QST

March 1979 $2.00

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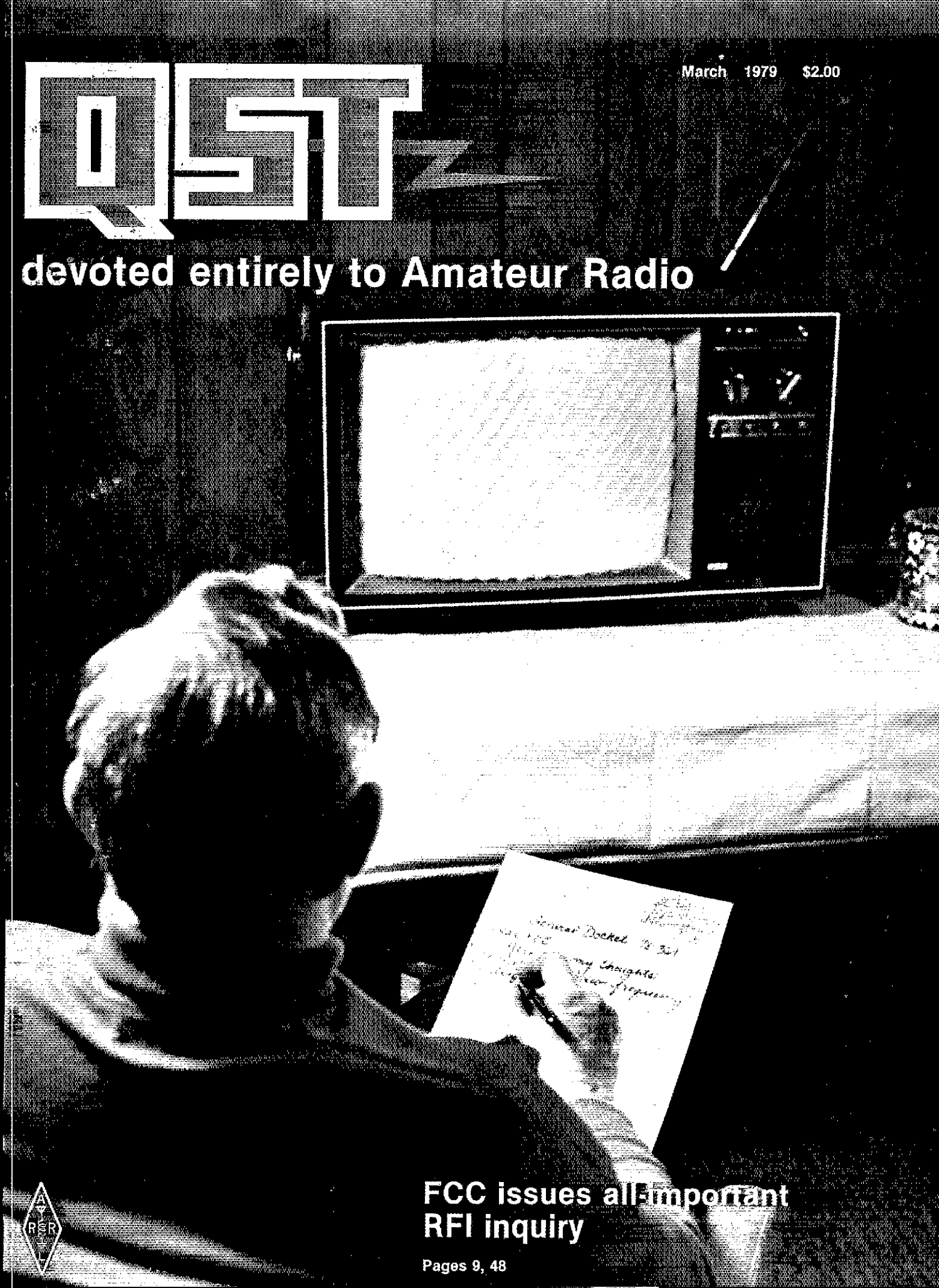

FCC issues all-important RFI inquiry

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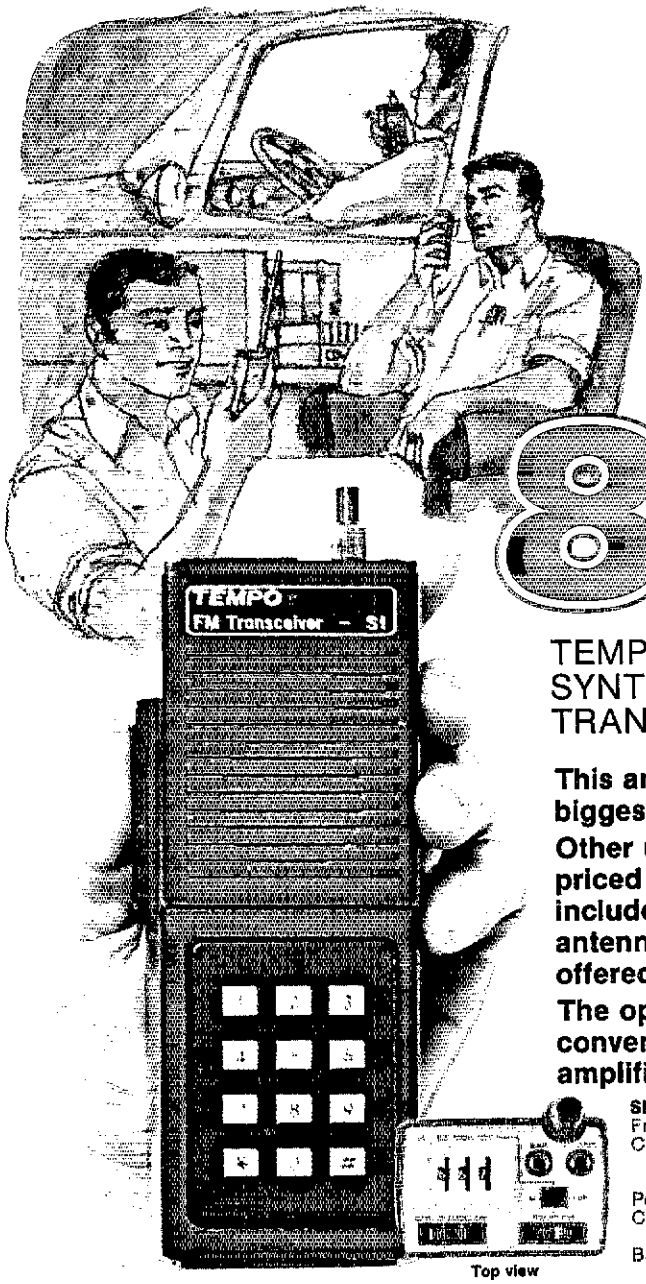
PORTABLE... MOBILE... BASE STATION



*Shown with accessory touch tone pad

Top view showing controls

the TEMPO SYNCOM S1

DOES IT ALL AND GIVES YOU 800 CHANNELS

TEMPO PRESENTS THE WORLD'S FIRST SYNTHESIZED 800 CHANNEL HAND HELD TRANSCEIVER

This amazing pocket sized radio represents the year's biggest breakthrough in 2-meter communications.

Other units that are larger, heavier and are similarly priced can offer only 6 channels. The SYNCOM'S price includes the battery pack, charger, and a telescoping antenna. But, far more important is the 800 channels offered by the S1.

The optional touch tone pad adds greatly to its convenience and the addition of a Tempo solid state amplifier adds tremendously to its power.

SPECIFICATIONS

Frequency Coverage:	144 to 148 MHz
Channel Spacing:	Receive every 5 kHz, transmit Simplex or +600 kHz
Power Requirements:	9.6 VDC
Current Drain:	17 ma-standby 500 ma-transmit
Batteries:	8 pieces ni-cad battery included
Antenna Impedance:	50 ohms
Dimensions:	40 mm x 62 mm x 165 mm (1.6" x 2.5" x 6.5")
RF Output:	Better than 1.5 watts
Sensitivity:	Better than .5 microvolts

SUPPLIED ACCESSORIES

Telescoping whip antenna, ni-cad ba pack, charger.

OPTIONAL ACCESSORIES

Touch tone pad: $55 • Tone burst generator: $29.95 • CTCSS sub-audible tone control: $29.95 • Rubbe flex antenna: $8 • Leather holster: $16 • Cigarette lighter plug mobile charging unit: $6 • Matching 30 wat output 13.8 VDC power amplifier ($3 $89 • Matching 80 watt output powe amplifier ($80)

Price... $349.00 With touch tone pad... $399.00

The Tempo line also features a fine line of extremely compact UHF and VHF pocket receivers. They're low priced, dependable, and available with CTCSS and 2-tone decoders

The Tempo FMT-2 & FMT-42 (UHF) provides excellent mobile communications and features a remote control head for hide-away mounting.

The Tempo FMH-2, FMH-5 & FMH-42 (UFH) hand held transceivers provide 6 channel capability, dependability and many worthwhile features at a low price. FCC type accepted models also available.

Please call or write for complete information. Also available from Tempo dealers throughout the U.S. and abroad.

TEMPO VHF & UHF SOLID STATE POWER AMPLIFIERS

Boost your signal. . . give it the range and clarity of a high powered base station. VHF (135 to 175 MHz)

Drive Power	Output	Model No.	Price
2W	130W	130A02	$209
10W	130W	130A10	$189
30W	130W	130A30	$199
2W	80W	80A02	$169
10W	80W	80A10	$149
30W	80W	80A30	$159
2W	50W	50A02	$129
2W	30W	30A02	$ 89

UHF (400 to 512 MHz) models, lower power and FCC type accepted models also available.

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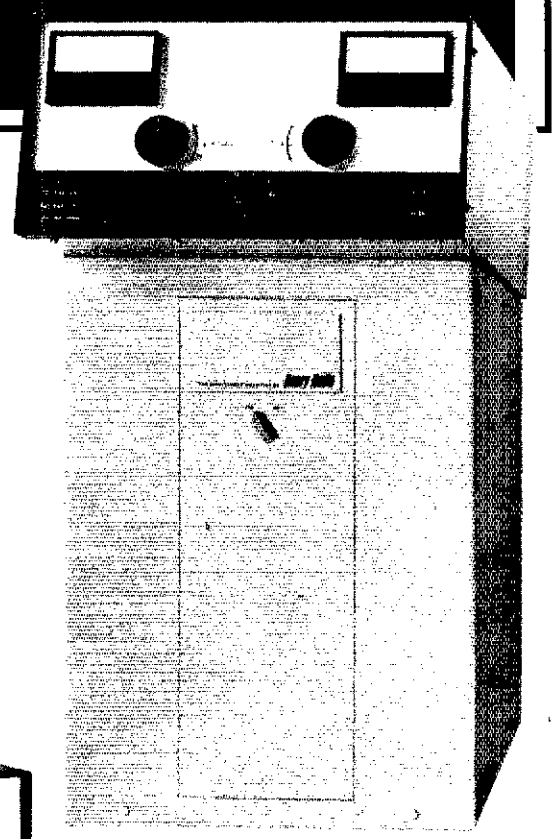
Henry Radio... because you demanded the best



HENRY RADIO'S "WORKHORSE" ...THE 2K-4A

Never has a linear amplifier racked up so many hours of dependable operation for amateurs worldwide ... operating at full legal power ... hour after hour... under every type of condition imaginable. Because the 2K-4A is built with the very best, heavy duty components available, it can loaf along at full legal power. It offers engineering and features second to no other linear on the market. The 2K-4A will put your signal on the air with greater strength and clarity than you ever dreamed possible.

Operates on all amateur bands, 80 thru 15 meters (export models include 10 meters) • Features two rugged Eimac 3-500Z grounded grid triodes • Pi-L plate circuit with silver plated tank coil • Resonant cathode-pi input circuit for finest linearity & maximum drive (tuneable design permits operation on any frequency from 3.5 to 30 megacycles) • High efficiency torodial filament choke • Built-in SWR bridge and relative RF output meter • Electrical re-set overload relay • Double rugged band change switch with 20 amp contacts and solid straight-through mechanical linkage • Heavy duty bronze gear drive for resonance and load condensers • Conservative, heavy-duty 2800 volt DC supply • Resonant choke input filter for superb voltage regulation • Solid state rectifiers • Maximum legal input all modes: 2 KW PEP SSB, 1 KW CW-AM-FSK • Long life 50 amp mercury power relay • Feed around antenna relay • All aluminum cabinet to elminate magnetic resonance • Double RF shielding.

The 2K-4 is still available for export and military use.

Price $1095.

2KD-5

Another superb linear from Henry Radio designed and built to perform at peak level month after month, year after year. Operates at full legal power continuous duty on all modes. The 2KD-5 is a 2000 watt PEP input (1200 watt PEP nominal output) desk model RF linear amplifier, covering the 80, 40, 20, and 15 meter amateur bands. Features two Eimac 3-500Z glass envelope triodes operating in a grounded grid circuit • Pi-L plate circuit with a rotary silver plated tank coil for greatest efficiency and maximum attenuation of unwanted harmonics • Full legal input in all modes, 2000 watts PEP input for SSB, 1000 watts DC input for CW-RTTY-AM. Price $895.

1KD-5

A little less power, a little lighter, AND less expensive... but the 1KD-5 is a true Henry Radio linear amplifier, offering superior quality and dependability. It is designed to greatly boost the strength and clarity of your signal. Its heavy duty components guarantee years of trouble free, dependable performance.

The 1KD-5 is a 1200 watt PEP input (700 watt PEP nominal output) RF linear amplifier, covering the 80, 40, 20, and 15 meter amateur bands (also 10 meters on units shipped outside the U.S.). Features an Eimac 3-500Z glass envelope triode • ALC circuit • DC relay system • Relative RF power meter • Pi-L plate circuit with a rotary silver plated tank coil • Cathode Pi input matching circuits • Conservative power supply with solid state rectifiers.

Price $695.

3K-A COMMERCIAL/MILITARY AMPLIFIER*

A high quality linear amplifier designed for commercial and military uses. The 3K-A employs two rugged Eimac 3-500Z grounded grid triodes for superior linearity and provides a conservative three kilowatts PEP input on SSB with efficiencies in the range of 60%. This results in PEP output in excess of 2000 watts. It provides a heavy duty power supply capable of furnishing 2000 watts of continuous duty input for either RTTY or CW with 1200 watts output. 3.5-30 MHz. Price $1495.

4K-ULTRA*

Specifically designed for the most demanding commercial and military operation for SSB, CW, FSK or AM. Features general coverage operation from 3.0 to 30 MHz. Using the magnificent new Eimac 8877 grounded grid triodes, vacuum tune and load condensers, and a vacuum antenna relay, the 4K-ULTRA represents the last word in rugged, reliable, linear high power RF amplification. 100 watts drive delivers 4000 watts PEP input.

Price $3250.

*Not available for sale to amateurs in the U.S.

Export inquiries are invited.
Export models of Amateur units available for 10 meter operation also.

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Optimum Performance Optimum Value / IC-211

2 meter Multi-Mode 4 MHz Transceiver

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"The IC-211 is a very fine piece of electronic equipment. It is every bit what I expected, and more."
John, K2UFA

"Very fine receiver, and easy to operate, even with so much on it. Nice!"
Alex, WD4DGF

"Fantastic rig! ICOM line recommended by dealer, but rigs sold themselves!!!"
Jerry, WB9QKV

"The IC-211 outperforms anything I've used . . . Regal quality throughout . . . exceptional cosmetic design and compact ruggedness. Truly a masterpiece of engineering inside and out."
Steve, WD9FRP

"I only buy the best."
Frank, WB4WUY

"An excellent rig. Both my wife (WB9BFY) and myself are very pleased with it."
Neal, WB9ZCU

"An exceptional piece of equipment. Very versatile."
Bernie, WB2FBP

"The one that probably best illustrates our point —that your Amateur Radio dollar buys a lot more these days—is the ICOM IC-211. . . The key word in any description of the IC-211 is *versatility*."
***QST Magazine,* "Product Review", Dec. 1978**

All ICOM radios significantly exceed FCC specifications limiting spurious emissions.

Specifications are subject to change without notice.

IC-211 Specifications: ☐ Frequency Coverage (any mode): 144.00 to 148.00 MHz ☐ Modes: SSB (A3J), FM (F3), CW (A1) ☐ Supply Voltage: DC, 13.8V ± 15%, AC117V ± 10% ☐ Size: 111mm(H) x 241mm(W) x 264mm(D) ☐ Weight: 6.8 Kg ☐ TX Output: A3J, 10W (PEP); A1 & F3, 10W ☐ Spurious Radiation: – 60 dB below Carrier ☐ Microphone Impedance: 600 Ohms ☐ Sensitivity: A3J & A1, 0.5 microvolt 10 dB S + N/N, F3, 0.6 microvolt for 20 dB quieting ☐ Spurious Response: – 60 dB or better ☐ Synthesizer Frequency Range: 144.00 MHz to 148.00 MHz ☐ Synthesizer Stability: ± 1KHz ☐ Frequency Readout: 7 digit LED 100 Hz Readout ☐ Antenna Impedance: 50 ohms ☐ Spurious Response Rejection Ratio: Better than 60 dB ☐ IF quencies: SSB, 10.7 MHz, FM 10.7 MHz, 455 KHz ☐ Carrier Suppression: Better than 40 dB down ☐ Opp Sideband Suppression: More than 40 dB down ☐ Selectivity: SSB, CW ± 1.2 KHz at – 6 dB, ± 2.4 KHz at – 60 dB, FM ± 7.5 KHz at – 6 dB, ± 15 KHz at – 60 dB

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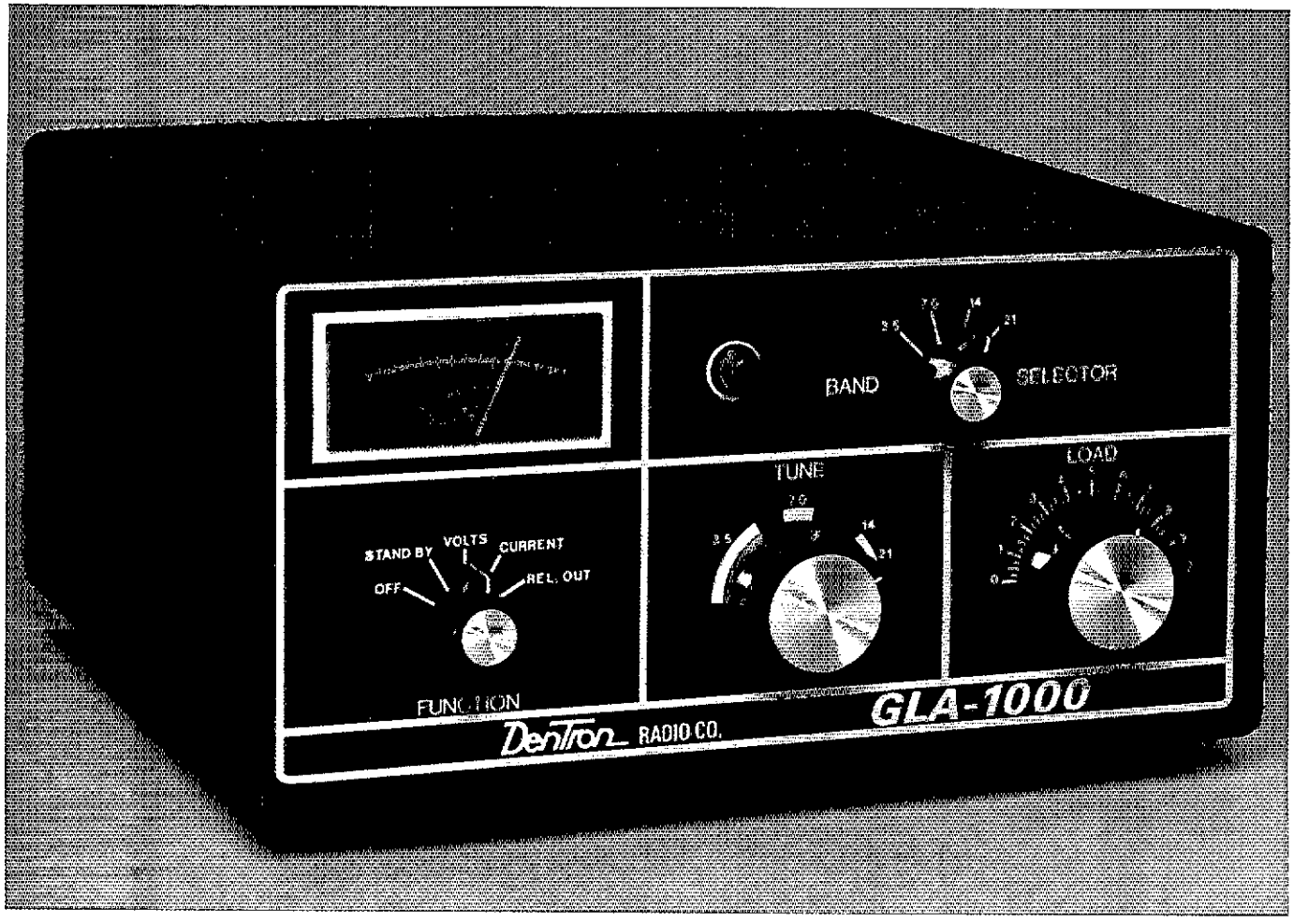
THE COVER

If you've ever had an RFI problem, now is the time to give the FCC a piece of your mind. Details appear on pages 9 and 48-50.

Contents

ANOTHER FIRST FROM DENTRON
more power for less.



In January, 1978, our engineers developed a unique linear amplifier. The GLA-1000 was to be the smallest amateur linear to offer 1200 watts SSB PEP input, and 1000 watts CW input, with a built-in power supply, at the lowest possible price, $379.50 sugg. retail.

How would it perform? Could a unit this small (5⅜"H x 11"W x 11"D) and economical measure up to high standards set by "professional" amateurs across the country? We decided to let a group of amateurs tell us.

The GLA-1000 was field tested for 1 month by the following amateurs: Robert Allen W8IO, Harold Unger WA2EQN, Robert Schiers NØAN, Jim Turle WA8RCN, Alan Applegate KØBG, Howard Townsend WA5MLT, Mickey LeBoeuf K5ML, Tom Lutman WB8ZWY, Ed Clegg W3LOY and Andy Calandria K5MVP. The group was instructed to "use the prototype under tough operating conditions, not to baby it in any way."

What was the response? Some on the air comments received by W8IO, *"Fantastic signal, 12 db over barefoot exciter"* (75SSB). *"Excellent keying, no change in wave form, 5-9 +30 db in Kentucky"* (40CW). From NØAN, *"Overall quality excellent and up to the standards DenTron has come to stand for."* From K5ML, *"Finally a high quality amplifier that everyone can afford."*

Response was unanimously positive. Build a powerful linear with special features like full metering of essential voltages and currents, a back-lit, black-out meter that even includes a relative, power output function. Keep it small and economical so that it is within the reach of all amateurs, and you've got a winner!

In inflationary times like these, it's important to find ways to do more for less.

We did, and we're proud of it.

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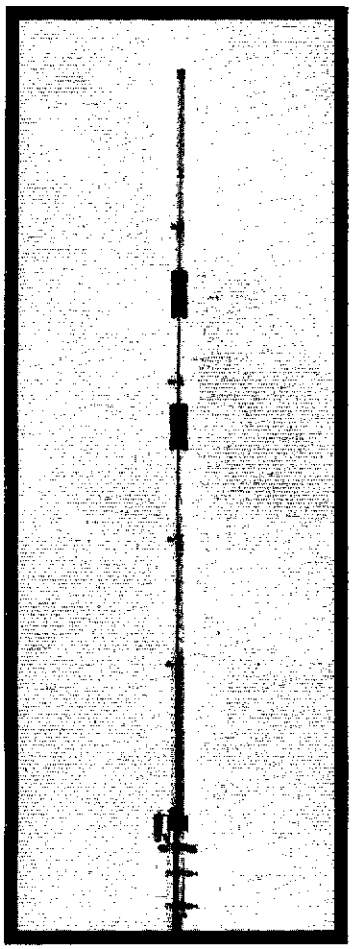
FCC Type Accepted

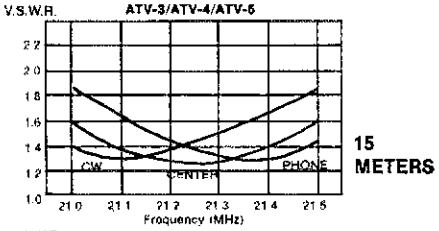
NEW HF VERTICALS BY CUSHCRAFT

Cushcraft's new multiband vertical antenna systems have been optimized for wide operating bandwidth and provide the low angle of radiation which is essential for long-haul DX communications on the high-frequency amateur bands. The high Q traps which were designed especially for these verticals use large diameter enamelled copper wire and solid-aluminum air-dielectric capacitors; the trap forms are manufactured from filament-wound fiberglass for minimum dielectric loss and high structural strength. High strength 6063-T832 aluminum tubing with 0.058" (1.5 mm) walls is used for the vertical radiator. The massive 2 inch (50 mm) OD double-walled base section and heavy-duty phenolic base insulator ensure long life and durability. For maximum performance with limited space, choose a Cushcraft multiband vertical; all models may be roof or ground mounted on a 1¼" - 1⅝" (32 - 48 mm) mast.

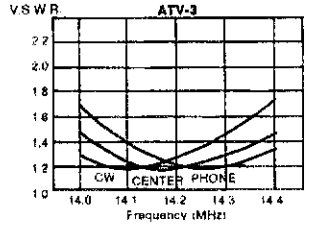
10-15-20 METERS



ATV-3 Cushcraft's ATV-3 multiband vertical provides low VSWR operation for both SSB and CW on 10, 15, and 20 meters. Matched to 50 ohms, built-in connector mates with standard PL-259. Stainless-steel hardware is used for all electrical connections. The ATV-3 is a compact 166 inches (4.2 meters) tall. Rated at 2000 watts PEP.

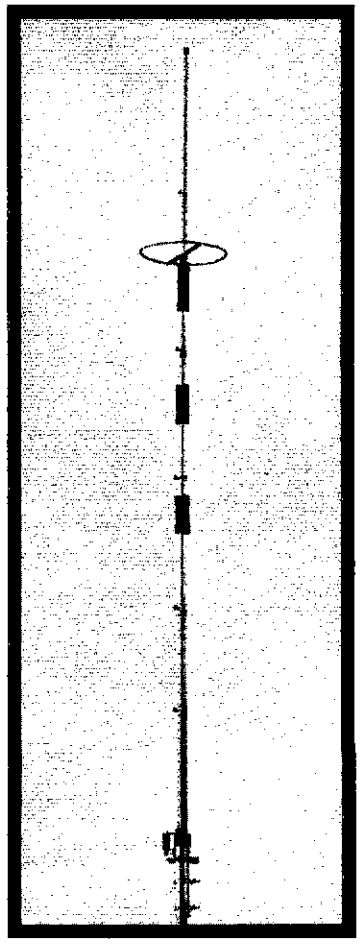


15 METERS

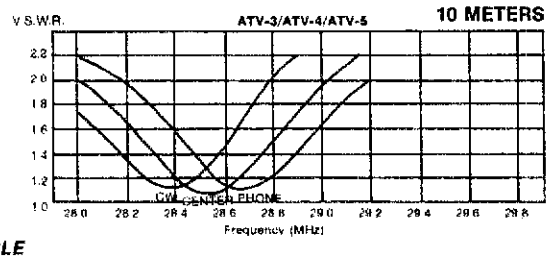


20 METERS

10-15-20-40 METERS

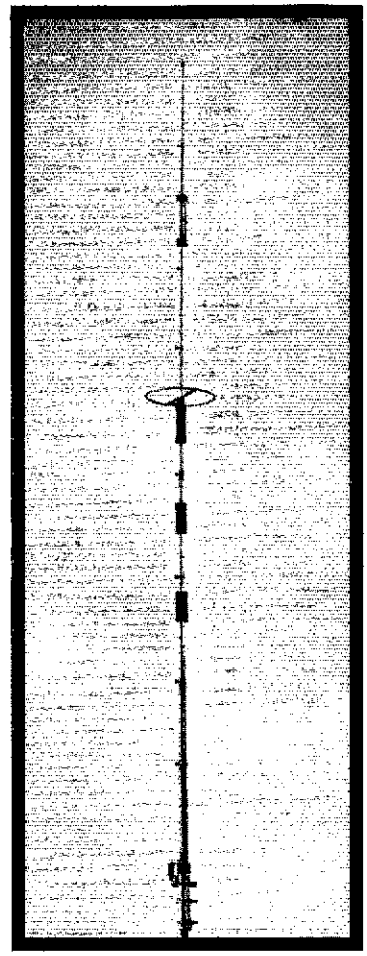


ATV-4 The Cushcraft ATV-4 four-band vertical antenna has been optimized for wide operating bandwidth on 10, 15, 20, and 40 meters. SWR is less than 2:1 over the CW and SSB segments of 10, 15, and 20. The 2:1 SWR bandwidth on 40 meters is approximately 240 kHz; may be quickly and easily adjusted to favor any part of the band. Coaxial fitting takes 50-ohm transmission line with PL-259 connector. Overall height, 233 inches (5.9 meters). Rated at 2000 watts PEP.



10 METERS

10-15-20-40-80 METERS



ATV-5 The ATV-5 trapped vertical antenna system has been engineered for five-band operation on 80 through 10 meters. The high Q traps are carefully optimized for wide operating bandwidth; 2:1 SWR bandwidth with 50-ohm feedline is 1 MHz on 10 meters, more than 500 kHz on 15 and 20 meters; 160 kHz on 40 meters; and 75 kHz on 80 meters. Instructions are provided for adjusting resonance to your preferred part of the band, CW or SSB. Built-in coaxial connector takes PL-259. Nominal height, 293 inches (7.4 meters). Rated at 2000 watts PEP on **all** bands.

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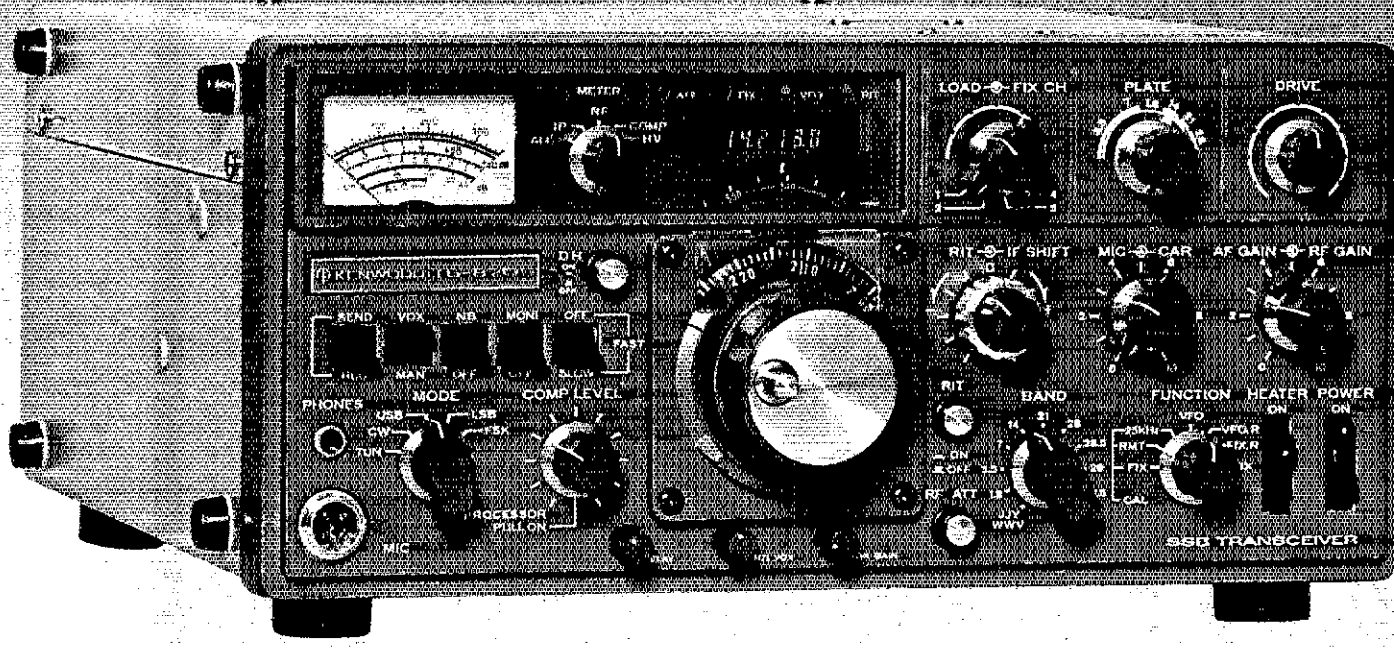

Kenwood's TS-820S has everything the Amateur Operator could want in a quality rig.

Time proven over thousands of hours of operating time, the Kenwood TS-820S has become the preferred rig for those individuals interested in high reliability. And, the TS-820S has every feature any Amateur could want for operating enjoyment, on any band, from 160 through all of 10 meters...plus an RF speech processor in the transmitter, IF shift and sharp filters in the receiver. All combine to give optimum performance under all conditions.

You can always tell who's running a TS-820S. Its superb quality stands out from all the other rigs on the band...and when the QRM gets heavy the TS-820S's adjustable RF speech processor, utilizing a 455-kHz circuit to provide quick-time-constant compression, will get the message through. RF negative feedback is applied from the final to the driver to improve linearity, and third-order products are at least -35 dB. Harmonic spurious emissions are less than -40 dB and other spurs are less than -60 dB.

RF input power is 200 W PEP on SSB, 160 W DC on CW, and 100 W DC on FSK. Receiver sensitivity is better than 0.25 μV for 10 dB S/N.

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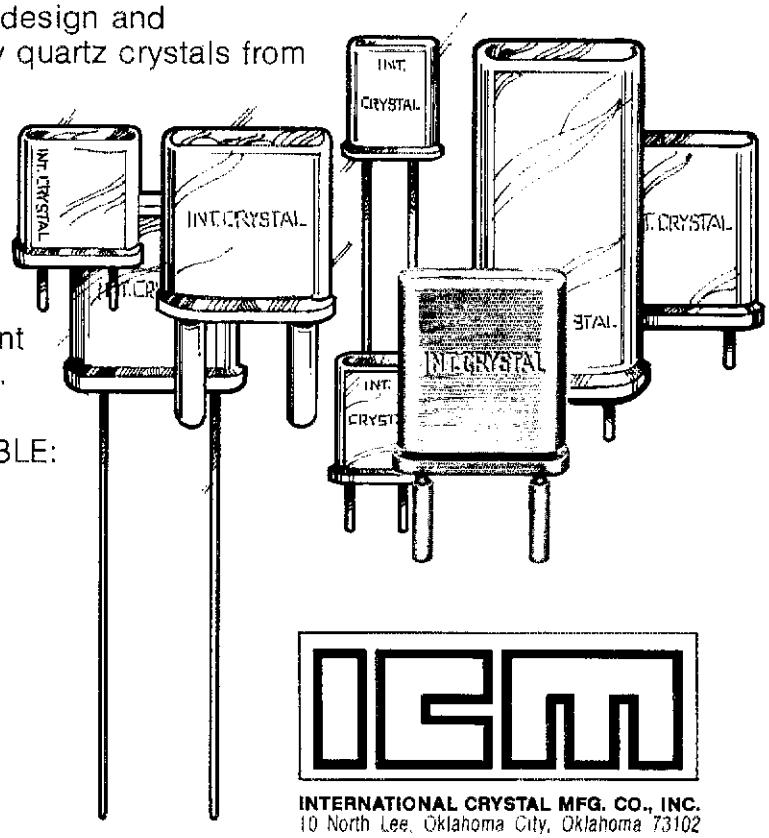

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Reports Invited: The ARRL Board of Directors (see list at left) determines the policies of ARRL. The 16 divisions of the League are further arranged into 74 administrative "sections," each headed by an elected Section Communications Manager. Your SCM welcomes reports of individual and club activity. ARRL Field Organization appointments are available covering a wide range of amateur radio operating interests. Whatever your license class, your SCM has an appointment available. Check with your SCM (below) for further information. Section boundaries are defined in the booklet *Operating an Amateur Radio Station*, free to members.

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Eastern Pennsylvania — George S. Van Dyke, Jr., W3HK, 4607 Convent Ln., Philadelphia 19114 (215-637-8329)
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Mississippi — E. Ed Robinson, W5XT, P. O. Box 602, Laurel 39440 (601-425-2381)
Tennessee — O. D. Keaton, WA4GLS, 141 Medearis Dr., Old Hickory 37138 (615-758-2329)

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Michigan — Stanley J. Briggs, W8MPD/K8SB, 1885 Pinetree Rd., Trenton 48183 (313-676-6248)
Ohio — Harold C. Chapman, WB8JGW, 990 Northwest Potee Rd., S. Vienna 45369 (614-852-4260)

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Vermont — Robert L. Scott, W1RNA, 9 Larae St., Swanton 05488 (802-868-4944)
Western Massachusetts — William T. Lowe, W1TM, Commonwealth Ave., Great Barrington 01230

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Montana — Robert E. Leo, W7LR, RFD 3, Box 104, Bozeman 59715 (406-586-6417)
Oregon — Dale T. Justice, K7WW, 2025 N. Saratoga St., Portland 97217 (503-289-6981)
Washington — Robert L. Klepper, W7IEU, 7027 51st NE, Marysville 98270 (206-659-3005)

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Nevada — Leonard Norman, W7PBV, P. O. Box 945, Boulder City 89005 (702-293-2091)
Pacific — George H. Morton, N7HR/KH6, 5689 Dovekie Ave., Ewa Beach, HI 96706 (808-499-1149)
Sacramento Valley — Norman A. Wilson, N6JV, Rte. 1, Box 730, Woodland, CA 95695 (916-666-1465)
San Francisco — Mark L. Nelson, AA6DX, 2023 Kent Ct., Arcata, CA 95521 (707-822-9674)
San Joaquin Valley — Charles P. McConnell, W6DPD, 1658 W. Mesa Ave., Fresno, CA 93711 (209-431-2038)
Santa Clara Valley — Jettie B. Hill, W6RFF, 22410 Janice Ave., Cupertino, CA 95014 (408-255-6714)

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Utah — Carl R. Ruthstrom, W7GPN, 437 Fifth St., Ogden 84404 (801-394-3314)
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THE AMERICAN RADIO RELAY LEAGUE, INC.

"It Seems to Us . . ."

RFI — Let Your Voice Be Heard!

FCC has issued a massive, all-encompassing Notice of Inquiry into the subject of radio frequency interference (RFI). It asks scores of questions, *all* of which you will find in the article on pages 48-50 of this issue. FCC wants answers to these questions. It wants to hear *in your own words* if there indeed *is* a problem with RFI, the magnitude of the problem, and what should be done about it.

With this Notice of Inquiry, FCC is effectively wiping the slate clean. As far as FCC is concerned, RFI is a whole new ball game, and its first play of the game is to ask the public *if* there is a problem and what should be done about it. Of course, we as amateurs know that RFI is definitely not a game and anything but new. RFI has been with us throughout our careers as amateurs. Scores of *QST* articles have been written on the subject. RFI legislation has been pending in Congress since 1972 — *seven* years ago. Yet only now is the FCC coming to grips with the issue. But the Commission's game is the only game in town, and we have to play by its rules.

Many types of electronic equipment are susceptible to RFI: TVs, stereos, electronic organs, clock radios . . . to name a few. Amateurs know that in most cases the device experiencing the interference is itself at fault, for it is reacting to signals it was not intended to react to. Be that as it may, you can be sure the manufacturers of these devices will also be responding to this Inquiry. But more likely than not they will be telling the Commission that all is well, that there *is no* problem, or that any problem that exists is well under control, so no action by FCC is necessary or desirable.

Now, for argument's sake, let's suppose all the manufacturers file comments with FCC saying that there is no RFI problem or that it is well under control and that manufacturers are voluntarily making their equipment RFI-proof and FCC should not get further involved in the problem. Suppose also, for argument's sake, that only a few people file comments saying that *there is* a serious problem and that something should be done about it. Under these circumstances, the Commission would be justified in saying that the record shows no serious problem exists. There would be no recourse for those who feel there *is* a serious problem.

This is why you should respond to the Commission's Inquiry. You must make your voice be heard. If you do not get involved, you are yourself to blame for the consequences.

Frankly, we're not going to tell you what to say to FCC. The Commission wants to hear from *you* directly, and if we put words in your mouth your comments would not be your own. However, we *will* tell you not to be overwhelmed by the size of the Commission's Inquiry. If you feel that you can answer only one of the Commission's questions, please do so. If you want to answer them all, do so by all means. If you just want to tell FCC about a personal RFI problem that you experienced and how it was resolved, go ahead. If you're an engineer and just want to answer the engineering questions, the Commission will welcome your effort. In other words, it is not necessary to respond to each and every question. Just give FCC the benefit of your thoughts, your experiences, and your professional and amateur background.

Your comments may be written in any style so long as they are readable and clearly show the docket number (General Docket No. 78-369) at the top of the first page. The Commission asks that you label your responses so that it will be clear which questions are being answered. If your comments are not related to a specific question, please state the issue being addressed.

FCC regulations require that you submit an original plus *five* copies of your comments. If you want each Commissioner to receive a personal copy of your comments, you should include seven *additional* copies. Send your comments to the Secretary, Federal Communications Commission, Washington, DC 20554. The deadline for comments is May 1, 1979.

If you think the RFI problem is serious, let FCC know. If you think the Commission should take some sort of action to resolve the problem, let FCC know. If you think government regulation is not the answer, let FCC know. The important thing is to *let your voice be heard;* then the record will speak for itself. — *Harold Steinman, K1FHN*

League Lines...

At this writing (early February) the WARC issue involving international broadcasting (February QST, page 55) is still unresolved. The U.S. proposals were sent to Geneva in late January incomplete; the high-frequency allocations (below 27.5 MHz) were not included. The Department of Defense, NTIA, FCC and important segments of the maritime and aeronautical communities are aligned with the Amateur Service in opposing the broadcasters on this issue. The broadcasters' intransigence already has hurt U.S. strategy by delaying circulation of the proposals to other administrations.

Membership dues will increase to $18 per year, effective April 1, 1979. The postal surcharge for Canadian members will be increased to $2, while the overseas postal surcharge will be increased to $3. For a special message from the General Manager, please turn to page 61.

In response to a joint request by the National Radio Astronomy Observatory (NRAO) and the ARRL, the period in which to file comments in Safety and Special Docket 78-352 (the Quiet Zone Docket) has been extended to March 5, 1979. This docket would require that amateurs in certain portions of VA and WV obtain prior approval from the NRAO before putting stations in repeater operation. The extension will allow representatives of the NRAO and the Amateur Radio Service to attempt to work out the problem voluntarily without the need for further regulation. See January 1979 QST, page 62 for details.

FCC has extended the comment deadline in General Docket 78-365 to March 22, 1979. Reply comments will be due April 23, 1979. The docket proposes changes in the Amateur Rules which would establish criteria to ensure interference protection for FCC monitoring stations from Amateur Radio stations. Refer to February 1979 QST, page 62, for more information.

Latest reports from people who have just taken FCC Advanced and Extra Class exams indicate that new tests are being used. In "League Lines" over a year ago we reported that the exams were the old ones and that the 75th edition of the License Manual was a better one to study. Now the 76th edition 8th printing, which is available today from your local ARRL dealer, follows the new study outlines as they were issued by FCC. The License Manual also contains an up-to-date Part 97 of the FCC Amateur Rules and Regulations.

Beginning this month, QST readers will be able to keep up to date on the latest exciting developments in the field of amateur microwave activity. "The New Frontier—The World Above 1 Gig" will discuss the equipment, achievements and future plans of amateurs active on the microwave bands. The column's conductor is Bob Cooper, W5KHT, a knowledgeable microwave enthusiast and editor in chief of Community Antenna Television Journal. He's soliciting readers' suggestions, comments and contributions. This month's column is on page 68.

Anyone for some SSTV pictures from Jupiter and Saturn? The Jet Propulsion Laboratory Amateur Radio Club, through its club station W6VIO (Voyager In Outerspace), will be sending pictures taken from spacecraft Voyagers I and II for amateurs throughout the world to see. Starting March 1 and continuing through March 11, 1979, W6VIO will be making contacts commemorative of this space mission on the following frequencies: cw—30-kHz above the bottom edge of the bands, 80 through 10 meters; SSTV—3845, 7220, 14,235, 21,340 and 28,680 kHz; SSB—3930, 7230, 14,285, 21,360 and 28,680 kHz; Novice—3730, 7130, 21,130, and 28,130 kHz. There are plans for OSCAR, 2-meter, and 220-MHz contacts as well. Operations will be increased weekends and between the hours 0000 and 0300 UTC. To receive a special QSL card, U.S. stations should send an s.a.s.e. Overseas stations may QSL via their QSL bureaus. A second encounter period for Voyager II will bring more amateur contacts July 6 through 15, 1979.

The Code Speedometer

Determining the speed of a received cw station is easy with this novel circuit. It's also handy for checking your sending speed.

By George L. Downs,* W1CT

Here is a meter that displays code speed in words per minute (wpm), just as the speedometer of your car reads in miles per hour. It is actuated by an audio signal. Connect it across your speaker or headphones, and it will indicate the speed of the station to which you are tuned. The sidetone you use to monitor your sending will allow you to measure your sending speed. This code speedometer will work with a bug, straight key, sideswiper, electronic keyer or keyboard. The code quality does not have to be good; it is necessary only that the correct number of dits and dahs is sent. The meter works by counting the number of code elements (dits or dahs) and differentiating with respect to time, on the basis that the average word contains 12-1/2 code elements.[1]

Measurement of Code Speed

It is well known that the elements of the international Morse code have the following relative values:

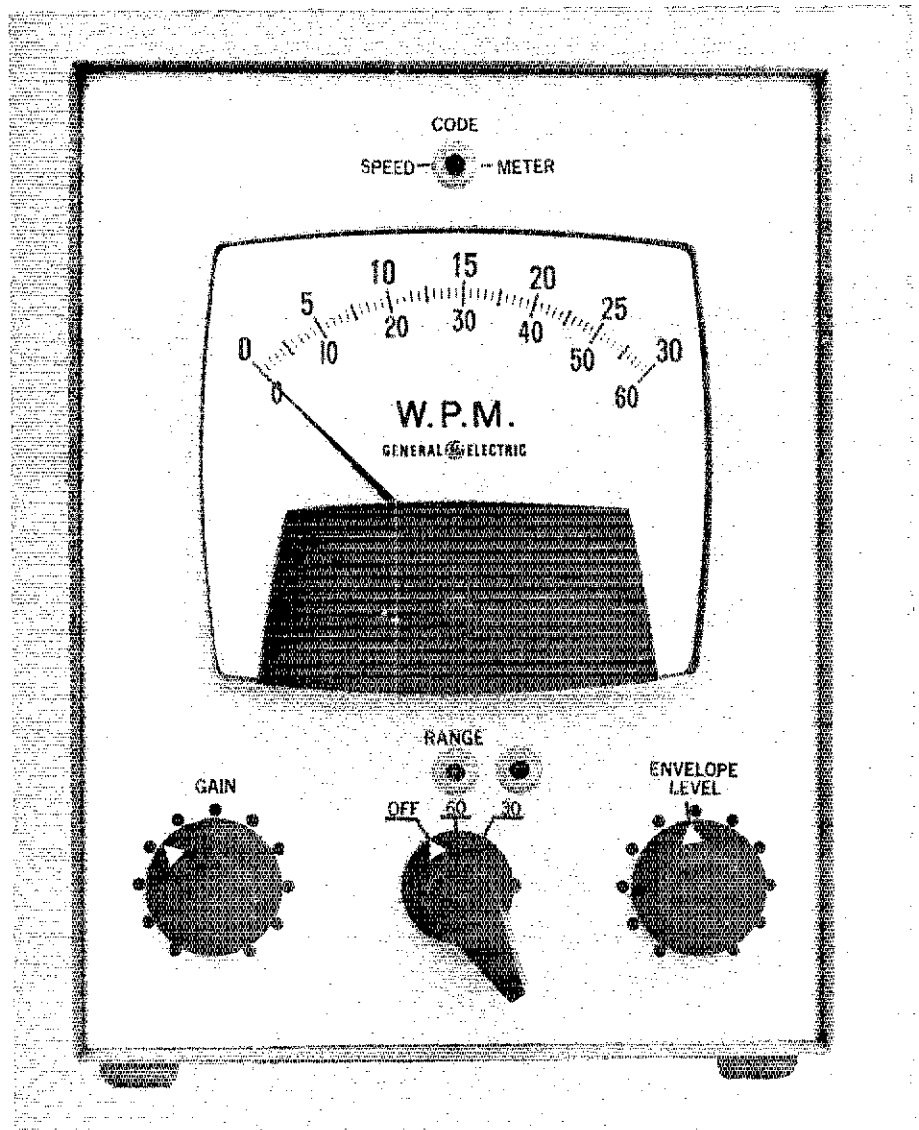
1) The length of one dit is the basic time element, and is called a bit.

2) A dah is 3 bits in length.

3) The space between dits and dahs is 1 bit.

4) Spacing between characters is 3 bits, and spacing between words is 7 bits.

For purposes of measuring code speed in amateur and commercial radiotelegraphy, the standard five-letter word *Paris* has been chosen. Counting the 7-bit space following the word, this is a 50-bit unit. Therefore, we may say that every 50 bits of code constitute one "word." If we send a string of dits, one "word" will contain 25 dits. If we send a string of dahs, one "word" will contain 12-1/2 dahs



The front panel of the code speedometer. The GAIN and ENVELOPE LEVEL controls are discussed in the text. When the red LED which forms the "O" in SPEED-O-METER flashes in sync with the incoming code, the meter is reading the correct speed.

*85 Fairview Rd., Weston, MA 02193

[1]See the appendix for a discussion of how this figure was derived.

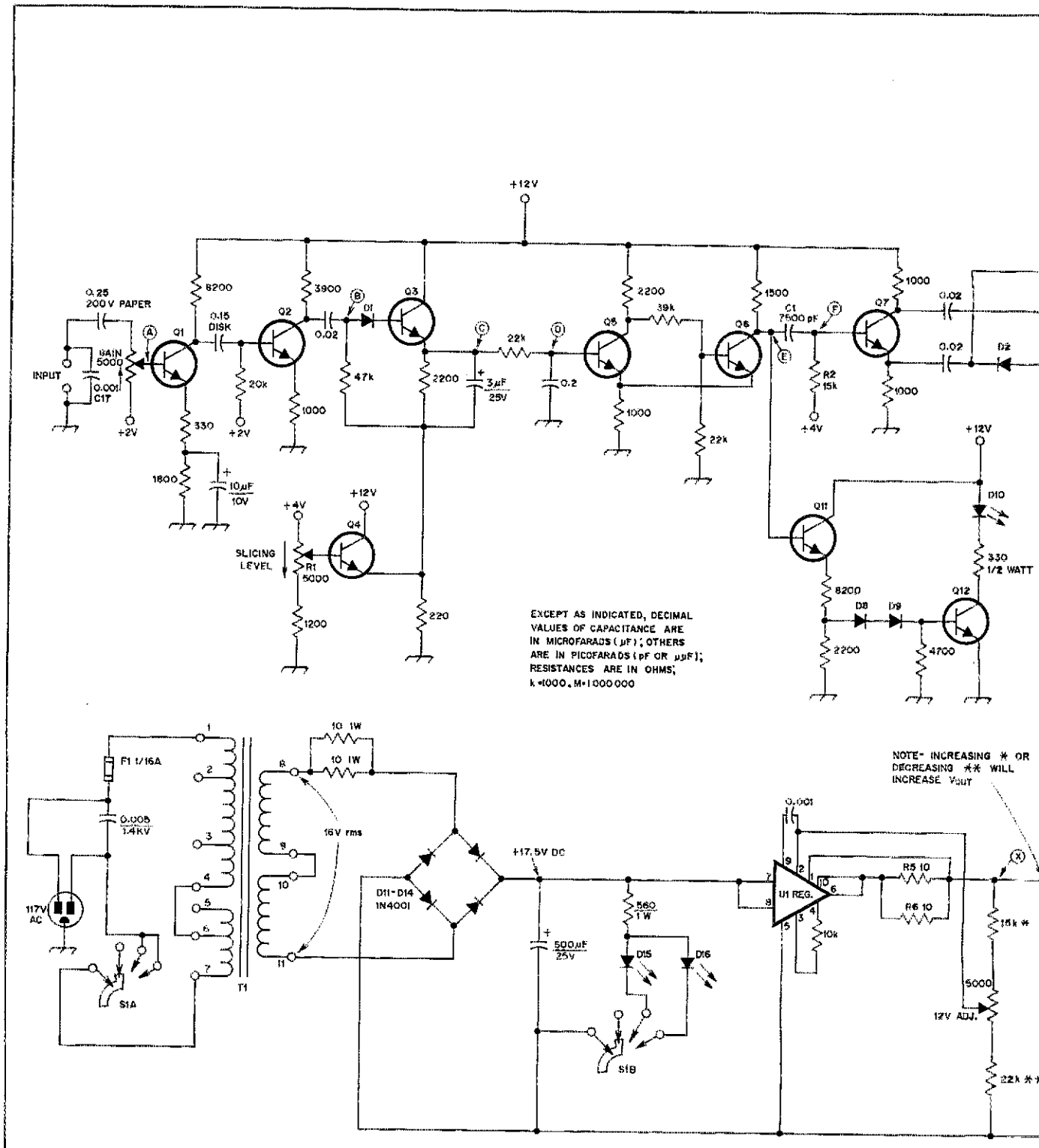
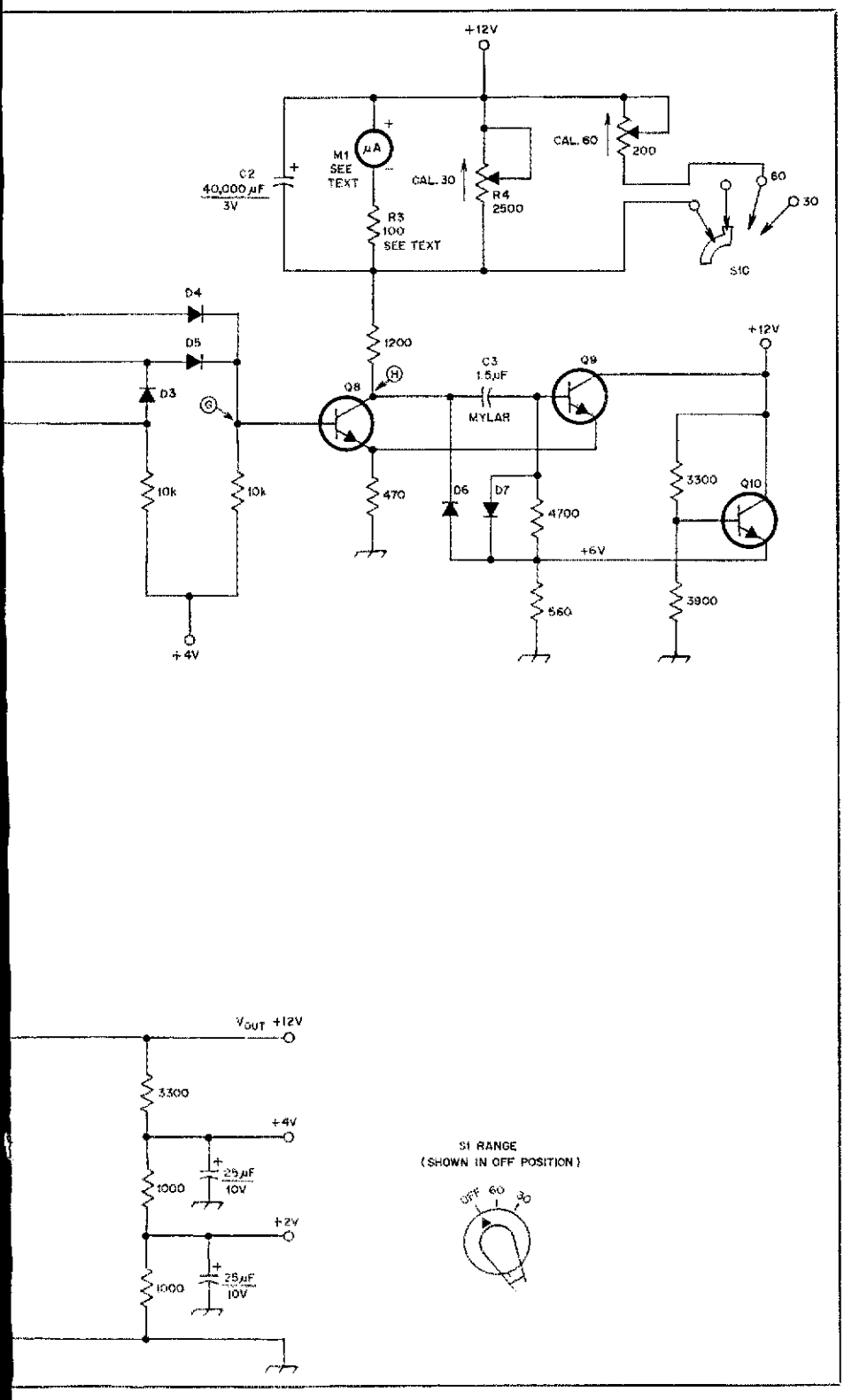


Fig. 1 — Schematic diagram of the code speedometer, complete with power supply. All resistances are 1/4- or 1/2-watt composition, unless otherwise indicated. Electrolytic capacitors, those with polarity marked, are 16-volt rated unless otherwise indicated. Circled letters denote test points for connecting an oscilloscope.

D1-D9, incl. — 1N4148 or equiv. (see text).
D10, D15, D16 — LED, Radio Shack 276-090 or equiv.
M1 — Microammeter, 50 to 100 μA full scale. The author used a General Electric 0 to 1 mA "Big Look" meter with the shunt removed, but the choice of meter is not critical. See text.
Q1-Q12, incl. — MPS5172 or equiv. (see text).

(dahs go by half as fast as dits). Thus wpm = dahs per minute divided by 12.5.

Average English text runs about 12-1/2 code elements per word. Hence wpm = code elements per minute divided by 12.5. (Note that the number of code elements per minute in average text turns out to be the same as the number of dahs per minute in a continuous string of dahs, given the same bit rate in either case.) This means that if we simply count dits and dahs without bothering to distinguish



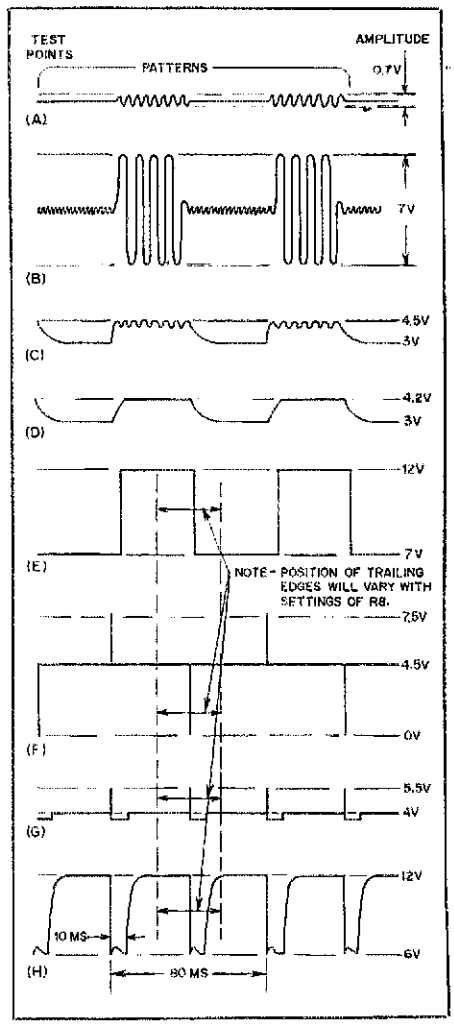


Fig. 2 — Waveforms observed by connecting oscilloscope at the test points marked by circled letters in Fig. 1. The pulse durations indicated at H are for a code rate of 750 bits per minute (30 wpm).

S1 — 4-pole, 3-position wafer switch.
T1 — Stancor 23V60 or RT-201 or equiv.

U1 — 150-mA positive voltage regulator, Motorola MC1723CG.

between them, and differentiate with respect to time, we can measure code speed in words per minute! Electronically, this is comparatively easy.

Don Gray, an associate of mine at Sylvania, suggested a circuit and supplied waveform patterns. Murray Preisler designed the power supply, and Ray Alexander helped keep the philosophy straight. We agreed that operation would be smoothest if we made two counts per code element: one count at the beginning and one at the end.

The Circuit

Fig. 1 is the schematic diagram of the code speedometer. Test points are indicated by circled letters. The waveforms at these test points are shown in Fig. 2.

Q1 and Q2 are audio amplifiers. The audio envelope begins to emerge at point C and is seen fully filtered at point D. Q5 and Q6 form a Schmitt trigger. Q6 is normally on and Q5 is normally off. When the audio envelope rises in voltage, these conditions reverse. When the envelope voltage drops, the trigger returns to normal. The result of this action is the square wave shown at E.

Potentiometer R1 controls the bias on the base of Q4. This allows the operator to control the level at which the Schmitt trigger actuates. This threshold control

provides for optimum reception through QSB or QRN. Note that the envelope is wider at the base than at the top, and that the length of the square wave will change somewhat as the threshold level is varied. This causes no problems.

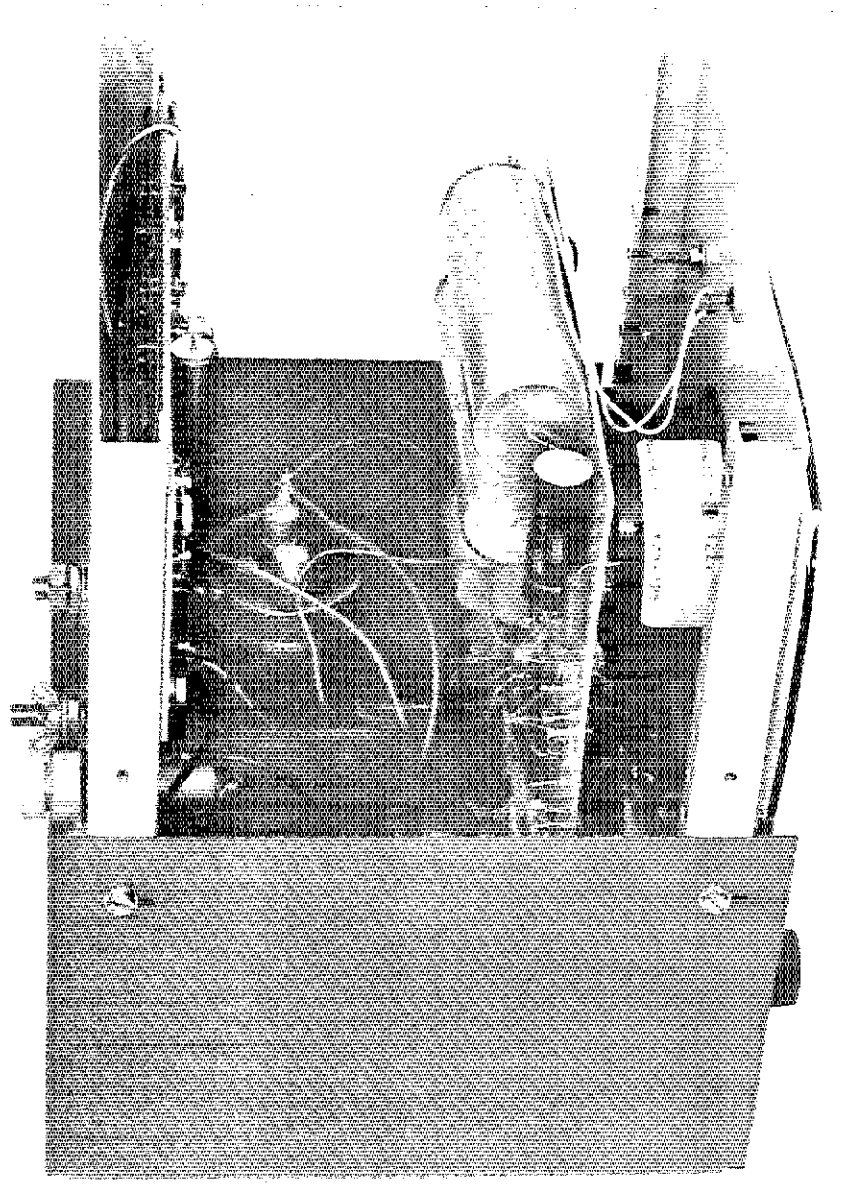
The square wave is differentiated by C1 and R2, and the negative pulses are inverted by Q7. The resulting positive pulses, which occur every time the key opens or closes, are applied to the base of Q8.

Transistors Q8 and Q9 constitute a one-shot multivibrator which delivers a measured pulse to the metering circuit each time Q8 is actuated. Q10 provides a stable, low-impedance, 6-volt reference level for this pulse. The pulse, which is shown at H in Fig. 2, is applied to the circuit consisting of C2, M1 and the associated shunting resistors.

The meter may have a full-scale sensitivity of anything between 50 and 100 μA. Add sufficient series resistance so that the voltage across the series combination of M1 and R3 is approximately 0.1 volt for a full-scale reading. A suitable shunting pot (R4) should then be added to allow adjustment. The value of C2 should be increased in increments of 10,000 to 20,000 μF until the desired damping effect is obtained. (The meter tends to jump around quite a bit and a long time constant is required. In my case, the time required for the meter to fall from full scale to 1/3 of full scale was 10 seconds for the 30-wpm scale and 6 seconds for the 60-wpm scale.) The value of C2 affects only the time constant, and can be changed without altering the calibration in any way. The damping has the effect of making the response very "sluggish." If you have an oscilloscope, check the pulse width at point H and adjust the value of C3 until it is about 10 ms. This must be a high-grade capacitor, because the width of this pulse is important to the accuracy of the meter.

Q11 and Q12 provide current for the LED D10, which flashes along with the code.

In the power supply, R5 and R6 provide a current limit of 100 mA. Current drain measured at the point marked X is 43 mA key up and 68 mA key down. Most of the difference is current required to light D10.



Interior view of the code speedometer. The speedometer perf board is mounted on the meter terminals, and the power supply board is mounted on the back-panel rails. Calibration pots, fuse holder, power input and signal input are on the rear panel. The large capacitors on the perf board are connected in parallel to form the total capacitance for C2.

Construction

The metering circuit was accommodated on one piece of perf board and the power supply on another. The metering circuit was mounted on the terminals of the meter itself, and the whole was enclosed in a Hammond cabinet. The physical design began with a large meter and went on from there; no attempt was made to miniaturize the circuit. A lot could be done to reduce the size. We leave construction details to the builder.

Any type of general-purpose silicon npn transistor will work in this circuit. MPS5172s were selling for 19 cents apiece when we went parts shopping, and were chosen purely on the basis of price! Similarly, any general-purpose diode will do the job of D1-D9, inclusive.

The voltage-regulator IC is quite fast and should be wired with short direct leads to prevent oscillation. Bypass capacitors at the power and input sockets should be wired directly across the socket terminals with short leads. Otherwise, construction is not critical.

Calibration

The 30-wpm scale must be calibrated first, then the 60-wpm scale. Because the meter is linear, it is necessary to calibrate at only one point for each scale; best results are obtained if the calibration point is near the high end of the scale. Here are two suggested methods of calibration.

Calibrate your keyer with an EPUT (events per unit time) meter or by checking its clock frequency (wpm = clock frequency in Hz times 2.4) with a counter or scope. Then calibrate the meter by sending dahs with the keyer.

If you have none of the test equipment mentioned above, tune in a W1AW code-practice or bulletin transmission and set the speedometer to the appropriate speed. (I found I could come within three percent by this method.)

Operation

For operation, first connect the speedometer across the speaker or headphones. Next, set the envelope level

control at the middle of its range. Adjust the receiver af gain for a comfortable listening level. Then, advance the speedometer gain control until the LED flashes with the code being heard. After the damping has been overcome, the meter will indicate the average code speed. Gain may be advanced another 60 to 90 degrees to stabilize operation.

For high noise levels which actuate the LED, advance the envelope level clockwise. For extreme QSB, reduce the envelope level setting. The receiver age or noise blanker may also be helpful under such conditions. When the band is crowded, an audio filter may be necessary.

To determine the speed at which your keyer is set, hold the dah paddle closed. The meter will then read the correct speed.

Some Second Thoughts

If I were to build another code speedometer, I might do some things differently. You might want to consider the following if you want to build one.

Two speed ranges really aren't needed. I use the 60-wpm range even at low speeds. Any speed range around 50 to 75 wpm ought to be suitable.

I would probably set the envelope level about midway up the ramp of the waveform shown at point D and move the control inside the cabinet. It is fun to play around with this control, but the receiver and speedometer gain accomplish pretty much the same thing.

I would arrange for switching C2 in steps. A fast time constant is handy for quick keyer adjustments, but slow code requires more damping.

Finally, I would provide for two inputs, one for the speaker and one for high-impedance headphones.

I have found the code speedometer to be as much fun to use as it was to put together. I hope you will, too!

Table 1

Frequency of Appearance of Letters in Text.
These figures are based on a sample of English text containing 10,000 letters.

E	1231	P	229
T	959	F	228
A	805	M	225
O	794	W	203
N	719	Y	188
I	718	B	162
S	659	G	161
R	603	V	93
H	514	K	52
L	403	Q	20
D	365	X	20
C	320	J	10
U	310	Z	9

Appendix

How did I determine that the average word contains 12-1/2 code elements? In the book *Cryptanalysis* by H. J. Gaines, I found a table that indicates the frequency with which each letter appeared in a representative sample of English text containing 10,000 letters. (See Table 1.) This table has the authority of representing "typical" text, in the opinion of a codebreaker.

I set down the letters and the frequency of each in a long column, and left some blank columns. To calculate the total bits (dit-durations) in the sample, I wrote the number of bits, including the 3-bit space after each letter, required to send that letter. For example, A = 8, B = 12, C = 14, and so on. The bits for each letter were then multiplied by the frequency of occurrence of that letter, and the total was entered into one of the blank columns. Individual bit totals were then added up, and extra spaces added to allow for spaces between words. The total number of bits for this 10,000-letter sample was 101,587. Since by definition there are 50 bits in a standard word, our sample is equivalent to 101,587 ÷ 50, or 2031.74 standard code words.

A figure for total code elements was computed in the same way. The code elements (that is, dits and/or dahs) per letter were set down opposite each letter in another blank column. For example, A = 2, B = 4, C = 4, and so on. Code elements per letter were then multiplied by frequency of occurrence of that letter, and the individual code element totals recorded. When these were summed, the total was 25,349 code elements for the sample. For this sample, then, there are 25,349 ÷ 2031.74, or 12.476 code elements per word.

Other similar trials came out in the same "ball park" so I have made the assumption that, for standard English text, we can figure 12.5 code elements per standard 50-bit word. This is an important conclusion, because it means that if we measure code on the basis of counting code elements, we can hold down the dah paddle of our electronic keyer and obtain a direct reading of words per minute on our speedometer. (It is a convenient coincidence that there are 12.5 dahs per 50-bit word unit as well as 12.5 code elements average!) Furthermore, logic dictates that there must be *some* figure that represents the number of code elements in an average 50-bit unit of English text; knowing this figure simplifies the circuit of the code speedometer. QST

Strays

KIWANIS NET

☐ The Kiwanis Fellowship Radio Net meets at 0400 on Sundays and Thursdays on 3.913 MHz and at 1700 UTC on Saturdays at 14.277 MHz. In addition, nets are held at 1800 each weekday on 28.544 MHz, and at 1900 each weekday at 21.324, when 10 and 15 are open. — *K7AII*

I would like to get in touch with . . .

☐ anyone knowing the source of ticker tape that measures 0.010 × 5/16 inch. It fits a "siphon recorder" that I built in the late '30s when licensed as W2JCF. George L. Rogers, 2432 Cortland St., Waynesboro, VA 22980.

After months of planning, the AMSAT-OSCAR Spacecraft Laboratory at the NASA Goddard Space Flight Center was dedicated in October. Here, Dr. Tom Clark, W3IWI (left), and Goddard official Dr. Charles Buffalano officially open the facility, located at Goddard's Visitor Center in Greenbelt, MD. The new laboratory is designed to provide visitors with a first-hand look at the construction of an amateur spacecraft. AMSAT's Phase III is scheduled to be launched in December 1979. *(NASA photo)*

A CMOS Control Circuit for Repeaters

Upgrade your noise-prone TTL control system and greatly reduce power consumption, too.

By Donald Dorson,* W1GBO

This circuit was originally designed to control a commercial solid-state repeater. One of the goals was low power consumption so the system could be battery operated for several days in emergencies. Since the original repeater went on the air, this circuit has been used in several other repeaters, including a collection of old tube-type equipment.

Circuit Features

In addition to its low-power advantage, CMOS circuitry will tolerate a wide range of supply voltage and is highly immune to noise and RFI.[1] This system has operated in close proximity to a 13-kW commercial transmitter with no shielding or rf bypassing required. The transmitter dropout time is adjustable from 220 ms to 3 seconds. A "tailending" option is provided, or the next user can be forced to wait until the carrier drops before returning a call. A timer initiates a remote cw identifier when the repeater input has been activated continuously for three minutes. At the end of the identification period the transmitter is shut off. When the timed-out user finishes, a one- to five-second tone is transmitted. This tells the user he was long-winded and lets listening stations know the input is ready for use. Another timer initiates the cw identifier at three-minute intervals during repeater use. It is interlocked with the carrier operated switch. This prevents transmitter keying for identification with no users present. If the repeater has not been used for more than three minutes, the identifier will be initiated at the end of the next input.

Provisions have been made for local control and monitoring at the repeater site. LEDs indicate INPUT PRESENT, input TIMED OUT, ID AT END OF PRESENT INPUT and TRANSMITTER ON. Front-panel switches are used to generate a local input signal, turn off the transmitter or initiate an i-d cycle, allowing an operator at the site to exercise the repeater in a convenient manner.

Circuit Description

Fig. 1 gives the schematic diagram of the control circuit. The input circuit consisting of Q8 and its associated parts is designed to accommodate a wide variety of COR circuits. If the input receiver provides a ground when a signal is received, it may be connected to point A (pin 18) in Fig. 1. If it produces a positive voltage it may be applied to point B (pin 16).

NOR gates U5A and B are connected as a flip-flop to debounce the front-panel local-control switch. Q7 is the INPUT PRESENT LED driver. Input timer U7 is a seven-stage binary counter. Its reset line is held low whenever the output of NAND gate U4D is high. At the end of three minutes it resets U3A and sets U6A. Resetting U3A turns off the transmitter if tailending is not enabled. When tailending is enabled, the transmitter is turned off by U6A via NOR gate U5D. U6A also enables the TIMED OUT notifier via NOR gate U5C. Three-minute timing is derived from a 728-Hz oscillator and 12-stage binary counter, U1 and U2. R1 adjusts oscillator frequency.

The duration of the drop-out delay and the TIMED OUT notifier are controlled by similar one shots. Unijunction transistors were used to obtain the required several seconds of delay, because they reset very quickly. The one-shot cycles are initiated at the end of each input transmission by the output of NAND gate U4D. The drop-out one shot (Q2) resets U3A after an interval determined by the value of R9. If the next user picks up the input before the tail has dropped he will be shut out until the input is open at least momentarily. If the TAILENDING switch is closed, this will not happen. The TIMED OUT notifier one shot (Q4) is triggered by every user but it does not key the notifier audio unless U6A has been set by the input timer.

The identifier timer is another seven-stage binary counter and is connected to the same oscillator as the input timer. The remote cw identifier may be started in three different ways. The identifier timer starts it every three minutes plus the time to the end of the current user. It may be started by a manual request from the local control panel. It is started whenever the input times out. If the identifier starts during a transmission, it means the user has just timed out and the transmitter will shut off at the end of the identification cycle.

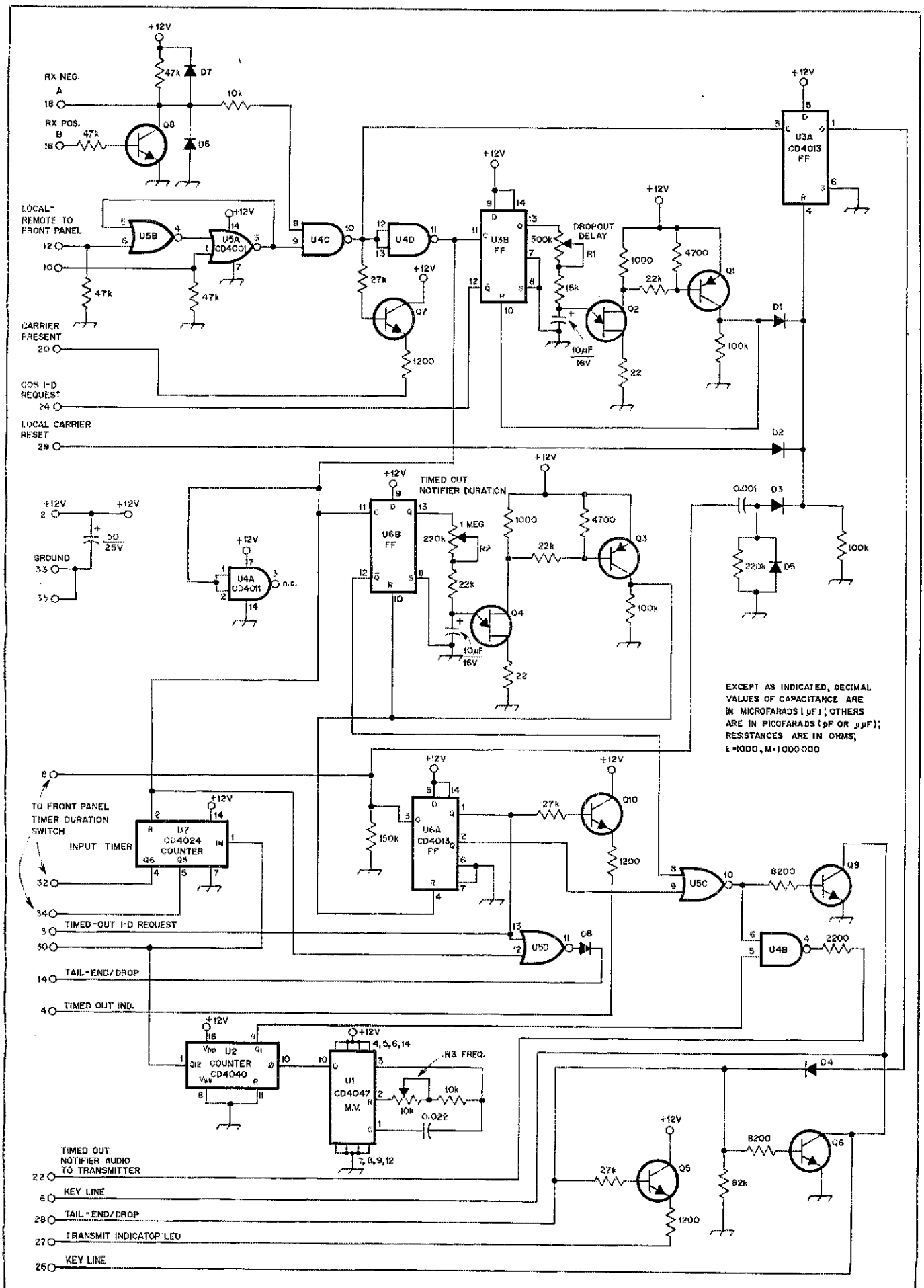
The transmitter-key line is grounded through an open-collector-transistor circuit. The input keys the transmitter via Q6, the TIMED OUT notifier Q9, and the cw identifier Q10. A small relay connected from the transistor collector to the power

Fig. 1 — Schematic diagram of the CMOS repeater control circuit. Pin numbers on the left side of the drawing refer to circuit-board terminals. All ICs are CMOS, which will operate over a wide range of supply voltages. This circuit will only draw a few milliamperes from a 12-volt supply, such as that powering the repeater itself. While the author's unit performed well in a high-RFI-level environment, it might be wise to mount the controller in an aluminum box and use bypass capacitors to bring power and control signals to and from the board.

D1-D8 — Silicon switching diodes, 1N914, 1N4148 or equivalent.
Q1, Q3 — Pnp silicon transistor, 2N3638 or equivalent.
Q2, Q4 — Unijunction transistor, 2N1671 or equivalent.
Q5-Q10, incl. — Npn silicon transistor, 2N3566 or equivalent.
R1 — Circuit-board-mounted trimmer potentiometer, linear taper, 500 kΩ.
R2 — As R1, except 1 MΩ.
R3 — As R1, except 10 kΩ.

*Gardner Rd., West Kingston, RI 02892.

[1][Editor's Note: CMOS devices have high-impedance inputs which are easily damaged by static-electricity discharges. A certain amount of caution in handling the ICs is advisable. A *Guide To Better Handling and Operation of CMOS Integrated Circuits*, ICAN 6525, is available free from RCA Solid State, Box 3200, Somerville, NJ 08876. This booklet thoroughly covers the subject and is "must" reading.]


+12V
RX NEG.
A
18
RX POS.
B
16
47k
10k
D7
D6
Q8
U3A
CD4013
FF
LOCAL-
REMOTE TO
FRONT PANEL
12
10
U5B
U5A
CD4001
U4C
U4D
U3B
FF
DROPOUT
DELAY
500k
R1
15k
10µF
16V
1000
4700
22k
Q1
Q2
D1
100k
22
27k
Q7
1200
CARRIER
PRESENT
20
COS I-D
REQUEST
24
LOCAL CARRIER
RESET
29
D2
TIMED OUT
NOTIFIER DURATION
U6B
FF
1 MEG
220k
R2
22k
Q3
Q4
100k
0.001
D3
220k
D5
50
25V
GROUND
33
35
U4A
CD4011
n.c.
EXCEPT AS INDICATED, DECIMAL
VALUES OF CAPACITANCE ARE
IN MICROFARADS (µF); OTHERS
ARE IN PICOFARADS (pF OR µµF);
RESISTANCES ARE IN OHMS;
k=1000, M=1000000
8
TO FRONT PANEL
TIMER DURATION
SWITCH
INPUT TIMER
U7
CD4024
COUNTER
32
34
U6A
CD4013
FF
150k
Q10
1200
U5C
8200
Q9
3
TIMED-OUT I-D REQUEST
30
U5D
D8
U4B
2200
14
TAIL-END/DROP
4
TIMED OUT IND.
U2
CD4040
COUNTER
U1
CD4047
M.V.
4,5,6,14
R3 FREQ.
10k
0.022
7,8,9,12
D4
TIMED OUT
NOTIFIER AUDIO
TO TRANSMITTER
22
KEY LINE
6
TAIL-END/DROP
28
TRANSMIT INDICATOR LED
27
KEY LINE
26
Q5
Q6
82k

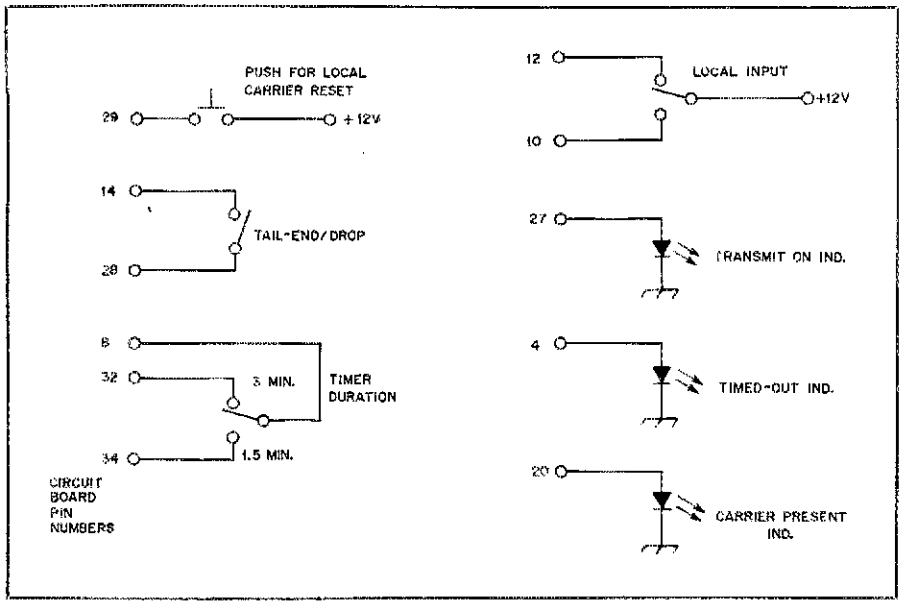


Fig. 2 — Functions of the control circuit are selected via a front panel containing switches and LEDs. Except for the switch shown connected to circuit-board pin 29, which is a normally open push-button type, all switches are toggle or slide type. The LED drivers (Fig. 1) are capable of supplying any common LED, leaving choice of color and size up to the builder.

supply may be used to key any transmitter not compatible with the open collector.

Construction

The prototype control circuit was constructed on a 5 × 5-1/2 inch (127 × 140-mm) printed-circuit board. Elco printed-circuit-card connectors were used because of their reliability and ready availability. The circuit-board plug is Elco part no. 00-7022-035-000-001 and the mating chassis-mounted socket is Elco part no. 00-7008-035-163-001. They are both stock items at Cramer Electronics. Fig. 2 shows the connections to the front-panel components.

A scale-size template for the circuit board used in this project appears in the "Hints and Kinks" section of this issue. Fig. 3 gives a component-side view of the board with locations of the various parts indicated.

If your repeater-control circuit has grown into a haywire mess over the years, this system will increase reliability and probably reduce the electric bill!

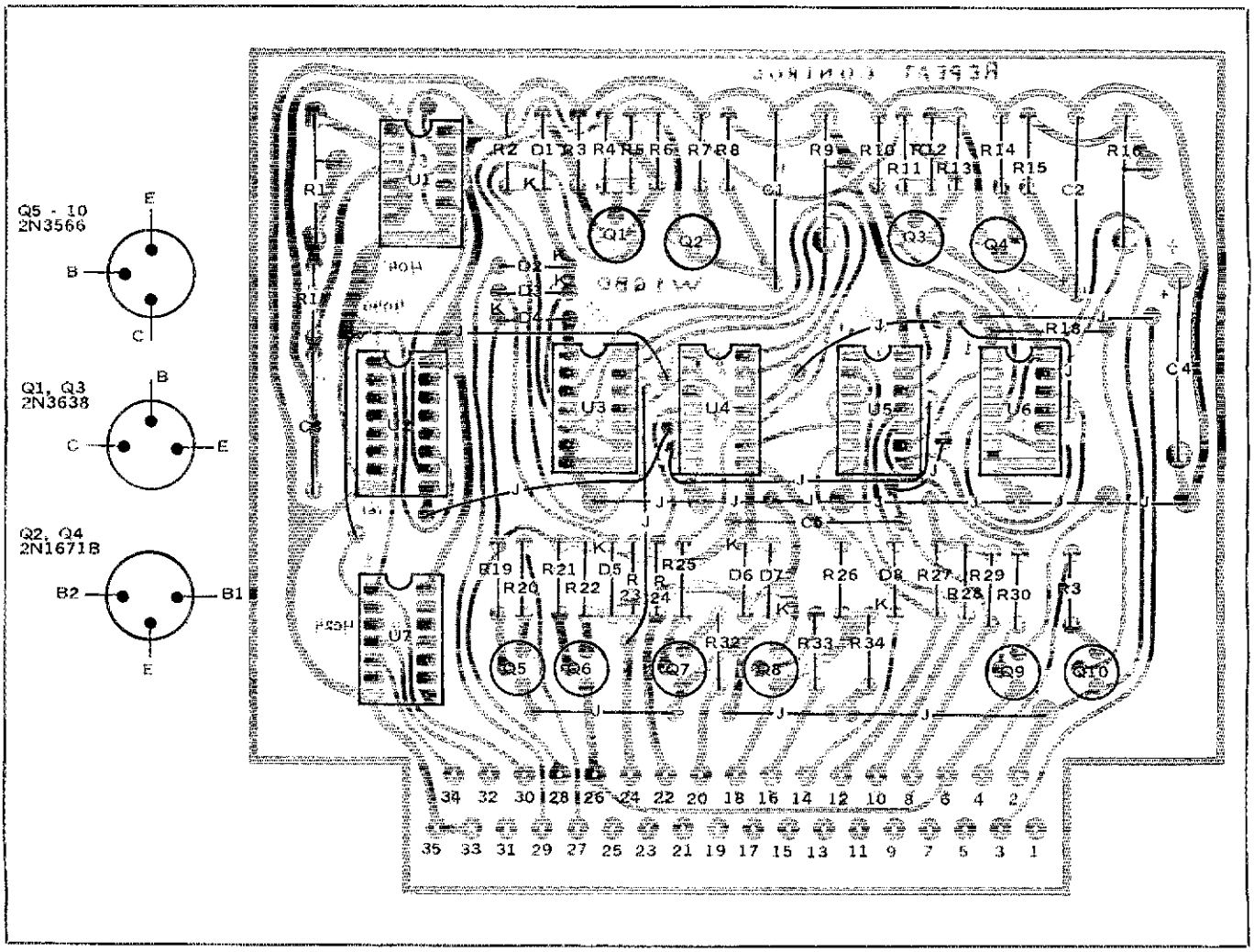


Fig. 3 — Parts-placement guide for the printed-circuit board, which is shown from the component side. The etching pattern for the board appears in the "Hints and Kinks" section of this issue. J indicates wire jumpers, and K indicates the cathode of a diode.

JFET "Soup" for Tired Receivers

Having problems dredging those weak signals up from the noise on 10 and 15 meters? Old receivers and some new ones need a front-end boost. "Soup" yours up with this simple preamplifier.

By Doug DeMaw,* W1FB

OSCAR enthusiasts and those who chase DX on 10 and 15 meters may not have the hottest receivers in town, especially if low-cost or early-design receivers are being used. When receivers run out of gas in terms of front-end gain and noise figure, it usually happens on 15 and 10 meters. A typical symptom is the need to carry the audio gain wide open to copy a weak signal. This problem can often be resolved by adding a preamplifier between the receiver input and the antenna.

Of course, it is not beneficial to add gain ahead of a receiver that already has sufficient gain. The end product may be *excessive* front-end gain, leading to the demise of good dynamic range. If the latter is degraded significantly, cross modulation, IMD and desensitization will occur when strong signals are present in and near the band of interest. In other words, don't "sock it to" your receiver if it performs satisfactorily now. All that will be achieved is a higher S-meter reading and a higher ambient noise level when no signals are present.

Circuit Description

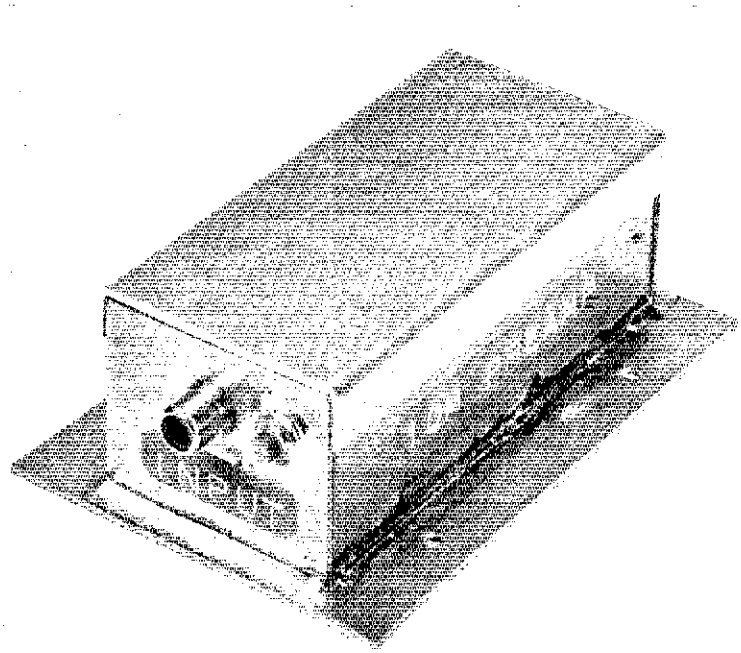
A major problem experienced by some builders who use common-source FETs in rf amplifiers is instability. Despite careful layout and input/output isolation, "frigglies" seem to occur. A quick solution might be to change the circuit to a common-gate (grounded-gate) type. Stability is relatively easy to obtain with the latter configuration, but a trade-off in gain will accompany the modification: A common-gate JFET amplifier usually provides between 10 and 14 dB of gain, whereas a common-source version will yield up to 25 dB of gain in some circuits.

An alternative to the common-gate configuration was highlighted in *Solid State Design for the Radio Amateur*, where Hayward and DeMaw illustrated and gave design data for fed-back, bipolar-transistor rf amplifiers. The same principles apply to FET amplifiers, where gain is traded for bandwidth and stability.

A design objective with any amplifier should be unconditional stability — no self-oscillations at any frequency regardless of the load connected to the amplifier. Properly applied feedback ensures unconditional stability. Circuits of this kind are ideal for amateur builders who have limited practical experience in the workshop.

Fig. 1 shows the circuit to which this article is addressed. Toroidal input

The "Soup" preamplifier for 10 meters, in an enclosure made from scrap pieces of double-sided pc board. The top cover is a friction-fit piece of sheet aluminum bent into a wide U shape and pushed over the top of the pc-board box.



*Senior Technical Editor, ARRL

transformer T1 is tuned to the operating frequency by means of C1. R1 and C2 form a shunt feedback network, coupling rf energy from the drain of Q1 back to the base *out of phase* with the input. This improves stability by lowering the gain. R2 provides additional stability by introducing degenerative feedback. (R2 is not bypassed for rf.)

The drain circuit contains a second tuned transformer, T2. R4 and C5 form a decoupling network in the 12-volt supply line. This helps prevent unwanted signal energy from entering the preamplifier via the power supply leads.

Construction Data

A printed-circuit layout, with parts placement details is shown in Fig. 2. Pc-board material (double sided) is used as a shield enclosure for the preamplifier. The outer dimensions of the box are (HWD) 1-1/2 × 1-3/4 × 3-15/16 inches (38 × 44 × 100 mm). A 3 × 4-1/2-inch pc-board base is used as the bottom cover (76 × 114 mm), and a U-shaped, press-fit aluminum cover serves as a top shield for the assembly.

The pc board is soldered in place inside the box after the circuit has been built and tested. A single-hole mount phono jack is used at each end of the box to provide input and output connections for the 50-ohm coaxial cables of the system. A 0.001-μF feedthrough capacitor is mounted at one end of the box to allow routing of the 12-volt supply to the preamplifier.

Performance

A 3-dB bandwidth of 1 MHz is characteristic of this preamplifier. The measured gain is 15 dB. Stability is excellent under all conditions, including an open-loop situation (no termination at either end of the circuit). The noise figure is under 3 dB at 30 MHz. A slightly better noise figure and increased dynamic range might be possible with a Siliconix E300 or U310 JFET. However, at 10 and 15 meters the MPF102 or Motorola HEP 802 (now known as HEP F0015) are entirely suitable. A Radio Shack RS 276-2036, 276-2028 or a 2N4416 FET would also be acceptable substitutes for the MPF102 in this circuit.

Operation on 15 meters can be had by adding two turns of wire to the main windings of T1 and T2. No other changes are necessary. The circuit constants given in Fig. 1 are for 10-meter operation.

If the builder isn't able to etch his own board for the preamplifier, or if parts are difficult to obtain locally, etched and drilled boards, parts kits, and/or pc artwork are available.[1] Good luck building this item, and may you never have to "dredge" for signals on 10 again! [QST]

[1] Circuit Board Specialists, Box 969, Pueblo, CO 81002.

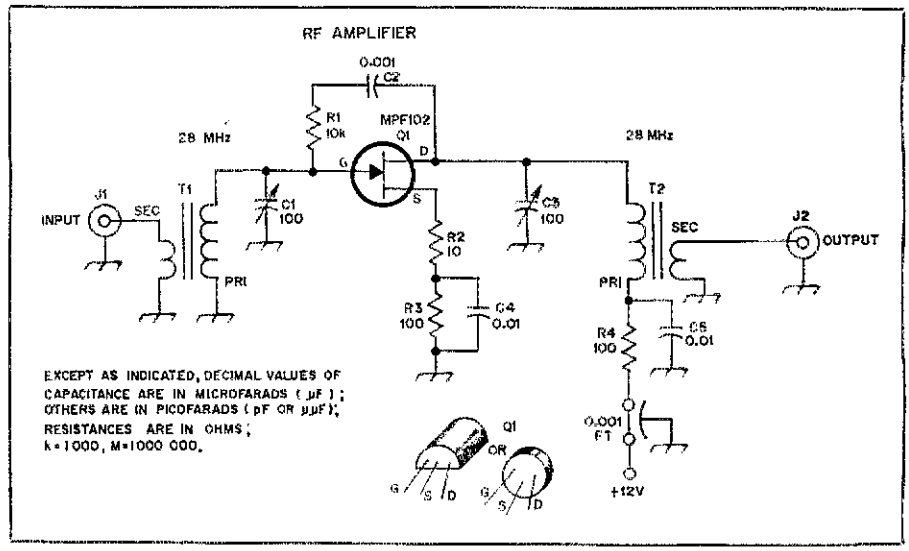


Fig. 1 — Schematic diagram of the 10-meter preamplifier. Data for 15-meter operation can be found in the text. Fixed-value capacitors are disk ceramic. Resistors are 1/4-watt composition types. Numbered components not appearing in the parts list are so identified for circuit-board layout purposes only.

C1, C3 — Mica compression trimmer, 100 pF max. Elmenco 423 suitable. Nominal capacitance for 10-meter operation is 42-52 pF.

J1, J2 — Coaxial connectors of builder's choice.

Q1 — JFET, Motorola MPF102 or equivalent (see text).

T1, T2 — 0.6 μH primary with 1-1/2 turn link. Wind 12 turns of no. 24 enameled wire on Amidon, Palomar or G. R. Whitehouse T50-6 powdered-iron toroid core. Spread turns evenly around core and cement in place. Then add 1-1/2-turn secondary link at center of primary winding.

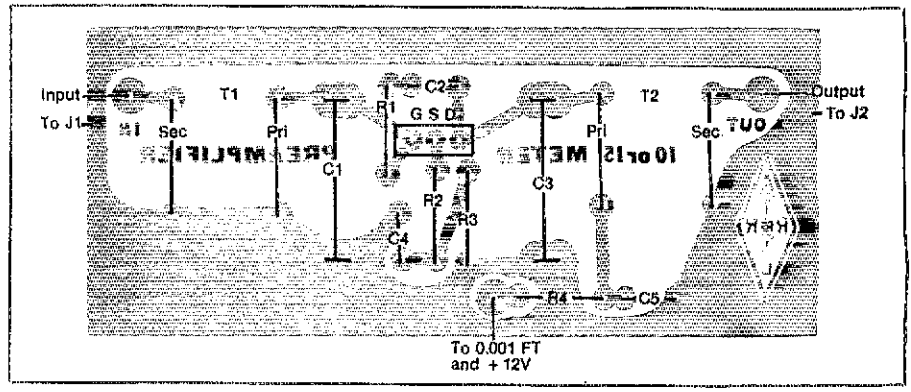
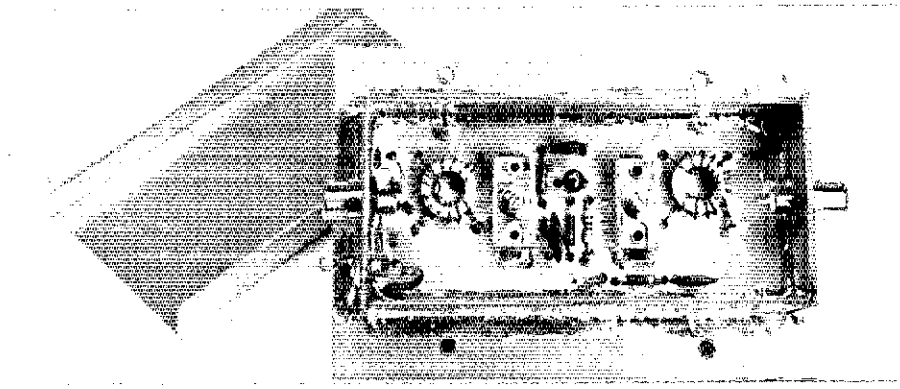


Fig. 2 — Parts placement diagram for the JFET preamplifier. The view is from the component side of the board, with shaded areas representing copper. A scale-size etching pattern for this project is reproduced in the "Hints and Kinks" section of this issue. Sections of the two transformers marked "SEC" are 1-1/2-turn links over the center of the primary windings.



Removing the aluminum cover exposes the simple layout inside the JFET "Soup." Double-sided pc board was used, with the component side left unetched to serve as a ground plane. After the component-lead clearance holes were drilled from the foil-pattern side, a larger drill bit was used to slightly countersink the holes from the component side. This procedure removes copper from the component side surrounding the holes, permitting component leads to pass through without shorting to the copper ground plane. The input is at left, output at right in this photo.

A Simple 10- and 15-Meter Converter

Do you have an old receiver that doesn't quite make it on the higher frequencies? Build this converter and let your receiver pick up some real DX!

By Jim Westbrook,* K1FD

Here is a simple converter that can be used with an 80-meter receiver to hear 10- or 15-meter signals. It can be especially useful with an older receiver that lacks sensitivity at the higher frequencies.

The converter is built on a pc board and housed in a metal box. (The circuit may be built on perf board or point-to-point fashion if attention is paid to proper construction techniques.) The metal box minimizes pickup of 80-meter signals. Its size is not critical.

Theory of Operation

The circuit uses two MPF-102 field-effect transistors, one as an oscillator and one as a mixer, as shown in Fig. 1. Q1 and its associated circuitry function as a Pierce oscillator at a frequency determined by crystal Y1. The oscillator is coupled to the gate of Q2 through the 15-pF capacitor, and incoming 10- or 15-meter signals are applied to the source. The resulting 80-meter i-f at the drain is matched by T2, a broadband transformer, to 50 ohms for the receiver. A T-section high-pass filter at the input keeps strong 80-meter signals from leaking through the converter.

C1 and T1B may be tuned to either 10 or 15 meters, passing signals from the desired band to the mixer while attenuating energy from the other band. Winding C of T1 is wound to match the source impedance of Q2.

The broadband transformer T2 matches the Q2 output impedance of several thousand ohms to 50 ohms, for optimum signal transfer to the receiver.

The oscillator crystal Y1 determines the frequencies that will appear between 3.5 and 4.0 MHz at the converter output. A single crystal will provide coverage on either 10 or 15 meters, depending on the setting of C1. Table 1 gives two possible frequencies for Y1 and the resulting coverage. (Note that 15 meters tunes "backwards" because this band is below the local-oscillator frequency.) If the receiver will cover 3 to 4 MHz, only the 25-MHz crystal will be necessary. The 10-meter cw band will then appear in the 3- to 3.5-MHz range.

Table 1

Crystal Frequency vs. Coverage

Crystal Frequency	*10-Meter Coverage*	*15-Meter Coverage*
25 MHz	28.5-29 MHz	21.5-21 MHz
24.5 MHz	28-28.5 MHz	21-20.5 MHz

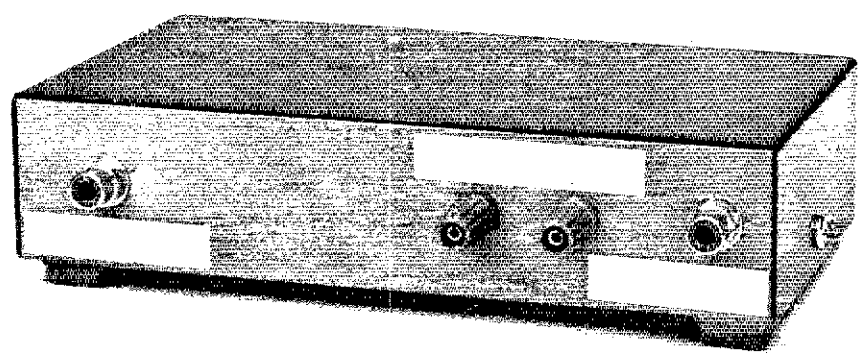
Adjustment

Once construction is completed, visually check the unit for possible wiring errors and poor solder connections. Then place an ohmmeter across the 12-volt input terminals. The meter should indicate approximately 200 ohms in either direction. If this is not the case, recheck the wiring. If the wiring is correct, then a component is defective.

Next, it will be necessary to get Q1 to oscillate. If a high-impedance oscilloscope is available, C2 should be adjusted to give an injection level of 3 volts peak-to-peak at the gate of Q2.

If an oscilloscope is not available, oscillation may be checked with the aid of

The 10- and 15-meter converter is simplicity itself! Just hook it up to 12 volts dc, an antenna, and an 80-meter receiver.



*Laboratory Technician, ARRL

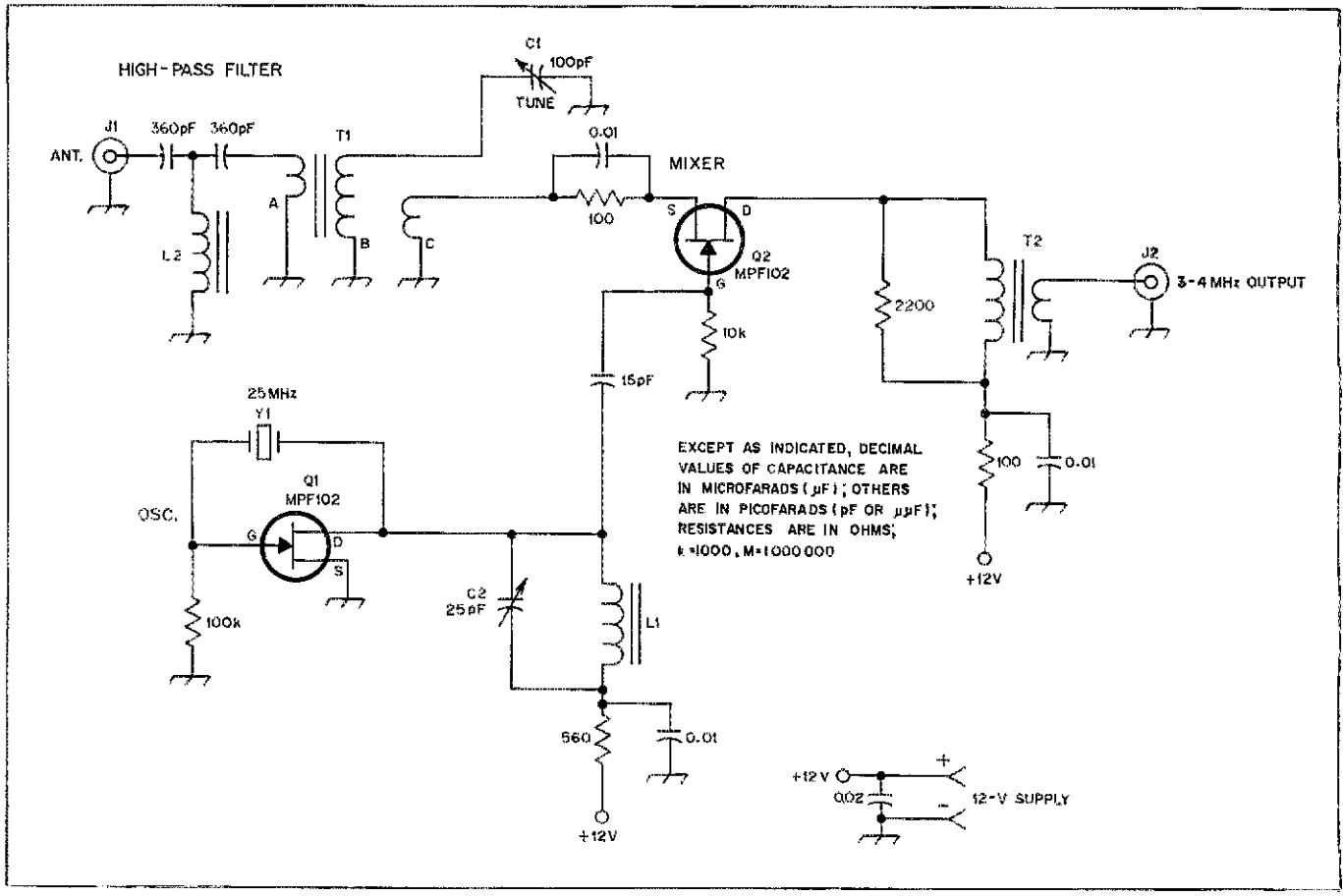
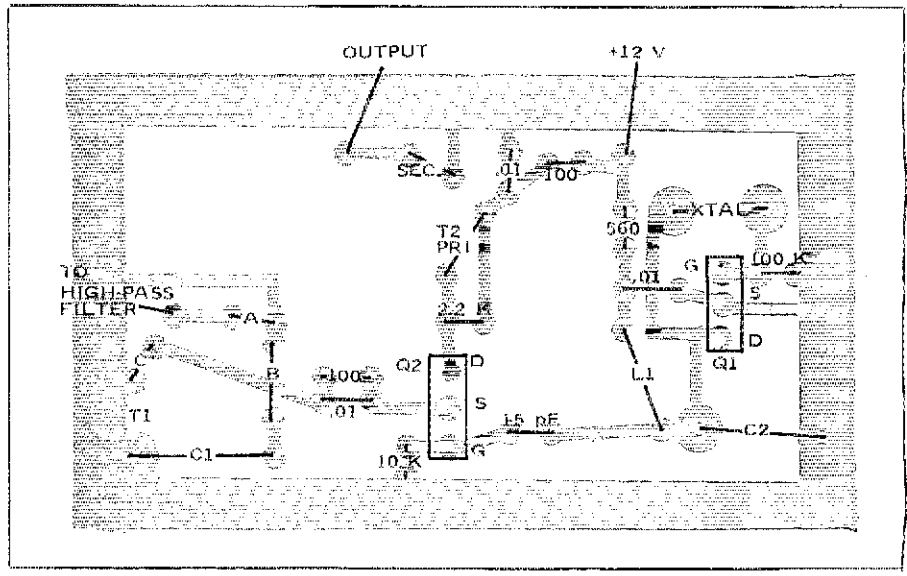


Fig. 1 — Schematic diagram of the 10- and 15-meter converter. Fixed capacitors are disk ceramic. Resistors are 1/2-watt composition.
C1 — 100-pF trimmer, Arco 421 or equiv.
C2 — 25-pF trimmer, Arco 424 or equiv.
J1, J2 — Phono jacks.
L1 — 6.8 μH, 22 turns no. 22 enameled wire on Amidon T50-6 core.
L2 — 2.8 μH, 9 turns no. 22 on Amidon T50-6 core.
T1 — A: 2 turns no. 22 on Amidon T50-6 core. B: 12 turns no. 22 adjacent to ground end of A. C: 4 turns no. 22, on opposite side of core from B. Winding direction not critical.
T2 — Primary 20 turns no. 26 on Amidon T50-61 core. Secondary 2 turns no. 26 over ground end of primary. Winding direction not critical.
Y1 — 3rd overtone crystal, HC-6/U holder. See Table 1.

a general-coverage receiver tuned to the frequency of Y1, or a milliammeter capable of reading at least 25 mA in series with the power supply. Adjust C2 for minimum capacitance. Then, with power applied, increase the capacitance until the oscillator starts. At this point, a signal will be heard in the general-coverage receiver and the milliammeter will kick up scale. After the oscillator has started, increase the capacitance by another 1/2 turn. Interrupt power several times. The oscillator should start immediately each time power is applied. If it doesn't, increase the capacitance of C1 gradually until it does.

Connect the output of the converter to an 80-meter receiver. Ideally, a 21- or 28-MHz signal generator should be connected to the converter input and C1 adjusted for maximum signal strength. If a signal generator is not available, the third or fourth harmonic of a nearby 7-MHz transmitter (tuned into a dummy load) or a 100-kHz crystal calibrator may be used. In the latter two cases, signals will be heard at two settings of C1: The lower

Fig. 2 — Parts-placement guide for the 15- and 10-meter converter, as viewed from the component (nonfoil) side. Shaded areas represent foil on the opposite side of the board. (The etching pattern appears in the "Hints and Kinks" section of this issue.) Decimal-value numbers alone represent capacitance in microfarads. Whole-number values with no units represent resistances in ohms; K = 1000. A, B and C represent the three windings of T1 (see Fig. 1).

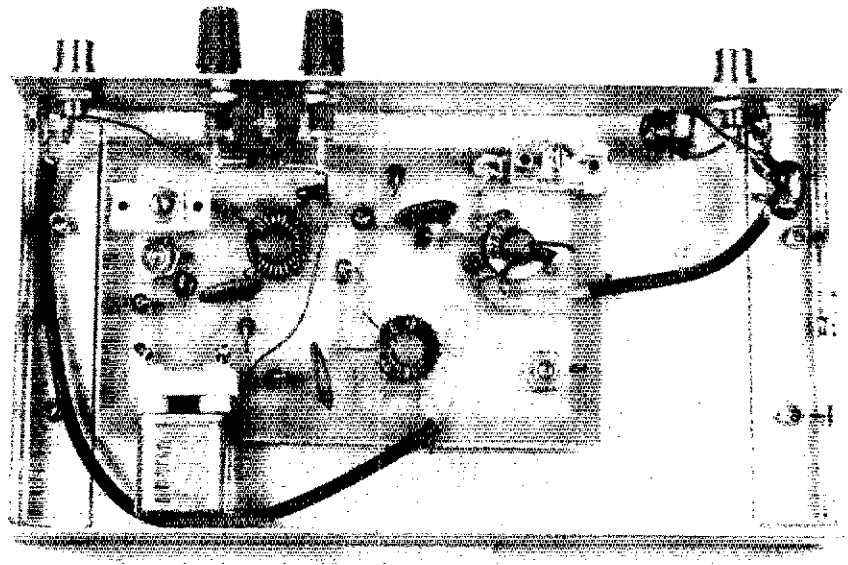


frequency setting will be 15 meters and the higher frequency setting will be 10 meters.

Performance

It is possible that extremely strong signals from one band may "leak through" and appear on the other band. For instance, if a local a few blocks away fires up on 28.700 while you're listening to a weak station on 21.300, QRM may result. This is especially possible if you are using an antenna which is resonant simultaneously on both bands, such as a trap beam or vertical. Also, if 15 meters is alive with S9-plus signals while 10 is dead (muf = 25 MHz, for example), one may be misled into believing there are signals on the latter band when there really aren't. While in use at Headquarters, leak-through was minimal, and typical signals did not penetrate to the wrong band. The image rejection is 25 dB. If the builder feels it is really necessary, additional image rejection can be provided by using an antenna tuner.

One interesting thing to keep in mind: Don't panic when you hear all the 15-meter phone stations on lower sideband! This happens simply because, as we already mentioned, the 15-meter band gets turned "inside out" in the mixer.



Inside view of the converter. The crystal may be either 24.5 or 25 MHz, as discussed in the text. The coaxial cables are RG-174/U, but RG-58/U may be used. The high-pass filter consisting of L2 and two adjacent 360-pF capacitors is mounted point-to-point fashion at the antenna input jack (upper right).

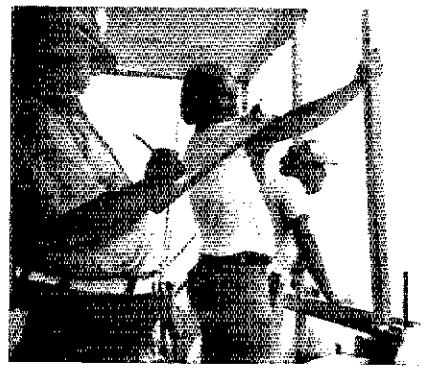
Strays

LOCAL HAMS MAKE A SPLASH AT BOAT RACE

"Tower, this is Patcom. The course is yours." With this message, WA4DZJ, aboard the Coast Guard Cutter *Chippewa*, relayed the decision of the Coast Guard Patrol Commander ("Patcom") to turn two miles of Ohio River over to the Owensboro, KY, Unlimited Hydrofair Committee for the running of the 1978 "Gold Cup," the "Super Bowl" for power boats. Unlimited Class hydroplanes, up to 32 feet long, are powered by World War II fighter-plane engines which enable them to reach speeds of 175 mi/h or more on a 2-1/2 mile oval course.

K4YOI, known during much of this day as "Tower," acknowledged with "Roger," at a preselected, exact time. He began the roll call of course safety stations, all linked by Amateur Radio, and by which all rescue and recovery efforts are controlled when, and, alas, not if, an accident happens.

"Rescue One?" "Ready." "Rescue Two?" "Ready." . . . "Ready." . . . "Ready." The litany continued as each of the five rescue boats, three fireboats, three towing boats, two utility craft, two buoy tenders, a flag boat, a Military Air Ambulance helipad, an ATV crew, and two separate pit areas (each with a subnet on 146.520) reported "Ready" in turn. All the safety boats were individually owned craft, manned by volunteers.



At the early-morning roll call, WA4DZJ checks the roster of volunteers. WB4OVU is on the mic, while W4OYI listens.

WB4OVU, on the judge's stand, raised his headset and turned to his right. "Mr. Referee, you have a 'green' ." The "CBS Sports Spectacular" cameras rolled and their mics opened as the live, coast-to-coast broadcast network came to life; over 100,000 race fans leaned forward in anticipation, and the Unlimiteds roared to life.

Five hours and 15 minutes later, it was all over. The hams had again earned the approval of the local Race Committee and of the American Power Boat Association for a thoroughly professional communications job.

Approximately 30 amateurs from Owensboro and nearby Henderson, and from three other states, were on the course that day. Ten years of participation in hydroplane racing in Owensboro has played a major part in building a public-service communications group that is recognized by all local and state government officials from the local deputy sheriffs to the governor. The event has spurred local hams to purchase equipment suitable for field work. Because one must stay calm to help save a life when a 6000-pound boat disintegrates 30 yards away at 160 mi/h, many new operators have learned to handle emergencies swiftly and without panic. Communications skills have been refined so that unnecessary words are rarely heard, and data are sent clearly and completely on the first transmission. Equipment — and personnel — reliability are assumed, so "callup procedures" are unnecessary and unused. All this has resulted in a ham public-service team that is called in and relied on when major and minor emergencies develop over a wide area around Owensboro. "The guy with the yellow cap and the radio" is sought out at disaster sites as the one from whom vital, sometimes lifesaving, information can be obtained by all sorts of officials. — *George S. Wilson III, W4OYI*

A Graphical Look at the L Network

Does the prospect of designing an impedance-matching network overwhelm you? Fear not! All you need are a piece of paper, a pencil, a QSL card, a metric ruler and a protractor.

By Bob Pattison*, N6RP

L networks can be used to match the output of a transmitter to a transmission line, to match one transmission line to another of a different impedance, or, for that matter, to match any two impedances having different characteristics.

A geometric diagram can make it easier to understand reactive networks. This article shows you how to obtain the values of inductive and capacitive reactance, and the associated phase angle, by the use of geometric drawings. The method described here circumvents the need for using mathematical formulas. For those interested, we will also show how the geometry of the drawings relates to the formulas.

A Sample Problem

Suppose we want to match 75 ohms to 52 ohms, and we need to find the capacitive and inductive reactances as well as the phase angle. The only items we need are a paper and a pencil, some rectangular object such as a QSL card, a ruler marked off in millimeters, and a protractor.

