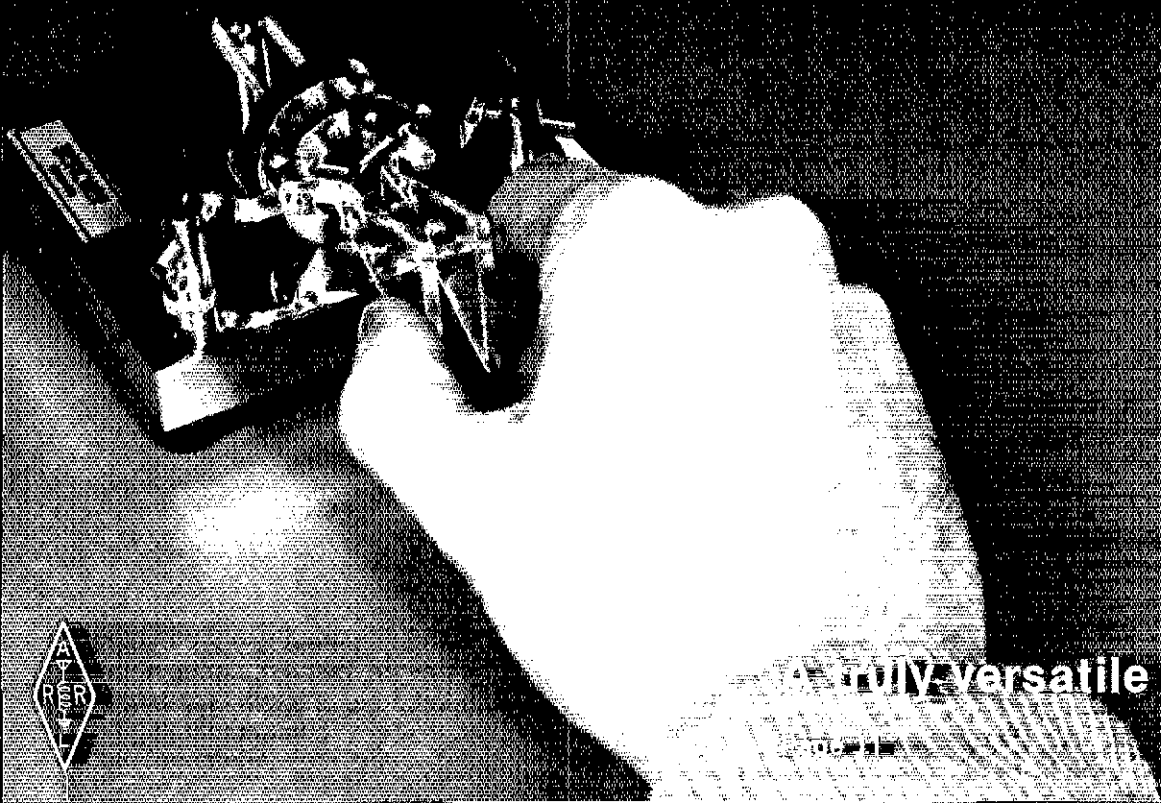
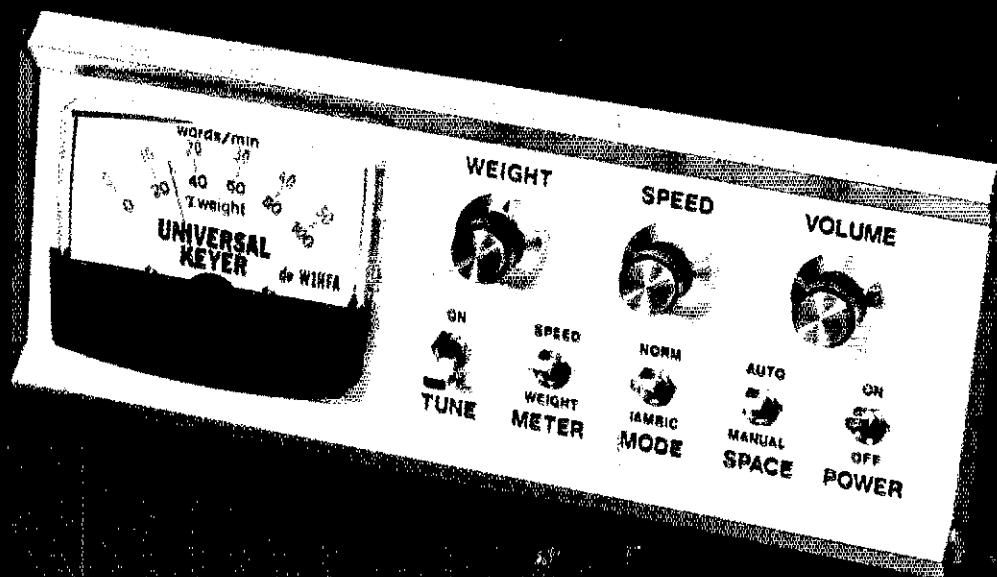


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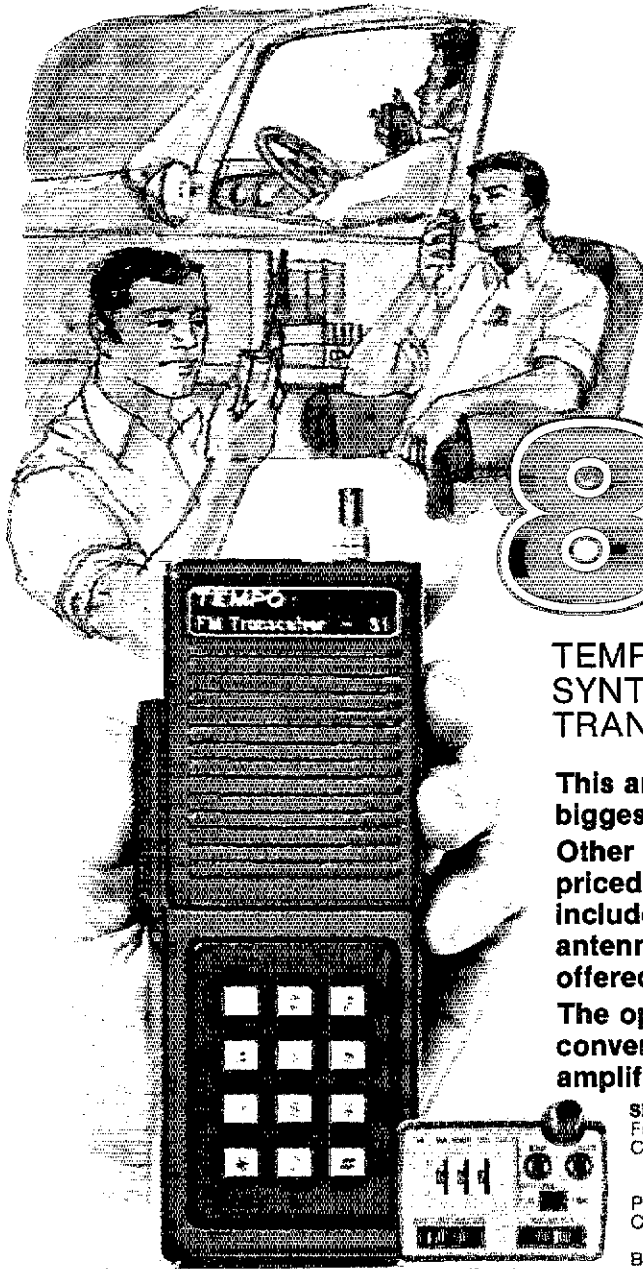
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the TEMPO SYNCOM S1 DOES IT ALL AND GIVES YOU **800** CHANNELS

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

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

SUPPLIED ACCESSORIES

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

OPTIONAL ACCESSORIES

Touch tone pad: \$55 • Tone burst generator: \$29.95 • CTCSS sub-audible tone control: \$29.95 • Rubber flex antenna: \$8 • Leather holster: \$16 • Cigarette lighter plug mobile charging unit: \$6 • Matching 30 watt output 13.8 VDC power amplifier (S30): \$89 • Matching 80 watt output power amplifier (S80): \$169.

*Shown with accessory touch tone pad

Top view showing controls

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 (UHF) 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.

NEW TOLL FREE ORDER NUMBER: (800) 421-6631
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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)

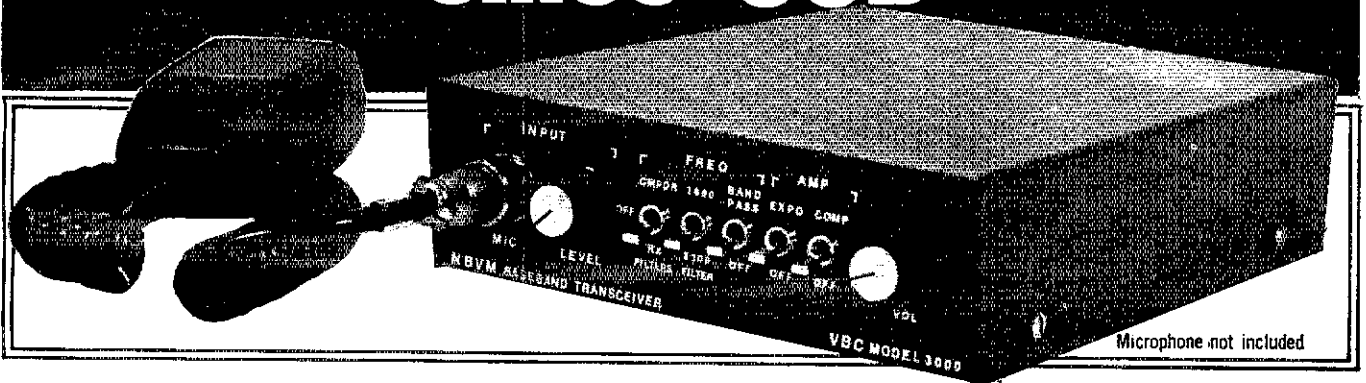
Drive Power	Output	Model No.	Price
2W	130W	130A02	\$209
10W	130W	130A10	\$189
30W	130W	130A30	\$199
2W	80W	80A02	\$169
10W	80W	80A10	\$149
30W	80W	80A30	\$159
2W	50W	50A02	\$129
2W	30W	30A02	\$ 89

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

Henry Radio

Prices subject to change without notice

Henry Radio is proud to offer the most important innovation in Amateur Radio since SSB



Historically, Amateur Radio operators have made important contributions to the art and science of communications. Once again Amateur Radio assumes leadership in advanced communications technology. You have the privilege of being one of the first to include a Narrow Band Voice Modulation (NBVM) system in your station. The VBC Model 3000 is the system that you have been hearing about for a year and have read about recently in QST and the 1979 ARRL Handbook. It is the world's first such system.

The VBC Model 3000 provides full audio level compression and expansion... complete intelligibility in only 1300 Hz bandwidth. It permits you to take full advantage of other stations' RF speech clippers and processors... similar to the amplitude compression and expansion used for many years in telephone and satellite communications.

The Model 3000 is for mobile and fixed station use and requires no modifications to your existing equipment. It is completely self contained, including its own audio amplifier. The unit automatically switches into transmit mode when microphone is keyed or voice operation is used. It connects just after the microphone on transmit and just prior to the speaker on receive. In addition to its basic

function of operating in a narrow bandwidth, the Model 3000 also increases the performance of your station in the following ways:

- Reduces adjacent channel interference
- Increases signal to noise ratio
- Increases communications range

Some of its outstanding features include:

- High quality narrow band speech
- Self contained transmit/receive adapter
- Built in audio amplifier
- 5 active filters with a total of 52 poles
- Rugged dependable hybrid IC technology
- Low power consumption

Receive only features, such as sharp voice and CW filtering and amplitude expansion, provide improved reception without requiring a unit at the transmitting station.

For the more advanced experimenter the Model 3000 is available in a circuit board configuration for building into your present transceiver.

Henry Radio is ready to offer technical assistance and advice on the use and servicing of the Model 3000 and will help introduce new owners to others operating NBVM units. Get in on the ground floor... order yours now.

Price: VBC Model 3000 \$349.00

Circuit board configuration \$275.00

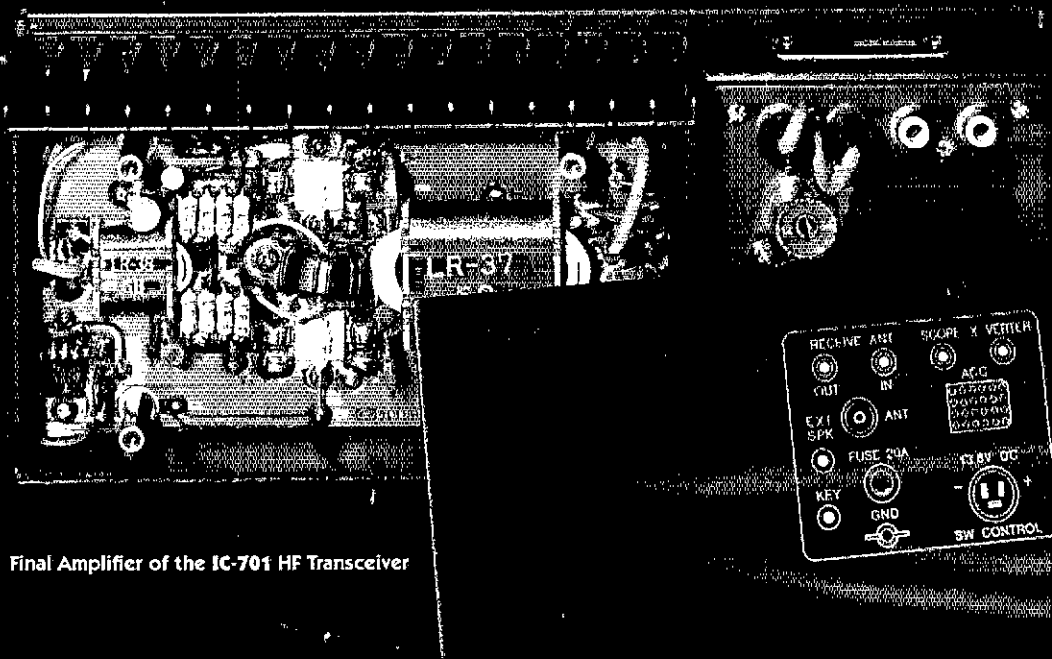
For more detailed information please call or write. The Model 3000 will be available from most Tempo dealers throughout the U.S. and abroad.

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The Final Warranty



Final Amplifier of the IC-701 HF Transceiver

When you look inside the purchase price of a new radio, go all the way to the bottom; and ask about the warranty coverage of the solid state finals. Surprisingly, most amateur radio manufacturers leave their final amplifiers less than fully guaranteed, which can get you caught with your finals down, just when you're expecting to be protected from repair costs on your brand new rig.

When you look into an ICOM radio, you see our quality and our confidence throughout. That's why ICOM radios are covered from front to finals during the entire new purchase warranty period. We're confident that an ICOM radio is simply the best value available for your Amateur Radio dollar, and we back it up with the final warranty.

So, when you look into the purchase of a new radio, look close for true value: look close for quality and confidence. And as you approach the final choice, ask your dealer about the final warranty. He'll tell you that when you choose ICOM, you're covered.

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QST

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THE COVER

Here's a keyer that will do just about everything but open your garage door. You can build one for under \$100! See page 11.



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DXpedition... The Ultimate Fantasy



Clipper ships sailing to foreign shores. Sixteen amateurs primed for adventure, coming together as the first group in 20 years to set foot on the remote French Island, Clipperton. Their goal: 30,000 QSO's in just 7 days.

If you're like most of us, a rare DXpedition is more a dream than a reality, but the Clipperton Linear Amplifier from Dentron brings the thrill of a DXpedition to you.

The Clipperton-L™ was inspired by the famous DXpedition on which 3 MLA-2500's were used. We built the Clipperton with 4 rugged, economical, 572 B's in the final to provide a full 2KW PEP on SSB and 1KW CW on 15 through 160 meters. With features like hi-lo power selector for equal efficiencies at 1 or 2 KW, a power transformer that is vacuum impregnated, wide spaced tuning and loading capacitors, built-in ALC and an improved whisper-quiet cooling system, the excitement of crashing a pile-up can be yours.

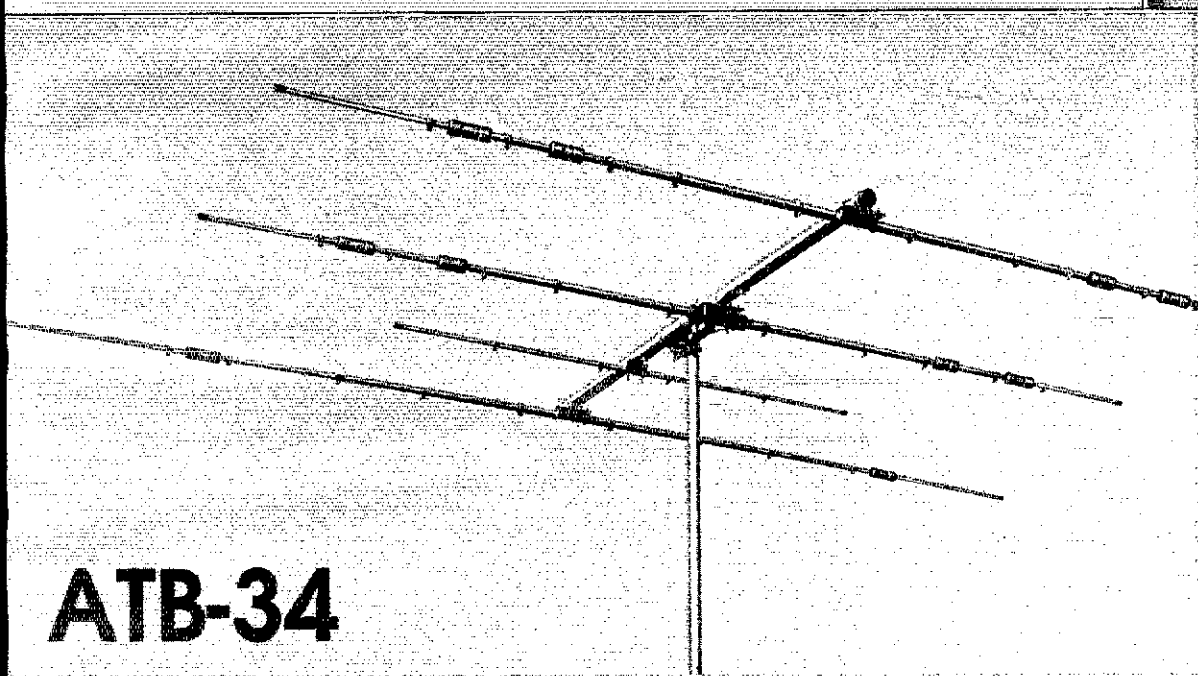
Clipperton-L suggested price \$599.50.
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ATB-34

Punch through the pile-ups with an ATB-34. The only three band beam to give you real full size performance. Check ATB-34 element lengths, check the trap design and construction. Check the spacing and the specially developed balun. All of these features add up to the no compromise performance that you expect from Cushcraft.

SPECIFICATIONS

3dB Beam Width	42°
Nominal Impedance	50 ohm
Power Handling	2000 Watts PEP
Boom Length	18'
Longest Element	37'8"
Turning Radius	18'9"
Wind Area	5.4 H ²
Weight	42 lbs.
Maximum Mast O.D.	2.5"

Cushcraft vertical antennas are designed to meet the exacting demands of your amateur radio station. They give top performance in easy to use packages. They can be installed at ground level or roof top.

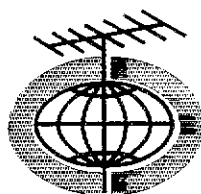
Durability is guaranteed with double wall seamless aluminum base sections and fiberglass high Q traps. If you are interested in local contacts or long path DX communications, a Cushcraft vertical antenna is your best choice.

ATV-3	ATV-4	ATV-5
10-15-20 Meters	10-15-20-40 Meters	10-15-20-40-80 Meters
Height 13.8' (4.2mtrs.)	Height 19.4' (5.9mtrs.)	Height 24.4' (7.4mtrs.)

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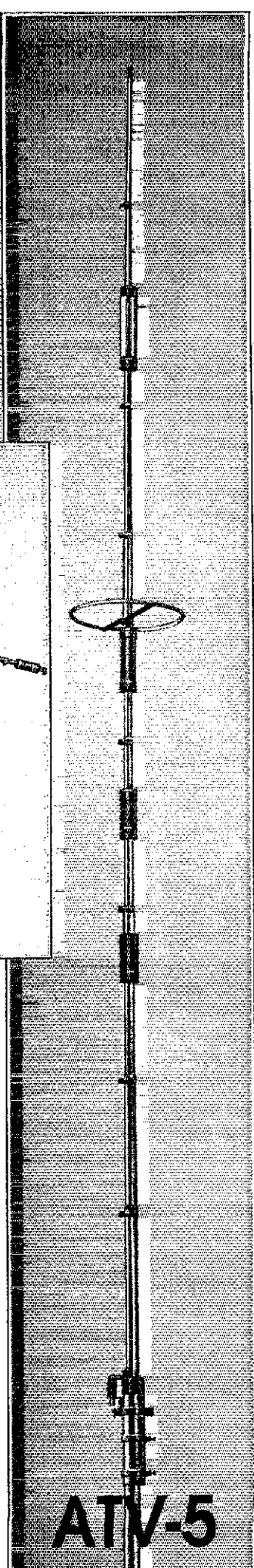
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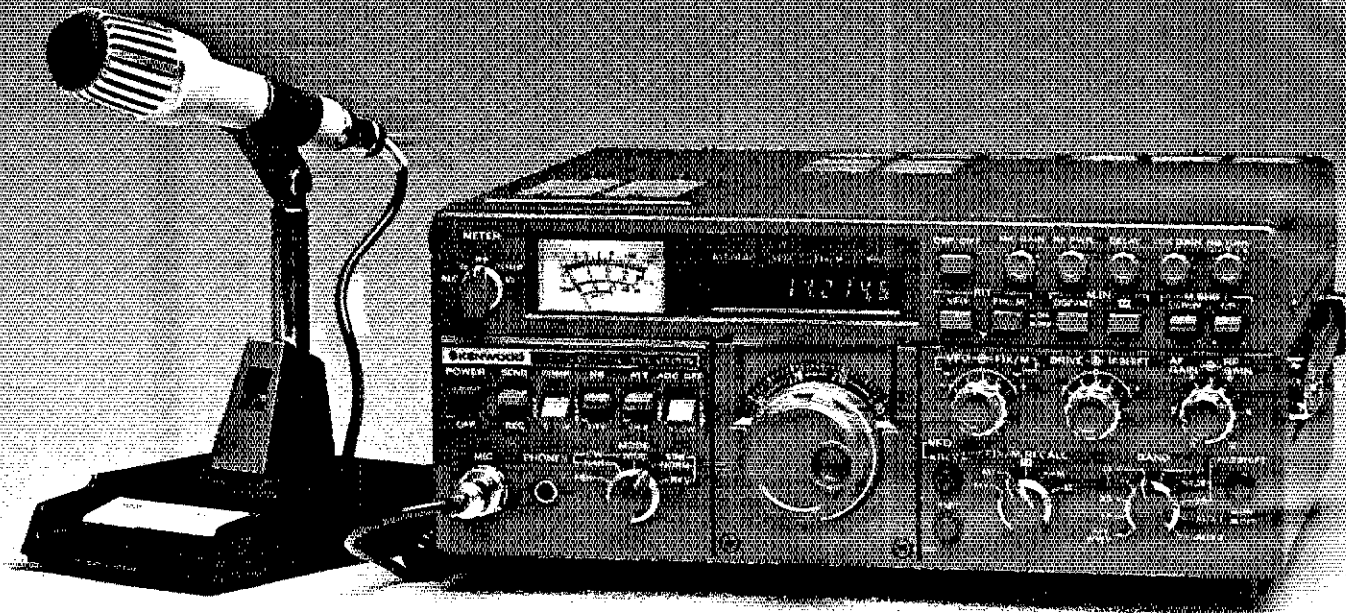
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ATV-5

TS-180S with DFC*



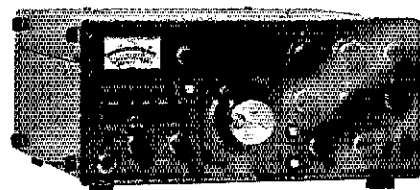
NEW! Digital Frequency Control* ...a Kenwood innovation for maximum HF operating enjoyment!

Kenwood's TS-180S with DFC is an all solid-state HF transceiver designed for the DXer, the contest operator, and all other Amateurs who enjoy the 160 through 10-meter bands. The following features prove, beyond doubt, that the TS-180S is the classiest rig available!

- Digital Frequency Control (DFC), including four memories and manual scanning. Memories are usable in transmit and/or receive modes. Memory-shift paddle switches allow any of the memory frequencies to be tuned in 20-Hz steps up or down, slow or fast, with recall of the original stored frequency. It's almost like having four remote VFOs!
- All solid-state ... including the final. No dipping or loading. Just dial up the frequency, peak the drive, and operate!
- High power. ... 200 W PEP/160 W DC input on 160-15 meters, and 160 W PEP/140 W DC on 10 meters (entire band provided). Also covers more than 50 kHz above and below each band (MARS, WARC, etc.), and receives WWV on 10 MHz.
- Improved dynamic range.
- Adaptable to all three proposed (WARC) bands.
- Single-conversion system with highly advanced PLL circuit, using only one crystal with improved stability and spurious characteristics.
- Built-in microprocessor-controlled large digital display. Shows actual VFO frequency and difference between VFO and "M1" memory frequency. Blinking decimal points indicate "out of band." Monoscale dial, too.
- IF shift ... Kenwood's famous passband tuning that reduces QRM.
- Selectable wide and narrow CW bandwidth on receive (500-Hz CW filter is optional)
- Automatic selection of upper and lower sideband (SSB NORM/SSB REV switch).
- Tunable noise blanker (adjustable noise-sampling frequency).
- RF AGC ("RGC"), which activates automatically to prevent overload from strong, local signals.
- AGC (selectable fast/slow/off).
- Dual RIT (VFO and memory/fix).
- Three operating modes ... SSB, CW, and FSK.
- Improved RF speech processor.
- Dual SSB filter (optional), with very steep shape factor to reduce out-of-passband noise on receive and to improve operation of RF speech processor on transmit.
- 13.8 VDC operation.
- Also available is the TS-180S without DFC, which still shows VFO frequency and difference between VFO and "hold" frequencies on the digital display.

- Full line of matching accessories, including PS-30 base-station power supply, SP-180 external speaker with selectable audio filters, VFO-180 remote VFO, AT-180 antenna tuner/SWR and power meter, DF-180 digital frequency control, YK-88 CW filter, and YK-88 SSB filter.

All of these advanced features can be yours... and at an attractive price! Visit your local Authorized Kenwood Dealer and inquire about the exciting TS-180S with DFC!



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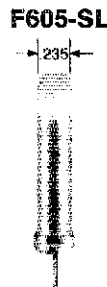
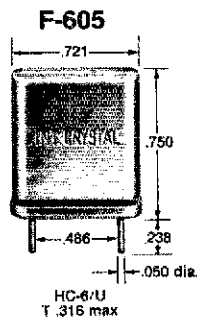
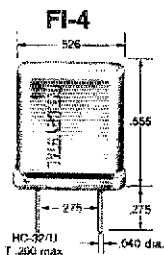
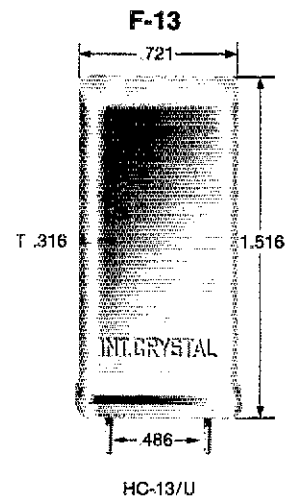
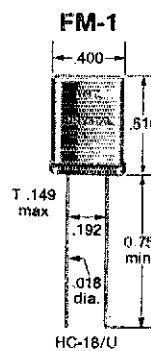
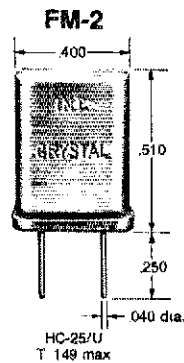
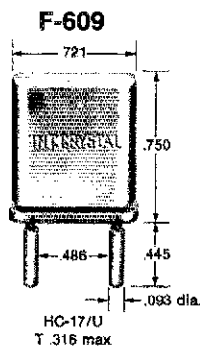
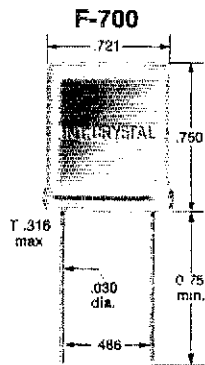
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Reports Invited: The ARRL Board of Directors (see list at left) determines the policies of ARRL. The 16 divisions of the League are further arranged into 74 administrative "sections," each headed by an elected Section Communications Manager. Your SCM 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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"It Seems to Us..."

The 65th Anniversary of ARRL

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

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

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

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

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

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One day recently the telephone rang and a voice at the other end said, "This is Hiram Maxim, a name in Amateur Radio of which you may have heard." After I caught my breath and replied that indeed it was a famous name in Amateur Radio, the voice went on to identify himself as Hiram Hamilton Maxim, the 79-year-old son of Hiram Percy Maxim. After an exchange of reminiscences about an interview I had with him in 1964 on the occasion of the League's 50th anniversary, and our common interest in sailing and the use of radio direction finders for navigation, we talked about the early days of Amateur Radio and his role in influencing his father to become interested in Amateur Radio, which led to the formation of ARRL.



Hiram Hamilton Maxim, 1979

A few days later Mr. Maxim came from his home in Farmington to visit us in Newington and to take a fond look at "Old Betsy." Hiram Hamilton Maxim is a charming gentleman, and to meet him was to step back in time and feel a kinship with Hiram Percy Maxim and his Hartford friends who helped to start the American Radio Relay League on its way in May 1914. It was a moment for spiritual rejuvenation and for awareness of the responsibility we have in conducting the affairs of the League in a way that would make Hiram Percy Maxim proud of us.

While Mr. Maxim was visiting us here at Hq., he dropped off the short piece that follows. — R. L. Baldwin, W1RU

Reminiscences of Hiram Percy Maxim's Early Days in "Wireless Telegraphy," by Hiram Hamilton Maxim, his son.

In 1911, when I was a boy of 11, I had a schoolmate friend, John Garret, who had made a wireless set with which he could telegraph back and forth with another friend and schoolmate, Harmon Barber. John Garret lived on the corner of Farmington Avenue and Prospect Avenue in Hartford. I was living with my family at 550 Prospect Ave. The distance they bridged was three blocks. John had made the sending and receiving set himself from equipment then available. My recollection of the details are understandingly sketchy at this late date (1979) but I do remember the wiring stapled to a board with little pieces of glass inserted where the wires crossed. The wiring consisted entirely of no. 16 "bell wire," as it was known at the time. The principal, and most spectacular, item in the transmitting set was an electrolytic interrupter which fed the spark coil.

I told my father about John's wireless and further told him that he could telegraph back and forth with Harmon Barber. My father, be-

ing a little skeptical, suggested that he give John a short message to send to Harmon who would then telephone back the answer. This was done, the correct answer came back at once, and Hiram Percy Maxim was hooked on "radio" from then on for the rest of his life.

I was just as interested. Together we immediately started to get some kind of an outfit to put out a signal and to receive. He first bought a receiving set from a firm in New York called "Hunt & McCree." I remember almost nothing of the details of this first set except that it had a simple tuning coil and an electrolytic detector. But I do remember that it was very unsatisfactory and would hardly work at all. The transmitter was typical of the time and consisted of nothing more than a small spark coil with a simple spark gap made from two zincs from the usual wet batteries, so common at the time for doorbells. One side of the spark gap was connected to the antenna and the other to the ground. That's all.

The receiver was so unsatisfactory that something had to be done. My father saw in Harris Parker's toy store at the corner of Ann Street and Asylum Street in Hartford a receiving set for sale that looked much more sophisticated than what we had. He bought it and brought it home one evening. We went right at it with great excitement, but couldn't seem to make it work, to our intense disappointment. So, the next day he sadly took it back to Harris Parker's.

The next evening, the doorbell rang. My father answered the door and found a rather unusual-looking young man with black hair and brilliant, striking, greenish eyes. He said his name was Clarence Tuska, that he had made the set my father had just returned and he had come to find out why my father couldn't make it work. At that moment began a lifelong association between the two in the radio world that led to the founding of the American Radio Relay League, the C. D. Tuska Radio Company, and a close association with all of us in many ways. I myself became

League Lines...

Has an Amateur you know made a significant technical contribution to the art? You can nominate him for the 1978 Technical Merit Award by a letter to Hq. before the end of June. The Board of Directors will consider the Award at its meeting in Baton Rouge July 18-19. Several previous awards have been for work in the amateur space program; others for propagation work, moon-bounce and the like; and for leadership on the radio frequency interference front.

The ARRL-Membership Overseas QSL Service will streamline its operations beginning June 1, 1979. For details, see "QSL Corner," page 68.

Effective May 15, 1979, ARRL Club and Training Department will be asking all instructors to share half the cost of printing and mailing instructor guides for the Novice, Tech/General and Advanced/Extra. All orders for guides postmarked on or after May 15 should include \$1.50 for each guide requested.

Our Circulation Department is working overtime to update the records of those members who extended their memberships prior to the dues increase. At this time there is a two-week backlog, so please be patient -- your new certificates will be along as soon as possible.

It's hamfest season once again, so it's worth reviewing QST guidelines for listings in the Hamfest Calendar. See page 17 for details.

"It Seems to Us...⁵⁹ (continued from page 9)

one of his first employees in his company during summer vacation from M.I.T. From that beginning we continued to get better gear and to learn how to make it work. I was just as fascinated by wireless as he was. We advanced so rapidly that in 1913 he and I, and perhaps Tuskas as well, went to Boston where we took the examination for First Grade Commercial Radio Operator's License, and all passed with flying colors. I was only 13 at the time, which caused some comment.

When we first really got on the air, there were no licensing requirements at all. We chose our own call letters, using whatever seemed appropriate. At first we merely used our initials, he took HPM as his call letters, while I used HM. Then it became the fashion in the Hartford area to have call letters with the prefix of SN. He took SNW and I took SNY. We used these calls until Federal licensing became established. As best I can remember, our first licensed call letters were IZM. Then some time later this became IAW, which became famous as the ARRL matured and its fame and membership grew.

As our equipment improved, we were always trying to reach out farther and farther. It occurred to HPM that it would be an interesting idea to see if a Relay League, or something like it, could be organized, by which messages could be relayed from one member to another and thereby cover great distances. He and Tuskas got together on this and from their efforts came the American Radio Relay League. This organization went on to become the "voice of Amateur Radio" and published the magazine QST, which became the outstanding and leading Amateur Radio magazine in the country, and it still is.

Odd bits and pieces of memories of some of the gear come into my mind. He read that in

order to put out a strong signal, a very large antenna with immense spread was needed. So he and I built a 50-foot pole for the backyard with a spreader that I recall was about 24 feet wide with 14 tinned iron wires strung to another spreader on a pole fastened up in a maple tree out near the street. The tree is still there beside the house at 550 Prospect Ave. I remember when rotary spark gaps became the thing to have. We went through a long period of experiment and development in this field, crowning the whole period with "Old Betsy," the great rotary spark gap that we had after moving to 276 N. Whitney St. It was the rotary gap to end all rotary gaps. It was (and still is) a fearsome machine, making an appalling noise when operating, but it put out the best signal we ever had in the spark gap days. Then I remember very clearly our first vacuum tube for receiving. It was called an Arnold Audion and was a tremendous improvement over the crystal detectors. It had a quirk in its design, which required that a small candle be burned under it at the right place and distance in order to get the best out of it. The antenna at the Whitney Street house was also enormous. The spark gap was so noisy and required such a large motor to drive it, that all the transmitting gear was installed in the cellar with the operating station in what my mother called "the conversery" just off the living room. The receivers were at the operating station.

It was great fun to operate the station. I kept it up right along with him until I went to M.I.T. After another year or two, those dreadful things called "girls" intruded into my life, which still further diluted my interest. But I can still copy the code and I'm on the air, in a way, by having a radio-telephone in my boat, although this is looked upon with utter contempt by any bona fide radio "ham."

These later years are well chronicled in the records of the Relay League and in QST. In the early days, HPM wrote a series of humorous stories under the pen name of "The Old Man." It was a well-kept secret who the author was. In describing the garbled messages he supposedly received, he coined funny words, which stuck for one reason or another. The most outstanding one was "Wouffhong" which in a devious manner became the secret holy of holies in the League. Not to be outdone, he eventually actually produced the mythical "Wouffhong." I never see it without an uncontrollable desire to laugh, because I was entirely familiar with its origin, knew precisely what it was originally made for, and who made it. It is such a holy and untouchable symbol in the League that I am afraid to let the cat out of the bag, even here, for fear some dedicated "ham" will someday read this. The secret of the "Old Man" was kept inviolate for years. I suppose all League members who aren't too young have learned by now, but it was a mystery for years. He used to give the stories to my mother and me to read for our reactions before he sent them to the boys at the League office.

Most of his old gear is preserved at the League's museum. "Old Betsy" is there in operating condition. After I moved on to other things, the art changed very greatly. The big change was from spark sets to "continuous wave" transmission. Instead of using a kilowatt of power to transmit 200 miles, it became possible to work two-way communication with places as far away as Japan with only five watts. As the available frequency spectrum became more and more restricted, greater selectivity had to be developed. If "Old Betsy" were to be started up today, she would paralyze every receiver in 50 miles with her broad signal. □

Versakeyer — A Multimode Paddle Keyer

This advanced-design keyer will fit just about any cw operator's preference. No huge memory banks here — just smooth, convenient operation.

By Paul Horowitz,* W1HFA

In the four years since the CompuCoder Keyboard Keyer¹ appeared in *QST*, the author has shipped nearly a thousand printed circuit boards. Many enthusiastic letters from builders confirm the author's experience that CompuCoder is extremely "friendly" and easy to use, largely because of features such as n-key rollover, first-in first-out (FIFO) memory with buffer storage meter, linear speed control with accurate meter display and independently adjustable weight, and recirculating message mode. Perhaps, as significant, there has not been a single report of rf-induced malfunction or sensitivity to component variations of any kind (except bad ICs — caveat emptor!), confirming the importance of the philosophy of 100-percent cold switching in the design of any digital circuit intended for use in an rf environment.

Keyboard keyers like CompuCoder make cw ragchewing a delight. However, as contest operators have discovered, they are not ideal for everything. In the heat of battle you just can't get your hands onto the keys fast enough. This project grew out of the author's growing awareness — as his fingers landed over the wrong row of keys at the same time his pencil rolled onto the floor — that perhaps the conventional paddle keyer is better under such circumstances. Besides, paddle keyers are a lot of fun!

Which keyer to build? A check of the literature revealed no rf-immune designs of the cold-switched variety; in addition, recent dual-paddle keyers are all "iambic" (squeeze both paddles and you get alternating dits and dahs), whereas those of us who grew up on the excellent dual-paddle "ultimatic" design of the fifties find iambic keyers decidedly uncongential. Finally, popular designs like the Accu-Keyer² require add-ons for such things as

a sidetone or cathode keying, and don't provide weight control. Weight control is important because the mark-to-space ratio can change as the keyed signal passes through transmitter amplifier stages. Additionally, code sounds best if the weight is modified somewhat when sending at either very low or at high speeds.

Versakeyer Features

The ideal universal keyer would be designed with (1) selectable iambic or ultimatic (squeeze) dual-paddle modes, (2) independent linear control of weight and speed with accurate readout of both, (3) self-contained sidetone circuitry, (4) transistor output for driving positive- or negative-keyed transmitters directly with protection against overvoltage and reverse polarity, (5) separate receiver-muting output with adjustable dropout time (for receiver recovery) to permit full electronic break-in operation with rigs equipped with fast T-R switches, and (6) 100-percent cold switching and careful circuit design (no more logic races, please!). In addition, the keyer should incorporate all the fine advances gained from past designs, such as the excellent auto/

manual space feature of the Accu-Keyer. Finally, a keyer of this complexity will be a formidable project unless carefully planned for simplicity of construction.

Versakeyer is an attempt to meet these requirements. All the above features are implemented, including fully independent linear speed (5-50 wpm) and weight (10-90 percent) controls with readout on an accurate panel meter, fully protected dual-polarity outputs for both keying and muting, and variable-delay (1-100 ms) muting dropout. For ease of construction, the entire circuit (including power transformer and ac-line fuse) goes on a single-sided printed circuit board. All you do is stuff the board, make connections to the panel controls and jacks, and turn it on! Figs. 1 through 3 show its construction.

Circuit Details

A major design feature of Versakeyer is the use of cold switching throughout. In a cold-switched circuit only dc control levels — never logic signals or analog waveforms themselves — are brought from the circuit board to panel controls and instruments. This prevents cross coupling

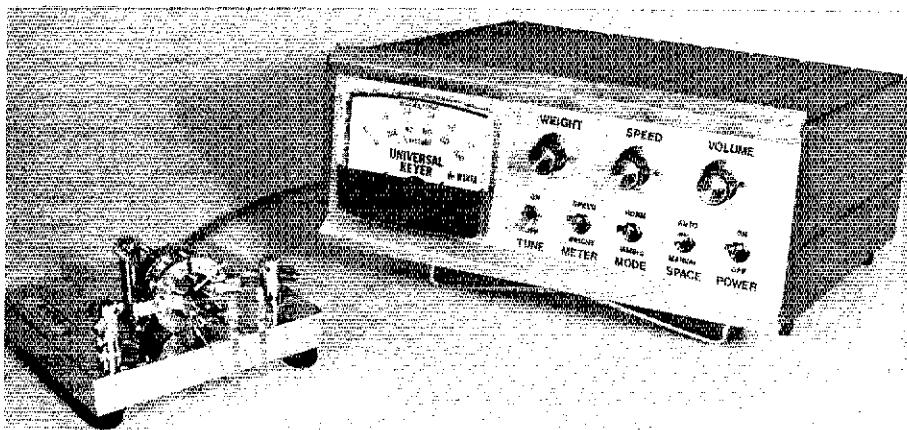


Fig. 1 — The Versakeyer in the author's enclosure. For right-handed operators, the front panel layout might be improved by putting the controls on the left and the meter on the right.

*Lyman Laboratory of Physics, Harvard University, Cambridge, MA 02138

¹Notes appear on page 16.

and degradation of signals, and allows thorough bypassing of all leads leaving the circuit board, including speed and weight controls. In circuits where logic signals are routed to panel controls, the impossibility of effective bypassing often leads to trouble, as a reading of past *QST* correspondence on keyer problems clearly indicates. The circuitry of Versakeyer splits itself rather neatly into four sections. Let's attack them separately.

Time Base

Versakeyer has to have the most elaborate clock circuitry ever put into a keyer! Take a look at Fig. 4. The action begins at the left, where the speed control taps a voltage (0.75 to 7.5 V) to be converted to a current by current source Q1; this current ultimately sets the clock rate. D1 compensates the base-emitter drop of Q1 for good temperature stability. We're off to a good start with bypass capacitor C1 — the clock circuit, like all the Versakeyer circuitry, is cold-switched, in this case by being de-voltage controlled.

Transistors Q2 through Q4 form an interesting circuit known as a "current mirror." A current is *drawn* from the collector of Q2, Q3 and Q4 each source the same current from their collectors, in this case a current between 0.1 mA and 1.0 mA, depending on the speed control setting. Current mirrors are favorites with IC designers, though you don't see them widely used in discrete circuit design. The current from Q4 charges C2 with a ramp waveform. When the voltage on C2 reaches 8 V, comparator U1A switches, triggering one-shot U2B and discharging C2 by turning on Q5. The waveform at C2 is thus a periodic ramp, with frequency proportional to the speed control setting.

To generate a logic waveform, the ramp also drives comparator U1B with the reference voltage provided by weight control R16, carefully rigged to provide voltages from 10 to 90 percent of the ramp amplitude. The result is a square wave with independently adjustable period (50 to 500 ms) and duty cycle (10-90 percent). Note that the weight is also voltage controlled and bypassed, and that both controls give linear variation with knob rotation.

Op-amp follower U3A drives the speed/weight meter. It buffers either the weight-controlling voltage or a voltage at R10 proportional to the charging current of C2, as selected by S1. Although the follower could be omitted if the recommended 50- μ A meter movement is used, it permits less sensitive meter movements to be used without loading the weight circuitry.

U14B gates the discharge signal in such a way that the clock can be halted in the high output state; this is essential for the asynchronous initiation of characters that makes modern paddle keyers so easy to use. In the automatic character-spacing

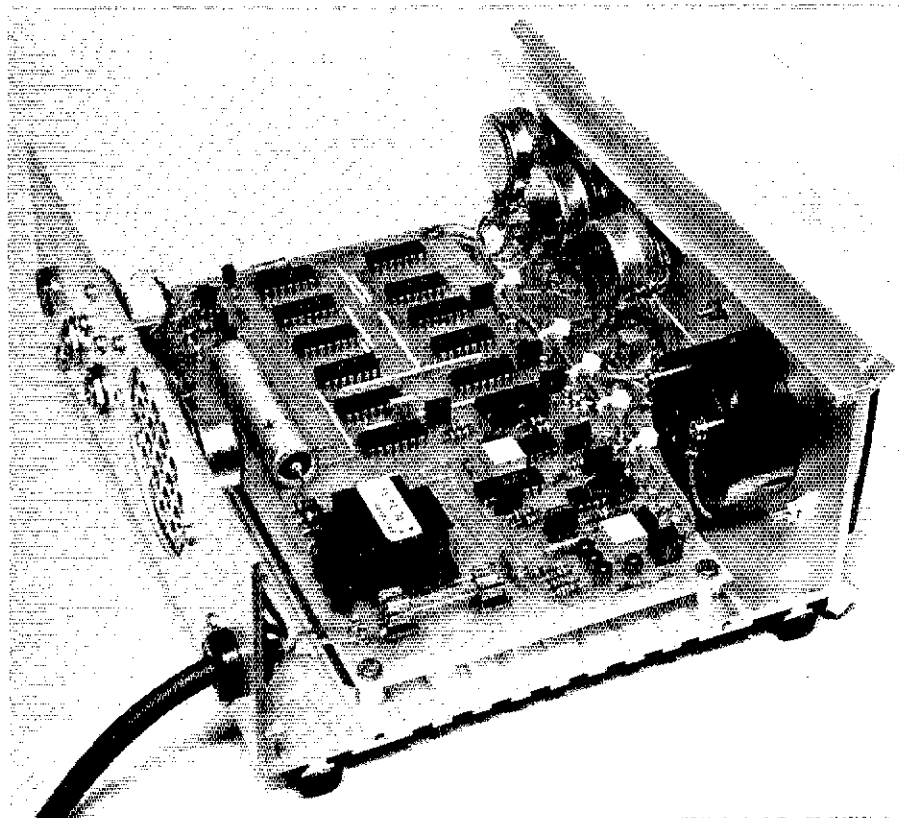


Fig. 2 — Interior view. Aside from the rf chokes and the speaker transformer on the rear panel, nearly all components are contained on the circuit board. The speed and weight calibration pots are visible on the pc board at the right, among other time-base components.

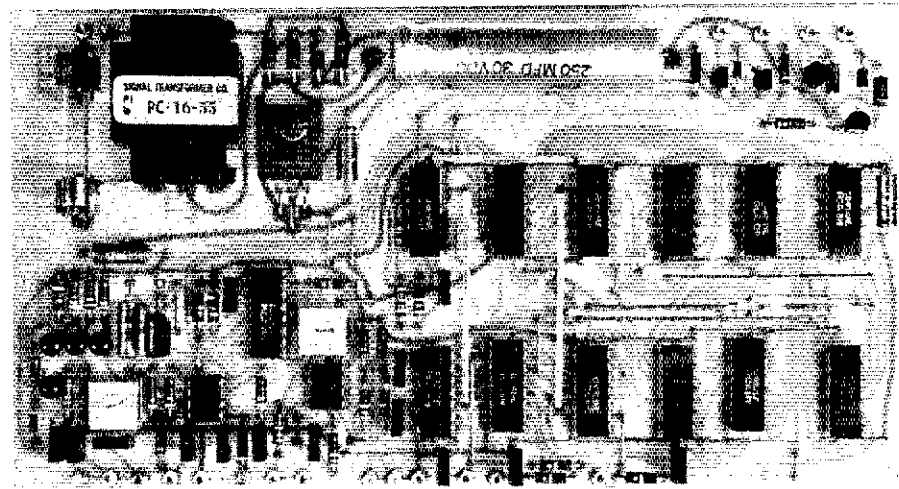


Fig. 3 — Detail of the circuit board, which measures 4.2 x 7.6 inches (107 x 193 mm). The time base is at the lower left, logic at lower right, power supply along the top, and output circuitry at top right. The power transformer is a small pc mounting type.* The fuse clips are Littlefuse no. 102068, although wire leads can be substituted. (The etching pattern was modified slightly after this photo was taken.)

mode, the clock is allowed to continue until the time the next character should begin, just as with the Accu-Keyer.

A couple of interesting points: Note that both comparators are connected as Schmitt triggers, with positive feedback via R14 and R19 for clean switching. The timing-capacitor discharge circuitry can be simplified by using one of the new n-channel VMOS FETs (for instance the Siliconix VN66AF) in place of Q5, Q6 and

R22; ordinary bipolar transistors are shown because they're so easy to get.

Code-Generation Logic

The digital logic necessary to generate a flexible keyer can become rather complicated, as numerous keyer articles amply demonstrate. Rather than dragging the reader through all the logic states of Fig. 5, let me just point out the function of the various flip-flops. With some head

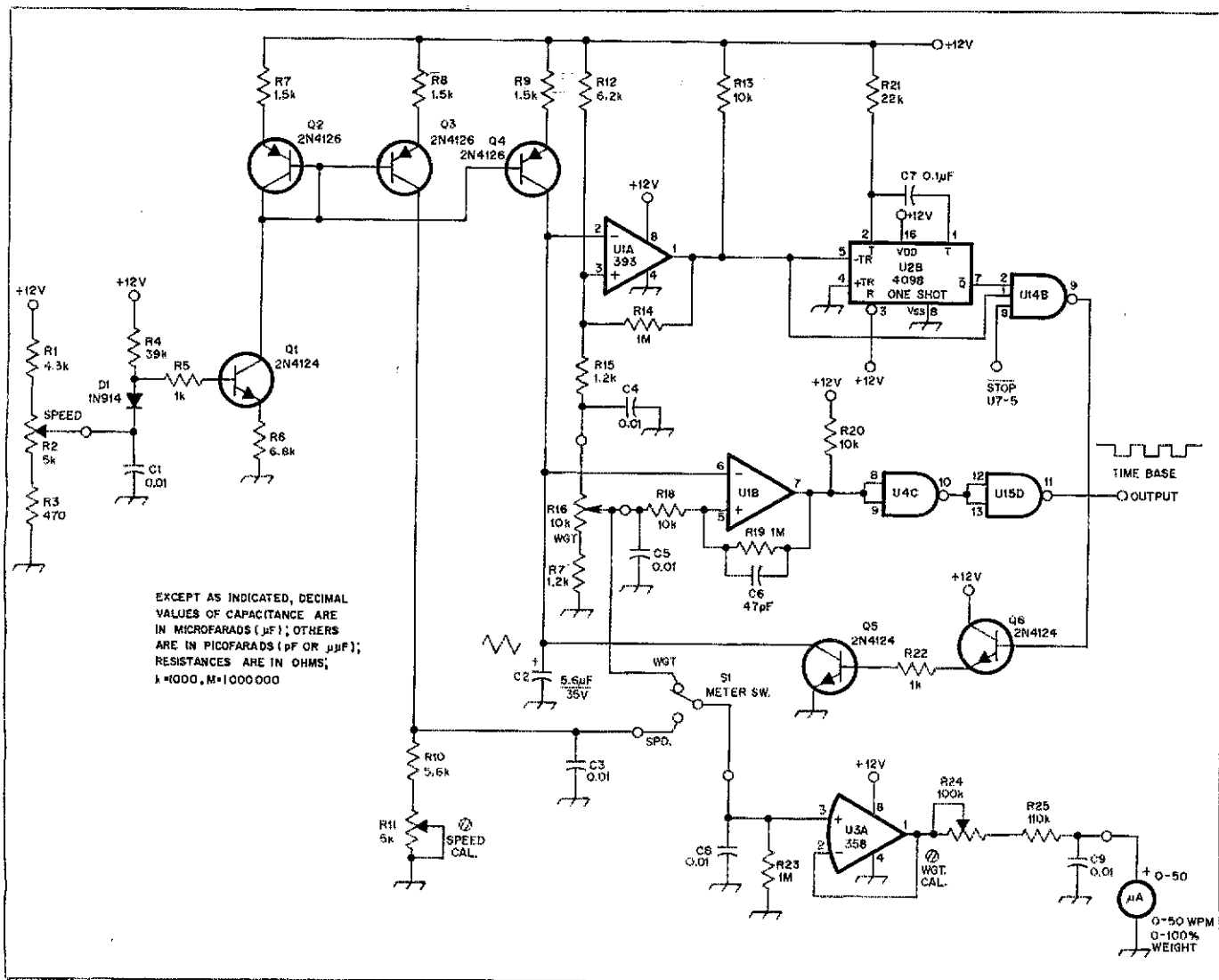


Fig. 4 — Schematic diagram of the time base. Capacitors are disk ceramic unless otherwise specified. Small circles signify pc-board terminals. Manufacturers listed below are the originators of the parts used by the author.

C2 — 5.6- μF , 35-V tantalum, type CS13B or 150D.

Q1, Q5, Q6 — 2N4124 or equiv.

Q2, Q3, Q4 — 2N4126 or equiv.

R2, R16 — Panel-mounting potentiometers.

R11, R24 — Trimmer potentiometer, Allen Bradley E2A, Bourns 3386P or equiv.

U1 — National LM393N or equiv.

U2 — RCA CD4098BE or equiv.

U3 — National LM358N or equiv.

U4, U14, U15 — See Fig. 5.

scratching, the reader should be able to work out the details. (The amount of head scratching would probably not be greatly reduced by a blow-by-blow description!)

The high input impedance of CMOS makes possible the simple RC slowdown network used at the paddle inputs, buffered by Schmitt inverters U4A and U4B. U6A and U6B form the dah and dit memories, with U7B keeping track of which paddle was struck last in the event both memories are set. U9A and U9B are the "present dah/dit" flip-flops, and they determine what is being sent. They get their input via multiplexers U8 and U5, with the input coming from various places in the circuit according to (1) whether the memories are set, and if so which ones was set last, (2) which mode (iambic or normal) is selected, and (3) whether both pad-

dles are closed. Depending on the above choices, the input to the "present dah/dit" flip-flops (U9) can come from the memories U6, the "last paddle" flip-flop U7, the same or opposite member of U9 or the paddles themselves.

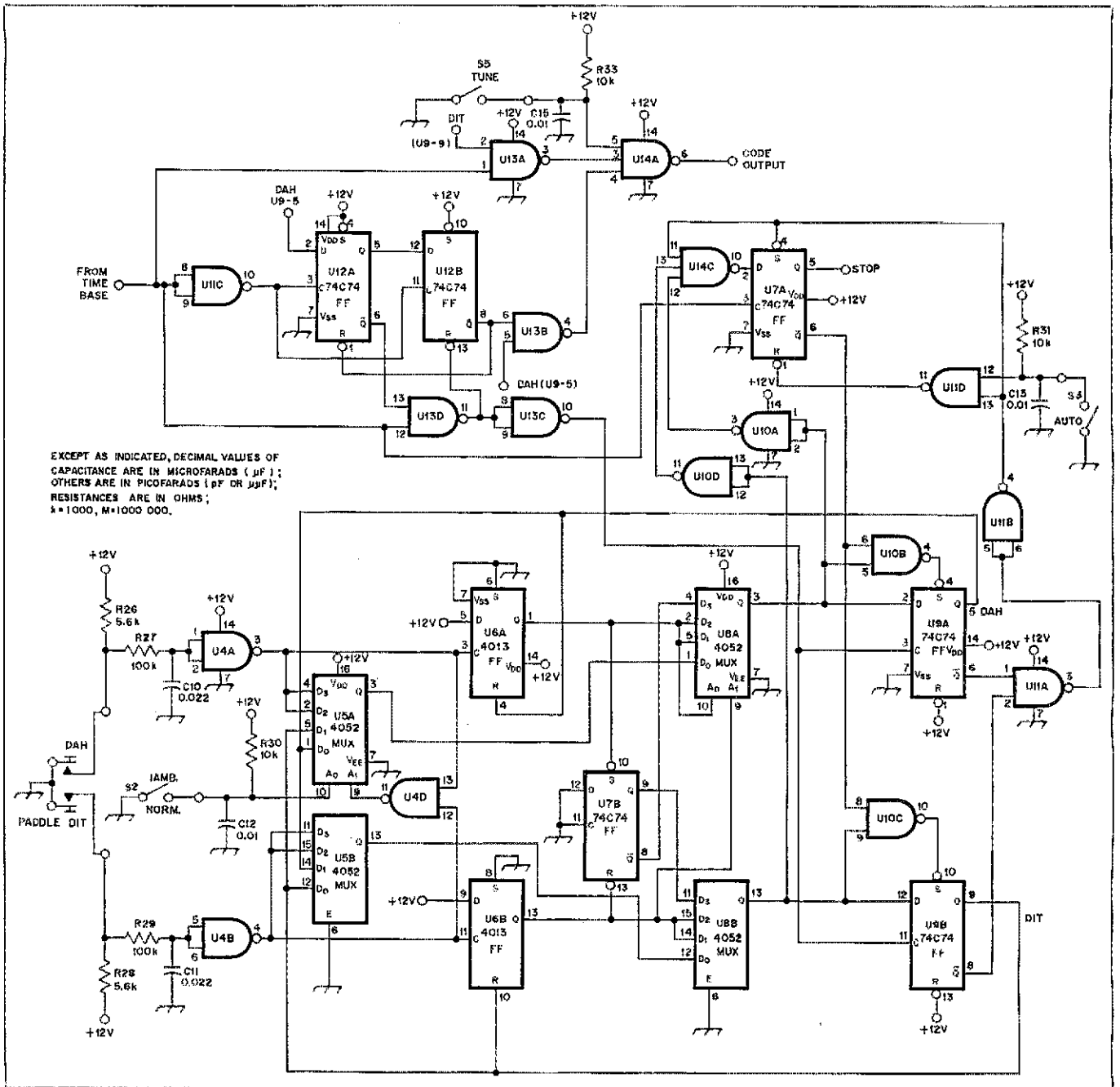
U12 and U13 form dits or dahs according to the state of U9. The code appears at the output of U14A; this circuitry also generates clocking pulses for U9 at times when the next dit or dah should begin. U7A and its associated gates halt the clock after a rising edge. Depending upon whether manual or auto character space has been selected by S3, this occurs either one dit space after the last dit or dah, or one character space later. U10B and U10C provide "jam loading" of U9 if the clock is in the halted state, causing immediate restarting of the clock and generation of

the character after such a pause. In the author's opinion, this ability to generate characters either synchronously, or asynchronously following a pause, is the nicest feature of the popular Accu-Keyer.

Keying, Muting and Sidetone

U15A and U15B of Fig. 6 form the standard CMOS all-purpose oscillator, with the code output from U14A enabling U15C, passing the sidetone output through to Q10. The latter operates Class C, heling out the sound via matching transformer T2. D6 prevents inductive catastrophe in Q10.

Q7 through Q9 form the keying circuit. Q7 is a follower to beef up the feeble CMOS drive current (less than 1 mA). The output of Q7 switches Q8 into saturation for positive keying, and pulls the emitter



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR μpF); RESISTANCES ARE IN OHMS; $k=1000$, $M=1000000$.

Fig. 5 — Schematic diagram of Versakever logic. "B series" CMOS is preferable to the older "A series," although the latter may be used if necessary.

U4 — Quad 2-input NAND Schmitt trigger, RCA CD4093BE or equiv.
 U5, U8 — Dual 4-input MUX, RCA CD4052BE or equiv.

U6 — Dual D flip-flop, RCA CD4013BE or equiv.
 U7, U9, U12 — Dual D flip-flop, National MM74C74N or equiv.
 U10, U11, U13, U15 — Quad 2-input NAND

gate, RCA CD4011BE or equiv.
 U14 — Triple 3-input NAND gate, RCA CD4023BE or equiv.

of Q9 up, putting Q9 into saturation for load currents less than 10 mA. Series diode D8 has been added to keep the negative keyed output near ground during keyed characters, since the collector of Q9 rises to +0.6 V. Zener diodes D7 and D9 protect their respective transistors against overvoltage and reverse polarity. The bypass capacitors and chokes are provided to keep rf out of the keyer.

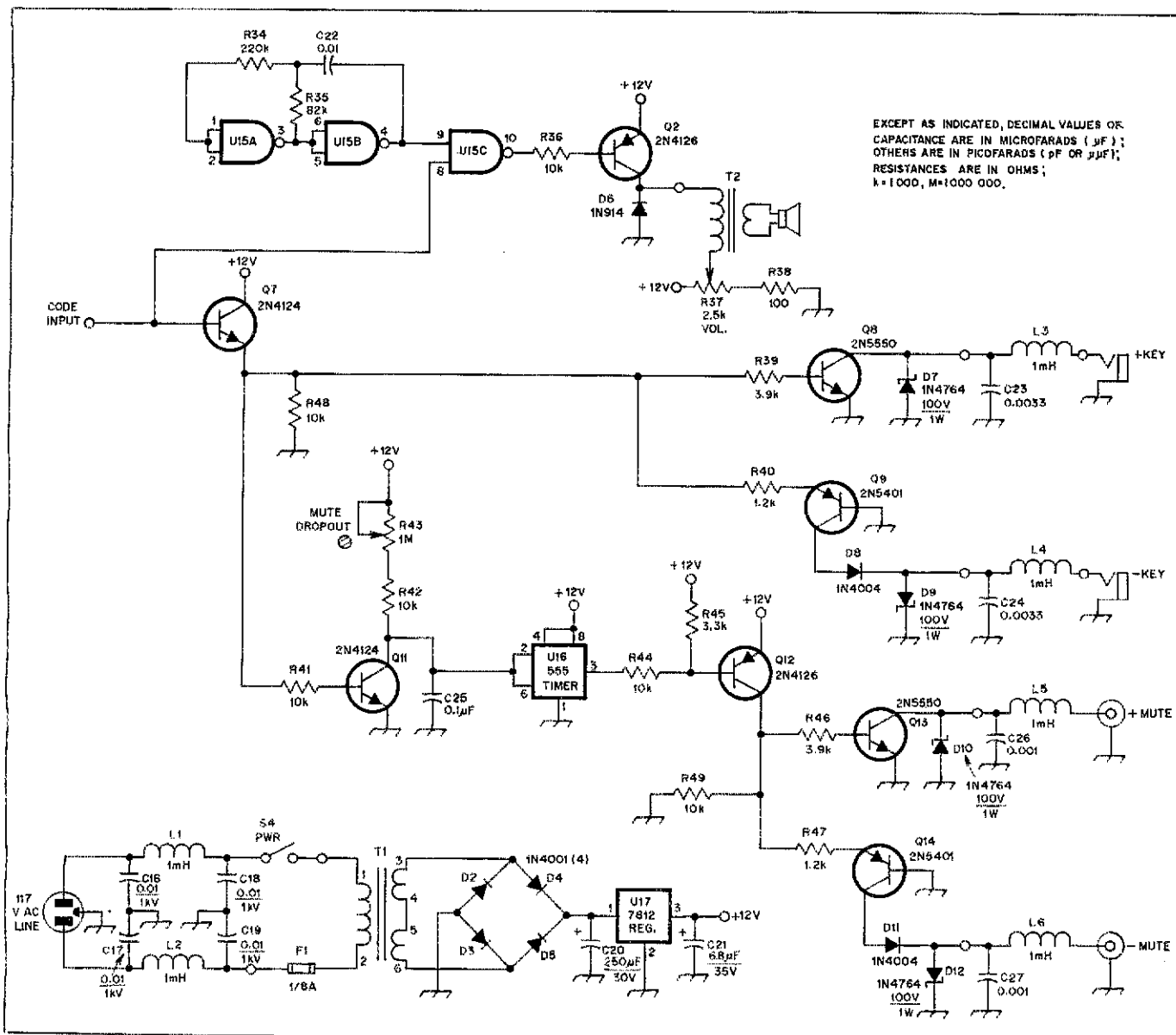
The receiver muting circuitry consists of U16, Q11-Q14, incl., and associated circuitry. The code signal keeps C25

(discharged, generating a high output from U16. At the end of each dit or dah, C25 charges up toward +12 V, giving a delayed logic low from the 555; Q12 inverts the output signal. The rest of the circuit is a carbon copy of the bipolarity keying output circuitry, to accommodate receivers with either polarity of muting signal. This circuit is designed for unmuting the receiver when the muting input is grounded, which appears to be universal. (If your receiver happens to be opposite, just remove Q12, jumper its base

to collector, and replace R44 with a jumper. The muting circuitry can be omitted if break-in operation is not desired.)

Power Supply

If you've gotten this far, the power supply section of Fig. 6 will be a pushover. CMOS draws essentially zero current. (There are bizarre tales of someone's circuit operating, with the power supply pin not connected, from current provided by a digital high input signal!) The entire keyer draws less than 30 mA, most of



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR μpF); RESISTANCES ARE IN OHMS; k = 1 000, M = 1 000 000.

Fig. 6 — Power supply and output circuitry.
 C20 — 250- μF , 30-V electrolytic, Sprague 39D257GO30EL4 or equiv.
 D7, D9, D10, D12 — 100-V, 1-W Zener diode, 1N4764 or equiv.
 L1-L6, incl., — 1-mH rf choke.
 Q7, Q11 — 2N4124 or equiv.
 Q8, Q13 — 2N5550 or equiv.

