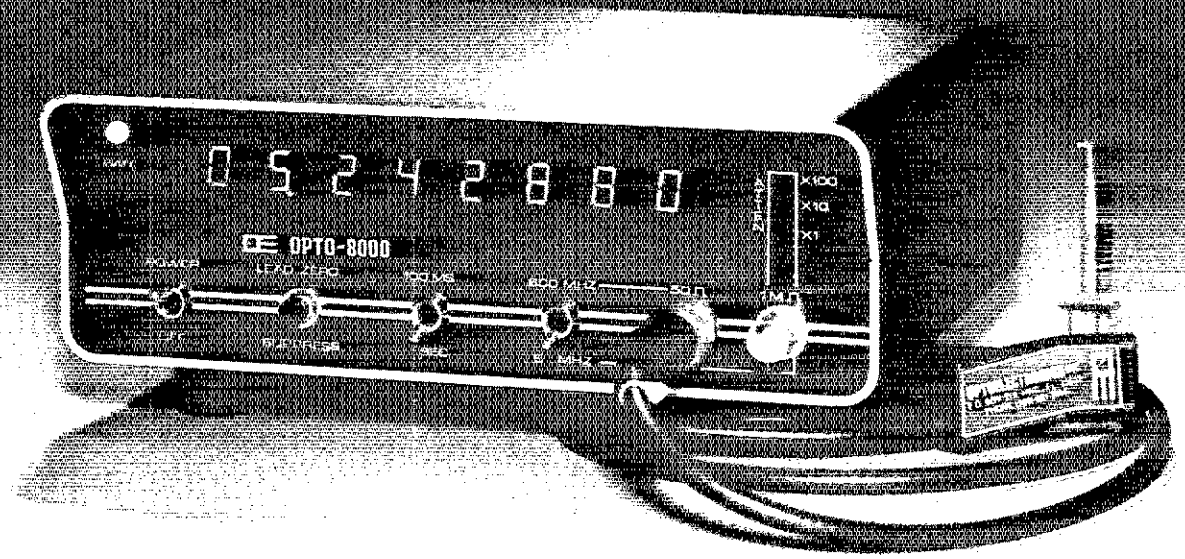
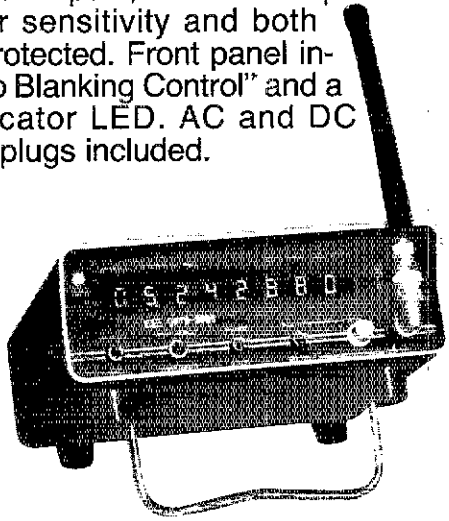
OPTO-8000.1



This new instrument has taken a giant step in front of the multitude of counters now available. The Opto-8000.1 boasts a combination of features and specifications not found in units costing several times its price. Accuracy of ±0.1 PPM or better — *Guaranteed* — with a factory-adjusted, sealed TCXO (Temperature Compensated Xtal Oscillator). **Even kits require no adjustment for guaranteed accuracy!** Built-in, selectable-step attenuator, rugged and attractive, black anodized aluminum case (.090" thick aluminum) with tilt bail. 50 Ohm and 1 Megohm inputs, both with amplifier circuits for super sensitivity and both diode/overload protected. Front panel includes "Lead Zero Blanking Control" and a gate period indicator LED. AC and DC power cords with plugs included.



SPECIFICATIONS:
Time Base—TCXO ±0.1 PPM GUARANTEED!
Frequency Range—10 Hz to 600 MHz
Resolution—1 Hz to 60 MHz; 10 Hz to 600 MHz
Decimal Point—Automatic
All IC's socketed (kits and factory-wired)
Display—8 digit LED
Gate Times—1 second and 1/10 second
Selectable Input Attenuation—X1, X10, X100
Input Connectors Type —BNC
Approximate Size—3"h x 7½"w x 6½"d
Approximate Weight—2½ pounds
Cabinet—black anodized aluminum (.090" thickness)
Input Power—9-15 VDC, 115 VAC 50/60 Hz
or internal batteries

OPTO-8000.1 Factory Wired	**$299.95**
OPTO-8000.1K Kit	**$249.95**

ACCESSORIES:
Battery-Pack Option—Internal Ni-Cad Batteries and charging unit **$19.95**

Probes: P-100—DC Probe, may also be used with scope **$13.95**
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Owners of FC-50 counters with #PSL-650 Prescaler can use this kit to convert their units to the Opto-8000 style case, including most of the features.

FC-50 — Opto-8000	**Kit $59.95**
*FC-50 — Opto-8000F	**Factory Update $99.95**
FC-50 — Opto-8000.1 (w/TCXO)	**Kit $109.95**
*FC-50 — Opto-8000.1F	**Factory Update $149.95**

*Units returned for factory update must be completely assembled and operational

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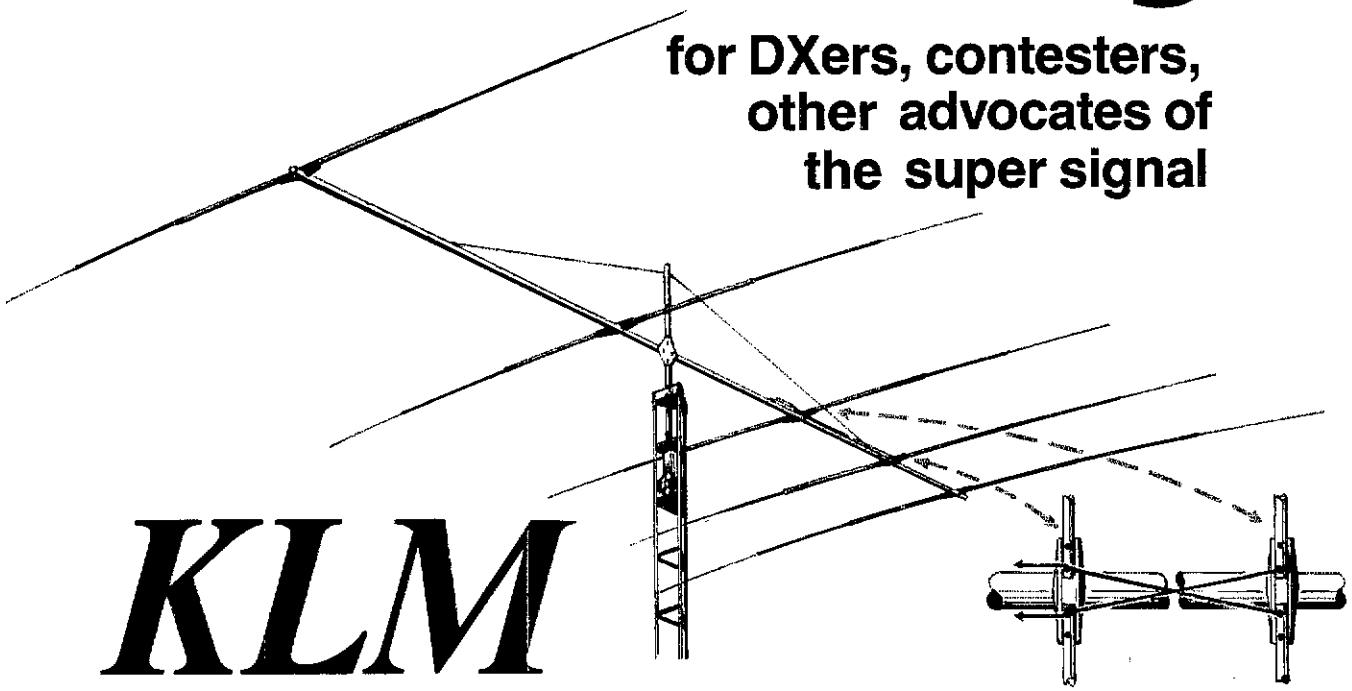
the double edge

for DXers, contesters, other advocates of the super signal



KLM "Big Sticker" monobanders

with double driven elements

full gain, low VSWR, CW/phone operation without retuning.

KLM beams with **double** driven elements continue to be the choice of amateurs throughout the world. They are performance proved. . . clearly superior. . . and there are good reasons for this superiority.

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Among other advanced design considerations, KLM uses log-periodic techniques with **double** driven elements to assure **full excitation** and low VSWR on beams covering the full 40, 20, 15 and 10 meter amateur bands. In addition, the frequency response of KLM "Big Stickers" rolls off very rapidly beyond band extremes thereby minimizing harmonics and adjacent channel interference.

These are husky, well constructed beams that use strong, lightweight elements and booms of 6063-T832 weather-resistant aluminum. Hardware is top quality stainless steel. The insulated mounting brackets (pictured below), an exclusive KLM design, are molded of GE polycarbonate "Lexan," a material that has excellent insulating qualities and very high mechanical strength.

KLM insulating support bracket

Available monobanders: 4 element, 40 meters. 5 and 6 element, 20 meters. 6 element, 15 meters. 5 and 6 element, 10 meters.

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KLM 1500-HD Rotator

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IDAHO: SCM, Ed Hamlin, W7KDB — ID had excellent response during the SET. Fifteen ECs and counties participated. Our SEC and participants are to be congratulated. The Pocatello ARC elected new officers with W7BDL as prexy. The Idaho Soc Of Radio Amateurs Boise chapter, also elected officers with W7PCP as their prexy. W7GHT again made BPL; W7IY now home and back on the air. K7QD and the Snake River chapter of The Idaho Soc. Of RA are teaching Novice Classes. W7GBO is new MARS member. The ID SCM would like news from the Lewiston and Coeur 'D' Alene area.

Net	Sess.	QNI	QTC	FREQ.	Mgr.
FARM	33	1098	52	3935	W7CJC
RACES	22	465	22	3990	WA7WXI
IMN	28	227	201	3635	W7GHT

Traffic: W7GHT 538, W7LLM 48, W7KDB 32, W7GBO 28, WA7NRP 12, W7IY 9.

MONTANA: SCM, Robert Leo, W7LR — Good 00 reports from WA7OBH & WA7IJN. How about more? Lots of traffic in SET, & good participation. Many new state radio classes, such as done by WB7DUJ & WA7IZR, Livingston. IMN: QNI 227, QTC 201, WA7PZO helps on new WR7ABY repeater & chases DX. K7CPC in CD & 160 tests. W7CJB reports WB7VCB new Ronan Novice. W7LR QSO VU, AP2, FH$\emptyset$, BY$\emptyset$SS. W7IDK Havre reports 14 new Novices, General Class, AREC nets, etc. RACES net 3947 1st & 3rd Sun. Traffic: K7CHY 193, WA7ZOO 69, W7NEG 65, WB7EJS 47, W7IXD 28, W7LR 15, W7HAH 9, W7DB 6.

OREGON: SCM, Dwight J. Albright, W7HLF — SEC: W7LBH, RM: K7OUF. NM BSN: WA7GFE. NM OSN: N7NO. NM WCN: K7UJY. NM ARES: WA7RWM. NETS: ARES 3993.5, 5:15 & 7 PM, QNI 374, QTC 27; WCN, 3702, 7 PM QNI 348, QTC 128; OSN, 3585, 6:45 PM, QNI 200, QTC 238; BSN, 3908, 5:45 PM, QNI 655, QTC 77, 15 OST; SMIRK, 50 MHz, 7 PM 27 QNI, 4 sess. N7DB. Emerald Amateur Radio Society names officers; K7KVV, pres; WA7SDI, vice pres.; WB7EBC, secy.; WA7YZT, act. Mid-Willamette Club WB7EEI, pres.; WA7OPZ, vice-pres.;WB7SXN, secy., W7KVO, treas. Grande Ronde Club in LaGrande now affiliated ARRL. WB7PMF activities Mgr. Linn, Benton Co EC K7UGF rpts combined ARES 75-2 939 QNI, 66 QST, 14 Tfc. W7LT has been running around again to SAROC. WB7TAZ passed his General Jan. 6th, congrats,. He did it again, W7VSE made Brass Pounders! SEC-W7LBH is taking a short vacation in CA. He needs it after the SET. Traffic: (Jan.) W7VSE 584, K7NTS 259, K7IWD 195, K7VM 158, WA7IHS 142, K7OUF 73, WB7AAK 70, W7LBH 67, WA7GFE 60, W7DAN 58, K7QPW 30, W7JHZ 28, WB7TAZ 24, W7LT 13, WA7ZAP 11. (Dec.) K7WW 12.

WASHINGTON: SCM, Bob Klepper, W7IEU — NTN 31 sessions, QNI 1790, QTC 77; NWSSB 31 sessions, QNI 715, QTC 43; ESN 26 sessions, QNI 497, QTC 46. Hope all of you had fun during SET, all should know now where improvements can be made. I'd like to keep in closer touch with the clubs so would appreciate being put on the mailing list for your club paper. W7ZEV lost all but a low band transceiver and 2-meter rig, fortunately no damage done to his house. BEARS is working on a repeater package. Radio Amateurs of Skagit County (RASCI is a new ARRL attiliated. The RC of Tacoma had 37 members upgrade during 1977. W7JIE WB7CFH very active in IW. Clark County ARC has handled messages for the VA hospital in Vancouver for 15 years. K7GZO is the new EC for BEARS. WA7UJQ studying in Taiwan. N7AM working on three-element vertical array for 40, 80, 160. Island Cty ARES meets Wed. 0300Z. K7BBG W7JIN and ex-7DT are Silent Keys. West Seattle ARC searching for old members. W7LMW WB7DYW WB7PUL are asst. EC's for Kitsap/Mason Cties. WA7OJI kept busy as QNB between ARES and WSN during SET. K7NZV airs OB's on 50 MHz in the Seattle area while W7YGU airs them on 2 and 6 in the Spokane area. W7LG off the air early Mar. to move to new QTH. N7RV is new OBS in Olympia area. W7ZRR new pres. of Spokane AR Council. WB7FGC Key Stn during SET for Spokane ARES. W7OM and K7GR are co-chairman of the 1980 convention committee. NARCS provided communications for motorcycle enduro in the Capitol Peak area. Tacoma ARC officers for 1978 are: WA7ZZA, pres.; WA7EUS, vice-pres.; WB7QCP, secy.; K7AFU, treas.; W7OVW W7KKN WB7AJR WB7BLQ, board. WB7EOK working on QRP WAC on 20. W7AXT using full automatic RTTY. WA7TWB operates 80 through 10 and 2 meters off batteries. W7ZIW and OM W7XV active in SET. SEC WA7RWK reports there are 576 ARES members in the Section. There are 2 events coming up in Apr., the Skagit Hamfest at Bryant on Sat. the 22nd, and the Diabetes Bikathon on the 30th, that's a Sun. so all interested should be able to help on this. Traffic: (Jan.) W7DZX 806, K7GXZ 312, N7IT 123, W7ZIW 113, W7LUP 100, WA7BDD 88, W7IEU 71, K7CTP 68, WB7OJV 67, WA7KGT 55, W7APS 45, W7BUN 42, W7LG 42, WA7OJI 38, N7AM 36, W7EBU 33, WA7LQV 32, WA7RCR 31, WB7CFH 17, K7NZV 13, N7CT 10, WA7EDQ 10, W7IXF 8, WA7PHD 6, W7AXT 5, WB7EOK 1. (Dec.) N7RC 138, N7IT 93, K7OZA 41, N7AM 39, N7CT 15, WB7CFH 2.

PACIFIC DIVISION

EAST BAY: SCM: Bob Vallio, W6RGG — SEC: W6IIH. PSHR:
W6OA WB6UZX N6IG. The East Bay RC did bang-up job during SET, including getting news coverage on San Francisco CBS outlet KPIX-TV,channel 5. Congratulations on a job well done. K6ARE in the antique radio equipment field. K6OE K6HW W6OA WB6UZX K6PMG N6IG WB6VEW N6NE WA6JVZ W6CBF have been active in their positions as East Bay Section appointees. Welcome aboard to new ORS appointee, K6XO. Congrats to these fellows who have up-graded their licenses; WA6GCB and WB6PCO to Extra; WB6DMB Advanced; WD6AHZ General; WD6EXS and WD6EYE Novice. In addition to those upward-mobile gentlemen,

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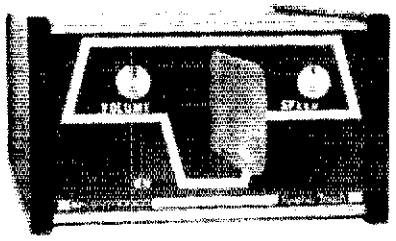

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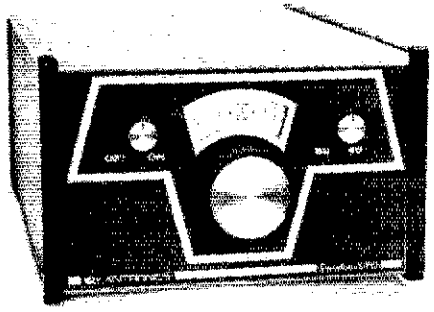

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special congrats to WA6VCN on achieving Extra Class status at the age of 13! The South Bay ARA starting their second year of operations. WB6DMB and K6UIU, both members of SBARA, are sporting new towers topped with tri-band beams. WR6ARR UHF repeater is on-the-air and headed for a new hilltop per trustee, N6IG. N6NE scored 290K in the CW CD Party and participated in SET by passing traffic via the NTS. WA6JVZ has a new 75-meter inverted vee up and plans to look for WAS on that band. W6CBF has a new KLM 2700. Traffic: K6OE 431, K6HW 343, W6OA 176, WB6UZX 50, K6PMG 22, N6IG 18, WB6VEW 15, N6NE 15, WA6JVZ 4.

NEVADA: SCM, Leonard M. Norman, W7PBV — Asst. SCM: W7SK. SEC: K7ZAU, K7DG is in charge of the 3 credit Radio Amateur course at Clark County Community College. WB7PXW on SSB 2M working into CA. WB7UFD mgr. of R.L. Drake Company service and sales in Las Vegas. Tues. night truck stop dinner gathering, meets every other Tues. with an average attendance of 30-35, thanks to W7OK. W7FJN and WA7ESM are graduates of the "SYN-AUD-CON" seminar in electro acoustics for sound systems design. WB7PWL moved back to OH. W7NVY had his FAA Pilots license revoked. K7ZOK working into CA on 432 MHz. W7PRM has a new mobile. Traffic: W7ILX 225.

PACIFIC: SCM, Pat Corrigan, KH6DD — SEC: KH6CKJ RM: KH6JAC. Emerg. ARC new officers KH6JMK, pres.; KH6IGU, vice-pres.; KH6HAB, secy.; KH6EVY, treas. KH6EKQ & KH6INK hosted nice dinner for visiting LU8EAM. KH6 may see more moonbounce efforts following KH6HI/K5MB effort in Jan. KH6IHP interested. Also, OSCAR users from KH6 continue to grow in numbers and some are gearing up in a big way for AO8. Thanks to all especially Guam who participated in ARRL SET and helped SEC KH6CKJ & EC Guam KG6JAH make it a success. I hope as many as possible will sign up with RACES/ARES. Contact KH6ION on Oahu, KH6HHG on Maui, KH6HOU on Hawaii & KH6FMT on Kauai. On Guam see KG6JAH. KH6CBS now KH6EW. K7SS visited KH6DL and helped in ARRL DX Test, then to Maui. Traffic: KJ6ST 59, KH6DD 54, KH6BZF 5.