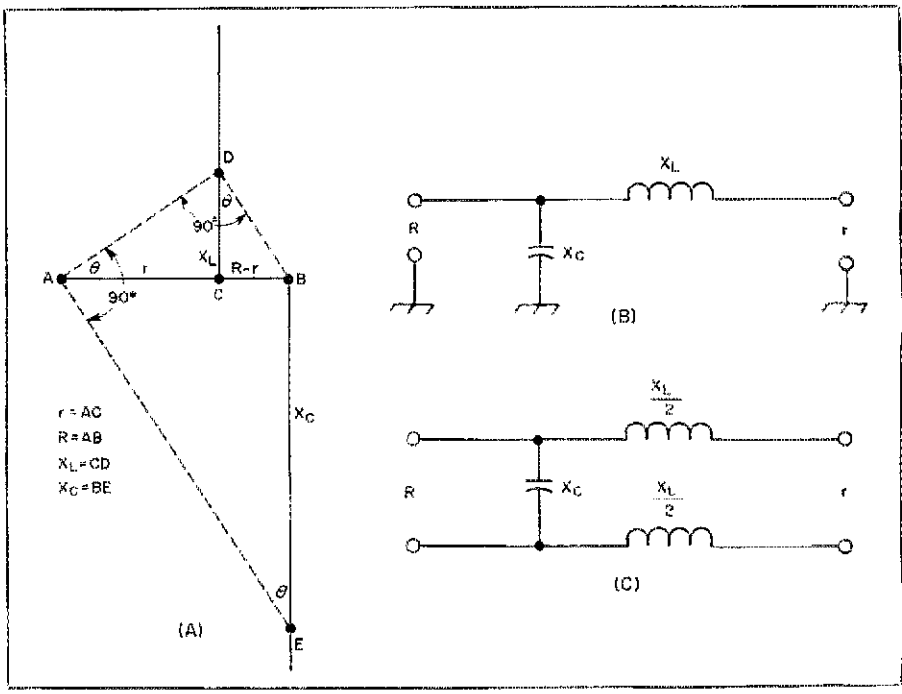
We shall evaluate the L network of Fig. 1B, in this case R = 75 and r = 52. The circuit of Fig. 1B would be used for matching unbalanced to unbalanced impedances. If a balanced matching circuit is required, that shown in Fig. 1C is applicable. The value for X_L is determined as described below, and is then halved to determine the inductance needed in each arm of the balanced circuit. The geometry for the solution is shown in Fig. 1A. It is recommended that you follow along by making your own drawing as well.

The Solution

First, draw a 75-mm-long horizontal line in the center of the paper. Mark the left end of the line A and the right end B. This line represents the 75-ohm input impedance. To represent the 52-ohm impedance, locate the point between A and B that is 52 mm from A; mark this point C.

To determine the inductive reactance, place the QSL card above the horizontal line and position it so that one corner is at C and the bottom edge of the card is lying along AB. Draw a vertical line upward from C using the vertical edge of the card as a guide, and extend this line to the top of the paper. (Using the card in this man-

Fig. 1 — The drawing at A shows the graphical representation of the L networks, in B for an unbalanced circuit and C for a balanced circuit. The angle θ represents the phase shift introduced by the network (see text). Triangles ACD, DCB, ADB and EBA are similar. Inductive reactance is measured upward along CD and capacitive reactance is measured downward along BE.



*Amidon Associates, 12033 Otsego St., North Hollywood, CA 91067

ner assures a right angle.) Now place the card so that one corner rests on the vertical line and the two adjacent sides slope downward, so that the chosen corner (call it corner X) is the uppermost part of the card. Move corner X up or down along the vertical line until the card's upper left edge passes through A and the upper right edge passes through B. Mark point D where corner X now rests on the vertical line. The distance between C and D represents the inductive reactance required in the L network (Fig. 1B). It should measure about 35 mm in length, which represents 35 ohms.

The capacitive reactance is found similarly.[1] Draw a vertical line down from B, again using the card to ensure that this line is perpendicular to AB. Then place the card so that the upper edge runs through A and D, with one corner at A. The lower left edge of the card now slants downward to the right and intersects the vertical line that was drawn downward from B. Mark this point of intersection E. The distance between B and E represents the capacitive reactance. It should measure about 113 mm, representing 113 ohms.

To measure the phase shift introduced by the L network, draw a straight line connecting A and D. Using the protractor, measure the angle formed by lines AD and AB. It should be approximately 34 degrees.

This procedure may sound complicated, but it can be accomplished in a matter of seconds.

[1]Capacitive reactance is sometimes defined as being negative. We have not done so here. (See pp. 2-19 and 2-20 of the 1979 *Handbook*.)

Variations

In the above example we used the circuit of Fig. 1B, which shows an inductance in series with the 52-ohm load. If we use the configuration of Fig. 2B, we must draw both vertical lines in the opposite direction: CD will extend downward and BE will extend upward. The line extending upward still represents inductive reactance and the line extending downward still represents capacitive reactance, and the phase shift is still the angle formed by AB and AD. To locate D on the line drawn downward from C, corner X is now the lowest point of the card; the lower edges of the card slope upward, passing through A and B. To locate E on the line extending upward from B, the lower edge of the card rests on A and D, with the left corner at A. The edge sloping upward from A intersects the line at E.

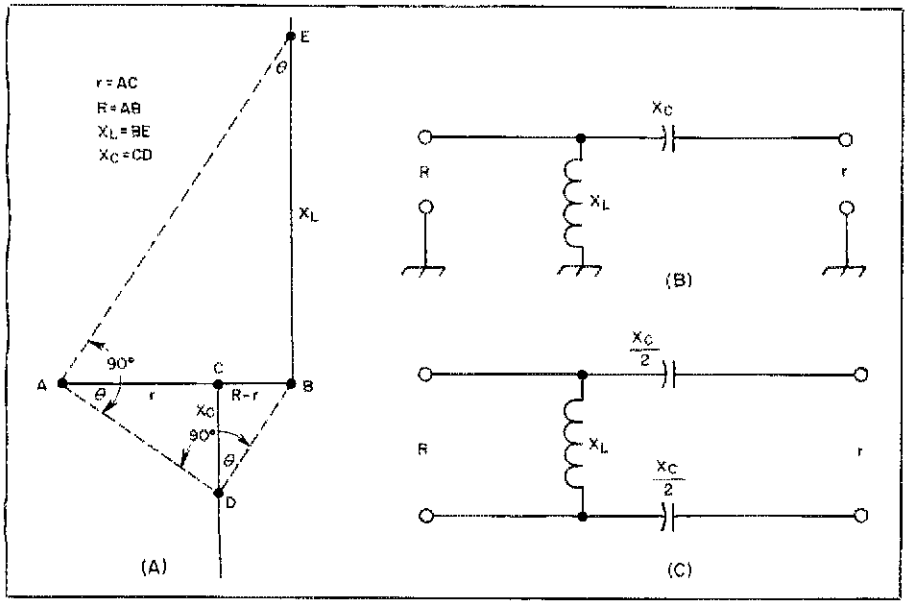
The actual values of inductance and capacitance may be found by referring to a reactance chart, such as the one in *The Radio Amateur's Handbook*.

Of course, the L network can be used in either direction, that is, the input and output impedances can be reversed. But *the higher impedance will always be in shunt with one of the reactances, and the lower impedance will always be in series with a reactance.* R represents the higher impedance and r represents the lower impedance. Reversing the input and output impedances will not change the geometry of the diagram.

Whether the output is leading or lagging the input depends on which circuit is used, and whether the circuit is being used for a step-up or step-down transformation. If the series reactance is inductive, the phase of r will *lag* the phase of R; if the series reactance is capacitive, the phase of r will *lead* the phase of R. In the example of Fig. 1B, the phase of the 52-ohm leg lags the phase of the 75-ohm leg, regardless of which load is the input and which is the output. In Fig. 2B the phase of the 52-ohm leg leads the phase of the 75-ohm leg.

As a point of interest, all purely resistive impedances lie along AB. Impedances with an inductive reactance component lie in the area above AB, and those with a capacitive reactance component lie in the region below AB. It might also be observed from Fig. 1A that the reactances in the L network are directly proportional to the input and output impedances, as long as the matching ratio remains the same. For example, if the input and output impedances are halved (to 37.5 ohms in and 26 ohms out, in the preceding example), the reactances in both arms will be halved but the phase angle will not change: The drawing will simply be half as big.

Fig. 2 — At A, a graphical representation of the networks of B for an unbalanced circuit and C for a balanced circuit. Triangles ACD, DCB, ADB and EBA are similar, although the geometry differs from Fig. 1A. Inductive reactance is measured upward along BE and capacitive reactance is measured downward along CD.



Reactance Formulas

To show how the geometry relates to the formulas for reactance, we will illustrate how these formulas can be derived from the geometry. We will demonstrate this for the circuits shown in Fig. 1. Note that triangles ACD, DCB, ADB and EBA are similar: that is, corresponding sides are proportional and corresponding angles are equal. By proportioning corresponding sides of triangles ACD and DCB, we obtain the ratio $r/X_L = X_L/(R - r)$. Algebraically this can be rewritten as $X_L = \sqrt{(r)(R - r)}$. In like manner, since triangles ACD and EBA are similar, $X_C/R = r/X_L$; hence $X_C = (R)(r/X_L)$.

For the phase angle, refer to triangle ACD and note that $\tan \theta = X_L/r$; hence $\theta = \arctan X_L/r$.

If the circuits of Fig. 2 are used, the reactance formulas will be reversed. We will then have $X_C = \sqrt{(r)(R - r)}$ and $X_L = (R)(r/X_C)$. The reader is invited to verify these formulas geometrically using Fig. 2, just as we have done above with Fig. 1.

Epilogue

One shortcoming of L networks is that the impedance ratio and the phase angle are interrelated: With any impedance transformation there is a corresponding phase shift. Also, the maximum obtainable phase shift is 90 degrees. Neither of these restrictions apply to pi or T networks. Fortunately the amateur is rarely concerned with the phase shift introduced by matching networks, making use of only the impedance-transformation characteristics. Therefore the L network is satisfactory for most of the amateur's impedance-matching requirements.

Matching-Network Design

Modern computing methods make designing matching networks an easy chore. Even with an inexpensive calculator and the right algorithms, you can solve just about any problem in short order.

By Tony Dorbuck,* K1FM

Next to filters, a matching network is perhaps the most common form of coupled circuit used in radio. While the math involved in a matching-network design is much simpler than that associated with a lot of filters, literature on matching networks seems rather sparse. Equations for matching networks can be found in older texts[1] but there is still a need to adapt them to modern computing methods.

A Few Simple Rules

Basically, a matching network consists of capacitors, inductors and other forms of reactive elements such as transmission lines. The purpose of a matching network is to transform one impedance level to another. In addition, a network may be required to tune out some unwanted reactive component, along with matching the resistances associated with the source and load. For instance, a whip antenna might have a series resistance of 10 Ω and a reactance of −1000 Ω. A matching network may be desired to transform this impedance to 50 Ω.

The first rule to remember is that matching networks are bilateral. That is, the source and load can be interchanged. The matching network used with the antenna could be just as easily employed to match a transistor with a collector impedance of 10 Ω (resistive) and −1000 Ω (reactive) up to 50 Ω. However, this is only true if a conjugate match exists. By conjugate match we mean that the circuit is essentially resonant, and that maximum power is being transferred from the source to the load. This in turn means that if we break the circuit at any point, and if the impedance looking in one direction is R + jX, then the impedance in the opposite direction must be R − jX (here, j is the $\sqrt{-1}$ and for our purposes is a shorthand way of distinguishing a resistance from a reactance).

Along with the bilateral property, a second implication of the conjugate-match theorem is that it doesn't matter which part of a transmission circuit contains the matching network. For instance, a matching network could be located at the terminals of an antenna or at the transmitter end of a feed line. In either case, a conjugate match would mean that the transmitter "wouldn't care" where the matching network was actually located.

A second rule to remember is that both positive and negative reactances must be present in order for a conjugate match to exist. This is ordinarily accomplished by inductors and capacitors, respectively. However, circuits with mutual inductance (such as a transformer) have negative-reactance components. While these components serve the same purpose as a negative (capacitive) reactance, only under theoretically ideal conditions can a conjugate match exist.

The T Network

A very important type of coupled circuit is shown in Fig. 1A and is called a T network. Equations that relate the reactances required to match R_2 to R_1 are given by[2]

$$X_1 = \pm \sqrt{\frac{R_1}{R_2}(X_3^2 - R_1R_2)} - X_3 \qquad \text{(Eq. 1)}$$

$$X_2 = \pm \sqrt{\frac{R_2}{R_1}(X_3^2 - R_1R_2)} - X_3 \qquad \text{(Eq. 2)}$$

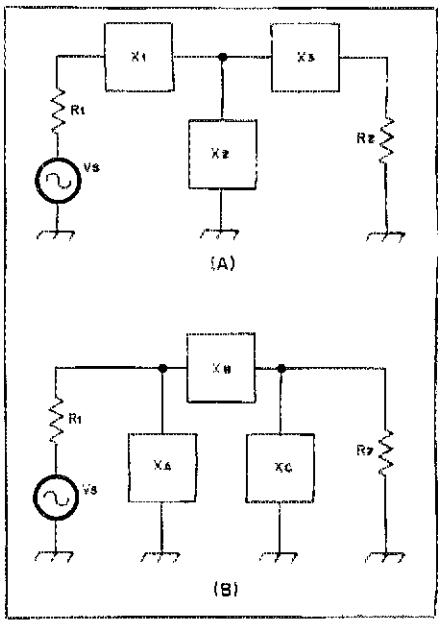
Because of the square root, there are four possible solutions. If the circuit is redrawn somewhat (Fig. 2), a set of conditions can be found that limit the number of solutions to two. (In Fig. 2, certain network theorems are employed to obtain the new circuit but the derivation is not important for our purposes here.)

In order for a conjugate match to exist, it is necessary that the resistive components of the new source and new load be equal. From Fig. 2, this requirement will be true if

$$\frac{R_1}{R_1^2 + X_1^2} = \frac{R_2}{R_2^2 + X_2^2} \qquad \text{(Eq. 3)}$$

However, this is not a *sufficient* requirement for a conjugate match since the sum of B1, B2 and B3 must be zero also. But if the right sides of Eqs. 1 and 2 are

Fig. 1 — Basic T- and pi-network configurations are shown at A and B, respectively. Reactances indicated in the blocks relate to Eqs. 1 through 9 and may be either capacitive or inductive.



*1650 Stanley St., New Britain, CT 06053
[1]Notes appear on page 30.

substituted into Eq. 3 for X_1 and X_2 respectively, the only combination of roots that satisfy the latter are the ones where the algebraic signs are the same. That is, if the positive-root solution is assumed for Eq. 1, then the positive-root solution must be assumed for Eq. 2 also.

There are four different T matching networks and these are shown in Fig. 3. Examination of Eqs. 1 and 2 reveals that the only requirement that must be met is that X_3 must be greater than R_1R_2. Once R_1, R_2 and X_3 are selected, X_1 and X_2 can be determined from Eqs. 1 and 2. There will be two solutions of these equations corresponding to the different roots and either one will be a realizable network.

A very interesting case occurs when X_3 is equal to the minimum value that it can have which is R_1R_2. Since the radical becomes zero, all the reactances have the same *numerical* values. But the two series arms have the opposite sign of the shunt arm (Fig. 3C and 3D).

The circuit of Fig. 3C might be considered as the circuit analog of a quarter-wavelength transmission-line transformer. Along with similar impedance-transforming properties, the network has a 90-degree phase shift between the input and load voltages. This is also a characteristic of the transmission-line transformer.

Series-Arm Equations

In Eqs. 1 and 2, the shunt-arm reactance is the independent variable. However, it is also convenient in many instances to make one of the series-arm reactances the independent variable instead. Eqs. 1 and 2 can be rewritten as

$$X_3 = \frac{-X_1 \pm \sqrt{\frac{R_1}{R_2}\left[X_1^2 - (R_1R_2 - R_1^2)\right]}}{1 - R_1/R_2} \qquad \text{(Eq. 4)}$$

$$X_3 = \frac{-X_2 \pm \sqrt{\frac{R_2}{R_1}\left[X_2^2 - (R_1R_2 - R_2^2)\right]}}{1 - R_2/R_1} \qquad \text{(Eq. 5)}$$

The problem of determining the proper root appears again with Eqs. 4 and 5. For instance, suppose we solve Eq. 5 for X_3 in terms of X_2. The value of X_3 could then be substituted into Eq. 1 in order to determine X_1. But we would have to know which root in Eq. 1 to use.

This difficulty can be resolved by noting the relations between X_2 and X_3 for various combinations of their absolute (or numerical) values and for changes in sign. For instance, if X_2 and X_3 are both positive, and if X_2 is smaller in numerical value than X_3, an examination of Eq. 2 reveals only the positive root could satisfy this condition. The various possibilities are summarized in Table 1.

In order to solve a problem using the series-arm approach, X_3 is first determined for some desired value of either X_1 or X_2. For instance, consider the antenna-matching problem mentioned earlier. Suppose we want to match the 10-Ω *(resistive) and −j1000-Ω (reactive) antenna* load to 50 Ω. This means R_2 is 10, R_1 is 50, and X_2 is −1000 Ω.

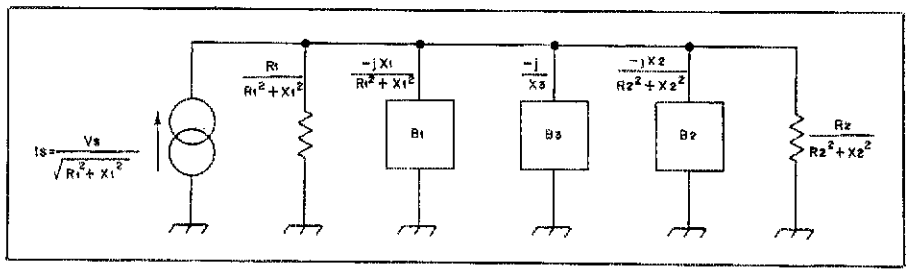


Fig. 2 — A parallel-equivalent circuit for the T network of Fig. 1A used to find conditions that pair the roots of Eqs. 1 and 2. (Discussion can be skipped if desired without affecting continuity of the article.)

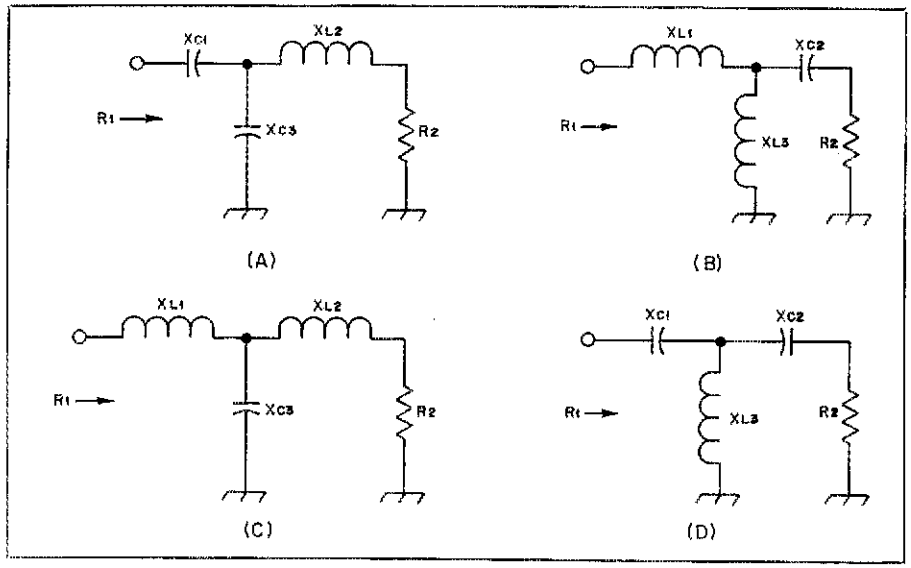


Fig. 3 — The four possible T-network combinations. See text.

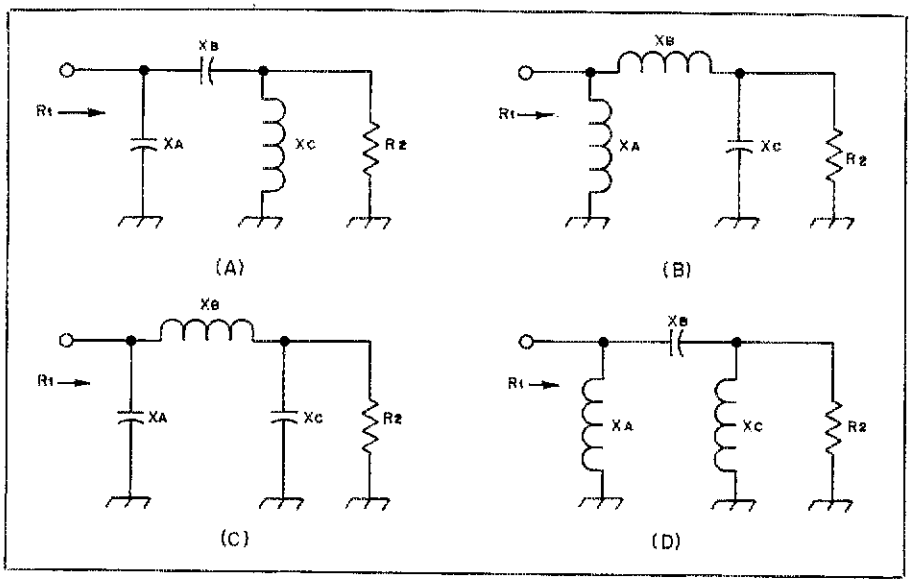


Fig. 4 — The four possible pi-network combinations. See text.

Table 1
Possible Root Combinations of Eq. 2.

$\|X_3\| \leq \|X_2\|$	X_2	X_3	Root
$\|X_3\| > \|X_2\|$	+	+	+
	+	−	−
	−	+	+
	−	−	−
$\|X_3\| < \|X_2\|$	+	+	+
	+	−	+
	−	+	−
	−	−	−

Using the positive-root form of Eq. 5 gives an X_3 of 1808 Ω. Since the numerical value of X_3 is greater than that of X_2, and since X_2 is negative and X_3 is positive, we know from Table 1 that the positive-root radical must be used in Eq. 1 in order to find X_1. The value for X_1 is then found to be 2236 Ω.

On the other hand, suppose the negative-root formulation of Eq. 5 is used. X_3 is then found to be 691 Ω. Note that since the numerical value of X_3 is less than that of X_2, and since X_3 is positive while X_2 is negative, the negative-root formulation of Eq. 1 must be used this time giving an X_1 of −2236 Ω.

If so desired, the problem could be started with the "input" end of the network (an X_1 specified) merely by interchanging X_1 for X_2 in Table 1. Then, for a given X_1, R_1 and R_2, X_3 could be found from Eq. 4 and the result substituted into Eq. 2 in order to find X_2.

The Pi Network

A very popular form of circuit is shown in Fig. 1B and is called a pi network. Again, there are four possible different combinations of capacitors and inductors. These circuits are shown in Fig. 4. Perhaps the most commonly used version is the one of Fig. 4C.

Equations for these networks are given by[3]

$$X_A = \frac{-R_1X_B}{R_1 \pm \sqrt{R_1R_2 - X_B^2}} \qquad \text{(Eq. 6)}$$

$$X_C = \frac{-R_2X_B}{R_2 \pm \sqrt{R_1R_2 - X_B^2}} \qquad \text{(Eq. 7)}$$

A set of shunt-arm formulas can also be derived which are

$$X_B = \frac{-R_2 \pm \sqrt{R_1R_2 + X_C^2\left(\frac{R_1}{R_2} - 1\right)}}{\frac{R_2}{X_C} + \frac{X_C}{R_2}} \qquad \text{(Eq. 8)}$$

$$X_B = \frac{-R_1 \pm \sqrt{R_1R_2 + X_A^2\left(\frac{R_2}{R_1} - 1\right)}}{\frac{R_1}{X_A} + \frac{X_A}{R_1}} \qquad \text{(Eq. 9)}$$

As with the T network, there is the problem of pairing roots. Again, roots of like sign are the only meaningful pairs with Eqs. 6 and 7. Also, if the problem is started with either Eq. 8 or 9, there is the difficulty of determining which root to use with either Eq. 6 or 7.

In the case of the pi network, the conditions are relatively simple. In Eq. 6, if the numerical value of X_A is less than that of X_B, and if they are of opposite sign, then the positive root is used. Likewise in Eq. 7, if X_C has a numerical value less than X_B, and if they are of opposite sign, the positive root represents the only case that can result in this condition. All other cases mean the negative root must be used.

So suppose we had a problem with R_1, R_2 and X_C given. We could find X_B from Eq. 8. If X_B was greater than X_C, and if they were of opposite sign, then X_A could be found from Eq. 6 using the positive root.

One difference of note between the pi network and the T network is that there is a maximum value for the center component in the network rather than a minimum value.

Actually, Eqs. 1, 2, 4 and 5 could be used with the pi network also. However, a conductance-susceptance formulation would have to be used as shown in Fig. 5. In any equation, G_1 would have to be substituted for R_1 with corresponding changes for the rest of the elements. This approach has the advantage that the same program could be used to realize either a T or pi network. Then, the network with the most desirable properties could be selected. On the other hand, Eqs. 6 through 9 are perhaps more convenient to use for those more familiar with resistance-reactance formulations.

The L Networks

If one of the series arms in the T network of Fig. 1A has a zero reactance or if one of the reactances in either shunt arm of a pi network (Fig. 1B) becomes infinite, a matching network consisting of only two elements results. Such circuits are called L networks. Assuming that X_C (Fig. 1B) is made infinite, the circuit of Fig. 6B is obtained. Referring to Eq. 7, values of X_B that make X_C infinite are

$$X_B = \pm \sqrt{R_1R_2 - R_2^2} \qquad \text{(Eq. 10)}$$

The resulting formula for X_A is

$$X_A = \mp \frac{R_1R_2}{|X_B|} \qquad \text{(Eq. 11)}$$

Note that R_1 must be greater than R_2 and that X_B must have the opposite sign of X_C. L networks are the simplest matching networks possible and are useful in a wide variety of applications. Also, the circuit of Fig. 6A is identical to one where X_1 is made zero in a T network. This is illustrated in Fig. 6A and the reader might verify that Eq. 1 is zero for the positive root if the positive root of Eq. 11 is substituted in for X_3. X_1 is also zero for the negative roots of Eqs. 1 and 11.

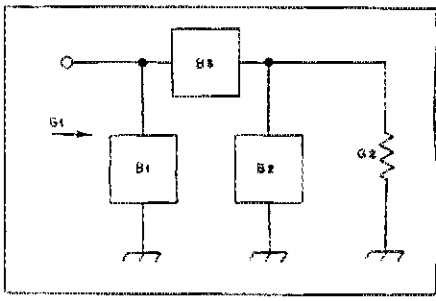


Fig. 5 — The T-network equations could be modified for use with a pi configuration merely by substituting G_1 and G_2 for R_1 and R_2, and by substituting B_1, B_2 and B_3 for X_1, X_2 and X_3. This could permit using the same calculator program to generate either a T or pi network.

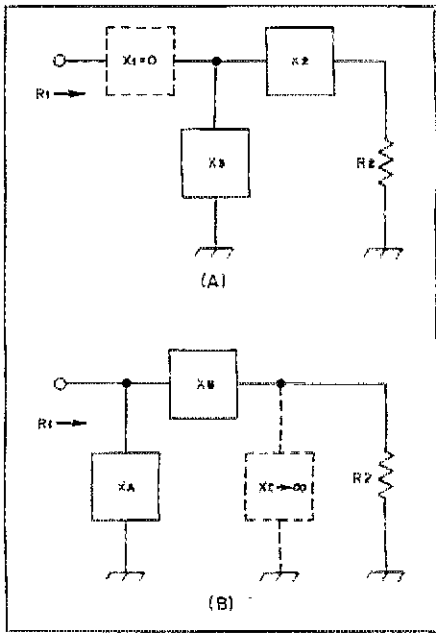


Fig. 6 — If one of the reactances in either series arm of a T network is zero (A), an L network results. Also, a pi network reduces to an L network if either shunt reactance becomes infinite (B).

Although R_1 must be greater than R_2 in Eq. 10, the network could be turned around in instances where R_1 was less than R_2. *Consequently, any two resistance levels can be matched with an L network.* The question than arises as to the purpose of a matching network with more than two elements. Why not use an L network all the time? The answer is that being able to solve a three-element network has certain advantages. There is greater design flexibility since there are more circuit configurations to choose from.

Some Examples

To illustrate the point, consider the circuits of Fig. 7. Suppose we want to match a resistive load of 20 Ω with a series inductive reactance of 150 Ω to 50 Ω. This

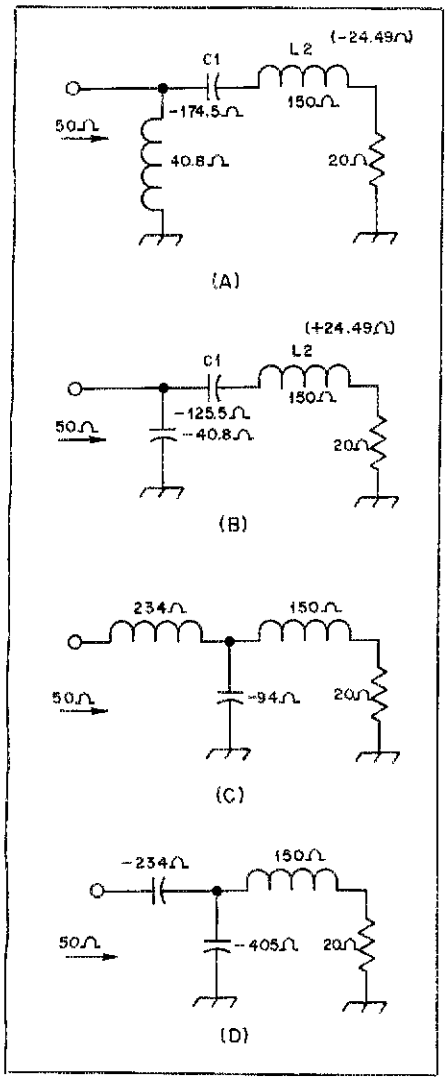


Fig. 7 — Text examples. Although the circuits shown at A and B are three-element networks, the L-network formulas can be used. This is because C_1 and L_2 can be adjusted to provide the proper reactance that will satisfy the L-network equations.

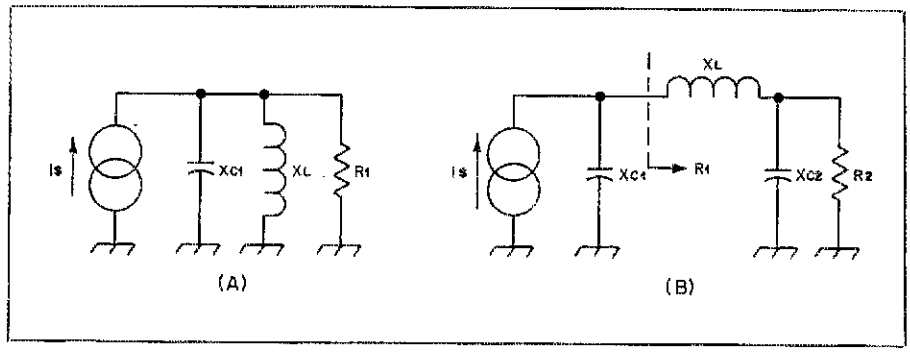


Fig. 8 — Because of the different circuit configurations, a pi network (B) cannot have the same frequency response as a simple RLC parallel circuit (A). This means interpretation of the frequency response of B in terms of circuit Q is only approximate.

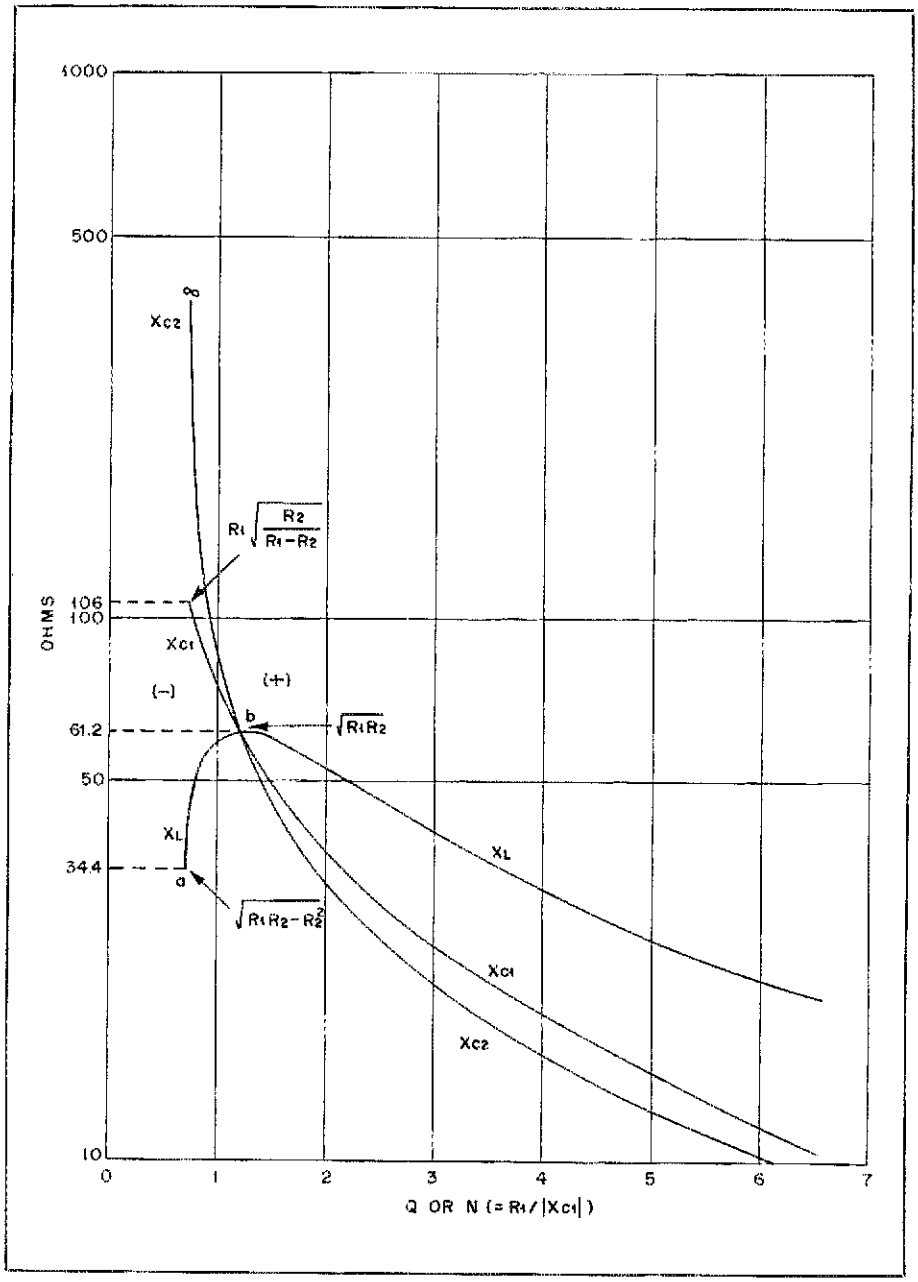


Fig. 9 — A formulation for a pi network in terms of a parameter that is approximately equal to the Q of a simple RLC circuit. (Reactances are in terms of the 1978 *Handbook* symbology with X_{C1}, X_{C2} and X_L corresponding to X_A, X_C and X_B of Fig. 1B.)

impedance might represent a magnetically coupled circuit and load, or even a section of transmission line connected to an antenna. Also, assume that the matching network should have variable elements in order to compensate for any changes in output load. Applying the L-network formulas (Eqs. 10 and 11), the series reactance, X_B, must be 24.49 Ω. The corresponding shunt reactance is then 40.8 Ω.

In the circuit of Fig. 7A, the series capacitor and the 150-Ω inductance are *tuned* to give a total reactance of −24.49 Ω. The shunt reactance is then an inductor with a reactance of 40.8 Ω. The circuit of Fig. 7B is for the opposite root which requires a shunt capacitor.

Next, let's assume that the 150 Ω is X_2 *in* Eq. 5. For the positive root of Eq. 5, X_3 is then −94.01 Ω. Going to Table 1, since 94.01 is less than 150, and since X_3 is negative while X_2 is positive, the

corresponding root of Eq. 2 is positive. Then, substituting the computed value of X_3 into the positive root of Eq. 1, the corresponding value for X_1 is 233.99 Ω. The resulting network is shown in Fig. 7C (with component values rounded off to the nearest integer.)

For the negative root of Eq. 5, the computed value of X_3 is −405.99 Ω. Table 1 indicates that this corresponds to the negative root formulation of Eqs. 1 and 2 and the negative root of Eq. 1 gives a value of X_1 of −233.99 Ω. This circuit is shown in Fig. 7D.

While the equations might seem tedious to solve, the job is easy if a programmable calculator is available. The computations for the preceding two equations took less than 30 seconds with a Hewlett-Packard HP-25. Most of the time involved looking up the appropriate root in Table 1. Of course, this table could be included in programs for more sophisticated models where greater memory space was available.

Although the L networks of Fig. 7A and 7B have practical component values, the range is not very desirable if variable elements are required. For this reason, the circuit of Fig. 7D would be the most preferable one. The capacitive reactances are higher than the ones for the other circuits, which means smaller variable capacitors could be used. For instance, the 40-Ω capacitive reactance would require a 1100-pF variable if the network was to be used on 3.5 MHz. On the other hand, the −234-Ω capacitive reactance would only need 194 pF. As mentioned earlier, a simple L network may not be the best choice although it is easy to design.

Other Formulations

A set of design equations for the pi network and similar circuits has been in *The Radio Amateur's Handbook* for a number of years. Basically, X_A (Fig. 1B in this article) is selected as the arbitrary or independent variable and X_B and X_C are then determined. One difference of note is the introduction of a third indexing or "dummy" variable.

In older editions, this variable was defined as Q and some confusion seems to have resulted because of this terminology. It is only for simple RLC circuits that the various definitions of Q are equivalent. For instance, in the circuit of Fig. 8A, the loaded Q would be defined as R_1/X_{C1} or R_1/X_L. Since R_1 is independent of frequency, this definition would also be equivalent to

$$Q = \frac{f_0}{f_1 - f_2} \qquad \text{(Eq. 12)}$$

where f_0 is the resonant frequency and f_1 and f_2 are the frequencies where the power delivered to R_1 is down by 3 dB.

On the other hand, consider the circuit of Fig. 8B. Assuming the component values are selected properly, the input resistance at one frequency will be R_1. However, at other frequencies, not only will there be reactive components present, but the parallel input resistance will have changed as well. Consequently, the circuits of Fig. 8A and 8B will not have exactly the same frequency response. Therefore, defining Q as the ratio of R_1/X_{C1} will only be an approximation with regard to the bandwidth formula. It will be a reasonably valid one for large transformation ratios and large values of R_1/X_{C1}.

While the formulation is a useful one for getting some idea of the frequency rejection of a pi network, it should be kept in mind that it is only an approximation. However, the network component values given by the *Handbook* formulas are valid ones. For instance, the graph shown in Fig. 16 on page 55 of the 1978 *Handbook* can be generated from Eqs. 6 and 7 in this article. The curves are for constant R_1 and R_2 with X_B being the independent variable. The results are then plotted against R_1/X_{C1}. This is shown in Fig. 9. To the left of point *b*, the negative roots of Eqs. 6 and 7 are used while to the right of *b*, the graph represents solutions to the positive-root equation.

At point *a*, the pi network reduces to an L network since X_{C2} is infinite. Generally speaking, it is desirable to stay to the right of point *b*. The curves are "well behaved" in this region and the circuit is not critical with regard to changes in component values or resistance levels. QST

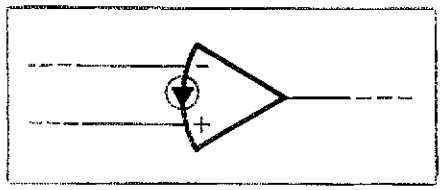
Notes

[1]Everitt, *Communications Engineering*, 2nd Edition, McGraw-Hill Book Co., pp. 241-273.
[2]Ibid., p. 248.
[3]Ibid., p. 265.

Feedback

☐ In "Hints and Kinks" (February 1979 *QST*), the symbols for the Norton op amps (U1A through U1D) on page 48 should be as shown here. The unusual input portion of these op amps is discussed briefly in March 1976 *QST*, page 24, in Blakeslee's "VOX for a Very Small Box."

Schematic symbol for the Norton op amp.



☐ There is an interchange of two drawings in "Human Engineering the Station Receiver" (January 1979 *QST*). The diagram which appears as Fig. 6 is really that of Fig. 7, and the drawing shown as Fig. 7 should be shown as Fig. 6. The captions as printed for the two figures are correct.

☐ In "A 20-Meter, VXO-Controlled, 6-Watt Transmitter," December 1978 *QST*, the designations for S1 and S2 should be reversed in the schematic diagram, Fig. 1.

☐ In the W4AMN modification of Frank Noble's filter described in "Hints and Kinks," August 1978 *QST*, the text should agree with the schematic diagram, indicating the correct value of the series inductance as 88 mH.

☐ The correct residence of Frank Bergerman, K2YSK ("Silent Keys, January *QST*), was Long Beach, NY.

☐ KØWQJ advises that the parts overlay drawing for his Accu-Keyer sidetone improvement ("Hints and Kinks," February) should show C1 between pin 4 of the 555 timer and ground.

☐ The Greek letters that represent longitude and latitude were reversed in the *QST* Abbreviations List (October 1978 *QST*, pages 94-95). Lambda (λ) refers to longitude, while phi (φ) refers to latitude.

☐ In "I Wish Someone Would Come Along" ("Public Service," November 1978 *QST*), Bob Patterson was incorrectly identified as K5ZDE. His call is K5DZE.

Strays

SURPRISED ENSIGN SIGNS OFF EARLY

☐ Santa nearly got himself in hot water with Ma Bell in the Southeast during the pre-Christmas season. It started innocently enough when Bill Echols, WA2NYR, set up a special hotline to Santa Claus, patching from an emergency amateur station at Fort Polk, LA. The idea was to have area youngsters transmit their gift wishes directly to St. Nick, but it didn't turn out exactly as planned: A trickle of calls soon became a torrent, tying up phone lines into much of Louisiana and eventually overloading telephone company computers as far away as Atlanta. Santa's hotline was shut down a few days early at the telephone company's request. *(AP news item)*

Zip-Cord Antennas — Do They Work?

Basic Amateur Radio: Parallel power cord is readily available and is easy to work with. How efficient is it when used at radio frequencies? Well, that depends.

By Jerry Hall,* K1TD

Zip cord is readily available at hardware and department stores, and it's not expensive. The nickname, zip cord, refers to that parallel-wire electrical cord with brown or white insulation used for lamps and many small appliances. The current price is about 6 cents a foot in hundred-foot rolls in most parts of the U.S. The conductors are usually no. 18 stranded copper wire, although larger sizes may also be found. Zip cord is light in weight and easy to work with.

For these reasons, zip cord is frequently used as both the transmission line and the radiator section for an emergency dipole antenna system. The radiator section is obtained simply by "unzipping" or pulling the two conductors apart for the length needed to establish resonance for the operating frequency band. The initial dipole length can be determined from the equation $\ell = 468/f$, where ℓ is the length in feet and f is the frequency in megahertz. (It would be necessary to unzip only half the length found from the formula, since each of the two wires becomes half of the dipole.) The insulation left on the wire will have some loading effect, so a bit of length trimming may be needed for exact resonance at the desired frequency.

For installation, many amateurs like to use the electrician's knot shown in Fig. 1 at the dipole feed point to keep the transmission-line part of the system from unzipping itself under the tension of dipole suspension. This way, if zip cord of sufficient length for both the radiator and the feed line is obtained, a solder-free installation can be made right down to the input end of the line. Granny knots (or any other variety) can be used at the dipole ends with cotton cord to suspend the system. You end up with a lightweight, low-cost antenna system that can serve for portable or emergency use.

*Technical Editor, *QST*

But just how efficient is a zip-cord antenna system? Since it is easy to locate the materials and simple to install, how about using such for a more permanent installation? Upon casual examination, zip cord looks about like high-quality 72-ohm balanced feed line. Does it work as well? Ask several amateurs these questions and you're likely to get answers ranging all the way from, "Yes, it's a very good antenna system!" to "Don't waste your time and money — it's not worth it!" Myths and hearsay seem to prevail, with little factual data. The intent of this article is to rectify that situation.

Zip Cord as a Transmission Line

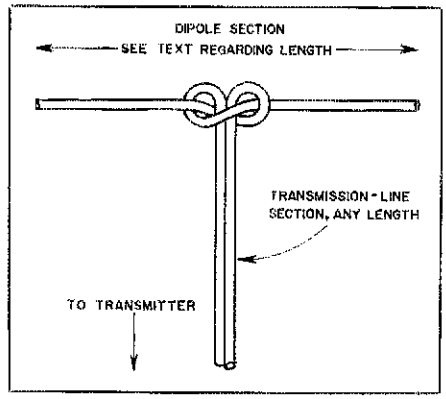
In order to determine the electrical characteristics of zip cord as a radio-frequency transmission line, we purchased a 100-foot roll and subjected it to tests in the ARRL laboratory with an rf impedance bridge. Zip cord is properly called parallel power cord. The variety purchased was manufactured for GC Electronics, Rockford, IL, being 18-gauge, brown, plastic-insulated type SPT-1, GC cat. no. 14-118-2G42. Undoubtedly, minor variations in the electrical characteristics will occur among similar cords from different manufacturers, but the results presented here are probably typical.

As the first step, we checked the physical length of the wire. GC generously provided nearly 4 feet over the specified 100-ft length, and the extra length was promptly lopped off.

We wanted to avoid measurement errors that might arise from coiling the wire on the supply spool (inductance between turns) or laying it out on the vinyl-tiled cement-slab floor (capacitance to a large surface), so the second step was to suspend the wire in a long hallway, about a foot or so below the false ceiling. Cotton twine was used for the supporting material. Undaunted by snide comments from fellow staff members about cheating the telephone company out of installation work and facetious suggestions that we use two paper cups and a string for our intercom, we continued with preparation for the tests.

With a General Radio 1606A rf impedance-measuring bridge, we made measurements at the input end of the line on 10, 15 and 29 MHz, while the far end of the line was terminated first in a short and then in an open circuit. We did notice during measurements that our readings changed somewhat as people walked in the hallway, especially during the 29-MHz tests. After a seemingly endless period of shooing away would-be helpers who disrupted measurements by grabbing the line, hanging objects on it, and so forth,

Fig. 1 — This electrician's knot, often used inside lamp bases and appliances in lieu of a plastic grip, can also serve to prevent the transmission-line section of a zip-cord antenna from unzipping itself under the tension of dipole suspension. To tie the knot, first use the right-hand conductor to form a loop, passing the wire behind the unseparated zip cord and off to the left. Then pass the left-hand wire of the pair behind the wire extending off to the left, in front of the unseparated pair, and thread it through the loop already formed. Adjust the knot for symmetry while pulling on the two dipole wires.



we finally arrived at a set of readings considered to be satisfactory for our purposes. From there, a bit of work with an electronic calculator and a Smith Chart told us what we wanted to know — the electrical characteristics at radio frequencies.

The results? Well, as the saying goes, I have some good news and some bad news.

First, the Good News

If ever you need a balanced 105-ohm transmission line, then zip cord is the stuff for you! Its characteristic impedance was determined to be 107 ohms at 10 MHz, dropping in value to 105 ohms at 15 MHz and to a slightly lower value at 29 MHz. The nominal value is 105 ohms at hf. The velocity factor of the line was determined to be 69.5 percent.

This reported change in impedance with frequency may raise a few eyebrows, but it is a fact that most lines do not exhibit a constant characteristic impedance across a range of frequencies. However, this writer has not previously encountered any line which was not "flat" between 3 and about 50 MHz. Zip cord may be exceptional from this standpoint, especially considering that the insulating material was not chosen for its qualities at rf.

And Now the Bad News

Who needs a 105-ohm line, especially to feed a dipole? Most of us know that a dipole in free space exhibits a feed-point resistance of 73 ohms, and at heights above ground of less than 1/4 wavelength the resistance is even lower. An 80-meter dipole at 35 feet, for example, will exhibit a feed-point resistance of about 40 ohms. Thus, for a resonant antenna, the SWR in the zip-cord transmission line can be 105/40 or 2.6:1, and maybe even higher in some installations. Depending on the type of transmitter in use, the rig may not like working into the load presented by the zip-cord antenna system.

But the really bad news is still to come — line loss! Fig. 2 is a plot of line attenuation in decibels per hundred feet of line versus frequency. Chart values are based on the assumption that the line is perfectly matched (sees a 105-ohm load as its terminating impedance). For lengths other than 100 feet, multiply the figure by the actual length in feet and then divide by 100.

In a feed line, losses up to about one decibel or so can be tolerated, because at the receiver a 1-dB difference in signal strength is just barely detectable. But for losses above about 1 dB, beware. Remember that if the total losses are 3 dB, half of your power will be used up just to heat the transmission line.[1]

Based on this information, we can see that a hundred feet or so of zip-cord transmission line on 80 meters might be acceptable, as might 50 feet on 40 meters. But for longer lengths and higher frequencies, look out! The losses become appreciable.

What About Zip Cord Wire as the Radiator?

For years, amateurs have been using ordinary copper house wire as the radiator section of an antenna, erecting it without bothering to strip the plastic insulation. Other than the loading effects of the insulation mentioned earlier, no noticeable change in performance has been noted with the insulation present. And the insulation does offer a measure of protection against the weather. These same statements can be applied to single conductors of zip cord.

[1]Additional losses over those charted in Fig. 2 will occur when standing waves are present. See Gibilisco, "What Does Your SWR Cost You?" January 1979 *QST*. Trouble is, you can't use a 50- or 75-ohm SWR instrument to measure the SWR in zip-cord line accurately.

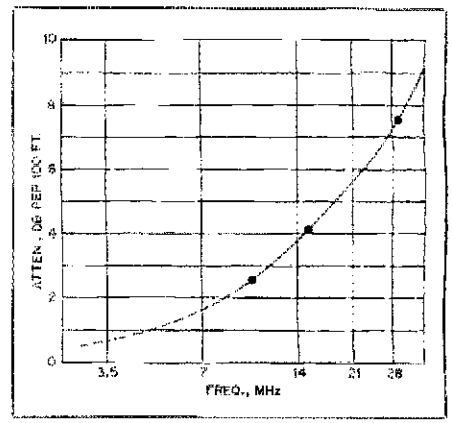


Fig. 2 — Attenuation of zip cord in decibels per hundred feet when used as a transmission line at radio frequencies. Measurements were made only at the three frequencies where plot points are shown, but the curve has been extrapolated to cover all high-frequency amateur bands.

The situation in a radiating wire covered with insulation is not quite the same as in two parallel conductors, where there may be a leaky dielectric path between the two conductors. In the parallel line, it is this current leakage which contributes to line losses. The current flowing through the insulation on a single radiating wire is quite small by comparison, and so as a radiator the efficiency is high.

Now back to the original question: How efficient *is* a zip-cord antenna system? Well, that *does* depend, on the length of the wire used for the feed-line section and on the frequency. In a pinch on 160, 80, 40 and perhaps 20 meters, communications can certainly be established with this kind of antenna. For higher frequencies, especially with long line lengths for the feeder, you're on your own. QST

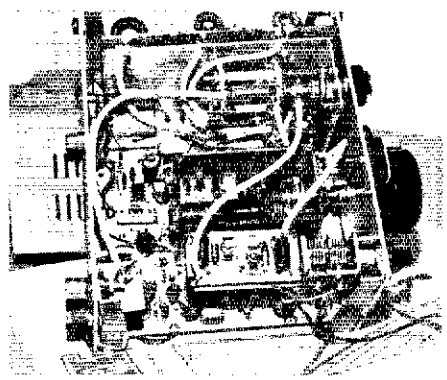
Strays

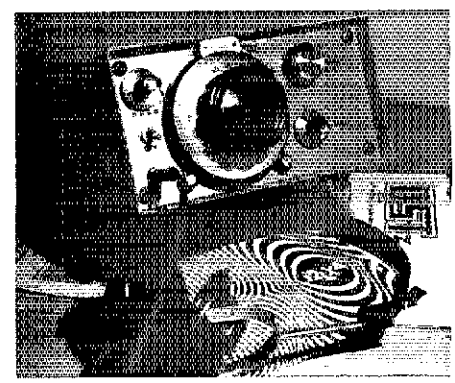
NEVER SAY DIE!

☐ W9TKR received a QSL card from HK2YO via the 9-land bureau in August 1978. Their 20-meter contact took place in August 1961, exactly 17 years earlier.

SOLAR-POWERED WAS

☐ As it is for many others, Idaho was the last state Joe Mikuckis, K3CHP, of Riverdale, MD, needed for WAS. But his was accomplished with a 5-watt station powered entirely by solar cells (directly — no batteries).





The inside and outside details of a slick version of W1FB's Mini Miser's *Dream Receiver* which was published in September 1976 *QST*. Built by Domenico Capello, I2LXA, of Milano, the unit includes three down converters for other hf amateur bands. He added one circuit which was not in the *QST* version — a 7-MHz preselector between the antenna and the main receiver input. It is also used between the converter outputs and the receiver input. Domenico is now building the transmitter described in a four-part *QST* presentation during 1978. Congratulations to I2LXA for keeping the soldering iron hot and for having done a superb job of constructing the mini-receiver!

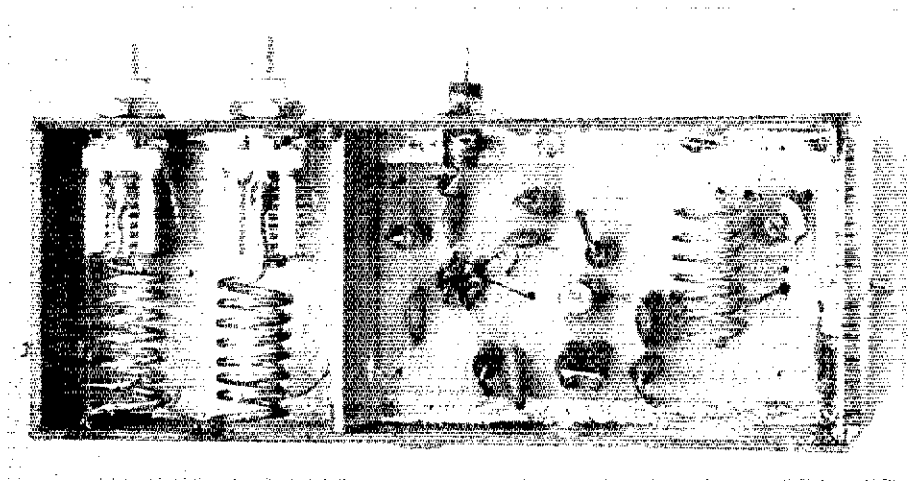
Toward Cleaner Local-Oscillator Chains — Spectral Purity

The weak link in some vhf and uhf converters is the LO chain. Poor spectral purity at the LO output causes a host of problems, the least of which is spurious responses in the receiver output. Here are some helpful tips.

By Doug DeMaw,* W1FB

What are the principal causes of crud in the output of an rf generator? More often than not the unwanted responses leaving the rf strip are caused by harmonic energy, self-oscillations and bleed-through of lower frequency energy from the low-level stages. Many amateur designers (and some professional ones, too) attempt oversimplification of design in the interest of economy. To complicate matters further, there exists a false criterion that a good converter must be a physically small converter. Neither of the foregoing concepts hold water when it comes to proper performance.

Correct design procedures have been known for many years. Following them is practically a textbook exercise, even for those who aren't technical heavyweights! This article illustrates some basic methods for obtaining clean output from an rf generator — local-oscillator chain or transmitter. With the FCC emphasis on spectral purity from transmitters, these tips should be of value to amateurs who design and build their own equipment.



Interior view of the last stage and band-pass filter of the circuit shown in Fig. 1. The earlier stages are also contained in a pc-board enclosure. Each box has an aluminum lid.

Unwanted Side Effects

What happens when the LO chain of a converter is delivering other than the desired injection voltage? The usual effect is observed when tuning across the band for which the converter was designed. Spurious responses will appear as unmodulated carriers of various amplitudes. Other responses might result from unwanted injection frequencies reaching the mixer, thereby enabling the latter to respond to TV, fm and commercial signals from nearby transmitters.

The local-oscillator chain used as the subject of this discussion (Fig. 1) was developed for use with a high-performance 144-MHz converter. Earlier experiences proved that the 58/116-MHz LO frequency combination caused reception problems in some areas if an appreciable amount of the 58-MHz energy reached the converter mixer. The unwanted injection energy produced responses from TV signals which appeared in the receiver tuning range. A similar problem can result from the third harmonic of the 58-MHz energy, or from self-oscillations within the LO chain. These problems are compounded when the converter front end has inadequate tuned-circuit selectivity. Many of the simpler converters have extremely wide frequency response at the rf amplifier and mixer stages. Nothing can be more discouraging during vhf or uhf weak-signal work than to find all manner of bogus signals in the band — i-f leak-through, spurs from commercial-broadcast signals and birdies of the unmodulated-carrier variety.

Design Objectives

The concepts discussed here are applicable when designing any narrow-band rf generator. The tuned circuits and transformers must, of course, be tailored for the frequencies used in the design. The same is true of the coupling and bypass capacitors. Paramount among the general objectives is spectral purity at the output of the rf strip . . . 70 dB or greater attenuation of all but the desired output frequency.

A simple overtone oscillator is shown at Q1 of Fig. 1. A 9.1-volt Zener diode is

*Senior Technical Editor, ARRL

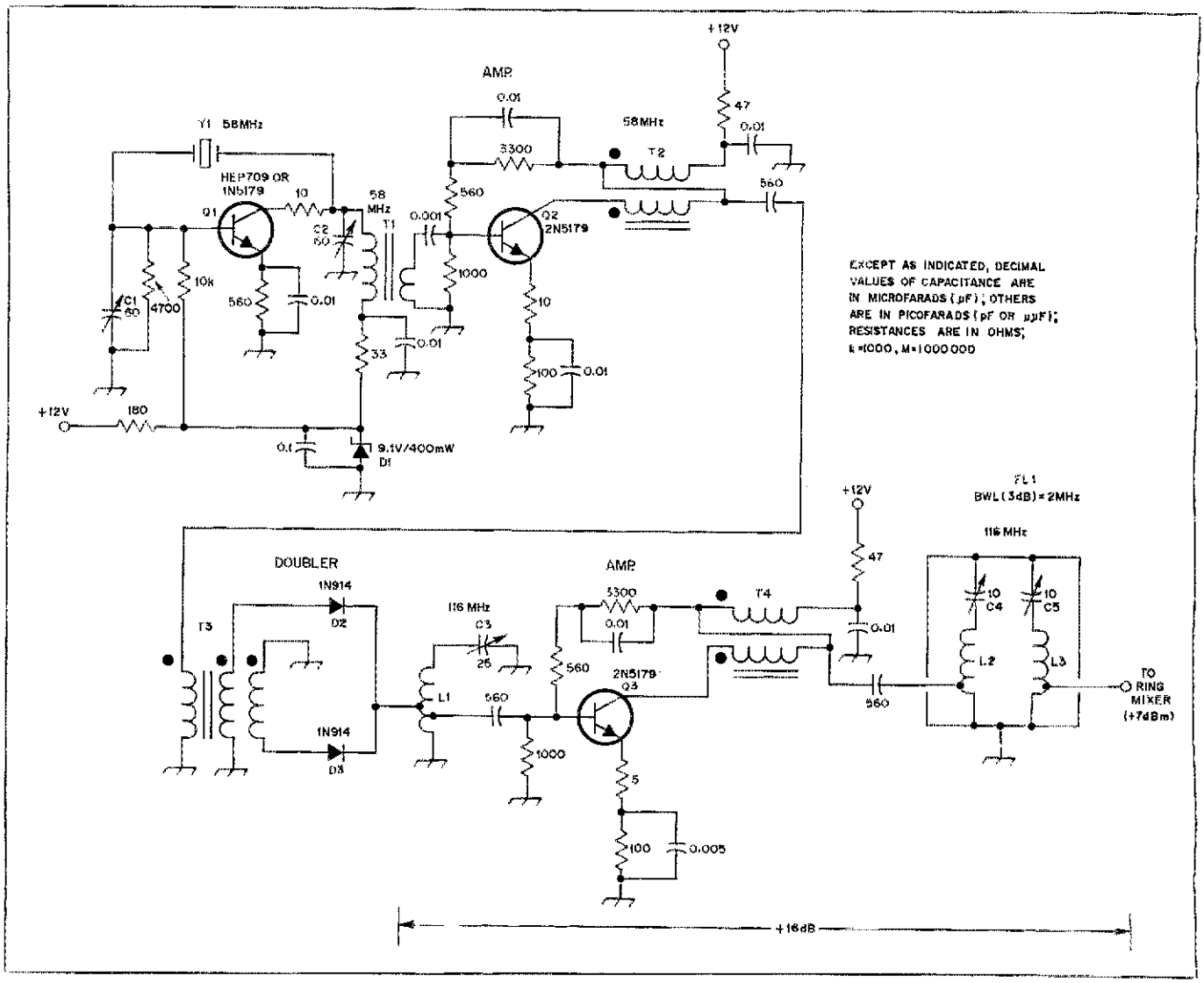


Fig. 1 — Schematic diagram of the local-oscillator chain. Fixed-value capacitors are disk ceramic. Resistors are 1/2-watt composition types. The dots at the ends of the transformer windings indicate phasing.

C1, C2 — Miniature ceramic or mylar trimmer, 60 pF maximum.

C3 — Miniature ceramic or mylar trimmer, 25 pF maximum.

C4, C5 — Miniature air-variable or glass-piston trimmer, 10 pF maximum. E. F. Johnson capacitor used here. Capacitor should be high-Q type.

D1 — Zener diode regulator, 9.1 volt, 400 mW or 1 watt.

D2, D3 — High-speed silicon diode (1N914) or hot-carrier diode.

L1 — 0.13 μH, 7 turns no. 16 bare copper wire, 1/4-inch ID × 1/2-inch long. Tap at 1-1/4 and 1-3/4 turns above ground.

L2, L3 — 0.09 μH, 7 turns no. 16 bare wire, 1/4-inch ID × 3/4-inch long. L2/L3 center-to-center spacing is 3/4 inch. Install in pc-board compartment 1-3/4 × 1-3/4 inches. (See photograph.)

Q1-Q3, incl. — Npn bipolar transistor with f_T of 1000 MHz or greater; 2N5179 or Motorola HEP709 suitable.

T1 — Primary, 8 turns no. 26 enam. wire on Amidon T-50-6 toroid core (0.25 μH); secondary, 3 turns no. 26 enam. wire.

T2, T4 — 6 bifilar turns of no. 30 enam. wire on Amidon FT-23-43 toroid core.

T3 — 7 trifilar turns of no. 30 enam. wire on Amidon FT-23-43 toroid core.

Y1 — 58-MHz overtone crystal (International Crystal type GP, 30-pF load capacitance).

used to regulate the supply voltage to the oscillator. This helps to assure frequency stability during operation. This is a particularly important measure of quality if the converter is to be used with a tunable i-f receiver which employs a high degree of overall selectivity; small changes in operating voltage usually cause shifts in the oscillator frequency. C1 has a small effect on the crystal frequency. It was included for netting purposes. Greater frequency change will result if a small amount of inductive reactance is inserted between C1 and Y1.

Output from Q1 is taken from the secondary winding of T1, a toroidal transformer that is tuned to approximately 58 MHz. Q2 functions as a broadband linear amplifier. It uses negative feedback and emitter degeneration. The input and output impedance of this stage is close to 50 ohms. A 2N5179 or an HEP709 should be used at Q2 and Q3 to assure ample gain at 58 and 116 MHz, respectively. The f_T of the 2N5179 is above 1000 MHz, thereby fulfilling the gain objective. The broadband, fed-back 58-MHz amplifier operates in a very stable manner. A final advantage is that no tuned circuits are required in that part of the system. Design details on this type of amplifier are presented (by W7ZOI) in the League's book, *Solid State Design for the Radio Amateur*.

D2 and D3 are used in a balanced diode doubler to provide output at 116 MHz. This operating frequency is required to establish a 28- to 28.2-MHz converter i-f (144-144.2 MHz). T3 is a broadband toroidal transformer which contains a trifilar winding. Output from the doubler is reasonably clean, but it is enhanced by tapping the diodes on a single-tuned resonator, L1, resonant at 116 MHz.

Q3 operates as a fed-back broadband amplifier at 116 MHz. A broadband 4:1 transformer, T4, steps the collector impedance down to 50 ohms for a match

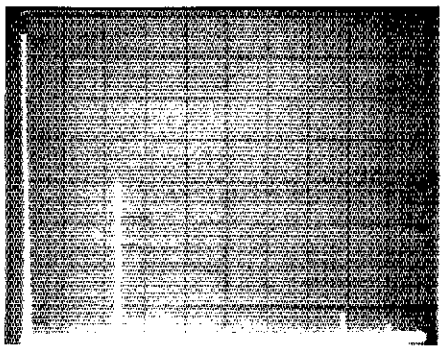


Fig. 2 — Spectral display of the LO output at 116 MHz. Vertical divisions are 10 dB each. Horizontal scale is 50 MHz/div. The 116-MHz response appears at the left (−40 dB line), but is actually full scale. It has been suppressed by means of a trap, as mentioned in the text. The line at the far left is a zero-reference mark from the analyzer. All unwanted responses from the LO chain are 72 dB or greater below the level of the 116-MHz output.

to FL1. Stage gain from L1 to the output of FL1 was measured as 16 dB. The gain provided by Q2 and Q3 is necessary in order to establish a +7 dBm LO injection level at the converter mixer. The latter is a doubly balanced diode-ring assembly which has a 50-ohm terminal characteristic.

The rf energy present at the input of FL1 is reasonably clean. The second and third harmonics of 116 MHz are down approximately 47 dB from the desired output frequency. The 58-MHz energy is some 50 dB below the 116-MHz peak level. FL1 "launders" the LO energy by virtue of the band-pass response it provides. The spurious output is 72 dB or greater below the peak value of the 116-MHz output frequency. The 58-MHz energy present at the output of the band-pass filter is so low that it can't be seen on an HP spectrum analyzer. Fig. 2 shows the spectrum of the LO output. In order to prevent front-end overloading and IMD responses in the analyzer it is necessary to suppress the fundamental frequency (116 MHz) by means of a trap. For this reason the carrier is not seen at peak deflection level. However, the tests were set up with full-scale deflection of the 116-MHz carrier before the trap was added and tuned to 116 MHz. This does not invalidate the readings for any of the spurious energies.

FL1 is not a helical resonator, but it resembles one somewhat. It consists of two high-Q tuned circuits in a box made from sections of double-sided pc board. The coupling is determined by the spacing between the resonators. There is no reason why a helical-resonator filter can't be used, provided the insertion loss is not so great that it reduces the LO output below +7 dBm.[1]

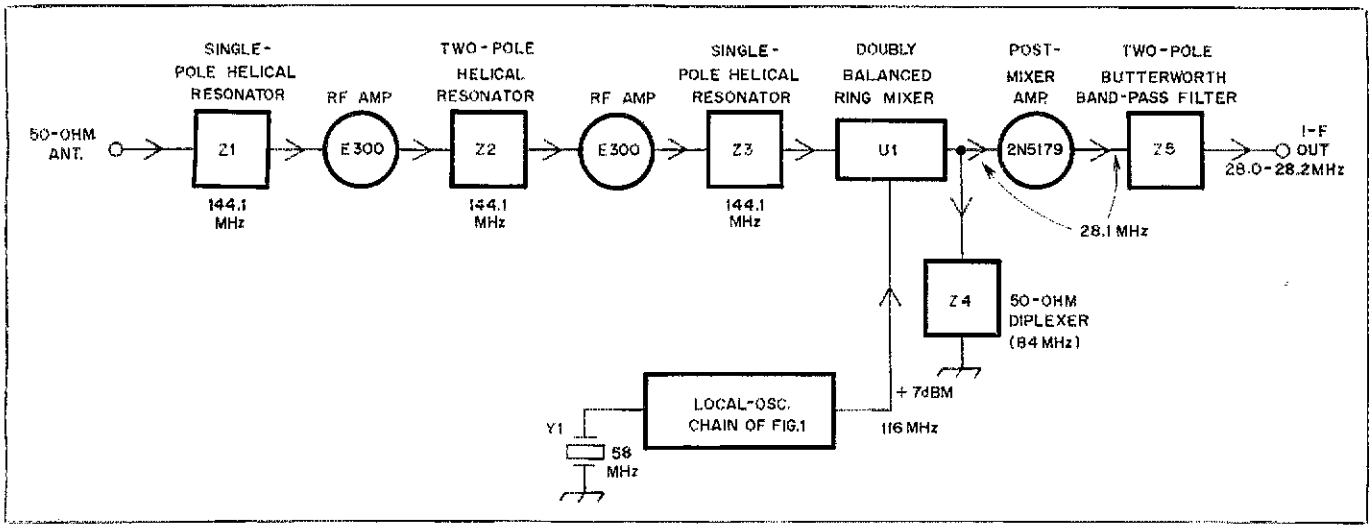
Some Final Thoughts

A block diagram of the composite 2-meter converter for which the LO chain was developed is shown in Fig. 3. A search for unwanted responses in the range from 144 to 146 MHz (FT-101E transceiver used as the 28-MHz tunable i-f) resulted in no discernible birdies. This feature is enhanced by the inclusion of a helical-resonator type of front-end filter (four resonators) at the input of the converter. Additional assurance that unwanted responses will not be heard in the receiver output is provided by the use of a 28-MHz Butterworth filter at the converter output. This helps prevent 58- and 116-MHz energy from being routed into the tunable i-f receiver. If a substantial amount of that energy reaches the receiver mixer, additional spurs can result.

The message given here is simple: Use standard design techniques in an rf strip. Employ filtering to suppress unwanted energy. Use stable amplifier stages so that self-oscillation will not occur. The result of this approach will be seen in a properly performing vhf or uhf converter. QST

[1]Fisk, "Helical Resonator Design Techniques," *QST*, June 1976, p. 11.

Fig. 3 — Block diagram of the composite 2-meter converter with which the LO system was used. The arrows indicate the direction of signal flow.



Strays

NEED A TOROID KIT FOR EXPERIMENTING?

☐ Harry Brown, W3IIT, offers this timely item of interest to amateurs who are devotees of homemade equipment. Harry purchased what is called a "Joule Box" bead, balun and broadband kit from Fair-Rite Products Corp., Walkill, NY 12589. It contains 34 different cores in 7 materials. Some of the cores are straight toroids, while others are multihole core types for winding baluns. An in-depth data sheet for fabricating broadband transformers is included with the kit. The magnetic properties and physical dimensions of the parts in the kit are tabulated on a card supplied with the kit. Harry says, "The cost is very low. It's handy for a quick project, where ordering the *right* part and experimenting with different parts is time consuming." We aren't sure of the kit availability to amateurs on a one-shot basis if they aren't working in the electronics industry. Interested would-be purchasers can check with the manufacturer concerning availability. — *W1FB*

The 3-Element 10-Meter Cheapie

Basic Amateur Radio: A CB beam is introduced to Amateur Radio after a few adjustments are made. For an inexpensive 10-meter Yagi that performs well, this one fits the bill!

By Jim Bartlett,* K1TX and Stan Gibilisco,** W1GV

Right now, the 10-meter amateur band is of interest to most active hams. With the sunspot cycle nearing its high point, the DX opportunities on 10 and 15 meters are excellent. A directional antenna, such as a Yagi, is desirable for even the smallest DXing station. If you've been contemplating the construction or purchase of a small 10-meter Yagi, consider modifying a similar CB beam as we did.

Pros and Cons

If you're an experienced antenna builder who has established sources for inexpensive aluminum tubing and element-mounting hardware, you may be better off going the "homebrew" route. On the other hand, if you're like many amateurs who lack the necessary mechanical knowledge or tools to build from scratch, or who live 100 miles from the nearest anything, you might be wiser to consider *purchasing* an antenna.

Of course, you could buy a number of compact commercial Yagis specifically designed for 10 meters. However, they range in price from about $50 to more than $100. If you're willing to do a small amount of "tinkering" on a used (or new) CB beam, chances are you can save more than a few dollars. Let's face it — with CB antennas being made in such large quantities, the manufacturers certainly must be able to sell them for less than a comparable 10-meter beam. Checking through a few catalogs, we found that most CB beams are at least 20 percent less expensive than comparable ham antennas. In addition to this, used CB Yagis are presently flooding the market as more and more CBers become disenchanted with the goings-on at 11 meters. Flea markets, "coffee breaks," swap meets, and even classified ads usually contain bargains for the sharp antenna hunter.

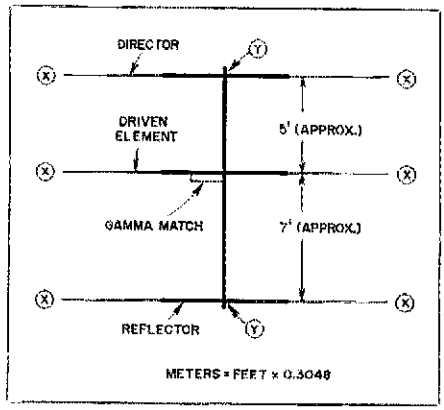


Fig. 1 — The 3-element 11-meter beam with modification points shown. At the points marked X, remove about 4 inches for 10-meter cw, or 7 inches for phone. At the points marked Y, the boom should extend about 2 inches past the elements for cw or about 4 inches for phone. Gamma-match adjustment and positioning are discussed in the text. This modification can be applied to any commercially manufactured 11-meter Yagi.

Antenna Selection and Preparation

Only one criterion was used to select the antenna we modified: price. The least expensive antenna we could find happened to be an Archer "Crossbow" — a 3-element job. (This is Radio Shack stock number 21-933.) First, the antenna was disassembled, cleaned and checked over for wear and tear. The antenna had been originally mounted for horizontal polarization, so the mounting bracket was already in the proper position for our use. Note that some antennas you find may be set up for vertical polarization. Not only must the bracket be changed for horizontal mounting, but you may find that one side of the driven element is longer than the other. If this is the case (and you don't have the original instructions for the antenna), cut the longer side (the one that would have been at the bottom — parallel to the mounting mast) so it is the same length as the other side. Finally, spread out the antenna parts in an orderly fashion. This will make the antenna ready for 10-meter modification.

Modification Details

Chances are that the SWR would remain acceptable (2:1 or better) even if the CB beam weren't modified at all! However, a parasitic array has other parameters that must be considered. A "low SWR" cannot be taken as assurance that a beam or quad is correctly adjusted. The front-to-back ratio is affected even by rather small frequency changes. Forward gain is also affected to some extent. In practice, these two factors are much more important than the change in SWR.

It was assumed that the Archer beam was designed for optimum performance at the center of the 11-meter band, or approximately 27.1 MHz. The center frequency chosen for 10-meter cw operation at W1GV was 28.1 MHz. It follows that if the antenna could be "shrunk" to 27/28 of its original size, the antenna would be optimized close to 28.1 MHz. This is a size reduction of 1/28 or 3.6 percent.

The modification was simple to perform; see Fig. 1. Since each element measures about 9 feet on a side, or 18 feet overall, a 3.6-percent reduction in size would entail removing about 4 inches from the ends of each element.[1] We used a tubing cutter to remove 4 inches from

*Basic Radio Editor, *QST*
**Assistant Technical Editor, *QST*

[1]Notes appear on page 37.

each of the six end pieces for the elements. This was done in the living room prior to assembly. Care was exercised to ensure that we cut each piece on the outer end (the one without predrilled holes), and that each piece was cut once and only once!

During assembly, the instructions were followed as written for horizontal installation, except that the director and reflector were mounted a couple of inches from the ends of the boom, and the gamma match short was moved 3/4 inch closer to the boom. Both of these changes were part of the scale-down operation, but were not considered as critical as element length, so we "guesstimated." It was also decided that the gamma assembly ought to be below the driven element rather than above it, to keep water from running down into the driven element.

The 27/28 scale ratio will be adequate for Novice operation. For phone, the center frequency might be chosen as 28.8 MHz, which would result in a ratio of closer to 27/29. In this case, about 7 inches should be removed from the ends of each element, and the reflector and director should be mounted about 4 inches in from the ends of the boom.

The gamma assembly adjustment will affect the impedance match, and consequently the SWR. However, it will have no effect on the center frequency of the antenna, its gain, or its front-to-back ratio. If the SWR at the center frequency, as measured at the transmitter, is better than 1.5:1, there's no point in tampering with the gamma adjustment unless you're feeding the antenna with 200 feet of RG-58/U (in which case you probably don't care much anyhow).[2] If the SWR is more than 2:1, adjust the gamma assembly for minimum SWR at the center frequency you chose, or at least until the SWR is below 2:1 over your favorite part of the band.

Performance

At W1GV, the modified Archer "Crossbow" is chimney mounted atop a 10-foot mast on a three-story apartment house. It is about 45 feet above the ground and there are no serious obstructions in any direction. The transmitter output is 3 watts. Would there be good results? The authors were confident. The SWR checked out all right (1.2:1).

In about 20 hours of operation as of this writing, 23 countries have been worked, including a ZE8 on the fourth attempt in a heavy pileup during the CQ WW cw contest. The front-to-back ratio is excellent. When the band is open with the beam pointed eastward in the evening, little or nothing is heard; but when the antenna is aimed west, there are numerous good signals.

Europeans are generally worked on the first call, and compliments are often received when they're told they are listening to 3 watts. A couple of hams have expressed skepticism concerning the accuracy of the power measurement!

Conclusion

Although the antenna we used was an Archer Yagi, the same modifications could easily be applied to any other commercially made CB Yagi. If you can't find any used bargains and decide to purchase a new in-the-box antenna, you might want to consider shopping for other brands similar in design to the Archer Crossbow. An example is Lafayette catalog number 42-P-02206W, which is comparable to the Archer antenna in both design and price.

The antenna installed at W1GV was attached to a mast section slipped through a small TV-type rotor. It provides ample torque to turn the antenna under most conditions. When installing your antenna, remember to stay clear of power lines, poles and transformers. Make sure that you are far enough away from any power leads that a stray antenna element cannot possibly contact them.

You don't have to tell your ham friends that the new antenna on your mast was made for CB, just tell them how well it works and how much money you saved! Remember — performance and cost are usually the most important things to hams! ham

Notes

[1]Meters = feet × 0.3048; mm = inches × 25.4.
[2]Gibilisco, "What Does Your SWR Cost You?" *QST*, January 1979.

Strays

TENTH-GRADE HAM TEACHES A LESSON

☐ We continue to be amazed at the vast sweep of Amateur Radio — at its potential for joy and hope as well as heartbreak and misery.

We made a routine contact the other evening with a KAØ in Colorado Springs, CO, who told us his name was "Hai."

After our signal report and all the usual mumbo-jumbo, we asked, "Is Hai a nickname? What does it stand for?"

He came back: "Hai is my name. It's Vietnamese."

While we were getting our breath back, Hai went on to explain, "We left Vietnam just one day before the Communist takeover. We stayed at Camp Pendleton in California for three months, then came here."

"What's your line of work, Hai?" we asked. And this was when he finally rocked us back on our heels.

"I'm in the tenth grade in high school," Hai said, "and I have my Advanced ticket."

So here's a Vietnamese kid, three years into a strange land, a sophomore in high school, and already an Advanced Class Amateur Radio operator.

Fumbling some, we suppose, we asked the obvious question: "Do you like it here, Hai?"

His answer: "Everyone has been very kind."

And we closed out as friends, promising to listen again for one another on the 40-meter band.

But although we said goodnight to Hai, we couldn't shake him from our awareness all that fast.

And in trying to put the whole QSO into perspective, we kept returning to his final words — "Everyone has been very kind." And, oddly, we found ourselves a little proud — proud of the people Hai had found kind and considerate.

America makes a lot of mistakes, as a nation and as individuals. But sometimes we win through to a magnificent sunrise — when sorely beset people, not much wanted, unschooled in our ways, frightened and abashed in a completely foreign environment, can say, "Everyone has been very kind."

For all our bumbling and fumbling, America is still the land of hope.

It took a Vietnamese tenth-grader to remind us! — *Lew Fay, AA5Q. Reprinted with permission from the* KC Club Bulletin

PAN-AM NET NEEDS VOLUNTEERS

☐ KP4EBQ has been designated the official Amateur Radio station for the Eighth Pan American Games, to be held in San Juan, PR, during July. Op Hans Tischer is looking for radio amateur volunteers to participate in a schedule system to handle the high volume of traffic expected (there will be 6000 athletes and officials from all parts of the Americas). Contact KP4EBQ at Box 524, Old San Juan, PR 00902, indicating operating hours, equipment, bands and frequencies. — *KP4RK*

Technical Correspondence

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

ATTENUATION OF FERRITE BEADS

☐ Based on some recent experience, it seems to me that many hams must be disappointed with the results obtained from the use of ferrite beads as rf chokes. The little information I have found on their use only suggests slipping them over a wire when rf decoupling is desired.

I investigated the use of ferrite beads to cure an audio-rectification problem. An rf signal generator and a communications receiver with calibrated S meter were used to perform these measurements. The attenuation of an FB73-801 bead at less than 4 MHz was barely discernible. Several more beads were added with little improvement. Then a choke consisting of 10 turns of no. 32 enameled wire wound on a single bead was tested. The results were gratifying. Attenuation on 80 meters now exceeded 50 dB. Toward the high end of the hf spectrum the single bead exhibited better than 80 dB of loss. In my case, the a-m broadcast station where I am chief engineer was interfering with a public-address amplifier. Twenty turns of wire, wound on a bead and installed in series with each mic input cured the problem. — *Gordon Wiley, WIAUN, 68 Pearl St., Gardner, MA 01440*

ON FERRITE-ROD INDUCTORS

☐ Since my article concerning loop antennas, some with magnetic cores, appeared in *QST* for July 1977, I have received requests asking for an A_L inductance factor for ferrite rods. The A_L for a given ferrite or powdered-iron core material is based, classically, on the inductance obtained from a single turn of wire around the core material, although any convenient number of turns can be used for closed cores. The equation is

$$A_L = L_{\mu H} \times 10^4/N^2,$$

where

$L_{\mu H}$ = inductance obtained, and
N = number of turns used during test

This procedure is entirely satisfactory for toroids and pot cores, but cannot be applied to rods and bars. Ironically, the effective permeability (μ_e) of the rod is a function of the rod length to diameter (ℓ/d). This is shown in the curves of Fig. 1. But despite this predictable characteristic, which should be applicable to finding the A_L, other factors influence rods and bars.

There is a definite relationship between the rod length (ℓ_r) and the coil length (ℓ_c) with respect to μ_e, as shown by Polydoroff[1] in his empirical equation

$$\mu' = \mu_e \sqrt[3]{\frac{\ell_r}{\ell_c}}$$

where

μ' = corrected permeability, and
μ_e = effective permeability from Fig. 1

The equation requires $\ell_r \geq \ell_c$.

Although the foregoing may suggest a simple solution to finding A_L, there remains another complication: The placement of the coil on the rod or bar has a marked effect on the inductance for a specified N. This is illustrated in Fig. 2, where tests were conducted with an Amidon R61-500X7 ferrite rod. No. 20 Formvar-insulated wire was used for the tests at A and B. The coils were close-wound and tight on the core. The coil turns at C in Fig. 2 were spread across the entire length of the rod. From these tests it was possible to secure three *approximate* A_L values from which the value for N can be obtained

$$N = 100\sqrt{L_{\mu H} \div A_L} \text{ turns}$$

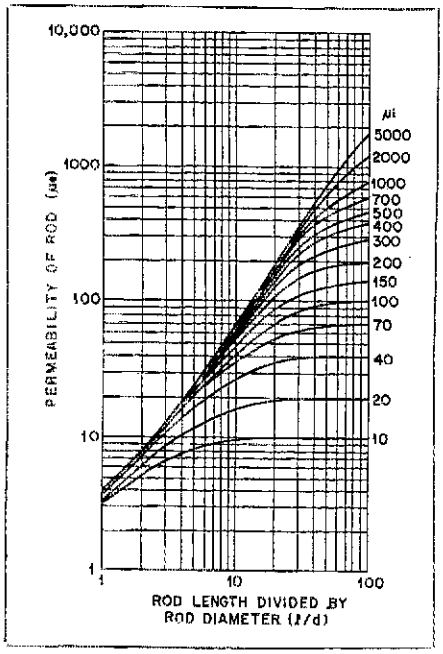
where

N = number of unknown turns
$L_{\mu H}$ = desired inductance
A_L = inductance index from the earlier equation

The greater the spacing between the coil and the core material, the lower the inductance and Q_μ. Therefore, these approximate A_L factors rely upon turns which are wound tightly on the core.

The Amidon core specified for the tests of Fig. 2 is suitable for optimum Q values from 0.2 to 10 MHz. These approximate A_L factors should be helpful in approaching the number of turns needed for the R61-500X7 rod or its equivalent. — *Doug DeMaw, W1FB*

Fig. 1 — Curves which show the relationship between effective permeability and initial permeability of ferrite rods as a function of ℓ/d. The μ_i values listed are standard values used by the industry.



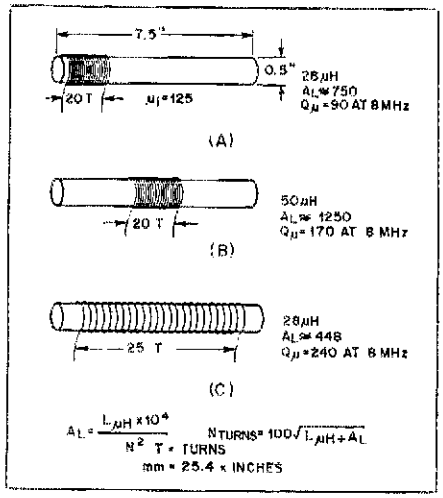


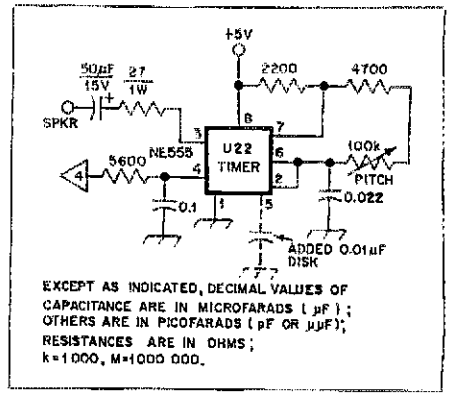
Fig. 2 — Three popular formats for inductors which are wound on ferrite rods. Each example has a different A_L factor, as discussed in the letter.

[1]W. J. Polydoroff, *High-Frequency Magnetic Materials*, John Wiley and Sons, New York, NY, p. 55.

ERRATIC OPERATION OF 555 TIMERS

☐ Circuits using the 555 sometimes show erratic operation. Monostable timing circuits are occasionally triggered for no apparent reason. Astable circuits sometimes break into unstable oscillation, especially right after power is applied. This instability may be the result of failure to bypass the control voltage pin of the

Fig. 3 — Schematic diagram showing a portion of the Accu-Memory, Fig. 3, page 362, 1978 *Handbook*. As originally published, the control-voltage pin of the 555 is unbypassed. This is an example of improper use of the 555. A 0.01-μF disk capacitor should be connected from pin 5 of the IC package to ground, as shown by the dashed lines. Most published circuits using 555 timers omit this capacitor.



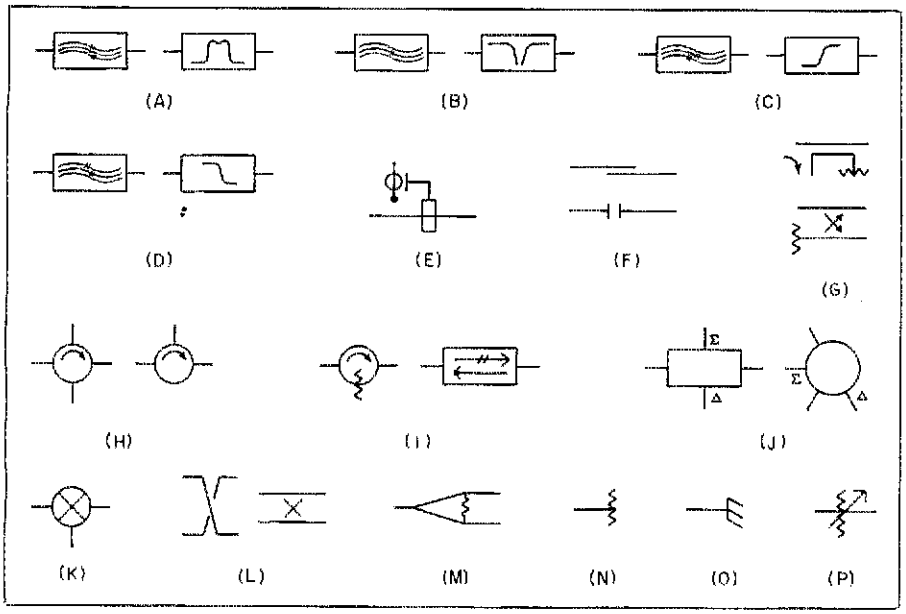
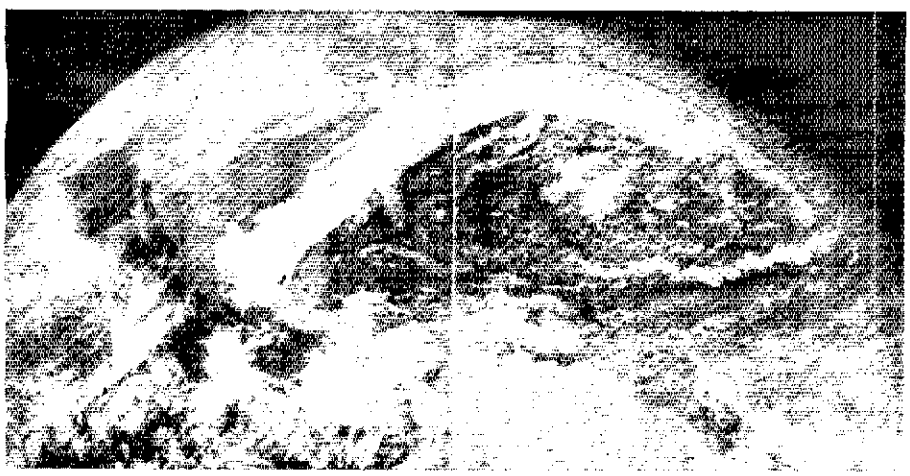


Fig. 4 — Schematic symbols recommended by W1CF for use by amateurs. Where more than one symbol is shown for one device, there is no single accepted indication as yet. A, band-pass filters. B, band-reject filters. C, high-pass filters. D, low-pass filters. E, coaxial-to-waveguide transition. F, dc block: a break in a transmission line that permits rf power to flow unimpeded, but which blocks low-frequency signals and dc. In coaxial line, stripline and microstripline, it is most commonly produced as a series quarter-wavelength stub, open-circuited 90-degree hybrid or, in some cases, a lumped capacitor. G, directional couplers, showing one sampling port terminated. H, ferrite circulators: for the clockwise circulator symbols shown, power entering at the left leaves at the top, that entering at the top leaves at the right, and so on. I, ferrite isolators: devices which permit power to pass in one direction but act as attenuators in the other. J, "magic tees": devices which permit an even power split from either of two inputs to two outputs. If the Σ (sum) input is used, the power split will be equal and in phase. When the Δ (delta) input is used, the power split is equal but will have a relative output phase differential of 180 degrees. In both cases the fourth port is isolated. K, mixer. L, 90-degree hybrids: four-port devices which permit an even power split from an input port to two output ports. A relative phase differential of 90 degrees exists at the output ports; the fourth port is isolated. M, power divider, in this case, two-way. N, resistive termination (matched load). O, transmission-line short: reflects all power incident at the short. When used at the end of a quarter-wavelength line it permits dc to be returned to ground without degrading the performance at the design frequency. P, attenuator. As shown, variable; if arrow not shown, fixed.

IC. Unless used in the circuit, this pin should be bypassed to ground with a 0.01-μF disk capacitor. In no case should the pin be left floating. Use of the bypass is mentioned in manufacturers' data sheets, yet the device is often omitted in published applications of the 555. One case in particular is the sidetone oscillator for the Accu-Memory, shown on page 362 of the 1978 *Handbook*. The specified value of the capacitor connected to pin 5 (see schematic diagram) of U22 in this circuit will eliminate occasional "bubbles" in the sidetone. — *Gerald R. Gerard, WA0DIL, 3442 136th Lane, Anoka, MN 55303*

Fig. 5 — Cloud-cover picture received from GOES/EAST by W1BGW on 1691 MHz. Cuba is at the center of the picture. A surplus Western Union Deskfax was used to receive the transmission.



MICROWAVE DRAWING SYMBOLS

☐ Microwave Associates, Inc., Burlington, MA, recently designed a template for drawing symbols commonly used in the commercial microwave field. Its purpose was to encourage uniformity in symbol usage. Some of these symbols may be of use to amateurs working at microwave frequencies and are reproduced here, along with a description of the item if it is not in general use by amateurs. In cases where more than one symbol is used, the alternates have been included. — *Dana Atchley, W1CF, Microwave Associates, Inc., Burlington, MA 01803*

FLUORESCENT-LIGHT NOISE

☐ On page 45 of January *QST*, there is a comment concerning "the fluorescent-light noise present in the ARRL headquarters building . . ." which surprises me, because I would have expected the League to build that new Headquarters with maximum RFI suppression.

Send to the General Electric Large Lamp Department, Cleveland, OH, for their application bulletin *Fluorescent Lamps and Radio Reception*, which has data on filters and lamp-to-radio operating distances. — *R. Ellers, K8JLK, 426 Central Parkway, Warren, OH 44483*

SYNTHESIZER/FUNCTION GENERATOR FOR LOW FREQUENCIES

☐ Hewlett-Packard has a new unit, called the Model 3325A Synthesizer/Function Generator, with output sine waves 0.000001 Hz to 20 MHz. For hams who tend toward the lower frequencies, the 0.000001-Hz (1-μHz) output should be of interest. It takes approximately 11.6 days to complete one cycle.

For low-frequency antenna enthusiasts — especially those who believe in half-wave wires rather than the new-fangled trap jobs — a wire 87.5 billion miles long (5.4 light days) should satisfy the requirements for a radiator at this frequency. — *Robert O. Zecher, W2YIK, 213 Oakley Drive, Syracuse, NY 13205*

GOES WEATHER SATELLITE PICTURE RECEPTION

☐ The cloud-cover photo of Fig. 5 was received from GOES/EAST on a surplus Western Union Deskfax in a configuration similar to that described by W7AVE in June 1978 *QST*. The drum and horizontal drive motors are operated from a power amplifier that is supplied with a 40-Hz signal derived from dividing down the 2400-Hz subcarrier from the satellite signal. In order for the drum motor to operate satisfactorily on 40 Hz, a 1-μF capacitor should be added across the existing 2.5-μF capacitor in the motor circuit.

The GOES (Geostationary Operational Environmental Satellite) series of weather satellites transmits this type of picture regularly on 1691 MHz. Since the satellites are geostationary, no antenna tracking is required. This picture was received using a 4-foot (1.2-m) parabolic reflector in the attic to feed the Micro-Comm down-converter, which in turn feeds a receiver used as an i-f amplifier. — *Jack Berman, W1BGW, 28 New Haven St., West Roxbury, MA 02132*

Product Review

Electrospace Systems HV-5 80-10 Meter Dual-Mode Antenna and HP-2 160-Meter Matching Network

Last year at the Dayton Hamvention, Electrospace Systems, Inc. introduced a unique amateur antenna called the HV-5. This new antenna was said to operate on 80 through 10 meters with a single transmission line, using no traps or switching system.

Sound interesting? We thought so. ESI shipped their new dual-mode antenna to us for review along with an HP-2 matching network that allows the HV-5 to operate on 160 meters as well.

Construction

The HV-5 is quite different from most vertical antennas this writer has ever seen. A 30-foot self-supporting mast consisting of four sections of heavy-wall, chromate-dipped 6061T-6 pipe makes up the main part of the assembly. The mast sections, 1.9-, 1.5-, 1- and 5/8-inch in diameter, telescope into each other and are secured with stainless-steel clamps.

Atop this vertical mast are four six-foot, stainless-steel whips that function as a top-loading capacity hat on 80, 40 and 20 meters, and as simple dipoles on 15 and 10 meters. The dipole whips are attached to ceramic insulators, which are fastened to a metal bracket on an enclosure at the top of the main mast assembly. This box contains the loading coils for the dipoles as well as other components necessary for the multicoupling scheme.

Assembly and Installation

The good part of a day was consumed in the installation of the HV-5 at the back of a small city lot. First, a number of items were obtained at local stores. These included an eight-foot section of two-inch water pipe, an eight-foot ground rod with clamp, RG-8/U coaxial cable and some wire for ground radials.

The instructions provided with the HV-5 are superior. A small, yet complete manual — not mimeographed sheets stapled together — furnished all necessary pictorial drawings and a step-by-step procedure for assembly. An "errata" sheet was also included, listing half a dozen changes and additions to the main set of instructions. Most of these were simply clarifications added to save the new owner a little time and head scratching.

As all parts were provided (none missing), assembly was completed in a couple of hours. The only "hitch" occurred when I broke a small ceramic insulator that was to be mounted inside the plastic enclosure. I informed ESI of the problem and a replacement part arrived the next week. (In the interim, I did without it as I was eager to try out the antenna.) After the antenna was completely assembled on the ground, it was pushed up into place, with one mounting bolt serving as a pivot point. This is a one-man operation. The other bolt was installed and the mast secured to the water-pipe mount.

Next the ground rod and radials were attached. I installed eight radials, although the instructions call for a minimum of 16 due to the low ground conductivity (only 1 or 2 mmho/m) in this area. I plan to install more radials in my neighbor's yard now that I've received his permission (he's W1NJM).

To tune the antenna, I placed a transceiver, an SWR meter, and a small table out in the backyard and set up a "station" right next to the antenna. All adjustments on the HV-5 can be made by moving adjustable powdered-iron cores inside the coils located in the HP-F matching unit attached to the bottom of the antenna mast. Rather than alternately adjust outside, run inside, transmit and check SWR, I figured it would be quicker and easier to do it all in the same place. I couldn't really see bringing the antenna down to the basement shack, so I took the gear outside.

The instruction book gives curves and charts to help determine the proper settings of the coil cores for the center frequencies used, but a little tweaking is necessary to obtain optimum multiband performance at the desired frequencies. This was quickly accomplished, and the temporary station was disassembled.

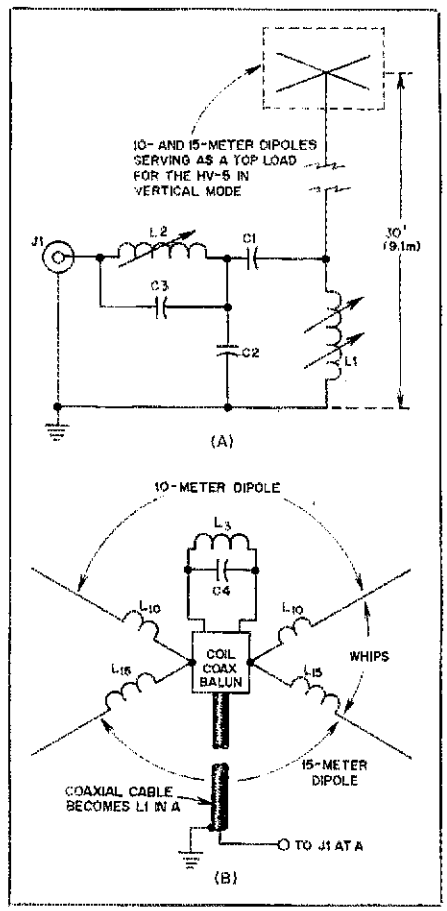


Fig. 1 — The Electrospace Systems HV-5 antenna.

Operation

The HV-5 is actually two antennas in one: a 20-, 40-, and 80-meter top-loaded vertical with base matching and a pair of horizontal, loaded V dipoles for 15 and 10 meters. These are multicoupled together at the base of the vertical with the HP-F network, forming a dual-mode five-band antenna that can be fed with a single transmission line. The dipole whips are canted in to form a 120-degree inclusive angle between opposite sections of the same dipole. This causes a horizontal-plane pattern that is more omnidirectional than that of a standard dipole.

Fig. 1A shows the equivalent circuit of the HV-5 vertical mode. The radiator itself is equivalent to an unloaded vertical monopole approximately 40 feet in length. Thus, it is shorter than a quarter wavelength on 80 meters, and longer than a quarter wavelength on 40 meters.

Proper selection of values for L1, C1 and L2 provides a good match for this length radiator simultaneously on 40 and 80 meters, and at a frequency slightly above the 20-meter band. On 20 meters, the antenna is longer than a half wavelength. L2 is used to tune out the capacitance, with C2 and C3 providing minor adjustment to the resonant frequency and impedance. L1 primarily affects the antenna resonant frequency on 80 meters. Powdered iron slugs in both L1 and L2 are adjustable, allowing quick adjustment of the HV-5 resonant frequency on 80, 40 and 20 meters. Since the base resistance of the antenna is high on 40 and 20 meters, compared to 50 ohms, high efficiency can be obtained with a minimal ground system.

The dipole mode is shown in Fig. 1B. The four stainless steel whips are tuned to resonance on 10 and 15 meters by separate loading coils, shown in the drawing as L_{15} (for 15 meters), and L_{10} (for 10 meters). Matching is accomplished by a shunt inductor, which also functions as a coil balun. The balun is made of RG-188/U coaxial cable wound on a plastic form. This is shown in Fig. 1B as a block. The balun, whips, loading coils, and so forth, all become a top load when the antenna is used in the vertical mode on 80, 40 or 20 meters.

The RG-174/U coaxial-cable feed to the dipoles extends down through the inside of the main mast and then becomes L1 of Fig. 1A. This coil is wound out of RG-188/U coax. The center conductor of the dipole feed then goes to the input connector J1. Components L3 and C4 serve no function during 15- and 10-meter operation. They provide a high impedance at J1 during operation on 80, 40 and 20 meters to ensure that the vertical mode is not affected by the dipole mode. The combination of L2 and

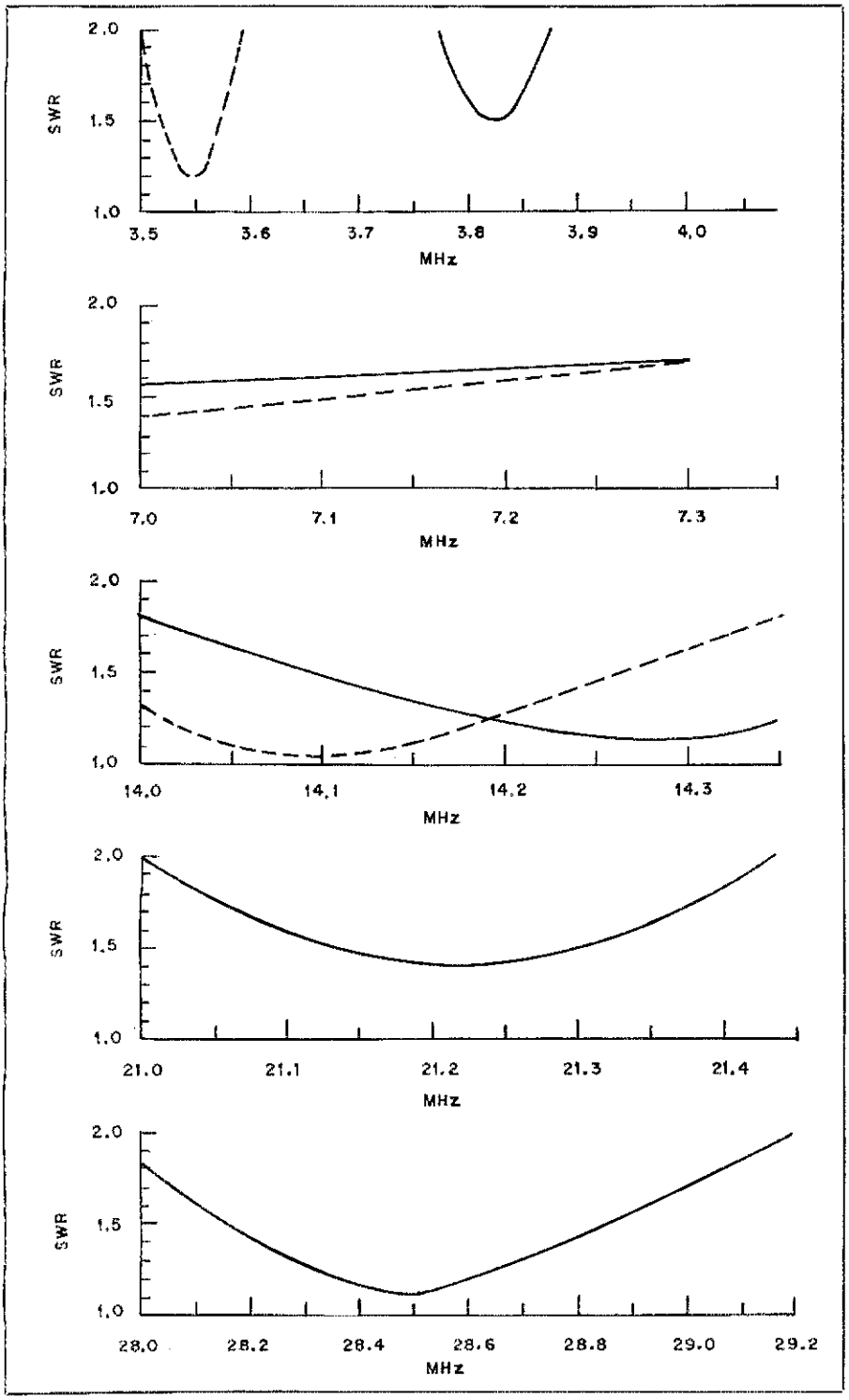


Fig. 2 — SWR curves for the Electrospace HV-5. Each graph containing two curves shows SWR measurements as taken with two different matching-network settings.

C3 is near antiresonance on 10 and 15 meters, causing the dipole section of the antenna to be effectively isolated from the vertical mode during operation on 10 and 15 meters.

Results — Use Report

The HV-5 operated smoothly on all five bands with the HP-F matching network in place. Especially interesting was the performance of the dipoles in comparison to a three-element triband Yagi up 35 feet at the same location. Shortly after the HV-5 was installed, I was listening on 15 meters and heard some strong South American stations coming in. A quick A-B switching between the HV-5 and the Yagi (pointed in the direction of maximum signal) indicated that these signals — apparently not low angle — were of equal strength on both antennas. A number of DX contacts have been made with this antenna on 20, 15 and 10 meters. The antenna seems to work quite well, and the SWR presented to the transmitter was acceptable. Fig. 2 shows SWR curves for the HV-5 on 80 through 10 meters. Note that for 80, 40 and 20 meters, there are two curves. These represent SWR measurements with the matching-network tuning controls adjusted two different ways. These controls are infinitely adjustable, however, so any number of variations of these curves is attainable. Operation on 40 and 80 meters was also as would be expected.

ESI HV-5 and HP-2

Frequency Coverage: 80- through 10-meter bands (160 also with optional HP-2 matching unit).
Height: 30 feet (9.1 m), installed.
Dipole length: 12 feet 5 inches (3.8 m).
Power rating: Full legal power, ssb and cw (600 watts PEP, 200 watts cw on 160 meters with HP-2 matching unit).
Wind rating: 80 miles per hour (128.7 kilometers per hour).
Mounting: Mounts to 1.9-inch water pipe or 4 × 4-inch wood post.
Input connector: SO-239
Ground system: Number of radials/rods recommended depends upon ground conductivity; detailed in instructions.
Weight: 33 lb 8 oz (15.2 kg).
Input impedance: 50 ohms.
Price class: HV-5, $260; HP-2, $40.
Manufacturer: Electrospace Systems, Inc., P. O. Box 1359, Richardson, TX 75080, 214-231-9303.

160 Meters

With a quick substitution of the HP-2 matching network for the HP-F unit, I converted the HV-5 into a short but effective 160-meter vertical antenna. When the HP-F matching unit is removed and the HV-5 is set up for 160-meter operation, 80- through 10-meter operation is not possible. Only eight ground radials were installed, as I mentioned earlier, yet the HV-5 still peformed quite well, especially considering its size in relation to a quarter wavelength. Two TUNING adjustments and a MATCHING adjustment were made using the three sliding powdered-iron cores in the base of the HP-2 network. The manufacturer provided with the HP-2 a graph showing tuning settings plotted against frequency, making the adjustments fairly simple.

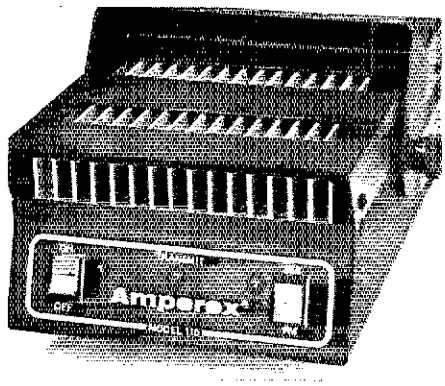
Although I didn't spend a lot of time on 160, I made enough contacts to get a good idea how the antenna performs on that band. Most operators contacted were surprised when they heard "the antenna here is a 30-foot vertical with eight radials." All reports were favorable, with a number of ops asking me to "hang around for some more discussion on that fancy antenna!" (Several times I had to promise to continue the discussion at a later time before I could sign off to get some sleep!)

Overall Impressions

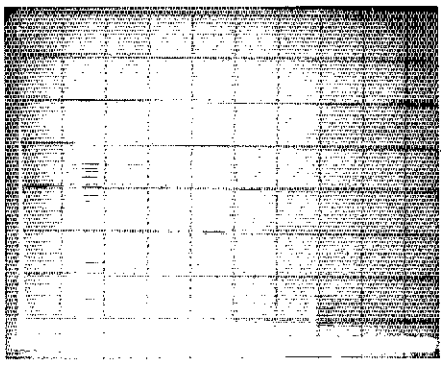
In general, the HV-5 appears to be of high quality, both in design and construction. So far, the antenna has been through long periods of heat and rain, and has been subjected to Connecticut winds, snow, ice and freezing rain. No maintenance has been necessary, and the antenna is still functioning as it was when it was first installed. — *Jim Bartlett, K1TX*

AMPEREX 110 2-METER AMPLIFIER

There has been a recent upsurge in 2-meter activity, brought about in a large part by the availability of multimode transceivers in addition to fm and repeater operation. This



Front-panel view of the Amperex 110 broadband 2-meter amplifier.



Spectral analysis of the Amperex 110 output at 144 MHz shows the second harmonic is 69 dB down and the only other noticeable output, near 700 MHz, is 65 dB down. A two-cavity notch filter was used to suppress the fundamental approximately 30 dB to avoid overloading the analyzer. Each horizontal division represents 100 MHz; each vertical division is 10 dB. These measurements were taken in the ARRL lab.

Amperex 110 2-Meter Amplifier

Power output: 100 watts nominal, with 10 watts drive.
Frequency coverage: 144-148 MHz.
Dimensions (HWD): 3 × 5-1/2 × 8-1/2 inches (76 × 140 × 216 mm).
Weight: 3 lb 14 oz (1.76 kg).
Power requirements: 13.6 volts at 20 A.
Price class: $190.
Manufacturer: Amperex Electronic Corp., 230 Duffy Ave., Hicksville, NY 11802.

upsurge has created a market for amplifiers in the 10-watt-input/100-watt-output class capable of both ssb and fm operation. A number of manufacturers have come out with amplifiers to answer this demand. One of the latest is Amperex. Long noted for its tubes and semiconductors, Amperex is now making its debut into the amateur equipment field with its model 110 solid-state, broadband amplifier. A companion 420-MHz amplifier and other items in the amateur field are expected to follow.

The Amperex 110 is designed for under-dash mounting in mobile installations, and for home use as well. An output of 115 watts on ssb or 100 watts on fm is possible with an input power of 10 watts. Although the efficiency will be adversely affected, lower amounts of drive can be used. For example, with 5 watts input the 110 will put out 100 watts on ssb or 75 watts on fm. For home use, a hefty power supply capable of providing 13.6 volts at 20 amperes is required.

Installation is extremely simple. The amplifier is installed in the line between the exciter and the antenna, and the power source is connected. The only control in the amplifier is the bias-adjust pot, which is factory preset, so there is no need to even remove the cover unless you want to admire the neat layout. The front panel is simple and functional with just two switches and three LEDs. The switches are "on-off" and "ssb-fm" bias. The LEDs indicate power on, ssb (linear) mode, and closure of the send-receive relay.

The amplifier package consists of four main subsections. First is a 10- to 30-watt broadband amplifier using a single BLW600CF transistor. This is followed by a 30- to 100-watt broadband amplifier using a pair of DX536CF transistors in push-pull. Stripline inductances are used in both sections. The use of two stages of amplification to reach the 100-watt level is a conservative approach and results in the amplifier being able to run at a 100 percent duty cycle at full rated power.

The third section of the 110 circuitry is the bias supply, which provides the proper bias to both amplifier stages for linear or Class C operation.

The fourth section, the T-R switch and filter section, contains the rf-actuated send-receive relay and a number of protective circuits. The amplifier is protected against reversed power supply polarity, excessive drive, excessive SWR and high ambient temperature. A built-in low-pass filter is used in the output circuit. An interesting feature is that when the amplifier is switched off and the exciter is running straight through, the low-pass filter is between the exciter and the antenna. Thus, if your exciter is a bit marginal in harmonic suppression, the additional filtering will be to your advantage.

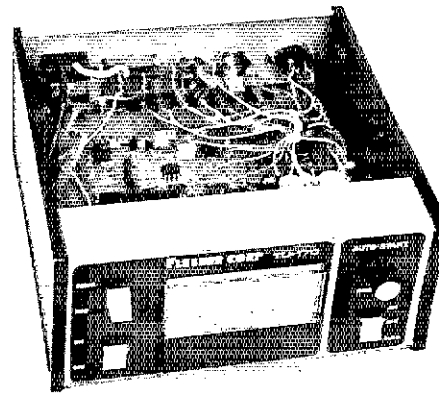
One hundred watts of rf energy on 2 meters is a sizable amount of power, so some precautions should be observed, toward both safety and good operating procedures. Fixed-station antennas, particularly high gain installations, should be as high and in the clear as possible. With good operating practices your enjoyment of 2-meter activity can be greatly enhanced. The use of excessive power for local contacts, thoughtless keying-up or DXing of out-of-area repeaters, and similar "bull-in-a-china-shop" tactics will soon earn you the scorn of your fellow hams. — *C. R. Bender, W1WPR*

FLESHER CORPORATION TU-170 RTTY TERMINAL

The Flesher Corporation's TU-170 radioteletype terminal unit fulfills the old adage that "big things come in small packages." This unit is not much larger than an electronic keyer, yet it contains all of the features that a RTTY operator needs, including demodulator, audio frequency-shift keyer, autostart and loop power supply.

TU-170 Features

A 170-Hz three-stage active filter is the heart of the demodulator. A signal of only 100



The Flesher TU-170 terminal unit is shown here with the top cover removed, exposing the single pc board and other components. The autostart relay, autostart power-output receptacle, and all other input and output jacks are located on the rear panel.

millivolts will activate its mark-hold circuitry to permit demodulation (and printing). With the flip of one switch, the receive and transmit modes are controlled. In the transmit position, the TU-170 remotely keys the transmitter and the afsk-generated tones are fed to the ssb transmitter microphone jack. A cw key may be plugged into the back of the unit to provide a 100-Hz shift of the afsk for FCC-required cw identification.

The loop power supply provides 130 volts at 60 mA, which is necessary for the selector magnets in a model 15, or similar printer. The autostart has an adjustable threshold control that can be varied according to the signal level desired for autostart activation. When the autostart turns the printer on, it remains on for approximately seven seconds after the received signal has ceased. This delay may be varied by changing the value of a resistor.

On the front panel is a convenient three-position switch that controls the autostart circuit and printer. In one position, the autostart is powered. In a second, the autostart is disabled; however, the printer is still active, printing all signals heard by the demodulator. In the third position, both the printer and autostart are disabled, but the demodulator continues to operate. This permits the demodulator to be used in conjunction with a video monitor and converter as part of a "noiseless" RTTY system. This system may be implemented via the TU-170's TTL-compatible inputs and outputs. A high-level output for scope tuning is also included.

Building the TU-170

The TU-170 is available in kit form or factory wired. I built the kit in approximately 12 hours. It is not a difficult kit to build, but it is not recommended for those without kit-building experience. The manual assumes that the builder has some electronic knowledge and building skills. Soldering techniques are very important; with 10 integrated circuits (ICs) and eight transistors mounted among a host of other components on a 5 × 5-1/2-inch (127 × 140 mm) circuit board, solder bridges can easily develop.

A frequency counter and ac voltmeter or oscilloscope are necessary for alignment of the

Flesher Corp. TU-170 Specifications

Power requirements: 115 V ac, 50-60 Hz, 15 watts maximum.
Input requirements: 100 mV minimum, 4-600 ohm line impedance.
Output: 200 mV sine wave.
Mark frequency: 2125 Hz.
Space frequency: 2295 Hz.
Shift: 170 Hz.
Power output to printer: 115 V ac, 3 A maximum.
Dimensions (HWD): 3-1/4 × 7-1/4 × 7-1/2 inches (83 × 184 × 191 mm).
Price class: Kit, $190; wired, $220.
Manufacturer: Flesher Corporation, P. O. Box 976, Topeka, KS 66601.

TU-170. First, the frequencies of the afsk tones are adjusted to 2125 and 2295 Hz. Then the levels of the tones are equalized. Finally these tones are fed through the demodulator and the filters are adjusted (by means of six potentiometers) for maximum deflection of the front-panel tuning meter.

The TU-170 in Action

Once the unit is connected to your radio and printer, the pleasure of using the TU-170 begins. Simply tune a received signal for maximum deflection of the tuning meter and printing should commence. The sensitivity of the unit is such that even weak, down-in-the-mud signals are printed perfectly. Once the demodulator "locks" onto a signal, it holds on through QRM and QSB. QRM is a problem only if it occurs exactly on the frequency of the signal you are trying to copy and completely *blocks the* receiver.

I have used this unit with a Kenwood TS-520 transceiver on the hf bands and with an ICOM IC-211 on 2 meters. On the printing end, I have used a Teletype model 28ASR and a Radio Shack TRS-80 microcomputer. The TU-170 has performed flawlessly with all combinations of this equipment. If you are a newcomer to RTTY, the TU-170 will relieve you of the frustrations sometimes encountered by beginners in this mode of operation. Veterans will find themselves stepping into state-of-the-art RTTY with this attractive little package. — *Stan Horzepa, WA1LOU*

THE III DIGITAL CAPACITANCE CONVERTER

If you have access to an oscilloscope or a time-interval measurement counter/timer, International Instrumentation, Inc. can provide the means for using it as a capacitance meter. Using their Digital Capacitance Converter and the counter/timer, you can read capacitance directly. Hams are more likely to have only an oscilloscope, though, on which capacitance is read as the length of a square pulse. Accuracy may be expected to be 5 percent or better with *this* method.