Q9, Q14 — 2N5401 or equiv.
 Q10, Q12 — 2N4126 or equiv.
 R37 — Panel-mounting potentiometer.
 R43 — Trimmer potentiometer, Bourns 3386P or equiv.
 T1 — 16-V, 50-mA secondary; Signal Transformer Co. PC-16-55 or equiv. (See note 6.)

T2 — Miniature audio transformer, 2000- to 8-ohm. (This impedance ratio is not at all critical.)
 U15 — See Fig. 5.
 U16 — Timer, Signetics NE555V or equiv.
 U17 — Regulator, Fairchild $\mu\text{A}7812\text{UC}$ or equiv.

which goes into the pnp output transistors and the sidetone. As a result, a simple power supply with pc-mounting transformer is entirely adequate. Fig. 6 shows the usual bridge followed by a three-terminal, 12-volt regulator. Ac line current is so low that ordinary 1-mH chokes can be used to decouple the line at rf, providing yet another defense against rf gremlins.

Construction Hints

The author built his keyer in an extruded aluminum cabinet that is no longer manufactured. Since the circuit is insen-

sitive to wiring and placement of panel controls, any metal cabinet can be used; even a plastic case would probably suffice. As the figures show, nearly everything mounts directly on the pc board³ which is attached to the case with four screws and standoff bushings. Fig. 7 shows all wiring not contained on the pc board itself.

Some pieces of advice: (1) Always use a three-wire line cord, with the green wire connected to the chassis. (2) Be sure to install screening over the speaker, to keep someone (yourself?!) from poking his finger through it. (3) Use cable ties or lacing to make a handsome job. Arrange

things so you can get at all controls, and especially the underside of the pc board, in case you have to replace any components. It's a good idea to gather all the wires going to a pc board along one edge and bring them away from the board in one neat bundle, so the board can be lifted up without having to unsolder anything. (4) To get a professional-looking front panel, try dry-transfer black lettering. I use Helvetica Medium, in sizes from 10 point to 16 point, sprayed with protective lacquer. (5) My favorite knobs are Alco KNS-501BA and KNS-701BA. The meter in the unit shown was made by Calctro

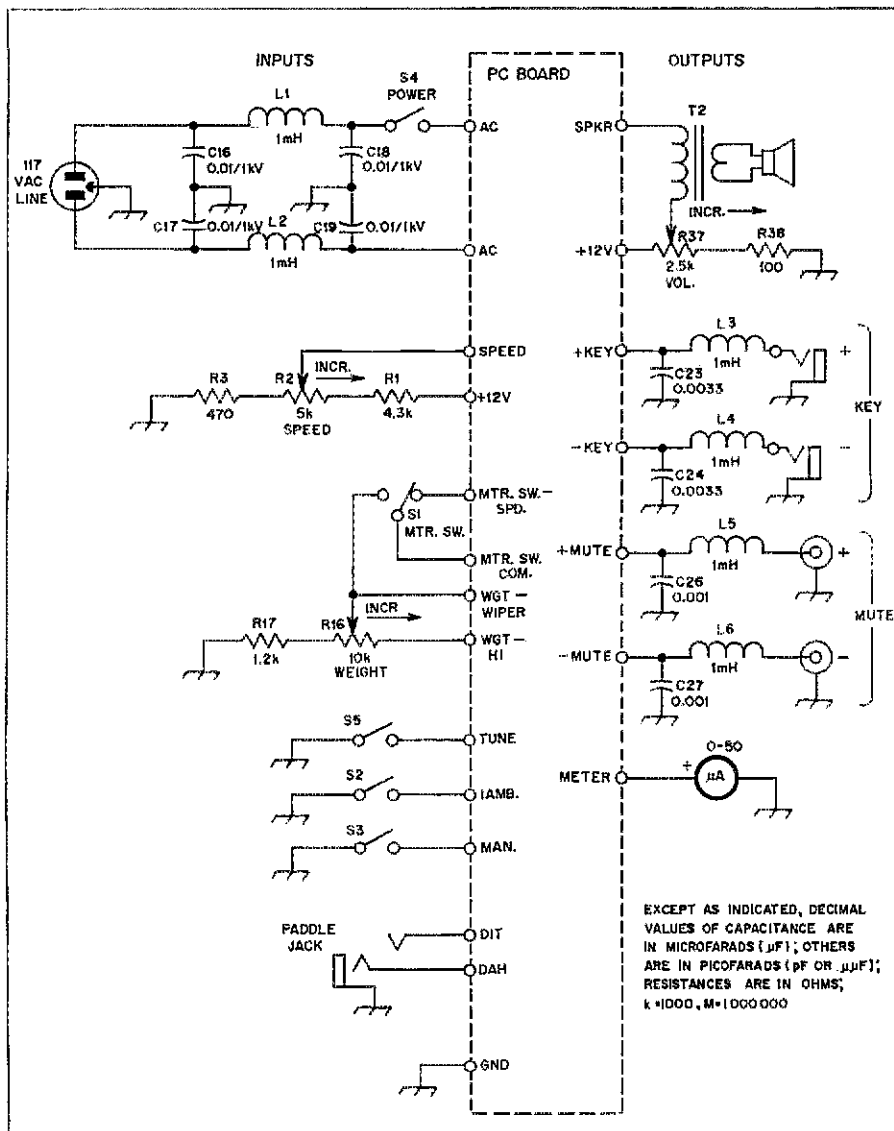


Fig. 7 — Wiring from the pc board to all external circuitry. Keying and muting leads should be filtered as shown where they enter the cabinet. A meter movement with a full-scale indication of up to 5 mA can be substituted with suitably altered values of R24 and R25. A commercial ac-line filter (such as Corcom 1R1) may be substituted for the power-line network shown.

and relabeled with dry transfers.

On stuffing the pc board: (1) CMOS logic is susceptible to damage from static discharge, and special handling is required. In particular, you must hold onto the pc board with one hand while inserting the chips with the other, to provide a discharge path for any static charge that may have built up. This problem is most serious in dry winter climates. Once the chips are installed, problems are unlikely. (2) Be sure to purchase your chips from a reputable supplier. (Avoid "bargain-basement" suppliers.) I've had no trouble when buying from large suppliers such as Arrow, Cramer, Hamilton/Avnet, Harvey, Newark or Schweber. (3) If you decide to use IC sockets, the best kind (and the most expensive) are the "pin and jack" type, such as Augat AG14-10D and AG16-10D. It's a good idea to use sockets for terminals for the output keying trans-

sistors as well. (4) Thermostat type soldering irons such as the Weller WTCPN or UNGARmatic are ideal for printed circuits. Use 700°F (370°C) tips. (5) It's best to install swaged terminals shown as in Fig. 3 (I used Vector T-19), rather than soldering external wires directly to the pc pads. (6) Finally, after all parts are installed and soldered, it's a good idea to deflux the board. Just lay it in a tray of alcohol and scrub with a small flux brush — or else it will look just awful in a few years when you may not be around to defend it!

Based on current prices, the parts on the pc board should cost around \$30. Consult the ARRL Parts Supplier list on page 17-11 of the 1979 *Handbook*.

Operation

When you're satisfied that all wiring is correct, it's time to try the keyer out.

There are just three adjustments — two meter calibrations and a muting-delay control. The weight calibration must be done first. If you have a scope, set the front-panel weight control for equal-width dits and spaces. Then adjust the "weight cal" trimmer, R24, for a 50-percent meter reading (half scale). If you don't have a scope, set the weight control to maximum, then adjust the trimmer so the meter reads 90.3 percent. To adjust the speed calibration, set the front panel speed control to get exactly five dits per second, and then adjust the "speed cal" trimmer, R11, for a 12-wpm meter reading. If break-in is used, the muting delay trimmer, R43, should be adjusted for the shortest delay time that allows break-in operation without great receiver pops and thumps. The keying and muting outputs can handle positive loads up to 100 V at 100 mA and negative loads up to 100 V at 10 mA.

The various modes of operation are probably familiar to keyer buffs, but it's worth pointing out a few details. First of all, dits and dahs are self-completing, and a subsequent dit or dah cannot be formed after less than one dit space. When either paddle is struck momentarily, it will set the corresponding memory unless its character (dit or dah) is being sent. In the latter case, the paddle must be held until the beginning of the next dit or dah. In the iambic mode, dits and dahs alternate when both paddles are closed. In the "normal" mode, the keyer emulates the ultimate: If the dit paddle is down and you then close the dah paddle, the keyer switches to dahs; releasing the dah paddle, or releasing the dit paddle and closing it again, causes the keyer to revert to dits. (It's easier done than said!)

In the automatic spacing mode, the keyer mandates a full letter space if you delay a dit or dah more than the standard dit space, while with manual spacing it "goes to sleep" one dit space after the last dit or dah, letting you form any length letter space you want. In either mode it "wakes up" again immediately when a paddle is struck, rather than forcing you to wait for a clock cycle.

The Versakeyer should operate reliably through sleet and snow, hurricane and blizzard. If not, standard troubleshooting procedures will help locate the offending component. If you've used sockets, simple IC substitution will usually suffice. □

Notes

- ¹Horowitz, "CompuCoder — A Buffered Morse/RTTY Keyboard Keyer with Advanced Features," *QST*, June 1975. There are no changes to the original design; pc boards are still available from the author (drilled only) at the original price.
- ²Kaye, "The All-Electronic 'Ultimate' Keyer," *QST*, April 1955.
- ³Garrett, "The WB4VVF Accu-Keyer," *QST*, August 1973.
- ⁴The MB-583, which measures HWD 3 × 8 × 5

Strays

IT'S THAT TIME OF YEAR

☐ *QST* will list your hamfest in its monthly Hamfest Calendar, free of charge. There are certain guidelines, however.

Hamfests will be listed only once. If the event will occur before the 10th of the month, it will be listed in the previous month's *QST*. If it will occur on or after the 10th, it will be listed in that month's *QST*. The deadline for receipt at ARRL hq. of hamfest information is the 18th of the second month preceding publication.

In other words, if your hamfest will occur on August 5, the information must be in our hands by May 18 (preferably sooner) to make the deadline for the July issue. If your event will occur on August 12, it should get to Hq. by June 18 for the August issue.

We will acknowledge all information received at Hq. for the Hamfest Calendar with a postcard stating the date of publication. If you do not receive an acknowledgement within two weeks, your letter may never have arrived at Hq., so send us a duplicate copy.

Oh, yes. The Hamfest Calendar is separate from the hamfest section of the Ham Ads. See the first page of the Ham Ads section in this issue for more information. — *Marge Tenney, WB1FSN*

A JUMP IN TIME SAVES 10

☐ Amateur Radio ingenuity paid off for 10 members of the Tuscaloosa (AL) ARC recently. After a club meeting, their elevator got stuck between floors of a building at the University of Alabama. W4WYP's hand-held couldn't bring up the autopatch on the local repeater, but WD4DAV overheard his call for assistance and notified the campus police. As it was 80 degrees that evening, the trapped hams became impatient, and decided to try a solution suggested by WA4CHV. Jim reasoned that the elevator was overloaded, and if they all jumped at once, it should resume its journey upward. To their relief, it worked — each jump raised the elevator 6 inches. They were about even with the third floor when the campus police finally pried open the door, only to discover 10 grown men jumping up and down in unison. — *Kelly Bruce, WD4DAT*

I would like to get in touch with . . .

☐ hams active in diplomatic and consular services. Donald A. Brody, K6QZZ, Consul General of the Republic of Malawi, 4504 Coolhaven Ct., Westlake Village, CA 91361.

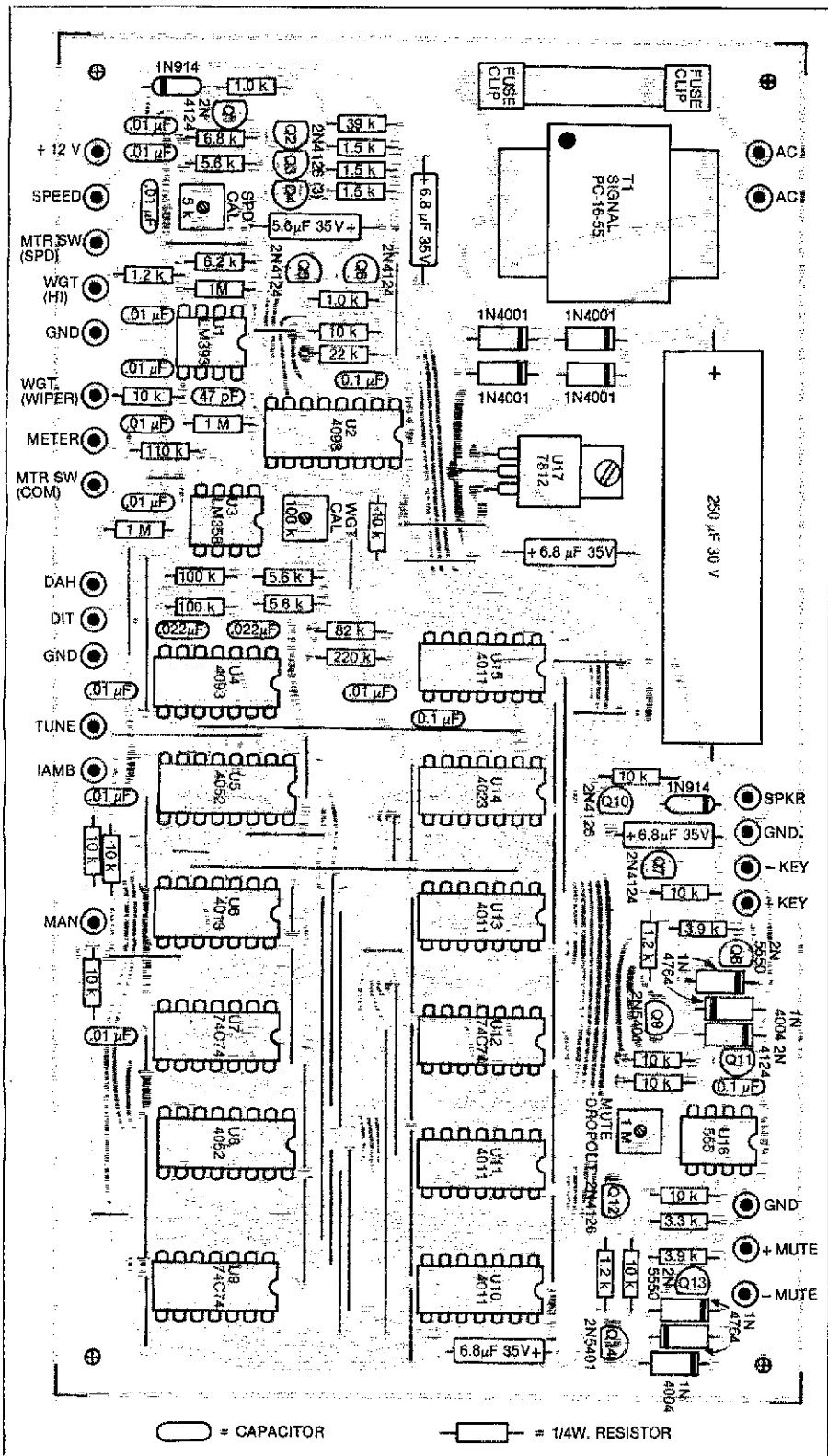


Fig. 8 — Parts-placement guide for the Versakeyer circuit board, as viewed from the component side. The shaded area represents an X-ray view of the copper pattern. (The etching pattern appears in the "Hints and Kinks" section of this issue.) Resistances are in ohms; k = 1000, M = 1,000,000. Wire jumpers are indicated by unmarked straight lines.

inches (76 × 203 × 127 mm), from LMB, 729 Ceres Ave., Los Angeles, CA 90021 looks good, although the pc board may be a tight squeeze.

Printed circuit boards are available from the author for \$12.50 postpaid. They measure 4.2 × 7.6 inches (107 × 193 mm), and are on FR-4 (G-10)

fiberglass epoxy stock. Assembly and parts-location drawings are included.

The PC-16-55 transformer is available from Signal Transformer Co., 500 Bayview Ave., Inwood, NY 11696. At the time of writing, it costs \$6.44 plus \$1 shipping.

An Experimental VMOS Transmitter

Working with power FETs is like revisiting the world of triode tubes — almost! This four-FET cw rig for 10 or 15 meters illustrates a few design methods you can apply.

By Doug DeMaw,* W1FB

MOS field-effect transistors have been updated from the small-signal world to a medium-power frontier! RCA initiated the MOS (metal-oxide semiconductor) movement many years ago with its 3N140 series of MOSFET transistors. Later, RCA introduced the still-popular 40673 dual-gate (protected) MOSFET. But for many years after the “Sarnoff gang” and other semiconductor manufacturers established themselves in the small-signal MOS market, progress seemed to stagnate.

In the early 1960s the Japanese began developing power VMOS devices, and eventually obtained the first patent for the technique. Their devices were used in hi-fi amplifiers. Meanwhile, some American firms experimented with power JFETs, but gave up because of frequency limitation and instability problems brought on by excessive junction capacitances.

A U.S. breakthrough came in late 1975 when Siliconix released the VMP-1 VMOS PowerFET.¹ It was the first U.S.-made “vertical-groove” MOSFET for medium power. Later, Siliconix released its vhf/uhf version, the VMP-4. Amateurs began working with the Siliconix VMP-1 and VMP-4 hf and vhf devices, despite relatively high single-lot cost. Some hi-fi equipment manufacturers were using “vertical FETs” in their amplifier output stages, and the show officially hit the road at that time.

Today, the state of the power FET art has blossomed to include devices of various power levels and package formats. Supertex Corporation² and International Rectifier³ have entered the VMOS power field, and others are on the brink of doing so. With this increase in manufacturing effort the prices have dropped to a level which most amateurs can afford.

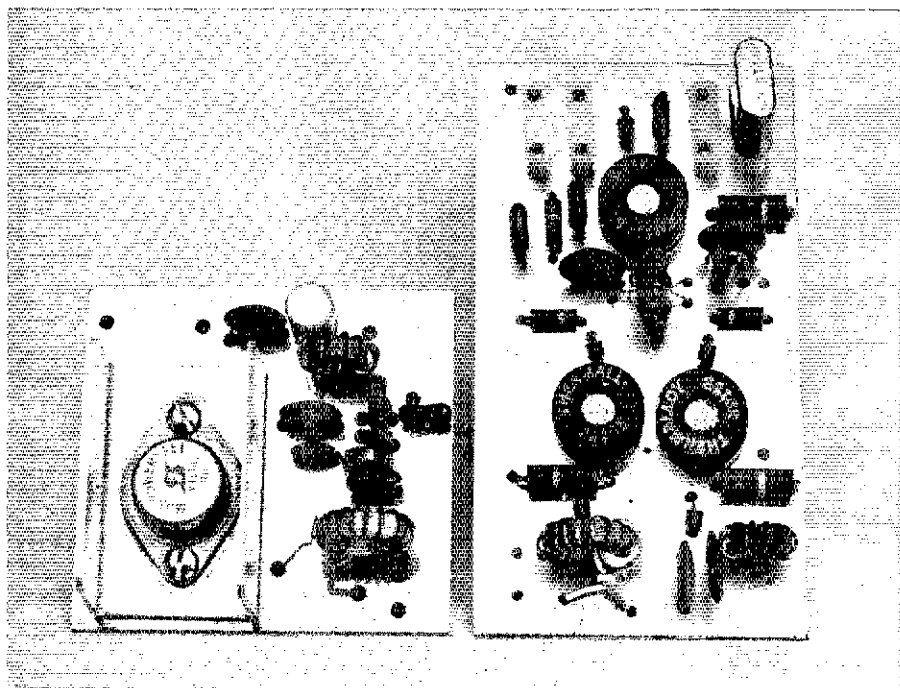
This article does not treat the chemistry of power FETs. Rather, it shows the ex-

perimenter some workable approaches to transmitter design while using these modern transistors. The most significant highlights of power FETs are (1) immunity to damage from mismatch, (2) no thermal runaway, (3) no secondary breakdown, and (4) no change in input capacitance versus drive level and operating frequency. This makes them ideal for use in broadband rf linear amplifiers.

If limitations are to be cited, one might mention the maximum gate-voltage swing restrictions. VMOS transistors which have built-in gate-protection Zener diodes are limited to 15 volts (forward) on the gate. Devices without Zener-diode protection have a maximum gate-source rating of ± 30 volts. The efficiency of power FETs which contain Zener diodes is somewhat below that obtained with “unZenered”

units, especially at the upper hf region and above. There is a trend at present toward eliminating Zener-diode protection in VMOS power FETs.

One other feature that sets VMOS transistors apart from bipolar types is the higher operating voltage. Although most power FETs can be made to operate at potentials as low as 12 or 13 volts, the efficiency and power output suffer considerably. Four popular maximum drain-source voltage levels are available: 90, 80, 60 and 35. In audio and rf circuits the sine-wave energy will swing to as much as twice the supply voltage, so the dc operating voltage must be chosen accordingly. Thus, a maximum dc drain-source voltage of 30 would be used with a power FET which had a maximum rating of 60 volts, and so on. An operating voltage of 24 to 28 is perhaps the most common



The exciter and PA modules. Heat sinks are used with all four transistors.

*Senior Technical Editor, ARRL
¹Notes appear on page 22.

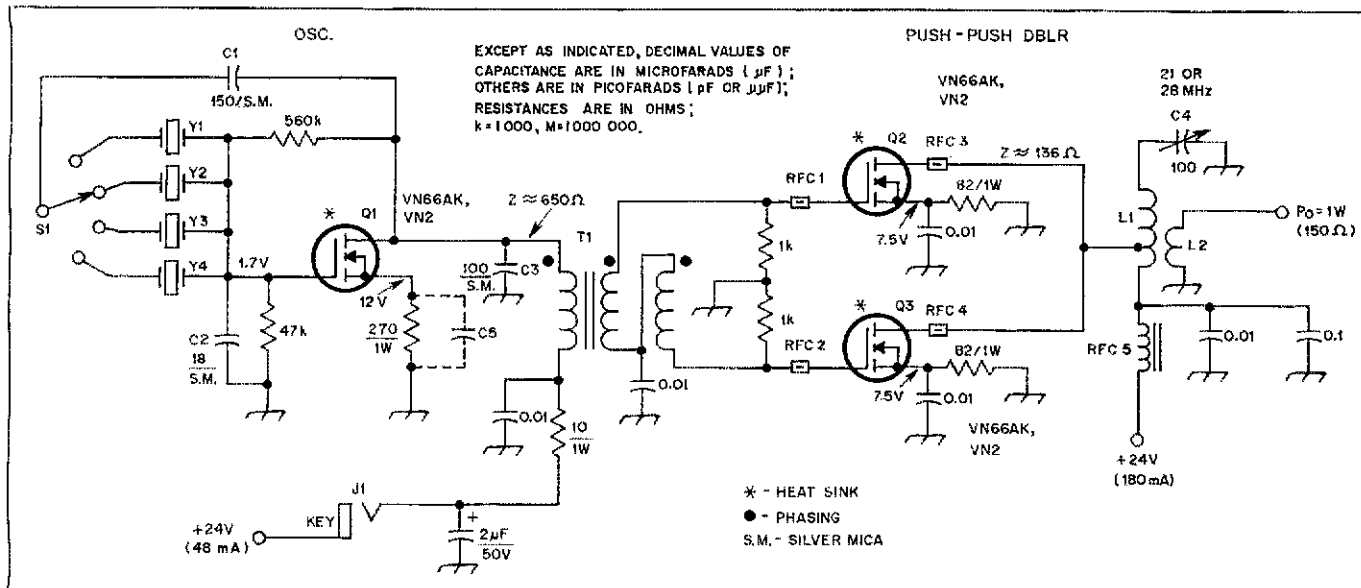


Fig. 1 — Schematic diagram of the VMOS exciter strip. Fixed-value capacitors are disk ceramic unless noted differently. Fixed-value resistors are 1/2-watt composition unless otherwise indicated.

C1, C2, C3, C5 — For text reference.
C4 — 100-pF miniature air variable or mica compression trimmer (ARCO 423).
J1 — Phone jack.
L1 — 12 turns no. 22 enam. wire on T68-6 toroid core (0.7 μH). Tap 7 turns above RFC5 end.
L2 — 3 turns of no. 22 enam. or hookup wire over RFC5 end of L1.

Q1, Q2, Q3 — See text.
RFC1-RFC4, incl. — Miniature 950-mu ferrite bead. (This and all other beads and toroids for this project were furnished through courtesy of Amidon Associates, 12033 Otsego St., N. Hollywood, CA 91607.)
RFC5 — 10 turns no. 20 enam. wire on T50-43 (950-mu) ferrite toroid core.
T1 — Broadband transformer; 15 trifilar turns

(10 twists per inch) of no. 28 enam. wire (18 μH) on T50-61 (125 mu) ferrite toroid core. *Observe polarity.*
Y1-Y4, incl. — International Crystal Mfg. Co. type GP, 30-pF load capacitance, HC-6/U holder. Sockets are F-605 pc mount (same manufacturer). See text.

range for the smaller VMOS devices. It should be said, however, that some manufacturers presently have VMOS components which are rated at 400 volts maximum, drain to source.

A 1-Watt Exciter Strip

The circuit of Fig. 1 contains three TO-39 size VMOS devices. The circuit was developed around three Supertex VN-21 transistors, which have a 40-volt V_{DS} maximum rating. The Supertex part number has been changed recently to VN2. Thermalloy no. 2215B crown heat sinks are used on each of the transistors.

Q1 operates as a Pierce oscillator, with Y1 through Y4 being fundamental-cut crystals at half the transmitter output frequency. This technique greatly minimizes the occasion for chirp when the oscillator is keyed.

A forward voltage of 1.7 is applied to the gate of Q1. This is because VMOS devices operate in the *enhancement* mode. Therefore, a positive gate voltage is required to "turn on" the transistor. Without it the circuit will not oscillate. The 270- Ω source resistor at Q1 is used to limit the oscillator drain current and establish a 12-volt dc drain-source voltage. For use at 10.5 MHz, Q1 does not require a source bypass capacitor (C5) unless the crystals are sluggish. If crystals are used which do not permit oscillation, C5 can be added to reduce the degeneration caused by the unbypassed source resistor. Degeneration is desirable in this

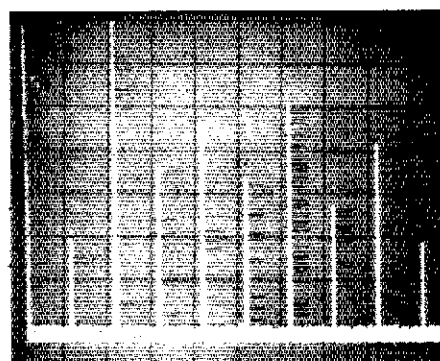
circuit, owing to the extremely high transconductance of power FETs — a g_f of approximately 250,000 μmhos ! For the same reason, feedback capacitor C1 is quite low in value. Excessive feedback will cause a very "dirty" output waveform and will lead to a poor cw note. Furthermore, excessive drain current will flow and the crystals could be damaged. In selecting a value for C5, if it is used, employ only that amount of capacitance which ensures quick oscillator starting. Typical values range from 10 to 100 pF.

This exciter strip can also be used for 28-MHz operation. It requires no changes other than the possible addition of C5 and the use of crystals cut for 14 MHz. The Q2/Q3 drain tank will tune to 21 or 28 MHz with the values specified.

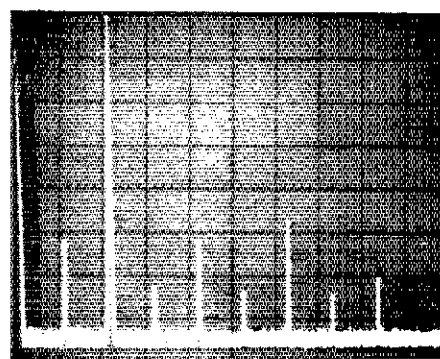
C2 and C3 are part of the feedback circuit, and the values given are suitable for operation on 10 or 15 meters (10.5 or 14 MHz, actually).

Broadband transformer T1 converts the single-ended oscillator output to a push-pull condition. Since Q2 and Q3 operate in a push-push doubler arrangement, the gates must be excited 180° apart. T1 accomplishes this. A gate-to-gate pk-pk voltage of 15 is obtained across the 1-k Ω gate resistors of the doubler.

A single 950-mu miniature ferrite bead is used at each gate and drain terminal of Q2 and Q3. This step was required to damp some vhf parasitic oscillations which became manifest. An 82- Ω resistor is used between source and ground at Q2



(A)



(B)

Fig. 2 — Spectral displays showing (A) the doubler output before filtering, and (B) after FL1 was added. Measurements were done by means of an HP 141T-8553B-8552B spectrum analyzer. Vertical scale is 10 dB per division. Horizontal scale is 10 MHz per div. The vertical white line at the far left is zero frequency (reference).

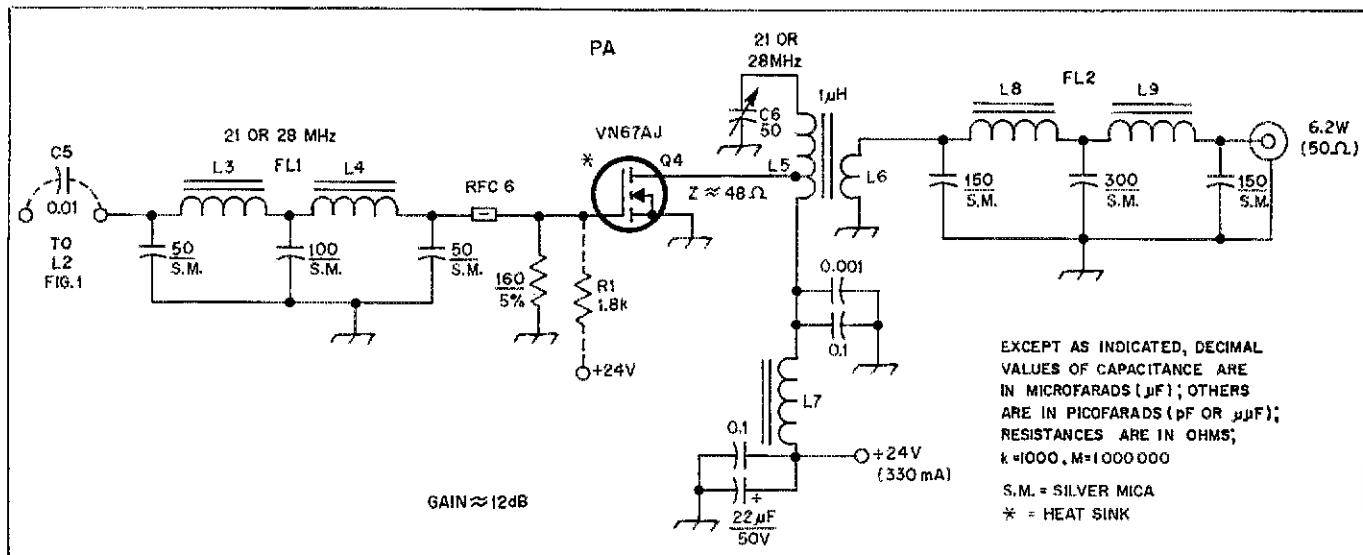


Fig. 3 — Circuit diagram of the VMOS power amplifier. Fixed-value capacitors are disk ceramic unless otherwise noted. The polarized capacitor is electrolytic.

- C5 — See text.
- C6 — 50-pF miniature air variable or mica trimmer (ARCO 422).
- FL1 — Low-pass filter, select for band. 150-Ω impedance, $Q_L = 1$.
- FL2 — Low-pass filter, select for band. 50-Ω impedance, $Q_L = 1$.
- L3, L4 — For 15 meters, 1.1 μH; 17 turns no. 22 enam. wire on T37-2 toroid core

- ($\mu = 10$). For 10 meters, 0.8 μH; 14 turns no. 22 enam. on T37-2 toroid core. Capacitors for 10 meters are 39 pF (ends) and 75 pF (center). See text.
- L5 — 1-μH inductor; 14 turns no. 20 enam. wire on T68-6 toroid core ($\mu = 8$). Tap three turns above L7 end.
- L6 — 4 turns no. 22 insulated wire over L7 end of L5.

- L7 — 10 turns no. 20 enam. wire on FT-50-43 (950 mu) ferrite toroid core.
- L8, L9 — For 15 meters, 0.368 μH; 9 turns no. 22 enam. wire on T37-2 toroid core. For 10 meters, 0.275 μH; 8 turns no. 22 enam. wire on T37-2 core. Capacitors for 10 meters are 100 pF (ends) and 200 pF (center).

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
S.M. = SILVER MICA
* = HEAT SINK

and Q3. This establishes a safe drain-source dc voltage of 16.5.

The drains of Q2 and Q3 are connected in parallel and tapped well down on L1 to effect an impedance match. Coupling to the PA stage is done at 150 Ω. L2 is tailored accordingly. Siliconix VN66AK transistors can be used as direct substitutes for the VN2s. Although the VN66AKs will handle 60 volts (V_{DS}), there is no need to eliminate the three source resistors. Without the resistors, more power than is needed would be generated, thereby causing circuit complications which would dictate some design changes.

Fig. 2 shows the spectral traits of the doubler. The display at A shows the 10.5-MHz energy down 51 dB from peak power (11 dB better than FCC specifications), but the harmonics of 10.5 and 21 MHz do not all meet the legal requirement [Part 97.73 of the FCC rules — Ed.]. For example, the third harmonic of 21 MHz is down only 19 dB from peak power! Therefore, if the exciter strip were used directly into the antenna it would be bad news, indeed! But, beyond the matter of legal compliance, the drive to the PA should be reasonably clean too. The spectral display at B of Fig. 2 shows the doubler output after a simple half-wave harmonic filter was added (L3 and L4 of Fig. 3). All spurious energy is down 48 dB or greater. The power reaching the gate of the PA stage, after filtering, is approximately 330 mW. Part of the power ob-

tained before filtering (1 W) was composed of harmonic currents.

One of the desirable features of power FETs is that *voltage*, rather than power, is needed to excite them. This is not true of bipolar transistors. When using VMOS devices we need be concerned only about having ample power to develop the desired peak voltage at the FET gate. The 330 mW of driving power available after FL1 will develop 20 volts pk-pk across the 150-Ω parallel resistance of the Q4 gate resistors.

FL1 was actually tested by terminating it with a 150-Ω, 1-watt resistor. The C_{iss} (input capacitance) of Q4 is roughly 33 pF. This suggests changing the output capacitor (at Q4) of FL1 to 18 pF to provide the proper value of capacitance. Although this was not done by the writer, overall transmitter performance was as expected (or hoped for!).

If the exciter strip is to be used by itself as a QRP transmitter, FL2 of Fig. 3 should be substituted for FL1. L2 will contain only two turns of wire, and the harmonic filter will be connected directly to the output terminal of L2. The constants given for FL2 are necessary when a 50-Ω transmission line is used. FL1 is designed for a 150-Ω bilateral impedance.

The VMOS Final Amplifier

Details of the PA stage are shown in Fig. 3. A Siliconix VN67AJ is used. The single-lot price at the time this article was written worked out to roughly \$4.25. A

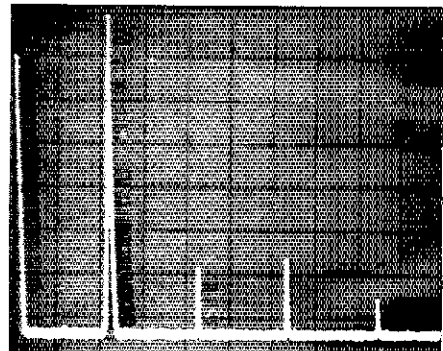
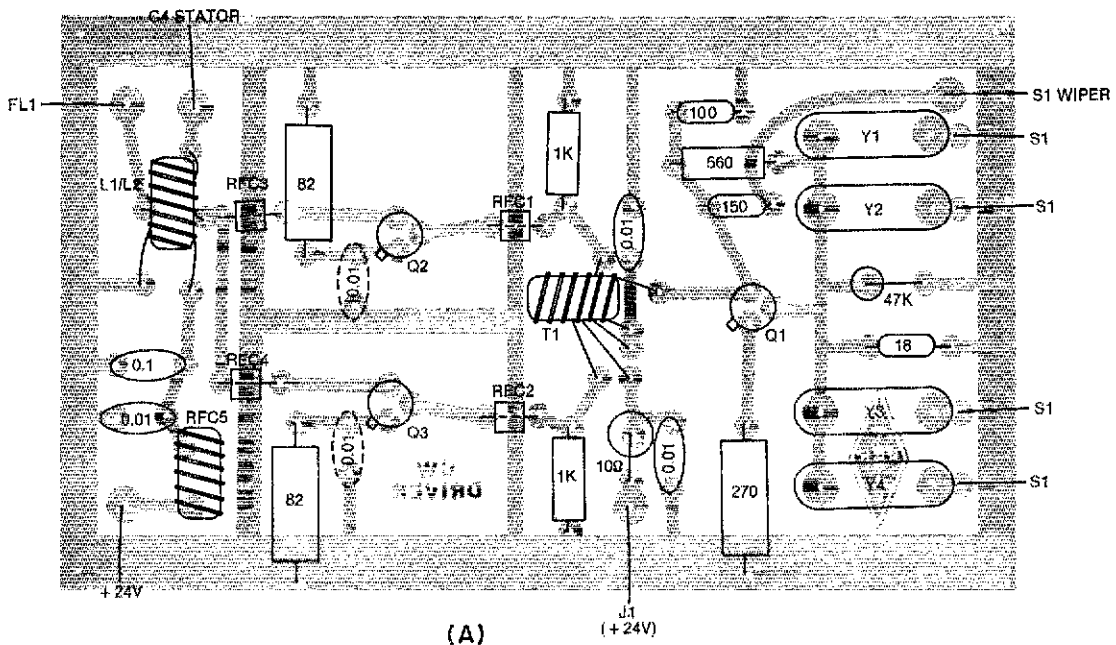


Fig. 4 — Spectral display of the PA stage at 6.25 watts of output. Measurement was made with FL2 in the line. Scale calibration is the same as for Fig. 2. All spurious responses are -56 dB or better. The 10.5-MHz oscillator frequency is but a pip in the base line. The spectrograph was taken with Q4 operating in the Class AB mode.

Supertex VN0106N should be entirely suitable as a substitute at Q4.

R1 is used to change the operating mode of Q3 from Class C to the Class AB region. If it is not used, the 160-Ω gate-return resistor can be changed to 150 Ω. When R1 is in parallel (at ac) with the 160-Ω resistor, the resultant value is 147 Ω. When both resistors are used (as a dc voltage divider) approximately 2.1 volts of dc are applied to the gate. This places the amplifier in a linear mode.

Comparisons between Class C and Class AB operation indicated an efficien-



(A)

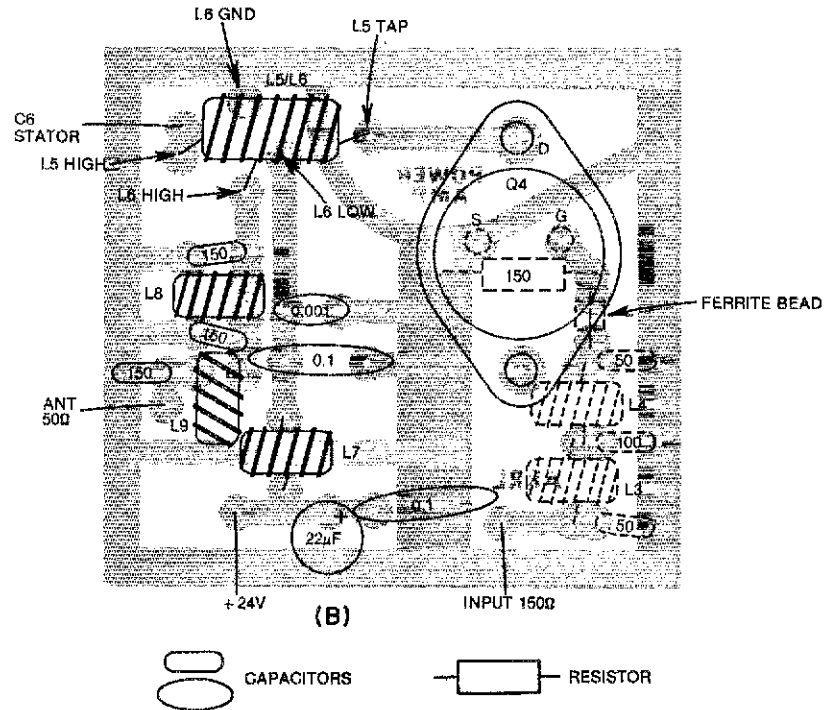
cy of 85 percent for Class C and 79 percent for Class AB. Some engineers have reported efficiencies up to 90 percent with power FETs in the hf spectrum and lower.

Power output from Q4 was slightly less during Class C operation — roughly 5.0 watts, but, the spectral purity was not as good as when operating in the linear mode. Under Class C conditions the spurious energy was 40 dB or greater below peak power, but during linear operation the spurs dropped to 56 dB or greater below peak power. Fig. 4 shows the spectral display obtained at the output of FL2 during Class AB operation. When R1 is used, resting drain current (no signal) is 40 mA. No meter reading is noted during Class C operation when excitation is removed.

RFC6 is a single 950-mu miniature ferrite bead. It prevents unwanted vhf parasitic oscillations. FL1 is mounted on the bottom of the circuit board and FL2 is on the upper (ground-plane) side of the board: Double-sided pc board is used for both transmitter modules.

If the PA is used with the exciter strip of Fig. 1, C5 of Fig. 3 is placed between the two modules as indicated (short leads). This prevents the Q4 bias voltage from being shorted to ground through L2.

Drain current for Q4 during excitation is 330 mA, Class AB. It is 250 mA in the Class C mode. For tune-up purposes a 500-mA meter can be switched between the drain supply to Q2/Q3 and that which feeds the drain of Q4. Both transmitter stages are tuned for a dip in drain current, just as one would do with a narrow-band tube type of rf amplifier. It is important that the push-push doubler and the PA be tuned for a dip in drain current. This ensures the best spectral purity at the



(B)

Fig. 5 — Parts-placement guides for the Experimental VMOS Transmitter. The boards are double-sided, with unetched copper forming a ground plane on the component side. (Clearance holes are required for the leads.) The shaded area represents an X-ray view of the copper pattern on the "back" side of the board. Parts shown in broken lines are mounted on the pattern side of the board. Etching patterns appear in the "Hints and Kinks" section of this issue.

transmitter output. Proper tuning of the push-push doubler establishes the required condition for minimum 10.5-MHz feedthrough to the PA. Similarly, tuning for the dip at Q4 suppresses the 10.5-MHz component and lowers the level of the 21-MHz harmonics.

Output capacitance (C_{oss}) of Q4 and most similar VMOS devices is on the order of 35 pF. Since the drain of Q4 is tapped well down on L5, it has a minor effect on

the tank circuit. C6 will permit resonating the drain tank on 21 or 28 MHz with the inductor values given for L5. FL1 and FL2 need to be modified for 10-meter operation, as noted in the parts list for Fig. 3.

Power output can be increased by elevating the forward gate voltage of Q4 to a maximum of 4. This will shift the operating mode toward Class A, thereby degrading the stage efficiency. The trade-

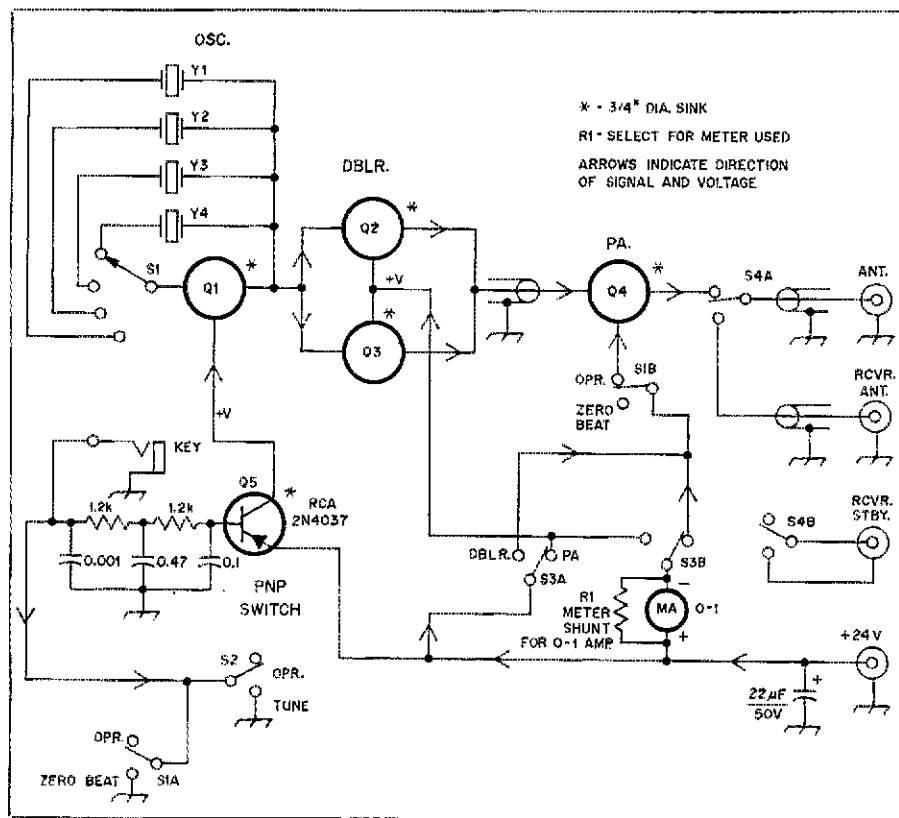


Fig. 6 — Block diagram showing how the VMOS transmitter can be wired. S1 is a single-wafer, single-pole, 4-position phenolic or ceramic switch. The remainder of the switches are miniature toggle types or a suitable substitute. R1 is chosen experimentally to provide 0.1 ampere. A Simpson 2121 meter with a 0-1 mA movement was used in the prototype (1-1/2 inch or 38 mm). It required exactly 2-1/4 inches (57.15 mm) of no. 32 enameled wire for the shunt. The wire was wound on the body of a 1-MΩ, 1/2-W composition resistor, then soldered directly across the terminal lugs of M1. Subminiature coaxial cable (RG-174/U) can be used for all rf connecting leads other than at S1. Metering is provided for the doubler and PA stages to permit tuning for a dip in drain current.

off may not be worth the relatively small increase in output power.

Assembly and Operation

Fig. 5 is a parts-placement guide for the two circuit boards used in this experimental transmitter. Fig. 6 is a block diagram showing how the VMOS transmitter can be wired to permit zero beating, tune-up, crystal switching and antenna changeover.

Circuit boards, negatives and parts kits for this experimental transmitter can be purchased.⁴ Those making their own boards should employ double-sided board stock. The surface on the component side of each board serves as a ground plane to discourage rf ground loops which can cause instability. The ground plane must be made common to the ground foils on the etched sides of the boards. A few through-connections can be made by drilling no. 60 size holes at random spots, then joining the top and bottom ground conductors by means of short lengths of bare wire and solder.

Silicone heat-transfer compound is placed on the bodies of Q1, Q2 and Q3, and between the mating surfaces of their heat sinks. Q4 is mounted on a homemade

heat sink which is a U-shaped channel of aluminum. It is 1/16 inch (1.6 mm) thick, 2 inches (51 mm) long and 1-1/4 inch (32 mm) wide. The wings of the U channel are 3/4 inch (19 mm) high. The heat sink is common to the ground-plane foil of the PA board, but Q4 is isolated electrically from the board, heat sink and circuit ground by means of a TO-3 mica washer. *Note: The drains of all four FETs are common to the cases.* Silicone grease is used between the heat sink and the pc board. It is also used on both surfaces of the mica insulator. Nylon screws and nuts (no. 6 size) can be used to affix Q4 and the heat sink to the pc board. If metal screws and nuts are used, the mounting holes in the pc board and heat sink will have to be no. 10 size and the two mounting screws will need to be centered in those holes before tightening. This will prevent shorting the case (drain) to ground. An ohmmeter can be used to check from drain to ground after installation is completed.

A 1-A, 24-V regulated power supply is recommended for use with this circuit. Small battery packs are not suitable because of the 558-mA total transmitter drain. Two 12-V lantern batteries con-

nected in series would suffice for short-term emergency use. The longevity of the batteries could be extended by operating the PA stage in Class C. A suitable battery supply might be two series-connected 12-V motorcycle batteries. They could be recharged as required.

Summary

Power FETs are definitely threatening to replace power bipolar transistors. As this article was being written in February of 1979, one major manufacturer of VMOS devices reported an 85-watt power output on 6 meters with VMOS devices. The operating voltage was 50. Another manufacturer who was just entering the power VMOS arena reported a prototype broadband linear amplifier for 2 to 30 MHz which delivered 300 watts of output!

Parallel or push-pull combinations of power FETs can provide substantial amounts of power output. Several such amplifiers could be used in combination by means of combiners to produce medium-power amateur transmitters. The Siliconix VN64GA is a high-power TO-3 style VMOS device. It carries a 60-V drain-source rating. The maximum continuous drain current is 12.5 amperes. Most of the available TO-39 and TO-3 types of VMOS transistors work well up to 100 MHz. For operation above 100 MHz it is better to use power FETs which are housed in 380-SOE flange-type packages (microstrip tabs). Supertex also has a 60-V, 16-A, TO-3 device — the VN1206N. International Rectifier has released an 80-V, 16-A, TO-3 device. It is the IRF100. Their IRF305 is a 400-V, 5-A component. For 6- and 2-meter work the Siliconix VMP-4 is recommended. Up to 12 watts of output can be obtained from a single VMP-4.

Notes

1. Siliconix Incorporated, 2201 Laurelwood Road, Santa Clara, CA 95054. Phone: 408-988-8000.
2. Supertex, Inc., 1225 Bordeaux Drive, Sunnyvale, CA 94086. Phone: 408-744-0100. Amateurs can order factory-direct from Supertex. VN2 devices are \$1.95 each. Send orders to Sue Short with a check made out to Supertex, Inc. Include a \$2 handling fee for orders under \$100.
3. International Rectifier, 233 Kansas St., El Segundo, CA 90245. Phone: 213-722 2000.
4. Circuit Board Specialists, P. O. Box 969, Pueblo, CO 81002. Phone: 303-542-5083. VMOS FETs are available from Whitehouse & Co., Newbury Dr., Amherst, NH 03031.

Selected Bibliography

- Evans, Hofmann, Oxnier, Heinzel and Shaeffer of Siliconix, "High Power Ratings Extend V-MOS FET's Dominance," *Electronics*, Dec. 22, 1978.
- Meet the Power Transistor of Tomorrow, by International Rectifier (IRI).
- Oxnier, "Try MOSPOWER™ FETs in Your Next Broadband Driver," *Technical Article TA76-1*, by Siliconix.
- Oxnier, "MOS POWER FET as a Broadband Amplifier," *Ham Radio*, Dec. 1976.
- Raab, WATWU W., "MOSFET Power Amplifier for Operation from 160-6 Meters," *Ham Radio*, Nov. 1978, p. 12.
- VMOS Power FETs Design Catalog, by Siliconix.

Build a Broadband Ultralinear VMOS Amplifier

This theory and construction article offers a unique opportunity to use the new power MOSFET. Amplifier two-tone intermodulation products can be as low as 70 dB below the carrier.

By Ed Oxner,* ex-W9PRZ

The high-frequency vertical MOS power transistor is nearest to being the most truly ubiquitous transistor ever to appear in the marketplace. Not only can VMOS perform in the conventional a-m and ssb amplifiers, but because of no minority-carrier storage time, it provides superb performance in high-efficiency switch-mode Class E and F amplifiers. In fulfillment of the definition of *ubiquitous*, the VMOS transistor can be used interchangeably either as a power transistor or as a small-signal low-noise transistor.

What Is VMOS?

VMOS, or more properly, vertical metal-oxide semiconductor field effect transistor, evolved from the double-diffused epitaxial bipolar technology and it's easy to see this evolution in Fig. 1. The obvious differences are the V-groove gate region, which has been anisotropically etched into the structure, and the joining of the source (emitter) to the base to assure that the parasitic npn bipolar transistor remains cut off during operation.

The VMOS substrate of N⁺ material forms the drain. The N⁻ epitaxial (epi) layer offers increased breakdown and, especially important for high-frequency performance, greatly reduced feedback capacitance. This epi layer also enhances the possibilities for the development of very high-voltage high-frequency power transistors which will soon revolutionize transmitter design.

Unlike the more familiar DMOS (double-diffused MOS) technology where a cross section may be viewed (Fig. 2) and compared to the VMOS cross-section (Fig. 1), for each VMOS V-groove gate,

two channels are formed which offers increased current density and, of utmost importance, halving the typical source-drain dynamic "on" resistance of the DMOS alternative. Much like DMOS, also a majority-carrier semiconductor — no minority carriers by virtue of the fact that current flow, in the form of electrons, is entirely through n-type material (the p channel becoming inverted by the gate bias) — the length of the channel plays a critical role in influencing the maximum F_T that is obtainable. Setting aside the deleterious effects of the parasitic elements inherent in any transistor, the calculated F_T for a silicon short-channel device such as either DMOS or VMOS approaches 20 GHz! Of course one cannot set aside these parasitic elements, and as a consequence the theoretical limits are unattainable.

Why Use VMOS?

Like all FETs, whether they be junction or MOS, VMOS is a majority-carrier transistor by virtue of the fact that electron flow is entirely through n-type material (speaking, of course, for an n-channel device; for a p-channel device the electron flow would be entirely through p-type material, the n-channel having inverted by virtue of the negatively biased gate potential). Consequently, an FET is somewhat analogous to an electric field-controlled bulk semiconductor resistor and, therefore, has a positive temperature coefficient. That is, as this semiconductor warms, its resistance rises. This is directly contrary to any bipolar transistor, for its temperature coefficient, by the same definition, would be negative.

All bipolar transistor failure can be traced directly to this negative coefficient which contributes to thermal stress: secondary breakdown, thermal runaway and current crowding. Since both DMOS

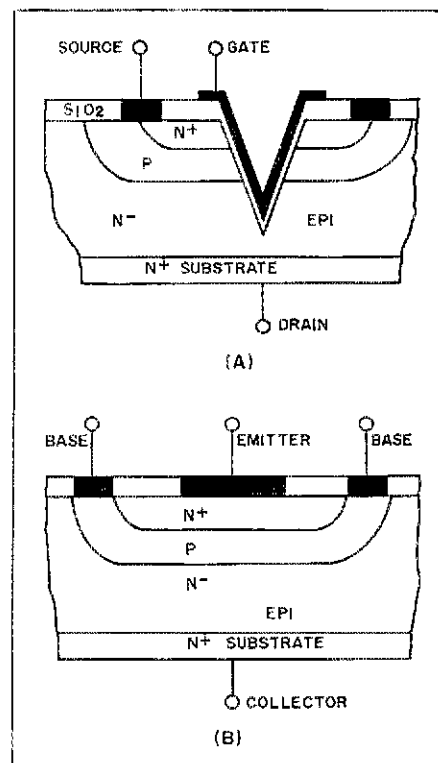


Fig. 1 — A comparison of similarities between a vertical MOSFET and a four-layer bipolar transistor (B). EPI indicates the epitaxial layer.

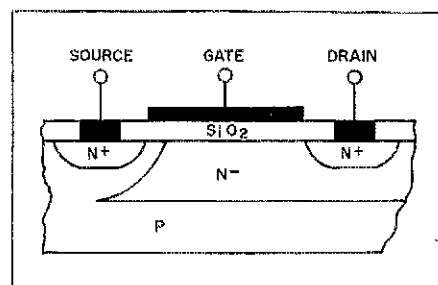


Fig. 2 — Cross section of a double-diffused DMOS transistor.

*ARRL Technical Advisor, Siliconix, Inc., 2201 Laurelwood Rd., Santa Clara, CA 95054.

and VMOS have the opposite characteristic under thermal stress, none of these failures occur. Consequently, with VMOS one does not experience any deleterious effects caused by either paralleling multiple VMOS power transistors or from severely mismatching the load.

How to Use VMOS

VMOS is an insulated-gate MOSFET differing greatly from the common dual-gate MOSFET. The typical dual-gate MOSFET handles a few milliamperes of drain current whereas VMOS can handle amperes. Because of its mass — and coupled with mass a much higher parasitic capacitance — there is little fear of an inadvertently blown gate. Because of the higher input capacitance, no gate-protection diode is necessary for protection in handling. To allay any arguments to the contrary, in over three years I have not experienced any failures stemming from gate puncture arising from mishandling.

VMOS is a Type C FET, an enhancement-mode MOSFET. That means it remains fully off when either zero bias or negative bias is applied to the non-Zenered gate (negative bias cannot be applied to a Zenered VMOS gate). With

the application of a positive potential beyond the threshold voltage (specified as between 0.8 and 2.0 V), drain current will flow. Once a certain quiescent current is reached, any further increase in gate voltage results in a linear increase in the dc drain current. Biasing VMOS is different than biasing bipolar transistors simply because VMOS only requires a positive potential to activate drain-to-source current flow. A cursory glance at a typical bias network might not appear too different but, unlike the bipolar transistor which requires a moderate to heavy base current, VMOS biasing requires no current at the gate. Consequently, the rf isolation between the gate and the bias network can be a simple high-value carbon resistor. Such a method was used in the video amplifier design described in this article, where a 27 kΩ resistor ties between the 4.7-kΩ voltage divider and the 20-V Zener diode.

Modeling the VMOS VMP4

The equivalent circuit for the VMOS transistor has been previously published and is repeated in Fig. 3. This model, when properly simulated to include the parasitic npn bipolar transistor elements using a computer simulation program

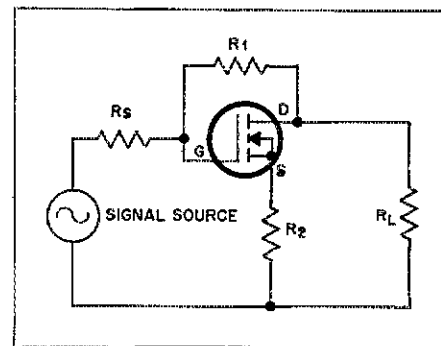


Fig. 4 — The simplified circuit of a broadband video amplifier.

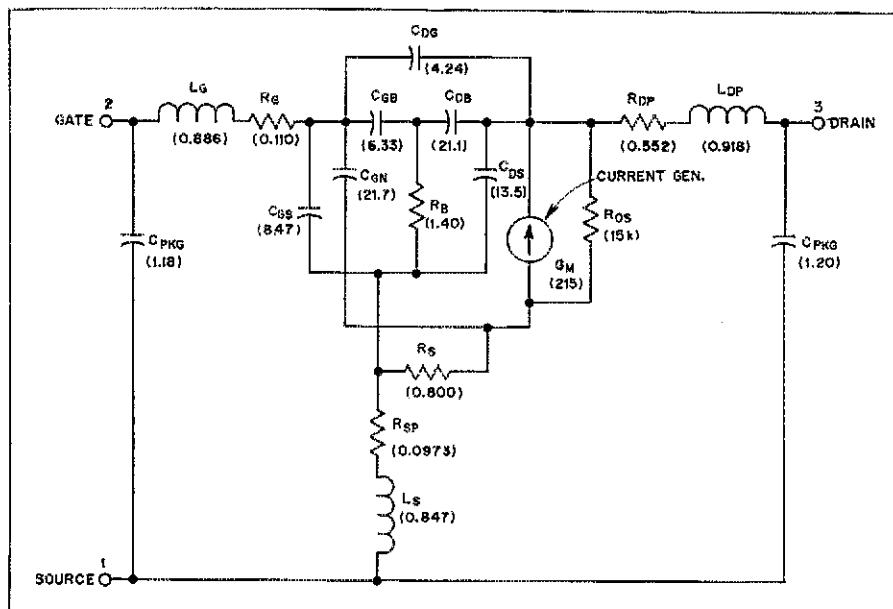


Fig. 3 — The vertical-MOS VMP4 circuit equivalent. Values in parentheses are for this Siliconix unit. Resistance is in ohms, capacitance in pF, inductance in nH and transconductance is in mmhos. Identification of the elements (left to right) is tabulated below.

C_{PKG} Input and output capacitances of the VMOS package.

L_G Gate inductance.

R_G Gate resistance.

C_{GS} Field capacitance.

C_{GN} Capacitance from gate to N'.

C_{GB} Capacitance from gate to body.

C_{DG} Capacitance from drain to gate.

R_B Body resistance of P diffusion.

C_{DB} Capacitance from drain to body.

R_{OS} The element R_{OS} ($1/G_{OS}$) represents the output resistance (conductance) which cannot be physically realized.

R_{DP} Drain resistance of die attach

material and package.

L_{DP} Drain inductance of package material.

L_S Source inductance.

R_{SP} Source resistance.

R_S N' diffusion resistance.

L_G , L_S and L_{DP} are not intrinsic (that is not part of the actual semiconductor element) but represent the package parasitic inductances of the Siliconix VMP4. R_G and R_{SP} represent resistive losses in both the gate and source metalizations as well as the lead losses. C_{GS} differs from C_{GN} in that the former is the field capacitance existing between the gate metal and the N' source diffusion.

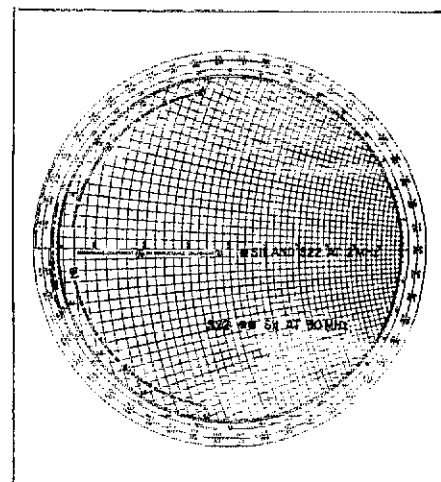


Fig. 5 — These expanded Smith Chart projections offer easy visualization of the expected broadband-amplifier results across a 2- to 30-MHz bandwidth. The plot of the calculated values for S_{11} and S_{22} is shown.

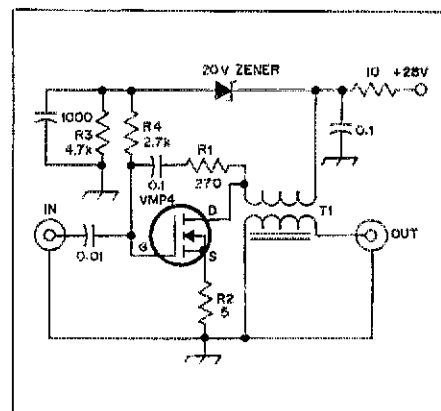


Fig. 6 — Schematic diagram of a broadband video amplifier. T1 consists of 9-1/2 turns of no. 30 enameled wire bifilar wound on a Stackpole no. 57-9130 balun. Resistance is in ohms and capacitance is in μF .

Table 1
Computed Two-Port Y-Parameter Matrix in Millimhos, VMP4

Freq.	Y11		Y21		Y12		Y22	
	(Real)	(Imag.)	(Real)	(Imag.)	(Real)	(Imag.)	(Real)	(Imag.)
1.0	0.00	0.24	210.58	-0.30	0.00	-0.03	0.07	0.25
2.0	0.00	0.48	210.58	-0.61	0.00	-0.05	0.07	0.50
5.0	0.00	1.20	210.59	-1.52	0.00	-0.13	0.07	1.24
10.0	0.02	2.39	210.64	-3.05	0.00	-0.27	0.09	2.48
20.0	0.09	4.78	210.84	-6.11	0.00	-0.53	0.17	4.95
30.0	0.20	7.17	211.18	-9.19	0.01	-0.80	0.31	7.43
50.0	0.56	11.97	212.25	-15.47	0.02	-1.31	0.74	12.41
100.0	2.32	24.09	217.24	-32.49	0.11	-2.50	2.88	24.95
120.0	3.42	29.00	220.13	-40.12	0.18	-2.91	4.21	30.01
140.0	4.78	33.94	223.51	-48.43	0.28	-3.27	5.86	35.11
160.0	6.42	38.92	227.33	-57.56	0.43	-3.57	7.85	40.21
180.0	8.40	43.91	231.53	-67.69	0.64	-3.79	10.24	45.31
200.0	10.75	48.88	236.01	-79.01	0.94	-3.93	13.07	50.36
220.0	13.52	53.79	240.62	-91.74	1.36	-3.98	16.39	55.30
240.0	16.73	58.58	245.17	-106.10	1.92	-3.92	20.25	60.06
260.0	20.45	63.15	249.36	-122.30	2.69	-3.76	24.69	64.52
280.0	24.67	67.39	252.81	-140.54	3.71	-3.50	29.72	68.54
300.0	29.40	71.16	255.01	-160.94	5.06	-3.17	35.35	71.95
320.0	34.56	74.26	255.36	-183.50	6.81	-2.81	41.48	74.52
340.0	40.05	76.52	253.13	-208.04	9.04	-2.49	47.97	76.04
360.0	45.63	77.74	247.61	-234.10	11.81	-2.31	54.55	76.29
380.0	51.00	77.81	238.15	-260.90	15.16	-2.40	60.87	75.12
400.0	55.76	76.70	224.34	-287.36	19.10	-2.93	66.44	72.51

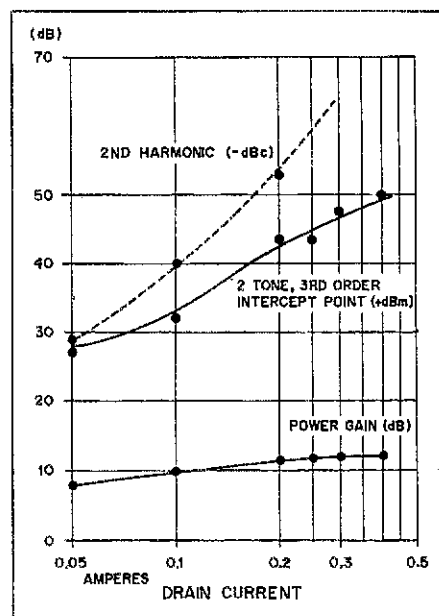


Fig. 7 — A graphical representation of performance of the 2- to 30-MHz ultralinear VMOS amplifier.