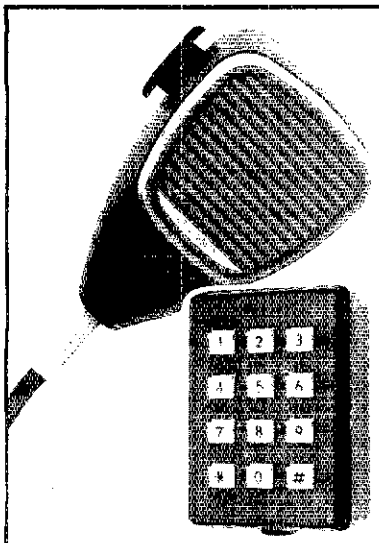
SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — Officers for the Golden Empire ARS are: WB6MMR, pres.; WA6GUO, vice-pres.; WB6CQF, secy.; WB6VLC, treas. K6HTM, Ed.; K6BYS, publisher. The El Dorado Co. ARC elected WA6ZKG, pres.; WA6ZBD, vice-pres.; WB6ZJS, secy-treas. The North Hills ARC now meeting at the Northridge Baptist Church, 6900 Madison Ave., Fair Oaks, meeting time is 7:30 PM on the 3rd Tue. of the month. K6QWT now has Advanced ticket. WA6HZT has put a GE Progress rig on 2 meters. The Sacramento Co. Sheriff has declared the Amateur Radio Surveillance program in local parking lots a success. Over 2400 hours of work by 44 amateurs resulted in drop in parking lot crime. The operation employs the AREC'S repeater (WR6AEN) output freq. 146.91. N6JV now has a new Rohn 25G tower up 100 feet. Traffic: W6RSP 103, K6RPN 87, W6DEF 20.

SAN JOAQUIN VALLEY: SCM, Charles P. McConnell, W6DPD — Asst. SCMs: WA6YAK W6TRP WA6HIN. SEC: WA6YAB. The Stanislaus ARA now an ARRL affiliate, WA6ZLO, pres. Officers of the Central CA Amateur Teleprinter Soc. (CCATS) are WB6OWE, pres.; WB6ITM, vice-pres.; WA6CTR, secy-treas. The group provides communications for the Central Valley UCP Telethon. The Sierra ARC provided communications for walkathons. The Turlock ARC will have its 50th Anniversary Sat. June 3 at the War Memorial Bldg in Turlock. The Fresno ARC Hamfest will be May 5, 6 and 7 at the Fresno Holiday Inn. All CD appointees are invited to attend a meeting on Sat. May 6 at the Hamfest. W6XP made WAS on 6 meters. WB6RGU and WB6UKB have TR 2200As. WB6TUR an NHW2036. K6RYN an FT227R. W6EJQ a TR7400A. WA6VIS a TS520. WB6PSW an HR312. WA6CPP needs 83 counties for WAC USA. WD6EYQ new ham in Firebaugh. Thanks to all who participated in SET. W6DPD on RTTY. WB6QWE operates WR6AXH as a voice/RTTY repeater in Fresno. Traffic (Jan.) W6DPD 51, WA6JDB 41, WB6VJW 30, WA6GJV 23, WA6RXJ 20, WB6MGG 13, WA6YAB 11, N7EUI/6 8. (Dec.) WB6TTP 92, WA6RXJ 6, WB6MGG 2.

SANTA CLARA VALLEY: SCM, Jim Maxwell, W6CF — SEC: WB6IZF. RM: W6RFF. W6XN has been appointed AMSAT coordinator for No. Calif. Welcome home to K6WR, just back from 3 years as PA9WRR in Amsterdam. The Santa Cruz AREC net has changed time to 1930 local each Mon. They hold forth on 146.52 FM simplex. WA6VCN just picked up his Extra ticket, even before picking up his 14th birthday! 22 members of the West Valley gang turned out to help at the recent Paul Masson Marathon. Over 1200 runners participated, including a dog, 2 in wheelchairs, and 1 blind runner. SCCARA's next Novice class starts Apr. 25, according to the SCCARA-Gram. The class will be held at San Jose Red Cross Hq. Contact pres. WA6GBQ for additional info. The Palo Alto ARA is growing by leaps and bounds, with 101 members at latest count. Last call for the International DX Convention to be held this year in Visalia on Apr. 15-16. Anyone on the NCDXC repeater WR6ACZ can come up with additional details if required. W6RFF made PSHR. Welcome to WD6ERA, a new Novice in Belmont. NCN had 8 extra sessions last month to handle SET traffic. One of the new regulars on NCN rings a familiar bell — W6ZRJ, newly retired Pacific Div. Director. Traffic: W6YBV 162, W6RFF 126, W6AUC 96, W6KZJ 26, W6ZRJ 18, WA6HAD 8, N6VB 5

ROANOKE DIVISION

NORTH CAROLINA: SCM, Bill Parris, K4GHR — SEC: W4EHF. PAM: W4OFO. RM: K4MC. VHF PAM: WB4VIM. The top event in Jan. was the outstanding SET brought about by the terrific performance of THEN, CN, CNN, CNCTN and many other of the well run nets. Preliminary



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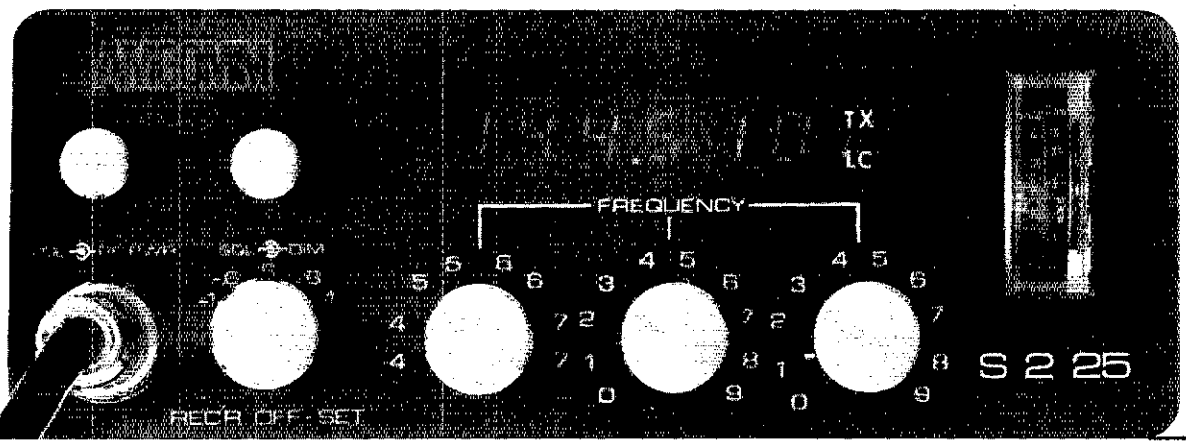

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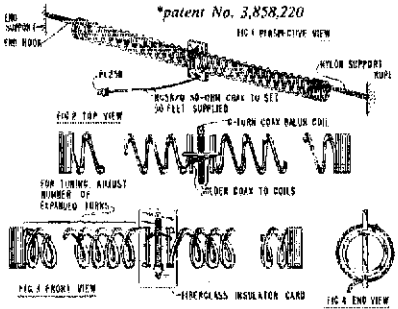

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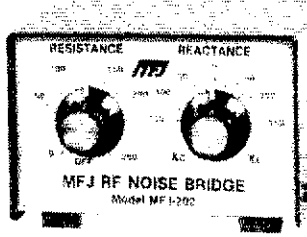

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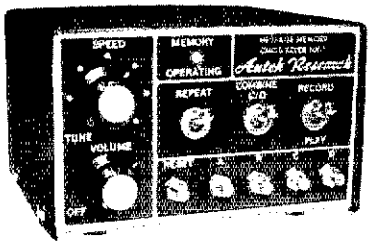

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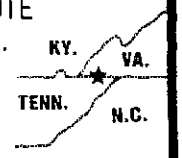

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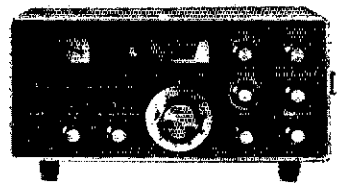

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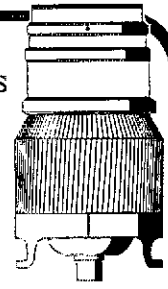

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results look as if new records were set. Super efforts by ECs: K4CJZ (Guilford); K4AI (Burke); W4FMN (Wake); WB4ULP (Surrey); WA4LZD (Sampson); WB4TTJ (Buncombe); W4OCZ (Rowan). Special notice goes to WB4SGA & the Alamance ARES who spent 2 straight weekends in session during severe ice and wind storms. Officers for the Forsyth Co. AR Service: W4HG, pres.; W4WXZ vice-pres.; W4NXM, secy-treas. Officers for the New Bern ARC: WD4DKF pres.; W4CZ, vice-pres.; WD4JIK, secy-treas.; WB4TCP commo. off. Congrats to WD4JMS club station of the New Bern ARC on BPL. Welcome to NC WB2SXD. The State CD Office was active in the SET this year. WA4OOS & WB4TTJ were active in Jan. CD Party. WA4KWC still active on 20 mtrs, running phone patches from maritime mobiles. K4TTN reports 64 students in Novice class after a club presentation at a local CB club. Look for W4BFB score in VHF Sweepstakes. Big crowds planned for the Roanoke Division Convention in Charlotte on Apr. 1-2, and at Raleigh Hamfest April 23. FCC will give walk-in exams at both events — see you there. Traffic: (Jan.) WD4JMS 486 AA4NC 430, WB4ZIQ 249, W4OFO 205, WD4JRs 191, K4MC 191, WD4FJM 178, W4EAT 154, W4FMN 152, K4FTB 115, K4VHT 112, WB4MXG 106, WB4RGS 99, N4ZH 94, WA4FFW 78, WA4SRD 59, WA4OOS 57, N4UE 56, WB4DAR 50, WB4OXT 48, WA4UTC 48, W4PCN 48, WB4ULP 47, K4GHR 46, W4EHF 44, WA4LZD 39, W4ACY 32, WB4TOP 24, WA4WQR 24, WD4CNS 21, WD4DKF 19, WD4CNQ 18, WB2SXD/4 15, W4WXZ 13, WB4TTJ 10, WB4WII 10, K4AIH 5, K4TTN 4. (Dec.) WB4TTJ 12, WB4CES 10.

VIRGINIA: SCM, Robert L. Follmar, N4RF — SEC: WB4ZNB. PAM: WB4DQZ. RMs: VN K4BKX; VSN AA4CK; 4RN W4SHJ. All indications point to an outstanding SET in a number of ways. In several locations, due to extreme wx they experienced the "real thing". Example: WA4YIU EC put in 16 straight hours restoring commercial pwr distribution before getting things under control. SEC WB4ZNB had the flu bug as did ur SCM but managed to see our emerg. test thru to the end. It was a bad month for equip. losses. Hr are some reported: K4BKX lost his ant. rotor and sez "this winter wl be the 1st time I refuse to climb tower." W4NWM lost quad K4LEF illness forced early end to SET activities. W4TMN lost 50 ft mast and ten-element slot 2-mtr ant. OO N4NW's 100 ft twr, with all the trimmings blew over damaging a house and a car. W4JK provided public svc actv thru 17 stns and 13 cities with hourly rpts. N4FM rptd much tfc on Shenandoah Svc NET. Ur SCM handled 112 emerg. msgs; cked in to VSN, VN, 4RN, EAN, CAN in 12 hrs. Ran full emerg. pwr for 2 hrs at main stn. EC N4UY oprated FM OES HQ on Sat, and at home till 7 PM on Sun. Expects to score over 700! Winch. EC (asst.) WB4FNW rpts emerg NET handled 108 msgs. EC K4EJ says SET involved mayor; chief-of-police; fire chief; Red Cross & Sal. Army of Harisonbg. EC K4KHB rptd ARC had 5 locations manned and in contact with msg ctr at ARC chapter house. WB4WLJ had outstanding ARES drill in Wmsbg. Over 70 stns rptd acty this mo.! K4GR finally got ELF2 comptr understanding him. New stn N4OT "getting serious" after 24 yrs of operating. Sez VN sounds like a grp of 'real pros,' WB4BYC finished new HW202 and wrks fine! WA4SBC part. In VHF contest wld gud results. WA4FTJ has NCS slot on VFN. Also was apptd admin comm. liaison with local Red Cross. Also applied for DXCC (QRP). New in VA is K8LGA who moved from Ohio. Welcome! W4OOL recd PSA and vy proud too! 172 took FCC exams at RATS Hamfest in Richmond as 75§ passed! WA4NTP surprised to learn his barefoot stn with vert. Ant placed in top 10 of American fone stns in last summer's CAN-AM contest! W4ZM still having fun putting on "SPARK" show, FB. WA4FDV on 2M with new IC22S. W4YE Rpts fun at RATS as well as ur SCM and W4SHJ. Ur SCM also attended SARA and VCC banquets; RF-79 (HRRA) and TARC club meetings and took a snow check for nice invite to Lynchburg Radio Club meeting. EC Franklin rpts successful SET; 9 of 12 members participated & involved 6 different agencies. Traffic: (Jan.) K4BKX 412, W4SQQ 404, K4KNP 381, WB4ZNB 336, W4UQ 250, W4JK 248, AA4CK 242, K4KA 235, N4RF 223, WB4DBK 218, WB4KIT 189, WA4UUX 181, WB4DQZ 171, WD4CYX 170, WB4FLT 161, W4LXB 160, N4FM 156, K4GR 152, K4KDJ 140, WA4STO 128, K4JM 126, WA4EGW 103, N4UY 96, N4NK 72, WA4FTJ 69, W4SHJ 66, WB4FNW 63, K8LGA/4 60, WA4QQI 60, WB4PBG 57, WB4PNY 57, AA4IT 56, WA4YJF 55, W4SUS 50, K4MLC 44, K4SPS 43, WA4KQL 39, W4OOL 37, WA4YIU 36, K4LEF 34, N4LE 31, K4EJ 29, WB4ZWT 27, N4FI 26, K4DHB 26, W4YVG 24, WD4OVR 23, WA4NPT 19, W4NWM 18, W4YE 16, K4SPS 16, W4KXE 16, WB4UHC 13, WB4WLT 12, W4OKN 12, WA4FDV 11, W4TY 11, W4TMN 8, W4ZM 8, WA4LTO 5, K4VWK 4, W4KX 4, WA4JUJ 4, WA4NYZ 4, WB2VYK 2, WB4FDT 2, N4DR 2, WB4QAX 1. (Dec.) K4KNP 375, W4TZC 6, WB4EDB 7.

WEST VIRGINIA: SCM, Donald B. Morris, W8JM — Marshall County commends W8CAL K8IXO W8WUX WA8LZE WB8ZTL on setting up new EC center. W8CKX WD8EGW K8MS WB8SAW WD8VAZ active in D8RN. Mountain State Transmitters ARC '77 Fox hunts stimulated club interest and WD8BDS new act'vy Mgr. K8AKC now N8EW. W8MHA back in WVA, ex-WA6WDA-K8OPU. New Novices: WD8QCS QCT QCU QCV QCW QCX QCY QCZ WD8QDA QDB QDC QDD QGA and QGR. Instructor was K8QEW

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Phone	3990	1700 Dy	1026	164	31
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K8MS 54, W8JM 45, WB8III 38, WA8OKG 38, W8JWX 31, WA8YTP 27, K8ZDY 26, W8CKX 22, WB8IDA 21, WB8ZTL 17, K8MHR 16, WB8VAZ 16, K8YL 13, WB8TJN 12, WB8FER 11, WB8SAW 11, K8QEW 10, WD8CDQ 9, W8ETF 9, K8KT 7, K8IXO 6, WA8WPW 6, K8CFT 5, K8MZM 5, WB8CNN 4, K8VNL 4, W8CAL 4, K8BS 4, WA8GXD 4, K8GEP 4, W8LYV 4.

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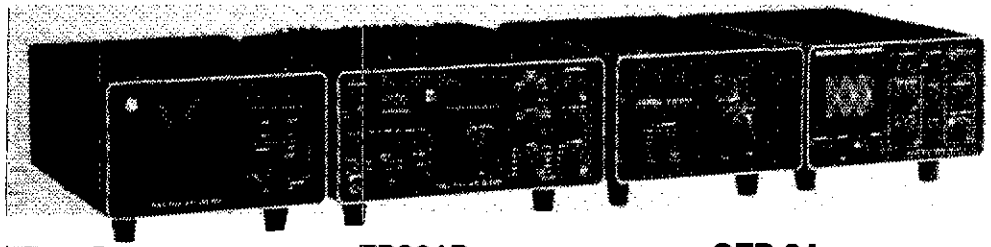

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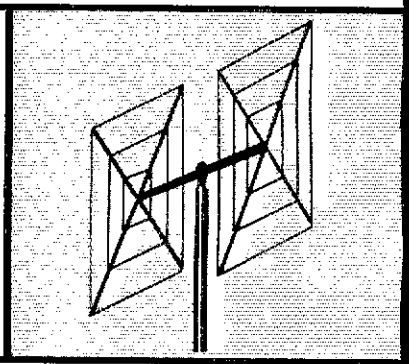

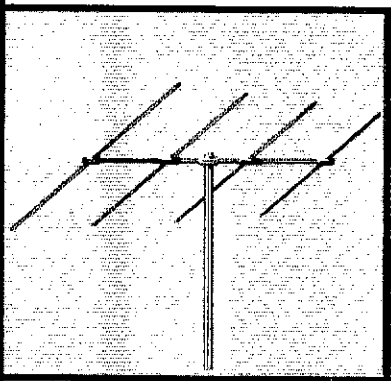

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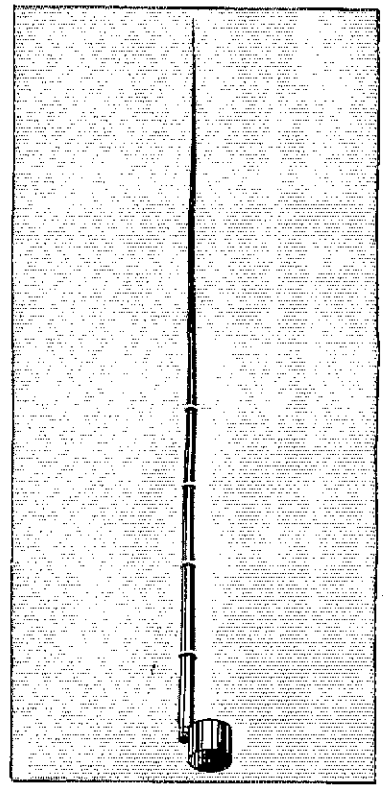
V80 vertical antenna for 80, 40, 20, 15, 10 and 6 meter bands. Our most popular vertical. Used by thousands of novices, technicians and general license hams. **JUST $24.95**

V160 vertical antenna for 160, 80, 40, 20, 15, 10 and 6 meter bands. Same as the other vertical antennas, except that a larger loading coil permits operation on the 160 meter band. **JUST $26.95**



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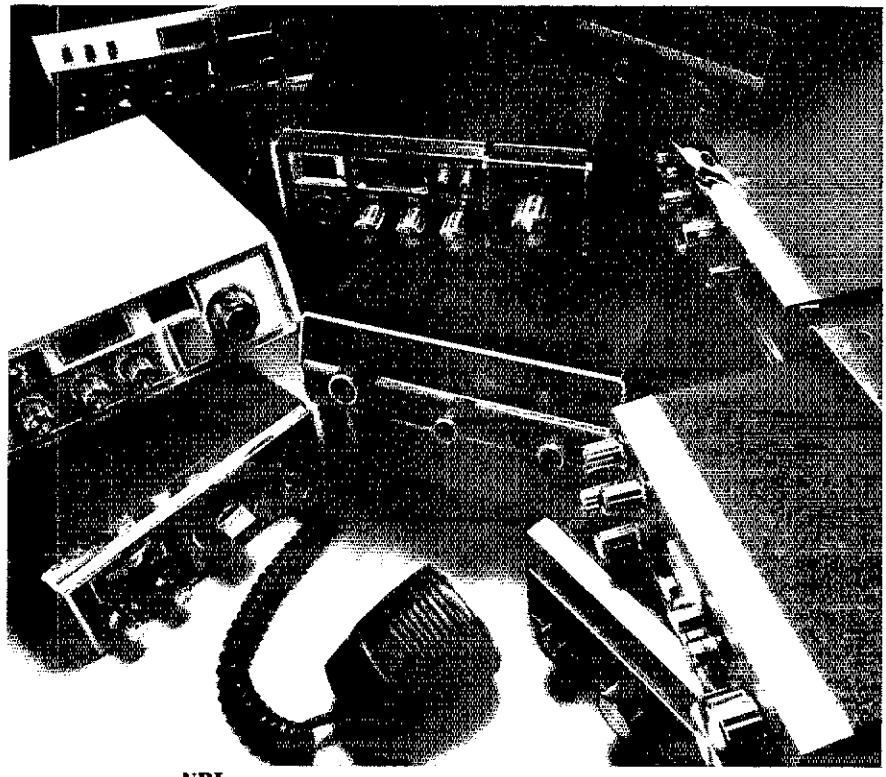

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The law requires that technicians hold an FCC Radiotelephone License to work on broadcast equipment. NRI training in Complete Communications Electronics or our CB Radio Specialist course is carefully designed to give you the special coaching so helpful in passing FCC license exams. If you fail to pass the FCC examination for radiotelephone license after graduating, *NRI will refund your tuition in full.* The money-back agreement is valid for six months after completion of your course.