The unit is particularly handy if you have a bunch of those little polka-dotted color-coded things lying around and can't remember the decoding scheme! Also it may be desirable to determine more closely the value of a capacitor rated at 20-percent tolerance.

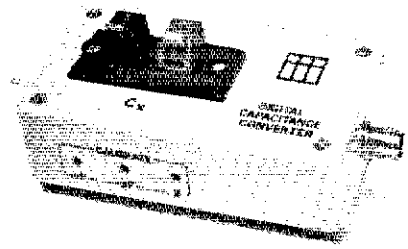
The Digital Capacitance Converter is housed in a bright orange plastic box which can be carried in your coat pocket. It has a BNC-type output connector, a switch for selecting μF or pF, and two sets of speaker-type terminals which do not require tampering with the component leads. The instructions are complete, including calibration details, optimum oscilloscope sweep settings for various ranges of capacitance, and an extension circuit diagram for use with a non-time-interval measurement counter/timer (complete with pc-board layout).

In use at Headquarters, we noticed that for values of capacitance exceeding about 100 μF, the required sweep time was so long that it was difficult to determine the length of a pulse. A "persistence" type oscilloscope would be handy for measuring large values of capacitance, but the average ham probably doesn't have one. Hence there is an upper limit to the capacitance that can be conveniently measured. The smallest capacitance that could be measured with reasonable accuracy in the ARRL lab was about 1 pF.

The true experimenter should not be without some means of readily measuring capacitance. The III Digital Capacitance Converter can fill this requirement. — *Stan Gibilisco, W1GV*

III Digital Capacitance Converter

Capacitance ranges: Selectable 1 pF to 1 μF and 1 μF to 10,000 μF.
Accessories required: Calibrated oscilloscope or time-interval measuring counter/timer.
Power requirements: 9 volts dc (transistor radio battery).
Dimensions (HWD): 1-1/2 × 4-3/8 × 2-1/2 inches (38 × 111 × 64 mm).
Color: Orange.
Price class: $40.
U.S. Distributor: International Instrumentation, Inc., Box 3751, Thousand Oaks, CA 91359, 805-495-7673.



The III Digital Capacitance Converter is housed in a bright orange box. Used with an oscilloscope, it can measure capacitance to within 5 percent from 1 pF to about 100 pF (larger values require a "persistence" trace oscilloscope).

PARTS PROCUREMENT CORNER

Ever since we printed our last list of small- and medium-sized parts suppliers we've been receiving more and more catalogs from additional firms that would like to be listed. It seems as though these suppliers have left no stone unturned in their attempts to outdo each other. This is great because we all benefit from their experience in digging up good buys and good components.

Just the other day we received a new catalog from a company in Miami called Small Parts Inc. Although, for the most part, the items included in the catalog are a dream come true for the "mechanical type," a large percentage of the merchandise is applicable to electronic equipment. For example, they stock the following: brass bar stock, rectangular and square; brass tubing, square, rectangular and round; brass channels and angles; aluminum bar stock and tubing; stainless steel shafting; ladder chains and sprockets; retaining rings — external and internal; pulleys and belts; brass rack and pinions; Delrin gears and cams; miniature universal joints; Teflon sheets and rods; machine screws of all types — metric and American thread; spacers; standoffs; springs and precision tools; wire cloth; O rings; and perforated metal. The catalog simply has to be seen to be believed. A free catalog will be provided upon request from

Small Parts Inc.
6901 N.E. Third Ave.
Miami, FL 33138

Along the lines of "strictly electronics," we've compiled the following lists of suppliers. We suggest that you send a large s.a.s.e. when requesting literature from these companies. This list is provided in addition to those already noted in September 1978 *QST* at the end of the "Product Review" section.

Adelco Electronics Center
2789 A Milburn Ave.
Baldwin, NY 11510

Babylon Electronics
Box 41778
Sacramento, CA 95841

Bullet Electronics
P. O. Box 19442
Dallas, TX 75219

Digital Research Corp.
P. O. Box 401247
Garland, TX 75040

Gull Electronics
12690 Route 30
North Huntingdon, PA 15642

Integrated Circuits Unlimited
7889 Clairemont Mesa Blvd.
San Diego, CA 92111

M-M Electronic Sales
2322 1st Ave.
Seattle, WA 98121

Martin P. Jones & Assoc.
P. O. Box 9023
Riviera Beach, FL 33404

MHZ Electronics
2111 W. Camelback Rd.
Phoenix, AZ 85015

Milo Associates
Box 2323
Indianapolis, IN 46206

Quest Electronics
P. O. Box 4430
Santa Clara, CA 95054

R. W. Electronics
3203 North Western Ave.
Chicago, IL 60618

Semiconductor Surplus
2822 North 32nd St., Unit 1
Phoenix, AZ 85018

M. Weinschenker Electronic Specialists
Box 353
Irwin, PA 15642

— *Jay Rusgrove, W1VD*

Hints and Kinks

A 75-METER DX ANTENNA

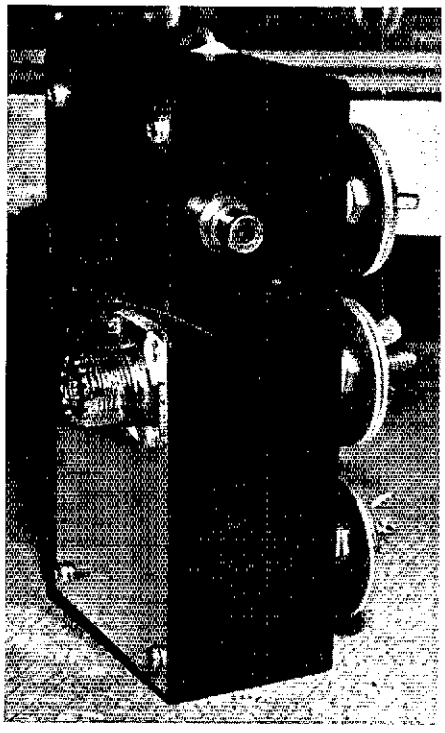
The long, cold winter nights in VE6 land, where I live, would seem like ideal times to work DX. At this time of year, though, the 20-meter band is as silent as a powerless transmitter. One, therefore, must use the lower bands to pursue any DX activity during the hours of darkness. I chose to operate in the 75-meter band using an inverted-V antenna. Reaching stations from coast to coast presented no problem, but all those DX stations I heard failed to respond to my calls. A change of antenna seemed desirable.

With a form of half sloper that I rigged up the DX barrier was broken. XE2AX became my first DX contact, followed two days later by a QSO with ZL2BT who radioed back a gratifying 5-9 report. That initial success led to the expansion of the sloper system to include two other half slopers as shown in the drawing. Radiation from a sloping antenna tends to be maximum in the direction of the slope. For that reason, with the antennas spaced 120 degrees apart, I'm able to take advantage of the directional characteristics of the system that offers three different signal patterns. Each of the three wires slopes downward at a 45-degree angle from the apex of the tower.

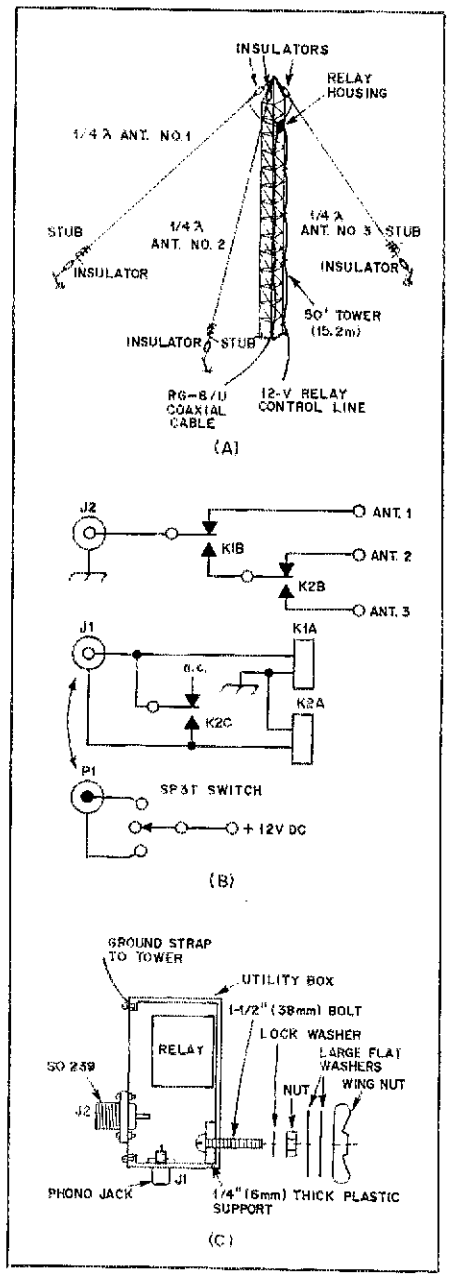
Feed points for the radiators are at the top of the tower where two relays enclosed in a plastic utility box (see photo) provide the necessary switching for selecting any one of the three antennas. This arrangement eliminates the need for separate transmission lines. An accompanying diagram illustrates the relay circuit. Each radiator is cut to approximately 1/4 wavelength at the operating frequency. Length, after final adjustment, should be between 60 and 65 feet, depending upon the selected frequency and the conditions at the antenna site. When trimming such an antenna for the 75- or 80-meter bands, tuning stubs, such as shown in the drawing, simplify the work. These may be shortened or lengthened as needed. A change in length will produce a resonant frequency difference of about 0.1 MHz per foot.

The relays I chose have 10-ampere contacts and operate from a 12-volt control circuit. The plastic keys on the octal bases of the relays had to be trimmed in order for the units to fit inside a 1-1/2 × 5 × 2-1/2-inch (38 × 127 × 64 mm) Radio Shack utility enclosure. Pin-to-pin leads are short. Wiring is done with no. 14 hookup wire. The outer conductor of the coaxial cable is common to the tower as shown in the illustration.

Reports that resulted from the first week of testing indicated a 25-dB change as the selection of radiators was rotated. During the last weekend of the ARRL DX contest, I logged the following prefixes on 75-meter ssb: VP1, VP2, XF1, XE1, KH6, KL7, PJ8, KP4, TG9, ZL, HD and KZ. I'm indeed pleased by DXing now with my $30 half-sloper system. — *S. Timothy Hopps, W7AEK/VE6, ex-W1WZR*



This utility box, which is mounted atop W7AEK's tower, houses two relays that are used to select any one of three sloping radiators connected to the terminals at the back of the box.



The W7AEK 75/80-meter DX antenna system is illustrated above. For directional effect three individually operated radiators are used. The circuit for the relay-operated antenna selector switch is at B. The utility box housing the relays is shown in a cutaway view at C. Lengthening or shortening the radiators is simplified by the use of the tuning stubs in Drawing A. Note that the shell of J1 is not grounded.

J1 — Phono jack.
J2 — SO-239 chassis-mounted coaxial connector.
K1 — Same as K2 but used as an spdt relay.
K2 — Dpdt 12-V dc relay, 10-A contacts, Radio Shack no. 275-208 or equiv.
P1 — Phono plug.
Utility box — Radio Shack no. 270-233 or equiv.

AMIDON PART IDENTIFICATIONS

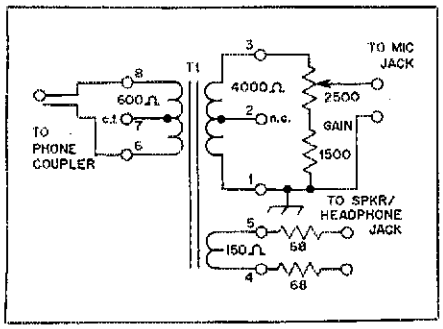
After being off the air for some 20 years, I have recently become active again but find I'm dragging myself (scratching, not kicking!) into the semiconductor age. The *QST* articles are of great interest and assistance to me. My current projects, a VFO with output on 40 and 80 meters and a small transmitter, are being constructed along the lines outlined in articles by Doug DeMaw.

My plans included the use of Amidon beads and toroids but the manufacturer's sizes and mixes of the devices puzzled me. William Amidon was kind enough to provide me with the following information which clarified the matter and it may be helpful to others. He said, "At first, our ferrite-bead stock consisted of only one material and two different sizes, the larger of which was known as the Husky or Jumbo size. Later a part number was assigned to this bead and it is now known as the FB-43-801.

"Some time ago, the original part numbers for the ferrite toroids were changed for easier identification. For instance, the original part number FT-75-601 was changed to FT-8275. FT for ferrite toroid, 82 for the 0.825-inch (21-mm) OD, and 75 for the type material.

"In any event, the proper core will be sent to the customer even though an older part number appears on the order."

The response from Mr. Amidon was received through the assistance of the ARRL Technical Information Service. — *Paul Binstock, WØDXG*



A simple phone-patch circuit. T1 is from an RM-52 remote-control unit purchased from Fair Radio Sales, Lima, OH. A push-to-talk switch, not shown, may be added to activate the transmitter.

SIMPLE PHONE PATCH

I use the simple phone-patch system in the accompanying drawing for interfacing my Swan 500-C with the local telephone line. This unit, built for under $5, is a little gem. T1 is a hermetically sealed UTC audio transformer extracted from a surplus RM-52 remote-control device purchased from Fair Radio Sales, Lima, OH.

To check the performance of the patch, I used a Central Electronics Multiphase rf analyzer. The audio levels of the patch and the transceiver are set with the aid of an oscilloscope.

Where this circuit is to be used at a station with high power, I recommend the installation of rf chokes in series with the line to the voice coupler and bypassing that line to ground as a means of avoiding RFI. This arrangement should work well with most modern transmitters and receivers. — *Howard Johnson, WA8QBJ*

SHOP TIPS

☐ To stop your screwdriver or pliers from picking up steel nuts and screws, insert the screwdriver all the way into the area between the rods of your soldering gun. Then turn on the gun and slowly withdraw the screwdriver. It will be demagnetized upon withdrawal. — *Roger Mace, W6RW*

☐ I restored the appearance of an old rusty telegraph key by using a highly refined gold leaf paste that left the key with a smooth antique bronze finish. The paste I purchased is no. 76361 produced by the American Art Clay Company, Indianapolis, IN, 46268. This substance is applied sparingly with a cloth. It may be thinned with turpentine if desired. When dry, the surface is brushed gently. — *Joe Rice, W4RHZ*

☐ Some time ago, I purchased a used Heathkit SB-220 linear amplifier. After close inspection I noticed some small paint chips in the finish of the light bluish-gray cabinet. Because touch-up paint is not available from the local Heathkit store, I decided to make my own mixture.

After some experimentation with brush-on modelers paints, obtained from a hobby shop, I developed the following formula: 2 parts of X-38 green Pactra 'Namel, 1 part black paint and 50-60 parts of white. The variation of the white paint amount should allow for natural paint variations. Gloss can be removed by light use of no. 000 steel wool once the paint has dried. The metallic green paint matches the Murch UT-2000A Transmatch cabinet fairly well, straight from the container. — *Carl R. Nebelsky, AA1U*

FOR THE KENWOOD 7400

I find the frequency display on my Kenwood TR-7400A tends to become intermittent and incorrect. Reseating the display driver printed circuit boards will correct the problem temporarily. A better solution is to place a 3/8 × 1 × 3-inch (10 × 25 × 76-mm) piece of foam rubber between the circuit boards and cover. This holds the boards in place permitting easy removal. The compression fit allows solid connector contact without excessive stress. — *Dave Brindle, K1WER*

IDENTIFYING TOROID WINDINGS

It can be an exercise in frustration when the individual windings of a bifilar, trifilar or quadrifilar type of toroid or pot-core transformer are ready to be connected to a circuit. Typically, the windings consist of brown- or red-colored magnet wire, and the ends of the windings all look the same! The usual procedure is to "ring out" the windings by means of an ohmmeter.

Some manufacturers of enameled magnet wire provide red, green and brown insulation, but large-quantity buyers seem to be the only ones who can purchase it. Radio amateurs can't find this wire in small quantities or without a restrictive minimum-billing levy.

The trifilar-wound transformer in the drawing was needed for a circuit developed by the writer. It consisted of 16 turns of no. 28 enameled wire on an Amidon FT50-61 toroid core. Rather than agonize over which winding was which after it was wound, a simple solution was effected: The first wire was left with its brown Formvar insulation. The second wire was spray painted blue, and the third was painted green. Ordinary aerosol-can enamel paint was used. It dried quickly and adhered well to the Formvar insulation on the wire. Identification of the windings was easy when the transformer was placed in the circuit. This method is recommended for any type of transformer which has two or more windings. Considerable flexing of the painted wires did not result in flaking of the green or blue paint. — *WIFB*

This Reese trailer hitch, secured to the frame of W8TK's Corvette, provides a rugged antenna mount for his 2-meter antenna.

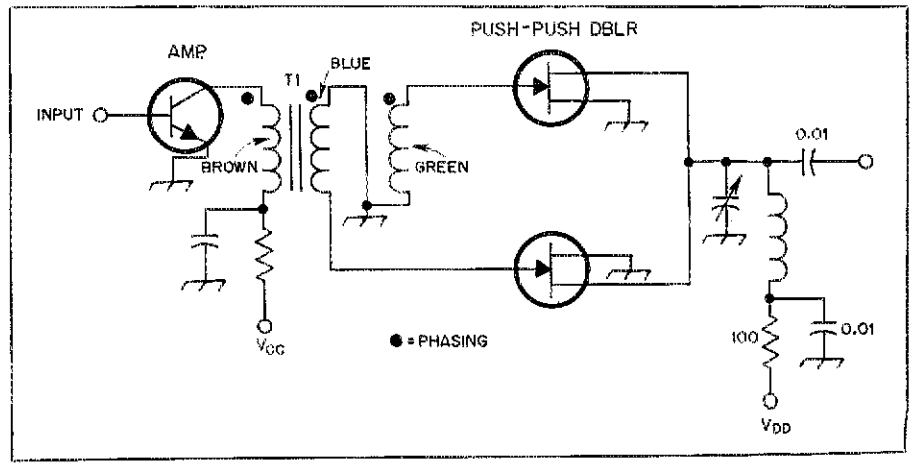
CORVETTE ANTENNA MOUNT

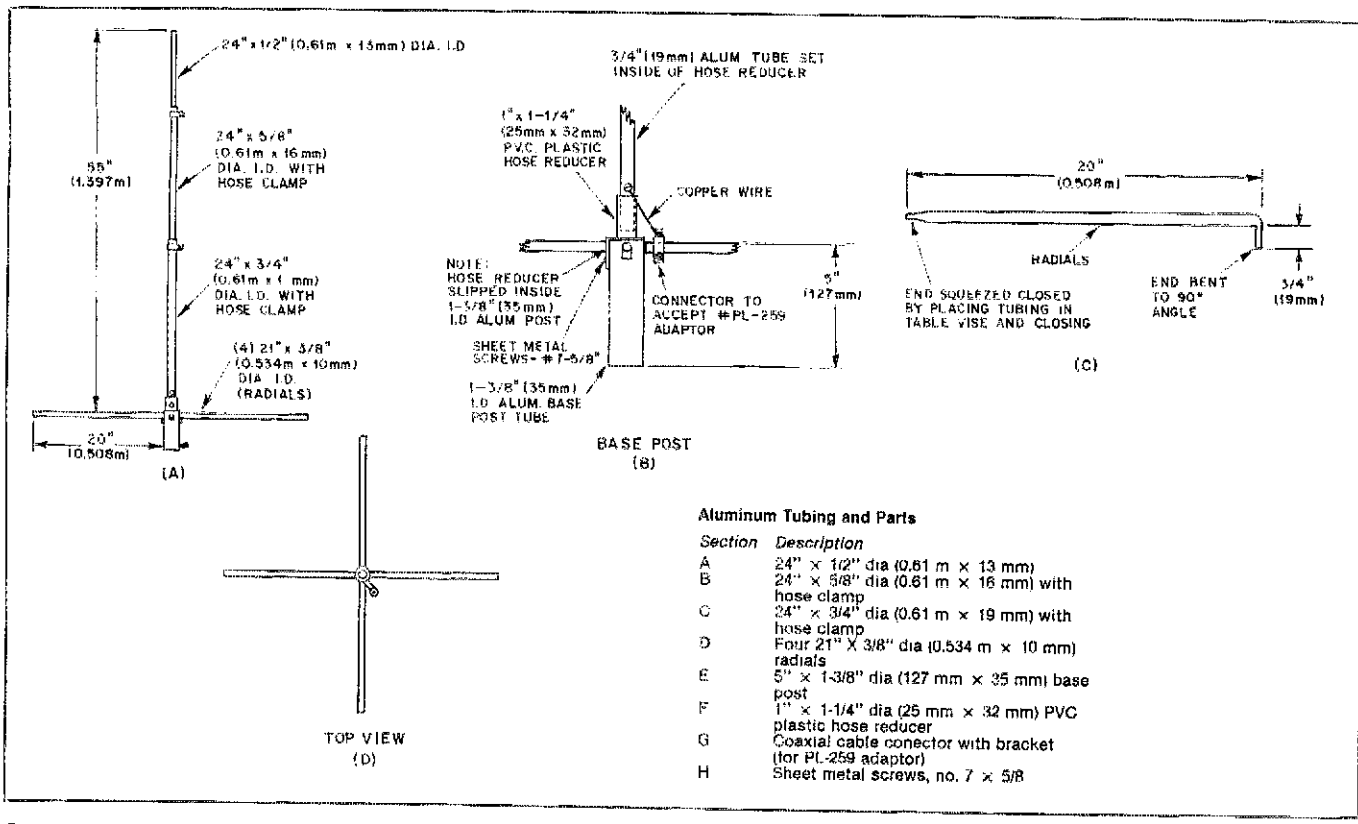
Corvette owners generally experience difficulty in attempting to mount mobile antennas on their cars without drilling holes in the body. Magnetic mounts obviously do not grip the plastic body. Gutter mounts don't fit because there are no rain gutters. Even bumper mounts are unsatisfactory for 1974 and later models because these Corvettes lack bumpers.

I solved the problem by installing a trailer hitch made by the Reese Co., Route 19, Elkhart, IN. The hitch is small, chrome finished and barely noticeable when in position below the rear license plate. Because it is mounted on the car frame, the hitch is strong enough to support the largest mobile antenna. Cost of the hitch at the time of my purchase was $43 including installation.

On-the-air tests indicate that a 2-meter J-pole antenna, which does not require a ground plane, outperforms a 5/8-wave whip by a wide margin. The hitch does not provide a satisfactory ground plane. But neither does a fiberglass body panel! — *Dr. Thomas Kravec, W8TK*

Color coding of wire to be used for individual windings of transformers will avoid determining which winding is which once the unit is finished. Wires for the push-push doubler shown below were sprayed with enamel before being wound. See text.





Aluminum Tubing and Parts

Section	Description
A	24" × 1/2" dia (0.61 m × 13 mm)
B	24" × 5/8" dia (0.61 m × 16 mm) with hose clamp
C	24" × 3/4" dia (0.61 m × 19 mm) with hose clamp
D	Four 21" X 3/8" dia (0.534 m × 10 mm) radials
E	5" × 1-3/8" dia (127 mm × 35 mm) base post
F	1" × 1-1/4" dia (25 mm × 32 mm) PVC plastic hose reducer
G	Coaxial cable conector with bracket (for PL-259 adaptor)
H	Sheet metal screws, no. 7 × 5/8

The WB3GCN 2-meter vertical antenna. All tubing sizes are for the inner diameters. Radial ends may be squeezed closed in a vise. Measurements provided are for 147.0 MHz.

CONVERTING A CB ANTENNA FOR 2 METERS

I remodeled an old CB antenna into a 3/4-wave vertical antenna with four 1/4-wave radials. The results have been most satisfactory. A drill, hacksaw and a screwdriver are the only tools required for the conversion.

My Sears no. 3038 rig supplies 10 watts to the antenna with an SWR of 1.4:1 at 147.0 MHz. I'm fortunate to have a pole behind the row house in which I live for mounting the antenna. Roof mounting would be most difficult.— *D. A. Inverso, WB3GCN*

ANOTHER TELEPHONE RFI SOLUTION

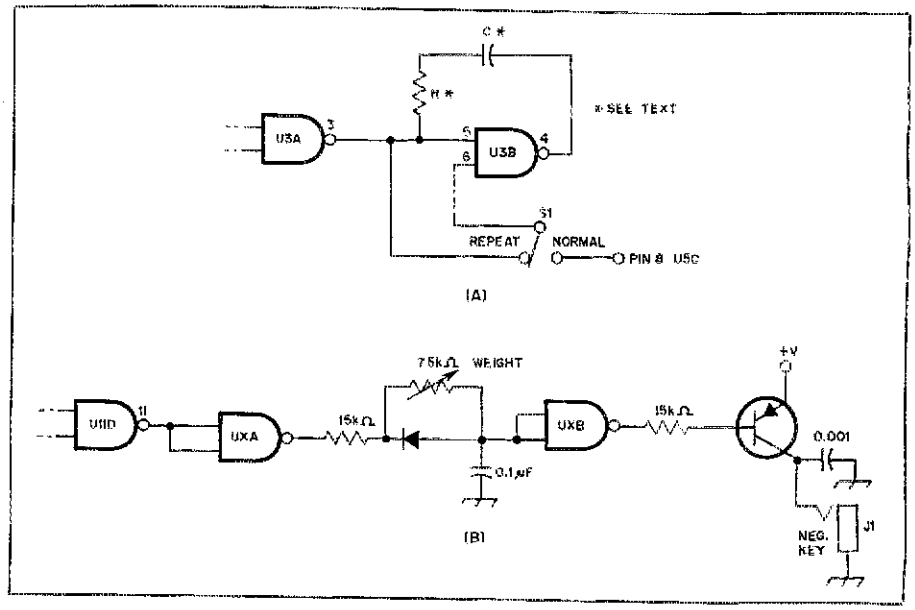
Fortunately there is no telephone interference while my transmitter is operating on 10, 15 and 20 meters. But when it is on 40 meters, strong RFI occurs. After the telephone company tried rf chokes and bypass filters with no success, I reasoned that the telephone line might have a resonance at some multiple of a quarter-wavelength at 7 MHz. The phone company then added 15 feet of line to their circuit. This resulted in detuning the telephone line and eliminating the RFI. — *Sam Peck, W6CQR*

KEYBOARD MODIFICATIONS

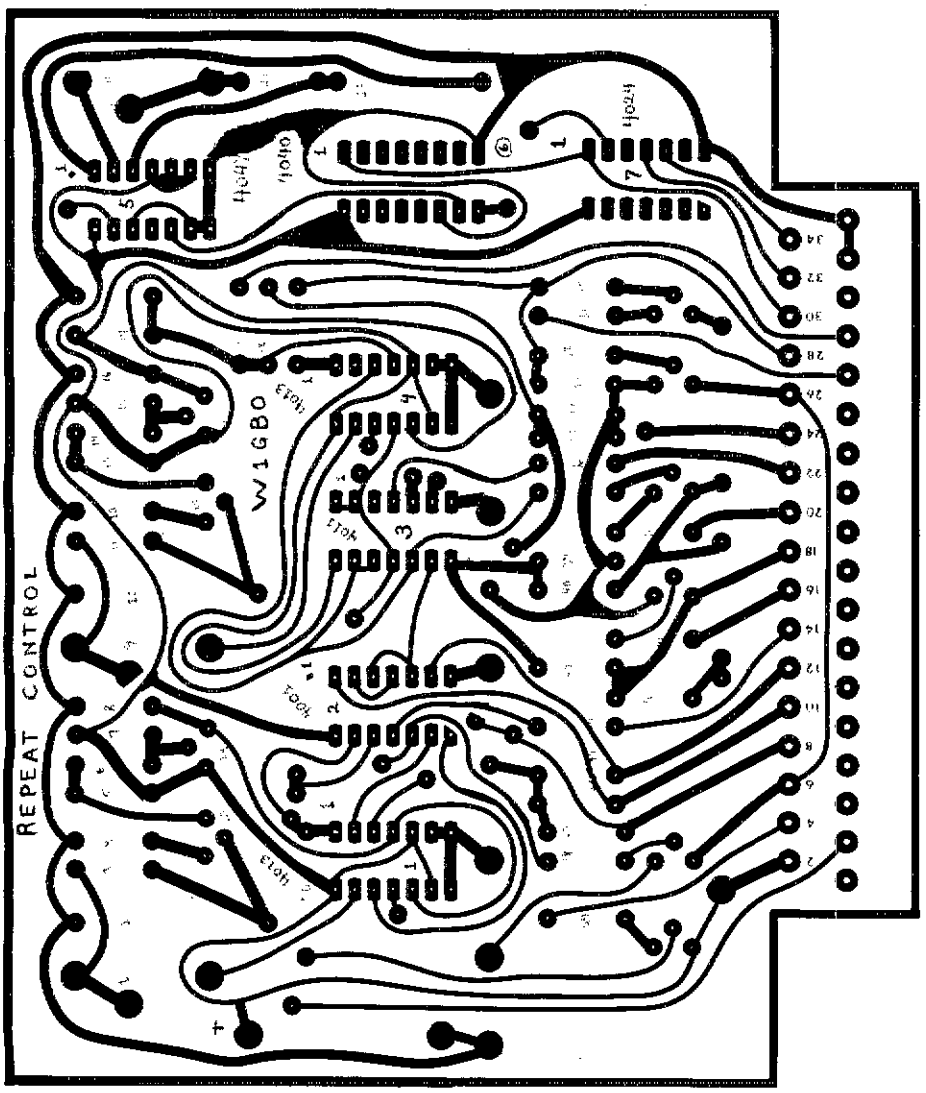
Because of the popularity of the K2BLA keyboard (January 1978 *QST*), I wish to share these circuit modifications which I acquired mainly from the cw gang on 40 meters. The schematic drawing A is for automatic character repeat. For operators who prefer closer character spacing, the RC values can be changed to 10 kΩ and 200 to 400 pF. Diagram B is for transistor keying of grid-block keyed rigs. Included in this circuit is a means of weight control. Note that a connection is made to U11D instead of U14B. UXA and UXB may be any one of several AND, NAND, OR, NOR gates or inverters. The output transistor must have suitable voltage and current rating. Rotation of the weight control to minimum resistance effectively eliminates the function of the weight control.

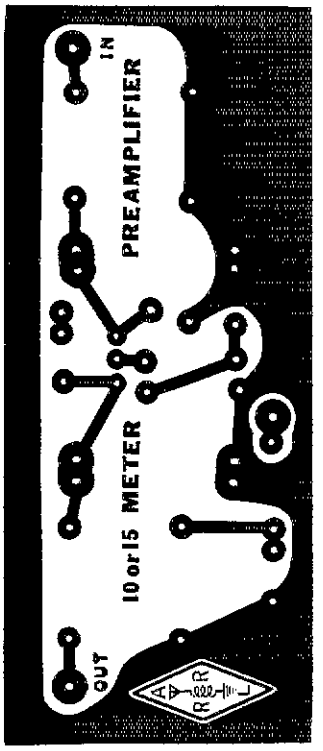
One problem I've yet to resolve is the erratic behavior of the clock oscillator at some values of resistance. The memory keyer described in February 1978 *QST* apparently has the same peculiarity. I shall appreciate any suggestions concerning this problem. — *Brian Alsop, K3KO*

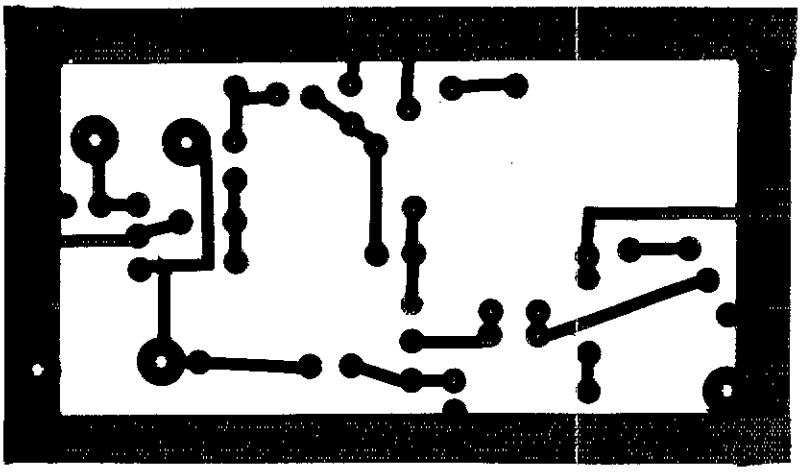
Modifications of the K2BLA keyboard (*QST* for January 1978). Diagram A is for automatic character repeat. Diagram B illustrates a method for weight control and also accommodates transistor keying of grid-block transmitters.



Circuit-board etching pattens for projects in this issue. All boards are single-sided. Black represents copper. The patterns are shown at actual size from the foil side of the boards. Upper left, the pattern for the CMOS Control Circuit for Repeaters (see Fig. 3, page 18). Upper right, the pattern for JFET "Soup" for Tired Receivers (Fig. 2, page 20), and bottom, the pattern for the Simple 10- and 15-Meter Converter (Fig. 2, page 22.)

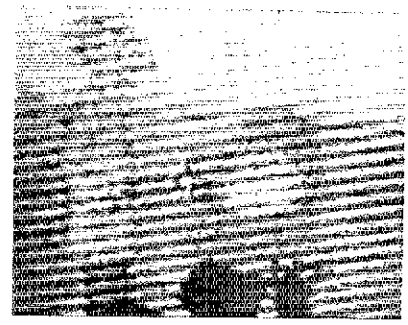






Hams Can Influence FCC's RFI Inquiry

Here's our chance to tell FCC why radio frequency interference is a major — and ever-growing — problem.



If you've read this month's editorial, you know that FCC is conducting an Inquiry into the thorny problem of radio frequency interference (RFI). To attempt to "further define the extent, nature and economics of the problem, and interest," FCC has published 107 questions covering the RFI problem from the perspective of consumers, equipment manufacturers, economics, the government and engineering. Due to the magnitude and importance of the RFI problem, we have reproduced all of the Commission's questions in their original form.

FCC clearly does not expect each person responding to answer all 107 questions. You may answer one, a few, several or all of them. The important thing is to let FCC know how you view the RFI problem.

Table 1 presents additional questions, written from the perspective of the Amateur Radio operator. These, and any others that you feel are relevant, may also be answered. The format and other information on submitting comments are given in Table 2.

While Congress once again debates RFI bills, FCC has decided to launch its own investigation. It is up to each of us to do all we can to see that the Commission hears the views of Amateur Radio operators. Send the Commission your comments and suggestions at your earliest convenience.

Consumer Issues

The FCC recognizes the problem encountered by consumers in dealing with interference to their home electronic equipment (TVs, radios, stereos, telephone, and electronic organs, etc.). We consider it critical that consumers comment on this inquiry, and, therefore, we seek answers to the following.

☐ How serious is the problem of interference to consumers?

☐ What do consumers know about the technical reasons for interference and common solutions to the problem?

☐ Are consumers aware that interference may be caused by deficiencies in receiver and other home entertainment design, rather than by deficiencies in transmitter design?

☐ What information is presently available to consumers about interference and where is it obtained?

☐ Is better or more technical information about interference desired by consumers?

If so, how much are consumers willing to pay for this information?

☐ Can consumers or consumer groups test equipment for susceptibility to interference, and would it be feasible to devise simple tests for the consumer to do this?

☐ How significant a factor is interference for consumers when purchasing a TV, radio, stereo, etc.?

☐ Would consumers prefer:

Equipment manufactured to be less susceptible to interference prior to purchase, or

To be provided add-on filtering devices after purchase of equipment if equipment does receive interference? (It must be understood that correction after manufacturing may be more costly and may or may not be effective.)

☐ Would consumers be willing to accept increased costs for equipment manufactured with less susceptibility to interference?

☐ For consumers who have equipment already receiving interference from a transmitter (CB, Amateur, etc.), were filters added to their equipment, and if so, did the filters resolve the problem?

☐ Was information received on how to install filters and was it adequate?

Table 1

Other Questions You Might Answer

In responding to the Commission's Inquiry, you are not restricted to answering only the questions the FCC asks. Here are some questions that do not appear in the text of the Commission's document, but which amateurs are uniquely qualified to answer. Perhaps you can think of others.

Is RFI a problem that FCC should deal with quickly and in a forthright manner?

As a licensee of the FCC, have you ever voluntarily curtailed your operating in some way due to the presence of rf-susceptible equipment in your vicinity? For example, have you ever restricted your operation to certain hours, reduced power, or gone off the air completely?

☐ Is entertainment equipment in your own home susceptible to radio frequency interference? How have you dealt with the problem? Have you resolved it? What types of cures did you use? What did it cost?

☐ Have you assisted your neighbors or others in solving interference problems? What experiences have you had? What cooperation did you or your neighbors receive from manufacturers of home-entertainment equipment? What costs were involved? Were you satisfied? Was your neighbor satisfied?

☐ Have you ever been accused by neighbors of causing RFI to their home-entertainment devices? If so, what measures were taken to resolve the problem? What was the cause of the problem?

☐ What should be done to curtail the problem, one that has reached monumental proportions since the CB boom began? Should Congress grant authority to FCC to improve interference immunity in home-entertainment devices? Or should such devices contain a label that indicates interference immunity, under a voluntary program administered by manufacturers?

☐ What information do consumers feel they need in order to make an intelligent decision about products and their potential susceptibility to interference?

☐ Would consumers prefer voluntary solutions from manufacturers versus government mandated solutions or no change?

☐ To what extent have consumers been involved in other consumer-oriented, voluntary or government programs (e.g., the labeling of the energy efficiency of air conditioners) and how successful have these programs been?

Table 2

How To Respond to the RFI Inquiry

1) Be sure the docket number (General Docket No. 78-369) appears at the top of the first page.

2) Label your responses so that it will be clear which questions are being answered. If your comments are not related to a specific question, please state the issue being addressed.

3) Submit an original and five copies, 12 copies if you wish each Commissioner to have a personal copy of your comments.

4) Mail to the Secretary, FCC, Washington, DC 20554. The deadline is May 1, 1979.

Equipment Manufacturing Issues

Manufacturers of equipment (transmitting and receiving) will clearly be deeply involved in commenting on any decisions proposed as a result of this inquiry. Therefore, we request comments on the following questions, and any additional information pertinent to this inquiry.

☐ How serious do manufacturers consider radio frequency interference to home electronic equipment and is it a serious enough problem to warrant government intervention or implementation of a self-regulatory program?

☐ What would be advantages, disadvantages, of:

A government regulated program?

A self-regulated program?

☐ Should any regulatory program *prescribe specific* components and equipment design which would be required to be incorporated in the product to eliminate interference?

Alternatively, should any regulatory program only prescribe general levels of immunity to interference?

☐ What would be the costs* involved in administering:

A government regulated program?

Explicit technical standards?

Information on immunity to interference?

A self-regulated program?

☐ What would be the relationship between improved interference immunity, equipment performance and equipment costs?

☐ Are there any current self-regulatory programs (such as labeling) that can be adapted to the consumer electronics area? If so, how effective have these programs been?

☐ To what extent would government intervention affect:

Diversity of equipment supply?

Other aspects of the industry structure?

☐ What equipment design methods are currently used for providing equipment with immunity to interference?

To what extent are they effective?

What are the costs to provide this immunity?

Are costs volume dependent or volume independent?

What performance features were affected, if any?

☐ Did the marketplace influence the decision to incorporate immunity features and to what extent?

Do product advertisements feature interference immunity design as a selling feature?

If so, does this influence consumer purchasing decisions and to what extent?

☐ What other measures should be taken to provide effective electromagnetic shielding?

☐ Would manufacturers prefer:

To provide consumers with adequate information about the level of immunity to interference of their equipment?

Equipment to be manufactured with less susceptibility to RF interference?

To provide consumers with adequate add-on devices after purchase of equipment?

☐ What are the relative merits of design solutions incorporated at the time of manufacture versus modifications after point of sale?

☐ To what extent have current retrofit solutions, such as filters, been successful in eliminating interference?

☐ If interference immunity designs are incorporated into equipment, what performance features might suffer?

☐ Do manufacturers presently have any interference awareness programs?

General consumer awareness programs which might serve as a model for an interference awareness program?

What are costs and benefits of such consumer awareness programs?

☐ If all newly manufactured electronic equipment were required to be immune to interference after some specific date, how long would it take until these new pieces of equipment became a significantly large part of equipment in use in the marketplace?

Economic Issues

We feel it is critical that the economic issues be considered in this inquiry. We would hope to receive responses specifically directed to the following questions, as well as other portions of the inquiry, from industry, government, consumers and the general public.

☐ What cost impact would there be in implementing:

A self-regulated program?

A government regulated program? (Taking into account such items as establishing standards, testing, enforcing regulations, administrative costs.)

A program requiring the provision of information?

A program requiring specific levels of interference immunity?

A program requiring specific electronic circuits?

☐ Based on current, similar programs, what costs are involved in disseminating consumer information by both government and non-government groups?

☐ What economic impact might be expected to the equipment manufacturing industry if:

A self-regulated program were implemented?

A government regulated program were implemented?

☐ If increased costs are incurred through self-regulated or government regulated programs:

Who should "pay" for increased costs?

How should any increased costs be apportioned between receiving/transmitting device owners, transmitting/receiving device manufacturers, government, retailers, wholesalers, or any others involved in the manufacture, distribution and sale chain of receiving/transmitting equipment?

What method of cost apportionment is more or less economically efficient than others?

☐ Would any competitive advantages accrue to a particular group under a:

Self-regulated program?

Government regulated program?

☐ What additional equipment manufacturing costs could be expected?

Would they be volume dependent or volume independent?

☐ What is the cost and availability of testing and measuring electronic equipment for susceptibility to electromagnetic interference?

☐ What impact will alternative regulatory programs have upon:

Diversity of equipment supply?

Competition in the electronic equipment manufacturing industry?

Other aspects of industry structure?

Rate of innovation and technological change in the industry?

☐ Is it more economically efficient to manufacture all equipment to be immune to interference, thereby imposing unneeded costs on consumers who are not troubled by interference, or to impose relatively higher costs only on those

*These costs might include completing registration forms or other paperwork, testing for compliance, or other administrative costs.

consumers who are directly troubled by interference?

Government

We are seeking the advice and assistance of other government agencies charged with consumer protection responsibilities. In particular, we seek the views of the Federal Trade Commission, Department of Commerce, Department of Health, Education and Welfare, the Environmental Protection Agency and state and local consumer agencies on the question of consumer protection standardization and testing discussed in this inquiry. We particularly seek answers to the following questions:

☐ Has any other government agency implemented a similar consumer-oriented, self-regulated program or government regulated program?

How successful have the programs been?

How costly were those programs to operate?

What incentives were offered to implement any self-regulated program?

Would these incentives depend upon a particular group being assigned program management responsibility?

What factors were considered by the agency to decide between self-regulation and government regulation?

☐ Should any voluntary, self-regulated program be monitored by some government agency and to what extent?

☐ Do other government agencies have overlapping jurisdiction in this area?

☐ What types of inter-agency cooperative arrangements would this require?

☐ What assistance can be provided by other government agencies in modeling a testing procedure to determine equipment susceptibility to RF interference?

☐ Are there on-going government consumer awareness programs that might be adapted to a program to deal with radio frequency interference?

☐ What costs might accrue to government, consumers, manufacturers and others from any consumer awareness proposals?

☐ Do other consumer protection laws provide possible alternatives for assisting consumers in resolving the interference problem? (Laws such as "Truth in Labeling" and others.)

To what extent can these consumer protection laws be used to monitor an industry self-regulatory approach?

Engineering Issues

Any program adopted as a result of this inquiry will succeed only if it is technically sound. Therefore, we seek answers to the questions listed below regarding the electromagnetic environment. We request information and comments to enable us to examine this problem from many views, and any responses should not be thought of as limited to these questions.

☐ How may we characterize the radio frequency environment? (A bulletin describing the radio environment and established "immunity grades" in Canada is attached as Appendix A.* Would a similar plan serve the interest of the U.S. public? If so, to what extent?)

☐ Should the FCC or another agency/group have the responsibility for modeling or determining the environment?

☐ What type of electronic equipment should be included in any plan evolved from this inquiry?

☐ Should the environment be characterized differently for different types of electronic equipment?

How can this be accomplished?

☐ Is measurement of the environment necessary?

What should be the complexity of such measurements?

What methods of measurement should be considered?

What different measurement methods would be needed for different types of equipment?

☐ What measurement data are there presently available which would be appropriate to this inquiry? (Although data may already have been informally submitted to the Commission, such data should still be filed with comments to this inquiry.)

☐ What will be the costs of these measurements? (This should be in terms of both initial capital outlay and continuing operating costs.)

☐ What problems might be expected with measurement reliability and repeatability?

☐ What means should be used to determine the environment? What agency or group, in addition to the FCC, should be involved in the effort?

☐ Would severity and probability of interference be confined to certain geographic and operational areas? If so, where might these areas be?

☐ What types of measurement and testing procedures now exist?

What others might be necessary?

☐ What special problems might be caused by the cumulative effect of many transmitter signals arriving at a single electronic device?

☐ What technical methods now exist to protect electronic equipment from interference?

Can interference rejection features be maintained or improved without hindering equipment performance or future innovations?

☐ What are the advantages and disadvantages of initial design versus retrofit?

☐ What are the advantages and disadvantages of requiring explicit electronic designs vs. requiring explicit levels of immunity from interference?

☐ To what extent would designs which increase the level of immunity to interference affect other performance characteristics of electronic entertainment equipment and the possibility of future technological changes and improvements in equipment design?

Information on Comments

Who should file comments? We urge consumers, equipment manufacturers, service technicians, government agencies, economists, engineers, licensees, and all other interested parties to participate in this inquiry. You may participate by sending information and opinions that are relevant to the questions listed in this Inquiry.

How will this information be used? The comments we receive will be used to evaluate the issues we have discussed above. The FCC will take action as appropriate after all interested parties are given an adequate opportunity to comment.

How comments should be prepared. Your comments must clearly show this docket number "General Docket No. 78-369," at the top of the first page. Please label your response so that it will be clear which question is being answered. If your comments are general, and not related to a specific question, please state the issue being addressed.

How many copies should be sent. Section 1.419 of the Rules requires that you file the original and five copies of your comments. If you want each Commissioner to receive a personal copy of your comments, you should include seven additional copies. The FCC will fully consider all comments.

Where to send comments. Send your comments to: Secretary, Federal Communications Commission, Washington, D.C. 20554.

How to see the comments of other parties. All comments will be available for public inspection in the FCC Dockets Reference Room, Room 239, 1919 M St., N.W., Washington, D.C. The FCC is open weekdays between 8:00 and 5:30 p.m. You can reply to comments submitted by another party by following the same procedure as you do for commenting.

Deadline for filing comments. Comments must be received by May 1, 1979. Replies to comments must be received by July 1, 1979.

*Appendix A is an advisory bulletin published by Canada's Department of Communications which describes the radio environment which may be encountered in typical Canadian urban and suburban communities, so that electrical and electronic equipment may be designed and manufactured which will meet its performance objectives in this environment. It is too lengthy to reproduce here. Readers may receive a copy by writing "DOC Advisory Bulletin," ARRL, Newington, CT 06111. S.a.s.e. please.

ARES and You

It is surprising how many amateurs have never heard of ARES, the Amateur Radio Emergency Service. It now boasts an estimated 60,000 members in the U.S. and Canada, and figures to grow rapidly. Shouldn't you be a part of it?

By George Hart*, W1NJM

Many hams agree that the fortunes and future of Amateur Radio are based primarily on the extent of public service we have rendered and *can* render. But just what *is* public service, anyway? Usually, emergency communication is the first thing that comes to mind. Traffic-handling may be the second. And there the progression usually stops.

Actually, there are many more things that make Amateur Radio valuable as a national resource, but we don't intend to go into them here. This article is about our own emergency communications organization, the Amateur Radio Emergency Service (ARES).

How It All Started

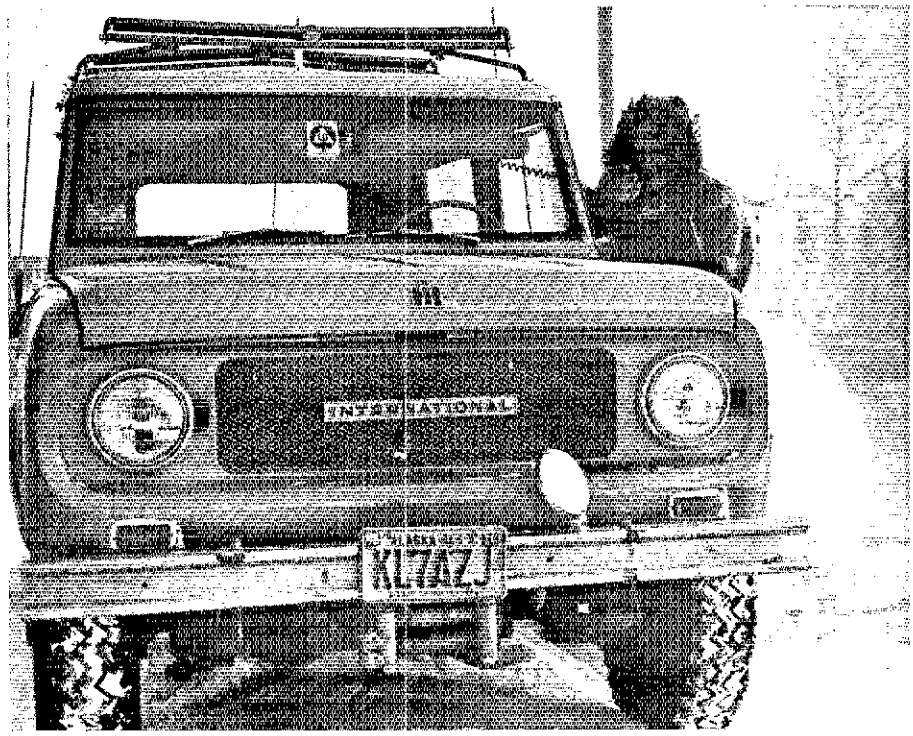
The first recorded instance of Amateur Radio emergency communication was in 1913. From that first, incomplete, record[1] we have data on a great deal of amateur participation in emergencies through the pre-World War I years, the roaring twenties and the early depression years. In those early days, emergency work was spontaneous and usually without previous organization of any kind. The need existed and the amateurs were available, so they went to work with whatever they had. This included very little in the way of what was then modern equipment, but a great deal in the way of skill, ingenuity and enthusiasm. These latter attributes carried us through a "proving" period during which amateurs gradually, without realizing it, attained a reputation for being able to supply communications, even under the most difficult circumstances.

The ARRL Emergency Corps

It may seem surprising, in retrospect, that not until over 20 years after the first recorded amateur participation in an emergency did the League make its first serious attempt at nationwide organization. But things were vastly different then. The public was not used to instant communication, and did not take it for granted as now. "Amateurs to the rescue" was top news then, and the more spontaneous the more newsworthy. It took a long time for the realization to seep through that as well as we were doing, we could do better with proper organization. So Communications Manager F. E. Handy, W1BDI, formed the ARRL Emergency Corps.

The first announcement, in September 1935 *QST*, merely asked amateurs interested in making themselves and their

An active ARES group has chalked up an impressive list of accomplishments in Alaska, where an experienced and dedicated emergency-preparedness team has been put to good use on many occasions. *(photo by KL7CFX)*



*Former Communications Manager, ARRL

[1]"In March, 1913 . . . amateur stations successfully bridged the communications gap surrounding a large isolated area left by a severe windstorm in the Middle West." — Clinton B. DeSoto, *Two Hundred Meters and Down*, ARRL, 1936.

They Served with Distinction

Nearly all the "charter members" of the "ARRL Emergency Corps" (1935) have since achieved some fame in the annals of ARRL history. Here is the roster:

Basil Cutting, W1APK (now W1JB, NH)
F. E. Handy, W1BDI (retired ARRL Communications Mgr.)
Paul Stumpf, W3AQN (York, PA)
Don Wallace, W6AM (former SCM Los Angeles)
Kendall Speer, W8OFO (former WPA SCM)

Gone, but not forgotten, are the following:

Phil Gildersleeve, W1CJD (*QST*'s famed cartoonist)
Eppa Darne, W3BWT (former MD-DE-DC SCM)
Paul LeVan, W3MG (Carlisle, PA)
Brad Martin, W3QV (former Atlantic Division director)
Hugh Caveness, W4DW (former Roanoke Division director)
Mike Caveney, VE3GG (beloved Ontarion)

equipment available for emergencies to sign up at Headquarters. We would then know whom to contact to get in there and pitch when an emergency occurred. Absurdly simple, but not absurd — not to the hundreds of amateurs who first signed up in the AEC. A list that appeared in March 1936 *QST* noted that there were then 136 members.

Once rolling, the organization grew like a healthy young weed. There was plenty of awareness, back then, of the need for amateurs in emergencies. Local emergency coordinators were appointed to take the lead in organizing the amateurs at city or county levels. During World War II, with Amateur Radio shut down, this structure was maintained. AEC was promptly reactivated after the war, and was soon renamed the Amateur Radio Emergency Corps. Section emergency coordinators (SECs) and then a Headquarters-based National Emergency Coordinator were appointed. A late-sixties reorganization wiped out NEC for a more descriptive title, but it died hard.

Our Existing Organization

It seems a shame to dispose of 40 years of Emergency Service history in a few lines, but suffice it to say that a lot of water flowed under a lot of organizational and activity bridges during that period.

The current name of our emergency-preparedness organization is the Amateur Radio Emergency Service (ARES). It is one of two principal parts of the Amateur Radio Public Service Corps (ARPSC), the other one being the National Traffic System (NTS). A third part of ARPSC is the Radio Amateur Civil Emergency Service (RACES), but since ARRL does not sponsor or administer it, the connection is nominal only, as are all the amateur emergency organizations which perform emergency services but are not directly a part of ARES. Fig. 1 attempts to delineate the distinction.

ARES purports to be tight enough to adhere to organizational concepts but loose enough to be flexible in the type of service it performs. This is not an easy combination, and not too many ARES units fully achieve it — but it's worth striving for. The key leader is the local Emergency Coordinator. This individual must be a League member and a licensed amateur of Technician class or higher, and possess leadership qualities. Over the years we have had some truly outstanding leaders at this critical local level, but we can always use more. The EC is appointed by the SCM, usually at the recommendation of the SEC, who coordinates all emergency planning throughout the section. When we say that the EC is the key person, we don't mean that he is the only ARES leadership official, or even necessarily the most important. What we mean is that most emergencies originate at the local level and the EC is usually the first to experience contact with them. His job is at the "grass-roots" level, where the dirty work gets done. The SEC and the Headquarters specialist are more at the pre-emergency planning level, although the EC is involved in these aspects as well. The SEC may also become involved in actual emergency work.

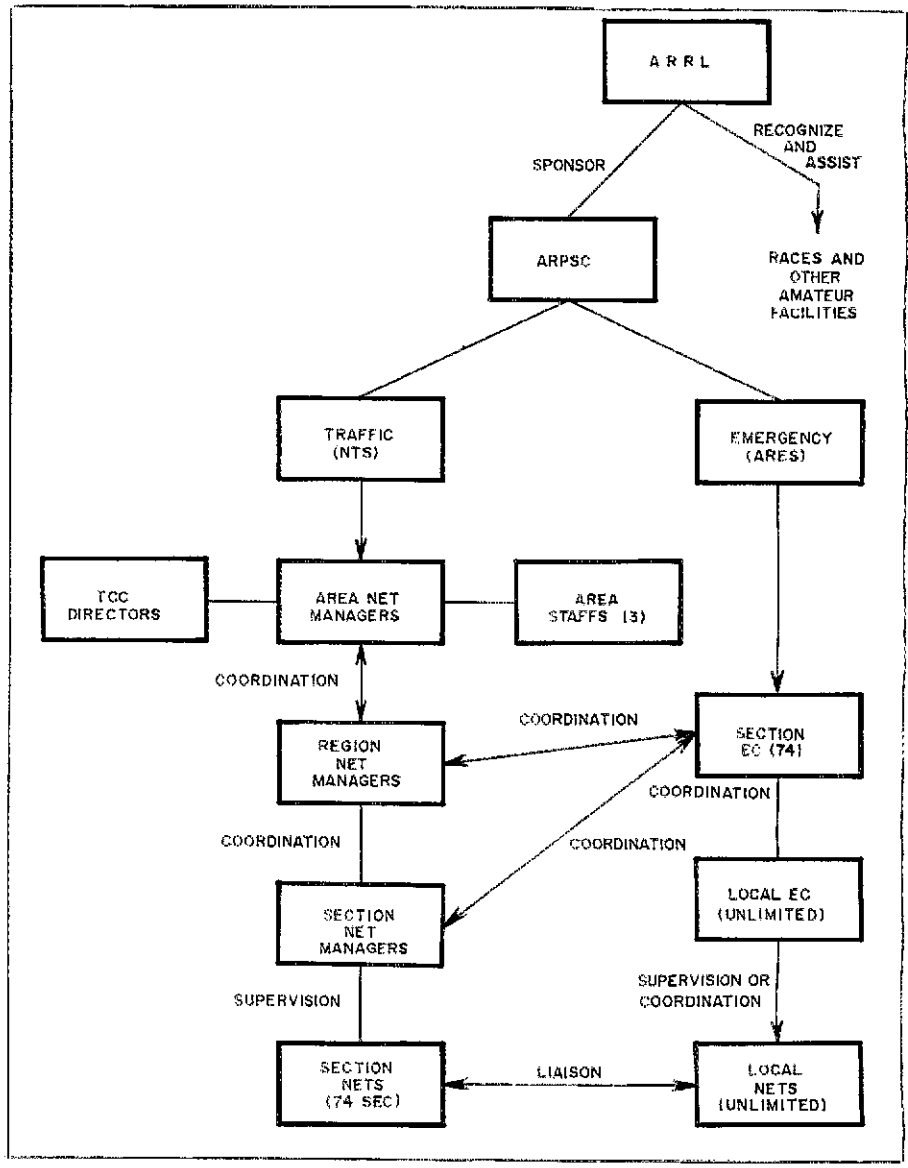


Fig. 1 — ARPSC organizational diagram.

Do you begin to see what we mean by flexibility? A loose organization is a flexible one, and this is good; but a too-flexibile organization is not really an organization at all, and this is bad. The trick is to effect the proper balance between tightness and flexibility for a practical application of emergency operation. ARES leaders may plan their heads off, but they are still never certain just what kind of emergency situation they are going to have to face when the chips are down.

The EC, then, is the local leader and is the one to look to. Since all ARES officials are volunteers, there may not be an EC with jurisdiction over every neck of the woods, so you may feel left out in the cold. Someone has to step forward to take

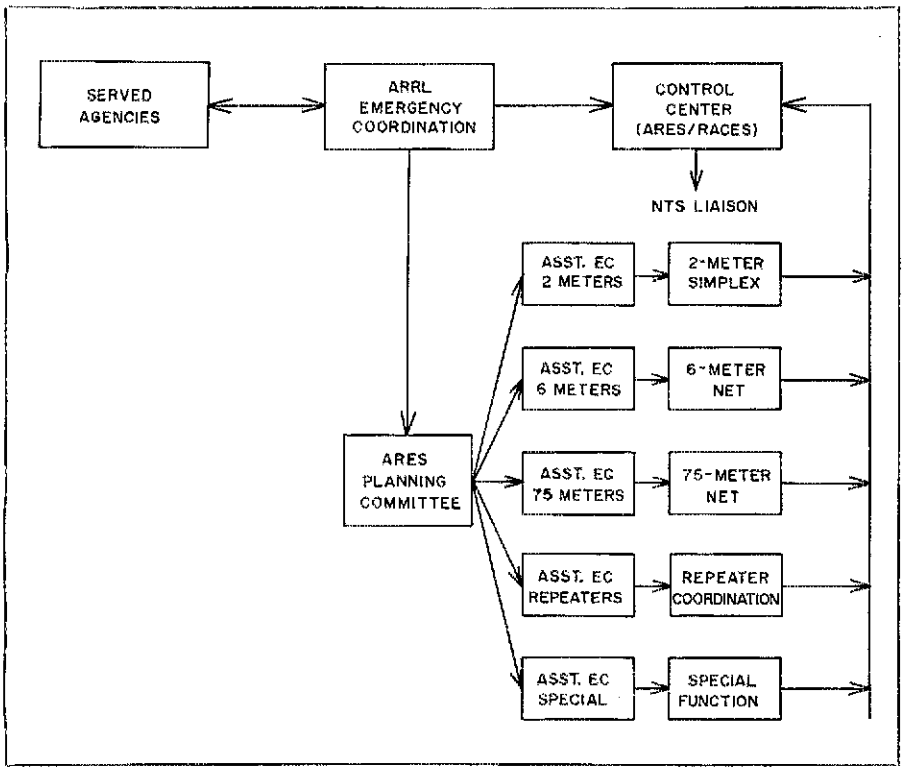


Fig. 2 — Your local ARES plan may be some variation of this chart, which shows a typical operational plan for a medium-sized city. The Control Center may be the local c.d. Emergency Operating Center or, if there is none, it can be one set up specifically by and for ARES. Assistant ECs can be designated by the EC for any purpose. The EC and his assistants constitute the ARES Planning Committee. Note that Assistant EC is not an SCM appointment; thus, a non-ARRL member can serve in this capacity. Served agencies could include the Red Cross, c.d., Salvation Army, Weather Service, public safety, utilities, radio and TV stations, newspapers, local industry, and other local organizations.

Why Be an EC?

Some years ago we got up a form which received the label "Form 34" (now CD-156) and was entitled "Application for Emergency Coordinator Appointment." One of the questions asked applicants was, "Why do you want to become Emergency Coordinator?"

We have often wondered how applicants for EC appointment answered this question. Since the completed applications go to the SCM for his consideration, we at Headquarters never see them. Consequently, we were intrigued with a bit in a recent Western Pa. AREC bulletin put out by SEC K3KMO commenting specifically on some of the answers he received. They are quite revealing of the type of amateur applying for this appointment.

"The fellow whose answer really warmed my heart," says K3KMO, "was the one who said, simply, '*Somebody* should be EC.' Obviously a little reluctant, perhaps not sure he's the best man for the job, maybe not having enough time to do the job to the best of his ability. But *somebody* should do the job. Amen."

In every group of amateurs, even a small one, there is always at least one who has the requisite leadership abilities, or at least some of them. But it appears that all too often the amateurs with the ability to do the job are too tied up in other pursuits to take it on. Everybody in the county nods solemnly when the question of the desirability of a public service program is brought up. But when it comes to *setting* it up, most of them are inclined to run and hide.

So we appreciate the amateur who says, "*Someone* has to be EC" and sends in his application. He knows it's not an easy job, he doesn't really have time for it any more than you do, and Joe down the street would make a better EC. But if no one else will do it . . . (From November 1966 *QST*.)

the lead or the job just doesn't get done. If you don't know who your EC is, chances are you don't have one. If you are qualified, why not consider taking the job yourself? Otherwise, you can still fill out an ARES registration form (CD-98) and send it in to Headquarters. We will forward it to your EC if you have one, and he will contact you or issue you an ARES registration i-d card. If there is no EC, we send the form to your SEC, who issues you an ARES registration card and keeps your form on file for future reference. Sooner or later there is going to be an EC appointed to cover your location; that individual will inherit the form and know of your availability.

Registration Versus Appointment

Anybody with an amateur license can register in ARES; no licensed amateur is excluded. Naturally, we'd like you to belong to ARRL, but better that you are signed up as a nonmember than not signed up at all. If you are a League member, however, you are eligible for Official Emergency Station (OES) appointment. No, it is not automatic. OES is an individual-level standard ARRL SCM appointment signifying performance of emergency operating preparedness and functions above and beyond merely making yourself available by signing up. An OES, for example, must be familiar with ARRL message form, must have emergency-power capability on two or more bands, must be a *regular* participant in local ARES doings — and must be recommended for appointment by your local EC or the SEC to the SCM. Getting an OES appointment isn't just a matter of an ARES registrant becoming a League member. An OES is an example setter.

Is It Fun?

We learned a long time ago that you don't get participation in a program by stressing that it's a duty and responsibility. That kind of approach drives prospects away in droves. It *is* a duty and responsibility, all right, and something you owe to yourself if you value your amateur frequencies and want the respect of officialdom and the general public. It is also a source of pride, a generator of a sense of high self-satisfaction, and an *honor* to be associated with the organization that handles it.

But, you ask, is it *fun*? Well, fun is when, where and if you find it. In the sense of idle amusement, certainly not. If that's what you are looking for, ARES is not for you. In the sense of feeling that you are doing something worthwhile, something that will instill in you and your compatriots a feeling of pride in yourselves and in each other, there is no better fun, no bigger thrill.

So don't be one who breaks into an emergency operation and says, "I'd like to help; just tell me what to do (and how to do it)." Be part of the group that finds out how to do it before the emergency occurs.

Sign up in ARES — now! QST

Strays

NJ COUNTY AWARD

☐ Those who work seven New Jersey counties are eligible for the NJ County Award. A seal is issued for each additional group of seven, to total 21 counties. Send log information (repeater contacts don't count), $1, and two 15-cent stamps to Wally Eichorn, K2CYX, JSARS Awards Chairman, 105 Seaside Pl., Sea Girt, NJ 08750.

Saturday Morning Follies

Upgrading can be painless — but it's usually far from it! One ham's story follows.

By Dennis J. McMahon,* WA7KYC

It was a nice touch. Lifesavers — little blue packages of three placed at neat intervals at all the tables, each imprinted "Washington Plaza Hotel."

But they were the kind I don't like — peppermint — and anyway, I hadn't come down here at 8:30 on a Saturday morning just for Lifesavers. After being a Technician class licensee for eight years, and having my goal of operating on the lower bands interrupted by such minor distractions as developing a career, getting married, raising a child and buying a house, I had finally returned to a regimen of reviewing radio theory and pushing my code speed up to — and past — that magic 13 wpm. The theory wasn't too much of a problem. After all, when you read the same material covered differently by three or four authors, it's bound to sink in. But the code was a different matter. I never really enjoyed pounding on that old brass key my Dad gave me and I liked copying all those dits and dahs even less. It took a certain amount of resolve just to reach 5 wpm for my Technician exam. Although it wasn't too hard to send at 13, I thought I'd never copy solid beyond 10. But after the FCC let us Technicians down into the Novice segments for a taste of the real thing, I was convinced that someone out there was trying to help me. After gaining enough on-the-air experience with my HW-16 and religiously listening to my cassette code-practice tape every evening for 20 to 30 minutes, I finally felt pretty comfortable at 14 wpm.

Then it came in the mail (along with two bills and three ads): an announcement of the Sea-Q-DX Convention here in Seattle. It was down at the bottom of the sheet, after all the bold print about the seminars, displays and dinners — "FCC will conduct exams, Washington Plaza Hotel, Saturday morning . . ."

"Fine," I thought. "If I can really stress the code and review the *License Manual* for the next three weeks, I'll take the test and see what happens." Otherwise, I'd have to get away from work some Friday for the exam. Besides, the FCC isn't even charging exam fees. Not yet, anyway. "So even if I blow it, it can only cost me some hurt pride and a 30-day wait," I figured.

Waiting Is Nerve-racking

So there we all sat — some finishing the form 610 — others nervously fidgeting with the sharp FCC pencils or making quiet wisecracks about those Lifesavers. Up in the front of the room, a pleasant

*6919 190th St. S.W., Lynnwood, WA 98036

little gray-haired lady who could be anybody's grandmother guarded a table strewn with forms, exam booklets, answer sheets, pens and pencils. Bouncing around her was the middle-aged FCC examiner, methodically arranging a cassette player, directing last-minute stragglers, and periodically consulting his wristwatch. Mild-mannered and somewhat less than tall, he reminded me of Elmer Fudd in a gray suit.

Finally, all the preliminaries were over. First, as usual, was the 20-wpm test. The examiner jockeyed the Extra Class candidates to a table up front. There were five of them — four old-timers and a relatively young one. All the rest of us — about 20 — suddenly became a captive audience, watching and listening. Expecially listening. An anonymous male voice on the cassette tape mechanically told us what we already knew: "This will be a test of your ability to copy international Morse code at 20 words per minute. There will be a one-minute practice . . ." And after the practice, "You will now hear the five-minute examination. There will be a series of six Vs, followed by the text. The text will end with the procedural symbol $\overline{AR}$. Good luck." (Nice of them to throw in that "Good luck," I thought.) As the blur of characters filled the room, some of us tried our hand at copying the ultimate speed; a few scribbled random letters on whatever was handy — an old envelope, the table — but most of us just listened for familiar sequences. There are the Vs. Say, this isn't bad! There's an L or was it an F? Some of us tried to close our ears and minds to all input, and concentrate intensely on the FCC pencils we'd been toying with for what seemed like hours now. We even began exploring the mysteries of the Lifesaver wrappers.

The five minutes seemed to drag on for five hours. Finally it was over, and the Extra Class aspirants relocated to a different table to answer their 10-question tests. If that five minutes was rough on them, it didn't show. They looked about as moved as the faces on Mount Rushmore. As they pored over their questions, Elmer Fudd called up all the candidates for the 13-wpm test. By this time the tension was hitting me in the stomach. I never got tense listening to that tape millions of times at home. Why now? Maybe one of these Lifesavers will help.

The Moment of Truth

All at once, there I was, listening to the same anonymous male voice. Wonder who that guy is. Yeah, I *know* this will be an FCC exam . . . let's get on with it! Wow! This pencil is slippery. Finally, the actual test starts. Well, at least I got the Vs right. When is this thing gonna end?

That was five minutes? It seemed like 35 seconds. The examiner herded us over to adjacent tables and carefully handed out the question sheets for this tape. Much to my delight, there was only one question of the 10 that I wasn't absolutely sure of. I thought that one over, made an educated guess, and handed in my sheet to granny. Suddenly, granny, who had been grading the 13-wpm tests, anxiously waved a pencil to get Elmer's attention. The two of them huddled and quietly whispered for a minute over the exam sheets. Something was wrong.

Finally, Elmer straightened up and said quite audibly, "Why, that *can't* be. That can't *be*." Someone up front had the nerve to ask, "What's wrong?" "Nobody passed that last exam! That can't *be*," he repeated. Everybody looked stunned. What was this, some kind of bad joke? Elmer stooped over the table once again to confirm granny's findings. The problem was obvious: Their answer sheet was the wrong one for this particular exam tape, and they couldn't find the right one. As the seconds ticked by in deafening silence, the examiner's only option became painfully apparent. "Could I have all the 13-word-per-minute people up here again?" he ordered. The herd migrated back to the same tables in a partial state of shock.

We Try Again

Maybe being half numb helped. Maybe just considering the first exam as a "dry run" helped. But the second one went better than the first. Predictably, the FCC had used something like a formula for the tapes, and had merely interchanged critical components of the text. Elmer stood close to the table as granny graded this second batch. More whispers; more huddles. We all sat rigidly at attention, hanging on every murmur. More trouble. Same results: no answers agreed.

"Well," said Elmer, scratching his thinning hair and looking at nobody in particular, "now we *do* have a problem." I could almost see tomorrow's headlines — "Riot At Washington Plaza Hotel — Two FCC Employees Missing."

After more paper shuffling and consultation, the sun finally began to shine — they found the right answer sheet for the second test, and the results began to make sense. We breathed a collective sigh of relief. Granny now started certifying that each of us had passed. Eight minutes and two Lifesavers later, it was my turn.

Almost Out of the Woods

As I picked up my Advanced theory exam, she was smiling, but not quite so brightly as before. I took my exam and answer sheet to an abandoned table and began to realize that I had the General ticket even if I handed in a blank answer sheet. That was a nice feeling, but before me was a means of going one step higher, so I let the euphoria wear off and dug in. No surprises here; the material covered was just as I expected. There are questions I nailed right away, those I had to think about to be sure, and a few that had me worried. But after taking my time (a recommended practice), reviewing the whole exam before submitting it (also a recommended practice), and sucking on three more Lifesavers, I took a deep breath and turned it in to granny.

I checked my watch — 11:30. "A.M. or P.M.?" I wondered to myself, but then I surmised there was still daylight outside. While granny started shuffling my papers, I went outside to the maze of hotel hallways to stretch my legs and find a water fountain; those Lifesavers hadn't helped my breath. I couldn't have been out more than five minutes. As I walked back into the room, granny motioned me over to the table. Two possibilities: I had forgotten to put my name on the answer sheet, or she was going to have me retake the entire exam because none of my answers agreed with her answer sheet.

"Youpassed. Pleasefilloutthisform-exceptintheboxontheright . . ."

"Youpassed?" I *passed*!

I frantically filled out her form and returned it to her. She waved her magic wand over the form and handed it right back to me, explaining that I was holding my interim license until my permanent one arrived from Gettysburg. "Read the instructions on the back," she advised, beaming as nicely as ever. "Thank you," I replied, which hardly seemed adequate for the occasion.

On the way home I bought some flowers for my wife, and some Lifesavers. The blue kind. QST

Are *You* Planning to Upgrade Soon?

Your ARRL headquarters has many services that will help to make your new license a reality. We can provide assistance with the ARRL *License Manual* that will give you a solid background on the topics your examination will cover for the Technician, General, Advanced or Amateur Extra Class license. Included are sample FCC-type practice exams, as well. The ARRL *Code Kit* will assist you in improving your Morse code proficiency, from 5 to 20 words-per-minute. Further cw practice can be obtained by listening to W1AW Code Practice and Bulletins. The code-practice texts are taken right from the pages of *QST*, so you can check your copy after the run is through. Not sure when W1AW is on? A schedule is printed in the "Operating News" column of *QST* each month.

Your Headquarters keeps a current list of the FCC's testing centers and exam schedules. We can inform you of the center closest to you and keep you posted on the latest hamfest and conventions that an FCC examiner will be visiting. The Club and Training Department at Headquarters can advise where you can join an upgrading class sponsored by an ARRL-affiliated club, often right in your vicinity. Do you need an FCC form 610 for your exam application? Send us a large (business-size) s.a.s.e., and we will get one right to you. Address your inquiries to ARRL, 225 Main Street, Newington, CT 06111. We will be pleased to assist in any way we can. — *Sandy Gerli, AC1Y*

ITU Lays Technical Foundation for WARC-79

Last October, 700 delegates from 85 countries gathered in Geneva for the CCIR Special Preparatory Meeting for WARC-79. The IARU was there for the Amateur Service.

By David Sumner,* K1ZZ

The ITU World Administrative Radio Conference (WARC-79) does not open until September 24 of this year. However, this date does not mark the beginning of WARC work. On the contrary, it will mark the culmination of up to six years of preparations by telecommunications administrations and by representatives of the various radio services, including the Amateur Service.

A good example of the preparations which are already being conducted within the ITU framework is the work of the International Radio Consultative Committee (abbreviated CCIR, to correspond to the French name). The CCIR is a permanent organ of the ITU, which can be said to comprise its technical expertise for radio. The CCIR carries out studies and prepares recommendations on technical and operating questions on an ongoing basis under the leadership of its director, Richard C. Kirby, WØLCT/HB9BOA. The technical experts who make up the CCIR are drawn from the telecommunications administrations of the ITU member-countries as well as from private operating agencies, industrial and scientific organizations, and international organizations. They are organized into Study Groups for about a dozen different topics. Most of the drafting and discussing of papers takes place at national and international meetings of the various Study Groups. There is a regular four-year cycle of meetings in which the work of the CCIR is conducted.

When a major Administrative Radio Conference such as WARC-79 comes along, however, the ITU Administrative Council usually asks the CCIR to deviate from its normal cycle of work and to sponsor a joint meeting of the Study Groups to assist the Conference in its work. In connection with WARC-79, the Administrative Council took this step in June 1977. Noting that WARC-79 would need to take account of technical advances, new services, more intensive use of the frequency spectrum and use of higher frequencies than presently used, and that a considerable amount of technical information would be required to ensure that the conference achieves the best results, the CCIR was invited to arrange a Special Preparatory Meeting (SPM) prior to the conference. The objective was to compose a comprehensive, self-contained report ". . . consisting of all technical information and conclusions considered by the SPM to be of importance to the work of the WARC; the report should be presented in a form consistent with the various items of the Agenda of the WARC" (Resolution 69 of the XIVth CCIR Plenary Assembly, Kyoto, 1978). The SPM was *not* to make specific proposals for revised or new allocations; this is a prerogative reserved for administrations at the WARC itself.

The SPM was scheduled for four weeks, October 23 to November 17, 1978, and occupied the same conference center in Geneva which will house WARC-79 (see photo, page 59, February 1979 *QST*). Because of the requirement that its report conform to the WARC Agenda, the SPM was not organized along the usual Study Group lines; instead, papers to be considered were organized by several topic areas, as listed in Table 1.

Table 1

Organization of the SPM by Committees Treating the Following Topic Areas:

A: Terminology
B: Terrestrial Services
C: Space Services and Space/Terrestrial Sharing
D: Monitoring and Identification
E: Services at Frequencies Above 40 GHz and Guidelines for Optimum Spectrum Utilization
F: Propagation
G: Resolutions and Recommendations from Past Administrative Radio Conferences
H: Editorial

Amateur Service Involvement

Until fairly recently, the Amateur Service was not included in the CCIR terms of reference. Especially where the Amateur Service occupied exclusive bands, there was little for the CCIR to study. After the 1971 WARC-Space conference, the Amateur-Satellite Service was added to the terms of reference of Study Group 2. Subsequent work in Study Group 2 established the feasibility of sharing between the Amateur-Satellite Service and nonamateur terrestrial services. The Amateur Service was added to the terms of reference of Study Group 8 at the Kyoto Plenary Assembly. This permitted papers dealing with "Preferred Bands for the Amateur Service" to be submitted for consideration at the SPM. Such papers were submitted by the administrations of Canada, the United States and Australia. The U.S. also submitted a similar paper for the Amateur-Satellite Service. While the papers differed in some respects, their general objective was the same: to establish a technical justification for new high-frequency amateur allocations, for continuation of present allocations, and for new satellite allocations in the microwave region. The papers were the result of hard work by many people, in particular Bob Eldridge, VE7BS, for Canada; members of U.S. CCIR Study Group 8, Ad Hoc 8E, convened by Jack Kelleher, W4ZC; and a similar group organized by the Wireless Institute of Australia, in particular its president, David Wardlaw, VK3ADW, and Michael Owen, VK3KI. The amateur contributions fell in

*Assistant Secretary, International Amateur Radio Union

topic areas B and C (Table 1).

While there are many amateurs active in the CCIR in their professional capacities, it was decided that the SPM was sufficiently important to justify attendance by representatives of the International Amateur Radio Union. The ARRL's chief WARC consultant, Merle Glunt, W3OKN, was present for the entire four-week session with IARU credentials and was assisted by two-week stints put in by this writer and by the secretary of the IARU Region 1 Division, Roy Stevens, G2BVN. The purpose of our attendance was to monitor the progress of the amateur contributions, to gain additional experience in ITU conference procedures, and to continue our ongoing efforts to establish rapport with conference delegates and ensure that they understand and appreciate the Amateur Service. While the SPM was in no official sense a mini-WARC, many delegates attended precisely because of its relation to WARC-79 and not because of any routine involvement in CCIR.

A highlight of the IARU reception at the SPM was the attendance by two delegates from the People's Republic of China, shown here being greeted by Merle Glunt, W3OKN (foreground) and David Sumner, K1ZZ (behind Merle). A great deal of information concerning the Amateur Service was sought by the Chinese delegation during the SPM. *(official ITU photo)*

Early Lessons

From the opening plenary assembly it was clear that things would move quickly. Eight committees were established along the lines of the pre-established topic areas. As soon as they met, the committees broke themselves into smaller subcommittees, and the subcommittees frequently found it desirable to split into even smaller working groups to treat specific subjects. Then, the working groups might create a drafting committee to put together a report along agreed-upon lines. As a result of this splitting, there were several dozen different groups which could conceivably have simultaneous meetings if the facilities would permit. As a practical matter there were seldom more than 15 groups meeting at once, but even at that it was an impossible task for a small delegation to keep track of what was going on. Even though the IARU group was concerned primarily with only four papers, at times different aspects of these papers were being considered in two meetings at once! That kept us hopping, but was good training for what is likely to occur in September. Fortunately, the IARU contingent will be several times as large at WARC-79.

Another lesson was that many delegates, even those who were not amateurs themselves, were sympathetic to the Amateur Service. Considering that the amateur contributions to the SPM were relatively minor in comparison with some others, the level of cooperation and interest displayed by everyone with whom we came into contact was quite remarkable. A comment which was made more than once was that if the Amateur Service representatives were doing anything wrong it was in trying to "sell" Amateur Radio too hard. Those who made this observation did not feel that an extensive justification of the Amateur Service was necessary — that its record was well known and spoke for itself. We did not necessarily agree with the comment, but it was reassuring to find that people were noticing our efforts!

IARU Reception

It has become traditional for a reception to be sponsored by the IARU during major ITU meetings and conferences. We could not invite all of the 700 delegates, but invitations were extended to the 85 heads of delegations and to those friends whom we could identify from the preliminary list of attendees. About 150 attended, which kept the fifth-floor ITU cafeteria buzzing with conversation for a couple of hours.

The attendance of two delegates from the People's Republic of China was especially gratifying inasmuch as this was the first IARU reception which was attended by members of this delegation. It is clear that the Amateur Service is regarded as a resource for technical training in China, and it is only a matter of time before it is re-established there, probably along the lines followed in Eastern Europe. Would-be DXpeditioners, please be patient! In the long run, the Amateur Service will be better off if China returns to the air with its own operators, as in Iraq.

Results of the SPM

The 600-page report of the SPM includes the essential points of the four amateur papers, thanks to the efforts of many of the 60-plus amateurs in attendance and nonham friends who are also too numerous to mention individually. A technical rationale for new bands in the vicinity of 10, 18 and 24 MHz is included, based upon propagation characteristics and the improved reliability of communication which additional bands would provide. The report also provides a justification for continuing the present allocations above 30 MHz, including those shared with the Radiolocation Service (mostly ground-based radars). Finally, and perhaps most important, the report builds on the work in Study Group 2 previously mentioned to show that sharing between the Amateur-Satellite Service and certain terrestrial services is feasible. This last feature of the report should be of significant help in gaining the much-needed microwave allocations for the Amateur-Satellite Service.

It is always dangerous to single out individuals for special mention where so many contributed to the common effort because some are bound to be overlooked, but the contributions of the following people should not go unrecognized: Dr. J. A. Saxton, past president of the Radio Society of Great Britain, who served as chairman of the SPM; Dr. Mirek Joachim, OK1WI, chairman of Committee A; Chuck Dorian, W3JPT; Osmo Koskenniemi, OH2KH; Tom Boe, LA7OF; Olof Lundberg, SMØCKV; John Serafin, W2QD; Herb Blaker, K4KDY; M. S. Aked, ZL2NG; Mirko Mandrino, YU1NQM; and William Borman of the U.S., chairman of subcommittee B-3, along with O. Langer of the Federal Republic of Germany, chairman of Working Group B-3-a, whose effectiveness helped smooth some difficult ground above 30 MHz. We look forward to working with many of these same fine people in September.

Happenings

Conducted By W. Dale Clift,* WA3NLO

Petition Filed to Allow Novices on 220 MHz

ARRL has filed a petition with FCC which, if adopted, would grant Novice class licensees access to the 220-MHz band. The League urges all to make their views known to the Commission by sending comments to the Secretary, Federal Communications Commission, Washington, DC 20554. The number of the petition would be at the top of the first page of your comments. [As *QST* went to press, FCC assigned the petition a rulemaking number, RM-3314. — Ed.]

The League's intention to file this petition was covered in "It Seems to Us" in November 1978 *QST*. For the benefit of all our members, this petition is printed below.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

Petition for Rulemaking

The American Radio Relay League, the national nonprofit organization of Amateur Radio operators and enthusiasts with more than 150,000 members in the United States, respectfully petitions the Federal Communications Commission to amend its rules so as to authorize Novice Class operators A1, A2, A3 and F3 privileges on the 220-225 MHz band, not to include stations in repeater or auxiliary operation, with a maximum power input of 50 watts. In support whereof, the following is respectfully submitted.

Background

On June 15, 1976 the Commission released its First Report and Order (FCC 76-537) in Docket 20282. This resulted in, among other things, the elimination of the mandatory 12-month period during which the former holder of an amateur license could obtain a Novice Class license. This made the Novice Class license "renewable upon reexamination." Thus, a Novice who did not upgrade his skills prior to expiration of his Novice Class license was not forced off the air for a period of time.

On April 6, 1978 the Commission released a Second Report and Order in Docket 20282 (FCC 78-212). This document extended the term of the Novice Class license from two to five years. It also made the Novice Class license renewable upon proper application; there was no longer a requirement to retake the Novice Class examination to retain the license.

The net result of the above actions by the Commission has been to change the character of the Novice Class license. Originally a one-year, one-time-only "learner's permit," the Novice license can now be held indefinitely. No longer is it necessary for the Novice licensee to increase his code speed and/or technical knowledge within a fixed period of time in order to retain his privileges. This is a change in the basic philosophy behind the Novice Class license, and suggests that a reexamination of the privileges conveyed by the license is in order.

The Commission by now is well aware of the unprecedented number of Amateur Radio training courses being offered by local radio clubs and educational institutions throughout the country. Many of the instructors of these courses use material supplied free of charge by the League. The League maintains close communication with the instructors so as to evaluate the effectiveness of the training material. These instructors have reported that the most significant obstacle to successful completion of the courses is that the students, most of whom are present or former CB operators, lack the motivation to study the Morse code for the sole purpose of obtaining a code-only license. Since they are using voice emission on CB, a code-only license does not provide an adequate bridge between the CB and amateur worlds. While these students are capable of learning the code, and have little difficulty mastering the theory and regulations required for the Novice license, the present privileges of the Novice license are simply not sufficiently attractive to someone already accustomed to voice operation.

In its original Notice of Proposed Rulemaking in Docket 20282 the Commission proposed the creation of a new class of code-free license, the Communicator, having the following operating privileges: 1) All amateur frequencies above 144 MHz; 2) F3 emission; 3) 250 watts input power. When it released the First Report and Order in Docket 20282 in June 1976 the Commission made reference to its heavy workload and indicated that further action would be taken as the workload permitted. No action was taken on the Communicator Class license at that time. The question of the Communicator Class license came before the Commission for discussion in July 1977, at which time the matter of the Commission's workload raised its head again. Consideration of the Communicator Class license was postponed again, and one major reason was the non-availability of the resources required to administer such a license.

Rationale for the League's Request

The League is aware that the establishment of an entirely new class of entry-level amateur license would require a significant commitment of the Commission's resources. However, the addition of new privileges to an existing class of license should be quite practicable. The League submits that the immediate granting to Novice Class licensees of certain privileges on the 220 MHz band would be consistent with the Commission's change in philosophy concerning the Novice Class license, would greatly increase the attractiveness of the Novice Class license, and would not complicate the Commission's administrative problems. Therefore, the League urges that this action be taken at the earliest possible date.

While wishing to make the Novice Class license more attractive to newcomers, the League does not wish to completely remove incentive for the Novice Class licensee to upgrade to a higher class license. Repeater operation is currently allowed on 144.5-145.5 MHz and 146.0-148.0 MHz. Operation in this area of the spectrum is widely regarded as the most desirable vhf privilege available. We feel that Novice Class licensees should not be granted operating privileges on the 2-meter band (144-148 MHz) lest they have no apparent incentive to improve their skills in order to obtain a higher class of license. Thus we are requesting 220 MHz privileges only, for the Novice Class license.

The League is requesting A1, A2, A3 and F3 privileges because it does not see the necessity of restricting any users of the 220 MHz band to any particular mode, such as F3. While F3 emission is simple and attractive, its effective communications range without repeaters cannot equal that of other modes — such as A1, A2 or A3 — using equal power. A restriction of mode privileges would not be in keeping with the Commission's deregulation policy. Furthermore, Novice users of this band who do not possess hf operating equipment should be permitted the use of A1 and A2 emissions for on-the-air code practice.

Before 1968, the Novice Class license conveyed voice privileges in the 145-147 MHz band. These privileges were discontinued because many of those Novices who operated voice did not invest sufficient time in studying for a higher grade of license, found themselves unable to upgrade at the end of their license term, and were forced out of Amateur Radio as a result. With the change in the Commission's philosophy behind the Novice license, this situation no longer exists. If the granting of voice privileges to Novice licensees necessitates the inclusion of material relating to voice techniques in the Novice written examination, the League deems the level of such questions in the pre-1968 examination to be entirely appropriate.

The League is requesting that the maximum permitted power for Novice Class operators on the 220 MHz band be 50 watts for several reasons. First, most amateurs now operating in the vhf bands use less power than 50 watts and have found that the resulting communications range is generally adequate. Second, the problems of television receiver front-end overload and electromagnetic compatibility (EMC) with home entertainment devices are largely power related. These are not simple problems even for experienced amateurs to solve and would be especially difficult for licensees with only a minimal knowledge of radio theory. Third, transmitting range at vhf is less dependent upon transmitter power than upon antenna height and gain characteristics. Finally, should a Novice Class licensee find that additional power is necessary to accomplish his objectives, it would provide a reason for him to improve his skills by working for a higher grade of license.

Summary

Implementation of the ARRL's proposals requires that only two minor modifications be made to the Commission's rules as follows (italicized portions to be added):

97.7(e) Novice Class. Radiotelegraphy in the frequency bands 3700-3750 kHz, 7100-7150 kHz (7050-7075 kHz when the terrestrial station location is not within Region 2), 21,100-21,200 kHz, and 28,100-28,200 kHz, using only Type A1 emission; *radiotelegraphy and radiotelephony in the frequency band 220-225 MHz using only Types A1, A2, A3 and F3 emission, not to include stations in repeater or auxiliary operation. This does not preclude the retransmission by stations in repeater operation of signals originating at Novice Class stations.*

97.67(d) In the frequency bands 3700-3750 kHz, 7100-7150 kHz (7050-7075 kHz when the terrestrial location of the station is not within Region 2), 21,100-21,200 kHz and 28,100-28,200 kHz, the power input to the transmitter final amplifying stage supplying radio frequency energy to the antenna shall not exceed 250 watts, exclusive of power for heating the cathode of vacuum tube(s). *In the frequency band 220-225 MHz Novice Class operators only are limited to a maximum of 50 watts to the transmitter final amplifying stage as described in this subsection.*

Conclusion

One of the stated purposes of the Amateur Radio Service is to expand "the existing reservoir within the Amateur Radio Service of trained operators, technicians and electronics experts." (97.1(d)) Adoption of the above modest change in the Commission's rules will make the present entry-level amateur license much more attractive, and will thereby stimulate growth without a corresponding increase in the complexity of the Commission's administration of the Amateur Radio Service. While not the ultimate answer to growth in Amateur Radio, it would be a worthwhile step in the direction the Commission has already indicated that it intends to take.

Respectfully submitted,
AMERICAN RADIO RELAY LEAGUE, INC.
By Richard L. Baldwin (signed)
General Manager

225 Main Street
Newington, CT 06111
January 16, 1979

*Deputy Manager, Membership Services, ARRL

HAMS WANT EXEMPTION FROM INDIANA RADAR LAW

An Indiana state representative has introduced a bill which may cause difficulty for Indiana radio amateurs experimenting with the amateur microwave frequencies. House Bill 1223 seeks to regulate the use, possession and sale of radar detection devices used to avoid arrest for violating highway speed-limit laws. However, the Indiana Radio Club Council has voiced its

concern to the sponsor of the bill, Indiana State Representative Donald Lash, that the legislation could have a detrimental effect on Amateur Radio operation in the state on those frequency bands shared with or adjacent to the frequency bands used by police to measure the speed of motor vehicles.

House Bill 1223, if enacted as introduced, would add a new section 62.1 to IC 9-4-1 which states, in part, the following:

"62.1

(a) It is a violation of this section:

1) to operate a motor vehicle upon a street or highway when the vehicle is equipped with any device or mechanism to detect the emission of radio microwaves in the electromagnetic spectrum, which microwaves are employed by police to measure the speed of motor vehicles upon a street or highway for law enforcement purposes;

2) to use any device or mechanism upon any motor vehicle on any street or highway to detect the emission of radio microwaves in the electromagnetic spectrum; or

3) to sell any device or mechanism designed to detect the emission of radio microwaves in the electromagnetic spectrum. . . .

d) Exempt from the restrictions imposed by this section are:

1) any receiver of radio waves utilized for lawful purposes to receive any signal on a frequency and from a source lawfully licensed;

2) state-owned motor vehicles or motor vehicles owned by any political subdivision which are used by law enforcement officers in their official duties; and

3) the sale of a radar detector device or mechanism to a law enforcement agency for use in its official duties.

e) A person who violates this section commits a Class C misdemeanor."

Although one of the proposed exemptions would allow ". . . any receiver of radio waves utilized for lawful purposes to receive any signal on a frequency and from a source lawfully licensed," the Indiana Radio Club Council fears that this would not protect Amateur Radio operators. In a letter to Representative Lash from the IRCC, Attorney Malcolm Mallette, WA9BVS, writes that ". . . such exemption would not protect the Amateur Radio Service because an individual police officer could hardly refer to the frequency tables to determine whether or not the frequency being received was within the Amateur Radio Service allocation. It appears certain that an arrest would be made and the matter would then, at the expense of the Amateur Radio operator, be determined in court."

The Indiana Radio Club Council has suggested that House Bill 1223 be modified so that subparagraph (d)(3) reads as follows (additions are italicized):

"3) the sale of a radar detector device or mechanism *designed to detect the emission of radio microwaves* to a law-enforcement agency for use in its official duties *or to a person who holds an Amateur Radio license issued by the United States Government.*"

The IRCC also proposes that there be an addition to paragraph (d) (exemptions) of the following subsection:

"4) any person holding an Amateur Radio license issued by the United States Government and any motor vehicle owned by or leased to any person holding an Amateur Radio license issued by the United States Government."

In 1977, the Indiana Radio Club Council was successful in getting Amateur Radio operators exempted from a similar law restricting the possession and use of receivers capable of tuning in police frequencies. The IRCC is hopeful that the same cooperation and consideration will be given Indiana hams in this matter.

BEHIND THE DIAMOND

For this month, "Behind the Diamond" went to *QST*'s Advertising Department for a visit with Assistant Advertising Manager George Barker, WB8PBC. George was brought up in the Youngstown, OH, area, having moved there as a child from suburban Washington, DC. He recalls that the electronics bug bit him around the age of five, when he got a shock unplugging a television set!

As an undergraduate at Youngstown State University, George learned of a part-time opening at a local TV station, WKBN, and joined the staff as a news photographer and film editor. He kept this position until he came to work at Hq.

While at college, George also became involved with the campus radio station, WYSU, serving as an announcer and broadcast and recording technician for music concerts on campus. In addition, he did some news and weather broadcasts.

George's ham career began in 1969 when he was licensed as WN8CXG, operating a "very" random wire antenna to a Heath Comanche receiver and a homebrew single-tube transmitter. He relicensed in 1973 as WN8PBC, at the behest of a friend at WKBN-TV. (The amateur world knows George as "Papa Bravo Charlie" but his friends call him "Play Boy Club.")

Upon graduation from Youngstown State, George answered an employment ad in "League Lines" early in 1976 — one of the first issues he received as a new ARRL member. Next thing he knew, he came to Newington to join the Hq. staff in March 1976, in the Membership Services Department.

George progressed through handling "Happenings," "League Lines," and information for the blind and handicapped, and was promoted to the post of assistant advertising manager in the fall of 1977. Among his responsibilities are advertising approval for new equipment, solicitation of new advertising, ad layout and management of the *QST* "Ham-Ads" section. He researches the level of service to League members by *QST* advertisers to help maintain the integrity that *QST* requires of these firms. George is a past assistant secretary of the ARRL Foundation and holds an Amateur Extra Class license.

His hobbies are quite diversified: photography, cinema and music ("from Gilbert and Sullivan and Grand Opera to progressive jazz"). You can't miss George at a hamfest, where you'd likely find him talking to *QST* advertisers — he's six foot nine. Has he had any problems with being that tall? Only one: "Back at WKBN, the TV station assigned me to cover a convention of midgets!" — *Sandy Gerli, ACIY*

NEW ADVISORY COMMITTEE MEMBERS

Each December, ARRL President Dannals chooses new members for the various ARRL Advisory Committees from nominations submitted by fellow amateurs. Positions are opened during the previous year due to expiration of terms or resignations. These committees, the rules for which are included in the League's bylaws, prepare recommendations within their specialty areas to the ARRL Board of Directors and/or staff. These recommendations are based upon consultation with segments of the membership and studies conducted by the committees. Every committee is composed of 11 volunteers representing Canada and each U.S. call area. Members wishing to serve on a committee are nominated by three League members; forms for this purpose are available from Hq.

George Barker, WB8PBC.

This year, 18 amateurs were picked to fill vacated slots, including new Hq. liaisons for the VHF/UHF Advisory Committee and the VHF Repeater Advisory Committee. Short biographies of the new members follow.

Contest Advisory Committee

Howard Hoyt, K4PQL, who holds the Amateur Extra Class license, was first licensed in 1958. He is a member of the Potomac Valley Radio Club, and is an active contester. He holds the WAC, WAS, DXCC and other awards.

James R. Stahl, K8MR, was licensed in 1964, and holds the Amateur Extra Class license. He was a CW Sweepstakes section winner in 1972, 1973, 1976 and 1977, and is active in nearly all hf contests. He has served as an officer with the Case Amateur Radio Club and the Mad River Radio Club, and is a Life Member of ARRL.

Emergency Communications Advisory Committee

W. D. Bemmels, WØKL, has been licensed since the early 1930s, and now holds an Extra Class license. He is presently SEC for Kansas, and is active on the Kansas traffic nets.

William Farone, N4NK, was licensed in 1955 and is an Extra Class licensee. He's been active in the National Traffic System on both phone and cw, and has held the posts of EC, OTS, STM and OES. He will chair the ECAC.

Another amateur active in emergency communications is Edward Gribi, Jr., WB6IZF. He was the SEC for Santa Clara Valley, and was the amateur in charge of communications during the 1977 Marble Cone forest fire (November 1977 *QST*, page 52). First licensed in 1963, he holds a General class ticket.

Table 1

League Advisory Committees and Their Members for 1979

Contest Advisory Committee

Kenneth M. Bolin, W1NG, chairman, 21 Pleasant Rise Cir., Brookfield, CT 06804.
Dennis G. McAlpine, K2SX, 901 Lexington Ave., New York, NY 10021.
William Olson, W3HQT, R.D. 1, Box 163, Ottsville, PA 18942.
Howard Hoyt, K4PQL, 9458 4th Pl., Lorton, VA 22079.
Mike Badolato, W5MYA, 2 Country Pl., Bedford, TX 76021.
Wayne Overbeck, N6NB, 5818 Woodland Ave., Woodland Hills, CA 91367.
Frederick D. Niswander, K7GM, 6802 S. 47th St., Phoenix, AZ 85040.
James R. Stahl, K8MR, 3592 Atherstone Rd., Cleveland Heights, OH 44121.
Victor A. Shields, K9UIY, 1258-1/2 S. Galena Ave., Freeport, IL 61032.
Fred A. Minnis, KØMM, RFD 3, Box 273, Clinton, IA 52732.
Richard W. Guy, VE7TT, 6812 Dunnedin St., Burnaby, BC, Canada V5B 1Z2.
Board Liaison — Stan Zak, K2SJO, 13 Jennifer La., Port Chester, NY 10573.
Hq. Liaison — Tom Frenaye, K1KI.

Emergency Communications Advisory Committee

Frank Jasinski, W1XA, 42 Saddleback Hill Rd., Bellingham, MA 02019.
Paul Vydareny, WB2VUK, 259 N. Washington St., North Tarrytown, NY 10591.
Bob Josuweit, WA3PZO, 9 Derwen Dr., Havertown, PA 19083.
William Farone, N4NK, chairman, 210 Midfield Rd., Bon Air, VA 23235.
H. O. Townsend, WA5MLT, 2324 Morgan Dr., Norman, OK 73069.
Edward A. Gribi, Jr., WB6IZF, Box 984, King City, CA 93930.
Everett R. Snyder, W7DO, 300 Abbot, Richland, WA 99352.
Robert F. Miller, WB8GGR, 330 Sherwood Dr., Lexington, OH 44904.
Bruce B. Woodward, W9UMH, 6208 Bramshaw Rd., Indianapolis, IN 46220.
W. D. Bemmels, WØKL, 40 Rockwood Dr., Ottawa, KS 66067.
W. H. Parker, VE5CU, 214 McMaster Crescent, Saskatoon, SK, Canada S7H 4E3.
Board Liaison — Max Arnold, W4WHN, 612 Hogan Rd., Nashville, TN 37220.
Hq. Liaison — Robert J. Halprin, K1XA.

DX Advisory Committee

Anthony C. Berg, W1OT, chairman, 11 Vanderbelt Rd., Acton, MA 01720.
Robert C. Scully, W2XN, 179 Kendall Blvd., Oaklyn, NJ 08107.
James A. Douglas, W3ZN, 22432 Goshen School Rd., Gaithersburg, MD 20760.
John C. Kanode, N4MM, RFD 1, Box 73-A, Boyce, VA 22620.
Sanford Hutson, K5YY, P. O. Box 5299, Little Rock, AR 72215.
James T. Rafferty, N6RJ, 178 Paseo Robles, Anaheim, CA 92807.
Robert W. Hudson, K7LAY, 29826 24th Pl. So., Federal Way, WA 98003.
Daryl H. Kiebler, WB8EUN, 517 Farmstead La., Lansing, MI 48917.
Robert C. Locher, Jr., K9AM, 1145 Osterman, Deerfield, IL 60015.
James Spencer, WØSR, 3712 Tanager Dr. N.E., Cedar Rapids, IA 52402.
Harold E. Parsons, VE3QA, RR 3, Metcalfe, ON, Canada KØA 2PØ.
Board Liaison — Gay E. Millus, W4UG, 1416 Rutland Dr., Virginia Beach, VA 23454.
Hq. Liaison — Don Search, W3AZD.

VHF Repeater Advisory Committee

Lewis D. Collins, W1GXT, 10 Marshall Ter., Wayland, MA 01778.
Charles Harrison, K2MZ, chairman, MR 179, Oyster Bay, NY 11771.
Thomas B. Carpenter, W3YVV, Post Office, Harmans, MD 21077.
Charles Durst, WA4WTX, 4407 Sunny Ct., Durham, NC 27705.
Eilene Spiegel, WA5WDW, 2812 Pritchett, Irving, TX 75061.
Gordon Schlesinger, WA6LBV, 5364 Saxon St., San Diego, CA 92115.
Clay Freinwald, K7CR, 8515 Idelwood Dr. S.W., Tacoma, WA 98498.
Richmond B. Shreve, W8GRG, 2842 Winthrop Rd., Shaker Heights, OH 44120.
Jack D. Forbing, K9LSB, 1416 Lakewood Dr., Ft. Wayne, IN 46819.
Whitman E. Brown, WBØCJX, 14418 West Ellsworth Pl., Golden, CO 80401.
Ronald MacKay, VE1AIC, Box 188, Cornwall, PEI, Canada CØA 1HØ.
Board Liaison — Carl L. Smith, WØBWJ, 1070 Locust St., Denver, CO 80220.
Hq. Liaison — Stan Horzepa, WA1LOU.

VHF/UHF Advisory Committee

Joe Reisert, W1JR, 17 Mansfield Dr., Chelmsford, MA 01824.
Richard T. Knadle, Jr., K2RIW, 316 Vanderbilt Pkwy., Dix Hills, NY 11746.
Anthony F. Souza, W3HMU, P. O. Box 169, Ottsville, PA 18942.
Russell G. Wicker, W4WD, chairman, Box 463, Perrine, FL 33157.
Roy L. Albright, N5RA, 107 Rosemary, San Antonio, TX 78227.
Louis N. Anclaux, WB6NMT, P. O. Box 82183, San Diego, CA 92138.
Randall Stegemeyer, W7HR, 2340 E. 18th St., Bremerton, WA 98310.
Ted Hartson, WA8ULG, 2444 W. Halbert Rd., Battle Creek, MI 49017.
Malcom M. Bibby, GW3NJY/W9, 990 N. Lake Shore Dr. no. 21C, Chicago, IL 60611.
John C. Fox, WØLER, 321-109th La., N.W., Minneapolis, MN 55433.
J. Leslie Weir, VE3AIB, 42 Cobham Cres., Toronto, ON Canada M4A 1V6.
Board Liaison — Jay Holladay, W6EJJ, 5128 Jessen Dr., La Canada, CA 91011.
Hq. Liaison — Bernie Glassmeyer, W9KDR.

Frank Jasinski, W1XA, was licensed in 1950 and is an Extra Class licensee. Active in public service, he serves as an EC.

Robert Miller, WB8GGR, who holds an Advanced class ticket, was licensed in 1970. He brings to the committee his experience as an EC and net manager. Bob was a speaker at a recent Dayton Amateur Radio Public Service Corps forum.

Paul Vydareny, WB2VUK, an Advanced class licensee, has been a ham since 1965. He holds the posts of EC and SEC, and is the communications officer for North Tarrytown, NY, civil defense.

DX Advisory Committee

Three new members have been appointed to the DXAC. The chairman, Robert W. Hudson, K7LAY, is an Extra Class licensee who joined the amateur ranks in 1959. He is an avid DXer and contester who enjoys homebrewing. He is a Life Member of ARRL.

Sanford Hutson, K5YY, was licensed in 1958 and holds the Amateur Extra Class license. He has been on 15 DXpeditions, and has held the post of president of the Arkansas DX Association.

James Spencer, WØSR, another Extra Class licensee, was first licensed in 1953. He's the past president and secretary of the Eastern Iowa DX Association, and has earned the DXCC award on phone and cw. Jim has been a member of ARRL since 1954.

VHF Repeater Advisory Committee

This committee can boast of having the first female appointee in the history of the Advisory Committees. Eilene Spiegel, WA5WDW, licensed in 1969, holds an Advanced class ticket. She has served on the board of directors of the Texas VHF FM Society, has served on the Texas Intra-City Radio System committee, and helped develop early frequency-coordination efforts in northern Texas.

Thomas B. Carpenter, W3YVV, is a charter member of the Maryland FM Association and the trustee for WR3ADZ and WR3ABO. He also serves on the T-MARC frequency-coordination committee and is the holder of a General class ticket.

Ronald MacKay, VE1AIC, active on 2 meters since 1973, has been licensed since 1967. He is the trustee for the VE1SPR and VE1AHC repeaters, and is a maintenance technician for CBC-TV. He holds a B.S. in engineering and is a Canadian Advanced class licensee.

Stan Horzepa, WA1LOU, is the new Hq. liaison for the VHF Repeater Advisory Committee. Licensed since 1969, Stan operates OSCAR, 10 and 15 meters, and 2-meter fm. He holds a B.A. from the University of Connecticut and a law degree from Western New England College. His duties at Hq. include the production of the *ARRL Repeater Directory*.

VHF/UHF Advisory Committee

Russell G. Wicker, W4WD, will chair this committee. Licensed in 1953, he holds an Amateur Extra Class license. He's been active in vhf/uhf for 20 years, and is currently heard on 50, 144, 432 and 1296 MHz and is active on 144- and 432-MHz moonbounce. Russ holds a B.S. and M.S. in engineering.

Malcom M. Bibby, GW3NJY/W9, is active on 50, 144, and 432 MHz. He received a B. S. and Ph.D. in engineering from the University of Liverpool, and studied rf propagation in Europe.

Randall Stegemeyer, W7HR, was first licensed in 1958. He, too, holds an Amateur Extra Class license and a B.S. degree in engineering, and is active on 50, 144 and 432 MHz. He prepares computer data for moonbounce and OSCAR enthusiasts, and has been interested in vhf/uhf since 1962.

The new Hq. liaison for the VUAC is Bernie Glassmeyer, W9KDR. A holder of the Advanced class ticket, Bernie is active on 160 meters through 70 cm, and holds the DXCC, WAC and a VHF Section Award. He is the OSCAR Program Manager for ARRL, and attended the launch of OSCAR 8 in California. He also was one of the first amateurs to hear the new Radio Sport satellites. — *Michele Bartlett, N1AGD*

1979 — A Year of Decision!

At its meeting in January, the League's Board of Directors recognized that 1979 is a year of decision which may mark a turning point in Amateur Radio. As a result they made not one but a number of decisions which will have a far-reaching effect on our League and our Amateur Radio Service.

First and foremost in the minds of all officers and directors was WARC-79 — the World Administrative Radio Conference convening in Geneva in September and which will set the pattern for spectrum usage for the next quarter of a century. Because of the many exciting possibilities that may spring from that conference (if you're an optimist) or because of the chance of some restriction in amateur activities (if you're a pessimist), and because of the growth that has been taking place in Amateur Radio during the past couple of years, and because of the changes in the political and economic climate, the Board (almost without debate) directed the President to appoint a Long-Range Planning Committee. This Committee has been tasked to study the future needs of the League membership and the Amateur Radio Service as a whole, and to determine what new programs should be inaugurated by the League and what old programs should be modified or scrapped in order that the League can be most responsive in meeting its goals and objectives of protecting and enhancing the Amateur Radio Service during the years ahead. Members of this committee are being recruited from the officers and directors, from the staff, and from the membership.

For the past 15 years, the League has become increasingly involved in preparation for WARC-79. We have added people to the staff just for that purpose. We have traveled extensively to other countries of the International Amateur Radio Union in order to coordinate their activities and ours, and we have supported meetings around the world in order to bring together groups of amateurs and others who were also working toward WARC-79. We set up a training program in this country in order to improve the growth of the Amateur Radio Service. And, to provide a further feather in the cap of Amateur Radio, we supplied extensive financial support to the Amateur Satellite Program in this country. All of these are worthwhile goals, but unfortunately they came at a time when we were being plagued by the effects of inflation. In many areas, simply because of the effects of inflation and growth, our costs have tripled. However, our income has not kept pace and for the past 15 years, with one exception, we have operated with a net loss each year. How could we go on so long providing more services for the members than we received payment for? Only because during the war years of 1942-1945 we sold many *Handbooks* to the armed services for training purposes, our membership services were curtailed, and so we built up a modest surplus. But now that surplus has been eroded to the point where it would be unwise to continue without a readjustment of our income. It was thus, after several hours of debate and extensive review of budget material which had been prepared by the staff, that the Board came to the conclusion, albeit reluctantly, that an increase in the dues rate was necessary if the League was to continue to meet the challenges of WARC-79, the training program, inflation and especially the challenges of 1980 and beyond.

Therefore, annual dues, effective April 1, 1979, will be $18 per year.

Obviously, an increase of 50 percent sounds big. On the other hand, if you put the percentage figure aside and look at it in terms of actual dollars, it's not so much. Six dollars is somewhat less than a tankful of gasoline for a compact car, or an eight-track tape for your stereo, or a carton of cigarettes.

But, however you make the comparison, in order to provide a transition period during which you can avoid some of the immediate impact of the dues increase, why don't you plan, before April 1, to sign up for as much as five years of League membership at the present special term rates: i.e., $12 for one year, $23 for two years, $33 for three years, $43 for four years, or $53 for five years. (In Canada, those figures would be $13.50, $26, $37.50, $49 and $60.50, all U.S. currency.) Or you might consider Life Membership, which at the existing dues rate would be $300 in the U.S. and $337.50 in Canada (on a quarterly basis, $37.50; in Canada, first payment of $43.50 and seven of $42, U.S. currency). On April 1, the Life Membership rate jumps to $450 in the U.S., $500 in Canada.

Amateur Radio has a bright future ahead. We have the support of our government for increased frequency allocations and there is a reasonable expectation that we'll meet with some success at WARC-79. There is continued growth in and continued support of the Amateur Radio Service worldwide. There are challenges and hopes, and your acceptance of the new dues structure will go far to help us meet those challenges and realize those hopes. — *Richard L. Baldwin, W1RU*

At the January Board meeting, W1RU presents the General Manager's report (center). WØBWJ (left) and W4KFC follow the outline. *(Martin Aronow photo)*

Miami Memorandum

Two big decisions — reported separately by General Manager Baldwin — and a continuing thread leading straight to WARC-79 sparked the ARRL Annual Board Meeting.

By Perry F. Williams,* W1UED

A year ago, in finishing the story of the Board Meeting, we penned these closing words: "Yes, that was one whale of a snow! . . . Anyone for Miami?"

Everyone for Miami! The memories of collapsed coliseums, cancelled flights, closed runways and cold drafts were still strong in Directors' minds last July, and they scheduled this year's Annual Meeting for the Sunny South — January 24-25 at the Airport Ramada Inn, in Miami.

The view out the window was a glorious green instead of silent silver, but, inside, the theme of the meeting, like its three or four immediate predecessors, was WARC-79, the World Administrative Radio Conference which opens in Geneva on September 24. WARC pervaded the remarks of President Dannals, First Vice President Clark, Vice Presidents Smith and Eaton; see Minute 5. General Manager Baldwin yielded the floor to his full-time WARC aide, Assistant General Manager Sumner, for a comprehensive review of preparations for the conference. The good news, of the proposed 350 kHz of new hf space, a 40-meter band without broadcasters, less sharing in 160 and 80. The bad news, of Radio Free Europe, Radio Liberty and Voice of America's attempt at an end run around the compromise U.S. position so painstakingly evolved over five years in Docket 20271; a last-minute proposal to make maritime radiotelephone our sharing partner at 220; some reduction in total space for 160 for the supposed benefit of broadcasting. (Did you catch Dave Sumner's editorial and page 55 article on FCC's WARC proposals in February *QST*? Worth a trip back there!) Dave also reported on the immediate countermeasures to those proposals of America's propaganda arms, which included a telegram to President Carter and others at the top. A January tour by International Services Officer Johnson to Africa also was featured in reports, along with word about the Special Preparatory Meeting for WARC held by the International Telecommunication Union's study arm in Geneva last autumn. Minute 6 summarizes this work.

WARC showed up again in reports. (Minutes 7 and 8) by General Counsel Booth and by Director Zak, speaking for the International Affairs Committee; in a resolution thanking Intruder Watch volunteers for their work and supporting its continuance (Minute 72); and indirectly (as a measure of progress in spreading the word to new countries) in the vote for the admission of Tonga into the International Amateur Radio Union (Minute 77).

There was early agreement in Docket

*Manager, Membership Services

The 1979 Board: For brevity's sake, we'll use call signs only; see paragraph 1 of the Minutes for names and titles. From left, seated: W4WHN, KØGA, W9NTP, W7PGY, W2HD, W1RU, W1JFF, W1HHR, WØBWJ, W5GM. Second row, from left: W4KFC, W6EJJ, K1FHN, W6ZM, W4UG, W1QV, W5EDZ, K9EN, K2SJO, W2IHA, W4ACY, WB6UIA, VE3CJ, W3PS, WB4ANX. Third row, from left: W3SW, WØFIR, W8ETU, W1UED, KØHRZ, K1ZZ, W3KT, W1RW, W4RH, KØPGM. *(Martin Aronow photo)*

20271 that no changes should be made in the general Amateur Radio rules (Article 41 of the ITU Radio Regulations). Despite this understanding, FCC's report recommends, in a revised Article 41, that a knowledge of the international Morse code be made optional for administrations. The Board registered its support for the present wording, at Motion 61. In Minute 97, the Board supported the continued availability of the 220-MHz band and expressed concern about proposed sharing, e.g., with the maritime radiotelephone service. The International Affairs Committee is to review (Minute 99) the level of support for the WARC effort and make recommendations thereto. Praise was expressed for the gifts of the Dayton Amateur Radio Association, the Northern California DX Foundation and the Delta DX Association (Minutes 87, 88, 90) in support of Project Goodwill, under which IARU hq. is sending transmitter/receiver kits to the developing countries. Wrapping it up at Minute 98, the Board thanked all those in the amateur fraternity worldwide who have helped prepare for WARC, often with no possibility for recognition by name.

Bolstering the future of the League were two important motions, Minute 45 for long-range planning and Minute 26, a dues increase to $18 per year. These two motions are discussed in the separate editorial by General Manager Baldwin adjacent to this article. Similarly looking to the future, the Board authorized the continued use of fund-raising counsel, at Minute 69, taking advantage of momentum gained late in 1978. The directors accepted the offer of Hazard E. Reeves, K2GL, at Minute 36, to establish and lead the ARRL International Council, providing a channel for successful business and industry figures to aid in the work of ARRL. (Buzz is well-known in amateur contest circles for the K2GL multi-multi entries and in the business world for such companies as Reeves Soundcraft and Cinerama.)

The separately organized ARRL Foundation received the continued blessing of the Board — both for Minute 63's administrative support and *QST* publicity, and financially, through the cancellation of an interest debt to ARRL (Minute 78). John Sanders, WB4ANX and John Sullivan, W1HHR, were named to the Foundation's Board (Minute 24). A report on the Foundation's annual meeting, held the day after ARRL's, will be summarized in an upcoming *QST*.

Some other organizational actions (minute number in parentheses): ARRL mailing permits not to be used in elections (67), help members with their nominations for the Hall of Fame (59), assist members wanting to write *QST* articles (57), encourage the editor to run the FM & Repeater column in *QST* as often as possible (51), retain two-year terms for directors (46), adopt an ARRL hq. organization chart and furnish to members on request (28), move Sullivan County, a resort area not far from New York City, into the Hudson Division (33), and finally, summing up by way of Minute 66, encourage greater participation and identification with ARRL on the part of the general membership.

Turning to matters more fraternal, the 1977 Technical Excellence Award was conferred on Wayne Overbeck, N6NB, for his article, "The VHF Quagi," appearing in April 1977 *QST*. Honorable Mention for the same award went to Howard Cunningham, WA9VRU, for "A Fully Automatic Morse Code Teaching Machine," May 1977 *QST*, and to Howard J. Sartori, W5DA, for "Update Your HF MUF Predictions Daily" in September 1977 *QST* (Minutes 73 and 89). Jean A. "Doc" Gmelin, W6ZRJ, was elected an Honorary Vice President of ARRL, as shown at Minute 76, based on long service to the League and Amateur Radio in a number of capacities, most notably as Pacific Division Director from 1968 through 1977. The present level of DXCC Awards is to continue while two committees jointly study possible improvements (Minute 39). The process of naming new countries for DXCC may sometimes appear random, but it actually follows stated criteria. On recommendation of the DX Advisory Committee, the Board eliminated "distinctively separate administration" as a selection criterion and removed demilitarized zones, neutral or buffer zones, embassies, consulates and extraterritorial monuments from any future consideration as "countries." The action at Minute 14 did not, however, alter the status of any entity already on the list. Turning to the field organization structure, the Directors provided funding for the travel of section traffic managers (a new appointment) on the same basis as for section emergency coordinators.

Minute 42 created a new field appointment, QSL bureau assistant. And at Minute 41, there was a significant nonaction: a motion to study QSL Bureau guidelines was withdrawn when it was discovered that the Fourth Call Area QSL Bureau, already in two sections, could subdivide further by agreement among the Directors of four divisions having members in that area.

A special committee will study the problems caused by the large geographic area of the Canadian Division and its Director's added burden of carrying on official liaison to the government (Minute 18). Vice Presidents Smith and Eaton, Director Hesler and Vice Director Loucks are on the committee, which may draw on the advice of General Counsel Booth and Canadian Counsel Benson.