Table 2
The Computerized Optimization Program (COMPACT).

```

RES AA SE -270.0
TWO BB S1 50.0
PAR AA BB
RES CC PA -5.0
SER AA CC
PR1 AA S1 50.0
END
2 30
END
1.00 -6 20.94 175.5 0.005 85.6 0.99 -6
0.81 -72 14.36 125.5 0.054 38.5 0.81 -74
END
EOF:
This program simulates amplifier performance.
See text.
    
```

(COMPACT), offered excellent correlation with measured data over a reasonably wide bandwidth. Values of two-port admittance parameters obtained from the computer simulation are offered in Table 1. For frequencies below 100 MHz these values must be considered as approximate because the characteristic break-frequency typical of all common-source-connected amplifiers using FETs and MOSFETs was not included in the simulation. However, for general design the values in Table 1 offer the circuit designer sufficient accuracy so that, in all probability, little or no tweaking of the finished circuit is required for optimum performance.

Designing the Amplifier

The design goals included the desire to cover 80 through 10 meters with flat gain, low input and output VSWR, and perfect linearity. That is, have the intermodula-

Table 3
Computer Printout of the Ultra Linear Amplifier Performance.

Freq.	S ₁₁		S ₂₁		S ₁₂		S ₂₂		S ₂₁	K
	(Magn)	Angle	(Magn)	Angle	(Magn)	Angle	(Magn)	Angle	DB	Fact.
2.00	0.02	-17	4.26	178.8	0.159	-0.3	0.02	-18	12.58	1.08
30.00	0.10	-79	4.21	161.3	0.156	-2.4	0.10	-82	12.49	1.06

These are polar S parameters in a 50-ohm system.

tion products as low as possible. To meet these objectives the basic equivalent circuit shown in Fig. 4 was chosen. The resistances, R_S and R_L, represent generator (source) resistance and load resistance, both 50 ohms for this design. Feedback resistance R₁ and source resistor R₂ combine to flatten the gain response and set the input resistance to match 50 ohms. R₁ and R₂ are determined by using the following formulas.

$$R_1 = \frac{\sqrt{R_S R_L}}{2}$$

$$\left[\sqrt{G} + \sqrt{G + 4 \left(1 + \sqrt{G} \cdot \frac{R_S + R_L}{2 R_S R_L} \right)} \right] \quad (\text{Eq. 1})$$

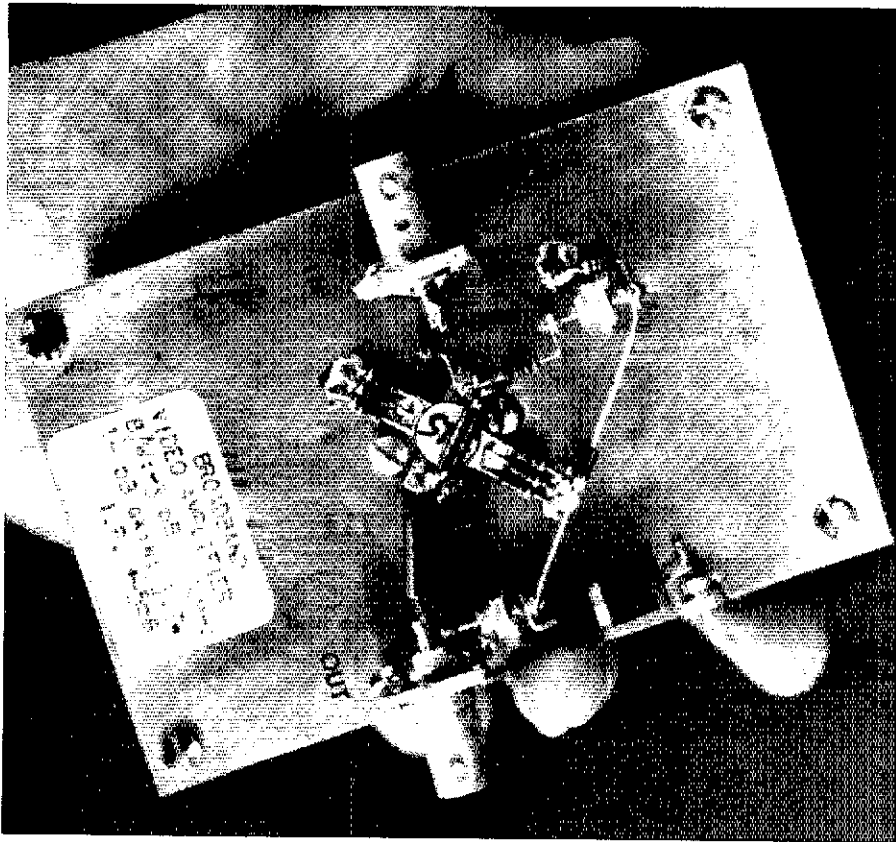
$$R_2 = \left(\frac{R_S R_L}{R_1} \right) - \frac{1}{G_M} \quad (\text{Eq. 2})$$

where

G is the desired stage gain for the amplifier, and
G_M is the forward transconductance value of the transistor expressed in mhos. (Y₂₁ real)

Manipulating these formulas for R₁ and R₂, values obtained were a bit different than easily obtained standard resistor values. So R₁ was adjusted to 270 ohms (the calculated value was only 273 ohms), and R₂ to 5 ohms. In the final assembly, R₂ consisted of six 30-ohm resistors in parallel, soldered three to a side from each source lead on the VMP4 to chassis.

The next step, which for most amateurs may not be possible, is to simulate the performance using a computerized optimization program, in this case one called COMPACT (Computer Optimization of Microwave Passive and Active Circuits). For those interested in the details, the basic program is offered in Table 2 and the final analysis showing the theoretical performance of the video amplifier is given in Table 3. If we remember that scattering parameters are reflection coefficients, the values of S₁₁ (input) and S₂₂ (output) suggest that a reasonably good match should be possible. The expanded Smith Chart projections in Fig. 5 offer easy visualization of the expected results across the 2- to 30-MHz bandwidth. The overall anticipated performance, taken from Table 3 data, suggests nearly 13-dB



A broadband amplifier using the VMP4 VMOS. It has a range from 1-70 MHz.

forward power gain (S_{21}^2) and so-so stability (k greater than 1.0).

After adding the proper biasing and voltage-isolating capacitors, the final operational circuit emerges as shown in Fig. 6. Performance is graphically offered in Fig. 7. Additional measurements include a 1-dB saturation output power of 3.7 watts and a spot noise-figure measurement of 4 dB at 30 MHz.

There is little explanation needed for the constructor. Layout is not overly critical. Leads should be kept short, in particular for R1 and the batch paralleling R2 which, incidentally, should be carbon-composition resistors. The heat sink shown is unquestionably an overkill but using one equal in size to the copperclad board is a great convenience.

I acknowledge the diligent efforts of my colleague, Larry Leighton, WB6BPI. For his contributions to the success of this project, I express my gratitude. □

References

- COMPACT Users Manual*, Compact Engineering, Inc., 1088 Valley View Ct., Los Altos, CA 94022.
 Frey, "VMOS Power Amplifiers," *EDN*, Vol. 22, No. 16 (Sept. 5, 1977), pp. 83-85.
 Oyner, "Meet the V-MOS E F Model," *RF Design*, Vol. 2, No. 1, Jan./Feb. 1979, pp. 16-22.
 Oyner, "Will VMOS Power Transistors Replace Bipolars in HF Systems?" *EDN*, Vol. 22, No. 12 (June 20, 1977), pp. 21-25.

Strays



CW — THE UNIVERSAL LANGUAGE

□ A Latin message recorded in cw, musical selections ranging from Bach to Chuck Berry, and a tape of waves crashing on shore are journeying through space, bound for the edge of the universe. These are recordings from "The Sounds of Earth," a gold-plated copper album strapped to the bodies of NASA's most sophisticated spacecrafts, Voyager I and II. The two identical ships were launched in 1977 to collect photographs and data of Jupiter and Saturn before continuing into the cosmos.

William R. Schoppe, WB2FWS, a recording engineer at CBS Records, taped the Latin cw phrase. The message was "ad astra per aspera" which translates to "the stars with difficulties." To tape the message, Schoppe's J-38 straight key was hooked up to a Hewlett-Packard audio oscillator. The phrase was recorded at 11 wpm on about 1 kHz.

The cw tape was mixed with the other sounds of Earth and transferred to a record. Each side of the album is about one-hour long. A simple hand-cranked turntable also was installed on board so

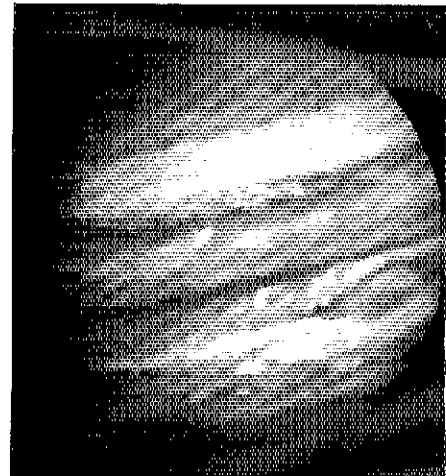
that any alien stumbling upon the spacecrafts can play the record.

"The Sounds of Earth" was the brainchild of Dr. Carl Sagan, professor of astronomy and head of the Laboratory for Planetary Studies at Cornell University. Dr. Sagan convinced NASA officials that because the ultimate path of the spacecrafts leads into the cosmos, Voyagers I and II provide an excellent opportunity to convey information about Earth to intelligent life in other solar systems.

Each Voyager also is equipped with two slow-scan TV cameras, which allow amateurs throughout the world to witness the transmissions from space. Pictures of Jupiter from Voyager I have revealed more detail than the best groundbased telescopic photographs.

Voyager I reached Jupiter in March 1979. The second Voyager is scheduled to arrive at Jupiter on July 9. To commemorate the event, the Jet Propulsion Laboratory ARC (CA) will contact the spacecraft through its station, W6VIO. From July 6 to 15, the following frequencies will be used, plus or minus QRM: cw — 30 kHz above the bottom edge of the bands, 80 through 10 meters; SSTV; ssb — 3930, 7230, 14,285, 21,360, 28,680; Novice — 3730, 7130, 21,130, 28,130; OSCAR, 2-meter and 220-MHz transmissions also are planned.

The schedule calls for heavier operations on weekends and from 4 P.M. to 7



Jupiter's Great Red Spot (lower right) is surrounded by a colorful and turbulent atmosphere. In July, hams can see slow-scan TV images of Jupiter, the largest planet in our solar system, transmitted by Voyager II. (Jet Propulsion Laboratory photo)

P.M. (PST) during the week. The club will issue a special QSL card of the Voyager Commemorative stamp to be released by the U.S. Postal Service. U.S. stations should submit an s.a.s.e.; DX stations may QSL via their QSL bureaus. The Jet Propulsion Laboratory ARC is located at 4800 Oak Grove Dr., MS 180-302, Pasadena, CA 91103.

A VMOS FET Transmitter for 10-Meter CW

Vertical metal-oxide semiconductor FETs are new on the amateur scene. Here is a practical construction project that makes use of the Siliconix VN88AF.

By Wes Hayward,* W7ZOI

Although QRP cw operation has been the major passion at W7ZOI for many years, 10 meters is a band that has been bypassed. The reason is not clear, for it's hard to find a better frequency during periods of high sunspot activity. The rig described here is a long-overdue remedy for this neglect.

It was decided to try one of the new vertical metal-oxide semiconductor field-effect transistors¹ as a power amplifier, rather than to use a conventional approach to transmitter design. Experiments with earlier VMOS FETs were encouraging. However, the devices were either expensive or completely unavailable. Today, plastic medium-power devices are readily available for less than \$2.

The transistor chosen was the Siliconix VN88AF. With 80-volt drain-to-gate and drain-to-source breakdown voltages and a peak current capability of 3 amperes, the device appeared ideal. The major limitations are the power dissipation of 15 watts and the presence of a protection Zener diode at the gate. The latter turned out to be a major constraint for cw operation. (We'll have more comments about that later.)

Modern operating practices dictate the need for some degree of frequency agility. A 14-MHz VXO was chosen for frequency control. A clean balanced doubler provides the required 28-MHz signal. Low-level stages with an abundance of stabilizing negative feedback increase the power to drive the VMOS final. All in-

dications are that the system should be eminently reproducible.

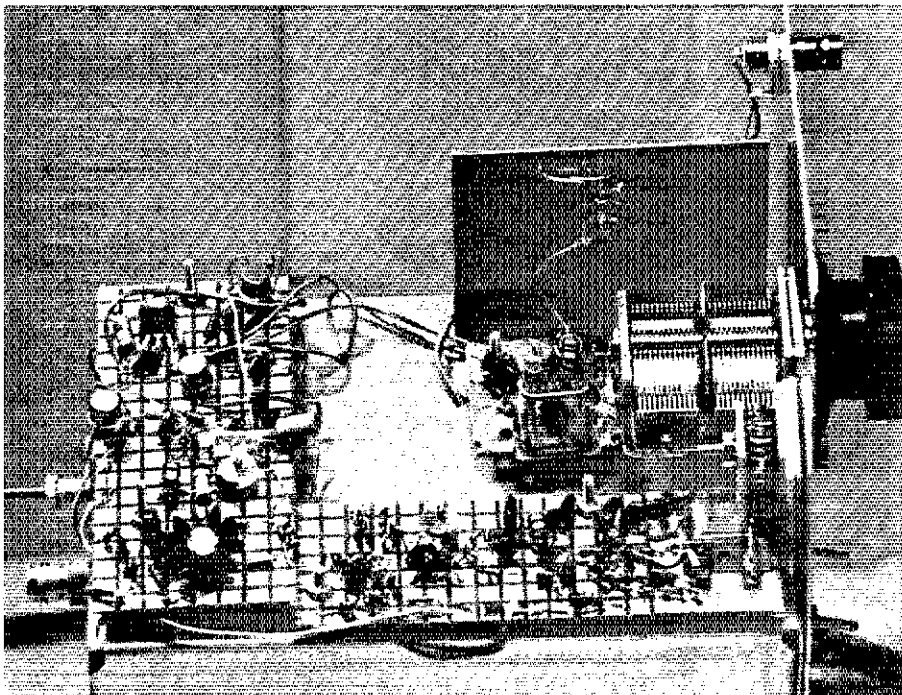
Circuit Details

The heart of the transmitter, the rf chain, is shown in Fig. 1. Q1 serves as a crystal Colpitts oscillator with the crystal operating on the inductive side of resonance. The crystal normally used in this circuit has a marked frequency of

14,025 kHz. With the components shown, a 25-kHz range is obtained at 14 MHz. (Some experimentation may be required with the number of turns on L1 to obtain the desired range.) As shown, the circuit tunes from 14,025 down to about 14,001 kHz. If the inductor L1 is shorted, the circuit will tune from the marked crystal frequency upward about 10 kHz.

Not all crystals will function well in this

Side view of the 10-meter VMOS FET transmitter. No attempt was made to miniaturize the unit. The final amplifier, Q5, is visible at the lower left. The crystal is immediately to the left of the variable capacitor. The connector at the upper right is for the receiver.



*Technical Advisor, ARRL, 7700 S. W. Danielle Ave., Beaverton, OR 97005

¹Notes appear on page 30.

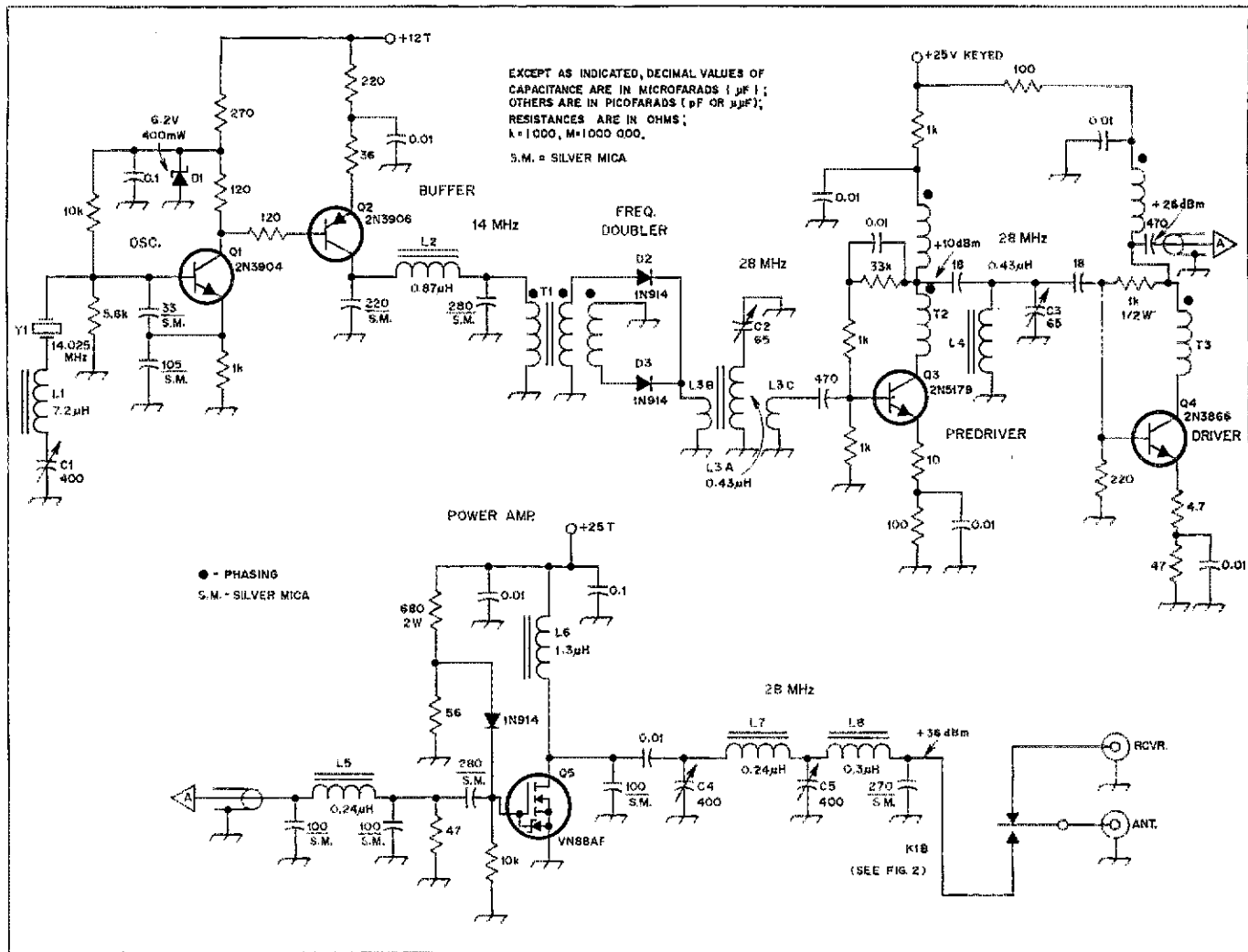


Fig. 1 — RF chain for the VMOS FET transmitter. All resistors are 1/2-watt composition and capacitors are disk ceramic unless otherwise specified. Tolerances are ± 10 percent. The +12 T indicates 12 V during transmit periods only (see Fig. 2).

C1 — 400-pF air variable, Allied 695-4200 or equiv.
 C2, C3 — 65-pF trimmer, Allied 782-0404 or equiv.
 C4, C5 — 400-pF trimmer, two Allied 782-3765s in parallel or equiv.
 D1 — 6.2-V, 400-mW Zener diode, 1N753A or equiv.
 D2, D3 — 1N914 or equiv.

L1 — 7.2 μ H, 40 turns no. 24 wire on Amidon T-80-6 core.
 L2 — 0.87 μ H, 17 turns no. 26 wire on Amidon T-37-6 core.
 L3A, L4 — 0.43 μ H, 12 turns no. 24 wire on Amidon T-37-6 core.
 L3B, L3C — 2-turn links over L3A.
 L5, L7 — 0.24 μ H, 9 turns no. 24 wire on Amidon T-37-6 core.
 L6 — Rf choke, approx. 1.3 μ H, 17 turns no. 24 wire on Amidon T-44-6 core.
 L8 — 0.3 μ H, 10 turns no. 24 wire on Amidon T-37-6 core.
 T1 — 7 tritilar turns no. 28 wire on FT-37-43 ferrite core.
 T2, T3 — 7 bifilar turns no. 28 wire on FT-37-43 ferrite core.
 Y1 — See text.

circuit. They should be fundamental-mode units, the usual case at 14 MHz. The best results are obtained with HC-6/U metal-can units, such as those manufactured by JAN Crystals and by International Crystal (type 031300). The most reliable operation occurs when the metal crystal case is grounded; if it is allowed to "float," the frequency will change when a hand moves near the rock, making a front-panel mounted crystal socket impractical. Tuning is very nonlinear, but this presents no problem in this application. The 50-kHz tuning range (after doubling) has been more than sufficient. While a 400-pF variable capacitor is used, a smaller unit will suffice with only a slight reduction in tuning range. The power available from the oscillator is

around one milliwatt (0 dBm).

Q2 functions as a buffer amplifier to increase the 14-MHz power to about +10 dBm, a near-optimum drive level for the diode doubler. The output of this stage has a low-pass filter to ensure a waveform relatively free of harmonics that would degrade the balance of the multiplier and hence reduce the suppression of 14-MHz energy in the output.

Frequency multiplication is obtained with a pair of silicon diodes, D2 and D3. One might question the use of a passive frequency doubler, but careful experiments using laboratory instrumentation have confirmed the wisdom of this choice. Details of this work are presented in chapter 3 of *Solid State Design for the Radio Amateur*.² The method is used in

several projects in that book.⁴

The doubler is followed by a single tuned circuit at 28 MHz. A pair of two-turn links on the toroidal inductor couple energy into and out of this resonator. The power available from the doubler, after filtering in the resonator, is about 0 dBm.

The 28-MHz energy is applied to a two-stage, keyed amplifier. Negative feedback is used in both stages to ensure broadband stability and to establish the gain levels desired. The resistor values used were chosen from a program written for the writer's programmable calculator. Additional information on feedback amplifiers is presented in chapter 8 of *Solid State Design*. The saturated output of Q4 is nearly 1/2 watt, more than enough to drive the VMOS final amplifier. Both

was paralleled with Q5. No circuit changes were required other than retuning of the output network. Operation was attempted at a drain supply potential of 12 volts, but power output and gain suffered severely.

Some experiments that might be of interest were done on 80 meters. An amplifier much like that used at Q5 was built with a similar bias scheme. This amplifier used four paralleled VN88AFs bolted to a large heat sink. Power outputs up to 25 watts were easily obtained but the efficiency was still poor. A similar 3.5-MHz amplifier was then built using a Siliconix VN84GA. This transistor is a real brute with no internal protection Zener diode. It had an output of over 25 watts with an efficiency of 73 percent. The amplifier was then moved to 14 MHz by resonating the 1000-pF gate capacitance. Similar results were obtained there. Unfortunately, this transistor is both expensive and difficult to obtain. Perhaps that situation will improve with time.⁵

The control circuitry for the transmitter is shown in Fig. 2. A 7812 three-terminal voltage regulator powers the low-level stages as well as a crystal-controlled receiving converter included within the same box. Transistor Q6 operates as a switch to apply voltage to the oscillator and buffer when either the spot or the transmit switch is activated. Q7 is a pnp switch controlled by the key to provide the

voltage for Q3 and Q4. A 1- μ F nonpolar capacitor from base to collector forces Q7 to act as an integrator during transitions. This shapes the keying nicely.

Transistors Q8, Q9 and Q10 form a semibreak-in circuit. When the key is pressed, the antenna relay is activated. It will remain on for a fraction of a second after the key is released. The transmit switch, S2, overrides the semibreak-in circuit for more casual contacts. If desired, Q8, Q9 and Q10 may be omitted. They were installed in this transmitter a few days before the annual November Sweepstakes contest. The antenna relay used was a surplus item from the junk box. There is nothing critical here.

The simplicity of the control circuitry presents one potential problem: The transmitter is on (and generating rf) at the instant the antenna relay changes to the transmit position. However, the low power and the inherent stability of the Class A final amplifier allow "hot switching" with no problems. Control systems for correcting this situation are described in chapter 7 of *Solid State Design for the Radio Amateur*.

Results

The performance of this transmitter has been as good as expected. Investigation with a Tektronix 7L13 spectrum analyzer after construction and alignment (using

less exotic home-station test equipment) was encouraging. The 14-MHz component is 57 dB below the 28-MHz carrier. The second harmonic is 64 dB down while the fourth and sixth harmonics are just barely detectable. The backwave is over 75 dB down. The output amplifier has performed flawlessly with no sign of the usual instabilities found with bipolar power amplifiers. The VMOS FET power transistor is certainly here to stay!

On-the-air reports are equally encouraging. Keying and general "cleanliness" are comparable to any of the better signals around. While using an inverted-V dipole only eight meters high, the writer worked 41 states and a considerable amount of DX in the first two months of operation. The DX (in all continents) includes many slightly rare prefixes, ranging from LU and CX to HK0 and EA8. Let's just hope that the sunspots hold for several more years! [QST]

Notes

¹Raab, "MOSFET Power Amplifier," *Ham Radio*, November 1978. Also see references cited in that paper, especially those by Oxner.

²Hayward and DeMaw, *Solid State Design for the Radio Amateur*, ARRL, 1977, p. 41. *Ibid.*, pp. 197, 223.

³Lewallen, "On Solid-State PA Matching Networks," *QST*, October 1978, p. 34.

⁴The VN88AF is available from G. R. Whitehouse, 11 Newberry Dr., Amherst, NH 03031.

Strays



SPORTING HAMS

17 Eighty-five hams in the Colorado Springs (CO) area received special thanks from the U.S. Olympic Committee for providing communications services at the National Sports Festival held last summer. More than 2500 athletes participated in the festival, which was held at facilities spread over a 700-square-mile area. The hams worked 16 hours a day handling communications at the event. Due in part to their efforts, the four-day festival ran smoothly. Contingency plans devised by the hams did not have to be implemented. The hams received commemorative medals for their work from Baaron Pittenger, director of U.S. Olympic Special Events. In thanking the volunteers, Pittenger said, "Amateur Radio was the heart of the National Sports Festival, providing communications and the capability of solving problems as soon as they occurred." — Robert Widmar, WB0TIB



Dave Reise, WB0SDW (left) and Dave Verling, N0DV, man a station at the National Sports Festival. (WB0TIB photo)

Feedback

□ In the article, "A First-Class Touch-Tone Encoder," by Roy Hejhall, K7QWR, appearing in February *QST*, the address line should have read ARRL Technical Advisor, Motorola, Inc., Semiconductor Group, B-324, P. O. Box 2953, Phoenix, AZ 85062. There is an error in the circuit-board etching pattern published in the "Hints and Kinks" section of that issue. The correct etching pattern appears here in Fig. 1 A.

The voltage readings shown for the emitter of Q3 in Fig. 1 of the original article are actually for the collector of Q3.

The jumpers required for either a 12- or 16-button keyboard were not clearly indicated in Fig. 2. The jumpers for a 16-button keyboard are shown here in Fig. 1 at B; the jumper for a 12-button keyboard is shown at C.

□ Not only was the author out of phase when he drew the diagram of Fig. 2 in "The Whys and Hows of Bifilar Filament Chokes" (April 1979 *QST*, page 29), but T1 ended up with an incorrect transformation format. The input transformer should be used as shown in Fig. 2 to provide the 50- to 200-ohm stepup. As shown in April *QST*, T1 is backward.

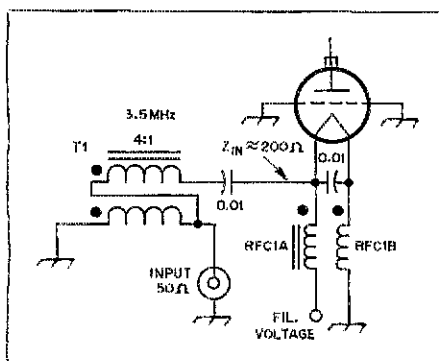


Fig. 2 — Corrected input circuit for "Bifilar Filament Chokes," April 1979 *QST*.

□ In the article by Dorbuck, "Matching-Network Design" (March 1979 *QST*), X₂ and X₃ should be reversed in Fig. 1A, page 26.

Strays

HQ. TOUR ON TAPE

□ Ever wanted to take a tour of ARRL headquarters? The New England Amateur

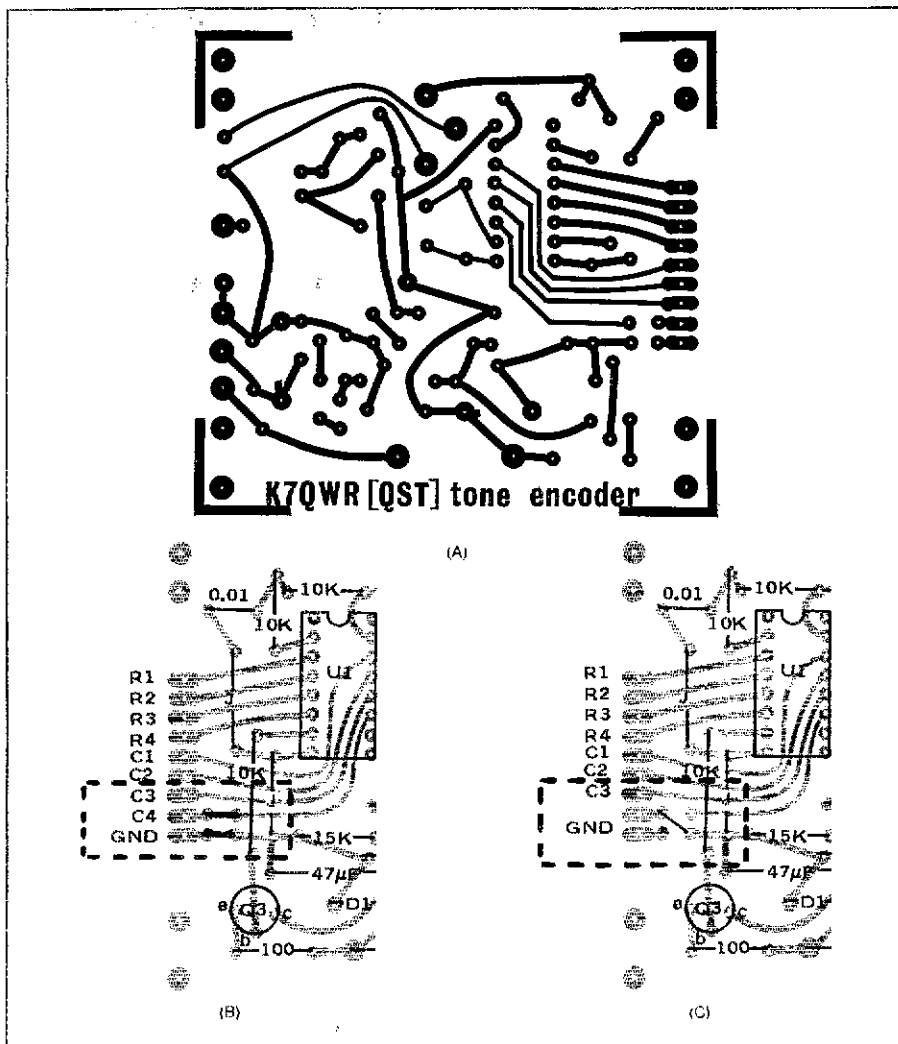


Fig. 1 — At A, the corrected etching pattern for the Touch-Tone Encoder (February 1979 *QST*). At B, jumper connections for a 16-button keyboard (inside the heavy broken line), and at C for a 12-button keyboard.

□ In the "Two-Tone Tester" (November 1978 *QST*, pages 22-24), a correction to the circuit diagram, Fig. 3, should be made. The capacitor to ground from the junction of the two 100-kΩ resistors in the circuitry of Q1 should be 0.01 μF, and not 0.1, as shown. The oscillator will not oscillate, or will just barely do so, with the 0.1-μF value. — Fred Brown, W6HPH

□ Builders of the "CMOS Control Circuit for Repeaters" (Dorson, March 1979 *QST*) will benefit from this cross-reference of parts-placement-diagram component numbers to circuit values.

Note: In Fig. 3, the resistor identified as R3 in the lower right corner near Q10 is actually R31. The component numbers follow. C1, C2 — 10 μF, 25 V; C3 — 0.022 μF; C4 — 50 μF, 25 V; C5 — 0.001 μF; R1 — Shown as R3 on schematics; R2, R3, R10 — 100 kΩ; R4, R11 — 4.7 kΩ; R5, R12, R15 — 22 kΩ; R6, R13 — 1 kΩ; R7, R14 — 22 Ω; R8 — 15 kΩ; R9 — Shown as R1 on schematic; R16 — Shown as R2 on schematic; R17, R26 — 10 kΩ; R18, R19, R25 — 27 kΩ; R20, R31, R32 — 1.2 kΩ; R21, R30 — 8.2 kΩ; R22 — 82 kΩ; R23 — 220 kΩ; R24 — 2.2 kΩ; R27, R28, R34 — 47 kΩ; R29 — 150 kΩ.

TV Group, known as the NEAT Group recently visited ARRL and WIAW with a videotape crew. The folks spent more than two hours taping various staff functions at WIAW, and upon their return to the Boston area, aired the edited tape over their 439.25-MHz/427.25-MHz ATV repeater. If you are unable to visit ARRL

in person, perhaps a stamped, self-addressed envelope with a request for copying information to the NEAT Group might get you into the videotape world, with an up-to-date view of your Headquarters. Address inquiries to NEAT Group, P. O. Box 307, Peabody, MA 01960.

A Novel Way to Mount a Rotary-Beam Antenna

Think a tower is too costly, too difficult to erect? You may go through the roof with this idea and yet keep your cool. It could end your quandary.

By Charles J. Ellis,* WØYBV

Around the world, towers are commonly used to support directional beam antennas. When I decided recently to use a tribander Yagi, my preliminary plans included the erection of a 50-foot mast. It took me, inexperienced in such things, only a short time to determine that raising a tower by myself, or with helpers, would cause more problems than I wanted. Yet, I surely needed a good beam. Consequently, alternatives were explored. My choice, a bit unusual indeed, is described below.

Our home is on a corner lot. Beside the lot are a power line, a close-by neighbor and two streets. Friends informed me that even with these factors to be considered, erecting a tower would be easy. To naive me the project still seemed foreboding. The tower would have to be installed against the house. The idea of raising it parallel to the side of our home impressed me as a nearly impossible task. Someone suggested the use of a commercial crane. That would have involved too much money. Besides, climbing a tower is just not my bag! Furthermore, rotator and tower instructions recommend yearly inspections to which I added, "But not by me!"

The Alternative

With my spouse, I explored the possibility of mounting the rotator in the attic and punching a hole through the roof to accommodate the mast. This idea shook some old gray heads. "I wouldn't do it!" "Can't be done!" "Your roof will leak!" they declared. But I was not dissuaded from believing that the mast could be installed in this manner.

Pursuing the matter further, I consulted a retired contractor. Basing his opinion on

knowing me, my purpose, the house and the lot, he agreed that my idea was better than constructing a typical tower. That did it! With such encouragement, I proceeded to finalize my plans.

Before going any further with the project, I reasoned that I needed to determine the dimensions and weight of the assembled antenna. These parameters could be the key to the whole proposition. Therefore, I assembled a large, multielement triband beam on the ground. Doing so also assured me that all the needed parts were available. As a result, I foresaw nothing that would hinder the overall installation.

In consultation with a young man who is at home on a house roof or the top of a 2200-foot tower, a decision was made to cut a hole in the roof, walk the mast up, lower the end into the hole and anchor it in a thrust bearing mounted on a quadripod beneath the roof. A short plywood

stand placed on the floor beneath the bearing would support the rotator. As can be seen in the photograph of the quadripod, the stand is arranged to provide easy access to the control wires under the rotator. In addition, this housing is movable, permitting the rotator to be centered beneath the mast.

The Mast

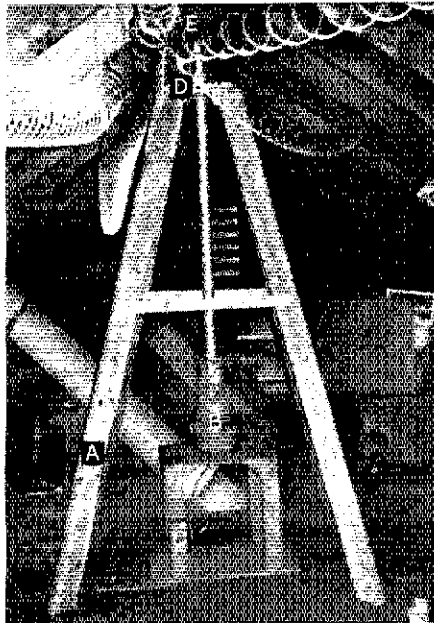
Credit for construction of the solidly built mast goes to W. J. Weiss, Jr., WØWOM. It deserves description. He used two pipes of the grade known in the plumbing trade as schedule 40. One is welded inside the other. On his own mast, similarly made, John welded cross bars which he uses to climb above his beam, yet the mast does not bend. The concept of his structure and his expertise went hand-in-hand with my ideas which were now clearly workable. My fear of the mast bending or collapsing under load had been removed.

According to plan, the mast was passed through the roof by means of a 21- × 11-inch (530- × 280-mm) piece of boiler plate pierced by and welded to a heavy-walled steel pipe. The angle between the plate and the pipe is such that when mounted on the roof, the pipe is vertical. The inside diameter of this guidepipe is slightly larger than the outside diameter of the mast, allowing free rotation of the mast. The plate, as shown in the photographs, is secured to the roof by four large bolts. The bolts are screwed into the roofing boards backed by a 2- × 10-inch (50- × 250-mm) piece of lumber. An alternative plan was to lag the plate to the rafters. Roofing compound, spread along the edges of the plate, prevents water seepage into the attic. It also serves to plug the hole through which the coaxial cable and ground wire enter the attic



Signals from WØYBV originate in this attractive home in Ames, IA. The tribander antenna is mounted atop a rotatable mast projected through the roof.

*2304 Storm St., Ames, IA 50010



The quadripod, A in this photograph, provides the main support for W0YBV's triband antenna and mast. Additional support for the rotator, B, is furnished by the plywood stand, C, resting on the attic floor. Separate, unrelated helical antennas, E, are attached to the rafters.

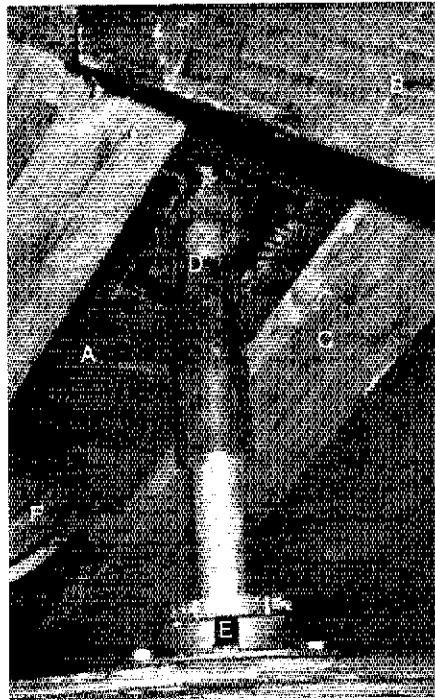
enroute to the radio room. The coaxial cable is extended up along the mast to which it is clamped. The radio-room ground lead is secured to the guidepipe, as are two separate no. 8 ground leads extending from individual ground rods driven in the earth outside the house. Under the same clamp on the guidepipe are two flexible 16/3 cables. The ends of these cables are soldered together forming a single conductor. The other end of this conductor is clamped to the mast, grounding the latter via two separate circuits. As the antenna is rotated in one direction, these cables gently wrap around the mast and unwrap in the opposite direction. There is sufficient free play so that no binding or cable wear occurs.

Lightning protection is the reason for the two external ground leads. One serves as a backup for the other and together they form a heavy-duty wire path to ground. This precaution was taken after WB0WXP's antenna evaporated during an electrical storm.

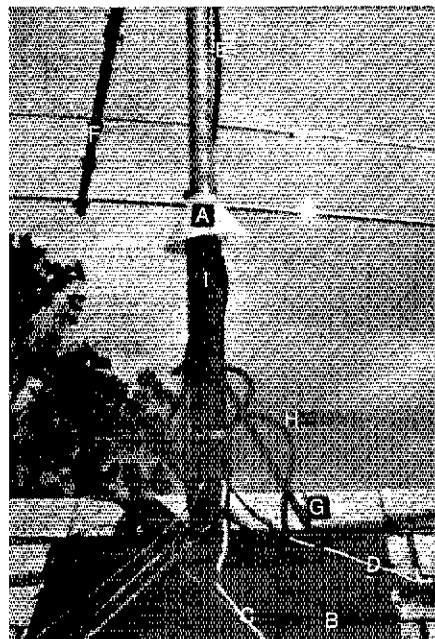
Once the mast was plumbed in place, the boom alone was lifted from the ground, mounted, then leveled. Spacings between the elements were re-measured easily since we could walk along the roof beside the boom. All element coupling plates were then leveled.

Next, individual elements were hoisted to the roof, set in place and leveled. To compensate for eventual stretching of the guys supporting the boom, we deliberately provided a bit of upturn at the ends of the boom so that it had a slight swaybacked configuration.

All final assembly work including leveling of the antenna was done at waist-high



A rectangular hole in the roof accommodates the sleeve and mast for W0YBV's tribander. The thrust bearing, E, placed atop the quadripod allows the mast to be turned easily while it carries the full weight of the antenna. Other letters identify the following: B = rafter; C = 2 x 10 support for mounting-plate lag bolts; D = vertical pipe below the mounting plate; F = roof vent.



The boiler plate, B, and metal sleeve, I, through which the W0YBV rotatable mast projects. A plastic funnel, A, is clamped to the mast to prevent rain from entering the sleeve. Cables, although secured to the sleeve, wrap gently around the mast as it is turned. Other letters identify the following: C = ground cable to earth; D = ground cable to shack; E = transmission line to boom; F = boom; G = brace between mounting plate and vertical pipe; H = ground cable between mast and mounting plate via the vertical pipe; I = vertical pipe support.

position as the hole through the roof was cut at a point one foot below the ridge of the roof. After the turnbuckles were tightened and all elements secured and leveled, the entire antenna was lifted up the mast to the final position.

With the beam in position, six feet above the ridge, we then tightened the mast clamps while the boom was held level. Doing this, however, should be avoided on a windy day!

Conclusion

In the weeks that followed the installation, I found very little reason to complain about the performance. Admittedly when turning the antenna, the rotator does produce some hum that can be heard within the house. This vibration may be reduced by a suitable method of shock mounting.

My tribander is some 35 feet above ground. The appearance occasionally draws a few stares, but then it has not been up very long. I imagine fewer people will notice the Yagi than if it had been mounted atop a tower.

Removing or servicing the antenna will be far easier for me than if it were on a tower. All parts are accessible from a relatively flat surface when the beam is in place. There is no need to lower it. Furthermore there are no guy wires and no worries over unauthorized climbing! Not only is the antenna firmly mounted on a soundly constructed mast but also it is nearly as high as many tower-mounted beams, and it rotates as well. Imagine, all these advantages and only a small hole in the roof that can be repaired rapidly if we ever sell our home. Now that I've tried it, I like it!

Strays

HAMS LEND A HAND

☐ When an earthen dam in Adams, KY, sprung a leak, hams helped out by providing communications services via an emergency net. Fred Jones, WA4SWF, transmitted reports from the dam to the DES office in Frankfort until the situation was brought under control.

I would like to get in touch with . . .

☐ hams who have surplus receiving and transmitting equipment they could donate or loan for research into developing new techniques for long-distance subsurface communications. I need a very sensitive and selective receiver that will cover the lower radio frequency spectrum (10 kHz-500 kHz). Contact Gaines Johnson, KA8CHN, Rte. 1, Box 65-A, Milton, WV 25541.

Novice Questions and Their Answers

Basic Amateur Radio: Popular questions on antennas, feed lines, radials and filters are covered in this Q and A session. Would you know the correct answers if you were asked?

By Jim Bartlett,* K1TX

Amateur Radio is constantly changing, and a part of this change is the continuous influx of newcomers to our hobby. New hams invariably have questions about practically every aspect of Amateur Radio, and they usually seek advice from those who are more experienced. If you are a new amateur, or even an old-timer who's likely to be asked to field Novice-type questions, the following information may be of interest to you. Many of the questions posed by Novices are, predictably, very similar in nature. Here are some of the typical queries I have recently received over the air, at hamfests and so on, along with their answers.

Q. I recently was given a low-pass filter. How should I use it with my hf transceiver, separate SWR indicator and antenna tuner?

A. First, let's assume your filter is designed for multiband use and has a cutoff frequency of 50 MHz. This is the typical low-pass filter available commercially. If the filter is designed for use on a single band or below 14 MHz, for instance, that's another story. If your filter is one of these, be sure that it is switched out of the line when you are operating on the higher bands. Regardless of the design of the low-pass filter, it should be installed as shown in Fig. 1. The filter should be placed as close to the transmitter output connection as possible, and the transmitter and filter should be strapped together with a heavy braid or copper wire.

Q. I have an 80-meter dipole, and have been feeding it with RG-58/U coaxial cable. I recently purchased an antenna tuner so that I could use the dipole on all bands. I can obtain almost a 1:1 SWR at the transmitter by using the tuner, but a

ham friend tells me the SWR in the line from the antenna is probably quite high. Is he right?

A. Yes, he is. Except during 80-meter operation, the SWR in the line from the antenna probably is much higher than your indicator shows. When you measure the SWR at the transmitter with a tuner in the line, you're not really measuring the SWR of the main part of the line, but rather that of the short section between the transmitter and the tuner. To measure the SWR in the main part of the line, you would have to insert the indicator ahead of the tuner (an impossible feat if the indicator is built into the tuner). Even so, the indicator would probably indicate a value lower than the true SWR on bands other than 80 meters, because of high line losses.¹ To find out the true SWR at the antenna, you would have to connect an SWR indicator between the antenna terminals and the feed line. Actually, this antenna installation is far from optimum for multiband use. You could probably obtain much better results by feeding the

dipole with open-wire line. When you "force feed" an 80-meter coax-fed dipole on 40 through 10 meters, you're simply asking too much! Sure, you may make a few contacts, but the antenna system is certainly not operating efficiently. Other solutions, besides using an open-wire feed line, include the use of a trap multiband dipole designed to operate on all bands instead of only one, or even an end-fed, random length of wire tuned with your Transmatch. You could obtain the same performance offered by the latter system simply by shorting the shield and center conductor of the coax line together and feeding the whole thing against a good earth ground. The performance of this random-wire antenna on 40 through 10 meters should be superior to that offered by your present system.

Q. I'm putting in a new vertical antenna and want to know what type of wire to use for the radials. The antenna will be ground-mounted, and I want to use radial-wire material that will last a while so I won't have to replace corroded wires in a few years. I was told I shouldn't use insulated wire. What should I use?

¹Notes appear on page 36.

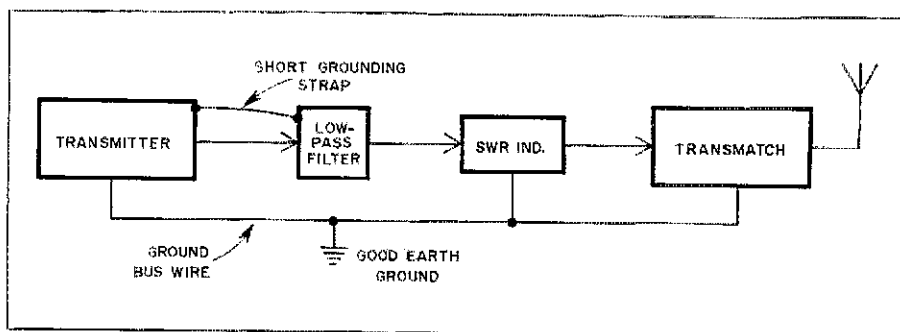


Fig. 1 — Station setup for using a low-pass filter.

A. There is no reason why you can't use insulated wire if you wish. Any wire, or for that matter any good electrical conductor, can be used to serve as ground "radials" under the base of a vertical antenna. The purpose of the radials is to improve the reflection capability of the ground surface beneath the antenna. The better the conductivity of the ground, the better the effective reflecting plane or image plane. Any wire will do the job here, and the more wire you can put down, the better the image plane will be. Of course, heavier wire, such as aluminum ground wire and electric fence wire, is superior in that it will take longer for corrosion to eat completely through it. Some people shun insulated wire for use as radial wire because, above ground, they know it has a tendency to fall apart more quickly. This happens when water gets trapped between the conductors and the insulation covering, causing accelerated oxidation. However, underground, this is not the case. Buried wires can actually last *longer* if they are covered by a tough insulation. One particularly good wire I've used is a 22-gauge, low-phosphor, stranded wire with a tough, molded insulation. This wire is available for \$3.50 per 1000 feet plus shipping charges from Madison Electronics² (at the time of this writing).

Q. I just moved into a new QTH. It's a brick house with nearby power lines and a small backyard (etc., etc.). What kind of antenna should I buy? What kind of beam is the best?

A. First of all, very seldom does an explanation of your yard help us make a decision for you. That's what you're asking us to do when you say, "What should I buy?" For one thing, who says that you have to *buy* your antenna? Sure, there are many excellent commercial antennas to pick from, but you'd be surprised at the number of Novices who ask where they can *buy* a dipole antenna! When I ask if they've tried to build one, most reply, "Oh, I can build it myself? Gee why didn't I think of that?" We won't discuss dipole construction here, as it is adequately covered in the *Handbook*, the *ARRL Antenna Book*, and *Tune in the World*, to name just a few sources. However, here are some things to consider when shopping for a commercially made "beam."

1) All other things being equal, a full-size monobander for each band should provide performance superior to that of a tribander. Most tribanders use traps, and it's safe to say that an antenna with traps cannot be as effective as a full-size antenna designed for the same frequency. This is not to imply that you shouldn't buy a triband beam. If you have room for only one Yagi, then it's probably best to consider going that route. Other things to check when you're comparison shopping are the materials and construction techniques used. Some antennas are built

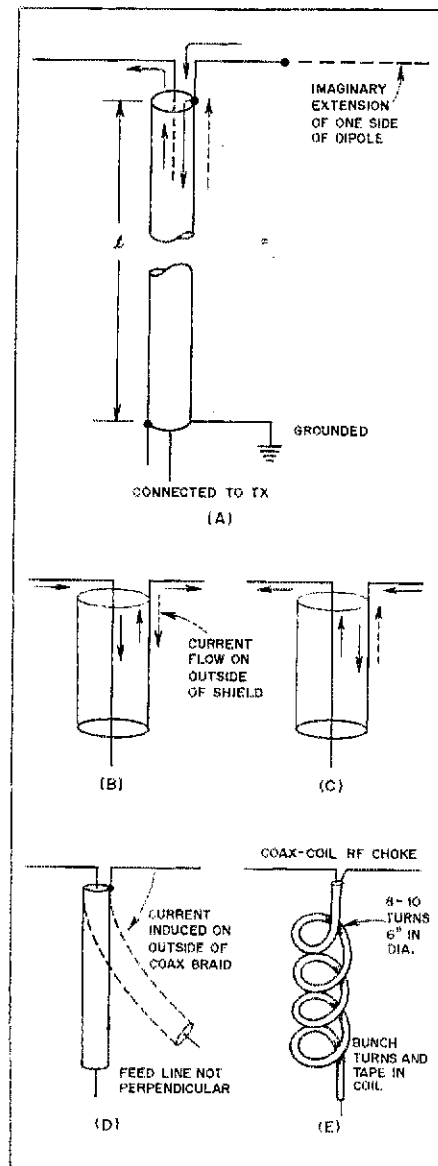


Fig. 2 — At A, rf current on the outside of the shield causes the antenna to behave as if it were shorter or longer than the actual length. This is indicated in the drawing by the extension added to one side of the dipole. B and C show how rf current on the shield causes one side of the dipole to change resonance. At D, rf current is induced on the outside of the shield because the feed line is not symmetrical with respect to the two sides of the antenna. A coax-coil rf choke is shown at E. This can be used to prevent rf current from flowing on the outside of the shield.

much more solidly than others, yet these usually weigh more, also. Is it more important that your antenna be lightweight, or strong? You must take all these things into consideration, along with the wind-load factor of the antenna and turning radius if you have space limitations.

2) Gain depends on several things: Element spacing and trap construction are probably the most important. If you decide to buy a commercially made beam, you should realize that a monobander can be designed for optimum element spacing, and that most trap antennas contain some

sort of compromise in spacing. Some manufacturers have added elements to their antennas for close-to-optimum spacing on more than one band. This helps.

Traps should be designed for minimum loss. Any trap will have some loss; the amount exhibited by a particular trap will depend on the wire size used in the coil and the type of dielectric material used in the capacitor.

Q. I just put up a new antenna, and the SWR is about 2:1 in the center of the 40-meter Novice band. I'm feeding the antenna (an inverted V) directly with about 100 feet of RG-8/U. Should I cut the feed line to some multiple of a quarter wavelength? I understand this will help reduce the SWR.

A. First of all, there's nothing wrong with the 2:1 SWR as long as your transmitter is able to load into that amount of mismatch — and most are. Second, if changing the length of your feed line affects the SWR reading, this indicates that you have rf current flowing on the outside of the coaxial-cable feed line. This causes a change in the apparent SWR on the line whenever the length of the line is changed. See Fig. 2A.

Let's assume that the feed-line outer conductor is grounded at the transmitter end. When this is the case, as the length l approaches any *odd* multiple of a quarter wavelength, the impedance down the outside of the coaxial cable becomes very large, and thus the rf current on the outside of the coax line is minimized. Conversely, as l approaches any *even* multiple of a quarter wavelength, rf current flowing on the outside of the coax line should reach a maximum as the impedance decreases. The effect here is one of changing the length of an imaginary extension connected to one side of the real antenna. This is why the SWR appears to change. (Actually, the SWR *does* change, because the terminating impedance at the antenna end of the line changes.)

The drawings in Fig. 2 at B and C should help explain this phenomenon. In B, during one half of a cycle the current is flowing up the shield inside of the line from the generator (your transmitter). At the antenna, the current flows out on the right side of the antenna. However, some current flows down the outside of the coaxial cable shield — this current is represented by the broken line and arrow.

At the end of that half of the cycle, the current flowing on the antenna has gone to the end. Some has been reflected and arrives back at the feed point at exactly the right time (because the antenna is resonant) to be in phase with the current as it starts flowing the other direction in the second half of the cycle. But the current that has flowed down the outside of the shield may not return at exactly the same time. This phase difference (along

with the magnitude of the current) causes a mismatch to occur, the same as if one side of the antenna had been shortened or lengthened, causing it to be nonresonant.

For example, in the drawing in Fig. 2D, let's say the antenna is being fed with coaxial cable and no rf current is flowing on the outside of the coax line. If the feed line is not kept perpendicular to the dipole elements while in the vicinity of the antenna, rf current *can be induced* on the outside of the shield. If the feed line is allowed to move in relation to the antenna, this induced current will be altered both in magnitude and phase. Therefore, even if the coaxial line is trimmed to a length that results in a minimum SWR reading, movement of the feed line can cause this SWR reading to change.

Going back to the antenna asked about in the question, assuming that the antenna *itself* is resonant in the middle of the 40-meter band and that it would exhibit

an SWR of 1:1, the 2:1 SWR on the whole antenna system (including the feed line) could be caused by rf current flowing on the outside of the coax.

If this is the case, you can correct the problem, if it really bothers you, by making a coiled-coax rf choke at the antenna end of the feed line. See Fig. 2E. This should choke the flow of rf current on the outside of the braid, and in turn eliminate the "imaginary extension" on the antenna that is causing the mismatch to occur.

That's just a sampling of the questions recently received here in the Technical Department at Hq. The questions we get cover a broad range of topics, but usually have one thing in common: The information, or at least a good part of it, is contained in the *Handbook* or one of the other League publications. Sometimes the published information hasn't provided everything the member wanted to know,

but many times we find that although the person *has* a copy of the publication that contains the information he is seeking, he hasn't taken the necessary time to read and digest the material.

From time to time, we'll try to cover a few of the more "popular" questions here in *QST*. Meanwhile, if you have a question you've been itching to ask, and you can't seem to find the answer anywhere, drop a line to Technical Information Service, ARRL.³

References

The Radio Amateur's Handbook, ARRL, 56th Edition, 1979.

The ARRL Antenna Book, ARRL, 13th Edition, 1974.

Notes

¹Gibilisco, "What Does Your SWR Cost You?" *QST*, January 1979.

²Madison Electronics, 1508 McKinney Ave., Houston, TX 77002. Tel.: 713-658-0268.

³For TIS guidelines, See Gibilisco, "Some Commonly Asked Technical Questions (and Their Answers)," *QST*, April 1979, pp. 35-36.

Strays

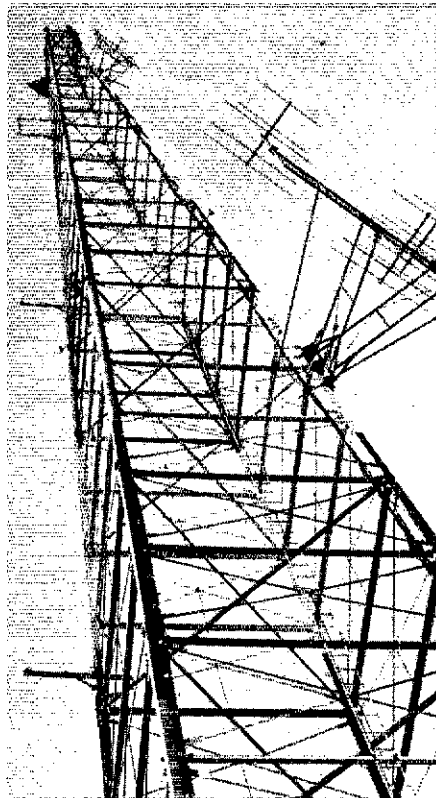


FEDERAL PUBLICATIONS AVAILABLE

□ The U.S. Department of Commerce issues a variety of books and pamphlets of interest to hams. Here is a sampling of current Commerce Department publications that might be useful in your shack: *NBS Time and Frequency Dissemination Service* (16 pages, 60 cents, catalog no. C13.10:432); *From Sundials to Atomic Clocks; Understanding Time and Frequency* (175 pages, \$4, stock no. 003-003-1650-1); *Electric Current Abroad, 1975 Edition* (82 pages, \$1.15, stock no. 003-025-00046-2); *Patents and Inventions: An Information Aid for Inventors* (23 pages, \$1.30, stock no. 0304-00511); *The International System of Units (SI)* (43 pages, 80 cents, stock no. 003-003-1326-9); *NBS Metric Kit* (\$2, stock no. 003-003-01736-1).

Orders for these publications should be mailed to the Superintendent of Documents, Government Printing Office, Washington, DC 20402. Include your name, address, titles ordered, prices, stock or catalog number and remittance by check or money order.

Many other Federal agencies publish items of interest to hams. *The Consumer Guide to Federal Publications*, available free from the above address, can direct you to these listings. You also may request to be placed (without charge) on the mailing list for *Select U.S. Government Publications*, a newsletter issued 10 times each year to announce new Federal books or pamphlets. — Neil Friedman, N3DF



The Long Island Mobile Amateur Radio Club has erected three ATV antennas in Syosset, NY, the highest of which rises 500 feet above sea level. Since November 1978, a 10-watt-peak TV beacon has been transmitting a video signal and a 5-kHz deviation sound signal on 439.25 MHz from 6 P.M. to 8 P.M. (EDT) to test propagation from this site. Reception reports have come from as far as 45 miles away. (W2MVS photo)

I would like to get in touch with . . .

□ Hams who are law-enforcement administrators interested in joining "Stop Drugs at the Source," a school-based drug abuse prevention program. Contact Chief of Police Terry L. Joyner, W4YBV, 608 Holcomb Bridge Rd., Roswell, GA 30075.



When microwave enthusiast Dr. Dain Evans, G3RPE, visited ARRL Hq. last fall, he found time in his hectic schedule to build a 10-GHz receiver in the ARRL lab. Near the end of a busy day of sawing, drilling, sanding and soldering, he was photographed while making final adjustments to the Gunn-diode oscillator. Dr. Evans served as president of the Radio Society of Great Britain during 1978. (W1XZ photo)

Product Review

Drake TR-7 HF Transceiver

The time was, some years ago, when any self-respecting ham was equipped to hear just about anything that might be happening in the radio spectrum. The usual receiver found in a ham shack was a "communications receiver" that tuned continuously from the standard a-m broadcast band to well above 10 meters. Amateurs tracked Amelia Earhart's ill-fated global adventure in 1937. Some sold their station receivers to the government for use in military installations during World War II, and others gained considerable press coverage in 1957 by providing their friends and neighbors with a unique view of the dawn of the space age by reception of signals from the first Sputnik.

The advent of "modern" equipment changed all that. Suddenly, our radio horizon was limited to the amateur bands, with barely enough overlap at the end of the dial to receive CHU and, possibly, to participate in MARS. To be sure, the trade-off was well worth it. We obtained vastly improved stability, sensitivity, selectivity, frequency readout and operating convenience in the bargain. But somehow, those of us who cut our Amateur Radio teeth on a general-coverage receiver never quite got used to not knowing what was going on next door in the radio spectrum.

All that has been changed with the introduction of the Drake TR-7. An outstanding feature of this transceiver is that, with the optional DR-7 digital readout feature, it becomes a general-coverage receiver with all the features and the high performance we have come to expect from "ham-bands-only" units. An added bonus is that the transmitter section can also be equipped for operation anywhere from 1.5 to 30 MHz — provided you can show Drake the license to operate there! This sort of flexibility in equipment was difficult to imagine just a few years ago.

The most important element in the Drake design, and the one which makes this performance and flexibility possible, is dubbed "up-conversion." Instead of being at a frequency such as 3, 5 or 9 MHz, the first i-f in the TR-7 is at 48 MHz, well above the highest operating frequency. There are several advantages to this approach: Image rejection problems all but disappear, gaps in the continuous coverage are eliminated, and good i-f rejection is provided relatively easily. Up-conversion is not new to Amateur Radio; it was employed in the Signal/One CX-7 10 years ago. However, with the TR-7, Drake has gone a couple of steps further: There is a four-pole crystal filter at the first i-f with a bandwidth of about 8 kHz, and *no active devices in the signal path ahead of the filter*. The objective is to minimize the effect of strong signals on the performance of the receiver.

On the transmitting side, the TR-7 features an all-solid-state design permitting broadband operation. The only thing the operator needs to do to change bands is flip the band switch. The TR-7 will deliver at least 100 watts output into a 50-ohm load on cw and ssb, and also on RTTY if the optional cooling fan is used. On

a-m (carrier plus one sideband) the output is on the order of 35 watts.

From an operating standpoint, the TR-7 is the most convenient rig this reviewer has ever used. The styling is functional, and is similar to that used in modern, high-fidelity audio equipment. Four different values of receiver selectivity are available with optional filters, which may be selected independent of the transmitting mode by front-panel push buttons. All of the controls are on the front panel; there is no need to grope inside the cabinet or behind the rig to reach anything. The different 500-kHz segments in a given frequency range are selected by push button as well. A touch of the "up" button, for example, results in a 500-kHz frequency increase. It may seem a bit tedious to push a button 12 times to go from 21 MHz to the 15-MHz WWV frequency, but a quick flip of the band switch to another range and back again will return you to 15 meters. The only transmitter-metering functions available are power output and reflected power, although a green LED is there to let you know that the alc is in operation. The wattmeter on our test rig

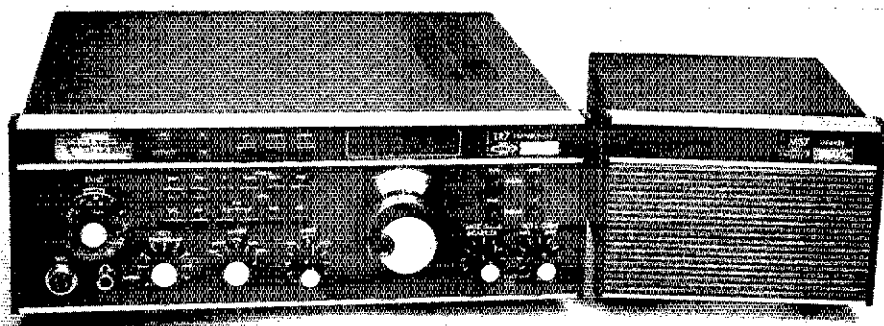
was reasonably accurate except on 160 meters, where 100 watts of rf output read 150 watts on the meter.

Receiver dynamic range is among the best we have seen: Noise floor is -133 dBm on both 80 and 20 meters, blocking above the noise floor is in excess of 120 dB, and IMD (third order intercept) is 90 dB (20 meters) and 84 dB (80 meters), using the procedures outlined by Hayward in July 1975 *QST*. With no rf amplifier and a passive first mixer, the receiver does not have the apparent sensitivity of some equipment designed with lots of front-end gain. Even so, with a good antenna in a quiet location, it is external noise, not sensitivity, which is the limiting factor in hf reception, even on 10 meters. Internally generated spurious signals ("birdies") were all within Drake's specification of less than a 1-microvolt equivalent signal, although a signal of that strength can sound surprisingly loud in a quiet receiver. The receiver agc threshold is about 2 microvolts; an increase in signal strength above that level results in little change in audio output. Reducing the rf gain will raise the agc

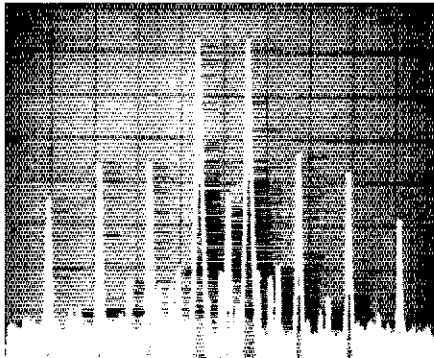
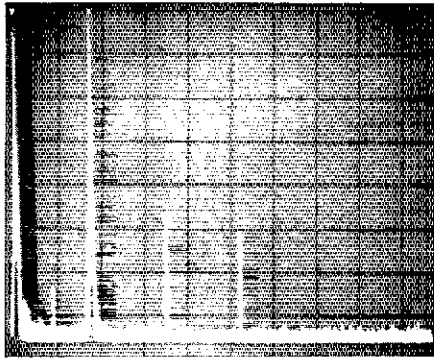
Drake TR-7 HF Transceiver

Receiver Performance:	Claimed by Manufacturer	Measured in ARRL Lab
Sensitivity	Ssb/cw, less than 0.5 microvolts for 10 dB S + N/N.	0.3 microvolts w/ssb filter, 0.13 microvolts w/cw filter.
Selectivity	2.3 kHz at -6 dB and 4.1 kHz at -60 dB (standard filter).	2.1 kHz at -6 dB and 4.1 kHz at -60 dB.
Transmitter performance:		
Spurious output (nonharmonic)	Greater than 50 dB down.	52 dB down (worst case).
Harmonic output	Greater than 45 dB down.	46 dB down (worst case).
Intermodulation distortion:	30 dB below PEP.	33 dB below PEP.