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ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Clyde O. Penney, WAØHLQ — SEC: KØFLQ. RM: KØTER. PAMs: KØCNV WAØYGQ. Newly elected officers of RMVHF Soc. for 1978 are WØMKZ, pres.; WBØUFP vice-pres.; WAØNHD, secy-treas. Newly elected officers for the BARC for 1978 are WØPWS, pres.; WBØMMJ, vice-pres.; WBØZID, secy.; WBØFFV, treas. KØOHU reports group of amateurs assisted in communications with Copper Mtn. Special Winter Ollympics, and also handled emergency communications for auto accident on I-70. WBØQPQ has been quite active during Jan., having placed his HT-32 on the air, passed his Extra Class exam., acquired a Heath 6er & scored 33000 points in Jan. CD party. WØWYX reports a new record, handling 89 messages during one session of the WX net. Net Tfc. for Jan.: Columbine QNI 1323, QTC 118, informals 422, QNF 1535. Hi-Noon QNI 1426, QTC 161, informals 208, 35 sessions, QNF 1543. Late Net Tfc. for Dec.: Colo-Wyo QNI 368, QTC 308, 31 sessions, QNF 1549. Traffic: (Jan.) WØWYX 2371, KØYFK 1114, WDØBNL 356, WBØQPQ 223, WBØZQG 201, KØOHU 177, WAØYNP 176, KØOTU 172, WBØMCL 128, WØGW 127, WØLQ 121, WØMDT 109, WØRE 102, WBØLFR 100, WØGO 99, KØCNV 53, WDØAJD 36, WØLAE 36, WBØYKH 22, WDØCHX 16, WBØLFQ 15, WØMYB 10, WØNFW 9, KØSPR 7, WAØHLQ 3, WBØUMV 1. (Dec.) WØLQ 162, WAØYNP 134, WBØMCL 128, KØOHU 70, WØMYB 12, WDØBNL 8. (Nov.) WDØBNL 62.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR PAM: K5IKL RM: K5KPS. Southwest Net (SWN) meets daily on 3585 kHz, at 1915 local time and handled 300 msgs with 312 stations reporting in. New Mexico Roadrunner Net (NMRRN) meets daily on 3940 kHz at 1800 local and handled 77 msgs with 1050 stations reporting in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 59 msgs with 721 check-ins. Helen, XYL of W5QNR improving after hospital stay. VHF gang snowed out. W5ENI marine mobile for next ten months on 14.065. WB5TGL new pres. of Silver City Club. Traffic: W5JOV 347, W5UH 317, N5NG 308, W5DAD 233, K5KPS 225, WD5AHH 96, W5ENI 85, N5SJ 35, W5TWZ 18, WA5MIY 13, K5XY 6.

UTAH: SCM, Carl R. Ruthstrom, W7GPN — WA7ZBO demonstrated Oscar to the BYU ARC, W7OHR. The club has begun action to develop an Oscar station with a new FT-221R. WB7FID and WB7FAW gave ATV demo at DEC. meeting with superior picture quality. Activities at W7OHR include DX and patches to AZ, MI, OR and PA. 160 meter activity low. WB7PZA and WB7RPF updated to General. Thanks to WA7VYJ, new W7OHR station mgr., for BYU ARC report. The UARC received a distinguished service citation from the UT OES, signed by the Governor, for 50 years of dedicated service in the field of emergency communications. W7OCX net mgr. of BUN. SET was successful. A swaptest is planned on Apr. 1, at WA6GMB's/7 in Riverton. Utah Co. has new ARC Central Utah ARC. Founders are WA7SVN and WB7BEG. Don't forget UT Hamfest June 17. Please get reports in by the 4th of the month. Traffic: K7HLR 210, WA7MEL 74, WA7JRC 66, WA7OAU 23, W7UTM 21, WB7DMI 19, W7FYR 14, WB7ECL 13, K7JL 11, W7OCX 7, WB7TSS 7, WB7RQP 2.

WYOMING: SCM, Chester C. Stanwaity, W7SDA — Asst. SCM: W7KHH. PAM: WA7WFC. RM: K7KSA. WB7UVB new Novice in Gillette. W7JZU now resides in ID. K9CEI/7 resides in Newcastle. W7JID in Sheridan now active after several years off the air. The Natrona County EC reports SET operations resulted in 27 QNI on SSB, 34 QNI on two meters and 16 Novices on CW. K7SLM planning to retire in July. Wyoming nets could use QNIs from several towns and cities around the state. Clubs and ECs should be planning for Field Day activities. Traffic: (Jan.) K7VWA 536, W7SQT 456, W7TZK 262, W7YWW 43, WA7WXQ 32, K7SLM 17, W7BMJ 6. (Dec.) WA7WXQ 100, K7WY 4.

SOUTHEASTERN DIVISION

ALABAMA: SCM, Frank S. Brown, W4LNN — PAM: K4JIE. RM: N4MD. Appointments: OOs Class II: WB4BYQ WB4TVY. OES: WB4TVY. Endorsed: ECs: K4ONF W4MTO. OBS: K4UMD. Early reports indicate the 1978 SET was a big success. A bigger and better BirmingHamfest is planned this year to be held in the New Civic Center. Enterprise ARC getting a new repeater and talking it over at Sat. breakfast get-togethers. WA4UTC top winner of 69 prize winners at BRAC Jan. raffle. K4JIE receives nice write-up in Balwin County paper for EC and CD work. Jackson Co. ARC election results: WA4NWW, pres.; WA4BCM, vice-pres.; WB4SRT, secy-treas. They are planning a new repeater. Montgomery ARC election results: WA4NFU, pres.; WB4TKU, vice-pres.; K4PFR, treas.; W4CNQ, secy. W4CNQ invites check-ins to their 04/64 Sun. 8PM net. K4HJM, busy again getting new ARES members. Muscle Shoals ARC holding round-table sessions on 21.4 MHz Wed. 9 PM. With K4UMD's help, WD4NYL/N now on the air and heading for WAS with 14 states the first month. Valley ARC re-activates AENI net, interested in a daily or Sun. morning 3965 kHz net? Let your SCM know your thoughts. Traffic: (Jan.) WA4JDH 1288, N4MD 374, W4DGH 174, WB4EKJ 130, W4LNN 76, K4AOZ 74, WA4RND 71, WA4VKD 66, WB4KSL 64, WA4FYO 44, WA4TYH 37, WB4TKU 30, WB4RCF 30, K4UMD 15, WB4UBW 14, WA4RMP 12, K4HJM 11, WB4ZOG 7, WA4VEK 3, W4MHO 2. (Dec.) WA4RAJ 91, WA4VKD 51, N4KC 3.

CANAL ZONE: SCM, Paul F. Ebdon, KZ5TJ — KZ5OD has turned over the QSL Bureau to KZ5PM. The CZARA presented Lee with an engraved D-104 mike for all his years of faithful service to all KZ5s. Senator Barry

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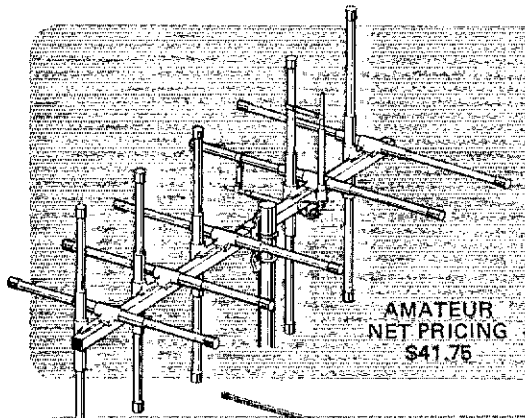
FINCO Is introducing its new Stinger Series Amateur Antennas.



AMATEUR NET PRICING $41.75

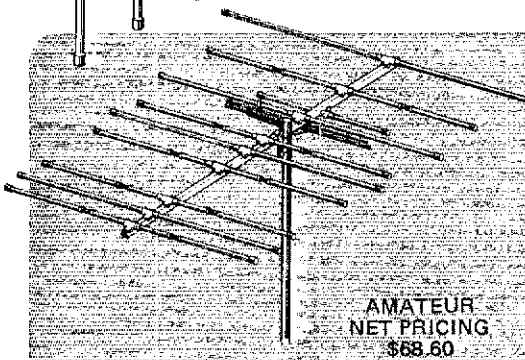
FINCO STINGER A 2+2

2 Meter

The model Stinger A 2+2 is a ten-element, dual polarization 2-meter antenna designed for OSCAR communications or where switching from horizontal to vertical polarization is required. The A 2+2 can even be phased to operate on both horizontal and vertical polarization at the same time (circular polarization). This is not only ideal for OSCAR work but gives your station versatility for ground communications.

Wide, non-linear element spacing gives the A 2+2 superior gain. However, since it is a five element beam in one given plane, the half power beam width does not make satellite tracking difficult because of sharp directivity. The dual gamma match assemblies provide for a very low V.S.W.R. and will withstand 2,000 watts P.E.P.

The Stinger construction features make the A 2+2 extremely heavy duty. Provisions are made for mounting the antenna at the end of the boom – for azimuth control – or at the middle of the boom for normal applications.



AMATEUR NET PRICING $68.60

FINCO STINGER A62

6 & 2 Meter

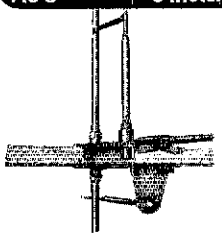
The model Stinger A 62 is a truly remarkable combination 6 and 2-meter beam designed for optimum performance on both bands yet only requiring ONE transmission line. This is accomplished through the use of exclusive phasing elements to accomplish dual band operation with no sacrifice to either band – NO SWITCHING REQUIRED!

On 2-meters, the A 62 has 6 colinear elements – equivalent to three 1/2 λ 6-element yagis stacked side by side – thus giving outstanding performance. Maximum forward gain is assured on 6-meters through the use of four wide spaced elements. The heavy duty Stinger construction is used throughout so that the antenna will withstand 100 mph plus wind loads.

The A 62 is ideal for mounting on the same mast as your tri-bander or other antenna thus easily opening up the world of 6 and 2-meter VHF communication.

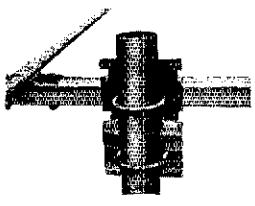
OTHER FINCO STINGER AMATEUR BEAMS AVAILABLE:

MODEL	AMATEUR BAND	ELEMENTS	BOOM LENGTH	AMATEUR NET PRICING	MODEL	AMATEUR BAND	ELEMENTS	BOOM LENGTH	AMATEUR NET PRICING
A10-4	10 Meter	4	16'	57.15	A2-5	2 Meter	5	5½'	25.60
A6-3	6 Meter	3	6'	27.30	A2-10	2 Meter	10	10'	41.15
A6-5	6 Meter	5	13'	41.95	A1¼-10	1¼ Meter	10	8'	29.65



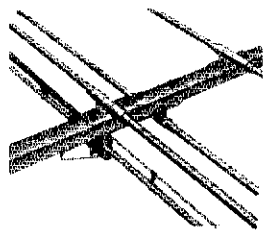
ENGINEERING FEATURES:

All Stinger Series Amateur Antennas incorporate heavy duty fully adjustable gamma matching systems to allow for maximum power transfer. The design provides for minimum V.S.W.R. and a wide bandwidth. A built in SO-239 type connector assembly is utilized plus the matching systems are power rated at 2,000 watts P.E.P.



A 4"x 6" x full 1/8" thick heavy duty plated steel mast to boom mounting assembly is used on all Stinger Series of Amateur antennas. The bracket assembly locks permanently on the square boom and thus withstands high wind loads and torque without twisting or becoming misaligned. The assembly accepts mast diameters of up to 2" O.D. Provisions for mounting either in a vertical or horizontal plane is incorporated in several models.

Exclusive Stinger square boom construction is used on all amateur antennas. The 1¼" square booms are of .064 wall high tensile strength aluminum which is many times stronger than its round counterpart. Also, special bracket assemblies have been developed to allow instant element to boom alignment – plus they stay aligned in the highest wind and ice loads. All elements are of thick wall high tensile strength aircraft quality aluminum.



Antenna design engineering is a specialty at FINCO. Top quality lab standard test equipment is used throughout the development and design of all antennas. The FINCO antenna test range has been carefully checked for erroneous reflection characteristics that could cause errors in antenna designs. Shown is the sophisticated stub and matching system that has been developed for the Stinger A62, 6 and 2-meter dual band beam. No traps or coils to burn out or detune, thus assuring you of the highest possible performance on both 6 and 2-meters.

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Goldwater was recently in the CZ and while here received KZ5BG as his call. The Koffee Klutch every Sat, between 10 and 12 noon, at the Balboa Cafeteria is open to all Hams or anyone interested in Amateur Radio. KZ5FTN started his 2nd novice class. It's not too late to offer Frank a hand with teaching a class or two. Give FTN a call if interested. Thanks go to two HP's for their fast and efficient operation in trying to save the life of a CZ soldier. An HP5 made radio contact with an HP1 who got the emergency evacuation under way. At this time I have not been able to find out their names or calls.

GEORGIA: SCM, A. H. Stakely, K4WC — SEC: K4YRL. RM: N4UZ. PAM: K4JNL. Congrats to all who participated in making SET '78 the biggest and best yet. A great job well done! Also congrats to K4VHC WA4BZY and WB4MZO making BPL; to K4YRL K4EV WA3NAZ/4 K4VHC WB4TEK WB4DHC and W4PIM making PSHR. Also congrats to W4BIW WA4DYK WB4KEY and W4MWT making Extra, to WB4PRM making Advanced; to WD4IBT and WD4ICC making General and WD4HZJ making Tech. Congrats to K4SMX as man of the year for SE DX club and to N4NX making 5BDXCC, 5BWAC, winning SEDX club yearly award and Washington State QSO Party. N4NX new call of K4KZP. WA4OZT second in Jan. CD phone contest. Sadly we report W4NKA a Silent Key. Officers of Cedar Valley ARC are: W4IMZ, pres.; WA4YOZ veep; WA4OHM sec/treas. Officers SEDX club are: W4LVM, pres.; WA4PYF, veep; AA4DR, secy; K4JRB, treas.; K4SMX, act. mgr. GARES QNI 162, QTC 2. CVEN no 1 263, QTC 313. CVEN no 2 QNI 1364, QTC 133. GSN QNI 410, QTC 347 (during SET only QNI 22, QTC 140). Cntrl GA VHF net QNI 116, QTC 12. Cedar Valley repeater 72/12. WA4OHM repeater 90/30. WA4FXV assisted K4WC during SET. Neat WR4AED directory is work of WA4BZY. WB4MZO sent printed notice to WE employees about Xmas radiograms with originations of 198. WB4DHC made PSHR in few holidays while back from Citadel. High winds did much damage to antennas all over the State, W4HON active on HF mobile during SET W4AAY back from AL. WB4TEK active in CD party. WA3NAZ now has a Super Pro with his Globe King. Traffic: (Jan.) W4FOE 430, WA3NAZ/4 407, K4WC 292, W4QH 277, W4PIM 219, K4VHC 188, W4HON 136, N4UZ 119, W4ELO 104, K4YRL 103, K4NM 83, W4BIA 63, WB4TEK 60, WB4DHC 53, K4BAI 49, K4EV 45. WA4OPV 19, WA4OZT 14, W4JM 4. (Dec.) WB4MZO 396, WA4BZY 378, K4YRL 24, N4NX 2.