Summing up, the 1979 Annual Meeting of the Board was productive and forward-looking. You'll find additional detail in the full official minutes which follow.

COMMITTEE WORK

The ARRL Board of Directors makes extensive use of committees in examining specialized or complicated issues. Its Advisory Committees are listed in "Happenings," page 58. Permanent Committees of the Board have the following membership for 1979.

Addresses and phone numbers appear on pages 8 and 9 of each *QST*.

Executive Committee

President Harry J. Dannals, W2HD
First Vice President Victor C. Clark, W4KFC
General Manager Richard L. Baldwin, W1RU
Director Gar Anderson, KØGA
Director Max Arnold, W4WHN
Director Richard A. Egbert, W8ETU
Director Larry E. Price, W4RA

International Affairs

Director Stan Zak, K2SJO, chairman
Director Max Arnold, W4WHN
Director Ron Hesler, VE1SH
Director Don Miller, W9NTP
Vice President Noel Eaton, VE3CJ, ex officio

Legal and Regulatory

Director Richard A. Egbert, W8ETU, chairman
Director Maurice O. Carpenter, KØHRZ
Director Robert B. Thurston, W7PGY
Vice President Carl L. Smith, WØBWJ, ex officio

Management and Finance

Director Larry E. Price, W4RA, chairman
Director William J. Stevens, W6ZM
Director John C. Sullivan, W1HHR
Vice President Carl L. Smith, WØBWJ, ex officio

Membership Affairs

Director Jack D. Gant, W5GM, chairman
Director Gar Anderson, KØGA
Director L. Phil Wicker, W4ACY
First Vice President Victor C. Clark, W4KFC, ex officio

Plans and Programs

Director Jay A. Holladay, W6EJJ, chairman
Director Paul Grauer, WØFIR
Director Harry A. McConaghy, W3SW
First Vice President Victor C. Clark, W4KFC, ex officio

Studies

Ongoing work laid down at the meeting includes studies by the Management and Finance Committee of Certified Public Accounting firms, seeking terms and conditions under which they might handle auditing services for ARRL (29) and restraints on division administrative accounts (71). The Membership Affairs Committee will complete, with the VHF/UHF Advisory Committee, its work on uhf operating awards (10) and study a biographical column for *QST* (55) and an award in memory of Sam Harris, W1FZJ, former *QST* "World Above" conductor (91). The Plans and Programs Committee will look at revising the list of League publications and contracting with nonstaff authors (65). The feasibility of hiring staff counsel will be studied by the Legal and Regulatory Committee (37). Minute 38 calls for the DXAC to make suggestions on the DX Operating Code. And the General Manager will report on in-house data processing (31), helping Library of Congress improve its delivery of audible forms of *QST* to blind amateurs (35) and studying ways of recognizing for all members their continuous tenure in ARRL (54).

Moved and Seconded...

MINUTES OF THE 1979 ANNUAL MEETING
OF THE BOARD OF DIRECTORS
THE AMERICAN RADIO RELAY LEAGUE, INC.
January 24-25, 1979

1) Pursuant to due notice, the Board of Directors of The American Radio Relay League, Inc., met in annual session at the Ramada Inn — Airport, Miami, Florida, on January 24, 1979. The meeting was called to order at 9:30 A.M., with President Harry J. Dannals, W2HD, in the Chair, and the following directors present: Garfield A. Anderson, KØGA, Dakota Division; Max Arnold, W4WHN, Delta Division; Maurice O. Carpenter, KØHRZ, Rocky Mountain Division; Richard A. Egbert, W8ETU, Great Lakes Division; Jack D. Gant, W5GM, West Gulf Division; Paul Grauer, WØFIR, Midwest Division; Jay A. Holladay, W6EJJ, Southwestern Division; Harry A. McConaghy, W3SW, Atlantic Division; Don C. Miller, W9NTP, Central Division; Larry E. Price, W4RA, Southeastern Division; William J. Stevens, W6ZM, Pacific Division; John C. Sullivan, W1HHR, New England Division; Robert B. Thurston, W7PGY, Northwestern Division; L. Phil Wicker, W4ACY, Roanoke Division; Stan Zak, K2SJO, Hudson Division. Also in attendance, as members of the Board without vote, were Victor C. Clark, W4KFC, First Vice President; Noel B. Eaton, VE3CJ, Vice President; Carl L. Smith, WØBWJ, Vice President; and Richard L. Baldwin, W1RU, General Manager. Also in attendance, at the invitation of the Board as nonparticipating observers, were the following Vice Directors: Jesse Bieberman, W3KT, Atlantic Division; Frank M. Butler, Jr., W4RH, Southeastern Division; Lys J. Carey, KØPGM, Rocky Mountain Division; George A. Diehl, W2IHA, Hudson Division; Kenneth A. Ebneter, K9EN, Central Division; Fred Evans, W1JFF, New England Division; Peter F. Matthews, WB6UIA, Southwestern Division; Gay E. Milius, W4UG, Roanoke Division; John Sanders, WB4ANX, Delta Division; and Raymond B. Wangler, W5EDZ, West Gulf Division. There were also present Honorary Vice President Robert York Chapman, W1QV; Treasurer John Huntoon, W1RW; General Counsel Robert M. Booth, Jr., W3PS; Assistant General Manager David Sumner, K1ZZ; Membership Services Manager Perry F. Williams, W1UED; and Washington Area Coordinator Harold M. Steinman, K1FHN. The President presented the regrets of Canadian Director Ronald J. Hesler, VE1SH, Canadian Vice Director William W. Loucks, VE3AR, and Canadian Counsel B. Robert Benson, QC, VE2VW, all of whom were unable to attend the meeting because of personal or family illness.

2) The assembly observed a moment of silence in recollection for ARRL members who had become Silent Keys within the past year, especially Charles M. Cotterell, WØSIN, late director of the Rocky Mountain Division.

3) On motion of Mr. Sullivan, seconded by Mr. Grauer, unanimously VOTED to amend the agenda, moving the report of the Management and Finance Committee to a point after the election of directors to the Foundation. Whereupon, on motion of Mr. Anderson, seconded by Mr. Arnold, the agenda as amended was unanimously ADOPTED.

4) On motion of Mr. Thurston, seconded by Mr. Wicker, unanimously VOTED that the Minutes of the 1978 Second Meeting of the Board of Directors are approved in the form in which they were issued by the Secretary.

5) Reports of the officers were presented here, in his written report, and in supplementary oral comments, the President covered preparations for the World Administrative Radio Conference (WARC), specifically the final report produced by FCC in Docket 20271; current financial difficulties; long-range planning for the League; and the work of the International Amateur Radio Union (IARU) for which the League, as Headquarters Society, provided considerable administrative and material support. In his written report, First Vice President Clark offered observations upon League leadership in a rapidly changing world. His oral remarks summarized travel to the IARU Region 2 Conference in Panama, the IARU Region 3 Conference in Bangkok, the Aeronautical Conference of the International Telecommunication Union in Geneva and several club meetings and conventions in the United States. He also reported on a meeting with respect to the Green Bank-Sugar Grove Quiet Zone proposed by FCC in General Docket 78-352. Next, Vice President Eaton reported on his activities, mainly as President of IARU. These included reports on the Region 1 Conference of IARU in Hungary as well as the Panama and Bangkok Conferences; discussions on the Observer Team for WARC-79; the Special Preparatory Meeting of the International Radio Consultative Committee (CCIR) of ITU; the January trip of Bruce Johnson, WA6IDN, to several African countries; new member-societies of IARU; the visit to Headquarters of the Postmaster General of Sri Lanka; and the success of Project Goodwill, in which more than $25,000 was contributed to provide receiver and transmitter kits for developing countries. In his written report, Vice President Smith also mentioned the Panama Conference, which he attended as an ARRL delegate; travel to several conventions in the U.S. and Canada; the Ad Hoc Committee for the study of director workload (in response to Minute 54, July, 1978 Board Meeting) and the advisory committees, especially the need for qualified candidates for future vacancies on these committees, from all call areas.

6) General Manager Baldwin began his extensive oral report with a discussion of membership growth and increases in the number of Amateur Radio operators during the year. He then called upon Assistant General Manager Sumner for an overview of WARC preparation, including activities over the past five years; the FCC Report and Order which recommends 350 kHz of new allocations and less sharing with other services in present bands; pressure from the Board for International Broadcasting to increase its allocations, and ARRL countermeasures; Project Goodwill status; more on Johnson's African trip including a presentation to an ITU Seminar in Nairobi; the CCIR Special Preparatory Meeting; and the drafting of U.S. position papers, in which the ARRL has been requested to participate. The General Manager then returned to internal affairs, discussing the financial picture for 1978, the budget for 1979, fund raising, long-range planning and miscellaneous administrative matters. During the course of the above, the meeting was in recess from 10:35 to 10:58 A.M., and again for luncheon from 12:35 to 1:50 P.M., the same persons being in attendance as at the morning session with the exception of Director Price, who was called away on business; Vice Director Butler came forward to represent the Southeastern Division.

7) A preliminary report was presented by Treasurer Huntoon with particular attention to the portfolio covering Life Membership funds. General Counsel Booth dealt with the Schroeder antenna case in California, which, though not yet complete, already has benefited Amateur Radio; the Sleeper case in Massachusetts; the Personal Communications Foundation; the ARRL suit in Federal Court to overturn FCC's decision in Docket 21116, Linear Amplifiers; reorganization by FCC of its Safety and Special Radio Services Bureau and its Office of Chief Engineer; the status of ARRL and certain of its officers as registered lobbyists; and certain aspects of WARC preparation. During the course of Mr. Booth's presentation, the Board was in recess from 3:30 to 3:47 P.M.

8) Reports of the Standing Committees came next. Mr. Zak, as Chairman, presented the report of the International Affairs Committee, discussing WARC preparations and expenditures; IARU regional newsletters; continuing concern over harmful operating practices in the amateur bands; and activities at United Nations Headquarters, including a plan to obtain Non-Governmental Organization (NGO) status for IARU.

9) The report of the Plans and Programs Committee was presented by its Chairman, Mr. Anderson. A study of the public relations function of the League pointed out the desirability of a staff member coordinating the activities of public relations assistants (PRAs) and the possibility of establishing a Public Relations Advisory Committee. The Committee also made recommendations with respect to the Amateur Satellite Service Council and operational use of Phase III Satellites.

10) Mr. Gant, as Chairman, presented the report of the Membership Affairs Committee discussing the proposed awards for communications on 220 MHz and above; the contest in progress to select an ARRL Flag; establishment of a new appointment, QSL Bureau Assistant; possible mobile operation awards; possibility of activities of shortwave listeners; the desirability of rescinding Minute 77, July 1978 Meeting concerning publications review; a change in director terms from two to four years; and a recommendation that no campaign material be mailed using a division director's ARRL non-profit postal permit. On motion of Mr. Gant, seconded by Mr. Stevens, unanimously VOTED that Minute 31 of the July 1978 Board Meeting be further referred to the Membership Affairs Committee and the VHF/UHF Advisory Committee to complete work toward recommendation to the Board. Minute 31 concerned the new awards for uhf operation.

11) Mr. Egbert, as Chairman, presented the report of the Legal and Regulatory Committee, covering its development, prior to the July, 1978 Meeting, of guidelines for ARRL assistance to those in legal difficulties, and review of certain cases under these guidelines in November.

12) The Board next considered reports of the Advisory Committees. First was that of the VHF Repeater Advisory Committee, presented by Vice President Smith, as Board Liaison. Matters included in the report were expansion of the 16F3 portion of 6 meters, planning for amateur television in the 420-MHz band, coordination between VRAC and the VHF/UHF Advisory Committee, band plans for 23, 13, and 3 centimeters, tone access standards, and similar matters.

13) Mr. Zak, as Liaison, presented the report of the Contest Advisory Committee for the year, the principal recommendations of which had already been adopted at the July, 1978, Meeting of the Board; these included shortening the operating time of the ARRL DX Contest from two weekends per mode to one, and establishing definite disqualification criteria for contest logs. The Board was then in recess from 5:08 to

The head table at work: from left, W4KFC, W3PS, W2HD, W1RU, W1UED, K1ZZ. Visible in front of the president are American and Canadian flags, the "solid-state amplifier" for the gavel, and the West Coast version of the IARU rig. *(Martin Aronow photo)*

5:20 P.M., at which time Mr. Price returned to the meeting.

14) Mr. Milius, as Liaison, read the report of the DX Advisory Committee, which discussed the status of Desecheo Island and Water Island; elimination of the "distinctively separate administration" clause in the country criteria; and new country criteria which would rule out future consideration of demilitarized zones, neutral or buffer zones, embassies, consulates and extraterritorial monuments from consideration as separate "countries." Whereupon, on motion of Mr. Egbert, seconded by Mr. Sullivan, it was unanimously VOTED that the recommendations of the DX Advisory Committee concerning the revisions of the DXCC country criteria presented in its January 1979 report to the Board are ADOPTED.

15) Mr. Arnold, as Liaison, presented the report of the Emergency Communications Advisory Committee, covering its ongoing study of the Emergency Coordinators Workbook; Simulated Emergency Test dates and formats; RACES regulations; and the possibility of developing an automatic alerting device.

16) The report of the VHF/UHF Advisory Committee was presented by Mr. Holladay, as Liaison. The Committee recommends amateur television (ATV) repeater outputs and simplex at 420-426 MHz, simplex at 426-432 MHz, and repeater inputs at 438-444 MHz, with the video carrier frequency 1.25 MHz above the low edge in each case. Mr. Holladay then presented the report of the Amateur Satellite Service Council, covering the launch of OSCAR 8, Radiosport 2, the new AMSAT building, acceleration of Phase III OSCAR activities toward a December 1979 launch, and the need for OSCAR education funds.

17) The Board was in recess from 6:00 to 8:18 P.M. for dinner, reconvening with all attendees present.

18) Mr. Smith, as Liaison for the RFI Task Group, yielded the floor to Washington Area Coordinator Steinman for brief mention of Docket 78-369, FCC's Notice of Inquiry on radio frequency interference to electronic equipment. Mr. Smith then presented, as Chairman, a report on the Ad Hoc Committee to study director workload. On motion of Mr. Eaton, seconded by Mr. McConaghy, unanimously VOTED that, in view of the recommendations contained in the report of the Ad Hoc Committee on ARRL Director Workload, the President appoint a further Ad Hoc Committee to discuss the specific organizational and geographic problems of the Canadian Division, and to report to the Board at its next regular meeting in July; such committee to consist of Vice Presidents Smith and Eaton, Director Hesler and Vice Director Loucks, with such assistance as may be requested from the General Counsel and Associate General Counsel for Canada.

19) Mr. Egbert, as Chairman, reported for the Official Availability Committee on possible candidates for election to the Board of the ARRL Foundation.

20) The Chair announced that the Board would now proceed to the election of four directors to the Executive Committee for the ensuing year. Mr. Wicker nominated Mr. Egbert, Mr. Clark nominated Mr. Thurston, Mr. Miller nominated Mr. Anderson, Mr. Grauer nominated Mr. Price, Mr. Egbert nominated Mr. Zak, Mr. Sullivan nominated Mr. Arnold. On motion of Mr. McConaghy, seconded by Mr. Stevens, it was unanimously VOTED that nominations be closed. The Chair appointed Mr. Chapman and Mr. Diehl as tellers. The tellers announced the results of the ballot: Mr. Egbert with 15 votes, Mr. Arnold with 14 votes, Mr. Price with 11 votes and Mr. Anderson with 8 votes were declared elected.

21) On motion of Mr. Sullivan, seconded by Mr. Egbert, it was unanimously VOTED that the reports of the officers and directors of the League are accepted and the same placed on file.

22) At this point the following committee appointments were announced: International Affairs Committee — Mr. Zak, Chairman, Mr. Arnold, Mr. Helser, Mr. Miller; Plans and Programs Committee — Mr. Holladay, Chairman, Mr. Grauer, Mr. McConaghy; Membership Affairs Committee — Mr. Gant, Chairman, Mr. Anderson, Mr. Wicker; Management and Finance Committee — Mr. Price, Chairman, Mr. Stevens, Mr. Sullivan; Legal and Regulatory Committee — Mr. Egbert, Chairman, Mr. Carpenter, Mr. Thurston.

23) The President then appointed Mr. Eaton as ex-officio member of the International Affairs Committee, Mr. Clark as ex-officio member of the Plans and Programs and Membership Affairs Committees, and Mr. Smith as ex-officio member of the Management and Finance and Legal and Regulatory Committees.

24) The Chair announced the opening of nominations for directors of the ARRL Foundation. Mr. Egbert nominated Mr. Sullivan. Mr. Arnold nominated Mr. Sanders. On motion of Mr. Zak, seconded by Mr. McConaghy, unanimously VOTED that nominations are closed and that Mr. Sullivan and Mr. Sanders are duly elected.

25) Mr. Arnold, as Chairman, presented the report of the Management and Finance Committee which included discussion of its activities as Board Audit Committee, its review of travel expense reports, the necessity for a raise in the annual membership dues and similar matters. On motion of Mr. Price, seconded by Mr. McConaghy, at 9:04 P.M., unanimously VOTED that the Board now resolve itself into a Committee of the Whole for the purpose of reviewing the financial and managerial performance of the League during the year just ended. The Committee of the Whole was in recess from 10:30 to 10:38 P.M. Mr. Wangler left the meeting at 10:00 P.M. At 11:21 P.M. the Committee arose and reported to the Board. On motion of Mr. Arnold, seconded by Mr. Price, it was unanimously VOTED to adopt the report of the Committee.

26) Moved by Mr. Arnold, seconded by Mr. Egbert, that Bylaw 4 be amended, effective April 1, 1979, by striking the words of the first sentence and replacing them with the following: "The dues of members of any class shall be $18.00 annually worldwide, payable annually in advance. For members, including Life Members, outside the United States, the General Manager shall assess such additional mailing costs outside the U.S. as are consistent with existing postal rates . . ." A roll call being required, the question was decided in the affirmative, 14 votes in favor to 1 opposed. All of the directors voted in the affirmative except Mr. Grauer, who voted opposed, and Mr. Hesler, who was absent. So the Bylaw was AMENDED.

27) The Board recessed at 11:30 P.M., reconvening at 8:30 A.M., January 25, 1979 in the same place, with all persons herein before mentioned present except Messrs. Wicker, Bieberman, and Wangler. Mr. Milius came forward to represent the Roanoke Division.

28) On motion of Mr. Price, seconded by Mr. Sullivan, VOTED that the Headquarters Organization Chart dated January 12, 1979, prepared by the General Manager in response to Minute 22 of the Second 1978 Meeting is approved. The Chart shall be made available to any member upon request.

29) At this point Messrs. Bieberman and Wangler joined the meeting, at 8:40 A.M. On motion of Mr. Grauer, seconded by Mr. Holladay, unanimously VOTED that the General Manager, in conjunction with the Management and Finance Committee shall direct inquiries to appropriate national public accounting firms seeking information on the terms and conditions under which they could furnish auditing services to the League. A recommendation for appointment of an auditing firm shall be made to the Executive Committee not later than March 31, 1979.

30) On motion of Mr. Sullivan, seconded by Mr. Thurston, unanimously VOTED that each of the committees of the Board be authorized an annual budget of $2,500.

31) On motion of Mr. Grauer, seconded by Mr. Sullivan, unanimously VOTED that the General Manager make a study of in-house data processing and report to the July Board meeting.

32) Moved, by Mr. Grauer, seconded by Mr. Sullivan, that first-class mailing of *QST* be discontinued to all officers, directors, vice directors, section communications managers and other League officials. But, after discussion, the motion was LOST.

33) Moved by Mr. McConaghy, seconded by Mr. Zak, to amend Bylaw 25 to add to the Hudson Division, the County of Sullivan, of the State of New York. A roll call vote being required, the same was conducted, with all directors present voting in favor. So the Bylaw was AMENDED.

34) Moved by Mr. Miller, seconded by Mr. Anderson, that the matter of duration of the ARRL International DX competition be referred again to the Contest Advisory Committee for the purpose of surveying all major club entries on their opinion of the recent change to a one weekend contest. But, after discussion, the motion was LOST. Mr. Miller requested to be recorded as voting in favor.

35) On motion of Mr. Egbert, seconded by Mr. Zak, unanimously VOTED, after discussion, that the General Manager is instructed to explore with appropriate officials at the Library of Congress, Washington, D.C., the possibilities of expediting delivery to blind amateurs of the monthly tapes of *QST* magazine, reporting the results to the Board within 30 days.

36) On motion of Mr. Zak, seconded by Mr. Sullivan, unanimously VOTED that the Board accept with thanks the offer of Hazard E. Reeves, K2GL, to form and act as chairman of the ARRL International Council, which is to be comprised of a cross section of influential amateurs and other individuals throughout the world and which will offer suggestions concerning and support of programs which will be advantageous to the ARRL and the Amateur Radio Service.

37) Moved by Mr. Grauer, seconded by Mr. Thurston, that the General Manager is authorized to establish within the Headquarters a new position of staff attorney. After discussion, on motion of Mr. Sullivan, seconded by Mr. Zak, unanimously VOTED that the matter is referred to the Legal and Regulatory Committee for study.

38) On motion of Mr. Sullivan, seconded by Mr. Grauer, unanimously VOTED that the General Manager be directed to solicit comments from the DX Advisory Committee on such matters as operating conduct and procedures, prior to reordering Operating Aid, "DX Operating Code, CD-215."

39) On motion of Mr. Stevens, seconded by Mr. Egbert, unanimously VOTED that the Membership Affairs Committee, in consultation with the DX Advisory Committee and the General Manager, conduct a review of the DX awards program with the objective of continuing the present level of services and making recommendations for any improvements which may appear desirable and report at the July Board of Directors meeting.

40) At this point Mr. Wicker rejoined the meeting briefly to report that he was being called away due to a death in his family. Whereupon, Mr. Wicker left the meeting, with the sincere condolences of those present.

41) Moved by Mr. Milius, seconded by Mr. Sullivan, that the Membership Affairs Committee study the feasibility of establishing revised guidelines for the operations of the ARRL incoming QSL bureaus. But, after discussion and learning that such a study was not necessary to resolve a particular situation in the Fourth Call Area, Mr. Milius withdrew his motion with the permission of his second.

42) On motion of Mr. Carpenter, seconded by Mr. Stevens, unanimously VOTED that League Headquarters establish an appointment known as "QSL Bureau Assistant," with appointments to be made by the individual QSL Bureau managers and paper furnished by League Headquarters.

43) The Board was in recess from 10:07 to 10:28 A.M.

44) On motion of Mr. Price, seconded by Mr. McConaghy, unanimously VOTED that the following resolution is ADOPTED: WHEREAS, the Government of the United States has recently reached an agreement with the Republic of Panama relative to the future governance of the Panama Canal Zone, and WHEREAS, under the terms of that agreement the issuance of KZ5 amateur call signs in the Zone will be terminated, and WHEREAS, United States amateurs presently holding KZ5 calls in the Zone also hold other U.S. prefix call signs issued by the FCC, and WHEREAS, present FCC call-sign practices permit an amateur holding more than one call sign to select the one to be designated as his primary station call sign, now, therefore, BE IT RESOLVED by the Directors of the ARRL in Annual Meeting assembled that the General Manager is directed to prepare comments for filing with the FCC supporting the request of Canal Zone amateurs that they be permitted, upon return to the United States, to retain, if they so desire, their KZ5 call as their primary call sign.

45) On motion of Mr. Holladay, seconded by Mr. Arnold, unanimously VOTED that the President is directed to appoint a long-range planning committee for the purpose of reviewing and making recommendations to the Board concerning the programs which the League is and should be providing to its members and to the Amateur Radio Service. This committee shall be composed of designated members of the Board, staff, and knowledgeable individuals from among the League's membership. The committee shall present its proposed plan of action and proposed budget for approval at the July 1979 Board meeting and shall make its final report and recommendations no later than the July 1980 Board meeting.

46) Moved by Mr. Gant, seconded by Mr. McConaghy, to amend Article 4 of the Articles of Association by deletion of the first three sentences and the replacement with the following: "The affairs of the Corporation shall be governed by a Board consisting of sixteen directors who shall be elected for terms of four years by the members eligible to vote. Eight directors shall be elected each alternate year. Implementation shall take place by the election of eight directors to take office January 1, 1980 for three year terms, by the election of eight directors to take office January 1, 1981 for four year terms, and eight directors to be elected for four year terms each two years following. Eight directors shall be elected each alternate year by mail vote in accordance with the Rules and Regulations prescribed by the Board of Directors in the Bylaws." But, after discussion, a roll call vote being required, the motion was LOST. Mr. McConaghy voted in favor; all other directors present voted opposed.

47) On motion of Mr. Clark, seconded by Mr. McConaghy, unanimously VOTED that the Board of Directors endorses the concept of a negotiated agreement whereby representatives of the Amateur Radio Service and the petitioners will seek to establish a

During a break before dinner, ARRL President W2HD (left) and IARU President VE3CJ (right) chat with Buzz Reeves, K2GL, chairman of the ARRL International Council (see text and Minute 36). *(WB4ANX photo)*

viable cooperative agreement regarding operation of amateur vhf repeaters within the so-called Quiet Zone described in FCC Docket 78-352, with any such agreement to be contingent upon withdrawal of the sections of the docket applicable to the Amateur Radio Service prior to the closing date for comment; further, that Director Wicker be designated to serve as the agent of the Board in this matter, employing other members of the Board, staff and membership, at his option, to assist.

48) Moved by Mr. Miller, seconded by Mr. Anderson, that the major technical articles appearing in *QST* be obtained from the amateur community at large as far as possible. These articles should be paid for at the same rate as that paid by other Amateur Radio magazines. The initiation of this program should receive ample advance publication in *QST*. After discussion, on motion of Mr. Price, seconded by Mr. Sullivan, VOTED that the matter is laid on the table.

49) On motion of Mr. Anderson, seconded by Mr. Sullivan, unanimously VOTED that the Management and Finance Committee study the League's expense reporting procedures to assess the adequacy of the information being submitted.

50) Moved by Mr. Zak, seconded by Mr. Anderson, that the President is instructed to appoint a special committee to study and make recommendations concerning the duties and responsibilities of the Vice Presidents with the objective of improving their ability to better serve the organization. After discussion, on motion of Mr. Sullivan, seconded by Mr. Grauer, unanimously VOTED that the matter is referred instead to the Management and Finance Committee.

51) On motion of Mr. Grauer, seconded by Mr. Holladay, unanimously VOTED that the editor of *QST* be encouraged to continue the column about repeaters and FM as often as possible.

52) On motion of Mr. Sullivan, seconded by Mr. McConaghy, unanimously VOTED the affiliation of the Greater Lawrence Amateur Radio Fellowship of North Andover, MA.

53) On motion of Mr. Smith, seconded by Mr. Thurston, unanimously VOTED that the Membership Affairs Committee review the structure of the VHF Repeater Advisory Committee and VHF/UHF Advisory Committee to determine the commonality, if any, of their areas of interest and expertise and to consider a consolidation or restructuring of such committees; the Membership Affairs Committee shall consult with current committee liaison members and chairmen in addition to any other personnel it may choose and submit a report to the Board at the January 1980 meeting.

54) On motion of Mr. Stevens, seconded by Mr. Holladay, unanimously VOTED that the General Manager investigate the possibility of adding to the annual dues card a method of indicating the years of continuous membership in ARRL, the finding to be reported to the July Board meeting.

55) On motion of Mr. Milius, seconded by Mr. Zak, unanimously VOTED that the Membership Affairs Committee, in cooperation with the editor of *QST*, explore the feasibility of establishing a feature column designed to provide personal information on amateurs who have distinguished themselves either in amateur radio activities or in their professional or volunteer activities.

56) On motion of Mr. Price, seconded by Mr. Holladay, unanimously VOTED that paragraph 6 of the Rules and Regulations Concerning Advisory Committees is amended by deleting the fourth sentence and substituting therefor: "The President, in consultation with the Committee Chairman, liaison members and division director of the appointee, on or about November 1 of each year, shall select replacements for members whose terms are expiring, or shall reappoint them for a subsequent term, as appropriate."

57) On motion of Mr. Holladay, seconded by Mr. Miller, VOTED that, consistent with the Board's policy to encourage membership recognition and participation in League activities, articles prepared by the members be selected for publication in *QST*, insofar as possible, with the staff assisting in their solicitation, preparation and editing.

58) Moved by Mr. Gant, seconded by Mr. Smith, that the Membership Affairs Committee study the advisability of forming a Traffic Advisory Committee and report to the Board at the July 1979 meeting. After discussion, on motion of Mr. Sullivan, seconded by Mr. Zak, VOTED that the matter is laid on the table.

59) On motion of Mr. McConaghy, seconded by Mr. Sullivan, unanimously VOTED that in support of the ARRL Hall of Fame, the Headquarters is requested to be as responsive as possible to requests from members for background information on possible nominees.

60) Moved by Mr. Miller, seconded by Mr. Anderson, that the Board refer to the Plans and Programs Committee the study of the feasibility of contracting for the writing of "State of the Art" books in major Amateur Radio interest fields. After discussion, on motion of Mr. Price, seconded by Mr. Arnold, VOTED that the matter is laid on the table.

61) On motion of Mr. Egbert, seconded by Mr. Sullivan, unanimously VOTED that the Board vigorously reaffirms its commitment for the retention of the requirement for demonstration of cw proficiency for an amateur license as currently provided in paragraph 1563 in Article 41 of the ITU Radio Regulations.

62) On motion of Mr. Zak, seconded by Mr. Sullivan, unanimously VOTED that the Membership Affairs Committee study the feasibility of establishing an annual award to encourage and recognize outstanding staff performance, including procedures for implementing such an award.

63) On motion of Mr. Sullivan, seconded by Mr. Egbert, unanimously VOTED that the Board reaffirm its support of the ARRL Foundation by providing administrative services through the use of Headquarters personnel and *QST*.

64) The Board was in recess for luncheon from 12:27 to 1:34 P.M., reconvening with all persons herein before mentioned present except Mr. Wicker.

65) On motion of Mr. Price, seconded by Mr. Holladay, unanimously VOTED to take from the table Mr. Miller's motion concerning a feasibility study of contracting for new technical books. Moved by Mr. Price, seconded by Mr. Thurston, to amend the motion by striking the text and substituting therefor the following: The Plans and Programs Committee is directed to study the feasibility of revising the list of titles in technical books published by the League. The study should include the possibility of contracting with non-staff authors. Until such time as the study is completed, the instruction of the Board to the Membership Affairs Committee relative to new publications of Minute 77 of the July 1978 Meeting of the Board is suspended. The question then being on the amendment, the same was unanimously ADOPTED. The question then being on the motion as amended, the same was unanimously ADOPTED.

66) On motion of Mr. Holladay, seconded by Mr. Sullivan, unanimously VOTED that the Membership Affairs Committee is instructed to study ways and means of encouraging greater participation in and identification with ARRL on the part of the general membership, with initial recommendations to be made at the July 1979 Board meeting.

67) On motion of Mr. Gant, seconded by Mr. Thurston, after discussion, unanimously VOTED that mailing permits issued to division directors in the name of ARRL may not be used for the mailing of individual campaign material.

68) At this point Mr. Clark assumed the Chair, at 2:01 P.M. On motion of Mr. McConaghy, seconded by Mr. Holladay, unanimously VOTED that the Executive Committee Minutes prepared by the Secretary be amended to include an updated figure indicating the current number of active affiliated clubs, by category.

69) On motion of Mr. Arnold, seconded by Mr. McConaghy, VOTED that the General Manager, exercising prudent economic judgement in his selection, be authorized to engage suitable professional fund-raising guidance during 1979, in order to build on the fund-raising efforts already underway. Mr. Grauer requested to be recorded as abstaining.

70) On motion of Mr. Egbert, seconded by Mr. Zak, unanimously VOTED that the General Manager is directed to revise the reimbursement provisions for ARRL Communications Department Officials (CD-180) to include reimbursed travel provisions for the Section Traffic Manager.

71) Moved by Mr. Sullivan, seconded by Mr. Egbert, that the administrative accounts of each director, officer and standing committee of the Board shall not exceed by three percent that year's approved budget without prior consent of the Board of Directors or its Executive Committee. After discussion, on motion of Mr. Price, seconded by Mr. Zak, unanimously VOTED that the matter is referred to the Management and Finance Committee for study.

72) On motion of Mr. Thurston, seconded by Mr. Grauer, unanimously VOTED that the Board of Directors commends the performance and contributions of those amateurs who are actively participating in the Intruder Watch program and instructs the General Manager to give maximum support to this important activity, particularly during the remaining year to the World Administrative Radio Conference.

73) On motion of Mr. Stevens, seconded by Mr. Holladay, unanimously VOTED that the 1977 ARRL Technical Excellence Award for *QST* articles is hereby enthusiastically conferred upon Mr. Wayne Overbeck, N6NB/K6YNB, for his article "The VHF Quagi" appearing in the April 1977 issue of *QST*.

74) Moved by Mr. Holladay, seconded by Mr. Miller, that the General Manager is directed to publish the League's audited financial statements in the pages of *QST*. After discussion, moved by Mr. Price, seconded by Mr. Egbert, to amend the motion by striking the text and substituting therefor the following: The editor of *QST* is directed to annually remind members through the "League Lines" page in *QST* of the availability upon request of the audited financial statements of the League. The amendment was ADOPTED, with Mr. Holladay requesting to be recorded as voting opposed. The question then being on the motion as amended, the same was ADOPTED.

75) The Board was in recess from 3:09 to 3:30 P.M., with Mr. Dannals returning to the Chair.

76) Moved by Mr. Gant, seconded by Mr. Thurston, that Jean A. (Doc) Gmelin, W6ZRJ, is nominated for ARRL Honorary Vice President. Whereupon, Mr. Gant acquainted the Board with the long and extensive service of Mr. Gmelin which, in the opinion of the Membership Affairs Committee, qualified him for this honor. A secret ballot being requested, the motion was ADOPTED, 14 votes in favor to 1 opposed.

77) On motion of Mr. Eaton, seconded by Mr. Clark, unanimously VOTED that the Secretary is directed to cast the vote of ARRL in favor of admission to the IARU of the Amateur Radio Club of Tonga.

78) On motion of Mr. Sullivan, seconded by Mr. Zak, unanimously VOTED that the Board cancels the

interest indebtedness in the amount of $3,875.89 of the ARRL Foundation to the League.

79) At this point the General Manager reported that a contribution in the amount of $1,000 had been received from Peter Borsi, W4HIL. This was Mr. Borsi's second such contribution in recent months. (Applause)

80) On motion of Mr. Arnold, seconded by Mr. Anderson, unanimously VOTED that the General Manager is hereby authorized to reimburse the division directors for actual expenses incurred by them during the year 1979 in the proper administration of ARRL affairs in their respective divisions, up to the amounts as follows: Canadian Division, $7,000; Atlantic Division, $6,600; Central Division, $6,500; Dakota Division, $2,750; Delta Division, $4,000; Great Lakes Division, $4,500; Hudson Division, $4,000; Midwest Division, $4,000; New England Division, $5,200; Northwestern Division, $4,800; Pacific Division, $7,500; Roanoke Division, $6,000; Rocky Mountain Division, $2,300; Southeastern Division, $6,795; Southwestern Division, $6,500; West Gulf Division, $5,500.

81) On motion of Mr. Thurston, seconded by Mr. Zak, unanimously VOTED that to continue the Board's policy of reimbursing Section Communications Managers for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1979 a total amount not to exceed $21,000 under terms prescribed by the Communications Manager, following the general pattern established by the Board.

82) On motion of Mr. Arnold, seconded by Mr. Egbert, unanimously VOTED that to continue the Board's policy of reimbursing QSL Managers of the League for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1979 a total amount not to exceed $4,000 under terms prescribed by the General Manager, following the general pattern established by the Board.

83) On motion of Mr. Stevens, seconded by Mr. Anderson, unanimously VOTED that to continue the Board's policy of reimbursing Section Emergency Coordinators for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1979 a total amount not to exceed $9,000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

84) On motion of Mr. Egbert, seconded by Mr. McConaghy, unanimously VOTED that to reimburse Section Traffic Managers for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1979 a total amount not to exceed $9,000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

85) On motion of Mr. Sullivan, seconded by Mr. Thurston, unanimously VOTED that to continue the Board's policy of reimbursing National Traffic System Officials above the section level for certain approved travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1979 a total amount not to exceed $6,000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

86) On motion of Mr. Egbert, seconded by Mr. Anderson, unanimously VOTED that the additional sums of $612.32 for the Canadian Division, $299.70 for the Atlantic Division, $1,025.63 for the Central Division, $300.01 for the Hudson Division and $336.56 for the Roanoke Division are authorized as additional reimbursible expenditures during the year 1978.

87) On motion of Mr. Arnold, seconded by Mr. McConaghy, unanimously VOTED that the Board expresses its appreciation to the Delta DX Association for their donation of $500.00 to the International Goodwill Fund.

88) On motion of Mr. Egbert, seconded by Mr. McConaghy, the following resolution was unanimously ADOPTED: WHEREAS, the outcome of the World Administrative Radio Conference affects the amateurs of the entire world, and WHEREAS, an important factor in success at WARC will be the ability of amateurs in new countries to convince administrations that Amateur Radio can assist in achieving technical development, and WHEREAS, Project Goodwill provides a source of equipment and a training experience to students of Amateur Radio in the developing countries, and WHEREAS, the Dayton Amateur Radio Association has ensured the success of Project Goodwill through its gift of $10,000, now, therefore BE IT RESOLVED by the Board of Directors of the American Radio Relay League in Annual Meeting assembled at Miami, Florida, this 25th day of January, 1979, does hereby heartily commend the Dayton Amateur Radio Association for its generous contribution to worldwide Amateur Radio.

89) On motion of Mr. Stevens, seconded by Mr. McConaghy, unanimously VOTED that the Board endorse the article in May 1977 *QST* entitled "A Fully Automatic Morse Code Teaching Machine" written by Howard Cunningham, WA9VRU, and the article in September 1977 *QST* entitled "Update Your HF MUF Predictions Daily" by Howard J. Sartori, W5DA, for Honorable Mention in the consideration and selection of a winner for the ARRL Technical Excellence Award for 1977.

90) On motion of Mr. Stevens, seconded by Mr. Holladay, the following resolution was unanimously ADOPTED: WHEREAS, nothing is more important to radio amateurs than the World Administrative Radio Conference, and WHEREAS, the fates and fortunes of amateurs in the developing countries are of importance to all amateurs in achieving success at WARC, and WHEREAS, the IARU Receiver/Transmitter Project promises to aid amateurs in developing countries in demonstrating the usefulness of the amateur service to their administrations, and WHEREAS, the matching fund provided by the Northern California DX Foundation greatly stimulated the success of Project Goodwill, now, therefore BE IT RESOLVED by the Board of Directors in Annual Meeting assembled at Miami this 25th day of January, 1979, does hereby commend the Northern California DX Foundation for its generosity, farsightedness, and goodwill.

91) On motion of Mr. Stevens, seconded by Mr. McConaghy, unanimously VOTED that the Membership Affairs Committee in conjunction with the ARRL Awards Committee study the possibility of establishing an award in the memory of Sam Harris, W1FZJ, a vhf pioneer.

92) On motion of Mr. Price, seconded by Mr. Thurston, unanimously VOTED that the Board expresses its appreciation to the Dade Radio Club for the hospitality and courtesy extended to the Board Family during the January 1979 meeting.

93) On motion of Mr. Price, seconded by Mr. Sullivan, unanimously VOTED that in order to reimburse the President for expenses incurred in the proper performance of his duties during 1979, the General Manager is hereby authorized to pay during the year 1979 a total amount not to exceed $10,000, following the general pattern established by the Board.

94) On motion of Mr. Price, seconded by Mr. Gant, unanimously VOTED that John Sullivan, W1HHR, is appointed parliamentarian of the Board for the year 1979.

95) On motion of Mr. Price, seconded by Mr. Eaton, unanimously VOTED that B. Robert Benson, QC, VE2VW, is appointed ARRL Counsel for Canada for the year 1979.

96) On motion of Mr. Holladay, seconded by Mr. Zak, unanimously VOTED that Robert M. Booth, Jr., W3PS, is appointed ARRL General Counsel for the year 1979.

97) On motion of Mr. Holladay, seconded by Mr. Thurston, unanimously VOTED that the ARRL Board of Directors strongly supports the continued availability of the 220 MHz band for amateur use and that the Board opposes any sharing arrangements which are incompatible with continued amateur use of this band. At this point Messrs. Huntoon and Steinman left the meeting.

98) On motion of Mr. Clark, seconded by Mr. Eaton, unanimously VOTED that the Board of Directors on behalf of the entire membership of ARRL expresses deep appreciation to the many members of the amateur fraternity worldwide who have assisted and continue to assist in preparation of the amateur position for the World Administrative Radio Conference, and have indicated their wish to make their important contributions without fanfare or publicity.

99) On motion of Mr. Smith, seconded by Mr. Zak, unanimously VOTED that the Board of Directors instructs the International Affairs Committee to review with the President of IARU the level of support needed to conduct preparations for the 1979 WARC during the remainder of the year, and to furnish recommendations in a written report to the Board of Directors; further, that the International Affairs Committee is instructed to intensify its involvement in and monitoring of WARC preparatory activities during the balance of the year.

100) The Board was in recess for dinner from 5:55 to 8:17 P.M., reconvening with all persons herein before mentioned present except Messrs. Steinman and Wicker. All those present were given the opportunity for informal closing comments.

101) On motion of Mr. Baldwin, seconded by Mr. Arnold, unanimously VOTED that the application of the Radio Amateur Club of Knoxville for a Tennessee Section Convention in Knoxville, Tennessee, May 26-27, 1979, is approved.

102) There being no further business, on motion of Mr. Sullivan, seconded by Mr. Thurston, the Board adjourned, *sine die* at 9:44 P.M. Total time in session as a Board, 17 hours, 21 minutes; as a Committee of the Whole, 2 hours, 9 minutes. Total direct authorizations, $145,519.22.

Respectfully submitted,
Richard L. Baldwin, W1RU
Secretary

MINUTES OF EXECUTIVE COMMITTEE MEETING

No. 373
January 23, 1979

Pursuant to due notice, the Executive Committee of the American Radio Relay league, Inc., met at 2035 EST on January 23, 1979, at the Airport Ramada Inn, Miami, FL. Present: President Harry J. Dannals, W2HD, in the Chair; Vice President Victor C. Clark, W4KFC; Directors Max Arnold, W4WHN, Richard A. Egbert, W8ETU and Robert B. Thurston, W7PGY; and General Manager Richard L. Baldwin, W1RU. Also present were a number of other directors, vice directors, officers and staff.

On motion of Mr. Egbert, the Committee recognized the names of 1551 individuals who had recently been elected to Life Membership, and instructed the General Manager to list their names in *QST*.

On motion of Mr. Clark, the Committee approved the affiliation with the League of the following Amateur Radio societies: Allegany Highlands Amateur Radio Club, Belmont, NY; Amateur Radio Club of Mt. Vernon, Mt. Vernon, IL; Bruce Amateur Radio Club, Ontario, Canada; Buffalo Radio Amateur Group, Buffalo, NY; Central Columbia School District ARC, Bloomsburg, PA; Escondido Amateur Radio Society, Escondido, CA; Guadelupe Valley Amateur Radio Club, New Braunfels, TX; Lake Martin Amateur Radio Club, Alexander City, AL; Los Angeles ARC Electronic Assn., Los Angeles, CA; Maryland Amateur Radio Assn., Rockville, MD; Matagorda County Amateur Radio Club, Bay City, TX; Mazama School Communications Club, Klamath Falls, OR; Minuteman Repeater Association, Lexington, MA; Morton Amateur Radio Club, Morton, IL; Omik Amateur Radio Club, Chicago, IL; Ouachita Amateur Radio Association, Mena, AR; Paynesville Amateur Radio Association, Paynesville, MN; Pend Oreille Amateur Radio Club, Newport, WA; Rock Bridge Amateur Radio Club, Glasgow, VA; Southwest Radio Society, Inc., Dallas, TX; Triod Amateur Radio Club, Murphy, NC; Western Carolina Amateur Radio Society (II), Greenwood, SC; Wilderness Trail Amateur Radio Club, Berea, KY; Williamson County Amateur Radio Club, Leander, TX; U.S. Center Amateur Radio Club, Smith Center, KS; Yeshiva of Flatbush High School ARC, Brooklyn, NY.

On motion of Mr. Arnold, the following convention dates were approved: Wisconsin State, May 19, 1979, Lake Delton, WI; Arkansas State, August 4-5, 1979, Little Rock, AR; West Gulf Division, October 5-7, 1979, Houston, TX; Southwestern Division, October 19-21, 1979, Anaheim, CA; Roanoke Division, October 20-21, 1979, Norfolk, VA.

On motion of Mr. Egbert, the Committee ratified its earlier mail vote authorizing the General Manager to accept financial support from the Amateur Radio Manufacturers Association in furtherance of the ARRL efforts to overturn the FCC decisions in Dockets 21116/21117.

On motion of Mr. Thurston, E. Laird Campbell, Senior Staff Assistant, was authorized to sign checks on behalf of the General Manager.

In accordance with previously established Board policy, the General Manager reviewed the status of actions taken on motions adopted at the July 1978 Board meeting. In addition to the completed items reported in the Minutes of the September 17 and November 19, 1978, meetings of the Executive Committee, action has been completed on Minutes 22, 42, 51, 59, 69, 71, 73, 74 and 87. Action is in progress on Minutes 21 and 32.

On motion of Mr. Clark, the Committee voted to take no further action in respect to the membership of Sam McCluney.

During the course of the meeting the Committee discussed, without formal action, various matters of litigation involving the League, the date of the next Executive Committee meeting, additional insurance programs for members, the retention of KZ5 call signs by the present holders when they return to the States, the program for the 1979 National Convention, and a previous Board action regarding publication of a guide for amateurs in dealing with antenna problems involving local zoning.

There being no further business, the Committee was adjourned at 2141.

Respectfully submitted,
Richard L. Baldwin, W1RU
Secretary

The New Frontier

The World Above 1 Gig

Conducted By Bob Cooper Jr.,* W5KH

Making "Impossible" Things Happen

While musing through my 50-plus year collection of *QST*'s one recent, cold early-winter evening, my eyes stopped to study the artwork accompanying the "head" of an old "World Above 50 Mc." column. There it was, probably unintentional, but graphic nonetheless: The amateur 50, 144, 220 and 420 bands were clearly shown "bending *around* the earth" while all higher bands were propagating in a straight (as in "line of sight") path. "An old bias" I chuckled, "reflecting more of what we didn't know at the time than what we did know."

Amateur enthusiasts have always been driven by the challenge of DX contacts; of doing something that has not previously been done, and more often than not realizing our goals with equipment designed and constructed on the kitchen table. When we fall short of our objectives we typically back up and look for a new approach. Which is perhaps where amateur achievement excels the most; for often by not "knowing" that we cannot do something we plunge in and do it, much to the confusion of the "professionals." A case in point:

A series of articles I had recently written for a professional journal explored the world of geostationary satellites (operating in the 4-GHz downlink region) and the television service they provide. An internationally noted space communications scientist had come to visit my satellite terminal installation. "Perhaps by the mid-1980s there will be satellites operating with sufficient transmitting power that you will be able to receive their video signals with that small six-foot dish," he suggested. I smiled and invited him inside to the shack. All of his installations feature 40- to 60-foot parabolic antennas and he was properly proud of their multi-megabuck performance. I asked him if he would like to "see" satellite television from the six-foot antenna. He laughed and said, "See??! You can't see anything on an antenna that small!" I pushed two switches and on twin color monitors the same space-relayed satellite television picture appeared. "Can you tell me which picture is from the six-foot antenna and which from the 20-foot parabolic?" I asked. Both pictures were identical — perfect and noise free. For the next several hours, the original purpose of his visit was forgotten as he pried and investigated what I had done to "make this impossible thing happen." He finally sorted it out. *"Actually, what you have done is remind me that professionals all too often lose sight of the real world. Our microwave systems work and work very well. Sometimes they work too well because we have designed them for contingencies which never or very seldom occur in the real world."*

The world above 1 gigahertz is fraught with professional overdesign "for contingencies that seldom occur." On purpose and for good reason. A commercial microwave link must plan on the worst possible propagation and equipment conditions and still "maintain the link." A 40-dB fade margin for rain attenuation is standard in telephone company links. And because these are largely fm systems, that's 40 dB above full quieting and hard limiting!

This PBS 4-GHz satellite transmission received on W5KHT's six-foot parabolic terminal changed one skeptic's mind about the capabilities of "amateurs."

What about the opposite end of the propagation equation, when we have not the worst possible conditions but rather the best possible conditions? Thinking in "best possible conditions" terms is the amateur's forte. When the ionosphere is blessed with a high muf we utilize its "peak conditions" to work rare DX the "long way around" on 10 meters or we catch the peak hours of muf on 6 meters and work halfway around the world. Using peak conditions we do not yet fully understand, we have communicated thousands of miles across the equatorial regions on 144 MHz and even 432 MHz. Clearly, our strength is in accepting that it can be done and then proceeding to try and try and try . . . until we do in fact achieve our objective.

What should our objective be above 1 gig? To see how far we can work using whatever equipment amateur ingenuity can design, build or "scrounge" in the best of amateur traditions! Equipment? Isn't equipment for above 1 gig complicated, expensive and difficult to work with? Perhaps it was, one day not very long ago. But recent technological breakthroughs have largely changed that — at least in one amateur band above 1 gig. Amateur Gunnplexers operating in the 10,000- to 10,500-MHz band now abound and these little 15- to 40-mW rigs are rewriting the textbooks for amateur communications in the 3-cm band. How so?

The "hot spot" on earth for 10-GHz amateur activity is without question England, where G3RPE and numerous others have created a virtual "national effort" to activate hundreds of stations on this band. Beacons for propagation test purposes are in 24-hour operation and a whole new knowledge base is being created. The world's record for the moment at 3 cm is 521 kilometers (323.75 miles), held by a UK station, incidentally. (The best U.S. effort to date has been 426 km or 264.72 miles.) Much of the work has been done along the English seacoasts, taking advantage of "peak propagation" humidity ducts forming over water. One- to two-foot parabolic antennas and 10 to 15 mW of power is a typical st tion configuration.

Correspondent VK6NR from the Perth are of Western Australia suggests the 10-GH record may be headed to the Southe Hemisphere shortly (Australians currently hol the 432, 1296 and 2304 tropospheric records Two separate groups in Australia have spe the past "winter" outfitting for an assault c this band. VK6CM has assembled a RocLo system with a 30-MHz i-f. He and VK6N have a 500-mile north-south seapath picked ou along the western Australian coastline. The will attempt a two-way contact using a pair c six-foot dishes on both ends.

Australia provides some of the finest "stab ducting" known to amateurs in the world. O January 17, 1978, at 0755 UTC, VK6W worked VK5QR on 2304.1 MHz, establishing new, 1170-mile record on this "microwav band." The "ducting path" across the Sout Australia Bight (that body of water immediate ly south of the continent) will be or is bein now attempted at 3 cm. It has similar ductin characteristics to the U.S. Gulf Coast area (i.e Florida to Texas), but the paths covered to dat on amateur bands from 52 MHz through 230 MHz have tended to be slightly longer than ou Gulf offers and the conditions are more stable

Are overwater or sea paths essential to lon hauls at microwaves? They certainly don' hurt, but whether they are essential or not re mains to be seen. The present amateur 5.9-GH band record is a 267-mile path from K5PJR t K5FUD. And it was done over some pretty nas ty terrain between northeastern Oklahoma an northern Texas; home station to home statior Yes, it took a duct to do it. Very little is know about over*land* ducts in the gigahertz range and therein is the challenge for amateurs. Us ing a four-foot dish and a 10-dB noise figur front end, this writer has copied numerou high-quality Instructional Television Fixed Ser vice (ITFS) band (roughly 2.6 GHz, wideband TV transmissions from transmitters as fa away as Chicago (700 miles) under ducting con ditions — again, all over land. So until we hav a try at it, we don't really know whether being "inland" is a handicap or not. I'm betting tha handicap is small if present at all.

On This Page . . .

. . . each month we cannot hope to do muc more than cajole you into getting involved i "The New Frontier" of Amateur Radio. The amount of space available here each month wil depend largely on your support of this column This means every now and again you should si down for a few minutes and set down on paper your own efforts and work in this frequency range. If you have circuits to share or lengthy dissertations to offer, don't be frightened away by the amount of space available here. If the material is good I'll find a way to get i distributed. Next month we'll spend some prim space looking at the mini-world above 10 GHz and discussing what is known about long-hau microwave ducting around the world.

*Rte. 5, Box 364, Guthrie, OK 73044

Canadian NewsFronts

Conducted By Ron Hesler,* VE1SH

CRRL Public Relations

As approved by the Board, Directors may appoint Public Relations Assistants (PRAs) within their divisions to plan, administer and coordinate public relations programs, as approved by the Director. The purpose is to encourage grass-roots PR of local, national and international events related to Amateur Radio and to disseminate information via the press, radio and TV.

Among the responsibilities of the PRA are (1) to act as PR advisor to the Director, recommending appropriate programs; (2) to develop and coordinate the PR program in local clubs; (3) to establish and maintain good personal press relations with the major print, audio and visual media in his area; (4) to provide liaison with ARRL headquarters on PR matters; (5) to assist the Director with the preparation and dissemination of communications within his division, including newsletters.

To carry out these responsibilities, PRAs perform the following functions: (1) Contact affiliated clubs to encourage appointment of a publicity chairman with each club. (2) Assist chairman in carrying out an effective program supplying materials available from Headquarters (such as the Publicity Handbook). (3) Seek out and develop significant stories in their area and promote their dissemination. (4) Establish and maintain personal contact with major media in cooperation with club representatives, encourage good press relations among club chairmen. (5) Develop and promote good ideas for community projects and special events to display Amateur Radio to the public. (6) Maintain regular contact with the Director and other PRAs in the division. (7) Distribute locally releases and announcements originated by Headquarters on national stories, supplying a local angle wherever possible. Provide a channel of communication on PR matters to and from Headquarters and the ARRL PR Counsel. (8) Advise and assist the Director in the preparation of division newsletters, convention programs and PR planning for the division. (9) Promote the distribution and showing of League films via schools, community organizations and TV stations in the area.

PRA appointments in Canada are listed in the Table. If you have a newsworthy event, do not hesitate to contact the PRA nearest to you, both for help in best presenting the information to the public and for broader distribution through the PRA.

Films held by the PRAs marked include *Moving Up to Amateur Radio* (aimed at GRS operators moving up), *Hams' Wide World*, and *Fine Business*, a Canadian production. These are available for loan to clubs. *Moving Up to Amateur Radio* is also available for showing by a licensed amateur to a GRS audience.

Anyone interested in assisting the cause by becoming a PRA, please drop a line or send a radiogram to the Director, CRRL, Ron Hesler, VE1SH, P. O. Box 418, Sackville, NB E0A 3C0.

Public Relations Assistants

Camille Maillet, VE1RO
2373 Moran St.
Halifax, NS

Tom McKee, VE3ETM
7140 Matchette Rd.
Windsor, ON N9J 2S3

Rick Proudfoot, VE3ILP
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Percy Crosthwaite, VE5RP
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*Films are available for loan.

RFI/TVI

The Department of Communications has published in color a booklet on *How to Identify and Resolve Radio-TV Interference Problems*. This is based on a similar publication of the Federal Communications Commission in the U.S. The publication is aimed at the owner of the equipment being interfered with, and will help to identify the cause of the interference and corrective measures that can be taken. If you know of anyone receiving interference to his radio or TV, you should suggest to him that he obtain a copy of this booklet from his District DOC office. It also would be a good idea for each amateur to have a copy on file in case of interference problems in his neighborhood. *Radio Frequency Interference*, available from ARRL hq. for $3.50 in Canada and $3 in U.S., contains the complete FCC version of the *How to Identify* booklet.

TRAFFIC TRAINING MANUAL

CRRL has recently published a *Traffic Training Manual* for Canadians, authored by Noreen Simmons, VE3GOL, and Larry Thivierge, VE3GT, respectively assistant SCM and SCM of Ontario. The manual contains clear and concise instructions for proper traffic-handling techniques for stations participating in section traffic nets — with liaison to the region and area nets. It contains three sections — phone nets, slow-speed cw traffic training, and advanced level cw traffic training.

Anyone contemplating traffic handling should obtain a copy. Even experienced traffic handlers can benefit from this publication. Copies are available on request to CRRL headquarters.

EXAMINATION RESULTS

The first amateur examinations using the new format of questions were held in November 1978. The following statistics, courtesy of the RSO News Service Bulletin, are of interest: 66 percent of those writing the Amateur examination failed the theory section, while 61 percent of the Advanced Amateur candidates failed the theory. In the regulations section, 45 percent of Amateur candidates failed while 29 percent of the Advanced candidates failed. Overall, 73 percent of those who wrote the Amateur examination failed, while 65 percent failed the Advanced Amateur examination. These figures refer to results Canada-wide. It should be noted that while the format of the examinations has changed, absolutely no change has been made to the course content.

Across Canada, 12 nonamateurs wrote the new Digital examination and four passed, while 28 amateurs wrote this examination and 21 passed.

HONOR ROLL CLUB

Scarborough ARC, a 100-percent ARRL club, recently elected Jim Ashfield, VE3FOE, president. The club has a membership of about 300, all ARRL members, including a code and theory class of 55. — *VE3AR*

CB CHANNEL 9 FOR EMERGENCY USE ONLY

The Department of Communications advises that General Radio Service Channel 9 may now be used for radiocommunications that concern only the immediate protection of lives or property. According to previous regulation, channel 9 could be used for both emergency and general calls.

During the past year, GRS users and organizations have asked that channel 9 be used for emergency communications only. As a result, the Department published in *The Canada Gazette*, part II, vol. 112, no. 23, an amendment to the General Radio Regulations, part II.

Because of the change, another channel will have to be used as a calling channel. The Department published a Notice in November 18 *Canada Gazette* asking for comments on the need for or the desirability of designating channel 11 as the new calling channel. A decision concerning this designation will be made later. — *DOC News Release*

*Director, Canadian Division

Washington Mailbox

Conducted By Michele Bartlett,* N1AG

Amplifier Ban Amplified

On April 28, 1978, the Federal Communications Commission banned the manufacture and marketing of any external radio frequency power amplifier or amplifier kit which is capable of operation on any frequency below 144 MHz unless the FCC has issued a grant of type acceptance for that model amplifier. Since that time, scores of amateurs have written ARRL and FCC with questions regarding this ban. In December 1978 FCC issued a Public Notice which included the most frequently asked questions, and their answers.

Q. Is it illegal to use amplifiers on 10 meters?

A. No. Amateurs may use amplifiers capable of operating on 10 meters. While this ruling may make it difficult to buy a new amplifier capable of operation on 10 meters, the FCC said it will allow those amateurs with the appropriate class of license to modify an amplifier to restore or include 10 meter capability. However, an amateur may modify no more than one unit of the same model amplifier in any year, without a grant of type acceptance (97.75b).

Of course, as in the past, he could also build his own amplifier, or convert equipment from any other radio service for this use, or buy a used amplifier. He can do this without regard to either the type-acceptance requirement or to the 24- to 35-MHz frequency ban, as long as the individual amateur does not intend to market this equipment, and the amplifier is used at a licensed amateur station. (Amplifiers may be sold on an individual level, as detailed later in this article.)

Q. Can a dealer modify amplifiers to restore their 10-meter capability if he sells them only to licensed amateurs?

A. No. These modifications can only be performed by an individual amateur for specific use by the licensed owner of the amplifier at his licensed Amateur Radio station. Note that you can ask another amateur to modify the amplifier for you, but you are responsible for ensuring that the equipment complies with all the technical requirements contained in the amateur regulations.

Q. What are these?

A. These requirements are listed in part 97 (subpart C — Technical Standards), which can be found in the ARRL *License Manual*. Part 97 also can be ordered from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. The cost is $1.30 and the stock number is 004-000-00338-1.

Q. What type of amplifiers may a dealer sell?

A. Until April 28, 1981, all external amplifiers capable of operation below 144 MHz must be type accepted by the FCC in order to be marketed. A number of amplifiers, manufactured prior to the April 28, 1978, cutoff date, were issued a waiver of the effective date of the new regulations. These may be marketed until April 28, 1979. See "Happenings," February 1979 *QST*, for more details on this waiver.

Q. May I buy or sell a used amateur amplifier that has not been issued either a grant of type acceptance or a waiver, or has been modified so that the grant is no longer valid? What about one that was originally marketed before these regulations were announced, or one that was built from scratch — neither of these two would have a grant or waiver.

A. You may buy or sell an amplifier under those conditions, but there are restrictions which would be valid regardless of whether the amplifier was capable of operation in the 24- to 35-MHz range. Some amplifiers marketed before April 28, 1978 are covered under the waiver if they are the same model which was granted a waiver. An individual amateur may sell his amplifier regardless of grants or waivers, provided that he sells it only to another amateur operator. He may also sell it to a bona fide amateur-equipment dealer. The dealer could sell only those amplifiers that he purchased *used* from an individual amateur operator, and then only if he sold it to another ham.

While the FCC said it does not require proof of licensing at this time, it is the responsibility of the seller of the equipment, whether he is an individual or a dealer (whoever currently owns the amplifier), to ensure that the buyer is indeed a licensed amateur operator, or a bona fide amateur equipment dealer.

Q. What does type acceptance mean?

A. Type acceptance is an equipment authorization granted by the FCC, based on equipment data submitted by the manufacturer, to be used in the proper manner of the service for which it has been accepted (FCC rules and regulations, subpart J, section 2.905a). This acceptance applies to all identical units marketed by the grantee. Amplifiers capable of operating below 144 MHz are the only sort of amateur equipment requiring type acceptance, by the way. Of course, other equipment must meet the FCC standards for purity of emission (97.73). But the manufacturer of amateur transmitting equipment other than hf amplifiers does not need to submit the "specs" or an actual unit for testing purposes unless the Commission decides a model is not meeting FCC standards, and wants to inspec the equipment.

Q. Under what circumstances would FC dismiss or deny an application for type accep tance of an external rf amplifier?

A. Some features which may cause a denial ar (1) any accessible wiring which, when alterec would permit operation in a manner contrar to FCC rules, (2) circuit boards or similar ci cuitry to facilitate the addition of component to change the amplifier's operatin characteristics in a manner contrary to FC rules, (3) instructions for operation o modification of the amplifier in a manner cor trary to FCC rules, (4) any internal or externa controls or adjustments to facilitate operatio of the amplifier in a manner contrary to FC rules, (5) any internal radio-frequency sensin circuitry or any external switch, the purpose c which is to place the amplifier in the transm mode, (6) the incorporation of more gain tha is necessary to operate in the Amateur Radi Service, and (7) any attenuation in the input o the amplifier, which when removed modified, would permit the amplifier to func tion at its designed output power when drive by an rf input signal of less than 50 watts mea power (97.77d, 1-7).

Q. Why was the 10-meter ban imposed?

A. In a news release dated December 1, 1978 FCC said that this action had been taken t "stem the flow of large quantities of amplifier which were being distributed for . . . illegal us on frequencies in and around the Citizen' Band Radio Service."

Q. What is the League's position on this ban

A. ARRL hq. has filed comments in opposi tion to FCC dockets 21116 and 21117, as we as reply comments to reiterate the stand, a peti tion for stay, a petition for reconsideration and repeated urgings in *QST* that members le their views be known to FCC. A suit has bee filed by ARRL in Federal District Cour against FCC on this matter.

[Note: Members are invited to submit ques tions to be answered in "Washington Mailbox." Questions appearing in this columr are typical of those frequently asked of FCC and other agencies. Answers, prepared a ARRL, have been approved by FCC staff. In terpretations contained herein concur wit those of FCC's Personal Radio Division an Technical Standards Branch. Numbers i parentheses refer to specific sections of the FCC rules.]

*Membership Services Assistant, ARRL

International News

Conducted By Bruce Alan Johnson,* WA6IDN

Jambo! Report from East Africa

Nairobi, Kenya — Some of the tribes in this part of the world have a Swahili saying they're fond of: "Until you have crossed the river, don't insult the crocodile's mouth." I asked a high-ranking Kenyan government official what this meant to these tribes. He answered: "Until you have taken the risks of crossing over into another man's or another people's way of life, don't criticize, don't judge harshly."

This official was an educated African who held great hope for the future of his country, and who is highly respected by Kenyans who know him. We talked further, and a great deal of our conversation was centered on Amateur Radio. "The time is now right," he said. "Many African nations are beginning to recognize the great merits of Amateur Radio, and are coming to see the tremendous value it offers to their people." He paused, and continued. "You must remember that the African does not view his life in the same way as a Westerner. He does not see Africa as one unified continent, but rather as a great, large land of many differences: climate, geography, language, and most of all, *problems*. For so many Africans on this grand continent, life means barest subsistence, and a meaningful life is one in which one can meet the needs of one's family — the vital core of African life. The very concept of 'hobby' is foreign to us. What does this mean, 'leisure time'?"

Amateur Radio here in Africa isn't viewed as a hobby. It's seen as much more than that, and in this greater overview lies the hope of its future growth. To enlightened governments, such as that of the Republic of Kenya, it's a means of creating a corps of self-trained technical experts so vital to a developing nation's telecommunications and technical growth. Too, it's a perfect source for an emergency communications network. And, of course, it's a *system* by which a country's youth can be occupied and directed. In this latter sense, African schools are interested in promoting Amateur Radio.

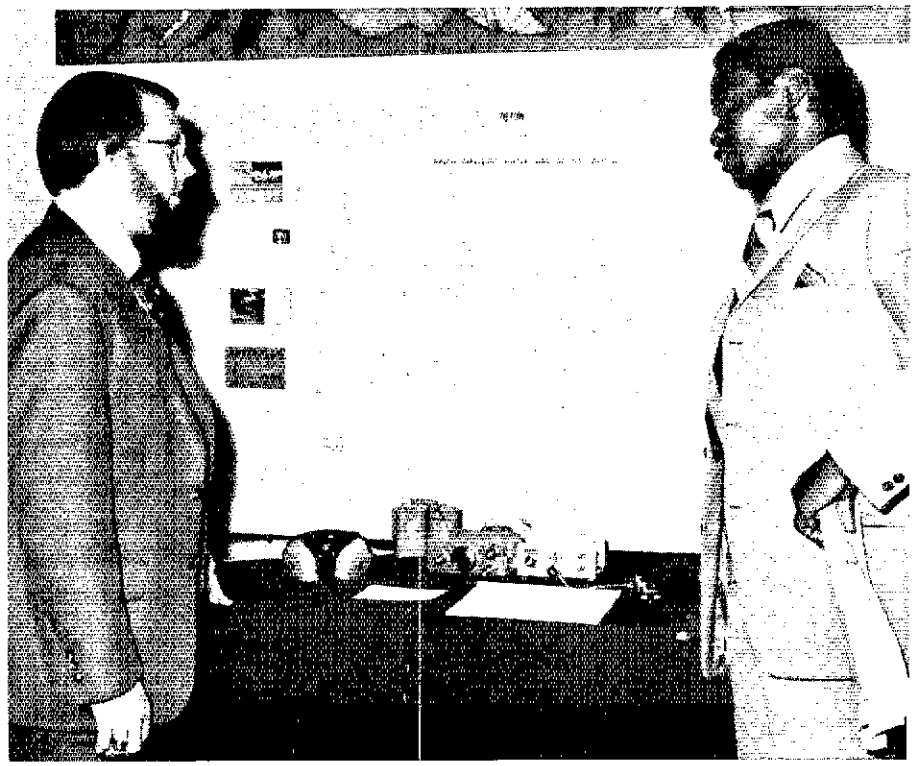
But what approach does an IARU member-society, such as the Radio Society of Kenya, take in defining what Amateur Radio is to young native Kenyans? Well, to be sure, all of the definitions we mentioned above are useful. Yet there's something more in African life which welcomes with open arms the concept of Amateur Radio: the power of the spoken word. (We don't mean necessarily just those words evocated by the human vocal cords, but that expressed *actively* through drums and music as *well*.) Said a Kikuyu tribesman to me, in response to something about Amateur Radio I had shown him in a book, "Yes, I know what it says there. But now tell me with your own voice, and I will believe you." This tradition goes deep in African history and culture, and for this reason, communication is quite important to the people. Focusing on the person-to-person communication offered by Amateur Radio, the Radio Society of Kenya finds that there is notable interest.

The Kenyan administration very recently began again to license nationals. Pictured elsewhere on this page is Mr. Gad Acholi, now the proud bearer of call sign 5Z4RY. He worked hard for this license, studying regularly with the RSK until he successfully passed the theory, regulations, and Morse examinations. He then had to await a security check by his government before being granted his call. And then, he faced a problem common to nearly every African aspirant to an amateur license: How could he afford a station? Even if he were able to locate some used equipment, its price would be *many* times that which an American or Canadian would pay. Project Goodwill was the obvious answer (see *QST*, October 1978, page 59, and January 1979, page 58). The Department of State Amateur Radio Club (W3DOS) has come forth and enthusiastically sponsored a Project Goodwill cw station for 5Z4RY. Gad's out this week collecting batteries. Listen for him around 14,025 kHz!

During mid-January, the RSK and IARU jointly hosted a reception one evening for Kenyan government officials and Nairobi residents who were interested in learning more about Amateur Radio. Here are some of the questions put to us by those who attended: What can be done to better promote Amateur Radio among African young people? You *really* don't need a thousand watts to talk with hams in other countries? Those IARU kit sets there: will they work as well up in the bush country as they do here in Nairobi? Why are the exams so difficult? Morse code is fun, but will we find many others in different lands who like it, too? And from a pleasant Kenyan woman who plans to take her test in June (Kenyans and many other Africans can take the tests only twice a year): Do you really think there's some person or club in North America who would sponsor a little station for me?

And so the travel through Africa continues — encouraging the IARU member-societies, meeting with enthusiastic amateurs in other African countries where no society yet exists, and with receptive government officials who see the far-reaching values offered by the Amateur Radio Service. As one young African amateur put it, "We hams must show that Amateur Radio plays such an important role in Africa's future, and can break down barriers between our people!" QST

IARU Assistant Secretary Bruce A. Johnson, WA6IDN/5Z4ARU, shows Mr. Gad Acholi, 5Z4RY, a sample station identical to the one donated to him by members of the Department of State Amateur Radio Club, W3DOS. *(photo by Radio Society of Kenya)*



*International Services Officer, ARRL, on assignment in Africa for WARC preparation.

Correspondence

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

COMPENDIUM OF ILLS

In the compendium of ills and evil practices in the "Correspondence" column of December 1978, one technique was missing: the tendency of high-powered stations to usurp a frequency by sheer power without regard for FCC regulations. More and more often two new arrivals to an occupied frequency remark, "Let's turn on the linears and we'll clear the frequency." Since mobile stations usually run low power, the frequency they operate on is particularly susceptible to this abuse. Here is a typical case I witnessed while I was participating in a mobile net. A mobile op, not a member of the net, answered a CQ sent by a fixed, high-powered station. Despite being informed several times by net control and others that he was interfering with a QSO, the mobile persisted in transmitting. This is a different side of the coin than that described by W2TLC. The moral is simple: Let's dispense with the semantics and obey the regulations as they are interpreted by the majority of hams. — *Alexander Marion, W2CUE, Great Neck, NY*

As a former CBer of 14 years and just now a prospective ham, I find it a bit disheartening to hear some of the things coming across the amateur bands these days. I hear sidebanders bad-mouthing those on a-m and vice versa. These are not casual opinions about so-called pros and cons of either mode but attitudes of inconsiderate expression or outright contempt. Are not all hams, regardless of preferred mode, on the air to enhance the art of radio and share the miracle of this communication in friendship? Without simple acceptance along with respect for fellow stations, the spirit of unity in Amateur Radio is threatened. Perhaps the FCC needs to authorize specific frequencies for each group of operators. Such a measure should not be necessary if there is a gentlemen's agreement to uphold harmony. — *Bill Wolf, Newark, NJ*

I had always heard that the Amateur Radio brotherhood was a fair sampling of the human community. After the events in Jonestown, Guyana, I no longer doubt that our representation is complete. — *Hunt Turner, KØHT, Berthoud, CO*

MORE ON 220

Most people would hardly think of 220 MHz, much less think of giving it to Novices. This part of the spectrum would be ideal for them. As K1ZZ stated ("It Seems to Us," November 1978 *QST*), the Novice conveyed 2-meter privileges in 1968, then in 1972 gave up 2 meters for 10. Why then did the Novice not get 220 also in return for 2? As for Technicians; I believe they should have had Novice privileges from the beginning. After all, who else needs code practice other than a Novice? — *Matthew Stennett, WA4TKG, Atlantic Beach, FL*

I don't want to see an almost giveaway license with phone privileges. By adding phone privileges you will not only be creating a darn close copy to a basic amateur license but it would take away the learning incentive for the Novice licensee. I suggest hitting the 220 problem at the club level. Clubs have the power to do much with the band if interested. — *Dan Marler, K7REX, Boise, ID*

I believe it would become a hangout for untrained operators who have no intention of upgrading. A possible solution would be to have a two- or three-year nonrenewable license with a portion of 220 for simplex. Unless this proposal is reworded, I will not renew my membership. I admit 220 MHz needs a shot in the arm but not shot to death. — *Vince Forbes, WB9WAX, Carpentersville, IL*

I oppose the phone privilege idea. This would lead to lack of motivation to upgrade, unscrupulous volunteer licensing practices, another band full of useless chatter with little or no discussion of radio theory and pertinent information and often unenforced obscenities. — *Daniel Thom, WB6DYN, Seal Beach, CA*

Did you really take the time to analyze what this means? The newcomer would study for his license and then once received, would go on to operate 2 meters or 220 until the ticket expired. Is this the way to help the Amateur Service increase its membership? Are we not supposed to be a pool of trained technicians and operators? Novices already enjoy many privileges. Had I had the phone privileges I have now I probably would have gone up to 2 meters and given up on increasing my code speed and electronics knowledge. Picture this example: The newcomer Novice achieves his ticket. He's now faced with a choice; either operate cw (which is still a hurdle because he is still learning) or go up to 220 and operate phone. The average person seeing the difference will choose 220. I think you are doing a disservice to the newcomer and Amateur Radio in general. It would be wise to poll the membership. — *Chuck Reville, K3FT, Timonium, MD*

The FCC now proposes to strip the 220-MHz band away and give it to the Marine Service. As hams we always seem to have to justify our existence, not so when commercialism is involved. Since we are a definite minority, we are entitled to all the prerogatives that all minorities are now striving for and getting in our country. Let us start to apply real pressure by writing to our congressmen and senators. — *Lou Roth, W2DKH, Jamesburg, NJ*

I am greatly concerned about the possible U.S. WARC stand involving 220 MHz and the possible loss or sharing of these frequencies with maritime use (February 1979 *QST*, "It Seems to Us"). Why do they need nine full megahertz of spectrum space? Please apply any and all pressures to keep the 220 band as it is. — *Thomas Maguire, WD8JPP, Ludlow Falls, OH*

[Editor's Note: On January 16, 1979, the ARRL filed a petition with the FCC renewing its request for voice privileges in 220 MHz for Novices. This is in keeping with the July 1978 board action request which had been based on results of a 1975 survey of the membership and comments filed in Docket 20282. See "It Seems to Us," November 1978 *QST* and "Happenings," this issue, for details.]

GOOD PUBS

I am a prospective ham and I have decided that my first step will be to join your organization. Besides the Heathkit Novice course I have your *Antenna Book*, *Understanding Amateur Radio*, *The Radio Amateur's License Manual*, the 1979 *Handbook* and the current issue of *QST*. These publications are extraordinarily excellent reading material. — *Max Cochran, Norman, OK*

Thank you very much for the new *Handbook*. I haven't had a lot of time to go over much of it in detail but I expressly liked the design examples used in the solid-state rf section. In the 15 years of my association with the ARRL, this is the most significant improvement in the *Handbook* I have ever seen. You deserve hearty congratulations for your successful efforts. — *Rick Olsen, N6NR, San Diego, CA*

HAMFEST TIPS

Here are some thoughts for anyone who looks for bargains at hamfests. Do not overlook the parts houses. One of our local stores had a bunch of magnetic-mount CB antennas which had been damaged. They were offering them for very little money. In most cases the coax was frayed or pulled out from the base, nothing serious that any ham couldn't fix and ideal for conversion to a 5/8 wave for 2 meters. This store was also selling 1000-foot rolls of RG-58 and RG-59 at very good rates. — *Edson Snow, W2UN, Canandaigua, NY*

I feel there should be set rules on hamfests, and their whereabouts should be made clear. I recently attended a hamfest but finding it was difficult. The signs were half the size of *QST*. I find this very annoying. These events should have larger signs that can be spotted and read easily. There should be a town map in the vicinity of the police station with directions marked on it. The sign should include the frequency monitored by the hamfest. — *Gary North, KA1AOR, Forestville, CT*

CHANGING TIMES AND CALL SIGNS

I was first licensed as an Advanced on November 23, 1976. When I applied for a modification of mailing address the date was September 16, 1977, which moved the date of expiration to September 16, 1982. I am about to modify again because I am going to have a new station location. As stated in the December 1978 *QST* (page 62) Advanced class licensees can begin asking for Group B call signs starting January 1, 1979. They further state that no one can request the new call sign before 60 days prior to renewal. I do not want to wait four more years for a group B call. It's not fair! Newcomers not even associated with Amateur Radio at this time will be getting 2 × 2 calls before me and hundreds of thousands of current Advanced class licensees. Please ARRL, help me and the other amateurs who will be penalized for having upgraded too soon or for being too prompt in reporting new station locations and mailing addresses. — *Andrew Henry, WB6DQE, Cudahy, CA*

I wish to go on record as being totally against the new regulation that allows an amateur to keep his call when moving to a new district. In time, this is going to wipe out the numbered areas in our country. This is going to make it very difficult for foreign stations who are looking to work all states. Having lived and operated overseas myself I know how important it is to be able to tune around the band and listen for certain call areas as a means of getting into a particular area of the country. In its attempts to deregulate Amateur Radio, the FCC has gone too far. — *James Hoffer, WA8OVC, Marshall, MI*

I would like to suggest a solution for the ham who moves permanently into a new call-sign district but would like to keep his same call and still acknowledge his new location. On voice he would use his call followed by the word "permanent" followed by the new district. For example: If I were to move to California I would say, "K3MS permanent 6." For cw, I would send "K3MS/6" and would indicate in the QSO that I was permanent in California. — *Mark Steiner, K3MS, Prospect, PA*

Congratulations to the FCC for their fine consideration of the Advanced class licensee. I've always thought that it's human to commit errors but to try to correct an error with another blunder is not a matter for praise. I've just renewed my license and will have to wait another five years to get a Group B call sign. I'll be 70 then and will remember Archimedes when I exclaim, "Fureka!" — *José Buttrago, KA4CWD, Ocala, FL*

The World Above 50 MHz

Conducted By William A. Tynan,* W3XO

A Model for Other VHF Clubs

On January 20 of this year, a group that has had a tremendous influence on vhf operation both here and abroad celebrated its 30th anniversary. It lays claim to being the oldest as well as the largest (excluding a few fm-oriented organizations) vhf club in the world, boasting some 200 members. Its straightforward designs for converters and transverters have helped populate the bands with ssb and cw signals not only in its own area but far and wide. You have probably guessed that I am referring to the Rochester VHF Group. The success of this upstate New York assemblage of vhf enthusiasts can be gleaned by perusing the results of the VHF Sweepstakes over the years. Consistently, the Rochester VHF Group has been in the runner-up spot, second only to the prestigious Mt. Airy VHF Society, the Pack Rats. One of these years they may tip the scales and beat their Philadelphia-area rivals.

But the real mark of a radio club's accomplishment is not to be found only in its contest totals. What really counts are the contributions it makes to its community and to its chosen specialty. The program this group has mounted to get people on vhf certainly places it in the outstanding category. The part of the country which the Rochester VHF Group calls home, while far from being considered the boondocks is, nevertheless, not exactly in the same population category as some of our major metropolitan areas. Imagine what a vhf club using similar organizational techniques could accomplish in populous areas.

Even more important, the Rochester approach shows that a vhf activity base can be built in almost any area. It is important to note that the members of this group are not on the air only during contests; their vhf activity is consistent throughout the year. Then, when the contests roll around, they are ready.

The 30-year record of the Rochester VHF Group stands as a mark for the rest of us to strive to approach.

Happy Birthday, gang!

NEW 23-CM RECORD SET IN AUSTRALIA

Just at deadline comes word of a record-breaking contact on 1296.3 MHz that took place at 2230 UTC December 29, 1978 between VK6KZ/p and VK5MC. The distance was 1310 miles (2109 km). Reports were 559 both ways. VK6KZ/p used 3 watts from a varactor tripler feeding a three-foot dish. The receiver preamp consisted of a BFR-91; location was Walpole, West Australia. At the VK5MC end of the circuit near Millicent, South Australia, a 10-watt transmitter excited a 28-foot dish. Earlier the same day, at 1320 UTC, a 1256-mile (2024-km) contact took place between VK6KZ/p and VK5KK. The latter station was running just 1.1 watt to a 1-meter dish.

Congratulations to the VKs for a job well done.

VHF RADIO PROPAGATION, BY J. D. STEWART, WA4MVI

VHFers are often asked by prospective or recent converts to the world above 50 MHz where they can obtain basic information on the various types of propagation affecting the vhf and higher reaches of the spectrum, along with corresponding operating procedures. Jim Stewart, WA4MVI, one member of that exclusive club comprised of those who have accomplished WAS on 144 MHz, has produced a very worthwhile and well written book explaining in terms the neophyte can understand most of the principal modes of vhf propagation, from tropo to moonbounce. Jim also goes to considerable effort to outline the operating procedures which have evolved over the years to accomplish amateur communication via these propagation modes.

Chapter one contains a brief history of vhf, while chapter two deals with the nature of vhf radio waves and summarizes the characteristics of the various bands. The next chapter goes into propagation in the troposphere and stratosphere, including such effects as knife-edge refraction, tropo scatter and ducting. Propagation via the ionosphere is the subject of chapter four. Effects of the sun on the ionosphere, auroral propagation, transequatorial scatter, back scatter, Es and F2 are among the subjects treated. Chapter five delves into the confusing, to many, subject of meteor scatter, including commonly used operating procedures. Amateur satellites are the subject of chapter six, while chapter seven is a quite complete introduction to EME. In the final chapter, Jim suggests some radio astronomy projects which amateurs might wish to explore.

All in all, *VHF Radio Propagation* should provide a ready answer when old timers are asked for a handy source of vhf knowledge. Maybe some of us who have been around for a few years can learn a few things from it, too. The book is published by Howard W. Sams & Co.

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730, or call 301-384-6736 and record your message.

Table 1

HF Nets of Interest to VHFers

Day	Time (UTC)	Freq. (kHz)	Net Name	Usual NCS	Subject Matter
Sat. and Sun.	1600	14,345	70-cm EME	W1JR	70-cm EME
Sat. and Sun.	1700	14,345	2-m EME	WØSD	2-m EME
Sun.	1700	28,885	Vhf Information	KA5CEB	6-m happenings
Sun.	1800	14,280	AMSAT Int.	WA3NAN	Amateur satellite operation
Sun.	1900	21,280	AMSAT Int.	WA3NAN	Amateur satellite operation
Mon.	0230	3818	Central States vhf	WØTG	Skeds and general vhf news
Tues.	2300	3820	6 Meter Net	K1ZFE	6-m happenings
Wed.	0100	3850	AMSAT East Coast	WA3NAN	Amateur satellite operation
Wed.	0200	3850	AMSAT Mid Continent	WØCY	Amateur satellite operation
Wed.	0300	3850	AMSAT West Coast	W6DOW	Amateur satellite operation

ON THE BANDS

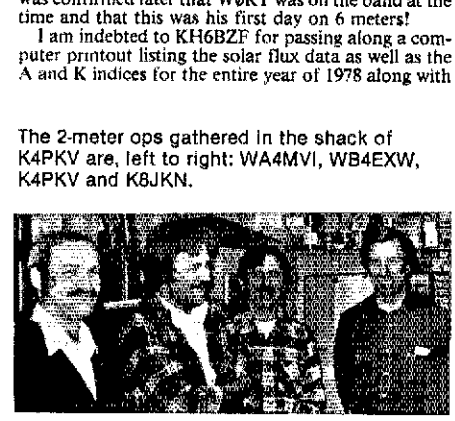
6 Meters — Several have responded to the 6-meter band plan proposed by WA6JRA and published in the October column. One of these is K2YOF. Bud takes exception to this conductor's statement that there was less crowding back in the late 50s. He cites the many who were crystal controlled in the first 40 kHz, although he does admit that there were more stations operating up to 50.5 than is the case today. I agree, Bud, but even though practically no one is crystal controlled now, everyone insists on ganging up around 50.110. Except in huge openings, one seldom hears anyone much above 50.120. One of the problems is that 110 is not used only as a calling frequency. Most of us, when we get an answer, just stay there and yak, preventing others from making calls. I have caught myself doing it! K2YOF goes on to defend the use of 110 as a ragchewing channel, maintaining that if there is activity on it, others listening will have a signal to hear. This is very true, but some other frequency, say 150, could be selected as a working spot, leaving 110 for calling. This way, anyone wanting to monitor could select from two frequencies. If he wants to answer CQs, he can listen to 110, but if he wants merely to get an idea of conditions, he can monitor 150. Some responding to WA6JRA's proposal, including W5UVG, thought Sam was trying to channelize the band, a la fm. I am certain this could not be farther from his mind. I think what he was suggesting was the opposite: His plan, or a variant of it, would spread out the activity by encouraging the gang to stop thinking of 6-meter ssb and cw operation as a one-channel proposition. Others, notably WA7RIB, appear to agree that some type of redirection of our 6-meter operating habits is in order, but took exception to some of the specifics of WA6JRA's proposal. Several noted that only 10 kHz was proposed for beacons and expressed the thought that such a narrow slice is insufficient. Opposition was also voiced to the idea of establishing an exclusive subband for EME, since there is little use of that mode on 6 meters.

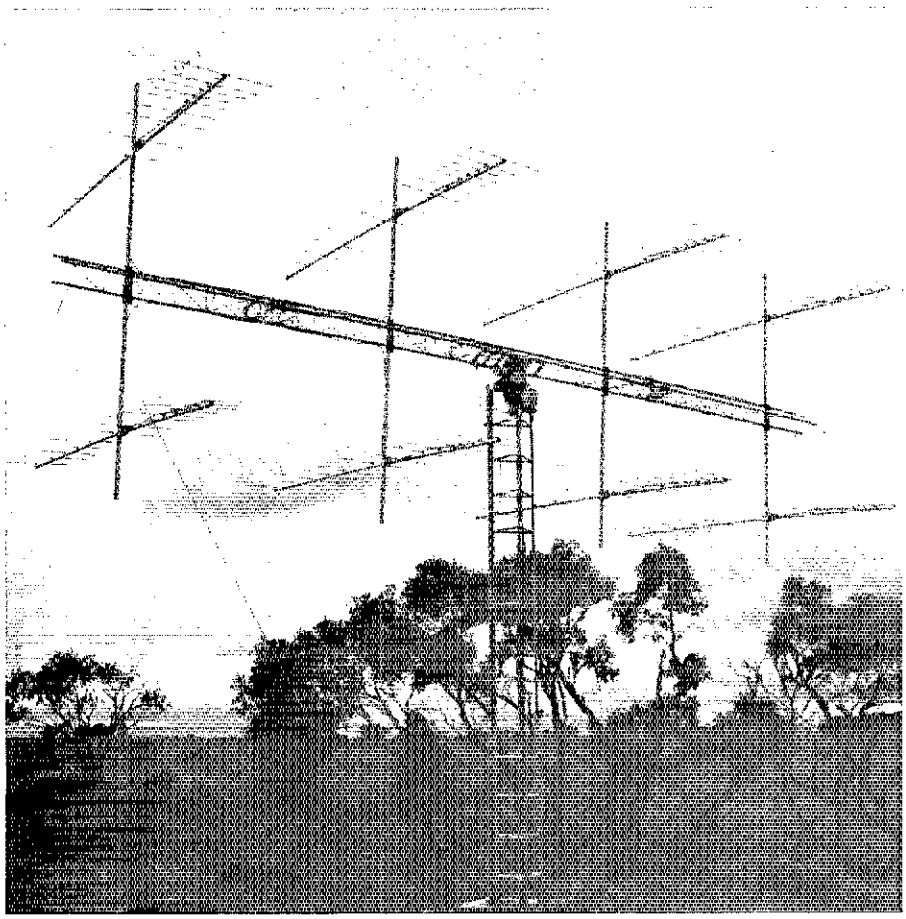
I will try to take WA6JRA's proposal and combine it with a distillation of the various comments received, along with some ideas of my own, and publish a set of proposed, consolidated 6-meter operating guidelines in an early column. In the meantime, it is hoped that WA6JRA's proposal and this discussion will serve to spread out the activity over at least the 50.05- to 50.2-MHz portion of the band. Remember — we can all now operate the entire band, including the cw portion between 50.0 and 50.1 MHz.

From JA3EGE, via K5ZMS, comes news of a JA-to-ZL opening on December 23. Altogether, ten ZLs were involved. Calls mentioned were: ZL1s MQ QI AVZ, ZL2s CD ARW BFC, ZL3s AQ AAD AAN, as well as ZL4LV. It is somewhat surprising, and gratifying, to hear that there is so much ZL activity on 6 meters. Ray also passes along the information that on December 31 between 2200 and 2310 UTC there was an opening between KG6 and KL7 involving KG6s JIH JIX DX JDX and KL7s CDG EOU JAI HMH, as well as AL7C. In this (or another) opening a day or so before, it was reported that KG6DX heard WØRT. It was confirmed later that WØRT was on the band at the time and that this was his first day on 6 meters!

I am indebted to KH6BZF for passing along a computer printout listing the solar flux data as well as the A and K indices for the entire year of 1978 along with

The 2-meter ops gathered in the shack of K4PKV are, left to right: WA4MVI, WB4EXW, K4PKV and K8JKN.





The businesslike EME array at WBØYSG, Harvard, NE. Eight 14-element KLMs are spaced 10-1/4 × 11-1/4 feet.

a summary of the propagation conditions for each month.

W5KHT, our new microwave editor, reports that H44DX on Guadalcanal is now active on 50 MHz. In other DX activity news, KP4ABN says that he is back on the band and notes that KP4s AAN AHX and FFS are also active. Manuel got in on some of the TE activity last fall, which certainly whetted his appetite for more DX.

It is with deepest regret that I report the passing of Robert D. Grimm, K6RNQ. Bob apparently succumbed to a heart attack on January 13 after beginning operation in the VHF Sweepstakes. K6RNQ was well-known to 6-meter operators and held WAS number 68. He will be missed.

2 Meters — The subject of the 2-meter band and how it should be divided among its various users still stirs up spirited, and sometimes heated, discussion. Despite the fact that the VUAC operating guidelines have received extensive coverage on these pages, there yet remains a degree of confusion. The following letter from Steve Powlishen, K1FO, president of the Northeast VHF Association, is being reproduced in the hope that it will clear up some of the misunderstanding. It certainly represents the views of one of the country's top vhfers, one who has been selected to head the organization representing vhf operators in a part of the country in which vhf work dates back many years. Supporting and dissenting views from all parts of the country are welcome, as always.

"At the Annual Northeast VHF Association picnic last August, much discussion occurred about operation on 2 meters. The Association supports the 2-meter band plan, but maybe some clarification is required.

"*Where is it all right to operate cw?*

"Mainly cw operation should be in the cw band (below 144.100). However the success of many DX contacts requires switching to cw when signals fade. We believe that ssb and cw are compatible modes and there is no objection to using cw above 144.1." [I agree. — Ed.]

"*What constitutes a local QSO, and a DX QSO, i.e. use of frequencies below 144.200?*

"As originally defined, local can be considered less than 100 miles. The original purpose of moving above 144.200 was to create a "weak-signal" window, i.e. free of QRM." [Probably ragchew vs. quick contacts, such as in contests, or long haul schedules (greater than about 400 miles) would have been a better division than local vs. DX. One hears many long ragchews over paths of several hundred miles. — Ed.]

"*Where should we run meteor skeds?*

"Anywhere but established calling channels (i.e. 144.100, 144.110 and 144.200). As activity keeps increasing, groups are developing similar to 75-m practice, that hang out on one frequency. Common sense tells one to avoid any local hot spots.

"The use of fm on the bottom end seems to be getting more and more of a problem. The three basic culprits can be identified as follows.

"1) The intentional QRMer chooses frequency such as 144.110. Conversations usually consist of: 'It sure is great to have a frequency that no one uses.' So far they are few enough and weak enough as not to cause much damage.

"2) Fm-only operator looking for escape channel, for some reason has never heard of ssb, and believes he was the first one to have ever made a simplex QSO on 2 meters. They can usually be persuaded to move, although usually will again be found higher in band.

"3) Multimode operator. Catches his buddy, who is 20 miles away, on 144.200. They decide to see how fm sounds tonight and proceed to spend the next two hours ragchewing via fm on 144.200. Naturally, tropo is excellent out to 500 miles on that particular evening!"

The U.S. is not the only place where various users compete for their share of the 2-meter band. In Venezuela, YV5ZZ says that he is running a beacon on 144.010 MHz. He chose that frequency in order to stake out a spot for his EME operations. Apparently, any unused frequency is rapidly gobbled up by fm operators. The beacon runs 4 kW erp, vertically polarized, and is aimed at southern Africa in hopes of receiving some reports from that part of the world. Edgar decries the fact that he feels called upon to protect weak-signal modes in this manner and pleads for some kind of committee in South America along the lines of the VUAC to formulate and publicize band plans or some form of agreement among users of the vhf and uhf bands.

Activity is spreading in the Caribbean. FM7AV informs me that he and FM7AB are both operational on 2 meters and 70-cm ssb/cw. FM7AV's setup consists of 100 watts to a nine-element beam on 2 and a 2C39A producing about 20 watts on 70 cm. FM7AB sports a similar station. Schedules with YV5ZZ and TE attempts with southern South America are planned.

Table 2

Suggested Activity Nights

Day	*Local Time*	*Band*	*Rallying Freq.*
Mon.	2100	2 meters	144.2
Tues.	2100	1-1/4 meters	220.1 (222.1*)
Wed.	2100	70 cm	432.1
Thurs.	2100	23 cm	1296.1
Fri.	2100	13 cm	2304.1

*West coast

After the good results in the Geminids reported last month, WD4MUO VA, took advantage of the Quanrantids in early January to work WØSD SD and KØPAY NE, bringing John's state total to 32. The Geminids were kind to WA4LYS FL, providing Paul with three QSOs in MO (WØRWH, WØRWG and WBØUFQ) and WBØVYV IA.

A number of TS-700 owners have complained of the inconvenience caused by the fact that this popular rig uses lower sideband for cw. This can be changed. I will send details of the modification as published by WØPN in return for an s.a.s.e.

According to the *SWOT Bulletin*, W6WOY of the Northern CA SWOT group is organizing a "Narrow Band Club" for the purpose of constructing a linear translator for installation on Mt. Vaca. From this site ssb mobile contacts from Southern CA to OR and NV should be possible. Progress on the equipment is well along. Speaking of SWOT, the contest sponsored last July by that organization was won by WØRWH MO with 139 QSOs in 19 ARRL sections. Very close on his heels was VE3DJE, with just one fewer contact in the same number of sections. Who says Easterners win all the contests?

70 Cm — During last fall, W1JR conducted a series of early-morning tests to determine what this time of day has to offer in terms of enhanced tropospheric propagation. Joe found conditions quite good on about 25 percent of the days, but, unfortunately, few QSOs over 300 miles were made because of lack of activity. It was quite a chore to get up and get on the air for a half hour of alternate transmitting and listening every day for several months. The experience brought home to Joe the advantages that could accrue if FCC permitted unattended beacon operation.

Another operating project at W1JR involves regular participation in the 2100 local time Wednesday 70-cm activity sessions. Joe says these bring out a good crowd, including a number from the north. These include VE2s LI SH and BBK, as well as K1LPS and W1AIM VT.

For his moonbounce operation, W1JR is trying out a new preamp using an NEC-64535 in essentially the same circuit as his FMT-4575. He offers the schematic to anyone forwarding him an s.a.s.e. According to the *432 EME Newsletter* published by K2UYH, the NEC device is available from WB6NMT. From the same source, it is learned that G4DGU is planning some experiments involving cooling his GaAs FET to the liquid nitrogen temperature of 77 degrees Kelvin. This should cut the noise figure in half. K2UYH agrees that it works but wonders how one gets such an assemblage up at the antenna. Also on the subject of receiving, I8CVS reports replacing his NEC-645 with a V-244, which netted him a 1.5 dB increase in sun noise to 15 dB. JA1VDV notes that the Mitsubishi Electric MGF-1400 GaAs FET equals the V-244 in performance. Aki says he can supply the device to amateurs for a nominal price. Interested parties should contact him directly. YV5ZZ reports following a visit to Argentina that LU3AAT now has his kW final going as well as his NEC-645 preamp. Hugo's only problem now is that he must be able to see the moon in order to aim the antenna. Talk about concentrations of hams, JA6CZD says that there are four EME dishes in operation or under construction within six miles of him. As a demonstration that EME can be worked on 70 cm without monstrous antenna arrays, WBØCOR has provided MN QSOs for W4WD, K3NSS and K2UYH using just four 19-element R1Ws. Dale does plan to go to eight of the Yagis soon, however. Another new station joining the ranks of 70-cm moonbouncers is DL7YCA in West Berlin. He is known to have worked I5MSH and W4WD.

What is reported to be the first 70-cm contact between Australia and New Zealand took place at 0850 UTC January 9, when VK2BQJ and ZL1TAB exchanged 5 × 5 reports.

How's DX?

Conducted By Clarke Greene,* K1JX

Making a List and Checking It Twice

One of the great DX controversies now raging is the growing use of "lists" as an aid to contact DX stations. For those unfamiliar with the practice, we'll give a quick example.

Henry, ZA1AA, shows up on 21.335 MHz one Saturday afternoon. Naturally, everyone west of Tirana begins calling. Henry is the first of a new crop of Albanian Novices, and is clearly unfamiliar with the latest pileup-handling techniques. Though he manages to separate a few calls from the mess, unfortunately, with all the stations calling, few are able to hear ZA1AA at all. Somehow, W1VV manages to make contact with Henry. Being goodhearted, Bill offers to go up the band a bit and take a list of stations wishing to work ZA1AA. Henry knows his limitations, so he willingly takes up the offer. W1VV goes up 5 kHz, where he handles the pileup himself. After he gets 50 or so calls, he moves back down and passes the calls to Henry, one at a time. ZA1AA works these in order, at his own pace. Time permitting, the process repeats itself, turning chaos into organization.

This sounds like an ideal solution. The amateur in the rare country, who through the plain desire for low-pressure operation, can offer contacts to many who would otherwise be unable to work his or her rare country.

The problem occurs not at the DX end, but at the origin of the pileup. Because of propagation anomalies, a station who might be loud in Albania, as in our example, may not be loud at W1VV. The reverse may also be true, slowing up the process. Further, the idea of having someone assist in a contact is distasteful to many. Many people love the lists; many hate them.

Gail, TR8GDC, wrote a strongly worded letter explaining her position on this very subject. Here is an abridged version of what she had to say.

"I would like to make some comments concerning the suggestion put forth by an amateur in 'How's DX' regarding list operations. You asked operators to write in their ideas. But you should have specified the DX station to answer — not only concerning list operations, but all operating procedures, be it zones, nets or ragchews.

"My husband, TR8AC, and I have discussed this at length. We have talked with 3D6BP, ZS3AG and several other DX stations preferring not to be mentioned. Though the points I make in this letter are my own, we are all in general agreement and in definite agreement with the following point.

"Only the DX station knows what he is physically or emotionally capable of doing. It's rather preposterous to ask U.S. operators how they think DX stations should operate, particularly as a large percentage of U.S. operators are totally naive regarding the operating difficulties and pressures faced by the DX.

"The stateside stations had best start putting themselves into the DX station's shoes. Certainly we have reversed the roles and know well the difficulties of the stateside operators. Every minute we are on a net, every second of a five-hour pileup, every moment we allow the breaker to "come on in," we have done so because of empathy for the station needing a new country. Believe me, most of us have worked all states a hundred times over and have no need for working nets, lists or pileups. We do it solely to pass out call signs and confirmations as we know how difficult it is for so many people who need them. But the time is overdue for some reverse perception.

"Start out by tuning into any DX net. Listen to the response when net control says 'standing by for any 4s, are they any 4s on frequency?' The tidal wave of noise that buffets you through your earphones may sound like heaven on earth the first few hours, the first few weeks, but . . .

"Imagine a tropical storm has just blown your two-week old beam off the roof, snapping an element and leaving the others to look like a frozen French fry. Your six-year-old is down with his fourth bout of malaria. You've just killed the third poisonous snake to enter your yard in two weeks. You've worked two hours overtime, only to find a downpour while leaving the office and your windshield wipers don't work. Just for a couple of hours you'd like to escape the tropical paradise you live in.

"You manage to get home, pop open a cold can of beer, pull up a soft chair and tune up the rig. You might try to find an old friend on the air and try to let some of the tensions ease. You tune around the band. 'Ah, there's my friend, Joe.' You give him a yell. 'Hey Joe, good to hear you on,' and Joe comes back, 'Real fine signal, old buddy. How's it going?' Then it starts: 'XYZ, XYZ, this is XYZZ, XXYYYZZZ, do you copy?' 'Are you going to work some other stations tonight?' 'A short one, a short one, please, just a quick signal report.' 'Break, break.' Carriers appear on the frequency. 'Info, info, break for info.' 'XXXYYYZZZZ, do you copy, do you copy? XXXXXXYYYYYZZZZZZZZZ.'

"Great relaxation, right? At times like this, thank heavens you can say 'XYZ, please take a list.' XYZ can go up 5 kHz with the roar and I can continue to operate for another three to four hours, relatively painlessly. If it's really late and a lot of people are still waiting for me it's great to ask XYZ to take a list of stations for me to meet the next night.

"What's so unsporting about a list? I thought the whole idea of Amateur Radio was the challenge of assembling a station, trying to do the best with what you've got, and seeing if you can get into such shape that your signal is capable of being heard X-number of miles away. If you can exchange signal reports between you and the DX then you've met the challenge. The challenge or spirit is not a shouting match between you and your neighbor to see who is loudest to the DX."

It should be noted that Gail is an expert in handling a pileup, when her operating schedule permits. Hers is no narrow-minded opinion.

Gail brings us to the whole point of operating with a list. The modus operandi of the list is for the benefit of the fellow at the DX end. The guy or girl at the DX station has Amateur Radio as a hobby, not a job, just as we do. It is not a responsibility of a resident of a foreign country to get on the air and tirelessly work the thousands who desire to work him or her. The high-pressure operating, the QSL burden and the rudeness of some operators may not fit into a DX ham's desire for relaxation. Many rare stations give out contacts not because of a desire on his or her part to work the world, but out of an appreciation for the DXer's approach to the hobby. He or she may not be interested in the same pursuits, but does respect the other fellow's desires. If the same tact were applied at this end, perhaps all the problems would cease.

Receiving his hard-earned "Bermuda 100 Club" Award is John Bazley, G3HCT (right). The award was presented on behalf of the Radio Society of Bermuda by Allan Davidson, VP9AD. This is only the fifth such award to be presented and the first outside of North America. It was awarded on submission of confirmations for 100 or more contacts with Bermuda amateur stations.

*c/o ARRL, 225 Main St., Newington, CT 06111

KNOW THE OPPOSITION

With WARC-79 coming up it might be useful to know just who it is that regularly plunk their a-m carriers smack in the middle of the DX portions of our bands. (It might also indicate frequencies to avoid while calling "CQ All Asia" in hopes of generating a run of JAs!) *The World TV Handbook* lists:

	kHz	
80 meter cw	3500	Radio Peking, La Voz de Frontera (Ecuador)
	3514	R. Niaga dan Budaya, Indonesia
	3515	Radio Centro, Ecuador
	3522	Radio Maldives (16 kW)
	3535	Fuzhou (People's Liberation Army) China
	3541	RKPDK Bangkalan, Indonesia
75 meter ssb	3778	RKPDK Sumbawa, Indonesia and Tehran, Iran (100 kW)
	3800	RKPDK Jember, Indonesia
	3805	Radio Maubere, Timor
40 meter cw	7010	Radio Peking
	7025	Fuzhou (PLA) China
	7035	Radio Peking
	7040	Radio NYAB, Bhutan
	7050	Cairo, Egypt (100 kW) and Wulumqim, China
40 meter ssb	7150-7300	Over 350 stations between 10 and 500 kW including: BBC; Radio Peking; Germany, VOA; Radio Japan; Australia; Radio Moscow; the Vatican; All India Radio; and others too numerous to mention.
10, 15 and 20 meters		None listed.
Proposed bands		None listed between 10.1-10.2, 18.068-18.168 or 25.110-25.210 MHz.

(Thanks Western Washington DX Club)

DX PORTFOLIO

The Netherlands Antilles has adopted a new call-sign issuing procedure for visiting hams. No longer will a PJ8 or PJ9 call be assigned to the visitor. Rather, the visiting ham will be using his or her call portable PJ2 through PJ7 depending on the island. The application procedure remains the same. Thus, when the former PJ9JT visits Curacao this March, he will be signing WIBIH/PJ2. John will be active on all bands both during the ARRL DX Test and noncontest times.

The winter vacation season will be producing a large variety of DXpeditions, many of which will be taking advantage of the newly shortened ARRL DX Test to run up large contact totals.

K2FJ will again be traveling to Gibraltar. His stay will last for two weeks, from February 22 to March 8. Look for Ken signing ZB2G on 160 through 10 meters.

Next summer, SV1IG and his wife will be traveling through the Dodecanese Islands. From July 1 to August 15, 1979, he will be operating as much as travel and local power restrictions permit. Anastasios will be active on all bands during the period. He also reports that he no longer holds office in the Greek national radio club RAAG, so he can no longer be reached at their address. SV1IG is also planning a trip to Mount Athos for 1980.

For those who keep asking, the lead time for this column is approximately two months. The due date for copy from the editor to ARRL headquarters is the 15th of the second month prior to publication (e.g., copy for March *QST* is due on January 15). As a result, unless information arrives somewhat in advance of this date, it cannot be included in that month's *QST*. Unfortunately, this precludes up-to-the-minute DX information. Perhaps a solution to this can be worked out, but until then, please plan accordingly.

The following amateurs have volunteered their time as QSL managers: KA6CDP, WA8AJG, WB1CPM, WB0YHG and WB0PID.

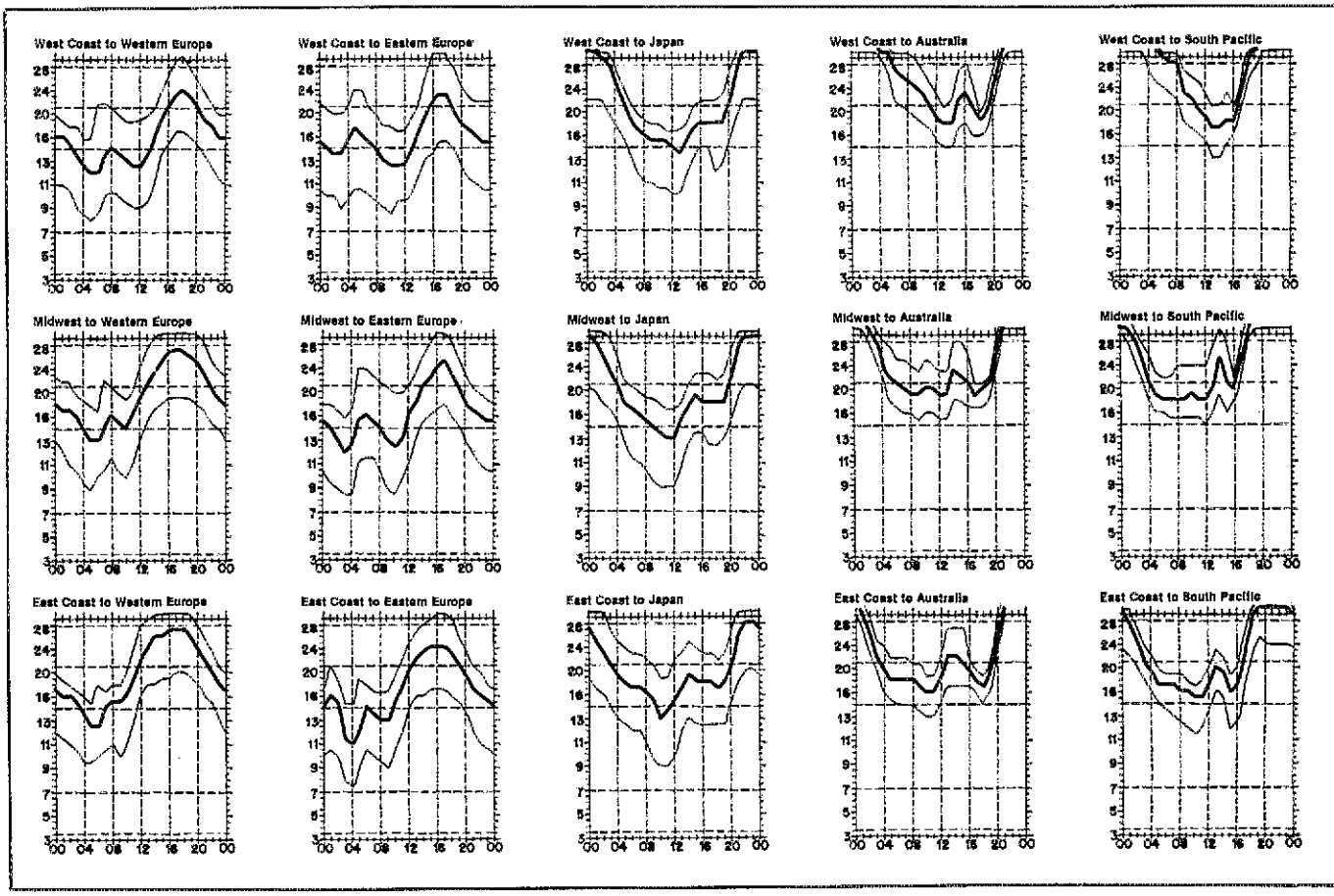
Table 1

The 18 islands comprising the Dodecanese group in Greece.

Rhodes	Astipalea	Lipsi
Kos	Kastelorizo	Pserimos
Leros	Nisiros	Giali
Kasos	Patmos	Halki
Kalimnos	Simi	Alimia
Karpathos	Tilos	Saria

QSL MANAGERS

AH2AB (WB7AZO)
C5AAG (LA7GV)
C5AAO (OZ6MI)
C5AAQ (WA1SQB)
C5ABT (OZ6MI)
CF3AIU (VE3AIU)
CN8CC (F6CVE)
CT2QN (W2KF)
CT8QN (W2KF)
DL2GG/YV5 (DARC)
EJ8H (EI8H)
EP2WR (G3JXE)
FB8X (F6FLZ)



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

FB8ZM (F6BCN)
FØAHY/FG (DJØUP)
HI8XDF (K3SWZ)
HV5GH (SP5GH)
HW7G (FG7AS)
HZ4GNA (WB4LFM)
J3AAG (K1DBA)
J3ABF (K7MKS)
KA1MI (WB1GXU)
KA1NC (WB1GXU)
KH6JFI/KH7 (WA6PYN)
LX1BL (F6ADQ)
OA6AD (WA1YWD)
OY6FRA (bureau)
PJ8NUT (W5NUT)
PJ9CG (AB1U)
SM2ALH/4U (SM2DLZ or bureau)
ST2SA (WA2TFC)
S79MC (N4NW)
S8GEH (WA4HNL)
TJ2P (G4EDH)
TU2ALC (Bureau)
TU2GK (K9KXA)
VKØJC (OZ8AE)
VP2MBV (W7VRO)
VP2MU (VE3HD)
VP8PL (G3LIK)
VP8SB (G3ZMF)
W4LN/PJ7 (W4-QSL Bureau)
W6QL/6Y5 (YASME)
NØTG/KP1 (NØTG)
WØRJU/KP1 (NØTG)
YB3AP (PAØLOU, CQWW only)
ZB2EM (G3JXE, European QSOs only)
ZD9GH (ZS1S)
ZF2AG (N8AG)
ZF2CI (YASME)
ZS3LK (DJ4PJ)
4U11TU (K1ZZ, Oct. 28-29, 1978 only)
4X4CW (WBØYHG)
5W1BP (ZL1VV)
5Z4OM (DJ1TC)
7P8BH (WB9ZZK)
7X2AP (G3STP)
7Z2AP (G3STP)
9L1KB (WB4WHE)
9X5AB (ON8RA)
A9XBJ, Bahrain, Box 14
A9XBR, Box 20212, Bahrain
AP2KS, F6DXE or Box 45, Meknes
BV2A, BV2B, Tim Chen, P. O. Box 101, Taipei
C5AAL, Box 385, Banjul, The Gambia
D4CBS, Box 101, Praia, Rep. Cape Verde Islands
EA9FD, Box 326, Mellila
EP2PZ, Box 2992, Tehran
FH8CL, P. O. Box 50, Dzaoudzi, Mayotte, Indian Ocean
FK8CU, P. O. Box 42, Noumea
HC8A, HC1QRC, Quito Radio Club, P. O. Box 289, Quito, Ecuador
HH2CQ, W4ORT (CQWW only) 1045 Le Brun Drive, Jacksonville, FL 32205
HH2LD, P. O. Box 74, Port-au-Prince, Haiti
HK1MY, Box 1823, Baranguilla, Colombia
HV3SJ, DJØYD, Bruehlweg 24, D-7061, Thomashardt, Germany
K1DZG/VO1, P. O. Box 51, Port Blandford, AØC 2GØ Newfoundland
K6RF, T. Cullian, 7399 N. 95th St., Longmont, CO 80501
KV4AD, Box 2126, St. Thomas, Virgin Islands
NØTG/KP1, R. Rowe, 3237 Connecticut Drive, St. Charles, MO 63301
VP2DAY, Box 00, Dominica, W.I.
VP2DR, Box 28, Roseau, Dominica
XE1EFT, P. O. Box 324138, Guadalajara, Mexico
YASME, P. O. Box 2025, Castro Valley, CA 94546
YJ8JH, Box 665, Port Vila
YJ8KR, Box 557, Port Vila
YJ8YD, Box 196, Santo
ZF2CI, YASME
ZS6ASO, KB4FW, 506 Coulter Road, Brandon, FL 33511
ZX5WD, PY5WD, P. O. Box 63, Curitiba, Pr. Brazil
5B4PA, Box 5009, Nicosia, Cyprus
5H3BP, P. O. Box 1002, Dar-es-Salaam
8P6JQ, 8P6JQ, Saint Peter, Barbados
9K2FP, P. O. Box 177, Kuwait
9X5PM, Marco Poroli, Box 863, Kigali

A big thank you to the following amateurs and groups of amateurs who supply this column with the QSL manager information above: AF2K, American Radio Relay League, DX News Sheet, K1SC, KA1IW, K2TV, K4WSG, KB4FW, KP4AE, KØMSP, Long Island DX Association, OH2BN, PY5WD, SCDXC, Vereniging voor Experimenteel Radio Onderzoek in Nederland (VERON), VE2YM, W1FTJ, WD4AXM, W4KFC, WA4MTZ, W4YKH, W7QMU, WB8CDK, WØRJW, WØYR, WBØYHG, ZL2TX, 3B8CV.

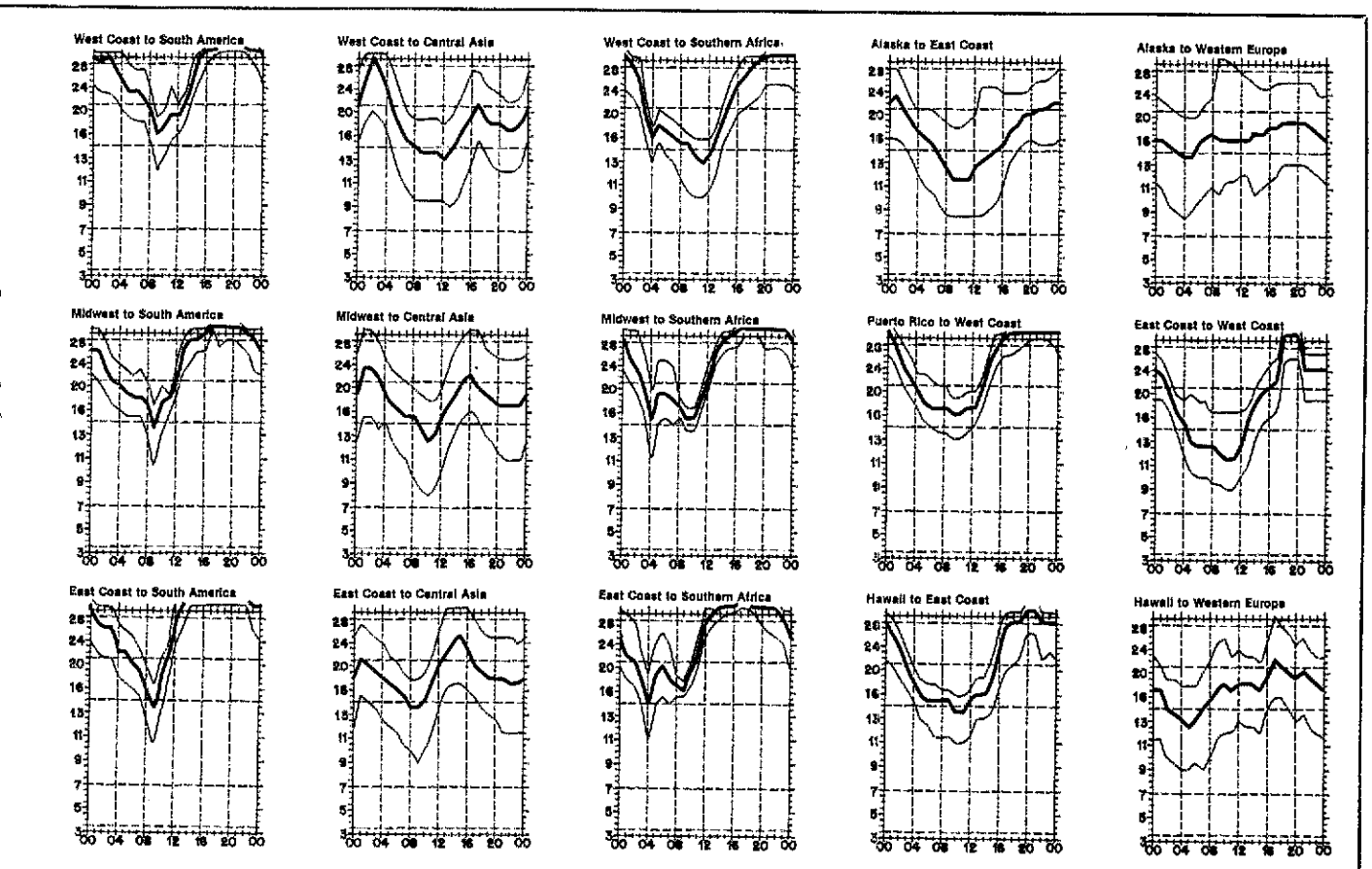
QSL Corner

Administered By Dave DeMaw, KA1BUQ

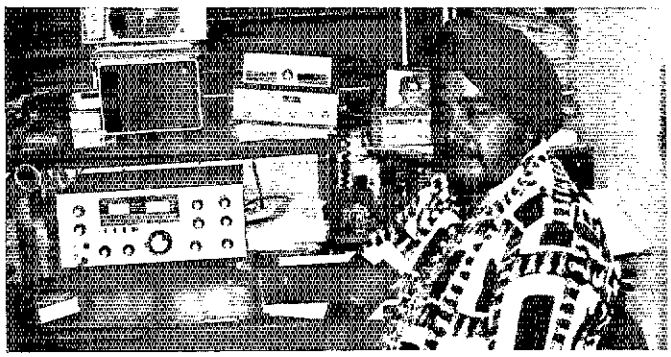
Each of the call areas in the U.S. and Canada has its own "incoming" QSL bureau, and is part of the ARRL DX QSL bureau system. This service is free of charge to ARRL members and nonmembers alike.