For other comparisons, see text and accompanying photos.
Frequency coverage: 1.5 to 30 MHz receive (with DR-7); 1.5-2.0, 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5, 28.0-30.0 MHz transmit (with DR-7).
Modes of operation: Usb, lsb, cw, RTTY, a-m (transmits full carrier and one sideband).
Power supply requirements: 11-16 V dc (13.6 V nominal), 3 A receive, 25 A transmit.
i-f: 48.05 MHz and 5.645 MHz.
Dimensions (HWD): 4.6 × 13.6 × 12.5 in. (117 × 345 × 318 mm) excluding knobs, connectors, and feet.
Weight: 17.1 lb (7.8 kg).
Price: TR-7/DR-7, \$1295; power supply, \$195; accessory filters, \$52 each.
Manufacturer: R. L. Drake Co., 540 Richard St., Miamisburg, OH 45342.



The Drake TR-7, shown here with matching MS-7 speaker.



These spectrum-analyzer photos were both taken with the TR-7 operating at full rated input power. In the top picture, the operating frequency was 1.8 MHz (worst case). Vertical divisions are 10 dB and horizontal divisions are 1 MHz each. The fundamental is shown here full scale. The most significant spurious output is the second harmonic, down approximately 46 dB. All other spurious outputs are down at least 50 dB with respect to the fundamental. The Drake TR-7 complies with current FCC regulations pertaining to spectral purity. The bottom photo shows the 14-MHz output of the TR-7 during a two-tone IMD test. Vertical divisions are 10 dB; horizontal divisions are 1 kHz. Third order distortion products are down approximately 33 dB from the PEP output. Individual tone outputs are down 6 dB from the PEP output. All measurements were taken in the ARRL lab.

threshold if you prefer, but the age cannot be defeated. Fast and slow age action may be selected from the front panel, and the time constants are automatically changed when the various modes are selected. The time constants were not measured in the lab, but the values selected provide appropriate performance for cw and ssb. The receiver incorporates the passband-tuning feature which was so popular on earlier Drake receivers; however, in the TR-7 the feature can be defeated for simplicity of ssb operation.

The transition from engineering prototypes to large-scale production runs is difficult with any piece of complex rf equipment, and the TR-7 was no exception. The review unit was one of the first off the assembly line, and some problems crept up which necessitated its return to Drake a number of times over the course of seven months of hard use. Drake tells us that the majority of the problems we encountered were corrected at the factory before more than a few dozen rigs were delivered, and that the rest were the result of random component failures, the likelihood of which has now been reduced thanks to a stepped-up program of

quality control. This can happen with any piece of gear, and when it does it is reassuring to know that there is a company with a solid reputation standing behind the product. The TR-7 comes with a 90-day limited warranty.

Accessories

The unit supplied for review was outfitted with 300-, 1800-, and 6000-Hz second i-f filters in addition to the standard 2300-Hz unit, and each proved to be useful during the course of the evaluation period. The NB-7 noise blanker was not available for evaluation, and other accessories were not requested. The PS-7 power supply is very rugged and includes circuitry to protect both itself and the transceiver from damage. The DR-7 digital display is so important to the versatility of the rig that it is not really an accessory in the conventional sense; it is difficult to imagine the rig without one, and Drake probably will not sell many "stripped" units. Finally, one promised accessory which we eagerly await is a complete service manual.¹ The instruction manual supplied with the unit is a very professional job, but it is almost completely devoid of technical information and does not even include identification of which circuit board is which. It is not known whether Drake plans to add vhf/uhf transverters to its "7-line" series, but there is no provision for a separate low-level transmitter output for this purpose. There is provided, however, a separate receiving antenna jack which has a variety of potential uses.

In closing, a word to sports-car buffs: In spite of anything you may have heard about the relationship between Triumph sports cars and Drake transceivers, the TR-7 does *not* have a sloping front panel! — *David Sumner, K1ZZ*

THE AEA AD-1 AUTO-DIALER

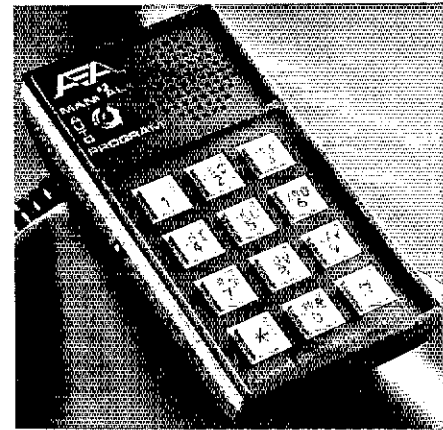
Don't trust your memory? Want to be able to safely drive while "dialing" with your Touch-Tone pad? Or how about programming or commanding your computer-controlled repeater from your car?

All of this and more is possible with the Advanced Electronics Applications (AEA) AD-1 Auto-dialer, a unique little device that uses the latest technology to generate Touch-Tone frequencies, plus stores and automatically dials any of the numbers programmed by the user or at the factory. In fact, this gadget performs so many functions that it may rival the intelligence of a few operators sometimes (but fortunately not often) heard on the air!

At first glance, the AD-1 looks like an everyday, run-of-the-mill Touch-Tone pad: a black box with keys on the front. But upon closer examination, you notice the built-in speaker and three-function manual/auto/program switch. Like many other tone pads, the AD-1 can be used between the microphone and the transceiver or it may be used in an accessory

¹Just before we went to press, the service manual and a "TR-7 Service Kit" arrived — and they're beautiful!

The loose-leaf service manual contains a complete description of how the various stages work, large schematics, and pictorials showing parts placement on each board, as well as complete alignment procedure. The service kit is a set of 13 extender boards which provide access to the various plug-in boards while the rig is in operation, as well as a complete set of alignment tools. The kit and manual were put to use immediately to diagnose a problem which turned out to be quite simple: the reviewer had plugged in one of the circuit boards incorrectly! The manual is \$30, and the service kit is \$50.



The AEA AD-1 auto-dialer. Note the manual/auto/program switch and monitor speaker at the top of the case.

jack on the back of the rig. So what's unique? We ain't got to that yet!

The AD-1 will store up to 18 different telephone numbers in as many storage memories, and each number may have as many as eight digits. Ten memories are user-programmable random access memory (RAM). The only problem with the RAM is that it is a *volatile* memory; it "forgets" the numbers as soon as power is removed from the RAM. Therefore, to retain the numbers in RAM, the AD-1 requires low-current external power for operation (usually from the rig at the mic or accessory plug, although a 9-volt battery can be installed for "memory keep-alive"). But loss of information in the RAM is no real problem since it takes only about a minute to reprogram the RAM with 10 telephone numbers.

What about the other eight memories? The numbers are permanently programmed into a programmable read-only memory (PROM). You are not limited to having only one programmed IC chip, either. You can order as many chips as you wish (programmed to your specifications), since the ICs plug into a socket inside the case (but only one IC at a time). Even though a fourth column of buttons is not present on the front of the AD-1, fourth column A, B and C tones are available on AEA-programmed IC chips. This permits the commanding of repeaters or remotely controlled equipment. Just think of what you could do with some decoding equipment and a computer!

There's still more! Not only does the AD-1 automatically dial the number you select, it also keys your transmitter. There are eight instantly programmable dialing speeds available; from an agonizingly s-l-o-w beeeep-hooop-boop to an incredibly fast "whutwuzrat?" Manual dialing is also possible, still with automatic transmitter keying. What happens if a manually dialed number is busy? Flip to "auto," hit the autopatch disconnect code already stored in memory, wait a few minutes and then simply recall the autopatch access code and hit "#." When the "#" button is pressed, the last manually dialed number is automatically recalled.

The eight-digit memory capacity does allow "local long distance" dialing (in many parts of the United States, a toll call that is dialed within the same area code needs to be preceded by the number 1.) As the AD-1 comes from the factory, the memory will accept only *eight-digit*

AEA AD-1 Auto-dialer

Power requirements: 12 V dc \pm 4 V at 25 to 50 mA.

Dimensions (HWD): 4-7/8 \times 2-9/16 \times 1-5/8 inches (124 \times 65 \times 41 mm).

Weight: 8 ounces (0.23 kg).

Price class: \$100.

Manufacturer: Advanced Electronic Applications, Inc. P. O. Box 2160, Lynnwood, WA 98036; tel. 206-775-7373.

number strings beginning with 1. A defeat jumper can be installed to allow the memories to accept eight-digit number strings beginning with any number, for other than autopatch uses.

User Comment

The AEA AD-1 took a little bit of getting used to because of the large number of features it contains. It is recommended that new owners practice using the AD-1 by itself before attempting to use it on the air. It's easy to make a fool of yourself if you only have a vague idea of what you're doing. Once you have practiced use of the AD-1 with your rig off, you should be able to take to the airwaves with confidence. Using the AD-1 on repeaters generated comments and questions galore until the "locals" got used to it.

You do not need an electrical connection of the AD-1 output to your transmitting equipment for it to work, either. Acoustic coupling can be obtained by holding the microphone of the rig or the hand-held up to the monitor speaker on the auto-dialer. However, this system does not always work, and AEA clearly says so in the manual (which, by the way, is quite concise on overall operation of the AD-1). But audio coupling does work in a number of situations, most of them being where experiments have already been done and where the user is familiar with the performance peculiarities of the repeater and transmitting equipment. The audio modulation must be of the proper level and there must not be too much extraneous noise.

It was also found that audio coupling works quite well on the regular telephone system when you happen to be sitting in front of a push-button phone. Just pick up the receiver, hold the mouthpiece a few inches away from the AD-1 speaker and let the AD-1 fly at full speed. The telephone decoding system never missed once in all the times this reviewer tried it, leading him to think of the business and industrial application potential of this accessory (but please don't use it for business on ham radio!).

Overall, the AD-1 auto-dialer is a precision, state-of-the-art piece of electronic equipment. This should help improve Amateur Radio public-service capabilities in emergency situations. Control of repeaters using decoders that only accept accurately spaced tone durations is one of the more apparent possible applications for the AD-1, as is control of computers, either at repeaters or remote-control stations. For operating a private or closed system, the AD-1 is a natural. But for the more immediate and not-so-exotic applications, the AD-1 takes a lot of guesswork out of autopatch dialing, since you can actually hear the tones through the monitor speaker. The AD-1 also allows the mobile operator to concentrate more on driving, contributing greatly to operating safety.

The only thing that remains to be done, though, is to bring the decoding equipment at many repeaters up to the standards of Ma Bell and the AD-1.

So, whether you have a common everyday use for such a developed accessory or you're "blue skying it" with a far-out applications project or you're the guy who has to have everything, the AD-1 could be the device that fills the bill.

Late news from AEA indicates that a portable auto-dialer is being introduced. Designated the AD-1P, the portable version comes with NiCad battery pack and a charger, for convenient use from the car, a telephone booth, or home. The model AD-1P speaker is slightly larger than that of the AD-1, for optimum acoustic coupling to the telephone mouthpiece. NiCads provide for a minimum of 10 hours of operation, and provide a "keep-alive" voltage for the RAM when the power switch is turned off. Price class of the AD-1P is \$120 with NiCad battery pack and charger, \$90 without. — *George Barker, WB8PBC*

BUTTERNUT HF5V-II MULTIBAND HF VERTICAL ANTENNA

Having an antenna for each of the different ham bands can be a difficult goal for many amateurs. Not everyone has a yard large enough for dipoles or neighbors who are sympathetic toward towers outfitted with beams. Antennas can also get to be a very expensive undertaking — but this isn't a problem that can't be solved. One way to get on all hands is to use a random-wire antenna and a Transmatch. The Transmatch can also be used with a dipole fed with open-wire line to obtain multiband performance. These antennas still require room, however, and might be impossible to put up in some locations. Another alternative is the multiband vertical. Many people scoff at the shortened vertical antenna, but the criticism is undeserved. In on-the-air tests, the shortened multiband vertical has often outperformed other kinds of antennas and provided consistent, reliable communications, mainly because of its low angle of radiation. One of the newest manufacturers to come out with a multiband vertical is Butternut Electronics in Lake Crystal, Minnesota. Their HF5V-II, with optional TBR-160 160-meter loading coil, gives an excellent account of itself from 160 through 10 meters. This antenna is one of the few on the market that will automatically cover six bands.

Over the last several years, most of my operating has been on 160 and 40 meters. But with the rise in solar activity, I became increasingly interested in operating the higher hf bands. The Butternut seemed to fit my operating needs to the T — coverage of all hf bands and automatic band switching. For the lower frequencies, the low angle of radiation provided by the Butternut HF5V-II optimizes DX performance while at the same time offering reasonable radiation patterns on the higher bands.

Butternut hasn't just come out with another multiband, trap antenna; their design is significantly different. The antenna is 26 feet (7.9 m) high and except for 15-meter operation the entire length is used regardless of the band in use. Most other trap vertical antennas use less than their full length for operation on all but the lowest band. On 160, 80/75 and 40

meters, heavy-duty, air-wound aluminum coils and resonator mast sections establish resonance at the desired operating frequency. On 20 and 10 meters, resonance is established by the overall length of the antenna and the L-C combinations of the 40- and 15-meter loading circuits. On 15 meters the antenna is a full 1/4-wave radiator with a trap isolating the lower sections from the top. To lower the high radiation resistance on 20 meters, a 1/4-wave matching section of 75-ohm coax (RG-11/U) is used. On 80/75 meters, where the base impedance is well under 50 ohms, a loading coil has been added to match the 50-ohm feed line.

The most serious shortcoming of the short vertical antenna is its narrow bandwidth. The 2:1 SWR bandwidth is 15 kHz on 160, 30 kHz on 80/75 meters (75 kHz with the TBR-160 removed), and 150 kHz on 40 meters. On 20, 15 and 10 meters, the antenna will cover each band entirely with less than a 2.5:1 SWR.

As with any construction project, it's best to read all of the instructions first and make a complete parts inventory. The antenna is constructed of high-strength aluminum and has a wind survival rating in excess of 80 mi/h (129 km/h). The quality of workmanship is excellent with all parts fitting together quite securely. Butternut's step-by-step instruction manual is complete with a full parts pictorial. Assembly took less than 60 minutes. The antenna was mounted on a three-foot piece of water pipe that had been driven two feet into the ground. The base section was then clamped to the water pipe with three U clamps. The antenna is insulated from ground by a piece of fiberglass that is attached between the 80-meter resonator section and the aluminum base. Butternut recommends that the base be placed in concrete, but for testing and comparison purposes the temporary water pipe mounting was used for the review unit. (*Remember — the antenna should be clear of all power lines before it is raised!*) Next it was necessary to install a ground radial system. The instruction manual gives ample guidance on the need to have as good a ground system as is physically possible to ensure optimum performance. For the HF5V-II, I cut eight 100-foot pieces of wire and laid them out in a radial pattern around the base of the antenna. Each wire was then stripped at the mid-point, soldered to a common bus and attached to the antenna. This arrangement (16 radials, each 50 feet long) seems to work rather well and is fairly simple to install. More radials will help improve performance, but according to the many articles on radial systems, this system seems to be sufficient for normal operation in this area (low ground conductivity). For a more permanent installation, the wires would be buried one to two inches under the ground. A simple method for installing radials is to use a hand edger and

Butternut Electronics HF5V-II Vertical Antenna, and TBR-160 Loading Coil

Length: 26 feet (7.9 m).

Weight: 12.5 lbs (5.7 kg).

Input impedance: 50 ohms.

Connector: UHF female.

Power rating: 1 kW cw, 2 kW ssb 40-10 meters;

500 W cw, 1200 W ssb 80/75 meters and

150 W cw, 200 W ssb 160 meters.

Price class: HF5V-II, \$100; TBR-160 \$35.

Manufacturer: Butternut Electronics, Rte. 1,
Lake Crystal, MN 56055; tel. 507-947-3126.

carpet knife as described in "Hints and Kinks," August 1977 QST.

Antenna tuning was remarkably simple and quick with the HF5V-II. It was not necessary to adjust the antenna at all in order to get resonance on 20, 15 or 10 meters. On 160, 80/75 and 40 meters, the heavy-duty coils are compressed or expanded to establish resonance at the desired frequency.

On-the-air reports from amateurs indicate that this antenna is a good performer for both DX and local work. The HF5V-II can be used in many different locations and should provide an excellent account of itself. — J. Craig Clark, Jr., NIACH

MICROTRONICS M-80 HAM INTERFACE

"How can I use a computer in conjunction with Amateur Radio?" asks the curious ham.

"You can send and receive Morse code and RTTY," says the proud owner of a Microtronics M-80.

The M-80 is a complete hardware and software package that interfaces a Radio Shack TRS-80 microcomputer with an Amateur Radio station (a similar package is available for the PET microcomputer). The hardware is a circuit board that plugs into the expansion port on the back of the TRS-80 and into the key and headphone jacks of a transmitter and receiver. The software is a machine language and Level II BASIC program recorded on a cassette tape.

The Kit Hardware

The hardware is available either wired or as a kit. The kit is easy to build; one or two evenings with a soldering iron should complete the job. Sockets are included for all of the ICs, so the builder need not fear "over-cooking" an expensive IC. The wiring of the 40-pin connector (only seven pins are wired) is a potential source of difficulty; however, if the directions are followed carefully, this task may be completed successfully the first time.

After I assembled the unit, I was unable to align it; the tuning LED remained lit whether or not a signal was being tuned. I inspected the circuit board for solder bridges and incorrect wiring, but found nothing wrong. Next, I compared my board with a factory assembled board and discovered the source of my difficulty: Pins 11 and 12 of IC-04 were jumpered together on the factory version. The assembly manual *did not* mention that this had to be done, but I tried it and sure enough, the unit could now be properly aligned. (Circuit boards

presently being shipped by Microtronics no longer need jumper wires.)

The only alignment involves tuning the phase-locked loop (PLL) frequency. This is easily accomplished by adjusting a trim pot in conjunction with an LED mounted on the edge connector.

CW Operation

After the interface is connected to the computer and ham equipment, the machine language and BASIC programs are loaded into the TRS-80. Now the system is ready to go; type RUN and press ENTER. The computer will ask you to choose either Morse or Baudot. If the choice is Morse, you may select a speed between one and 100 words per minute. After entering the speed, you obtain cw transmission by typing on the TRS-80 keyboard. A 255-character buffer permits typing ahead of the characters that are actually being transmitted.

To receive cw, simply hit the CLEAR and ENTER keys (all functions are initiated by hitting the CLEAR key). After you tune a signal for maximum illumination of the LED indicator, the system will begin decoding cw and printing the message on the computer video screen.

Unless the sender's fist is very inconsistent, the M-80 will perform perfectly and copy solid with speed changes of plus or minus approximately 10 words per minute, with respect to the speed initially chosen. Machine-sent WIAW transmissions and shaky-fisted novice transmissions have been copied with equal ease.

To return to the transmit mode, hold down the CLEAR key. Five special cw characters may be sent by pressing a single key for each: AR may be sent by hitting the "@" key, AS with "↑," KN with "<," SK with ">" and error with "←."

RTTY Operation

To transfer to the RTTY mode, hit CLEAR and type R. Hit CLEAR again and type "%0" to choose a speed; the standard 60, 66, 75 or 100 words per minute are available. A transmitter with frequency-shift keying, or an outboard audio-frequency-shift keyer, is necessary to transmit RTTY. Again, typing ahead of the transmitted characters is possible, as the 255-character buffer is available for RTTY also.

Carriage return and line feed (CR and LF) are sent by hitting the ENTER key once. LTRS and FIGS are sent automatically whenever you shift between sending letters and figures; LTRS and FIGS may also be sent manually if you desire. "Diddle" (blanks) may be sent by typing hyphens.

Special Functions

The M-80 has numerous special functions that make its operation complete. Ten canned messages of up to 255 characters each may be created beforehand, stored in computer memory and transmitted in Morse or RTTY whenever the user wishes. For example, the operator's name, QTH and list of equipment may be typed into message slot number one. When the operator is on the air and ready to transmit that information, he simply hits CLEAR and types the number 1 and the message is sent automatically!

A specialized utilization of this function is geared for the RTTY operator. The operator's call sign is typed into message slot number

zero, and at the end of a RTTY transmission the operator hits CLEAR and types "#" and the message "CW ID FOLLOWS." is automatically sent in cw and then the computer switches to the RTTY receive mode. All this is accomplished merely by hitting two keys!

Receiving RTTY requires more critical tuning than that required for cw. The tuning LED is lit on space and unlit on mark; again — tune for maximum illumination and the computer will display the transmitted message on the monitor.

The M-80 uses a PLL circuit to decode RTTY. However, the M-80 has provisions for hooking up a more elaborate outboard terminal unit for more consistent reception when band conditions are less than ideal.

For easier readability of the message displayed on the monitor, the operator may shift to the larger 32 characters-per-line display. Also, reversing of mark and space tones, and automatic downshift-on-space in the RTTY mode are available.

A note in reference to the special functions: All special functions must be initiated while in the transmit mode. For example, if one is unable to decode a cw signal because the computer is set at the wrong speed, first one must switch to the transmit mode, then change the speed and finally return to the receive mode to copy the signal.

Computer Noise

The only drawback encountered while using the M-80 was noise from the Radio Shack computer, rather than the ham interface. The TRS-80 generates a lot of noise that can be heard on the Amateur Radio bands. Some bands are worse than others, but no band is free of noise. Weak signals that are on the same frequency as the noise *cannot* be worked because the system copies the noise rather than the signal. Stronger stations overcome the noise and can be worked successfully and, of course, weak stations can be worked on frequencies where there is no noise.

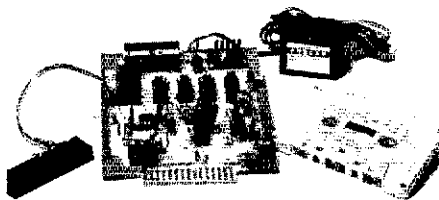
On RTTY, the noise was reduced substantially by using an outboard terminal unit in conjunction with the M-80. On some bands the noise was eliminated completely, so if you have a terminal unit available, it is advisable to put it to use; it will not only reduce the computer noise, but it will also help you copy those fading RTTY signals through that heavy Saturday afternoon ORM on 20 meters.

Code Practice

If a ham wishes to improve his cw receiving skills, the M-80 has provisions to generate code practice. After a speaker is connected to the unit, the code speed is chosen and the system generates random five-letter words that are simultaneously displayed on the monitor.

To check copy, practice may be interrupted by pressing the space bar and resumed by pressing the bar again.

The original version of the M-80 software had a few bugs. Microtronics has removed the bugs and their new program works perfectly. All purchasers of the M-80 who have sent in their warranty cards should have received the modified program according to the manufacturer. If you are an M-80 owner who has not yet sent in the card, it is advisable to do so. Shortly, all registered purchasers will receive a new manual that contains more detailed information on operation of the M-80. The manual will include information on how to use



The Microtronics M-80 ham interface shown here is a complete hardware and software package designed to be used with the Radio Shack TRS-80 microcomputer (with Level II BASIC and 16-k RAM). The connector on the left plugs into the TRS-80 interface port; the cassette contains the machine-language and BASIC programs.

the unit in conjunction with popular RTTY terminal units, how to troubleshoot the M-80, and how to use the unit in non-Amateur Radio functions, such as using it in conjunction with a Baudot printer to enable you to get hard copy from the TRS-80!

MLK-1 Loop-Keyer Module

Microtronics has a loop-keyer module, the MLK-1, available as an option for the M-80. The module is used in place of the solid-state relay and permits the M-80 to be used with the loop supply of an RTTY terminal unit. This allows an operator to have hard copy from a teleprinter that is in the same loop and also is an easy way to use the terminal unit demodulator and afsk for the reception and transmission of RTTY.

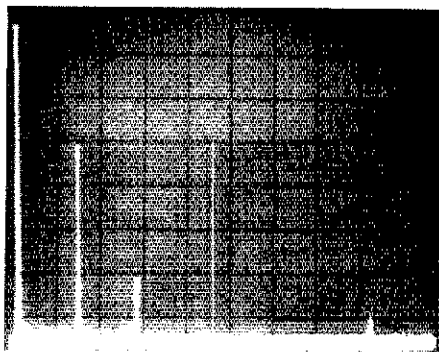
The MLK-1 is in the \$30 price class. Both it and the M-80 are available from Microtronics at P. O. Box 747, Keyes, CA 95328. The M-80 Ham Interface package is in the \$100 price class for the kit and \$130 assembled. — *Stan Horzepa, WAILOU*

MIRAGE B108 144-MHZ AMPLIFIER

Many amateurs active on vhf have used low power with excellent results. This is usually the result of coupling that low-power signal to a well-placed, high-gain antenna. Those of us who are restricted to indoor antennas have much poorer results with low power on vhf. The advent of vhf multimode transceivers has made the vhf spectrum more interesting to newcomers and to apartment dwellers, yet there is a limit to the number of elements an apartment dweller can stuff into his living room or into the attic. One obvious way to provide a bigger signal is to run more power.

Most new vhf amplifiers are mode-selectable so they complement the multimode transceiver. The Mirage B108 is a fairly recent addition to the lineup of equipment designed for 2-meter operation.

The Mirage B108 was unpacked and connected between an ICOM IC-245E and a four-element attic-mounted Yagi. A full 80-watt output was measured on a vhf wattmeter in the beginning. During the evaluation period, the output power was closely watched, and after two months of rather heavy use, no degradation in power output was observed. The Mirage B108 has a built-in, switchable receive preamplifier that has a claimed gain of 10 dB and noise figure of 2.5 dB \pm 0.5 dB. Full specifications are shown in the specification table.

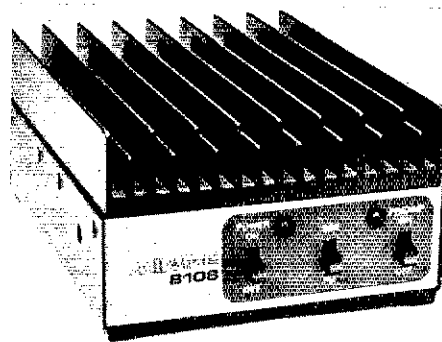


This photo shows the B108 spectral output with the amp. running 30 watts output on 144.1 MHz. Vertical divisions are 10 dB; horizontal divisions are 100 MHz. The large pip at far left is generated internally by the analyzer. The fundamental shown here was attenuated approximately 30 dB by a two-cavity notch filter to prevent overload distortion in the analyzer. The most significant spurious output (second harmonic) at 288.2 MHz, is down approximately 60 dB with respect to the unnotched fundamental. Other spurious outputs are down at least 70 dB. This device complies with current FCC regulations pertaining to spectral purity. All measurements were made in the ARRL lab.

Visually, the Mirage amplifier is very pleasing to the eye. The front panel is a handsome two-tone beige with two LEDs and three slide switches. One LED indicates that dc has been applied to the power amplifier in the unit; the other LED indicates operation of the receive preamplifier. The slide switches select power amplifier on/off, ssb/fm operation, and receive preamplifier on/off. The unit is completely enclosed in a black case with matching heat sink on top. On the left side panel is an access hole for screwdriver adjustment of the variable I-R time delay. The back panel has two SO-239 (UHF) connectors for input/output, a fuse holder, a three-pin power connector and a six-pin connector that permits remote operation of the unit with the Mirage RC-1 remote control option or a user-provided interface.

Operation

The opening paragraph of this review described the situation of the apartment dweller. This apartment dweller enjoys Mode-A satellite operation and vhf ssb/cw operation. During the review period, no exceptional propagation enhancement occurred (sporadic



The Mirage B108 amplifier, shown here with high-use controls readily visible to the operator.

E. tropo ducting or aurora). However the writer found that many near-horizon satellite passes which could not be used with the 10-watt output were successfully used with the addition of the 80-watt amplifier. On a number of OSCAR 7 and 8 orbits, the amplifier was switched in and out. This procedure established that the usable access window from this station was extended an additional 5 to 10 minutes with the amp./preamp. combination in use. During overhead passes, it was not possible to use the amplifier without developing an unfair share of downlink signal devotion.

The amplifier was used during the 1979 VHF Sweepstakes with good results. The receive preamplifier was essential to balance the station capability. Numerous Hartford/Newington area amateurs run high power and large 2-meter arrays, resulting in distortion products and the expected front-end overload. It was found that when copying a very weak station, the insertion of the receive preamplifier enhanced that station enough so that signal information could be copied even underneath overload distortion products caused by local stations. For example, Jim, K1TX, who is only three miles from my location, runs 80 watts to a 16-element Yagi and has an average location. I found that with the preamp turned on I could dig out a station within 3 kHz of Jim's signal, but that with the preamp. off, the difference of signals in the IC-245 was not sufficient to permit readable copy. It will suffice to say that under adverse conditions the preamplifier outperformed my expectations.

How much "help" does the 80 watts provide? In three hours of operation during the January 1978 VHF SS, 11 contacts were made in three sections. The same three hours were chosen for this year's operation, resulting in 48 contacts in 11 sections. To me, that performance alone is enough to warrant an investment of this nature. — *Jim LaPorta, N1CC*

Mirage B108 Amplifier

Manufacturer's specifications	Claimed	Measured in ARRL Lab
Frequency coverage:	144 to 148 MHz.	Okay.
Power input requirement:	5 to 15 watts.	11 watts.
Power output:	80 watts nominal	80 watts.
Power requirements:	13.6 V at 10-12 A.	13.6 V at 10.5 A.
Impedance:	50 Ω input and output.	
Modes:	Fm, ssb and cw.	
Dimensions (HWD):	5-3/8 x 3 x 8 inches (137 x 76 x 203 mm).	
Weight:	3 lb (1.4 kg).	
Price class:	\$170 (RC-2 remote unit \$25).	
Receive preamp.:	10 dB gain, 2.5-dB noise figure (\pm 0.5 dB).	

DAIWA CS-201 AND CS-401 COAXIAL SWITCHES

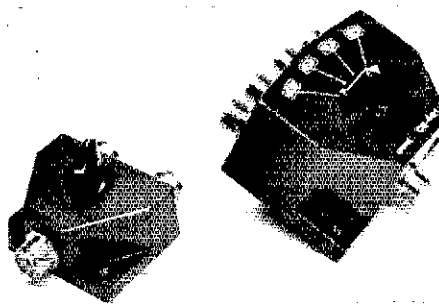
Were you ever faced with the problem of having to switch a transmitter between a number of antennas? The Daiwa model CS-201 and CS-401 coaxial switches might just be the answer. How many times have you been asked in the middle of a QSO to give a signal comparison between two different antennas, only to wait five minutes while the other operator fumbled with the coax connectors? When the contact finally *did* continue, band conditions had probably changed so much that an

accurate comparison was impossible. Sometimes you wish the *other* guy would "discover" coaxial switches!

Those of you who are fortunate enough to have an antenna farm will appreciate the fact that the model CS-401 is capable of switching one piece of equipment between four different antennas. The automatic feature that grounds the other three antennas when not in use is an important consideration in lightning protection.

As an avid QRP operator, this reviewer has found a real advantage in establishing a contact using medium power and then switching over to low power for the remainder of the contact. The CS-201 lends itself beautifully to this, allowing two transceivers to be tuned up and ready. To switch from one to the other, just turn the switch position on the CS-201. This is great for making comparisons of low and high power levels, or to be ready when you stumble across a DX pileup in the middle of your QRP operation.

Both of these switches are of excellent construction, sealed to keep the switch contacts dry and clean. Both switches are equipped with nonscratch bases. Three mounting holes are provided for securing the switch to the operating table or the wall of the shack. Switch positions are indicated by a pointer knob



The Daiwa CS-201 coax switch, left, and the CS-401, right.

mounted on top of the switch, and the switch *sounds* solid — a nice assurance that this piece of equipment will be around the shack for a long time to come. The switches are rated to handle the legal power limit and their usable frequency range extends up to 500 MHz for vhf/uhf as well as hf work. The excellent adjacent-terminal attenuation makes it possible to have more than one piece of equipment connected to the switch without being concerned about possible damage to a receiver front end during transmitting.

Coax switches are just for switching antennas, right? While this is a major application for coax switches, it is certainly not their only use. Many amateurs are finding out that in our r-filled world, interference problems are sometimes hard to cure. It may not just be the simple case of installing a low-pass filter and forgetting about it. Sometimes additional filters or wave traps are needed for each band. Coax switching can be utilized here to select the proper filter when changing bands, making band changing a pleasure again.

A dummy load is present (or should be) in almost every shack, but how often do we put it to use? Most of us probably just pull it out when we are making some repairs on the rig; the rest of the time it makes an interesting conversation piece or an oily paper weight. The fact is, your dummy load should be used almost every time you turn on the transmitter. Instead of spending five minutes tuning up on the already crowded amateur bands, we should first switch to a dummy load to make transmitter adjustments before switching to the antenna for any final adjustments. End of sermon.

Whatever the application, the use of one or more of these Daiwa coax switches will probably fit the need. Take a look at your own station; you may find many areas where the use of coax switching can improve your operating and add some extra convenience to your station. — *Garry Bartels, W1C1PM*

Daiwa Coaxial Switches

Power rating: 2.5 kW PEP, 1 kW cw.
 Impedance: 50 ohms.
 Insertion loss: Less than 0.2 dB.
 VSWR: 1.2:1.
 Maximum frequency: 500 MHz.
 Adjacent terminal isolation: Better than 60 dB at 300 MHz, 50 dB at 450 MHz.
 Contact resistance: Less than 20 milliohms.
 Connectors: SO-239 (UHF).
 Circuit: CS-201 — Spdt, automatic grounding;
 CS-401 — Sp4t, automatic grounding.
 Price class: CS-201, \$20; CS-401, \$65.
 Supplier: Bell Industries, J. W. Miller Division,
 19070 Reyes Ave., Compton, CA 90224.

SEM CON, INC. MODEL HA-2 2-METER MOBILE ANTENNA

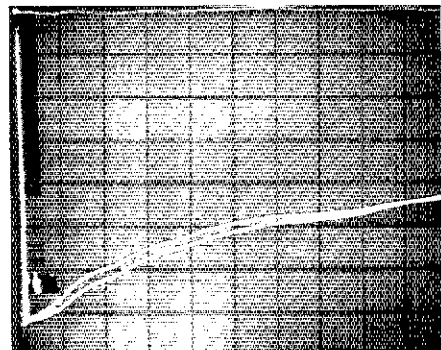
There have been many ingenious antenna designs used by the 2-meter-mobile ham fraternity in the past few years. Quarter-wavelength and 5/8-wavelength verticals seem to have been the most popular for consistent, all-around performance on simplex and through repeaters. Sem Con, Inc. has come up with a novel antenna that may be easily set up for either vertical or horizontal polarization — owners of the new, smaller multimode rigs, take note!

The HA-2 antenna is a one-half wavelength, gamma-fed antenna shaped in the configuration of a cubical-quad element. A unique, yet simple clamping arrangement (supplied) allows the change in polarization to be made easily. In order to mate with many existing mobile antenna brackets, the HA-2 mast has a standard 3/8-inch x 24 stud on the bottom.

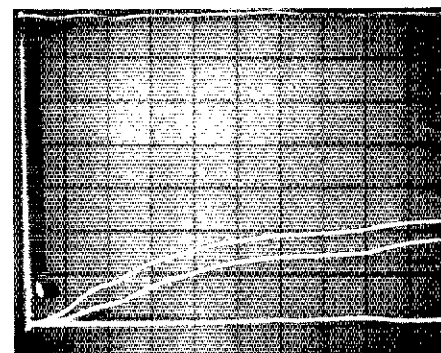
Set up for vertical polarization, the HA-2 stands about 3 feet (0.9 m) high; about 2 feet (0.6 m) high for horizontal. For mounting on hatchbacks or trunks of cars, this height allows the radiating "loop" to clear most roof lines and keep a low enough profile so that the antenna won't be prone to strike tree branches, garage doors or other low-hanging objects. This is quite a convenience, as there's nothing more annoying than having to remove an antenna every time the car is garaged!

During the test period of the last few months, the HA-2 has performed well in the local area through many repeaters. Once mounted on the hatchback of this reviewer's car, the antenna was easily tuned by using the variable gamma capacitor located inside the antenna center insulator. Checking and readjusting the capacitor only took about 10 minutes. The antenna was tuned for minimum reflected power at 147 MHz, and the SWR at 146.01 and 147.99 MHz was between 1.5 and 1.7. The bandwidth appears to be suitably broad for most repeater use. Sem Con, Inc., claims an omnidirectional radiation pattern for the HA-2 in the horizontal mode, with minor side lobes appearing in the vertical mode. The manufacturer supplied a set of test-range measurements to substantiate this. The exact placement on the car in individual circumstances will likely alter this pattern to some degree, however.

The HA-2 is well constructed. Good-quality aluminum mast and stainless-steel hardware are used for the radiating element and gamma match. The gamma capacitor is mounted inside the center insulator, which can be weather-proofed with a tight-fitting plug after the capacitor has been adjusted. The appearance of the HA-2 gives the impression that it will stand up to the extremes of weather and give good service for many years. For further information on the HA-2, contact Sem Con, Inc., P. O. Box 2751, Palos Verdes Peninsula, CA, 90274. Price class of the HA-2 is \$30. — *Sandy Gerli, AC1Y*



Terminal isolation of CS-201 as displayed on a spectrum analyzer. Vertical scale is 10 dB per division, and horizontal scale is 50 MHz per division. The top line in the photo represents direct coupling to the analyzer. Each trace represents one switch position. Measurements taken in the ARRL lab.



Terminal isolation of CS-401 as displayed on a spectrum analyzer. Vertical scale is 10 dB per division, and horizontal scale is 50 MHz per division. The top trace represents direct switching to the analyzer with the switch in position 2. The second trace shows the switch in position 1, third trace position 3, and fourth trace position 4. Measurements taken in the ARRL lab.

Strays 

I would like to get in touch with . . .

11 hams who use long-wire antennas, especially on 15 meters. Glenn Markley, W8V1B, RD 4, Mansfield, OH 44903.

Technical Correspondence

POSITIVE-FEEDBACK AUDIO FILTER

I would like to comment on Spencer Schubbe's article on page 35 of December 1978 QST. I am using a much simpler filter which I have "simplified." This is the well-known multiple-feedback band-pass filter, to which I have added positive feedback for Q control and a dc output to drive a siphon recorder.

Fig. 1 is a schematic arrangement of the circuit. Fig. 2 shows the normalized response characteristics. The values shown in Fig. 1 are

for $f_0 = 530$ Hz. Normalizing is done by making $R1 = 1$, $C1 = 1$, $\omega_0 = 1$, and so on.

This filter has the advantage that the center frequency is readily calculated as

$$f_0 = \frac{1}{2\pi(C1)(R1)}$$

and is readily adjusted by changing only two equal capacitors, C1 and C2. Also, the Q can be adjusted with a single control and the gain at the center frequency is constant.

The chief disadvantage is that the op amp, U1, can easily run out of range at high Q

values, and if the gain is made too large it becomes an oscillator! At high values of Q, pinging is a nuisance. — George L. Rogers, 2432 Cortland St., Waynesboro, VA 22980

BALANCED DIPOLE ANTENNA FED BY COAXIAL CABLE

Ordinarily, when a balanced dipole is fed with coaxial cable, an unwanted current will flow down the outside conductor jacket of the cable unless some means is provided to minimize the currents. The ARRL Antenna Book (13th edition, pages 113-114) suggests measures such as the use of a quarter-wavelength conductor alongside the jacket and attached to the jacket at the bottom, or a quarter-wavelength sleeve around the cable connected to the shield at the lower end.

The effect of such "side elements" is to cause the impedance looking into the outside of the cable to become much higher than the impedance of the half of the antenna connected to the shield. As a consequence, the current "prefers" to flow in the antenna rather than down the outer conductor of the coax, and the unwanted current becomes negligible.

I have found a variant of the quarter-wavelength sleeve that is simplicity itself, and still provides good results (see Fig. 3). A half-wave horizontal dipole with a radiation resistance of R_a ohms is fed by coaxial cable. The center conductor is connected to the right-hand half and the jacket is connected to the left-hand half. The conductive sleeve S surrounds the cable and is spaced a distance g from the jacket. The bottom end of the sleeve is connected to the jacket at X, a distance of a quarter wavelength from the antenna feed point. Air insulation is assumed between the jacket and the sleeve S. Suppose that the

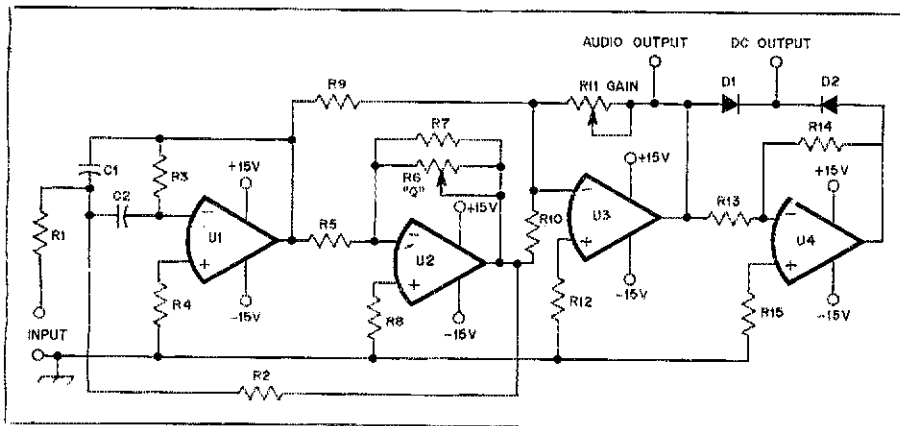


Fig. 1 — Schematic diagram of the positive-feedback audio filter. Resistors are 1/4- or 1/2-watt composition. Capacitors should be disk ceramic, mica or polystyrene. For a center frequency of approximately 530 Hz, the following component values are used.

- C1, C2 — 0.02 μ F.
- R1, R2 — 15 k Ω .
- R3 — 30 k Ω .
- R4 — 33 k Ω .
- R5, R7, R9, R10, R13, R14 — 10 k Ω .
- R6, R11 — 100 k Ω .
- R8, R12, R15 — 5100 Ω .

U1-U4, incl. — 741 operational amplifier.

For other values of f_0 , best results are obtained when $R2 = R1$, $R3 = 2 \times R1$, $R4 = R3$, $R7$ (max) = $R5$, $2 \times R8 = R5$, $R10 = R9 = R6 = 100 \times R7$, $R11 = 100 \times R10$, $2 \times R12 = R9$, and $C2 = C1$.

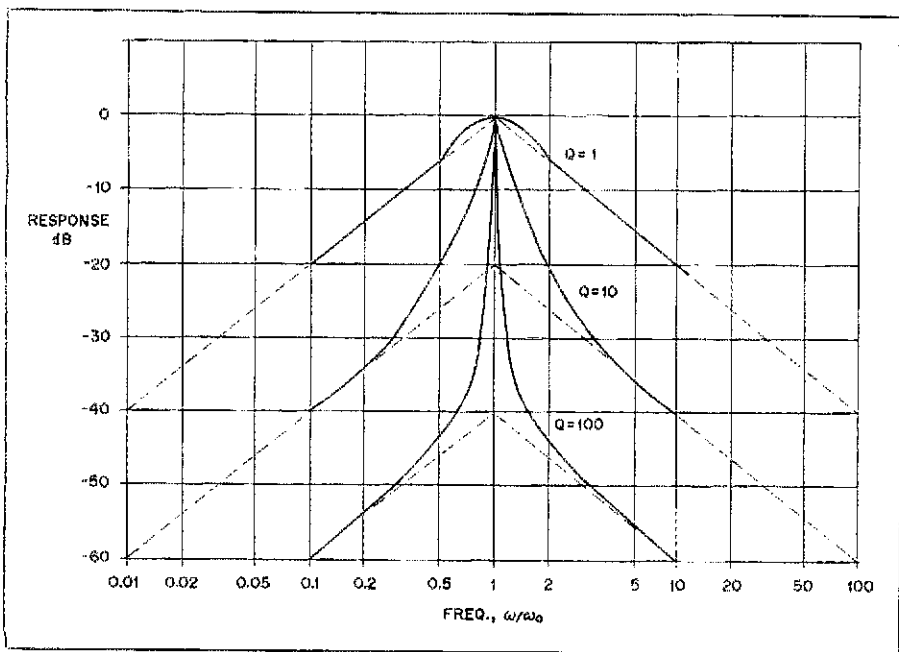


Fig. 2 — Normalized band-pass response for $Q = 1$, $Q = 10$ and $Q = 100$.

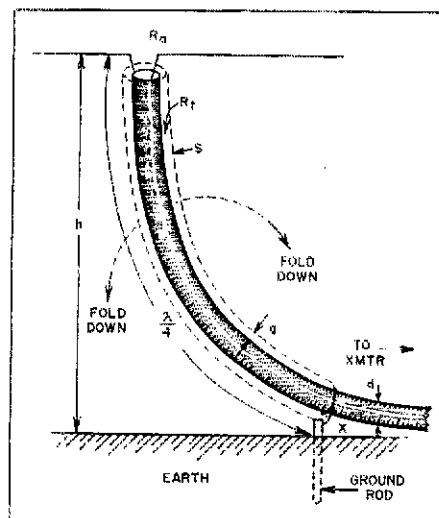


Fig. 3 — Balanced antenna fed by coaxial cable. S is the quarter-wavelength sleeve which is simulated by grounding the shield at point X, 1/4 wavelength from the antenna feed point. R_f represents the impedance of the shield as seen from the antenna feed point. R_a is the radiation resistance of the antenna.

construction of the antenna system is such that the point X is connected to a ground rod at the earth's surface.

Now suppose the distance g is increased by expanding the sleeve outward (as indicated by the curved dashed arrows) so that it becomes a cone with the apex at the bottom. If continued, this cone will become a disk with radius $\lambda/4$. Since this disk will lie on the earth's surface, the ground can be substituted for it, and the sleeve as such can be dispensed with!

The jacket now becomes a radiator, chiefly vertical, and its radiation resistance may be calculated. Add this to the ground-loss resistance of the rod in the earth, and the total base resistance may be expressed as R_b ohms. The impedance of the jacket, looking down from the top, is resistive at resonance and is equal to $R_t = Z_0^2/R_b$ ohms, where Z_0 is the characteristic impedance of the jacket treated as a single-wire transmission line.

If the voltage across R_a is e volts, the power radiated by the antenna is $P_a = e^2/R_a$ watts. Since half of e is applied to the top of the jacket, the power delivered to the jacket is $P_j = (e/2)^2 \times (1/R_t)$ watts. Substituting for R_t gives $P_j = (e/2)^2 \times (R_b/Z_0^2)$ watts.

The ratio of the power sent into the jacket to the power radiated by the dipole is thus

$$\frac{P_j}{P_a} = \frac{R_a R_b}{4 Z_0^2}$$

As an example, let the dipole be an 80-meter half-wave antenna 25-feet high, fed with RG-58/U. The jacket of the cable is 0.195 inch or 0.0163 feet (4.95 mm) in diameter, so the characteristic impedance of the jacket considered as a single-wire transmission line is $Z_0 = 138 \log_{10} (2h/d) = 138 \log_{10} (2 \times 25/0.0163) = 481$ ohms. (If RG-8/U is used, its outer-conductor Z_0 is 438 ohms.)

The radiation resistance R_a of the antenna is determined from its height above ground in wavelengths, which here is $h = 0.095 \lambda$; the resulting radiation resistance is $R_a = 20$ ohms. (See "Impedance of Short Horizontal Dipoles," January 1976 QST, page 32. F_2 is read from Fig. 1 of that article for $h = 0.095 \lambda$.)

The value of R_b is determined from the radiation resistance of vertical antennas plus a reasonable allowance for ground-loss resistance. For a sloping wire having a length of $\lambda/4$ and a height of h wavelengths, the radiation resistance is approximately $R_{b1} = 586(h^2/4)$ ohms, where 586 = 16×36.6 , and 36.6 ohms is the radiation resistance at the base of a quarter-wavelength vertical antenna.

In this example, $h = 0.095 \lambda$, and therefore $R_{b1} = 586 \times (0.095)^2 = 5.3$ ohms. A reasonable value for the ground-loss resistance might be $R_{b2} = 10$ ohms; hence the total value of the base resistance $R_b = R_{b1} + R_{b2}$ is approximately 15.3 ohms. Substituting in Eq. 1,

$$\frac{P_j}{P_a} = \frac{20 \times 15.3}{4 \times (481)^2} = 0.00033$$

Thus the power diverted into the outside conductor of the coaxial cable is only 0.033 percent of the power radiated by the dipole!

Calculations of the power ratio for off-resonance frequencies (such as at the edges of the 80-meter band) have been made and have resulted in values of P_j/P_a that are less than two percent.

It is thus seen that the simple expedient of connecting the shield of the coax to ground a quarter wavelength from the antenna feed point ensures negligible diversion of power on-

to the outside of the feed line. Of course, the cable may continue on after the grounding point X for any distance desired, in order to be connected to the transmitter. — Robert B. Dome, W2WAM, 645 Terry Rd., Syracuse, NY 13219

MORE ON DISCONE ANTENNAS

□ The week following the publication of my article, "An Inexpensive Multiband VHF Antenna," in December 1978 QST brought overwhelming mail. Here are answers to some of the most frequently asked questions.

I had nothing to do with the invention of the discone. The notes below offer some of its history. My only contribution was one inexpensive form of the antenna.

The dimensions given in the December article are not optimum and there is a drafting error, but the antenna will work as described. In Fig. 4 here, area A forms the cone. The narrow triangle, B, provides an overlap (inside the cone) so the seam can be mechanically secured.

In the optimum case, the radius of the disk for this size cone would be 7-7/8 inches (200 mm) and the cone-to-disk spacing should be about 1/8 inch (3.2 mm); these two dimensions are 70 percent of the maximum cone diameter and 30 percent of the diameter of the small cone opening, respectively. If maximum bandwidth is to be obtained, a smaller connector such as a BNC should be used. The "radius min." of Fig. 4 would of course be smaller with the smaller connector.

The discone can be inverted, in which case it becomes a "conical monopole." The latter would probably be best for sky-wave propagation, but I prefer the conventional discone for mobile and repeater work. Measurements³ show a strong lobe at zero degrees. Radiation at high angles is given as equal to that of a half-wave dipole at the discone's lowest design frequency. This 60-degree cone shows a 3.3-dB loss as compared to a dipole in the horizontal plane at the frequency where the slant height is 0.94 wavelength. Above this frequency, the horizontal field strength increases.

Hardware cloth (also called "mason's cloth" or "plasterer's cloth"), with its zinc coating, is of course lossier than silver, copper or aluminum, but I doubt if it makes much difference in this case. A worrier can reduce the loss by making the cone tip and the center portion of the disk out of sheet copper. After the surface currents have spread a bit, there will be less current and therefore less loss per grid wire.

As to the wave passing around the edges of the little squares, the most recent reference I

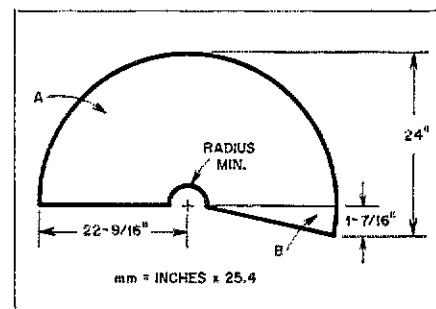


Fig. 4 — Revised diagram for construction of the conical portion of the discone antenna. The size of "radius min." will depend on the type of connector used at the apex of the cone.

know of does not contradict my results, as long as the squares are a small fraction of a wavelength across.⁴

Commercial discones are available. You can see them mounted on many airport control towers. Some surplus military discones are available, such as the AT-49/APR and its A and B versions, which cover 300-4000 MHz. Engineering Associates of Arcanum, OH, tell me they stock this item. As for the conical monopole, I have seen versions of this antenna operating as low as 2 MHz.

The big advantage of the discone and the conical monopole is wide bandwidth. The antennas are useful over an even wider frequency range for receiving than they are for transmitting, since the VSWR is less important for good reception. The unit in my article is good for receiving at frequencies in excess of 300 MHz. — D. T. Geiser, W4ZANU, RD 2 Box 787, Snowden Hill Rd., New Hartford, NY 13413

References

- Boyer, "Discone — 40 to 500-Mc. Skywire," *CQ*, July 1949. Reprinted in *CQ Anthology*, Cat. No. 102-1 (New York: Cowan Publishing Co., 1958).
- ITT, *Reference Data for Radio Engineers*, Sixth Ed., (Indianapolis: Howard W. Sams and Co., Inc., 1975,) p. 27-10.
- Kandoian et al., "High Gain with Discone Antennas," *Electrical Communication*, vol. 25, June 1948.
- Kandoian, "Three New Antenna Types and Their Application," *Proceedings of the IRE*, vol. 34, Feb. 1946; Also *Electrical Communication*, vol. 23, March 1946.
- Seybold, "The Low-Frequency Discone," *CQ*, July 1950. Also reprinted in *CQ Anthology*.

Notes

- ¹Nail, "Designing Discone Antennas," *Electronics*, Aug. 1953.
- ²Jasik, *Antenna Engineering Handbook*, First Edition (New York: McGraw-Hill Book Co., 1961), pp. 3-24.
- ³See note 1.
- ⁴Hill and Wait, "Electromagnetic Surface-Wave Propagation Over a Bonded Wire Mesh," *IEEE Transactions on Electromagnetic Compatibility*, vol. EMC-19, Feb. 1977, p. 2.

Strays

QST congratulates . . .

□ Peter Kemp, WB1FX, coordinator of industrial arts education at the Bethel (CT) Middle School, who received the Bethel Jaycees' Distinguished Service Award for 1979.

□ Samuel Saar, W9PQQ, recipient of the Herbert S. Brier Memorial Award and Radio Amateur of the year, as selected by the Porter County (IN) Amateur Radio Club.

□ James F. Bartram, W1PDL, assistant E.C. for Newport (RI) County, who was named consulting engineer of Raytheon's Submarine Division in Portsmouth, RI.

□ Dr. Kalman Oravec, A15B, an instructor at the New Mexico School of Mining, who passed all FCC Amateur Radio elements in one sitting. Oravec also has passed exams in Great Britain and Hungary.

□ Kenneth Miller, K6LR, who was elected president and chief executive officer of Penril Corp. of Rockville, MD, manufacturers of radio and computer communications equipment.

□ Steve Lauffer, K9QIM, a senior at Lewis University majoring in social justice, who was selected to receive the Educational Achievement Award of the Lincoln Academy of Illinois for the 1978-79 school year.

Hints and Kinks

SIDETONE AND AGC MODIFICATIONS FOR THE HEATH SB-303/SB-401

Having owned a Drake 1A receiver with amplified/delayed agc, I appreciate the utility of this type of agc. In order to apply a modification to my SB-303 for this advantage, I made these circuit changes.

The SB-303 i-f stage following the selective filter responds to the voltage on the 0.02- μ F capacitor which charges in about 160 μ s and discharges through a 33-k Ω resistor in less than one millisecond by charging the regular agc system. The new agc charges rapidly and controls the gain until the regular agc has time to charge; then both circuits function as one. On a short pulse only the new agc operates. The fast agc action tends to reduce the sound of the noise and the fast release leaves no dead space after the pulse.

An emitter-follower stage, added ahead of the agc detector, provides a lower source im-

pedance, reducing the charging time. The net improvement in agc action is dramatic!

The circuit changes, illustrated in the accompanying drawing, were accomplished by mounting the added components by the leads on the SB-303 i-f/audio board. A wire was connected from the junction of D507, the 0.02- μ F capacitor and the 33-k Ω resistor to R503 and C533.

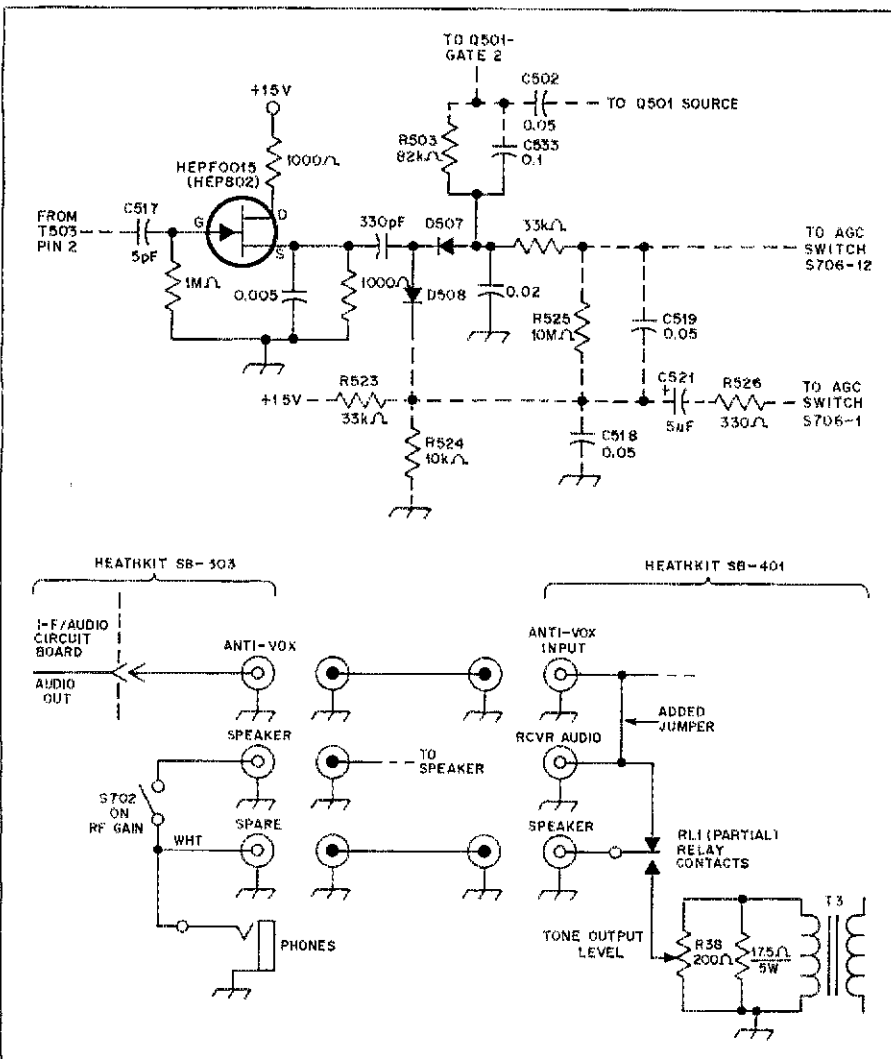
The original SB-303 circuitry has no provision for supplying cw sidetone to the headphones. Also cw signals emanating from the loudspeaker are not particularly appreciated by other members of the household. By modifying both the SB-401 and the SB-303 to the configuration shown, the cw sidetone will be available at the headphones and the loudspeaker can be shut off completely. The 17.5-ohm, 5-watt resistor was added to reduce the volume of the sidetone to a comfortable level. There is a trade-off with this modification. The SB-303, as designed, is susceptible to overloading by strong signals. The noise

blanker I used presented additional gain prior to the selective filter, making the symptoms of overloading more noticeable. — *John W. Hartung, W7THY, Portland, OR*

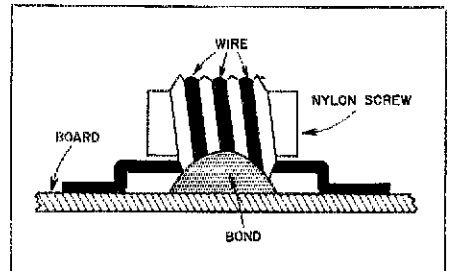
COIL-FORM IDEA FROM NASA

Ever think of trying nylon screws for coil forms? The idea is described in *NASA Tech Briefs* which points out that they are available in a variety of sizes and have been used successfully for breadboarding electronic equipment.

Key parameters to consider, according to the NASA publication, are the diameter and the pitch of the screw and the separation of the threads. Copper wire for the coil is simply placed in the spiral thread so that the coil inner diameter and the spacing between turns can be reproduced easily just by choosing the right screw. Should a screw of the right length not be available, a longer one may be easily trimmed. A drawback, however, is that one cannot tune such a coil by adjusting the spacing between turns. — *Merton P. Backlund, K0MVM, N. St. Paul, MN*



These modifications for the Heath SB-303/SB-401 series, offered by W7THY, provide amplified delayed agc action (top) and a means for sidetone during cw operation (bottom).



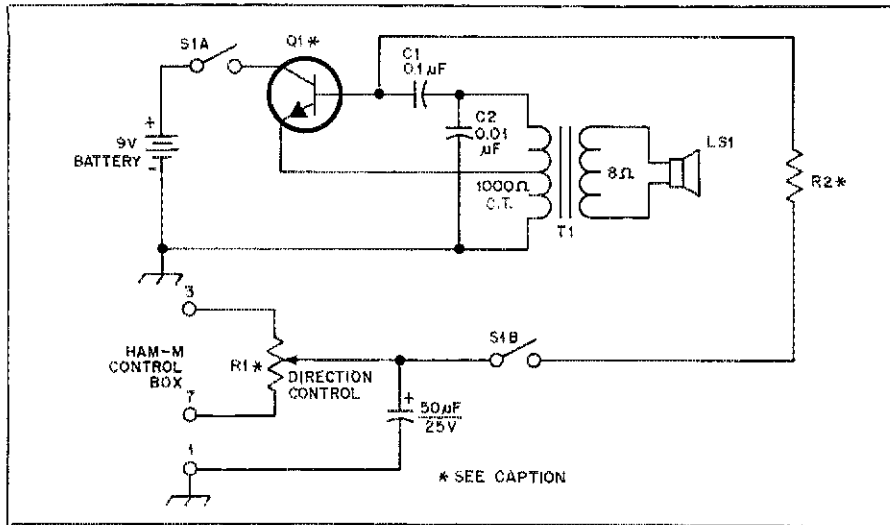
A nylon screw serves as a coil form. Copper wire is placed in the spiral thread. The completed coil may be bonded to a printed-circuit board. (From *NASA Tech Briefs*)

SIMPLE AUDIBLE METER FOR HAM-M ROTATOR

Even when a blind operator can tune an exciter expertly with the aid of an audible tuner,



Leo J. Heint, K0DNT, with his finger on the audible meter for his Ham-M rotator. K0DNT is an NCS for the American Council for the Blind net which meets daily on 14.305 MHz from 1800 to 1900 UTC.



This diagram is for an audible beam position indicator for the Ham-M rotator.

LS1 — 8-ohm, 0.1-0.3 W loudspeaker.

Q1 — General-purpose audio amplifier npn transistor, Radio Shack no. 276-2014 or equiv. Almost any npn transistor may be used.

R1 — Linear-taper potentiometer. Maximum

value may be between 10 kΩ and 25 kΩ.

R2 — 75 kΩ, 1/2 watt. 68 kΩ or 82 kΩ is acceptable.

T1 — Audio output transformer, pc board mounting, Radio Shack no. 273-1380 or equiv.

setting a beam antenna for the desired direction may be difficult. This is true for the Ham-M rotator, particularly, because the meter indicator is very silent.

An audible indicator for use with such rotators largely overcomes this difficulty for the blind operator. The circuit I've shown involves the paralleling of the voltages of the Ham-M rotator potentiometer with the potentiometer in the audible indicator where the oscillator is located.

Choose a potentiometer for the audible indicator that has a pointer rotation of nearly 360 degrees. Install the parts in a small Minibox with the potentiometer facing the operator. Mark north as being in the straight up position (or south if the rotator swings through the southerly direction.) Sound will begin or cease at the point matching the Ham-M control box. If an operator wants the beam to head west he moves the arm of the audible indicator to halfway between the north and south positions, adjusting the beam direction until the sound begins or ceases. Several blind operators in the local area use this system and are pleased with the ease of handling. — Richard F. Hunt, KØMG, St. Paul, MN

PULSED CRYSTAL CALIBRATOR FOR THE DRAKE R-4C

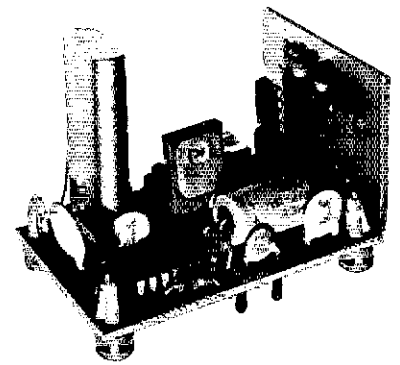
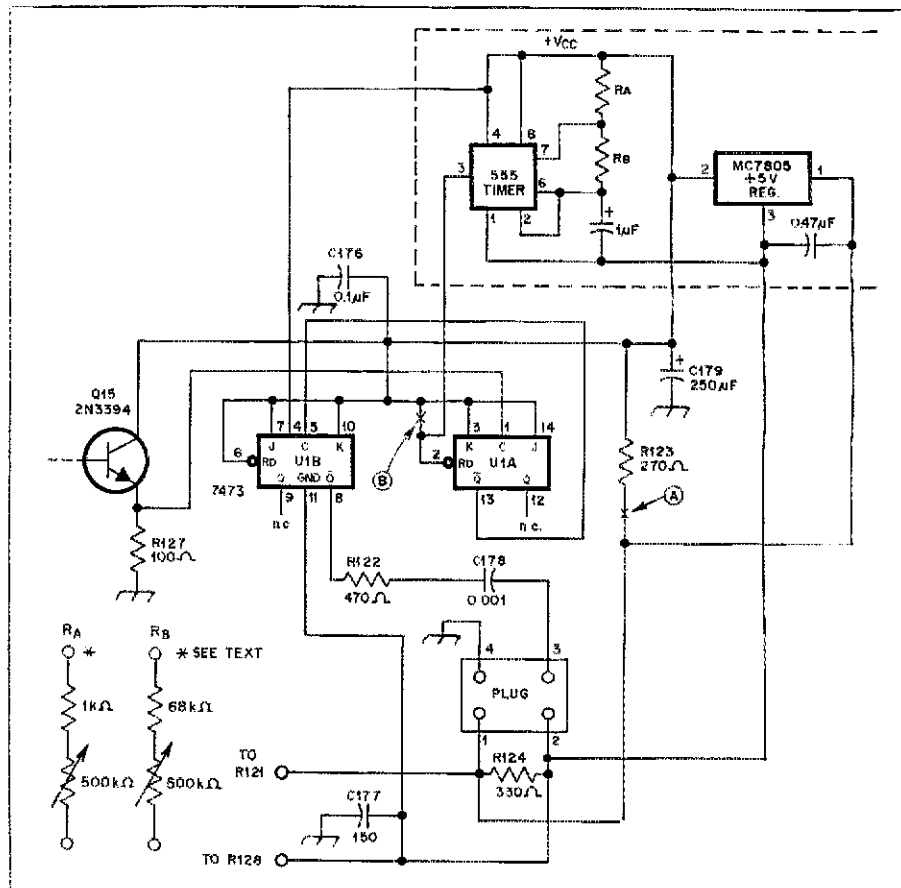
The diagram shows a simple, inexpensive method for gating the crystal calibrator in the Drake R-4C. All modifications are confined to the plug-in crystal-calibrator board, which can be removed easily for work without affecting normal receiver operation.