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RH — SEC: WA4WBM, RM: WB4GHU, PAM: WA4TNC/75; WA4FKE/40; WB4BSZ/VHF. Appts: WA4FKE PAM/40m; WD4IHA EC/Gilchrist Co., WD4NYY EC/Washington Co., WA4NKA EC/Beaches of Jax; N4PL OBS; W4SME OPS. New NM of FPTN is WB4WYG; Asst. NM WA4FKE. WB4JMM now Asst. NM of TPTN. SNCs earned on NFPN by K4ADM WA4BZV W4COD WB4EXA WB4FVV K4IKY W4LYJ N4PL WB4QBB WA4VLT & WB4WXP; also by W4FZX and WD4HIF on FMTN. FMTN has new rollcall procedure, minimizing waiting time. Five Flags Chapter, 10-10 club, active with WB4QBB certificate Mgr. and WA3VEW/4 NCS. USNCTC club Corry Station, now meets Sat. at 1900Z. W4SMM's son now WD4MFJ. N4SS settled in new Pace home. W4LRC W4COD W4BPJ and W6DSD/4 all hospitalized last month. W4OMC now on 75M from Caryville. Tallahassee 31/91 repeater now has autopatch tnx to WB4NAY. WD4ENQ active on 80-10M CW from Perry. Lake City area now has 29 hams. Newcomers are WD4KFH WD4KPE WD4MFT and WD4MLO. WA4ZFQ upgraded to General, 1978 Jax. Hamfest to be sponsored by all local clubs — N4UF appointed chmn. NFDXA has its own QSL design for members. NOFARS won FL Skip award for high club score in FL QSO Party. WA4VJP WB4FAJ and W4KUU helped stop an illegal intrusion into amateur 2m band. W4MGO continuing FB ham column in Daytona Beach newspaper. CFRA now running Orlando 22/82 repeater. W4MVG new NCS on NFPN. New calls: WB4SQJ now N4ZL; WA4BXT now N4ZF. Officers of Gulf Coast ARC: WB4AOY K4INK WD4LGA & WB4YNN. Lake Monroe ARS officers: WA4OAX WD4DIU WA4LQV WA4VUX & WD4DTC. Tnx to all for fine support of SET. Traffic: (Jan.) WB4QBB 402, N4PL 384, WB4GHU 349, WB4SKI 326, N4WA 265, WA4OEM 175, WB4TZR 172, W4JL 160, K4HYV 144, W4KIX 136, WA4ECY 127, W4MGO 113, W4RH 108, N4SS 108, WD4HIF 89, W4DTV 74, WD4IIO 70, W4LDM 60, WB4EXA 58, K4RZM 55, WD4NYY 52, WA4EYW 51, K4OER 42, WB4VAP 39, WB4WYX 36, WB4RIS 35, WA4FAJ 33, WA4CRI 30, WA4STZ 25, WB4HRG 22, WA4HHC 21, W4MVG 16, WA4TNC 13, W4FZX 12, K4RNS 12, K4DDY 8, WA4EYU 7, K4KUU 7, WA4CLY 6, WA4HCS 4. (Dec.) K4VFY 112, K4BV 66.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — SEC: WB4ALH. RM: W4MEE. PAMs: WB4AID & WA4NBE. New appointments: WA4YQI EC Polk Co. New Official Emergency Stations: WB4ALH W4APV WB4BNL W4BX WB4DWU W4ESH W4GPL K5IHH/4 K4ISS W4IYT WA4KCR WD4KPG WB4LXH W4MIM WA4MJT W4OBL K8PXM/4 K4QCG WA4QGV K4SCL K4SJA K4URX with several more applications pending at month's end. Looks like this is going to be a very popular as well as important appointment. Official Observers qualifying under new rules: W4BK W4MML W4ROA WB4SSP W4ZR. K40SQ Miami Springs ARC has new Swan HF rig and 2-meter gear working. W4IYT reports big SET operation from K4IWT using 4 Miami repeaters 75/40 SSB and C.A.P. Pinellas Co. ARES was active on at least 10 frequencies racking up a traffic total of 762 with 5 repeaters and 150 hams — highest scores in history. And there was newspaper coverage — first time anybody can remember. SEC, WB4ALH placed whole Section in emergency status Sat. for imaginary hurricane Evelyn crossing FL, giving us a good workout. Clean-up operations continued on Sun. in local drills with good participation by civic organizations, hospitals, Red Cross and Salvation Army. FL SECs have reached tentative agreement with REACT to help in emergency location of travellers by relaying messages from one REACT group to another. Traffic: (Jan.) W4MEE

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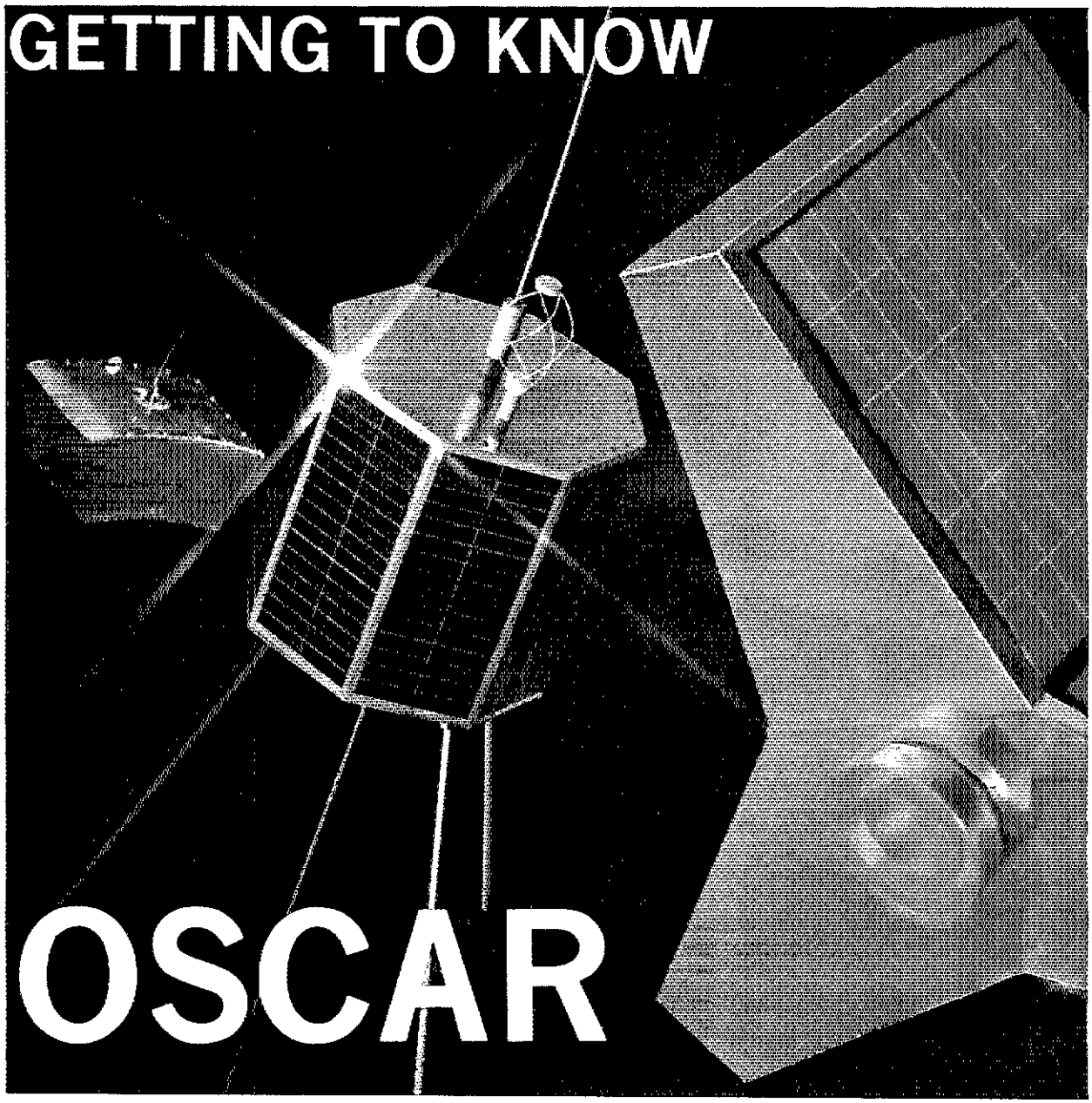

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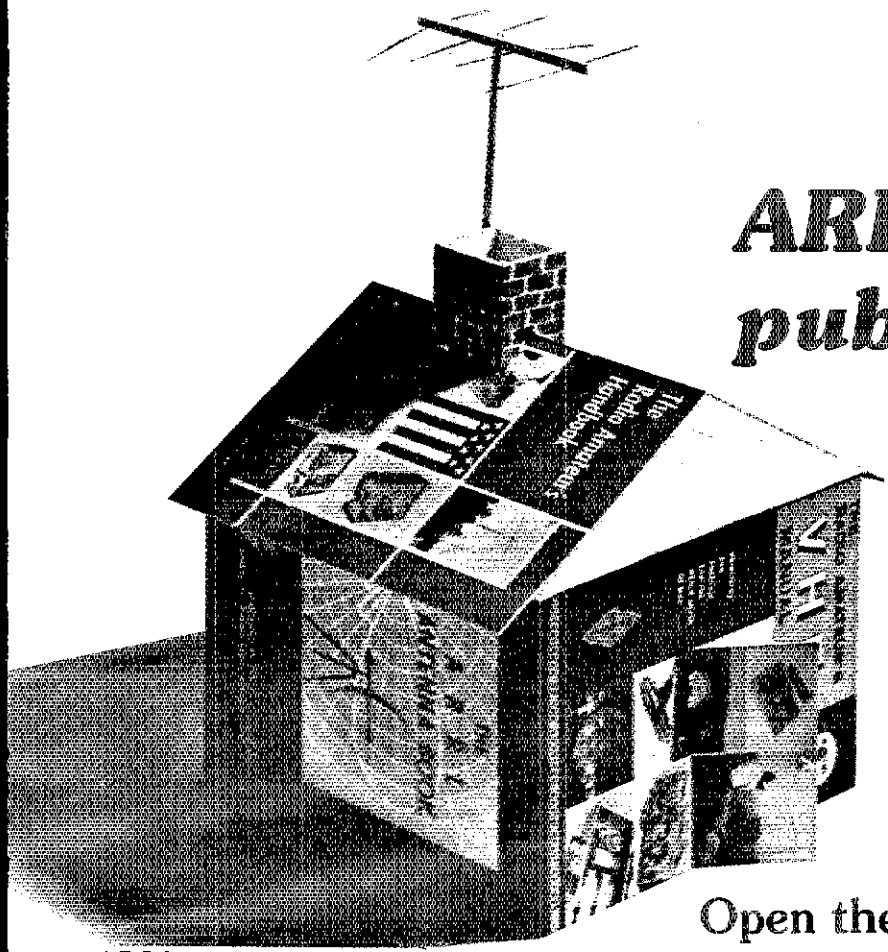
SOUTHWESTERN DIVISION

ARIZONA: SCM, Marshall Lincoln, W7DQS — PAMs: W7UQQ WA7KQE. RM: W7EP. New officers of ARCA are WB7PVJ, chmn.; WB7DRD, vice-chmn: WA7IVA, secy.: W7KMV, treas. AZ ARC activities for the coming year will include license classes, demonstration of ham radio in public schools and conversion of CB rigs to 10 meters. Members have been using 15 meters at night for local CW practice, around 21.14 MHz. Many members of the Phx repeater club again supplied communications for the Fiesta Bowl parade. K7QWR is the club's new program chmn. The Metropolitan ARC of Tucson now is affiliated with the ARRL. K7RDH is now curator at the Hall of Flame fire museum at Phoenix. WB7CZL passed the Extra test. WB7TPY reports success on 2-meter repeaters in moving traffic when there is no outlet on 75 and urges more hams try this. At its Jan. meeting, Hualapai ARC members already were planning for Field Day and a Christmas party. WB7OEC listed amateur radio license training in a short course program at ASU. Nets: SWN 300, Cactus 172, ATEN 93. Traffic: (Jan.) W7EP 401, WA7EBR 293, K7UXB 130, W7LVB 102, WB7CAG 94, WB7TPY 62, WA7IYG 56, K7NTG 56, WA7KQE 52, WB7ORT 43, K7NMQ 23, W7OIF 21, W7DQS 10, K7RDH 10, WA7WEB 10, WA7JCK 8, W7HFR 7, WB7CZL 3, K7GLA 2, WA7QMA 1, W7RQ 1. (Dec.) WA7EBR 482.

LOS ANGELES: SCM, Perry Masterson, W6RHS — Latest word from Stan Brokl is that he is doing fine. He has a new call, N2YO. Lots of activity reported for SET '78. The Pasadena Radio Club led the way this year. The following stations reported activity for the test: W6KA K6OMU WD6AZC WD6EQK WB6RQY WD6AND W6QQM N6LL WB6YJJ WA6LDT N6VA W6BRO W6ZH K5DY/6 W6INH W6RHS. I am sure there were others involved, but did not report their activity. Duane Heise ex-WA6ORJ now AA6EE in Ramona. N6HE reported 15 U.R.A.C'ers participated in the 1-29 walkathon in South Bay. Ray has been active with SET '78 and an unscheduled bout with the flu. Some of the mail addressed to the SCM still coming by way of New Jersey. Thanks to Stan for forwarding it back to me. There are still openings for appointments in the section. We need amateurs to work in EC, OO, and all other ARRL slots. If you have the desire to get involved in the exciting activities in amateur radio as well as operating, drop me a line and let me know of your interests. I would like to hear from the lady hams in our section. I know their activity is much greater than is being reported. I would like to give them credit for their operation. The Section is gradually being reorganized. Let's have more inputs for next month! Traffic: W6INH 235, K5DY/6 110, N6PZ 105, K6EA 72, W6BRO 50, K6CL 19, WA6WJV 14, N6HE 9, N6VI 2.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — As a result of the recent election, W6INI will continue as your SCM for two more years. Only five more months to the National Convention in San Diego, Sept 22-24, 1978. Advisory committee representatives for 6th call area are: DX N6RJ, Contests N6NB, Repeaters WA6LBV, Emerg Comm W6INI, VHF/UHF WB6NMT. Ideas and comments in those areas are welcome. New appointments: ORS W6HUJ, OTS W6TVY, OO W6NWF. Upgraded: WD6AHE to Extra, WD6DGY to General. San Diego Repeater Assn's new meeting place is University Town Center. Their 1978 officers: WA6SND, pres; W6PDA, vice-pres; WA6NEH, secy., WB6LXG, treas. Correcting an error in Feb QST, ARRL pancake breakfast is second Sat. of each month at Normal Heights United Methodist Church, 4650 Mansfield, 0800-0900. 220 Club's roster shows 82 members and growing. Planning is underway for an Amateur Radio booth at the Southern California Exposition, Del Mar, in late June. Emergency communications will be the theme. Escondido ARS officers for 1978 are: WB6TAW, pres.; WD6BRV, vice-pres.; N6WB secy.; W6IHH, treas. Traffic: WB2BKC 356, WA6UAZ 224, N6GW 213, N6AT 129, WA6UFY 56, K6HAP 39, KGLKW 28, W6DEY 23, WA6HJJ 4.

SANTA BARBARA: SCM, D. Paul Gagnon, N6MA — RM: WA6VBS. WA6BLS doing good job recruiting for the Section ARES Net (Sun. at noon 3935). The Novice practice Net meets on 21146 at 2030 M F T Su. To CW Net meets Wed. at 2000 on 21156. New ARRL affiliated clubs are Hueneme High School ARC and Bunker Ramo ARC. WA6OBT spoke on TVI and Cable TV at Canejo Valley ARC. Mike and Key Club of Camarillo visited the GTE satellite tracking station. Ventura Cty ARC swapfest Apr. 8. WA6FPX won the VCARC badge contest. Sulphur Mt Repeater Assn. officers: K6JA, pres.; WA6ODN, vice-pres.; WB6BPL, secy.; WB6FLI, treas.; K6GYL, chmn.; N6MA, vice-chmn. W6KW recuperating at home. W6RGO working DX from Oxnard. K6TOD is now HF coordinator for SB ARES. WB6QNG has a new Triton IV. K6WI and N5MR building keyboards for CW nets. WB6BWZ/WA6KAA/WA6TLP working on RTTY stations. N6NB scored 25K in Jan. VHF contest for west coast record. N6MA WA6DJS WA6IJZ WA6UEO K6VMN and WB6DUZ put K6MEP on the VHF contest from snowy Pine Mt. WB6BWZ new EC for Santa Maria area, WA6KAC new EC for San Luis Obispo. WB6JKM new Bulletin Station, Oxnard. WA6OBT headed communications for the Hidden Valley Marathon in T.O. Thanks to



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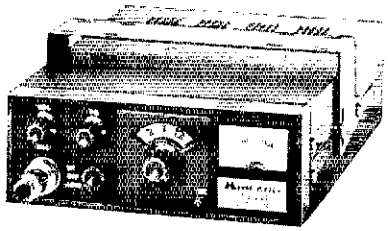

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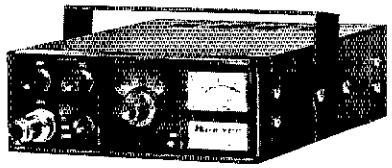

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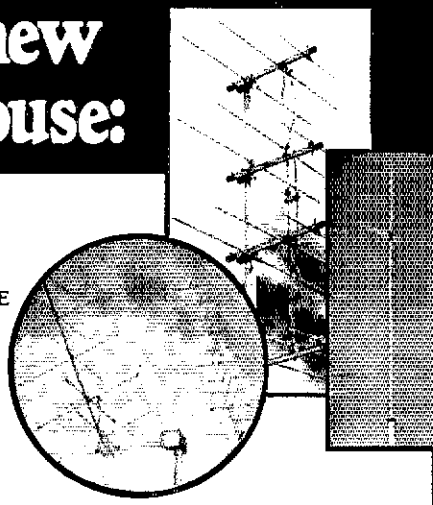

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A220-20	220-225 MHz	22 El. $74.95
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A432-20T	430-436 MHz	20 El. $49.95

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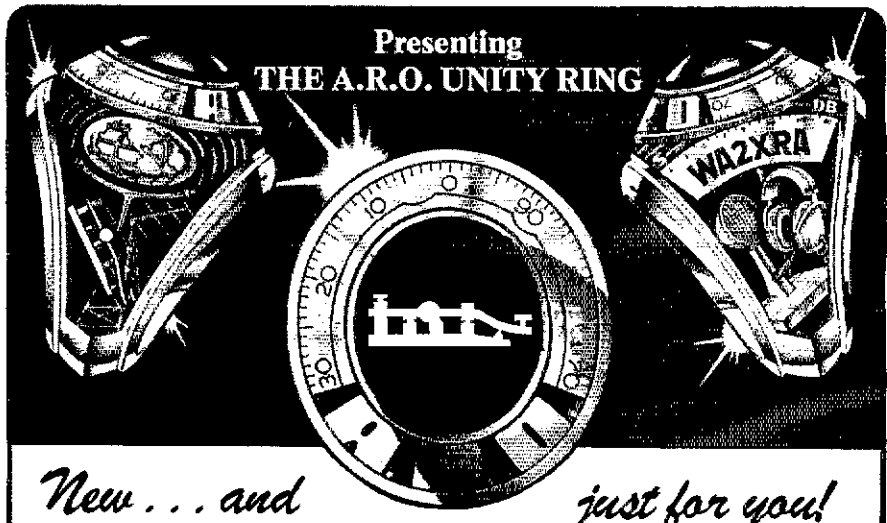