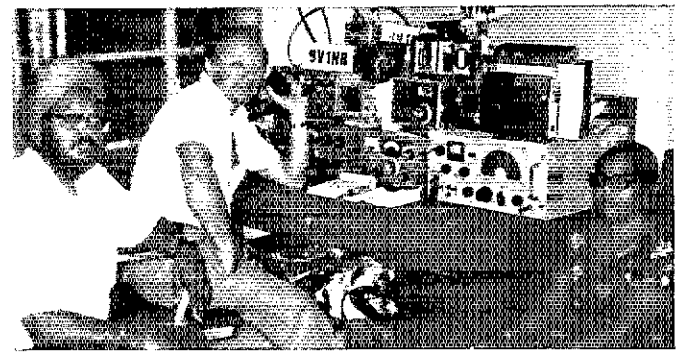
To receive your DX QSLs, send several 5 × 7-1/2 self-addressed stamped envelopes, with your call printed neatly in the upper left-hand corner, to your area bureau. Affix at least one 15-cent stamp to each envelope.

Some "incoming" bureaus sell envelopes or postage credits in addition to the normal handling of s.a.s.e.s. They provide the proper envelope and postage upon prepayment of a certain fee. The exact arrangements can be obtained by sending your inquiry with an s.a.s.e. to your area bureau.



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11, for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Asterisk indicates long-path circuits. Data are provided by the Institute for Telecommunication Sciences, Boulder, CO. These predictions for March 15 to April 15, 1979, assume a sunspot number of 129, which corresponds to a 2800-MHz solar flux of 172.





WA4SKE has recently returned from a round-the-world trip, visiting many active DX stations. On the left is a photo of Artar Singh, 9M2AV. Artar is a QSL manager for Malaysia, residing in Kuala Lampur. The photo on the right pictures the station of 9V1NR. That's Bob Black, WA4SKE, in the center with Dr. Chavan Singh and his wife surrounding him. Both Chavan and Artar can be found on 20 meters around 1300Z, looking for DX.

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: All single-letter prefixes — National Capitol DX Assn., Box DX, Boyce, VA 22620.

☐ Fourth Call Area: All two-letter prefixes — 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, P. O. Box 1460, Sun Valley, CA 91352.

☐ 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.

☐ 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: CRRL Central QSL Bureau, P. O. Box 663, Halifax, NS 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 Ave., Montreal, Quebec H3R 2E3.

☐ VE3 — The Ontario Trilliums, P. O. Box 157, Downsview, Ont. M3M 3A3.

☐ VE4* — W. A. Stunden, VE4BJ, 578 Oxford St., Winnipeg, Man. R3M 3J9.

☐ VE5* — A. Lloyd Jones, VE5JI, 2328 Grant Rd., 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 — CRRL VO QSL Bureau, P. O. Box 6, St. John's, Nfld. A1C 5H5.

*These hureaus 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 December 1975 *QST*, page 64.

Silent Keys

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

W1ALZ, Philip L. Gould, Bangor, ME
WB1GUB, Edwin F. Hattersley, Scarborough, ME
W1KJ, Charles G. McAuley, Lynn, MA
W1NR, Reginald C. Caries, N. Windham, ME
W1OCD, Norbert A. Greenwood, Rutland, VT
W1OKQ, Loren P. Neal, Billerica, MA
K1QZO, Caesar Rosi, Medford, MA
ex-W1RVG, George E. Roberts, Tilton, NH
W1SVH, Carl H. Harris, Stamford, CT
KA2APH, Charles F. Cochran, North Brunswick, NJ
K2DAV, Harry E. Trubenbach, Wallkill, NY
W2EJZ, Clifford C. Chivers, Liverpool, NY
K2IX, Alfred S. Cresse, Cape May, NJ
W2LXV, William C. T. Gray, Yonkers, NY
W2NT, James F. Hackett, Somesville, ME
WA2PSM, Ann E. Blackwell, Toms River, NJ
WA2PWZ, Harlan V. Smith, Newark, NJ
WA2SXM, Lee J. Stone, Pensacola, FL
W2ZF, Theodore G. Heinemeyer, Elizabeth, NJ
W3DUB, Duard E. May, Corry, PA
K3EHQ, James L. Barnes, Philadelphia, PA
*W3EXY, Harold Dillon, Rosemont, PA
WB3FWY, Carl J. Flirst, Rankin, PA
W3FZ, Dean S. Young, Adelphi, MD
W3GXU, Donald A. Rice, Crofton, MD
WB3KIV, Charles F. Marhanka, Edgewater, MD
WB3KKV, Robert P. Brackett, Bethesda, MD
W3KTN, Lester H. Velock, Bryn Mawr, PA
K3VIK, William S. Black, Springfield, PA
W4AQT, John P. McCullin, Cape Coral, FL
K4BM, John A. Paisley, McLean, VA
N4EN/W1ZJJ, Dr. Andrew Peterson, Sneads Ferry, NC
W4LXG, Philip N. Hunter, Winchester, VA
WA4TCL, Alton C. Bennett, Eustis, FL
W4TGO, Edward S. Greene, Germantown, TN
W4WME, William J. Foley, Clearwater, FL
K4YNF, Harold C. Gilliland, Dalton, GA
W4ZL, Harris F. "Buzz" Lund, Ellenton, FL
W4ZW, Arthur S. Fish, Miami, FL
WD5DSV, Barry L. Bolton, Southaven, MS
K5ET, James F. Manship, Tulsa, OK
W5FEL, Ornith H. Richards, Houston, TX
W5JZN, Dr. W. David Stuart, Oklahoma City, OK
K5KVR, Oscar W. McGuire, Cordell, OK
W5PJ, Dr. Shailer Peterson, San Antonio, TX
W5PT, Dr. Olin B. Gober, Temple, TX
WA5WLC, Lawrence A. Hancock, Richwood, TX
WB5YBY, Larry W. Hough, Los Lunas, NM
WA5YGY, Dee R. Kelly, Shawnee, OK
K6FT, James H. Murrill, Santa Ana, CA
WA6GYH, William F. Carleton, Norwalk, CA
KH6IPM, David H. Shaw, Kaneohe, HI
K6JLJ, Roy F. Dawson, San Diego, CA
WA6PJW, Jesse B. Barrs, Chowchilla, CA
W6QVQ, Adolph M. Blanchard, El Cerrito, CA
W6WAG, Leonard M. Williams, Los Angeles, CA
WA6YBL, Donald E. Evans, Hyampom, CA
W7ACD, Louie B. Cox, Cottonwood, AZ
W7CTN, Lionel L. Carrier, Seattle, WA
W7JQ, Ernest H. Morgan, Salt Lake City, UT
W7KNY, Ernst R. Tapper, Sun City, AZ
K7OUF, Merton G. Jones, Troutdale, OR
WA7PUC, John A. Hendrixson, Tacoma, WA
WA7RMZ, Sam Seybold, Nehalem, OR
W7SJR, A. Douglas Slagle, Jr., Las Vegas, NV
WA7VFN, John B. Clark, Warrenton, OR
WA7YCN, James R. Baker, Everett, WA
W8FUM, Joseph E. Favorite, Huntington, WV
W8FUU, Earl T. Halloran, Hinton, WV
WD8KIH, Elward T. Smith, St. Louisville, OH
K8OMH, Pearl E. Allen, Mio, MI
W8PNP, George W. McGohan, Monroe, OH
W8ZB, George M. Withington, Marietta, OH
WA9BMC, Ernest W. Berg, Oak Park, IL
W9DVE, John M. Newman, Elkhart, IN
K9HHJ, Dr. Norman A. Frigerio, Waterman, IL
W9LUZ, Cornelius P. Smith, Winona Lake, IN
W9PQ, Charles B. "Chuck" Diehl, Madison, WI
W9YZR, Victor W. Nickel, Wheaton, IL
WAØEEG, Arlie E. Paige, Parker, CO
WDØEGD, Maurice D. Neuhauser, Kearney, MO
WØKLC, George F. Abel, LaPorte City, IA
WØMU, Kent Ravenscroft, St. Louis, MO
WBØRVC, Edward N. Provence, Wichita, KS
WØRX, Rex G. Howell, Grand Junction, CO
WBØVMV, Richard F. Coon, Iowa City, IA
VE1AKU, Donald T. Sutherland, Kentville, NS
VE1BLU, Harold Wilson Jacques, Berwick, NS
VE1BM, Glen E. Kitchen, Fredericton, NB
VE1QG, N. G. Sweeney, Lewisville, NB
VE3GMW, G. M. Haney, London, ON
VE7WL, R. S. Wild, Victoria, BC
DL3VR, Heinz Behrens, Eschborn, West Germany
F5PW, Pierre Weingaertner, Sautron, France
HC2ZA, R. Zoila Munoz, Guayaquil, Ecuador
PAØED, Johannas Brom, Amstelveen, The Netherlands
ZL2RC, Ronald J. Coakley, Palmerston North, New Zealand
*Life Member, ARRL

YL News and Views

Conducted By Louise Moreau,* W3WRE

Little Things That Count

There is nothing world shaking about one amateur helping another toward that first license; if we look back, we find that we all have done it. There are some instances, however, that don't seem to rank in that standard answer to a request for help but were the result of a realization of a need.

Because a YL cared, a suddenly disabled young man was able to do more than spend the rest of his life lying on his back. In this case, the gal's husband mentioned that a fellow worker was drawing a complete blank in finding some way to interest his son who had fallen and broken his neck and was permanently handicapped. She suggested Amateur Radio and sent a copy of ARRL's *License Manual* and *Learning the Radiotelegraph Code* via his father. A week later, her telephone rang and the boy asked, "Is this right?" and slowly whistled the characters of the code.

From then on she was very busy working with the boy who had to learn to write all over again in order to copy, and lining up local club members to help him understand the questions and theory. Slowly he managed to acquire all that was necessary not only for Novice but General and started plugging towards his Advanced license.

Then there was the gal who said that her log began to look repetitious after she discovered a Novice who was ready to take his General test, but completely ignored the punctuation in code practice. For the next few weeks she spent her evenings on the Novice band just chatting with him and sneaking in all the periods, commas and fraction bars she could at strange intervals. Then she checked his copy by telephone.

Probably everyone can remember, as did one gal from the Midwest, meeting a Novice who was about to sell his station because his license was about to expire and he had failed to upgrade four times. She remembers: "He froze at the words '13 words a minute.' Tell him it was 10 and he could copy 15, but say 13 and send 5 and he blew up!" They worked, she said, an hour a night for weeks. Then, one night when all seemed to be going smoothly, she switched on the receiver as W1AW sent "HR 13 wpm," and he took it like a veteran.

It's a common experience for us to step in and help; for all of us the greatest reward we can ever receive is the special feeling when that happy voice on the phone says "I passed!"

YL PUBLICATION SOURCES

"YL News and Views" has received a number of requests for the sources of material about women in Amateur Radio. Both the books *CQ-YL*, by Louisa Sando, W5RZJ, and *Globe Trotting via Amateur Radio*, by Darleen Magen, WD5FQX (ex-HC2YL) are now in print and readily available. The *QST* articles may be found in your local library's magazine files or those of a local amateur. The *YL Harmonics* references are available only from YLRL members.

YL CERTIFICATES

In answer to requests to "YL News and Views" regarding certificate custodians, requests should be made to the following YLs for full details of mailing requirements. *CLARA:* DX-YL Award — Cathy Hrischenko, VE3GJH. *The Ontario Trilliums:* Marion Course, VE3CLP. *YLRL: WAS-YL Award* — Agnes Helinski, WA3GBJ; *WAC-YL Award* — Miriam Blackburn, W3UUG; *DX-YL Award* — Emma Berg, WØJUV (for YLs only); *YLCC Award* — Onie Woodward, W1ZEN; *DX-YLCC Award* — Phyllis Shanks, W2GLB. All calls are ok in the *Callbook*. The YLRL Continuous Membership Certificate is automatically issued as the gal qualifies in YLRL records.

YLISSB 1979 CONVENTION ANNOUNCED

The 1979 YLISSB Convention will be held in Hot Springs, AR, June 15 through 17, at the Majestic Hotel. Darleen Magen, WD5FQX, has been appointed chairman of this annual event.

NEW YL CLUB — SAYLARC

SAYLARC, the Second Area YL Amateur Radio Club, is the newest statewide organization of YL operators. Organized for the women of New York and New Jersey, this on-the-air club meets each Friday morning at 1400 UTC on 75 meters. The club has plans to hold a cw net for all women who are interested.

1979 officers are President Jean Chittenden, WA2BGE; Vice President Ione O'Donnell, WA2DMK; Secretary-Treasurer Madeline Greenberg, W2EEO; Phone Net Managers Minerva Fronhofer, WB2JNL, and Myra Itchkow, K2YL; and cw Net Manager Mary Davenport, WB2JXF. Membership is open to all women Amateur Radio operators in the second call area. Interested gals should write W2EEO for details.

SOWP YLs

Anny Schwager, DF2SL, is the first German YL to be accepted as a member of the Society of Wireless Pioneers. Through her communications career with the Luftwaffe in the 1940s, Anny has recently qualified in the Military classification. She is the second DX YL member in this organization, the other being Canada's Barbara Bareham, VE3AHV.

Eight YLs from this country have been members: Rose Ellen Bills, N2RE; Louise R. Moreau, W3WRE; Elsie Hermanson, W4CQL; Esther Given, W6BDE; Sophie Heintz, W6SH; Robinette Smith, W6RZA; Carmella Cicerello, W8NAL, and Marie de Forest, WB6ZDR, have been among the society's Honorary Members. Membership is open to anyone who has been employed as a commercial or military radio operator.

*YL Editor, *QST*. Please send all news notes to W3WRE's home address, 305 N. Llanwellyn Ave., Glenolden, PA 19036.

50 Years Ago

March 1929

☐ This issue reproduces the Department of Commerce's new regulations for amateurs — really old hat by now since they simply comply with results of the Washington conference, sadly including loss of 7300-8000 and 14,400-16,000 kc.

☐ The new international rules also make it clear that amateurs are not to handle messages across national boundaries unless each country involved agrees in writing. Such a "treaty" has been concluded with Canada, and the League has urged the Department of State to negotiate similar agreements with additional countries.

☐ Our military liaison now has a new name: Army Amateur Radio System, and a revised operating setup on a national and corps-area basis. Those up in the hierarchy will get crystals to work in nets just outside the ham bands.

☐ Ross Hull continues intensive research into improved gear to meet 1929 needs, and describes an elaborate but effective superheterodyne with two stages of i.f. for good selectivity in both voice and c.w. reception.

☐ Milton B. Sleeper analyzes the status of television, decreeing that the scanning disk has no real future and that electronic systems will require a minimum of 3.5-kc. bandwidth, so that TV channels will have to be assigned up in the megacycle ranges.

☐ The regeneration control most of us still use (despite the influx of superhets) causes annoying detuning effects, and Lew Hatry relates results of experiments trying to lick the problem.

☐ *QST* announces a station description contest, with cash prizes.

25 Years Ago

March 1954

☐ Five of the seven FCC Commissioners, plus two bureau chiefs, visited League Hq. for expanded orientation in the amateur radio field. An extensive presentation by Technical Director Grammer on problems of television interference highlighted the discussions.

☐ Much of the (foreign) commercial operation in "our" bands is in accordance with regulation, the editor points out, since many other countries do not share the Canadian and U.S. view that the 80- and 40-meter bands should be exclusively amateur.

☐ Always probing for new techniques, W2AOE suggests use of delay lines to achieve the necessary phase shift for sideband transmission.

☐ Two Convair engineers have developed a Morse-to-binary converter which will display letters on a cathode ray tube as you send to it.

☐ W1DX shows how we can achieve a selectivity curve that will produce maximum results in voice reception; the ultimate design, which present-day techniques can approach, has practically no "skirts."

☐ FCC has released its formal proposal to establish license fees, indicating a charge of $3 for amateur applications.

☐ W2JXM has a system for using a common antenna in both receiving and transmitting functions without switches or relays; electronically, the transmitter output is isolated from the receiver input, permitting full breakin.

☐ The new 6AN4 tube is inexpensive and yet excellent at u.h.f., so W5AYU and W5HPC have built 420-Mc. amplifiers around it.

☐ W1ICP's aid to the Novices this month provides information on log-keeping, both necessary (regulated) items and additional desirable ones. — *W1RW*

Public Service

Conducted By Robert J. Halprin,* K1XA

The Long Goodbye

Warning: This tale, which was composed right after the New Year's holiday, may not be suitable for some readers who are overly sensitive to maudlinism. Discretion is advised.

More than three years ago, K5MAT, the Director of the National Traffic System's Transcontinental Corps for the Pacific Area, appointed a ham by the name of Robert Poirier to a sked whereby he was responsible for receiving all traffic destined eastward from the Pacific Area Net and then later meeting up with a designated eastern area counterpart and sending him the traffic. The TCC is an elite, savvy group of traffic handlers who serve to link the three areas of NTS with out-of-net skeds. Bob and his eastern area compadre had their meeting on Thursdays; Bob's function was designated Station J while the eastern area function was referred to as Station D. Bob started out as WA1QME, signed portable zero after his move west and was lucky enough (?) to be assigned WBØQOT, holding that until he became eligible for his one-by-two, KØDJ.

The sked between KØDJ and the easterner shuttled between 20 and 40 cw depending on seasonal conditions. Now and then, rigs and/or antennas went out to lunch or propagation wasn't so terrific, and they misconnected. But all in all, they were a pretty reliable combo, undoubtedly one of the more dependable duos in TCC. Bob always managed to put a good signal in to the East Coast and he had a good fist, so Station D (or Delta for you phonetics freaks) didn't often have to ask for fills. It was a neat arrangement; one station reeling off the messages one after another after another, and the other station would just tap the dit side of his paddle to signify "I got it, man, give me the next one." Trafficking can be awfully enjoyable that way.

When an individual accepts a TCC sked (and there is always a waiting list), it is with the understanding that he/she will show up that particular evening every week. There is no problem with an anticipated absence; it's those unforeseen ones that are frowned upon. But to be honest, Station Delta didn't show a few times because of nonradio reasons. Perhaps it was a dead car battery, an unexpected dinner engagement (or whatever), or a suddenly intensified basketball game at a local playground which lasted until you couldn't see the hoop anymore. Our society is one in which people are unwilling to make many commitments in their lives. So how come many radio amateurs continue to devote significant parts of their free time to NTS work even when inconvenient? Because more often than not it's a lot of fun, not work, because of operators of the caliber of KØDJ.

When our two principals finished their message handling on Thursdays, time permitting they'd chew the rag for a bit. Being contemporaries, this was natural. Strange as it may seem, they were able to develop the ability to sense each other's moods, just in the way that they manipulated the dits and dahs. It would seem that a bit of ESP develops when two amateurs conduct a weekly sked for a period of time. So they'd chat, about what's happening there, what's happening here, about the mind games that various YLs were spinning, about the shape of things to come, and, oh yes, a debriefing of contest last. They were immersed in communication to the degree that they were no longer conscious of actually having to send code; it was an almost instantaneous connection to thought processes.

But, as you might have guessed, there wouldn't be a story here unless all good things didn't ultimately come to an end. Bob changed jobs and work hours so he had to relinquish his sked in December. Hearing the news on 20 meters, his eastern counterpart felt as if a good friend were leaving town. Nevertheless, Bob continues his intense involvement in Amateur Radio organizational activities as ARRL section communications manager for Colorado.

The End

Oh . . . one more thing. Bob happened to be working at ARRL hq. before his move west. And coincidentally, the fellow who was his TCC sked partner all this time was the same guy who replaced him at Hq. That fellow started out as WB2NOM, used to be WA1WEM and now signs K1XA.

Three years is a long time. It gets you thinking; y'know what I mean?

PUBLIC SERVICE DIARY

☐ San Fernando Valley, CA — October 23-24. Litton DSD RC and other local amateurs provided support communications for the Red Cross evacuation shelters during three simultaneous forest fires in the hills northwest of Los Angeles. Communications were maintained using hf and repeaters WR6BDL and WR6APP. (N6AMO)

☐ Albuquerque, NM — November. It is hunting season here and many would-be hunters get lost in the wilderness. Search and rescue teams which included radio amateurs rescued four lost hunters. Also, amateurs sent troubleshooters to broken voting machines, helped remove a mountain suicide victim and searched for a person lost in a flash flood. (W5VYC)

☐ Las Cruces, NM — December 7. When Interstate Highway 10 was closed due to freak snow and ice conditions, local hams, in cooperation with the c.d. and CAP, worked with state police and Red Cross in setting up a high-school shelter for stranded motorists. (W5VIJ)

☐ *Repeater Log.* According to reports received to date, repeaters and fm simplex frequencies were used in conjunction with 145 vehicular emergencies, six crime reports, six fires, three weather emergencies, one search and rescue and five miscellaneous incidents. Repeaters involved were WR2ADM, WR3ADJ, WR4s AIQ ALL, K4KGO, WR5s ABA ABE ABY ADP AIB AJG APK, WR6s ASW ACJ, WR7s AEL, K7EE, W7FEL, WR8s ABC ABS, W8WUX, WR9s ABE ACF ADQ.

AMATEUR RADIO EMERGENCY SERVICE REPORTS

☐ Lewes Beach, DE — August 26. WB3ANC, WB3DWW and W3YAH provided continuous 2-meter communications during the search for a nine-year-old boy. (W3DKX, SCM DE)

☐ Pulaski and Saline Cos., AR — September 13-14. Twelve to 14 inches of rain fell in a six-hour period, causing the worst flooding in this area's history. Telephone communications were unreliable so Amateur Radio became the primary mode of communications throughout the emergency. (WD5ENG, EC Pulaski Co., WA5VNV, SEC AR, N5EL)

☐ Flint, MI — October 17 and 29. Area hams provided communications for the relief efforts of the Salvation Army during two devastating fires. (KB8CG, Asst. EC Flint)

☐ Cowlitz County, WA — October 29-November 28. Local hams assisted county authorities in the search for two lost hunters and a downed aircraft. The terrain was often rugged and the weather inclement, but all three operations were successful. (K7SH, EC Cowlitz-Wahkiakum Co.)

☐ Halloween Patrols — October 31. The following groups provided communications for Halloween patrols in their areas: Burlington (MA) c.d., Camden Co. (NJ) ARES, Cumberland (PA) ARC, Huntington (NY) ARES, Lower Columbia (WA) ARA, Polk Co. (IA) ARES, Raleigh (TN) ARA, R. F. Hill (PA) ARC, Van Buren Co. (MI) ARES, Warrington (PA) ARA, Washington Co. (OR) ARES, White Water (IN) ARC.

☐ Bullitt, Greenup and Hardin Cos., KY — December 9-12. Local ARES groups were activated after heavy rains caused the Ohio and Rolling Fork Rivers to rise to flood stage. Hams provided communications for the c.d. and Red Cross throughout the emergency which included the flooding of the town of Lebanon Junction. (WA4AGH, EC KY 6th District; W4CID, SCM KY)

☐ SEC Reports. For December 1978, 34 SEC reports were received denoting a total ARES membership of 16,119. This represents a 15-percent decrease in reports received one year ago (40), but a 15-percent increase in ARES membership (14,051). Sections reporting were Alta, Ariz, Ark, Conn, Del, ENY, EMass, EPa, Ind, Iowa, Kans, Me, Mar/NFld, Mich, Mont, NH, NLI, NFla, NTex, Ohio, Okla, Org, Oreg, Que, SDgo, SFla, SJV, SCV, Sask, SNJ, Va, Wash, WVa, WMass. At the deadline for this issue, SEC reports received for 1978 total 438 from 51 different sections. Both figures are down from 1977's 440 reports from 56 sections. Twenty three SECs reported every month; this is an increase of two over 1977's total. Including late reports, the following sections had 100-percent reporting; the number in parentheses shows how many years of complete reporting has occurred: Alta (1), Ariz (4), Ark (2), Conn (4), Del (5), ENY (1), EMass (3), Ia (5), Kans (1), Mich (10), NFla (3), NTex (2), Ohio (1), Okla (2), SDgo (8), SFla (27), SJV (1), SCV (1), Sask (14), Va (2), Wash (1), WVa (3), WMass (2). Over 90-percent reporters included Colo, Iowa, Mar/NFld, Mo, Ont, Oreg, SNJ. The all-time record of 100-percent reporting still belongs to SFLa with 27 consecutive years of reporting.

On the negative end, nonreporters numbered 21, an increase over 1977's 18. These sections were Ala, Alask, BC, CZ, Ida, Ill, Ky, LA, La, Minn, NMex, Pac, RI, SC, STex, Tenn, Vt, WI, WNY, Wis, Wyo.

NATIONAL TRAFFIC SYSTEM

Xmas Times — EAN-E set a new single-session record with 291 messages cleared by net control W2MTA. WA6OTU cleared 206 on PAN-E, also believed to be a record. "Well, the figures speak for themselves — ARN7 had a record month — we are very proud of our gang. They did their jobs and did them well . . . It is very gratifying to see participation like we had during our "hour of need." — *W7YSE*

The Bill Shaw, WB2VEJ, Award for 1978, given to an individual for significant and dependable service to the Second Region, was awarded to Don Brooke, WA2ELD. Don has also been named asst. mgr., 2RN-E. WA6ZZL, now manager of RN6-D, replacing WB6PVH. TCC-Pacific set a new record for total traffic and the highest total since 1966 for TCC traffic.

*Asst. Communications Manager, ARRL

December Reports

Area Nets

(evening sessions)
(daytime sessions)

	1	2	3	4	5	6	7
EAN		31	4667	150.6	2.921	100.0	
EAN		62	2244	36.2	1.040	97.8	
CAN		31	2831	91.3	1.782	100.0	
CAN		62	892	14.4	.425	97.8	
PAN		31	3073	99.1	1.732	99.5	
PAN		31	1357	43.8	.612	100.0	
Region Nets							
1RN		113	1848	16.4	.774	91.1	98.9
2RN		122	1759	14.4	.701	93.3	98.9
3RN		93	1170	12.6	.711	99.6	100.0
4RN		124	3279	26.4	.770	73.0	100.0
RN5		85	2477	29.1	.739	92.4	100.0
RN6		93	2304	24.8	.478	98.4	100.0
RN7		124	2484	20.0	.958	100.0	100.0
8RN		90	1203	13.4	.519	95.0	98.9
9RN		120	1664	13.9	.575	92.0	97.8
TEN		93	1434	15.4	.499	70.0	97.8
ECN							
TWN		93	1294	14.0	.416	87.5	98.9
TCC							
TCC Eastern		226'	6409				
TCC Central		214'	4358				
TCC Pacific		157'	4575				
Sections²		5296	39507	7.5			
Summary		6694	90829	13.6			
Record		6309	61416	28.5			

'TCC functions not counted as net sessions.
²Section and local nets reporting (155): ASN (AK), AENB AEND AENJ AENM AENS AENV (AL), OZK (AR), ATEN SWN (AZ), BCEN (BC), NCN SCN SDNN (CA), CWN SSN (CO/WY), CN CPN NVTN WESCON (CT), DEPN (DE), FAST FMTN FPON FPTN NFPN PBTN PEN QFN QFNS SPARC (FL), CGVHFN CVEN GASSB GSN GTN (GA), I75m ICN ITCN (IA), IMN MTN (ID/MT), ILN IPN ICN QIN (IN), KPN KSBN QKS-SS (KS), KNTN KRN KSN KTN KYN SEKEN (KY), LAN LRN LTN (LA), HHTN WMPN (MA/RI), MEPN MMN MTN WRIN (MB), MDCTN MDD (MD/DC), AEN BYN CMEN MPSN MSN PTN SGN (ME), MACS MITN MNN QMN MSN MSPN MSSN PAW (MN), MEOW METN MSSN NEMOE (MO), APN (MR/NF), CAEN MN MSBN MTN (MS), APN (NB), NCSSBN (NC), SHWN WNN (NE), CRN NHSN (NH), MCN NJN NJPN OBTTN (NJ), BN BNR 06mN ONN OSN OSSBN (OH), OAN OFON OLZ OPEN OTWN STN (OK), OPN (ON), 16/76 ARESTN BSN JCARES LBARES OSN PAARES WCN (OR), EPA EPAEPTN PTTN WPA WPA2mTN WPAPTN (PA), WQV/UHF (PQ), SCSSBN (SC), NJO SDEN SDN SDWXN (SD), SATN (SK), TN TNN (TN), HCN TTN (TX), BUN UCN (UT), SVEN VFN VN VNTN VSBN VSN (VA), BEN BWN WIN WNN WSBN (WI), WVN WVNN WVPN (WV).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVG.
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

	1	2	3	4	5
TCC Eastern	253	89.3	6409	2348	
TCC Central	233	91.8	4358	2101	
TCC Pacific	170	92.4	4575	2244	
Summary	656	91.2	15342	6693	

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (December): Eastern Area (VE3SB/N2YL, Directors) — W1s KX NJM OD, WA1s VEI ZAZ, K1s BA EIR GN PAD SSH XA, W2s CS FR MTA RQ, WA2s ICB SPL, K2s NY PL, N2s TW YL, W3s FAF PQ YQ, WA3WQP, K3s KW NGN, N3HR, W4s MEE SQQ UQ, WA4s CCK YSK, WB4PNY, K4s BKX KNP, N4KB, W8PMJ, WB8WTS, K8KMQ, VE3s GFN GOL SB. Central Area (W5GHP/W9JUJ, Directors) — WN4KKN, N4MD, W5s KLV RB, WA5s BHF INJ IQU RKU, WB5s FDP HHK KKT NKC SDD, K5s GM MC, N5s TC TS YL, W9s CXY DND JIJ JUJ NXG, W0s AM HI, WA0TNM, K0s EVH EZ, AF0O. Pacific Area (K5MAT, Director) — N5s MR NG, W5s JOV KH, K5MAT, N6s GW PZ WP, W6s EOT OA SX VZT YBV, WA6UAZ, K6OE, N7AM, W7s DZX EP GHT LYA VSE. K7s HLR IWD, AD0A, W0KON, K0s BN DJ TER, WB0TAQ, VE7ZK.

Independent Nets (December)

1	2	3	4
Amateur Radio Telegraph Society	31	3239	238
Central Gulf Coast Hurricane	31	318	2441
Clearing House	31	707	691
Empire Slow Speed	31	159	436
Hit & Bounce	50	469	612
Hit & Bounce Slow	30	75	190
IMRA	26	547	1035
Mike Farad	26	131	360
North American SSB	23	372	136
North American Traffic and Awards	31	190	1416
Washington Region PON	17	45	345
West Coast Slow Speed	31	171	447
20 Meter ISSB	26	1066	566
75 Meter ISSB	31	1725	1350
7290 Traffic	42		

Public Service Honor Roll December 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.

119
WB5WOE
70
VE5HG
69
WD4COL
W7VSE
67
VE1LCR
66
AF2L
64
W2MTA
WB3JGP
WB4PNY
W5KLV
W7GHT
W9JUJ
63
WB5JZP
62
WA3NAZ
N5TC
61
VE1CH
W1TN
WA1YMN
AA2H
WB4ZOJ
VE5AE
W5GHP
WA6UAZ
AF0O
WB0VHN
60
VE1ST
WB2RMI
WB5NKC
WB8MTD
59
W2SQ
N2TW
N4NK
K4ZN
WB5NKD
K5TL
58
W2RQ
WD4KPG
WD4LUG
WB8YDZ
57
WA4CNY
56
W2XD
AC3N
K4BKX
WD4OVR
VE4PG
WA4VLT
N4WA
WB5LAT
N5RB
W6RNL
WD8NKA
W8SOP
WD0BFR
55
K1PAD
K2VX
W5BGE
WA5RKU
WA5RVT
W7HLF
K8OZ
54
W3BI
WD5AHH
53
WA2ZJP
WA4UYD
52
VE1WF
N5ES
AJ5F
VE5MC
K5OWK
K5SOR
W8VPW
WB8WTS
W0HH
50
WA1TBY
WB4OXT
49
WA1ZAZ
W2XQ
K3QRW
W3PQ
AA3S
W3YQ
VE4IZ
AF4T
K5DPG
WD5ETD
WA6NTI
K7GXZ
WA7MEL
N8CW
WA8ZNC
WB9ICH
K0DJ
WA0TNM
48
WD4CNQ
K4VHT
WB5IYH
WB9KPX
47
WB1DXR
WA2MFV
W4FMN
K4JGW
WA4PFK
N4PQ
WB4QBB
AE5I
WB0HZL
46
WB1CPF
K3JL
W6JXK
45
WA1MJE
WA2AIV
WB4TEK
N6WP
AF8V
K0PIZ
44
W1BJ
WA1QFX
N1RI
W1TM
WA1VAB
WB2PJU
WB2RDT
W4ANK
K4EV
AA4GA
KB4G
WD4ISN
KB4N
W4PIM
VE4QU
K4XE
K5ARH
WB5LBR
K5QEW
W5VMP
W6OA
AF8A
WD8DMX
WB8YRY
WA9QCF
W9XD
43
W4JK
AJ5K
WD6EEN
WB8KWD
WB8TRK
WB0PYD
42
N3AKC
K3KW
WD4ITJ
WA5VBM
WA6LBO
K7NTG
ACBY
W0MDT
41
WB5MVR
N6NE
KB8BZ
WD8LRT
W9NXG
40
WD2AKR
N3AIU
W3DP
N5IB
W5JOV
WB5SDD
WB8SIQ
30
WB3EYY/T
27
WA1SMY/T
22
KA1AHD/T
WA2HEB/T
WB2PXD/T
WB3GZR/T
WA4MJT/T
K4TH 21 500 318 203 1042
K1BCS 86 302 636 9 1033
WA3ZRY 40 443 468 27 978
WB6PVH 29 462 453 27 971
W9ZGQ 627 1 343 971
WB8KWD 470 473 1 944
WB6EIG 25 451 453 2 931
K5JGZ 38 399 476 7 920
WB5JZP 338 96 424 32 890
WA0AUX 58 509 301 10 878
WB4PNY 2 453 395 17 867
WA0RWM 50 448 37 318 853
K1PAD 1 411 402 13 827
WA4CCK 3 390 376 12 781
K3NGN 5 380 372 12 769
W0ZWL 384 1 376 761
W9JIJ 32 363 6 357 758
WB4ZIQ 13 357 354 28 752
WA4NBE 19 359 346 20 744
K5OWK 185 180 348 24 737
W0HH 5 345 371 15 736
WA1TBY 32 348 335 14 729
K3KW 4 448 261 9 722
W4MEE 5 349 341 25 720
K8AAZ 12 327 354 17 710
W1YK 345 12 345 3 705
WB5NKD 82 254 301 37 674
WB8OFR 79 247 326 21 673
W0KON 51 313 308 1 673
N5TC 1 337 322 12 672
WBPMJ 4 350 312 1 667
WA4PFK 140 207 233 86 666
WB4WYG 17 340 294 16 666
WB5NKC 42 262 341 16 661
W2MTA 41 310 308 659
K0ONK 497 138 22 657
W4SQQ 309 342 1 652
N2TW 3 338 305 646
W7GHT 24 309 300 13 646
N5NG 319 289 36 644
WD4LUG 30 264 312 30 635
WA0VRE 125 278 260 633
K9PNG 50 262 220 99 631
VE1WF 43 266 288 22 619
N4NK 2 294 310 5 611
W2RQ 3 334 234 36 607
WB4QBB 45 253 294 15 607
WB1DXR 51 251 233 62 597
WD0AIT 42 261 158 131 592
W5TI 19 279 282 9 589
N6GC 308 32 243 5 588
W4JK 294 292 586
WB2RMI 7 269 281 7 584
WA4CRI 156 115 255 54 580
K4SCL 4 315 246 6 571
K4ZN 53 222 288 5 568
VE7ZK 42 263 240 23 568
WA1MJE 17 284 251 11 563
N0ZO 5 271 287 563
W8VPW 33 241 246 41 561
VE5AE 210 72 255 21 558
WA3ATQ 309 128 117 2 556
WB7TPY 289 1 260 5 556
W2SQ 269 274 6 551
W6YBW 21 253 245 31 550
W6INH 31 231 248 38 548
K4DZM 32 258 241 16 547
WB3JGB 63 194 267 20 544
K7HLR 15 265 258 5 543
W1EFW 37 221 274 10 542
K4ZK 15 260 265 1 541
WD9DMV 6 251 268 16 541
W8GK 270 270 540
W9FC 7 325 185 7 538
AA5J 101 241 175 15 532
WA8WPW 4 265 252 7 528
WD4KPG 20 200 300 5 525
WB4MJH 4 251 253 16 524
WD9CQC 42 201 265 15 523
WB8MTD 1 248 262 9 520
WB5WOE 120 136 124 136 516
AF2L 4 261 217 30 512
W5JOV 21 215 206 68 510
W9CXY 246 263 1 510
W3EGJ 64 185 219 37 505
W9DND 11 236 252 5 504
K5OUK 187 124 86 105 502
W0BMA (Nov.) 145 231 288 91 755
W0KON (Nov.) 48 271 258 3 580
W4JK (Nov.) 2 265 293 17 577
WB0BIS (Nov.) 13 246 246 505

Multioperator station:
W1TKZ 1003 1003 2006

BPL for 100 or more originations-plus-deliveries:

K4TXJ	435	WD4COL	126
W0FQB	357	WD8CSA	125
WB4RIS	218	WA3THT	123
W4LX	206	KH6JJP	122
WD8KZX	179	WB3GZU	112
K5DG	166	W8AU	110
W3BBN	161	W4FMN	109
WB4MXG	146	WB0HZL	108
W7LUP	142	VE1LCR	107
K9BVE	130	N6NE	103
W7SQT	129	WA4CNY (Oct.)	112
VE7FB	127	WA4CNY (Nov.)	115

Multioperator stations:

WB4TOP	242	WB3IVO	207
W4DW	216	WD4JMS	194
		K4KDJ	111

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Brass Pounders League December 1978

BPL Medallions (see December 1973 *QST*, page 59) have been awarded to the following amateurs since last month's listing: K1DFS, WA4BZY, WA4CCK.

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

1	2	3	4	5	6
K3NSN	989	2716	1125	237	5067
W3CUL	480	1643	1891	59	4073
W2ZQ	357	1002	1319	40	2718
W0WYX	57	1261	533	728	2579
W7DZX	24	785	794	8	1611
W9JUJ	25	817	727	10	1579
W5KLV	3	735	694	28	1460
K0YFK		681	2	679	1362
WA4YSK	26	607	630	3	1266
WA3WQP	85	527	597	21	1230
W7AK	20	580	573	27	1200
N4PQ		588	607	1	1196
W3BI	98	467	545	64	1174
W0BMA	131	451	498	84	1164
W7VSE	7	562	536	24	1129
WA6UAZ	51	486	527	26	1090
W3VR	271	310	481	9	1071
KL7JEB	63	473	525	8	1069
W5REC	3	511	544	6	1064

Hamfest Calendar

Delaware: The Delaware Valley ARS is sponsoring the first annual Winter Fest, March 25 from 8 A.M. to 4 P.M. at the Christiana Fire Hall, Rtes. 7 and 273, Christiana. All indoors. Donation $3; flea-market tables $3; dealer tables $5. Talk-in on 52 and 355/955. For details, contact DVARS, 2 E. 39th St., Wilmington, DE 19802, or call Fred Forkner, WB3JTK, at 302-762-9040 or Larry Knerr, WA3PCW, at 302-322-5202.

***Florida:** The ninth annual North Florida Swapfest, sponsored by the Playground ARC, will be held March 24-25 at the Fort Walton Beach Fairgrounds. Admission $1 in advance, $1.50 at the door. ARES, QCWA, MARS meetings. Talk-in on 52 and 19/79. For more info, send s.a.s.e. to PARC, Box 873, Ft. Walton Beach, FL 32548.

Florida: The Treasure Coast Hamfest is March 17-18 at the Vero Beach Community Center. Prizes, drawings, QCWA luncheon. Admission $3 per family. Talk-in on 146.13/73, 52 and 222.34/94. For info, write P. O. Box 3088, Vero Beach, FL 32960.

Georgia: The Columbus ARC will have its annual hamfest March 31 and April 1 at Columbus Municipal Auditorium, U.S. 27 and 280. Talk-in on 28/88. Donation still $1 at the door. Exhibitors and flea market inside, free outside flea market. Details from Bob Glasgow, N4BGN, 1503 Layard Dr., Columbus, GA, 404-561-7746.

Illinois: Libertyville and Mundelein ARS (LAMARS) will hold its second annual Lamarsfest on Sunday, March 25, at the J. M. Club, 708 Greenwood Ave., Waukegan, IL. Doors open at 7 A.M. There will be plenty of free parking, and a large indoor flea market (plenty of nine-foot tables available at $4 each). Tickets $2 at the gate, $1.50 in advance, children under 10 free. Hot lunch available. Lots of commercial exhibits and demonstrations. Talk-in on 94 simplex. For info, write LAMARS, 1226 Deer Trail La., Libertyville, IL 60048 (include an s.a.s.e.) or call 312-367-1599.

***Louisiana:** The Lafayette ARC will hold its hamfest March 10-11 at the Lions Club Building in Lafayette. For info, contact Al Oubre, K5DPG, Star Route A, Box 185E, New Iberia, LA 70560, 318-364-2857.

Maryland: The Greater Baltimore Hamboree will be held Sunday, April 1, at Calvert Hall College, Goucher Blvd. and LaSalle Rd., Towson (1 mile south of Exit 28, I-695), beginning at 8 A.M. Food service, prizes, giant flea market. Admission $3. 250 tables inside gym and cafeteria. For info and table reservations, contact Bro. Gerald Malseed, W3WVC, Calvert Hall College, 8102 LaSalle Rd., Towson, MD 21204, 301-825-4266.

Massachusetts: The Wellesley ARS is conducting its annual auction Saturday, April 7, beginning at 11 A.M. at the Wellesley High School cafeteria, Rich St., Wellesley. Talk-in on 96/36, 63/03, 04/64 and 52. Doors open at 10 A.M. For more info, contact Kevin P. Kelly, WA1YHV, 7 Lawnwood Pl., Charlestown, MA 02129.

Massachusetts: The First Annual Spring Flea Market sponsored by the WPI Wireless Assn. will take place Saturday, March 31, on the WPI campus in Worcester. Hours are 9 A.M. to 4 P.M. For more info, write WPI Wireless Assn., Worcester Polytechnic Institute, Box 2393, Worcester, MA 01609.

Minnesota: The Rochester ARC and Rochester Repeater Society will sponsor the Rochester Area Hamfest on Saturday, April 7, beginning at 8:30 A.M. at St. John's School Gymnasium, 490 W. Center St. Large indoor flea market, refreshments and plenty of free parking. Talk-in on 22/82. For more info, contact RARC, c/o KØTS, 2514 N.W. 4th Ave., Rochester, MN 55901.

Mississippi: The Old Natchez ARC Hamfest will be held at the Natchez Convention Center on Sunday, April 1. Indoors, air-conditioned. Free admission and swap tables. Talk-in frequency 31/91 and 52. For info, contact ONARC, 1226 Magnolia Ave., Natchez, MS 39120.

***Missouri:** The Central Missouri Radio Assn. will sponsor a hamfest on April 7 at the Cosmo Recreation Center, Columbia. Admission $2. Contact Wayland McKenzie, WBØKZS, 1417 Pickford Pl., Columbia, MO 65201, 314-445-3637.

***Nebraska:** The Midway ARC will sponsor a hamfest at the Holiday Inn Holidome, Kearney, March 31-April 1. For information, contact Jerry Ramsey, WØPXD.

Nebraska: The Third Annual Hamboree, sponsored by the Siouxland ARC, Sooland Repeater Assn. and the 3900 Club, will be held Saturday, March 10, at the Marina Inn, South Sioux City. Entertainment, exhibitors, flea market all day. Technical programs in the afternoon; evening banquet. Ladies activities. First sellers' table free, additional ones $2 (contact Al Smith, WØPEX, 3529 Douglas St., Sioux City, IA 51104). Banquet/admission tickets ($6.50) available from Glen Holder, KØTFT, Hilton, IA 51024. Hamboree admission without banquet $1 at the door. Talk-in on 39/97.

New Jersey: The Cherryville Repeater Assn. will hold its annual hamfest March 17 at the Hunterdon Central H.S. field house (just north of Flemington on Rte. 31). There will be more than 200 sellers' tables and seminars throughout the day. Admission $2.50. Hours are 10 A.M. to 5 P.M.

New Jersey: The Chestnut Ridge RC Flea Market is March 10 at the Demarest Methodist Church, 109 Hardenburgh Rd., Demarest, NJ. Tables $5. Tailgating (weather permitting) $3. No admission fee. Hot dogs and soda. Contact Jack Meagher, W2EHD, 201-768-8360 or Andy Woerner, K2ETN, 201-261-1047.

New Jersey: The Knight Raiders VHF Club flea market will be Saturday, March 24 at St. Joseph's Church, Hoboken Rd., East Rutherford. Free admission and parking. Refreshments available. Table $5 in advance, $6 at the door. For more info, call Jack Mandelberger, 201-857-0016 or Bob Kovaleski, 201-473-7113.

North Carolina: The Charlotte Antique Wireless Assn. regional conference will be held April 7 at the Holiday Inn (Coliseum location). Flea market in the morning, displays and talks. Registration begins Friday afternoon. Ladies tours. For more info, contact Robert Lozier, 318 E. Houston St., Monroe, NC 28110, 704-283-2638.

Ohio: The first annual Lake County Hamfest sponsored by LCARA is April 1 from 8 A.M. to 4 P.M. at the Lake County Armory, at the N.E. corner of the Painsville Fairgrounds, Rte. 20, Painsville (35 miles east of Cleveland). Exhibits, flea market and 1 P.M. auction all indoors. Reserved tables $2 full, $1 half. Admission $2; under 12 free. Talk-in on 52 and 81/21. Write LCARA, P. O. Box 868, Painsville, OH 44077; 216-257-4486.

Ohio: The Toledo Mobile Radio Assn. (TMRA) is holding its 24th annual auction and hamfest March 25. Tickets are $2 advance, $2.50 at the door. Talk-in on 52, 01/61, 19/79, 34/94, 87/27 and 975/375. It will be held at the Lucas County Recreation Center, Maumee.

Oklahoma: The Lawton-Ft. Sill ARC will hold its 33rd annual hamfest the weekend of March 23-25 at the Montego Bay Motel complex, Lawton. Large flea market, ARRL officials, technical programs, ladies activities and QCWA breakfast. Contact P. O. Box 892, Lawton, OK 73502, for more info.

Pennsylvania: Penn Wireless Assn. will hold its Tradefest '79 Sunday, April 1, at National Guard Armory, Southhampton Rd. and Roosevelt Blvd. (Rte. 1), 1/2 mile south of Turnpike exit 28. Sellers' space $3; bring tables. Limited number of power connections, $2. Some tables available at $1. General admission $2. Prizes, refreshments, rest area, displays and surprises. Talk-in on 37/97 and 52. Contact Charles Miller, AD3X, 215-943-3973.

Pennsylvania: The third annual University of Pittsburgh Hamfest is Sunday, March 25, from 8 A.M. to 5 P.M., at the Student Union Building. Free parking; vendors bring own tables. For more info, send s.a.s.e. to University of Pittsburgh ARA, Box 304, Schenley Hall, Pittsburgh, PA 15260, or call Mark at 412-931-6700 or Harry at 412-624-8887.

Texas: The Midland ARC is having its annual swapfest Sunday, March 18, at the Midland County Exhibit Building. Preregistration is $4.50; $5 at the door. Talk-in on 16/76. Tickets and info from MARC, Box 4401, Midland, TX 79701.

Wisconsin: The Madison Area Repeater Assn. (MARA) will hold its 7th annual Madison Swapfest on Sunday, April 8, at the Dane County Exposition Center Forum Building, Madison. Doors open at 7 A.M. for sellers and exhibitors; 8 A.M. for the public. Plenty of parking and nearby camping and hotel accommodations. Exhibits and vendors will have equipment for hams, computer hobbyists and experimenters. Free movies. Pancake breakfast and barbecue lunch. Admission $1.50 in advance, $2 at the door (children under 12, free). Tables $3 in advance, $3.50 at the door. Talk-in on 16/76. Info from MARA, P. O. Box 3403, Madison, WI 53704.

Wisconsin: The Tri County ARC Hamfest will be held March 18 at the Jefferson County Fairgrounds, Jefferson. Advance tickets $1.50. Tables $2 in advance; 6-ft. space $1. Send s.a.s.e. to Glenn Eisenbrandt, WA9VYL, 711 East St., Ft. Atkinson, WI 53538, for info or reservations.

*ARRL Hamfest

Coming Conventions

March 2-4
Southeastern Division, Orlando, FL

March 17-18
South Carolina State, Greenville, SC

March 24-25
North Carolina State, Charlotte, NC

March 30-31
Great Lakes Division, Muskegon, MI

April 21-22
Missouri State, Kansas City, MO

May 19
Wisconsin State, Lake Delton, WI

May 19-20
Alabama State, Birmingham, AL

May 25-27
New York State, Rochester, NY

May 26-27
Tennessee Section, Knoxville, TN

June 15-16
Central Division, Milwaukee, WI

June 16-17
Georgia State, Atlanta, GA

June 30-July 1
West Virginia State, Jackson's Mill, WV

ARRL NATIONAL CONVENTIONS

July 20-22, 1979
Baton Rouge, LA

July 25-27, 1980
Seattle, WA

March 13-15, 1981
Orlando, FL

SOUTH CAROLINA STATE CONVENTION

March 17-18, 1979, Greenville, SC

The 1979 South Carolina State ARRL Convention will convene at the Memorial Auditorium in Greenville, SC, on March 17-18, 1979. The Blue Ridge Amateur Radio Society of Greenville has planned a program which will be interesting to all Amateur Radio operators. The schedule includes an ARRL forum and banquet, and ARRL members may obtain the Wouff Hong degree. Dealers will be showing the latest in amateur equipment.

FCC examinations will be given at the

Greenville Technical Center on March 17. The FCC examiner advises that preregistration is not required. *It is imperative, however, that these forms be filled out before 8 A.M.*

A registration fee of $3 includes the Amateur Radio operator and spouse. Others registering for the event pay the ticket price of $3. For further details call Jerry Watson, 803-244-1166.

NORTH CAROLINA STATE CONVENTION

March 24-25, 1979, Charlotte, NC

The 1979 North Carolina State Convention and Metrolina Hamfest will be held March 24-25 at the modern Charlotte Civic Center.

With over 140 commercial booths and a tremendous flea market, you will be treated to the ultimate in indoor hamfest enjoyment and comfort. Major equipment manufacturers will host technical programs throughout Saturday and Sunday.

DXers will find many prominent DXpedition leaders discussing their adventures and many clubs, groups and nets will have their own programs. There will be forums on traffic handling, emergency preparedness and many more public service topics.

FCC will be at the convention on Saturday administering examinations.

Come be a part of the largest hamfest in the Roanoke Division. For more info, write Mecklenburg Amateur Radio Society, 2425 Park Road, Charlotte, NC 28203.

GREAT LAKES DIVISION CONVENTION

March 30-31, 1979, Muskegon, MI

The Muskegon Area Amateur Radio Council once again sponsors the ARRL Great Lakes Division Convention and Hamfest at Muskegon Community College — a facility with free parking for over 1500 vehicles, dining/cafeteria service and clean modern facilities.

Friday evening, March 30, at the Muskegon Ramada Inn, the "Ham Hospitality" is open to all. Also at the Inn, there will be a film presentation of the Clipperton Island DXpedition by Hugh Vandegrift at 8 P.M. The Wouff Hong initiation will be put on by the MAARC Players at midnight.

Saturday, March 31, at the Muskegon Community College, doors/registration open at 8 A.M. The event features many technical forums; annual net meetings; commercial exhibits and a large swap and shop.

Besides the ARRL forum and other special sessions, Vandegrift will once again present the film of the Clipperton DXpedition.

Saturday's tickets are $2.50 each. No advance or mail ticket sales. Swap and shop table space many also be purchased Saturday. Advance reservations are required for the Saturday evening dinner program.

Overnight reservations should be made directly with the Ramada Inn, Holiday Inn, and other motels in the Greater Muskegon Area.

For additional information write to Muskegon Area Amateur Radio Council, Box 691, Muskegon, MI 49443, or contact Hank Riekels, WA8GVK, event coordinator, 616-722-1378 weekdays only.

Club Notes

A hodgepodge of ideas that clubs have found to be successful fills this month's column. The range of topics includes ways to get members and to raise money, program ideas and kudos. Look them over and try them.

☐ Worthington ARC (MN) members bring unwanted items to be auctioned off at meetings, with the money raised going to the Handi-Hams.

☐ WD8AYI of Lake Erie ARA (OH) called in a report of an automobile accident to the police, who then asked if she was a ham. When she replied that she was, a car was sent.

☐ Each student joining 3M ARC (MN) receives a *Tune in the World* package.

☐ Posters placed in area electronics stores state the time and place the Quannapowitt RA (MA) meets.

☐ A plant manager spoke on radio-controlled cranes used at nuclear-power generating plants to the Milwaukee RAC (WI).

☐ An electronic keyer expo put on by Livermore ARK (CA) covered evaluation of capabilities and benefits of keyers with programmable memory, and variable tone and sidetone volume, etc.

☐ Hampden Co. RA (MA) held a flying program in which several members/pilots gave talks and showed films (obtained from FAA — Office of Public Affairs, APA 10, 800 Independence Ave., S.W., Washington, DC 20591).

☐ DF hunt participants of Utica ARC (NY) receive envelopes containing hints, to be used only when in a state of complete confusion.

☐ Douglas Co. ARC's (KS) DF hunts are announced on very short notice for a more real-life effect.

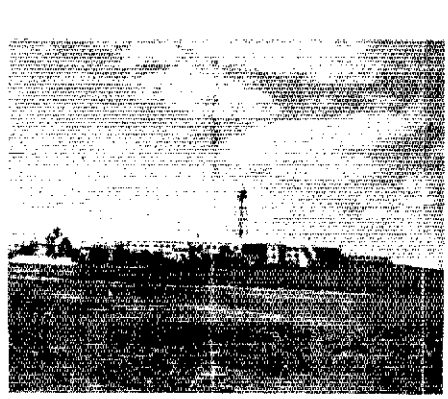
Clubs that are outfitting club stations should bear in mind that manufacturers sometimes have a policy of selling equipment at discounts for that use. It's good business, they feel, because of the exposure the gear receives. One company that has told us about such a policy is Alda Communications, Inc., 215 Via El Centro, Oceanside, CA 92054. — *Rosalie White, WA1STO*

Strays

GALLUPS ISLAND REVISITED

☐ It has been 37 years since *QST* first visited Gallups Island. A June 1941 article announced the discovery of a school on an island in Boston Harbor that trained radio operators for the U.S. Merchant Marine. It became so popular that it was reprinted and widely distributed as recruiting literature by the Maritime Service. *QST* again went to Gallups Island after Pearl Harbor. A May 1943 update was, many of us felt, even superior. It was rereading these articles that prompted Art Bradford, W1EQK, and this writer to arrange a reunion of graduates, instructors, officers and families. It was held back on Gallups Island on July 8, 1978.

Remains of the recreation hall used by trainees at the U.S. Maritime Service Radio Training Station during World War II.



Gallups Island as it looked in 1943.

We encountered some difficulties in trying to locate the graduates who, after more than 35 years, had spread to the four corners of the world. But we do wish to acknowledge with thanks the help given us by several publications, including *QST* and *World Radio News*.

One of the reasons behind the reunion was, of course, to see old friends and comrades. But there was another, and possibly more compelling, one for those of us who are hams and World War II buffs: to talk personally with hams and prospective hams who participated directly in the convoys and convoy battles, and who sailed on the Liberty ships, Victory ships, T-2 tankers, and C-2s of that war.

Hams often tend to hide their lights under a basket. But it is to Amateur Radio's everlasting credit that, when trained radio operators were desperately needed during the war, hams responded in force. Several of them attended our reunion. In fact, most of the graduates who came back had become hams at one time or another in their lives.

At noon on July 8, 1978, 100 of us, with wives, sons and daughters, left again, after more than 35 years, for Gallups Island. The code rooms, classrooms, barracks, and officers' quarters are all gone; only the foundation for the recreation hall remains, being guarded by oversized sea gulls. Pathways have been cut through the tall grass, and historical signs have been placed about the island.

John Olivieri, W1NJI, of Dedham, MA, operated, appropriately, a cw station during the reunion on Gallups. The signals coming from W1NJI/1 were probably the first cw sounds to be heard on the island since the closing of the station at the end of the war.

During our days as students there, we all felt the gang from Gallups Island was something out of the ordinary. And coming back, slightly older, it was easy to see that the feeling hadn't changed. — *Edward L. Hayden, K3OKL*

FLORIDA "DXPEDITION"

☐ The Chipola Amateur Radio Club will hold a mini-DXpedition to Liberty County, FL, April 28-29 (rain date May 5-6). We will be operating on or near the following frequencies: *21.300, 14.280, 7.230, 3.910* MHz. Operation on 15 and 40 meters primarily during local daylight hours; 20 and 80 during local nighttime hours. Calls used: on 15 and 20 W4IRO; on 40 and 80, K4KHV. QSL via WA4HFG, P. O. Box 74, Malone, FL 32445. — *Grady Watson, WA4HFG*

1978 CAN-AM Contest Results

Operate this contest if you CAN — AM glad I did.

Yuri Blanarovich,* VE3BMV

We are pleased to announce the results and winners of our second CAN-AM contest. It looks like our new baby is well and kicking, for those who tried to operate the CAN-AM like it very much. We would like to keep it that way and we are open for suggestions to make it even better. This year the top banana goes to Jim Bearman, VE5DX, who is the Canadian champion in the combined phone and cw category, beating last year's champion VE7CC. The high cw score in Canada was taken by Lee Sawkins, VE7CC, who is the winner of Canadian CW Champion Trophy. Canadian Phone Trophy goes to next-eligible phone high scorer, Sid Kemp, VE7BGK.

Top American and the overall champion is David Hachadorian, K6LL/7, who also won the phone and cw category for the U.S. American CW Trophy goes to John Hawkins, K5NW and the Phone Trophy was won by Jack Webb, W5JW.

The multioperator category was won by Walt Tillner, CG3IXE, with the second operator VE3BMV. Highest American multioperator entry was by W9YH, University of Illinois RC, operated by K9GL and K9MK.

The club competition is getting tougher: Last year's winner, Toronto DX Club, was wiped out by the new star on the contest sky, B.C. Contest Club, winner of the Club Competition Trophy. We will probably see more from the VE7 gang in the future.

New records were set in the number of QSOs by the winning stations. All time high on phone was VE5DX with 1530 contacts; on cw it was VE7CC with 804 contacts. The highest multiplier in the single-op category on phone was 191 by VE7BGK and 182 on cw by VE7CC.

A free one-year subscription to the CANADX bulletin, *Long Skip*, was awarded to the following stations: WD5EEF, W9YH, WD8DPB, WB4OSN and W1ECH/1. Our congratulations to all the winners. We hope you enjoyed the contest, will like the trophies and certificates, and will be back next year. You can make your own summary sheets, so long as you try to stick to the format. Samples are again available — please send an s.a.s.e. (with Canadian stamps, or U.S. stamps not glued to the envelope).

A number of contesters have suggested that we split the cw and phone portions and move them a little bit later into the fall. We will try this idea next year. The new dates are phone on Saturday, September 15, cw on Saturday (UTC, full 24-hour period), September 29.

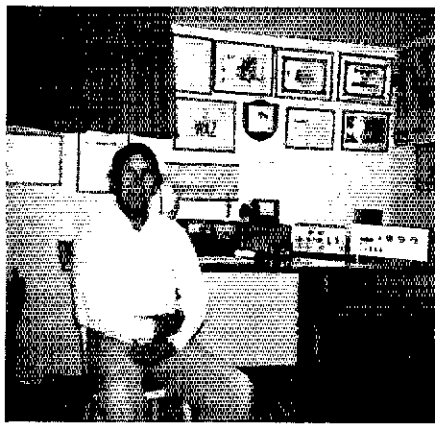
*CANADX President and CAN-AM Contest Chairman, Box 292, Don Mills, ON M3C 2S2

This may very well bring more of the big guns into the competition and give them the chance to test their weapons and warm up for the big season in the fall. Only one other major change was made: We are removing the rule about staying on the same band for 10 minutes after the band change for the multioperator entries. The deadline for mailing the log is 30 days after the contest; please send it in even if it doesn't look like a record-breaking one.

I would like to express appreciation to Ontario Contest Club members VE3KZ, VE3FFA, VE3HGN, VE3IXE and VE3MR, who helped immeasurably.

Top Ten

Canada		**U.S.**	
Mixed		*Mixed*	
VE5DX	1,219,884*	K6LL/7	727,192*
VE7CC	1,134,987*	W5JW	466,150*
VE7BGK	704,217*	AA6DX	375,756*
VE7CNY	517,310*	K5NW	335,440*
CG4SW	435,778*	K5UR	295,104*
VE3KZ	397,308	WB4SKI	269,698
VE7CMK	288,673	WA4HRG/7	186,410
VE6MP	262,071	K8MO	173,816
VE4OY	218,151	WAØLKL	166,995
CG3FFA	194,584	K1ZZ	164,794



Saul, VE1AIH, high scoring VE1 on cw.

Club Competition

Canada — U.S.

BC Contest Club — 2,683,539
Toronto DX Club — 1,369,143
807 Contest Club — 194,184
Farout ARC — 62,399

Line scores list call, state/province, score, QSOs, multiplier.

Canadian Single Op

CW

VE7CC	BC	418,964	804	182*
VE5DX	SK	403,704	799	178*
VE7CMK	BC	288,673	610	163
VE3KZ	ON	238,044	509	166*
VE4OY	MB	176,900	500	122*
VE1AIH	NS	147,030	400	130*
VE1AJP	NS	137,475	446	107
VE7AV	BC	106,272	343	108
VE3DRB	ON	105,216	320	96
VE7DLM	BC	101,813	317	113
VE2HY	PQ	95,016	306	111*
VE6MP	AT	51,894	189	93*
VE7DUS	BC	43,676	252	61
VE2EOH	PQ	43,407	241	63
VE3DUS	ON	40,825	202	71
CG4SW	MB	38,320	169	80
VE3BR	ON	36,135	179	73
VE3EZU	ON	25,901	161	59
VE3BBH	ON	22,680	143	60
VE1ABU	PE	22,086	142	54*
VE3JGX	ON	13,884	133	39
VE1ANU	NS	9706	84	46
VE1MX	NS	9234	83	38

Phone

VE5DX	SK	816,180	1530	183*
VE7CC	BC	716,023	1303	187*
VE7BGK	BC	704,217	1253	191
VE7CNY	BC	517,310	1040	170
CG4SW	MB	397,458	982	142*
VE6MP	AT	210,177	596	121*
CG3FFA	ON	194,584	641	104*
VE4IE	MB	179,634	658	94
VE3KZ	ON	159,264	444	126
VE6AGV	AT	146,787	445	113
VE7AQR	BC	96,264	459	72
VE3DLR	ON	57,227	228	89
VE3EUP	ON	52,245	220	81
WB2RLK/VE1	NS	45,493	233	67*
VE7AV	BC	44,403	268	57
VE4OY	MB	41,251	198	71
VE7AQF	BC	38,352	197	68
CG6LB	AT	34,748	175	68
VE3BBH	ON	30,601	162	71
VE3IVI	ON	16,432	103	52
VE3DUS	ON	9196	72	44
VE3BR	ON	2450	35	25
VE3CXL	ON	203	11	7

*Certificate winners

American Single Op

CW

K1ZZ	CT	164,794	474	148*
WA1JGK	VT	57,190	269	95*
W1ECH/1	VT	6474	73	39
W1VH	CT	6192	69	38
W1CNU	CT	4719	49	39
AC2U	NJ	76,494	303	114*
WB7EME/2	NJ	53,802	250	98
WA2OTC	NY	44,589	224	89*
AB1M/2	NY	13,617	119	51
SMØCCM/W2	NY	10,164	108	42
AB2E	NJ	9650	84	50
N2GC	NY	2916	50	27
LA7LG/W2	NY	901	22	17
WA2WSD	NJ	767	25	13
W3ARK	PA	49,504	240	91*
K3FR	PA	29,949	201	67
WB3JGP	PA	9168	84	48
WB3GZV	PA	5250	64	35
WB3EKV	PA	3999	54	31
K3VW	PA	660	17	15
WB4OSN	FL	142,737	443	147*
K4BAI	GA	105,664	370	127*
AA4GA	GA	51,870	160	91
N4UF	FL	40,006	219	83
W4OMW	NC	19,880	111	56*
K4BAM	GA	15,960	121	57
W4KMS	VA	9000	87	45*
N4DP	GA	3690	53	23
N4LS	SC	44	4	4*
K5NW	TX	173,404	511	154*
W5JW	NM	154,624	465	151*
WD5EEF	TX	25,740	139	78
W5NR	TX	7806	117	41
WB5TAP	TX	1944	50	18
AA6DX	CA	109,368	403	124*
WA6TOE	CA	20,128	135	68
K6SSS	CA	6435	72	39
WB6QPG	CA	5513	68	37
WA6KWM	CA	3135	41	33
AA6EE	CA	2970	45	27
WD4ELG/6	CA	1136	29	16
K6LL/7	AZ	214,240	618	160*
WA4HRG/7	OR	109,347	414	123*
W7WSV	AZ	7080	75	40
WD8DPB	MI	91,542	363	114*
K8MO	OH	88,639	303	136*
W8QWI	OH	32,604	200	76
K8EKG	OH	25,256	145	77
W8XT	OH	15,677	110	61
AA8S	OH	14,784	119	56
WB8OFR	OH	8118	89	41
K8MR	OH	6786	80	39
AC8P	MI	3648	50	37
N9DX	IN	87,515	300	115*
W9RW	IL	62,348	258	109*
K9TI	IL	44,745	206	95
N9NO	IN	41,144	248	74
W9WI	WI	35,724	203	78*
W9QWM	IL	31,407	160	87
W9HE	WI	14,580	116	54
K9GDF	WI	13,719	120	51
N9AFU	IN	13,279	117	49
K9GS	IL	12,896	120	52
K9UR	IN	10,122	114	42
W9WR	IL	468	26	6
WAØLKL	MN	166,995	564	135*
KØVSU	MO	87,464	338	116*
KØMT	CO	49,294	224	98*
WBØUCP	IA	13,664	107	56*
KØKD	KS	11,450	100	50*
WBØYMO	CO	8694	92	47
WBØUBL	IA	4640	65	32
ABØX	KS	2525	40	25
KH6IJ	HI	42,978	238	87*

Phone

WA1JGK	VT	4250	55	34*
WA1SQB	CT	1824	96	19*
AB2E	NJ	29,484	165	81*
WB7EME/2	NJ	4795	59	35
WB2AIO	NY	1134	28	18*
N2GC	NY	230	11	10
WB3EKV	PA	20,636	134	67*
WB3GZV	PA	11,925	104	53
K3FR	PA	4410	55	35
K3VW	PA	4012	54	34
N3RL	MD	3663	45	33*
WB4SKI	FL	269,698	943	143*
AA4GA	GA	63,632	304	97*
WA4NTP	VA	48,894	260	87*
W4KMS	VA	28,000	43	28
WB4AFH	KY	6270	68	38*
W4OMW	NC	2938	45	26*
WA4YUU	SC	2640	49	24*
WD4NNP	SC	816	22	16
W5JW	NM	311,526	909	162*
K5UR	AR	295,104	788	174*
K5NW	TX	162,036	601	126*
WB5TAP	TX	90,474	408	102
W5WG	LA	38,631	219	79*
WA5IYX	TX	7612	70	44
WB5VRI	LA	780	21	15
K5DEC	OK	729	27	9*
AA6DX	CA	166,388	811	158*
WB6RDA	CA	133,245	604	105
WA6TOE	CA	27,760	158	80
WA6KWM	CA	7480	81	40
K6SSS	CA	2880	40	32
WB6QPG	CA	2025	36	25
K6LL/7	AZ	512,952	1426	174*
WB7RFA	OR	99,246	405	119*
WA4HRG/7	OR	77,063	338	109
WB7SHD	OR	10,098	102	51
K8MO	OH	85,176	321	126*
K8MR	OH	35,568	263	78
WB8OFR	OH	23,249	153	67
W8XT	OH	12,614	105	53
W8QWI	OH	2900	52	25
AA8S	OH	2790	40	31
WD8NVY	OH	1872	35	24
WB8SVN	OH	867	22	17
WA1TWD/8	OH	590	25	10
W9RW	IL	64,900	301	100*
K9VV	IL	25,340	162	70
N9ACP	WI	13,462	127	53*
W9QWM	IL	9682	93	47
WD9GRI	WI	4752	56	36
W9WI	WI	4192	57	32
N9AFU	IN	1152	30	16*
WDØAPC	MO	57,684	290	92*
WDØCPS	MO	52,083	298	81
KØMT	CO	43,460	237	82*
WBØYMO	CO	15,624	130	56
ABØX	KS	14,168	136	46*
WBØRJJ	NE	494	45	26*
KH6IJ	HI	17,278	158	53*

Check Logs:
VE1AJP, VE3CXL, WA6FXL.

Multiop

CW

CG3IXE	ON	302,400	607	175*
VE2FU	PQ	291,088	633	161*
VE3HBX	ON	185,148	470	139
W9YH	IL	137,904	477	136*
N5TV	LA	71,900	327	100*

Phone

CG3IXE	ON	254,184	729	119*
VE1AWN	PE	171,304	633	92*
VE3HBX	ON	170,646	493	119
N4UF	FL	101,822	494	98*
WB3GPR	PA	60,277	256	109*
WD5EEF	TX	29,475	176	75*
VE3FEA	ON	27,090	156	63
N5TV	LA	20,944	165	56*

Multiop operators: VE1AWN + VE1LI; VE2FU + VE2BPT; VE3FEA + VE3EZU; VE3HBX + VE3HLC, VE3HLS; CG3IXE + VE3BMV; WB3GPR + WB3FWZ; N4UF + WB4YEY; N5TV + WB5VAN; WD5EEF + WD5GXO, WB5OFB; W9YH + K9GL, K9MK.

April CD Party — All ARRL Members

The April "Open" CD (Communications Department) Party is for all ARRL members. This is the time you can meet some of the more than 4000 people with CD appointments — such as official traffic stations, intruder watchers, official bulletin stations — along with many of the elected ARRL officials, such as section communications managers, directors and some of the Headquarters staff. But most of all it is a time to meet other ARRL members on the air.

In this event, the same station may be worked on each of the bands but section multipliers count just once. (Maximum multiplier is 75.) Transmit your "status" plus ARRL section. Nonappointees transmit Member (MBR), Life Member (LM) or Charter Life Member (CLM) — whichever is applicable; plus ARRL section. Appointees, officials and advisory committees send usual designation. Score five points per QSO. To this figure add your highest ARRL code-proficiency credit; multiply by the total number of sections worked.

Suggested frequencies are cw, 35 kHz up from the bottom edge of each band; phone, 3870-3900, 7200-7235, 14265-14285, 21340-21360, 28600-28630. Try 10 on the half hour. Try 160 at 0430 and 0530 UTC and again during the last five minutes of the party. Don't forget 6 and 2 *and* the Novice bands.

Reports should be on ARRL CD Party report forms or a reasonable facsimile. Send an s.a.s.e. now for your logs, requesting form CD-136. Entries must be RECEIVED at Headquarters by May 4th. All participants will receive copies of the *CD Bulletin* containing the results.

CW

Starts	*Ends*
2300 UTC April 6	0500 UTC April 8

Phone

Starts	*Ends*
2300 UTC April 20	0500 UTC April 22

(You may operate any 20 hours out of the 30-hour period. Times out must be 15 minutes or more to count as off-time.)

Operating News

FMT Results

The November 4 Frequency Measuring Test showed a sharp drop in the usual number of entries (possibly due to the change in scheduling plus band conditions). Most of the participants realized the change to Standard Time influenced W1AW scheduling (FMTs, as do code practice sessions, always occur at the same local clock time). The umpire measured frequencies for the early run at 14,137.201, 7077.823 and 3544.438 kHz. The late run checked out at 14,079.010, 7070.399 and 3550.423 kHz.

In order to achieve the FMT Honor Roll, one must submit at least two readings (one averaged reading each on two bands, or early and late runs on the same band) that fall into the top ten percent of all entries that measure within the Official Observer standards of 100 hertz or less. November FMT produced 109 entries with a total of 1644 individual measurements. One participant failed to identify his (or her) name, call or location. Sixty measured within 100 hertz of the umpire (class 1 OO qualification) and 15 met with all Honor Roll requirements. They are K1VHQ W1PLJ W2AXT WA4AXA W4IBU W5IJW K5QH W6CBX K6MZN W6RQ W7ANF W8CUJ W8OK K9WGN WØBJ, all measuring without error (0 Hz). All within the 100-Hz limit with an average error shown preceding their calls, were (1 Hz) W1BGW W1JH WB2WQA K4BE WA5NOM W5OS AD8I N8APC WA8QBJ KØBRS WØRWG WBØUFQ KØVM (2) W3FSV W4NTO K5DL N6UW WB8STQ NØRK (3) WA1QOI W2DW WB3AHI W4DRF W8ZM (4) K7ST (5) WØCZ (6) W3QHF (7) K9WMP (8) W4HU (10) WA7PHD (11) K8JH (12) WB6YID (13) K9NR (14) N1AS W2ND (16) K5FSA KØMOZ (17) K1QBP (21) N2BE (26) WA1OHA K5FO (27) WA7HGB (30) N7HR (33) K1MEM (37) W1VH WB5NGF (40) K1SF (43) WØCQE (54) W4XP (60) W6CDF WA6NQF (66) K8ND (70) K4MZK (71) VE6MJ (76) WA8CEU (83) W3ADE (84) WØGW (90) W6AEE (91) KL7IXZ (94) WA3CFC.

Stations who failed to meet with the class 1 OO standards but whose participation is appreciated, include W1DDO W1MK WA2AIV W2JJQ K2NI W2RUK WA2YPW W3BFF W3GVR K4AO WD4APM WN4AZY WA4LWO K4NE W4PKD W4TI. W4UCL WB5EXI W5LI K6GG WA6IQL W6SSB W7FIS W7LBK W7SK WB8KKI W9HPG W9TGN W9IL WØGA WH6ADR KH6CZ and VE2XL.

Excerpts

Conditions were very good, with some jamming of W1AW signals, but with the use of sharp filters, I was able to make the three early readings. (W2AXT) Crowd on top of FMT frequency as usual. We just work around them. (K6MZN) I used my SPR-4 receiver with a random-length wire in a tree. I used a mixer to combine the first and second local oscillators. I observed the output on a frequency counter. I "phased compared" the i-f of 50,000 Hz on an oscilloscope, with a signal divided down from my TCXO standard. I used 15-MHz and 5-MHz WWV to calibrate the standard before and after each run. (W7ANF) I always enjoy the tests and a chance to recheck the stability of my homebrew setup. (K4BE) System calibration check of color burst frequency 3579.545 kHz on 80 meters and using its harmonics on 40 and 20 meters prior to the test. Also direct hookup of counter to 3579.545 kHz while locked in on network signal before and after test to check counter by itself. I really enjoy these FMTs. (WA8QBJ) My first FMT entry in May 1978 was to check using the scope for indicating receiver tuning. This entry was used just to exclusive OR gate to synchronize the received signal automatically with the counter time base (an unstabilized 1-MHz xtal osc). It does not need a stable or fine-tuned receiver, even with S2 signals. The September 1978 entry used the TV color-burst oscillator for time base. This frequency may change when the station switches from network to local commercials and can be off up to 1 ppm. I have a few more refinements to try before getting a computer and sit back while it prints out the results so keep up the good work with FMTs. (W3FSV)

Our thanks for all the special comments (good and bad) sent along with your FMT entries. We will print as many as there is room for, along with the quarterly results.

The next Frequency Measuring Test is scheduled for May 12. Results will be printed in the "Operating News" section of the August issue. Check the "Operating Events" column of April *QST* for full information. CU in May! — *Jeannie DeMaw, W1CKK*

W1AW Operating Schedule (October 29, 1978-April 29, 1979)

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[1]	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[1]	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	0000	Slow[1]	Fast[1]	Slow[1]	Fast[2]	Slow[1]	Fast[1]	Fast[1]
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[1]	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, 5, 7-1/2, 7-1/2, 10, 13, 15 wpm.
[2]Fast code practice on cw bulletin frequencies, 8 minutes each session; 35, 30, 25, 20, 15, 13, 10 wpm.
[3]Cw bulletins, 18 wpm, on: 1.835, 3.58, 7.08, 14.08, 21.08, 28.08, 50.08, 147.555 MHz.
[4]RTTY bulletins 60 wpm/170-Hz shift on 3.625, 7.095, 14.095, 21.095, 28.095 147.555 MHz.
[5]Phone bulletins on 1.835, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.
Please note that all footnoted frequencies are approximate.

Normal W1AW visiting hours are 3:30 P.M. to 1 A.M. seven days a week (local Eastern Time). The station address is 225 Main St., Newington, CT 06111 (about seven miles south of Hartford). Note: ARRL office-visiting hours are 8 A.M. to 5 P.M. Monday through Friday. Maps with local street detail are available upon request. If you wish to operate when visiting, you must have your original operator's license with you. The best time for visitors to operate is on weekdays between 1 and 4 P.M. local time. (Schedules can also be arranged to work W1AW.) The station will be closed April 13, 1979. *Staff:* Chief Operator/Asst. Communications Mgr. C. R. Bender, W1WPR; Chris Schenck, W1EH.

In a communications emergency, monitor W1AW for special bulletins as follows: *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: March 2, It Seems to Us; March 6, World Above; March 12, League Lines; March 20, Public Service; March 23, Happenings; March 28, Operating News.

Idaho SCM Lem Allen, W7JMH.

MEET YOUR SCM

Idaho Section Communications Manager Lemuel H. Allen Jr., W7JMH/W7ADD, was first licensed in 1946 after having had an interest in Amateur Radio since 1934 when attending high school. Lem has been an ARRL member since 1946 and holds the Amateur Extra Class license. Born in Dawson Springs, KY, he moved with his family to Idaho while a youngster, graduating from Weiser High School. Lem attended the University of Idaho until World War 2 interrupted his education as a civilian. He then attended the Army Technical Electronics School while serving six years in the Army Air Corps, remaining in the service until it became the Air Force. Since the war, he has been employed primarily as chief engineer of KTVB-TV in Boise, ID. W7JMH enjoys being involved in the scouting program and is a recipient of the Silver Beaver award, scouting's highest honor within the Order of the Arrow. When not teaching scouts the lore of the woods Lem teaches Novice classes. Active in local nets, Lem has been the Idaho SEC and has held office in several area clubs. His shack is equipped for 80 through 2 meters. Lem likes to wander down into the Novice band and help the beginners, but most often enjoys traffic handling.

SCM ELECTION RESULTS

Uncontested:

The following were elected for two-year terms of office beginning April 1, 1979:

Mississippi	E. Ed Robinson, W5XT
Ontario	L. P. Thivierge, VE3GT
Wyoming	Chester C. Stanwaity, W7SDA

5BWAS AWARDS

☐ Updating the October 1977 listing beginning with 5BWAS number 293: WA1NXR WØSR WA1PEL K4UAS K9MFY WA5CBT W6HX W1NG W7ZSL WB9MFC LU1BAR/W3 K3UA K5XJ K1ACL W3NB WA7OVP WB6EXW KH6HHN WA1QHS N2MM AA4US K5ZHP W7ABX W5KNZ WBØMWJ WA4JNE WA4FDE WA6WZO K5IW WB2VFT WBØRZY WØKC W6BTO WAØJYJ KØHPE W8KI K6HD N4CQ K1WQU WA4HDD W1FZ W4MNZ K4TXJ WA4FVT WA4JWT W2AO K5MK K8CW WA1QNF WB9ETQ WB7DJU WA1YAX W4UW K4AEA WB2IDU WA9TVM WA9IXF WA7JBE K5KX N5UR N4SU/9 WA1NRF WA4JRD K3HBP WA7OMX W4DZZ WB4SLJ KL7GRP WA4LOF N6KD W1VV HC5EE W7ISG WB5GZR K9JD K2HVN VE2YU WB6EGQ K8LJG WB5ZDO WB4TIN W2IN WA7KGT WB5HGI N4YD W2FVS K7LQI W7DAZ W6ANB WA4BTS WB5PKS WØNQM KØUBP W2QL WBØLLR WA2WJL WB9GTC W2FGY K8MFO W2LZX W5YH W1GNR K5HKG W1LQQ W4EV/VP9 K4RDU W2JPN K1LA K5EJD WA6AHF WA6AXH W3AP WA3ZMY N4RR WA2BDP K4LRX K1ECC N5RQ HI8LC WA1YTW WA4MOQ WB7EUT K7TED WB4BV WB5IKT WA4LOX WBØPTB WBØMVX WA6WTO WAØCEL K6CBL VE2JQ WA6IYN W1JHU K7SE W4XW WA5WMC WB5JKY WA4OAX WØJIE WA7OYL WA4QMQ KØHSC KØDVY WØMLY WB3FAF WB5LDN WA7IRD WA6LFF WB5FLP K1IK K2VV W4JHE N6HE K7RDH K5UBD WB1ADD N4LA N7BN IØJX XE1FR AA4KY WB4WFT N2OO WD8EOC K5WG KH6WF K1XA W7GYG WBØNHD WB7BFK W8AP K1WJ WBØOQV WA7USI WA2AUB K1OT AC8F WB3EFC AA4BA W1LMO WA4OIB WB9DVV N6ZU WA1UVX AA4FF VE3GGO WB4VNZ WØRT W1ZW ZS5LB K5RPC WA4PCS WDØDAM WB6ICJ KB4BH WA7ZLC W9NSO KL7AW WA6MXD WBØWAD W7GUR K1WJB WB2JZK WA4VDE WBØPEA W8MD WB1CLC N4DW W2RJL K5CKQ and W2ZZ. — *WICKK*

DATE (UTC)	OSCAR 7 Ref. Orbit	OSCAR 7 Time (UTC)	OSCAR 7 Long. W.	OSCAR 8 Ref. Orbit	OSCAR 8 Time (UTC)	OSCAR 8 Long. W.	SOVIET RS Ref. Orbit	SOVIET RS Time (UTC)	SOVIET RS Long. W.
1 March	19623	0105:56	78.3	5026A	0032:18	51.1	1505	0023.08	69.2
2 March	19635	0005:16	63.1	5040A	0037:30	52.4	1517	0027:48	72.0
3 March	19648	0059:33	76.7	5054J	0042:41	53.7	1529	0032:29	74.7
4 March	19661	0153:50	90.3	5068J	0047:53	55.4	1541	0037:09	77.4
5 March	19673	0053:11	75.1	5082A	0053:05	56.3	1553	0041:49	80.1
6 March	19686	0147:28	88.7	5096A	0058:17	57.1	1565	0046:30	82.9
7 March	19698	0046:48	73.6	5110X	0103:28	58.9	1577	0051:10	85.6
8 March	19711	0141:05	87.2	5124A	0108:40	60.2	1589	0055:50	88.3
9 March	19723	0040:25	72.5	5138A	0113:52	61.6	1601	0100:31	91.0
10 March	19736	0134:42	85.6	5152J	0119:03	62.9	1613	0105:11	93.7
11 March	19748	0034:02	70.4	5166J	0124:15	64.2	1625	0109:52	96.5
12 March	19761	0128:19	84.0	5180A	0129:27	65.5	1637	0114:32	99.2
13 March	19773	0027:40	68.9	5194A	0134:39	66.8	1649	0119:12	101.9
14 March	19786	0121:57	82.5	5208X	0139:50	68.1	1661	0123:53	104.6
15 March	19798	0021:17	67.3	5221A	0001:48	43.6	1673	0125:33	107.3
16 March	19811	0115:24	80.9	5235A	0007:00	44.9	1685	0133:14	110.1
17 March	19823	0014:54	65.8	5249J	0012:12	46.3	1697	0137:54	112.8
18 March	19836	0109:11	79.4	5263J	0017:23	47.6	1709	0142:34	115.5
19 March	19848	0008:32	64.2	5277A	0022:35	48.9	1721	0147:15	118.2
20 March	19861	0102:49	77.8	5291A	0027:47	50.2	1733	0151:55	121.0
21 March	19873	0002:09	62.6	5305X	0032:59	51.5	1745	0156:35	123.7
22 March	19886	0056:26	76.2	5319A	0038:10	52.8	1756	0000:52	96.2
23 March	19899	0150:43	89.8	5333A	0043:22	54.1	1768	0005:33	98.9
24 March	19911	0050:03	74.7	5347J	0048:34	55.5	1780	0010:13	101.6
25 March	19924	0144:20	88.3	5361J	0053:45	56.8	1792	0014:54	104.3
26 March	19936	0043:40	73.1	5375A	0058:57	58.1	1804	0019:34	107.1
27 March	19949	0137:57	86.7	5389A	0104:09	59.4	1816	0024:14	109.8
28 March	19961	0037:17	71.6	5403X	0109:20	60.7	1828	0028:55	112.5
29 March	19974	0131:35	85.1	5417A	0114:32	62.7	1840	0033:35	115.2
30 March	19986	0030:55	70.3	5431A	0119:44	63.3	1852	0038:15	117.9
31 March	19999	0125:12	83.6	5445J	0124:56	64.7	1864	0042:56	120.7
1 April	20011	0024:32	68.4	5459J	0130:07	66.1	1876	0047:36	123.4
2 April	20024	0118:49	82.6	5473A	0135:19	67.3	1888	0052:17	126.1
3 April	20036	0018:10	66.9	5487A	0140:31	68.6	1900	0056:57	128.8
4 April	20049	0112:27	80.5	5500X	0002:29	44.1	1912	0101:38	131.6
5 April	20061	0011:47	65.3	5514A	0007:40	45.5	1924	0106:19	134.4
6 April	20074	0106:04	78.9	5528A	0012:52	46.7	1936	0100:59	137.1
7 April	20086	0005:24	63.7	5542J	0018:04	48.8	1948	0115:39	139.8

Have you listened to OSCAR 8 yet? It is available to anyone with a good-quality, 10-meter or 70-cm receiver. To track it, you'll need an OSCARLOCATOR and the above reference-orbit information (also available on W1AW bulletins). It orbits the earth every 103 minutes; the morning and evening passes occur at approximately the same times each day. Decoding the telemetry from the beacon is a simple matter using the ARRL OSCAR telemetry forms, available from Hq. for an s.a.s.e. When you return it, we'll send you a colorful OSCAR 8 QSL card.

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 O 7 reference orbits, and AMSAT nets (East Coast at 0100 UTC Wednesdays; Mid States at 0200 UTC; West Coast at 0300 UTC, all on 3850 kHz lsb); (international net at 1800 UTC Sundays on 14,280 kHz usb).

Notes

1) The times and longitudes are for the satellites' first equator crossing each day, which is called the reference orbit.
2) Due to spacecraft problems, OSCAR 7 will not be maintained in any specific mode.
3) All Monday orbits are reserved for QRP use only. Use a maximum of 10 watts erp. Wednesdays are reserved for special experiments. Schedule O 7 experiments through AMSAT, O 8 experiments through ARRL. At no time exceed 10 W erp using Soviet RS.
4) The OSCAR 7 Mode B and OSCAR 8 Mode J transponders invert signals. Upper sideband into the uplink becomes lower sideband on the downlink.
5) O 7 progresses an average of 28.737571° W. per orbit in a period of 114.944858 minutes. O 8 progresses an average of 25.808120° W. in a period of 103.228227 minutes. RS period is 120.3894 minutes. RS progresses 30.227° W.
6) O 8 modes of operation are Mondays, Tuesdays, Thursdays and Fridays — Mode A. Saturdays and Sundays — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D. Soviet RS transponders are on Saturdays and Sundays for QSOs. Wednesdays are for experiments only.
7) 5 March 1754 UTC: Happy 1st Birthday, OSCAR 8.

Spacecraft Frequencies

Spacecraft	Uplink	Downlink	Beacon
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
O 8			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.402 MHz
Mode J	145.900-146.000 MHz	435.100-435.200 MHz	435.095 MHz
RS			
Mode A	145.880-145.920 MHz	29.360-29.400 MHz	29.401 MHz

Further information on the radio amateur satellite program can be obtained free of charge from ARRL hq.

Operating Events

MARCH

3-4: DX Competition, phone, January, page 86. **YL-OM Contest,** cw, from 1800Z March 3 through 1800Z March 4. Sponsored by the YLRL; open to all. OMs work YLs, and vice versa. All bands may be used. Contact each station once per band. Exchange RST and ARRL section or DXCC country, as applicable. Scoring: One point per QSO times sections/countries worked. Awards. Logs not later than April 16, 1979 to Margaret Williams, WA4FTJ, 965 Redwood Circle, Virginia Beach, VA 23462.

7: West Coast Qualifying Run, (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z. The run takes place at 9 P.M. PST the night of March 6. Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send to ARRL for grading. Please include your full name, call (if any) and complete mailing address. A large, stamped, self-addressed envelope will help to expedite your award/endorsements.

10-11: QCWA Membership QSO Party, phone, **Virginia State QSO Party, Commonwealth Contest,** cw, January, page 91; **International SSTV Contest,** second annual event sponsored by W1JKF and K4TWJ. Starting at 1500Z and ending at 2200Z both days, all amateur bands 3.5 to 29.7 MHz. Open to all radio amateurs. Exchange call sign and RS. You may work each station once per band. Score one point for each contact plus one point for each state/province, five points for each country and five points for each continent, add all points for total score. Disqualifications for excessive errors. Awards. Logs to R. Brooks Kendall, W1JKF, 10 Stocker St., Saugus, MA 01906 by April 10.

15: W1AW Qualifying Run, 10-35 wpm at 0300Z (10 P.M. EST) on March 14. Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 and 147.555 MHz. Other details per the March 7 listing.

17-18: DX Competition, cw, January, page 86.

24-25: CQ World-wide WPX SSB Contest, January, page 91.

24-26: BARTG RTTY Contest, February, page 87.

26: W1AW Qualifying Run, 10-35 wpm at 1400Z (9 A.M. EST) March 26. Other details as shown under March 15 listing.

31-April 1: North Dakota QSO Party, February, page 87. **Tennessee QSO Party,** starting 2100Z March 31 through 0500Z April 1, and 1400Z to 2200Z on April 1. Sponsored by the Tennessee Council of Amateur Radio Clubs. Open to all stations; contact only Tennessee stations. Exchange RS(T), Tennessee county or state, province or ARRL country. You may work each station once per band per mode. Suggested frequencies on cw 50 kHz up from band edge and 3.98 7.28 14.28 21.38 and 28.58 MHz, on voice. No repeater contacts. Scoring for out-of-state stations: one point per contact times number of TN counties (maximum 95). TN stations contact sponsor for detailed scoring instructions. Awards. Logs mailed by May 1 to Dave Goggio, W4OGG, 1419 Favell Dr., Memphis, TN 38116. **Wisconsin QSO Party.** Any 24 hours between 2100Z March 31 and 0300Z April 2. Contact each station once. Exchange RS(T) and Wisconsin county; others send state, province or ARRL country. Suggested frequencies 3.550 3.770 7.050 7.120 14.050 21.050 21.120 28.050 28.120 MHz on cw, and 3.980 7.280 14.280 21.380 28.580 MHz on phone. Scoring: one point for each phone contact and two points for each cw contact. Multiply QSO points times total WI counties (maximum of 72) or by state/province/ARRL country total for WI stations. Novices multiply total by 2.5 to get final score. Awards. Logs must be sent by May 1 to West Allis RAC, P. O. Box 1072, Milwaukee, WI 53201.

APRIL

5: West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z. The run takes place at 9 P.M. PST April 4. Other details under the March 7 listing.

7-8: Open CD Party, cw, details this issue. **QRP ARC International QSO Party,** starts 1600Z on April 7 and ends at 2359Z on April 8. Sponsored by the QRP Amateur Radio Club, this annual event is open to all amateurs. Contact each station once per band. Exchange RS(T), state/province/ARRL country plus QRP member number (if any), and power input for others. Suggested frequencies: 1.810 3.560 3.710 7.060 7.110 14.060 21.060 21.110 28.060 28.110 and 50.360 on cw, and 1.810 3.985 7.285 14.285 21.385 28.885 and 50.385 on phone. Score three points for each member worked, two points for other W/VE stations and four points for all non-W/VE stations. Score by multiplying QSO points times multipliers times a power multiplier: 100 watts or more × 1, 25-99 watts × 1.5, 5-24 watts × 2, 1-4 watts × 3 and for less than 1 watt input × 5. Awards. Logs plus station setup used by April 30 to E. V. Sandy Blaize, W5TVW, 417 Ridgewood Dr., Metairie, LA 70001. **SP-DX Contest,** cw, 1500Z April 7 to 2359Z April 8. Sponsored by the Polski Zwiazek Krótkofalowców. Open to all amateurs. Phone competition held the following weekend. Work each station once per band. World works SP/SQ/3Z. Exchange RS(T) plus serial number for non-Polish stations and RS(T) plus two letters denoting the province (maximum of 49). 80-10 meters. Awards for single-operator/single-band and multi-operator entries. Logs with summary for cw by April 30 and phone by May 15 to SP DX Contest Committee, P. O. Box 320, 00-950 Warszawa, Poland.

11-12: DX-YL to NA-YL Contest, cw from 1800Z April 11 through 1800Z April 12. Sponsored by the YLRL; open to all YL amateurs worldwide. Work each station once per band and mode. Phone portion next weekend. Exchange QSO number, RS(T) and state or ARRL country. Score by multiplying QSOs by multipliers. Power multiplier for 150 W dc or less input is 1.25. Logs mailed by April 28 to Phyllis Shanks, W2GLB, 3 Honey Ln. West, Miller Place, NY 11764.

13: W1AW Qualifying Run, 10-35 wpm at 0300Z. This is 10 P.M. EST April 13. Other details per the March 15 listing.

14-15: SP-DX Contest, phone, see entry under April 7-8. Same periods of time; other information the same, also.

18-19: DX-YL to NA-YL Contest, phone, see entry under April 11-12 for all other information; same time period.

21-22: Open CD Party, phone, details this issue; **EME Competition,** Part 1, details in February *QST*. **Common Market DX Contest,** cw from 0600Z to 2359Z April 21 and phone 0600Z to 2359Z April 22. Sponsored by the Belgian Union of Amateur Radio. Open to all amateurs. The world works the Common Market nations, with prefixes DA-DL, EI, F, G, I, LX, ON, OZ, PA-PI. One multiplier for each call area of nine countries with a maximum of 69 per band. Point system: CM stations count five points, non-Common Market Europeans counting two points. CM stations score using different multiplier. Twenty-five bonus points for working ON4UB. Submit separate log for each band by May 31 to Michel Le Bon, ON4GO, Chee. de Wavre 1349, B-1160 Brussels, Belgium. **BARC Contest,** details next month.

28-29: PACC Contest, from 1200Z April 28 to 1800Z April 29. Sponsored by the Vereniging Voor Experimenteel Radio Onderzork in Nederland for all radio amateurs. Exchange RS(T) plus serial number; PA-PI give province (GR FR DR OV GD UT YP NH ZH ZL NB LB) in addition. Suggested frequencies: up from 3.525 7.010 14.025 21.040 28.050 on cw, and 3.650 7.040 14.200 21.250 and 28.500 on phone. Score one point per multiplier per band times total contacts. Awards. Logs to VERON Contest Manager PAØDIN, Schoutstraat 15, Nymegan 6805, The Netherlands, by June 15. **Helvetia 26 Contest,** from 1500Z April 28 through 1700Z April 29. Open to all amateurs of the world who work Swiss stations. Exchange RS(T) plus serial number. Swiss stations also send Canton (ZH BE LU UR SZ OW NW GL ZG FR SO BS BL SH AR AI SG GR AG TG TI VD VS NE GE JU). Score three points for each HB station, working only once per band. QSO points times total of Cantons worked per band (26 per band). Logs should be postmarked no later than May 29 and sent to TM USKA K Bindschedler, HB9MX, Strahleggweg 28, 8400 Winterthur, Switzerland. **Zero-District QSO Party,** from 2000Z April 28 through 0200Z April 30. Sponsored by the Mississippi Valley Radio Club open to all amateurs. Exchange ARRL section/country with Zero stations, who also send county. Suggested frequencies 3.560 3.725 7.060 7.125 14.060 21.125 28.060 28.125 on cw, and 3.900 7.270 14.300 21.370 28.570 on phone. Score QSO points times total of Zero-district counties (maximum of 672). Awards. Logs should be mailed by May 31 to WØSI, 3518 W. Columbia, Davenport IA 52804.

29: W1AW Qualifying Run, 10-35 wpm at 2300Z (5 P.M. EDT) April 29.

MAY

2: West Coast Qualifying Run
5-6: Florida QSO Party
8: W1AW Qualifying Run
12: Frequency Measuring Test
12-13: CQM, World Telecommunications Day, phone
19: EME Competition, Part 2
19-20: World Telecommunications Day, cw, Armed Forces Day
26: W1AW Qualifying Run
26-27: CQ Worldwide WPX, cw

JUNE

9-10: VHF QSO Party
23-24: Field Day

JULY

4: SKN
14-15: Radiosport

AUGUST

4-5: UHF Contest

SEPTEMBER

8-9: VHF QSO Party
16: Frequency Measuring Test

OCTOBER

6-7: Simulated Emergency Test

NOVEMBER

3: Frequency Measuring Test
3-4: Sweepstakes, cw
17-18: Sweepstakes, phone

Strays

☐ The REF, IARU society for France, is sponsoring a CW Diploma for operation between January 1, 1979 and December 31, 1979. A minimum of 300 QSOs on cw must be made with different stations of the world. The list must include one station from Geneva, Switzerland, 50 French stations, 10 different cantons of HB-land, 5 provinces of Belgium, 25 provinces of Italy, 8 districts of Spain, 5 provinces of Holland, 15 DOKs of West Germany, one each G, GI, GM, GW and 15 other European countries. A list, authenticated by the secretary of your IARU/ARRL affiliated society (local club) must be accompanied by 10 IRCs and sent prior to April 1, 1980 to REF (WARC-79) Square Trudaine 2, 75009 Paris, France. REF will issue awards, plus a special award for the first from each ARRL country.

☐ The Wireless Institute of Australia (West Australian Division) announces the West Australian 150th year Celebration Contest. This contest marks the 150th anniversary of the foundation of West Australia. The award is available to all radio amateurs who contact VK6 stations on any amateur band between January 1 and December 31, 1979. Full logging requirements and reporting information may be obtained by writing Contest Committee, P. O. Box 6250 Hay St. East, Perth, 6000 Western Australia.

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, Net Mgr (APSN), VE6AFO, Net Mgr (ACWN): VE6BBL. It is with regret that I must report the passing of VE6VU. Our sympathy is extended to his wife and family. VE6AQZ and XYL were visitors in Calgary during the Xmas season. VE6AK home from hospital and active on 432 MHz. VE6RP and VE6RM are conducting classes and should graduate several students in the spring. I would appreciate news from the various clubs in Alberta for inclusion in this page. Please mail material to VE6MJ, 10706 57th Ave., Edmonton, T6H 0Y6. Traffic: VE6HO 327, VE6AVV 73, VE6ABC 58, VE6AMM 43, VE6CJT 43, VE6BBL 20, VE6MJ 12, VE6BDU 11, VE6AMN 7.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — You may notice that there have been misses in these reports of late. BC Section is active but no one wants to take time to tell us. Let us do better in '79. BCEN has two nominations for asst. Net Mgr. After catching our wind from a busy traffic month an election will be held. VE7QC long time working member of the B.C. Phone net has retired from B.C. Highway Branch and into a new home. Thanks to Zero Beat, Nanaimo and Penticton and Vernon for their monthly news letters. VE7XQ visited Vancouver ARC and presented an interesting talk on our OSCARs. Traffic: VE7ZK 568, VE7FB 202, VE7DFY 195, VE7COA 174, VE7BLO 61, VE7BOT 59, VE7BLS 10.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst. SCM: VE4JP. SEC: VE4TR. NMs: VE4s NM IZ TE VJ. A busy month for traffic and both phone nets handling record traffic. A lot of old age folks messages handled which makes it all worth while. Keep it up fellows. MEPN QNI 1365, QTC 117, sess 31. MMN QNI 448, QTC 53, sess 31. MTN QNI 246, QTC 175, sess 31. WRIN QNI 57, QTC nil, sess. 5. Traffic: VE4PG 260, VE4IZ 146, VE4QU 114, VE4RO 87, VE4QJ 72, VE4FK 45, VE4HR 43, VE4NE 40, VE4JI 25, VE4TE 25, VE4LU 24, VE4AED 21, VE4JA 16, VE4ID 15, VE4AAD 14, VE4NM 14, VE4CR 13, VE4MG 11, VE4JP 10, VE4AAU 7, VE4TR 7, VE4TF 6, VE4XN 6, VE4DS 4, VE4IF 4, VE4LB 4, VE4DT 2, VE4ACX 1, VE4BD 1, VE4EG 1, VE4SR 1.

MARITIME-NFLD: SCM, Aaron D. Solomon, VE1OC — Asst. SCM: VO1FG, STM: VE1WF, SEC: VE1ASW, NPN Mgr.: VO1JN. Silent Keys: VE1APM, ex. VE1CF, VE1TJ. Congrats new OTS: VE1s AMR AVL BFV BXC CH HO RO ST WF, who handled bulk of Xmas traffic. VE1WF rpts. APN traffic 2nd highest month ever. New SEC rpts plans advanced for Section SET. VE1ST gave int. talk MAARC on traffic handling. VE1OC gave on-air talk NBARA on ARRL activities. NSARA & NBARA have abt 30 check-ins each session. VE1YO rpts. 84 check-ins Mar. Net. recently taking 1 Hr. VE1ACA writes on "Microprocessors" in MAARC Bull. & VE1AKL writes on "Computers" in C.B. Amateur. New 2m voices Moncton VE1s BSD BSQ BUB BUK BUL BVX RV. VO1NP acted as Santa Xmas eve. on NPN freq. VO1PR now asst. NCS NPN. VO1BT working for YL cert. APN, sess. 31, QNI 190, QTC 235/225. VE1WF made BPL. Traffic: VE1WF 619, VE1LCR/RO 273, VE1CH 104, VE1ST 78, VE1OC 68, VO1PR 40, VE1AMR 32, VE1KR 15, VE1AMB 12, VE1HO 8, VO1FG 4.

ONTARIO: SCM, Larry Thivierge, VE3GT — Asst. SCM: VE3GOL. SEC: VE3APK. I have been nominated for a second term as SCM and as there were no other nominations, I will be commencing my new term Apr. 1, 1979. I would like to take this opportunity to express my deep appreciation to all those who nominated me for another term, I hope I can live up to your expectations. Ont. traffic totals reached an all-time high during the Christmas holiday season. BPLs earned by VE3s KK GOL JIR and GFN. VE3HGJ came very close. VE3KK a very active OTSer from the Kitchener-Waterloo area reached another all-time high with a traffic count of 1003 including an amazing 307 originations. New club executive for Scarboro ARC has VE3FOE as prez.; VE3BMG, past prez.; VE3CKI, vice-prez.; VE3CNA, money man; VE3HHV, secy. VE3AIB reappointed to the VHF/UHF Advisory Committee. In order to promote VHF/microwave activity, QST will carry a microwave column, conducted by W5KHT, commencing with this issue. Don't forget the League sponsored DX competition, weekends Mar. 3rd and 4th, phone, and 17th and 18th cw. New NPARC members are VE3s CNC BHJ KYA and BSA. The number of licensed amateur white cane radio operators in Canada stands at 383 with 206 in Ont. VE3GFN finally installed as net mgr. of OLN. The Bancroft ARC, VE3TBC planning big events for Home Coming week Aug. 11-18, 1979. All amateurs watch for more info as the year goes on. VE3GMI new bulletin editor of the OVMRC. VE3FZG enjoyed a recent eyeball with NTS stalwart VE3GJG. VE3BZB when not working on the NTS is busy with VE3s MT and D-DB keeping repeater VE3PBO going. Details for a Canadian Awards book, listing over 65 awards available from VE3HLL. VE3s DSP and HWB busy preparing for digital packet communications. Model 15 and 19 teletype machines, in any condition are wanted for use of the deaf, contact VE3BAD. Regretfully I announce VE3s AIJ and EXN have become Silent Keys. Traffic: (Dec.) VE3KK 1003, VE3GOL 988, VE3JIR 890, VE3GFN 580, VE3HGJ 482, VE3ISW 285, VE3GJG 276, VE3CYR 260, VE3JRT 248, VE3FZG 205, VE3GT 197, VE3DPO 181, VE3DVE 146, VE3GNW 69, VE3FGV 59, VE3FHZ 59, VE3IMR 59, VE3AAI 55, VE3SB 53, VE3EWD 52, VE3JKC 52, VE3ATR 51, VE3FGU 40, VE3FRG 40, VE3JJK 40, VE3APK 38, VE3DUK 37, VE3EHL 36, VE3NV 36, VE3EST 33, VE3CEA 32, VE3ANJ 25, VE3GUU 23, VE3BZB 20, VE3XL 18, VE3BVG 17, VE3HDA 4. (Nov.) VE3AWE 39, VE3APK 19, VE3BVG 17, VE3FGV 9.

QUEBEC: SCM, Harold Moreau, VE2BP — This being the initial report from your new SCM, it seems most appropriate to say thank you to all the well-wishers who have offered their kind words. So come on all, lets have your report. Merci a tous et j'espere recevoir votre rapport a tous les mois. Traffic: VE2EC 13, VE2APT 9.

SASKATCHEWAN: SCM, Percy Crosthwaite, VE5RP — Asst. SCM: Norm Waltho, VE5AE. Percy headed to KH6-land in Jan. for a vacation from the cold. With the winter now upon us, the 2-meter repeaters are more faithfully being monitored now. VE5HG the new phone net mgr, has revamped the phone net, sounds pretty good now. The 1979 Hamfest "PARTICIFEST '79" will be held in Moose Jaw on July 27, 28, 29 1979, and is now off the ground. SATN had a good year with 367 sess. 4130 QNI, 710 QTC. Traffic: VE5AE 558, VE5HG 182, VE5RP 25, VE5WM 24, VE5DF 8, VE5UK 7, VE5LN 4, VE5AAT 3, VE5BO 3, VE5DN 2, VE5LK 1, VE5YD 1.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ. STMs: W3QQ, W3WD. PSHR: W3PQ 49, K3JL 46, N3AKC 42. The Delaware Valley ARS will sponsor a Winterfest/Indoor Flea Market at the Christiana Fire Hall on Mar. 25th from 9-5. Talk-in on 146.52, 146.355-955, 3.905, and 223.50 MHz. AA5B, ex-WA3LMY and N2UT dropped by while on a visit East from Albuquerque. W3QQ hopes his new vertical will poke a better signal into the MDD from FL this year. DEPN QNI 61, tfc. 27. Traffic: (Dec.) W3PQ 401, W3QQ 120, N3AKC 115, WB3DUG 50, W3DKX 46, WA3WIY 31, WA3RAU 27, K3JL 26, WB3GOI 18, AC3T 9, W3HGA 6, WA3DLH 1. (Nov.) WA3RAU 36.

EASTERN PENNSYLVANIA: SCM, G. S. Van Dyke, Jr., W3HK — SEC: WA3PZO. NMs: K3KW K3NGN W3VA W3IAZ. Net repts. EPAEP&TN QNI 428, QTC 220; EPA QNI 763, QTC 775; PFN QNI 375, QTC 1215; PTTN QNI 419, QTC 209; AREC (2) QNI 9. OVS repts: W3GOA W3CL K3YD WA3BJQ. OBS rpts. N3AIU W3VA W3ID W3CL W3TI K3EBZ WA3RPG W3AVJ. OO rpts.: K3NSN WA3RPG. BPL: K3NSN W3CUL W3VR WA3WQP W3BI K3NGN K3KW WA3ATQ WB3JGP WA3THT WA3ZRY. PSHR: W3BI K3KW WB3JGP AA3B N3AIU W3DP WB3CAI W3PD. Traffic reports are the largest they have been for some time! W3CUL & W3VR put in 16-hr. days

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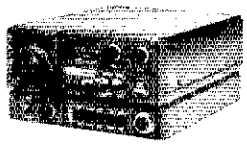

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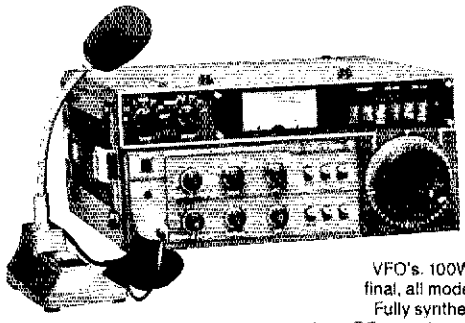

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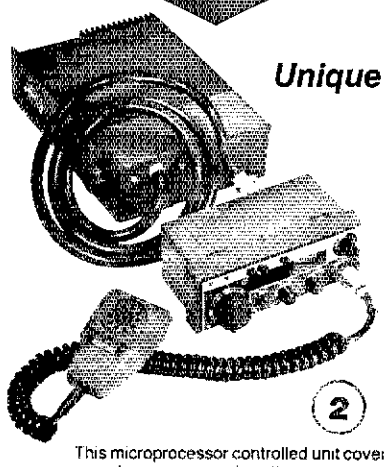

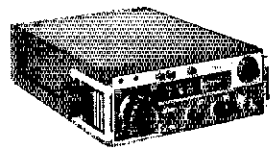

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*OK28 mounting cord, bracket required. This is optional and not supplied with IC-280.

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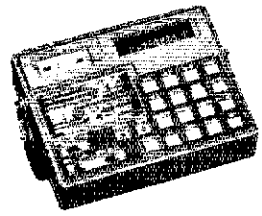

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to do it. Many BPLs this month too. WA3ATQ might take a while to recover from her cruise! Welcome new ham KA3CEM to tfc. nets. WB3JGP going all out on ant. farm. WA3THT's wet noodle seems to be working. W3ADE handled tfc. from CPRA Amateur Exhibition via 2M RTTY to NTS! NMs reporting a lot of QRM but getting thru it. K3YD enjoying QRP. AA3C reports AREC membership up, new slo speed net 3735 kHz all welcome. W3GMK working on eliminating all switches! Hope everyone took a part in the SET. W3OI operation Santa Claus at Allentown Hospital big success, N3ET WB3EVL and WA3EWU oprs. WA3JAF now has his big A ticket. Reminders: 1-send your report by the first of each month; 2-check the traffic count it saves me a lot of grief!; 3-read the rules for counting tfc some are counting msgs in two places orig. & sent. 4-ECs get your SET reports in early. Hope you all had fun in the VHF contest. Traffic: (Dec.) K3NSN 5067, W3CUL 4073, WA3WQP 1230, W3BI 1174, W3VR 1071, WA3ZRY 978, K3NGN 769, K3KW 722, WA3ATQ 556, WB3JGB 544, WA3THT 409, AA3B 405, AD3X 362, W3FAF 282, WB3GZV 257, W3IPX 241, W3ADE 131, WB3BKV 129, W3VA 108, N3AIU 100, W3DP 94, WB3JYZ 83, WB3CAI 67, N3CD 62, W3PD 58, WB3JZA 50, W3ID 43, WA3RAV 28, WA3VIL 25, WA3YOE 18, W3BUR 17, K3NB 12, W3CL 10, W3TI 6, K3YD 5, K3EBZ 5, WA3CKA 3, AA3C 3, WA3RPG 3, WA3BJQ 2, W3HK 2, W3AVJ 1, W3EU 1, W3GMK 1, W3GOA 1, N3AI 1. (Nov.) WA3VIL 19, W3BUR 10, N3AIU 1, K3AI 1.

MARYLAND-DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — Congrats to WB3IVO multiop, and to WB3GZU single op BPL winners Dec. First single op BPL winners Dec. First since July 1977. Spearheaded by WA3VPL as Santa WA3YSW WB3JGW and K3CN provided communications for the Little People marooned in North Arundel Hospital over Christmas. Good Show. The AARC has AA3A, pres.; WB3HZC, vice-pres.; WB3CLF, secy.; K3CN, treas.; W3GMI W3AZV and N3FN directors. Finishing the club house is their goal. W3CDQ is looking for J YLs. WB3FTN got more than he expected for Xmas. W3ECN is an OTS on Fone. WB5FIX/3 is now into RTTY. School finals over WA3RSK is ready for action. W3JPT needs KL7 and KH6 for OSCAR WAS. WB3EPN moved again, now half way thru law school at Gallaudet. W3ZNW has opened new south Md. outlets via repeaters. W3HJH and W0VJD/3 tried FL for vacation and warmth. Tnx to Capitol Hill newsletter, the Ham Arundel News, and the FAR for news items. Dec. 31 was the last session of the MDCTN which lasted over a decade. W3LDD was the first and last NCS. OO reports from WA3RSK W3MR W4MLR/3 and K2SCU/3 who moved to TX. FAR offers a prize for a nw LOGO, and is planning Gaithersburg 1979! N3QA found Dec. a big month for traffic. N3SJ did too. AA3S has expanded duties with MEPN now a daily net. K3ORW can take it a little easier now. AD3H is getting scholarly. N3IT is an early bird. WA3EHK finds it works better with the hot mike lead connected. WB3CES has become a bowler. W3CDG is quiet and sly. W3FZV is ready for the CD parties. N3CL is a speed merchant. WA3IHW celebrates his birthday on Dec. 31. With the nets: Net-Manager Sessions/Traffic/QNI Average. MDD-W3PQ 62/402/9.0. Top Brass W3OQ W3PQ and K3IU. MEPN-AA3S 21/187/26.1. 100% W3LDD K3ORW WA3ZRY. Others WD4BIT W3DKX AA3S AE3W and K3YUC. MDCTN-K3ORW 18/151/20.6. Top Honors to K3ORW WA3ZRY W3DKX AD3H and K3YUC. WR PON-W3DFW 17/45/20.3. MDC PON-W3OYY 4/12/23.1. Traffic: WB3IVO 442, WB3GZU 441, K3ORW 264, N3CL 223, N3SJ 201, N3QA 179, W3FA 171, K3IU 163, AD3H 143, W0VJD/3 98, AA3S 86, WA3EHK 71, W3FZV 31, N3IT 31, WB5FIX/3 31, W3ECN 22, WB3FTN 8, WA3VPL 8, WB3CES 7, W3CDG 3.

SOUTHERN NEW JERSEY: SCM, Bill Luebkemann, WB2LCC — SEC: W2HOB.

Net	Mgr.	Time(PM)	Freq.	Sess.	QNI	QTC
NJN/E	W2XD	7	3695	31	405	326/236
NJN/L	W2XD	10	3695	31	304	317/205
NJPN	K2VX	6	3950	36	687	725/654
JSARS	WA2HEB	10:30	.91	31	340	172/164
MCN	AA2H	10:30	.075	31	341	216/187
SPARTN	KB2EV	10:30	.94	15	127	62/62

A warm welcome to the Shore Points Amateur Radio Traffic Net (SPARTN) as our newest county traffic net, bringing our total to three. Traffic can now easily be moved via two meters from the top of the section to the bottom, which is something we've all been dreaming of for years. Dec. 16 saw the annual NJN-NJPN contab as successful as ever, with much interest in two meter traffic handling and the 1979 SET. Both areas warranted much discussion. If your not already involved in two meter traffic handling, why not join in, it's a lot of fun! Special kudos to W2ZQ for BPL this month and to AA2H, W2ZQ WB2RDT WA2HEB and WB2PXD on making PSHR. Traffic: W2ZQ 2718, AA2H 412, WB2LCC 271, WB2RDT 255, W2SWE 154, N2AJG 124, W2KUU 118, WB2VFT 100, W2HOB 58, K2UL 58, WA2HEB 48, WD2AHO 37, WB2UGA 31, WA2GTJ 30, WB2HZR 30, WB2PXD 25, WB2EYF 16, WA4RDI 4.

WESTERN NEW YORK: SCM, Lonnie J. Keller, WA2AOG — STM: W2MTA. Nets:

Net	Time(Z)	Freq.
EAN	1830	7.240 MHz
EAN	2030	7.240 MHz
2RN	2130	3.930 MHz
NYPON	2200	3.913 MHz
ESS	2300	3.590 MHz
NYPTEN	2300	3.925 MHz
2RN	2330	3.930 MHz
NYS	2400	3.677 MHz
2RN	0045	3.690 MHz
WDN	0230	146.04/.64
NYS	0300	3.677 MHz

Congrats to W2MTA and N2TW on BPL, and PSHR to W2MTA N2TW WA2ZJP WA2MFV WA2AIV and WB2PJU. NM appointments to WA2AIV (WDN) and K2KQC (NYPON). Hope all your SET plans came off OK and was glad to hear from so many of our groups. W2AV now has 31 states confirmed on 2 meters. Rochester VHF Group planning their annual big push after Club honors in the VHF Sweepstakes. W2WSS reports ESS QNI for Dec. up as well as traffic. W2RQF has a new keyboard for SSTV. K2VJG now signing /4 from North Carolina. New upgrades: WA2GWW, WA2ROB and KA2BBD to Technician; KA2CJS and WA2PCQ to General; WA2TLZ and KB2GD to Advanced. WA2WYX is /XE in Mexico for several months. ARATS Outstanding Amateur of the Year award went to WB2GUF. Traffic: (Dec.) W2MTA 659, N2TW 646, WA2ELD 422, WA2HSB 378, W2RUF 290, WB2PJU 236, WA2MFV 209, W2FR 145, W2PZL 135, WA2ZJP 124, K2GWN 84, AF2K 54, W2TZ 52, W2ROF 43, WA2AIV 41, WB2KOS 40, AF2A 38, W2ZOJ 25, WA2AOG 24, K2VR 23, WA2UAR 14, N2APB 12, WB2FPI 8, WA2ORS 6, WB2PID 4. (Nov.) K2GWN 68, W2ROF 36.