A type 555 timer IC is used to develop +5 V gating pulses of adjustable duration and frequency. These pulses are fed to the "CLEAR" line (pin 2) of the first =2 flip-flop in U1. Calibrator output is normal with pin 2 high (pulse on), but is interrupted whenever pin 2 is low (pulse off). A +5-V regulator IC (MC7805) was included to assure stable operation.

All components except the regulator IC were

mounted on one side of a 1-5/8 × 1-5/16-inch (41 × 33-mm) piece of copper-clad fiberglass circuit board. Two 1/4-inch (6-mm) lengths of no. 16 wire were soldered parallel to the copper cladding, extending approximately 1/4 inch (6 mm) beyond the edge of the small board. These wires pass through mating holes drilled near one edge of the calibrator board. They are

This circuit shows a modification for gating the crystal calibrator in the Drake R-4C.



The neat modification of W3GCZ's Drake R-4C receiver shown above provides pulsed crystal calibration.

soldered to the ground foil on the underside to provide rigid vertical mounting. The regulator IC was mounted near the center of the calibrator board, using the two holes available after removing R123 and drilling a third hole.

Modifications to the original calibrator board can be minimized if the regulator IC is also mounted on a small board. Both sides of the board may be needed. Only two electrical modifications are then required on the calibrator board: (1) lift one end of R123 from the board, and (2) isolate the foil tab at pin 2 of U1.

The values shown for RA and RB provide a wide range of adjustment. A repetition rate of approximately one pulse per second and a duty cycle of approximately 75 percent (i.e., 0.75-second heat-frequency tone duration) has proved satisfactory. A shorting switch can be

added across the 1- μ F timing capacitor for selecting ungated operation, if desired. Investing an evening of time and about \$5 has made frequency calibration under crowded band conditions a breeze. — *J. W. Wonn, W3GCZ, Irwin, PA*

CHART FOR HEATH RCL BRIDGE

The Heath IB-5281 RCL bridge is a very useful measuring instrument that makes short work of identifying those unmarked components we've all accumulated. However, in mentally multiplying the range factor by the scale reading, one may very easily slip a decimal point. To prevent errors, I prepared the attached table and typed it on a cut down 3 x 5-in. (76 x 127 mm) card which is placed in the handle recess for use or stored in the test-lead compartment.

My chart is arranged in this manner:

Range	LO	MID	HI
Cx .01 μ F	0.1 μ F	1.0 μ F	10 μ F
Cx .0001 μ F	.001 μ F	.01 μ F	0.1 μ F
Cx 1 pF	10 pF	100 pF	1000 pF
Lx .01 H	0.1 H	1.0 H	10 H
Lx .1 mH	1 mH	10 mH	100 mH
Lx 1 μ H	10 μ H	100 μ H	1000 μ H
Rx 10k	100 k	1 Meg.	10 Meg.
Rx 100	1 k	10 k	100 k
Rx 1	10 Ω	100 Ω	1000 Ω

— *Donald C. Mead, K4DE, Greensboro, NC*

IMPROVING NOTCH-FILTER SELECTIVITY

Here is a simple method of improving the cw selectivity of any receiver having a notch filter. The idea is well-known among old-timers. It is most useful with receivers lacking steep skirt selectivity.

Simply set the notch to the "high pitch" side of zero beat as shown in Fig. 1. This results in improved rejection of high-pitched noises by making the i-f response steeper. The exact setting of the notch for best results must be determined by experimentation. This technique may also be used to advantage for ssb reception. Pencil marks on the dial make for quick resetability in case the notch is needed for its conventional purpose. — *Stan Gibilisco, W1GV, West Hartford, CT*

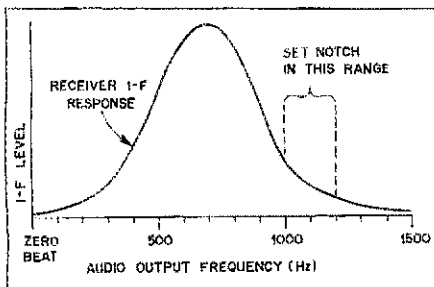
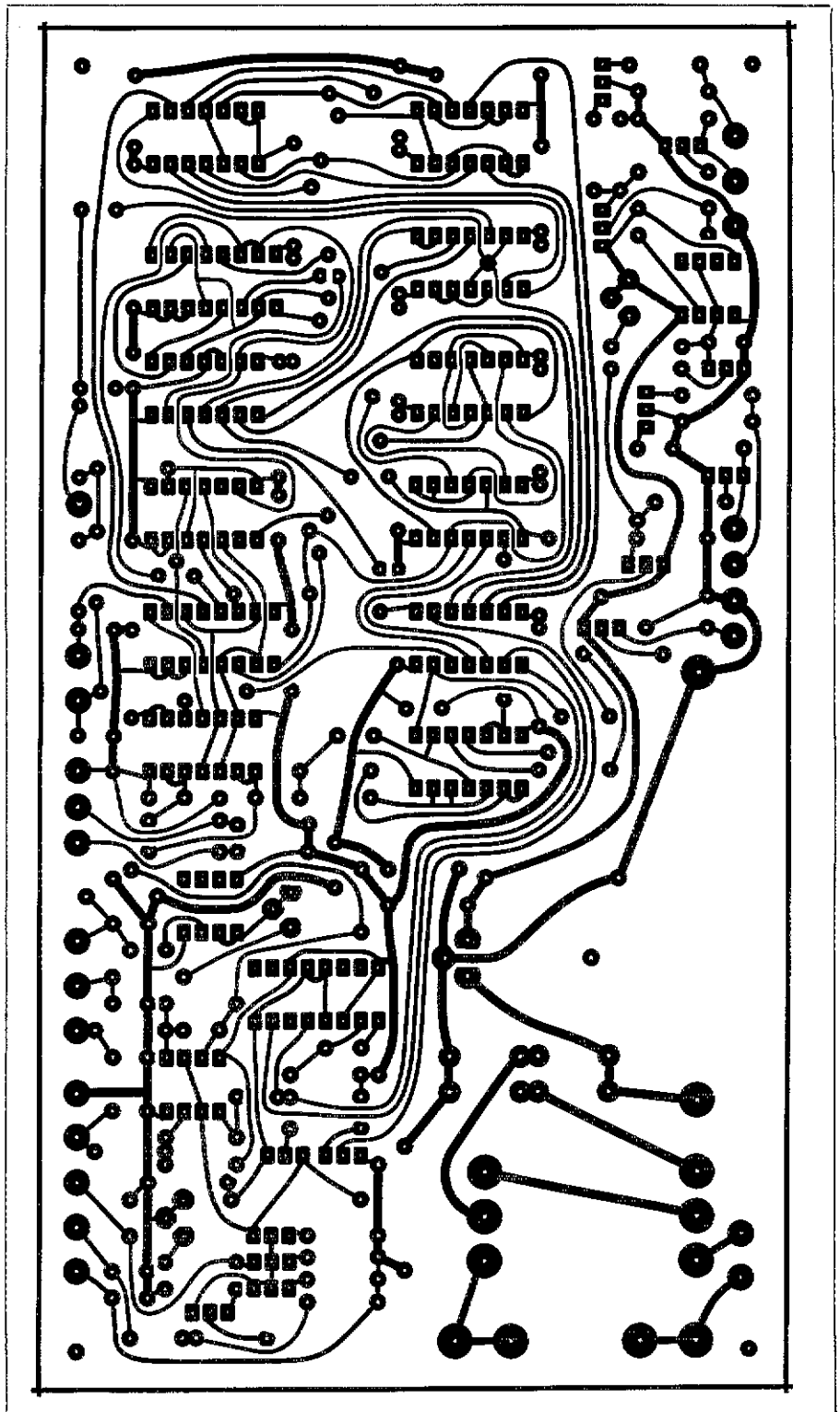


Fig. 1 — Setting notch filter for improved receiver selectivity. The audio output frequencies shown are for example only.

TS-520S RF LEAKAGE

Since I am the very satisfied owner of a Kenwood TS-520S transceiver, I read the product review by W1FB in May 1978 *QST* with considerable interest. Mr. DeMaw's remarks regarding rf leakage are well taken, if perhaps a



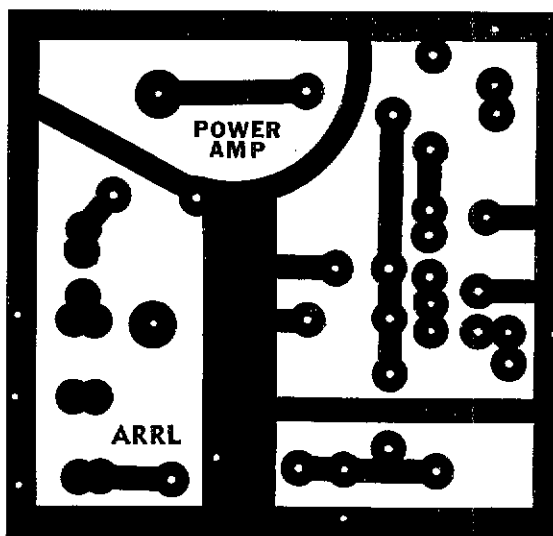
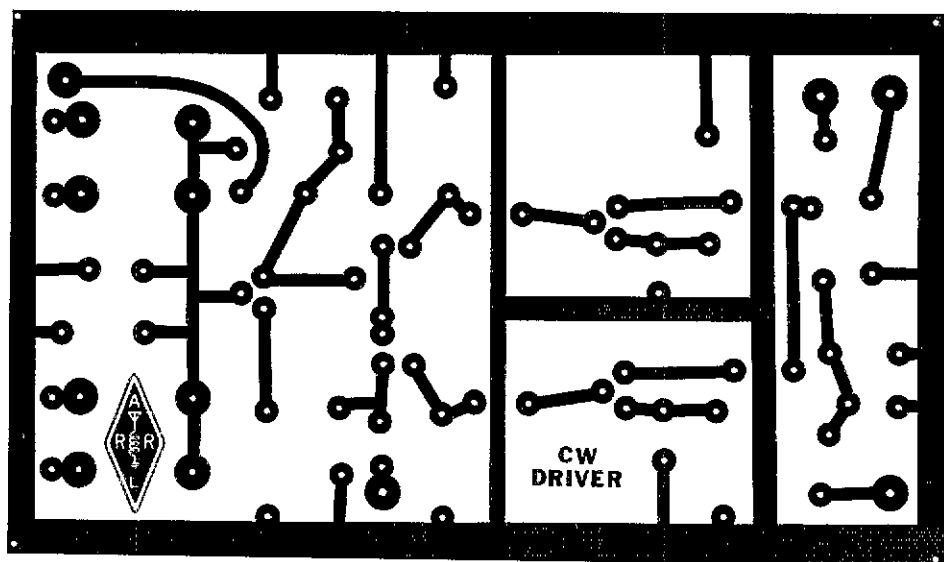
Circuit-board etching pattern for the Versakeyer (see the parts layout of Fig. 8, page 17 of this issue). Black represents copper. The pattern is shown at actual size from the foil side of the circuit board.

bit overstated. I thought you might be interested in publishing the following procedure to correct each of the deficiencies Doug mentioned.

Cabinet grounding: Remove each screw holding the top and bottom pieces of the cabinet sheet metal. Install a star type lock washer with each screw being reinstalled. Paint scraping is not necessary.

Blower wiring bypassing: Remove the four

blower housing screws. Dismount the blower assembly from the rear of the cabinet. Install a no. 4 ground lug under the blower mounting screw nearest the blower motor. Do this inside the housing and near the ac connections. Next, install a 0.01- μ F, 1-kV, disk-ceramic bypass capacitor between each ac terminal of the blower motor and the nearest ground lug. Then reinstall the blower assembly, adding a lock washer under each of the four mounting screws



Etching patterns (continued). These patterns are for the Experimental VMOs Transmitter (see Fig. 5, page 21). The patterns are shown at actual size from the foil side, with black representing copper. The larger board is for the cw driver section; the smaller board is for the power amplifier.

to ground the housing to the transceiver cabinet.

Screening the blower orifice: The blower housing is metallic and is grounded in the manner described above. No screen should be necessary at the frequencies involved because the orifice slots are closely spaced. If a screen is installed as a final touch, it should be securely grounded. — *Kenneth H. Kerwin II, K6UXO, Hudson, NH*

IMPROVING THE HD-1250 DIP-METER RESPONSE

When using the Heath HD-1250 solid-state dip meter to check resonances on cables cut to 1/4 or 1/2 wavelength, one may find the response to the injected signal is not very evident. The Heath Company has advised me that improved response may be obtained by connecting another 9-V battery in series with the power supply, providing a total of +18 V. By doing this, I find the response appreciably improved.

The HD-1250 may also show some slight

dips when the tuning capacitor is rotated through the tuning range. These result from built-in resonances. Each coil should be checked for this condition. To avoid erroneous indications when making measurements, the dip meter should not be placed near any metallic objects, including such tools as pliers. — *Herb Patterson, WA1ZMV, Madison, CT*

IDEAS FOR THE IC-225

If your IC-225 occasionally loses lock on transmit (the power indicator drops to zero and the green light comes on) the problem may be resolved without returning the unit for factory service. The cure suggested to me by W7EX, simple preventive maintenance, ended weeks of exasperation. Cleaning the matrix-board pins with alcohol, a five-minute task, is all that I had to do to restore normal operation. You might try this idea before your set goes back to the shop.

Removing diodes from the IC-225 matrix board can be difficult. My method is simply to

cut the leads and bend them aside. When replacing a diode, one only has to bend the leads back into position and solder them to the replacement diode. — *Richard M. Kriss, N7AET, Scottsdale, AZ*

TOUCH-UP FOR THE LOW-COST DOT-MEMORY KEYS

My finished Low-Cost Dot-Memory Keyer (June 1978 *QST*) performs flawlessly, with the result that my old TO keyer has been relegated to the junk box. As the Feedback item in August 1978 *QST* points out, the anode of D5 should be wired to the Q output (pin 9) of FF U3B and not to the \bar{Q} output (pin 8).

I improved the operation of my keyer by using a germanium rather than a silicon diode for D5. The lower voltage drop across the germanium diode is better for holding the clear input of FF U3B high during the dot memory phase of operation. R11, however, could be adjusted for the same effect. — *David W. Kammer, WA8ZCQ, Albion, MI*

Extra Special Extras

Science and Amateur Radio combine for a unique learning experience in the junior high schools of Ridley, PA.

By Bobbie Chamalian,* WB1ADL

Hey, I've got JAIHQ on 20 meters!" exclaims Lisa Winner, N3CK.

"What's so great about that? I got him on 80 last week from my house," replies WB3GSJ.

"What's so great" is that this is the first of many DX stations Lisa will work from a most unlikely location, Ridley Park South Junior High School. Lisa, age 14, has earned her Extra Class license thanks to her school's Learning Enrichment Program (LEP) and one extra special Extra, N3DR.

Most of the excitement for the Amateur Radio portion of the program emanates from an unpretentious-looking room much like one's ham shack at home, with one small exception. This shack has the unique power to lure some 20 teenagers to it daily. The 12- by 18-foot room (which doubles as the closed-circuit TV control center), with its five international time zone clocks, old army rigs and multiple maps, is the brainchild of Dr. Arthur Smith, N3DR, chairman of the science department for the Ridley School District.

"Doc" as he is affectionately called by his followers, has worked for 3-1/2 years with residents of this working-class community to create a living laboratory for students in the LEP, a broad-based academic course of study utilized in 34 states. Through it, students have a wide range of learning experiences which prepare them for choosing a career.

Arthur Smith's seemingly boundless energy and dedication to his "hands-on" approach to electronics has brought his school local and national attention. A new Teletype machine, donated by the Western Union Telegraph Company, and an electron microscope from RCA are,

like the Amateur Radio program, used to further the students' practical electronics knowledge.

In fact, Art Smith has been so successful in the field of science education that he was elected "Teacher of the Year" by the National Teachers' Association. "Amateur Radio was a natural extension of what used to be six short weeks of basic electricity study. The world these kids are entering is going to be electronically complex; their participation in Amateur Radio will take

them beyond the basics," says Smith.

As enthusiasm for the science program grew, more and more students began making Amateur Radio part of their lives. Thus far, 436 students have earned their licenses. "It's great!" Smith continues. "I really didn't expect the excitement for our hobby to spread quite this much. But I see the difference it's making in these kids' lives. I'm happy to have helped them and to see them help each other. It's not uncommon to have one or two of the high-school students down here helping the newcomers prepare for the Tech or General."

The Word Spread

Naturally, parents soon got caught up in the excitement and asked for equal time. Doc's evening classes were as well received as his school-hour lessons. When his hometown of Wilmington, DE, heard of his successful program, residents wanted their own classes in ham radio and electronics. Soon Doc found himself living Amateur Radio in the classroom three to four nights a week.

What do the parents think of their children using Amateur Radio as a tool? Kim Schaefer, AB3M, another of the "Smith graduates" gives this account: "I used to practice cw all the time. My parents think it's fascinating. They love to listen to me send code. Mom's even getting so she can pick out certain letters. My dad's starting to get interested in it again. He learned code in the army." So it was her parents who got her started? "No," Kim continues, "it was through the other kids here at school and, of course, Doc. If he asks you to do something, you do it. Doc kept encouraging us. He'd open the station during the summer and on weekends. If it hadn't been for him, I wouldn't have gone on for my Extra."



N3DR proudly displays one result of his hands-on approach to science. This 20-meter rig was etched, assembled and soldered by second-year science students in the Amateur Radio portion of the LEP. (photos courtesy of WB1ADL)

*Public Relations Specialist, ARRL

And how long did this encouragement continue? 1-1/2 years. "Anybody can do it if they want to," says AB3M.

Asked for her views on her motivation to earn an Extra Class license (held only by six percent of all U.S. hams), 14-year-old Kim Schaefer replies: "It's all in the way a teacher projects his or her image." Doc looks at it this way, "A teacher's style has a lot to do with the way the students respond, but when you get right down to it, the kids have to see a goal and strive for it themselves. They have to want something in order to work for it. We have anywhere from 10 to 20 students through the shack or in electronics-related studies here daily."

What Kind of People

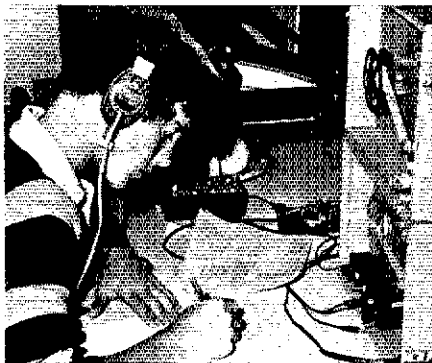
Just what kind of young people are these and why are they turned-on to Amateur Radio? Brian McKeller, N3BK, age 16 and two years an Amateur Extra, gives us this insight: "Contests are my favorite ham activity. It's good competition and it's kinda' different. You can get a feeling of satisfaction and of doing well. It's as exhilarating as any sport and it's a challenge without ever having to move. I like sports too, but this is a nice break." How do his nonham friends react to his hobby? "My friends think I'm a little strange. They can't see why I spend so much time with it, but when I invite them into the shack, they get a kick out of DX because it seems so impossible."

Here in the 20th century, Amateur Radio is no longer a hobby strictly for males. In fact, females comprise 62 percent of the ham population in the Ridley Park LEP. National statistics show that six percent of the total number of U.S. hams are female.

Novice operator Colleen Sheffer, WB3LAV, expresses her interest this way, "Cw is fun, but I like phone better. Ham radio is a great equalizing factor. People talk to me and it doesn't matter what age I am or that I'm a girl."

Laura Whaley, WB3KCS, likes DX: "My most exciting contact was with a DL. It was a challenge to understand him, but it will help my study of foreign languages." Beth McFall, WB3KCI, says, "Some girls look down their noses at girl hams. They call you a brain if you have your license. But it really doesn't take being a brain to become a ham. All you have to do is study. Besides, it's a great way to meet boys."

These teenagers, who have found Amateur Radio to be the best way to make friends around the world, are really no different than the rest of us. What does make them so special is their desire to learn new things, meet new people, conquer a challenge and enjoy competition through the hobby. Perhaps someday each of these young people will earn their Extra Class license. But one thing is for certain, the amateur fraternity will be a



Eighth-grader Walt Green, WB3LRS, takes daily code practice on the U.S. Signal Corps high-speed sending machine.



Extra Class licensee Lisa Winner, N3CK, operates from the 40-meter position, a Viking II/National receiver combination, usually used as a Novice listening section.



Eighth-graders Beth McFall, WB3KCI, Dawn Naumowich, WB3KEL, and Colleen Sheffer, WB3LAV, explore with ninth-grader Brian Budd, WB3GSJ, the function and structure of a high-vacuum tube using models donated by the U.S. Navy.

better place for having been blessed with one "extra special Extra" known as "Doc," N3DR, and the hundreds of kids who have discovered the merits of Amateur Radio through his efforts. [157]

Strays

COLLEGE AWARDS AVAILABLE

□ Hams planning to attend college or technical school in the 1979-80 academic year are eligible for six scholarships offered by the Foundation for Amateur Radio. Only those with at least a General class license are qualified for the awards, ranging from \$250 to \$800. For further information and an application form, write to the FAR, 8101 Hampden Lane, Bethesda, MD 20014.

LUCKENBACH DXPEDITION

□ Luckenbach, TX, a rare 1870s-style town made famous by a hit country and western song, will be the site of a DXpedition this month. On May 12 from 0800 to 1200 (CST) and May 13 continuous, hams can work W5TEX in Luckenbach, which got its first pay telephone installed late in 1978. The frequencies and modes of operation are cw — 7.110 MHz and 21.110 MHz (± 5 kHz); fm — 52.525 MHz, 29.600 MHz, and 146.52 MHz; ssb — 3.900 MHz, 7.235 MHz, 14.285 MHz, 21.360 MHz, 28.625 MHz, 50.110 MHz, 144.200 MHz (all ± 5 kHz).

To receive a specially designed Luckenbach QSL certificate, send a legal-size (4" x 9-1/2") s.a.s.e. to W5TEX, 2618 Rigsby, San Antonio, TX 78222. Only QSOs confirmed by W5TEX will receive the certificates.

ATTENTION CERTIFICATE HUNTERS

□ The Rip Van Winkle ARS will award the Worked Columbia and Greene Counties certificate to applicants who have made two-way contacts with two stations in each of the two New York counties. Any band or mode may be used, except repeaters. Send log information and \$1 to the Rip Van Winkle Amateur Radio Society, P. O. Box 1028, Hudson, NY 12534.

MEMORIAL CERTIFICATE

□ Qualified hams can receive the Jefferson Davis Memorial Certificate from the Pennyroyal Amateur Radio Society (KY). To be eligible, amateurs must present written confirmation of contact with the PARS during their portable operation from the Jefferson Davis Memorial Park on June 3. Frequencies to be monitored are Novice: 3.740, 21.140, 28.140; General: 3.970, 7.270, 14.310, 21.370, 28.610. Hams also can qualify for the certificate by contacting 10 Kentucky amateurs during the year. To receive the certificate, send \$2 and the QSL cards (to be returned) to PARS, P. O. Box 1077, Hopkinsville, KY 42240.

The Care and Feeding of Repeater Traffic Nets

A repeater traffic net is an extraordinary animal that requires special grooming.

By Stan Horzepa,* WA1LOU

Which band has more nets than any other? The title of this article should give you a hint; 2 meters is the band and fm repeaters are the *modus operandi*. Surprised? Ten years ago, when repeaters were still experimental, the answer would have been 75 meters. Back then, there was a lot of building, smoke-testing and rebuilding — and not too much operating. Today, repeaters can be bought off the shelf and put on the air in two shakes of a squelch tail. The nearly 5000 repeaters that now cover the states and provinces may be used by thousands of hams per hour.

More hams are regular users of 2 meters than any other band. These "regulars" are located everywhere, providing a

natural resource for local traffic nets, outlets for traffic that the low-band nets can only dream about. Since checking into a repeater traffic net is just as easy as accessing a repeater, the potential number of check-ins is high. Each repeater that has a traffic net is fulfilling a key purpose of Amateur Radio, i.e., "the enhancement of the value of the amateur service to the public . . ." (Section 97.1a of the U.S. Amateur Regulations).

Interested? Want to get involved? Want to get your repeater involved? Want to have some constructive fun? Let's start from scratch.

Starting a Net

You'll need a repeater. If you own one, you are all set. If not, you will have to build or "borrow" one. (Read the

ARRL's *FM and Repeaters* to build your own; read on to "borrow" one.) If you are affiliated with a repeater group, their machine may be the easiest to get access to. Otherwise, you may pick and choose from what is available. If there's only one repeater in your town, the choice is obviously limited. But, if there is a large group to choose from, a machine with good coverage and reliability should be your first choice. You don't want a repeater that only covers a few square miles and is off the air more than it is on.

Once you have made your choice, the next move is to get an okay. Again, if you already belong to a repeater group, getting the okay may not take much effort. In other cases, you may have to be a salesman and sell your net to the group. Some good selling points are: the fulfillment of ham radio's duty to serve the public, the increased use of the repeater providing a source of new members for the repeater group, and putting the repeater "on the map." Some groups may have no use for a net; no matter what you tell them, they will not be persuaded, so pack up your bags and try elsewhere. On the other hand, many groups will probably be receptive and offer the services of their repeater; if so, you have overcome the biggest obstacle.


Now that you have the ball rolling, get on the repeater and generate some interest. Talk it up on the air. Don't be discouraged if initial interest is not overwhelming; this is often the case. But just as often, the first night the net is called up, the number of check-ins is larger than anticipated.

Should the net meet weekly, daily or somewhere in between? At the least, somewhere in between should be your choice. Of course, you may be limited by the operating agreement with the repeater group.

If not, try to schedule the net to meet as often as possible. A weekly meeting is a poor choice because it is hard to sustain interest, especially when the net is new.

*Communications Assistant, ARRL

The new Local Net Certificate was designed with repeater traffic nets in mind. It is available to GD leadership appointees and may be issued to active members of the repeater nets.



AMATEUR RADIO PUBLIC SERVICE CORPS
Sponsored by the American Radio Relay League

LOCAL NET CERTIFICATE

This certifies that amateur radio station _____ in the _____
Section of ARRL is a member of the _____ Net
Membership is hereby recommended for the net, observance of net rules and of ARRL
rules.

Date _____ Net Manager or Emergency Coordinator _____ Section Communications Manager _____

The Section Emergency Coordinator's signature below indicates that this net is part of the ARRL
AMATEUR RADIO EMERGENCY SERVICE. The signature of the Section Traffic Manager below
indicates that this net is affiliated with the ARRL NATIONAL TRAFFIC SYSTEM.

Section Emergency Coordinator _____ Section Traffic Manager

Net Control Station
Endorsement

Liaison to Higher-
level NTS Net
Endorsement

With a weekly schedule, the net may wither on the vine. The flow of traffic is rigorous and a good traffic net should be as rigorous; a daily meeting is the best choice.

Selecting a time to meet should be done carefully. The rush hour and dinner hour are poor choices for obvious reasons. Also, you don't want to choose a time when another local net or a section net is in session. A time in between the meetings of the section nets is a good choice; traffic from the section net can be brought to the repeater to be handled, while traffic leaving the repeater net can be taken up to the section level for interstate relay.

In the Flow

While on the subject of local and section nets, it is time to consider the question of National Traffic System (NTS) status for your new venture. The greatest advantage of being part of NTS is that your net will be in the pipeline that is handling traffic across the continent. When someone checks into your net with traffic for Aunt Tilly in a state many kilometers away, you won't have to put that traffic on the indefinite hook; instead, Aunt Tilly will receive the message in one or two days. How does the net maintain this flow? How does the net become part of NTS? The answer to both questions is one and the same: have someone who will relay traffic to and from a higher-level NTS net check into each session of your net. This someone, known as a "liaison station," is the key to NTS. Once you have liaisons, you are in the flow and are part of the National Traffic System.

The big day is coming . . . your first net session is scheduled. Again, get on the repeater and talk it up. Get on other repeaters and talk it up. Check into the low band and other repeater nets and talk it up. Talk it up! Also, try to persuade some experienced traffic handlers to check into your initial sessions. They can help you get through the hard times when someone has a problem or a question that requires the guidance of an experienced ham.

The ARRL can lend some assistance, too. Four aids are available that can be very helpful to both the newcomer and experienced traffic handler. CD-235, "Public Service Communications," explains NTS and traffic-handling procedures. CD-218 is a ready reference aid that explains the ins and outs of the standard radiogram form. The "Net Directory" (CD-50) is a compendium of hundreds of nets that also contains pertinent operating information. CD-3, a key to the ARRL Numbered Radiogram shorthand, also provides a convenient form on which to record messages originated from your station. All of these aids can be obtained by simply forwarding a large s.a.s.e. to ARRL headquarters. When your net



WB8WLA is ready to receive traffic via 2 meters during a simulated emergency operation. The equipment is very compact and portable — it is all that is needed to access the world of repeater traffic handling. (WB9QF photo)

begins to meet, announce that these aids are available; those who are new to traffic handling may have no idea that these aids, which many traffic handlers depend on daily, even exist.

Numerous articles and guides have been written on how to handle traffic ("Public Service Communications," mentioned above, contains the most comprehensive information; this month's "Public Service" column deals with common pitfalls of net operation). This article will not repeat that information. If you need it, you know where to look. However, there are some unique characteristics of repeater nets that should be addressed.

Extraordinary Behavior

Repeaters ain't like the low bands! QSB is unheard of. QRM seldom occurs. And QRN is rare. Unless a station is in the noisy fringes, all stations should be very intelligible and the use of phonetics during message handling is unnecessary. Even spelling is unnecessary unless the word is very unique. Only when the receiving station asks for a repeat should the sending station resort to spelling. Phonetics should only be used when there are e's, b's, d's and p's strung together in one word. "John, I spell: Japan, October, Hotel, Nancy . . ." wastes valuable net time; avoid it if possible.

If QRM does occur on a repeater during net operation, it may be of the intentional variety. Never acknowledge the culprit. If you miss something and need a fill, ask for the fill, but never admit that the intentional interference was to blame. If the culprit does not get the attention he is seeking, he probably will go away.

If there is a lot of traffic in a particular session, move stations off the net repeater to relay traffic. If the stations can communicate with each other on a simplex frequency, direct them to go there. If simplex will not work, you may direct them to another repeater. Use discretion. Don't send them to a closed or private repeater or to a strictly RTTY repeater. It pays to know your local area well — both repeaters and topography — before your first session as net control. Also, don't send someone to another repeater to relay a book of 50 . . . talk about wearing out your welcome quickly! Before sending anyone anywhere, the net control station should check the other frequency to see whether or not it is occupied; you don't want your net stations to interrupt even the most casual conversation to pass traffic and give your net a bad name.

Occasionally, the repeater will be out of service at net time. What to do? You should have a contingency plan. If you can find another repeater group that is agreeable, you can plan to use their repeater whenever yours is out of action. If this is not possible, operating the net on simplex can work. If the net control station has a good location and the right kind of radio, he may be able to call up the net on the output frequency of the repeater; you will find that many of the net members also have the capability to transmit on the output. A designated simplex frequency also may be chosen beforehand to be used in case the repeater is off the air. Either way, the number of check-ins will be lower and the readability of the stations will be variable, but it is better than no session at all. If none of these plans work, the session may have to be canceled; there's always tomorrow when the repeater is back on the air.

It's getting to be net time. The big day is here. Your first net control station is itching to key his microphone. So get ready for some of the most interesting ham radio operating you've yet to experience. And good luck!

[QST]

Strays

U.S./SWEDEN RADIO EXCHANGE

□ Hams in Sweden and the U.S. will attempt direct radio contact between Bishop Hill, IL, W9FKC, and Biskopskulla, Uppland, Sweden, SK0MG, on May 26 and 27. Historical Bishop Hill was settled by Swedish immigrants in the 1840s. Operation will be on all bands, phone and cw, continuous. Special QSOs will be issued. S.a.s.e. or IRC is requested, all others via bureaus. QSL via John Swartz, WA9AQN, 1208 Leland Ave., Springfield, IL 62704.

Mountaintopping, Midwest Style

Shunning towering peaks and palm-studded atolls for Midwestern hills, these enthusiastic contesters have racked up impressive scores in VHF QSO Parties.

By Curtis C. Roseman,* K9AKS

Many hams dream of participating in a DXpedition to some rare country, but this is beyond all financial and practical limits for most of us. Field Day offers a domestic alternative — a chance to operate from a temporary site on a hilltop. It's not the same, however, because there are no multipliers on location and no direct competition between stations in a given section or state; there is no "rare" location for Field Day.

One of the best practical substitutes for an exotic DXpedition is participation in a vhf contest from a relatively rare location. For years, ham groups have sought out mountaintops in less-populated Eastern areas for this purpose. Their strategy is to operate from a section rare enough for a multiplier but within normal vhf access of many contest participants located in different sections. This strategy works in the East, where sections are small (there are 13 ARRL sections within 200 miles of New York City, for example) and the ham population density is high.

Some domestic expeditions head for the relatively rare Western states, locating on the border of two or more sections to maximize rarity. Success in the West usually depends on above-average band conditions because of the great distance between dense ham populations.

But what do Midwestern hams do? There are no mountain ranges in this part of the country. Sections are large (there are only six within a 200-mile radius of Chicago), and there are no truly rare sections, except for such plains states as South Dakota, where vhf/uhf activity is rather low.

Against the Odds

For the past several summers, a group

of reasonably sane individuals has ignored these disadvantages and gone "mountaintopping" in the Midwest. Using the call W0OHU/, we have operated the ARRL June VHF QSO Party from three different sections (in three divisions) and hold multioperator records for those sections and the Midwest and Dakota Divisions. Although our scores are not as high as those in the East, the challenge is at least as great.

The key to mountaintopping in the Midwest is "locational strategy." Most years, we use a modified Eastern strategy — maximize access to ham populations within the vhf range in as rare a section as possible. We've located atop a 500-foot bluff in the southeastern corner of Minnesota and in the extreme eastern part of Iowa. These locations provide greatest access to hams in the Chicago/Milwaukee area, and are in demand as multipliers.

A few simple ingredients are needed to participate in a VHF QSO Party. They include a bit of vhf expertise, equipment and antennas for the 50- and 144-MHz bands (and higher if possible), some labor and a power source. In our operation, Jim, W9UD, and Ed, W0OHU, provide the vhf experience and equipment, while K9CHZ, WB0BBM, WB9QPI and WA9CWY bring such miscellaneous supplies as tools, tents, vans, hardware and brown 870s — along with their general radio knowledge. I bring only my body — they use me to anchor guy wires and occasionally to operate on 6 meters. We drag along a 5-kW generator for power (if only mountaintops had ac power!). Procedures during the contest are much the same as for Field Day.

Record Breakers

From 1973 to 1976, our contact total ranged from 291 to 409, only a few on

2-meter fm (many stations pad their scores with hundreds of 2-meter fm contacts). We worked up to 14 sections on 2 meters, and were consistently near the top on 6 meters. Our highest 6-meter total was 65. The potential for working 6-meter sections via scatter and with reasonable sporadic E or aurora is one of the few locational advantages to the Midwest.

In 1977, because of excellent 6-meter conditions and increased activity on both 6- and 2-meter ssb, we broke all previous records. In 1978, we journeyed out of the Midwest to northern Arkansas. A substantial tropo opening on 2 meters and heightened ssb activity accounted for our significantly higher score.

Weather Hazards

Murphy, of course, always tags along. In June, good vhf band conditions correlate with severe weather in the Midwest. In 1976 at the Minnesota site, two tornadoes touched down within 15 miles of our station, and three severe storms put us out of commission for several hours. The third storm took our 6-meter tower and smashed the Yagi during a New Jersey QSO. The year before, we lost our 6-meter amplifier early in the contest. It seems as though our 70-cm rig blows up every year.

June and September VHF QSO Parties are ideal in terms of potentially good band conditions. The adventure is limitless and the challenge matches that of most DXpeditions. To me, the view from a 500-foot bluff in Minnesota is as exciting as the sight from atop a 3000-foot peak in Vermont or California or out across the ocean from a rare DX atoll in the Pacific (well, almost). And when the band opens, the view is even better. This year, we might travel to Missouri, Iowa, South Dakota, or . . .

*503 East California, Urbana, IL 61801

The RV Service Net System

During a devastating earthquake in Panama, a raging storm on the high seas or some other emergency, travelers can depend on these hams for assistance.

By Kevin Wollschlager* and Carl Bixby,** W1TKG

Recreational vehicle (RV) caravans are on the move across North America in ever-increasing numbers. A single caravan often will contain more than 100 RVs. They travel as far south as Panama and as far north as Alaska, and can be found camping out in every state and country in between. Yet, no matter how far the RV caravans roam, they are seldom out of contact with emergency services, since almost every caravan has at least one Amateur Radio operator who is responsible for maintaining contact with the International Recreational Vehicle Net System.

The RV net, which has more than 500 active members, is sponsored by the Amateur Radio Club of the Wally Byam Caravan Club International, Inc. (WBCCI). When first organized by Earl Johnson, W0ICV, in 1963, the system was known as the "Airstream Net," as it was made up of hams who owned Airstream travel trailers and were members of the WBCCI. Today, all interested licensed Amateur Radio operators are welcome to participate in any of the seven RV Service Nets sponsored by the club.

In addition to handling emergency traffic for RVs, the nets provide services for the Caravan Clubs' extensive national camping program. In a typical year, there are 25 major rallies, 15 vacation caravans lasting from three to four weeks each, and the big Fourth of July International Rally, when more than 4500 travel trailers gather. Add the local rallies and the total number of RVs involved is staggering.

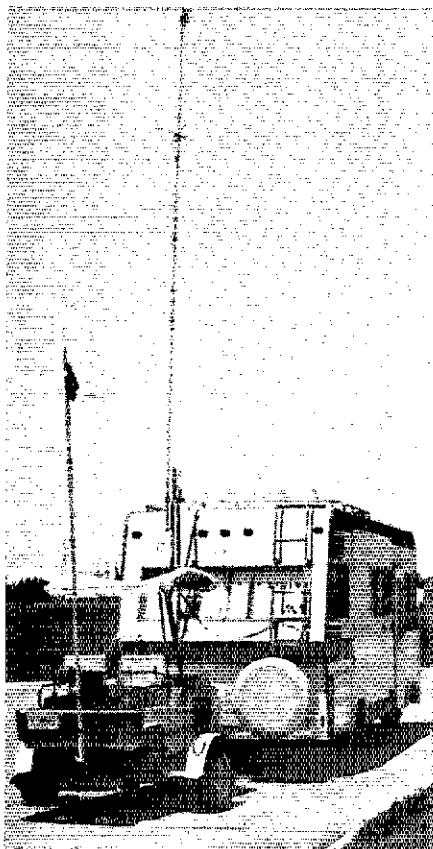
When the Caravan Club holds its International Rally, the selected site becomes an instant city. Every aspect of city planning and organization is considered, including hospital and health facilities, policing and establishing a communications center. The center has its own 2-meter fm repeater as well as hf facilities on the established net frequencies. Mobile radio units with two operators each are assigned to key points in the rally area. Hand-held equipment is used by

designated operators in each mobile radio unit to assist in relaying requests for medical assistance and damage or injury reports. The mobile unit also coordinates police, fire and medical personnel when appropriate.

Net Vital at Rallies

The net activity becomes particularly important during the International Rally, which will be held this year from June 28 to July 4 in Las Cruces, NM. Many local units sponsor caravans to the rally, and it is important for organizers to know how

More than 500 amateurs have joined the International RV net, which has the well-deserved reputation for handling emergency traffic and providing reliable communication services for travelers. (K5TCK/5 photo)



many RVs are in each caravan and their estimated time of arrival. If there is a radio amateur with the caravan, this information is reported to headquarters daily. Emergency traffic is called into the club station and relayed to the appropriate caravan for delivery. The importance of the RV nets was proven at a recent International Rally in Bozeman, MT. The net began at 0500 MDT, and 15 minutes later the operator received an emergency message for one of the RVs to call home as quickly as possible. The RV sought was parked in a holding area 20 miles away. At 0700, an amateur in that area was contacted on 2 meters and asked to locate the people. At 0730, they were found in a line waiting to be parked at the rally site, and the message was delivered.

Base stations sometimes call in for the caravans. Last summer, for example, Rachel Trout, WA6EQA, had an equipment breakdown and was unable to report in. Members of the net picked up her 2-meter signal and relayed the traffic for her. (Bob Nelson, WB8TCF, was on duty at the club station at the time. He later met Rachel at an ARC luncheon, and they are now married.)

Panama Caravan

A caravan of 100 recreational vehicles that travels more than 650 kilometers and is away from home base for four weeks at a time can generate a considerable volume of daily operational and emergency traffic. The story of a caravan to Panama, as told by Fred Stedman, W7JWW, is typical of this facet of the net's public service activities.

On January 15, 1976, the 181 travel trailers of caravan number 108 crossed the border into Mexico on the first leg of an 11,500-kilometer trek to Panama and back. The caravan included nine hams from four call areas.

After stops in eight Mexican cities, the caravan arrived at Guatemala City. Fred and his XYL, Happy, were licensed as W7JWW/TG9 and W7JWX/TG9. These calls were used during the nine days in Guatemala, southbound and northbound.

*Editorial Assistant, QST
**11 Birch Ln., Madison, CT 06443

ARC Service Net Schedules

Area Covered	Time (Local)	Days	Frequency
Eastern and Central U.S./Canada	0700 to 0900 E	Daily	7.233 MHz
New England States	0800 to 0900 E	Sun.	3.963 MHz
Central U.S.	1700 to 1730 C	Mon./Fri.	3.895 MHz
Rocky Mountain	0900 to 1000 M	Mon./Fri.	7.275 MHz
Pacific Coast	1000 to 1100 P	Mon./Fri.	7.263 MHz
U.S., Canada and Mexico	1200 to 1300 E	Mon./Fri.	14.308 MHz
	1700 to 1800 E	Mon./Fri.	14.308 MHz
Yankee Bird Net	0930 to 1000 E	Tue./Thur.	3.960 MHz

During the journey, Fred and Dave, WØDVZ, acted as scouts for the caravan, relaying reports on road conditions and parking sites.

After visiting San Salvador and Choluteca, Honduras, the caravan pushed on to Managua, Nicaragua. While en route, they learned about the earthquake that had ravaged Guatemala. Happy first heard about the disaster when she checked into the morning net on 14.308 MHz. When the NCS asked how the caravan had weathered the earthquake, Happy asked, "What earthquake?" Luckily, the caravan had been just outside the quake area. One couple who stayed in Guatemala City for repairs, however, had been awakened violently as the earthquake shoved their trailer sideways about three meters. As might have been expected, the quake generated a great deal of traffic on the net, as worried relatives and friends in the United States, Canada and elsewhere tried to contact the caravanners.

Club Sends Aid

The caravan continued its journey, stopping in Costa Rica before crossing the Cerro del Muerte pass (3400 meters) and entering Panama. They were met at the border by a motorcycle escort which accompanied them to Panama City. Hams from the caravan attended a meeting of the Republic of Panama Amateur Radio Club, where they learned that the club had purchased and flown to Guatemala more than 30 tons of food and medical supplies for the earthquake-relief program.

After a short trip to the end of the Pan-American Highway, 50 km south of Panama City, the caravan returned to Guatemala City. The hams were appalled by the extent of earthquake damage the city had suffered. Minor and medium-strength quakes still were occurring and hardly a building was left undamaged. Many people were camped in parks or their front yards because of the continuing quakes, and assistance was arriving from every part of the world.

The ARC net proved invaluable to Joe, WB4WQV, when his tow vehicle's transmission failed in Mazatenango, Guatemala. He was assisted via the net by Bill, W4QV, in arranging to air freight the transmission to Miami for repairs. The remainder of the caravan continued north

along the Gulf of Mexico and, after 77 days, arrived back in Del Rio, TX.

Nets Ready to Help

Whether providing aid during an earthquake or helping to solve an individual problem, the ARC nets are ready for action. The *International R-V Service Net Bulletin* offers the following example.

On December 9, 1977, Nina Gilbert of Augusta, ME, a member of the White Mountain WBCCI unit, wrote to Vern Madsen, WB8ISC, who was then president of the WBCCI-ARC, asking for help in locating RV owners who had a kidney dialysis machine hooked up in their trailer. Mrs. Gilbert said her husband George had to be on an artificial kidney machine three times a week, and they wanted to install a unit in their travel trailer. In order to satisfy the Veterans Administration that a portable installation was feasible, the Gilberts had to supply first-hand information from someone using a similar unit in their trailer.

An appeal for help was made through the International RV Service Nets, and the response was immediate. Carl Commander, W4ZRH, of Mt. Pleasant, SC, supplied the name and address of Airstreamer Leon Hardy of Georgetown, SC, who was using such a unit. Al Paulson, WB4KBZ, of Sarasota, FL, prepared a complete summary of a friend's kidney dialysis installation, including availability, type, cost, use and operation of the equipment. This information was furnished to Howard Bullock, W4LBM, who transmitted it to the Gilberts. On the basis of this information, the Gilberts received approval for installing an artificial kidney machine in their trailer.

Mrs. Gilbert later wrote to W4LBM: "George and I truly appreciate and are so grateful for your help. Because of all of you, living and traveling full-time in our trailer is going to become a reality."

Ship in Distress

The *Bulletin* provides yet another example of the growing list of problems solved by the ARC nets. On September 26, 1978, Hal Brown, WB5CYY, opened the Rocky Mountain RV Net on 7.275 MHz from his control station in Las Cruces, NM. Walt, WBØOAA, reported a faint "break-break" signal, and Hal immediately asked

all stations on the net to stand by. An amateur operating from a 36-foot sailboat, located 15 miles off the coast of Newport, OR, called in, saying his craft was disabled and he could not contact the Coast Guard.

The signal from the disabled vessel was weak and the amateur on board was operating only on battery power. The net control station got relays from stations with a more ideal skip distance. Stations that helped relay communications were located in Arizona, California, Colorado, Idaho and New Mexico.

When all the information had been gathered, Hal asked a station in California to phone the Coast Guard and relay the facts about the emergency and the frequency for contacting the vessel. Net operations were suspended so the emergency traffic could be handled. Within 30 minutes, the Coast Guard station came on the net frequency and asked the vessel to transmit for vectoring. The Coast Guard got an accurate fix on the boat and directed a rescue craft and an airplane to its position. The vessel was located and towed into port. The RV Service Net had performed another life-saving service.

The ARC nets are each on the air more than 40 hours a week relaying messages in time of need and emergency. Besides this vital service, the ARC also is involved in promoting interest in Amateur Radio among Airstreamers. The club offers Novice training courses in Texas, Arizona, Florida and Iowa, and sponsors ham radio discussions at RV rallies to build interest in the hobby. For more information about the ARC and the International RV Net System, write to WBCCI, Headquarters Office, 15939 Piuna Ave., Cerritos, CA 90701. ☐

Strays



Ralph Martin (left), general manager of Raytheon's Submarine Signal Division in Portsmouth, RI, presents 2-meter fm equipment and other retirement gifts to Paul Skitski, W1FX. Paul, a charter member of Raytheon's Sub-Sig ARC, is a pioneer with the corporation, having worked on radar since it first was developed. The night of his retirement party, Paul was rehired by Raytheon as a consultant. They just won't let him go! (Raytheon photo)

Stamps Reflect Growth of Amateur Radio

The result is the same in any language; ham radio has received the stamp of recognition around the world.

By James Montagnes,* VE3BIF

Postal authorities around the world use stamps to publicize all aspects of their countries, including events, organizations, industry, technology, tourist attractions, history and transportation. In keeping with this tradition, radio communications have been depicted on stamps in a variety of ways. Since the United States issued its Amateur Radio stamp in 1964 to commemorate the 50th anniversary of the ARRL, the number of countries releasing stamps pertaining to our hobby has increased greatly. Many countries have released stamps about telecommunications and its inventors, new equipment, new transmission towers and microwave installations. A few countries, notably Romania, the German Democratic Republic and Russia, have used stamps to develop an interest among their youth in Amateur Radio.

Stamps have been used to honor a wide variety of Amateur Radio organizations. For example, stamps came from Yugoslavia in 1966 for the Region 1 conference of the International Amateur Radio Union, from Colombia for the 40th anniversary of the Liga Colombia de Radio Aficionados, and from Poland for the IARU conference at Warsaw in 1975.

In May 1975, Costa Rica issued three stamps commemorating the 16th conference of the Federación de Clubes de Radio Aficionados of Central America and Panama at San José. In June 1976, the Dominican Republic released two stamps for the 50th anniversary of the Radio Dominicano. In 1977, Japan issued a stamp for the Japanese Radio League. In the same year, a stamp was printed for

Amateur Radio Day in Brazil. A commemorative stamp celebrating the 50th anniversary of the Swiss Union of Short-wave Amateurs will be released in September 1979.

An Abundance of Topical Stamps

Potential philatelists interested in starting a topical stamp collection on telecommunications could include hundreds of stamps from around the world. In fact, each year since 1956 most European countries have issued two or more stamps on telecommunications. Many have used them to commemorate such noteworthy events as the laying of ocean cables or the

opening of radio communications with such remote places as the Falkland Islands. The values of some stamps even have been expressed in Morse code.

Radio History on Stamps

As long ago as 1928, Newfoundland released a stamp featuring the Cabot Tower at St. John's, where Marconi heard the first transatlantic radio signals. A Guatemalan stamp printed in 1919 shows old radio towers and antennas. Stamps also have been issued to honor key inventors in the development of radio: Alessandro Volta, André Ampère, Heinrich Hertz, Samuel Morse and others have been depicted on stamps. Several stamps show old radio communications equipment and broadcasting studios at Arctic and Antarctic scientific stations, and youngsters building and listening to radio receivers.

The photos provide an idea of the beauty and variety of stamps that feature Amateur Radio and telecommunications. It's only natural that many hams are also stamp collectors.



*11 Burton Rd., Toronto, ON MSP 1T6

Washington Mailbox

Conducted By Michele Bartlett,* N1AGD

A Potpourri

It's spring, when a young ham's fancy lightly turns to thoughts of . . . Part 97? Here is a bouquet of thorny questions which have cropped up recently.

TRAFFIC JAM

Q. I tried to send a "good luck" radiogram to my favorite team before the "Big Game." To my surprise, the net control station refused to accept the traffic, saying that since people pay for tickets to the game, the team is a business, and my message therefore was illegal.

A. Recently, one of the questions posed in this column was, "What if someone wants to pass traffic to a nonprofit organization like . . . the ARRL?" The answer was ". . . it may be illegal traffic." Evidently many amateurs read "may be illegal" to mean "probably is illegal." Perhaps a better wording would have been, "What if someone wants to pass *business* traffic to a nonprofit organization?" The point is that it matters not whether the organization is General Motors or Brother Love's Travelling Salvation Show. If it is business traffic, defined in 97.114c as ". . . any transmission or communication, the purpose of which is to facilitate the regular business or commercial affairs of any party," then it is illegal.

Amateurs have always used their best judgment regarding third-party traffic, but now many hams are wondering whether it was okay to send a congratulatory radiogram to their college roommate who was promoted to president of Widget Inc. Or maybe they should have refused to pass that birthday greeting to a member of the Majestic Order of Oxen, obviously a nonprofit organization. As long as amateurs continue to use good sense when handling messages, our service will live up to the first tenet of the Basis and Purpose: "Recognition and enhancement of the value of the Amateur Service to the public as a voluntary noncommercial communications service, particularly with respect to providing emergency communications."

A NEW AWARD — NWAC?

Q. Lately I've been receiving a lot of DX QSLs. That would be nice, except I haven't been on the air in months. I think my call is being bootlegged — what should I do?

A. It would appear that the number of call signs being "bootlegged" has skyrocketed since the inception of the new call sign assignment system. It's entirely possible that many stations just aren't copying these new calls correctly. Check the dates on the cards. Was the QSO during a contest? The frantic pace of contests and pileups promotes some errors. But if you receive more than a few QSLs for stations you never worked — and especially if all the salutations are addressed to Mortimer but your name is John — you probably should take action. Keep a detailed log of your on-the-air ac-

tivity, even though FCC rules require only (1) the call sign or a copy of the station license or the signature of the licensee, (2) the dates and locations fixed or portable operations were initiated and terminated, and (3) notations of other control operators or third-party traffic (97.103a-b). You should note *all* your contacts, even brief ones, including date, frequency, time, etc. You also should write a letter to the engineer in charge for your district explaining the situation. Include photocopies of the QSLs or other evidence to substantiate your suspicions. Then, if your call *is* being bootlegged, and the operation results in a citation, you'll be able to respond effectively.

NOVICE LICENSE RENEWAL

Q. My Novice license is due to expire in six months. Do I automatically have another three-year extension, or do I have to reapply?

A. The Novice license is renewed like all other amateur licenses. About 90 days before the expiration date (but no later than 30 days prior), complete a form 610 available from the FCC or ARRL, check "renewal only," and mail it to P. O. Box 1020, Gettysburg, PA 17325. Upon renewal, your license will be valid for five years.

2 X 2 BLUES

Q. Somebody told me that Advanced class licensees now can apply for new call signs. I sent in a form 610, but it was returned with a note indicating that I wasn't eligible. What did I do wrong?

A. You probably applied too far in advance. Although Amateur Extra Class licensees may apply for a Group A call sign at any time, an Advanced class licensee may apply for a Group B (2 x 2) call sign *no sooner than 60 days prior to the expiration of his license*. You should also be aware that if you move and apply for a call sign from a new area, you will be assigned a call *from the same group as the call you now hold*. (This is the case, regardless of what class license you hold.) In other words, if your call is W1ABC and you request a new call when you move to Texas, you'll receive a call like N5XYZ even though someone who upgrades to Advanced may receive a Group B call sign upon request. For more information, see "Happenings," January 1979 *QST*.

SQUELCH TALE

Q. What is the maximum time allowed for an unmodulated carrier on a repeater?

A. Five seconds (97.85a).

STATION LICENSE AVAILABILITY

Q. Do I have to post my original station license in my shack, or can I tack up a photocopy? What about when I operate portable or mobile?

A. The amateur license is really two licenses: your station license and your operator license.

You must have your original license with you anytime you are the control operator of any amateur station (97.82). It is like your driver's license. You may post a photocopy in your station, so that if you authorize another amateur to be a control operator while you are somewhere else, the posted copy is the station license (97.83). Also, if you have more than one station, post a photocopy at each location. The original station license must be available for inspection by any authorized government official at all times while the station is being operated (and at other times at the Commission's discretion), unless your original license is lost or destroyed and you have applied for a duplicate.

SELLING HAM GEAR ON THE AIR

Q. The other day on 10 meters, a couple of hams were discussing the price of a transmitter that one of them was selling. Is this illegal?

A. In 1974, the FCC concluded that a licensed amateur could use his station from time to time to discuss the availability and price of a piece of his Amateur Radio equipment, but such activity would be limited to that of an occasional nature, and could not include such items as cameras, stereos, etc., *nor could this activity be conducted on a regularly scheduled basis*. We certainly don't want our ham bands filled with a lot of commercial advertisements!

MORE ON AMPLIFIERS

Q. I've been living overseas, but I'll soon be returning to the U.S. My station includes a 10-meter amplifier. Can I bring it home with me?

A. You should have no problem, as long as the amplifier is for your own use. You should try to provide some kind of proof that it is your personal equipment, like a sales receipt or something similar. You may have to sign an FCC Form 740, which is an affidavit certifying that the equipment you're bringing in is for your own use. Of course, you are still responsible for insuring that the amplifier meets the FCC Purity of Emission standards set forth in 97.73.

Once you're home, you may sell the amplifier to a bona fide Amateur Radio equipment dealer or to another licensed amateur. See "Washington Mailbox," March 1979 *QST*.

Q. I heard that an Amateur Radio dealer is prohibited from buying an amplifier that has not been type accepted.

A. Not true. A dealer may buy a non-type-accepted amplifier from an individual, but he may sell it only to a licensed amateur.

[Note: Questions appearing in this column are typical of those frequently asked of the FCC and other agencies. Answers, prepared by ARRL, have been reviewed by FCC staff. Numbers in parentheses refer to specific sections of the FCC rules.]

FCC Extends Grace Period for Renewal to Five Years

Are you regretting having let your Amateur Radio operator license expire and failing to renew it within the one-year grace period? There is no longer any need for remorse if you have held a license within the past five years. FCC has ordered an Amateur Rule change, which became effective March 16, 1979, that allows a five-year grace period for renewals from the date of expiration of Amateur Radio operator licenses. This means that if you fall within the new five-year rule, you will not have to be reexamined to regain previously held Amateur Radio operator privileges.

If it has been more than one year since your license expired, however, you will not be able to regain your old call sign. The one-year grace period for station license renewals remains in effect.

An Amateur Radio license is actually two

licenses. Though a ham gets only one piece of paper from the FCC, it authorizes an operator license and a station license. The five-year grace period for operator license renewal and the one-year grace period for station license renewal are good examples of the importance of making this distinction.

FCC gave several reasons for extending the operator license grace period to five years. It stated that "... the five-year period is one in which it is reasonable to presume that the licensee will remain fully qualified." It also cited a reduction in its workload in two ways: "(1) The Commission will receive fewer requests for waivers, each of which now requires individual attention and handling; and (2) the Commission will administer fewer second examinations to ex-licensees who failed to renew their licenses within the 'grace period'."

The Commission found that prior notice and public procedure provisions were unnecessary in adopting this amendment because it believed that there would be no objection to this relief from previously imposed restrictions. Therefore, it adopted this change without first adopting a Notice of Proposed Rulemaking.

For those of you keeping track of all the latest changes in the Amateur Rules, you should change your copies to reflect the following:

§97.13 Renewal or modification of operator license. (d) If a license is allowed to expire, application for renewal may be made during a period of grace of five years after the expiration date. During this five-year period of grace, an expired license is not valid. A license renewed during the grace period will be dated currently and will not be backdated to the date of its expiration. Application for renewal shall be submitted on FCC Form 610 and shall be accompanied by the applicant's expired license.

DOCKET DEAD BUT NOT FORGOTTEN — 20282

Red letters jumped off the page at anyone opening his January 1975 QST to the table of contents. The urgent message was that FCC was proposing sweeping changes in the entire structure of the Amateur Radio Service. Never had there been so many simultaneous proposals by the Commission for change in the Amateur Rules. Docket 20282 became the extraordinary Notice of Proposed Rulemaking of the decade. The issues were so encompassing and important to the future of Amateur Radio that the ARRL Board of Directors ordered that every League member be polled by a mailed questionnaire...

Now, more than four years since Docket 20282 was made public, FCC has voted to terminate the proceeding with a Third Report and Order. March 1979 marks the end of the "Era of Docket 20282."

This is a good time to look back at what was and was not accomplished by this proceeding. It is also important to consider the Commission's passing comments in its Third Report and Order because they address some of its plans for the future of the Amateur Radio Service.

What Was It All About?

Because of space limitations we will not be able to go into detail here about all the proposals. For that, dig out your 1975 QSTs! However, here is a brief summary of the major changes proposed over four years ago. (1) Creation of a "dual ladder" licensing structure. There would have been separate "high frequency" and "very high frequency" classes of license. The "hf ladder" would have been comprised of the Novice, General and Advanced class licenses; the "vhf ladder" would have been comprised of the Communicator, Technician and Experimenter class licenses. The Amateur Extra Class license would have been

at the top of both ladders by authorizing all amateur privileges. (2) Creation of a Communicator class license having no telegraphy privileges or telegraphy examination requirement. (3) Establishment of new power limits based on transmitter peak envelope power output. (4) New restrictions on licenses obtained by means of volunteer-administered mail examinations. (5) Issuance of lifetime Amateur Extra Class operator licenses. (6) Modification of the frequencies and modes available to certain license classes.

What Was Adopted

It was not until June 1976 that the FCC released its First Report and Order implementing changes considered in the Docket 20282 proceeding. The long delay was caused, in part, by the complexity of the issues. However, the primary reason was the sudden surge in citizens band applications which put the Commission staff under severe manpower and time restrictions.

August 1976 QST featured a special article, "One Shoe Drops . . ." about the changes that went into effect that July. A brief recap of those major changes follows: (1) Technician class licensees were given all Novice class privileges. (The Technician used to be restricted to frequencies above 30.1 MHz.) (2) Technician class licensees with the "conditional" limitation would henceforth be issued regular Technician class licenses. (3) The Novice class examination became the only volunteer-administered test except in cases where the applicant was physically disabled. (In those cases the Commission, not the applicant, would select the volunteer examiner.) (4) The maximum permissible power for Novices was increased to 250 watts. (5) Applicants for any class of license would henceforth be required to pass Element 2, which includes basic law, comprising rules and regulations essential to beginners' operation and elementary radio theory for the understanding of those rules.

On April 6, 1978, the Commission released a

Second Report and Order in Docket 20282 which changed the Novice class license from two years, nonrenewable to five years, renewable. This action was covered in May 1978 QST, pages 46-47. However, there were many proposals still to be considered.

Code-Free License Will Be Revisited

On March 16, 1979, FCC released a Third Report and Order that disposes of the remaining unresolved matters and terminates Docket 20282. The "Communicator class" license will be reconsidered. The Commission pointed out that it does not agree with the assertions of the majority of those filing comments that the privileges which would have been conveyed to the Communicator class licensee were "out of proportion" with the proposed qualification requirements. Nevertheless, it has declined to take action on the proposal at this time. The reason it declined action for now is that it feels that the original proposal and comments have "become somewhat outdated" because of the tremendous growth of the Amateur Radio Service (about a 50 percent increase) and the Citizens Band Radio Service (about a 1400 percent increase) over the past four years. The Commission also stated that it "... would like to get the views of these newer licensees on the need or desirability of a 'codeless' class of amateur license." The Commission then went on to say, "Accordingly, we hope to revisit this matter later this year in a new rulemaking proceeding."

The Commission also concluded, in the matter of lifetime Amateur Extra Class licenses, that even though very few amateurs drop out of Amateur Radio after having attained this license class, the Commission does not have the legislative authority to issue station licenses for a term greater than five years.

Hams had better look for new ways to measure transmitter output. FCC declined action on the proposal to establish new power limits based on transmitter peak-envelope power output. It noted that the majority of the comments filed addressing this suggestion were

*Deputy Manager, Membership Services, ARRL

negative. However, the Commission reiterated its belief that present-day amateur communications warrant the use of better procedures than the "plate voltage times current" method. It further suggested that amateurs develop and disseminate data which could be used as a basis for a workable and state-of-the-art measurement technique. FCC intends to "revisit this matter at a later time."

End of Docket 20282

The one factor that colored the Commission's actions most was the phenomenal growth of Amateur Radio and, especially, CB Radio and the strain it put on the FCC's resources. In its Third Report and Order terminating the docket, FCC emphasized its sensitivity to matters that could overload its staff and data-processing facilities. It referenced its decision to extend the grace period for renewals of all amateur operator licenses as one response to this problem.

The Commission accomplished a lot of change in those four years. But it is certain that it wanted to do more. Though Docket 20282 is dead, indications are that many of its components will be resurrected in the future.

NORTHERN MARIANA ISLANDS UNDER FCC JURISDICTION

The Northern Mariana Islands have recently been added to the Commission's jurisdiction. This necessitates minor amendments to the Amateur Radio Rules. In Section 97.61, paragraphs (b)(2) and (b)(4) are amended to read as in Table 1.

ARRL WILL OPPOSE CB PETITION

ARRL plans to oppose a Petition for Rule-making, filed by the Washington State CB Radio Association. The petition, RM-3317, asks FCC to create a new "hobbyist type class" of radio service with a new special frequency band from 27.41 MHz to 28 MHz. Licensing procedures would be similar to those already established for the Novice class amateur license. The exams would be administered by radio amateurs. The Association also asks that any licensed Amateur Radio operator be authorized to utilize the hobbyist radio frequencies subject to the restrictions established specifically for operations in the new service.

The Washington State CB Radio Association asserts that creation of this new service would address the problems caused by overcrowding and inter-mode interference in the CB Radio Service and the alarming increase in operations on unauthorized frequencies. The Association also said that the interface with the Amateur Radio Service "... would allow active participation of licensed Amateur Radio operators in establishing and maintaining high standards

of training, operations and conduct in the proposed service."

The ARRL Executive Committee, polled by mail, has directed League hq. to prepare and file comments in opposition to RM-3317. Though the League's comments had not yet been filed at the time of this writing, it appears that there would be at least two fundamental arguments against the proposal. One argument may well be that because of the close proximity of the new band to the amateur 10-meter band, the chances for illegal migration from the hobbyist band would be high. The other reason is that the new service would duplicate the purposes of the Amateur Radio Service.