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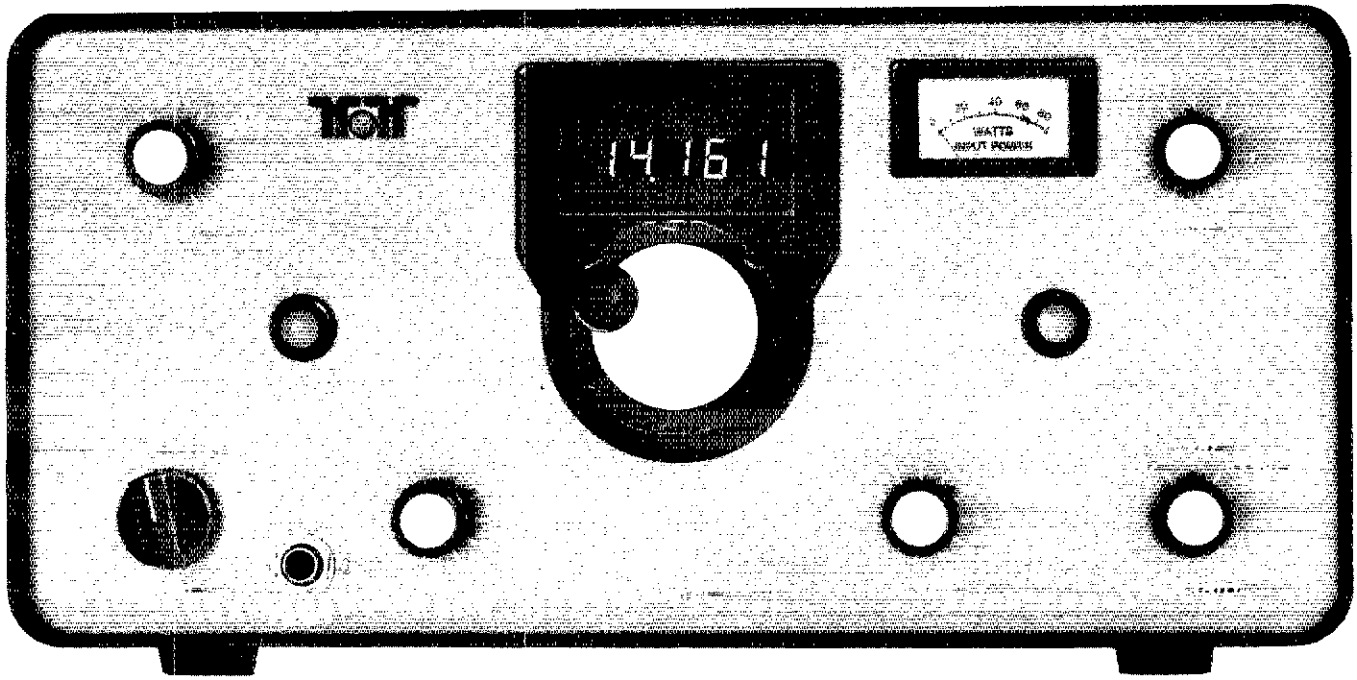

all who participated in the SET. W6RIC led the Ventura ARES on damage survey for County emergency services. PSHR: WA6VBS 37, N5MR 34, K6WI 34, W6SXV 12. Traffic: (Jan.) WA6VBS 190, K6WI 110, N5MR 91, KH6IQU 87, WB6BWZ 29, W6SXV 25, N6MA 26. (Nov.) KH6IQU 40.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Ted Helthecker, W5EJ — K5PC, EC for Northern Texas takes on additional work as Asst. SCM and W5GN named as RM. Jan. has been best reporting month in two years. Panhandle ARC active in SET reports a complete success with continued tests expected during year. Directed by W5CBT, EC. Headquarters announces ARRL affiliation of North Texas Contest Club, N5AU, pres., welcome! WA5RKU providing info on traffic nets in his Tex-notes. This is best info available and if interested, write him to receive your copy. K5WIQ reports new Novice classes underway and best of all, he passed his Extra in Jan. SWOT reports continued growth and interest sparked by good Dec. openings. Red River ARC issued new roster, with news of activities. Editors WA5KZA/WB5JFL doing fine job. W5CTM teaching Novice classes had time to snag ZS4MG/H5. W5TI made PSHR. Reports ARTS Net expected to have ARTS East/West soon as a full-fledged Net. Route map available, 7060 at 1430Z. Hurst ARC reported wonderful Christmas activities with all looking to WB5DRM/WA5UOC Valentine party. WB5MTN reports good traffic total because of SET activity, and Explorer Post No 404 again active. K5SOR operated during SET with "wind-power," that's real emergency testing. W5LGY reports sickness, hope all is OK soon. W5TJ new call for WA5UGT, received 5BDXCC, congrats! New appointments in West Texas in the mill, we need an SET every month to spark and maintain interest, but hard on the ECs. From FT Worth, a new KC Club roster showing nearly 300. New upgrades are WB5HFH WB5TBM WB5UUE! Jan. tranmitter hunt was tough, finishers were WB5GBR WB5SKI and WB5QQH, in that order. . .Lots of fun by all! WB5BRC, working with Tex VHF and OKC sponsors worked out non-conflicting convention dates, W5EYB been wanting this kind of cooperation for years. Good work! Irving ARC prexy WB5UXS announced Irving Ham of Year, WA5EYS awarded for contribution work benefitting the club. WA5ZNZ busiest man in DARC reported traffic! Citizens Radio Watch (CRW) activities on DARC repeater important to police work. Texoma Hamarama Assn. formed and will be sending out info on that popular fall activity in Tex-OK region. As we sit here with snow on ground (Feb. 6) we feel very privileged to be a part of Ham Radio — the people who work in it, who enjoy it, and who unfailingly are generous, friendly and helpful. Don't know why we deserve to be a part of it, but Thank The Lord for the blessing. Right now we're hoping the snow melts in time for Field Day! Keep reports coming. Stations reporting activity in SET WD5BDC W5DOI WB5MTN WD5HEZ WD5EUE K5JR W5LRT W5GFR. There were many others, but reports were not received by deadline time for this report. Traffic: W5TI 325, K5PC 247, WB5SDD 201, WB5MRB 191, WD5BDC 181, WB5MTN 132, WB5LAT 120, K5SOR 117, W5CTZ 115, WB5PWM 112, W5GSN 94, WB5RPU 76, WA5INJ 43, K5YL 23, W5AYX 13, W5YK 12, K5YM 12, N5BT 8, WD5HEZ 6, W5LGY 3, WD5COF 2.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — WB5RLR new PAM for OFON. WB5OSN had to resign due to health problems in the family, we wish them well. W5MGE was featured on Tulsa TV demonstrating a "Windpowered" Atlas. Good Publicity. By the time you read this, both Tulsa and Oklahoma City will have had their Weather Watch program planning sessions. Do you have a copy of "Amateur Radio and the National Weather Service"? Contact your EC or SEC. It is time to be thinking more about "Operation Skywarn." Are we all ready for Storm Season? We welcome affiliated Clubs; Sanite Sideband ARC, Sand Springs and Tri-City ARC at Holdenville. SET 1978 has come and gone with better participation from more groups FB. Several of our repeaters are offering Code Practice on a regular basis FB. We need more nets on repeaters. The OTWXN Weather Reports were up in Jan. Any nominations for OES.? Traffic: W5REC 464, WB5NKD 391, WB5NKC 385, K5OWK 349, W5RB 268, WB5FLG 131, WB5SOH 85, W5UYH 84, W5BYC 68, WA5OUV 66, WA5FSN 58, W5SUG 52, K5CAY 33, WB5OCZ 27, W5VOR 24, WB5EAY 22, WB5TZZ 18, WB5AOH 14, W5FKL 10, W5GM 7, WA5LWD 5, WB5MSU 3, WB5UCM 3, WB5OYU 2.

SOUTHERN TEXAS: SCM, Arthur R. Ross, W5KR — Asst. SCM/PAM: N5TC. SEC: W5TQP. RM: WA5RKU. BPLs: W5KLV N5TC K5DG K5HZR. OOs reporting: K5DL W5VAH. OVS reporting: WD5HJB. OPS WA5RVT completed new top for his operating desk; reports heavy SET activity. WB5FZO active in traffic nets. K5GM resigned as EC for Travis Co. WA5CXG is new EC for Travis Co. EC WB5TNN reports 21 members in Brazoria Co. ARES; all active in SET; Angleton repeater (146.31/.91) getting new antennas; newly licensed Novices: WD5s IPH IPF IQN IPM IPQ. WB5UYV attending Dept. of Public Service (Highway Patrol) Academy for in-service classes. N5ZZ now living in CO; has requested NØZZ so the El Paso gang will recognize him. 7290 Net and Texas Traffic Net will enjoy joint picnic at Kerville State Park Apr. 28, 29, 30. 7290 Net help special sessions Dec. 17 and 24 to take care of heavy Christmas traffic. OPS WA5YEA has moved to Georgetown, still in this Section. K5EWJ and WB5NVH co-authored an article which appeared in Feb. Ham Radio Horizons. K5RAV has been working Europe and Africa on RTTY. OPS WA5VBM reports ice storm wiped out power in Lufkin Jan. 19; Sister Mary operated on emergency power; got through on 40 meters in spite of losing 40-meter antenna in wind storm. Traffic: (Jan.) W5KLV 801, N5TC 608, WA5RKU 432, K5DG 404, K5HZR 322, WA5VBM 212, W5TQP 156, WA5RVT 112, WA5JYH 110, K5QEW 100, K5GM 86, W5BGE 82, W5KR 79, WB5TNN 69, WB5UYV 34, K5ZD 6. (Dec.) K5HZR 795, WA5VBM 158.

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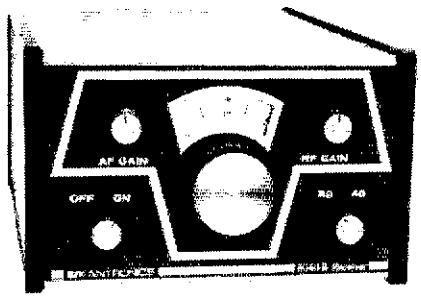

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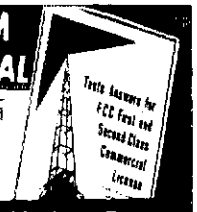

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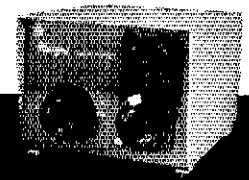

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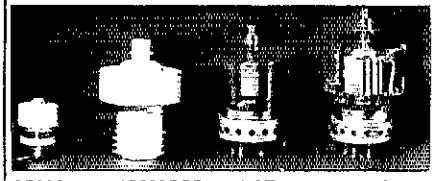

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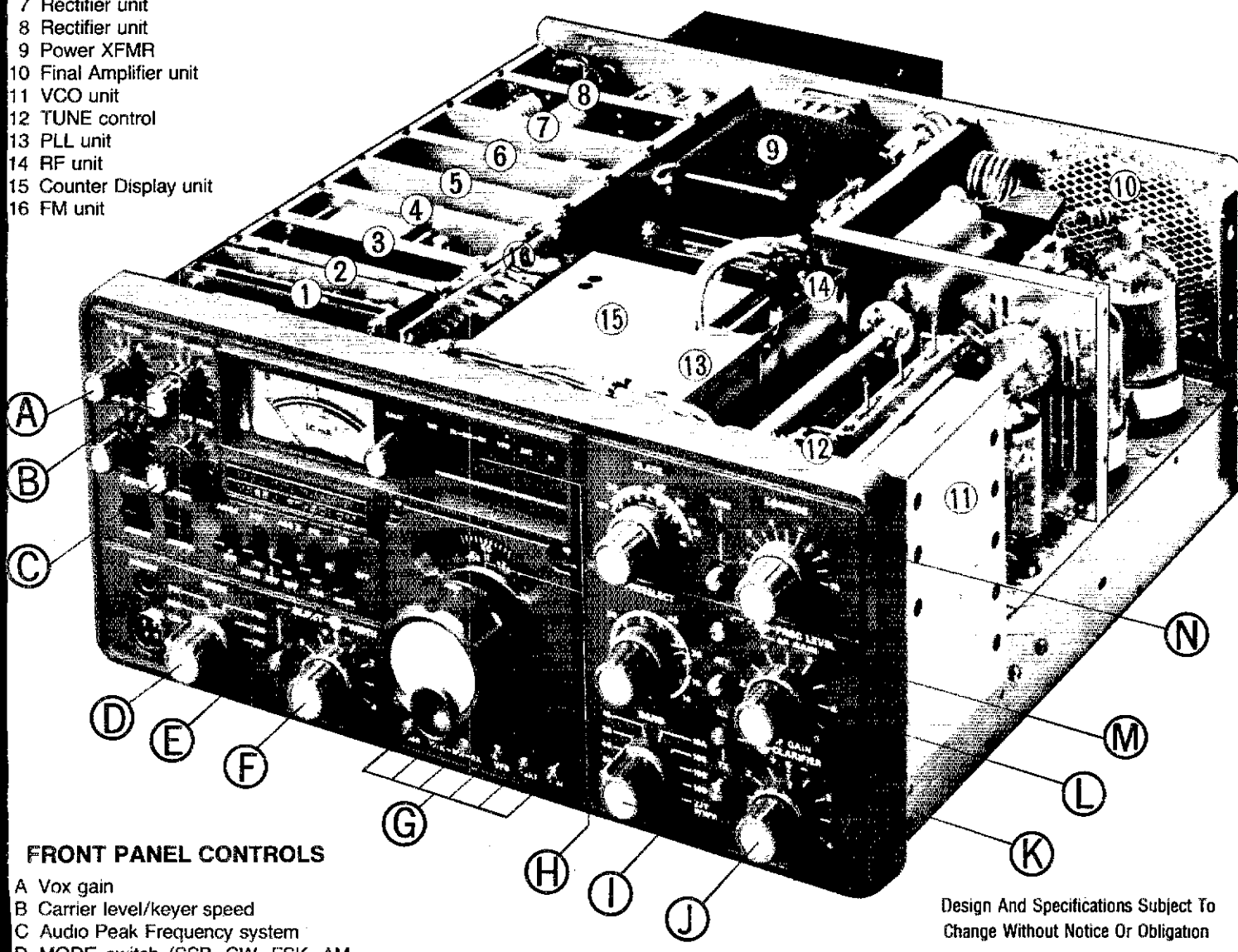

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MOULTRIE Amateur Radio Klub's 17th Annual Hamfest is one week earlier to miss Dayton. April 23, 1978 at Wyman Park, Sullivan IL. Heated indoor & large outdoor flea market. No charge to vendors. For information write M.A.R.K., Box 327, Mattoon, IL 61938. Talk-in 146.94.

THE 41H Annual Northwestern Pennsylvania Hamfest May 6th Crawford County Fairgrounds Meadville PA. Gates open at 8:00. $2 ticket required for admission — $1 to displays. Children FREE. Refreshments, commercial displays welcome. Indoors if rain. Talk-in 04/64 and 52. Details CARS P. O. Box 653 Meadville PA 16335.

RARS Sixth Annual Hamfest, April 23, Crabtree Valley Mall, US 70 West, Raleigh, NC. Big, big flea market all under cover. Fantastic events, ladies activies, meetings. Walk to nearby motels, restaurants, shopping. More info? Write RARS,Box 17123, Raleigh, NC 27609.

TRI-COUNTY ARC annual hamfest May 7. Rain or shine — indoors at Stirling, NJ Youth Center just off Valley Road. 9:00 AM to 4:00 PM. Tables $5, buyers $1. Talk-in on 146.52 and 147 855-147.255. For info write Tri-county ARC P.O. Box 412, Scotch Plains, NJ 07076 or call Herb W2CHA 201-647-3461.

N.E.C.T. 2nd Annual Hamfest: Sunday, May 21st. At: All Seasons Ice Rink, one mile west of Illinois Route no. 59, on North Aurora Road, Naperville, Illinois. For further information contact: WD9HDA, (Cliff) 312-420-8629.

"CALL for papers — Amateur Computing 78 festival, July 22-23 Sheraton National Hotel, Arlington, Virginia. Especially welcome papers, seminars, demonstrations on amateur radio applications of microcomputers. Papers due June 1. Send letter of intent and abstract to John Miller, 6921 Pacific Lane, Annandale, VA 22003. Phone 703-256-5702."

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SPOKANE Swap-Fest, Saturday April 29, Interstate Fairgrounds. Flea market, auctions, contests, picnic, some most unusual exhibits. Sponsored by Inland Empire area amateur clubs. Write: Swap-Fest, Box 3606, Spokane, WA 99220.

ATTENTION: The 9th Annual Dayton, Ohio F.M. B*A*S*H has been moved to new, much larger quarters — the downtown Dayton Convention Center across from Stouffer's Plaza Hotel, Main at Fifth Streets. Plenty of parking in the adjacent garage. Same date and time as advertised earlier, Friday night of Dayton Hamvention, April 28, 1978, at 8 PM, with the same super entertainment and activities. Spread the word that we've moved — there's room for Everyone and we're looking forward to seeing YOU!

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ROME Ham Family Day will be held on June 4, 1978. For information write Rome Radio Club, P.O. Box 721, Rome, NY 13440. (Dealer inquiries invited.)

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TRAVEL-PAK QSL Kit — Send call and 25c; receive your call sample kit in return. Samco, Box 203, Wynantskill NY 12198.

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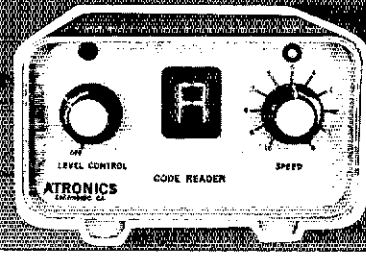

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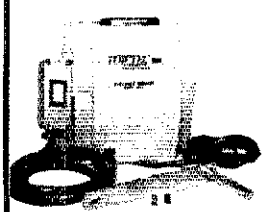

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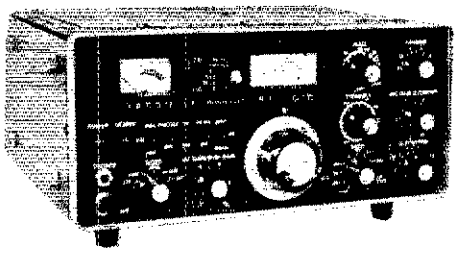

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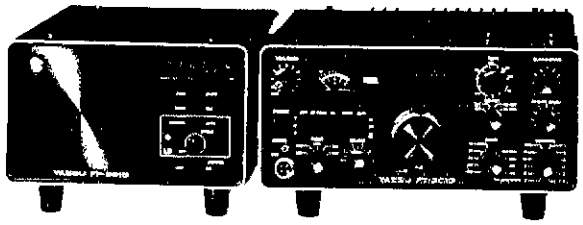

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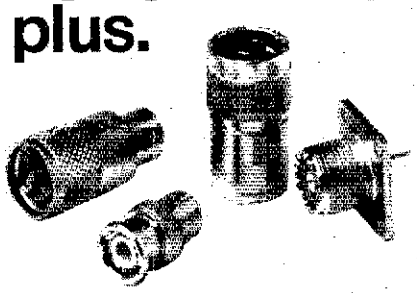

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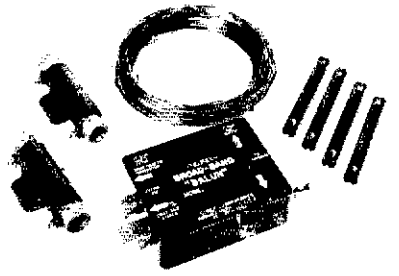

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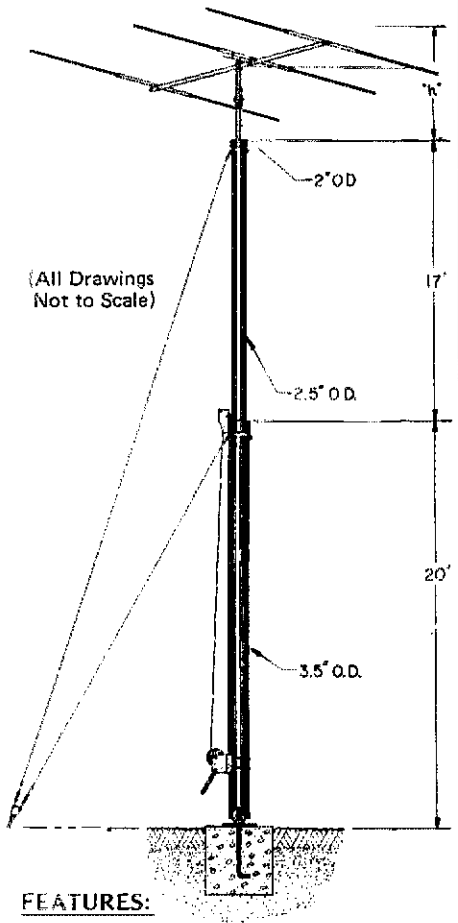


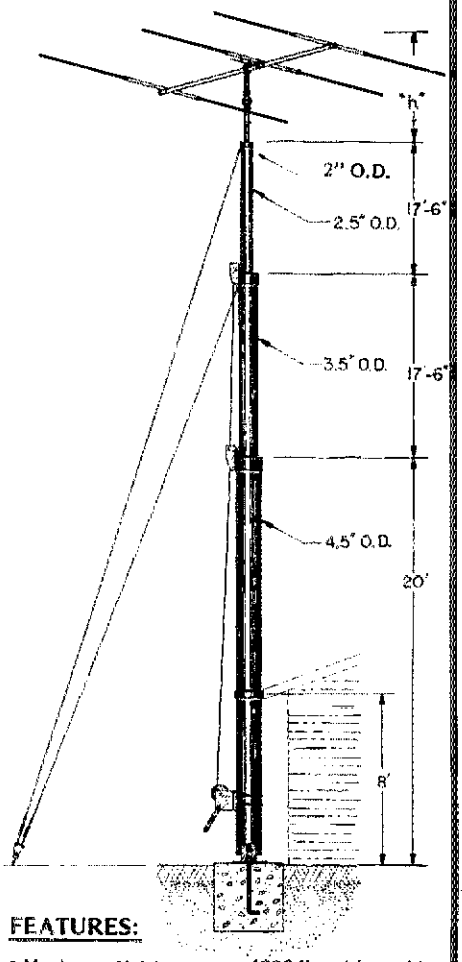
(All Drawings Not to Scale)

FEATURES:

- Maximum Height 46'
- 800 lb. winch
- 2000 lb. raising cable
- Only one cubic foot of cement required
- Total weight, 117 lbs.