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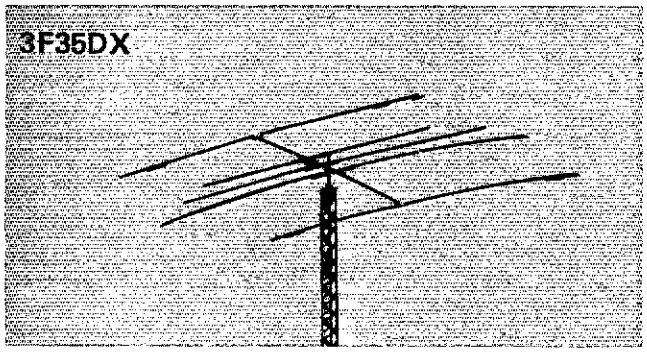

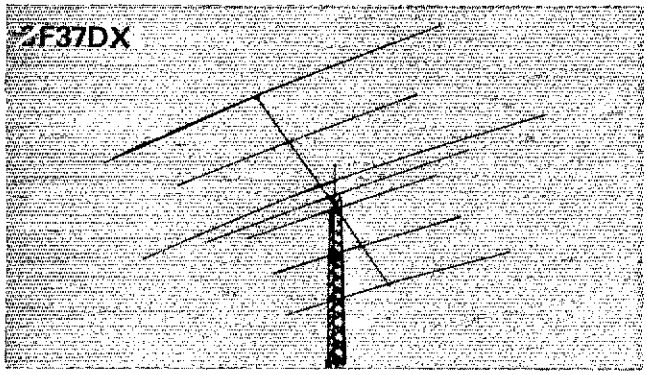

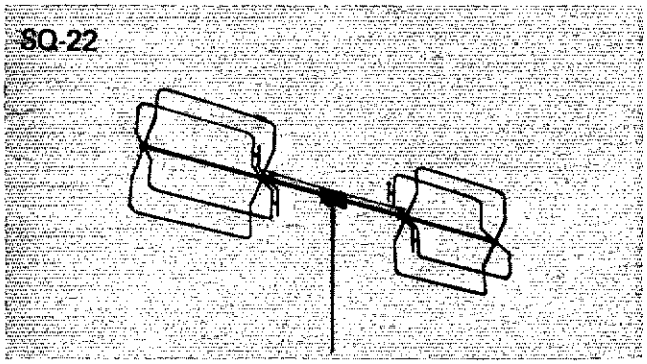

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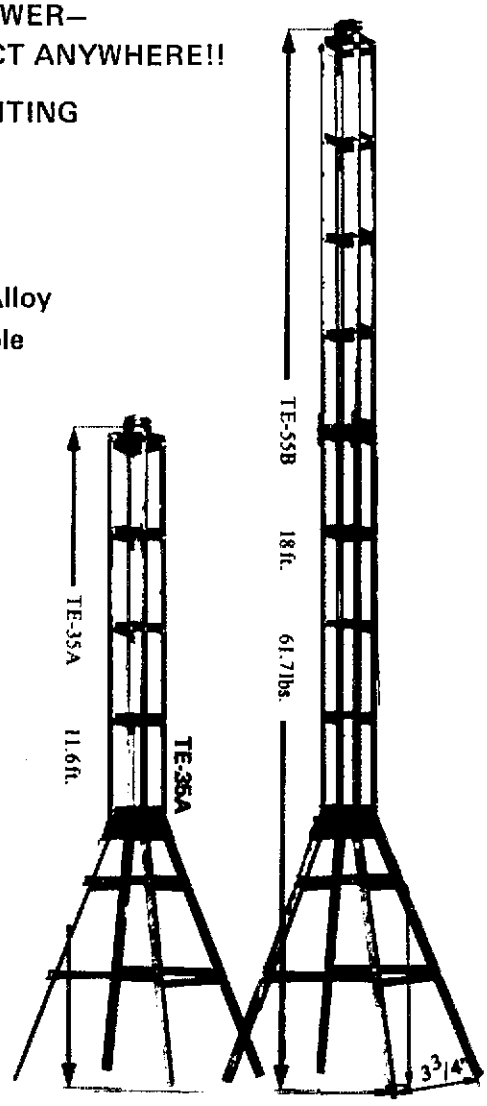

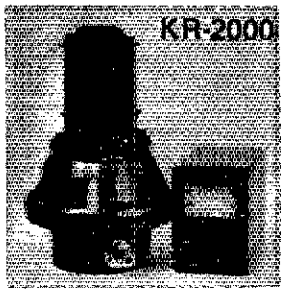

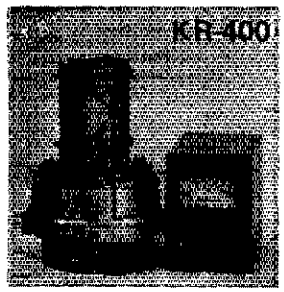

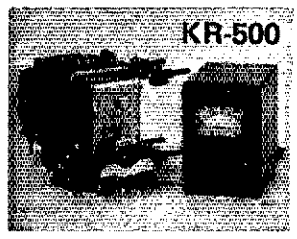

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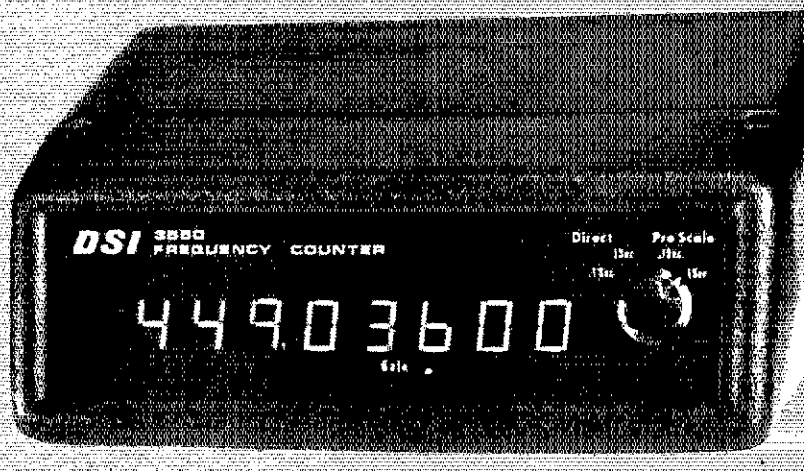

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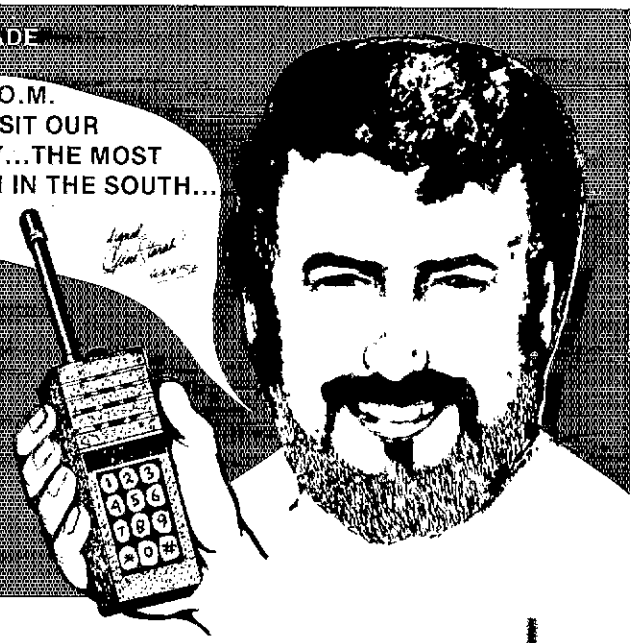

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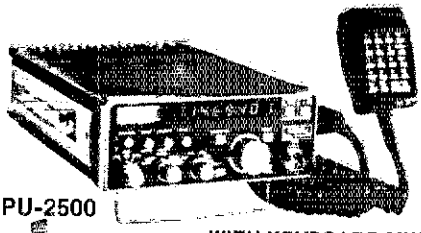

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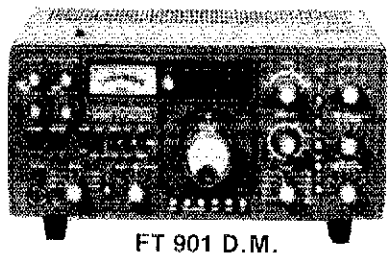

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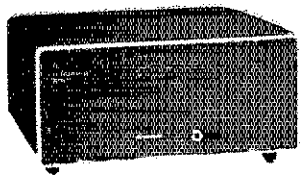

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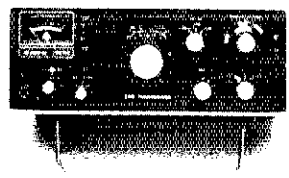

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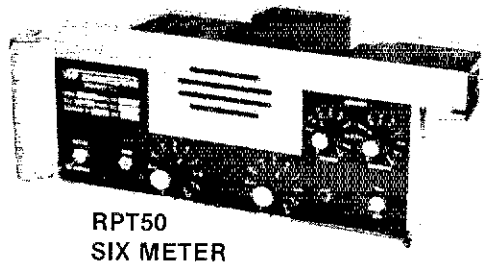

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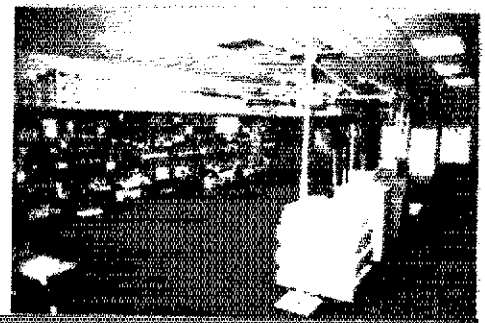

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WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB — Asst. SCM: N3FM. SEC: W3VUP. STM: W3YQ. Asst. SEC: WA3LJW. NMs: K3LL W3NEM W3KUN and W3MML.

Net	Sess.	QNI	QTC	Freq.	Time/Day
WPAQW	31	526	353	3585	7:00 Dy
WPAPTN	31	407	202	3993	6:30 Dy
WPA2MTN	31	582	263	146.28/88	8:00 Dy

N3FM has consented to serve as ASTM. Bob has been very active in net operations and will be an asset to the section. WB3GAB has applied for EC appointment in Jefferson County and WB3JDI has asked for the EC appointment in Crawford County. New amateurs are KA3AVD & KA3BXA. Upgrading are WA3DKY WB3HAU WB3KJH & WB3LFB to General, also WB3LFA. WB3IFA to Advanced. WB3BOV to Extra. WB3LDE now a Tech with call N3ANP. WB3DKT now AF3B. The Breezeshooters Ground Wave Contest brought area amateurs onto 10 meters in great numbers, more than ever. BPL: W3EGJ. Club officers for 1979 are as follows: Indiana County ARC, WB3EUQ, pres.; WB3J, vice-pres.; W3FVU, secy-treas.; W3MMY & W3FE, dir. Foothills RC WB3CQA, pres.; N9TP secy.; WB3HZM, treas.; WB3EKC, act. mgr.; WA3RVD, asst. act. mgr.; WB3LNX, mem.-at-large W3UEA. Radio Amateurs of Corry, W3KSE, pres.; WB3BNH, vice-pres.; WA3PGL, secy.; WA3SJM, treas. Butler County ARA, K3HJH, pres.; K3LL, vice-pres.; WB3AWH, 2nd vice-pres.; K3ENM, secy.; W3TIG, treas.; W3YNE & K3SAG, trustees. Washington (County) Amateur Comms. AD3T, pres.; K3PSP, vice-pres./secy.; WB3GWR, treas. North Hills ARC, K3KAR, pres.; W3OJM, vice-pres.; K3GT, act. mgr.; WA3ZPL, treas.; WA3WOX, secy. Traffic: (Dec.) W3EGJ 505, W3YQ 296, N3FM 289, WB8PAV/3 242, AF3B 211, K3LL 203, N3EE 168, W3SMV 149, AC3N 124, W3KUN 93, K3HI 65, W3MML 64, WA3QNT 63, WB3AIB 61, K3SMB 61, W3AS 52, WA3PXA 51, K3HCT 49, N3WS 40, W3ATO 39, W3SN 37, WB3EYY 35, WB3GWJ 34, W3RUL 19, N3NR 17, WB3EUM 9, WB3GZR 9, AB3X 8, W3LOD 5, K3UA 3. (Nov.) N3EE 43, K3HI 2. (Oct.) K3HI 1.

CENTRAL DIVISION

ILINOIS: SCM, Edmond A. Metzger, W9PRN — Asst. SCM: Harry Studer, W9RYU. SEC: W9AES NMs: WA9KFK and WB9JSR. Cook County EC: W9HPG.

Net	Freq.	Times/Day	Tfc.	Sess.
ILN	3690	0030/0400 Dy	647	62
Ill Phone	3915	2245 Dy	232	31
NCPN	3915	1300/1800 Dy	380	50
IEN	3940	1400 Su		
W9VEY Mem. Stn.			8	

no report.

It is with deep sympathy that this column lists K9DYD and W9MDZ as Silent Keys. Our sympathy to their families and many friends. WD9IUD now N9ANR and WB9YIY is an Extra Class. LAMARS (Libertyville and Mundelein Radio Society) meets the first Thur. and third Tue. of each month at 7:30 at the Libertyville Library. WB9YJC was recently inducted into the National Honor Society at Downers Grove High School. WB9AGR 04/64 is being relocated to a higher QTH. The ILN (Illinois Section Net) had a new record of QTC, with 647 messages this month. This was due to the heavy influx of Christmas traffic. CAND report 892 messages in 62 sessions. Daytime 9RN representation 98.8. Ill. stations W9JIJ W9HOT and W9NXG. W9HOT reports that the 9RND had traffic count of 300 messages in 991 minutes (58 sessions) and that the Ill. participation was 100% with W9JIJ W9YCE W9NXG W9KIC and W9HOT participating. The Starved Rock Radio Club has announced that their 1979 Hamfest will be held on June 3 at the usual Princeton Fairgrounds site. This promises to be bigger than the record breaker of last year. New 220 MHz repeaters are: WR9ANF on 222.10/223.70, W9JTD on 222.14/223.74, and K9SP on 222.74/224.34. N9AMY is the new circulation manager of HALO (Six Meter Club). New call hard was N9ALN. The Moultrie County Hamfest will be held Apr. 22, (the week before Dayton) at the Moultrie County 4-H Fairgrounds. AA9C demonstrated his TRS-80 Micro Computer at the Dec. meeting of the St. Clair Amateur Radio Club. New licensees of the Hamfesters Radio Code and Theory classes conducted by W9HPG are KA9CRR KA9CTY KA9BUM KA9BVP KA9BVQ KA9CNX KA9BUL KA9BPA KA9BVN KA9BVR KA9BVS KA9BZA KA9CTE KA9BRS KA9BYS KA9BUK KA9BVT KA9CNW and KA9CSD. The newly elected officers of the Suburban Amateur Repeater Assn. are K9UAA K9SEM W9RSV and WA9MED. W9RY has a new Kenwood TS-700SP with a Cushcraft VHF twist antenna. BPL certificates are awarded to W9JIJ K9PNG WD9DMV and K9BVE. Traffic: W9JIJ 758, K9PNG 631 WD9DMV 541, K9BVE 397, W9NXG 387, W9OK 348, W9KR 183, N9TN 199, W9HOT 196, W9OBS 167, WA9KFK 159, WB9JSR 152, WA9BFV 143, N9DR 141, WB9BEX 136, K9SW 113, K9EEA 101, WD9DSG 100, WB9YJF 84, W9YCE 64, W9LNQ 53, W9OYL 48, W9HBI 30, N9MX 26, WD9DSG 16, W9PRN 16, WA9AQN 14, AB9M 12, WB9VFY 12, WB9ZED 12, WB9RFC 10, K9BK 4, WD9EBQ 4.

INDIANA: SCM, J. M. Kell, W9LTU — SEC: W9UMH. NMs: K9CGS (ITN), W9JUJ (QIN), WB9YXN (ICN), W9PMT (Hoosier VHF). Dec. Net reports. Times in UTC and freq. in kHz.

Net	Freq.	Time	QNI	QTC	Sess.
ITN	3910	1330/2130/2300 Dy	3657	724	90
QIN	3658	1430/0100/0400 Dy	1047	790	90
ICN	3708	0015 Dy	137	45	29
IPON	3910	1330 Su	141	5	5

Two changes in the Net schedules. ICN has moved to 3708 kHz and early QIN slipped to 1430Z. Christmas was a busy time for the nets and two people in particular. Both W9JUJ and W9FC made BPL for Dec. Clark Co. ARC new officers are N9PU, pres.; WD9FIC, vp; W9HRY, secy.; WA9FCM, treas.; K9QWJ, dir. W9FMJ had good time in Telephone Pioneers QSO Party. Renewed a lot of old friendships. IN was 100 percent on 9RND again this month. Lets keep that up. March is the beginning of tornado season in IN. The National weather service has asked our cooperation with their skywarn program. If you dont have a local weather net, get busy and form one. Tie in to the NWS can be direct, or relay via the net on 3910. Last year the NWS at Indy requested info on local conditions as far south as Mt Vernon and as far north as Peru. As you can tell this was beyond 2 mtr range. The reports came back via 3910 in a very short time. Watcher training is available through NWS. W9MS became a Silent Key New Year's Eve. It's nice to see the number of people handling traffic in Dec. (traffic: (Dec.) W9JUJ 1579, W9FC 538, W9XD 367, WB9UYU 226, W9EI 150, WA9QCF 136, WB9IHH 121, W9QLW 115, W9DKP 96, WB9OBN 78, W9DLF 49, WB9VJE 47, W9IOH 45,

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RX220C Kit	210-240 MHz rcvr w/2 pole 10.7 MHz crystal filter	74.95
RX220C W/T	same as above–wired & tested	131.95
RX432C Kit	432 MHz rcvr w/2 pole 10.7 MHz crystal filter	84.95
RX432C W/T	same as above–wired & tested	142.95
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RF220D Kit	220 MHz RF front end 10.7 MHz out	18.50
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TX144B W/T	same as above–wired & tested	65.95
TX220B Kit	transmitter exciter–1watt–220 MHz	34.95
TX220B W/T	same as above–wired & tested	65.95
TX432B Kit	transmitter exciter 432 MHz	49.95
TX432B W/T	same as above–wired & tested	87.95
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TX150 W/T	same as above–wired & tested	43.95

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PA144/15 Kit	2 mtr power amp–1w in–15w out–less case, connectors and switching
PA144/25 Kit	same as PA144/15 kit but 25w
PA220/15 Kit	similar to PA144/15 for 220 MHz
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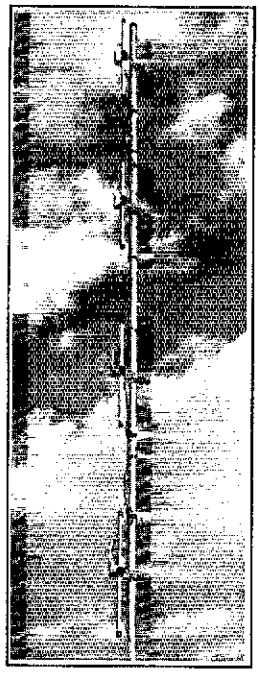

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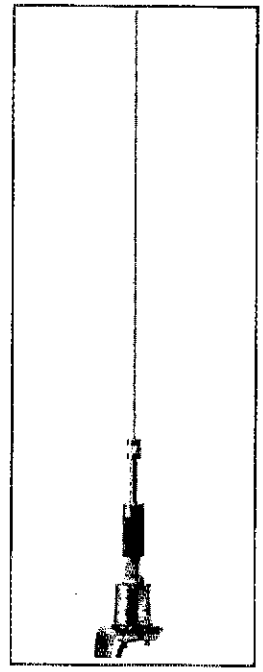

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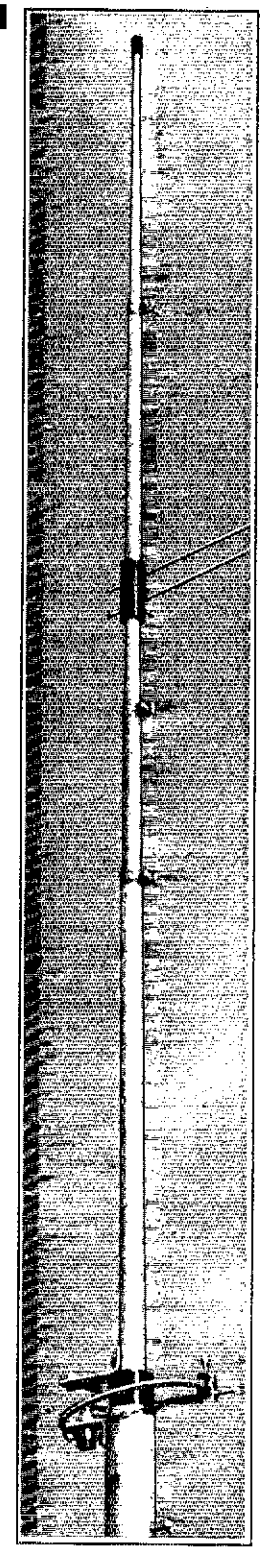

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"LOVE LETTERS" TO TEN-TEC...

Thousands of unsolicited letters received each year from our customers speak more eloquently than we about the quality and service of TEN-TEC products...

Dear OM:

I recently purchased a TEN-TEC 544 and thought I would pass on to you my thoughts concerning the transceiver. First let me say that I have been using Collins equipment for several years. I am telling you this to let you know that I am familiar with "quality" ham equipment.

For the past eight years I have been using a Collins S line station. I operate CW exclusively so this required me to build a QSK control circuit in order to effectively operate in today's crowded bands. Although I have a Collins 500 cycle filter, it just is not enough. So, I bought a CWF-3 active audio filter and installed it in my station control to try and separate the DX out of the turmoil. There was no provision in the Collins 32S1 to zero beat the received signal. So, I built a circuit to do just that and installed it in the station control. It is mandatory to know the VSWR your transmitter is working into, so I purchased a Johnson directional coupler and VSWR meter. Other refinements were added from time to time to bring the Collins equipment up to what I would term as "more than adequate" for the CW operator. I have elaborated on this to make a point, which is:

Now I am using the TEN-TEC 544 with its associated power supply. I did select the options of a CW filter and noise blanker. I now have, in the one piece of equipment, all that I need for a complete ham "station" — I can't even think of anything that I could add to improve my station. I have used the 544 now for a month and am completely sold on all solid state equipment. The internal noise is lower, the sensitivity is better, operating convenience has more than doubled, and as your ads indicate "CW is now a conversation" and a pleasure.

I have been a ham since 1941 and I must say that the TEN-TEC 544 is the best all around item of amateur equipment that I have seen. Just as soon as I complete working all the DX countries, I am going to settle down to some serious rag chewing and the 544 will provide the effortless method.

73
Vernon L. Gibbs, W4JTL

Number 15 of a Series

arma

TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862
EXPORT: 5715 LINCOLN AVE., CHICAGO, ILL. 60646

K9FG 41, WD9FIC 40, WB9DAG 35, N9PS 32, N9AEI 31, W9BTZ 31, W9TG 29, WB9DIX 27, WB9OTX 25, K9DZC 22, WB9IZL 21, W9CMT 19, W9HUF 13, K9TKE 13, K9RPZ 12, W9RTH 11, K9CGS 10, WB9PIR 10, WA9TJS 10, WA9OHX 7, W9BDP 3, WB9GJZ 2. (Nov.) W9EI 87, W9IOH 36, WB9UBF 32, W9PMT 27, K9EQT 11, AA9S 3.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9FZC. NMs: W9AYK K9UTQ W9IEM WB9ICH K9KSA WB9KPX K9LGU K9EN. Nets, freq., time, QNI, QTC, Mgr. BWN, 3985, 1245 M-S, 772, 576, W9AYK. BEN, 3985, 1800Z Dy, 719, 263, W9IEM. WSBN, 3985, 2300Z Dy, 1176, 456, K9UTQ. WNN, 3725, 2315Z Dy, 20, 2, WB9ICH. WIN-E, 3662, 0100Z Dy, 340, 233, WB9KPX. WIN-L, 3662, 0400Z Dy, 305, 218, K9LGU. Wi EXPO, 3925, 1801Z M-F, 561, 28, WA9NIX. KA9AZF is now Tech. WD9CYL now Gen. WB9IKA now AE9P. Wisc. QSO party 2100Z March 31 to 0300Z April 2, 24 hour max. phone & cw same contest 160-10 meters. K9APW and WB9DWF are proud parents of a girl. Congratulations to K9EN being elected to Vice Director, also to W9NTP on being reelected. WB9UYE now AF9B. W-F ARC swapfest Sat. Mar. 5, 1979. WD9CJG, WD9IXZ new Generals from Oconomowoc area. WB8QEP new ham in Junction City area. BPL to WD9CQC W9DND W9ZGQ W9CXY. Mark your calendar for the following: YTARC hamfest May 19, Central Division Convention June 15-16. WNA picnic July 8. Your attendance to all of these doings is welcome. WB9RRU passed Extra. New in Wisconsin Dells KA9DCS. New hams Green Lake area KA9CVL KA9CVE. Fond du Lac area KA9DBC KA9CXF. This month's traffic total came to 5,734 An all time high, keep up the good work. Traffic: (Dec.) W9ZGQ 971, WD9CQC 523, W9CXY 510, W9DND 504, W9IEM 331, W9SFL 245, WB9KPX 226, W9YCV 185, K9FHI 176, WD9DHF 172, WA9GJU 118, W9DM 112, WB9ICH 95, W9UW 95, K9UU 81, N9JW 81, N9CP 70, WD9EAQ 70, K9LGU 69, WD9ESZ 66, K9UTQ 61, W9AYK 58, WD9AJA 57, WB9YPY 54, WA9WYI 52, K9AKG 41, K9JPS 41, KB9CV 40, W9IHW 39, WD9BKT 37, W9MYL 36, W9TXB 36, WB9MPF 33, WB9ESM 33, K9AQ 31, K9VSY 27, W9YYL 27, WB9RRU 26, WB9BRE 25, WA9ZTY 22, WA9GYF 20, K9HDF 18, K9ANV 17, W9FDY 12, WB9ZRE 11, WB9YPZ 8, K9ASC 5, WA9LWJ 5, W9RTP 4. (Nov.) WB9KPX 155, WB9DAN 3.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX — SEC: KØHJC. STM: AFØO. Minn. Nets.

Net	Freq.	Time	QNI	QTC	Mgr.
MSN 1	3685	6:30 P	252	980	WØRIQ
MSN 2	3689	10:15 P	120	80	KØPIZ
MSPN N	3945	12:05 P	621	108	KØZBI
MSPN E	3929	5:45 P	766	283	WØDUW
PAW	3925	9-12/1-5	3608	547	WAØYVT
MWX	3925	6:15 P	437	344	WBØUKI
MSSN	3710	5:30 P	130	55	AFØO

WØVB has put together a 2-meter moonbounce station during the past year. He reports working 5 U.S. and Sweeden stations during 1978. Moonbounce propagation and experimentation are the scheduled activities for his setup. We will be looking forward with anticipation to the availability of the first world wide E.M.E. directory which he is compiling. He also is an OVS appointee. It was with regret that our SCM announced the resignation of WØSA as MN SEC last Dec. Dr. Cross is continuing to serve as an OO. Bemidiji reports that their 3494 repeater is now operational. Upgrades: Novice to Tech. KØAJE KØCBC KØCJO; Novice to General: KØCOG WDØGEB KØBOA; Novice: KAØCYB KAØCRX KAØCRZ KAØCSC KAØCSE KAØCSF KAØCXU KAØCRO; Advanced: WDØHDD. Congrats to recent Net Cert. recipients: WDØBFR WDØFFE WDØGGX NØAHA WDØCQC. Traffic: WAØTFC 426, WAØYVT 391, AFØO 387, AEØM 248, WDØBFR 187, WBØHOX 169, WBØCEU 149, KØPIZ 137, WØDUW 135, WØRIQ 98, WBØUKI 90, WAØQIT 72, KØIL 60, WDØNZD 50, NØAHA 47, KØCSE 42, WØOPX 39, WDØEKL 37, KØHJC 37, WBØJYT 28, KAØBZP 26, KAØZBI 25, WBØSYT 22, WBØZBJ 21, NØJP 19, WAØRKB 19, WBØPKG 17, WBØUIP 14, KØFLT 12, WBØJUL 9, KØBED 4.

NORTH DAKOTA: SCM, Lois Jorgensen, WAØRWM — WAØYSF came upon a three car accident on a State Hwy and with the help of WDØECS on the Grafton repeater got the ambulance on way in 10 minutes. Congrats to: KØRHX and WDØCCG on new harmonic, WDØDFT working 10 meters FM on Yaesu 901D, got African stations where there are only 9 hams! Carrington Repeater has a pre-amp so get more on 129 from Crystal Springs to Steele. WAØRWK & WAØRWL families spent Holidays at WAØVGJ & WAØRWM. Wish WØWWL and WAØREW a speedy recovery.

Net	kHz	CST/Days	Sess.	Q	N	IQTC	Mgr.
Goose River	1990.0	0900 Su	5	5	4	1	WØCDO
DATA	3996.5	1830 Dy	24	3	5	2160	WBØWSQ
YL WX	3997	0730 Dy	31	6	3	4640	WAØRWM

Traffic: WAØRWM 853, WBØOAJ 143, WBØWIB 136, KØFRP 133, WAØCRH 108, WØCDO 82, NØAFP 54, KØGGI 49, WDØECS 45, WBØWSQ 40, WAØSUF 33, WBØJGM 30, WØDM 21.

SOUTH DAKOTA: SCM, Lydia S. Johnson, WØKJZ — Asst. SCM: WØDVB. SEC: WAØTNM. NMs are ZWL TNM UEN VRE WE. ARRL Life Member WAØJCV uses Heath SB-100 fxcr, acquired H8 computer. SVRA Pres. WBØUZC has a low band TS-820 and IC-211 with a 50-ft. tower tri-band ant. fired up for all emergencies. SD WX net at 1400Z on 3980 kHz, M thru S reports are toned to NWS in S.F. by WØZWL and WØMZI. NWS distributes to the public via 3 teletypewriter circuits. "A.M. WX" Americas 1st Ntl. tV 15 min. wx program can be seen at 1345Z M thru F on Public channel. For DX QSLing refer to your ARRL DX Bureaus in QST and Worldwide QSL in Callbook. Congrats to WØZWL and WAØVRE on BPL, and WAØTNM for PSHR 49 pts. WBØVGN renewed OTS. KAØAMG can be heard on 80 mtrs. with an HW8. KØAS sending on keyboard. SDN 78; NJQ 68; WX 439, Eve 120. Traffic: (Dec.) WØZWL 761, WAØVRE 683, WAØTNM 311, WØDVB 224, KØFRE 156, WDØBMR 137, WØHOJ 120, WAØUEN 98, WBØVGN 38, WBØEVQ 33, WØKJZ 28, WBØOMF 20, WØIG 15, KØZMA 14, KØJV 10. (Nov.) WAØTNM 129.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU — SEC: WA5VNV. NMs: AD5D W5MYZ W5POH WA5ZWZ. Nets, kHz, Time/Day, QNI, QTC, Mgr. ARN, 3995, 0030/Dy, 1514, 171, AD5D. OZK, 3760, 0100/Dy, 152, 18, W5MYZ. APN, 3937, 1200/M-S, 1155, 71, W5POH. M-Bird, 3928, 746, 61, WA5ZWZ. NEAWN, 146.28/88, 0130/M-F, 94, 16, WB5WJH. SCARC, 28.765, 62, 5, WD5HJC. Interested in Novice net contact WD5CAA, Rt. 3, Clinton. KA5AFZ has new Kleinschmidt printer. KA5AFZ KA5AHX have new Flesher TU-170s. WB5IGF WB5KUI running General

We've cut your final cost on Bearcat® scanners up to $150!

Communications Electronics™ celebrates the introduction of three new *Bearcat*® scanners with special cash rebates of up to $20.00 on all *Bearcat* brand monitors. During February and March, 1979, when you purchase your *Bearcat* scanner from any **Communications Electronics**,™ Scanner Distribution Center,™ you will get a special rebate coupon and a proof of purchase invoice that entitles you to a portion of the biggest scanner rebate in our history. In addition, prices have been drastically cut during our special sale to make your final price the lowest ever. Check out the super features of *Bearcat* scanners and select the models that are right for you at work, home or in your car.

Bearcat® 250

List price $399.95/**CE price $269.00/$20 Rebate**
Your final cost is a low $249.00
50 Channels • Crystalless • Searches • Stores Recalls • Self-Destruct • Priority channel
The *Bearcat* 250 performs any scanning function you could possibly want. With push button ease you program 50 channels (five banks of ten channels each). Push another button and search for new frequencies. There are no crystals to limit what you want to hear. A special search feature of the *Bearcat* 250 actually stores 64 frequencies, and recalls them, one at a time, at your convenience. Automatic "count" remembers how often frequencies are activated by transmission–so you know where the action is. Decimal display shows the channel, frequency and other programmed features. The priority feature samples your programmed frequency every two seconds. Plus, a digital clock shows the time at the touch of a button. This is the only monitor radio that has received the **Communications Electronics** quality control approval rating #1. Our highest quality grade for technologically sophisticated equipment. The *Bearcat* 250. Scanning like you've never seen or heard before. In stock for immediate shipment!

New Bearcat® 220

Available April – May, 1979. Order before March 31, 1979 to qualify for $20.00 CE direct rebate.
List price $379.95/**CE price $299.00/$20 Rebate†**
Your final cost is a low $279.00
Aircraft and public service monitor
We have received **thousands of requests** to have a scanner capable of monitoring the aircraft frequencies. The *Bearcat* 220 is one scanner which can monitor all public service bands plus the exciting aircraft band channels. In fact, the *Bearcat* 220 covers seven bands, Low and High VHF, UHF, UHF-Government, UHF-T, 2-meter and ¾ meter amateur and Aircraft. Up to twenty frequencies may be scanned at once. Or frequencies can be arranged into two banks of ten frequencies each, allowing the listener to choose the bank of most interest.

Not only does this new scanner feature normal search operation, where frequency limits are set and the scanner searches between your programmed parameters, it also searches all marine or aircraft frequencies by pressing a single button. These frequencies are already stored in memory so no reprogramming is required. The frequency Reception Range is 32-50, 118-136, 144-174 and 420-512 MHz. The *Bearcat* 220 also features a Priority channel, Dual scanning speeds, Patented track tuning and Direct channel access.

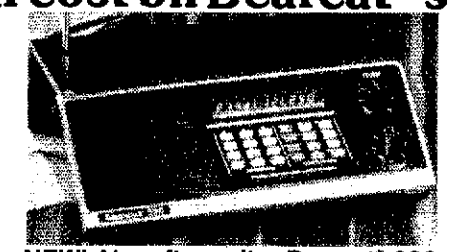
New Bearcat® 211

Available March, 1979
List price $329.95/**CE price $239.00/$20 Rebate**
Your final cost is a low $219.00
The *Bearcat* 211. It's an evolutionary explosion of features and function. More channels than the *Bearcat* 210. Added scan control. Plus, a full complement of state-of-the-art innovations that increase scanning capabilities—and quicken the excitement.

18-channel monitoring. With no-crystal six-band coverage. Dual scan speeds. Color-coded keyboard. Even a digital clock. All at a modest price. Take a look. Here's more scanning excitement than you bargained for.

Frequency reception range: 32-50, 146-174, 420-512 MHz. Sensitivity: 0.4 microvolts. All accessories included!

NEW! 18-channel Bearcat® 211



NEW! Aircraft monitor Bearcat® 220

Now Bearcat® 210

List price $299.95/**CE price $219.00/$20 Rebate**
Your final cost is a low $199.00
10 Channels • 5 Bands • Crystalless
Improved reliability and performance
Use the simple keyboard to select the 10 channels to be scanned. Band coverage includes Low, High, UHF, UHF-T, 2 and ¾ meter Ham–and other government law enforcement UHF frequencies. Automatic search finds new frequencies. Decimal display shows the channel and frequency being monitored. The 210 features patented selectable scan delay, push button lockout, single antenna, patented track tuning, AC/DC operation. With no crystals to buy. Ever!

Bearcat® 12

List price $179.95/**CE price $126.00/$15 Rebate**
Your final cost is a low $111.00
The finest crystal scanner ever offered.
More features, more channels, more action. The *Bearcat* 12 monitors 10 channels over five bands (Low and High VHF, UHF, UHF-T, and 2-meter Ham). Scan delay lets you listen to both sides of a two-way, same-frequency conversation. Variable scan rate puts you in control of the scan speed. Other features include automatic squelch, individual lockout, and more. The *Bearcat* 12 has more of what you're scanning for.

Bearcat® 8

List price $159.95/**CE price $112.00/$10 Rebate**
Your final cost is a low $102.00
8 Channels • 5 Bands • Handsome wood case

Bearcat® 6

List price $119.95/**CE price $84.00/$5 Rebate**
Your final cost is a low $79.00
6 Channels of Exciting Low or High VHF action.

Bearcat® 3 (One band)

List price $119.95/**CE price $84.00/$7.50 Rebate**
Your final cost is a low $76.50
The "selectable" scanning radio.

Bearcat® Four-Six

List price $169.95/**CE price $119.00/$10 Rebate**
Your final cost is a low $109.00
The first 4 Band, 6 Channel, Hand-Held Scanner.
The *Bearcat* Four-Six offers "hip pocket" access to police, fire, weather and special interest public service broadcasts. It receives Low, High, UHF, and UHF-T bands. Lightweight. Extremely compact. The *Bearcat* Four-Six—with its popular "rubber ducky" antenna and belt clip— provides "go anywhere/hands-off" scanning. When it comes to scanning "to go," *Bearcat* has it.

Bearcat® Hand-Held

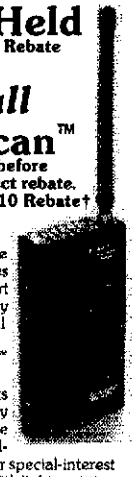
List price $129.95/**CE price $91.00/$5 Rebate**
Your final cost is a low $86.00

NEW Ultra Small Bearcat® ThinScan™

Available March – April, 1979 Order before 3/31/79, to qualify for $10.00 CE direct rebate.
List price $149.95/**CE price $119.00/$10 Rebate†**
Your final cost is a low $109.00
World's smallest scanner!
The *Bearcat* ThinScan.™ High-performance scanning has never been this portable. It goes anywhere. ThinScan™ slips easily into a shirt pocket. Hands-off convenience—within easy reach. Slim, trim. But with the professional capabilities you expect from a *Bearcat*.

Go ahead, size it up. *Bearcat's* ThinScan™ measures 2¾" across. Just 1" deep. And 5¾" high. Ideal for law enforcement agents to covertly receive transmissions from "body mikes". Four crystal-controlled channels are scanned every ½ second providing immediate access to police, fire, weather and other special-interest broadcasts on High and Low VHF bands. With light-emitting diodes indicating the channels being monitored. And individual lock-out switches for by-passing any channel not of current interest. Frequency reception range: 33-44, 152-164 MHz. Weight: 10 ounces. Sensitivity: 1 Microvolt. Selectivity: −45dB @ 25 KHz.

The *Bearcat* ThinScan.™ The professional portable. The small high-performance scanner anywhere. Size it up. It won't let you down.



Bearcat® Alert™ Warning Radio

List price $79.95/**CE price $64.00/$5 Rebate†**
Your final cost is a low $59.00
Early warning for the 1979 tornado season!
† Rebates on these units are offered directly from Communications Electronics.™

TEST A BEARCAT SCANNER FREE

Test any *Bearcat* brand scanner from **Communications Electronics**™ for 31 days before you decide to keep it. If you do, you'll own the most sophisticated and technologically advanced scanner available. If for any reason you are not completely satisfied, return it in new condition with all accessories in 31 days, for a courteous and prompt refund (less shipping charges and rebate credits).

NATIONAL SERVICE

With your *Bearcat* scanner, we will send all accessories, a complete set of simple operating instructions and a one-year limited warranty. If service is ever required on any *Bearcat* scanner purchased from **Communications Electronics**,™ just send your receiver to one of our approved national service centers. When you purchase your scanner from **CE**, you're buying from the **world's leader in no-crystal high technology scanners**. We've sold more synthesized scanners than any other company.

MADE BY ELECTRA QUALITY CHECKED BY CE

Since all *Bearcat* scanners sold by **Communications Electronics**™ are products of Electra Company, a Division of Masco Corporation of Indiana, you can be assured of the finest monitor radios available in the world. In addition, our Quality Control Department further audits the quality of every *Bearcat* model sold by us to insure the high reliability inherent in *Bearcat* scanners.

THE SMALL PRINT

All sales are subject to availability. Prices and specifications are subject to change without notice. This special rebate offer on ***all*** *Bearcat* brand scanners is good only when purchased from **Communications Electronics**,™ Scanner Distribution Center™ between February 1 and March 31, 1979. **Communications Electronics**™ Proof or Purchase Invoice and special rebate coupon (enclosed with your order) must be postmarked by April 15, 1979. Rebates on *Bearcat* scanner models 220, ThinScan™ and Alert™ Warning Radio will be processed exclusively by **Communications Electronics.**™ Offer good in U.S.A. International shipments are welcome *without* rebate offer. Void where taxed or prohibited by law. Offer limited to one rebate per scanner. If returned for credit during our 31 day free trial, rebate and shipping costs will be deducted from refund. Resellers, companies, clubs and organizations (profit and non-profit) are not eligible for rebates. Allow 4-6 weeks after rebate request for check.

BUY WITH CONFIDENCE

All *Bearcat* scanners are extraordinary scanning instruments. They provide virtually any scanning function that the most professional monitor could require. To ***get the fastest delivery*** of any *Bearcat* scanner, send or phone your order directly to our Scanner Distribution Center.™ Be sure to calculate your price using the CE prices in this ad. Your rebate will be returned separately from your order. Michigan residents please add 4% sales tax. **Crystal certificates** are available for $5.00 each. These certificates allow you to order crystals directly from the manufacturer. **Base or mobile antennas** specifically designed for all *Bearcat* scanners are $25.00 each postpaid. Mail orders to: **Communications Electronics,**™ Box 1002, Ann Arbor, Michigan 48106 U.S.A. Add $5.00 per scanner for U.P.S. U.S. ground shipping or $9.00 for even faster U.P.S. air shipping. If you have a MasterCharge or Visa card you may call and **order toll free** 800-521-4414 to place a credit card order. If you are outside the U.S. or in Michigan, dial 313-994-4444. **Dealer inquiries invited.** All order lines at **Communications Electronics**™ are staffed 24 hours.

Since this rebate offer is the biggest in our history, you must place your order today at no obligation to assure prompt delivery.

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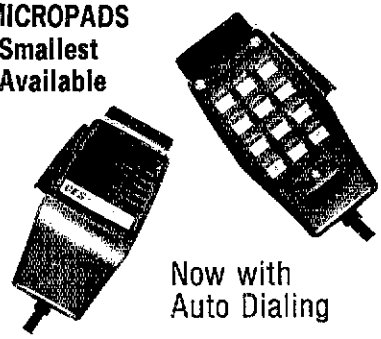
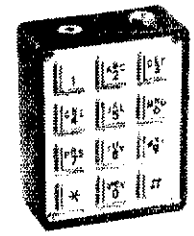


Now with Auto Dialing

Model 230A 500 ohm Dynamic microphone with built-in Tone Pad. 3-3/4" x 2". Snap action Tactile Keys. Adjustable balance and level controls. Automatic PTT. Use with any transceiver with 500 ohm microphone . . . **$39.95**

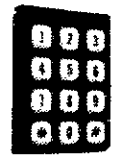
Model 235 Automatic Dialing Touch Tone Microphone. Programs and operates entirely from Keyboard. Stores 5 eleven digit and 5 seven digit phone numbers. Programmable dial rate. Programmable 2 sec. pause. Auto. PTT .5 sec. before first tone. Stores last dialed number. **$69.95**

Battery Powered Tone Encoder



Model 300 Self-contained Tone Encoder with 9v battery and integeral, rear mounted speaker with external volume control. Use acoustically coupled or wire direct. Use for Amateur Autopatch, Computer Access, Mobile Telephones, Remote Control and Data Entry. Snap Action Keys. 1-1/4" x 2-1/2" x 3-1/4" **$49.95**

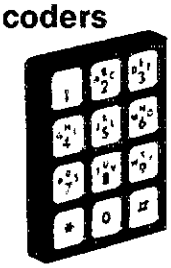
Miniature Tone Encoders



- Standard Dual Tone Freqs
- Guaranteed .2% Accuracy
- Crystal Controlled
- Level and Balance Controls
- MOS Digital I.C.
- High RF Immunity
- Regulated for 7v to 20vdc
- Easily Mounted to Transceivers

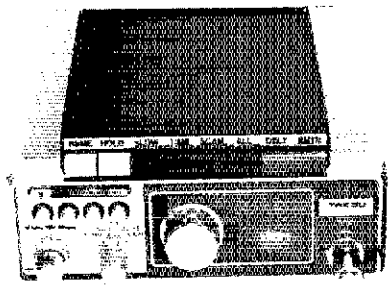
Model 215A 2-3/8" x 1-11/16" x 5/16" **$39.95**
Model 217 Keyboard 2" x 1-1/2" x 1/16". Small Component Module mounts in remote location **$34.95**

Thin Tone Encoders



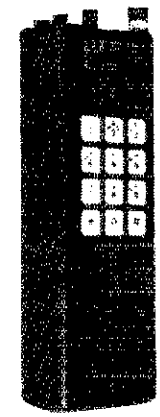
Model 211 Snap Action Keyboard. Standard dual tone frequencies. Crystal controlled with .2% accuracy. MOS Digital I.C. - High immunity to RF. Operates 7v to 35vdc. 2-7/8" x 2-1/4" x 7/16". Easily mounted to Transceivers. **$39.95**
Model 210A As abv, flush mt. keys . . . **$39.95**

NEW CES 800 Channel Programmable Scanner for Yaesu FT-227R, Midland 13-510 or Kenwood TR-7400A.



Model CES800 (Specify radio) An inexpensive way to convert the listed rigs into 800 channel scanners. Simple to install and operate. Program a channel quickly from front panel. Up to 800 channels can be programmed and entire band scanned without loosing memory. Stop scan by hitting PTT. Internal battery holds memory when disconnected from power. . . . . **Introductory Price: $99.95.**

Pad/Back for Standard 146A HT



Model 220 A complete back assembly with Touch Tone Encoder already mounted and ready to plug into the private channel connector. Snap Action Keys. **$49.95**

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Contents: Chapter 1. FM Past and Present. 2. Basic FM Theory. 3. FM Receivers. 4. FM Transmitters. 5. Mobile and Portable Equipment. 6. Antennas for Base and Mobile Stations. 7. Repeaters — FM Relay Stations. 8. Repeater Circuits and Accessories. 9. Repeater Troubleshooting. 10. Getting a Repeater Club Organized. 11. Testing and Servicing FM Gear. 12. Shopping for Surplus. 13. Tips on Buying FM Equipment. 14. Reducing Interference. 15. A Microprocessor-Controlled Repeater System. 16. Operating Procedures and Regulations.

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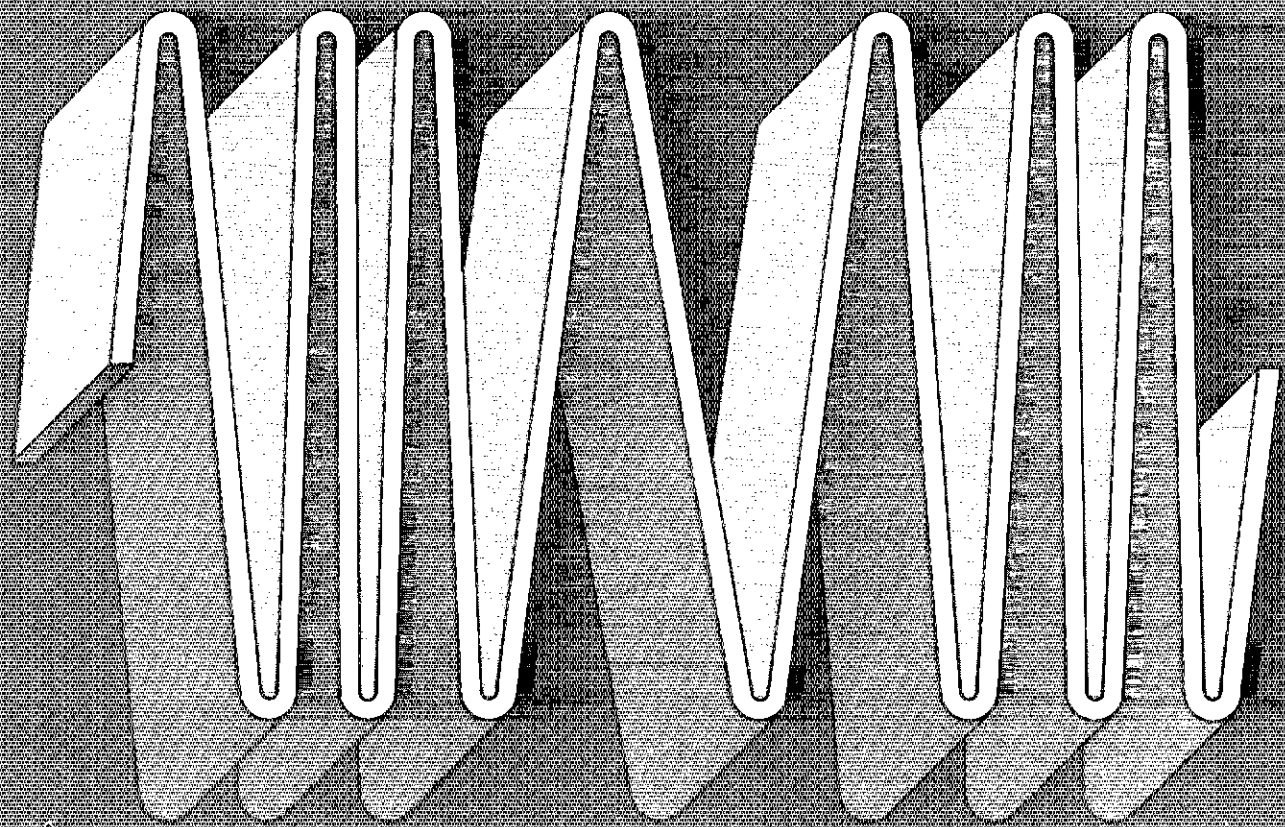
FM & REPEATERS

All you need to know to operate on Amateur Radio's most popular mode ● Basic gear and accessories ● Mobile equipment and antennas ● Repeater design and operation, and more



Published by the American Radio Relay League

class theory 8 PM Tue. Hot Springs ARC officers for '79 WB5SPD, pres.; WD5CPP, vice-pres.; WD5JYL, secy-treas. New EC Monroe Co. WB5OAO. W5ODF new repeater coordinator for Ark. Jonesboro ARC annual banquet Dec. 11 had 40 in attendance. OBs WB5WWA 4, W5UAU 2, P5HR W5POH 39. Traffic: W5BLP 34, W5POH 24, W5UAU 20, WB5WJH 14, WB5KUI 11, WB5WWA 10, WB5GWU 8, K5DW 7, WB5GQH 1.

LOUISIANA: SCM, S. T. "Tom" Losey, Jr., K5TL — Asst. SCM/ K5DPG, SEC: WB5IYH, STM: N5YL. Net Mgrs.: W5GHP N5ES N5RB WB5IYH. Leesville Repeater down for receiver repair. WB5NAA now Extra Class. K5BLV WB5CDX K5DPG WB5LBR K5TL WA5TQA WB5ASD K5ARH all active on DRN5. Officers for LARC are K5FNQ, pres.; W5EXI, hon vice-pres.; WA5KNC, vice-pres.; K5DPG, secy.; K5ARH, treas. GNOARC sponsoring charter bus trip to Dayton Hamfest in Apr. Delta DX Assn. presented awards to W5ZPA and K5OA on DDXA Contest. WB5TPG WB5TPH moving to Shreveport. WA5MJM appointed exhibits chmn. and WB5GFM appointed registration committee chmn. for National Convention in Baton Rouge. Don't forget Lafayette Hamfest Mar. 10 & 11. WB5IYH has made the following EC appointments: K5DPG Region II, WB5ASD Region III, K5ARH Lafayette Parish, WB5USS Caddo-Bossier Parishes, K5AAM St. John The Baptist Parish, WD5CBX Desoto-Red River Parishes. K5HN Area G, WD5FMD Asst. EC for Public Relations and training.

Net	Freq.	Time/Day	QNI	QTC	Mgr.
LAN	3615	7&10 PM Dy	523	356	W5GHP
LTN	3910	6:30 PM Dy	777	735	N5ES
LSN	3703	7:30 PM M-F	186	18	N5IB
LRN	3587.5	6:30 PM Su-W	12	5	N5RB
RACES	3993.5	8:00 AM Su	112	12	WB5IYH
LEN	3910	9:00 AM Su	286		WB5IYH

Traffic: (Dec.) WA5IQU 323, N5YL 286, W5GHP 280, N5TS 207, N5ES 176, K5TL 162, W5MI 129, K5DPG 128, WB5LBR 116, WB5IYH 99, WA2NYR/5 84, WA5TQA 70, N5IB 60, WA5PRI 58, K5BLV 57, WB5USS 53, K5ARH 42, WB5OOM 39, N5EK 34, N5RB 13, W5YN 12, WD5GJB 4, WB5IKT 3. (Nov.) W5MI 120.

MISSISSIPPI: SCM, E. Ed Robinson, W5XT — SEC: WB5FXA. Dec. reflects increased net attendance and tfc. Our net mgrs. are all doing FB! MSBN-K5WSC does FB with our largest net. MTN-K5OAF doing well but needs more cw help and ck-ins. MSN-WA5IDF has given this net to WD5GNR. Al would appreciate the support you've given Hoyt. MN-WA5JWD has gotten this morning net rolling. Other local nets also improving. OBSs WA5OKI W5EPW WD5DCK WD5CSU continuing good activity. My sincerest thanks to everyone!! DRNS-(WD5CDX) QTC 942 with Ms. Rep. 95% by W5EDT, WD5GNR, K5AKM, WB5SXK, K5DMD, WB5NGF, CGGHN (WB5PGB) sess. 31, QNI 2441, QTC 318. MSBN (K5WSC) sess. 31, QNI 2637, QTC 239. MTN (K5OAF) sess. 31, QNI 129, QTC 50. MSN (WA5IDF) sess. 12, QNI 88, QTC 16. MN (WA5JWD) sess. 27, QNI 604, QTC 21. Capital AEN (WB5SNB) sess. 5, QNI 79, QTC 1. NEMs. FMN (WD5PDP) QNI 200. Traffic: K5QAF 333, N5CW 140, WB5FHA 127, W5WZ 63, W5EDT 61, K5AKM 59, WB5SNB 56, W5XT 36, WA5IDF 25, WB5YGQ 25, WA5OKI 15, WD5BVY 13, WD5IKD 7, K5MK 5, N5XA 5, WD5QZZ 5, W5XX 3, WA5TMC 3, AF5V 2, WD5HQW 2, WD5DCK 1, W5EPW 1, WD5CSU 1, WB5PDP 1.

TENNESSEE: SCM, O. D. Keaton, WA4GLS — Asst. SCM: WB4PRF. SEC: WB4DYJ. STM: W4ZJY. AF4T W4PIM K4XE & K4QG have been awarded Section Net Certificates for their participation in the late TN. WB4NFI has been appointed NM of the ETVHFN and as an OTS. RATS Club's officers are: K4MZE, chmn.; WB4GWA, vice-chmn.; WA4GZZ, treas.; KB4X, secy.; K4TVI & WD4NMD, pro, co-chmn. HARES officers are: WA4HGN, pres.; WD4SIQ, v-pres.; WB4EAI, secy.-treas.; KA4INX, pr; WA4TPA, act. chmn. JARC officers are: WA4WOZ, pres.; W4WKZ, v-pres.; WA4VVS, treas.; WD4MTO, secy.; K4EP, sgt.-at-arms. Some reports are getting to me too late, please originate a message reporting your monthly activities to me on the first day of the month. Phone nets report 144 sess., 5280 QNI & 674 QTC. C.W. nets report 65 sess. 420 QNI & 183 QTC. Congratulations to WA4CNY on making BPL in Oct. and Nov. WA4CNY's traffic report below in for Oct., Nov. & Dec. '78. The RATS club is moving to new facilities at Nashville Tech. on White Bridge Rd. Special thanks to WA4CNY K4CNY WB4GZF W4OGG & WB4ZSZ for their extra efforts on DRN-5. Net certificates have been given to K4CNY WB4ZSZ K4ON K4VM N4UC K4WOP K4JGW KB4G W4OGG WA4CNY W4PTI W4DDK & N4ZZ for their participation on the early TN. Traffic: WA4CNY 1241, AF4T 334, WA4NIF 293, K4JGW 269, WB4PRF 180, K4CNY 158, WB4BKF 107, KB4G 98, K4XE 80, WB4GZF 79, N4UC 76, W4OGG 72, W4ZJY 42, K4DEC 35, WB4ZSZ 34, K4FSK 30, WA4GLS 30, W4TYV 28, WA4DKC 26, WB4GWA 22, K4MOA 20, K4VM 20, WA4WVW 18, W4EWR 17, K4MZE 16, W4PFP 16, K4WOP 14, WB4YPO 12, WB4BOC 8, WB4GBI 8, W4QD 7, WB4BGV 6, W4PSN 6, W4RUW 6, WA4CGK 4, W4SGI 4, W4VJW 4, WA4DXA 3, WB4YBL 2.

GREAT LAKES DIVISION

KENTUCKY: SCM, Ted Huddle, W4CID — SEC: WA4ZML. BPL: K4DZM and K4TXJ. Dec. Nets:

Net	QNI	QTC	Net	QNI	QTC
KRN	373	59	KYN	113	80
KPON	88	4	KSN	131	72
KTN	1478	382	KNTN	302	198
SEKEN	33	9	4DARES	45	6
5DARES	59	12	6DARES	30	6

Widespread flooding, around Kentucky kept KY hams busy in early Dec. Units were active in Ashland, Louisa, Owensboro, Hopkinsville and Paintsville. Our planning last summer paid off since we heard many new ARES groups active. We now have an excellent rapport with officials in most of our major population areas. If you want in on this action contact your local EC, the SEC or your SCM. District Ten also conducted a Simulated Nuclear Drill during all this. Traffic: K4DZM 547, K4TXJ 470, WA4AVV 209, WA4IGS 152, WD4ITJ 161, WA4EBN 146, WA4KDQ 131, WB4NPD 129, WA4UIH 106, K4AVX 76, W4HKT 63, W4CID 54, W4CDA 50, K4HOE 48, K4AML 44, WA4EFG 43, WA4AGH 42, WA4JAV 42, WA4ABE 41, WA4FAF 38, WB4AUN 36, WB4RIT 36, KB4CF 32, WB4RRI 30, WA4YPO 26, WB4ILF 10. WD4LXX 16, N4GD 9, WD4NCS 5.

MICHIGAN: SCM, Stanley J. Briggs, W8MPD/K8SB — Asst. SCMs: WA8DHB W8SOP. SEC: WA8EFK. STM: WB8MTD. NMs: K8LNE KB8AI K8RV K8KMQ WB8YDZ WD8LSV.

Net	Freq.	UTC/Days	QNI	QTC	Sess.
MiTN*	3953	0000 Dy	989	600	31
QMN*	3663	2300/0300 Dy	1281	534	91

New Heathkit Linears...More Power Packed Value

These new Heathkit linears give you the power and performance you want to get your signal out clean, crisp and clear. They feature rugged, conservative design for years of dependable performance; built-in solid-state power supplies with full circuit breaker protection for safety and stability, heavy-duty final amplifier tubes with built-in fan cooling and complete shielding.

The SB-221 uses a pair of Eimac 3-500Z's to deliver up to a full 2000 watts PEP input on phone and can be loaded to 1 kW on both CW and RTTY. Its pre-tuned pi-input delivers maximum efficiency and low distortion over the entire band. And at only $619.95 in kit form, it's a real Ham Radio bargain!

The SB-201 uses a pair of 572B/T-160-L tubes for a full 1200 watts PEP input on phone and 1 kW on CW. It has a multi-function front panel meter and easy to operate controls. It's a lot of rig for only $449.95 and some easy kitbuilding.

Both kits feature open chassis layout for easy assembly, rugged metal cabinets for long life and year after year dependability. So pick your power and your price! Either one will be a hard-working, top performing unit and a fine addition to your station. Read more about them in the new FREE Heathkit catalog. Send for your copy today!

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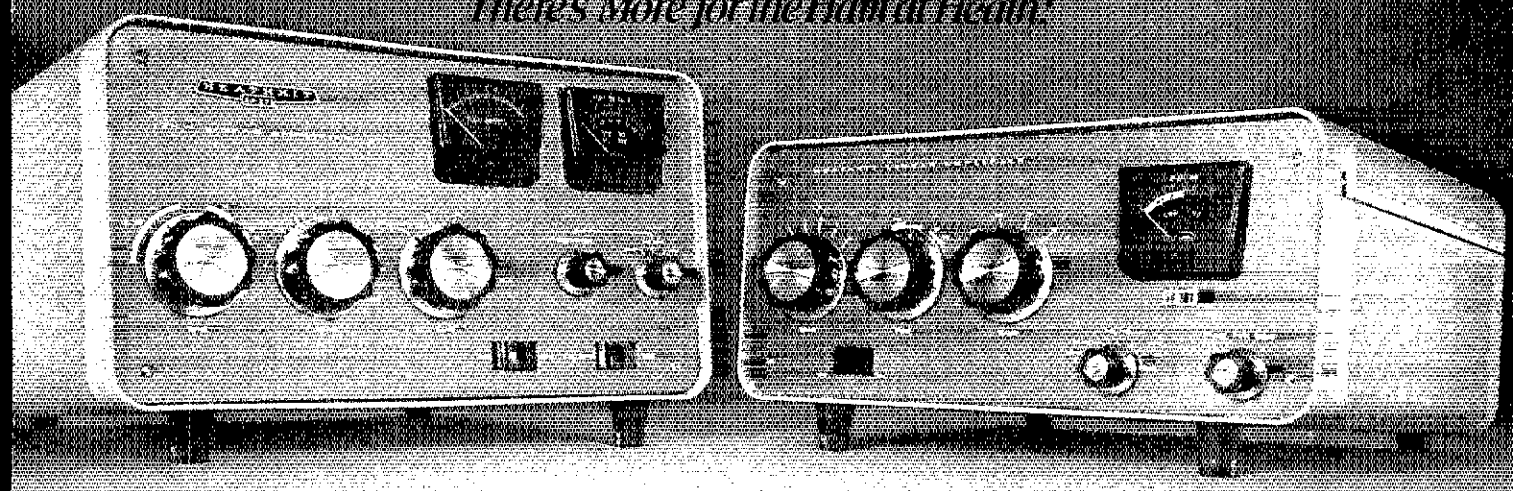

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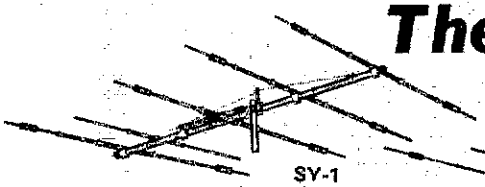
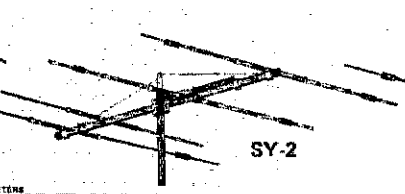
The SYSTEMS from Wilson


SY-1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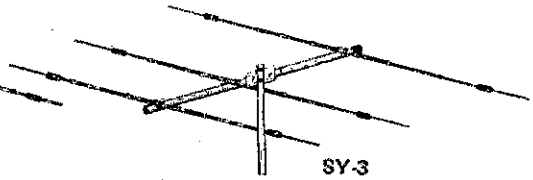
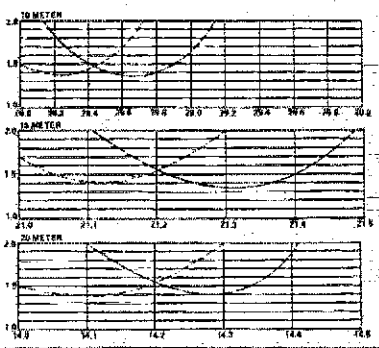
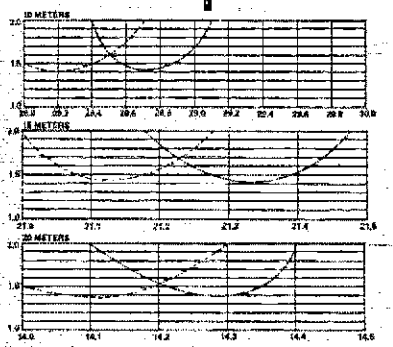
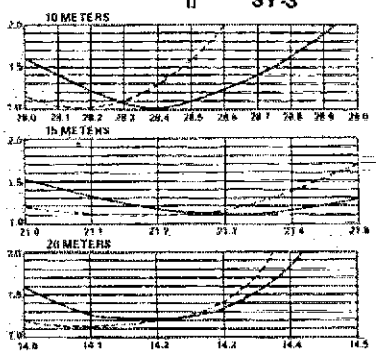

SY-3

——— PHONE setting - - - - - CW setting



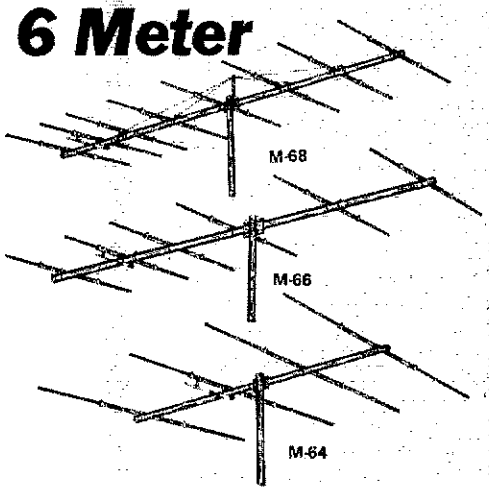


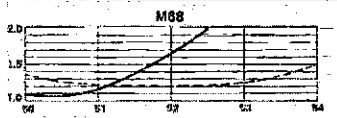


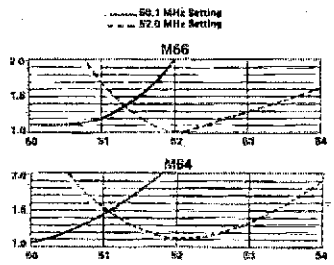
SPECIFICATIONS	SYSTEM ONE	SYSTEM TWO	SYSTEM THREE
Band MHz	14-21-28	14-21-28	14-21-28
Maximum power input	Legal limit	4 Kw	Legal limit
VSWR at resonance	1.5:1	1.5:1	1.3:1
Impedance	50 ohms	50 ohms	50 ohms
Boom (O.D. x Length)	2" x 26'	2" x 18' 6"	2" x 14' 4"
No. of elements	5	4	3
Longest element	26' 7"	26' 7"	27' 4"
Turning radius	18' 6"	16' 4"	15' 9"
Maximum wind survival	100 lbs.	100 lbs.	100 lbs.
Maximum mast diameter	2" O.D.	2" O.D.	2" O.D.
Surface area	8.6 sq. ft.	6.15 sq. ft.	5.7 sq. ft.
Wind loading @80 mph	215 lbs.	153 lbs.	114 lbs.
Assembled weight (approx.)	60 lbs.	47 lbs.	37 lbs.
Shipping weight (approx.)	65 lbs.	50 lbs.	42 lbs.
Matching method	Beta	Beta	Direct feed

Designed by Hams and for Hams, the SYSTEM series of tri-banders are the newest antennas on the market, and with the latest engineering practices. Ranging from the long distance SYSTEM ONE to the space saving SYSTEM THREE, you will find the antenna to fit your needs among them. Using a high grade of aluminum, with super hardware, they are designed to stay up and give years of satisfaction in use and durability. The many hundreds of Hams on the air using the SYSTEMS testify to their dependability, ease of installation and satisfaction. See your favorite dealer for the antennas of the decade . . . "THE SYSTEM SERIES".

6 Meter

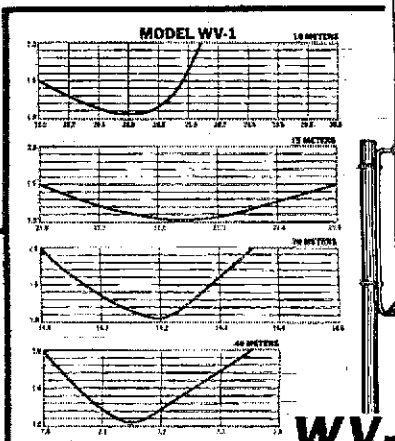






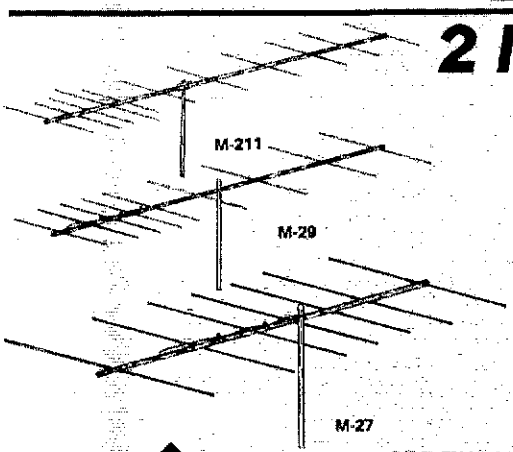
The Wilson 6 meter beams satisfies even the most critical amateur today. With the most popular sizes available, Wilson offers you the performance you want, at a price less than you would expect. The workmanship in the parts will immediately give you the impression of an antenna that will last through the years. For your latest copy of the Ham Buyer's Guide, featuring the 6 meter beams, contact your favorite dealer.

SPECIFICATIONS	M68	M66	M64
Band MHz	50-54	50-54	50-54
Maximum power input	4 kw	4 kw	4 kw
VSWR (at resonance)	1.1:1	1.1:1	1.1:1
Impedance	50 ohms	50 ohms	50 ohms
Boom (O.D. x length)	2" x 36'10"	2" x 25'5"	1½" x 11'6"
Number of elements	8	6	4
Longest element	9' 8"	9' 8"	9' 8"
Turning radius	19' 0"	13' 10"	7' 6"
Mast diameter (O.D.)	2"	2"	1½"
Boom diameter (O.D.)	2" to 1½"	2"	1½"
Surface area	5.8 sq. ft.	4.5 sq. ft.	1.5 sq. ft.
Wind loading @80 mph	145	112	37
Assembled weight (approx.)	34 lbs.	26 lbs.	11 lbs.
Shipping weight (approx.)	39 lbs.	31 lbs.	13 lbs.
Matching method	Gamma	Gamma	Gamma



2 Meter

MODELS M211, M29 and M27



Wilson's new 2 meter series combines the ultimate in design and quality materials. These top performing beams feature 7, 9 or 11 aluminum elements held to the heavy walled boom with the exclusive molded Lexan® boom to element mounting. The four driven elements use Log Periodic design for broad band characteristics providing full 144-148 MHz coverage with less than 1.2 to 1 VSWR across the band. Universal mounting is provided for vertical or horizontal polarization.

SPECIFICATIONS	M27	M29	M211
Band MHz	144-148 MHz	144-148 MHz	144-148 MHz
VSWR	1.2:1	1.2:1	1.2:1
Impedance	50 ohms	50 ohms	50 ohms
Boom (O.D. x length)	1" x 64"	1" x 120"	1.5" x 12'6"
Number of elements	7	9	11
Longest element	40"	40"	40"
Beam width @3dB pt.	27 degrees	24 degrees	21 degrees
Turning radius	37.13"	@3.24"	97.97"
Mast diameter (O.D.)	1" - 1½"	1" - 1½"	1" - 1½"
Surface area	.44 sq. ft.	.93 sq. ft.	1.11 sq. ft.
Wind loading @80 mph	5.5 lbs.	24 lbs.	28 lbs.
Shipping weight (approx.)	6.5 lbs.	8 lbs.	9 lbs.
Assembled weight (approx.)	3.5 lbs.	5 lbs.	6 lbs.

WV-1 WILSON VERTICAL TRAP ANTENNA
No bandswitching necessary with this vertical. An exc
lent low cost DX antenna with an electrical quar
wavelength on each band and low angle radiation. A
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response across full width of each band. Featured is
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resonant points with varying temperatures and hum
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mount bracket to attach to vent pipe or to mast driv
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OPTO-7000 10 Hz to 600 MHz Miniature Counter

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#D-146 Antenna, Rubber Duck, 146 MHz $ 2.50
#RA-BNC Right-Angle BNC Adapter for Above Antennas $ 2.95

PROBES

#P-100 50 Ohm, 1X Direct Connection RF Probe		$ 7.95
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UPN*	3922	2200 Dy	914	151	16
WSSBN	3935	0000 Dy	1040	144	31
MNN*	3722	2230 Dy	339	92	30
BR	3930	2230 M-S	481	89	25
SEMTN	147.60	0315 Su	37	23	4
MEN	3930	1400 Su	222	5	5
MIARES	3932	2230 Su	139	5	5
			517	16	34

VHF local net reports: 8 reports

*NTS Section Nets. The first Mini-SET in Mich. was a success the first part of Dec. Activity coordinated by the STM and liaison officer WB8YDZ, was designed to test the Section Net's part of the Section Emergency Plan. Thanks to all for making it a success. To promote origination of message traffic on behalf of the public, the new Mich. Traffic Award is offered to Mich. amateurs who originate 20 messages during a month for a non-amateur 3rd parties. I am sorry to report the following Silent Keys in the Mich. Section: W8BKQ W8CFM W8IYX K8JUH W8QQL WB8VEI. OTS appointments: KB8GC WD8KZX WA8YAN. OO reports from: K8AIT K8JH K8RCT WB8IKJ W8SOP. OBS reports from: N8AG WB8DJS WD8IXV K8NKB WA8RNB W8SOP AC8Y. Regular reporting of activity is required to maintain your appointment. Club officers: Central Mi. ARC: WD8NQG, pres.; WB8VNP, vice-pres.; WA8BAP, secy.; WA8ABN, treas.; WD8IMJ WD8IJE W8LCU, dir. Muskegon AARC: WB8OBF, pres.; WD8MKY, vice-pres.; K8IJD, secy.; AC8U, treas. Stop by the ARRL booth at the Muskegon Great Lakes Division Convention; March. 31. Traffic: (Dec.) W8VPW 561, WB8MTD 520, WD8KZX 473, WB8YDZ 406, WD8CSA 377, K8KMQ 332, K8RV 280, WB8ITT 263, WD8NKA 228, AF8V 227, WA8DHB 185, W8MPD 179, WA8QAF 130, WD8DMX 127, KB8BZ 125, WD8MCN 125, WD8LRT 122, K8DTG 117, WD8BSE 109, K8LNE 109, N8AKY 104, N8ABA 95, WB8QYU 91, WD8NYN 85, WB8YRY 79, WB8WYO 77, WA8WZF 72, K8GXV 68, WD8LSV 67, KB8GT 65, AC8F 62, K8AI 61, WB8TTA 61, K8DYI 57, W8YIQ 56, AC8Y 55, WD8EAQ 52, WB8POL 50, W8SOP 50, W8IHX 46, WB8SYA 43, WB8DJS 42, WA8AXF 41, W8DSE 41, WD8IEW 41, W8QOM 41, WA8YAN 40, N8AOA 37, WA8PIM 35, KB8FK 30, K8AIT 28, K8DD 28, W8WOJ 28, KB8GC 27, W8CUP 26, WA8VBF 25, WB8AXI 24, W8HIN 24, WA8FXR 23, WD8PAF 22, W8WVL 22, KA8CPS 21, K8ZJU 19, N8ACL 18, W8BEZ 18, WB8HPZ 18, K8JED 17, W8LDS 17, K8QBZ 17, W8SCW 17, WB8NBD 16, W8PBO 16, W8TBP 16, WB8BNN 15, WB8VAI 15, W8VIZ 15, WB8YIG 15, WB8HSN 12, W8SDB 12, K8MJK 11, N8AFZ 9, WB8UZM 9, WB8VVF 9, WA8AWU 8, WD8CSZ 8, W8DCN 8, WA8FON 8, WA8MDK 8, WA8WVV 8, WB8AFO 7, W8JUP 7, WD8MJB 7, WB8UUJ 7, KA8CUT 6, W8AP 5, W3GQJ/8 5, WB8IEK 5, W8EOI 4, WD8ROK 4, K8NKB 4, WB8GKB 3, WA8FJF 3, W8FRC 3, W8QFO 3, K8CN 2, W8HKL 2, WD8NJQ 2, KB8VF 1. (Nov.) AF8V 78, WA8EFK 21, K8AIT 20, WB8VVF 8, WA8FON 6, WA8GTG 5, W8RC 2.

OHIO: SCM, Harold C. Chapman, WB8JGW — Asst. SCMs: WA8MCR W8TP N4VY. SEC: K8AN. NMs: AF8A N8CW W8DIL WB8KWD K8OZ WB8YGW. Net reports (Dec.)

Net	QNI	QTC	Sess.	Time(Z)	Freq.
OSN*	321	189	31	2310	3.577
OSSBN	3137	1561	93	1530/2115/2345	3.9725
BNR	127	419	31	2300	3.605
BN	697	512	61	0300/2345	3.577
O6mN	335	91	31	0200	50.160
ONN	125	115	29	2330	3.708

Effective Dec. 1 WB8YGW became mgr. of O6mN. Thanks to WA8SSI for FB job with O6mN. On Jan. 1, '79 AF8A relieved WB8WTS as mgr. of ONN; congrats to Gary and many thanks to Jim for his help in '78, and continued good luck with TCC. AB8P reports Lake Erie ARA provided communications, after last minute arrangements, for transfer of patients from one hospital to another in Cleveland on Dec. 4. WD8BIL acted as net control. Another fine example of emergency communications provided by amateur radio. Thanks to all for your help. There is a definite need for assistance on the Section nets (phone or cw) from the following areas: Findlay, Lima, New Philadelphia, Warren and Wooster. Interested parties please note times and freq. of OH Section nets listed above. Letters will be sent to clubs and/or ECs in those areas soon. A reminder to those who hold *any* ARRL appointment; a monthly report of your activities is necessary to keep the appointment current. The SCM has the prerogative to cancel any appointment after three months of no activity. *Please*, if you have no activity send a report to me anyhow as a matter of keeping your appointment current. License upgrade WD8OYK to Advanced. ONN cert. to KA8BON KA8CTC KB8GM WD8KKI. Award of outstanding service to ONN to WD8DTG. Appointments: EC, W8SGX/Mercer & Van Wert Counties, W8OQL Hardin Co., NM, WB8YGW; OES, WB8RUW; OO, WB8GUU, OTS, WD8QMP. Local net reports: BRTN QNI 234, QTC 70 in 31 sess. TSRAC QNI 540, QTC 35 in 29 sess. Traffic: (Dec.) WB8KWD 944, K8AAZ 710, WB8OFR 673, W8PMJ 667, WB8WTS 537, W8ENI 477, K8BYR 371, WA8HGH 356, WD8CGR 351, WB0ZK 244, W8TH 233, W8AU 226, N8CW 204, WB8UBR 196, W8MGA 175, WB8JGW 172, N8TM 169, K8OZ 164, AF8A 163, WD8QMP 137, K8FE 134, WB8YTI 132, WA8GMT 131, W8TP 107, WD8DTG 100, WB8SRC 100, W8DIL 94, KB8FS 94, WB8SIQ 90, WD8CDA 84, WD8KBW 76, W8WEG 76, WA8SED 74, WD8DIP 71, WB8QHV 71, WB8CJU 70, N4VY 69, W8MOK 59, WB8OMQ 58, WB8TRK 58, WA8MAZ 57, AD8I 55, WA8RQQ 48, WB8PIY 44, WB8MEK 42, WA8ZNC 42, WB8YGW 39, WD8LPP 37, K8CYX 36, W8RG 36, AB8P 35, W8EMK 34, K8DL 33, WA8SSI 32, WD8KFN 30, WD8QZM 30, K8CKY 29, W8LZE 29, W8DCX 28, WB8HMI 28, K3RC 28, K8PE 26, N8JR 25, WA8TSX 24, WB8VLR 24, WD8MKC 23, W8BHL 22, WB8WNH 22, WD8DDJ 21, K8AN 20, W8JMD 19, WB8TCZ 19, WA8MHQ 18, WD8NAD 18, WA8BQV 17, WD8PEI 14, W8GGX 12, KB8GM 12, WB8MRL 12, AE8N 12, WBUPH 12, WD8JKX 11, WB8GGR 10, WA8VEC 10, N8XX 10, WD8DOS 8, W8ELWY 8, WD8OYK 8, W8IM 7, WB8VZX 7, W8ZM 7, W8EK 6, WD8LOL 6, W8OUU 6, WB8KXV 5, W8DYF 4, K8ONA 4, KA8BZM 3, K8DHJ 3, WD8EKI 3, W8ERD 3, WB8GVI 3, WB8KKI 3, AF8O 3, KB8GG 2, K8ND 2, WB8VNV 1. (Nov.) K8ONA 55, WA8BOV 17, WB8VNV 5, W8LT 4.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Guy L. Olinger, K2AV — ASCM/SEC: WB2VUK. ASEC: W2IT K2AYQ. STM: WA2SPL. NM: W2CS W2WSS. Nets: NYPON 5 PM 3913, ESS (slow) 6 PM 3590, NYSPTEN 6 PM 3925, NYS 7 & 10

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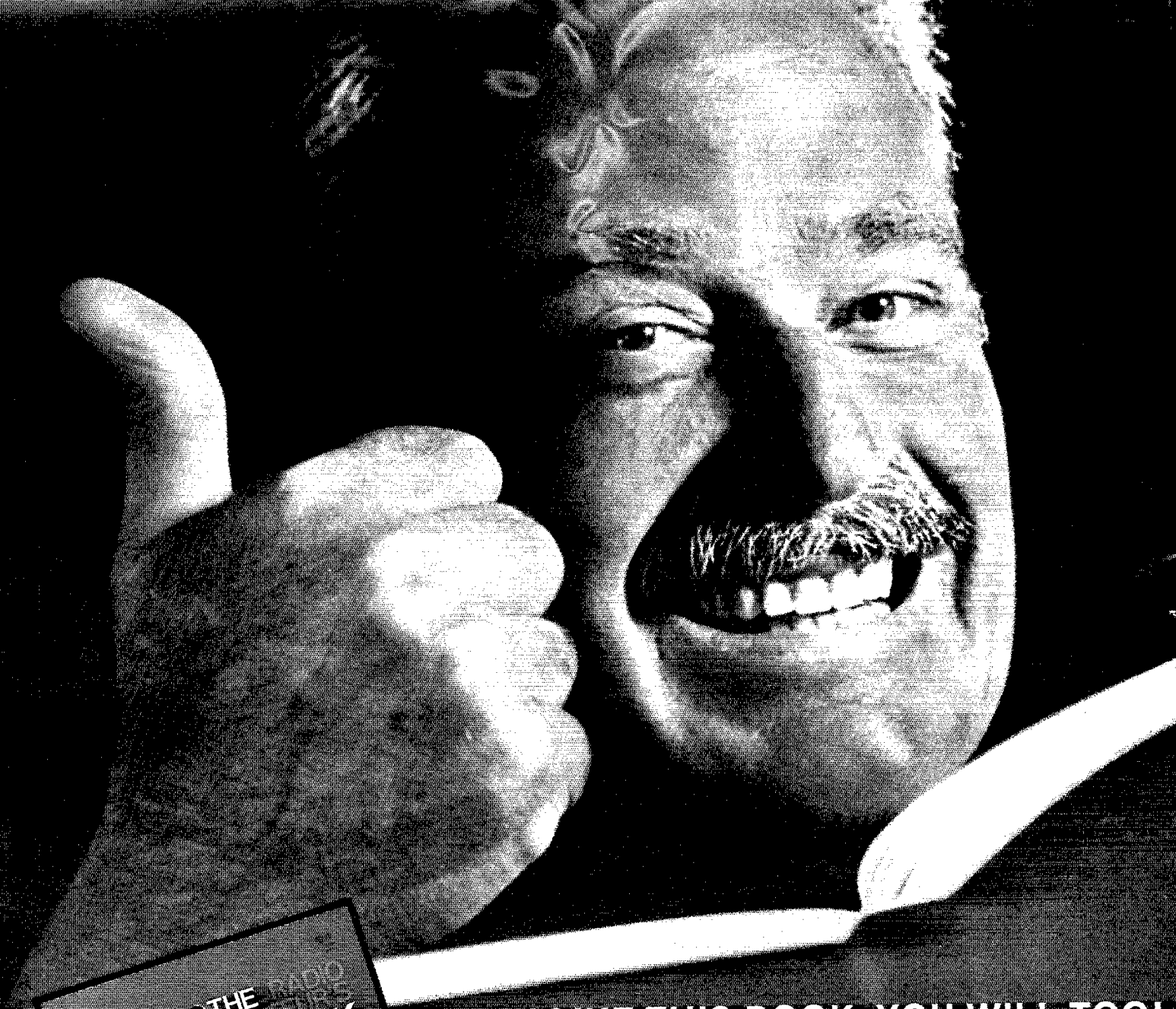

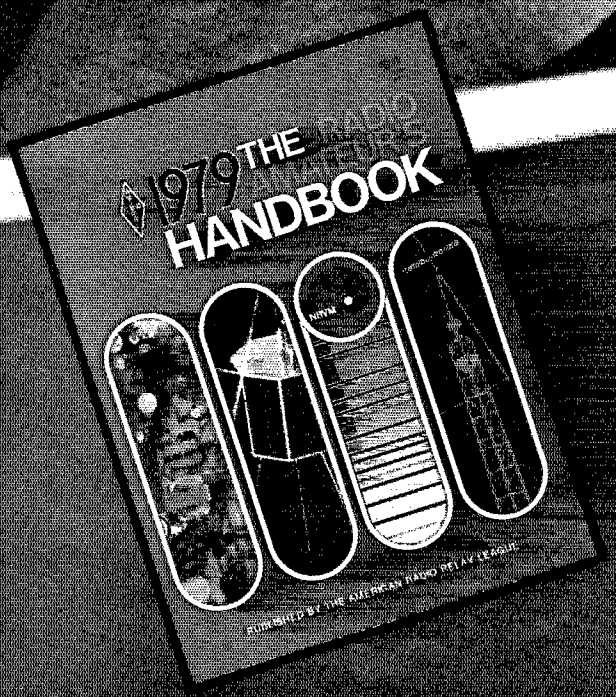

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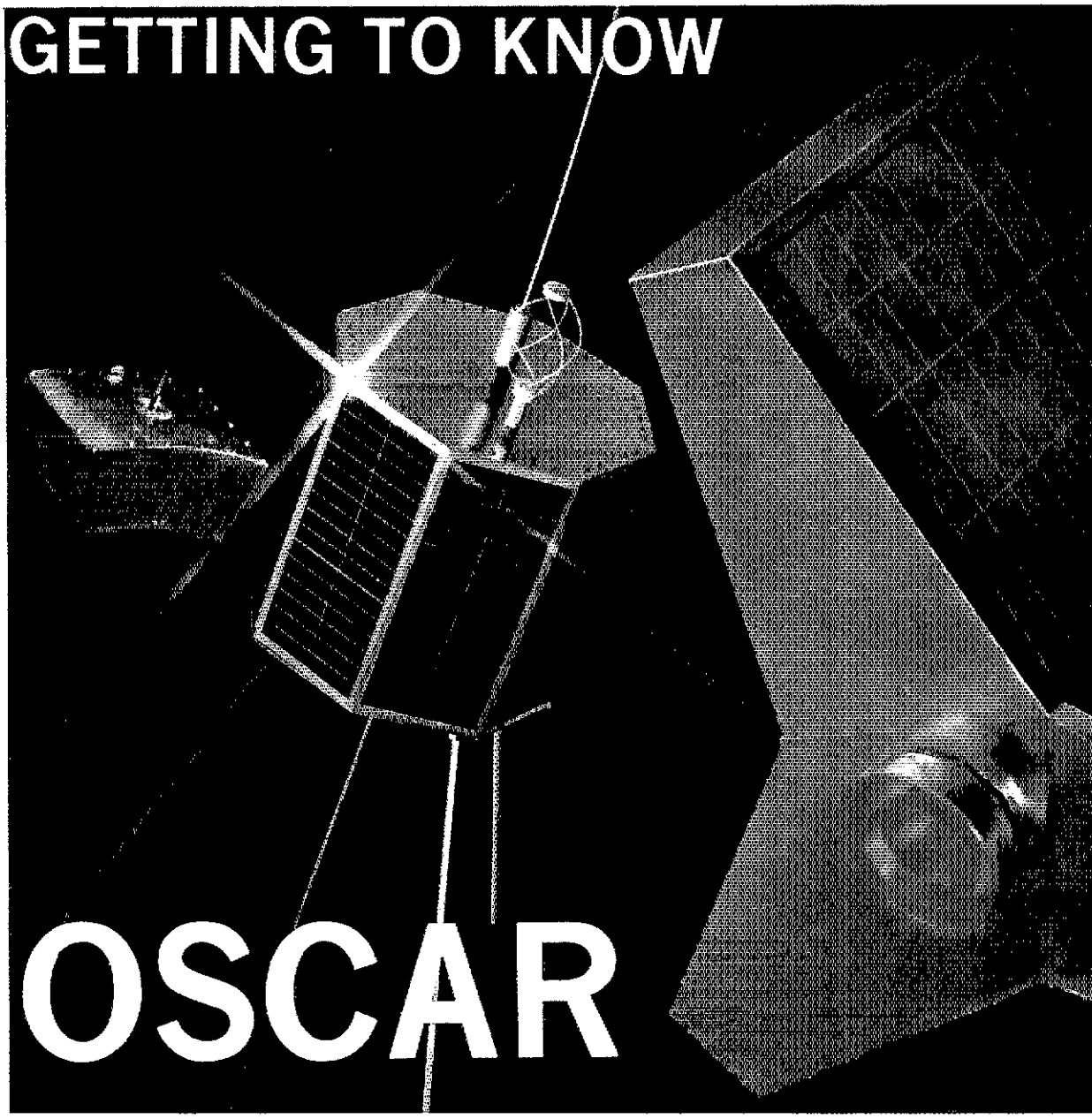

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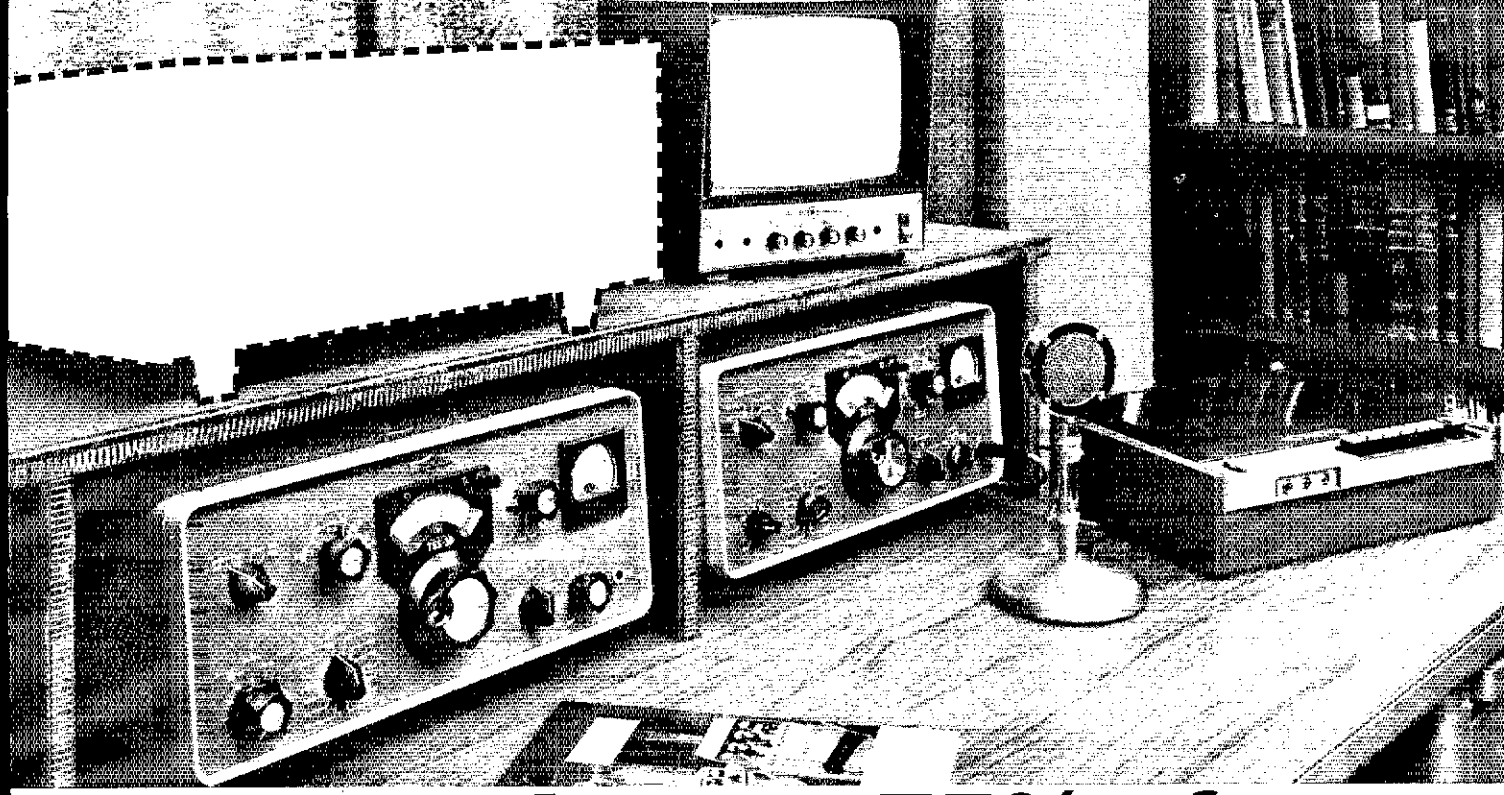
PM 3677, SDN 9:30 PM M-F 66/06. A word of thanks to all in ENY who chose to use their time to serve others in 1978 . . . bulletins, classes, traffic, marathons, Santa, emergencies, administrative, committees, etc., & being ready. AMEN, people. long list of congrats to New Asst. SEC W2IT, W2WSS for a super rookie year as ESS Mgr. New AARA brass: WB2KDC WB2SMR WA2WNJ WA2AHL W2OOJ. New Asst. Mgr. 2RN-E WA2ELD. New Adv.: WA2VNK WA2LHN K2HUG. New Gen.: WA2YDG KA2ASO KA2BLI WA2YBM WA2AFO KA2AXM. New Tech.: WB2WQN WA2UYY WD2AAX KA2AEH KA2CQK. New Novices: KA2DHO KA2DDQ. Westchester ECA got wide publicity for the 2nd annual Santa Claus operation to the children's hospitals on 66/06. It is rumored that K2MQR wore out his HO! HO! HO! presiding over the North Pole in all of this and was only able to muster a heh? heh? heh? whilst watching the Muppets thereafter. One tragic note: We regret to report the death of KA2BUM, which occurred when an antenna being removed came in contact with power lines. Dec. BPL: WA2EQW WA2SPL. PSHR: WB2KDC WB2EAG WA2SPL. Traffic: (Dec.) WA2SPL 2278, WA2EOW 302, WB2EAG 293, WB2KDC 211, W2BIW 152, W2IT 145, K2AV 105, WA2OTC 103, N2JK 75, WB2ZCM 42, WA2ZSG 35, WB2KHK 21, K2HNN 3, K2RRR 3. (Nov.) WB2ZCM 22, K2HRR 10.

NEW YORK CITY — LONG ISLAND: SCM, John H. Smale, K2IZ — SEC: K2HTX. RM: WB2EUF. The following are major AREC/RACES Nets in this Section, please check into your local one: Bronx 28.64 MHz, 50.35 MHz, 146.88 fm, Kings: 28.64 MHz, 50.35 MHz, 146.88 fm, Richmond: 145.66 fm, New York: 29.5 MHz, 146.88 fm. Queens: 29.5 MHz, 50.52 MHz, 145.62 am/fm, Nassau 28.72 MHz, 145.68 am, Suffolk (West) Hunt. 28.73 MHz, 145.59 am. Smith: 28.65 MHz, 147.21 fm, Babylon: 21.430 MHz, 146.085/685 fm, Islip: 28.65 MHz. Suffolk (East) 146.82 fm, Brookhaven: 146.115/715 fm. Riverhead: 3730 kHz cw. Note: Net times between 2000 and 2100 local on Mon. For any further info, contact your local EC or SEC, K2HTX. Please try to remember, the new SCM's call is WA2UWA, not K2PL. Club officers for TARCOM are: WA2ACV, pres.; W2DJS, vice-pres.; W2FPF, treas.; N2JE, secy., WA2EXI, editor. WB2JKJ now has a new FT 225RD and Henry 2002 amp for two meters. WA2SUB is the new EC for the town of Babylon, many thanks to K2TV for the outstanding job he did, he now is an AEC for the town. Congratulations to WB2PJA who upgraded to General. W.I.N. had their first meeting of 1979 at the QTH of K2IZ with K1KI as the guest speaker. If you are interested in contest operations, or if you want to find out what it's all about, contact K2PE in Laurel Hollow or N2UN in NYC, or W2RQ. Contact via the club net on 3830 kHz, Wed. night at 2000 local or the New Jersey Phone Net on 3950 kHz at 1800 local. As of Dec. 31, 1978, W2DBQ has been a member of ARRL for 50 consecutive years. Radio Central ARC had their first operation "talk to Santa" and it "came off rather well." Stations taking part were WB2IMX WB2KZY WB2ART K2HPZ KA2BPE WB2FZE WA2TWQ and WB2WPG. WA2RWP and KA2BTP passed their General and WA2WPG passed his Tech. K2TLW is now a General after 20 years as a Tech. Officers for the Hall of Science ARC are N2PM, pres.; WB2KVY, vice-pres.; W2VZQ, treas.; WA2YUS, secy. W2MT has relocated from Central Jersey to the Sheepshead Bay section of Brooklyn. K2OVS now with 2-meter state total of 33. Traffic: WA2UWA 369, K2LIE 87, W2MLC 54, K2GCE 53, W2GP 39, K2IZ 14, N2LI 12, W2DBQ 11, WB2IDP 11, WB2DCJ 6, WB2TWY 6, WB2YUJ 6.

NORTHERN NEW JERSEY: SCM, Robert Neukomm, WA2MVQ — SEC: WB2VUF. STM: W2XD. NMs: AF2L K2VX NJSN WA2LHV & (VHF) WA2LHV.

Net	Mgr.	Frq.	Time/Days	Sess.	QNI	QSP
NJN	AF2L	3695	7:00 P Dy	31	405	236
NJN	AF2L	3695	10:00 P Dy	31	304	205
NJPN	K2VX	3950	6:00 P Dy 9:00 A Su	36	687	654
OBTTN	WA2OPY	Dy		31	334	94
NJSN	WA2LHV	3735	7:00 P MWF			
NJVHF	WA2LHV	49/49	10:30 P Dy			

Congrats. to following upgrades: Advanced: N2AAZ WB2BQU WA2VJF WB2VOH WA2UPK: Extra W2YWC. KA2CNV was inadvertently reported as KA2CND — apologies! Hope she is enioying her new 2-meter rig. Additional upgrades Novice WB2CAM; Extra W2RJW. Fairlawn ARC reports officers: WB2UVU, pres.; N2AIH, vp, WA2RSL, secy.; WA2NFB, treas., WR2AHD 550 Club repeater has been used by the NNJVHF net, the 550 Club reports the VHF net working out FB! OO report from W2TPJ & WA2MVQ with plenty of "chirpy" signals and some out-of-band reports. Late report from NNJ Slow Net: Sess. 9, QNI 23, QTC 1, QSP 9 in 92 minutes. Due to lack of interest the net will met on MWF only. W2QNL was sick & cards were appreciated. KA2BWR now Advanced, is active on NNJ. WB2RMI reports WA2RTO now General and RMI sure had his problems wid "Murphy's Law" and his rig with 2 trips to the factory and the Swan 350 out of the moth-balls! WA2RTO has new Clegg FM 28. WA2AKR helped WB3AIG & WA2WIM visit 2 hospitals to bring "Mrs. Santa Claus" to the young patients. AF2L made his first BPL and reports N2ANM now Advanced. N2SU in addition to handling Tfc during holidays while home from college was active on cw chasing DX, reported he worked N4SU. The Mumford brothers: W2CU, W3CU & W6CU welcome breakers on their schedules. W2CU & W3CU 3695 1900Z Mon., all 3 T-F 21.265, M 21.365 ea Sat 21.115 at 2030Z. They also work 3705 for N/T. Anyone working all 3 brothers qualifies for a special and unique QSL card! WB2HSG basked in the sunny climes of Marietta, GA in Dec. and W2IHA our Vice Dir. attended the ARRL South FL Convention in Miami in Jan. The Tri-County RA News had a nice article on "Trouble-Shooting" as did the Garden State ARA. More clubs are recognizing this need for the new hams. WB2RNJ spoke on "Operating Procedures in Contests and Operating Events." Tri-County Radio Assn. started class for Novices Feb. 1st. Those interested send a note to WB2RNJ at 28 Exeter Road, Clark, NJ 07066. NJ Army Mars Technical Net will continue a "Hands-on Trouble-Shooting" demonstration for Bergen ARA at the Feb. meeting. Traffic: (Dec.) W2RQ 607, WB2RMI 584, W2SQ 551, AF2L 512, K2VX 275, WA2MVQ 199, W2COB 178, WB2NSV 160, N2NS 139, N2IC 115, W2ZEP 87, W2XD 73, K2SE 59, W2UEZ 58, WD2AKR 55, WB2AIU/T 53, KA2BWR 46, WB2RMJ 49, WA2FZJ 35, W2CU 32, WB2KLF 29, K2NJ 25, W2UH 23, WA2DLZ 22, K2ZFI 20, KA2CHK 17, WB2KAK 15, WB2JVE 14, W2KB 11, W2CC 10, N2SU 7, WA2WXM 7, W2ODV 2. (Nov.) K2VX 249, WB2MCO 136, W2SQ 79, WA2LHV 73, W2CVW 6. (Sept.) W2GD 7. (Aug.) W2GD 3. (July) W2GD 6.



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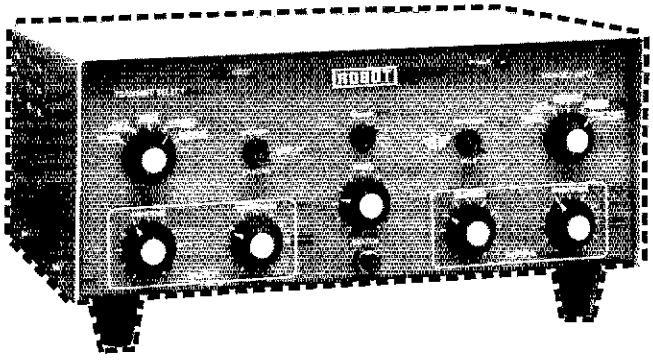

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FM2016A

All Solid State-CMOS PL digital synthesized - No Crystals to Buy! 5KHz steps - 144-149 MHz-HUGE ⅜" LED digital readout PLUS MARS-CAP and MULTIPLE OFFSET BUILT IN. ● 5 MHz Band Coverage - 1000 Channels (instead of the usual 2 MHz to 4 MHz-400 to 800 Channels) ● 4 CHANNEL RAM IC MEMORY WITH SCANNING AND AUTO TRANSMIT ● MULTIPLE FREQUENCY OFFSETS ● ELECTRONIC AUTO TUNING - TRANSMIT AND RECEIVE ● INTERNAL MULTIPURPOSE TONE OSCILLATOR ● RIT ● RF ATT ● DISCRIMINATOR METER - 16 Watts Output-Unequaled Receiver Sensitivity and Selectivity - 15 POLE FILER, 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.

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SHOWN WITH OPTIONAL μP-800 MICRO-PROGRAMMER*

FMMC-1* Microphone with Built-in Touch Tone Pad.

WHY BUY LESS?
THE FMMC-1 HAS IT *ALL!*

- New! Auto key up
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- Only 3¾" x 2" x 1" $39.95

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- **HUGE ⅜" LED DIGITAL READOUT.**
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- **MULTIPLE FREQUENCY OFFSETS: NO CRYSTALS TO BUY - EVER** - Any offset any split! "Odd Ball" splits accomplished by digital programming. Never any need for crystals!
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- **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 Frequency Selection 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.
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- **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.
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- **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.
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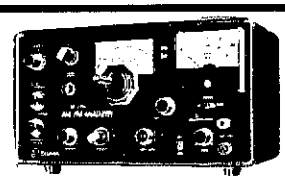
NEW! SIGMA MODEL AF250L DEVIATION/MODULATION METER

WINTER SPECIAL



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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.***

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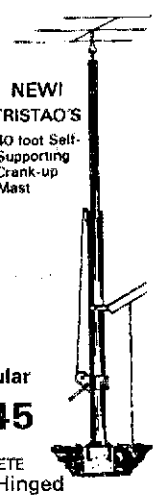

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COMPLETE With Hinged Mounting Plate And House Bracket

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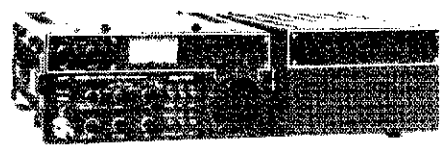

SUPERB! NEW ICOM IC-701S H.F. XCIEVER

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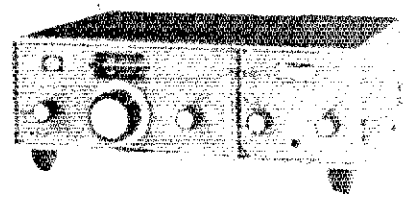

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ATLAS RX-110 RECEIVER

- CW and Normal SSB - Five Band Full Coverage
- Built in AC Supply and Speaker
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ATLAS TX 110 PLUG-IN TRANSMIT MODULE

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- 15 Watts Input (200 Watts with Optional P.A.)

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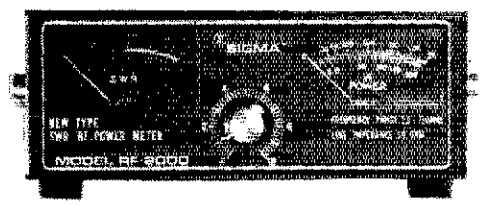

SIGMA RF-2000 SWR & POWER METER

Cal PWR Scales 200W-2000W Freq. Range 3.5-150 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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VISA

MIDWEST DIVISION

IOWA: SCM, Max R. Otto, WØLFF — The IA-Ill. ARC at Burlington will host FOØXA/WA4WME with his famous Clipperton Show at their Mar. 17th meeting. WBØNSS is new mgr. of Iowa Code Net. WØSR has been appointed to DX Advisory Committee. Grinnell College ARC now an affiliated Society. WØBVO had eyeball QSO with IØRKF and IØRKK in Italy. Club elections: At Humbolt, WDØBPR, pres.; NØAPG, vice-pres.; WDØDCD, secy.; KAØARN, treas. At Iowa City, WBØZXU pres.; AEØR, vice-pres.; KØCF, secy-treas.; WDØAWH, actvtys. WØSJ moved to Cedar Falls. Upgrade congrats to: WBØUFE WDØFZX WDØBBD and NØAPI for Tech. WBØVJH and WDØAXF for General. WBØLLY WDØAXG and WBØRUY for Advanced. WBØEIH at E. High in Sioux City back on with Kenwood Twins. 3900 Club has 561 members. KØIMO's three-element Quad is ice victim. 25/85 Assn. at Iowa City officers: KØRLT, pres.; KØCKX, vice-pres.; WØLFF, secy-treas.; WBØPJU, at large. AEØR WØYLS WBØPYD WØSS KØEVH WDØGDL NØSM KØGP WBØNSS and WBØUPF gave Iowa 100% on NTS-TEN. Hq. advises you will have to put up with me a little longer. Good luck in the DX Contests.

Net	Freq.	Time/Days	QNI	QTC	Sess.	Mgr.
Iowa 75M	1830	3970 M-S	1345	171	26	WAØVZH
Iowa 75M	2330	3970 M-S	970	142	26	WØYLS
Tall Corn	0030 0400	3560 Dy	391	185	62	WØYLS
Iowa Code	0100	3713T-T-S	54	28	8	WBØNSS

Traffic: (Dec.) WAØAUX 876, WØSS 325, WØYLS 273, AEØR 261, WBØKHO 174, WBØPYD 138, WDØGDL 75, WDØFEW 55, WBØUPF 52, KØOFI 27, KØGP 26, WØLFF 22, KØCNM 18, WBØMCX 18, WDØFGY 16, WØBW 4, KØIIR 2. (Nov.) WBØKHO 7.

MISSOURI: SCM, L. G. Wilson, KØRWL — Asst. SCM: Joe Flowers, WØOTF. SEC: WBØFKY. On Sat. night, Mar. 17, 1979, WA4WME will present his famous movies and slides of the Clipperton Island DXpedition of 1978 in Burlington, Iowa. The presentation lasts about an hour and a half. As a bonus, WA4WME will present a 15-minute prelude of slides of a combined Liechtenstein/Monaco DXpedition that sets the stage for the Clipperton trip. For further information, contact Jim Livengood, c/o KBUR/KGRS Radio, Roosevelt Avenue, Burlington, Iowa 52601. A big congratulations to KØJEQ on his 76th birthday. Congratulations also to WDØCFK on new Tech.

Net	QNI	QTC	Net	QNI	QTC
MEOW	559	118	MON	236	233
METN	260	178	MON2	132	42
NEMOE	69	2	MOSSBN	1183	191

KAØAVD now operating EL1FN. There was a real fine turn out at the DX Club Christmas Party and a great time was had by all. These same DX Club members should turn out an excellent showing in the recent 160/10-meter contest. Our deepest sympathy to the families and friends of KØWES and KØCWQ who joined the ranks of Silent Keys and to KØCEV on the loss of his XYL. Traffic: (Dec.) WØBMA 1164, WØHH 736, KØONK 657, WØOTF 163, NØWM 152, WØBV 143, KØSSN 131, KØSI 106, WBØVHN 105, WØOUD 101, WØBVL 26, KØRWL 23, WBØUFQ 19, WØRNG 17, WØQAU 15, WBØOKK 11.

NEBRASKA: SCM, Ed O'Donnell, WBØGWR — The 1979 officers for the Nebr. Chapter of QCWA are: WØAP, pres.; WØUS, vice-pres.; WØFQB, secy.; WØVYX, treas. Congrats to WBØDGF on being elected pres. of the Lincoln ARC. Also, KØGND and WAØASM received the 1978 Jerry Cox award for their outstanding contributions to Amateur Radio and the Lincoln ARC. WBØGMQ has accepted the position of net mgr. for the Nebr. Cornhusker Net. Net reports: 160 Mtr WX Net, QNI 613, QTC 6; Cornhusker Net, QNI 852, QTC 120; Mid-Nebr. ARES 2 Mtr Net, QNI 208, QTC 7; Nebr. Storm Net, QNI 1288, QTC 114; Pawnee ARC 2 Mtr. Net, QNI 41, QTC 0; PM Net, QNI 255, QTC 173; QCWA Net, QNI 93, QTC 0; Sandhills WX Net, QNI 153, QTC 10; Western Nebr. Net, QNI 674, QTC 75. Traffic: WØFQB 391, WØVEA 286, WØEUT 100, KØBRS 88, WAØPCC 51, KØTUH 32, WØVYX 22, WØZNI 21, WAØOQX 17, WBØNFG 16, WAØDXY 12, KØFJT 12, WØKLB 12, WBØROG 10, WAØQEX 10, WØYFR 9, WBØGMQ 7, WBØGWR 7, WBØIGN 6, WØNIK 5, WØDJU 2, WØIXB 2, KØSFA 2, WØJUJ 1, WAØLOY 1.

KANSAS: SCM, Robert M. Summers, KØBXF — I hope Ole' Santa brought you each the new gear you have been wishing for. Bulletins received from the following clubs were: Douglas Co. ARC, Wichita ARC, Jayhawk ARS, Johnson Co. RAC, PHD newsletter, Central Kansas ARC, Kaw Valley ARC, Pittsburg Repeater Org. and the Parsons ARC. Does your club publish a newsletter? Would you see that the SCM and Division Dir. are put on the mailing list? Shortly after the 1979 SET WØKL and myself will be reviewing the results of each zone participation. If your zone was not too active, perhaps you might put your best foot forward and volunteer to either help co-ordinate the emergency communications in your area or perhaps accept the EC spot and really get your feet wet. KS NE ARC elected WBØSRP, pres.; ABØZIS, vice-pres.; WDØCJV, secy.; WØWXY, treas.; WØUQD, hamfest chmn.; WØFDJ, prg. chmn. Jayhawk ARS elected WDØGGA, pres.; WBØZON, vice-pres.; KØTHP, secy.; KØBXF, treas.; WAØHZS and WBØMDF, board! Traffic: (Dec.) WØAM 452, WBØOBH 411, KØEZ 280, NØAQL 176, WAØLBB 84, WØFIR 77, WØFT 68, KØBXF 57, WBØCJB 30, WØPB 27, WØKL 25, KØFPC 22, WDØDZE 16, WØNYG 14, WØZUX 14, KAØBUT 12, WAØOWH 10, WDØDZE 9, WØRT 9, KØMXJ 4, KØGZL 2. (Nov.) WBØOBH 295, WØHI 101, WDØFBF 93, WØECJ 71, WAØOWH 5.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, William Pace, W1ID — SEC: W1SY. STM: WB1AIU. NMs: K1EIC K1EIR WA1ELA WA1LOU.

Net	Freq.	Time/Days	Sess.	QNI	QTC
CN	3640	1900/2200 Dy	62	417	414
CPN	3965	1900 M-S	31	560	274
		1000 Su			
Nutmeg	28/88	2130 Dy	31	522	189
WESCON	78/18	2030 Dy	31	695	214

High QNI — CN — W1KV K1GF W1EFW K1EIR WB1CPF. QNI — CPN — W1NQO K1BSB AD1O W1HMJ. QTC Nutmeg W1EFW. CARA provided complete communication coverage for the reenactment of Conn. Valley Forge at Putnam Park, in Redding Ridge. Included were WB1DUZ WB1DRE WB1DHI WB1DSB WA1JGS WB1THN WB1DIP WA1GSO KA1AXM WB1HCA and WA1JVV. The SARA Squelch Burst provides an interesting homebrew project for a gain type vertical for two, by W1GOZ. Officers for 1979 elected by FARA are WB1DEB, pres.; WB1BSF, vice-pres.; WA1ZXF, treas.; WB1CPH, secy.; WB1GEB, act. mgr. The annual PVRA

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Frequency Schemes Available:

MODEL	INPUT (MHz)	OUTPUT (MHz)
XV2-1	28-30	50-52
XV2-2	28-30	220-222
XV2-3	28-30	222-224
XV2-4	28-30	144-146
XV2-5	28-29	145-146
XV2-6	26-28	144-146

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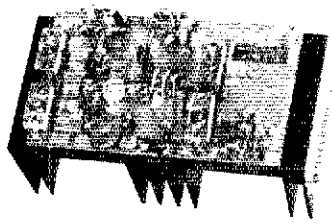
VHF Linear PA's

- Use as Linear or Class C PA's
- For XV-2 Xmtg Converters, T50 Exciters, or any 2W Exciter



LPA 2-15 Kit $59.95
- 15W out (linear) or 20W (class C)
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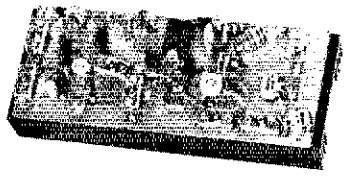
- Models for 6M, 2M, or 220 MHz



LPA 2-45 Kit $109.95
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- Models for 6M or 2M

LPA 8-45 Kit $89.95
For 2M, 8-10W in, 45W out

T80 UHF POWER AMP

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- Class C PA
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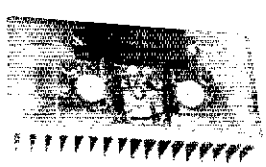
- 200 mW Drive



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C28	28-32MHz	144-148MHz
C50	50-52	28-30
C144	144-146	28-30
C145	145-147	28-30
C146	146-148	28-30
C110	Aircraft	26-30
C220	220-222	28-30
C222	222-224	28-30
Special	Inquire About Other Ranges	

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UHF RECEIVING CONVERTERS

MODEL	RF RANGE	I-F RANGE
C432-2	432-434	28-30MHz
C432-4	432-436	144-146
C432-5	435-437	28-30
C432-7	427.25	61.25
C432-9	439.25	61.25
Special	Inquire About Other Ranges	

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Optional xtal filter for 100 dB adj chan 10.00

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P9 Kit $12.95
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Specify Band When Ordering

- Deluxe vhf model for applications where space permits
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- 12 Vdc
- 2 stages
- Ideal for OSCAR
- 20 db gain
- Diode transient protection
- Easily tunable

P8 Kit $10.95
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Specify Band

- Miniature vhf model for tight spaces - size only 1/2x2-3/8
- Models avail to cover any 4 MHz band in the range 20-230 MHz
- 20 db gain
- 12V

P15 Kit $18.95
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- Covers any 6 MHz band in UHF range of 380-520 MHz
- 20 dB gain
- 2 stages
- Low noise

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BUILD UP YOUR OWN GEAR FOR MODULAR STATIONS, REPEATERS, & CONTROL LINKS
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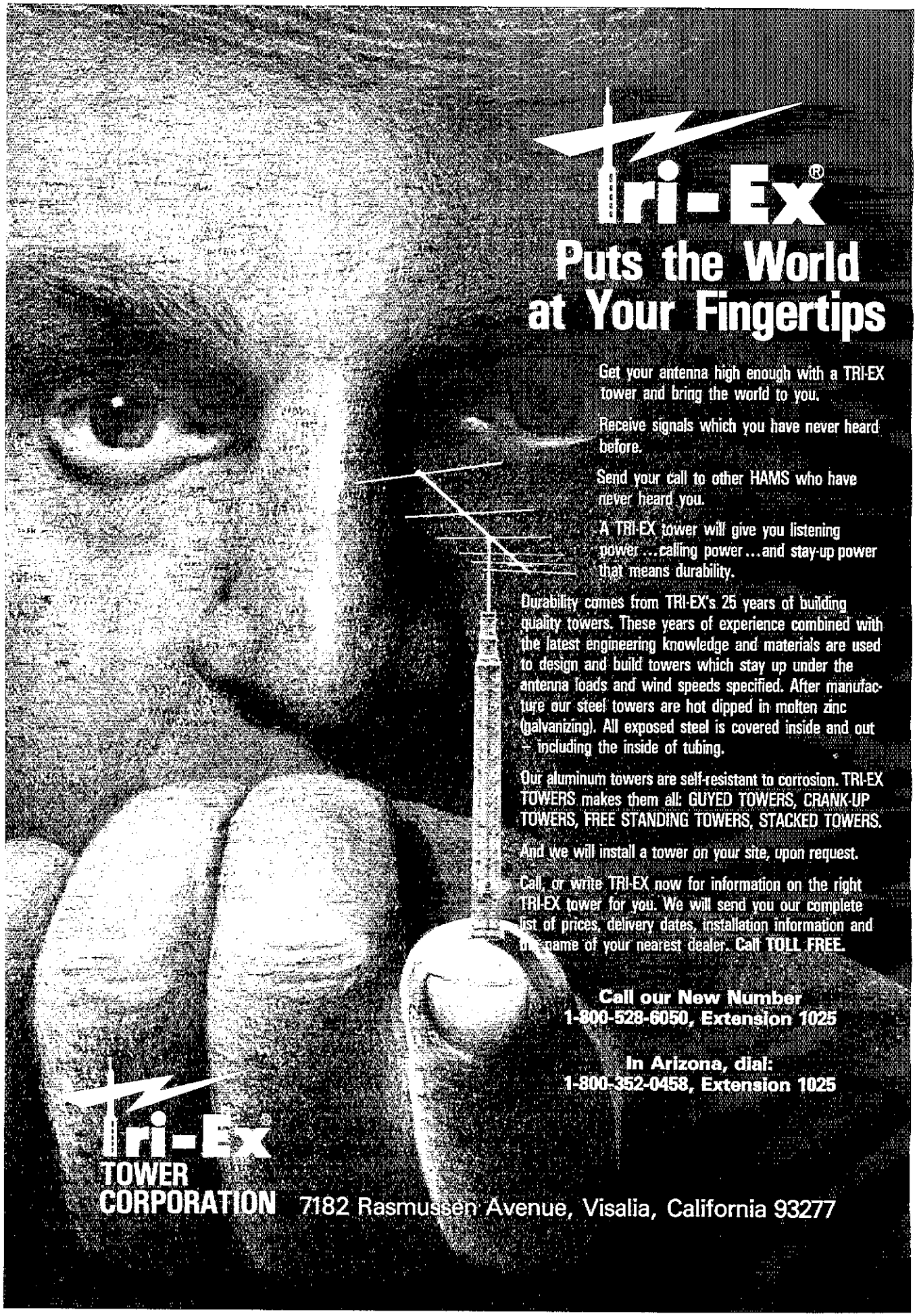
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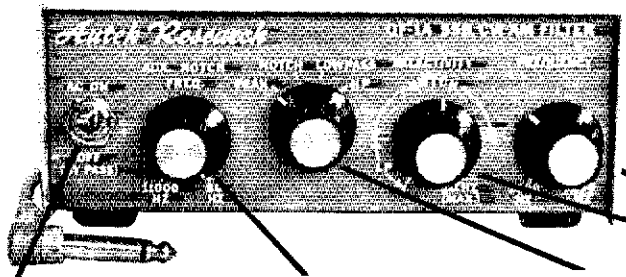

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AUTEK pioneered the **ACTIVE AUDIO FILTER** way back in 1972. Today, we're still maintaining that engineering leadership. Our **QF-1A** evolved from suggestions from thousands of owners, and years of dedication to making the "ultimate" filter. No gimmicks — just something that really "works" like the ad says. You're in for a treat!