Any League member may obtain a copy of the League's comments by writing to ARRL Hq., Membership Services Department, Newington, CT 06111. Please include a long, self-addressed stamped envelope with your request, and specify "League Comments on RM-3317."

TEXAS RFI BILL WITHDRAWN

The sponsor of a bill to establish civil liability for causing RFI has withdrawn the measure. Texas House Bill 75, introduced by Representative Sam Hudson, would have allowed civil actions to be brought against anyone "interrupting the transmission or reception of radio and television." The bill proposed that the perpetrator of the interference be required to pay actual damages incurred by the complainant or \$100, whichever is larger. Additionally, the bill would have allowed any complainant prevailing in an RFI lawsuit to be reimbursed by the defendant for attorney's fees.

Amateur Radio operators throughout Texas responded to the proposal with letters and phone calls. Nearly all the letters expressed the widely held legal opinion that matters of radio-communication interference are under the exclusive jurisdiction of the Federal Government. The overwhelming response to this bill no doubt contributed to its being withdrawn.

AKRON WITHDRAWS ANTENNA LAW

The City Council of Akron, Ohio, adopted a zoning ordinance which would have limited all antennas in residential areas to those which must be attached to a dwelling or accessory structure. It would also have limited height so as not to exceed the highest portion of the building by 15 feet. Exceptions would have been permitted only by special authority. The Council's motivation was to address the problems of radio frequency interference to television, radio and telephone reception. However, one week after approving the measure the City Council withdrew the ordinance.

According to Bob Sharkey, WB8DI P,

Akron amateur and CB operators sent many letters, tied up councilmen's phone lines, and appeared at council meetings "en masse" to protest the ordinance. The council withdrew the law by a unanimous vote.

Councilman William Grimm, sponsor of the ordinance, appeared satisfied even though the proposal was withdrawn. He said the proposal brought attention to some of the fairly severe TVI problems, admittedly caused by a small number of operators, in Akron.

Jim Miller, K8EIO, indicated that the hams have proposed the formation of a countywide TVI committee where people like the councilman can turn when they have TVI problems.

ELECTROMAGNETIC RADIATION EXPOSURE BILL IN OREGON

State Senator Ted Hallock has introduced a bill, S-423, into the Oregon Senate which would prohibit operation of "electrical equipment" in any manner which would expose residential areas to electromagnetic radiation above a level yet to be established. "Electrical equipment" includes "radio and television transmitters, electric power transformers and transmission lines and other electrical devices."

The bill also directs cities and counties to adopt their own zoning regulations to prevent any part of a residential area to be exposed to the electromagnetic radiation level to be established. A violation would be a misdemeanor punishable by a \$250 fine.

Other provisions of the bill authorize trespass actions against operators of rf-emitting devices by persons owning or leasing property in residential areas exposed to the established electromagnetic radiation level. Complainants who prevail in trespass actions would be entitled to damages, court costs and reasonable attorneys' fees.

Additionally, the bill would require any person operating electrical equipment which exposes any part of a residential area to electromagnetic radiation to provide notice to the occupant of each house, apartment building or other dwelling unit. The notice would give (1) type and source of the electromagnetic radiation, and (2) estimated frequency, duration and strength of the electromagnetic radiation to which the occupant is exposed.

Any resident of Oregon wanting more information should contact his state legislators and request a copy of Senate Bill 423.

HOUSE SUBCOMMITTEE ON COMMUNICATIONS

The U.S. House of Representatives Committee on Interstate and Foreign Commerce has announced the members of its Subcommittee on Communications for the 96th Congress: Chair-

Table 1
Authorized frequencies and emissions for the Northern Marianas

(2) Maximum DC Plate Input Power in Watts

Area	1800-1825	1825-1850	1850-1875	1875-1900	1900-1925	1925-1950	1950-1975	1975-2000
	kHz Day/Night	kHz Day/Night	kHz Day/Night	kHz Day/Night	kHz Day/Night	kHz Day/Night	kHz Day/Night	kHz Day/Night
Baker, Canton, Enderbury, Howland	100/25	0	0	100/25	100/25	0	0	100/25
Guam, Johnston, Midway, Northern Mariana	0	0	0	0	100/25	0	0	100/25
American Samoa	200/50	0	0	200/50	200/50	0	0	200/50

(4) 3900-4000 kHz and 7100-7300 kHz are not available in the following U.S. possessions: Baker, Canton, Enderbury, Guam, Howland, Jarvis, the Northern Mariana Islands, Palmyra, American Samoa and Wake Islands.

man, Lionel Van Deerlin (Dem.-CA); Ranking Minority Member, James M. Collins (Rep.-TX); James T. Broyhill (Rep.-NC); Samuel I. Devine (Rep.-OH); Albert Gore, Jr. (Dem.-TN); Thomas A. Luken (Dem.-OH); Edward J. Markey (Dem.-MA); Marc L. Marks (Rep.-PA); Carlos J. Moorhead (Rep.-CA); Ronald M. Mottl (Dem.-OH); John M. Murphy (Dem.-NY); Marty Russo (Dem.-IL); Harley O. Staggers (Dem.-WV); Al Swift (Dem.-WA); and Timothy E. Wirth (Dem.-CO).

It should be noted that Congressman Staggers is chairman and Congressman Devine is ranking minority member of the full committee. Both serve on the subcommittee as ex-officio members.

LAW STUDENT COMPETITION

The Personal Communications Foundation is pleased to announce its 1979 law student essay competition.

Any person who was a student in good standing at an ABA-accredited law school on February 15, 1979, is eligible to participate. Prizes of \$500, \$250 and \$100 are being offered. In addition, the Foundation will endeavor to have the winning essays published in a national bar journal.

The general subject matter of the essay must deal with one or more of the legal aspects of personal communications by use of Amateur Radio, Citizens Band Radio, monitors and/or radar detectors. Within this area, suggested topics include, but are not limited to: constitutional issues; Federal versus state and local regulation; effects upon property use and values; zoning and land use considerations; and civil and/or criminal liabilities in connection with equipment operation (exclusive of FCC proceedings).

Essays may be of any length. They must be typed, double spaced. Footnotes must appear at the end of the essay and conform to the current edition of *A Uniform System of Citation* published by Harvard Law Review Association.

All essays must be received at the offices of the Personal Communications Foundation on



ARRL Midwest Division Director Paul Grauer, W0FIR (on the right), presents the June 1978 QST Cover Award to James Rohler, N0DE, who coauthored the award-winning article, "A Low-Cost Dot-Memory Keyer."

or before October 1, 1979. Contestants must include, in addition to their name, mailing address and telephone number, the name and address of their law school. Essays will be returned only if they are accompanied by a self-addressed, stamped envelope.

All entries will be judged by a committee of the Board of Trustees of the Foundation. The decision of the judges is final, and all entries will become the property of the Foundation. Winners will be announced no later than November 30, 1979.

The Personal Communications Foundation is a nonprofit California corporation dedicated to the collection and dissemination of legal research and information concerning personal communications. Its Board of Trustees is composed of lawyers, judges and law school professors who are licensed Amateur Radio and/or citizens band operators. Inquiries and essays should be addressed to Kenneth S. Widelitz, President, Personal Communications Foundation, 10960 Wilshire Boulevard, Suite 1504, Los Angeles, CA 90024. Telephone 213-478-1749. — PCF News Release

BEHIND THE DIAMOND

Preparations for the World Administrative Radio Conference in Geneva have been on all amateurs' minds for some time now. This month, "Behind the Diamond" departs from its usual course to introduce a very special ham, E. Merle Glunt, W3OKN. Merle is our consultant for WARC preparation and he brings with him many years of experience both as an active amateur and as an expert on frequency allocation.

Merle's career began while he was still in high school, attending radio classes in the U.S. Naval Volunteer Communications Reserve. Before enlisting in the armed services, he attended George Washington University School of Electrical Engineering and Capitol Radio Engineering Institute. He's been a licensed amateur continuously since 1935. Before World War II, Merle served in various positions with the U.S. Navy and was active in the Army Amateur Radio System. Through the Civil Service, he was appointed a senior radio officer in the National Defense Operations of the Federal Communications System, working in four different monitoring stations around the U.S. During the war, he was transferred to Washington, DC, as a cryptanalyst and became senior intelligence analyst with the FCC's Radio Intelligence Division. In this capacity, he was responsible for much high-level interception of German espionage to Africa and the North American continent. After the war, in the Navy Reserve, Merle was involved with security and traffic analysis, and helped establish what is now the National Security Agency.

In 1952, he was invited to return to the FCC. Here, he began his involvement with frequency conferences at the Extraordinary Administrative Radio Conference in Geneva that year. He was soon named assistant chief, then chief, of the FCC Treaty Branch. In this capacity, he established the Intruder Watch which continues today. Between 1959 and 1974, Merle was a prime contributor to six international frequency conferences as well as numerous bi-lateral conferences with Canada and the United Kingdom. He retired from the FCC in 1974 with over 38 years of service.

One might wonder when Merle has had any



E. Merle Glunt, W3OKN

time to be a ham. Well, somehow he's managed to be very active, indeed. His primary interest is traffic handling — he's been net control of the Eastern Canada Net and the Ontario/Quebec Net, and has been ECN representative to the Eastern Area Net, the Atlantic Provinces Net and the Grey Bruce Net. Merle first joined ARRL in 1937, became a Life Member in 1970 and is currently an Advanced class licensee.

On the romantic side, Merle met his wife, Betty, through ham radio — both of Betty's brothers are amateurs! Merle and Betty have two children, a son and daughter. According to the latest information, the kids aren't licensed yet, "although my daughter may one day surprise us with a ham license!" We're sure she will! — Sandy Gerli, AC1Y

FCC DENIES CBER AN AMATEUR LICENSE

The FCC has denied the application of Joseph E. Castelletti, Jr., of Largo, FL, for Amateur Radio station and Novice class operator licenses. On February 10, 1978, Castelletti's citizens band license was revoked for willful violation of FCC rules — operating on frequencies assigned to the Industrial Radio Services, for which he had no license, and identifying his operation on the unauthorized frequencies with a "Whiskey Club" or "W" designator. Such designators are used by "Whiskey Club" members, a group of single-sideband CB radio operators, almost exclusively on frequencies above those authorized for CB use. They enable members to avoid detection by the Commission, except through time-consuming direction-finding techniques.

Pointing out that the Commission's enforcement program would have little effect if CB licensees knew they would be qualified for an amateur license having greater operating privileges and responsibilities than their revoked licenses, the judge said it would be inconsistent to find Castelletti qualified for the Amateur Radio Service when he recently had been found unqualified to hold a CB license. Therefore, it was found the public interest required denial of Castelletti's amateur application. The initial decision becomes final in 50 days unless there is an appeal by one of the parties or the Commission orders review on its own motion. — Marge Tenney, WB1FSN



Canada Finalizes WARC Position

At the end of February, the Department of Communications released the *final* WARC Canadian proposals which have by now been formally submitted to the International Telecommunication Union in Geneva. In general, there were very few changes which would affect the Canadian radio amateur from those proposals contained in the last draft position. Unfortunately, notwithstanding CRRL's extremely strong objection to the Department's proposed loss of the top end of 80 meters, this proposal was retained in the final position paper. All we can hope for now (and continue to work for through IARU) is that majority support for such a tragic loss will not be forthcoming at the conference. As previously mentioned on this page, at the recent IARU Region 2 Panama Conference, it did not appear as if such support would be forthcoming.

The previously proposed new amateur bands at 10.1 to 10.3 MHz and 24.0 to 24.5 MHz have been retained. Even though the new band at 18 MHz which CRRL had proposed (it appeared in the First Draft) inexplicably was dropped in

the Second Draft, we understand Canada will be favorably disposed to support this band if proposed by other nations.

A new band at 902 to 928 MHz also has been included, but with the Amateur Service secondary to the Fixed and Mobile Services. On 420 and 450 MHz, Radiolocation would remain primary (with Amateur Radio secondary) throughout Region 2; however, in Canada, the 420- to 430-MHz segment would be allocated to other services on a primary basis.

1.8 to 1.9 MHz has been proposed for exclusive amateur use in Region 2, while 1.8 to 2.0 MHz is proposed for shared use in Region 3. Similar to the United States proposal, our 40-meter band would be changed downward to 6.9 to 7.1 MHz; however, it would be exclusively amateur. In our opinion, if this could be achieved, even though we suffer a small loss in frequency this would be more than compensated by not sharing the band (authorized or not) with every Tom, Dick or Harry.

The 20-, 15-, 10-, 6- and 2-meter bands would remain unchanged. Amateurs would

gain 220 to 225 MHz on a primary basis, however, with Radiolocation becoming secondary.

Unfortunately, our requests for a new low-frequency band and expansion of some of our hf bands were not met. However, the proposal to allocate 10 kHz on each of the hf bands for disaster use was dropped. As previously stated, CRRL categorically opposed such an allocation.

We feel that the department is to be congratulated for a job well done at a difficult time. They were faced with many more frequency requests than they could reasonably accommodate. Other than their continued pressure on our 80-meter band, we are quite pleased with the department's final position. The eventual outcome is now in the hands of the conference, although, as we have previously stated, we shall continue to work for the welfare of the Canadian Amateur Radio Service through our position as the Canadian delegate to the International Amateur Radio Union.

DOC ANNOUNCES NEW LICENSE-FEE SCHEDULE

A new license-fee schedule for non-broadcasting stations will be implemented on April 1, 1979, Communications Minister Jeanne Sauve announced recently. She said the new schedule will balance revenues with the cost of radio spectrum management. This is in accordance with the principle that the cost of licensing radio stations should be borne by the licensees, not by the taxpayers generally.

Mme. Sauve emphasized that the more than one million GRS and amateur licenses will not be affected by the fee revision and that *fees for these licenses will remain unchanged*. These two license classes represent more than 70 percent of radio station licenses currently in force.

POTPOURRI

□ We have been advised that a candidate for an Amateur Certificate will be permitted to use a *non-programmable* calculator at all future sittings of the Amateur exams.

□ The Manager of the ARRL/CRRL National QSL Bureau, Brit Fader, VE1FQ, advises that he is still receiving envelopes *from all parts of Canada* requesting him to forward cards individually. This is impossible, and all Canadian amateurs are again requested to send envelopes to *their respective QSL Bureaus only*. Except for VE1 and VO amateurs (Brit is also the manager of the VE1/VO Bureau), sending envelopes to Brit will only cause delays.

□ DOC has advised me that the next Amateur examinations will be held May 9, while it is anticipated that the next sitting will be July 11.

□ A reunion of all Navy Communicators (World War II) is planned for July in Dartmouth, NS. Further information may be obtained by writing Box 2755, Dartmouth, NS B2W 4R4.

□ The Moose Jaw Amateur Radio Club will sponsor the 1979 Hamfest (Particifest '79) July 27, 28 and 29. As the name implies, amateurs

can participate in all of the activities and contests. Additional details may be obtained by writing: Particifest, Box 150, Bushell Park, SK S0H 0N0.

□ The Guelph Amateur Radio Club has announced June 9 (8 A.M. to 4 P.M.) as the date of the annual Central Ontario Amateur Radio Fleamarket. Details from GARC, P. O. Box 1305, Guelph, ON N1H 6N9.

□ The Scarborough Amateur Radio Club has announced sponsorship of a special award, the North America Award. It is open to all radio amateurs or SWLs who make contact (or SWLs heard) with all Canadian provinces or territories *plus* all states of the continental U.S. Only contacts made after December 1, 1978 are eligible. Any band; any mode; no net contacts. Send a copy of your log, signed by the operator and another licensed amateur, together with a list of provinces and states to Awards Chairman, SARC, P. O. Box 1011, Station C, 3434 Lawrence Ave. E, Scarborough, ON M1H 1A0.

□ Another new award, the Ski Canada Award, also is now available. Two stations from each of the major skiing provinces (British Columbia, Alberta, Ontario and Quebec) must be worked. Send log data and \$2 to Eric S. Walden, VE3HLL, R. R. No. 1, Gowanstown, ON N0G 1Y0. A list of the specific skiing areas in each of the provinces which must be worked is available from VE3HLL. He also announces that because of increased mailing costs, it has been necessary to increase the price of the Canadian Awards Directory to \$4 (U.S. and Canada) and \$6 for DX.



HS1ALT, ex-VE3JKD, usually can be heard on or near 14.160 from 1000 UTC working his father, VO1CW. After 1300 UTC it's "CQ Canada" from Bangkok, Thailand, the only country operating from zone 26. HS1ALT, VS6CZ and 5H3BP are originators of the Canadians Overseas Net (CONET), which meets informally Thursday and Saturday on 14.140 MHz at 1430 UTC. Also look for check-ins of other Canadians overseas with prefixes DU4, 7P8, YB0, P29, G3, CN8, EL1 and more.

*Director, Canadian Division

The Safari Ends. What Have We Learned in Africa?

While traveling through Africa in preparation for the World Administrative Radio Conference (WARC-79), I enjoyed talking with many fellow amateurs in North America via Amateur Radio. On almost every occasion I did find to operate, I wasn't alone; Sometimes as many as eight or nine African amateurs or government officials would be gathered in the station with me, interested in the remarks of North American amateurs, and especially their questions.

Is it really as bad as some have said? Are all the African countries against us at WARC? What can we do to help? Good questions, all of them. But even more impressive to the Africans were those questions which dealt with life in Africa and the unique problems faced by today's African ham.

Could we have made the trip sooner to Africa? Financially, yes. But the timing would have been unpropitious at worst and unproductive at best, for Africa is a continent of change — dramatic change. And this point became patently clear to us after only a few weeks of traveling about the African countries. The shift in interest among Africans has been in the past few years from introspective nationalism to a broader vision aimed at technological development and international cooperation. Oh, there are still struggles and wars among some of the 53 African nations to be sure. But on the whole, students of African affairs have noted that along with this shift in outlook has come a pragmatic recognition of just what needs to be done to raise the standard of living for Africa's millions. An expanded industrial base is one of the key factors in increasing a nation's income, and the backbone of such expansion is *technical training*.

That's where Amateur Radio comes in. Very few African languages even have a word for "hobby," much less for "Amateur Radio." What sells Amateur Radio over there is the time-proven argument that *Amateur Radio alone creates a unique corps of self-training technical experts* who in turn provide a developing nation with a body of people truly motivated to advance themselves — and hence their country — in the technical arts. As ITU Secretary-General the Honorable Mohamed Mili observed, "The role of the amateurs in technical training (as contrasted with that played in emergency communications) seems to be little known for all its great importance. . . . There is no doubt that the development of Amateur Radio in the [Lesser Developed] countries makes a substantial contribution . . . that costs governments so little."

I enjoyed talking too with a dozen or more educators in Africa during the safari. Not all of them were technically oriented, but most of them did volunteer that the remarkable distinction they had seen in Amateur Radio was that the students were *motivated*, and motivation is the key factor in any form of education. Young

Africans, especially, are enthused when they discover Amateur Radio. They see it not only as a fascinating use of what free time they might have, but also as a stepping-stone to careers which will raise their standard of living and help their countries as they plunge into the 20th century.

Yes, there are a few nations in Africa who for security reasons oppose the Amateur Service. But by and large, the African nations recognize Amateur Radio as a tool vital to their technical development, and they're willing to promote it. Yet this promotion, while certainly backed by the International Amateur Radio Union, must be done by the Africans themselves, and not by well-intentioned outsiders. Project Goodwill is a good example of the sort of aid which directly meets several needs of the new African amateur, while leaving the administrations free to structure the Amateur Service within their countries as they see best.

As for what you can do to help in this important mission, well, there's plenty. I asked the Africans all over the continent this very question, and added their answers to my own observations. For a beginning, when you work an African on the air, take a few minutes to talk with him or her about life in that particular country; even seemingly trivial questions concerning the day's weather or what the amateur does for a living are questions which indicate interest, and in turn support. Africa is vastly misunderstood in the West, and Amateur Radio can do much to dispel many of these misunderstandings and promote goodwill for which we're so famous.

Remember, too, that if you're working on

ssb, English is most likely the African amateur's second (or even third) language. So speak slowly and distinctly, and share information about yourself and your other interests. (After hearing a particularly chaotic DX pileup one afternoon, one West African government official turned to me and asked, "Can you please tell me what *that* had to do with 'promoting international goodwill'?" We should keep this in mind.)

The Africans are a vigorous people with a long and varied history. They're now joining the West in the 20th century, and they're eager to be helped with dignity in breaking down barriers to communication, and to grow. Let's pitch in!



Mrs. Cassandra Davies, 9L1YL, secretary of the Sierra Leone Amateur Radio Society, also serves professionally as deputy manager of Frequency Allocations for her government. She is shown here studying one of the many documents in her office which deal with the complexities of spectrum management and the upcoming WARC-79. (photo WA6IDN/9L3IARU)



Two African telecommunications officials from different countries demonstrate the apolitical nature of Amateur Radio by enjoying a friendly exchange about the ITU Seminar in Nairobi, Kenya. The venue is the reception held by radio amateurs during the seminar. Experienced observers and ITU officials will frequently remark that delegates who might hesitate to "talk shop" with one another on the conference center floor feel free to break down barriers when they are in the unique atmosphere offered by friendly aficionados of Amateur Radio. (photo by Foto-Unique Kenya, Ltd.)

*International Services Officer, ARRL
To the many stations who took a second to toss a cheery word to 5/4ARU/1L2IARU/9L3IARU/C5ARU/A2IARU, a hearty thanks!

Correspondence

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

CONDITIONS WORSENING — HOPE IN SIGHT

□ What is being done about the condition of 15-meter cw? It is worse than the 40 channels of CB: power that covers 3-5 MHz, deliberate jamming, sending CQ before listening for a clear space, and warming up on a frequency in use. These conditions are what drove many from CB and are driving many from ham radio. These conditions are worse than I have ever heard. You have an organization that can and does work alongside the FCC. What is being done so that I and others think it worthwhile to advance any further in what once was a great hobby? — *G. Louis Johnson, WAIWHE, Shelburne Falls, MA*

□ I'd like to say a few words to those hams who operate near the Ten-Ten backscatter nets. Difficulties inherent with ionospheric backscatter propagation are great enough without the added S9 QRM. The use of backscatter was increased when sporadic E contacts in the states were very limited. Ten-Ten Inc. members who wanted to exchange certificate numbers began adding filters and preamps, building bigger and better antennas, and upgrading their receivers with every "hot" modification they could find. Things went along well until the increased solar activity brought many people to 10 meters who heretofore considered it a dead band. We are all extremely happy that all these people are keeping 10 meters active. What I'm suggesting is nothing more than courteous and conscientious radio operation. Think about us and listen to us on 28.825 MHz and if you like, check-in. We would like to meet you. — *Ron Reid, WD5CSK, San Antonio, TX*

□ On more than one occasion with schedules from here to Canada, I have been intentionally interfered with by unidentified whistles and carriers that mysteriously appear on a clear frequency on 75 meters and remain for the length of the QSO. Canadian amateurs advise me to call them only once or twice so unwanted attention and jamming carriers can be avoided. This situation has happened to me quite often but only with VE QSOs. All indications are that U.S. stations are causing this problem. Perhaps these amateurs feel resentment because Canadians have subbands where U.S. phone stations cannot operate. Maybe they feel the VEs should stay there and not visit the U.S. subbands. Individual retaliation is pointless and stupid. There are valid reasons for exclusive phone subbands and the individual Canadian ham is not responsible for the policy. Sometimes psychology can avert severe interference but I think that condemnation by other amateurs of such action may help stop this nonsense. — *Ken Nuebeck, WB2AMU, Patchogue, NY*

□ I would like to suggest that some use be put to the unused sidebands on each band. Perhaps nets and schedules could be set for one sideband while hams just out for a casual QSO would stay on the most commonly used sidebands (usb on 10, 15, 20 and lsb on 40 and 80). Or perhaps a QSO could be established and the hams move to the other sideband. This might prevent many of the arguments that give Amateur Radio a bad name. — *John H. Wolf, WDSIQI, Dewey, OK*

□ Those cw buffs who enjoy chewing the rag are due for a shock. The portion of the 3500-4000 band now designated for cw is occupied only during the hours of 7 P.M. until midnight. During the morning hours, around 5 A.M. local time, the 7-MHz band is alive with signals and acute QRM but good old 80 meters has no one taking advantage of its lack of QRM. Use it or lose it. Which do you choose? — *John Pomeroy, K6UQ, Inglewood, CA*

□ Your decision to take legal action against the FCC ("Happenings," January QST) is good. The Commission, by banning the manufacture of power amplifiers capable of tuning the 24- to 35-MHz range, has multiplied their problems, and ours. It denies the legitimate amateur, as well as the CBER, a well-designed factory-built amplifier, one that is type accepted and stable. It has created a black market in home-modified amplifiers, the design and performance of which the Commission has lost control. Some of these amplifiers blanket our 10- and 15-meter bands with spurious hash-type interference which reads S7 on my Drake R-4B. This is happening in Fort Lauderdale, the location of one of the Commission's larger monitoring stations. They can control this illegal use of linears by CBERs through better enforcement of the rules. The present approach has only succeeded in creating new problems and is a step in the wrong direction. — *George Littlefield, K4HEG, Fort Lauderdale, FL*

□ Ever since the FCC's ban on linear amplifiers I've had this gnawing feeling in my stomach. Every day the Washington bureaucrats take away one more right from us all. Like a fungus fed on paperwork they're now eating away at our hobby. They have deprived us of privileges because of their own ineffectiveness and outright incompetence. They aren't going to cure RFI problems this way. That's why General Docket no. 78-369 is addressing the problems inherent in electronic receiving devices. But that is only part of the problem. Banning amplifiers isn't the answer. The real problem is 11-meter CB. With no-fee licensing, new CBs for \$29.95, and no enforcement, who cares if the CB band is garbage or not? They don't have anything invested and have nothing to lose. To transplant CB to 900 MHz would be the best aspirin for Uncle Charlie's biggest headache. Hams must still push for General Docket no. 78-369 and force the manufacturers to give consumers honest value in RFI-free equipment. As it stands now, the FCC has gotten away with the 10-meter amplifier ban, so what's next — "Quiet Zones" around FCC monitoring posts? No, they wouldn't do that. — *Fred Hurteau, WD4SKH, Whiteville, NC*

WORDS ON 160

□ When the FCC allowed the Hawaiian stations permission to operate from 1805-1810 kHz in the 160-meter band, it disrupted the peace and tranquility for the 160-meter cw operator. By gentlemen's agreement, this band regulated itself for many years. It appeared to work well that way until the KH6s came on the air and the ssb people used 1810-1825 kHz. This left 1825-1830 kHz as the DX window for the East Coast. Now, cw people have been asked to give a little and move because the ssb stations are in the 1805- to 1810-kHz section. I can see their point but where can you ragchew? 1835 kHz was suggested up at reduced power but there you find loran pulses and a rash of ssb stations. It seems to me that someone should establish some rules. It is apparent that the FCC and ARRL do not care. Part 97 of the rules says that no frequency is owned by any particular group, so this leaves the situation to be solved by the amateurs themselves. How is this going to be done? Are we going to have more fighting and jamming between cw and ssb people? — *Ed Marriner, W6AM, La Jolla, CA*

□ Many operators are confused when they try to understand the 160-meter rules. These rules specify certain power input on the 25-kHz segments of the band between 1800-2000 kHz. Amateurs look at the

general rules which say we can run 1000-watts input and think this applies to all amateur bands. Although propagation affects all the bands with regard to daylight/nighttime hours, it is most pronounced on the 160-, 80- and 40-meter bands. 160 acts like the standard broadcast band, 540-1600 kHz. But the low end is vastly different from the high end. The FCC publishes a chart for sunrise and sunset times and each broadcast station has its permitted times. You could also call your local broadcast station to find out local sunrise/sunset times for each month, but FCC publishes a list of averaged times for each month and locale. Amateurs must change power for these times. The FCC publishes the powers and frequency segments for Amateur Radio operation partly to protect the loran navigation system. These rules cannot be treated too lightly. Our adherence to them may affect our later operation. — *Joe Rice, W4RHZ, Covington, KY*

YOUR COOPERATION APPRECIATED

□ I realize that many of us enjoy contests. Others prefer ragchewing. I wish to thank the courteous operators during the recent 10-meter contest for realizing the different interests of all on the bands. It is my hope that each of us can learn from these operators and cooperate with others on any band during any contest. — *Will Summers, WA2RZR, Asbury Park, NJ*

□ What can be more frustrating than failing an FCC exam? Having the whole weekend off, stocking the refrigerator with all kinds of goodies and finding all the low frequency bands occupied by stations calling, "CQ contest" or giving the last three letters of their call signs. — *Harold Parks, W2BNH, Yonkers, NY*

□ Please don't ask a DX station for a phone patch when he/she is in the middle of a pileup. — *Beatriz Herrera de Arango, HK3AXT*

COSMAC ADDRESS

□ In the product review for the RCA Cosmac VIP Microcomputer, the writer neglected to mention where to write for additional information. An address would be appreciated. *Daniel Kreithen, AE3E, Allentown, PA*
[Editor's Note: VIP Marketing, New Holland Ave., Lancaster, PA 17604; 717-291-5848]

STILL GOING STRONG

□ In "Banter About Band Use" ("Correspondence," January QST) Arthur Hallam remarked that *Popular Electronics* had discontinued its shortwave listening column. I'm happy to report that my *PE* column, "DX Listening," is still going strong. — *Glenn Hauser, Knoxville, TN*

WIZARD WAR

□ Ham radio is given a very fine boost in a new book on World War II, *The Wizard War*. In this book by R. V. Jones, there are two places where our hobby is given accolades, pages 87 and 244. The amateurs in Britain who helped in radio and radar work during the war are given high praise. The author even mentions their help as an "invaluable contribution." Also mentioned is the fact that Germany suffered from a lack of an experienced group from which to draw people for radio and radar work. It was pointed out that Amateur Radio was not encouraged by the Third Reich. — *A. R. Anderson, W7LJL, Port Angeles, WA* 1057-1

YL News and Views

Conducted By Louise Moreau,* W3WRE



YL-DX

DX-YL, DXCC-YL, DX-YLCC, WAC-YL and (for many gals around the world) WAS-YL mean DX, those faraway places with the strange-sounding prefixes. We point to those certificates proudly when a visitor asks, "How far can you talk?" We exhibit colorful QSLs as evidence of our contacts.

With these certificates plus those that are YL-club sponsored from New Zealand, Germany, Brazil, Italy, Japan and South Africa, it is even possible to claim that we hold certificates from all the continents. The feminine DX picture certainly has grown rapidly since 1913 when Mrs. Ingram, IX1, became the first

YL operator in a country other than the United States.

The best part of finding women Amateur Radio operators is their pleasure in meeting another YL and their desire to have more than a signal report. Suran, JT2RA, in Mongolia was so anxious to meet other women that in a contact with an OM who signed Gene, she was so sure he was another YL that she signed "33 you are my first YL!"

The YL form of DX very often leads to warm friendships that turn into weekly schedules. For Maxine, W6UHA, Lia, WA2NFY, or Darleen, W5FQX, DX con-

tacts have turned into visits from the gals they met on the air. Eila, WA8EBS, Chris, WB2YBA, Liz, W3CDO, and many other YLs have met gals in their homelands. In this country or in DX lands, they meet members of the YL clubs and cement even more strongly friendships that began with a chance on-the-air contact.

Amateur Radio has provided a bridge that ignores international boundaries. Through it, we have found a link with women we probably will never meet, yet we can say truthfully "Sweden, Ceylon or Argentina? Oh I have very close friends there."

YL CONTESTS

Due to an oversight, the YLRL contests have not been listed in the QST Contest Calendar. In answer to the many queries to "YL News and Views," the YLRL, CLARA, YLISB and TOT contests are still scheduled. The 1979-80 contests will be listed as soon as the dates are set by the clubs. It is unfortunate that the YL-OM material was lost.

CANADIAN YL OFFICERS

CLARA announces the following officers for the coming year — President, Ann Nutter, VE3HAI; Vice President, Diana Vanderzande VE7DIO; Secretary, Jeanie Gordon, VE2JZ; Treasurer, Vivian Taylor, VE3HGA. All licensed Canadian Women Amateur Radio operators are eligible for membership in Canada's national YL club.

YL EXTRA CLASS CALLS

"YL News and Views" erred February in listing KA4S as the only YL with the new single-letter suffix call and AA6YL as the only AA prefix for Extra Class YLs. Mail from other gals shows that Sally O'Dell, formerly WBNOK now holds AEP in West Virginia. North Carolina's three Extra Class YLs are KB4C, AA4YL and W4YL. [Editor's Note: Let's not forget Hq. staffer Jeanie Zaines, AB1P, who has had her newfan-

gled call for about 10 months now.] "YL News" thanks AE8P and KB4C for this information.

YL YASME OPERATION

Iris Colvin, W6QL, and OM Lloyd, W6KG, have been active since January on a worldwide YASME DXpedition. They operated from Cayman Island in January, making some 9000 contacts with amateurs in 126 countries. As noncitizens of Cayman, they used the call ZF2 because ZF1 is reserved for the islanders. Iris later operated from Jamaica as W6QL/6Y5.

Iris and Lloyd have made more than 500,000 contacts during their Amateur Radio activity and have on file at their home in California more than 250,000 QSL cards. This latest tour will add more countries and cards to their collection.

MAJOR YL CONVENTIONS SCHEDULED

June 1979 is an important YL convention month. YLRL will be celebrating the club's 40th anniversary at the Quadrennial YLRL International Convention June 29-July 1 at the Holiday Inn in Philadelphia. With special emphasis on the club's 40 years, plans include a number of panel discussions, a birthday luncheon, YLRL Forum and talks by W3BIW, WIZEN, WA8EBS, K4LMB and W2EEO. W3WRE will speak at the banquet and as yet undisclosed professional entertainment will perform. See you there. All licensed women are welcome, whether YLRL members or not.

The 1979 YLISB convention has been scheduled at

the Hot Springs Majestic Hotel in Hot Springs, AR from June 15-17. As always with this club, whose global membership numbers more than 10,000, there will be meetings on procedure and System operation, technical talks, special awards and exhibits. Members and Amateur Radio operators who are interested in the System are welcome to attend.



Nancy Melson, KA1BIL, spends most of her operating time on cw on the Novice band after she comes home from teaching school. Nancy finds that most of her contacts are with YLs in the Novice portion of the band.

*YL Editor, QST.

50 Years Ago

May, 1929

□ ARRL's Technical Development Program has been officially concluded. We have learned that we can operate in our new, narrower bands by equipment modifications to improve transmitter stability and receiver selectivity. The editor points out, however, that by no means have all problems been solved.

□ The director of that successful program, Ross Hull, returns to his native Australia. Jim Lamb, W1AL, takes over in the technical department, with W9BR joining the staff to provide membership assistance through the Technical Information Service.

□ President Maxim pens his famous "Rocking the Boat" editorial, chastising those who keep carping about our reduced bands.

□ The 1929 Governors-to-President Relay was highly successful and much appreciated by the recipient (and former Secretary of Commerce), Herbert Hoover. Familiar names among the team of Washington amateurs handling the exercise are Redington and Zandonini.

□ The League's Official Frequency System, chaired by W6AM, continues to perform a needed service in

helping keep us in band. W1XV at M.I.T. and W9XL in Anoka, MN, are the most accurate standards.

□ J. E. Smith of National Radio Institute describes the advantages of "wired wireless" multi-channel communication over power lines — and the extreme caution necessary because of the high voltages involved.

□ W2ALW shows us his modification of the W9EK keying circuit to handle an oscillator-amplifier system with minimal frequency effect.

□ W8ARO's station is chosen this month as the best example of "1929-style" design.

□ J. M. Grigg unravels some of the mysteries of condenser rotor design in attaining S.L.F. (straight-line-frequency) tuning.

25 Years Ago

May, 1954

□ ARRL is 40 years old, and QST's editorial recounts the birth and early years of our League under President Hiram Percy Maxim and Secretary Clarence D. Tuska.

□ No more Novice and Technician exams will be given by FCC; they will be available only by mail, through volunteer examiners, because of the commission's overload of work.

□ A lot of us still don't completely understand the principles of modulation. W1DX tries once again to explain, starting from fundamentals almost as basic as the "tin-can" telephone.

□ You can burn up a plate choke in parallel feed final amplifiers if you aren't careful about values; W1JEQ shows us how to keep out of trouble.

□ W1M1J has a nifty, compact beam design of two elements on 20 meters. W0VZC and W0QFG add their suggestions on an even smaller construction, but with three elements!

□ Crystal half-lattice filters can improve selectivity if properly designed and installed, and W7ESM presents his cascaded system.

□ A good way to produce a solid signal on 220 Mc. is W1HDQ's 40-watt amplifier with plate lines.

□ W7JIP and W7OKV have set a world record DX mark of 47 miles on 10,000 Mc.

□ The League has filed in opposition to FCC's proposal for license fees.

□ WINWO describes a handsome kilowatt amplifier with 4-250As and thorough precautions against TVI.

□ W2RYI's article on TVI problems was chosen the best of the lot in 1953 QSTs. — W1RW

How's DX?



Conducted By Clarke Greene,* K1JX

A Band May Work from Sun to Sun, But . . .

A few weeks ago, several of the check-ins to a Connecticut 2-meter traffic net exclaimed amazement at the signal strength of a certain VE station they were hearing on 75 meters. Claims of 59-plus reception on indoor antennas were made. What's so unusual about a Canadian being 59-plus in Connecticut? VE3BWK was there, big as life, signing portable 4U, in the Golan Heights. That counts as Syria, folks.

For at least three decades, some hearty souls have chased DX on our lowest hf band. The going was tough at best, not because of propagation, but rather lack of activity. About 10 years ago, the announcement of a new award, Five-Band DXCC, changed all that. People who once thought 14,001 MHz was as low in frequency as one could work DX were showing up between the traffic nets on 80. Even with antennas miniscule in comparison to their 20-meter monsters, these guys literally began working the world.

As you might expect, the competition became fierce and gargantuan 80-meter antennas began appearing. Those of us who longed for even a tribander for the higher bands were competing with four element arrays on 80. Luckily, after the novelty of working "easy" DX on 80/75 wore off and the big guns had confirmed their hundred on the band, things quieted down. The activity is still there, but the hand-shattering pileups to work a G3 don't exist any more. As is usually the case, the fellow with the modest setup is able to work choice DX, once the dust has cleared.

It isn't merely wishful thinking to think that you can work DX on 80 meters. Remember, most of the Europeans or Japanese you'll eventually work if you become active on 80 are using stations which are average by U.S. amateur standards. A dipole in the clear at 30 feet is beyond the means of many overseas stations; few run kilowatts. Granted, these stations don't have commanding signals, but they do work lots of DX. If the truth were to really leak out, many of the first amateurs to achieve 5BDXCC (i.e. W4QCW) used simple antennas no higher than 50 feet. While living in an apartment in downtown Washington, DC, K3NPV worked about 200 countries on 80 meters while using only a sloping quarter-wave wire hung out his window as the antenna. More than 100 of these were worked before John bought an amplifier!

Enough pep talk. What is really necessary to work all this alleged DX? The science (art?) of working DX on 80 required several talents. The first is a *knowledge of propagation*. The major difference between 80 and 20 meters and above is that a portion of an 80-meter DX path must be in darkness or close to it. (One obvious advantage here: The ham who has to work for a living during the day won't miss any of the band openings. That is, provided he or she has insomnia.) A *very* general statement, enough to get you started, is that signals over an east-west path peak when the eastern end of the path is close to sunrise. The north-south paths usually

peak after local midnight. The real details beyond those two vague statements require more space to explain than we have here. The *Radio Amateur's Handbook* has a section on propagation well worth referring to. An excellent book totally devoted to our topic is *80 Meter DXing* by John Devoldere, ON4UN.¹ John, who has worked nearly 300 countries on 80, really covers all the aspects of 80-meter DXing.

The second talent requisite to pursuit of 80-meter DX is *familiarity with the operating practices* on the 3.5-MHz band. Cw operation is rather straightforward. Most of the DX congregates below 3540 kHz, especially in the lower 25 kHz of the band. Region 1 of the IARU has officially recommended that the bottom 10 kHz (3500-3510 kHz) be used exclusively for inter-regional contacts.

Phone operation on 75 meters is a lot more complicated, because of frequency spectrum allocations throughout the world. Most of the countries outside North and South America are not allowed to operate above 3800 kHz. Some can't go even that high. While there is a fair amount of simplex operation between 3775 and 3800 kHz, split operation is often the rule (see last month's "How's DX?") This is when separate transmitter and receiver combinations or remote VFOs come into play. Split operation not only bridges the frequency allocation gap, it also allows both ends of a QSO to hear the other without local QRM. Table 1 gives a listing of frequency allocations for some of the more populated areas of the world. In general, most of the DX activity can be found in the 3790-3800 kHz segment.

The final two attributes necessary to be successful at 80-meter DXing are *patience* and *perseverance*.

¹Published by Communications Technology, Inc., Greenville, NH 03048

Table 1
3.5 MHz Phone Allocations Throughout the World

Area	Frequency (MHz)
Africa	3.600-3.800
Asia (most)	3.600-3.900
Australia	3.535-3.700
Canada	3.725-4.000
Europe (except USSR)	3.600-3.800
Japan	3.500-3.575
Pacific	3.600-3.900
South America	3.600-4.000
USA and possessions	3.775-4.000
USSR	3.600-3.650

Japan also has a "DX band" between 3.793 and 3.802 MHz.

IARU Region 1 has officially recommended that 3.790-3.800 MHz be used for only intercontinental contacts.

There are several exceptions to the above table; local license-class restrictions were not accounted for.

The fact that VE3BWK/4U was being received so well in late February 1979, during a very high period of sunspot activity, brings up the important point of all this. At the bottom of the sunspot cycle, few attempted to work any DX on 10, even though the band was open, since popular wisdom said that 10 meters never opens at a sunspot minimum. Now, approaching a sunspot maximum, 10 is hopping and 80 should be useless, right? Tell that to the guys on that 2-meter traffic net.



Gurbux Singh, WB9TTN, recently visited his native Asia. His father-in-law, Dr. Charan Singh, 9V1NR, is seated on the right. The fellow in the middle is a visiting Yugoslavian ham.



Dr. Singh and Gurbux then traveled to Malaysia where they visited Tan, 9M2DW.



On his return home, Gurbux stopped to see Jimmy, VU2IJ. WB9TTN was introduced to Amateur Radio by his late father, Tara, XZ2KN.

*c/o ARRL, 225 Main St., Newington, CT 06111

ARRL DX QSL BUREAU SYSTEM

The ARRL DX QSL bureau system distributes cards free of charge from DX stations to amateurs within the League membership area (see page 8). Every active DXer should keep several 5 × 7-1/2-inch envelopes on file with the bureau of his home district. Place your call sign in large block letters in the upper left corner, and attach a single first-class stamp, unless you normally receive more cards. Unclaimed cards are discarded after one year. For more details on the bureau system, write ARRL HQ.

□ First Call Area: all calls* — Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.

□ Second Call Area: all calls* — North Jersey DX Assn., P. O. Box 8160, Haledon, NJ 07508.

□ Third Call Area: all calls* — Jesse Bieherman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.

□ Fourth Call Area: K4, N4, W4 — National Capitol DX Assn., Box DX, Boyce, VA 22620.

□ Fourth Call Area: AA4, WA4, WB4, WD4, WN4 — Sterling Park Amateur Radio Club, P. O. Box 599, Sterling Park, VA 22170.

□ Fifth Call Area: all calls* — ARRL W5 QSL Bureau, Box 1690, Sherman, TX 75090.

□ Sixth Call Area: all calls* — ARRL Sixth (6th) District DX QSL Bureau, 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* — W0 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 — Giraciano Refardo, KV4CF, P. O. Box 572, Christaasted, St. Croix, VI 00820.

□ Canal Zone: all calls* — KZ5 QSL Bureau, Box 407, Balboa, C.Z.

□ 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 B31 2T3. Or, QSL cards may be sent to the individual bureaus.

□ VE1* — I. J. Fader, VE1FQ, P. O. Box 663, Halifax, NS B31 2T3.

□ VE2 — A. G. Daemen, VE2IJ, 2960 Douglas Ave., Montreal, PQ H3R 2E3.

□ VE3 — The Ontario Trilliums, P. O. Box 157, Downsview, ON M3M 3A3.

□ VE4* — W. A. Stunden, VE4BJ, 578 Oxford St., Winnipeg, MB R3M 3J9.

□ VE5 — A. Lloyd Jones, VE5JH, 2328 Grant Rd., Regina, SK S4S 5E3.

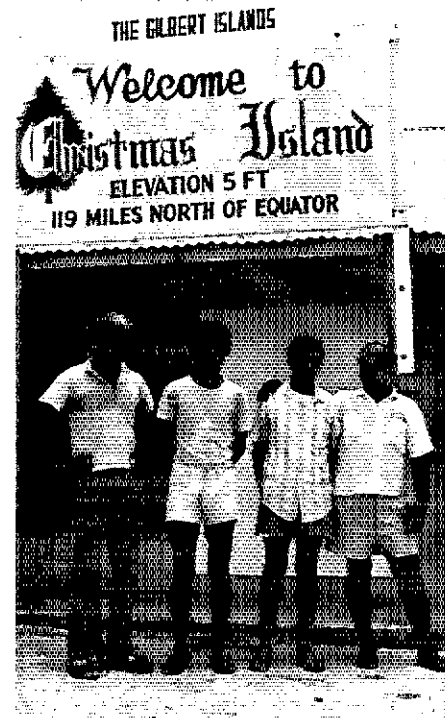
□ VE6* — G. D. Holton, VE6AGV, 4003 1st St., N.W., Calgary, AB T2K 0X2.

□ VE7* — Howard Martin, VE7AFY, No. 45-9960 Wilson Road, Ruskin, BC V0M 1R0.

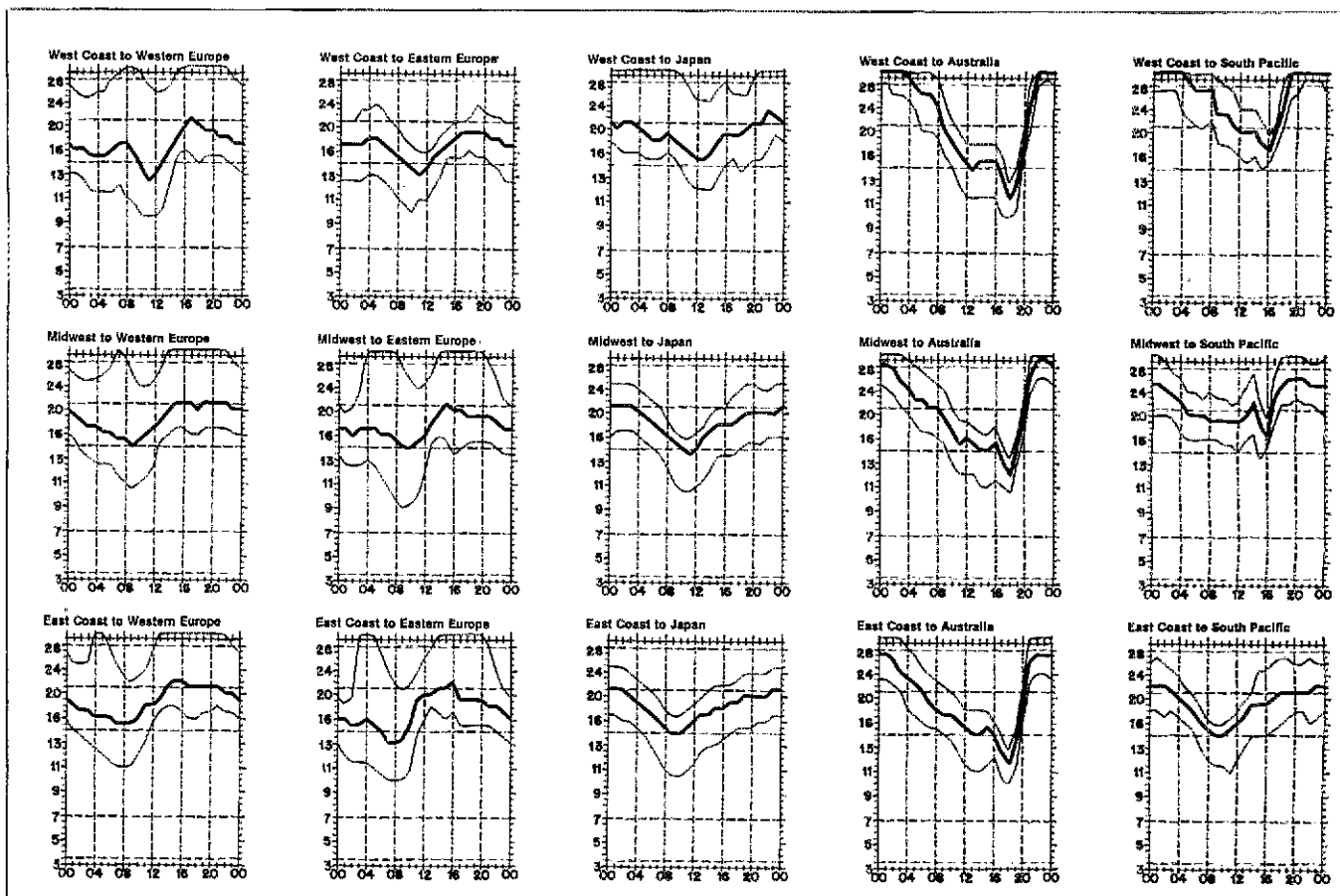
□ VE8* — Al Sturko, VE8NS, P. O. Box 72, Fort Smith, NWT X0E 0P0.

□ VO1, VO2 — CRRL VO QSL Bureau, P. O. Box 6, St. John's, NF A1C 5H5.

*These bureaus sell envelopes or postage credits. Send an s.a.s.c. to the bureau for further information.



Here are all the present VR3 hams: from left to right, VR3AH, VR3AV, VR3AR and a local SWL. (Tx VR3AH)



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



Some months ago, we mentioned the Novice class on the Tonga Islands. Here at club station A35FJ, are (left to right): Sione Maife, A35SM; Susana Helu; Etuate Kavenga, A35EK; and Mele Helu sitting in front. Don, A35DE, not only took the photo, but taught the Novice class!



From this elaborate station in Hyogo, JA3UB is well-known on the ham bands.

DX CLASSIFIED

The Caribe DX Association's Alex Kasovich, W1CDC, is in the process of engineering a large DX-pedition to some rare place on the globe. All interested persons who feel they meet the requirements listed should apply for an interview. The time window for this adventure is August 1980; exact dates will be made available when government legalities and logistics permit.

A large seaplane with pilot and copilot is available, while ham gear is being loaned by a large manufacturer. All persons who apply must hold a current Amateur Radio license, General class or higher. A doctor's endorsement is required, indicating that you

have no physical restrictions that could be affected by extreme heat, sun, humidity, sea/air sickness, possible physical exhaustion and insect bites. All members shall be proficient cw/ssb contest-style operators and must have a secondary ability to contribute to the expedition in the following categories: 2 persons with some paramedic training; 1 doctor, 2 cooks, 1 navigator, 1 antenna specialist, 1 electronics (solid-state) technician, 1 mechanic, gasoline generator maintenance.

All members of the expedition must be able to swim and have some climbing ability.

These requirements have been made to insure the safety of all members and make the DXpedition a success. It also must be clearly understood that there is always the possibility of hidden dangers in pulling off

a trip of this magnitude. Questions will be answered in the best interest of all parties concerned.

Please send your reply with your remarks, phone number and best time to contact you to: The Caribe DX Association, c/o Alex M. Kasovich, W1CDC, P. O. Box 93, East Glastonbury, CT 06025.

DX PORTFOLIO

A two-month DXpedition to Afghanistan and Pakistan is being embarked upon by Masood Kahn, OZ1CRH. Sudi has obtained operating permission from both countries. He will operate from Afghanistan for about three weeks as YA7MI. Then Sudi will operate for about a month in Pakistan using the call AP21J. The trip is currently scheduled for April through June of this year.

Operation will be on ssb and cw on 80 through 10 meters. The antenna will be a ground plane, but Sudi will also bring a kilowatt and split frequency capability. Sudi is financing this trip himself and would probably appreciate any contributions. His QSL manager will be WA8AJG.

Other likely DX catches include:

Bahrain: Look for A9XBD near 14.235 MHz at 1200Z on Saturdays. Jeff can usually be worked long path at that time.

Bangladesh: Peter, 52BTF, regularly shows on 14.275 MHz at 1700Z on Saturdays.

Borneo: Horace, 9M8HG is feeding much better now and is regularly on at 2200Z on 21.320 MHz.

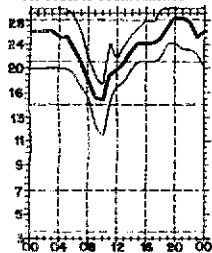
Brunei: Chris, V55CW, will be active for about two years. Find him on 14.225 MHz daily at 1500Z.

Iraq: Y11BGD is now able to operate cw. Look on 14.024 MHz at 1100Z. Majid says there are now two stations active and 21- and 28-MHz operation is imminent.

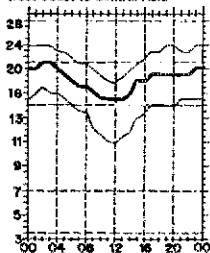
South Georgia: A new operator, Phil Grant, has arrived on the island. Look for VP8SU daily on 14.275 MHz from 1900-2200Z.

Thanks to *DXpress*, *DX News-Sheet*, *The Long Island DX Bulletin* and the National Capital DX Association for all the above.

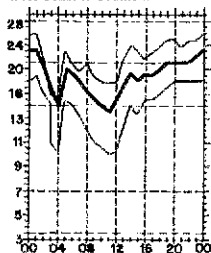
West Coast to South America



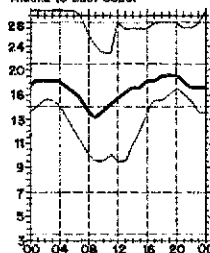
West Coast to Central Asia



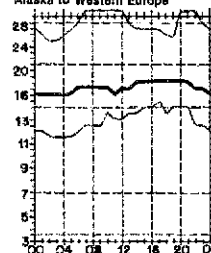
West Coast to Southern Africa



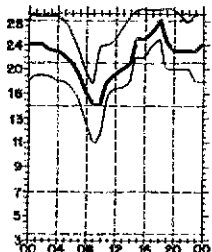
Alaska to East Coast



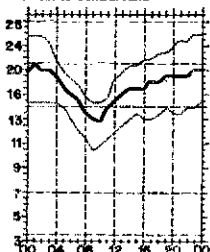
Alaska to Western Europe



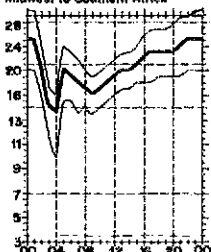
Midwest to South America



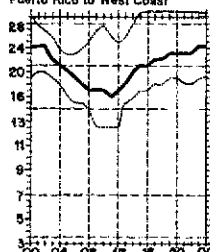
Midwest to Central Asia



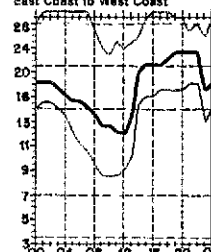
Midwest to Southern Africa



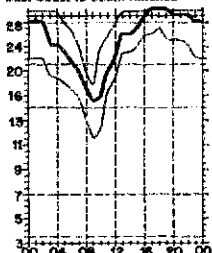
Puerto Rico to West Coast



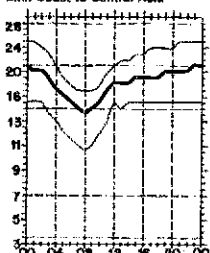
East Coast to West Coast



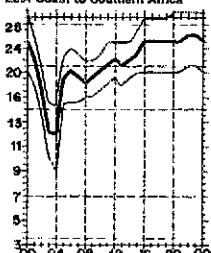
East Coast to South America



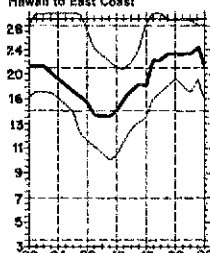
East Coast to Central Asia



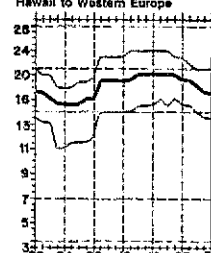
East Coast to Southern Africa



Hawaii to East Coast



Hawaii to Western Europe



lowest curve (optimum traffic frequency, or tot). 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 May 15 to June 15, 1979, assume a sunspot number of 144, which corresponds to a 2800-MHz solar flux of 187.

QSL Corner

Administered By Dave DeMaw, KA1BUQ

The ARRL-Membership Overseas QSL Service has undergone relatively few minor changes since its inception in 1976. To continue the same efficient service, we find it necessary to make the following changes, which will take effect beginning June 1, 1979.

The s.a.s.e. previously requested with each submission of QSL's will no longer be required, since confirmation slips have been eliminated. Your canceled check will now serve as confirmation that your cards have been received by Headquarters for distribution. There will be no outback in service. Weekly overseas mailings will continue.

The flat \$1 fee for each use of the bureau will be replaced by a graduated fee schedule: \$1 per pound or portion of a pound of QSLs (155 cards average one pound). For example, 1 pound = \$1, 1-1/2 pounds = \$2, 2 pounds = \$2, 3 pounds = \$3 etc.

Any ARRL member can utilize this outgoing service by observing these criteria:

1) Sort QSLs alphabetically by call sign prefix (A4, AP, CE, F, G, GL, GM, VK1, VK2, JA2, etc.).

2) Enclose the address label from the brown wrapper of your current copy of QST.

3) Enclose the proper fee for the QSLs being forwarded (\$1 per pound or portion of a pound).

Here is QSL information for those who wish to QSL direct. Remember that the accuracy of this listing cannot be guaranteed.

CN8CX (WB0MSZ)
CT2QN (W2KF)
EL0AN/mm (OH2BDP)
FK8CD (W7LJC)
GM6RV (K9KLR)
KC4AAA (W6MAB)
KZ5GH (WB2DCP)
KZ5RX (WB2DCP)
N4UM/C6A (WA4YWE)
PJ8DIT/PJ3 (KISA)
S79MC (N4NW)
L2T (W5RBO)
VP2MBH (W0SH)
VP2MCH (KA0CHK)
VP2MCX (K0XD)
WA7JRI/NU (W8I/V 3/1/79-onl)
X12AV (VE2DIK)
YR0ADI (WA2DWF)
Y19MI (YU2CBM)
ZB2G (K2FJ)
ZD7BW (G3PED)
ZK1DR (W0WP)
*W1AX (KH6I W)
9V1TE (WA0TKJ)
A9KBS David Boniface, P. O. Box 5357, Bahrain
I0RFN P. O. Box 125, Papeete, Tahiti
J6LFT St. Lucia ARC, Box 390, Castries, St. Lucia, W.I.
UR2 stations Estomian Central Radio Club, P. O. Box 125, Tallin, USSR

(This information was made available by K1TO, K2TV, K7PM, WA0TKJ and W8LZY.

DX QSL MANAGER VOLUNTEERS

WBICPW	WD4OCO	W6TPC
WBIDKG	WDSABR	KA7AWH
WA1JUA	WDSADR	WB7UVB
KA3BWT	WBSHBS	WA8AJG
NA3DD	KA6CDP	WA0TKJ
WD4EDQ	WA6KMS	WA0YHX
WA4GFC		



I would like to get in touch with . . .

1) amateurs interested in forming a net for active duty and retired military personnel. Contact TSut, Albert Morton, WD6FMG, 1736 Vermont St., Fairfield, CA 94533.

1) hams who had D-4 calls in the vicinity of Nuremberg, Germany, during 1945 or 1946. Jack Duncan, K4IOR, 6811 S. W. 83rd Pl., Miami, FL 33143.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmation for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 20-country increments through 240, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from December 1 through December 31, 1978. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

DJ2FX/103
DJ3OG/101
DK0EK/107
G8VR/121
HB9BF/S129
I2BMR/109
I0YGV/116
JA7BAL/137
JH1BAN/179
JH1BMV/123

KA2BD/121
LU7DI/100
OE8HFL/141
OQ3BA/105
ON6HX/138
SM3DTR/100
TF3JB/103
VE2KD/103
VE3IPR/100
YE3JJ/101
YU3TYX/255

ZE1BJ/116
4X4HU/112
5T5CJ/214
K1BJ/115
K1NM/116
KA1BU/113
WA1UUA/103
AB2Y/108
WA2MUA/100
WA2NDB/102
K3BHZ/101

W3BI/111
W3JF/107
W3JG/105
WA3R/JN/100
WA3XUJ/104
WB3CON/107
WB3CZK/104
KB4FH/107
WA4WPN/101
WA4WQH/105
WB4DBK/103

WB4GQL/101
WB4GX/108
W5TC/101
K6HY/106
K6YCM/123
WA6AJR/115
WB6JLP/105
K7EF/105
WB6IWI/101
W8UBS/100
WB8KZS/104

WD8NDB/100
K9HA/206
NS9AG/139
WB9TI/146
WB9UAC/102
WB9YV/101
WD9AS/105
K8CS/206
WB9AS/105
WB9UFL/108

Radiotelephone

DL8JUI/264
F7YAN/134
I4KET/100
I0DCI/101
I0YGV/114
JA7BAL/124
JH1BAN/173
JH3IEF/102
KA6TC/109

KH6DF/124
LU2AFH/270
PZ1BK/140
XE1XF/104
YV4BDB/121
ZL1AD/100
4Z4Z/106
5T5CJ/182
KA1BU/102

N1NA/103
W3FEA/202
WB3ABS/100
WB3FMQ/107
AK4E/113
K4IPN/233
KB4FH/105
KB4IF/118

WA4LTG/127
WA4RJR/103
WB4OGX/101
WB4ZIM/113
W5TKV/101
WB5LZG/118
K6YCM/121
KB6DJ/108

WA6GTU/103
WA6QUA/107
WA6SRJ/110
W7GLU/118
WB7CLU/100
WB8T/307
K9HA/203
K9W/184

NS9AGC/139
W9VA/152
W9ZT/106
WB9NOV/122
WB9YV/101
WD9CLO/110
WA9CZO/103
WB9MB/101

CW

HB9BNV/107
J11VLV/163
JR10IS/109
KZ5EK/102

OA8V/101
PY2KN/100
SM7CZC/110

DJ2BW/210
424MB/105
5T5CJ/116

AD1E/100
K2BZT/145
N2HA/100

K4OAH/104
W6PYV/101
K9W/101

W9VA/105
N0RR/147
W6SI/102

5BDXCC

DL7RT
K5OVC

DK8NG

UA2EC

UP2NV

WA7ZLC

UA9CBO

Endorsements

DJ1BV/260
DJ2MN/252
DJ5VQ/10
DJ5CR/250
DL7UR/220
EA4CR/290
EA8BK/244
EP2TW/310
EY7AN/244
I3EVK/322
IT9WGI/282
I5PUL/250
JA7JAA/243
OE1ZGA/312
OE3HGW/270
OK1AEH/203
OZ6JE/134
PA9WRR/145
PP5UG/317
PY2DFR/319
SM5AOB/300
SM0K/335
VE3CEF/148
VE3FZW/174
XE1FR/282
YV5BX/340
YV5BZ/334
ZE4LS/321
ZL1AD/154
ZS6YQ/336
9H4G/301

K1BW/315
K1CC/257
K1DP/160
K1HMC/204
K1KT/122
K1SA/231
K1UC/280
K1UJL/204
N1NA/129
W1AX/342
W1GDC/299
W1GG/300
W1HGA/320
W1VW/261
W1YV/295
WA1TX/141
WA1YAX/186
WB1DGD/160
AC2P/159
4F2L/120
K2MEY/252
N2JAJ/175
N2WS/168
W2AXZ/244
W2CC/281
W2FHY/220
W2KE/261
W2SM/271
W2SUA/307
WB2JZK/120

WB2LOF/241
WB25JG/164
NS6B/201
W3GE/330
W3GG/320
W3GJA/220
W3GY/325
W3KA/323
W3KWH/140
W3UJ/240
W3DSD/202
WA3HUP/320
AA4US/220
K4CG/266
K4DXO/306
K4KBL/242
K4R/269
K4OAH/144
K4RZ/250
KA4S/280
NA4UJ/254
NA4AS/10
N4RR/280
N4TX/270
N4XJ/320
N4ZJ/12
W4AVY/340
W4FLA/310
W4GTJ/325

W4HSJ/251
W4JVN/117
W4NGT/140
W4OCH/260
W4ORT/320
W4TJ/161
W4WG/316
W4XR/322
WA4DAN/141
WA4DUF/239
WA45KE/150
WA4VY/240
WA4ZEC/161
WB4FTU/146
WB4KZG/320
WB4PRU/161
WA4XJ/133
K5DEC/142
K5PR/140
K5SS/295
N5FG/279
N5OK/280
W5GE/L300
W5IB/200
W5JC/291
W5JJA/294
W5KJ/198
WB5ZG/P/120
K6ASJ/181

K6AOV/318
K6CBL/250
K6CLV/169
K6DT/325
K6EXO/321
K6UFT/309
K6UW/129
N6HR/130
N6VF/216
W6DN/294
W6MUS/204
W6NPY/241
W6OY/324
WA6CPR/120
WA6TOH/176
WA6YQW/160
WB6BPZ/133
WB6ZU/180
WB6ZUC/217
K7SB/180
K7SFN/206
W7CON/294
W7LLC/340
W7LR/251
W7QS/280
WA7ZL/C/250
K8JH/126
N8DE/239
N8II/189

W8GIO/274
W8KBZ/159
W8UW/212
W8BAHS/199
W8BOH/156
K9IUF/279
K9IW/121
K9KT/200
K9OXY/250
K9WC/139
N9ZN/329
W9CA/121
W9DA/326
W9TA/258
W9TJ/250
W9UO/255
WA9TVM/283
WB9BGJ/270
WB9CJW/141
K0GVB/301
K0GB/338
W0CPM/325
W0JIG/160
W0MHR/220
W0MYN/321
W0S/1215
W0V/338
WA0VKF/220
WB0SNG/140

Radiotelephone

DJ1BV/244
EA3KW/212
EA3SA/281
F5YU/311
F8RU/322
F9MD/326
G2BOZ/307
I2RGI/171
I3EVK/188
I5FLN/321
I8GS/219
I8PNM/211
JA1IBX/326
JA1MDC/304
JA1MCM/312
JA1UQP/321
JE1XRZ/140
JA2JW/326
JA3FD/201
JA3PUL/243
JA8ADQ/325
KH6BZ/258
KH6JEB/181
LU1BA/RS/292
OA8V/273
OE1ZGA/299

OE2EGL/325
OZ8RT/317
SM5AOB/281
SM8AEK/324
VE3FZW/153
VE7A/V/161
XE1CI/254
YS8AJE/201
YV5ANQ/322
ZL1AMN/281
ZL1AV/304
ZS6YQ/333
9H4G/301
K1KT/301
K1TO/151
K1UO/280
W1BH/320
W1ESN/272
W1FZ/333
W1HGA/320
W1TPK/239
W1YRC/296
WA1WMS/120
AC2P/159
K2BK/295
K2GM/321

K2LGI/278
W2CC/280
W2NCL/180
W2SM/159
W2SUA/305
W2BBDP/240
WA2EAN/303
WA2VEG/315
WB2RLK/VE1/264
K3MWW/230
N3GB/185
W3GE/306
W3IF/280
W3KA/226
W3MP/324
AA4CK/220
AA4M/141
AE4X/293
K4CG/235
K4DXO/299
K4FJ/321
K4LSP/305
K4VAA/121
K4XO/309
KA4D/250

N4MM/320
N4RA/293
N4XX/316
N4ZJ/168
W4AVY/310
W4BRE/325
W4JVN/127
W4MID/160
W4MNY/282
W45ME/132
W4TJ/163
WA4CZ/290
WA4DAN/120
WA4OIB/127
WA4ZEC/161
WB4KJZ/126
WB4TPU/223
K5DEC/142
K7GEX/248
K5GZ/260
K5OVG/319
N5FG/262
W5AQ/310
W5VJG/198
WA5IEV/324
WA5WMC/160

WB5CBJ/209
K6AQV/315
K6ASJ/179
K6CBL/125
K6DT/284
K6MA/301
K6EXO/316
W6GR/327
W6ILH/200
W6ISQ/326
W6KQ/260
W6MUS/200
W6QL/252
WA6CPR/220
WA6OET/294
WB6BPZ/130
K7FE/142
K7GEX/248
W7ELU/250
W7EPA/135
W7MS/199
WB7PTZ/152
K8IF/322
K8ONV/329
N8DE/137

N8II/150
W8ARH/326
W8CNL/315
W8CY/241
W8GIO/271
W8GMF/333
W8JTD/324
W8KS/327
W8PR/307
WD87AHS/168
W9DH/305
W9GU/296
W9HPS/331
W9LA/310
W9TA/250
W9TKD/325
W9ZRX/315
WB9BGJ/270
WB9DIX/158
WB9CJW/141
K0UC/250
W0BK/306
W0BN/308
W0MYN/321
W0SH/150

CW

CX4LO/164
DK5AD/160
DL3BK/164
HB9AL/O/140
I0DYB/132
JA1JRK/264

JA7JAA/178
JA7JT/140
OE1ZGA/211
OZ1LO/250
OZ1VY/259
SM5BHW/252

K1SA/175
N2JA/173
W2SM/135
W3GRS/216
W3ODJ/150
K4FJ/180

K4XO/243
N4MM/220
WA4DAN/140
WB4KZG/180
WB5UWF/120
K6AG/219

K6DT/207
WB6ZUC/219
W7LR/219
N8II/146
WB8T/200
W8UW/2178

WB2CQ/236
W9DH/140
W9DWO/245
W9TY/206
K0DEQ/141

DXCC HONOR ROLL

The DXCC Honor Roll is comprised of those call signs which have been credited with at least 310 countries of the 319 current countries on the DXCC List.