The GT-46 is the most economical tower to get you on the air with a Wilson System Two or possibly a 6 element six meter beam . . . this tower needs two sets of guys if used on the side of the house. It may be roof mounted for extra height.

SST-64
64' GUYED TOWER

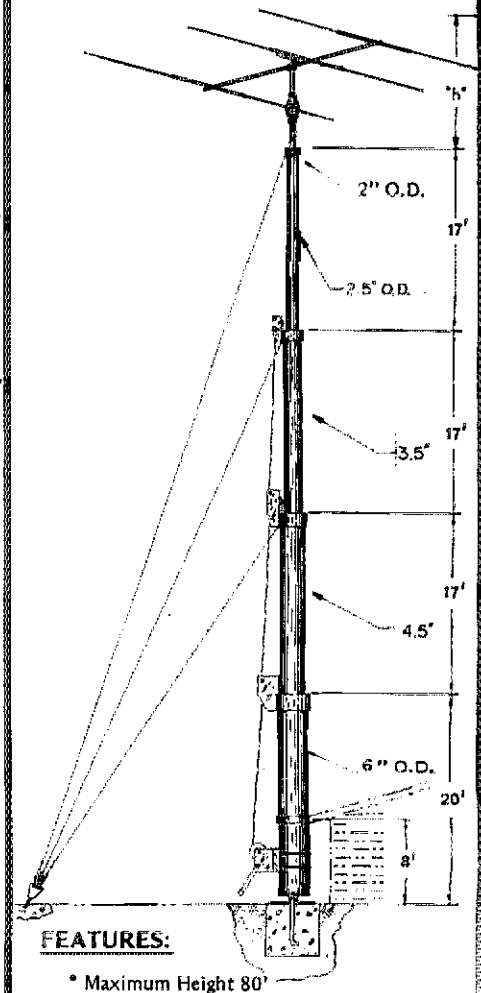


FEATURES:

- Maximum Height 64'
- 1200 lb. winch
- 4200 lb. raising cable
- Total weight 250 lbs.
- Requires only 1½' x 1½' x 1½' concrete base

The SST-64 can get your System One Tri-Bander way up there. This tower needs two sets of guys if side mounted to the house. Mount the WR500 Wilson Rotor on top of the 2" mast with the TB-50 thrust bearing accessory with a set of top guys to the TB-50 for support to the rotor allowing maximum wind loads.

CT-80
80' GUYED TOWER



FEATURES:

- Maximum Height 80'
- 1500 lb. winch
- 4200 lb. raising cable
- Total weight is 400 lbs.

The CT-80 is the tower for a person who really wants to get to the clouds! It will go up to 80' and must have three sets of guys if attached to the house. The TB-50 thrust bearing accessory is recommended if a rotor is used.

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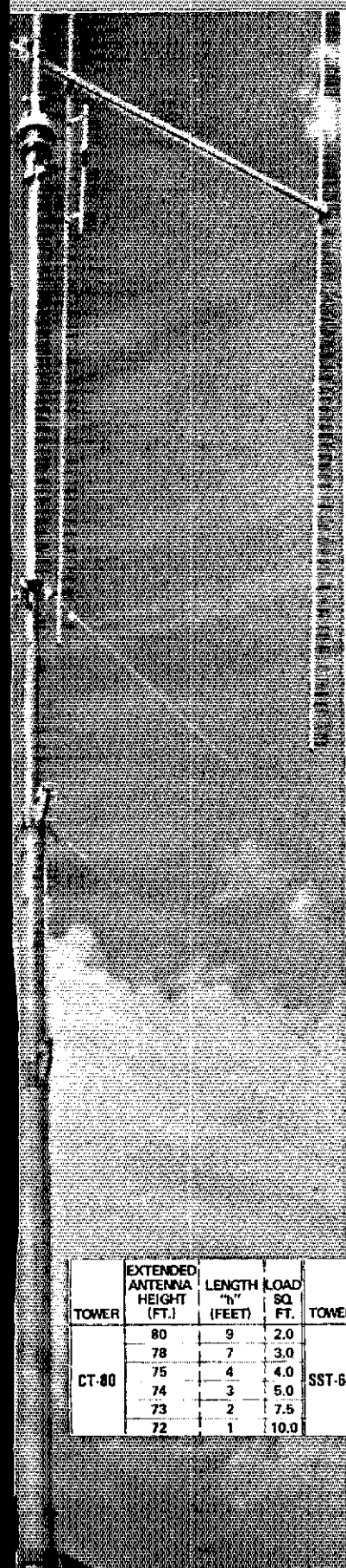
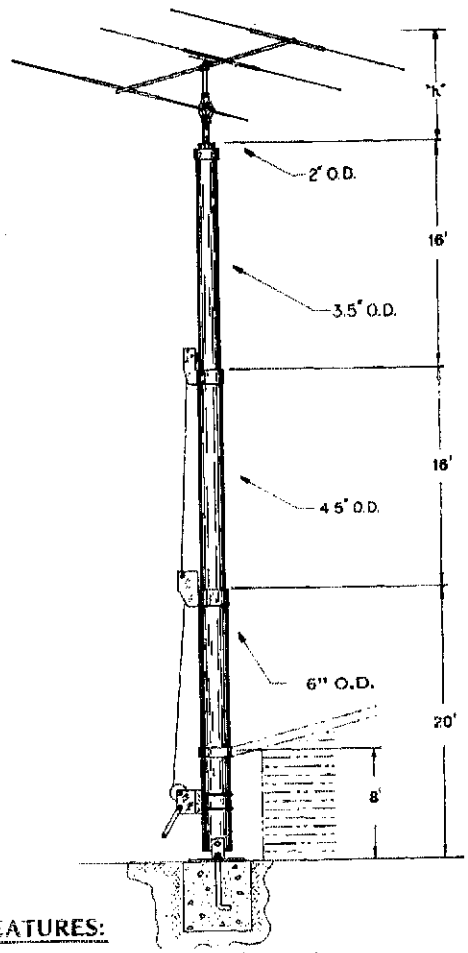


MT-61
61' FREESTANDING TOWER

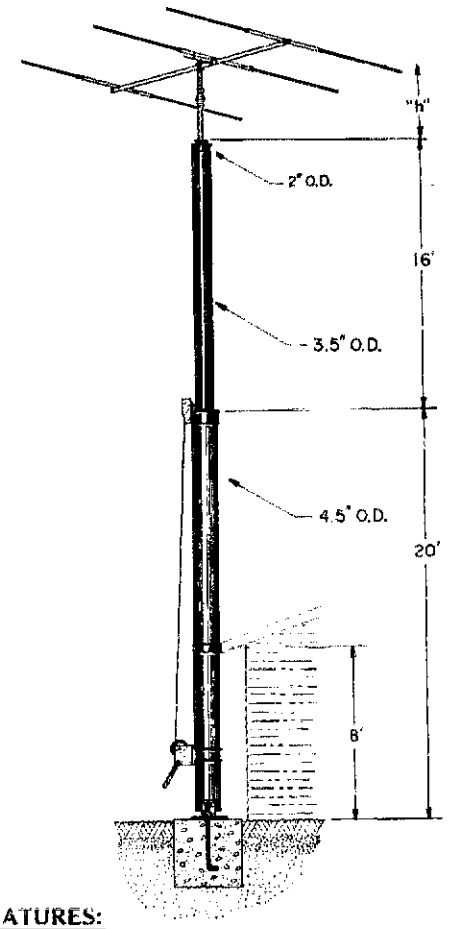


FEATURES:

- Is freestanding with use of proper base
- Maximum Height is 61'
- 4200 lb. raising cable
- 1200 lb. brake winch
- Total Weight 350 lbs.
- Recommended base accessories: Rotating base w/raising fixture or concrete base raising fixture.

The MT-61 is our largest and tallest freestanding tower. By using the RBRF-20 rotating base fixture, the MT-61 is ideally suited for stacking beam antennas. If you plan to mount the tower to your house, caution should be taken to make certain the eave is properly reinforced to handle the tower. If not, one of the base accessory fixtures should be used.

TT-45
45' FREESTANDING TOWER



FEATURES:

- Maximum Height 45'
- 800 lb. winch with padlock feature
- 2800 lb. raising cable
- Totally freestanding with proper base
- Total Weight 189 lbs.
- Recommended base accessories: Rotating base w/raising fixture or concrete base raising fixture.

The TT-45 is a freestanding tower. Ideal for installations where guys cannot be used. If the tower is not being supported against the house, the proper base fixture accessory must be selected.

(CHART BASED ON 50 MPH WIND)

NOTE: Towers will perform to specifications when guyed to engineered factory instructions.

TOWER	EXTENDED ANTENNA HEIGHT (FT.)	LENGTH "h" (FEET)	LOAD SQ. FT.
CT-80	80	9	2.0
	78	7	3.0
	75	4	4.0
	74	3	5.0
	73	2	7.5
	72	1	10.0

TOWER	EXTENDED ANTENNA HEIGHT (FT.)	LENGTH "h" (FEET)	LOAD SQ. FT.
SST-64	64	9	2.0
	62	7	3.0
	59	4	4.0
	58	3	5.0
	57	2	7.5
	56	1	10.0

TOWER	EXTENDED ANTENNA HEIGHT (FT.)	LENGTH "h" (FEET)	LOAD SQ. FT.
MT-61	61	9	2.0
	59	7	3.0
	56	4	4.0
	55	3	5.0
	54	2	7.5
	53	1	10.0

TOWER	EXTENDED ANTENNA HEIGHT (FT.)	LENGTH "h" (FEET)	LOAD SQ. FT.
GT-46	46	9	2.0
	44	7	3.0
	41	4	4.0
	40	3	5.0
	39	2	7.5
	38	1	10.0

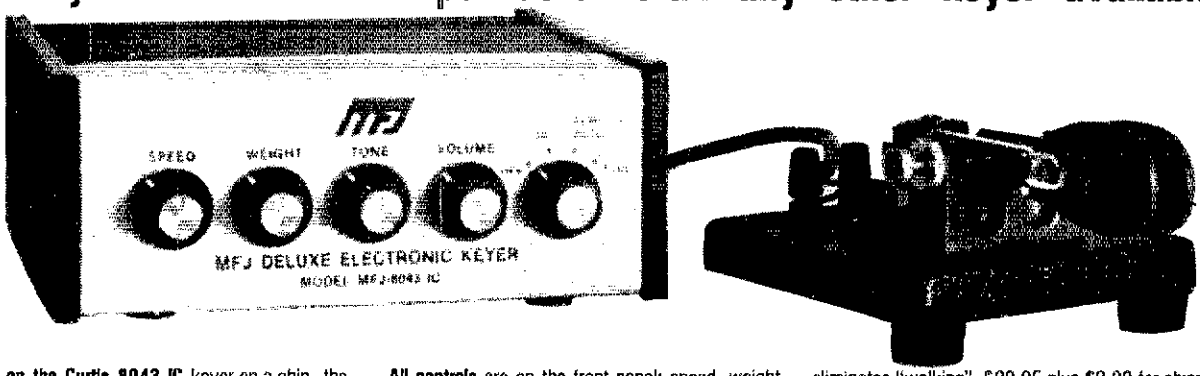
TOWER	EXTENDED ANTENNA HEIGHT (FT.)	LENGTH "h" (FEET)	LOAD SQ. FT.
TT-45	45	9	2.0
	43	7	3.0
	41	5	5.0
	40	4	6.0
	39	3	8.0
	38	2	10.0

NOTE. Dimension "h" refers to length of extended push-up mast.

Dealers for Wilson's amateur line of products are needed for many areas of the country . . . if interested, write for details.

This NEW MFJ Deluxe Keyer at $69.95 . . .

gives you more features per dollar than any other keyer available.



Based on the Curtis 8043 IC keyer-on-a-chip, the new MFJ Deluxe Keyer gives you more features per dollar than any other keyer available.

Sends iambic, automatic, semi-automatic, manual. Use squeeze, single lever or straight key.

Iambic squeeze key operation with dot and dash insertion lets you form characters with minimal wrist movement for comfortable, fatique-free sending.

Semi-automatic "bug" operation provides automatic dots and manual dashes. Use a manual straight key to safely key your transmitter or to improve your fist.

Dot memory, self-completing dots and dashes, jam-proof spacing and instant start for accurate and precise CW.

Totally RF proof. No problems, whatever.

Ultra-reliable solid-state keying. Keys virtually any transmitter: grid block, −300V max., 10 ma, max.; cathode and solid state transmitters + 300V max., 200 ma, max.

All controls are on the front panel: speed, weight, tone, volume, function switch. Smooth linear speed control. 8 to 50 WPM.

Weight control lets you adjust dot dash space ratio; makes your signal distinctive to penetrate thru heavy QRM for solid DX contacts.

Tone control. Room filling volume. Built-in speaker. Ideal for classroom teaching.

Function switch selects off, on, semi-automatic/manual, tune. Tune keys xmtr for tuning.

Completely portable. Take it anywhere. Operates up to a year on 4 C-cells. Miniature phone jack for external power (3 to 15 VDC).

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Optional squeeze key. Dot and dash paddles have fully adjustable tension and spacing for the exact "feel" you like. Heavy base with non-slip rubber feet eliminates "walking". $29.95 plus $2.00 for shipping and handling.

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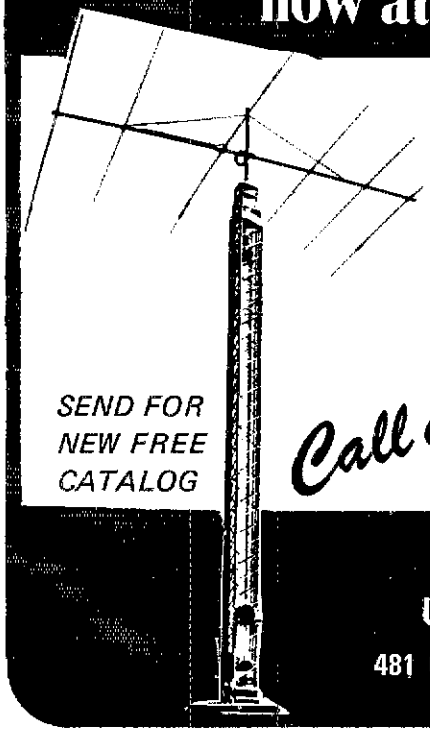
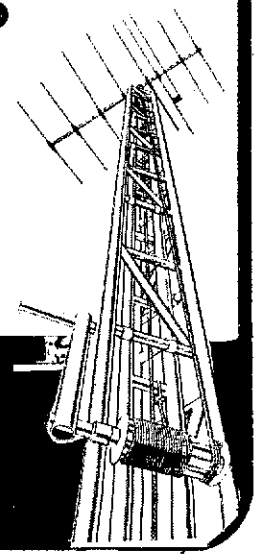


TRIEX - ROHN - ALUMA
TRISTAO TOWERS



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WANTED: Keys, bugs and sounders. Also 2m cw transmitter. WA@YED, 701 19th, Glenwood Springs, CO 81601.

SELLING — Heath SB301, SB401 w/harness. All xtals and filters. Good shape. $375 plus shipping. Collins 32S-3 w/pwr, 75S-3, 312B-4 2/ all harness, extra xtals. Good shape. $1200 plus shipping. All above rigs just overhauled. Will sked. WD4DAH, 912-559-7825.

40-METER YAGI: KLM 4-elements, on ground, perfect condition. $300. 203-667-3170.

DRAKE MN 2000 transmatch 2000 PEP. Brand new. Sell 200. 1-302-994-9536 WB3ERC.

SWAN 500C with 117XC and 14C power supplies $400. Lafayette HA460 $50. Heathkit HW18. WB2SHZ.

HENRY 2K2, excellent condition, very low hours on new finals. U ship. $650. Jene Melton, WA@DEM, P. O. Box 413, Deadwood, SD 57732. 605-578-2191.

TRADE: My Technics SA-5760 stereo receiver, 165 watts per channel, never used, in box, retail $800, for your new or used 80-10M transceiver worth $500-$600 (no kits). Dealers welcome. Jim, WB9YXC. 217-384-2749 weekdays; 217-359-2475 nights.

SWAP: IBM Executive typewriter, Professional binocular microscope, with 4 objectives for two meter HT or 10-80 SSB rig. K4GVW, 4000 Anderson Rd. TH 21, Nashville, TN 37217. 615-367-0767.

FOR SALE, Hallicrafters HT37 ssb, am, cw $160; SX101 receiver/spkr ham bands $160; Johnson Ranger II am, cw $130. 201-431-7581. NJ. WA2HAU.

WANTED: Band "E" coil (900-2050kc) for National HRO-50T1. R.E. Ridinger, P. O. Box 3122, Anaheim, CA. 92803. 714-539-9023.

SELLING: Novice, 2m/6m, HF station components/accessories, test equipment, parts, magazines; antiques, manuals, old books. SWL/satellite receiving — and surplus equipment. Details for (s.a.s.e., catagories). WA3JWF, 89 Shagbark Drive, Shavertown, PA 18708.

WANTED: Heath HW18-3 160 meter good operating condition with manual. WA5WBN P. O. Box 447 Corrales, NM 87048.

4CX250K tubes for sale, sealed containers, $25 each. Ron Allen — 201-793-7643.

FOR SALE: Collins KWM-2 XCVR. $700. Hammarlund HQ-170-A receiver. $250. Perfect condition. Manuals. WD8JUQ. 616-279-9663.

SELL: TS-520D $400, FL-2100B $275, MC-50 mic $25, ext. 520 VFO $80, mic compressor $20, all used 8 months. Excellent condition. 4CX1000A (new) + socket $50. Will trade all for FT-301 or Atlas 350-XL + ac supply. Jim Gulvin, Box 80895 DMAFB, AZ 85707

SWAN 240 transceiver with Galaxy ac supply and Linear Systems dc supply, microphone, Hustler mobile antennas, manual and cords works fine all for $250. Yaesu 200R synthesized 2m fm transceiver and Robyn hi band vhf scanner and vhf preamp for $225. Or all above for TS-700A or equivalent. B & K Model 1801 freq counter good thru 6 meters $125. Belcom 6 meter am and ssb transceiver with regulated power supply for $250. Trade counter and 6 meter gear for good Robot 70C monitor. WD4LUM 976 Birch Forest Ct., Virginia Beach, VA 23462. 804-420-0081

NEED: Manual or schematic for HP Audio Oscillator Model 200A type 53045, Xerox copy ok. Edward Nadolny, W9BM, 888 Schirra Palatine, IL 60067

TOWERS & Antennas. Wilson tribanders — big discount. Universal aluminum self-support towers — 25 percent off list. Info — s.a.s.e. JRS Electronics, P. O. Box 1893-A, Cincinnati, OH 45201.

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BETTER Buys By Ross: Astron RS20A power supply $79.90, ICOM-245SSB $480, IC-215 $179, DV21 $190, IC22S $227, 701 phone, Yaesu FT-301-D W/FP301 $925, FT227R $285, FT-901DM $1169, Complete Stock of Yaesu, Dentron 160-10AT 3kw tuner 179., 160-10 Mon $229, MLA-2500 $729, MT-3000A $309, ETO Alpha 374 $1399, Bearcat 210 scanner $279, KLM 2700 $670, PA15-160BL $229, Hy-Gain 3806 handheld 2-meter $149, 3750 $2050, quad $219, Tempo VHF1-plus $345, 2020 $680, Wilson WE800 $429, Mark 2 $190, All prices cash F.O.B. Preston. Largest stock of ham gear in Tintermountain West, EST, 1957. Ross Distributing, 78 So. State, Preston, ID 83263. Personal service phone 1-208-852-0830.