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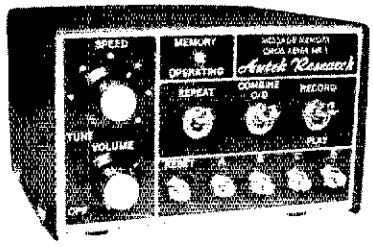

Calls CQ while you relax.
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Record anything you want in seconds!

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Our classic **MK-1** should make you wonder why anyone would buy an ordinary keyer, when memory costs so little! Records 4 messages. Just select "record," tap the A, B, C, or D message, and start sending at any speed! Record over old messages as easily. Playback by tapping the same button. Each message holds about 25 characters (letters, numbers). Total 100 characters. Handy repeat switch repeats message forever until reset. Very useful for **CQ's. YOU SIT BACK AND WAIT FOR A CALL!** Another switch combines two messages for 50 characters. "Memory-saver" feature standard.

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talk-with-Santa for hospitalized kids was a smashing success. Under the direction of W1ZUS, handy-talkie teams at many hospitals brought Santa to the bedside of many ailing tots. Through the PVRA repeaters, Santa (Ken Griffin) talked with kids at Newington, Meriden, Bridgeport, Derby and Waterbury hospitals. Coverage of the event by WFSB-TV pointed up the value of this kind of Public Service. The first W1AW Work-The-World weekend went over with a bang. Stations around the world expressed their gratitude at the opportunity to work Hq. for the first time. 1800 contacts were made in a 14-hour period. The effort was geared to pass along a friendly ARRL hello to hams everywhere. The response was most gratifying to those who took part — WA1LOU WB1AIU WA1YKR WA1YKT W1WEM WB1GBY K1TGX N1CC W1DDE N1ADE W1EQD and many others are anxious to do it again. MARS of Middletown have a slate of officers: K1PI, pres.; KA1BOE, secy.; WB1EOS, treas. A seminar for the new Conn. Amateur Radio Weather Reporting System was sponsored by WFSB-TV at their studios with 50 hams in attendance. The new system began regular reporting in early Jan. under the direction of EC-Director K1DFS. WA1TBP gearing for upgrade. WA1QVQ ready for Advanced. K1FHR and W1ID joining the exclusive Kenwood (820) squared club. W1EFW got BPL No. 25. Traffic: W1EFW 542, W1OD 439, K1GF 339, WB1CPF 212, WB1ACZ 206, W1BDN 120, WB1DGR 113, K1AQE 109, WA1HYN 107, K1XA 94, K1DFS 93, N1ADE 83, W1JTD 76, W1JA 71, WA1LOU 71, WA1RLV 68, W1KV 55, WB1AIE 46, WB1AIU 39, WB1ASH 23, W1GVT 23, W1QV 7, W1VS 6, W1CUH 5, W1BDI 2.

EASTERN MASSACHUSETTS: SCM, Frank Baker, W1ALP — Well gang this is my last report as your SCM a total of 465 of them since 1940, many interesting events, some sad, humorous, no other way could one meet so many different kinds of all kinds. 73's. Please give Rich, K1PAD your support as our new SCM and keep this Section right up there. WA1ZAZ is your STM. HHTN had 409 QNI, 268 QTC. EM2MN had 38 QNI, 65 QTC. W1MYF had an operation. Endorsements: W1AOG as OBS OTS. K1EA as OTS. WA3TXR as OVS. SEC W1AOG received reports from ECs WA1BLG WA1HPS W1BHD K1NFW W1XA W1ZMO K1FMM. Ex-W1GM living in Dunedin, FL WB6TGD, ex-W1JYC here for visit. K1AFF/VE1 also. W1NF has been skeding W1MZ/MM/RR2 for 2 yrs. WB1FDZ now KA1AV. KA1BLR now N1AIS. Barnyard Net had 25th Anniversary on Dec. 9th. EMRIPN had QNI 404, QTC 482. W1GXT has WAS on 10. W1OT is new chmn. of DX Adv. Comm. W1XA is new member of ECAC. K1CLM retubed his R-388. K1VR chasing DX. WA1CRE has Public Service Award of '78 Blizzard. AE1L is ex-W1BSW. WA1TPC has new tower. BPLs this month: K1PAD WA1TBY W1TKZ. N3CL visited WA1ZAZ. W1PL in Europe for a month. K1ES graduating and moving to Southwestern U.S., good luck. W1MEG writing for the Milford Daily News and hopes to retire in 15 months. Officers of So. Eastern Mass W1AEC ARS: WA1KFA, pres.; W1CGR, v. pres.; WA1ZXH, treas.; WA1ZXG, secy.; WA1BZJ K1VJZ WB1ASD, dir.; W1ATI, trustee. WA1YUJ mgr. of New England Novice Net on 3720 kHz at 1830 local time daily, doing a nice job. SLO-Nites; Mon., Wed., Fri., Sat., Sun. — 8 wpm FAS-Nites; Tues. is Thurs. — 18 wpm. Massasoit ARA had it's annual MARA NIGHT with lots of good food and prizes. W1AUU had second eye operation. Sturdy Memorial Hospital ARC hosted meeting of the Attleboro Area ARES/C.D.A.R.O.S. WB1DXR made BPL. N1AFQ has a TR-33C. AE1X is ex-WA1PYZ. Wellesley ARS, W1TKZ had very successful Message Fair, handling over 1000 messages and of course BPL. K1FB has a Work All States net on Sat. at 10 A.M. on 7250. K1BZD says the NEEPN had 878 QNI, 232 QTC in 1978, for this month 67 QNI, 33 QTC. Framingham ARA had a film on CPR by WB1FHT & WA1PYF, annual dinner meeting at Marconi's. WB4ZZA back in FL. K1VVC & K1YHM have their RTTY auto-start monitoring station going on 147.42 simplex. Chelmsford ARA had a Christmas Party. Bob Rice of the Weather Service Corp gave a talk. WB1CDD moved to TX. W1ALP appointed an Asst. Dir. by W1HHR, our Director. K@JHH spoke at the meeting of the Quannapowitt RA. Traffic: (Dec.) W1TKZ 2006, K1PAD 827, WA1TBY 729, WB1DXR 597, WA1VAB 435, W1PEX 433, WA1ZAZ 404, WA1YMN 313, WA1EYY 293, K1CE 251, W1FJI 202, WB1EZT 192, N1ADY 152, WB1EMU 144, W1ATX 118, WA1LAD 93, K1TK 84, KA1AHD 83, W1DMH 83, K1BZD 64, K1ES 53, WB1ABM 29, W1DGD 24, W1XA 22, WA1QAJ 16, W1AOG 13, WB1EYE 11, WA1IFE 11, W1NF 10, W1PL 8, W1SR 8, WA1QMZ 7, K1LCO 6, N1AFQ 7, W1AAR 6, WA1KSF 2. (Nov.) N1GQ 169, K1CE 88, WB1EVP 18, W1DMS 12.

MAINE: SCM, Bill Mann, W1KX — SEC: WA1YUW. New Aroostook Co. EC WA1YNZ. Androscoggin ARC sports a club newsletter. Aroostook ARA losing pres. and EC KA1DM (WB1BSS) to CA. Yankee RC Jan. meeting at WCSH-TV studios in Portland. Sandy River ARC classes successful and rptr. ready for a mtn. New local net: Somerset Public Service Net, Tue. & Thur. at 1930 local on 146.13/73 and Sun. at 1900 on 28.180. Sess./QTC/QNI. PTN 31/263/289. SGN 26/353/1118. MSN 11/16/35. MPSN 5/32/114. CMEN 13/64/189. AEN 5/19/65. BYN 26/35/983. Traffic: (Dec.) WA1MUX 304, WA1OFX 251, W1KX 235, W1BJ 202, W1HDC 181, WB1AOD 172, WB1BYR 160, W1RWG 115, N1RP 114, WA1JZP 108, K1TVT 98, W1GCB 54, W1NPP 46, WA1SMY 42, WA1PXD 36, W1IXC 32, W1JTH 32, WB1BSS 31, WA4UJJ/1 30, WA1JCN 26, K1TZH 24, W1GU 23, K1BZ 21, WA1JHT 19, W1AHM 17, W1OTQ 16, W1EPN 8. (Nov.) WA4UJJ/1 16.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1SWX/W1NH — SEC: K1HSC. NMs: N1NH & W1TN. The Amherst RC meets at the Horace Greeley Restaurant courtesy of N1AFD, owner. The Port City ARC new pres. is WB1EHV. The Nashua Area ARC fox hunts are a challenge to participants. K1GQ K1GW K1LL K1MBQ, W1SWX, K1OX K1RR W1RR K1RX WA1TZV W1UR & K1XX are members of the famous Yankee Clipper Contest Club. WB1FPD now Intruder Watcher. W1GUX active on the NHVTN & Concord Repeater Net. New hams KA1BRF & KA1BRG (XYL & OM) use Drake TR7/DR7 from Colebrook. W1BLR home was destroyed by fire. K1KA & XYL W2URY/1 use an FT-101E. W1DVC & son N1AAP keep the Drake R4C/T4XB busy. Portsmouth's new CD Director is Harold F. Good, Jr. KA1ACC has 2 stations, one is Collins & the other a Kenwood. DXer W1QNH has new 75-foot tower & Cushcraft beam. WB1FVL now free of Novice band with General & ICOM 215. W1UFK is on 220. K1WHS gave slide show & talk on EME at the Great Bay ARA. WA1PSI new 5B Vert got 47K in the CQ WW DX Test. It is sad to report that the XYL of W1HRI is a Silent Key. Seen on Byways & byways: W1GUX N1AED WB1EFA & W1JJD. Happy St. Patrick's Day to all. Traffic: (Dec.) K1BCS 1033, W1TN 404, N1NH

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8287NCV	RG-8/U foam, non-contaminating jacket, #11 ga. center conductor (19 #24s), loss: 1½db/100 ft. at 100 MHz. Black jacket. Good for 2 meters	18.5	17.9	17.0
8285	Same as above but has PVC jacket. Color of Jacket is white. Good for 2 meters	17.0	16.5	15.5
8283	RG-8/U foam, black PVC jacket, #13 ga. center conductor (7 #21s). Best buy for 30 MHz down.	15.0	14.0	12.9
8409	RG-213/U, non-contaminating jacket, #13 ga. center conductor (7 #21s). Suitable for 30 MHz down and direct bury in ground	17.0	16.5	15.5
8214	Mfg. by Belden. RG-8/U foam, #11 ga. center conductor (7 #19s), black PVC jacket. Good for 2 meters.	23.0	22.5	22.0
8291	RG-58A/U foam, #20 ga. center conductor (19 #33s) white PVC jacket.	7.0	6.0	5.7
1596	RG-174/U, miniature 50 ohm coax, non-contaminating jacket	4.5	4.0	3.7
5300	18 ga. copperweld antenna wire	2.0	1.5	1.0
5302	14 ga. copperweld antenna wire	4.5	3.5	2.9
5303	12 ga. copperweld antenna wire	5.5	4.5	3.9
2500	450 ohm open wire transmission line (100 ft. coils)	5.5	4.5	3.9
2502	300 ohm open wire transmission line (100 ft. coils)	5.5	4.5	3.9
1039	8 conductor rotor cable for Ham III, T2X and HD-73. Two #18 ga. and 6 #22 ga.	11.0	10.0	8.9
Hy-Gain	155 - Dipole center insulator	$5.95 list, $4.30 spl.		
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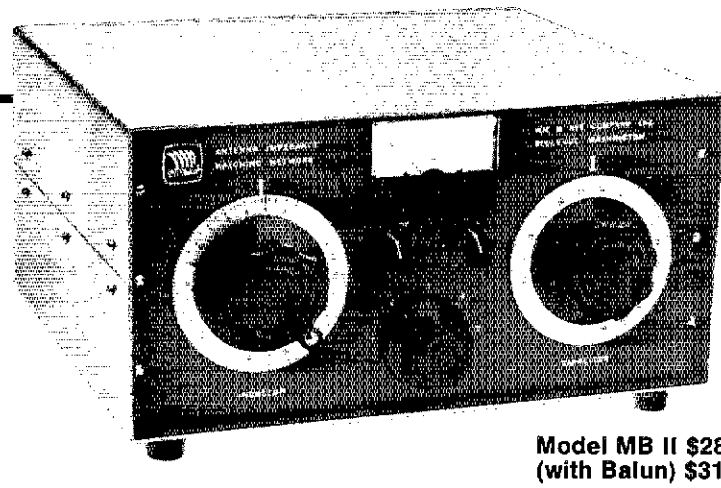

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388	TH3MK3 3 el. Tribander	229.95	169.00
221	TH3JR 3 el. low power beam	149.95	109.50
375	105 BA 5 el. 10 M. beam	119.95	87.75
376	155 BA 5 el. 15M. beam	169.95	124.50
377	205 BA 5 el. 20M. beam	289.95	212.00
385	14AVQ 10-40 M. vertical	69.95	51.25
386	18AVT/WB, 10-80 M. vertical	99.95	73.00
203	3 el. 2 Meter Beam	15.95	11.75
205	5 el. 2 Meter Beam	17.95	13.25
208	8 el. 2 Meter Beam	25.95	19.25
214	14 el. 2 Meter Beam	31.95	23.75

Mosley

TA-33	3 el Tribander 14 ft. Boom	264.00	169.00
TA-33JR	3 el. low power beam (will not go UPS)	197.00	126.00
CL-33	3 el. Tribander 18 ft. Boom	304.75	194.00
CL-36	6 el. Tribander 24 ft. Boom	392.75	249.75
RV-4C	10-40 M. vertical	82.00	52.25
RV-8C	80 M. Kit for RV-4C	49.50	31.75
RKV-345	Roof Mount for RV-4C	14.25	9.00

Cushcraft

ATV-34	4 el. Tribander	289.95	215.00
A147-11	11 el. 2 M. Beam, 144" Boom	36.95	27.50
A147-22	22 el. 2 M. Beam-stacked-A147-11	109.95	81.50
ARX-2	2 M. Ringo Ranger Base	39.95	29.75

Wilson

System One 5 el. Tribander	274.95	212.00
System Two 4 el. Tribander	219.95	169.50
System Three 3 el. Tribander	179.95	139.00
TT-45 Freestanding crank up tower quantities limited!	345.95	199.95

Hustler

4-BTV 10-40 M. vertical	99.95	68.25
5-BTV 10-80 M. vertical	134.95	92.00
SFM 2 mobile magnet mount ant.	42.95	29.25
HT-144 2M 5/8 wave trunk mount ant.	27.95	19.00
GG-144B 2 M. Repeater ant.-Master Gainer	79.95	54.75
MO-1 Mobile Mast for ball mount	22.95	15.75
MO-2 Mobile Mast for bumper mount	22.95	15.75

	List	SPL
RM-10 Standard Resonator 10M-400 W.Pep	6.95	4.65
RM-15 Standard Resonator 15M	7.95	5.60
RM-20 Standard Resonator 20M	8.95	6.25
RM-40 Standard Resonator 40M	14.95	10.25
RM-75 Standard Resonator 75 M	16.95	11.50
RM-80 Standard Resonator 80M	17.95	12.40
RM-10S Super Resonator 10M-2000 W. PEP	11.95	8.10
RM-15S Super Resonator 15M-2000 W. PEP	12.95	9.00
RM-20S Super Resonator 20M-2000 W. PEP	13.95	9.75
RM-40S Super Resonator 40M-2000 W. PEP	16.95	11.50
RM-75S Super Resonator 75M-2000 W. PEP	31.95	21.75
RM-80S Super Resonator 80M-2000 W. PEP	31.95	21.75
CGT-144 QM Mobile Colinear, Trunk Mount	42.95	29.15
CG-144 QM Mobile Colinear less mount	26.95	18.75
BM-1 Bumper Mount	15.95	10.90
SSM-2 Stainless Steel Ball Mount	18.95	12.95
SSB-3 Stainless Steel Spring	16.95	11.75
RVM — Recreational Vehicle Mount w/coax	14.95	10.50
QD-1 Quick Disconnect	16.95	11.50
RSS-2 — Resonator Spring	5.95	4.05

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Model 40 — Rising Response Mike	44.95	29.75
Model 45 — Noise Cancelling Mike	54.95	35.75

Rotors

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Alliance HD-73 10.7 Sq. Ft. rating mast mounted comes with mast mount hardware.	159.95	99.95
CDE — CD — 45 5.0 Sq. Ft. rating mast mounted 8.5 Sq. Ft. rating tower mounted comes with mast mount hardware		Write
HAM IV 7.5 Sq. Ft. rating mast mounted 15.0 Sq. Ft. rating tower mounted less mast mount hardware.		Write
Tailtwister 15.0 Sq. Ft. rating mast mounted 30.0 Sq. Ft. rating tower mounted less mast mount hardware.		Write

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146, WA1PEL 39, K1UQX 37, WA1HOB 26, WB1CTJ 7, W1SWX 4. (Oct.) W1BYS 8.

RHODE ISLAND: SCM, J. Titterington, W1EOF — SEC: AB1D. RI QSO Party last July was won by WB1EJI with a a score of 109,480 points. A remarkable score. N1RI and WA1YUH keeping RI alive on the tfc. nets. W1QOV moved from NH to Barrington. Welcome! WA1CSO soaking up the sun in CA. Congratulations to ex-WB1EKA who now is AE1S. At Sub Sig ARC, new General is KA1BVJ/BS. He made Novice and General same week, also, new Novices are KA1BWB KA1BZE KA1BWO and KA1BWU. Apple Valley ARC reports a total of 36 upgradings and 12 new calls, great! The Newport County ARC elects W1AXO, pres.; WA1VTZ, vice-pres.; WB1GVH, corr. secy.; WA1OSL, rec. secy.; W1LO, treas. RIEM 2-meter tfc. net shows sess. 20, QNI 204, and tfc. 115. WA1WWK, asst. mgr., great work! Traffic: N1RI 323, WA1YUH 140, W1EOF 67.

VERMONT: SCM, Bob Scott, W1RNA — SEC: W1VSA Jay Peak Border repeater group, WA1HSG, 146.145-.745 has appointed WA1ELD Net Mgr.; W1SVT chairman annual meeting and FD; VE2FRX P.R. VE-Land; WA1OVW as a Director with CD activities responsibilities. WA1HSG, white cane, is very happy in receiving QST cassettes thru VT Lending Library for the handicapped. New repeater K1VT, Burlington IBM ARC, expected in operation soon on 146.25-.85. K1BCS, PR asst. to NE Dir., available as guest speaker to ARCs. NE SWOT net is quite active on 144.22 Mon. Carrier 26/474/50; GMN 25/505/68; VTP 5/84/10; VTSSB 31/596/216; V1RFD 5/83/28. Traffic: K1BQB 257, WB1FKQ 61, AA1E 21, W1RNA 6, WB1BZR 5.

WESTERN MASSACHUSETTS: SCM, Bill Lowe, W1TM — SEC: WA1DNB. STM: W1KK. NM (WMFN): WA1MJE. W1UD now NM of WMN. Although it is not listed in the current ARRL Net Directory, WMN is very active daily on 3562 kHz at 7 P.M. New stations are very welcome. Don't be afraid to ask the NCS to QRS. Congrats to W1YK on BPL, also WA1MJE. WB1AUV now full QSK with new TR switch installed in xmtr. K1IJJ/K1IJV enjoying DX with new tower and three-element beam. Elinor Gray (Mgr. of 1st Region QSL Bureau) recovering from surgery. HCRA will have display at Springfield Science Museum in Mar. N1CO getting antenna system in shape at new QTH. K1NM applied for DXCC. WA1CRL now Silent Key. Net traffic heavy during Christmas season. WA1OPN now using Century 21. Traffic: W1YK 705, WA1MJE 563, K1SSH 379, W1TM 359, W1UD 256, W1KK 190, W1DOY 98, WB1EHS 97, K1IJV 86, WB1AUV 55, N1YY 51, K1PUG 44, W1BVH 40, W1ZPB 35, N1CQ 24, W1EFC 22, K1BE 14, WA1OPN 11.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davie, KL7CUK — I am very sorry to report another Silent Key, WA7ACU who was a long time Alaskan. The Alaska Gold Net has stopped meeting due to lack of interest. KL7GD reports he is on with QRP. AL7O and XYL WL7ACV are back in AK for good. The ASN reports 1535 ck-ins, a record breaker. The APN reports 876 ck-ins. Our nets are growing every day. AL7C reports an F2 opening on Dec. 31 with several QSO on 6 mtrs with Guam. SEC KL7IKX had to resign due to business pressures. Our new SEC is KL7FSE. Our NM for ASN KL7HOV and XYL are off to Hawaii for a well deserved vacation. KL7EKZ home from the hospital after a serious operation, get well fast, Al. KL7JDI made BPL this month. AL7J and KL7HDS are busy on RTTY. Traffic: KL7JDI 343, KL7JDH 195, KL7JFT 14, KL7DG 1.

IDAHO: SCM, Lem Allen, Jr., W7JMH — Most of the Idaho Clubs had Xmas banquets and parties enjoyed by the amateurs and their families: Payette, Boise, Pocatello, Kootenai, to name a few. People and things. KØEJ (Idaho Falls) left for MN, thence to submarine school in CT, Etc. WB7OUO, now N7PB is co-author of an article in Datamation Mag. N7DH moved from Boise to Pullman as mgr. of KWSU-TV. His XYL reporting for local newspapers. Net reports: IMN, 3635, CW, 730 PMST 21 sess, 120 QTC, 145 QNI; CD, 3990 SSB, 810 AMST 21 sess, 16 QTC, 575 QNI. Now the SET is history. Think a minute — what did you learn? What can you do better next time? What needs fixing? Plan on it and DO it! Traffic: W7GHT 646, W7JMH 140, AC7P 134, WA7CTS 82.

MONTANA: SCM, Robert Leo, W7LR — I will soon begin my 2nd term as MT SCM and want to thank all who have helped so much in recent years. Keep up the good work. Gt. Falls ARC mtgs. 1st Mon. each month, 7:30 MPC Hospitality Room. Cut Bank ARC 1st Mon. each month. Butte ARC alternate Fri. nites. Gallatin HRC 1st Thur. month, 7:30 PM, Summit Engr. Co. WB5FLB formerly Texas A&M Univ. now on Mont. St. Univ. staff. He will soon have a new 7 call. IMN Dec. QNI 145, QTC 120. More K7ABV good DX: A6XB, VK9XW, YI (again!). W7LR: VK9XW, 4S7EA. W7OIO busy on 2 meters, 6 meter transverter, and more homebrew gear. W7GP puts on good Gallatin HRC programs, recently on 1913 ham gear & books. Showed how to wind spark coil using paraffin & beeswax wire dipping. Montana nets: GCWA, 3938, 2030, Sun; MTN, 3910, 0030; IMN, 3635, 0230. MTN, QNI 834, QTC 190. W7IXD busy at store near Xmas. 8 Novices from W7IDK class. Big Sandy hams join Havre ARES. N7AIT new 80m ant. WB7UOB new Hi-Lme RC pres. Traffic: W7TGU 104, W7IXD 58, WA7KMP 29, W7OIO 7, W7LR 6, W7HAH 2, W7LBK 2.

OREGON: SCM, Dale T. Justice, K7WWR — Asst. SCM: K7JF. SEC: W7HLF. Top story is the airliner crash in Portland, Dec. 28. Numerous amateurs took part in traffic control, Red Cross traffic, and stand-by operations at local hospitals. Several repeaters were used and simplex was useful, also. New appointments: WB7UMM K7WWG WB7PMG as ECs. Totals for six traffic nets:

1¢ SALE

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Item	Sale	1¢ Sale
☐ 3 MICROPROCESSOR/SUPPORT CHIPS, asst. MMS780-90 series, 24-28 pin (#5639A	1.29	6 for 1.30
☐ 5 CLOCK/CALCULATOR CHIPS, asst. MM5378, 75, 5737 etc. (#5638A	1.29	10 for 1.30
☐ 25 DTL FAIRCHILD IC's, gates and flip flops, Dip, 100% (#3709)	1.29	50 for 1.30
☐ 1-24 VOLT 50 MIL. TRANSFORMER, 115 V input, open frame, 1" x 1" x 3/4" (#5631)	1.29	2 for 1.30
☐ 10-2N3704 TRANSISTORS, silicon, TO-92 case, hfe-300, 100% (#5625)	1.29	20 for 1.30
☐ 10-2N3705 TRANSISTORS, silicon, TO-92 case, hfe-150, 100% (#5626)	1.29	20 for 1.30
☐ 10 D33021 TRANSISTORS, low power, silicon, hfe-60, TO-92 (#5627)	1.29	20 for 1.30
☐ 1 ALLEN BRADLEY POT, 10K, 2-1 4 watts, type-J, 2" x ¼" shaft (#1748)	1.29	2 for 1.30
☐ 50 ASST. RED LEDS, 20% or better, various styles and types (#5624)	1.29	100 for 1.30
☐ 10 G.E. POWER TAB TRANSISTORS, D40N1, N2, some NS, TO-202 (#5629)	1.29	20 for 1.30
☐ 4-¼" BLOCK TRIM POTS, 200K (#2535)	1.29	8 for 1.30
☐ 1-12VDC 5MIL REED RELAY, spst, N.O, 2200 ohms, 7/8" x 5/16" x 5/16" (#5515)	1.29	2 for 1.30
☐ 50 TEMP. COEFFICIENT VOLTAGE REF. DIODES, asst. volt, +50% (#5647)	1.29	100 for 1.30
☐ 12 LM-380 IC's, 2 watts, dip, 50%+ yield, U-test (#1975)	1.29	24 for 1.30
☐ 50 RED BLOCK DISC CAPS, assorted values, 50% material (#1698)	1.29	100 for 1.30
☐ 50 SHOCKLEY DIODES, most popular switching diode, hobby & untested (#1072A)	1.29	100 for 1.30
☐ 6 OPTO-COUPLER, 1500V isolation, hobby material, U-test (#2629A)	1.29	12 for 1.30
☐ 4 CHERRY MICRO SWITCH, 125 VAC, 15A, N.C. type E-13, screw terminals (#5525)	1.29	8 for 1.30
☐ 5 SPST PUSHBUTTON MOMENTARIES, rt. angle, pc mt, on-on' (#5635)	1.29	10 for 1.30
☐ 25 TTL's, with 7400's, U-test, dips (#2415A)	1.29	50 for 1.30

Item	Sale	1¢ Sale
☐ 100-CAPACITOR SPECIAL, discs, mylar, lytics, more (#2738)	2.49	200 for 2.50
☐ 10-VOLTAGE REGULATORS, hobby LM320, 340, TO-3 (#3330)	2.49	20 for 2.50
☐ 30-PANEL SWITCHES, slides, rotaries, mod, etc (#3268)	2.49	60 for 2.50
☐ 200-RESISTOR SPECIAL, ¼ to 1W, carbon, metal (#3054)	2.49	400 for 2.50
☐ 200-HALF WATTERS, resistors, carbon, metal (#3044)	2.49	400 for 2.50
☐ 100-NATIONAL IC BONANZA, linears, 7400s ROMS (#2860)	2.49	200 for 2.50
☐ 15-LM340T VOLTAGE REGULATORS, 5 to 24V, TO-220 (#2835)	2.49	30 for 2.50
☐ 100-POLYSTYRENE CAPS, asst'd values, voltage, hi-Q (#2729)	2.49	200 for 2.50
☐ 50-THERMISTORS, resistors that change with temp (#4089)	2.49	100 for 2.50
☐ 20-BRIDGES, untested, 2, 4, 6, amp, full wave (#4022)	2.49	40 for 2.50
☐ 15-MIXED READOUTS, hobby, untested, .127, .3, .5, etc. (#3619)	2.49	30 for 2.50
☐ 150-QUARTER WATTERS, resistors, metal film, marked (#3413)	2.49	300 for 2.50
☐ 100-PLASTIC TRANSISTORS, untested, TO-92 (#2604)	2.49	200 for 2.50
☐ 200-PREFORMED RESISTORS, ¼, ½, 1W, marked, asst'd (#2608)	2.49	400 for 2.50
☐ 150-PRECISION RESISTORS, ½, 1W, 1%, 2% marked (#2428)	2.49	300 for 2.50
☐ 60-DIPPED MYLARS, shiny finish, asst'd values (#2597)	2.49	120 for 2.50
☐ 30-VOLUME CONTROLS, audio, linear, asst'd values (#2421)	2.49	60 for 2.50
☐ 300-SILICON SIGNAL DIODES, micro, glass, zeners too! 50% yield (#2628)	2.49	600 for 2.50
☐ 15-CLOCK-CALCULATOR, may include MM5378, MM5375 (#5638)	2.49	30 for 2.50
☐ 10-PUSH SWITCHES, push-to-break, spst, alarms (#5289)	2.49	20 for 2.50
☐ 12-MICROPROCESSORS, and support IC's. (#5639)	2.49	24 for 2.50
☐ 150-GLASS ZENERS, 400 MW, untested, better than 50% yield (#2740)	2.49	300 for 2.50
☐ 75-CARBOFILM RESISTORS, ¼, ½ watt, 5 & 10%, marked, asst's (#3534)	2.49	150 for 2.50
☐ 250-UNMARKED CAPACITORS, polystyrene, molded, pop values (#3805)	2.49	500 for 2.50
☐ 100-1N4148/914 SWITCHING DIODES, 50%+ yield. Untested! (#2418)	2.49	200 for 2.50
☐ 30-PC TRIM POTENTIOMETERS, thumbwheel, screwdriver ass't. (#3345)	2.49	60 for 2.50
☐ 15-SLIDE VOLUME CONTROLS, asst'd values, duals, singles (#3057)	2.49	30 for 2.50
☐ 75-4" CABLE TIES, plastic, like "Ty-wrap" (#5218)	2.49	150 for 2.50
☐ 10-CRYSTALS, may include CB, Ham & more (#3250)	2.49	20 for 2.50
☐ 100-TERMINAL STRIPS, from 2 lugs up (#3136)	2.49	200 for 2.50
☐ 30-NE-2NEON LAMPS, all 100% good (#2613)	2.49	60 for 2.50
☐ 40-ft. SHIELDED CABLE, 1 cond, mikes, phones, (#3577)	2.49	80 ft. for 2.50
☐ 3-SOUND TRIGGERS, sound triggers scr w/amp (#3625)	2.49	6 for 2.50
☐ 10-CB CRYSTALS, for phase lock loop, HAM, HC/18 (#5050)	2.49	20 for 2.50
☐ 50-4 LAYER SHOCKLEY DIODES, Asst. pop. voltages (#1072)	2.49	100 for 2.50
☐ 75-SN7400 TTL ICs, untested 50%+ yield, pop types (#2415)	2.49	150 for 2.50
☐ 100-MINI DIP ICs, linears, untested 50%+ yield, pop types (#3245)	2.49	200 for 2.50
☐ 30-LM380 AUDIO IC's, 2 watts on-a-dip 50%+ yield (#5314)	2.49	60 for 2.50
☐ 75-LINEARS, OP AMPS, untested 50%+ yield, amps-dips-minidips (#2416)	2.49	150 for 2.50
☐ 100-TTLs & LINEAR MIXED, with 7400s, 50%+ yield (#2431)	2.49	200 for 2.50
☐ 150-PREFORMED DISC CAPACITORS, mark-d values, asst'd (#2605)	2.49	300 for 2.50
☐ 10-CALCULATOR KEYBOARDS, 20 keys and up. (#3524)	2.49	20 for 2.50
☐ 2000-FACTORY REJECT DIODES, zeners, rect, signal, untested (#5369)	2.49	4000 for 2.50
☐ 40-AXIAL ELECTROS, asst'd values & capacitance. (#3227)	2.49	80 for 2.50
☐ 40-UPRIGHT ELECTROS, asst'd values & capacitance. (#3226)	2.49	80 for 2.50
☐ 150-RED DISC SPECIAL, Erie, mostly marked, pop values (#5341)	2.49	300 for 2.50
☐ "WATCH GUTS", LED, who knows how good (#5267)	2.49	2 for 2.50
☐ 10 1000V 1 AMP RECTIFIERS, 1N4007 (#2383)	2.49	20 for 2.50
☐ 150 MOLEX IC connectors, for 14, 16, 18, 40 sockets (#3324)	2.49	300 for 2.50
☐ 25 POWER TAB TRANSISTORS, TO-202, 30 watts (#2425)	2.49	50 for 2.50
☐ 10 PUSH MICRO TOGGLE SWITCHES, spst (#5635)	2.49	20 for 2.50
☐ 10 MICRO TOGGLES, spst, dpdt, for panel, etc. (#5636)	2.49	20 for 2.50
☐ 50 2 AMP METAL CASE AXIAL RECTS, up to 1KV (#4006)	2.49	100 for 2.50
☐ 100-MINI BLOCK CAPACITORS, Erie, Red sq disc style. (#3528)	2.49	200 for 2.50
☐ 20 PLESSEY 0.1MF – 100 VDC 1" SQUARE CAPS (#5581)	2.49	40 for 2.50
☐ 10 TV-FM 300 OHM TWIN LEAD SPLICERS (#5547)	2.49	20 for 2.50
☐ 2.9V NICAD BATTERY CHARGER 110vac in (#4098)	2.49	2 for 2.50
☐ 4 MIKE HOLDERS, for CB's and other mobile rigs (#5634)	2.49	8 for 2.50
☐ 10 PLESSEY CAPS, 1MF – 100V 1" sq. CERAMICS (unmarked) (#5633)	2.49	20 for 2.50
☐ 100 PLESSEY CAPS, mixed values marked and unmarked (#5613)	2.49	200 for 2.50

Item	Sale	1¢ Sale
☐ 50 IF TRANSFORMERS, asst sizes (#35A9)	1.29	100 for 1.30
☐ 30 RADIO AND TV KNOBS, asst styles, sizes (#B217)	1.29	60 for 1.30
☐ 50 TUBULAR CAPACITORS, asst volts and sizes (#B219)	1.29	100 for 1.30
☐ 50 LOW NOISE RESISTORS ¼, ½W, HiFi, etc (#220)	1.29	100 for 1.30
☐ 40 POWER RESISTORS, 3,5,7 w, axial, pop sizes (#B228)	1.29	80 for 1.30
☐ $25 SURPRISE, all kinds of parts in a pak (#B294)	1.29	50 for 1.30
☐ 12 PANEL SWITCHES, rotary, slide, toggle, etc (#B295)	1.29	24 for 1.30
☐ 50 COILS AND CHOKES, rf, parasitic, if, etc (#B297)	1.29	100 for 1.30
☐ 50 TERMINAL STRIPS, up to 4 solder lugs (#B334)	1.29	100 for 1.30
☐ 50 PRECISION RESISTORS, ½W, 1%, axial (#B363)	1.29	100 for 1.30
☐ 50 MICA CAPACITORS, asst values (#B373)	1.29	100 for 1.30
☐ 10 SETS RCA PLUGS AND JACKS, phone (#B402)	1.29	20 for 1.30
☐ 50 DISC CAPACITORS, asst values long leads (#B437)	1.29	100 for 1.30
☐ 20 TRANSISTOR ELECTRO'S, asst up and ax (#B453)	1.29	40 for 1.30
☐ 75 HALF WATTERS, resistors, color coded, asst (#B454)	1.29	150 for 1.30
☐ 35 SILVER MICAS, red backs, axial, asst. (#B455)	1.29	70 for 1.30
☐ 5-50 AMP RECT, asst volts up to 25, stud (#L717)	1.29	10 for 1.30
☐ 100 GERMANIUM DIODES, axial leads, u test (#L642)	1.29	200 for 1.30
☐ 100-STABISTORS, Regulator, sensing and computer. Axial, excellent yield (#3140)	1.29	200 for 1.30
☐ 100 PRINTED CIRCUIT ½ WATT RESISTORS, asst (#U1060)	1.29	200 for 1.30
☐ 12 TRANSISTOR SOCKETS, asst npn and pnp types (#U651)	1.29	24 for 1.30
☐ 50-3 AMP SILICON RECTIFIERS, axial, asst V (#U865)	1.29	100 for 1.30
☐ 50 POLYSTYRENE CAPS, plastic coated, prec. (#U1052)	1.29	100 for 1.30
☐ 10 NE-2 bulbs, for 110vac projects, hobby, etc (#U1222)	1.29	20 for 1.30
☐ 10 PROXIMITY REED SWITCHES, asst sizes (#U1258)	1.29	20 for 1.30
☐ 6 2N915 UHF TO-18 TRANSISTORS (#U1423)	1.29	12 for 1.30
☐ 30 MOLEX CONNECTORS, nylon, asst. sizes (#5642)	1.29	60 for 1.30
☐ 50-MINI BLOCK CAPACITORS, Erie, red square discs. Asst. values. (#1698)	1.29	100 for 1.30
☐ 6-CALCULATOR AC ADAPTOR JACK, standard threads 3 terminals. (#2316)	1.29	12 for 1.30
☐ 50 ONE AMP ZENER DIODES, asst, axial, u test (#U1964)	1.29	100 for 1.30
☐ 5-PA-263 THREE WATT PC BOARDS, for amps (#U2013)	1.29	10 for 1.30
☐ 5-MICRO MINI SLIDE SWITCHES, SPDT (#U2354)	1.29	10 for 1.30
☐ 5 MINI MOTORS, 1½ Vdc, for many hobby proj (#U2551)	1.29	10 for 1.30
☐ 50 IN4000 RECTIFIERS, asst to 800V, u test (#U2594)	1.29	100 for 1.30
☐ 15 PRINTED CIRCUIT BOARDS, asst sizes, hobby (#U2010)	1.29	30 for 1.30
☐ 2 MERCURY SWITCHES, silent touch, SPST (#U2823)	1.29	4 for 1.30
☐ 6 ITS A SNAP, 9 VDC BATTERY, red & black lead (#U2852)	1.29	12 for 1.30
☐ 8 1400 VOLT "RED BALL" RECTIFIERS, axial 1 AMP (#U2590)	1.29	16 for 1.30
☐ 20 IN4148 SWITCHING DIODES, 4 nsec. axial (#U3000)	1.29	40 for 1.30
☐ 6-10 AMP QUADRACS, w/trigger diode up 600V (#U3820)	1.29	12 for 1.30
☐ 5 MICRO SWITCHES, push, asst types (#U3011)	1.29	10 for 1.30
☐ 40 SQUARE DISC STYLE CHOKES, color coded (#U3203)	1.29	80 for 1.30
☐ 30 TRANSISTORS TO92 2N4400 series, u test (#U3291)	1.29	60 for 1.30
☐ 4-TRANSISTORS TRANSFORMERS, audio, inter, etc mini (#U3295)	1.29	8 for 1.30
☐ 15 PRINTED CKT TRIMMER POTS, asst values, etc (#U3346)	1.29	30 for 1.30
☐ 6 UTILITY AC OUTLET JACKS, Hifi, equip, etc (#U3582)	1.29	12 for 1.30
☐ 20 ft CABLE, 1 cond shielded, 1-24, for phone (#U3653)	1.29	40 ft 1.30
☐ 7-2N3055 HOBBY NPN TRANSISTORS, TO-3 (#U3771)	1.29	14 for 1.30
☐ 10-PNP 30 WATT TO-3 TRANSISTORS, hobby (#U3772)	1.29	20 for 1.30
☐ 50 TUBE SOCKETS, 4,5,6,7 pin tubes, asst (#U3839)	1.29	100 for 1.30
☐ 1-10 AMP POWER TAB QUADRAC, 200 PRV, TO220, 2/trigger (#1590)	1.29	2 for 1.30
☐ 10-BULLET RECTIFIERS, 2 amp, 200V, axial (#84)	1.29	20 for 1.30
☐ 2-MAN4 READOUT, RED, com anode, size-.19" (#1503)	1.29	4 for 1.30
☐ 10-READOUTS, MAN 3, common cath, LED, the claw, RED (#3338)	1.29	20 for 1.30
☐ 8-LEDS, asst. sizes and shapes, red, green, yellow, amber (#3869)	1.29	16 for 1.30
☐ PHOTO FLASH ELECTRO. CAP, 600 MF – 360 V (#3897)	1.29	2 for 1.30
☐ 2-CIRCUIT BREAKERS, glass sealed, axial, rated – 1 amp (#3905)	1.29	4 for 1.30
☐ MICRO MINI TOGGLE, SPST, 2 pos, on-off, 125V – 3 amps (#3936)	1.29	2 for 1.30
☐ 5-CB CRYSTALS, orig. used w/synthesizer, asst. freq, HC-18/U holder (#5051)	1.29	10 for 1.30
☐ 4-PUSH BUTTON, SPST, PANEL, N.C. 125V – 1 A (#5289)	1.29	8 for 1.30
☐ 10-INSTRUMENT KNOBS, asst. styles and colors, ¼" shaft (#5121)	1.29	20 for 1.30
☐ 4-TAPE HEADS, Hill types (#5182)	1.29	8 for 1.30
☐ 5-TANTALUM ELECTROS, TEARDROP style, 2.2uf – 25V (#5205)	1.29	10 for 1.30
☐ 2-INLINE FUSE HOLDERS, complete w/5 amp fuse (#5213)	1.29	4 for 1.30
☐ 30-4" CABLE TIES, non-slip white plastic (#5217)	1.29	60 for 1.30
☐ 30pc HEAT SHRINK, asst. sizes, 50% shrinkage (#5248)	1.29	60 for 1.30
☐ 20-TOROIDS, some with coils (#5431)	1.29	40 for 1.30
☐ 15-15V ZENERS, 400mw, axial, glass case (#5404)	1.29	30 for 1.30
☐ 2-ALUMINUM HEAT SINKS, for TO-220 (#5338)	1.29	4 for 1.30
☐ 2-5.1V, 5%, 10W, STUD ZENER, DO-4 case (#5287)	1.29	4 for 1.30
☐ 12-SKINNY TRIM POTS, PRECISION, asst. styles, values 50% yield (#3389)	1.29	24 for 1.30
☐ 60pc PRECUT, PRETINNED WIRE, various lengths and colors (#1971)	1.29	120 for 1.30
☐ 60-MINI RESISTORS, for PC appl., vert, 1/8W, color coded (#2235)	1.29	120 for 1.30
☐ 8-TRANSISTOR RADIO EARPHONES, 8 ohms imped (#2946)	1.29	16 for 1.30
☐ 10-5K POTS, audio taper, plastic snap-in mounting (#5124)	1.29	20 for 1.30
☐ 10-1&2 MEG DUAL POTS, audio taper, "snap-in" mnt (#5125)	1.29	20 for 1.30
☐ 50-1 AMP ZENERS, wide asst. of values, untested (#1964)	1.29	100 for 1.30
☐ 12-SCR'S & TRIACS, 10 AMP, asst. values, untested (#2087)	1.29	24 for 1.30
☐ 3-QUADRACS, 10 AMP, 100% prime, 50-100-200 V, TO-220 (#5048)	1.29	6 for 1.30
☐ 20-MINI RECTIFIERS, 1½ AMPS, 25V, epoxy, axial (#5374)	1.29	40 for 1.30
☐ 5-1N4007 1000V MINI RECTIFIER, epoxy case, axial leads (#2383)	1.29	10 for 1.30
☐ 60 MOLEX CONNECTOR Type M1938-4, makes 14 to 40 pin sockets (#1609)	1.29	120 for 1.30
☐ 2-T.V. CHEATER CORDS, for AC power, w/6' cable (#5552)	1.29	4 for 1.30
☐ 10-T.V. CHEATER CORD JACKS, for use with above (#5520)	1.29	20 for 1.30
☐ 10-1 AMP 200V MINI RECTIFIER, IN4003, epoxy, axial (#2379)	1.29	20 for 1.30
☐ 2-1.5V SILVER OXIDE WATCH BATTERIES, (specify dia.) (#5063)	1.29	4 for 1.30
☐ 3-LCD WATCH READOUTS, 3½" digits, 7 seg, dim 1½ x 1" (#5066)	1.29	6 for 1.30
☐ 10-IC DICE CHIP, complete circuitry, asst. sizes (#5065)	1.29	20 for 1.30
☐ 2-100KHz MARKER CRYSTALS, specify 104.067, 104.092, or 114.00 KHz (#3896)	1.29	4 for 1.30
☐ 12-1.5V LAMP AND SOCKET SET, 200ma, T2 style (#3956)	1.29	24 for 1.30
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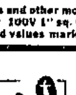

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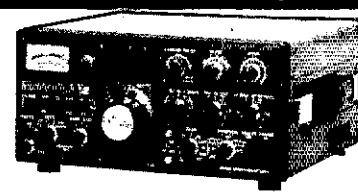

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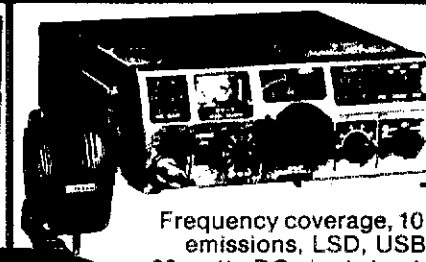

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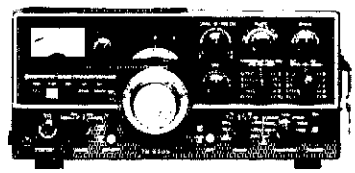

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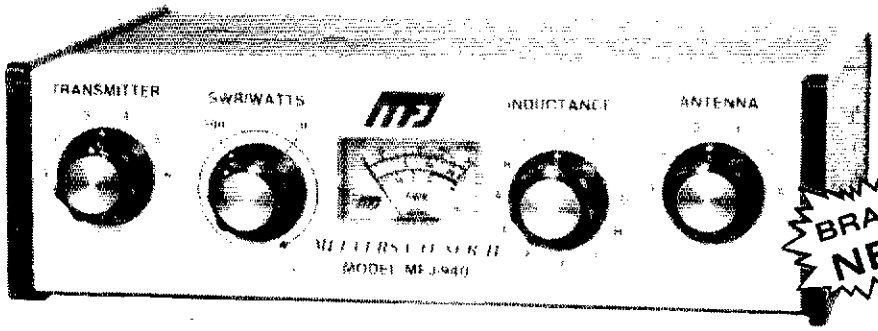

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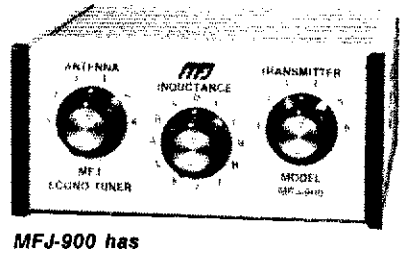

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QNI 3342, QTC 1073, sess. 178. Excellent month for traffic. WB7OZI now Advanced. KA7AMY and KA7AMZ are now Interim PO and on two fm. Traffic: W7VSE 1129, WA7IHS 351, K7WWR 174, W7HLF 140, K7QPW 37, WA4HRG 30, W7LT 20, K7DMM 4.

WASHINGTON: SCM, Bob Klepper, W7IEU — NTN, QNI 1890, QTC 212; WARTS QNI 3632, QTC 373; NWSSBN QNI 755, QTC 41; WSN QNI 451, QTC 341; SCARES QNI 86, QTC 5. Beginning Mon. Mar. 5 and each Mon. and Wed. following I will hold sessions on net operation and ttc. handling on 3970 kHz. These 15 minute sessions will begin at 5:45 PST. Designed for beginners it may also be of interest to the old timer. KL7JEB happy over making BPL for the first time, but admits it was a lot of hard work. WA7RWK reports that 925 of you have signed up in ARES. Joe and I both thank you. W7JIE reports 925 IW reports & 35 FCC alerts in '78. K7MF has completed networks for 80/40 phased verticals. FK8CL was new country for W7BCS in 10 mtr. test. Clark Cty 84/24 Rptr. on the air again with ARES net Tue. 7 PM. So many of you have been sick, in and out of hospitals, etc., a speedy recovery to all. WB7BMW KL7JEB KB6AL new members of RASC. Sno-King Rptr. now on 18/78. New officers of WWARA are: W7FHZ, chmn.; W7ZZL, vice-chmn.; K7CR, secy-treas.; W7NAN W7JPH W7OUI WA7UPP, board. Please remind your friends that inputs and outputs of Rptrs. are no place to simplex, plenty of simplex freqs. available, use them before someone puts a Rptr. on them! Also remember that 146.58 is monitored by many of us and used for emergency or Public Service work. WB7BFK doing an excellent job with the Whidbey Island DX Club's "DX-O-GRAM." For 15 yrs. W7RGD K7CYZ & K7AMJ have published "The Loggers Bark" the official paper of the RC of Tacoma. New officers of LCARC are: W7KQH, pres.; WB7QFJ, vice-pres.; K7FB, secy.; WB7PEI, treas. WB7AHF WB7VCO have completed courses and are now certified EMTs. W7YGU wants everyone to know of the FAX (esRHY) net Wed. evenings on 50.85 MHz. WB7PSP made 73K in SS-CW portion, now rebuilding 80 mtr. tuner. New officers of West Seattle ARC are: WB7RYC, pres.; K7JBZ, vice-pres.; WB7RMD, secy.; W7AIF, treas.; W7IAZ, steward; W7AUK K7NC W7LCS WA7PME WB7SEV, trustees. WB7QWC sez the EC Mtg. in Tacoma was very informative. W7ERH tells us of a good Amateur Radio PR article in Jan. '79 Runners World. WB7FGC and WB7CRR participated in successful 2 mtr. cross state Rptr. link-up. New officer of North Seattle ARC are: N7ABA, pres.; WB7PSP, vice-pres.; WB7RTG, secy.; W7GPS, treas. Traffic: (Dec.) W7DZX 1611, W7AK 1200, KL7JEB 1069, W7LUP 320, K7GXZ 248, WA7BDD 214, WA7YCM 134, WA3WPY 133, WA7PHD 121, N7AJ 117, WB7EBP 92, W7IEU 83, W7BUN 57, K7RBR 54, W7APS 45, W7EBU 33, WA7CBN 31, KA7AWH 19, WA7RCR 15, W7ZEV 15, WA7TWB 13, WB7CFH 12, W7LG 11, W7GB 9, WA7KGT 8, W7RXH 8, WB7PSP 7, WB7EXZ 6, W7BCS 5, K7VSZ 3. (Nov.) WB7PSP 9.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — Asst. SCMs: K6UWR W6ZF VE2AQV/W6. SEC: K6UWR. PSHR for Dec: WA6NTI W6JXK W6GA N6NE (who also made BPL for the third Consecutive Dec.). W6OA out of town over Xmas; as was WB6UZX, who was in VE7. New OO in Section is KA4DZW. K6ARE received a thank you reply to one of his OO cards, and N6OP actually sent in his first OO report form. If I don't start receiving some form ones from some of the EB section appointees, there may suddenly be very few appointees left in the section. RARC nets: 21115 at 8 PM and 21355 at 9 PM, Wed. SBARA nets: 28700 at 7:30 PM, 28150 at 8 PM, and 145.80 at 8:30 PM, Sun. My wife and I were guests of MDARC at their Christmas Dinner. It was a huge family affair complete with lots of kids and Santa Claus himself. The food was pot luck style and delicious. Traffic: N6NE 254, W6JXK 174, W6OA 136, WA6NTI 122, WB6UZX 34, WB6YBA 24, WD6BMX 3.

NEVADA: SCM, Leonard M. Norman, W7PBV — SEC: K7ZAU. Speedy recovery to K7NVB and WA7ESM who have been hospitalized. K7ZOK has 8 confirmed States on OSCAR 8 mode J and 45 States confirmed on OSCAR 7 mode B. WA7JUO has new moonbounce antenna. WB7TRW and N7SD handled Jonestown traffic. W7MRS and KWHF handled phone patches with Korea. SAROC convention was not held due to space not available. The ARRL Pacific Division convention is scheduled for Aug. again in Reno, contack W7SK for additional details. KA7AGM new EC for Henderson, W7IA and N7YL appointed OTS-1.

PACIFIC: SCM, George Morton, N7HR/KH6 — PACDIV Director W6ZM spent Hawaiian holiday meeting isle hams. Showed off his new Tempo S1HT to envious locals then zipped off to Big Island ARC ARRL Charter party. Honolulu and Kauai ARCs elected new officers, 73 to them for success in coming year and 73 to those who preceeded them and served so well. KH6IGU won grand prize Wilson Mk II HT at HARC annual Christmas bash and KH6ION rcvd HARC "Ham of the Year" award. KH6JIB and KH6HY aim to link Kauai into the statewide repeater system, the missing link has been found! KH6JJU had 8 hams help replace burnt out RG8 with RG17. Not hi-pwr, but SWR got him. His "armstrong" tiltover array "got" his helpers — BPL: KH6BZF. Traffic: KH6BZF 248, KH6JJP 30.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — Asst. SCM: W6NJU. New officers for the Sierra Foothills ARC (Auburn) are: K4TXK/6, pres.; WB6HEV, vp; W6MEI, secy.; WA6HYO, treas., WB6LFD, act. mgr.; K6ARR, trustee; WA8LCD WB6KFL and WB6OHV dir. The former Foothill ARC received their ARRL affiliation charter from W6ZM and will now use the name Yuba-Sutter ARC. If you miss the ARRL bulletins from W1AW, OBS station W6RNC retransmits them at 7:30 P.M. on 3520 kHz on Mon. Wed. and Fri. Congratulations to WB6HJM who passed his Extra. N6JV passed his 1st Telephone and K6XB passed his 2nd Telegraph. N6JV was portable in Utah over Xmas and almost froze at -10 F. Traffic: W6RSP 422, W6SX 78, W6DEF 26, N6JV 5, WD6CVC 2.

SAN FRANCISCO: SCM, Mark L. Nelson, AA6DX — SEC: N6KM. Note FB totals on traffic for Dec.! Nice work! SFRC repeater, W6PW/R now on 144.55/145.15. W6MLZ gave submarine talk at SFRC meeting — he was survivor of original Nautilus disaster. Ham plates are now $15, and $7 to transfer. W6GGR has cw via pushbutton, had first computer QSO with W6RNL. W6RQ busy with sunspot pictures, Al did great on Nov. FMT, he got zero cycles error on two, one cycle error on next two! New prexy for Redwood Empire Radio Amateurs is WA6OXV who is also EC for Mendocino. WB6SYQ has new Wilson H/T. FWRA autopatch to have memorized numbers.

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SX-146 Receiver	175
HT-44 Transmitter	159
SX-111 Receiver	149
SX-122 Receiver	249
S 36 UHF Receiver	125

Hammarlund
HQ-110 A VHF Receiver	$189
HQ-110C Receiver	119
HQ-110AC Receiver	149
HQ-145X Receiver	169
HQ-170C Receiver	159
HQ-180 Receiver	379
HQ-215 Receiver	259
SP-600 Receiver	179
HX-50 Transmitter	169

Heathkit
SB-300 Receiver	$199
SB-301 Receiver	229
HR-10-B Receiver	69
SB-303 Receiver	269
SB-220 Linear Amp	449
SB-102 Trivcvr	379
DX-60B Transmitter	69
HW-32 Transmitter	85
HW-100 Transceiver	249
SB-100 Transceiver	299
SB-401 Transmitter	249
SB-101 Transceiver	349
SB-650 Digital Freq. Display	149
HW-30 Twoer	29
Also Sixer	29
H-10 Monitor	69
VHF-1 Seneca	79
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 MCFM	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	$139
NC-300 Receiver	129
NCX-5 Transceiver	279
NCX-5MKII Transcvr	299
NC-303 Receiver	199
AC-500 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-LP Linear	179

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SRC-146 HT	$149
826 M Trnscvr	195
SRC-144	395
SRC-851T	250

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700-CX Xcvr	$459
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270 Cygnet	329
500 Xcvr	299
500 CX Xcvr	389
117-XC AC Supply	95
14X DC Module	39
MK II Linear	475
KK VI 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

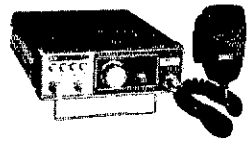
Tempo
Tempo One Xcvr	$299
AC One Supply	79
FMH 2M H.T.	149
CL-220 Trancur 220 MC	179
FMH 2M w/Talkie	149

Ten Tec
PM-3 Trnsvr	$ 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
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

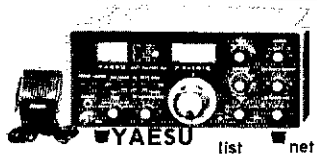
The inventory quantities of the items shown in this list vary. There may be one or several of any item. Some items may be sold by the time you read this ad. It is also likely that we have items in stock that are not listed, as a result of the many trades we make each day. We reserve the right to sell 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.



YAESU FT227RA
Regular $399.00
Cash (no trades) $339.15

MIDLAND 13-510
Regular $399.00
Cash (no trades) $339.15

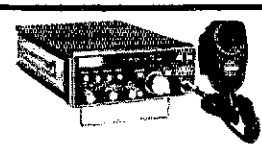
KENWOOD
TS-820 — $1055 Regular
Cash (no trades) $896.75
TS-820S — $1249.00 Regular
Cash (no trades) $1061.65



YAESU

	list	net
FT101F	$799.00	$679.15
FT101FE	$759.00	$645.15
FT101FX	$699.00	$594.15

All cash (no trades)



YAESU CPU-2500RK
(with keyboard mic)
Regular $585.00
Cash (no trades) $497.25

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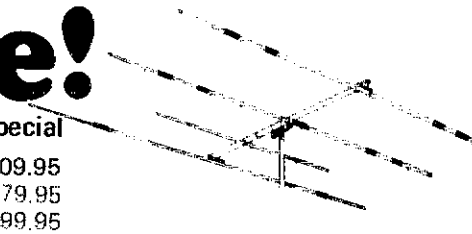
Antenna Sale!

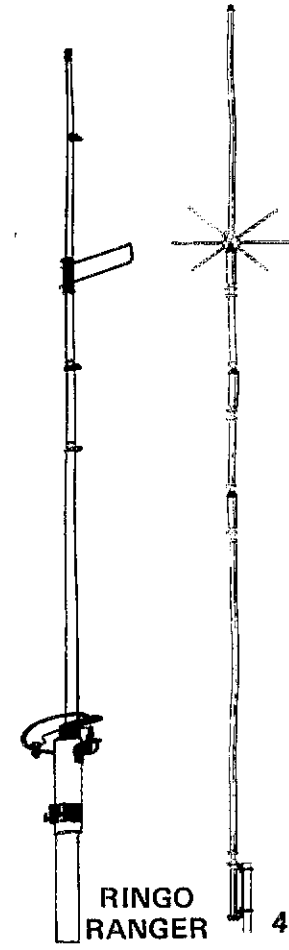


18HT

		Regular	Special
	HY-GAIN		
TH6-DXX	Super Thunderbird	$296.95	$ 209.95
TH3-MK3	3 ele. 10, 15, 20 Mtr. beam	219.95	179.95
Hy-Quad	2 ele. Quad 10, 15, 20 Mtr.	229.95	199.95
TH3-Jr.	3 ele. 10, 15, 20 Mtr. beam	144.50	129.95
18 HT	Hy-Tower 10-80 Mtr. Vertical	299.95	259.95
14AVQ/WB	10-40 Mtr. Trap Vertical	67.00	57.00
18AVT/WB	10-80 Mtr. Trap Vertical	97.00	84.95
205 BA	5 ele. "Long John" 20 mtr.beam	289.95	249.95
203	3 ele. 2 Mtr. beam	14.95	
205	5 ele. 2 Mtr. beam	16.95	
208	8 ele. 2 Mtr. beam	24.95	
214	14 ele. 2 Mtr. beam	31.95	
	MOSLEY		
Classic 33	3 ele. 10, 15, 20 Mtr. beam	304.75	219.95
Classic 36	6 ele. 10, 15, 20 Mtr. beam	392.75	289.95
TA-33	3 ele. 10, 15, 20 Mtr. beam	264.00	199.95
TA-36	6 ele. 10, 15, 20 Mtr. beam	392.75	289.95
TA-33 Jr.	3 ele. 10, 15, 20 Mtr. beam	197.00	149.95
TA-40KR	40 Mtr. add on	119.50	89.95
	CUSHCRAFT		
ATB-34	4 ele. 10, 15, 20 Mtr. beam	259.95	209.95
ARX-2	2 Mtr. Ringo Ranger	36.95	32.95
A147-20T	2 Mtr. Twist	59.95	52.95
A144-10T	10 ele. Twist 2 Mtr.	39.95	32.95
A144-20T	20 ele. Twist 2 Mtr.	59.95	52.95
A147-11	11ele. 146-148 MH2	34.95	30.95
A147-22	Power Pack 22 ele.146-148 MH2	99.95	88.95
A432-20T	430 -436 MH2 20 ele. TWIST	54.95	49.95
ATV-4	10,15,20,40 MTR Vertical	89.95	79.95
ATV-5	10,15,20,40,80 MTR Vertical	109.95	94.95
	HUSTLER		
4BTV	10-40 Mtr. Trap Vertical	99.95	82.95
RM-75	75 Meter Resonator	16.95	14.50
RM-75s	75 Meter Super Resonator	31.95	27.50
G6-144B	6 db. 2 Mtr. Base Colinear	79.95	64.95
G7-144-A	7 db. 2 Mtr. Base Colinear	119.95	99.95
	WILSON		
System One	5 ele. 10, 15, 20 Mtr. beam	274.95	239.95
System Two	4 ele. 10, 15, 20 Mtr. beam	219.95	189.95
System Three	3 ele. 10,15,20 MTR beam	179.95	159.95
WV-1	Vertical 10-40 MTR Vertical	79.95	69.95

CDE ROTORS
Ham III $125.00 T2X Tail Twister $225.00

CUSHCRAFT
ATB-34



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This NEW MFJ Versa Tuner II . . .

has SWR and dual range wattmeter, antenna switch, efficient airwound inductor, built in balun. Up to 300 watts RF output. Matches everything from 1.8 thru 30 MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.

MFJ LOWER PRICES!

NEW, IMPROVED MFJ-941B HAS . . .
- More inductance for wider matching range
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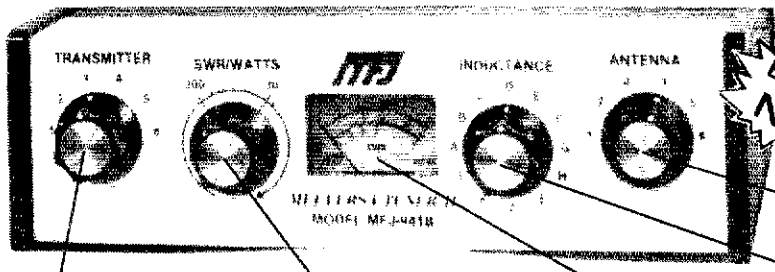

NEW LOWER PRICE

$79.95

Transmitter matching capacitor. 208 pf. 1000 volt spacing.

Sets power range, 300 and 30 watts. Pull for SWR.

Meter reads SWR and RF watts in 2 ranges.

Efficient airwound inductor gives more watts out and less losses.

Antenna matching capacitor. 208 pf. 1000 volt spacing.

Only MFJ gives you this MFJ-941B Versa Tuner II with all these features at this price:

A SWR and dual range wattmeter (300 and 30 watts full scale) lets you measure RF power output for simplified tuning.

An antenna switch lets you select 2 coax lines direct or thru tuner, random wire/balanced line, and tuner bypass for dummy load.

A new efficient airwound inductor (12 positions) gives you less losses than a tapped toroid for more watts out.

A 1:4 balun for balanced lines. 1000 volt capacitor spacing. Mounting brackets for mobile installations (not shown).

With the NEW MFJ Versa Tuner II you can run your full transceiver power output — up to 300 watts RF power output — and match your transmitter to **any** feedline from 160 thru 10 Meters whether you have coax cable, balanced line, or random wire.

ANTENNA SWITCH lets you select 2 coax lines direct or thru tuner, wire/balanced line, dummy load.

You can tune out the SWR on your dipole, inverted vee, random wire, vertical, mobile whip, beam, quad, or whatever you have.

You can even operate all bands with just one existing antenna. No need to put up separate antennas for each band.

Increase the usable bandwidth of your mobile whip by tuning out the SWR **from inside your car.** Works great with all solid state rigs (like the Atlas) and with all tube type rigs.

It travels well, too. Its ultra compact size 8x2x6 inches fits easily in a small corner of your suitcase.

This beautiful little tuner is housed in a deluxe eggshell white Ten-Tec enclosure with walnut grain sides.

SO-239 coax connectors are provided for transmitter input and coax fed antennas. Quality five way binding posts are used for the balanced line inputs (2), random wire input (1), and ground (1).

NEW 300 WATT MFJ VERSA TUNER II'S: SELECT FEATURES YOU NEED.

NEW MFJ-945 HAS SWR AND DUAL RANGE WATTMETER. NEW LOWER PRICE

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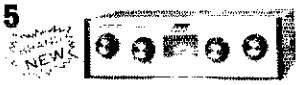

Same as MFJ-941B but less 6 position antenna switch.

NEW MFJ-944 HAS 6 POSITION ANTENNA SWITCH ON FRONT PANEL. NEW LOWER PRICE

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Same as MFJ-941B but less SWR/Wattmeter.

NEW MFJ-943 MATCHES ALMOST ANYTHING FROM 1.8 THRU 30 MHz. NEW LOWER PRICE

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Same as MFJ-941B, less SWR/Wattmeter, antenna switch, mounting bracket. 7x2x6 in.

ULTRA COMPACT 200 WATT VERSA TUNERS FOR ALL YOUR NEEDS.

MFJ-901 VERSA TUNER MATCHES ANYTHING, 1.8 THRU 30 MHz. NEW LOWER PRICE

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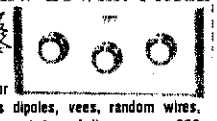
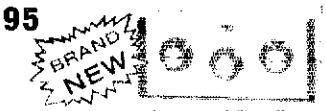


Efficient 12 position air inductor for more watts out. Matches dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax. 200 watts RF, 1:4 balun, 5x2x6 in.

MFJ-900 ECONO TUNER MATCHES COAX LINES/RANDOM WIRES. NEW LOWER PRICE

$39.95



Same as MFJ-901 but less balun for balanced lines. Tunes coax lines and random lines.

MFJ-16010 RANDOM WIRE TUNER FOR LONG WIRES. NEW LOWER PRICE

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WA6KWM moving to Lodi. Your SCM considers a tape recorder an essential station item. The "Relay" advocates using one for high speed traffic. Traffic: W6NL 558, W6IPL 380, W6RNL 357, K6TP 356, WB6AMP 285, K6PB 188, WB6RTE 27, W6GGR 18, N6KL 14, WA6QXV 4.

SAN JOAQUIN VALLEY: SCM, Charles McConnnell, W6DPD — SEC: WA6YAB. Asst. SCMs: WA6YAK W6TRP WA6HIN. Officers of the Kern County RC are WB6WPC, pres.; WB6WVN, vp; N6AWD, secy.; WA6CDB, treas.; WB6KLL, editor. The club meets the 1st and 3rd Fri. in Bakersfield. Officers of the Kings County RC are WB6SZG, pres.; WA6QLN, vp; WD6BPC, secy.; WB6ZXF, treas. The club meets the 3rd Thur. in Armona. K6RAU is OTS. K6YK W6TWN and K6QPE are ARRL Life Members. WD6GBT and WA6PRE made General. WB6ETR is AF6H. WA6JUB is AD6V. WA6MXH is N6AYI. WB6IRV is KA6X. WB6HWE is KA6Y. The Fresno ARC provided communications for the annual UCP Telethon as did the Turlock ARC. The following SJV stations made NCN Honor Roll for Nov.: N6AWH K6CPQ W6DPD WA6JDB K6PMG WB6RYG WA6RXI W6VIJ and WA6YAB. WB6SIA a Silent Key. Emergency Coordinators are still needed in Amador, San Joaquin, and Tulare Counties. The Fresno Hamfest will be May 11, 12, and 13, 1979 at the Sheraton Inn of Fresno. Traffic: W6DPD 68, K6RAU 36, W6MRT 35, K6PMG 22, WB6TTP 19, WA6YAB 14, WA6WDL 10.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF, NM: W6RFF. WB6IZF is a member of the Emergency Committee. WB6VWK worked his 100th country and Hawaii on OSCAR 8 — Congrats! W6AUC running phone patches to Alaska and HI, and busy on nets. W6ZRJ very QRL with work on his house and hopes to make major changes on the shack. N6NK has new antenna farm with two-element on 40 at 85 feet and tribander at 75 feet, he is also busy on traffic nets. WB6HBL has new mobile antenna from Stanta. W6MMG busy on SOWP net and reports W6MXO has new Keyboard keyer. WA6HAD busy on NCN sessions. W6ASH busy with net and EC work. K6PU getting antennas up and doing lot of listening. W6RFF received new 40 ft tower from Santa and should be up with antennas by now. W6OII busy with several nets and a good traffic total. RFF spoke to the PAARA on SET and emergency communications. Annual West Coast UHF/VHF Conference in Santa Clara/San Jose on May 5 and 6. During EMARC's Homebrew Night the following displayed gear: WA6VAQ K6ODK W6IRA W6FKF WB6WBK. K6DTX is new member of EMARC. The Bay Area Hamfest sked for Oct. has been CANCELLED. PAARA officers for 1979 are K6SEM VE3FZK WA6LNV and WB6LML. The Foothill Electronics Museum needs financial help due to Prop 13 — its tax deductible. The NCN Honor Roll gets longer each month. Those listed were WD6AFR K6AXT WD6GUA WA6JWK W6KZJ WB6MIV WA6NMO WA6PWT W6RFF WA6WEQ N6YE W6YBV K6YKG W6YTV and WA6ZFK. W6YBV made BPL with holiday traffic. Traffic: (Dec.) W6YBV 550. N6NK 128, W6RFF 122, W6AUC 61, W6KZJ 56, W6OII 50, WA6HAD 28, W6ZRJ 2. (Oct.) W6ASH 4, WA6HAD 4.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Bill Parris, AA4R — SEC: K4CJZ. STM: N4UE. Congrats to the following BPLs in Dec.: WA4YSK WB4ZIQ WB4MJH W4FMN WB4MXG; WD4JMS (New Bern ARC); WB4TOP (Wake Tech ARC); W4DW (Raleigh ARS). Thanks to all the traffic handlers in NC as the 1978 traffic count is up over 30% that of 1977. Many clubs had Christmas exhibit stations set up including the New Bern ARC, Raleigh ARS, Cary ARC, and Gaston Co. ARC. Congrats to Richmond Co. ARC now attiliated with ARRL. New leaders of the Charlotte ARC include K4GFH, pres.; WA4JLW, vice-pres.; WB4BUK, secy.; WB4QYC, treas.; WD4CFX, act. mgr. Charlotte ARC provided como for annual Charlotte Marathon, 26 stations participating. Congrats to WA4KGF named Charlotte/Mecklenburg Amateur of the Year by the Charlotte ARC. Officers of the Raleigh ARS include AA4VK, vice-pres.; WB4EOV, treas.; AA4L, tng dir. WB4EOV now EC Dir. of Army MARS. Lot of DX and 10-meter activity in the Raleigh area with AA4BA & AA4VK writing articles for the local newsletter. Western Carolina ARS now has new Editor — WA4QQN. Buncombe Co. ARES/RACES had good test on Dec. 14 with local CD involvement. Glad to have N4ZH back on the air after tour in hospital. WA4OJU now Net Mgr. of the Metrolina 2-meter Emergency Net. Glad to have AI4O as new OBS appointee. Look forward to seeing everyone at the NC State ARRL Convention at the Metrolina Hamfest in Charlotte on Mar. 24-25. Traffic: (Dec.) WA4YSK 1266, WB4ZIQ 752, WB4MJH 524, K4VHT 432, W4FMN 411, K4MC 409, WD4JMS 388, WB4MXG 320, W4DW 253, WB4TOP 246, W4EAT 245, K4DHX 208, W4WXZ 196, W4PCN 144, WD4CNO 134, KB4IZ 132, K4FTB 129, WA4CUD 124, K4BUH 102, N4UE 88, WA4SRD 86, N4AGP 80, WD4NTE 70, WD4CNS 67, AA4R 66, N4ALE 65, WB4GYN 59, WB4ETY 56, WA4UTC 53, WD4ABZ 51, N4ZH 42, WD4FJM 39, WB4CES 37, W4ACY 33, W4OCZ 32, WB4WII 31, WA4PID 31, WA4AKB 28, WB4VQZ 28, WD4AIE 26, WD4EPO 26, WA4IHG 22, WD4BXS 22, WB4RGS 21, WB4OXT 18, W4IZI 16, K4PTB 16, N4BEX 15, WD4HYM 13, WB4VHE 10, K4AIH 9, WA4WFY 9, W4EHF 8, WA4ULA 4, K4KA 2. (Nov.) N4ZH 10. (Oct.) WD4AIE 21.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — Asst. SCM: WB4UDK. STM: W4ANK. NMs: WA4SJS KD4D. Many thanks for your support in recent SCM election. I will strive for better communications among all SC amateurs. Congrats to new appointees. WB4UDK as Asst. SCM, W4ANK STM, WA4SJS NM SC SSBN and KD4D NM CN(E). All amateurs are asked to please cooperate with all new appointees. Congrats to N4PQ and K4ZN on making BPL. As ARRL OO W4NTO reports more discrepancies — 90% (out of band) violations — so watch your frequency. W4DRF spent 15 hrs. on ARRL Intruder Watch. SC SSBN check-ins 1596, traffic 298. Anderson 2-meter net check-ins 521, traffic 27. Blue Ridge 2-meter net check-ins 511, traffic 5. CN(E) QNI 269, QTC 308. Traffic: (Dec.) N4PQ 1196, K4ZN 568, W4ANK 260, W4NTO 221, W4FMZ 103, W4MTK 67, WB4UDK 61, W4OCX 55, K4FRX 49, W4FVV 46, W4NQL 44, WB8TCT/4 41, WB4MOT 30, KB4IU 22, WA4VYS 20, WB4JNE 16, N4EE 12, WD4FJP 12, W4DRF 10, WB4NBK 8, WB4DRT 2.

VIRGINIA: SCM, Rick Genter, K4BKX — Asst. SCM: Buddy Smith, W4YE. STM: W4SQQ. SEC: WB4ZNB.

Net	kHz	Time	Sess.	QTC	QNI	Mgr.
VNTN	3907	Noon	31	334	355	WA4FDV
VSBN	3947	6/10:15 PM	62	898	1450	W4JK
VSN	3680	6:30 PM	30	226	424	WA4YIU
VN	3680	7/10 PM	62	598	895	WB4FLT

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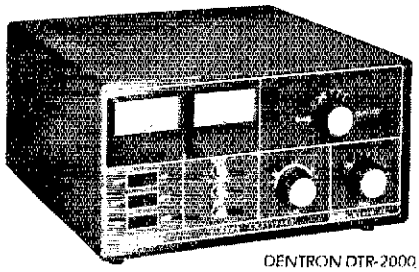
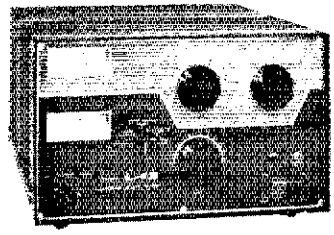
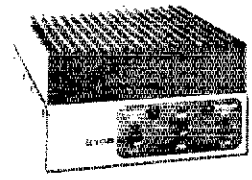
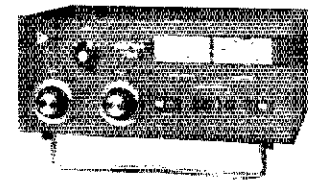
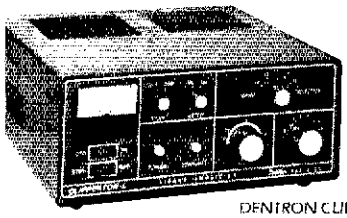

DENTRON DTR-2000 L

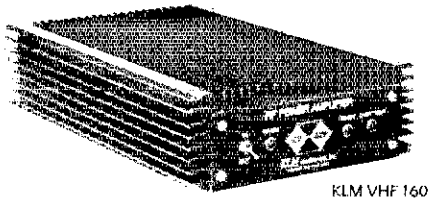

DRAKE L-4B


MIRAGE B108


ALPHA 76 SERIES


DENTRON CLIPPERTON L


DENTRON MLA-2500 B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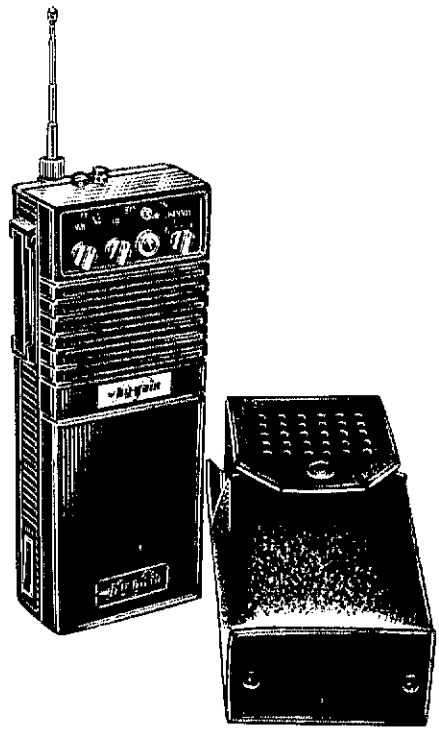

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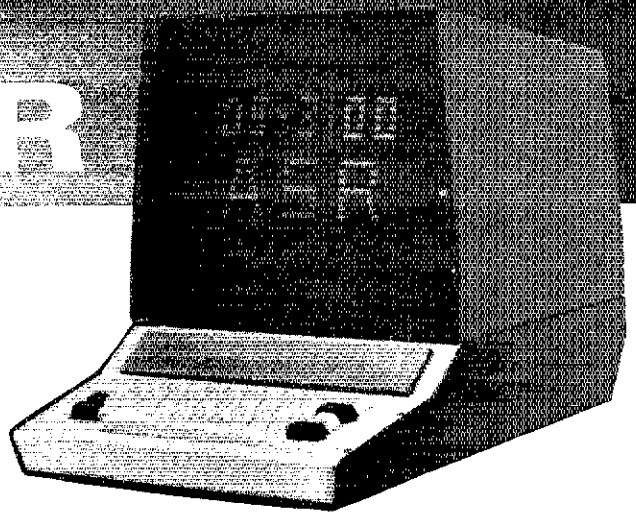

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Activity and traffic are up. Bravo! However, we are left with less room for this column. All suggestions on a remedy are welcome. Congrats and good luck to the new ECAC chmn, N4NK and a big thank you, Bill, for your fine job as STM. Va. Ham publisher, K4MLC, reports it's good to handle traffic again after a year. W4NWM pleased with new Drake TR-7 and AF4B is waiting for his. WB4PNY has a new Omni on order. K4KFC visited many clubs, shovelled mail and took in 3 contests. AA4CK working 160 meters and N4FP working OSCAR. WB4DRC starting a Masters program. WA4FTJ and N4FM are teaching radio classes. N4SD and WA4JUO are working on antennas. W4PRO has new six-element beam on 20 and L-4B; also made 500 plus QSOs in 160 test. K4LMP, Scott Co. EC, busy organizing area. WA4STO had several tfc, orig. due to local newspaper article. WB4UHC worked Japan with low power and dipole. WA4UYD finally got his KL7 card. WA4WPO confirmed her 100th country. WB4DBK is college shopping for the fall. WD4GVU is busy as NCS on ARES net. N4IF working hard on quiet-zone fight. AD4J, ex-WB4DKY, has new TS-520. WN4AZY upgraded to Extra. KØJH now settled into new home and promises more activity. KF4R reports that the 147.90/30 Franklin repeater is going strong. WB4JAY has new 6 meter rig. WA4STO, Asst. Mgr. for VSBN, is working with W4JK in preparation for SET. Traffic: (Dec.) WB4PNY 867, WA4CCK 781, W4SQQ 652, N4NK 611, W4JK 586, NØZO 563, K4KNP 471, K4BKX 425, KB4N 425, W3BBN 384, WB4FLT 325, K4KDJ 253, W4UO 242, WA4STO 179, WA4YIU 178, K4GR 173, WD4OVR 168, WB4DBK 155, K8LGA 143, K4JM 140, AA4CK 135, WB4ZNB 135, W4LXB 130, WB4KIT 120, K4EJ 118, K4RF 105, W4NWM 104, W4YVG 97, WA4FDV 93, WB4KSG 92, WA4UYD 88, WA4OQI 83, W4SHJ 80, WA4ONR 76, W3BBQ 69, WB4DQZ 58, WA4ISA 50, N4IF 45, W4OKN 41, N4LE 40, KF4R 39, WA4RXY 39, WB4ZWT 39, WB4ODZ 35, W4WWQ 34, N4AOP 33, W4OOL 24, WB4MAE 22, WA4WQG 22, WA4QWC 20, W4SUS 19, K4VWK 19, WB4HBR 18, WD4GVU 14, KØJH 14, WA4NTP 13, WD4PIH 12, W4YE 12, WN4AZY 11, W4JUJ 9, W4KFC 9, K4MLC 9, WD4IFP 8, W4KXE 8, WB4UHC 8, K4ITV 5, K4LEF 5, WD9HFO/4 4, W4KAO 4, WA4YJF 4, N4FP 2, WA4LTO 2, W4DM 1, AD4J 1, WA4JUO 1. (Nov.) W4JK 577, N4RF 97, AA4CK 55, WB4FNW 25, WB4MAE 14, AF4B 8, N4SD 8, N4UY 8, K4DHB 6, K4SPS 5, KØJH 4, W4KFC 3, WD4KUK 2, N3RC 2, WA4WPO 2, WN4AZY 1, K4ITV 1, W4PXA 1. (Oct.) W4TZC 7, N4FP 2. (Sept.) N4FP 4.

WEST VIRGINIA: SCM, Donald B. Morris, WBØJM — Asst. SCM: K8KT. SEC: K8QEW. NMs: WBØYP WA8WPW WD8JYM. WA8NDY has resigned as SEC and has been replaced by K8QEW. Congrats to George and thanks to Delf for his 7 years service. Contact K8QEW for EC info in your county. WV hams assisted National Wx Service during Dec. flooding. Wx Service meeting for Clarksburg will be held on Feb. 15. Contact WB8PBS for details. Congrats to K8JQ who placed 9th in the Oct. CW CD Party. Successful State Radio Council Meeting held in Feb.

Net	Freq.	Time(Z)	Ck-In	Tfc.	Sess.
Hillbily	14290	1700 Su	210	104	5
Novice	3730	2215 Dy	133	57	27
Phone	3990	1700 Dy	602	75	29
Phone	3990	2300 Dy	1258	221	30
CW	3567	0000 Dy	220	140	31

Traffic: W8GK 540, WA8WPW 528, WB8TDA 262, W8HZA 113, K8YL 83, WD8DHC 77, K8MHR 59, W8YP 56, WBETF 51, N8AJC 48, WB8AKQ 48, WD8JYM 47, WD8LDY 35, WD8JYN 33, K8BS 31, K8KT 26, WB8TJO 24, K8ZDY 22, W8CKX 16, WD8CDQ 13, WB8NQB 10, WB8IHA 7, K8QEW 7, N8ALU 6, WD8EBH 6, WA8GXD 5, K8LSN 4, W8FG 3, K8CFT 3, WD8NAD 3.

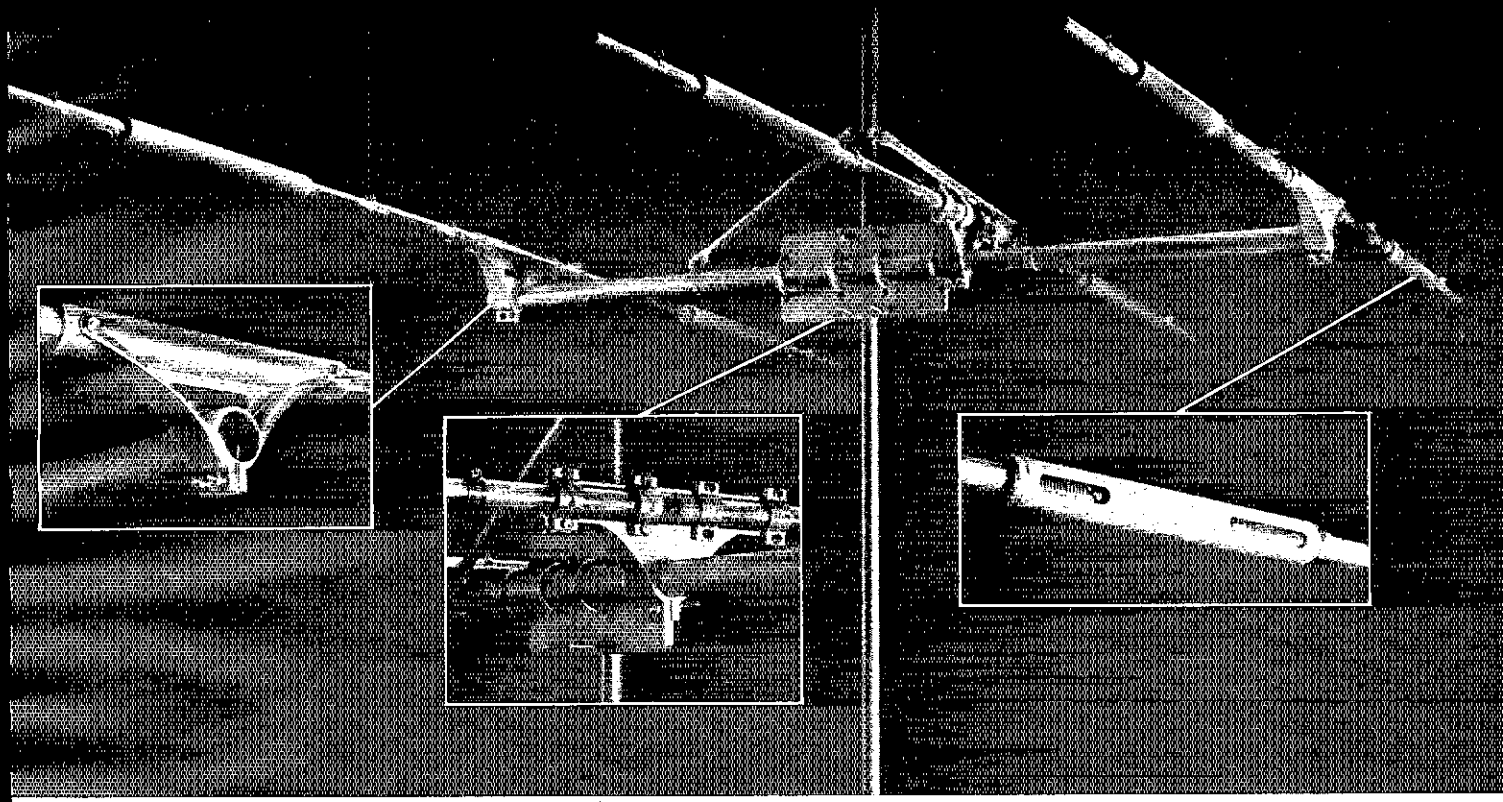
ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Robert W. Poirier, KØDJJ — SEC: WØGOW. STM: WBØMCL. NMs: KØCNV WBØZQG. Empire Radio Club participated in handling of formal traffic and phone patches during the holidays. Welcome to KAØCQA new Novice in Kremmling. WDØDNM new secy-treas. of Grand County ARC. WØWYX reports an increase of ORM on the Weather Net and is attempting to overcome the problem. WØDYK experimenting with antennas for OSCAR work and also looking for tropo skeds on both 6 and 2 meters. WBØHZL sporting newly acquired HW-101. KØYFK handled over 12,000 pieces of traffic in 1978! The Emergency Preparedness Network (EPN) for North Central Colo. new schedule as follows: Sun. 1800 local, 3893 kHz; Mon. 1845 local, 3747 kHz; Mon. 2015 local 7147 kHz; Thur. 1845 local, 3747 kHz; and Thur. at 2015 local 7147 kHz. Net tfc. Dec.: CWN 31 sess., QNI 298, QTC 349, QNF 1167; Columbine 31 sess., QNI 1127, QTC 313, informals 258, QNF 1701; Hi Noon 30 sess., QNI 1510, QTC 149, informals 328, QNF 1638; SSN 31 sess., QNI 180, QTC 51, QNF 651; EPN 23 sess.; QNI 113, QTC 242, QNF 991. Traffic: (Dec.) WØWYX 2579, KØYFK 1362, WB5JZPØ 890, WDØAIT 592, KØDJ 315, WBØZQG 303, ADØA 256, NØACW 198, WBØHZL 188, WAØYNP 129, WØEJD 125, WØLAE 76, KØPVI 73, WDØDNM 61, WØMDT 60, WBØYKH 36, WBØUWE 35, WØNFW 32, WØGO 20, KØCI 6, WØGW 4. (Nov.) WBØIBS 505, WBØTAQ 195, NØACW 122, ADØA 61, WØMDT 44, WDØDNM 42.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. NMs: K5IKL, K5KPS. Southwest Net (SWN) meets daily on 3585 kHz, at 1915 local time and handled 334 msgs with 334 stations reporting in. New Mexico Roadrunner Net (NMRRN) meets daily on 3939 kHz at 1800 local and handled 211 msgs with 1126 stations reporting in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 165 msgs with 902 check-ins. Gila ARS, Silver City reports new officers; WD5JCR pres.; WB5TGL, vp; W5VRJ, secy-treas.; WB5NEN, rpt. chmn. With deep sorrow we report the passing of W5LNG and W5NTG. The Caballo Pk. Rpt. 16/76 is now linked via 450 to the Sandia Crest Rpt. 66/06. FB job. Traffic: W5UH 600, N5NG 644, W5JOV 510, K5KPS 375, WD5AHH 180, WA5MIY 36, KB5DA 25.

UTAH: SCM, Carl R. Ruthstrom, W7GPN — SEC: WA7ZBO. N7DF, ex-WAØEMS is new EC for Uintah and Duchesne Counties, as well as OTS appointee. He's been active in 12th region and Utah code nets. 1979 officers for OARC are WA7ADK, pres.; WB7RLX, vice pres.; AC7K, secy-treas.; W7LFI and WA7HQD directors. UARC new officers are WA7ZBO, pres.; WB7VJK, exec. vice pres.; WB7DPA, vice pres.; K7YWR secy.; W7KCC, treas. Also elected were WB7VCI and WB7TFZ as pro. chmn. WB7SUB, editor; and K7HFV asst. editor of UARC's Micovolt. Both clubs are sponsoring Novice classes. W7OCX recovering nicely from viral pneumonia. W7Be reports activities of the UVHFS weather and road net which had 38 sess. and 1102 checking in. He is NCS.

TOO STRONG TO GIVE THE WIND A BREAK!



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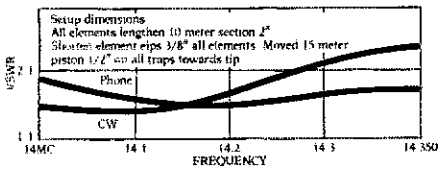

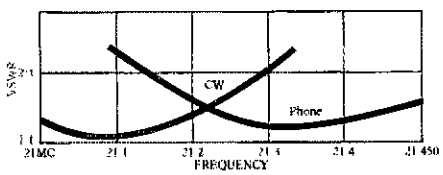

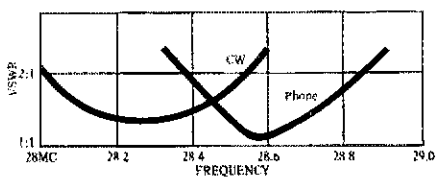

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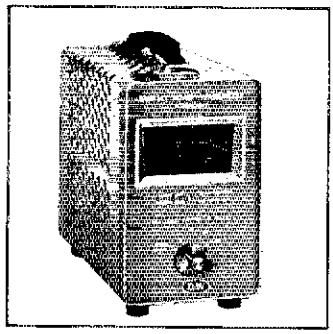

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VSWR . . . . . Less than 1.3:1 to 230 MHz
Power Range
. . . . 1500 watts DC intermittant. Warning light * signals maximum heat limit.
Wattmeter Ranges
. . . . . 0–15, 0–50, 0–300, 0–1500
Input Connector
. . . . . SO-239 (hermetically sealed)
Size . . . . . 4¾" x 9" x 10¼"
Shipping Weight . . . . . 12 lbs.

Model 334A
Dummy Load Wattmeter

Our most popular combination unit. Handles full amateur power. Meter ranges individually calibrated. Can be panel mounted.

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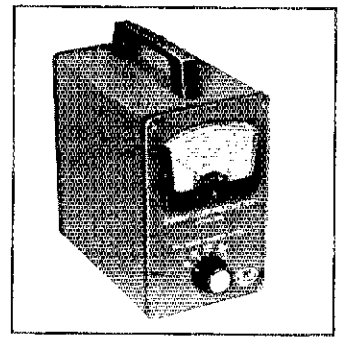
Frequency Range . . . . . DC to 300 MHz
VSWR . . . . . Less than 1.3:1 to 230 MHz
Power Range
. . . . 1000 watts CW intermittent. Warning light* signals maximum heat limit.
Wattmeter Ranges
. . . . . 0–10, 0–100, 0–300, 0–1000
Input Connector
. . . . . SO-239 (hermetically sealed)
Size . . . . . 4¾" x 9" x 10¼"
Shipping Weight . . . . . 12 lbs.



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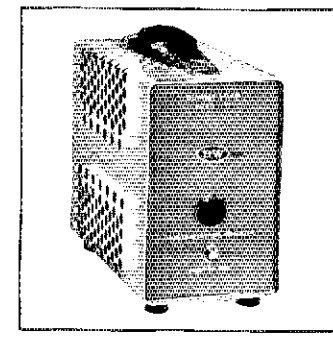
Power Range . . . . . 250 watts intermittent
Wattmeter Ranges
. . . . . 0–10, 0–50, 0–125, 0–250
Connector SO-239
Size . . . . . 4" x 7" x 8"
Shipping Weight . . . . . 2 lbs.



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specifications
Frequency Range . . . . . DC to 300 MHz
VSWR . . . . . Less than 1.3:1 to 230 MHz
Power Range
. . . . . 1500 watts intermittent. Warning light* signals maximum heat limit.
Connector
. . . . . SO-239 (hermetically sealed)
Size . . . . . 4¾" x 9" x 10½"
Shipping Weight . . . . . 12 lbs.

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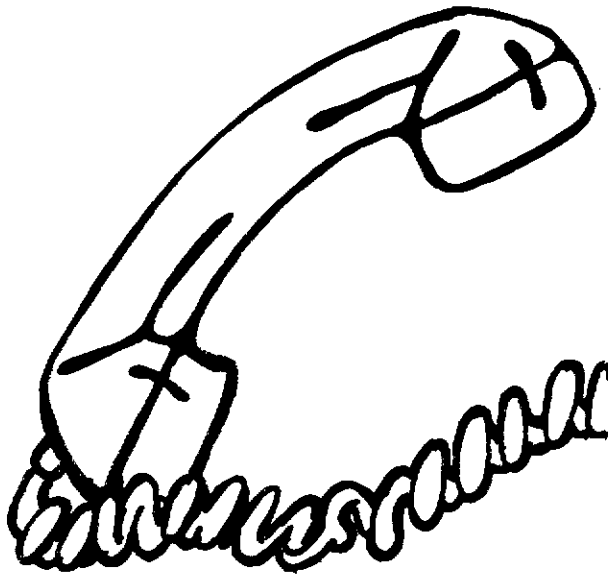

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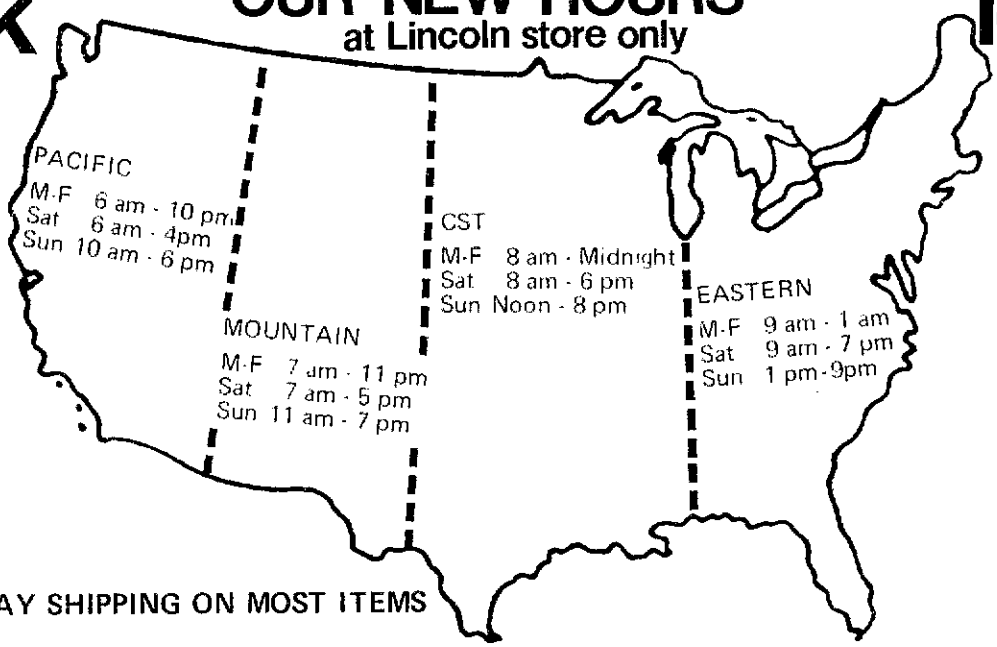

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with alternates W7GPN W7RO WB7AMR and WB7FCB. BUN had 31 sess., traffic 99 and 1452 checking in. UCN had 31 sess. traffic 83, and 212 participants. Congrats to WA7MEL who qualified for Extra Class. Hidden Peak's solid state repeater is back in service after lightning damage. Traffic: K7HLR 543, WA7MEL 244, K7VO 40, AC7K 32, N7DF 25, KB7DC 24, W7FYR 22, W7GPN 7, W7OCX 6, W7UTM 5, WB7AMR 4, W7HKC 4.

WYOMING: SCM, Chester O. Stanwaity, W7SDA — SEC: WB7EIN. NMs: K7KSA WA7WFC. WB7COX has moved from Cheyenne to Powell. WB6PQB now residing in Worland. At their last club meeting the Sheridan Amateur Radio Club elected the following officers for the coming year. WB7WQQ, pres.; WB7WVP vice-pres.; WB7TGA, secy-treas. Wyoming Cowboy managers report for Dec. 21 sess., 763 QNIs and 45 QTCs. For the year 264 sess., 8151 QNIs and 299 QTCs. Traffic: W7LYA 741, W7SQT 419, K7VWA 132, WA7SGG 126, WA7GYO 36, K7SLM 7.

SOUTHEASTERN DIVISION

CANAL ZONE: SCM, Alvin Sholk, KZ5AS — To enable all DXCC hunters to confirm KZ5 prefix before its planned deletion as a "country" the CZARA has voted to ask all KZ5 stations to participate in a series of QSO parties. Certificates will be awarded to stations working 5 and 25 KZ5 stations. Dates are: 2400Z May 19 to 2359Z May 20, '79; 2400Z Sept. 22 to 2359Z Sept. 23, '79; 2400Z Sept. 29 to 2359Z Sept. 30, '79. The club has voted to petition FCC for permission for currently licensed KZ5 operators to retain that prefix after rotation to the U.S.

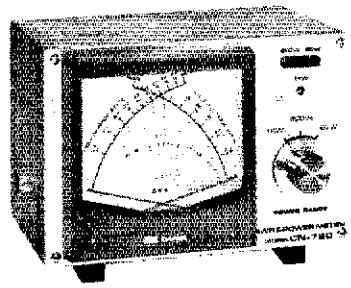
GEORGIA: SCM, A. H. Stakely, K4WC — SEC: K4SWJ. NM: K4JNL WA3NAZ. Congrats to WA3NAZ WB4ZOJ WB4TEK K4EV AA4GA and W4PIM making PSHR and WB4ZOJ doing same for Nov. Congrats to WB4ATT making General and to WD4ICA making Technician. Sadly we report that K4AEJ W4OTD W4UCC and W4WM are Silent Keys. GSN QNI 496, QTC 407. CGVHF QNI 56, QTC 1. CVEN No. 1 QNI 62, QTC 4. CVEN No. 2 QNI 936, QTC 33. GTN QNI 212, QTC 63. WGAARES QNI 55. All are invited to check in to GA. Emerg. Novice Net (GENN), Sat. at 2200Z on 3.725. Gov. Busbee declared Jan. 22-28, 1979 as "Georgia Amateur Radio Service Week." 1979 officers of Alford Memorial RC are: WD4DCQ, pres.; WA4CGE, veep.; WA4PUW, secy.; WD4KDT, treas. 1979 Board of Directors of Albany ARC are: KB4AJ, pres.; KB4IF, veep.; K4DDM and WD4IBT, secy.; K4XA, treas. WA3NAZ got private pilot license. Brunswick now has a rptr. on 13/73. N4UZ now on 10-75 SSB with 250W. Albany now has ATV rptr (WA4GKI/RPT) with video and audio input 439.25, and output video and audio on 427.25 with additional audio out on 431.75 so standard TV set with converter can be used to receive. For more info contact WA4GKI. Thanks to KA4AFI. Red Cross CPR certificates went to: KB4AJ W4ATO WA4BDD WA4BDE WD4IBO and XYL, WB4HXF K4GCR WD4IBT WD4IBV K4KZO WA4MMK WA4VYR and XYL, and K4KKZ and XYL. Traffic: (Dec.) W4FDE 416, W4PIM 245, WB4ZOJ 208, WA3NAZ 190, K4NM 171, AA4GA 117, WB4DHC 92, WA4PUP 81, N4UZ 72, K4BIA 62, K4EV 62, W4FIZ 36, K4WC 26, W4BIA 23, W4HON 21, WB4TEK 19, AK4T 8, K4PIK 6, WB4SPB 6, WA4VMV 4, N4BGN 2. (Nov.) WB4ZOJ 175.

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RH —

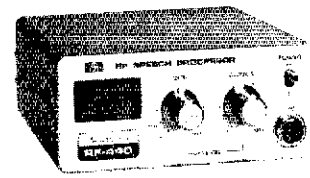
Net	Freq.	Time(Z)/Days	QNI	QTC	Mgr.
NFPN	3950	2330 Dy	1427	390	WB4PGB
QFN	3651	0000/0300 Dy	1094	1135	WA4JPV
CFN	7251	1730 Dy	348	304	W4WNY

New appts.: AA4US as OBS; WD4NYY as OTS; WA4MYF as OES. SNCs earned by WA4IWW and WD4HXS on FAST; by K4HBV KB4LB and WD4HXS on FMTN. Fla. rep. 100% on DRN-5 by WD4HIF W4JGD WD4LUG WB4QBB AA4US & W4WNY. K4HYV named Pensacola "Ham of the Year." Pensacola hams sponsored "Operation Santa Claus" at four local hospitals using 2m FM. Marianna 07/67 net on Mon. nights averaging 21 check-ins, with W4BKD & WA4HFG as NCS. WD4HWE KC4N and W4MDH upgraded to Extra. AA4US provides 2m phone patch service in Tallahassee. WA4PWF conducting televised Novice course on Gainesville cable TV. Gainesville ARC's "Most Outstanding" award given to WB4GRK. New GARC officers: WB4GRK, pres.; WB4NGF, vice-pres.; W4OQX, secy.; WD4GOR, treas.; W4ANN, rptr. dir. Beaches of Jax ARS also elected WB4MMH, pres.; WB4FAJ, vice-pres.; WA4ZIL, secy.; W4SME, treas. WB4RIS active on Straight-Key Nite. W4IZ won Fla. Skip Field Day trophy for third time, placed 4th nationally. 1979 NOFARS officers are: WD4ETG, pres.; WB4HRG, vice-pres.; WB4QVK, secy.; WD4KKX, treas.; WD4ETI, act. mgr. WA4DUD earned DXCC Award. Daytona Beach ARA and DBRA set up a traffic station on I-95 in conjunction with REACT COFFEE BREAK; over 200 messages originated. WD4BII now N4BFC. Traffic: (Dec.) WD4LUG 635, WB4QBB 607, WA4CRI 580, W4MGO 388, N4WA 370, WB4RIS 344, AA4FG 319, W4LDM 312, WD4HIF 306, WD4NYY 301, KB4T 226, K4RNS 222, W4FZX 173, WB4TZR 149, W4KIX 123, WA4IWW 96, W4MVG 86, WD4IIO 73, WB4DTS 67, WA4VLT 60, WA4EYU 58, WB4VAP 57, W4RTH 47, N4ARP 37, W4BKC 30, N4ARJ 28, N4BBY 27, WA4NMH 26, KB4LD 24, WA4CLY 21, KB4B 18, WB4YKV 18, WB4WOO 13, K4IEX 12, W4DFU 2, WA4QBW 2. (Nov.) WA4STZ 27.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst. SCM: W4KGJ. SEC: A4WJ. The month started interestingly enough with a spill of radioactive medicine on Dec. 1st closing ground traffic to and from Tampa airport as well as air departures for more than 2 hours. Hillsborough County ARES was active trying to help with a rather confused situation and Pinellas County ARES stood by to respond if needed. Fortunately the situation did not mushroom to effect a wide area. Perhaps the biggest news of the month was the tremendous traffic activity with Christmas and New Year's rush. Fifty stations reported a traffic total of 10,802. We believe this is a new record for our Section. Ten stations earned BPL certificates as follows: WD4COL WD4KPG W4LX W4MEE WA4NBE WA4PFK K4SCL K4TH WB4WYG and K4ZK. We believe this is a new record, too. Since these statistics are based on 50 reports, less than one-hundredth of the stations in our Section, we wonder what the traffic total would look like if everybody would report! Our new All-Florida Phone Net, now called CFN for Combined Florida Net, started Dec. 1st for the purpose of ensuring formal FL liaison to Region nets, is off to a good start, handling 304 messages in Dec. WB4VWO reports he is new Mgr. of Inter-American Traffic Net, 21,415 kHz, 3 to 5 P.M. EST. K4ZK has new stacked dipoles in phase on 80 and 40 giving better sigs on



CN-720



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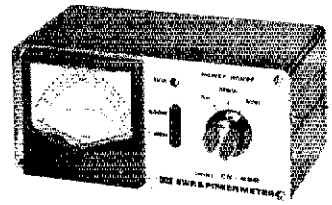

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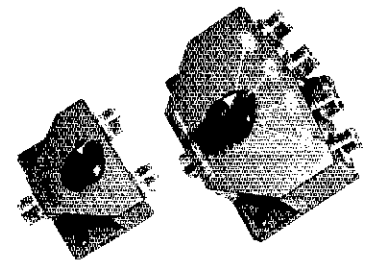

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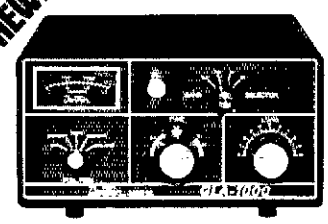

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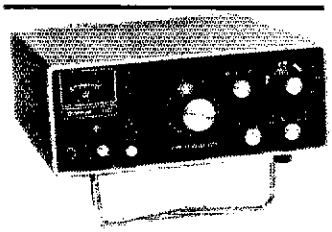

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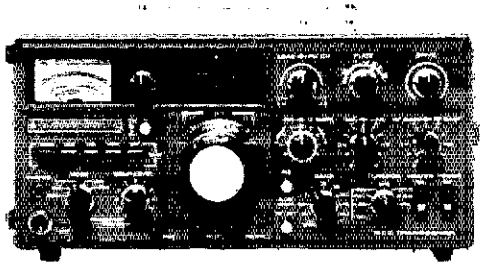

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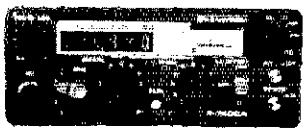

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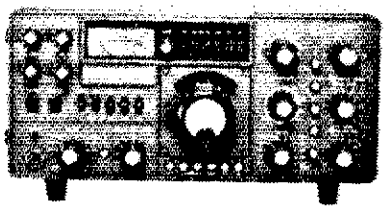

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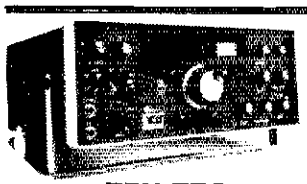

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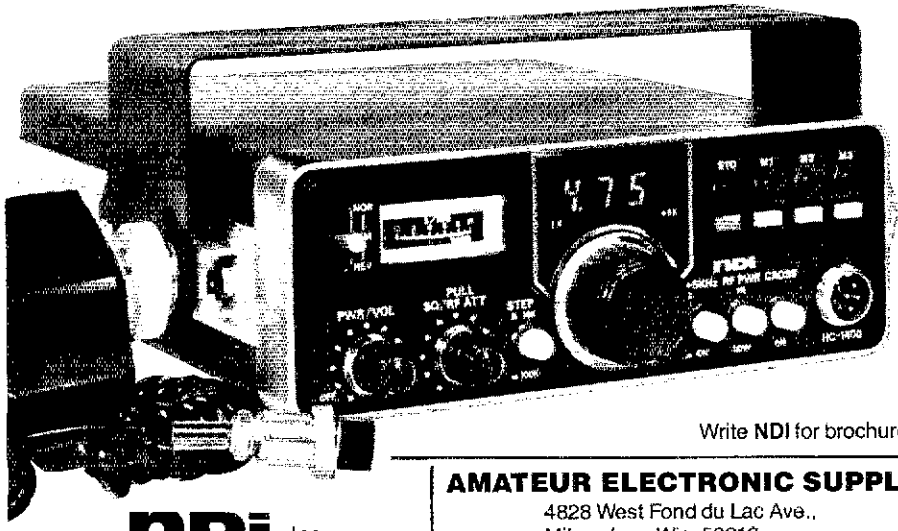

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UPC555H	1.25	1.40	1.55
UPC572C	3.45	3.55	3.65
UPC574C	1.00	1.08	1.20
UPC575C2	1.25	1.40	1.55
UPC576H	1.85	2.05	2.35
UPC592H2	.65	.75	.85
UPC1001H2	1.85	2.05	2.35
UPC1008C	4.10	4.30	4.80
UPC1020H	1.85	2.05	2.35
UPC1025H	1.85	2.05	2.35
UPC1028H	1.40	1.62	1.80
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2SA473	.45	.55	.60
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2SA564	.25	.30	.35
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2SA673	.30	.35	.40
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2SB77	.30	.40	.45
2SB175	.20	.27	.30
2SB186	.20	.27	.30
2SB187	.20	.27	.30
2SB324	.25	.30	.35
2SB367	.85	.95	1.10
2SB405	.25	.30	.35
2SB407	.65	.80	.90
2SB461	.80	1.00	1.10
2SB474	.60	.70	.80
2SB507	.70	.80	.90
2SB511	.60	.70	.85
2SB557	1.60	1.85	2.30
2SC183	.30	.40	.50
2SC184	.30	.40	.50
2SC372	.18	.25	.28
2SC373	.20	.25	.30
2SC380	.18	.25	.28
2SC382	.30	.35	.40
2SC387A	.27	.25	.40
2SC394	.18	.23	.27

	25-UP	10-24	1-9
2SC458	.18	.23	.27
2SC460	.30	.35	.40
2SC461	.90	1.10	1.25
2SC482	.80	.95	1.10
2SC485	.95	1.15	1.30
2SC495	.30	.40	.50
2SC509	.25	.30	.35
2SC517	1.80	2.00	2.40
2SC535	.25	.30	.35
2SC620	.25	.35	.40
2SC632A	.30	.35	.40
2SC634A	.30	.35	.40
2SC697A	2.65	2.95	3.20
2SC710	.18	.25	.27
2SC711	.18	.25	.27
2SC712	.18	.25	.27
2SC717	.30	.35	.40
2SC730	2.80	3.00	3.20
2SC732	.20	.25	.30
2SC733	.20	.25	.30
2SC734	.20	.25	.30
2SC735	.20	.25	.30
2SC756A	1.30	1.60	1.80
2SC761	.30	.32	.35
2SC778	2.70	3.00	3.20
2SC781	1.85	2.05	2.35
2SC784	.25	.30	.35
2SC789	.75	.85	.95
2SC793	1.90	2.10	2.40
2SC799	1.95	2.15	2.45
2SC828	.20	.25	.30
2SC829	.20	.25	.30
2SC839	.25	.30	.35
2SC867A	3.10	3.30	3.60
2SC900	.20	.25	.30
2SC930	.20	.25	.30
2SC945	.20	.25	.30
2SC1000BL	.30	.40	.45
2SC1013	.50	.60	.65
2SC1014	.45	.60	.65
2SC1018	.50	.60	.70
2SC1030	1.70	2.00	2.30
2SC1056	4.30	4.50	4.70
2SC1060	.65	.75	.85
2SC1061	.55	.75	.85

	25-UP	10-24	1-9
2SC1096	.40	.50	.55
2SC1114	3.30	3.50	3.70
2SC1116A	2.30	3.45	3.80
2SC1124	.75	.85	.95
2SC1127	.75	.85	.95
2SC1162	.60	.70	.80
2SC1166	.20	.25	.30
2SC1172B	3.00	3.50	3.85
2SC1173	.55	.60	.65
2SC1177	10.80	12.30	13.70
2SC1209	.25	.30	.35
2SC1222	.20	.25	.30
2SC1226A	.50	.55	.60
2SC1237	1.60	1.80	2.05
2SC1239	2.00	2.55	2.75
2SC1306	1.30	1.45	1.60
2SC1307	1.85	2.05	2.35
2SC1318	.30	.35	.40
2SC1364	.25	.35	.40
2SC1381	.25	.30	.35
2SC1384	.25	.30	.35
2SC1424	2.60	2.70	2.80
2SC1448A	.60	.70	.80
2SC1475	.60	.70	.80
2SC1509	.40	.45	.50
2SC1567	.50	.60	.70
2SC1675	.20	.25	.30
2SC1678	1.00	1.15	1.30
2SC1687	.35	.40	.45
2SC1727	1.55	1.65	1.75
2SC1728	.60	.70	.80
2SC1760	.65	.75	.85
2SC1775	.30	.35	.40
2SC1816	1.85	1.60	1.80
2SC1908	.25	.35	.40
2SC1909	1.60	1.80	2.10
2SC1945	4.30	4.80	5.20
2SC1957	.50	.60	.70
2SC1969	3.40	3.80	4.20
2SC1973	.60	.65	.70
2SC1974	1.20	1.60	1.80
2SC1975	1.20	1.60	1.80
2SC2009	.70	.75	.80
2SC2021	.50	.55	.60
2SC2028	.45	.50	.55

	25-UP	10-24	1-9
2SC2029	1.45	1.75	1.95
2SC2077	3.50	3.70	3.90
2SC2076	.40	.55	.60
2SC2091	.80	1.00	1.10
2SC2092	1.70	1.90	2.10
2SC2098	2.90	3.10	3.35
2SD72	.45	.60	.65
2SD91	1.25	1.40	1.55
2SD92	1.25	1.35	1.45
2SC178	.85	.90	1.05
2SD187	.30	.40	.45
2SD218	2.40	2.60	2.90
2SD234	.55	.65	.75
2SD235	.55	.65	.75
2SD261	.30	.35	.40
2SD287	2.45	2.65	2.85
2SD291	2.05	2.45	2.75
2SD313	.55	.65	.70
2SD315	.55	.65	.70
2SD325	.55	.65	.70
2SD330	.55	.65	.70
2SD356	.65	.75	.85
2SD358	.65	.75	.85
2SD359	.75	.85	.95
2SD427	1.75	1.95	2.20
2SD525	.70	1.00	1.10
2SD526	.55	.65	.75
2SK19	.45	.50	.55
2SK23A	.65	.75	.85
2SK30A	.40	.45	.50
2SK33	.55	.65	.75
2SK34	.45	.55	.60
2SK41	.50	.55	.60
2SK55	.60	.65	.75
2SK22Y	1.35	1.55	1.75
2SK35	1.20	1.30	1.50
2SK47	1.70	2.00	2.30
3SK40	.85	1.05	1.15
3SK41	1.25	1.40	1.55
3SK45	1.25	1.40	1.55
3SK48	3.30	3.40	3.70
3SK49	1.25	1.40	1.55

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NTS. W4MML operates the new 2nd repeater in Belle Glade on 145.450/145.850 MHz. N4KB says some of his extra TCC skeds were successful and for the rest he took his traffic direct to PAN. No formal report on this, but we hear snatches of conversation from the Dxers that DX is terrific lately. Lots of new countries being worked. And 2 meters seems to stretch out more lately, e.g. Miami working New Orleans through the St. Petersburg repeater. Traffic: (Dec.) K4TH 1042, WA4NBE 744, W4ME 720, WA4PFK 666, WB4WYG 666, K4SCL 571, K4ZK 541, WD4KPG 525, K4EUK 483, W4LX 412, WA4EIC 352, W4YCL 343, WA4JPV 278, WD4COL 270, WA4SCK 264, WB4FVV 251, WB4AID 239, WD4IUD 239, WD4ISN 196, WB4PIB 176, W4NTE 174, WA4RLV 161, N4KB 138, W4IRA 136, WD4HYJ 134, WB4CDO 124, W4GPL 122, W4KMN 120, WB4NJU 93, W4ESH 92, W4KGJ 92, WD4HMC 61, WB4SNX 39, WA4HXU 37, WA4UQO 37, WB4GSV 36, K4NAN 32, W4SMK 32, AA4BN 29, N4AXN 27, W4CF 24, W4TJM 18, WD4BAJ 12, K4BLM 12, WA4MJT 11, W4MML 11, WA4BYT 6, WD4PUV 6, N4XR 6, N4AUO 5. (Nov.) N4TW 97, WB4NJU 34.