MIXED

319
 DJ2BW/356
 DL6EN/354
 DL9OH/350
 G3FKM/356
 G3HCT/350
 I0AMU/357
 K2FL/356
 K2LWR/353
 K6EC/353
 K6ZO/363
 K8DR/350
 K9ECE/348
 W1HX/359
 W2AGW/363
 W2BXA/363
 W2NU/355
 W2OKM/357
 W2QM/354
 W2TP/348
 WA2RAU/340
 WA2DIQ/346
 WA2RLQ/340
 W3GH/354
 W3GRS/351
 W3KT/362
 W4EX/363
 W4SSU/346
 W5MMK/360
 W6AM/364
 W6BZF/358
 W6EL/343
 W6ET/351
 W6KZL/356
 W6PT/356
 W6RT/356
 W6ZM/349
 W7MB/363
 W8AH/355
 W8BF/360
 W8GZ/362
 W8LKH/358
 W8OK/350
 W8PHZ/354
 W8RT/357
 W9DWW/352
 W9WQ/362
 W9WU/361
 W0MLY/360
 4X4DK/357

Radiotelephone

319
 DJ2BW/349
 DL6EN/352
 DL9OH/350
 I0AMU/357
 W1JF/345
 W2BXA/361
 W2TP/345
 WA2RAU/340
 W3GH/348
 W4EX/361
 W6AM/362
 W8AH/355
 W8BF/360
 W8GZ/362

318
 DL1JW/350
 K2BZT/355
 K2TQC/345

317
 DL1HH/346
 DL1KB/357
 DL7HU/346
 H5BMO/355
 I1ZL/349
 I1TZY/352

316
 DJ7ZG/337
 DL3RF/354
 DL7HZ/341
 G2BVN/354
 G3FBX/353
 G5VT/356
 G18VJ/351
 K1RQE/335
 K8OJH/340
 K4IKR/334
 K4KQ/354

315
 K4HEF/355
 LU9DAH/348
 Y5F5R/348
 W1A/350
 W2OKM/353
 W4UG/339
 W6EUF/335
 W9JF/336
 W9ZM/348
 W9CM/354
 XE1AE/346
 YV5ANF/342
 ZL1HY/360
 4X4DK/355

314
 DL1KB/346
 HB9TL/349
 I8AA/332
 I19AI/332
 DL7ZG/336
 DL7FT/336
 DL7HU/342
 F9RM/344

CW

292
 W9KNI/295

286
 K9MM/287

281
 K2TQC/281

279
 N4RJ/280

278
 K4YFQ/281
 K6GA/280

K4YLL/336
 W1DK/348
 K6J/357
 K8ONV/345
 LU4DMG/351
 OK1ADM/341
 ON4NC/356
 OQ3O/357
 O23Y/350
 P77Y/346
 W1JNM/351
 W1GK/361
 W2GJ/350
 W2GK/357
 W2QH/357
 W3AFM/349
 W3EVW/357
 W4AAV/357
 W4IF/347
 W4OCW/352
 W4QM/343
 W4VPD/353
 W5AQ/347
 W5QI/355
 W5KQ/359
 W5QKZ/343
 W6CH/354
 W6FF/349
 W6H/359
 W6ID/355
 W6RJ/340
 W7OF/352
 W8CUT/343
 W8ARH/340
 W8WJ/346
 W8ZCQ/351
 W8ZCH/345
 W9DY/349
 W9RCJ/349
 W9SFR/352
 XE1AE/346
 YV5ANF/342

317
 G3FKM/348
 G3IVJ/348
 I8KDB/348
 JA1BK/341
 K1IXG/342
 K4IKR/332
 K4YLL/333
 K6WR/341
 K6WCK/331
 W2FC/336
 W2ECC/335
 W3ADM/338
 W3DHM/348
 W4OCW/347
 W6RKP/344
 W7GN/341
 Z56LW/347

314
 DL1KB/346
 HB9TL/349
 I8AA/332
 I19AI/332
 JA1BN/328
 K5DA/345
 K6EC/330
 OK1ADM/333
 SM3BI/349

313
 CT1BH/324
 EA2HX/337
 EA4JL/328
 F3KMG/333
 I5WT/335
 JA1BN/328
 K5DA/345
 K6EC/330
 OK1ADM/333
 SM3BI/349

312
 DL8NU/328
 I6F/338
 I6YRK/329
 I0XJ/327
 I18J/328
 I19J/327
 I19PRK/327
 JA1JRK/325
 K5UC/349
 K6JG/328
 P17YS/342
 P74TK/344
 W2GKZ/333
 W2L/344

312
 DL1BO/349
 DL1CF/336
 DL3BK/345
 DL3OH/328
 G2BZO/351
 G13OCP/337
 I5ARS/337
 I0XJ/327
 I03PRK/327
 JA1ADN/339
 JA1DM/347
 JA1MCU/329
 JA1MIN/330
 JA2JW/343
 JA4Z/334
 JA8JL/328
 K2CL/328
 K2PXX/336
 K2UWU/343
 K3II/346
 K4MPE/332
 K9KA/327
 K9MM/327
 LU5A/344
 OH2QQ/345
 OZ1LO/330
 PY1HX/345
 UR2AR/342
 VE3WT/332
 W1PM/347
 W1WY/343
 W2AYJ/351
 W2CP/338
 W2GQN/333
 W2QK/336
 W3CGS/351
 W3PV/330
 W4BF/340
 W4ML/352
 W4WV/331
 W5LZ/330
 W5MMD/350
 W5TI/345
 W5TO/331
 W6AE/351
 W6CF/332
 W6EPZ/353
 W6HYG/344
 W7ADS/350
 W7CDS/342
 W8KPL/342
 W8PR/339
 W9BM/343

311
 W0NVZ/344
 YU2DX/328
 YV5AHR/334

310
 DJ7CX/331
 DK3PO/325
 HB9DX/337
 JA1HX/330
 K1YZW/328
 K2URP/332
 K3ZF/323
 K4F/333
 K6RN/339
 K6ZM/335
 K8IF/325
 K9GM/324
 KP4RK/340
 N4MM/326
 N4XO/337
 ON4UN/326
 OZ6M/325
 PA0FX/350
 PY2BK/331
 PY4AP/328
 VE3GMT/325
 VE3HD/345
 W1AZY/343
 W1RLQ/338
 W2DXX/336
 W2HO/346
 W2SAW/347
 W2UE/346
 WB2HXD/331
 W4UW/325
 W4BA/347
 W4BRE/328
 W4YN/332
 WA4FDR/324
 W5HDS/346
 W6BS/347
 W6NJU/344
 W7JFO/325
 W7LFA/325
 W8YA/323
 WB8EUN/323
 W9DC/333
 W9HJ/340
 W9KNI/336
 W9ZRX/324
 W0AUB/338
 W0KF/346
 W0AI/348
 W0QA/326
 YV5BBU/329
 ZL1AV/327

310
 DL1JW/330
 EA8JL/325
 G3TJW/322
 I2AT/327
 I5DJ/333
 I0LLZ/325
 JA1MIN/328
 JA2AAQ/326
 JA4ZA/330

310
 W1FXD/326
 W2HTU/346
 W2YU/337
 W3RX/326
 W4DPS/325
 W4LWX/342
 W5GJ/340
 W6CH/343
 W7ADS/345
 W8ZD/337
 W9WHM/348
 W9WU/338
 W0GKL/344
 W0AI/348
 W0QA/326
 YV5BBU/329
 Z2ERR/352

310
 DL1JW/330
 EA8JL/325
 G3TJW/322
 I2AT/327
 I5DJ/333
 I0LLZ/325
 JA1MIN/328
 JA2AAQ/326
 JA4ZA/330

310
 K9AB/325
 K9MM/327
 KV4FZ/323
 W3RX/326
 ON4UN/326
 PY3CB/325
 VE3GMT/325
 W1CU/326
 WA3ATP/325
 W6AUR/325
 W6CCB/322
 W6UDC/324
 W7JFO/325
 W7LFA/325
 W8AJR/331
 W9ZV/328
 W0GJ/336
 W0QA/326
 YV5AHR/334



I would like to get in touch with . . .
 I hams younger than 20 in the Texas-Oklahoma-Arkansas-Louisiana area interested in forming a net.

Send a s.a.s.c. to Steve Genusa, WD5EAE, 2106 Park Ave., Monroe, LA 71201.
 I those interested in starting a teen net. Jim Stanley, WD9CIS, 649 Monroe Ave., Evansville, IN 47713.
 I hams who are yachting enthusiasts, and Amateur Radio clubs which operate from yacht clubs. Hal Metter, W2DHH, Knickerbocker ARC, Knickerbocker Yacht Club, 433 Main St., Port Washington, NY 11050.

I hams interested in circular full wave loop antennas on 15 and 20 meters. Contact I. W. Kennicott, W4OVO, 468 Colonial Dr., Lexington, TN 38351.
 QST congratulates . . .
 I Steve Nissen, WD4ITK, a junior at Ed White High School in Jacksonville, FL, who has been inducted into the National Honor Society. (HR Report)

Coming Conventions

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

July 27-29
Oklahoma State, Oklahoma City, OK

August 4-5
Arkansas State, Little Rock, AR

August 11-12
Pacific Division, Reno, NV

ARRL NATIONAL CONVENTIONS

July 20-22, 1979
Baton Rouge, LA

July 25-27, 1980
Seattle, WA

March 13-15, 1981
Orlando, FL

WISCONSIN STATE CONVENTION

May 19, 1979, Lake Delton, WI

This is the ninth annual festive shindig being held under auspices of the Yellow Thunder Amateur Radio Club, Inc. Those attending will enjoy continuous computer displays with at least six different ones on display, the very latest in 2-meter DF gear, ARRL forum with an ARRL speaker, ARPSC forum, a practical 2-meter fm regenerative RTTY repeater, Ladies' Contest, ladies' activities all afternoon, big banquet at 6 P.M. featuring music by an all-time "Ham Band," short speeches, and many prizes. Early bird deadline May 1. Registration (including banquet) \$7.95 in advance; \$8.45 at door. Registration only (no banquet) \$1.50 advance; \$2 at door. Send to Ken Fbnetter, K9EN, 822 Wauona Tr., Portage WI 53901; 608-742-3560. Make checks payable to the club. Registration starts at 9; meetings begin at 11. A most enjoyable day, you'll agree!

ALABAMA STATE CONVENTION

May 19-20, 1979, Birmingham, AL

The Birmingham Amateur Radio Club announces the Alabama State Convention and BIRMINGHAMFEST '79, on May 19 and 20, 1979. The FEST will once again be held at the beautiful and spacious Birmingham-Jefferson Civic Center Exhibition Hall, which features thousands of feet of exhibit space, comfortable meeting rooms, and plenty of free parking nearby. Many of the exhibitors who filled more than 120 booths at last year's BIRMING-

HAMFEST will be back, including most major manufacturers and distributors. There will be even more room than last year at the huge indoor flea market, along with a full slate of meetings, forums and activities. Prizes will be offered. Plans are being made to offer on-site FCC exams Saturday morning.

The real highlight this year will be the Saturday night banquet, featuring nationally known comedian and Grand Ole Opry member Jerry Clower.

Banquet tickets will be available in advance, by mail, while they last. For more information, write to BIRMINGHAMFEST '79, P. O. Box 603, Birmingham, AL 35201.

NEW YORK STATE CONVENTION

May 25-27, 1979, Rochester, NY

The ARRL New York State Convention and 46th annual Rochester Hamfest will be held the weekend of May 25-27 at the Monroe County Fairgrounds near Rochester, NY. Activities begin on Friday at the Rochester Marriott Inn where club groups, manufacturers, distributors and publishers will have open-house suites.

The huge outdoor flea market at the fairgrounds will begin at noon Friday and run continuously through Sunday. The indoor flea market will open at 7 A.M. Saturday, close at 5:30 P.M. and reopen Sunday morning. The fairgrounds Dome Center (where commercial exhibits and most programming are located) will open at 8:30 A.M. Saturday. FCC tests for Technician and higher classes will begin at 8:30 A.M. Saturday at the fairgrounds. A completed FCC form 610 should be sent to FCC, 601 Market St., Philadelphia, PA 19106 to arrive not later than May 18. It *must* be marked on Item 19 "for examination at Rochester Hamfest." FCC will send confirmations and exam times.

A child care center near the fairgrounds will be open for those with youngsters. A modest fee will be charged.

Ladies activities begin at the hotel at 1 P.M. Saturday. Buses will operate between the fairgrounds, the Marriott and Eastview Mall, where the ladies can shop in Rochester's largest indoor mall.

All activities return to the Marriott Saturday evening where the annual awards banquet will be held. Advance registration (which closes May 18) is \$3.75; at the gate, \$4. Children under 12 free. Banquet tickets are \$9.50 each. All who attend the banquet, flea markets and ladies activities *must* hold a registration ticket. Unlimited outdoor flea market space is available at \$1 per parking space. Indoor flea market space is \$5 per table, per day. Some camper hookups are available free on a first-come, first-served basis.

Ticket orders: Rochester Hamfest -- Tickets, 737 Latta Rd., Rochester, NY 14612. Information: Rochester Hamfest, P. O. Box 1388, Rochester, NY 14603. Phone 716-424-1100 (business hours) for more information.

TENNESSEE SECTION CONVENTION

Knoxville, TN, May 26-27, 1979

The greatly expanded 1979 Tennessee Section Convention/Greater Knoxville Hamfest runs Memorial Day weekend, May 26-27, in the Jacob Building at Knoxville's Chilhowee Park.

Features include an indoor tailgate fleamarket and a large number of dealer, organization and manufacturer booths. Admission is \$2.

There will be forums on ARRL, MARS, satellite communication, emergency preparedness and others. Additional events include a cw contest and the Wouff Hong initiation. FCC exams will be administered at 8 A.M. Saturday, with help from Knoxville's 01/61 Repeater Group which will provide talk-in to the exam site on 01/61.

Chilhowee Park is the home of Knoxville's world-famous zoo and amusement park. Talk-in frequencies are 13/73 and 3980. For information contact Ed Dunn, W4NZW, or Ray Adams, N4BAQ, at P. O. Box 6333, Knoxville 37914 or call evenings 615-584-2455.

Hamfest Calendar

California: The Fresno ARC will hold its 37th annual hamfest May 11-13 at the Sheraton Inn of Fresno, Clinton at Highway 99. Activities include technical talks, transmitter hunt on 2 meters (146.52), prizes, prime rib banquet, ARRL-FCC forum. Full registration is \$19. Talk-in on 34/94. More info from Fresno ARC, P. O. Box 783, Dept. HF, Fresno, CA 93712.

California: The Lockheed Employees Recreation Club ARC's 14th annual hamfest is May 19 and 20 at the LERC facility in Burbank. For details, contact the LERC ARC, 2814 Empire Ave., Burbank, CA 91504, or call 213-842-1863.

Connecticut: A flea market and hamfest will be sponsored by the Norwalk Area ARC on May 20 at the Old Norwalk High School, East Ave., Norwalk. Prizes, exhibits, refreshments planned. All buyers and sellers welcome, talk-in on 39/99 and 52. Contact Dr. Eugene Herman, N1AEX, 520 West Ave., Norwalk, CT 06852.

Florida: The Daytona Beach ARA's Family Funfest will be May 12 and 13 at the Holiday Inn Surtside in Daytona Beach. Registration is \$3 per family in advance to \$3.50 at the door. Rooms available. Commercial exhibits and electronic flea market. Write to Daytona Beach Family Funfest, Dave Rusler, WA4ZFT, 1725 Hope Dr., Ormond Beach, FL 32074.

Illinois: The Starved Rock Radio Club hamfest is June 3 at the Bureau County Fairgrounds in Princeton. Advance registration \$1.50, \$2 at the gate. Send s.a.s.c. to W9MKS-WR9AFG, Starved Rock Radio Club, RFD 1, Box 171, Oglesby, IL 61384.

Indiana: The annual hamfest of the Madison County ARC will be from 8 to 3:30 on June 3 at the U.A.W. no. 662 Union Hall, 109 Bypass and Hillcrest Dr., Anderson. Talk-in on 22/82 or 52. For more info, contact the Madison County ARC, 703 Milton Ave., Anderson, IN 46012.

Indiana: The Tri-State ARS will hold its annual hamfest on May 20 at the Vanderburgh 4-H Rural Center in Evansville. No admission charge. Bingo, prizes and food available. Talk-in 75/15. Details from Mort Silverman, W9GJ, Vice President, Tri-State ARS, 1121 Bonnie View Dr., Evansville, IN 47711.

Indiana: Wabash County Amateur Radio Club's 11th annual hamfest, May 13, 1979, at Wabash County 4-H Fairgrounds, Wabash. Write (with s.a.s.c.) WD9BDZ, 555 Valley Brook Ln., Wabash, IN 46992.

Kansas: The Central Kansas ARC will hold a hamfest on June 2 and 3 at the Hilton Inn in Salina. FCC exams, flea market on June 2, ARRL forum on June 3. Registration is \$2.50. For details, write to the Central Kansas ARC, 1924 Page, Salina, KS 67401 or call John Shoultys Jr., WB0BNC, at 913-823-6624.

Kentucky: The Northern Kentucky ARC hamfest is May 20 at the Boone County Fairgrounds in Burlington, 10 miles south of Cincinnati, OH. Tickets cost \$3. Contact NKARC, Box 31, Ft. Mitchell, KY 41017.

Maine: A tailgate flea market will be cosponsored by the Portland Amateur Wireless Assn. and the University of Southern Maine Radio Club from 9 to 5 on the USM campus. Cost \$1, food available. Talk-in on 73 and 52. Write to John Taylor, 44 Milton St., Portland, ME 14102 or call 207-773-2651.

***Maryland:** The fifth annual Eastern ARS hamfest is from 10 to 4, May 20, at the Easton Senior High School cafeteria. \$2 donation, additional \$2 for tables or tailgaters. Talk-in on 52 simplex and 445/045. Contact Charles C. Walgren, WA3ZWX, Box 7, Trappe, MD 21673, or Easton ARS, Box 781, Easton, MD 21601.

Maryland: The Maryland Mobile ARC will hold its hamfest on May 20 at Camp Barrett, Crownsville, just west of Annapolis. Prizes available, tickets \$3. Talk-in on 52 and 10/70. For information, contact NMAARC, P. O. Box 784, Severna Park, MD 21146.

Maryland: The Potomac Area VHF Society will hold its eighth annual hamfest from 8 to 5 on May 6 at the Howard County Fairgrounds, 15 miles west of Baltimore on I-70. The \$3 fee includes flea market or tailgate sales. Catered food and drinks, unlimited parking. Talk-in on 52. For details, contact Paul Rose, WA3NZL, 25116 Oak Dr., Damascus, MD 20750.

Massachusetts: The Eastern Connecticut ARA will sponsor an electronics flea market and hamfest from 9 to 6 on May 20 at Point Breeze Restaurant in Webster. Auction at 1 P.M. Contact Richard Spahl, K1SY1, Lane Parkway, Webster, MA 01570, or call 617-943-4420 after 8 P.M.

Massachusetts: An auction will be sponsored by the South Shore ARC from 2 to 6 on June 3 at the Viking Club, 410 Quincy Ave., Braintree. A flea market is scheduled for the Viking Club parking lot from 10 to 2. \$3 for space and own tables. Write to Kristen Johnson, K1WQ, 86 Alton Rd., Quincy, MA 02169.

Michigan: The ARROW Repeater Assn.'s annual swap and shop is May 13 at the Saline, Michigan, Fairgrounds. Indoor tables, covered area for trunk sales, prizes, \$1.50 in advance, \$2 at the door. Wives admitted free for Mother's Day. Talk-in on 37/97, 223.18/224.78 and 448.5/443.5. Additional details from ARROW, P. O. Box 1572, Ann Arbor, MI 48106, or call George Raub, AD8X, 313-485-3562.

Michigan: The Chelsea swap and shop will be held June 3 at the Chelsea Fairgrounds. Cost \$1.50 in advance, \$2 at the gate. Under 12 and nonham spouses admitted free. Talk-in on 52 and 37/97. Proceeds to benefit the Dexter High School Radio Club and the Chelsea Communications Club. Details from Reg Smith, Dexter High School, 2615 Baker Rd., Dexter, MI 48130.

Michigan: The Wexaukec ARA will hold their 19th annual swap and shop on May 19 from 9 to 4 at the Michigan National Guard Armory, 415 Haynes St., Cadillac. Free parking, lunch available. Cost \$2. Talk-in on 37/97. For more info, write to the Wexaukec ARA, Cadillac, MI 49601.

Minnesota: The Wrenhead Radio Amateur Club's annual swapfest is May 5 from 11 to 3 at the First United Methodist Church, 230 E. Skyline Parkway, Duluth. Admission \$1.50, refreshments available. Auction at 2, talk-in on 34/94. Contact Harold Simmerman, N9AMA, Rte. 1, Box 7, Lake Nebagamon, WI 54849, or call 715-374-3231.

Minnesota: The North Area Repeater Assn. will sponsor the division's largest swapfest and exposition on June 2 at the Minnesota State Fairgrounds in St. Paul. Free overnight parking for self-contained campers on June 1. Talk-in on 16/76 and 52. Exhibits, booths and prizes. Admission \$2. For info or reservations, write Amateur Fair, P. O. Box 30054, St. Paul, MN 55175.

Nebraska: The 25th annual Pine Ridge ARC hamfest will be held June 2 and 3 at the Park View Trailer Park at Chadron State Park. The program includes technical info, contests and prizes. Overnight camping available. Nominal registration fee. Talk-in on 16/76. For details, contact Lynn Bilyeu, 406 Henkens Dr., Chadron, NE 69337, or call 308-432-2297.

New Jersey: The Tri-County Radio Assn.'s annual flea market and hamfest is May 20 at the Stirling Youth Center in Stirling. For details, contact the TCRA, George A. Diehl, W2IHA, 20 Wilson Ave., Charham, NJ 07928.

***New York:** The Long Island Mobile ARC hamfest is from 9 to 4 on June 3 at the Ishp Speedway. Take the Southern State Parkway to exit 43 (Rte. 111). \$1.50 admission, \$3 per space. Talk-in 25/85 or 52. Door prizes, special events. Contact Henry Wener, WB2ALW, 53 Sheppard St., East Hills, NY 11577 or call 516-829-5880 during the day or 516-484-4323 nights.

New York: The Mobile Amateur Radio Awards Club will co-host the MARAC/ICHN (county hunters) convention May 4 to 6 in Albany. Admission is open to all MARAC/ICHN members. Contact Jerome F. Walsh, WA2LSU, RFD 1, Box 197B, Hudson, NY 12534.

***North Carolina:** The Durham FM Assn. will hold

its annual Durhamfest May 19 and 20 at the South Square Mall in Durham. Covered flea market, no sellers' fee, prizes, demonstrations, seminars, bingo. \$3 general registration. Unlicensed XYLS get in free. Talk-in on 825/225, 34/94 and 222.34/3.94. For more info, write DFMA, Box 8651, Durham, NC 27707.

North Dakota: The Goose River Amateur Club will hold their annual picnic-swapfest June 3 at the Mayville State Park. Auction and bake sale planned. Talk-in on 31/91 and 94. For details, contact Mary Carlson, WA0CSL, RFD 2, Box 8, Hatton, ND 58240.

Ontario: The Central Ontario Amateur Radio flea market will be held from 8 to 4 on June 9 at the Centennial Arena, College Ave. West, Guelph. Large outside and indoor flea market; commercial and equipment displays are planned. Write to Harold Smoikin, VE3IZQ, 211 Elmora Dr., Acton, ON L7J 1T7 or call 519-853-1531.

Pennsylvania: The 25th annual Breeze Shooters' hamfest is May 20 from noon to 5 at the White Swan Park, on Rte. 60 (Parkway West) near the Greater Pittsburgh International Airport. Flea market, prizes, contests. Registration at gate only, \$2 or three for \$5. Talk-in on 28/88 and 29. Undercover tables by advanced registration only. Contact Rick Evanuk, WA3LUM, 311 Evergreen Ave., Pittsburgh, PA 15209.

Pennsylvania: The fifth annual Crawford ARS Northwestern Pennsylvania hamfest is June 9 at the Crawford County Fairgrounds. Details from Brian Teasdale, WA3ZBY, P. O. Box 653, Meadville, PA 16335.

Pennsylvania: The Milton ARC's eighth annual hamfest is from 8 to 5 on June 3 at the Allenwood Firemen's Fairgrounds. Take Rte. 15, four miles north of I-80. Sellers pay \$2.50 in advance, \$3 at the door. XYLS and children free. Portable and mobile fm clinic, prizes, food. Talk-in 37/97, 34/94 and 52. For details, contact Kenneth Hering, WA3HJ, RD 1, Box 383, Allenwood, PA 17810, or call 717-538-9168.

Pennsylvania: The annual Reading Radio Club hamfest will be held May 27 at the Hamburg Field House in Hamburg. Door prizes, food, tailgate sales. Dealer space available. Talk-in 31/91 and 52. For more info, write the Reading Radio Club, Hamfest Committee, P. O. Box 124, Reading, PA 19603.

South Carolina: The Columbia Amateur Club hamfest is from 9 to 5 on May 12 and 13 at the National Guard Armory, Bluff Rd., Columbia. FCC walk-in exam at 9 A.M. on May 12. Free flea market tables, prizes include a Caribbean weekend vacation. Talk-in 34/94. Tickets are \$3.50 in advance, \$4 at the door. Write to P. O. Box 5802, Columbia, SC 29250.

Tennessee: The Humboldt ARC will hold its annual hamfest May 20 at Shady Acres City Park in Trenton. Flea market, ladies' activities, food and prizes. For details, contact Ed Holmes, W4IGW, 501 N. 18th Ave., Humboldt, TN 38343.

***Virginia:** The Ole Virginia Hams ARC's annual hamfest is June 3 at the Prince William County Fairgrounds, 1.2 mile south of Manassas on Rte. 234. Admission \$3, tailgating \$2 per vehicle. Food, prizes, fm clinic, YL program. Write to OVHARC, P. O. Box 1255, Manassas, VA 22110. Attn. Sam Lebowich, WB4HAV.

Virginia: The Roanoke Valley ARC will sponsor its hamfest May 27 at the American Legion Building, Apperson Dr., Salem. Tickets \$2 or three for \$5 in advance, \$2.50 at the door. Inside tables \$3, tailgaters pay \$2. Talk-in on 88, 985 and 52. For tickets, send s.a.s.e. to George Moore, WA4GFX, 701 Apperson Dr., Salem, VA 24153.

Washington: The Central Washington hamfest, sponsored by the Apple City ARC, is June 2 and 3 at the Rocky Reach Dam, seven miles north of Wenatchee on Highway 97. Variety of exhibits, tours, films, craft sale, prizes. Talk-in on 76, 07/67 and 69/09. Tickets are \$3 for hams, \$1 for others, under 12 free. For more info, contact the Apple City ARC, 713 Grandview Ave., Wenatchee, WA 98801.


***Washington:** Clark County ARC's Fort Vancouver hamfest is May 12 and 13 at the Clark County Fairgrounds, seven miles north of Vancouver. Activities to include contests, seminars, displays. Cost \$4, catered dinner is \$5. Contact Ken Westby, W7DYX, 606 Miami Ct., Vancouver, WA 98664.

West Virginia: The 17th annual Tri-State ARA hamfest begins at 10 A.M., June 3, at the Camden Amusement Park in West Huntington. Prizes, exhibits, displays. Covered space available for dealers. Talk-in on 34/94 or 16/76. FCC exams June 2. For details, write to TARA, P. O. Box 1295, Huntington, WV 25715.

Wisconsin: The Central Wisconsin Radio Amateurs' second annual swapfest is June 3 at Bukolt Park in Stevens Point. Picnic area, refreshments,

equipment sales, prizes. Contact CWRA, 1632 Ellis St., Stevens Point, WI 54481.

Wisconsin: The Milwaukee RAC's annual auction of amateur equipment is 7:30 P.M., May 17, at the Club Meeting Hall, 7500 W. State St., Wauwatosa. No admission or sales charge. No flea market dealers. Please tag all gear to be sold with name and minimum opening bid. Write to H. Charles Kactel, N50 W16328 Pin Oak Ct., Menomonee Falls, WI 53051.

Wisconsin: The second annual spring swapfest of the Milwaukee UHF Society will be held May 13 at the County Expo Center in Waukesha. Advanced tickets \$1.50, at the gate, \$2. Send s.a.s.e. to Swapfest, Box 49, North Prairie, WI 53153. 

*ARRL Hamfest

Strays



What has two wheels, goes nowhere at an average speed of 20 mph, and copies cw at 35 wpm? W4BEB on his cw cycle. Tom Todd, Sr., of Tuscaloosa, AL, has installed an old Mill no. 3 Underwood Upright, all caps and no shift, between the handlebars of his exercise bicycle. Now Tom can work out while he works in his shack at his life-long love, copying cw. (photo by KA4DXS)

I would like to get in touch with . . .

former radio operators on board any of the Liberty ships, especially the S.S. *Jeremiah O'Brien*. Contact the National Liberty Ship Memorial, 215 Market St., Suite 532-533, San Francisco, CA 94105.

General license amateurs to help start a Novice class at Howard University. Write to Jesse Alexander III, WB2IFS, Meridian Hill Hall, 2601 16th St. N.W., Rm. 575A, Washington, DC 20009.

amateurs who were in the original Royal Order of Hootnaws wishing to reactivate their membership. Submit name, call, mailing address, ROHO number and one-time \$1 fee to WB5SND, 6821 West Ave., San Antonio, TX 78213.

hams in the U.S. and Canada who speak Italian and are interested in forming a club. Contact Silvio Bianco, WA3YOB, 3821 Morrow Dr., Cornwells Hts., PA 19020.

Franco-American hams in the New England area for Sunday afternoon ragchew in French on 75 meters. Contact Henri Chapdelaine, W1ZPA, 180 Oakland Ave., Manchester, NH 03103.

other Explorer posts majoring in Amateur Radio. Contact Explorer Post 599, Brad Brannon, WD4CYR, President, 2205 Longbrook Dr., Greensboro, NC 27406.

Silent Keys

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

WA1CRL, William H. Winn, Lee, MA
 W1DIU, Sebastian Gahn, Hull, MA
 W1DZL, Arthur J. Penney, Malden, MA
 W1EP7, James W. Cook, Waltham, MA
 EX-W1G1J, Leon W. Batchelder, Concord, NH
 K1JMK, Anthony S. Brazauskas, Athol, MA
 W1ROX, Robert W. Wicke, Newton, CT
 K1WD, Joseph R. Beckman, Hudson, NH
 KA2BUM, Peter J. Farma, Schenectady, NY
 K2EHX, Dr. David Eichen, Rochester, NY
 K2HHZ, Roger C. McKean, Jackson, NJ
 W2JUV, Edward Wozniak, Lewiston, NY
 WB2JW1, Harry R. Weisman, Tottenville, NY
 WR2VBM, John A. Hilbert, Sr., Southampton, NY
 W2VRB, Frank J. Hollister, Glen Head, NY
 WA3AEP, Michael S. Tenner, Broomall, PA
 WB3AII, Ronald B. Ashman, Freeland, PA
 WA3BAQ, Francis J. Kohler, Warminster, PA
 WB3BMZ, Stanley Bredbenner, Forest City, PA
 *W3CO, Alfred S. Hayes, Ashton, MD
 K3MMN, Ralph DeCecco, McKeesport, PA
 WA3MXN, Charles W. Pfeifer, Baltimore, MD
 WA3ZKY, Edward A. Morris, Upper Marlboro, MD
 K4AEL, Stuart M. Zuckerman, Decatur, GA
 KA4AGK, Albert M. Yoss, St. James City, FL
 KA4AQJ, Raymond H. Shell, Athens, TN
 K4ARF, Roy R. Williams, Thomson, GA
 WD4BJU, Merlin A. Doyen, New Port Richey, FL
 WB4BMA, John D. Blanton, Huntsville, AL
 W4DEX, John R. Lomax, Sr., Miami, FL
 W4DYO, Norman F. Moore, Bethel, NC
 W4EJM, Dr. Richard L. Burt, Clemmons, NC
 WA4FRW, Arthur G. McCabe, Mobile, AL
 W4JNS, Colin E. Ambrose, Madison, AL
 W4JO, Frank J. Orcutt, Miami, FL
 WA4LKA, George H. Closs, Stuart, FL
 W4OTD, James "Hawk" Stoulenmire, Canulla, GA
 W4TGO, Edward S. Greene, Germantown, TN

W4UCC, R. A. Carden, Forest Park, GA
 WA4WIR, Jack Waterman, Birmingham, AL
 W4WM, Herbert K. Armistead, Atlanta, GA
 WB4YFP, Andrew J. Shugart, Chester, SC
 K4ZQS, Ernest E. Winter, Daphne, AL
 W5ANA, Jesse N. Roberts, Jr., Slidell, LA
 K5BH, Howard B. Shaw, Jr., St. Louis, MS
 W5BS, Benjamin C. Sale, Jr., River Ridge, LA
 W5CJP, Charles Corha, Shawnee, OK
 W5DET, William B. Teitzel, Enid, OK
 W5FJN, Donald B. McGee, Houston, TX
 *K5HXR, James K. Freeman, Houston, TX
 W5KW, H. Frank Gregory, Tulsa, OK
 W5LNG, Jack O. Wilson, Espanola, NM
 W5NTG, George R. Faulkner, Tularosa, NM
 W5RXT, Carl E. Croston, Mt. Pleasant, TX
 W5SHO, Joe Kenneth Ryden, Norman, OK
 W5SR, Sidney A. Rovira, New Orleans, LA
 W5WGD, James Culver, Texas, TX
 WD6ABL, William J. Lindsey, Oceanide, CA
 WB6BHR, Nellie C. Lara, Aptos, CA
 WA6BUR, Roseco Putnam, Antioch, CA
 W6LJ, Cyril H. Kreighbaum, Sherman Oaks, CA
 WB6KHT, Matthew J. Lotysh, Dixon, CA
 W6RNI, Harry H. Plumeau, Santa Barbara, CA
 WB6SIA, Chadwick C. Walter, Fresno, CA
 WB6WHU, Augustino H. Gray, Santa Barbara, CA
 WA7ACU, Jack G. Edwards, Camano Island, WA
 W7COX, Francis I. Viers, Vashon, WA
 W7DKN, Charles D. Lewis, Green Valley, AZ
 W7KAK, Kenneth W. Myers, Sun City, AZ
 W7MMC, Dr. Edward V. Fortmiller, Salem, OR
 WA7MX1, Renard P. Stasi, Portland, OR
 W7PI, Arthur Henning, Seattle, WA
 K7UJ, Fred G. Frohese, Ft. Angeles, WA
 W7WPN, James R. Tweedy, Apache Junction, AZ
 W8CLH, Mae Keller K. Graham, Birmingham, MI
 W8DS, Earl S. Nelson, Richmond Heights, OH
 *W8DV, Charles C. Miller, Dayton, OH
 W8FU, Laurance W. Kianne, Frankfort, MI

W6HWH/W8BHD, Robert E. Winn, Millersburg, MI
 WA8POB, Fred W. Bachr, Grand Blanc, MI
 WA8QFQ, Merden L. Kain, Cincinnati, OH
 WB8TUY, Howard M. Sayre, Gallon, OH
 WB8UO, Henry Lipsy, Rocky River, OH
 WA8UKO, Ortha C. Gunton, Weirton, WV
 W8UX, Willis H. Hinman, Kettering, OH
 WA9EBB, Orville Neathery, Rochester, IN
 WD9GRJ, Richard E. Ives, Fikhorn, WI
 W0AS, George R. Scriener, Topeka, KS
 W0CE, James D. Moffat III, Clayton, MO
 W0DI A, Marion H. Gordon, Storm Lake, IA
 W0ID, Faun S. Fritts, Lincoln, NE
 W0IPX, Harry E. Nodder, Minneapolis, MN
 W0IBD, William N. Campbell, Colorado Springs, CO
 WB0LHM, Donald J. Massey, Clarion, IA
 WA0VJI, Sister Mary H. Fherwean, Leavenworth, KS
 KH6GGS, Capt. Wynand E. Vithoen, Kona, HI
 *VE1APM, Ralph L. Whiteley, Moncton, NB
 VE1MH, Merrill Young, Sackville, NB
 VE1OM, Douglas C. Johnson, Halifax, NS
 VE1RE, William J. Luker, Florence, NS
 VE1U, Thomas J. Dubcet, Weymouth, NS
 VE1WT, J. Donald B. Comeau, Moncton, NB
 VE2AFN, Ephrem Turgeon, Rouville, PQ
 VE3BL, Henry B. Liddle, Belleville, ON
 VE3EBS, Edna M. Lowe, Toronto, ON
 VE3ENV, James A. Conway, Hamilton, ON
 VE3EXN, William H. Everest, Newmarket, ON
 VE4EU, James D. Andrew, Rosburn, MB
 VE5YF, Madolyn E. Sinclair, Prince Albert, SK
 VE7DDM, K. L. Joe, Victoria, BC
 VE7MP, P. R. McAnany, Langley, BC
 FO8AQ, Raymond Narua, Mahina, Tahiti
 VK2AP, V. P. Reynolds, Blackheath, Australia
 VK2OI, Noel E. Arnold, Albany, Australia
 ZS4H, Daniel G. Malan, Kimberley, South Africa
 Z4ERR, E. R. "Robbie" Robson, Nairobi, Kenya

*Life Member, ARRL

Club Notes

One month left until Field Day. Is your club ready? At this writing, it is February and clubs are already preparing for the big yearly event. Will it be a fun, family happening or a serious, all-out, point-chasing effort? Your members must decide this before any detailed preparations can take place. Set a goal to work toward. Do you want to top last year's club score? Another objective is to involve every club member, or get PR. How about challenging the club in the next county, introducing the Novices to a neat weekend of camaraderie, or trying a category the club's never tackled. Once the decisions are made and a FD chairperson voted on, the work begins.

For starters, Heart of Texas ARC FD officials hand out a checklist to members. The sheet covers equipment members can furnish, including lamps, coffee makers and any other essentials. The last section concerns what hours members can work: set-up, operating or take down. Want a copy? Send an s.a.s.e. Early tasks to remember include site preparation and security, publicity, and power and lighting (grounding and safety, too).

North Florida ARS prints a rundown in their newsletter of the members' decisions concerning FD. Such questions as, "Do I bring my own food?" and "How will the antennas be supported?" are summarized so everyone will remember when the time comes. A copy is available from us for an s.a.s.e.

Once the planning is complete, the major effort should go toward "psyching up" the members. Funny reports for each meeting and club bulletin before FD ought to motivate everyone. Ideas: a comical rendition of the rules, a countdown of the days left before FD, recounting humorous episodes from past Field Days, or quotes such as the following by a Larkfield (NY) ARC member: "We need your help. Modesty about us speed or claims of speech defects do not count."

Planning for Murphy is almost impossible; but clubs often ready a table with soldering gun, solder and other necessities for making minor repairs. The best Murphy medicine is to remember past FD foibles and do as much as possible to keep them from happening this year. Or is that a paradox?! Happy Field Day. — *Rosalie White, WA1STO*

Strays



A proud moment at ARRL headquarters as Rich Zwirko, K1HTV, AMSAT vice president of Operations (left), and a member of the AMSAT Board of Directors, receives the first New England Satellite WAS certificate no. 36. The presentation was made by Bernie Glassmeyer, W9KDR, OSCAR 8 Operations Manager from the Club and Training Department. Rich is chief engineer of radio station WTIC in Hartford, CT, and an active member of the Connecticut Wireless Association. The "box of electronics" hanging in the background is one of the two working OSCAR backup satellites. The other backup is on display at the Smithsonian's National Air and Space Museum in Washington, DC. (WB1ADL photo)

RELIEF FUND ESTABLISHED

While in the hospital, Dave Johnson, W9JFP/W9UISA, was informed that his house and all his possessions had been destroyed by fire. Donations can be sent to Mount Sinai Baptist Church, 2401 Argonne Dr., North Chicago, IL 60064. Alt: Dave Johnson, W9JFP Fund.

ON-THE-AIR LESSONS

Amateurs interested in upgrading their licenses should tune in to 3.965 MHz, from 7 to 8 A.M. (PST), Monday through Friday for the Amateur Radio License Study Group. The course has been taught by Lou Cartwright, K6SQ, for the last eight years.

EXHIBIT PLANNED

The Albany (NY) Amateur Radio Association will sponsor an exhibit station at the Colonial Center Shopping Center in Colonie, NY, from May 31 to June 3. The station will be operated under the club call, K2CT. Tentative operating frequencies are 3.735, 7.125, 7.250, 14.300 and 28.700 MHz.

QST congratulates . . .

James Abercrombie, N4JA (ex-K4BMS), who has been named group chief engineer for the Beasley Broadcast Group in Augusta, GA. Abercrombie will be responsible for technical operations of the BHG's 12 radio outlets.

Bob Jensen, W6VQG and Rosemary Wilts, KYL of Archie, W6LPI, who were presented special awards by the San Fernando Valley (CA) Radio Club for their public relations work for Amateur Radio and the club in 1978.

The Not-Ready-For-Prime-Time Traffic Handlers

Live from Newington! Nobody's perfect; that's true. But Amateur Radio operators take pride in being *good* operators, so we should learn from our mistakes. Traffic handling, in particular, requires a certain amount of savvy and thought. Indeed, it's a lot more fun (and easier) when things go smoothly. Errors are human, but when they become the rule rather than the exception, it's cause for concern. The chronic cases, referred to as the Not-Ready-For-Prime-Time Traffic Handlers, are easily spotted. Tune around the band; you'll find their "accomplishments" falling into three categories as indicated below. Just listen for the ham who:

(Message Handling Method)

- 1) initiates messages with long texts, sometimes known as night letters.
- 2) doesn't know how to list or count book traffic.
- 3) neglects to include telephone numbers on originations.
- 4) makes sure to send messages either too fast or too slow.
- 5) starts sending a message before the previous one has been acknowledged.
- 6) sends a message containing a check of DOUBLE XRAY, filed on TODAY'S DATE.
- 7) on cw, doesn't separate components of the address with AA.
- 8) gives another station a hassle about an aspect of a message, even though that station is only relaying it. In particular, will express patriotism by refusing messages composed of words he doesn't understand.
- 9) receives traffic for delivery, but doesn't deliver it.
- 10) won't bother to use the telephone book or Information (if free) to effect delivery.
- 11) ignores handling instructions.
- 12) after receiving a message, repeats the entire message back, and still doesn't have it right.
- 13) without any warning to the net manager, checks in with 200 messages for Rockville Centre, Long Island.
- 14) on an NTS net, lists traffic destined out-of-section as one for "Truth or Consequences, New Mexico" instead of "one thru" or "one for umphthreign net."

(Directed Net Method)

- 1) checks in "with traffic," but only wants an "informal."
- 2) breaks a directed net with unessential information.
- 3) doesn't follow the net control's instructions explicitly.
- 4) when sent off frequency, does one of two things: if as receive station, isn't hip to the fact that the receive station calls, or transmits on the wrong VFO thereby stomping the net control.
- 5) "helps" the net control.

6) has "words" or "informals" that last longer than a Southern senator's filibuster.

7) leaves the net without notifying the net control (though nobody cares).

(General Operating Method)

- 1) uses Q signals on phone.
- 2) uses a brand new keyer, but can't control it. The words come out like quotations from the Dead Sea scrolls rather than continental code.
- 3) has the weakest signal on the band . . . and all the traffic.
- 4) is always off frequency when checking in.
- 5) includes his location each and every time checking in.
- 6) sticks like glue to an out-of-state net, but won't support nets in his own state.
- 7) repeats words that don't require repetition. Generally beats fellow net members over the head with phonetics, especially on vht, where phonetics are usually unnecessary.
- 8) provides newcomers with a wealth of information, most of it erroneous, or chastizes them on the air.
- 9) hasn't cleaned the wax out of his ears in the last decade.

The Not-Ready-For-Prime-Time Net Control Station also is hanging out on your radio dial. How can you tell? Easy. This will be the NCS who says "Okay gang, we have a lot of traffic listed tonight, so let's take care of the informals first." Need I say more?

The more a traffic handler eliminates this kind of stuff from his operating practices, the closer he (she) will be getting into the "prime time" of traffic handling, becoming an ARRL Official Traffic Station, a net manager or a section traffic manager, or perhaps moving up the ranks in the National Traffic System. It's a rewarding experience to be good at what you do.

How do you do it right? Read the various League publications available on message handling and pattern yourself after those hams who are obviously together. More on this in future columns. In the meantime, there is no truth to the rumor that this column is conducted by Samurai Public Service Editor.

MARS ADDRESSES

Save yourself a long-distance call to Headquarters. Information on the Military Affiliate Radio System is available directly from the following:

Air Force MARS
Chief, U.S. Air Force MARS
HQ AFCS/DOYR
Scott AFB, IL 62225

Army MARS
Commander
U.S. Army Communications Command
ATTN: CC OPS OM
Fort Huachuca, AZ 85613

Navy MARS
Chief, Navy-Marine Corps MARS
Eighth and Courthouse Rd.
Building 17
Arlington, VA 22204



WD8KVD surveys the route from a plowed street through snowdrifts to transport essential medical personnel after a storm in Flint, Mi. (WBWN photo)

NEW NET DIRECTORY

There's still time to register your public service net for the next edition of the ARRL Net Directory. The deadline for information is June 1, 1979. If you have not already done so, please register your net so that the directory can be as complete and accurate as possible.

REPEATER NETS

Elsewhere in this issue is an excellent article on getting a traffic net started on a local repeater. Called "The Care and Feeding of Repeater Traffic Nets," it is authored by Stan Horzepa, WA1LOU, who serves as manager of WESCON, the Western Connecticut Traffic & Emergency Net, which meets nightly on WRIADP. Vhf trafficking is where it's at; this article explains all the ins and outs.

STATUS OF THE NATIONAL NOVICE TRAFFIC NET

The 1800 UTC time does not suit many of those responding to the "Stray" on page 22, February 1979

The ARRL Ham Radio Newslines: 203-667-0138

Our Public Information Office's 24-hour Newslines should be used to report items of interest to the general public, so that this information can be passed on to the news media. News dies a quick death, usually within hours, so please call before, during or immediately after the newsworthy event.

We suggest that you write down the essential details of the event before calling and when you do call, please follow the directions on the recorded message. Don't forget to supply your name, call, address and telephone number(s) where you can be reached. Names and phone numbers of other contacts in your area would also be appreciated. Remember, your story is for the public at large, which for the most part, is unfamiliar with Amateur Radio. So, for publicity purposes, names are more important than call signs.

Please note: In order to have *emergency communications reports* duly covered in the Public Service Diary or elsewhere in QST, follow up your phone call with a *complete written report, directed to the Communications Department.* — K1XA

QST, or articles about such a net in *Worldradio News*. Prospective net members should specify a time during the hours that 15 meters is open that they can participate on a daily basis. From that pool, a time suitable to the greatest number will be selected and net operations can begin. Address postcards or radiograms with your preference to Armond Bratland, K6EA, 1135 Magnolia Ave., Long Beach, CA 90813, tel. 213-435-5289. — K6EA

EVERY PICTURE TELLS A STORY

We need good pictures with a public service theme for a variety of purposes. Most of the photos on file in the Public Service Branch deserved (and recently received) a decent burial. We're looking for good-quality, black-and-white operating shots; action pix. A group picture of a bunch of hams standing around a portable repeater, smiling into the lens, is pleasant, but useless. We prefer those photos with hams in the throes of operating. If they have to be staged "after the fact," so be it. I won't tell if you won't.

THE SHORT HELLO

This note is not intended to answer your article entitled "The Long Goodbye" (March 1979 QST, p. 80). I wish, nevertheless, to express my understanding and "I know how you feel."

My ICC sked with W0HI began in 1969. Almost immediately, there developed something indefinable and very intangible. That something became and still is an inseparable part of me — but what is it? I know some of the ingredients (of whatever this something is) consist of great quantities of friendship, admiration and loyalty. The personal relationship which developed is so close that immediately upon contact, I know Dick's mood and health. I know whether our QSO at the end of traffic will be short or as long as time permits. I am sure that Dick also can sense my mood just as fast. Funny stuff, this ew, wouldn't you say? — W7GHT

SERVICE COMMENDATIONS

As a result of a study conducted by the ARRL Emergency Communications Advisory Committee, the Board of Directors directed Headquarters to change the present scheme of the Public Service Award. The PSA certificate will be replaced by two new awards. The Emergency Service Commendation will be for an amateur's contribution during a communications emergency while the Public Service Commendation will go to those who significantly contribute during a non-emergency event. Formerly, Public Service Awards were issued to participants in emergencies only, after the story was duly chronicled in QST. Because of obvious difficulties, the QST coverage requirement is also being eliminated. Another change is that certificates will now be issued only to those amateurs who were, as the Minute states, "outstanding, meritorious participants." PSAs used to be sent to every reported call sign in an emergency situation. Presumably, under the new criteria, the certificates will be more meaningful. How do we determine who is meritorious? Are we going to resort to a Quija Board or Tarot Cards to find out? Not if the Public Service Activity Reporting Form, CD-157, is used. This form requests the leadership official to indicate who was outstanding. With your continued help, we will use that as a basis for issuing the new certificates. But what about those reports, mostly from outside the ARRL Field Organization, that aren't submitted on CD-157? Good question. We'll just have to do our best to determine, from the raw material, who is deserving. It's not a foolproof system by any stretch of the imagination, so bear with us. CD-157 is available for an S.A.S.C.

PUBLIC SERVICE DIARY

|| Santa Monica, CA — October 31. When fires erupted in the Santa Monica Mountains in late October, Amateur Radio groups went into action. WB6BIM, who maintains an elaborate closed repeater, opened the system and offered its services to the Red Cross. Communications were provided for evacuation shelters, dispatch locations and first-aid stations throughout the area. (W6VGG)

|| Decatur, AL — December 4. Members of the Decatur ARC used 2 meters to establish a link between the site of a chemical plant fire and the c.d. headquarters. The repeater's autopatch was used to obtain backup fire-fighting equipment from another chemical plant. (WB4NLM)

|| Greenville, NC — February 19. In the early morn-



Barry Newberger, W5KH, is the new director of the Transcontinental Corps — Pacific Area, ARRL National Traffic System. (W0HXB photo)

ing hours, a chemical company caught fire and several drums of toxic chemicals exploded. Hundreds of people in the immediate area were evacuated and members of the Brightleaf ARC provided communications during the emergency. (WA4VDJ)

|| Ulen, IL — February 25. WD9VIE was forced to leave Interstate 57 when a storm dumped nearly 20 inches of snow throughout the area. He arrived at an auditorium sheltering 100 other stranded travelers. All the telephones were out of service, so WD9VIE requested assistance from members of the 20-Meters County Hunters Net who moved to 75 meters to pass messages to the relatives of the stranded storm victims. (WD4LTD)

AMATEUR RADIO EMERGENCY SERVICE REPORTS

|| Genesee County, MI — January 13-14. A heavy snowstorm blanketed the state and the Genesee County ARES dispatched its members to provide communications for the local c.d. and for four-wheel-drive vehicles that were transporting medical personnel (see related photo). (W8WN Asst. EC Flint MI)

|| Ardmore, OK — January 29-30. The Arbuckle Traffic and Weather Net was activated after a train, which included tank cars containing highly toxic and explosive chemicals, derailed. Hams assisted the Red Cross and sheriff's department in the evacuation of nearly 2000 residents in the area. (W5BLW EC, K5OWK Asst. EC Carter Co., W5AFSN SCM, W5ASMLI SEC OK)

|| Atlanta, GA — February 17-19. Snow, sleet and freezing rain immobilized the Atlanta metropolitan area; the DeKalb County Police Department contacted the Metro Atlanta Emergency Net with requests for four-wheel-drive vehicles to transport medical personnel to and from hospitals. Thirty-two people were transported by net members during the storm. (WB4HXE EC Fulton Co, GA NM MAEN)

|| Sparks, NV — February 23. Local amateurs assisted police in the search for a missing six-year-old girl. Those who volunteered their services on that very cold night walked many miles searching in the darkness, sometimes over terrain replete with abandoned mine shafts, potholes, barbed-wire and other obstacles. (K7WLY EC Western NV)

|| Belmont Co., OH — February 25. The Disaster Service Agency requested assistance and communications to check flood-prone areas for water levels and people needing assistance. Two mobiles got more than they bargained for. Unable to return home due to mud slides, they took an alternate route. Their trucks were engulfed by a flash flood and they, in turn, had to be rescued. The Eastern Ohio Traffic Net was called into emergency action and remained on the air until the two were safe. (K8IP EC Belmont OH)

|| Birmingham, AL — February 26. Alabama hams named the National Weather Service office and relayed weather bulletins between the various emergency nets as a tornado warning was issued for the northeast counties of the state. Most law enforcement agencies were notified, but only one touchdown occurred, in Copeland, resulting in 12 injuries and no deaths. (WA4IYU SCM AL)

|| ARRL Section Emergency Coordinator Reports. For February, 34 SEC reports were received, denoting a total ARES membership of 14,827. This represents a 10-percent decrease in reports received one year ago (38), but a one-percent increase in ARES membership (14,736). Sections reporting were Alta, Ariz, Ark, Del, EBav, ENY, EMass, EPA, Ind, Kans, Mar/Nfld, Mich, Mo, Mont, NH, NLI, NFla, Ohio, Okla, Ont, Ore, SDgo, SF, SJV, SCV, Sask, SFla, SNJ, Utah, Va, Wash, WVa, WMass, WPa.

PUBLIC SERVICE FEATURE STORY

On November 18, at approximately 1600 hours, U.S. Coast Guard officer and Amateur Radio operator K2CYI was in conversation with another ham while driving home. N2APK was on board the 42-foot ketch *Strega* in the rock-strewn western end of Long Island Sound. The *Strega* was out of Stamford, CT, bound for New Rochelle (NY) Harbor with two adults and two children on board. The vessel had been stripped for winter lay up and had minimal supplies and no food on board.

Because of a late start, the *Strega's* captain, WB2UMG, was caught by nightfall in a rocky area that has no lighted aids to navigation. K2CYI advised the captain that he would help as soon as he arrived home, where he had a navigation chart of the area. After arriving home and consulting the chart, it was agreed that the long way around Davis Island was safer than a direct approach to the harbor.

Starting at 1730 hours, K2CYI guided the *Strega* via Amateur Radio. As the ship passed specific points, N2APK reported the position and K2CYI responded with course corrections and estimated arrival at the next checkpoint. At all times, the vessel's drift and reaction to wind was taken into consideration. *Strega* was safely docked at 1915 hours. — K2CYI

REPEATER LOG

According to reports received between February 20 and March 20, the following repeaters and simplex frequencies were involved in the delineated public service events.

	Criminal Activity	Medical Emergencies	Search and Rescue	Unusual Emergencies	Weather Emergencies	Miscellaneous	Total
WR1AAI	1						1
WR1ABD					1		1
WR1ABP					1	2	3
WR1AHQ					1		1
WR1AKG					1		1
WR2ADL		1			1		2
WR2ADM				20			20
WR2AFD					1		1
WR2AIX					1		1
WR2ARV					1		1
WR3ABM					3		3
WR3AIJ					1		1
K3PSP					1		1
WR4AFO			1				1
WR4AGJ						1	1
WR4AGL						1	1
WR4AVI						1	1
K4EAJ						1	1
WB4HHN					1		1
K4HXD					1		1
WA4YRJ					1		1
WR5AAA					2	1	3
WR5ABA	1				10	2	13
WR5ABY					51	1	54
WR5AEQ					1		1
WR5AGJ					1		1
WR5ALZ					1		1
WR5APK					5		5
WR5ARG					1		1
WR5AUG					2	1	3
N5DD					1		1
W5DWJ					1	1	2
WR6ACB	1						1
WR6AKV						1	1
WR7AEF						1	1
WR7AFJ						1	1
WR7AFN						1	1
WR7AKB					1		1
WR7ANA					1		1
WR8ABC					1		1
WR8ACM					1		1
WR8AES						1	1
WR8AGR	1						1
WR8AJL					1		1
WR8ANO	1	1			7		2
WR8ANW						1	1
WR9ABK			1				1
WR9ACD					1		1
WR9AFT						1	1
Simplex						1	1
Total	4	4	2	3	105	21	26



Fulton County, GA, Emergency Coordinator WB4HXE acted as net control of the Metro Atlanta emergency net during a winter storm alert.

NATIONAL TRAFFIC SYSTEM

Like the swallows returning to Capistrano, confusion concerning the proper way to count net traffic seems to be a seasonal recurrence. Okay, here's the scoop. The basic count for traffic handled in nets is one point for each time a message in standard ARRL form is transmitted and received during a net session, at the direction of the net control station. This has nothing to do with the individual station traffic count. In a net count, there is no breakdown of originated, received, sent and delivered traffic as there is for individual stations. The count is the number of message *handlings* accomplished during the net's directed sessions.

February Reports

Area Nets

(evening sessions)
(daytime sessions)

	1	2	3	4	5	6	7
FAN	28	2505	89.5	1.930	98.8		
EAN	58	942	16.8	1.687	88.6		
CAN	28	1203	43.0	1.135	100.0		
GAN	56	578	10.3	.375	98.4		
PAN	26	1231	44.0	1.377	98.4		
PAN	27	444	16.4	.349	94.0		

Region Nets	1	2	3	4	5	6	7
1RN	108	923	8.5	.572	94.8	95.2	
2RN	109	1497	13.7	.842	91.7	91.7	
3RN	84	801	9.5	.648	100.0	100.0	
4RN	112	1554	13.9	.506	74.7	100.0	
HN5	84	1217	14.5	.488	93.8	100.0	
RN6						98.8	
RN7	112	904	8.1	.617	99.6	98.8	
8RN	84	615	7.3	.392	91.5	96.4	
9RN	110	657	5.9	.377	89.0	99.1	
TEN	84	633	7.5	.342	70.0	100.0	
FCN						90.5	
TWN	79	479	6.1	.316	72.9	95.2	

TCC	1	2
TCC Eastern	185	1138
TCC Central	188	912
TCC Pacific	101	1006

Sections*	5227	24961	4.8
Summary	6414	44200	8.9
Record	5909	40204	24.3

*TCC functions not counted as net sessions.
 †Section and local nets reporting (162): ASN (AK), AENB AEND AENJ AENM AENS AENV (AL), OZK SCARC (AR), AFEN HARC (AZ), BCEN (BC), NCN SCN SDNN (CA), CN SSN (CO/WY), CN CPN NVTN WESCON (CT), DEPN (DE), FAST FMTN FPON FPTN NFPN PBTN PEN GFN QFNS SPARC (FL), CGVHFN CVEN GASSB GSN WGN (GA), 175mE 175mN ICN ILCN (IA), IMN MTN (ID/MT), ILN IPN (IL), ITN GIN (IN), KPN KSN QKS QKS-SS (KS), LAN LTN (LA), WM2mN EMRI EMRIPN HHTN RIEM2m (IA/RJ), MEPN PMN MTN WRIN (MB), MDD (MD/DC), CMEN MSPN PTN SGN SPN (ME), MACS MNN MTN QMN UPN (MI), MSN MSPN MSSN PAW (MN), MEOW (MO), APN (MR), CAEN MN MSBN MSN MTN (MS), CNCTN NCSSBN THEN (NC), WNN (NE), NNN (NH), BARTEN JSARS MCN NJN NPUN OBTN SPARTN UCETN (NJ), NMRRN (NM), NAS/SUF (NY), BN BNR 06mN ONN OSN OSSN (OH), DARA NWOSN OFON OLZ OPEN OTWVN STN (OK), CMN GBN GBSSN LN ODN OLN OPN OSN (ON), 1676 ARESN ARESB BSN JGARS OSN PdxARES WCN (OR), EPA EPAEPTN LVN PTN WPA WPA2mTN (PA), WQVUHF (PC), SCSSBN (SC), NJQ SDEN SDN SDWX (SD), SATN (SK), TN TNN (TN), TTN (TX), BUN UN (UT), SVEN VFN VN VNTN VBSN VSN (VA), BEN BWN WIN WNN WBSN (WI), WVN WVNN WVPN (WV).

1 — NET	5 — RATE
2 — SESSIONS	6 — % REP.
3 — TRAFFIC	7 — % REP. TO AREA NET
4 — AVG	

Transcontinental Corps

Certificates: TCC-E(D): WA1VE, WA2SPL, WA3WQP, WA4CCK, WB4PNY, TCC-E(E): W2RQ (1st annual), K4BKX (1st annual), K8KMQ (14th annual). WA4CCK has been appointed assistant TCC-E(D) director.

1	2	3	4	5
TCC Eastern	174	34.8	3233	1138
TCC Central	195	96.4	1819	912
TCC Pacific	112	30.2	2006	1006
Summary	481	93.8	7058	3056

1 — AREA	4 — TRAFFIC
2 — FUNCTIONS	5 — OUT-OF-NET TRAFFIC
3 — % SUCCESSFUL	

TCC Roster

The TCC Roster (February): Eastern Area (N2YL/K3KW, Directors) — W1s KX NJM OD, WA1s VEI ZAZ, K1s BA EIR GN SSH XA, W2s CS FR GKZ MTA RO, WA2s ICB SPL, WB2KDC, N2s TW YL, W3s FAF PQ YQ, WA3WQP, K3s KW NGN, N3HR, W4s JK MEE SOQ UQ, WA4s CCK, WB4PNY, WD4OVR, K4s BKX KNP, N4KB, W8PMJ, WB8WTS, K8KMQ, VE3s GOL SB. Central Area (W5GHP/W9JUJ, Directors) — WD4HIF, WN4KKN, N4MD, W5s KLV RB, WA5s BHF INJ IQU RKU, WB5s FDP HHK MVR SDD, K5s GM MC, N5s TC TS YL, W9s CXY DND JIJ JUJ NKG, N9TN, W9s AM HI, WA9s TNM VYT, K9s EVH EZ, AF00. Pacific Area (W5KH, Director) — N5s MR NG, W5s JOV KH, K5MAT, N6s GW PZ WP, W6s EOT OA SX v2T WA6UAZ, K6OE, W7s DXZ EP, GHT LYA VSE, K7HLR, AD0A, W0KON, K0s BN IER, WB0TAQ, VE7ZK.