BETTER Buys By Ross: Ham III Rotor $118, 4 hr video recorder $850, Kenwood TR2200 $190, 3-500Z tubes 68, MFJ 160-10 ant. tuner $34.90, Astro 200 $863, Rohn 25G Towers $46 persection, Ten-Tec Century 21 $265, Wilson 1402 SM w/ttp $240, Mosley CL-33 $159, Hallicrafters HT37 $129, HT32A $169, Gonset Communicator IV w/VFO $129, Drake TR33C w/1525EM mike $209, TR-4C $489, Super flex cable, 100 ft. $20.98. All prices cash FOB Preston. Ross Distributing, 78 So. State, Preston, ID 83263. Personal service phone 1-208-852-0830.

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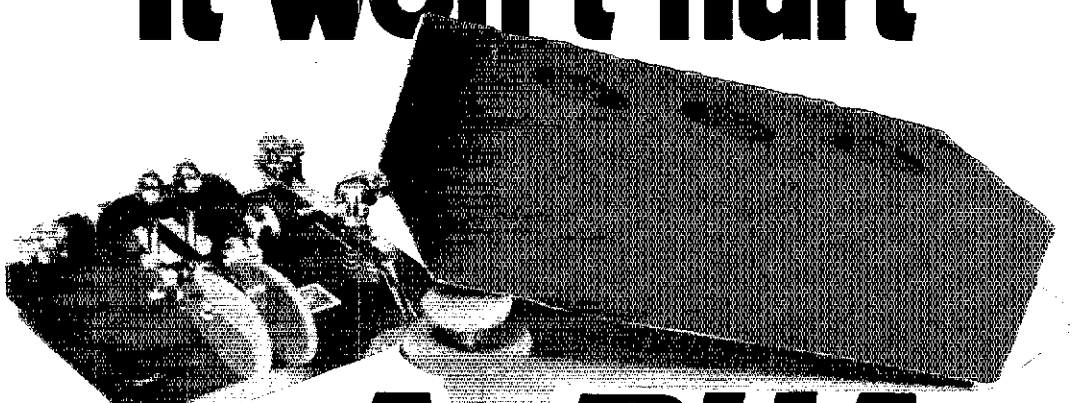

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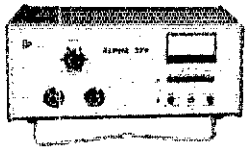

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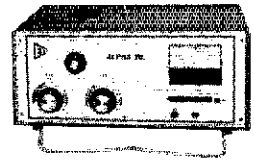

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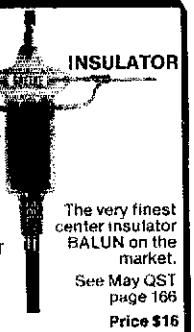

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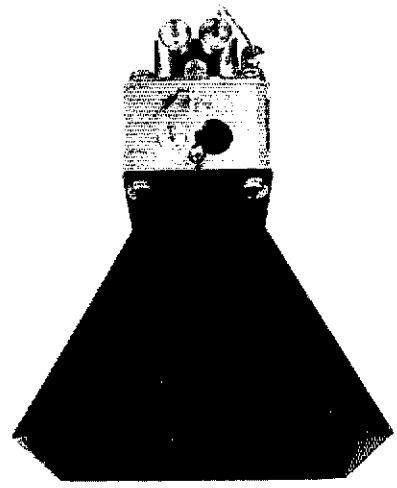

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FOR SALE: Radio magazines, books, pamphlets, catalogues; QSTs; CQs; xtals; RCA Ham-Tips; GE Ham-News; old IREs; Special: Complete CQs Vol. 1 to 5 (1945-1949) $85. Ask for listing available, 35c ppd. E. Shalkhauser, W9CI, 527 Spring Creek Rd., Washington, IL 61571.

SELL: HQ-180 $375, GSB-201 linear $275. Heath IM-13 VTVM $20. QST for 1961-65 in binders, part 1966, complete 1967-76, and 73 for 1967-69 all for $100. K4IN, 120 Tuxedo Cir. Chattanooga TN 37411, 615-698-5774 evenings.

CASH for Collins (455-FB-21) mech filter. Urgently needed. W7GFN, Box 22, Lookout, CA 96054.

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SELL: Mint Yaesu station. FR-101 receiver with all crystals, cw and am filters. FL-101 transmitter with rf processor. SP101B speaker. FL2100B linear. New cost over $2000. Certified check for $1350 takes all. I ship. John Kenney W1KVQ, 14 Bryant Road, Nashua, NH 03060. 603-888-3016.

SELL: Heath HR-1680 receiver; ssb-cw 6 months old; mint $170.00 Mike Elder, Rt. 1, Box 87A, Simms, TX 75574. 214-543-2298.

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FOR SALE: Hammarlund HQ-180 rcvr $195. Genave GTX-2 2M FM w/20 xtals $139, Heath Apache TX-1 mint $95 or offer. Wanted: SB-102 or equal. Dave W3INB 8201 McKay Dr., Brandywine, MD 20613, 301-782-4590 eves.

SELL: Heath: SB-101, with CW filter; HP-13A acPS; HP-23 dcPS; SBA-100-1 mobile mount; SB-600 speaker; SB-630 console; Super Hustler mobile antenna, 80-10 M. Package or sell individually. Harlan, WØMYN 303-979-8770.

WANTED — Hammarlund HX-50-A with manual. Tom Gibson, Box 784, Dodge City, KS 67801.

FOR SALE: Oscilloscope Heath model 10-102 w/PK-1 probe $90; VHF Engineering 2 meter synthesizer $90; Galaxy 5 transceiver w/ac speaker console and dc supplies $250. You pay shipment. WB4MNW, 1555 Galveston St., Memphis, TN 3114.

NEED type "C" coils for HRO-5. Would like BC and LF coils, KØGON.

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ROTOR, CD-44, new, full warranty. Was $154, now $86. 601-769-2586. Electronics World.

WANTED, HX-50, prefer factory 160M modification. Also consider other 160 ssb transmitters. Fred Brandeberry, WB9MNT, Building 360, Argonne, IL 60439.

FT101 — $425. SB-220 — $375. 51J3 — $325. SB-500 150. Nagata, 1330 Curtis, Berkeley, CA 94702.

FOR SALE: Vibroplex Original Deluxe. New condition. Used one hour. $30 & shipping. WB8AHH, 817 Willowdale, Morgantown, WV 26505. 304-599-4966.

WANTED: Hy-Gain 18HT, Dallas-Fort Worth area. Going to West Coast in June. Could pick up in that area then. C. Galbreath W5WZX, 2210 Glenforest Ln., Plano, TX 75023.

HANDI-TALKIE, Wilson, 1405SM, TTP, XF-1, LC-2, SM-2, BC-1, new, full warranty, $345. Price decreases $20 month until sold. 601-762-2686, WB5FXI.

SSTV — Mint Robot 70B monitor, 80A camera, 61 viewfinder. 1.4 macro, lens, Hewlett Packard hood, all standard cables plus extra 25' control cable. U ship. $650. Jene Melton, WAØDEM, P.O. Box 413 Deadwood, SD 57732. 605-578-2192.

WOW!! TV502 $197; ACT R10 H/L/U and 10 xtal certificates $115; Regency "touch" scanner $247; B&W keyer $59; KLM 681 $549; KLM PA10-140BL $183.50, PA10-70BL $124; Multi U-11 DX $309.50; VFO 7-11 $118; Multi 2700 $625; KDK 2015R $349; Dentron Super Super Tuner $175; 160-10 MAT $224; ATB-34 $179; MFJ Super Tuner $52; SST-1 $26; SST-2 $43.50; 2 mtr. fm xtals $3.03; all new ppd. offer good til April 25. Used: Clegg Zeus & Interceptor $275; Vanguard synthesizer 8 MHz $115; DX-4 $70; SB301 $200; Order/write Ferris Radio 308 E. Harry, Hazel Park, MI. 48030. Certified check or M.O. please.

SELL Collins 75S3-C 32S-3 516F-2 30L-1. Winged emblem. Mint, cables, manuals, $2000. Prefer pickup. WA1DHM 617-994-1214.

WORK OSCAR via cw — TX-62 6 & 2 meter am/cw transmitter, VFO, extra final — like new condition. $125. L.D. Strader, RR no. 3, Concord, TN 37922.

DUPLEXER for sale, 6 cavity, 600 kHz spacing, 2m, per Jan. 1972 QST. Isolation better than 100 dB. In service 5 years. Selling: Upgraded. $250. Contact Chesapeake Bay Radio Assn. 301-287-5211.

SALE: New Andrew Heliax, 7/8" foam w/installation kit, Type N connectors. 4 Pieces (1) 120' (2) 130' (1) 150' $1.25/ft. + shipping. Drake 2C rcvr w/2CQ — $200. WB4PDK, 6801 Ft. Royal Rd., Springfield, VA. 22151. Ph. 703-941-7760.

SELL: Complete Drake station. R-4C, T-4XC, AC-4, MS-4, noise blanker, 500 kHz filter, and Shure 444 microphone. Excellent condition — only 6 months old. $1300. WBØWLI, 2810 Gray St., Denver, CO 80214. 303-232-0602.

HALLICRAFTERS SR400 400W all bands ssb transceiver with p.s. and speaker 20m whip, etc. Ex G3WHB/W2. $250. Details from engineering at 212-581-7100.

McELROY Aerokey with aluminum base wanted — Top $ paid. Trade or sell old keys and radio magazines. WB4RLM, Box 557445, Miami, FL 33155.

WANTED: defunct NCX-5s good appearance, low price important. W3MEO 301-757-1991.

TRIMMER capacitors, ARCO 465 (50-380 pf). New. Regular price is $1.34, your price is 8 for $5, 20 for $10, postpaid. Warren Simmonds, 2214 Bryan Circle, Salt Lake City, UT 84108.

SELL or trade — Heathkit SB-303 cw filter. Excellent. $300. WD4DAU, P.O. Box 2028, Tuscaloosa, AL 35401, 205-339-3713.

160, 80, 40. New TD-160 trap dipole. 104 feet long. Only 160 meter trap dipole available. $41.95 plus $3.00 UPS. Antenna Supermarket, P.O. Box 1682, Largo, FL 33450. 813-585-9688.

WANTED — Manual for Knight T-150A transmitter, or to borrow, copy and return a manual. Wm. A. Grambo, WA9MCT, 8601 W. Eckel Lane, West Allis, WI 53227, 414-321-1871.

PROP PITCH motors. New, large 17" H × 11" W. New smaller 15" H × 10" W. Both mint. Used smaller and many spare parts and mast coupler and control box, Selsyn. All units 24-32 volts ac or dc. Best offers. U ship. 716-342-0231. Bill Eidman, 2190 Bayshore Blvd, Rochester, NY 14622.

ABSOLUTE mint FT301D, FP-301 with cw filter $895. M. A. Jenkins, 136 Foxcroft Dr., Rockhill, SC 29730.

COLLEGE forces sale: Triton II, 252ps; cashier's $425, I ship UPS. Ted Morris, WB8VNV/9, 114 Foley, Bloomington, IN 47401.

SALE: QSTs, Electronics, IRE Proceedings, 1920's — 1930's, send s.a.s.e. W6THU, 1545 Raymond, Glendale CA 91201.

COLLEGE needs radio equipment. WB4KEW, Freed-Hardeman College, Box 351, Henderson, TN 38340.

HEATH HW-7 QRP. Like new, factory aligned w/manual. No power supply $80. Johnson Ranger II factory wired $120. W/manual. Both work good. WBØSWO, Dennis Andres, 3237 Stark Jct. Rd., Proctor, MN 55810.

HEATH SB-401, needs crystal pack (available from Heath) or SB-301, etc. for operation. $225. Charlie Wood, WB8EJR, 46201 Jonathan Circle, Apt. 158, Utica, MI, 48087. 313-731-5955.

FOR SELL, new Spectronics digital display model DD-1, for Yaesu FT101/FT401; $125. W4FNN, P. O. Box 535, Corbin, KY 40701.

KENWOOD TS-820S, 10 hours airtime, $875. WB9BCL 312-743-5563.

NEW Yaesu cw & am filters $28. Both $51. K8AQ, Box 171, Fairfield, OH 45014.

COLLINS 75S3A, 32S3, 516F2, 312B4, 30L1 plus freebees $1950. — W1FDA. 802-985-2843.

DRAKE TR22C 2 meter handi-talkie 12 sets crystals $160. Heathkit HD1410 keyer $35. Kenwood 2 meter TR7500 $250. New unopened Regency and Bearcat programmable scanners $245 each. Bob Park WB5MSH, 1319 Eastview, Weatherford, TX 76086 817-594-6292.

WANTED: Telrex monobanders 10-15-40 mrts. K1RO/K1VTM.

WANTED: FM modulation meter. Paul Wise, W5LI, Route 6, Rogers AR 72756.

WANTED Globe King Coils. 80JVL, 500LCS80. W7IWU, 2105 Irene, Boise, ID 83702.

TRANSCOM Thermal Printer owners: Heat sensitive tape, 10 rolls $5, quantity discounts also; Drake 2A/B crystals 8.0, 8.6, 9.0, 10.0, 11.5, 12.0, 13.5, 22.0 MHz $2.50 each. K1YGS, Box 161, Torrington, CT 06790.

DX-60B and HG-10B VFO $200, Johnson Match Box 275 watt. $55. Manuals for each included — You ship. WA3YTB. Phone 302-227-9239.

KENWOOD TR7400A, synthesized 2m fm. New 2/78. Perfect condition $319 complete. Phelps, K1SW, 14 Ridgewood Dr., Rockville, CT, 06066.

RCA PUBLICATIONS wanted for radio, television (especially color), phonos — technical books, service data, sales literature. Any year. Write with description and price wanted. C. Q. Sarver, 256 West 88th Street. New York, NY 10024.

WANTED Collins Linear Model 30S1, also replacement parts etc. Write Jay R. Norris, 431 Windsor Place, Rockville Cntr, NY 11572.

KDK FM144-10SXRII mint condition! Why not the best? I ship anywhere in the 48. $309. Call 203-229-0470 after 6 pm EST. N1UM.

QUAGI/YAGI Builders — Insulated fiberglass booms to 16-feet. Straight, strong, vaulting poles. S.a.s.e. for info. Guaranteed new $30. K5WSE, Box 20-AA, San Antonio, Texas 78201. 512-699-9260.

HEATHKIT SB-301, SB-401, SB-600, HM-102, HD-15. Cw, am, ssb filters. $450. Phil WB9EQI, 1531 N. Woodlawn PL., Griffith, IN 46319. 219-972-1008.

OLD TUBE collectors — Pre-broadcasting models circa 1916 — 2 Western Electric VT-1 $200 each. VT-2 $350. Signal Corps $100. Audiotron pickle $200 (labeled) 2 same (unlabeled) $100 each. Fred Gooding, Dorset Apt. 302, 1301 N. Harrison, Wilmington, DE 19806.

TRITON II, cw filter, factory installed 8 pole xtal filter, mike, 262 power supply, ham key $450, WA3MXE c/o Doug Frick, 5 W. 9th St., Pottstown, PA 19464. 215-323-1520.

NJ's NEWEST Amateur Radio Store — Radios Unlimited — New & Used equipment — KLM, Mosley, Microwave Module, CushCraft, Lunar, Bird, Dentron, Wilson, Rohn, much more — call or write — Radio Unlimited, 1760 Easton Ave., Somerset, NJ 08873. 201-469-4599.

FAMOUS Heathkit HW-101 transceiver and HP-23B power supply for sale! 90 day parts and labor warranty from Heathkit. Professionally aligned. Asking $325. Call Paul, WA2HKG. 914-762-0386.

K4NI Navassa Island, W.I. 1928, later QSL cards wanted by collector. Describe, price send: Vern Ardiff, Box 118, Sunnymeade, CA 92388.

COMPLETE visual display RTTY or MORSE reception setup. Viditype RTTY converter (use any standard TV set) — St-6 Tu-Pasnasonic Monitor (9")-Info-Tech Morse convertor-visual display, DE-lux Vibroplex key, Midland SWR field strength meter, Hal RKB-I keyboard. All A-1 condition. All or part. Will ship. All inquiries answered. Make offer. Claude Sweger W5SHC, Box 1842, Ft. Stockton, TX 79735.

WANT CBS Columbia television set, circa 1951, wood console, about 12-inch screen, may have magnifier, may have color wheel inside, may have 12CC2 model number. Possible ATV use? Original or modified, or cabinet, parts only. Any information or recollections also appreciated. C. Sarver, 256 West 88th Street, New York, NY 10024. Or 212-873-2954 collect.

2 METER beams, A-147-11 and A-147-22. Factory sealed cartons. Full warranty. Only 2 each. $19.49 and $50.20. Will sell individually. 601-762-2686. WB5FXI.

DISPERSAL Sale of Estate of W2PW. QST's 1937 — 1977, HW12A — 80m Phone transceiver, home brew SSTV monitor, frequency counter to 30 mc, plus miscellaneous items. Write to Mrs. Glenola Wilson, 102 Westfield Drive, Ithaca, NY 14850 for detailed listing.

DRAKE TR-4C, AC-4, MS-4 mint. $525 incl. shipping. WB9IIS 217-345-6498.

CODE Reader, Atronics CR101, factory assembled, used 3 hours, guaranteed to be in perfect condition or your money refunded. Cost $225, sell $175. First letter received takes it. Will ship UPS COD you pay all charges. Will not accept phone calls. WB2EKC, 28 Holly Blvd. Scotia, NY 12302.

SELL: Kenwood QR-666 general coverage receiver like new $165. K2MRU 201-391-2166.

FOR SALE: 6 meter Genave GTC 600 & antenna coupler, 6 crystals. $200. Paul Wischner, WB8VDB.

WANTED — Motorola/Signal Corps amplifier, AM-494/GR, 120-174 MHz, any condition. Fred Brandeberry WB9MNT, Bldg 360, Argonne, IL 60439.

WANTED: Drake T-4XB with AC-4 power supply, no modifications, must be mint. New Jersey area. WB2BHV, 850 Fourth Ave., Westfield, NJ 07090.

WANT HRO-60 15 meter coil ac, dial scale ac, also ther mocouple rf ammeters. KØOCC/3, 3012 Madeira Drive, Erie, PA 16506.

WANTED: Mint Heath DX-60B, HG-10, and HR-10. William Blair, PSC BOX 81042, Davis-Monthan AFB, AZ 85707.

GALAXY GT550 transceiver, mint, AC400 power supply, speaker, VOX, 25kc calibrator, cw filter, spare finals. $325. K6TLG, 1354 Via Vista, San Lorenzo, CA 94580. 415-276-0748.

SELL: mint late production Heath SB-102 transceiver, SB-600 speaker, HP-23B supply, $450; Heath SB-610 monitor scope, $90; Drake TR-6 six meter transceiver w/noise blanker, MS-4, AC-3 supply, $500. Will split UPS shipping. WA4MCP, Phil Wilson 654 Missimer Lane, Vinton, VA 24179. 703-890-4290 after 6 pm EDST.

SMALL Johnson Matchbox $50. W8CXZ, 45046 Mayo Dr., Northville, MI 48167.

HEATH SB303, SB600, and extra LMO. Absolutely mint. $250.00 WB8SCF, 51 W Rt. 1 Milton, WV 25541. 304-743-5876.