WEST INDIES: SCM, Jose R. Lebron, KP4JL — Many hams have upgraded to General and Advanced such as KP4s DSP EFD FIV WP4AAZ. KP4BSQ has recovered from auto accident and is back with us. Over 150 hams attended the last minihamfest in Aguadilla organized by KP4CPG. The Puerto Rico YL club is very active, now we see many YLs attending the Novice classes. Look in a recent Callbook to see how many are listed. The coming Hamfest-convention promises to be very good, watch for further details. KP4J and the RCPR are organizing a minihamfest in Guayama, the date will be announced. These minis give us a chance to meet personally. KP4CV is looking for volunteers to participate on the next SET. All interested please contact him.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Marshall Lincoln, W7DOS — NMs: W7EP W7UQQ WA7KQE. Arizona amateur radio operators did themselves proud in Dec. by supplying excellent public service communications during flooding which followed heavy rains. We don't have as many large scale emergencies as some other parts of the nation, so building enthusiasm for this kind of work is hard. It's much to the credit of those who participated in the Dec. emergencies that they immediately pitched in to do the job that needed to be done. Significantly, the most serious emergency was in a remote area of the state, far from the thoughts of the political bigwigs at the state capital. Several days after it happened, the big shots still didn't understand what was going on, and their very costly tax-suported communications system and personnel organization were not up to the task, but the hams, who do it as a "hobby," along with other public service-minded volunteers, did the job and did it very well. Congratulations to all who were involved! You proved again that amateur radio exists and can function in the public interest, convenience and necessity. Nets (Dec.): SWN 334, QTEN 318. Traffic: (Dec.) WB7TPY 555, K7MC 279, K7NTG 274, W7LFB 173, WA7KOE 158, K7UXB 117, K7NMQ 79, K7JKM 35, AC7D 34, WB7PXS 33, K7EMM 30, WA7NXL 21, WA7WEB 19, N7EH 13, KA7BZM 13, W7DQS 11.

LOS ANGELES: SCM, Perry Masterson, W6RHS — Dec. with its holidays have gone, and the New Year is underway. The reports received for Dec. are exciting and show that our membership is alive and active. The traffic stations did an outstanding job. W6INH made BPL. This is the first BPL reported to me for the whole of 1978. W6OEO didn't miss it by much. Look at the traffic scores at the end of this report. K6KH sent me a report from the Northrop Radio Club. Thanks for the report. I hope to hear from all the clubs in the section in the next months. The United Amateur Radio Club reports a super Christmas Banquet. New officers were elected. N6HE remains as pres. Ray reports that he is only 5 short of 5BWAS for SSB and almost there on CW as well. Oh, before I am called to task, the club is United Radio Amateur Club. I mixed the title a little above. K5DY/6 requests more SCN 2 participation. Code speed is held to 13 wpm so anyone who wants to learn traffic handling can get in and get their feet wet. If you have any questions, just give Tom a call or if you can't reach him contact me. The Amateur Radio Telegraph Society now has an 80-meter session beginning at 1800 local, on 3560 kHz. N6VI now has three elements on 40, five elements on 20, five elements on 15, six elements on 10, Vees on 80 and 160. He also has antennas on 6 and 2. N6OU received a new TR 7 for Christmas. I wish I knew his Santa Claus. You will note not a single report from the VHF gang. Please let me know what is happening with your activity. Would also like to hear from the ATV gang. Traffic: W6INH 648, W6OEO 432, AD6M 371, N6PZ 347, K5DY/6 240, WA6LVO 139, K6EA 114, WB6YID 86, W6BRO 68, W6QAE 54, K6CL 8, N6VI 6, N6OU 2.

ORANGE: SCM, Fried Heyn, WA6WZO — Asst. SCM: K6KNC. SEC: AE6N. STM: WB6DAB. NMs: WB6AKH W6CPB & K6JT. ECs: WB6ARK W6DQR K6GGS W6LKN WA6PLZ W6SQE & W6WPP. Many thanks to WA6YWS for his eight years of service as EC of Inyo Co., he has highly recommended W6DQR as his replacement with K6IMN agreeing to stay on as asst. EC. WA6TLE appointed EC for the southern part of Orange Co. with WD6AQK staying on as his top asst. EC; other asst. ECs are WA6CUE W6TIO N6AIW WD6EDB WB6SZO & WA6TMN. ARES nets for South Orange Co. are held on Wed. 7:30 PM on 146.045/.645 MHz and Thur. 8:00 PM on 223.040/224.640 MHz plus joint nets (Orange Co.) on Sun. 4:00 PM (formally at 9:00 AM) on 3.955 MHz as well as Mon. 7:45 PM on 7.290 MHz. The monthly Section Official's net held the first Sun. of each month on 3.955 MHz has been moved back one half hour to 9:30 AM. All clubs are invited to have a PR representative check into the Community Relations net Wed. 7:30 PM on 147.84/.24 MHz. Congrats to N6UC who we expect to make the next DXCC Honor Roll. Also congrats go to WB6AKH with his score of 60,416 points in the ARRL 10-meter contest. The third annual Santa-Vision program at St. Jude Hospital (spearheaded by WA6JFP and WA6OPS) was a rousing success with patients getting to talk to Santa via Amateur Radio while viewing him on TV. Most formal traffic can be initiated thru local ARES nets; however usually it can be taken directly to the Southern Calif. net system (part of the NTS) with daily nets at 0330Z on 3.598 MHz, at 0430Z on 3.598 MHz (13 wpm max.) and at 0500Z at 147.045/.645 MHz. Anyone interested in receiving the monthly newsletter of SCN entitled "Zero Beat," please write the SCN manager N6WP. Traffic: WB6EIG 931, W6RE 194, WB6OBZ 191, WB6BZZ 146, K6XI 108, K5WI 96, W6NTN 71, WA6PEE 50, WA6QCA 48, AI6E 32.

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IC-202 2m SSB Xcvr	199
IC-21 2m FM Xcvr	149
IC-245 2m synth Xcvr	349
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1-25-79

(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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SPR-200 Speaker	30	24
SOC-200 Stn console	295	236
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COMCRAFT	reg.	NOW
CPS-6 AC supply, 6A	$139	49
DENTRON	reg.	NOW
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160-10AT Ant tuner	129	115
160-10AT-3Kw Ant tuner	229	199
160-10M Monitor tuner	299	199
Jr. Monitor Ant tuner	79	49
MT-2000A Ant tuner	199	159
MT-3000A Ant tuner	349	279
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34PNB Blanker - TR-4CW	$100	95
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R-4C Receiver	699	575
T-4XC Transmitter	699	575
AC-4 AC supply	150	115
MS-4 Speaker	33	25
2CQ Speaker/Q-mult	49	45
7077 Hand microphone	19	14
WV-4 VHF wattmeter	89	75
AL-4 Loop ant - SPR-4	29	19
AN-5 Shortwave ant	8	5
MN-4C tuner/B-1000 balun	189	139
ELECTRA	reg.	NOW
BC-210 Synthesized scanner	$299	239
BC-250 Synthesized scanner	399	299
ELECTROLERT	reg.	NOW
Fuzzbuster II Radar detector	$129	99
GALAXY	reg.	NOW
ZZM Mobile floor mount	$ 6	2
R-1530 General cov Rcvr	1550	950
SC-1530 Speaker	60	35
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GENTEC	reg.	NOW
PM50U 1 Kw wattmeter	$ 48	24
HY-GAIN	reg.	NOW
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IC-21 VFO Receive VFO	$119	69
IC-21A 2m FM Xcvr	399	269
IC-3PA Power supply/spkr	99	69
KLM	reg.	NOW
Force 5 Xcvr DEMO	1095	695
F5PS AC ps/spkr DEMO	249	199
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KLM AMPLIFIERS	reg.	NOW
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PA15-160BL 2m 15/160w	289	259
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CL-33 3 el beam **(truck)**	$304	243
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DFS-5K Dig selector - Whamo	199	89
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HR-312 2m FM Xcvr	269	169
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SC-30 30 MHz counter	169	129
SC-250 250 MHz counter	219	169
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ST-1 Antenna tuner	189	149
WM-6200 6 & 2m wattmeter	87	59
WM-3000 SSB PEP wattmeter	87	69
PS-20 AC supply	179	129
117XC AC supply/spkr	159	129
TPL	reg.	NOW
8028 2m 1-4/50-80w amp	$259	189
1202 2m 5-15/80-120w amp	239	179
PS3-A12D 12v 20A supply	136	99
TEN-TEC	reg.	NOW
544 Digital Xcvr	$869	749
252G/E Power supply	116	79
262G Power supply	139	99
509 Argonaut Xcvr	369	319
570 Century/21 Xcvr	299	269
KR-1 Keyer paddle	22	15
WILSON	reg.	NOW
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Mk II As abv, TTP installed	332	279
Mk IV HT/batt/wall charger	300	249
Mk IV As abv, TTP installed	362	299
Note:High/low switch may be installed by AES for $20.00.		
YAESU	reg.	NOW
FT-901DM 160-10m Xcvr	1459	1259
FT-301S DIG 20w PEP Xcvr	750	550
FT-301A DIG 200w PEP Xcvr	935	749
FT-101F Xcvr	799	699
FT-101FE/EE Xcvr	759	659
FTV-650B 6m transverter	239	199
FTV-250 2m transverter	275	239
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FL-101 Transmitter	649	549
FL-2100B Linear **(with 10m)**	529	479
YC-500S 500 MHz counter	399	349
YO-100 Monitor scope	245	229
YC-221 Dig disp - FT-221	119	109
DC kit for FT-201		5
XF-31C CW filter - FT-401	45	35
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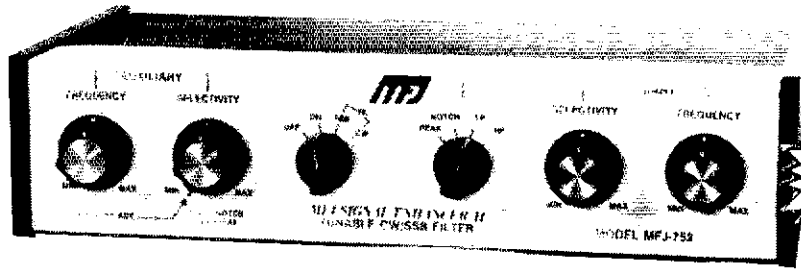

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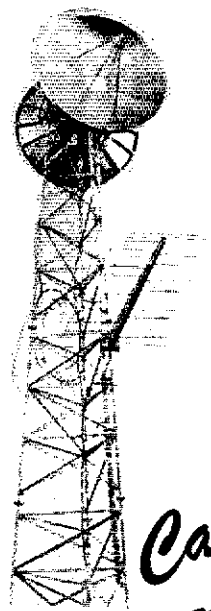

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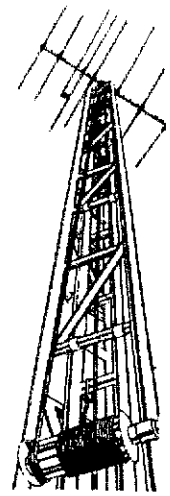

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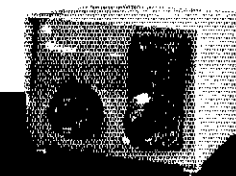

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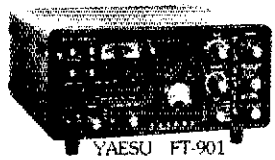
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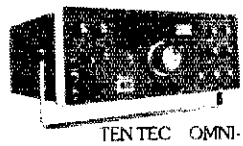
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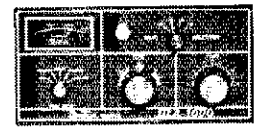
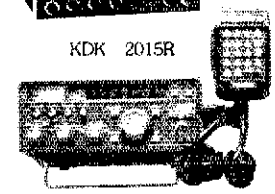

GLA-1000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SAN DIEGO: SCM, Arthur R. Smith, W6INI — N6RD has been apptd. to Asst. SEC. New OTS appts.: WA6AMK N6BB and K6HAP. San Diego amateurs are fighting a new county ordinance limiting antenna height to 50-ft. W6OGC leads the battle with SANDARC ad hoc committee members W6GIC and N6LY. WA6UAZ and WB6PVH received BPL certificates for Dec. traffic activities. Upgraded: K6APV WD6BRU to Advanced, N6AYO KA6BCC WD6EPU to General and WD6CAA to Tech. W6GIC has retired as editor of SANDRA's "Squelch Tales." A much deserved "well done!", Sybil. N6LY has taken over the editorship. Clubs' 1979 officers: Escondido ARS WD6FYO, pres.; WD6BRU, vice-pres.; N6AIJ, secy.; W6IHH, treas. ARC of El Cajon WB6DPO, pres.; WA6MHZ, vice-pres.; AD6O, secy.; K6QI, treas. Palomar ARC WA6EJL, pres.; WA6HPP, vice-pres.; WA6ZKC, secy.; K6SLA, treas. Don't forget that renewing ARRL membership through an ARRL affiliated club will benefit the club by $1.50. WA6COE again active on 80 mtrs. and plans to refurbish HF antenna system. The 220 Club is sponsoring a contest with an award for working 100 stations on 220 MHz. Palomar ARC has daily traffic net at 2030 on their 13/73 repeater. Traffic: (Dec.) WA6UAZ 1090, WB6PVH 971, WA6ZZL 216, W6HUJ 144, WA6UFY 115, N6RD 80, K6HAP 79, WA6SKU 28, N6AT 14, WB7SUA 14, WA6HJJ 6. (Nov.) WA6AMK 312, N6RD 50, W6TVY 4.

SANTA BARBARA: SCM, D. Paul Gagnon, N6MA — Club speakers this month were KA6DVA at Mike and Key on power supplies; AD6T on oscillators at Conejo Valley Club; W6RIC on emergency communications at Simi Settlers. The Simi Settlers had Operation Santa Claus at hospitals for Christmas with WD6EVT W6SUN WA6OHX WD6EZY WB6ZWZ WD6EDY WB6QKF WA6GUT WA6MQU and Miss Simi Valley participating. WA6RSU received his worked all 220 award. W6RGQ still DXing with 234 worked. WA6IJZ and K6VMN have new rigs for 1296. W6GMC received his tough WAVE award. W6ZRR sent 91 bulletins in Nov. and 100 in Dec. and is monitoring 146.22 RTTY autostart. WD6EEN busy on traffic nets. N6GC and WØKON are to be congratulated for making BPL. WA6KMN and WB6JVL have a new Tribander up. Participants in the Santa Maria town Mall demo in Nov. included WD6CYW N6GC WA6ARG WB6BWZ WA6TLP WA6VNO WD6FGV WA6DKY WB6LDW WA6LBO and K5BNH. Much traffic was handled on RTTY and much PR was gained for amateur radio. Sulphur Mountain Repeater Assn. officers for 1979 are WA6IJZ, pres.; K6VK, vice-pres.; WB6BPL, secy.; N6MA, treas.; WB4CBZ and WB6JKM, board. PSHR: WA6LBO 42, N6WP 45, K6YD 22, WD6EEN 43, N6YH 22, WB6BWZ 32, W6JTA 37, N6MA 22. Officers for Conejo Valley ARC are K6PHT, pres.; AD6T, vice-pres.; WD5FPO, secy.; W6TSH, treas.; K6CAB, editor. Two section nets are 3935 on Wed. at 7 PM and 1813 on Wed. at 8. WB6BWZ is new OTS appointee. Traffic: (Dec.) WØKON 673, N6GC 588, N6WP 443, N6YH 115, WB6BWZ 107, WA6LBO 101, W6JTA 95, K6YD 88, WD6EEN 38, N6MA 27, NØFB 2. (Nov.) WØKON 580, WA6MBZ 164, WA6LBO 54.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Ted Heithecker, W5EJ — Last year we here in N. Tex. Section came out No. 54 out of 74 total Sections in traffic count. This was not because we didn't handle the tfc., but because a lot of it went unreported! This is partly the result in the laxity in leadership, and not enough "on-the-air availability" on my part; and the failure to communicate the importance of recording every last piece of tfc. handled each month in our Sect. This can be rectified by "spreading the word" to the many newcomers to the NTS, and jogging up the competitive spirit of all our outstanding tfc. folks. As an aid (not to mention the postage savings) in your reporting; K5PC meets the TTN and TEX CW nets the first few days of each mo. to relay Stn. Activity and EC Rpts. sent in msg. form. Just addr. your msg. to "K5PC" Lewisville, TX. Tel. 221-2222 and someone will pick it up via NTS. We deserve a better "mark" for we've already earned it! Upgrades: WD5DRK/AJ5F WB5MTN/AJ5K WD5CDU/KB5HP WB5BFG/KB5HR WB5YKW/Tech. New club: Free State ARC in Van Zandt Co. & area; WD5IMY first pres! Joint SKYWARN class for Cherokee/Henderson Co. ARES groups was held in Athens Feb. 28. W6HMR won "Ham of the Year" award/Lake Country ARC. Congrats! 50 repeaters in this section now with ARES nets active! SET was biggest and best ever! ECs don't forget Mar. 15 deadline on SET rpts. PSHR for Dec. WB5SDD W5VMP WB5LAT AE5I K5SOR AJ5F AJ5K. OO rpts from W5QPX WA5UBK. OVS rpt from K5IS. Please address all future SCM tfc. and mail to: Phil Clements, K5PC, 1313 Applegate Lane, Lewisville, Texas 75057. Phil takes office as new SCM April 1. Traffic: (Dec.) W5TI 589, AA5J 532, WB5WOE 516, K5OUK 502, WB5SDD 478, WB5BKM 439, W5VMP 362, K5MC 259, WD5HHK 256, AG5W 202, AJ5K 198, WB5LAT 197, AE5I 155, N5CY 154, K5SOR 147, K5PC 125, WA5INJ 109, K5QKM 92, WB5JCT 61, WB5OXE 58, AJ5F 48, W5CTZ 35, WA5EZT 28, WA5KCZ 27, AE5U 16, W5YK 8, WD5EPC 6, K5HSZ 6, WB5UHO 5, K5DOI 4, WD5GFP 2, WA5UBK 2. (Nov.) N5CY 124.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — This report marks the wind-up of another good year's activities in OK Amateur Radio. A year that has shown a very healthy increase in activities. We are pleased to announce new ECs WB5ETD W5HGH WB5OVT & WA5UTO. Traffic summaries from 2 of our Net Managers, show a very healthy increase in operators and coverage. Traffic and WX net shows 14 with 50% or better participation and W5BYC W5IQL WA5OUV W5UGA and W5VLW averaged above 90%. WX reports averaged 9.77 per session. Enid has installed new exciter in repeater. Woodward working to increase coverage to the west. Muskogee has joined ranks of repeaters using automatic announcements, bulletins, etc. Spring classes will be starting soon in many areas. Due to skip conditions on 75, W5REC acted as NCS for the Arizona Emergency Net during Phoenix flood Dec. 19. Ray also spends much time on ISSB including 1 4-1/2 hr. session as NCS. I wish I could see some of the other traffic reports to compare with ours, in originations and deliveries. It would be hard to get a true comparison. But do feel that our "Originations" could be more. We can improve this through better Public Relations. Just how many people know what we have to offer? Traffic: W5REC 1084, K5JGZ 920, K5OWK 737, WB5NKD 674, WB5NKC 661, W5RB 444, WB5MVR 307, WB5EAY 139, WD5ETD 134, W5UYH 101, WB5ELG 86, WA5JGU 70, WA5OUV 66, W5BYC 64, WD5ETD 54, W5SUG 47, WA5FSN 33, K5CAY 32, W5VOR 32, KB5EK 25, WB5AOH 17, W5FKL 12, WB5UCM 8, WB5KVA 7, W5JJ 6.

SOUTHERN TEXAS: SCM, Art Ross, W5KR — Asst. SCM: N5TC. SEC: WB5LHK. Net Managers-at-large: N5TC, phone. WA5RKU, cw. K5QEW has been elected as Net Manager of Texas Traffic Net (TTN) for coming year. OOs reporting: K5DI. WB5CIT. OVS reporting: WB5CIT. Asst. EC WB5ZRH has his WAS certificate, working on DXCC. OO/OVS WB5CIT has new AFSK teletype converter for use on TIRS. WB5BWV reports results on inverted "L" antenna at twenty feet are equal to inverted "V" at 50 ft. EC/OTS WA5RVT gave talk to Matagorda County ARC on traffic handling; has new TRS80 computer which will be used on traffic nets when he is NCS; has new 160 watt two-meter amplifier on SSB; also reports following: WB5AHN has forty-foot tower with CL-33 up; WB5UER has new TRS-80 computer and is quite active with RTTY traffic; WD5DOQ using TRS-80 computer for send/receive cw; WB5FZO has new amplifier and remote VFO; new Novices in area are KA5CSA and KA5CSX. OTS WA5VBM grateful for daily Mexico contact; two members of her order injured in Jeep accident while traveling through Mexico; XE2WH has been helping the Sisters (one critical, one in coma) and keeping all concerned advised. Sister Mary thinks Bill should have Public Service Award. New CHARRO (Brownsville) officers: W5YMU, pres.; W5KR, vice-pres.; W5UML, secy.; WD5CLG, treas.; W5DX WD5CLI WD5CLE, directors. The first annual CHARRO Hamfest took place Jan. 14th. K5DG went to several mobile home parks for Christmas traffic; he made BPL with originations! Other BPL certificates for Dec. go to W5KLV (naturally!), N5TC. Traffic: (Dec.) W5KLV 1460, N5TC 672, K5HZR 485, K5GM 414, WA5RKU 392, K5DG 278, W5BGE 113, WD5GLS 113, WB5MMI 113, W5BHO 94, K5QEW 59, AC5R 58, WA5RVT 48, W5KR 32, W5SPD 32, WB5BWV 26, W5TTW 24, WB5CIT 20, WB5UYV 14, WB5ZRH 14, W5QO 4. (Nov.) K5GM 414, WA5RVT 37, KA5CQN 5, WB5UYV 5.

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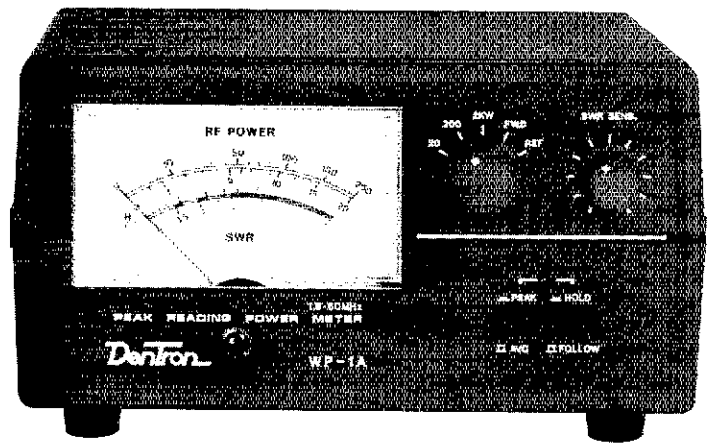

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6.19T	7.75T
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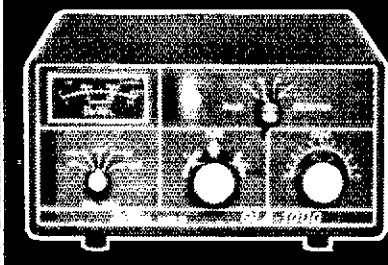

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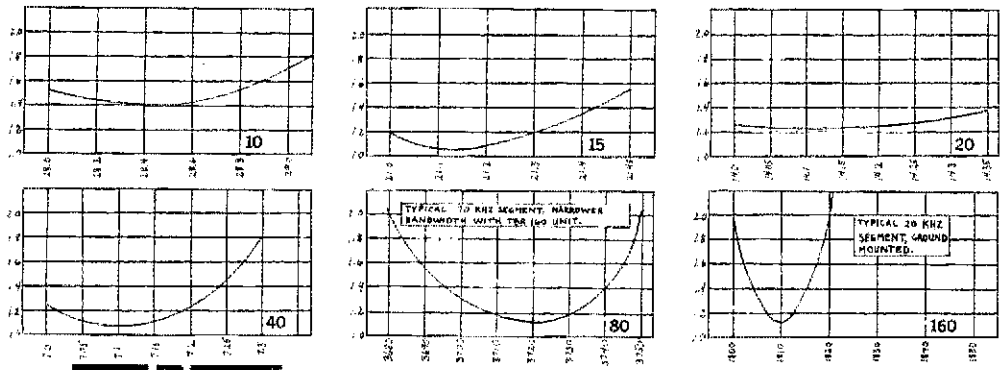

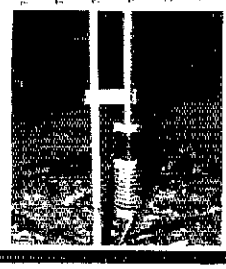

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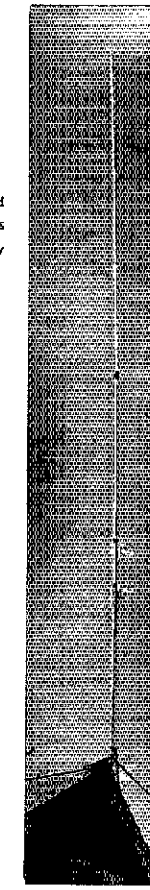

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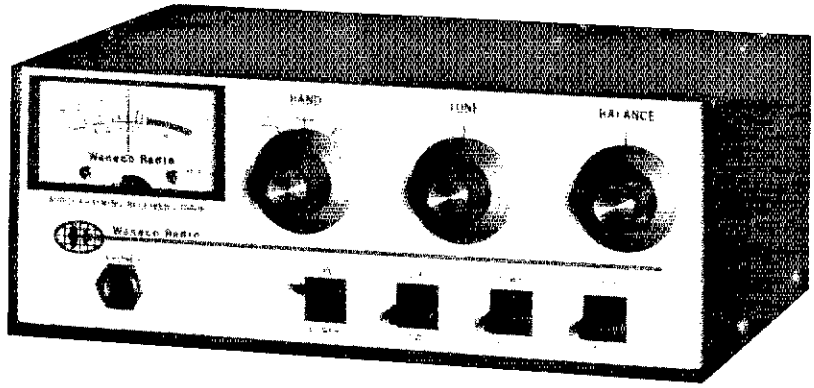

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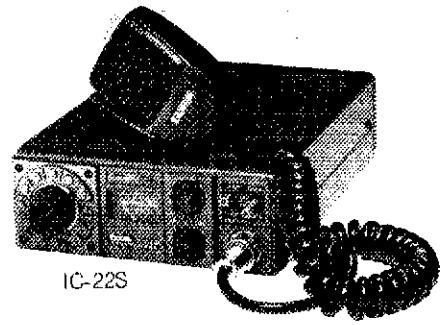

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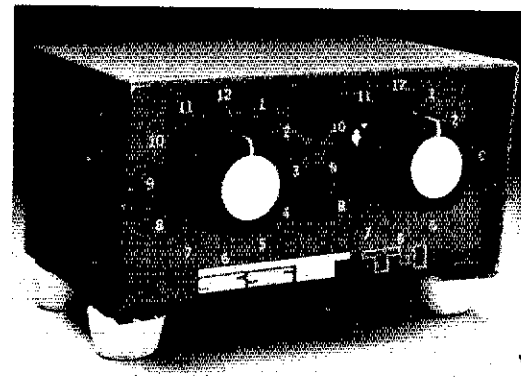

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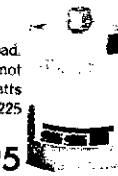

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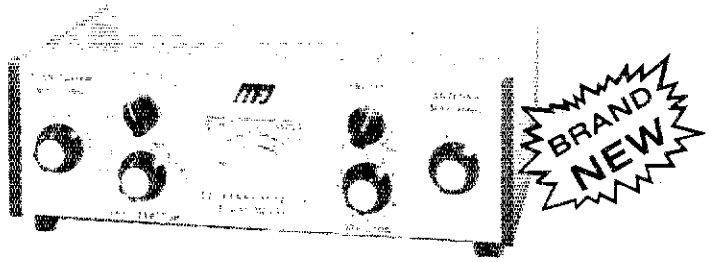

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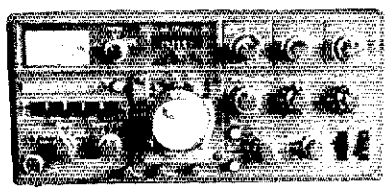

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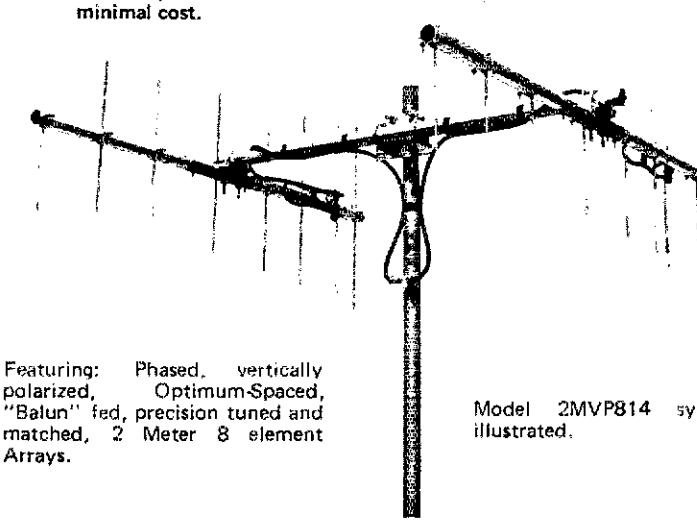

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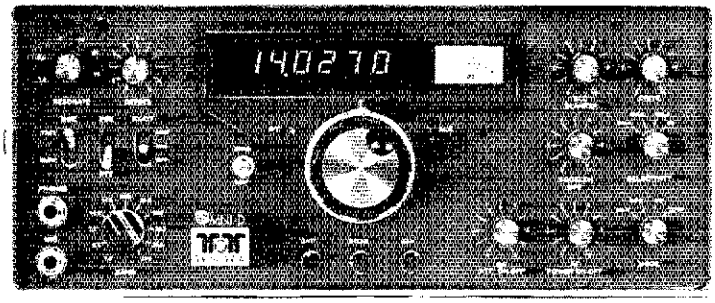

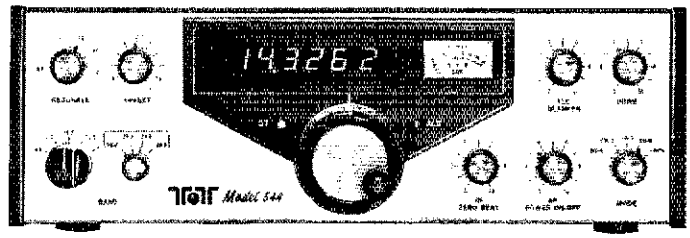

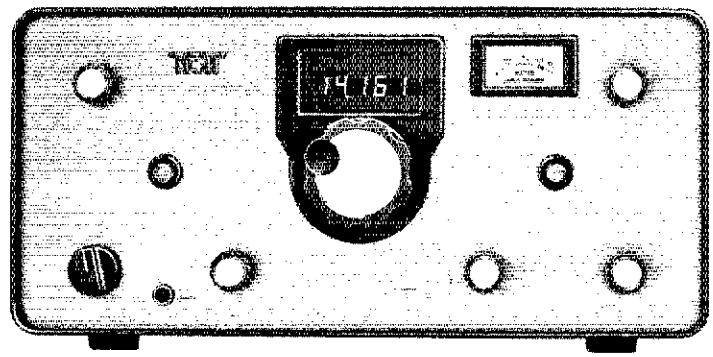

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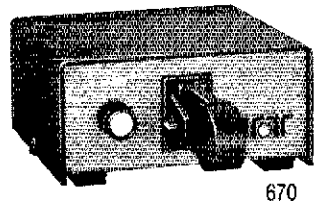

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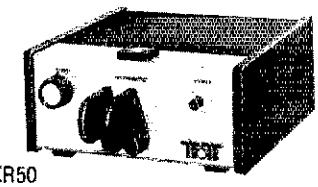

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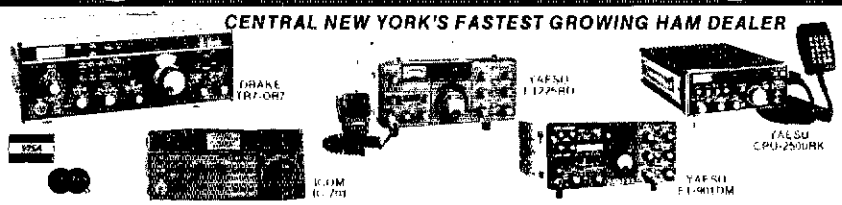

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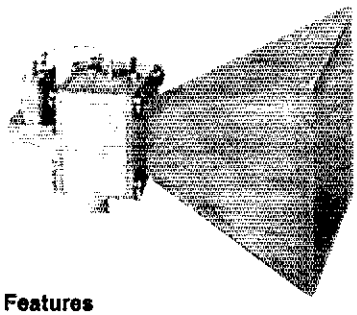
"FRONT END" BY MICROWAVE ASSOCIATES



Features

- Low Cost • High Sensitivity
- Integrated Assembly • Electronically Tunable • High Reliability
- Low Operating Voltage

THE GUNNPLEXER SYSTEM

The fascination of amateur microwave is unique. Microwave systems have an 'exotic' ring to them. Until the appearance of the Gunnplexer, getting into microwaves required either a six foot rack of surplus gear or a friend on the inside of a microwave hardware supply company. The Gunnplexer has changed all of that; now you don't need any friends in the microwave business (in fact it may be better if you don't have any prior microwave knowledge because the Gunnplexer pretty much throws away the book on standard microwave design practices!)

Equally fascinating is the wide band capability of the microwave region. The 10 GHz assignment has spectrum-space for 111 **simultaneous** video (4.5 MHz wide) channels. Try that even using SSTV in the 20 meter assignment.

The bottom line on microwaves is simply that it will do much more communicating than you might first suspect.

TWO-WAY COMMUNICATIONS

The primary application of the Gunnplexer "front end" is for 2-way communications. Two units, one a transmitter and the other a receiver down converter, are used with their carrier frequencies off-set to provide a reasonable IF (30 MHz or higher). Applications range from linking remote receivers to VHF repeaters, transmitting color video, linking homemade computers, full duplex mountain top DXing or over water duct DXing. A separate power supply and simple FM modulator must be provided; the MA-86551 (17 dB) horn antenna (shown here) is suggested.

WHY A GUNNPLEXER?

Amateur microwave communication is fascinating and challenging. Now with the revolutionary MICROWAVE ASSOCIATES Gunnplexer front end this exotic form of communications is available to virtually anyone. And at an unbelievably low cost!

MA-87141-1 2 Complete Gunnplexer transceivers (MA-87127-1, 15mW typical and 2 horn antennas MA-86551, 17dB) just $199.95 plus $2.00 shipping and handling.

Rush Your Order by Calling (603) 673-7724. Or send for our FREE Detailed Information Package.

VISA and Master Charge Orders Welcomed

G.R. WHITEHOUSE & CO.
11 Newbury Drive, Amherst, NH 03031

Exclusive distributor for MICROWAVE ASSOCIATES products in the U.S and Canada.

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MARCH 25, 1979

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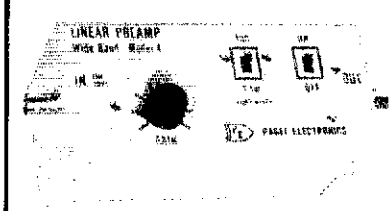
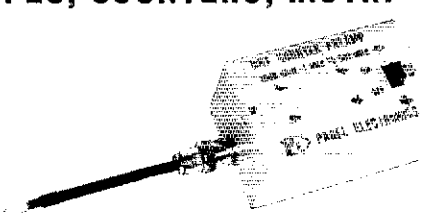
PREAMPS FOR SCOPES, COUNTERS, INSTR.





The Model 4 LINEAR PREAMP has performance to match lab type scopes, counters, and instruments which need wide band width and flat freq. response. It has 40dB gain (34 dB into 50 ohms) for IF, RF, pulse, video, audio, and a full range variable gain control. The band width switch reduces noise for low freq. measurements. Good pulse response with 10 nanosec. rise time. Freq. response is 10 Hz to 30 MHz at —3dB. Standard 1 Meg/20pF input matches scope probes. Max. output is 2 volts p-p into 1 Meg ohm and 0.5 volts p-p into 50 ohms. Resistive output will drive any impedance of 50 ohms or more.
Model LP-4, less batt. (6 pencells) .. $69.95

The Model VP-2 and UP-3 COUNTER PREAMPS are wide band with 20 to 30dB gain and will increase the sensitivity of counters at least ten times. Can be used with the probe to sniff weak oscillators or as in-line preamps for signal generators to allow a lower output setting and avoid frequency shifts. High Z input, output is 200 to 400 mv into 50 ohms. With probe, less batt. (3 pencells).

Model VP-2, VHF Counter Preamp, 100 KHz to 200 MHz $39.95

Model UP-3, UHF Counter Preamp, 1 MHz to 500 MHz $54.95

Order from PAGEL ELECTRONICS, 6742-C Tampa Ave., Reseda, CA 91335. Send check or MO for ppd. shipment via UPS when avail. Or call 213-342-2714 for COD. Foreign add 10% for airmail & handling. Calif. res. add 6% sales tax. One year warranty, money back guarantee.

2-METER FAVORITES

RUBBER DUCKIES


HM-4

Model HM-4. Has 5/16"-32 thread. Fits Motorola HT's, ICOM IC215 and Standard 146A $7.00

Model HM-5. Same as above, but with PL-259 connector $7.00

Model HM-226. Same, with TNC connector for Wilson 1405 . . . . . $16.00

Model HM-227. Same, but with BNC connector termination $11.00

Model HM-228. With F connector for Wilson 1402 & Tempo $10.00


HM-5

ADD $1.00 to each order for shipping.

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Baluns & Coil Kits for Ham Gear in ARRL Handbook & QST
Postpaid

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Balun for Transmatch per ARRL Handbook Page 585
Get POWER into your Antenna

1 KW — 4:1 Impedance	$11.50
2 KW — 4:1	14.00
1 KW — 4:1, 9:1, or 1:1 (pick one)	12.50
2 KW — 4:1, 9:1, or 1:1 (pick one)	15.50
100 W — 4:1, 6:1, 9:1, or 1:1 (pick one)	7.50

COIL KITS

Ultramountaineer Miniature 40 M CW Transceiver — QST Ap '75 p 28	6.50
Tuna Tin II — WAS 40 M Transmitter — QST May '76 p 15	4.75
Herring — Aid V Dir. Conv. Receiver — QST Jul '76 p 27	6.75
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CB Slider — VFO — QST Mar '77 p 15	6.50
QRP Transmatch — 25 W Max — Handbook p 388	8.50
Mini-Miser's Dream Receiver — QST Sep '76 p 21	12.75
80-10 M FET Preselector — Handbook p 265	15.50
RF Sensed Antenna Changeover Relay — QST Aug. '76 p 22	5.50

All baluns & coils are wound, ready to mount. Many other interesting coil kits in our List 4C. Send a stamped envelope for list.

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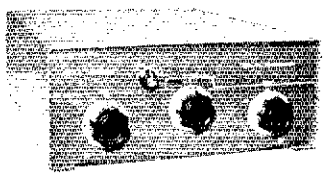
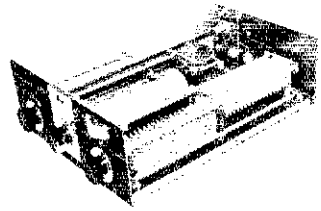
NEW — FROM MURCH ELECTRONICS — THE ULTIMATE TRANSMATCH

NEW — The UT-160 & UT-160B

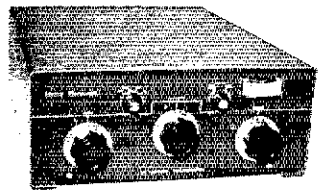


UT-160, less balun & meter $194.50 + shipping
UT-160B, with balun, no meter $212.75 + shipping



Internal construction
Of UT-160 models

NEW — The UT-160M & UT-160MB

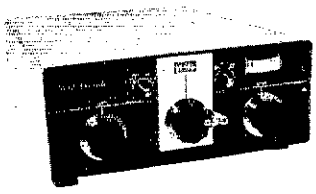


UT-160 M with meter, no balun $212.75 + shipping
UT-160MB with meter, balun $230.50 + shipping

- UT-160, UT-160B, UT-160M & UT-160MB models:
- Air wound inductor tapped every turn each band
- All B models for use with balanced lines, heavy duty 3 core balun
- All M models have relative output meter

12"Wx15½"Dx5"H, 13 lbs. shipping wt.

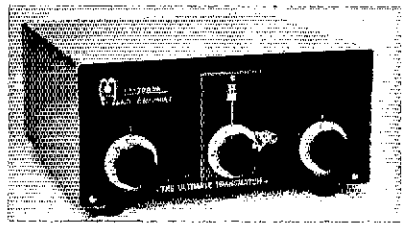
NEW — The UT-2000B



- Continuous coverage 160-10 meters
- Rotary inductor with turns counter
- Relative power output meter
- Three core balun

12"Wx15½"Dx5"H, 13 lbs. shipping wt.
$242.50 + shipping

MODEL UT-2000A
ULTIMATE TRANSMATCH

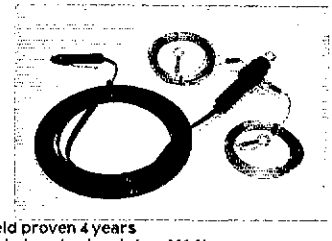


Similar to the one in Low McCoy's article
July 1970 QST also 1976 Handbook

- Use with any coax or end fed random wire antenna, ideal for apartment dwellers
- 80-10 continuous, including MARS
- Rotary inductor with turns counter for precise and rapid tuning

12"Wx12"Dx5½" H, 12 lbs. shipping wt.
$139.95 + shipping

MODEL 68A
MULTIBAND ANTENNA 10-80 M



- Field proven 4 years
- Sealed center insulator, 102 ft. wire, 30 feet heavy duty twin lead
- Coax fitting to connect twin lead to 52 ohm transmission line (68 feet or more, not included)
- Ready to use. Great on all bands when used with the Ultimate Transmatch
- 2000 w P.E.P.

$44.50 p.p.

- Use these Transmatches with any antenna — dipoles, random wires, verticals, whips, beams
- Function switch — in, out, dummy load (not supplied), ground (switch not on UT-2000A)
- Provides SWR of 1 to 1 to the transmitter
- Full legal power on all bands 160 to 10 meters (UT-2000A 80 to 10)
- Outputs for coax, random wire, balanced line
- 4000 volt capacitors, heavy duty construction throughout
- Use with any watt meter, SWR bridge
- Changing frequency by a few kilocycles normally requires only a slight adjustment

Send for our literature

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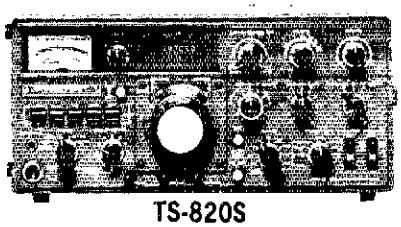
KENWOOD



TS-820S

At the time this ad was prepared (1/25/79) we had some particularly HOT Specials on the KENWOOD TS-520, TS-820, TS-820S and TR-7400A. Call us TOLL FREE for SPECIAL PRICES on these and other KENWOOD models.

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Power Range	Frequency Bands (MHz) 2-30	25-60	50-125	100-250	200-500	400-1000
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10 watts	—	10A	10B	10C	10D	10E
25 watts	—	25A	25B	25C	25D	25E
50 watts	50H	50A	50B	50C	50D	50E
100 watts	100H	100A	100B	100C	100D	100E
250 watts	250H	250A	250B	250C	250D	250E
500 watts	500H	500A	500B	500C	500D	500E
1000 watts	1000H	1000A	1000B	1000C	1000D	1000E
2500 watts	2500H					
5000 watts	5000H					

MODEL 43 ... $125.00
Elements (Table 1) 2-30 MHz ... 45.00
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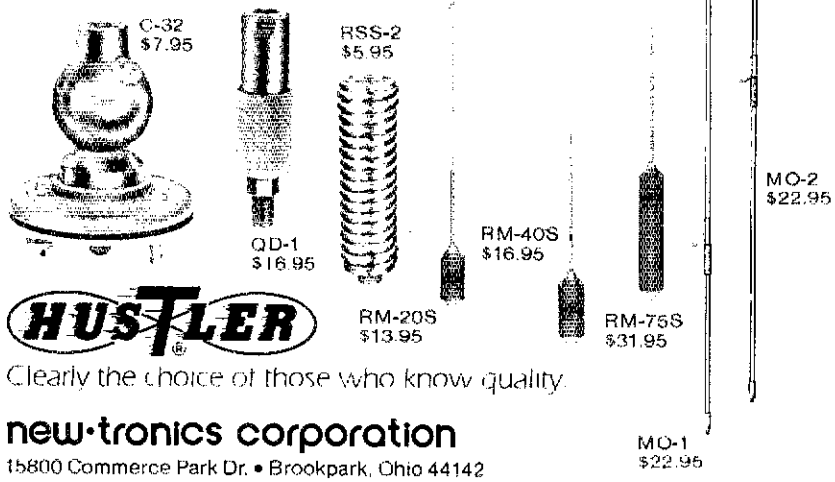

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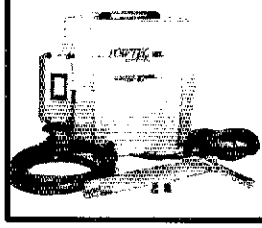

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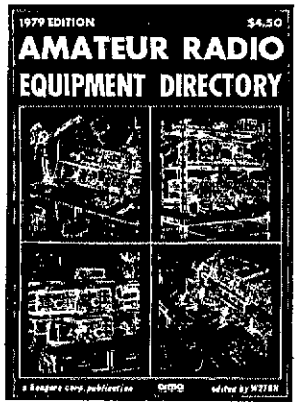

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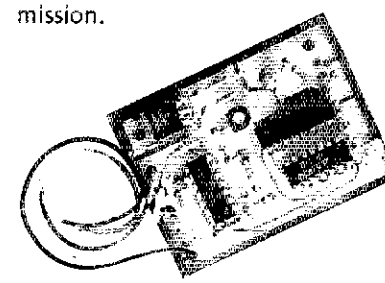

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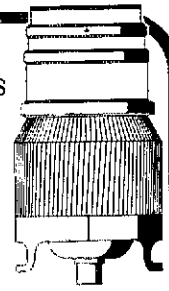

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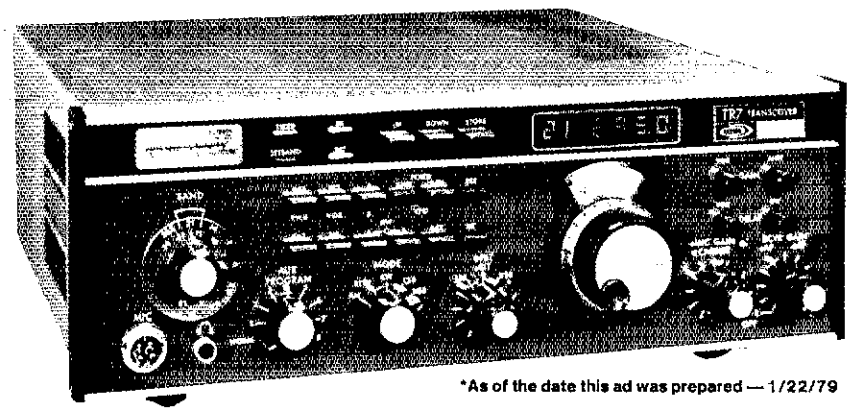

*As of the date this ad was prepared — 1/22/79

fabulous Tr-7 in Stock for Immediate Delivery.*

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DR-7 Digital/gen cov board	195.00
PS-7 120/240V ac supply	195.00
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Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 70 cents per word. A special rate of 25 cents per word applies to hamfest and convention announcements, to individuals seeking to dispose of or acquire personal equipment, and to other advertising which, in our opinion, obviously qualifies for the individual rate.

(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 11" sheet of paper.

(4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received February 21 through March 20 will appear in May *QST*.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permited in *QST* advertising.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

Clubs/Hamfests

QCWA Quarter Century Wireless Association is an international nonprofit organization founded 1947. Any Amateur Radio Operator licensed 25 or more years is eligible for membership. Members receive a membership call book and quarterly news. Write for information. Q.C.W.A. Inc. 1409 Cooper Drive, Irving TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

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ROCHESTER Hamfest & NY State ARRL Convention, May 25-27. Add you name to mailing list. Send QSL to Rochester Hamfest, Box 1388, Rochester, NY 14603. Phone 716-424-1100.

RADIO Expo '79 September 15th and 16th, 1979, Lake County Fair Grounds, Routes 120 and 45, Grays Lake, Illinois. Manufacturers displays, flea market, seminars, ladies programs. Advance tickets, $2. Write EXPO, P. O. Box 305, Maywood, IL 60153. Exhibitors inquiries: Expo Hotline 312-345-2525.

NORTHWEST Missouri Hamfest — Missouri State ARRL Convention Kansas City, Missouri (Kansas City Trade Mart Old Airport). April 21, 22. Commercial space and other information: PhD Amateur Radio Assn., P. O. Box 11, Liberty, MO 64068.

ANNUAL Flemington, New Jersey Hamfest Saturday March 17 from 10 to 5 at the Hunterdon Central High School Field House. 20,000 square feet of heated indoor area. Gigantic flea market, 200 tables, major manufacturers, informative seminars. Bring the XYL, kids and friends. Flemington is located between NYC and Philadelphia at intersection of routes 202 and 31, just 12 miles off I78, and is tourist shopping area. Talk in 146.52. Admission $2.50 donation. For reservations or info call 201-995-2266 or write Cherryville Repeater Assn, c/o S. Franklin WB2GQN, RD3 Box 336 Milford NJ 08848.

THE 15th Annual Penn Central Hamfest will be held Sunday, April 29, 1979 at the Woodward Township Fire Hall from 11:00 A.M. to 5:00 P.M. Talk-in on 13/73 and 52. For info write K3QDA, Richard Sheasley, R.D. no. 1, Box 454, Linden, PA 17744 or call W3GPR, Ted, 1-717-323-3343.

NASSAU-Suffolk NY — Those sincerely interested in establishing a new radio club in the Long Island area, please contact Tony, WA2WBI — 516-333-0063.

STARVED Rock Hamfest — June 3 — See May Hamfest Calendar details via s.a.s.e. April W9MKS, R.R. no. 1 Box 171, Oglesby, IL 61348 — 815-667-4614.

MASSACHUSETTS: University of Lowell Wireless Society 5th Annual ham radio auction, Friday, March 16, doors open 5 P.M. auction starts 6 P.M., talk-in on 52, coffee, donuts. Directions: from route 495 take exit 26 (route 38) north two miles to route 110 west two miles right on University Avenue.

PHILADELPHIA, Pennsylvania — Penn Wireless Association will hold Tradefest '79 Sunday April 1 (No Fooling!). Set up 7:00 A.M. Doors open from 8:00 A.M. to 4:00 P.M. QTH: National Guard Armory, Southampton Road and Roosevelt Boulevard (Route 1) 1/2 mile south of Turnpike Exit 28. Sellers 6' X 8' space $3., Bring tables. Limited number power connections available $2. Some tables available $1. General admission $2. Prizes, refreshments, rest area, displays and surprises. Talk in W3SK 146.37/97 and 146.52. Contact Charles Miller — AD3X — 215-943-3973.

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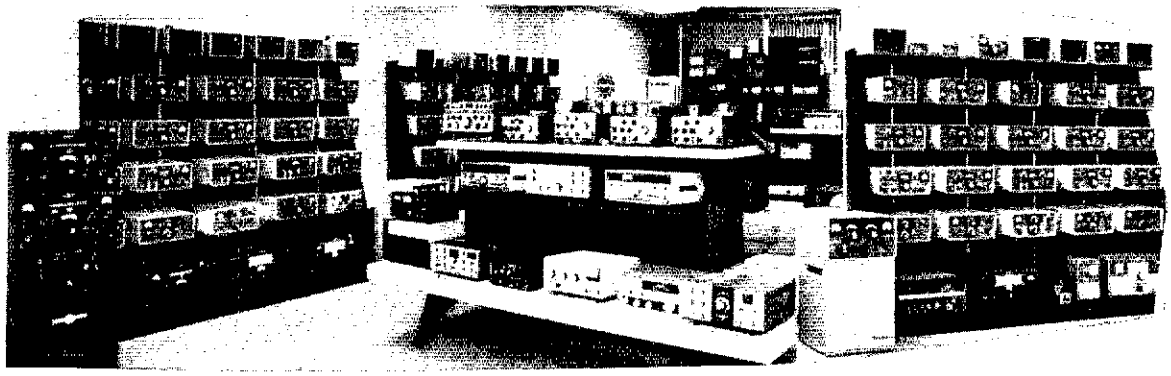

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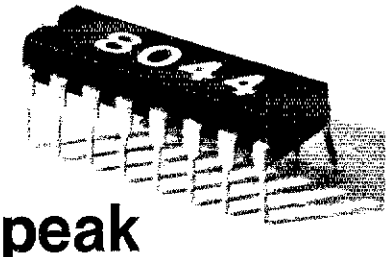

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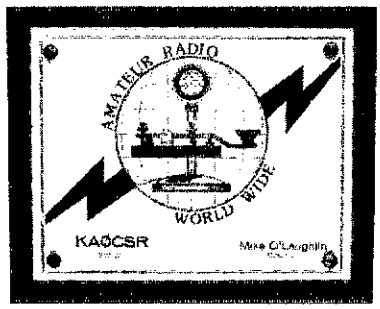

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FM B*A*S*H*. Dayton, Ohio, April 27, 1979, Friday night of Dayton Hamvention. Social evening for hams and friends, 8 P.M. til midnight, Dayton Convention Center, Main at Fifth Street. Admission free. Sandwiches, snacks and C.O.D. bar available. Loads of fun plus live entertainment by TV personality Rob Reider, WA8GFF, and his group. Same fabulous activities as last year and more! For further information on this 10th Annual B*A*S*H* contact: Miami Valley FM Assn., P. O. Box 253, Dayton, OH 45401.

FIFTH annual Copper Country Radio Amateur Association Swap and Shop, March 10, 1979 at the Chassell Community Building on US 41 in Chassell, MI. Doors open nine A.M. Admission $1. Seller table $1. Talk-in 28/88 and 07/67, into WA8VBZ.

THE Blossomland's 13th Annual Spring Hamfest, March 4, 1979 at the Berrien County Youth Fair Grounds in Berrien Springs Michigan. Talk-in 22/82, 52 simplex. Information — write/call W8WWO, 3013 Longlake Road, Berrien Springs, MI 49103, 616-471-2288.

HAMFEST! Indiana's friendliest and largest hamfest, Wabash County Amateur Radio Club's 11th annual hamfest will be held Sunday, May 13, 1979, rain or shine, at the Wabash County 4-H Fairgrounds in Wabash, Indiana. Large flea market (no table or set-up charge), technical forums, activities for the YLs, free overnight camping, plenty of free parking, good food at reasonable prices. Only one ticket to buy this year. Donation is $2.50 for advance tickets — $3 at the gate. Children under 12 years old are admitted free. For more information or advance tickets, write Dave Nagel, WD9BDZ, 555 Valley Brook Ln., Wabash, IN 46992. S.a.s.e. required.

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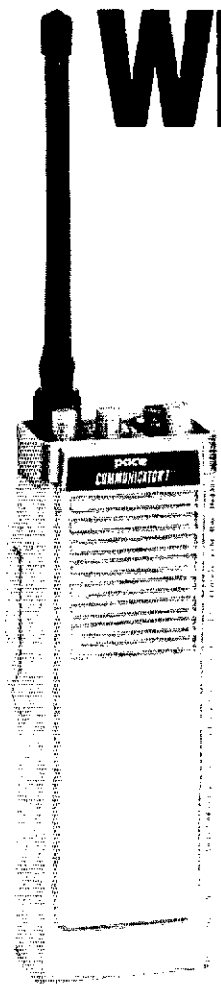

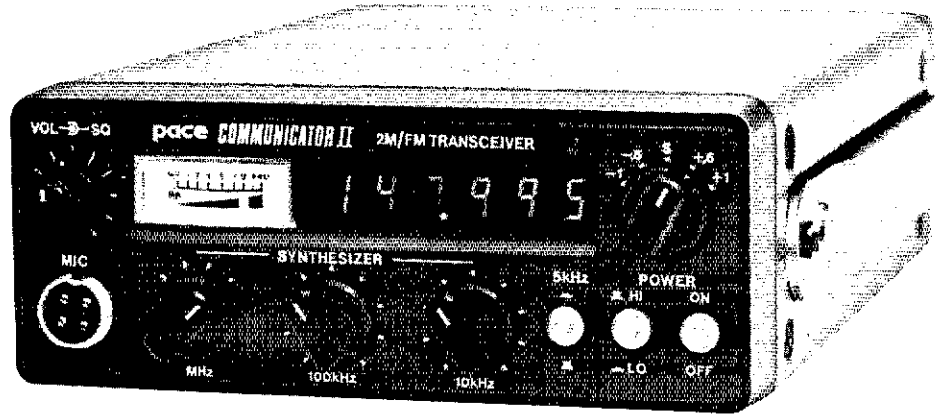

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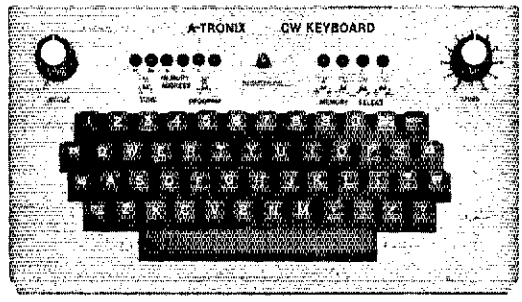

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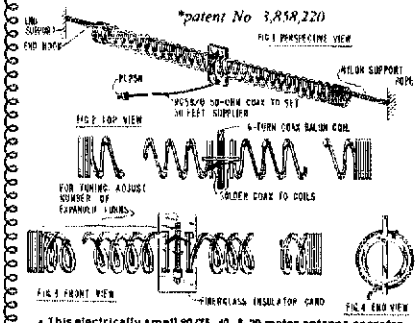

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Radiotelephone Third Class, Elements 1, 2 and 9, $7.95. Posi-Check, P. O. Box 3564, Urbandale Station, Des Moines, IA 50322.

WANTED: Hallicrafters receivers, transmitters, parts, accessories and manuals for private collection. C. Dachis, WD5EOG, 4500 Russell, Austin, TX 78745.

ALLIANCE HD-73 heavy-duty rotator, regular $154.95 introductory price only $129.95, cable 13c/ft., prepaid. Custom Electronics, 1209 Broadway, Boise, ID 83706. Bob, W7SC 208-344-5084.

TECH Manuals for Govt. surplus gear — $6.50 each: SP-600JX, URM-25D, OS-8A/U. Thousands more available. Send 50c (coin) for 22-page list. W3IHD, 7218 Roanne Drive, Washington, DC 20021.

BUY-Sell-Trade. Send $1 for catalog. Give name, address and call letters. Complete stock of major brands — New and reconditioned amateur radio equipment. Call for best deals. We buy Collins, Drake, Swan, etc. Associated Radio, 8012 Conser, Overland Park, KS 66204, 913-381-5900.

QST magazines wanted (pre-1924). W6OU, 529 Kevin Way, Placentia, CA 92670.

WANTED: Early spark gap transmitter, 1915-1925, complete, or parts for wireless museum. Jim Kreuzer, 1428 Main Rd., Cortu, NY 14036. 716-762-8472.

WANT pre-1925 Marconi, DeForest, Amrad, Paragon, Grebe, Murdock and similar gear and parts. Spark gear, loose couplers, crystal sets. Mike White, 25W 118 Countryview Drive, Naperville, IL 60540 312-355-2580.

WILSON hand-helds and antennas — big discounts! Bearcat 210 scanners $208.88! New Pace synthesized 25 watt 2 meter mobile $326! New Pace 3 watt Talkie $195. Write for special sheet. Ben Franklin Electronics, 109 N. Main, Hillsboro, KS 67063. 316-947-5751.

ADVERTISE your used gear free! No commissions! S.a.s.e. details. BGS, 436 West St., Hebron, CT 06248.

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RTTY — Bandpass active filter 2125/2295 Hz kit $11.95; W/T $16.95, postpaid. S.a.s.e. for info. Nat Stinnette Electronics, Tavares, FL 32778.

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QUICKLY buy/sell used amateur gear. Nationwide — we match buyers with sellers. Send make, model number, price, name, address, telephone, $1. fee, s.a.s.e. Write: Amateurs Buy/Sell Exchange, Box 374-A, Visalia, CA 93279.

METUCHEN Radio, 216 Main St., Metuchen, NJ 08840. 201-494-8350. 9:00 A.M. to 8:00 P.M. All ham needs: We specialize in used ham rigs. MFJ, B&W, Mirage, Transel dealer. "T." Bruno, WA2AET, since Nov. 1977.

FREQUENCY Allocation Chart. See how the entire radio spectrum is used, 2 kHz to 200 GHz. Send $3. Collins Chart Co. Box 935 Coronado, CA 92118.

ICOM 230 owners. Five cheap and easy modifications, including 10 kHz steps, automatic offset, variable output, variable dialight, and new repeater subband. Illustrated, beginner tested. Kit style directions. $3 to David Thompson K7OMT, 11740 NW West Rd., Portland, OR 97229

UNDERWOOD capacitors, type J101, s.a.s.e. Leo Schaaf, WA8ZHE 2648 North Aragon, Kettering, OH 45420.

WANTED: RCA publications on television (especially color), radios, including technical literature, customer instruction books, sales literature, RCA ham gear info. Also RCA Broadcast Equipment Catalogs, RCA Broadcast News magazines. Write with description and price. Carleton Sarver, 256 West 88th Street, New York, NY 10024.

C6A — LAND Adventure aboard completely equipped 42 ft. sailboat; Yaesu FT-301D, FRG-7, Atlas 210X, ICOM 22S, Dentron MT-3000A tuner, long wire antenna, electronic keyer; crew wanted to share expenses; sailing experience not necessary. Phone WD4OCI 904-387-3647 evenings.

CLIPPERTON Island DXpeditioner available for hamfests/conventions/forums with movies/slides. Moving near Austin, TX, but write to 1318 Fifteenth Street, Huntington, WV, 25701, until address established. Travel expenses only. WA4WME, Vandegrift.

QST DE Ferris Radio. Spring sale. Cushcraft & Hustler 25 percent off; Larsen, Hy-Gain, Taylor 20 percent off; Dentron, Ten-Tec, KLM, Nye 15 percent off; MFJ, Ameco, B&W, 10 percent off; U.S. Callbook $13.95, DX $13, both $26; KDK 2015R $379.95; all ppd. Limited to supply on hand; mail order only; cert. ck. or C.O.D. order/write Ferris Radio, 21738 John R, Hazel Park, MI 48030, 313-398-6645 10-6 Mon-Sat.

KENWOOD TS-520S — mint, $600; Drake TR-4CW, 34-PNB noise-blanker, RIT, AC-4 supply $775 Both purchased new Nov., Autek QF-1 $50. Dr. Perciful, 502-451-5916 after 1800 EST.

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UHF amplifier kits, solid state, 100 watt, 420-450 MHz fm-ssb-ATV, s.a.s.e., Leo Schaff, WA8ZHE, 2648 North Aragon, Kettering, OH 45420.

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KDK's new FM2016A $314. TouchTone mike for KDK's $36. Bearcat 250 scanners $264.88. Atlas 210X w/N.B. $665. Write for red hot specials! Ben Franklin Electronics, 109 N. Main, Hillsboro, KS 67063. 316-947-5751.

COLLINS 32S-3 no. 101223, 75S-3B no. 15583, 516F2, 312B-4 all winged & in excellent condition. $1375. WA7MAI Larry 509-632-5603.

TRS-80 programs. DXCC, WAS tracking. Dup-search, log contests. List $1.00 refundable. WA4PYF Box 145; Lithonia, GA 30058.

LOWEST prices electronic parts. Confidential catalog free. Knapp, Dept. Q, 4750 96th St. N., St. Petersburg, FL 33708.

TEKTRONIX 545A oscilloscope with dual trace plug-in, 30 MHz, $350. WA9COS 317-856-5556, 5546 Kentucky Ave., Indianapolis, IN 46241.

WANTED: Transceiver or transmitter — receiver reasonably priced, W9HF, 3685 Sycamore, Marion IN 46952.

COLLINS w/e 75S3B $625, 75S3 $440. Both in mint condition. K1FPJ 203-589-6120.

MINT collins Round 75S3C, 32S3, 312B4, Wing 75S3, 516F2. John White, N8JW, 3629 Delta River, Lansing, MI 48906.

INVENTORY reduction sale — Wilson system I — $193. System II — $158. Monobander M420 — $149. DB43 — $135. Yaesu FT-301D w/power supply — $845. TTW Radio, 871 Homewood, Salem, OH 44460. Telephone: 216-332-0965.

COURSE "HF Amplifier Design" based on Carson's ht amplifier book. Taught by him and other members of Electrical Engineering staff at University of Missouri-Rolla, May 7-9. Contact: Burns Hegler, WØGQM, 218 ERL, UMR, Rolla, MO 65401. 314-341-4718.

WILL buy Valiant IIs, factory wired only. State condition. W8MJ.

RTTY Parts and Machines: Model 28 printers, typing reperts, TDs. Gears — all machines. Underdone repert for 28ASR, complete, $285. Auto CR-LF, non-overlide kits for 28 printers, $12.75pp. M28 stand-alone TD, $170pp. Model 15 gearsets. Model 14TD, $50. M14 typing repert, $95pp. Much more. Send s.a.s.e. for complete list machines and parts. Lawrence Prieger, K9WJB, 1715 E. McPherson, Kirksville, MO 63501.

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MOBILE power supply, Henry TP-400 for 150-500 watt transceivers. $50 or trade. Mike Gauthier, K6ICS, 9550 Gallatin, Downey, CA 90240.

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WANTED Old microphones — Pre 1940, for my microphone museum. Also mic related items. Write Bob Paquette, 443 N. 31 St., Milwaukee WI 53208.

30L1 — $595, mint; 32S1 — $350; 516F2 — $150; S/Line weighted knob — $20; Rohn BPH25G — $25; RPC-3 processor —$15. K9DKW, Box 301, DePere, WI 54115.

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VHF Engineering 446 MHz transceiver and BLE 10/80 amplifier, like new. 12 volt 30 amp power supply, Heathkit SB-401 and SB-303. Wallace Domier, Buxton, ND 58218.

12 YEAR old needs used gear for first station. Reasonable, Byron Baldwin, 42773 Rd 415, Goarsegold, CA 93614.

HALLICRAFTERS SR-2000 transceiver, with new P-2000 power supply. Mint condition, 2 kW PEP, 80-10 meters, new finals — one of the best $995. Signal One CX7A. Good condition, $475. K. Gesler, WA2BAP c/o Barry, 512 Broadway, NYC 10012. 212-925-7000.

WANTED: Swan 40 meter mobile transceiver — W6IPA.

TS-820 new $775. Yaesu FTDX-560 $375 excellent. Dentron MT-3000A tuner $250 mint. W1ABJ 1751 Beacon, Brookline, MA 02146. 617-232-7080.

BEAM Headings calculated for your QTH. All states, ARRL country list, others — over 8 pages. $7.50 — Bruce McNair, N2YK, 12 Marion Ave., Howell, NJ 07731.

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QSTs 1926, up, Handbooks, etc. Tubes, meters, parts — antiques, moderns. S.a.s.e. for 10 pages. W4BLQ, B158, Edgewater, FL 32032.

IC-202 2m portable ssb transceiver, with OSCAR crystal. $195 or trade for IC-22S. WB5MAP/ø, 1112 17th Ave., Plattsmouth, NE, 68048.

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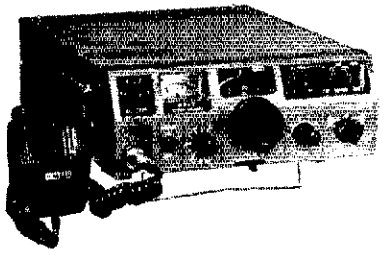

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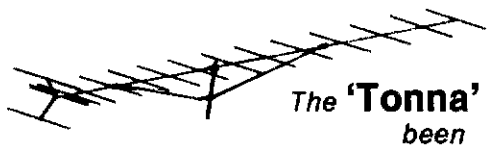

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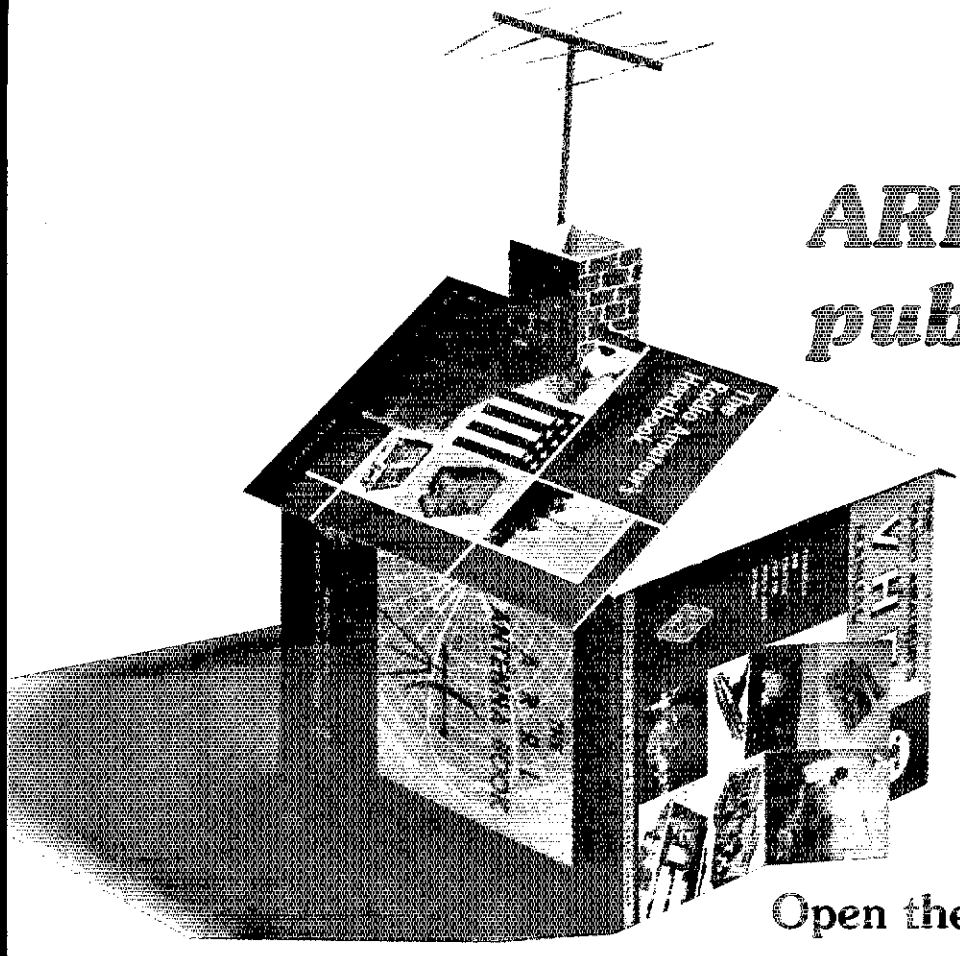

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THE AMERICAN RADIO RELAY LEAGUE 225 MAIN STREET NEWINGTON CT 06111

Ave., Newark, NJ 07112. 201-575-1570 days. 201-923-5322 evenings.

REPEATER, commercial type, 2 meter, HMR Communications, 100W, solid state, complete, best offer. Bob Termatt WA5SCP, Box 8026, Albuquerque, NM 87108. 505-255-5600.

KENWOOD — TS-520S, DG-5, VFO-520S, SP-520, CW-520, MC-50, DS-1A, all mint, whole package $1000. Also available: SM-220, Microlog cw keyboard keyer, Tempo FMH-2. Pickup only. Bob, W6ZRK, 714-824-1133.

QSTs for sale: Complete from 1925 to 1931 and from 1936 to the present. Also assorted issues from 1921. Best offer takes all. Also have old CQs, 73s and Ham Radio. Tomm Cordich, WB6LPN, 3029 Valley View Ave., Norco, CA 91760. 714-735-8818.

SELL: 71 ft. Tristao self-supporting tower, 20 ft. mast, Ham II rotor, 2 el 40 mtr beam, 150 ft of coax and connector cable. Dolly and erection fixture available. Best offer. Tom Cordich, WB6LPN, 3029 Valley View Ave., Norco, CA 91760. 714-735-8818.

FOR SALE: Ham II rotor and HW-202. O. Uhrbrock, W5OUT, 209 W. 8th St., San Juan, TX 78589.

TEKTRONIX 310A oscilloscope, mint condition, calibrated, $175 or trade for test equipment, commercial fm vhf, ham gear. W5ZSL, P. O. Box 5702 Santa Fe, NM 87502. 505-471-5458.

WANTED: SB-620, SB-650, must be mint, WA4JAJ, 1809 Green Valley, Albany, GA 31707. 912-432-7892.

KENWOOD TS-520, used very little, excellent condition. $510. You ship. Write Steve Randall, WA2EHW, 2823-C Maple Ave., Eden, NY 14057.

WANTED: HW-101 modifications such as trap for signals in i.f. bandpass 8.4 to 8.9. WA6QFK, 15 Robinhood, San Rafael, CA 94901.

WANTED: Ghirardis Radio Physics Course. Condition immaterial if usable. Cantrell, R-3, Box-112, Comanche, TX 76442.

WANTED — Ten-Tec model 405 lienar. WB7WRD, 1805 J St., Bellingham, WA 98225.

COLLINS 51J3 in working condition $225. Will ship. Weldon Drennan, K5LQL, P. O. Box 3434, Port Arthur, TX 77640.

U-PICK-UP: Hallicrafters Twins HT-32, SX-101, 80 thru 10 coaxial antenna relay, Ameco preamp, 5 el. triband beam, Drake phone patch, EV-664 mike, all manuals, total $300. W1ZPG 401-467-7830.

U-PICK-UP: Collins KWM-1 516F power supply, PTT mike, manuals, $175. W1ZPG 401-467-7830.

SELL: Hammarlund HQ100C with manual $100. Gonset Communicator IV Model 3341 2 meter am SB1160 with manual. Gonset Communicator VFO 50-144-220 S16198. Make offer. Pickup preferable. Write WA2QMH, Pine Point, Lake George, NY 12845.

SELL: Swan 250C, power supply, speaker all excellent condition $395. I pay shipping charges. WA8RCN, 4650 Friar Rd., stow, OH, 44224.

SELL: I have old QST, 73, CQ, and others for sale. S.a.s.e. for info and prices. WA8RCN, 4650 Friar Rd., Stow, OH 44224.

WANTED: Grebe CR 9, RORK amp. For sale: Heath HW-12 plus supply $85. W3HWT, 329 Evergreen, North Wales, PA 19454.

HAMMARLUND HQ-110A vhf rcvr, 160 to 2 meters, $180 ppd. MFJ SBF-2BX ssb filter, $15 ppd. WB3FZI, 525 Dutch Ln no. 2, Sharon, PA 16146. 412-342-3048.

SPEECH processor, complete kit per ARRL SSB Manual $29 ppd. K2VAH.

QST Blue Library Buckram Bound Dec. 1915 to Dec. 1975 including unvolumned early sheet May 1919 and October 1919 pink sheet. 1976 and 1977 in ARRL Binders. Rest loose to date. Best offer over $3,000 plus shipping. S.a.s.e. for reply. Mrs. Al Marcy, 461 Third Avenue, South Patrick Shores, FL 32937. 305-777-1950.

AMPLIFIERS: 4-813's, 80-10m, 4 ft. cabinet, $200; 2-810s, 20m, 4ft. cabinet $150, both heavy duty. K9NN, R.R.1, Albany, IN 47320.

DUPLEXER needed to get our 147MHz repeater on the air. Good used one preferred. Tri-County ARC c/o WD4LWC.

SELL: Excellent R4B receiver. WA2ILK, Jim, 914-764-4433.

SBE-34, excellent. $225. WBØPLP, 605-352-5712.

WANT Johnson T-R switch. WØPRZ 605-225-2881.

ONE tube, 10 watt, homebrew 40m xmtr w/5 xtals. $45 or trade for used rotor. WD5JFK, 8204 Columbia, Tyler TX 75703.

DON and Mike springtime goodies: ICOM IC701, ac, mic, $1399; ICOM IC280 $385; Bearcat 250 $299; Alda 103 + noise-blanker, calibrator $495; Bird 43, slugs — stock; Consolidated HD18ga tower $29.95/10ft.; Belden 9888 doubleshield RG8 foam 39c/ft; 9405 heavy duty rotor cable 26c/ft; 8214 RG8 foam 25c/ft; Columbia RG8X 16c/ft; Amphenol silverplate PL259 59c; Alliance HD73 $109.95; New Q5 thru QRM coaxial broadband dipole 80M $59.95, 40M $49.95;. Amperex, GE 6146B $7.95; New Palomar all band transceiver preamplifier $89.50; Telrex TB5EM $415; 2M814 $61; prices FOB Houston, subject change without notice. All items guaranteed. Madison Electronics, 1508 McKinney, Houston, TX 77002. 713-658-0268.

APPLE II SSTV software. Display slow-scan TV pictures in hi-res graphics. Software demodulated — just con-

nect rcvr audio to Apple — no hardware needed! Req. 16K. On cassette with test pictues, $18. Listing only, $12. C. H. Gallo, 602 Orange St., Charlotesville, VA 22901.

COLLINS 75-S1 receiver, 32-S1 transmitter, 516-J power supply-speaker, all cables, excellent condition, $650. Sony Stereo Tapecorder TC-630, professional reel type, all solid state stereo player-recorder, all plugs and cables, mint, $575. W1tD, Upland Rd., Middlebury, CT 06762, 203-758-9228.

FOR SALE/TRADE: QSTs 1967 — date, teletypes, phone, computer gear, more. Send s.a.s.e. WA2DDU, 1122 Victory, Plainfield, NJ 07060.

COLLINS complete station: KWM-2 0980, 30-L1 13082 linear, 516F-2 ac pwr, 312B-5 VFO/console, DD-IC digital freq. display, 10-D mike w/ppt stand, all cables. Sell complete only. $1500. Excellent condition. Don Daino W6MBR, 73-043 Somera, Palm Desert, CA 92260. 714-346-1695.

SB-401, SB-301 with cw filter, manuals, excellent condition but don't need second rig. Prefer local sale but will ship. Best offer over $400. Steve Mintz, W2AZO, 11 Eve. Lane, Rye, NY 10580. 914-967-8535.

SB-614 monitor scope asking $135. K3IXD. 301-489-7616.

WANTED: Power transformer for Heath model 0-12 oscilloscope. Randy Stanley, WD5GQZ, 5317 Lawrence Dr., Wilmington, NC 28405.

WANTED: Crystal controlled ssb transceivers 2-30 MHz, also Hallicrafters FPM-300 MK II any condition. WB8IJX Fred Slaughter, 5844 Grisell, Oregon, OH 43618.

QSTs 1959 to 1978, 198 issues. Ham Radio 1968 to 1974, 68 issues. Make offer. Box 52, Franksville, WI 53126. 414-637-1386. WA9KFL.

CODE practice cassettes — computer generated, perfect code. High quality, full 90-minute cassettes. QSO tapes very much like new FCC code exam. Printed text included. 25 QSOs at 22.5 wpm order no. C8. Other types and speeds available. All cassettes $5.95 each ppd. S.a.s.e. for catalogs. MC and Visa welcome. K5SMG, 810 Cardigan, Garland, TX 75040. 214-495-3604. Dealer inquiries invited.

COLLINS Filters: F455FA05 — $110, F455FA08 — $75, F455FA21 — $40, F455J08 — $75, F455Q05 (75S1) — $75. W9ZR, 1-414-532-6643.

HEATH SB-104 with cw filter, speaker, power supply and mike. Mint condition. Experienced builder. $600 plus shipping. AD1P (ex-KA1BI) 401-737-4479.

WANTED: BC610E final tank coils for 80, 40, 10 meters, also TU-52 (40 meter) tuning unit. W2HYN, RD1, Box 143, Holcomb, NY 14469.

WANTED: Hallicrafters SB-20 transceiver. W8SMD, 317 East Dudley, Maumee, OH 43537.

HEATH HW-8 and power supply, good condition, less than year old, $100. Dick, AE3F, 814-837-6558.

WANTED: 2 each 6083s or 9909s final tubes for Globe Champion model 350 xmtr. Ed Matchin, 83-11 77 Ave., Glendale, NY 11227. 212-497-4215.

WANTED: 2 mtr. tube type amplifier. Swan VHF 150 prefered or what have you. Gordon W4BSA, Sparta, TN 38583.

TEN-TEC Argonaut, supply — $245. Heath desk mike $30. Antique Atwate-Kent model 20 Big Box, make offer over $80. Telescopes. Inquire. Buddy Wilkins, Route 3, Box 150, Staunton, VA 24401.

WANTED — Hallicrafters FPM300 MK II and Heath HW-14 with AC P.S. no modifications. State price and condition. Jose M. Menoyo, KP4WF, 610 Union St., Santurce, P.R. 00907.

HEATH HW-2021 and HW-201A 22/62 28/88 07/67 16/76 34/94 modified for BNC antenna and external earphone. Coax jumper and charger included. $250 firm. S. Stout, KA5CRI, 6227 W. I-40 no. 274 Amarillo, TX 79106.

VINTAGE straight key wanted, WB6SCQ.

COLLINS F500Z4 filter, make offer. WB6SCQ.

DRAKE TR4C, new Feb 78; $425, FOB K5YYI. 1-405-262-3363.

WANT to buy a 6 band transceiver such as: Kenwood TS-520, Yaesu FT-101 series, Drake TR-3 or 4, Heath SB-102, Tempo One, or what have you that is clean and priced right? Richard Schark, 417 North Ferry, Ottumwa, IA 52501. Ph. 515-682-5741.

HW-32A and HP-13B. $170 Used less than 20 hours total. On shelf rest. Excellent condition. Worked first time and wiring excellent. I ship. WA4FRB. 703-636-6245.

HT-220 Slimline, 6 channels, extra crystals, touchtone, charger, manual, tuneup accessories, case. $390. Bruce Berg, WB2IUE, 9 Fairway Lane, Ocean NJ 07712. 201-531-4062.

SALE: Kenwood 820S, cw filter, SP-820 mint, original cartons. $900, ship incl. FRG-7 $250. Brian, WD9GGO, 412 E. Scranton, Lake Bluff IL 60044. 312-234-2968.

SELL: CQ, 73, Ham Radio complete. QSTs 1940-1978. Misc. years and issues back to 1923. Please submit offers during March 1979. W6YB, Gunnar Ohlson, Apt. 208, 5625 Santa Anita, Temple City, CA 91780.

HEATH HW-22A, HW-32A, HP-23B — 40 and 20 meter ssb transceivers and power supply. $175. A. Ziegel, W2HDI, 914-941-2168.

20 METER 2 element Cushcraft A14-2 beam excellent $60. W2ETB

SELL — Knight TR-108 w/VFO, Swan 350 w/p.s., Elco 753

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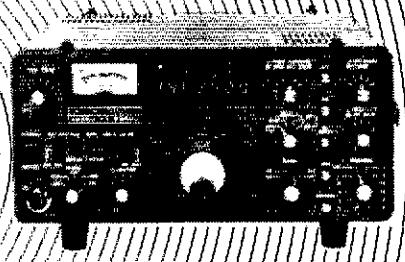

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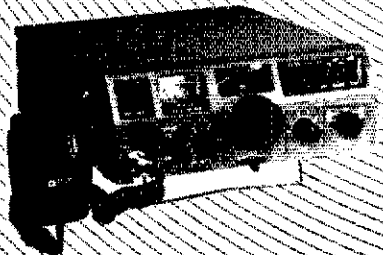
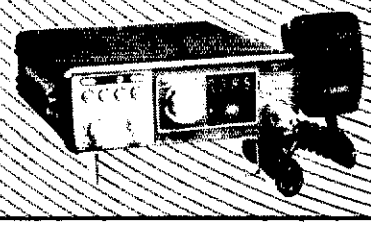




TEN-TEC **KANTRONICS**
TEMPO **ATLAS**
WILSON **DENTRON**
INFO-TECH **CUSHCRAFT**

Write For Used Equipment Sheets and Catalog

w/p.s. Genave GT-200, Misc. Surplus, W4PRC, Cooper City, FL Tel: 305-434-4245.

WANTED: Back issues Pacific Radio magazine; National 5/10 meter transmitter. Sell/trade: Collins 51J4. Nagle, 12330 Lawyers, Herndon, VA 22070.

SELL Heathkit HW-16 HG-10 VFO $130, both in excellent condition. KB2AS 212-856-1115.

FOR SALE: Drake L-4B linear amplifier. Perfect condition — only 6 months old. $800. WBØWLI, 2810 Gray Street, Denver, CO 80214. 303-232-0620.

CASH for Telrex 10 m and 15 m monobanders, Drake L-4B, RV-4. Arch Lynch, 1-405-262-3353.

DRAKE TR4CW, RV4C, AC4, 34PNB, all 10 m crystals — $700; Heath HR1680 with 29.2-29.7 MHz OSCAR coverage $160. All excellent condition. Bob (AE6S), 6322 Via Serena, Alta Loma, CA 91701. 714-987-6594.

HEATHKIT HW-100, HP-23A, mic; $295. K2MAL, RD no. 1, Box 422, Manners Road, Ringoes, NJ 08551 609-466-1480.

HEATHKIT SB-104, cw filter, factory aligned, manuals, never used, $500, will ship. John Cherry, 860 Dora St., Bedford, TX 76021. 1-817-268-4439.

SELL: Hallicrafters SX-28, Meissner 9-1090EX Signal Shifter, Globe SD-75A. All with manuals and some spares. Two Cetron 810s, unused with sockets, $60 ppd. Dave, WD4CON, 1472 Canterbury Rd., Macon, GA 31206.

FOR SALE: A-Tronix visual code reader, model CR-101, $125. B. Eiselt, KAØAFG, 517 South Lakeshore, Spirit Lake, IA 51360. 712-336-1354.

HRO-50, $300; HRO-50 coils, $25-50; SB-620 monitor scope, $150. Contact George James, 7407 Castle Trail, San Antonio, TX 78218, 512-655-3934.

WANT Drake SC-2 converter for CC-1 console. Nilson, Hudson Bluff, Marlboro, NY 12542.

KENWOOD TS-700A, excellent, $475. Wanted — Janel QSA-5. WD4NCF, Bob, R1, Box 466 Campbellsville, KY 42718.

WANTED: Manual/Schematic RCA Voltohmyst Jr., using 6L6s, model 165? W2OWH, Bill Gieckel, 14 West Holly Drive, Sayville, NY 11782.

SPIRO Line — 0.5 dB loss/100 ft. at 432 mc. (list $250) $100. Adaptors to Series N (2) $18.95 ea. Transco Y vhf ant. relay, low SWR, high isolation at 432 mc. (1 kW), spdt, 28 volt dc, $70. W6RQZ, 1330 Curtis, Berkeley, CA 94702.

WANTED: Junk HT-32 or HT-37 with working power supply. Describe condition and price. Jim Alexander, KØHIP — N5JA, 4 Stoneybrook, Searcy, AR 72143.

SB-104A, speaker, ac supply, mike, keyer, matching dust covers, mint; $560. General Microwave power meter, dc-14 GHz, excellent; $55. K5TB, 505-266-3924.

HD-1410 keyer, perfect, $45. WA1UUA 203-776-5651.

COLLINS 312B5 station control, round, mint $375. No shipping. N6JE 714-752-1486.

FT101E: mint, cw filter, fan, speaker, service manual, original cartons, $695. 507-282-3983. 851-D Homestead Vlg., Rochester, MN 55901. KBØAA.

HEATH HW-7 and power supply, unmodified, $85, plus shipping. WB6WDA, 5444 Rock Castle Drive, La Canada, CA 91011.

APPLE II ham radio software — send & rcv in Morse, Baudot or ASCII. Variable size text buffer; 3-field screen display; stored messages & more features. Uses on-board (game) I/O. Req. 8K. On cassette, $18. C.H. Galfo, 602 Orange St., Charlottesville, VA 22901.

ATLAS 350XL with matching power supply $900. Drake SR-1 rcvr $200. HP 130 O-scope $65. Bird 1 kW dummy load $125. Ron, WD4ONX. 703-261-5318 evenings.

ALPHA Vapor Linears, the Cadillac, immaculate. $1195, warranty. New, used. Vaportubes available. Payne Radio, K4ID, 615-384-2224.

COLLINS KWM-2, round, $900. 516F-2, round, $150. 209-733-3215 Dick Shideler, 3731 Evergreen, Visalia, CA 93277.

FR-101D and FL-101, new condition, $1050. Includes speaker, all crystals, filters, converters, processor, microphone, spare set new tubes, dustcovers. Will ship. W7LJI, 291 Coachman, Eugene, OR 97405. 503-686-8879.

COLLINS 75S-3B winged, $599, and 32S-1 with 516F2 $499; Drake R-4B with MS-4, $299; Standard SR-C826M with GLB 400B, HWA-202-1 p.s. and mic, $179; Heath SB-110A with homebrew p.s. $225; SB-500 transverter, $125; HX-20 with homebrew p.s. $65. All ppd. Bob Ciesla, K2QL, 1874 Bailey Ave., Buffalo, NY 14211. 716-892-6195 evenings.

WANTED: Collins 310B-3 or 310B-1 40 watt exciter in good condition, unmodified; also good 75A-1. All replys answered. Russ Joslin, W7OYA, 8431 E. Edgemont, Scottsdale, AZ 85257.

KENWOOD, ICOM, Atlas: Call for lowest prices in U.S.A. Crarg Radio, 207-439-0474, 603-436-2884.

RTTY — Sell ST 5000 terminal unit, brand new, never used, $275. Price includes complete Model 19 TTY machine, manual, misc. Stan, K2SJO, 914-939-6681.

WANTED — Knight R-100 receiver, good working condition, reasonable. Call collect 517-323-7109. P. Snow.

WANTED — Hammarlund HX-50 or HX-50-160 transmitter. State condition. N3AKG, 102 Jackson Drive, Lancaster, PA 17603.

FOR SALE: Robot 400 scan converter like new — cables,

manuals. $600 cash. Dayle Hansel — 3810 Law 2, Houston, TX 77005. 713-665-3910.

CERAMIC Filters: 7 element ladder network; 455 ± 1 kHz center frequency; 4 kHz min. 6 dB bandwidth; 10 kHz max. 60 dB bandwidth; 2 k impedance; 1 dB max. insertion loss and ripple; .65" × 28" × 4"; full specs and applications included. 3 for $12.95; 30 for $99.50. David Anderson, 3433 Bent Drive, Loveland, CO 80537.

TIMING Crystals: 4.194304 MHz .001 percent Tol., 32 pf, HC-32 case, wire leads, new. Divides down to precise 1 sec. time base. Schematics included. 3 for $9.95. David Anderson 3433 Bent Drive, Loveland, CO 80537.

GE PROGRESS base repeater 80W out complete all metered 4 channels with remote console. Weather proof pole box wired. 3 spare finals. Best offer. W9GDM, 811 N. Blanchard, Wheaton, IL 60187. 312-668-1295.

COLLINS: KWM2-A; 312B-5, 30L-1, 516F-2 supply, 351D-2 mobile mount, (2) MP-1 supplies (all winged), absolutely mint, $1750 firm. Yaesu FT-101B (mint), $525 firm. FT-301S (new) $450. Wanted: Kenwood VFO-820. WB4ZJE, Steve, 941 Middleton Rd., Jacksonville, FL 32211. 904-724-7121.

ZOOM-Lens television cameras, new $179. Haas Enterprises, 6017 Majorca Ct., San Jose CA 95120.

BEARCAT 250 scanner, new — $290; Wilson WE-800, mike, duck, nicads, charger and bracket — $390; Hammarlund SP-600 JX in $125. I ship. AK4U — 606-285-3374.

SELL: as a unit: Ten-Tec 574 (plus xtals), 670 keyer, 277 antenna tuner. Excellent condition; seldom used. $455. Dr. Wade Johnston, 1801 Yardley Commons, Yardley, PA 19067. 215-493-9275.

High power mobile? Atlas 350XL/digital $895. Consider trade Drake C-line, Collins etc. W5YH. 918-371-4509.

SOLAR Cells 4 inches diameter 2 amps. 4 volts $6.75 each or 10 for $65 plus shipping. WB0DFS, 1742 Dowd Drive, St. Louis, MO 63136. 314-522-6667.

QST 1950 to 1969. Make offer for all. W9OEV, 1235 Hillcrest Lane, Freeport, IL 61032.

FOR SALE: SB-104A, SB-644A, SB-604, SB-230 and MN-2000 matchbox. Mint condition. G. Von Bokern, 1219 Laurel, Kent, WA 98031. 206-852-9570.

SELL complete Novice station — Heath HW-16, HG-10B, small speaker, key, connectors & manuals $150, will ship. Wally, WB6WOL 805-943-4538.

TEN-TEC 405 QRP amplifier $120, 251 power supply 10 amps $40. Both for $150. Mint condition with cables, manuals, WA5DGI 14327 Crosshaven, Houston, TX 77015.

LINEAR 2kW 10-80 pr3-500Z; Kenwood Twins T/R599D, spkr, 2mtr conv, pre-amp; Heath 2102 vhf swr mtr; 2mtr transverter; 20ft twoer, tri-bander, rotor, cables; TR7400A; 12V dc 20A reg p.s.; IC-215; 10 mtr CB; N3AR Ron Schwendt, 149A Sycamore, RD 1, Douglassville, PA 19518. 215-326-8948 eve/w.e.

SELL: Swan 350C, with 117XC power supply, with manual, in original cartons. Also 1 Astatic mike 10D on stand, 1 Turner hand mike 355C, 1 key, 1 low pass filter, 1 SWR meter, 1 dipole antenna, center fed with RG8U coax and 145 issues of QST mags. Price $300 for whole lot. Cash, money order or certified check. WA2JEM, Box 3, Montauk, NY 11954.

HEATH HW-2036A 2 meter transceiver, ac power supply, mobile antenna $450. WA6FCG. 408-739-1106.

HT-44, HT-45 wanted, WB5FXI.

CRYSTALS: FT-243 — Made to your frequency. 40m fundamental, Novice & General to 20m, 15m and 10m $1.50 each, minimum five $1.25. 80m $2.95, minimum five $2.50. 160m $3.45, sockets 30c. Air/first class 20c per crystal. Novices know your band limits. Just inside edges for QSO and calibration of receiver and VFO. Useful with VFO or no. 80m, 40m, 15m — EBM-QSO-Six crystal $9.95, adding 10m, EBM-QSO-Eight Crystal — $11.95. Package Airmail $1. Stamp for 1700 to 30000 FT-243 and 160m to 2m listings/circuits. "Crystals since 1933." Bob Woods, W0LPS. C-W Crystals, Marshfield, MO 65706.

FOR SALE: Drake TR4CW, RIT, AC4, MS4, mint, $575. Drake R4B $330. KLM-661 ssb, am, fm 6 meter transceiver. First reasonable offer takes it. Wanted: FT-301S or FT-301. N4DA, L.M. Lord, 2006 Pine Hill Cir., Kennesaw, GA 30144. Phone: 404-422-1415.

FORTY ft. tower for sale, E-Z Way crank down tilt over with house bracket, N2AO 315-478-1022.

WANTED — Precision apparatus tube checker. Model 10-12, 10-15, 10-20, or 10-54. W1JE, 6 Locust Grove Road, Harwich, MA 02645.

EICO 753 transceiver, solid state VFO, calibrator, mike, no power supply, cable for HP-23 included. Absolutely mint. You ship. $125. W2EVE, 301 Osborne, Waterville, NY 13480.

COLLINS 75A-3 receiver with 800 Hz. Mechanical filter, crystal calibrator, GSB-1 ssb adapter, and matching speaker $300. Johnson Viking Valiant transmitter with Central Electronics 20A exciter with VFO, transmit-receive relay $200. All manuals, excellent. Jim Caneen, WA2FKD, Box 179, Arkport NY 14807. 607-545-8603.

FIGHT Inflation — MFJ 15 percent off; Cushcraft 20 percent off; Alliance: HD-73 rotor $97; U100 $38.50. AEA AD-1 Audodialer $78; Hustler Antennas greatly reduced. Wilson: Mark II $205, Marck IV 229. Upgrade your Mark LED, Switchkits, Tone Pads installed. Wilson towers at low prices. System 3 $130, System 2 $159, System 1 $195. Mini-Products HQ-1, Telex headsets, Write for flyer, see you at Dayton in the fleamarket. EGE, 2410 Drexel, Woodbridge, VA 22192. 703-494-7949.

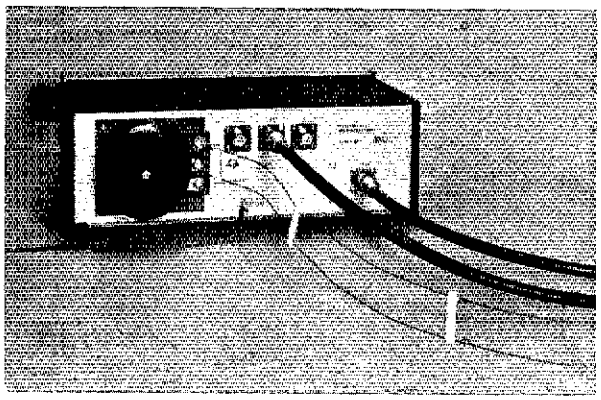
The Drake MN-2700 2kW Matching Network

a precision instrument providing

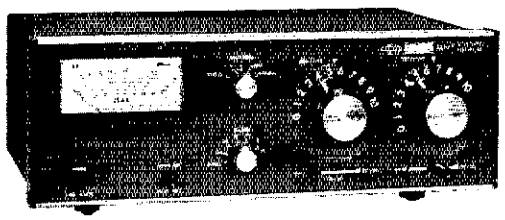
rf radiation control and measurement

for your communication system

The Drake MN-2700 manages rf radiation in the areas of impedance match to the antenna, rf power measurement, VSWR measurement, reduction of harmonic radiation, and antenna selection.



Drake B-1000 Balun installed on Matching Network.



The Drake MN-7. Same features as the Drake MN-2700, but rated at 250 watts. Same width and height, but only 8½" (21.6 cm) in depth, and weighs 10 lbs. (4.55 kg).

160 thru 10 Meters Frequency Coverage—With out-of-band coverage for MARS, future band expansions and other applications.

Antenna Choice—Matches antennas fed with coax, balanced line, or random wire. (For balanced line use optional Drake B-1000 Balun, which mounts on rear panel of MN-2700.)

Antenna By-pass Switching—Unique design allows unit to be switch-by-passed regardless of which antenna is in use, whether coax or wire type. No need to manually disconnect feedlines. Switch also selects various antennas.

Extra Harmonic Reduction to help fight TVI—Drake Matching Networks employ special "pi-network" low-pass filter type circuitry for maximum harmonic rejection. This feature alone makes the MN-2700 a worthwhile investment; it is a Drake exclusive.

Built-in Metering—Accurate rf wattmeter/VSWR bridge is pushbutton controlled from front panel.

Power Capability—2000 watts PEP, 1000 watts average. Continuous Duty.

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SELL Heathkit HX-30 $125 and HA-20 $100. NC-303 with xtal calibrator $200. Nolan Reid, 891 Loraine Drive, Newport News, VA 23602. 804-874-4528.

YAESU FT-101EX with fan, cw filter, and extra crystals — $640; Yaesu YC-601 digital display — $140; Yaesu FR-101S receiver with cables — $425; Palomar SWR/Watt meter — $35. George, WB1FXI — 413-739-8247. Evenings.

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FOR SALE: Kenwood VFO-520S $120. W1FYR, 339 Tanglewood, Keene, N.H. 03431. 603-352-7281.

COLLINS: 75S3B, mint, one owner, recent lab check, manuals, $525 plus UPS. Paul Beavin, K4LRJ, 4091 Northlake Creek Cove, Tucker, GA 30084. 404-938-9245.

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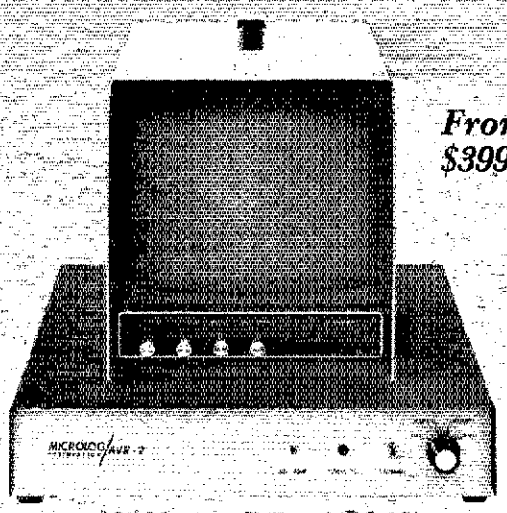

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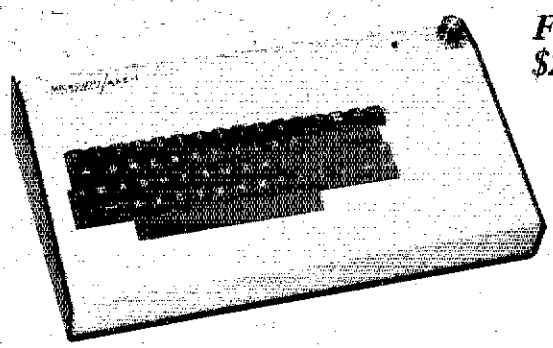

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HEATH HO-10 monitor scope and MFJ 16010-ST antenna tuner, $135 together only. A-Tronics code reader, $150 three months old. Heath IG-82 audio generator, $35. Eico lab ac VTVM, $65, used 8 hours. Knight grid dip meter, $18 damaged but completely functional. All manuals. Prefer pickup. WA5GQT, 1536 Terpsichore, New Orleans, LA 70130.

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SALE: SSTV keyboard, homebrew, $150. Model 15 printer $25. W2IZY 609-655-0835.

2M Repeater — New Spectrum Communications SCR-1000/PL purchased as back-up station. $1,000. Also, Cushcraft 8-pole antenna system, 12dB off-set — 9dB Omni add $125. Anytime. WA2CEB. Dennis. 716-648-4450.

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SB104A, w/p.s., cw filter, n.b., SB644 VFO, excellent, built by Heath design engineer. $725; SB620 spectrum analyzer, $95; HW2021 handheld, touchtone, 10W amplifier, $140; C.S.I. PL. $22; Hammarlund HQ180, speaker, excellent, $250; Symtek, 10-80m low-noise preamplifier, $45; Daytronics Iambic Keyer $28; K2RV, 516-757-7575.

FOR SALE: 75S-3B, 32-S3, 516F-2, manuals & cables. Excellent condition. $1375. Extra 75S-3B $550. S. J. Huber, W7NOI, 318 Steven Ct., Benicia, CA 94510. 707-745-8089.

QST — December 1915 — First issue — original autographed by C. D. Tuska — Reprint $5 ea. May 1919 reprint $1.50 ea. Back issues — 1923 to 1926, $4 copy — 1927 to 1936, $3. 1937 to date $1 ea. Quotes on package deals and few old 1916 to 1922 issues. W3ZD 215-675-4539.

Jobs for Hams

HAM Counselor wanted to operate amateur station and teach code. June 21 — August 21. Write John Klein, 28349 Chagrin, Cleveland, OH 44122. 216-944-9054.

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CAMP Counselor — over 19, General or Extra Class license. Summer camp for boys in Maine. Exc. sal. + benefits. Allowance to bring own rig. Write Director, Camp Chickawah, P. O. Box 178, Carle Place, NY 11514.

WANTED: Electronics Counselor for well established summer camp with individualized program. Kits, ham radio, computer games, computer, also rockets and auto mechanics if interested. June 25 to Aug. 24. All special counselors also help run cabin groups, hikes, overnighters, etc. If interested, contact: John Seeger, Killooleet, Hancock, Vermont 05748. Tel.: 802-767-5152.

SUMMER Job. Buck's Rock, a teenage summer camp in New Milford, Conn., seeks a mature counselor/instructor in ham radio from June 21 to August 21. Salary open. Please write or call Lou or Sybil Simon, 140 Riverside Drive, New York, NY 10024, 212-EN 2-2702.

CAMP Counselor: Minimum age 20. To operate amateur station, teach code, assist in building kits. June 23 — August 20. Camps in New England. Write: K2GBS 18 Dolma Road, Scarsdale, NY 10583.

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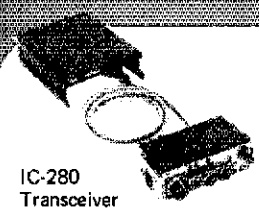

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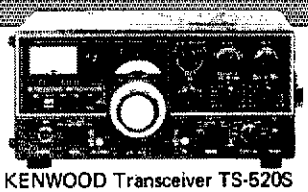

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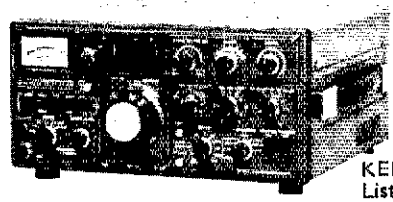

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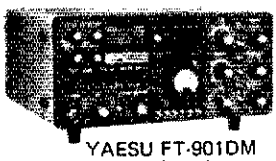

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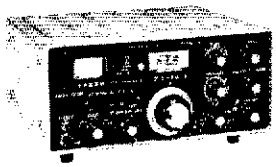

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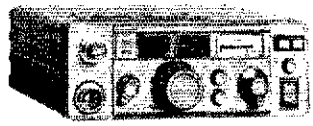

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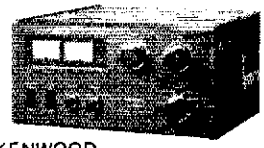

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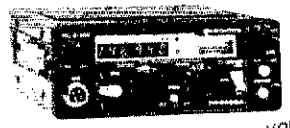

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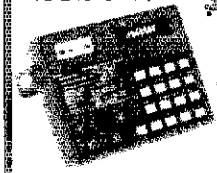

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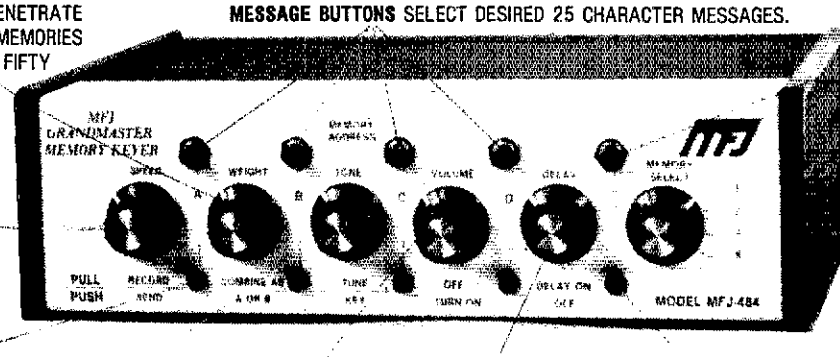

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RESETS MEMORY IN USE TO BEGINNING.

SPEED CONTROL, 8 TO 50 WPM. **PULL** TO RECORD.

MEMORY SELECT: POSITIONS 1, 2, 3 ARE EACH SPLIT INTO MEMORY SECTIONS A, B, C, D (UP TO TWELVE 25 CHARACTER MESSAGES). SWITCH COMBINES A AND B. **POSITION K** GIVES YOU 100, 75, 50, OR 25 CHARACTERS BY PRESSING BUTTONS A, B, C, OR D.

LEDs (4) SHOW WHICH MEMORY IS IN USE AND WHEN IT ENDS.

TONE CONTROL. PULL TO TUNE.

VOLUME CONTROL. POWER ON-OFF.

DELAY REPEAT CONTROL (0 TO 2 MINUTES). **PULL** FOR AUTO REPEAT.

LED INDICATES DELAY REPEAT MODE.

NOW YOU CAN CALL CQ, SEND YOUR QTH, NAME, ETC., ALL AUTOMATICALLY.

And only MFJ offers you the MFJ-484 Grandmaster memory keyer with this much flexability at this price.

Up to twelve 25 character messages plus a 100, 75, 50, or 25 character message (4096 bits total).

A switch combines 25 character messages for up to three 50 character messages.

To record, pull out the speed control, touch a message button and send. **To playback,** push in the speed control, select your message and touch the button. That's all there is to it!

You can repeat any message continuously and even leave a pause between repeats (up to 2 minutes). **Example:** Call CQ. Pause. Listen. If no answer, it repeats CQ again. To answer simply start sending. LED indicates Delay Repeat Mode.

Instantly insert or make changes in any playing message by simply sending. Continue by touching another button.

Memory resets to beginning with button, or by tapping paddle when playing. Touching message button restarts message.

LEDs show which 25 character memory is in use and when it ends.

Built-in memory saver. Uses 9 volt battery, no drain when power is on. Saves messages in memory when power loss occurs or when transporting keyer. Ultra compact, 8x2x6 inches.

PLUS A MFJ DELUXE FULL FEATURE KEYER.

Iambic operation with squeeze key. Dot-dash insertion.

Dot-dash memories, self-completing dots and dashes, jamproof spacing, instant start (except when recording).

All controls are on front panel: speed, weight, tone, volume. Smooth linear speed control. 8 to 50 WPM.

Weight control lets you adjust dot-dash-space ratio; makes your signal distinctive to penetrate QRM.

Tone control. Room filling volume. Built-in speaker.

Tune function keys transmitter for tuning.

Ultra reliable solid state keying: grid block, cathode, solid state transmitters (−300 V, 10 ma. max., +300 V, 100 ma. max.). CMOS ICs, MOS memories. Use 110 VAC or 12 to 15 VDC. Automatically switches to external batteries when AC power is lost.

OPTIONAL SQUEEZE KEY for all memory keyers. 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.

THIS MFJ-482 FEATURES FOUR 25 OR A 50 AND TWO 25 CHARACTER MESSAGES.

- **Speed, volume, weight, tone controls**
- **Combine memory switch**
- **Repeat, tune functions**
- **Built-in memory saver**

$99.95

Similar to MFJ-484 but with 1024 bits of memory, less delay repeat, single memory operating LED. Weight and tone controls adjustable from rear panel. 6x2x6 inches. 110 VAC or 12 to 15 VDC.

THIS MFJ-481 GIVES YOU TWO 50 CHARACTER MESSAGES.

- **Repeat function**
- **Tune function**
- **Built-in memory saver**

$79.95

Similar to MFJ-482 but with two 50 character messages, less weight controls. Internal tone control. Volume control is adjustable from rear panel. 5x2x6 inches. 110 VAC or 12 to 15 VDC.

For Orders Call toll-free 800-647-1800

Order any product from MFJ and try it. If not delighted, return within 30 days for a prompt refund (less shipping).

Order today. Money back if not delighted. One year unconditional guarantee. Add $2.00 shipping/handling.

For technical information, order/repair status, in Mississippi, outside continental USA, call 601-323-5869.

Order By Mail or Call TOLL FREE 800-647-1800 and Charge It On VISA master charge

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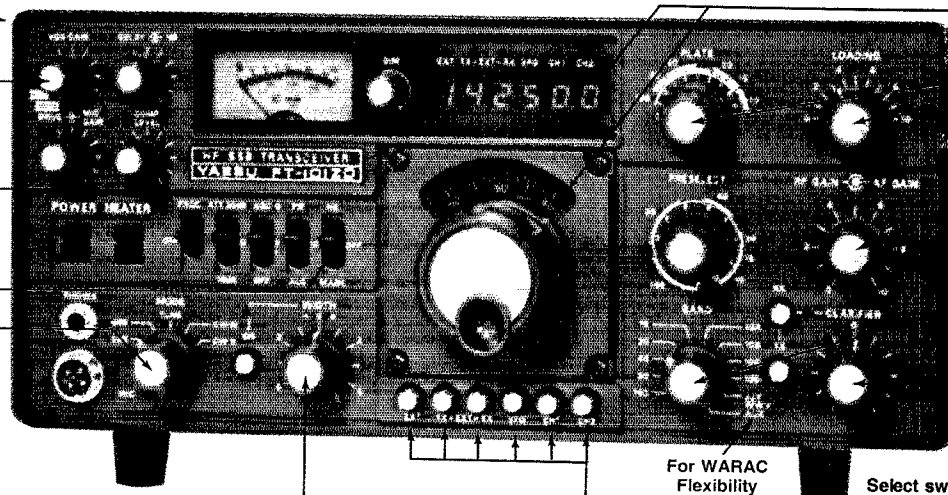
ALL NEW

FT-101ZD

HIGH-PERFORMANCE HF TRANSCEIVER

Today's technology, backed by a proud tradition, is yours to enjoy in the all-new FT-101ZD transceiver from YAESU. A host of new features are teamed with the FT-101 heritage to bring you a top-dollar value. See your dealer today for a "hands on" demonstration of the performance-packed FT-101ZD.



Diecast front panel, plus heavy duty case

Built-in, fully adjustable, VOX circuitry

Built-in RF speech processor for more "talk power" when you need it

Built-in, threshold adjustable, noise blanker

Equipped for SSB and CW operation. Choice of wide or narrow bandwidth for CW (with optional CW filter installed)

Digital plus analog frequency readout. Digital display resolution to 100 Hz

Rugged 6146B final amplifier tubes with RF negative feedback

RF and AF gain controls located on concentric shafts for operator convenience

Full band coverage: 160 through 10 meters, plus WWV/JJY (receive only)

TX, RX, or transceive frequency offset from main dial frequency

For WARAC Flexibility

Select switches for use with FV-901DM synthesized scanning VFO (option). FV-901DM provides scanners plus 40 frequency memory bank.

Continuously variable IF bandwidth: 300 Hz to 2.4 KHz

SPECIFICATIONS

TRANSMITTER

PA Input Power:
180 watts DC
Carrier Suppression:
Better than 40 dB
Unwanted Sideband Suppression:
Better than 40 dB @ 1000 Hz, 14 MHz
Spurious Radiation:
Better than 40 dB below rated output
Third Order Distortion Products:
Better than −31 dB
Transmitter Frequency Response:
300-2700 Hz (−6 dB)
Stability:
Less than 300 Hz in first 30 minutes after 10 min. warmup; less than 100 Hz after 30 minutes over any 30 min. period
Negative Feedback: 6 dB @ 14 MHz
Antenna Output Impedance:
50-75 ohms, unbalanced

GENERAL

Frequency Coverage:
Amateur bands from 1.8-29.9 MHz, plus WWV/JJY (receive only)
Operating Modes:
LSB, USB, CW
Power Requirements:
100/110/117/200/220/234 volts AC, 50/60 Hz; 13.5 volts DC (with optional DC-DC converter)
Power Consumption:
AC 117V: 75 VA receive (65 VA HEATER OFF) 285 VA transmit; DC 13.5V: 5.5 amps receive (1.1 amps HEATER OFF), 21 amps transmit
Size:
345 (W) × 157 (H) × 326 (D) mm
Weight:
Approximately 15 kg.

COMPATIBLE WITH FT-901DM ACCESSORIES

RECEIVER

Sensitivity:
0.25 uV for S/N 10 dB
Selectivity:
2.4 KHz at 6 dB down, 4.0 KHz at 60 dB down (1.66 shape factor); Continuously variable between 300 and 2400 Hz (−6 dB); CW (with optional CW filter installed): 600 Hz at 6 dB down, 1.2 KHz at 60 dB down (2:1 shape factor)
Image Rejection:
Better than 60 dB (160-15 meters); Better than 50 dB (10 meters)
IF Rejection:
Better than 70 dB (160, 80, 20-10 m); Better than 60 dB (40 m)
Audio Output Impedance:
4-16 ohms
Audio Output Power:
3 watts @10% THD (into 4 ohms)

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Price And Specifications Subject To Change Without Notice Or Obligation

YAESU The radio.

379X

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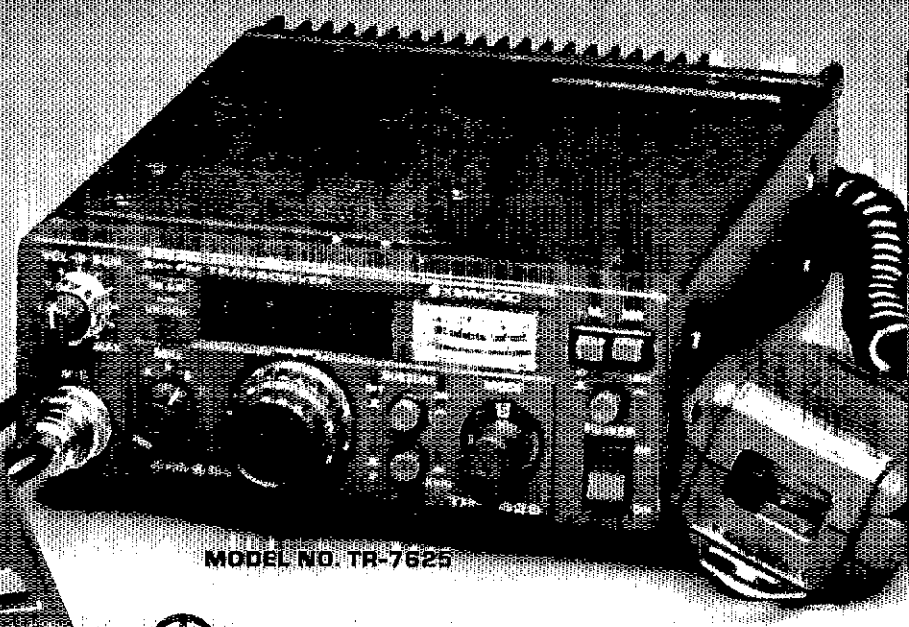
Instant recall.
(and with 10 or 25 watts of power)

Kenwood offers you a choice.
The TR-7600 (10-watt) or TR-7625 (25-watt) with optional RM-76 Microprocessor Control Unit.

TR-7600 and TR-7625 . . . one of them is sure to fit the needs of today's Amateur Operator who's looking for optimum versatility in a 2-meter FM transceiver. And, when either rig is combined with the RM-76, a whole new dimension unfolds in channel memory and scanning capability.

MODEL NO. TR-7600



MODEL NO. TR-7625

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