MOTOROLA HT200 hi-band $150, Mocom 30 vhf $125, HO4 BNC-1103 uhf pager $120, L44BBB-3000 uhf base station $200, U54HHT-3100 $195, U43HHT-3100 $250, HT220 hi-band $350, HT220 uhf pl remote speaker mike $350. Daniel Herlihy K6KTP, 714-466-7558.

RECEIVERS — Heath HR1680 $190, Hallicrafters SX-100 $125. Glen, WB1FOO, P.O. Box 114, Windsor, CT 06095.

COLLINS KWM-2, Round Emblem, 516F2, MP-1 12Vdc supply, 351D-2 mobile mount. Instruction books, excellent condition. $895. W6CP, 11 Charro Court, Santa Rosa, CA 95401. 707-528-1246.

FOR SALE: QST, CQ, 73 magazines and other books. S.a.s.e. to WA8RCN, 4650 Friar Rd., Stow, OH 44224.

TEN-TEC, Atlas, Swan, Dentron, Wilson, Lafayette, Mosley, CushCraft, Nye, MFJ, etc., at Electronics World. 601-799-2586. Call for quote.

FOR SALE: Hicock 670 oscillograph, $50. Collins 30FXC transmitter — make offer. QST 1969 to 1973, 10c/copy. Many tubes, 1930 era, list upon request. You pay shipping. Wanted linear uses 4-1000-A tube with power supply. W8OAR, Mitchell Kohn, 3915 Grosvenor, Cleveland, OH 44118.

FOR SALE: model 32 teletypewriter, pick-up, best offer, Bob Helm K8HLH, 46 Spruce Pl. Sandusky, OH 44870.

HEATH DX-60, HG-10 VFO, manuals, $95. Realistic DX-160 receiver band-spread ham bands $100. Electronic TR switch $20. Phil — WA7QWF — 801-969-4383.

QST 1956-77 Ham Radio 1969-76 few skips. Make offer all or part. K. Meyers, 3997 E. 186th, Cleveland, OH 44122.

COLLINS S-line Station: 75S3B w/500Hz filter (wing), recently aligned; 32S3 (wing); 312B4 (round); 516F2 (round); SM-1 mike. All I/C cables and manuals. Mint. Bargain-priced package at $1500, but will not ship or sell separately. W1TTC, 21 Metacomet, Sudbury, MA 01776. 617-237-4452, 9-5 PM.

CLEGG FM-27-B latest production. Excellent condition. With locking mount, manual, plug-in touchtone pad $210. Lampkin, 205-A fm deviation meter, manual. $90. S.a.s.e., W1BGW, 28 New Haven, Boston, MA 02132.

28ASR, 28 3-speed printing reperf, 28TD — $650. Pickup only. WA2FSD 516-482-2737.

75A4 — Excellent condition, 2.1 & 3.1 filters, vernier dial, matching speaker, manual, $399. Collins KWM2 Mobile mount 351D-2, manual, $25. Bob Sutton, W5KFD, P.O. Box 45-588, Houston, TX 77045. 713-437-8200.

ELDICO SSB100F power transformer needed. K4JYS, Box 1025, Smithfield, NC 27577.

SPECIAL — Swan 500 CX — SS16B. 117 XC used very little only 1 year old, with Swan phone patch! $650. 312-544-1127. Walter Wladuck, W9ZWH, 4926 Hawthorne Hillside, IL 60162.

HEATH HP13A supply, new, unused, $70. W8OPC, 11271 Riveredge, Parma, OH 44130.

SELL: Heath HW-100 transceiver, built by Electrical Engineer, $240. Homebrew power supply $25. Unused power tubes: 250th $20; 5867 $20; 2-813's $17 each; 2-4CX250B's $22 each. All tubes in original cartons. R. Bonkowski, W3HWJ, 1401 Clearview, Greensburg, PA 15601.

HEATH HW-8, homebrew p.s., DX-20, manuals. Make offer, phone 517-770-4272, ask for Steve Orlowski.

WANTED TMC GP-90 and TMC GSB-1. John Callan, 65 Beechcroft St., Brighton, MA 02135.

MUST SELL Johnson Invader 2000 and power supply. Mint condition. Pickup — no shipping. $425. W8HXC, 198 Shipherd Circle, Oberlin, OH 44074. 216-774-7762.

WANTED: Old E.F. Johnson Invader transmitter for spare parts, call W3VOI 215-277-2124 after 5 pm.

ESTATE of W9NZO. Local area only. Collins 75A3 clean, Johnson KW Matchbox, mint. Johnson Viking Valiant-wkg. call W9ALI 312-629-5030.

HEATH DX60B, HG-10B, HR-10B. $150. WA1YIO 603-224-5737. RFD 2 Bow, NH 03301.

HEATHKIT HW100 transceiver. Excellent condition $275. K1PNL Tel. 203-582-3255. Box 243 Forestville, CT 06010.

WANTED: Collins 62S-1 VHF transverter. Please include age, condx and price. WA1MMD Box 355, Camden, ME 04843.

OUR PRICES are the lowest I've seen on Wilson — Others available. Example: System One tribander, regular $269.95, our price $203. System Two, regular $199, now $160. TTW Radio, 871 Homewood, Salem, OH 44460. Telephone — 216-332-0965.

COLLINS Station, 32S3 s/n10201, 75S3B s/n30127, 30L1 s/n40791, 312B4 s/n70212, 516F2 s/n60168, all round emblem, good condition, no modifications, will sell as package only, $2,700 F.O.B. Dallas, TX, Nick Quackenbush, 6203 Rainier Road, Plano, TX 75023 214-424-6619.

WANTED: Heath SB-10 ssb adaptor. WA2NCU 201-647-2931.

WANTED: Mint original National NC2-40D, NC200, NC400, Hallicrafters SX28, SX88. WØLOV, Tom Fowler, 1364 Madison, Denver, CO 80206.

SELL or trade: Have freq. meter BC-221 AJ-mint except ac supply, HW-32 and HP-13 mobile complete, DX 100, T-60, Vibroplex Lightning Bug, assorted homebrew receiver goodies. Wanted FT101E, WA9KWS, Peter Morin, 509 Forest Glen, Round Lake Park, IL 60073.

COLLINS KWM-2A, 30L-1, 312B-5, PM-2, MP-1, 351D-2, crystal pack, suitcase, $2500. 51J4, $400. N6QI, 4462 Littlemeadow Court, San Jose, CA 95129. 408-255-5828.

51J4 PTO 70E15 new boxed. $200. K6AVF Box 566, LaMesa, CA 92041.

BUY-Sell-Trade. Send $1.00 for catalog. Give name, address and call letters. Complete stock of major brands new and reconditioned equipment. Call for best deals. We buy Collins, Drake, Swan etc. SSB &FM. Associated Radio, 8012 Conser, Overland Park, KS 66204. 913-381-5900.

SELL Tubes new old stock OA3, OB3A, OC2, OD3, 2X2a, OA4G, 2A3, 710/6011, 615/7015, 3C23, 1P21, 2E24, 2D21, 1P40. WD4NZW, P. O. Box 763, Brentwood, TN 37027. 615-794-7553.

WANTED: Synthesized 2M transceiver, Atlas 180/210/215, signal generator. Trade — new television camera, VTR, digital multimeter. W6DOM, 6017 Majorca Ct., San Jose, CA 95120, 408-997-0132.

EICO 753 triband xcvr with solid state VFO, excellent, $120; Globe chief 90A Novice xmtr, excellent, $30; K7VRB, 14718 N.E. 38, No. 2015, Bellevue, WA 98007. 206-883-1250.

SELL: Mint R4C $400; Instructograph with 10 tapes $30; Clegg Thor 6 M xcvr with ps $80; NC-300 $80; Valiant Viking Valiant $150; 3600-0-3600 V plate xfmr with 110/220 pri $40, HP-13 DC supply $30. WØAIH. Paul Bittner, 1616 South St., Eau Claire, WI 54701.

COLLINS 30K-4 500W transmitter with 15 teletype, HT-32-B and NC-300, trade for KWM-2. WBØZBE, 2324 21st Ave., Greeley, Co 80631.

HALLICRAFTERS SX-100 receivers and matching HT-37 transmitter. Excellent condition. Manuals included. $275. ship FOB — Chuck Cibik, WA3UIQ, 5134 Clairton Blvd. Rt. 51, Pittsburgh, PA 15236.

SELL: mint Kenwood TS-520, includes cw filter, 12V supply. $550. W3GC, 505 Old Gulph Rd., Narberth, PA 19072. 215-664-2628.

ESTATE of W1QCO. Collins KWM-2 serial 12688 winged with mobile mount 351D-2, KWM-2 serial 15542 round. Two 30L1, two 516F-2, one PM-2, one MP-1. Hallicrafters SX101. Best offers. Prefer pickup. Write L. Prescott, W1RFQ, 15 Loring Drive, Lincoln, RI 02865.

FOR SALE — Heath HW-2036 w/micoder —$300. Heath HW-202 with 34/94, 28/88, 13/73, 16/76 crystals — $150. Heath HW-101 and power supply $300. Call WA3VXV 717-334-9432: 231 N. Stratton St., Gettysburg, PA 17325.

WANTED: Heath HW1ZA, HW-22A, or HW-32A with power supply. Stan Seiffert, Rt. 3, Box 145A Snohomish, WA 98290.

TRANSFORMERS rewound, Jess Price, W4CLJ, 507 Raehn, Orlando FL 32806.

COLLINS: All round, ultra-mint, KWM2A, 516F-2, Blanker, $1795. 32S3, 516F-2 $900, 75S3-B $625, 500 filter $110, 312B-3 $45, 312B-4 $265, 75S3-B, wing, immaculate (covered filters) $425. KWM2 Engineering Processor $65. Rayne Radio, Box-100, Springfield, TN 37172. 615-384-2224.

WANTED: HRO-60 coils and scales. Louis, K5DAH, 2731 Hearne, Pasadena, TX 77502. 713-914-1792.

8 PAGE revised list — for s.a.s.e. Everything (almost) from 1920's to date. Reasonable prices. W4BLQ, B158, Edgewater, FL 32032.

RENT gentleman's farm south central NY state. Heath station, quad. Historic, isolated, beautiful. Very reasonable if you agree to take care of large yard and flower gardens. Completely furnished. Available May through November. Jamie Crandall, McDonough, NY 13801.

VENUS SSII SSTV monitor for sale. First cert. check for $220 takes it. WA4JCS, 919-693-5309 after 6 pm.

RUBBER STAMPS personalized for hams. 3 or 4 lines, $2.50 pre-paid world wide. Les Belyea, WB7FBV, Box 327, Belgrade, MT 59714.

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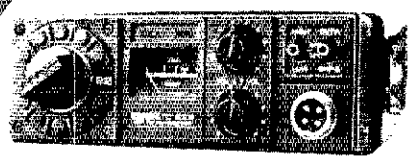

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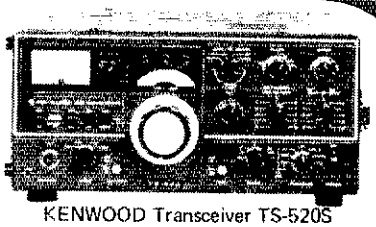

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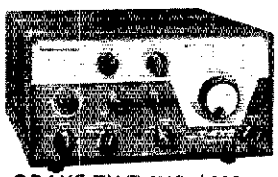

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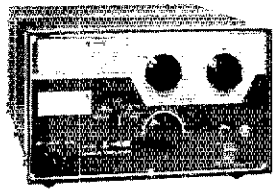

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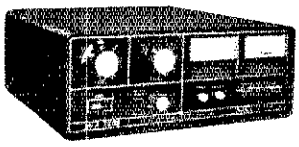

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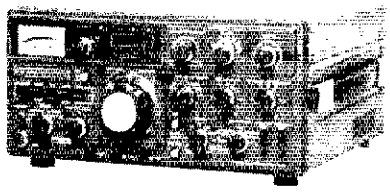

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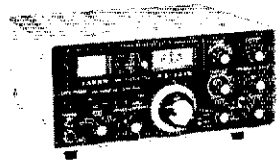

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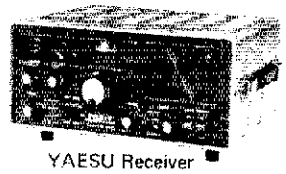

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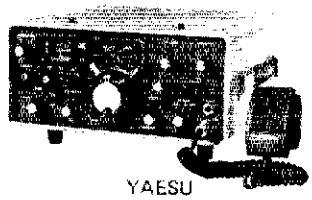

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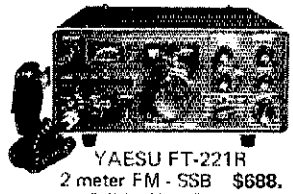

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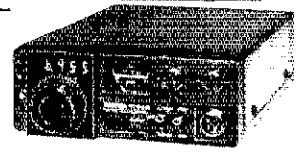

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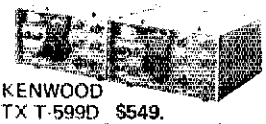

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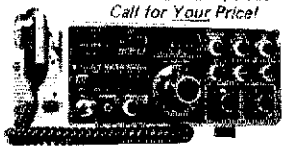

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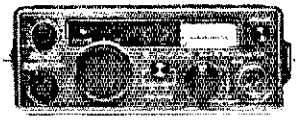

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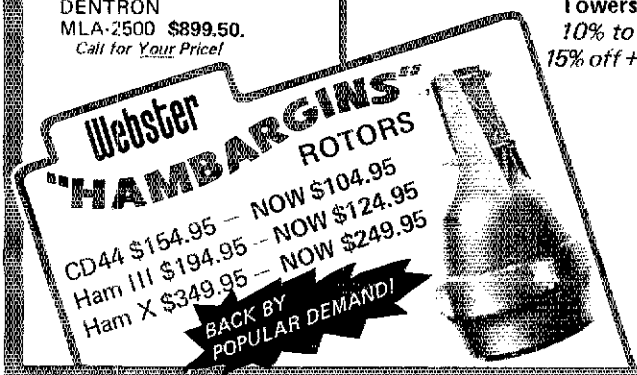

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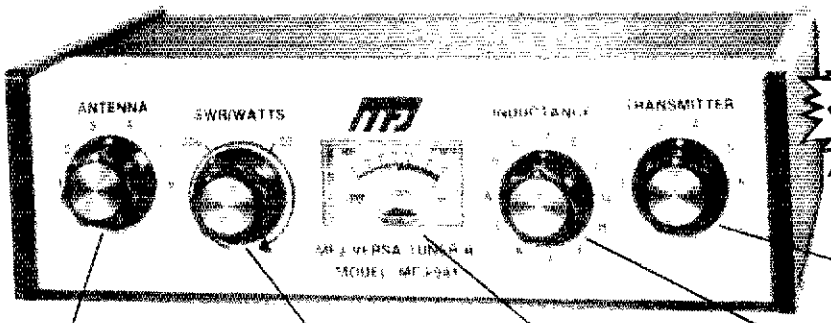

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A new efficient airwound inductor (12 positions) gives you less losses than a tapped toroid for more watts out.

A 1:4 balun for balance lines. 1000 volt capacitor spacing. Mounting brackets for mobile installations (not shown).

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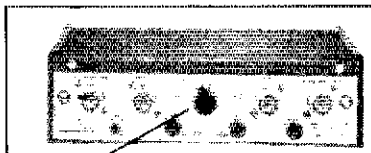

ANTENNA SWITCH lets you select 2 coax fed antennas, random wire or balance line, and tuner bypass.

transmitter to **any** feedline from 160 thru 10 Meters whether you have coax cable, balance line, or random wire.

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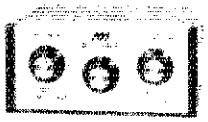

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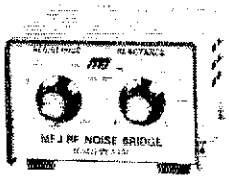

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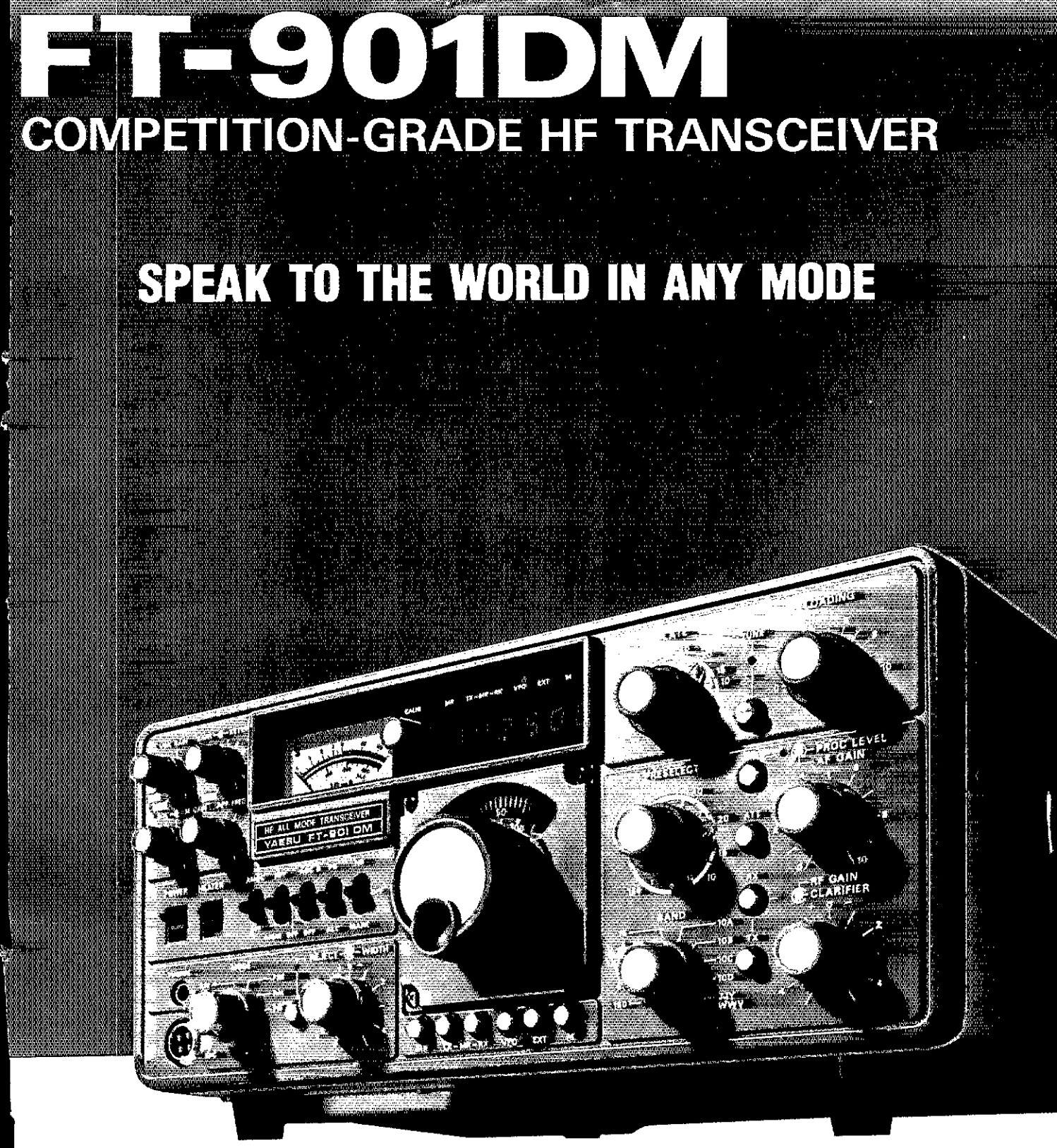

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