Independent Nets (February 1979)

1	2	3	4
Amateur Radio Telegraph Society	28	2232	296
Central Gulf Coast Hurricane	28	267	2531
Clearing House	28	273	514
Empire Slow Speed	26	157	393
Hit & Bounce	28	300	469
Hit & Bounce Slow	16	57	162
IMRA	24	542	1080
North American SSB	22	254	205
Washington Region PON	16	31	361
West Coast Slow Speed	28	229	377
20 Meter ISSB	24	334	472
7290 Traffic	44	565	2817

1 — NET	3 — TRAFFIC
2 — SESSIONS	4 — CHECK-INS

Public Service Honor Roll February 1979

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/RITV nets, 1 point each, max. 10; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RITV 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.

67	WA4JGD	WB8YDZ	WA1VAB
W40GG	58	WA1MJE	VE1WV
66	VE1CH	WB2MFV	WA2MFV
WD4COL	K2VX	WB4OXT	VE3DPO
64	WB5LAT	WB5GE	VE3JGJ
AF2L	K5TL	53	W3PO
WB4PNY	56	AA2H	W3YQ
W7GHT	W1GUX	WB2KDC	W4NWV
W7VSE	W1TM	N5ES	WA4PZD
W9JUJ	K2GCE	K5OWK	AF4T
63	W2SQ	52	K5DPG
WB2RMI	N2TW	W2MTA	K5QEW
61	WA2UWA	WA4CCK	K7GZK
K1BA	VE3GT	N5RB	WA4XZ
W1RWG	K4BKX	51	W7MEL
WA1YMN	NANK	WD4LUG	AF3A
WB2EAG	N4WA	WD6EN	W0FT
WA3NAZ	N5TC	W0GJH	W0OTF
WA4CNY	W6OA	WB3CH	WB3GZU
WB4ZJ	WB8MTD	50	K0FRP
W5GHP	WD8NKA	48	WA3PXA
W5KLV	WD0DFR	48	WB0VHN
W6UAZ	K0EZ	WA1TBV	
AF00	55	W5AC	W7LUP
59	WB3JGP	49	WB8VPW
WA2SPL	AJ5F	49	47
		VE1RI	W2XD

WA2ZJP	K1EIR	K9DQU	41
VE3FGU	WA1QFX	W8XQ	VE3FHZ
K4KDJ	WB2MCO	WB0PYD	WB4QBB
WA4RFK	WB2PUJ	43	WB5NKD
N4PO	N3AKC	W2ZQ	WB5SD
K5SOR	VE3GOL	W4HON	WB7BCC
N6GC	VE3JRT	K4VHT	WB7PSP
K8AAZ	AC3N	WB5MVR	40
WD8DMX	K4EV	W5SPD	K1EIC
46	K4JGW	WB8SIQ	VE5AE
K3JL	W4WXA	WB8TRK	VE5HG
AE5I	K4XE	W9HOT	N5IB
WA0YVT	WD5AHH	WA9QCF	K0PVI
45	K5ARH	AE0L	29
AA3S	AA5J	42	WA3EYIT
WB5NKC	WB5LBR	WA1VEI	27
KB8GC	WA5RVT	WB3JZA	WA2HEB/T
WB8KWD	W5VMP	KD4D	WA4MJT/T
WB9ICB	N6GW	WA5VBM	22
	W6RFF	W6AUC	KA2CHK/T
	N8ABA	WA6LBO	WB2RMJ/T
	WD8LRT	K0DJ	WB3GZT/T
44	AF8V	W0MDT	WB7UOQ/T
W1BJ	WB8WTS	K0PIZ	N8AKS/T
K1BSO	WB8YRY		

Brass Pounders League February 1979

BPL Medallions (see April 1979 QST, page 77) have been awarded to the following amateurs since last month's listing: WA4NBE, N4NK, K4TXJ, K5DG, WD9CQC, W0HH.

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
W3GUL	587	1094	1411	34	3131
W0WYX	47	1206	467	739	2459
WA2SDY	908	27	910	4	1849
K0YFK		525		525	1050
WA2SPL		3	490	471	36
W0BMA	160	322	419	63	964
W9JUJ	31	506	416	8	961
WB4PNY	77	374	395	30	876
WA3ZRY	50	338	270	118	776
W0ZWL		368	3	367	738
W5KLV	3	373	330	12	718
WA3WOP	23	330	355	7	715
WB2RMI	2	347	317	13	679
WA0RWM	60	364	10	224	663
W3VR	261	101	279	9	650
W7VSE	4	311	328	7	650
N4PQ	1	291	325	2	619
WA0AUX	24	191	392	1	608
K4TH	15	291	161	133	600
K8AAZ	31	258	279	29	597
K5OWK	202	67	315	9	593
K5JGZ	48	229	292	8	577
K1BCS	68	193	303	8	572
W2ZC	6	276	278	4	564
W5UW	145	324	93	7	564
WA0HJZ	17	331		209	557
W3BI	23	242	271	13	549
W2ZCJ	14	229	251	50	544
WA2OTC	97	229	210	5	541
WB3JZA	29	255	214	21	519
WB3JGP	101	215	189	12	517
WB8KWD	1	255	253	8	517
WA4CCK		262	247	6	515
WB5MVR	102	153	220	32	507
W0WYX (Jan.)	55	636	1297	661	2649
WA4JDH (Jan.)		655	644	2	1301
WA2SPL (Jan.)	13	560	539	46	1148
K0YFK (Jan.)		552		552	1104
W0BMA (Jan.)	187	282	301	108	878
W9ZGO (Jan.)		604	1	247	852
WA0HJZ (Jan.)	28	538	5	219	790
K8AAZ (Jan.)	8	310	311	13	643
W7VSE (Jan.)		335	296	9	640
WA2OTC (Jan.)	111	178	221	10	520
W9JUJ (Jan.)	36	236	4	232	508
WA0HJZ (Dec.)	31	412	31	264	738

Multioperator stations:				
K3CR	634	634		1278
K4SCL		372	220	4
				596

BPL for 100 or more originations-plus-deliveries:			
WA3ATQ	265	WD4COL	105
W0MZI	247	WB4RIS	105
W9ZGO	235	WA0VRE	105
W9JLJ	223	WA4PFK	102
WA4CRI	167	W0FOB (Jan.)	225
K4KDJ	156	K4KDJ (Jan.)	168
WA2JCU	138	K0GND (Jan.)	139
AA4FG	137	WA2EQW (Jan.)	122
WB3GZU	113	K7NTS (Jan.)	116
K0FRP	108	WB3BOB (Jan.)	111
WA3PXA	106	K7NTS (Dec.)	186

Multioperator station:			
K3CR (Dec.)	217		
1 — CALL	4 — SENT		
2 — ORIG.	5 — DEL.		
3 — RCVD.	6 — TOTAL		

The World Above 50 MHz



Conducted By
William A. Tynan,* W3XO

Beacons

The usefulness of beacons on the vhf bands is becoming clear to more people as time passes. In previous years, many have felt that these ever-present signals would serve no purpose except cause QRM. Oh, it was all right if the beacon was several hundred miles away, especially if it was closed down during band openings. Certainly, no one wanted a beacon right in his backyard! Or did he? In order to find out, and to assess the utility of beacons in the U.S. in general, the radio club at the Johns Hopkins University Applied Physics Laboratory, located between Washington, DC, and Baltimore, constructed a low-power (30-watt) 2-meter transmitter and an ROM keyer that tirelessly repeated the message W3VD API. RC BEACON MD, followed by a long dash. A halo antenna, intended for mobile use, was lashed to the side of a 140-foot tower, about 30 feet off the ground. It was deliberately not installed near the top of the tower because the beacon was not designed to have wide local coverage. The equipment was installed in a shack at the base of the tower.

One would think that would be all there was to putting W3VD BEACON on the air. There are a few other things to consider, however. One is the choice of frequency. Some would conclude that a beacon should be where everybody listens most of the time. On this basis, 144.200 would appear to have been the logical selection. But putting a beacon right smack on the most popular frequency would be hegging for criticism from just about everybody. Those who have never thought much of beacons in the first place would be certain to be heard from. On the other hand, if a frequency is selected which is far removed from the bulk of the activity and from where antennas and receivers are peaked, the beacon would certainly lose much of its usefulness. A look at activity patterns in the 2-meter band provided some inkling of optimum beacon frequencies. First, the only efficient way to operate beacons, assuming that they should be low power, is on

cw or possibly fsk. Therefore the cw segment from 144.0 to 144.1 would appear to be the right portion of the band. Most non-EME cw operation is from about 144.1 down to about 144.060. During particularly heavy activity periods such as contests and auroral openings, a few signals are heard below 144.060, but not many. The extreme low end, from 144.0 up, is where most EME work is accomplished. That worthy mode must be afforded protection since it depends on reception of extremely weak signals. The VUAC's band occupancy guidelines suggested 144.0 to 144.05 for EME and 10 kHz from 144.05 to 144.06 for beacons. This seems to this writer to be a little too narrow to support any useful number of beacons, with 25 kHz appearing more appropriate. A good compromise would seem to be 20 kHz. This is a rather minor difference and certainly can be worked out.

Since the W3VD beacon was to be a temporary experiment, it was decided to use 144.041. Why was it temporary? That leads to the other consideration preventing immediate operation. Section 97.79(b) of our rules requires that all U.S. amateur stations, except those in repeater operation, be under the control of a licensed operator. If a beacon is operated only while a control operator is available, its purpose of providing a continuous signal that can be used by many to determine band conditions and adjust equipment is compromised.

In order to operate the W3VD beacon on a continuous, unattended basis, a Special Temporary Authorization (STA) was requested from FCC. STAs are issued for a period of six months; the Commission does not intend them to be repeatedly renewed to provide permanency. In due course, the STA was granted and things were made ready to begin operation.

On its first day on the air, June 20, 1978, the usefulness of vhf beacons was immediately demonstrated. Reports from the local area as well as stations up to 200 miles distant started

coming in. It also turned out that, on W3VD's first evening of operation, the 2-meter band opened for Es. Those in the club who were unfamiliar with what 2 meters can do were amazed to see reception reports from Montreal, PQ, and St. Johns, NB. As the months went by it became apparent that many 2-meter operators within about 50 miles counted on W3VD to provide a consistent signal source. If they couldn't hear it, they assumed that something was wrong with their gear — and they were usually right. After W3VD BEACON was shut down on the afternoon of December 31, the expiration date for the STA, several locals were overheard wondering "what happened to the beacon." During the next few weeks, the club received many letters saying that W3VD's signal had become "like an old friend who could always be counted on to be there." In the entire time the beacon was on the air, no amateurs expressed complaints concerning the operation. Surely, the low power, low antenna and rather careful choice of frequency contributed greatly to this.

In accordance with the terms of the STA, a report is now being drafted for submission to FCC. This report will summarize the operation of W3VD BEACON and review comments received from the amateur community. Attached to the report will be a petition for a rule change to provide stations in "beacon operation" the same privilege of operating under automatic control now accorded stations participating in repeater operation. If this petition is successful, we in the U.S. may yet have a system of beacons to aid our vhf work, as amateurs do in many foreign countries. In the meantime, there are a number of U.S. stations operated as attended beacons on reasonably good schedules. There are also quite a few very useful 6-meter beacons outside the country, such as VE1SIX 50.088, T12NA 50.080, ZB2VHF 50.035, 6Y5RC 50.025 and HH2PR 50.023. Incidentally, VE1SIX also operates on 144.072. Its 2-meter signal has been widely received in the Northeast.

VHF CONFERENCES COMING UP — RIGHT NOW

Two of the year's greatest vhf get-togethers are scheduled to take place in early May. Both the Northeast VHF Conference and the West Coast VHF Conference are to be held the weekend of May 5 and 6. The East Coast affair will be at the Center for Continuing Education on the Campus of the University of New Hampshire at Durham. Contact W1JR for details. Not to be outdone, the West Coast gang is planning a first-class conference of their own. It will be at the Dunfey Hotel, 1770 South Amphlett Blvd., San Mateo, CA 94402. Contact the West Coast VHF/UHF Conference, 350 E. Middlefield Rd., Mountain View, CA 94043 concerning reservation and other advance information.

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730 or call 301-384-6736 and record your message.

CHICAGOLAND ANTENNA GAIN CONTEST

The Radio Amateur Megacycle Society will for the third successive year hold its Antenna Measuring Contest on Saturday, May 19, starting at 10 A.M. CDT. The location is the same as before, the grounds of the Flick-Reedy Corporation at the corner of Thorndale and York Roads in Bensenville, IL (just northwest of Chicago). Equipment will be available to measure the gain and SWR of 2-meter, 1-1/4-meter, and 70-cm antennas; equipment for higher frequencies will be brought in advance request is made. Prizes will be awarded for the highest-gain antenna in each category. Refreshments will also be sold. Further details, including directions, are available for an s.a.s.c. by contacting WB9GOL, 2558 N. McVicker Ave., Chicago, IL 60639.

ON THE BANDS

6 Meters — The flurry of DX activity occurring the first half of February and reported last month, returned pretty much on schedule the second week in

March. It does seem, however, that we in the Mid-Atlantic states live in some kind of 6-meter E2 "black hole" as everyone else seemed to be getting in on the fun. One exception was the February 18 opening to Gibraltar when ZB2BL worked some 20 1s, 2s and 3s on 50.004 cw. Jimmy now has the transverter that N5TX put together for him and was kindly transported by K2JU's XYL, so he now has ssb and VFO capability. The weekend of March 10 and 11 furnished a good example of the excitement and disappointment the old 6-meter band can provide. Most of this information was obtained from the 28.885 MHz liaison frequency which is kept continuously busy with up-to-the-second 6-meter happenings, particularly on weekends. Saturday morning, the 10th, produced a fine opening between the West Coast and the Caribbean with 6s working W1QXX/KP4, KP4EOR and other KP4s, as well as PJ2DW and NP2AE, running an IC-502 in the U.S. Virgin Islands. Nor was that the end of the excitement which the day had in store. A few hours later, the West Coast, and even the Mid-Southern section were treated to propagation to ZL. W6XJ worked ZLs 2AQR, 1AV7, 2CD, 1AUM, 2BFC (10 watts), 3AAN, 3RW, 2BGI and 1MQ. Most of the ZLs were at 52 MHz but a few could be found

just above 51 MHz. The ZLs were in as far east as TX with K5ZMS and W5XO (close!) of the Lone Star State, along with KASCEB, NM, logging a new country for themselves.

We Fastners consoled ourselves with a very good aurora Saturday afternoon, March 10, between 2020 and 2400 UTC. Signals from 1s, 2s, 3s, 4s and 9s were quite strong here in MD with even 10-watt stations giving good accounts of themselves. Nevertheless, this conductor would have been glad to trade it all for the ZL or LU openings enjoyed by other parts of the country.

The next morning, KZ5NW flashed the word on 28.885 that he was hearing signals on 6. While most of the East Coast listened intently to both bands, we heard via the 10-meter frequency that WB2RLK/VLI had worked KZ5NW and shortly thereafter that VE2DFO had made contact with IU6HFQ. It was learned later that, in addition to Don, VE2SH and W1A1M, VT, had also made the grade with the Argentine station. All this time, ears were straining and antennas were swinging to no avail for most of us. During the 1700 UTC net on 28.885, W7FN called in to report that LU3EX and LU3DCA were being worked in the Pacific Northwest. Also during the net, the 6s reported contacts with VP9WB, H8WPC, K14AAN, as well as the choice catches from Argentina, LU3EX and LU3DCA.

Later in the afternoon, the VKs put in an appearance on the West Coast with W6XJ and WB6NMT among those in on the action. This opening was tipped off by WB6NMT hearing the VK TV audio on 51.75. VK3OT takes up the story from there. Steve noted the 50-MHz signals from W6XJ and observed that they peaked about 15 degrees north of the true path. Using 28.885 to play them back, Gary was able to optimize his beam heading, finding that it was also slightly north of the true direction. At 2234 UTC they were able to work 50 to 52 MHz for the first W to VK 6-meter contact of this cycle. Later Gary shifted to 52 MHz also with an *improvement* in his signal Down Under. Other VKs in on the action included VK3s AQL, ARK, AMK, AUL, AUQ and ZZX, as well as VK5BK who heard W6XJ but they could not make contact. In this frenzy of activity, it's hard to find out exactly what happened but VK3AQL is known to have worked N6CT, K6FV, N6HZ, WB6NMT and AA6S.

The ionosphere wasn't fired yet. It still had a few more treats in store, one in the form of what appears to be a new 6-meter DX record involving a 12,090 mile (19,456 km) contact between HL9JG near Seoul, Korea, and LU8AHW, Buenos Aires, Argentina.

This has been a sketchy summary of what happened just over one weekend. I have found it difficult indeed to set that down in readable form. Previous to that there were many West Coast contacts with Japan. W6XJ says that we don't need any beacons in that part of the world. There are so many JAs active that we'll know it when the band opens to that area. In addition, there were crossband contacts between South African stations and Europe, as well as a two way between ZS6LN and Cyprus station 5B4AZ, running just 0.070 watts output. That station has permission for 6-meter operation using cw only on a frequency of 50.499.

With 6 meters becoming somewhat akin to a DX band, many are complaining about the operating habits of some U.S. and foreign stations. One such complainant is WA5YX. Pat particularly singles out the fellows who work the same DX station on every opening and sometimes several times per opening. This makes it next to impossible for the lower power stations, or ones in areas less favored by the opening to make contact. He also suggests that DX stations try to handle the contacts faster as time is usually short on 6-meter openings and that they periodically look for less favored areas and make it clear that they will not respond to calls from other areas during these times.

The fifth annual SMIRK contest will be held over a 48-hour period beginning at 0000 UTC June 2, just one week before the ARRL-sponsored VHF QSO Party, so it makes a good tune-up for that affair. In addition to doubling the period of the SMIRK test, there have been several other rule changes this year. An s.a.s.c. to K5ZMS at 7158 Stone Fence Dr., San Antonio, TX 78227 will bring all the details.

2 Meters — After the deadline for last month's column, word came of record-breaking contacts from South Africa to Greece. Two ways are known to have taken place on several occasions between ZS6DN and ZS6FN on the southern end and SV1DH and SV1AB, but the record officially belongs to ZS6DN and SV1AB for spanning a distance of some 4419 miles (7127 km). Additional information is provided by K5DUT on a 20-meter QSO he had with ZS6DN.

One contact on 2-meter cw between ZS6DN and SV1DH was estimated to be 4340 miles (7000 km) and lasted for one hour with signal levels up to S3. The frequency was 144.130 and the cw signals had a hissing sound to them similar to steam or white noise. Very

70-Cm Standings

Figures are states, U.S. call areas and best DX in miles.

W1JR	30	11	10,110	K5JL	33	11	6400
K1WH5	21	9	7820	W5FF	23	11	5963
K1PXE	19	8	2800	W5RCI	19	6	880
K1FO	18	6	820	W5HN	15	5	1467
WA1TZV	17	7	2000	K5LL	10	5	1612
K1HTV	17	5	610	W5AHNK	9	5	1625
W1AJR	16	5	680	W5SWV	9	3	915
W1SL	15	7	2600	W5GVE	7	3	963
WA1MUG*	15	5	740	W5LPV	7	2	950
K3EAV/I	14	6	700	W5UKO	6	2	590
K1BFA	13	5	719	W5SQOG	5	3	700
K1JX	13	5	620	K5UGM	5	2	956
W1GXT	11	5	526	W5SXJ	5	2	850
WA1JTK	11	4	715	W5HPT	4	3	645
W1HDQ	11	4	380	K5MWH	4	2	289
K2UYH	45	12	10,000	W6ABN	16	9	—
K2RIW	24	8	2593	W6BHXW	6	4	7500
K2ACO	24	8	925	W6DQJ	4	2	360
K2LGI	22	8	2300	K7ICW	4	2	225
W2AZL	21	7	1000	W7JF	3	2	420
K2CBA	20	8	2670				
W2BLV	20	6	812	K8WW	35	10	9600
W2CLL	20	6	790	K8DEO	24	8	775
W2OMS	19	6	725	W8IDU	22	7	735
K2VDK	18	6	750	W8YIO	22	7	650
WA2EMB	18	6	720	W8HCV	19	7	660
WA2FGK	17	6	745	W8VCV	13	7	625
K2ARO	17	6	740	W8MNT	13	7	600
K2YCO	16	6	675	K8BR	10	6	625
W2DWS	16	4	570	W8PQJ	10	6	425
K2OVJ	15	5	734	W8OOD	8	5	500
W2CNS	14	6	525	W8FWF	8	5	450
K2BF	12	4	325	W9AAG	26	8	900
WB4NXY/2	12	4	270	W9ID	24	8	980
WA2EUS	11	4	380	W9JIY	24	7	1025
WA2DKB	11	4	—	W9WGD	22	9	1725
W3OZ	25	8	2410	W9HUV	22	7	780
W3RUE	24	7	900	K9HMB	21	8	836
K3WHC	23	8	2450	W9SNNR	20	8	850
K3QCO	23	7	2650	W9YF	17	6	715
W3IP	19	7	722	K9IIF	16	7	695
W3HMU	19	6	2450	K9XY	13	5	650
K3IUV	18	5	650	K9AAJ	12	5	425
WA3JUF	14	5	250	W0YZS	47	10	8840
W3XO	12	5	325	K0TLM	36	11	9800
W3OMY	11	7	850	N0IS	27	8	923
K3SWZ	10	6	2422	W0DRL	24	9	1425
W3CJG	10	5	450	K0DAS	22	7	950
W3UJG	9	4	400	W0LER	18	6	1000
WA4PI	26	9	1985	W0RAP	16	7	670
W4FJ	25	8	2430	K0CJ	16	5	814
K4QIF	24	7	1065	W0PW	15	5	1700
W4NUS	22	8	2400	W0ZKU	14	7	928
W4ISS	16	5	849	W0BCF	12	5	—
W4ACQG	15	5	800	K0ALL	11	3	825
W4HJZ	15	5	580	W0OHU	11	3	514
K4SUM	15	5	482	K0WLU	10	3	760
W4VHH	15	4	750	W0WAO	6	3	630
K1FJM/4	14	5	580				
WA4GPM	14	4	—	K0BHP	7	7	6300
K4GL	12	5	720	VE2HW	6	2	750
WA4SBC	12	5	539	VE3DKW	19	7	940
K4PKV	10	4	380	VE3VNO	12	6	520
WB4EXW	9	4	—	VE3ONT*	11	7	390
K4NTD	9	2	363	VE3AIB	9	5	600
K4QF	8	6	2000	VE3E2C	7	5	510
K4KAE	8	2	482	VE4MA	6	3	1030
WB4NMA	7	2	480	VE7BBG	12	—	—
WA4MV1	7	1	—				
K4IXC	5	2	800	VK2AMW	9	8	10,535
W4AWS	4	2	750	F9FT	8	7	10,445
WB5LUA	35	10	9046	I5MSH	6	5	10,500

*Club station

good tape recordings were taken of the contact.

The date of the first contact was January 13 and the feat was repeated on the 16th between ZS6DN and two Athens stations, SV1DH and SV1AB. Dave has reports of being heard several times in the past but these are the first two-way contacts. The antenna system at ZS6DN is a 16-element K1M Yagi with a measured gain of 19.5 dB and the erp is in the 10-kilowatt range. The antenna at SV1DH is a 16-element Yagi with 100 watts.

Dave credits the success to the team effort of a group known as T.E.S.S.A. (Trans Equatorial Skip Southern Africa). The group consists of the following amateurs: ZS6PW, ZL2JV, 5B4WR, SV1AB, SV1DH, ZS6DN and ZS6IM.

Dave's antenna is 55 feet high and according to him the 19.5-dB gain figure is an actual measurement over a reference dipole.

Exciting stuff, gang. Keep it up.

The March 10 aurora, mentioned in the 6-meter section, produced a brisk few hours on 2 meters also. W3BDP, DE, logged contacts with AA1A, MA; W1BJ and W1YTW ME; K2TTI, K2OS and K2LWR, NY; N8TG, OH, and IL stations W9BOZ and W9QBU. Sam set up a sked with W0VB, MN, but heard nothing of him. K2QR, western NY, also had a field day, including working a new state — WA1JXN,

VT. In all, Dick had 18 QSOs, including one with this conductor. Represented were nine states and two VE provinces with several stations producing 59A reports. W0VB was heard but not worked. This conductor shared time between 6 and 2 meters, coming up with 14 contacts on the higher band in the 1st, 2nd, 8th and 9th call areas, including WB9WXM, IL, on sbw and ending with VE1ASJ. This was my first 2-meter QSO with Andy, after working him many times on 6 meters.

An always interesting activity report is regularly received from K7ICW and junior op N7AKB. Their QTH in Las Vegas is 225 miles from the large activity centers of southern CA; nevertheless, they always report a substantial number of 2-meter contacts. A recent report notes 54 out-of-state QSOs during a one-month period, most of them with southern CA stations. One was with WB6NMT/M in San Diego. Another was with W6UAD running just 250 mW and WA6RSA and N6CA using 1.5 and 2 watts respectively. Incidentally, K7ICW has his EME station functioning having worked SM7BAE.

Despite the fine work of K5MB, setting up at KH6HI last year, many still need HI. That rare state is now represented on 2-meter EME by the station which put it on the 70-cm map — KH6HP. Steve has an 8K77 going and is using four 19FTs. He has already worked K5GW and W5LUA. For skeds, call 808-671-5211 or write 94-1084 Lum St., Wapahu, HI 96797.

An interesting approach to a 2-meter EME array is mentioned by WA5WCP in connection with a project to achieve EME capability at the North Texas State University Radio Club station. Paul says that they have scaled up to 2 meters the W1JR 70-cm 128-element extended expanded collinear. He has promised a photo.

WB2WIK brings up the problem of desensitization from nearby fm repeaters and wonders if anyone has a proven design for a filter offering at least 30-dB attenuation of signals in the 146 to 148 region while maintaining low insertion loss at 144 to 144.3. Steve can be reached at 24 Louis Dr., Budd Lake, Mt. Olive, NJ 07828.

70 Cm — K4QIF reports that his EME system seems to be working well with 700 watts out to a 20-foot dish and a GaAs FET preamp, providing a noise figure of 0.8 dB. Recent successful two ways for Rusty include K3NSS, VE7BBG, K2UYH, JA9BOH, LX1DB, K5JL, W1JR, W4WD and W5LUA. A new station on 70-cm EME is G3X3YW. Stu is using an 18-foot dish, an R1W type amplifier and Lunar preamp and has copied K2UYH, H8CVS and others. An interesting experience, witnessed by DL9KR, was reported in a recent issue of the K2UYH 432-EME Newsletter. Karl was listening to K5JL echo testing early in February. He characterized Jay's signals as "fantastic" but the real surprise came when they stayed in until the moon was 2 degrees below the horizon.

The Echo 70 is quite a popular rig for this band but could certainly stand some improvement in the receiving department. K1LPS reports that he has been doing some work on his, bringing the noise figure from 11.5 dB to 2.5 dB. Larry will provide information on how he accomplished this, along with details on adding cw sidetone output, for an s.a.s.c. to 97 Parker Ave., St. Johnsbury, VT 05819.

VE4MA had an experience which should be a warning to all of us. While adjusting his array of Yagis with power on, Harry felt his eyes "dry out." Needless to say, he beat a hasty retreat. Upon looking in a mirror he observed that his eyes were bloodshot. Although they remained irritated for a week, there was, luckily, no permanent damage. We're all glad to hear that but this should be a lesson for the rest of us. RF can be dangerous, especially to the eyes, and often the damage is done before the person realizes it. As QST reminded us for many years: "Switch to Safety." [est-]

Strays

QST congratulates . . .

11 hams in the Salt Lake City area who volunteered their services for a charity marathon race held for the Easter Seal Society. Society spokesman Doug Beck said the amateurs were "one of the keys to success" for the event, which raised \$12,000 for Easter Seals.

LJ William C. Cline, WD4EXG, who has been promoted to city editor of *The Daily Advance*, a newspaper located in Lynchburg, VA.

The New Frontier

Conducted By Bob Cooper Jr., *W5KHT

The World Above 1 Gig

Using What's Available

Practical amateur techniques usable in the world above 1 gig and the results one can expect are the column themes for this month.

If you happen to reside in a spot where shf propagation is poor or you are "terrain sheltered" by surrounding topography, one option open is the Australian Solution: You pack up the rig and head for a spot where more favorable propagation exists.

VK6KZ, holder of one end of the new 1296 terrestrial record of 1308.1 miles (see "The New Frontier," April QST), has outfitted his Volvo for just this purpose. Wal Howse has transportable 144-, 432- and 1296-MHz gear (including the 3-foot — 1-meter — parabolic) ready to go on short notice. This allows him to drive to coastal areas along the "Great Australian Bight" when slow-moving high-pressure areas suggest good long-haul ducting may be forming. Being at or close to the water is an advantage for long-haul work.

What about a location on the flat "coastal plains" such as Wilmington, NC? KB4BR is interested in exploring the shf region but worries about getting on the band and then finding propagation unfavorable. There are no sure things, of course, but one would suspect that areas like Wilmington would find both overwater and overland ducting possible. Being "inland" from the actual coast is likely to be an impediment to overwater ducting only where there are substantial wind shifts marking the land-water separation. This suggests that in areas such as Wilmington the overwater conditions might well extend substantial distances inland quite frequently.

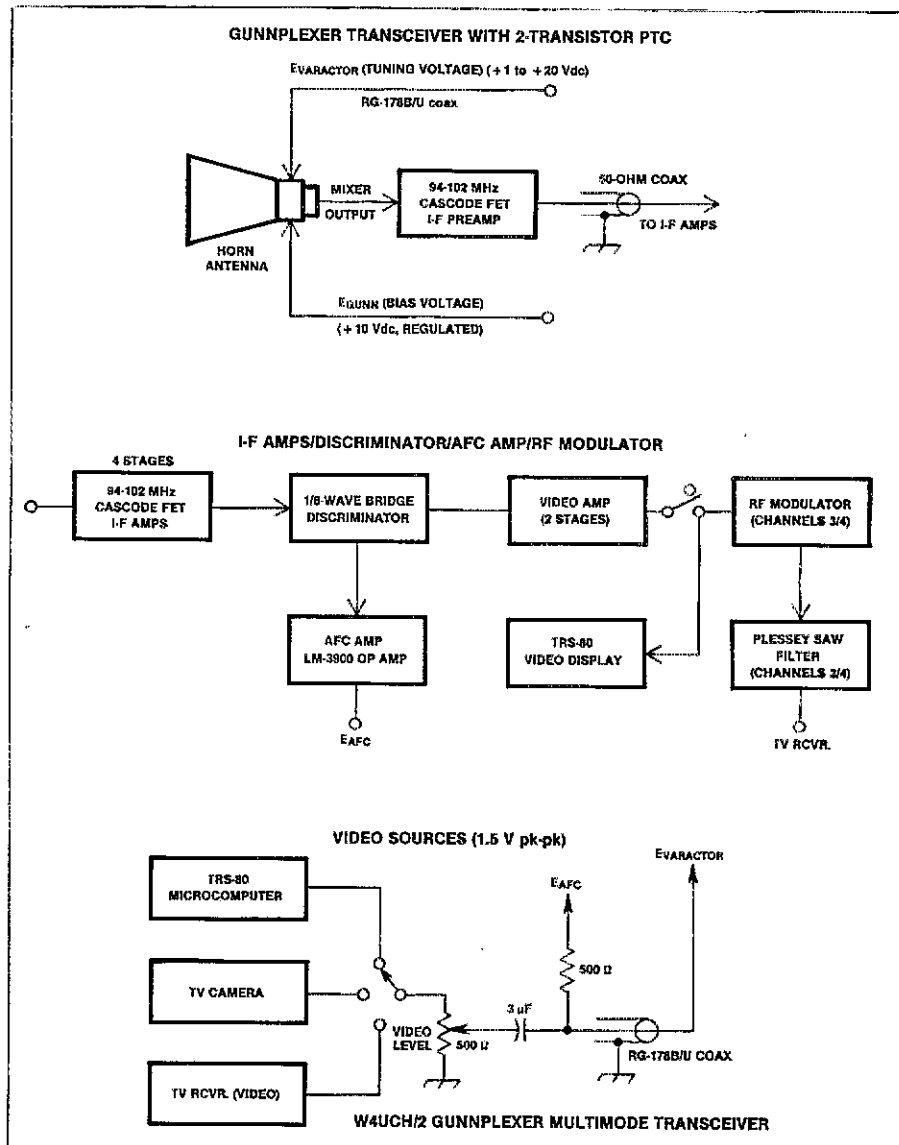
I4SN suggests that overland paths are no more impossible at 10 GHz than overwater; they simply occur at different times of day. With 70 Italian amateurs now active at 10 GHz, and typical rigs running 10-mW output into 25-dB antennas (that sounds like an 18 inch parabola), they find the 155-mile Bologna to Trieste path, which is overwater, open "virtually anytime" and overland paths primarily a nighttime phenomenon.

Obtaining information on simple circuits for 10-GHz Gunnplexer work is becoming easier all the time. G. R. Whitehouse & Co. (11 Newbury Dr., Amherst, NH 03031) provides a collection of circuits from numerous sources and WICF has a paper describing a 10-GHz Gunnplexer link for tying vhf receivers together for repeater operation. One enthusiast, W4UCH/2 (Bob Richardson, Drawer 1065, Chautauqua, NY 14722), is completing text on a 17-chapter "Gunnplexer Cookbook" covering virtually every aspect of 10-GHz Gunnplexer operation from simple simplex voice systems to more complex wideband video and computer-link data terminals. The basic W4UCH system is shown here; it is a system Bob has labored over for nearly two years showing the infinite patience of a man enthralled by the challenges presented. Richard-

son was the guest of this columnist during July 1978, incidentally, at a national conference on satellite television communications. Bob put on a one-hour talk and demonstration of his techniques and we arranged to have his talk televised via geostationary satellite to several hundred receiving terminals spread from coast to coast, Mexico to far northern Canada. His "program" was preserved on videotape so 1/2-inch Beta or VHS-format dubs could be made available to those interested.

Richardson applies automatic frequency control (afc) at only one end of the circuit while both ends utilize proportional temperature control (ptc) to maintain Gunn oscillator drift to within ± 1 MHz with *no* afc applied. His system allows phase locking the Gunn oscil-

lator to the harmonic of a low-frequency crystal oscillator and he has successfully transmitted both 170- and 850-cycle 1sk. Both Baudot and ASCII (when approved) formats are possible. Using a J. C. Penney 24-inch snodded as a reflector he maintains 40+ dB signal-to-noise ratios with 4.5-MHz-wide video over paths of 10.5 miles. Bob aligns the 3-degree-beamwidth antenna on an initial path with the aid of a small telescope. The Gunnplexer transceiver, i-f preamp., and ptc system are spotted inside of the insulated white housing located at the focal point of the 24-inch reflector. The small plastic cup in the center of the dish houses the crystal oscillator/multiplier harmonic generator (a diode) and the injection antenna.



*Rte. 5, Box 364, Guthrie, OK 73044

Results, 32nd ARRL VHF Sweepstakes

Visiting the Higher Frequencies is Something Special.

By Bill Jennings,* K1WJ

The results of the 32nd running of the ARRL VHF Sweepstakes, January 13-14, 1979, seem to epitomize the doggedness and determination of the vhf contesteer's spirit. Despite a deluge of post-contest reports that told horror stories of doom and gloom, terrible conditions, waning participation (nobody to work) and some of the worst weather conditions ever to hamper fixed stations and mountaintoppers alike, when all the entries were in and the results tabulated, this the latest VHF SS looks like a pretty darned good outing.

The statistics go something like this: entries received — 861, up from 838 a year ago; new all-time division records set — 12, six multioperator, six single operator; top ten single-operator average score — 45,695 points, up 11k points from the average top ten score in 1978; top ten multioperator score in 1979 — 46,011 points, up 7000 points from the 1978 average of 39,413. Fact. The one-million-point total for a club aggregate score has been reached and surpassed for the first time in VHF SS history.

In this the second year of the VHF SS scoring structure that rewards operation above 148 MHz with an increased points-per-QSO ratio, a number of stations/operators, taking to the higher bands, have broken all-time division scoring records, all-time section scoring records, and have bettered their own personal multiplier, QSO, or scoring totals. These achievements are highlighted in the score listings and the various "boxes" included in this report.

To those who have met or surpassed their VHF SS goals, a hearty "well done." To those who have met their fate at the hands of Old Man Murphy, "wait til next year."

Who better to tell the story of the contest than the participants themselves? Excerpts of several narratives, which were received here with VHF SS entries, follow.

Single Operators

"Conditions at this location were not good. No 'E' or tropo at all, just ground wave and very poor scatter. Not one opening on 6. Just like trying to pull hen's teeth to pick up another multiplier. Activity fair.

"Started out Saturday with a SWR of over 6 to 1 on 6 and 2 because of the ice cover. Couldn't hear a thing! Ice went away Saturday night after I beat the guy wires every 30 or so minutes. Almost cooked my amplifiers with the high SWR. Boy, do those 4CX250s make noise when they are over!! Contest going slow, but

doing much better after ice; gonna get 'em now!

"Then there was Mr. Murphy's helper, WD4LGR. He gave me more competition than I care for. Boy is he tough.

"Conclusion: New call (KA4DCZ), ice on Saturday, S9 noise on Sunday and (Wild Dog 4 LGR) on my tail may have caused me to 'bite the bullet'." — KA4DCZ, NC

"Getting these logs out at the last minute but that goes along with the rest of the disaster this contest turned out to be. Mr. Murphy has been very kind to me for quite a few contests in a row. Think he decided to make up for lost time on this one. Getting set up in the bitter cold led to me getting sick and it has taken me three weeks to shake it. Early Sunday morning the freezing rain came and put the VSWR right out of sight. Considering my state of health, I packed it in early on Sunday. I was not able to get back up the mountain for three weeks and

about that time, I got a call from the people up there to come and rescue my antennas. The ice had continued to build up and eventually bent the 2-inch water pipe mast right over like wet spaghetti. The 220 and 432 beams survived without a scratch, but the 16-element one took a beating including a bent boom. It looks like I might be able to salvage it, though.

"So . . . all things considered, I think this will be the last attempt at winter mountaintop operation for a while. Last year I was fortunate, in that although there was a lot of snow up there, at least it was warm and dry during the contest. It's just too hard on the gear getting things set up in the winter. Well, we'll think about it next year." — KILPS, VT

Multioperator Stations

"The Cuyahoga Falls ARC decided to enter this contest a week prior to the event, although none of the members were equipped to operate



The king, WA3AXV.



K3MWV, number three single-operator score in the 1979 SS.

Top Ten

Single Operator Call

Call	Score
WA3AXV	64,512
W3HQT	61,864
K3MWV	56,576
WA2DPU	49,490
W3HFX	41,220
N3AHI	40,854
WB2SZK	37,488
K3IUV	36,540
W3HMU	34,720
W2EIF	33,694

Multioperator Call

Call	Score
K8III	80,984
K2DEG	65,520
K2XR	54,464
W3KKN	45,198
WA1RWU	42,550
WA2SNA	41,602
K2NE	39,040
W8CCI	33,120
WB2LCC	31,958
W4BFB	25,680

*Communications Assistant, ARRL

Club Competition

Club Name	Score	No. of Entries	Club Winner
Unlimited Class			
Mt. Airy VHF RC (Del/NJ/PA)	1,175,988	75	WA3AXV
Rochester VHF Group (NY)	904,428	230	K2YCO
Medium Class			
South Jersey Radio Assn.	167,980	19	WA2KOK
Potomac Area VHF Society (MD/VA)	142,920	18	K3DUA
West Jersey Radio Amateurs	118,542	24	WB2GEX
550 ARC (NJ)	94,084	25	WB2QQQ
Hampden County RA (MA)	93,570	28	K1GXU
Gloucester County ARC (NJ)	66,274	13	AA2Z
Northern California CC	53,928	7	K6KLY
Mobile Sixers RC Inc. (Del/NJ/PA)	42,306	19	W3ETB
Murphy's Marauders (CT)	34,638	8	K1ZZ
Rochester ARC (MN)	12,170	14	W0VB
Local Class			
MIT Radio Society (MA)	33,460	5	N1HR
Ill Wind Contesters (IL)	31,460	4	K9MBX
Mitre-Bedford ARC (MA)	20,948	5	W1JR
Mt. Tom Amateur Repeater Assn. (MA)	14,554	5	W1JP
Six Meter Club of Chicago	11,662	7	WA9FIH
Lake Success RC (NY)	9,176	3	WB2GVD
Central Michigan ARC	8,936	4	WA8SQL
Northrop RC (CA)	7,548	3	W6CN
Warminster ARC (PA)	6,856	3	K3EBZ
Quad County ARC (PA)	5,906	5	WB3DVR
Skylands ARC (NJ)	5,906	3	WB2NCF
Indiana University ARC	1,528	3	W3EP/9

Single Operator Multiplier/QSO Leaders

Multiplier Leaders		QSO Leaders	
Call	No. Multipliers	Call	No. QSOs
WA1DZJ	24	K1FO	427
WA1OUB	22	W1JR	351
WB1FUB	22	K1ZZ	230
K1FO	21	W1EJ	197
WA2DPU	25	WA2DPU	603
WB2SZK	23	WB2SZK	465
K2LZF	23	W2EIF	440
WA2TEO	19	WB2YEH	385
W2EIF	19	WA2KOK	366
WA2KOK	19	K2YCO	354
WA2BPE	19	WB2RJL	321
W3HQT	28	WA3AXV	741
WA3AXV	26	K3MWX	684
WA1NGR/3	25	W3HQT	657
K3MWW	23	W3HFY	550
K3IPM	23	N3AHI	506
WB3CXE	22	K3IUV	474
KA4DCZ	26	WD4MUO	237
WB4JGG	26	KA4DCZ	179
K4EJQ	13	WB4JGG	171
K5CM	17	WA5VJB	135
WB5JAR	7	WB5KTC	129
W6YKM	13	N6NB	529
WB6NMT	12	K6KLY	328
N6NB	10	WA6HCI	268
K6KLY	10	WB6FTW/6	215
WA6HCI	10	W6AMT	159
WA7KYZ	12	W7ZSL	210
W7ZSL	7	WA7KYZ	199
W7YOZ	7	W7YOZ	135
WB8IGY	27	WB8IGY	213
K8NXI	22	WA8OGS	213
WA8OGS	21	K8NXI	180
K9RO	25	GW3NJY/W9	254
WA9PKL	19	K9SLQ	212
K9SLQ	14	K9RO	180
WB0ZXU	20	WB0ZXU	111
N0LL	18	W0RWH	103
VE1ASJ	31	VE1ASJ	258
VE2DFO	23	VE3BQN	151



WA4QYP, number three single-operator score from Virginia.



K3HZO made his call known on 2 and 432 from the Maryland-DC Section.



W2AV, half of the W2AV-WB2KAO team from Western New York.

the vhf bands. It was decided to operate from the home of WD8CVH and WB8VNO, but we had to put up the antennas and borrow equipment for 2-meter sideband. We erected a pair of stacked 5-element 6-meter beams at 60 feet, an 11-element 2-meter beam, a 7-element 220 beam, and a second tower to hold the 440 beam. All of this done in sub-zero weather. The operators were powered by 2-1/2 dozen sloppy joes, 2 cases of pop, and assorted munchies." — *WB8UNO/W8VPV, OH*

"It seemed like it was going to be a difficult project — working our first VHF SS, but WB7VQQ, WB7TIV and I (N7ACJ) were undaunted after having frozen (it was only 20 degrees) last weekend, getting the tower up just for this event. We weren't going to let a little thing like inexperience stop us. By the end of Saturday when we quit, we had amassed 34 QSOs (all on 2-meter tm), using all forms of subterfuge — like the mobiles who would come to the contest frequency from a repeater. We worked two unsuspecting fellows 70 miles away in Salem, Oregon — rolling up interstate 5. All in all, a successful weekend." — *N7ACJ/WB7VQQ, OR*

Clubs

When the club competition for the VHF SS is mentioned, it just seems natural to follow it up with the word Packrats. The Mt. Airy VHF Radio Club is number one in the unlimited class of club competition and the first and only club to break the one-million-point club aggregate barrier in the VHF SS. Enough said.

The other club in the unlimited class of club competition, the Rochester (NY) VHF Group can well be proud of a fine effort also. They added 200k points to their 1978 club aggregate and are on the threshold of breaking that magic one-megapoint barrier also.

The separation of the club competition into the three-tier system proved lucky for the South Jersey Radio Association and the MIT Radio Society, two clubs with excellent records of performance that deserve to win in their respective classifications.

Complacency has no place in the VHF SS club competition. Now that the competition is defined within each tier, we expect that real tooth and nail battles will develop for those three club gavels.

"As a historical note, back in 1963, the club came up with a slogan to help spur the group on — it was 'Time for a Million.' We never did make that goal and really didn't think that we

could until we started getting ready last fall. The amount of effort getting new antennas up and new rigs on the air was quite considerable. Guys were on the air checking signals and providing test signals on all bands into the wee hours of every night right up til the start of the contest (and even a few during the contest).

"All the logs have been checked by the submitting member and by a minimum of two other members. The overall score represents a greater than 50 percent increase over last year and breaks our old record from back in the 60s. The major reason for this is the 'scare' that we had from the Rochester Group last year. We haven't heard how they did this year, but the scare was good for us — it turned us (the club) into a unified group of very hard workers. We even surprised ourselves with the results. We wish the Rochester group a lot of luck and hope that the fierce competition was good for them also. Even though population and geographical differences make it difficult to compare scores across the country, the local competition really makes you hustle just to keep even. See you later; we're getting ready for 1980!" — *W3IIT, contest chairman, Mt. Airy VHF Radio Club*

"We all had a good time this year despite the antenna icing problems that seemed to settle over the Northeast early in the contest. Scores this year were down for the 'big guns' in this area because conditions were fairly poor. Our average score was up since a few more of the fm gang are now on ssb and cw and are able to work more than one section.

"We sincerely hope that this score is enough to give the Packrats a real go, but if not, I predict that next year's score will be well over one megapoint as we are all continuing to work on our 'low end' capabilities. I hope that the three-tier club competition structure will encourage more and more competition since the general increase in activity that seems to result is a real benefit to everyone's enjoyment of the vhf/uhf bands.

As this is written, I have no idea whether or not we beat the Packrats in 1979. If we did — FB! If not — wait til next year." — *W2AV, contest chairman, Rochester (NY) VHF Group.*



WBØYQS used 2 meters and 432 MHz to work seven sections and lead the South Dakota Section for single ops.



WA4MMP/1 doin' it on 2 from Rhode Island.



Bob, N2SB, who went portable 3 in MDC with friends WB2NPE and WB2RVX, concentrates on pulling out another 2-meter multiplier.



Aletha, WB3FUR, handled 6 meters while OM Mick, W3ILG, looked after the 2-meter chores at W3ILG, EPA.

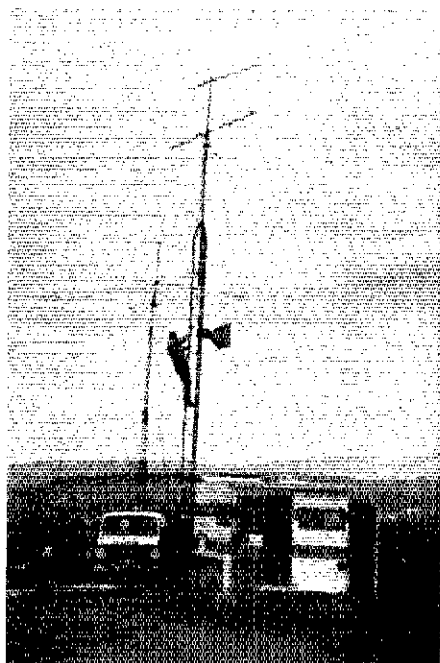
SOAPBOX

Had a hard time working my own section (WPa) (WA3TTH). Again everybody thinks that 6 meters is only 25 kHz wide! Heard WIs calling CQ under W3s all day but couldn't get back to them. The QRM here with the beam pointed northeast is unreal (N4CD). After a night of sleet and freezing rain, my 144-MHz beams looked like "an icicle built for two" (WB2RRH). Surprisingly enough, the number of stations participating in the January SS lately seems to exceed the number in the September contest. Consistently work over 200 stations here from Eastern Long Island. Band conditions were poor to fair. Six meters never opened and trying to exchange reports on scatter is near impossible due to the length of the exchange (K2OVS). The WX and band condx were so bad that I saw two earthworms racing my ground wave for the nearest cover (WB4NBK). Activity seemed down this year. Shoveling 24 inches of snow and repairing the amplifier screen supply didn't help my score (K9MBX). Splatter made contacts very difficult. The increase in activity during a contest is amazing

Division Leaders

Single Op	Division	Multioop
WA3AXV*	Atlantic	W3KKN*
K9RO	Central	K9HDE
WØVB	Dakota	KØVXM*
WB4JGG*	Delta	WB4LHD/5
WB8IGY	Great Lakes	K8III*
WB2QOQ	Hudson	K2DEG
WBØZXU	Midwest	WØRT
K1FO	New England	WA1RWU
WA7KYZ*	Northwestern	K7ND*
K6KLY	Pacific	N6AMG
WD4MUO*	Roanoke	W4BFB*
WØPMY	Rocky Mountain	NØKV
WB4NMA	Southeastern	W4VO
N6NB*	Southwestern	K6MEP
K5CM	West Gulf	K5LZO
VE1ASJ*	Canadian	VE1DXA*
N4UM/C6A	DX	—

*Denotes new all-time division record.



The crew at K6MEP doing what they do best, mountaintopping and turning in the top divisional score for multioperator stations in the Southwestern Division.

(WB2CHE). How about 6-m scatter ops using 15- or 30-second sequencing? Sure would make things a lot easier (K1FO). Quite a bit of competition in the Orange Section. A remarkable increase in the last couple of contests. I like the idea of sending the serial numbers as part of the exchange. It lets one know where he stands. How about including serial numbers as part of the exchange for the June and September contests? (WB6MFV). I hold the Section Certificate for the first VHF SS, held in 1948 and a few thereafter. Things sure have changed. This was my first vhf contest entry in about 25 years. Expect to enter the June and September contests this coming year (W4JAZ). I kept waiting for "good weather" to put up the 2-meter beam. The weather never improved, so my son (WBØUIP) and I erected it the morning of the contest — in a blizzard! The fm simplex rule is a good one. We have many new people interested in contests as a result (WØRGU). I have mixed emotions about the scoring for the bands above 144 MHz. The present system almost forces an individual to gear up on 220, 432 and even 1296 in order to become even modestly competitive. I can appreciate

the fact that this is in essence a "reward" for populating these higher vhf/uhf bands, but it tends to tip the edge to large groups who have geared up for these bands. Years ago the "sections plus 10" feature was incorporated to try to smooth out some of the geographical disparities; why not do something like this for the frequency situation? Perhaps an option, such as either taking the "sections plus 10" factor or something of a point bonus for operation on the higher bands (220, 432, etc.). This might tend to restore a fairer system to the "little guns" (N2FY). "Dirty" signals on the vhf bands are an increasing problem. Suggest that OOs be alerted to monitor the bands during the VHF SS, noting in particular sss platter and key clicks (W2PAU). Will see you in the June contest from 8000 feet up (WA2JTM). More contest participants than in any of the past five sht contests. I think that the club participation brought out many more ops, new to contesting. Also amazed at the number of YLs in this contest (WB2NCF). Please excuse the low score, but our 2-meter logs were lost during high winds and a snowstorm on top of the mountain. Snow covered up the logs before we could find them (WA4WZQ). Worst ever on 432 (WA2SNA/N2AAZ). We expected great things from our 432 antennas. Four 15-element quags up about 30 feet sure looked impressive, but we only heard one local station (VE3AEA/3 VE3IQZ). We were on a fire-tower-like structure 110 feet above the prairies of Illinois. Would have been great if it weren't for an ice storm on Saturday and 50-mph winds and below-zero temperatures on Sunday. Even the scatter on 6 meters on Sunday morning couldn't warm us up! (K9AKS). Seems the 2-meter fm operator courtesy is improving.

About time! (WA3AXV). Saturday night, K2OWR put up our 220-MHz Ringo, a five-minute job normally, but it took about half an hour in the 15-degree sleeting WX and 40-mph winds! Brrr (K2XXR). Very nice contest. Conditions poor to average most of the time, but this is preferable to the true contest. Anybody can work openings (W2EIF). You might consider a separate fm only contest, preferably at different times than the vhf contest. It would hurt my score, but would make the contest much more enjoyable (W3HT). We have begun preparations for another XE2BC assault for June. The gang in XE is quite enthusiastic about it, and it looks like it will be a much better prepared operation. The 144 array which did not use our own echoes and some sigs from K1WHS, W7FN and W6PO has been very thoroughly tested at my OTH, and we may put it up down there as well. We will be working to have gear on 2.3 and 10 GHz this year, which may be a first for these bands from XE, certainly VE2 (WB6NMT). A VO1 or VO2 quite literally doesn't stand a chance of winning or even placing in the Maritime Section. There would be little incentive for me as a VO1 or VO2 to enter a contest where the cards (propagation wise) are stacked against me. To benefit all, VO1/VO2 should be made a separate multiplier, distinct from the Maritime Section (VE1BNN). On multiops working people that are part of their operation, I think that any call sign shown as part of a multiop roster should not be counted as a QSO for that multiop effort even if that operator has left the site and returned home (K1LPS). Conditions on 6- and 2-meter sss were very poor. Not even the locals were on (W5HYL). Loved the earlier operating time, but hated the exchange (WB2CUT).

The club participation rules, I believe, are overly complicated. As club chairman for this activity, I felt the need for the services of a lawyer for interpretation, an accountant to track membership activity and a surveyor/geographer to determine station distance for club classification (K1CHY). [Thanks, Irwin, for taking the time to do the job correctly. You should see what we have to go through when we receive club entries that aren't documented quite as nicely as yours. — Ed.]

FEEDBACK

Please note the following corrections to the report of the 1978 VHF SS, which appeared on page 69 of July 1978 QST.

The score for WB0HHM was incorrectly listed as 3840. It should have been 1024 points. This moves K0VXM with a score of 1656 up to first place in the South Dakota Section and makes him the Dakota Division leader for single ops.

W1EMF should have been listed in the number 10 position in the top ten multiplier listings. Through an oversight, W1ABF was not listed as the co-winner of the club award for the Mt. Tom Repeater Association.

Murphy also reared his ugly head in the results of the September VHF QSO Party. In the Ohio Section, the score of WA2TTS should be 18,304, not the 3432 listed. This moves Tom to the top spot for single operators in Ohio as well as number one single op in the Great Lakes Division. QST

Scores

Scores are listed in order, single-operator stations first within each section. From left to right: Call, score, number of QSOs, number of multipliers, bands operated (A-60 MHz, B-144 MHz, C-220 MHz, D-432 MHz, E-1296 MHz, F-2304 MHz, G-3300 MHz, H-5 GHz, I-10 GHz).

DX

WA1OUB 6336-99-22-A
AC1J 9006-126-11-ABCD
WA1FSZ 3600-100-18-AB
WBDC 2392-46-16-A
WA1MGC 1788-39-13-A

Bahamas

N4UM/C6A(WD415Y,op) 1368-57-2-AB

U.S.A.

1
K1COW/I 4211-61-WG
WB1DRW 8464-765-13-ABCDE
K1PAM/(K1DS) 4180-94-9-ABCD

Connecticut

K1FO 30,904-877-21-ABCD
K1ZZ 14,472-230-14-ABCD
K1TK 9560-169-15-ABCD
W1AVV 6750-116-15-A
W1AVL 5670-105-17-B
K1VMI 4300-100-14-B
W1FAI 3740-79-11-BCD
W1ZDW 3680-80-13-B
W1ASQB 3570-78-11-ABCD
W1ALW 3280-74-10-BCD
W1ALCN 3108-74-11-AB
K1EM 2688-64-11-AB
N1CC 2016-48-11-AB
W1MAAO 1980-33-5-CD
W1AGTP 1932-46-11-AB
K1KI 1180-29-10-A
WB2BPC/I 696-24-2-BC
N1AGD 672-22-2-ABCD
W1AZNT 598-21-3-AB
WB1EYI 360-15-2-B
W1HDQ 308-22-4-A
W1BZRV/I 180-17-5-B
W1CDD 112-4-4-B
W1ALUJ(K1V VSC ZKR,WA1S HYN RLW,WB1EAT,op) 48,466-903-23-ABCIII
K1V(M/(K1JL)) 4272-38-14-BC
W1WHF/(W1AZCN,op) 1018-56-9-AB
WB1BYW(WA21V,op)

Eastern Massachusetts

W1JR 16,150-351-15-ABCDE
W1SOD/I 8928-165-14-ABCD
W1FJUS 8512-133-22-A
W1GKT 7728-118-14-BCD
W1HFK 5544-110-12-ABD
N1HR 5512-106-18-B
Z1CHY 2992-87-2-ABCD
K1GVM 3826-83-18-AB
W1CRL 2640-55-12-ABD
W1MX(WA2ZY,op) 23-1-1-B
W1ZR 870-23-5-ABD
W1DU 768-24-6-AB
W1AY 390-17-5-ABD
W1BIFK 364-21-2-ABD
W1JOT 224-6-6-ABD
W1UJ 158-7-2-B
WA2TTS/I 144-1-1-D
WB2CWO/I 144-1-1-D
K1JMR(W1LUG,op) 23-1-1-B
W1XMK(M1KMX,W1XG,WA4TTG,op) 25,500-347-20-ABCDE
W1MZC/(K1S BA MON,WA1PGE) 10,100-192-15-ABD
WA1AYS/(WB2C,UD,op) 3990-94-9-AB
K1TK(WA1QV) 1802-53-7-B

Maine

W1LDZJ 11,132-164-24-AB

New Hampshire

W1EJ 12,824-197-18-ABCD

WA1OUB 6336-99-22-A
AC1J 9006-126-11-ABCD
WA1FSZ 3600-100-18-AB
WBDC 2392-46-16-A
WA1MGC 1788-39-13-A

Rhode Island

WA1PBR 7300-129-15-ABCD
WA4MMP/I 8032-116-16-AB
W1UHE 6140-71-3-AD
WA2JHR/(WB4RVA) 11,960-210-6-ABCD
K1COW/I 4211-61-WG
WB1DRW 8464-765-13-ABCDE
K1PAM/(K1DS) 4180-94-9-ABCD

Vermont

W1AJXN 2852-62-14-B
K1LPS 1596-34-11-ABD
K1BF 602-24-10-B
WB1BZR 210-7-5-B
K1SVT 104-4-3-AB
W1AIM/(K1TOL) 17,472-217-29-ABD
WA1SYQ/(K1K1B,W1RYF) 986-18-7-BC

Western Massachusetts

K1GXU 7540-145-16-B
W1ZI 7506-139-17-A
W1NH 6152-12-13-B
W1MTV 4968-92-17-A
WB1ABF 4752-108-12-H
AC1I 4576-98-19-ABD
WB1CBH 4046-81-10-ABD
N1PF 3486-83-11-AB
W1WRM 2754-81-7-AB
W1UWX 2560-64-10-AB
W1UJL 2676-60-4-B
K1NWE 2620-90-10-AB
K1TF 2120-53-10-AB
W1UJL 150-7-5-AB
W1LVPD 1860-75-5-AB
K1TQA 1696-65-3-B
W1KUL 1620-54-5-B
W1HAW 1400-50-4-B
W1LYW 1178-53-3-B
N1ABJ 1148-41-4-AB
W1ETH 1092-42-3-AB
W1PQT 936-36-3-BC
WB1ETS 936-39-3-BC
W1LVHU 910-35-3-BC
K1BE 884-34-3-B
W1LPH 806-60-4-B
W1LWC 840-21-5-AD
WB1CJ 806-31-3-B
WB1EHS 806-31-3-B
W1KUE 504-21-2-AB
WB1BPJ 468-18-3-BC
W1DNB 440-20-1-B
K1UOR 364-28-3-BC
W1UJL 300-18-4-AB
W1UWX 264-12-1-B
K1YQV 176-8-1-B
K1JG 156-6-3-B
W1UJL 150-7-5-AB
W1LRWU/(KA1APR,W1UWX,WA1ECR,LPI,UDC,WB1CAC) 42,550-858-27-ABD

2

Eastern New York

W1TEO 10,324-170-19-ABC
W1SDV 740-146-5-ABD
K2OY 5750-106-13-BC
K2GSF 4692-107-13-B
WB2SHU 3312-63-13-AB
WB2KHH 3112-61-17-AB
WB2EHE 1938-51-9-B
W1P 684-19-8-B
WB2Z/(K2T,K2M,K2B2 BXP,CFP,GFP,KO,OC,OP) 18,014-256-23-ABCDE

New York City - L.I.

WA2SLY 13,033-232-16-ABD

WB2QBT 12,896-228-16-ABC
K2QVS 12,096-216-18-AB
WA2NCT 7500-150-15-AB
WB3HHS/Z 6762-147-13-BC
WB2W 6488-147-13-BC
WB2GVD 5136-107-14-AB
W2H 3920-64-12-BCD
WB2ED 3560-64-12-BCD
W1ASEL 1500-25-18-BCD
WA2ISH 1520-38-10-B
WA2WZV 1222-33-7-B
WB2IDE 208-7-4-AC

Northern New Jersey

WB2QQQ 14,992-247-14-BCD
WB2CUT 13,160-235-18-B
WB2ICZ 10,120-220-13-AB
WB2WH 2900-192-12-ABCD
WB2CAM 8148-194-11-AB
WB2RMI 7266-173-11-B
WB2NCF 6244-138-9-B
WB2HGS 6242-102-8-B
WB2HES 3472-110-4-BC
WB2HC 3390-56-5-BC
WB2LSJ 3180-100-12-BC
WB2JUL 3120-104-5-B
KA2AVA 2800-100-9-CD
WB2GAT 2018-96-8-BC
AG2N 1858-66-4-AB
W2CWW 1802-48-7-ABCD
K2ZEW 1792-67-3-AB
W2H 1622-67-3-AB
WB2TBB 1596-42-7-AB
WB2ADH 1484-53-8-AB
W2H 1352-47-2-BC
WA2KAZ 1428-29-11-AB
K2BDN 1300-50-3-B
K2LPG 1196-46-3-AB
K2TO 1144-45-3-AB
K2KME 1144-24-2-BC
W1AZJUS 1056-41-5-AB
WB2LNL 1036-37-7-AB
W2H 1022-37-7-AB
WA2ZNT 840-36-2-BC
W2JLS 726-33-1-B
WB2W 576-36-1-B
W2H 512-4-4-AB
WB2CL 506-23-1-AB
WB2LAH 506-23-1-AB
K2MBZ/(K2LP,op) 466-13-8-AB
WB2WAB 462-21-1-B
WB2CHE 238-7-7-AB
W2RWJ 178-6-1-AB
W2H 112-4-4-AB
K2DEG/(K2S KJ1 RVH,WA2S IRY RLW,WB2EY,op) 65,200-754-25-ABCDEI
K2KRI/(K2S JWE OWR,W2S RVO,W1U) 64,464-708-27-ABC

Southern New Jersey

WA2SNA 54,464-708-27-ABC
W1W 49,200-754-25-ABCDEI
HM LUW NJLZ,WA2VA JSW JUO SLH UPK,WB2S ARS JCP LBP QEA,W2DAA,op) 41,602-251-21-ABCD

2

WA2DPU 49,490-603-25-ABCD
WB2SZK 37,488-465-23-ABCD
W2EIF 33,698-440-19-ABCD
WA2KUH 24,360-366-19-ABCD
WB2YEM 20,884-385-13-ABCD
W2EMB 18,592-308-18-AB
W1P 15,548-299-16-AB
WS4NXY/Z 15,120-270-18-AB
K1AZZ 15,032-270-18-AB
N2F 14,224-254-18-AB
WA2OMY 12,466-271-13-AB
W2BLV 8832-184-14-AB
W2ORA 7190-205-9-AB
A12B 6778-156-12-AB
WB2NPNY 6592-254-12-AB
WA2PFC 5990-215-3-AB
K1TQ2 5472-144-9-AB
N2CQ 5202-153-7-AB

WA2QOX 5200-200-3-AB
N2ALA 4646-186-3-BC
W2QGB 4660-138-2-BC
N2H 4590-175-3-BC
WA2YSW 4420-108-3-AB
4326-103-11-B
WA2JVL 4082-157-3-BC
WB2GK 3840-148-4-AB
K2S 3584-128-4-AB
W2FFU 3492-84-8-BCD
WB2HGI 3480-75-13-BC
WB2HAB 3162-93-7-AB
WA2MMA 2912-112-1-H
KN2QW 2886-111-2-AB
WB2EFL 2006-59-7-AB
K2NH 2652-102-3-AB
WA2NBM 2408-85-4-BC
N2AF 2100-75-4-BC
WB2EFL 2006-59-7-AB
WB2AY 1976-76-3-AB
WB2AOL 1976-75-3-BC
WA2RHJ 1932-69-4-AB
K2L 1872-70-2-AB
WB2KKS 1872-72-3-AB
N2AZ 1870-95-7-BC
WB2SPJ 1870-95-6-AB
K2BZL 1872-70-2-AB
WA2NAK 1728-72-2-B
WB2JMK 1508-58-3-AB
W2EKS 1484-61-2-AB
WB2GTY 1476-75-3-AB
WA2WSV 1416-59-2-AB
WA2TRJ 1344-56-2-BC
N2HF 1176-49-2-AB
K2CWY 1068-41-5-AB
WB2RKM 768-17-2-AC
WB2WXM 600-25-2-AB
WA2ARW 456-19-2-AB
WA2GLY 254-11-2-AB
W2HOB 254-11-2-AB
WB2DD 180-5-3-AB
K2NE/(KA2BOP,WA3RKM,WUL,WA3C,CT) 13,040-519-27-ABC
N2ASC/(KA2BAO,W2HN, WB2KCS,op) 22,844-522-17-ABCD
WB2LCC/(N2ME) 31,958-481-19-ABCD
W2PAU/(W2EZX,op) 24,300-403-20-ABC
WB2CUD/(W2E1,GE2,HWF) 20,736-358-14-ABCD
AB2Y/(AB2E,AB2R,NJ) 16,928-368-13-AB
AERV/(WA2E2S,WB2UOH) 6890-265-3-AB
WA2DKB/(WB2S JGQ,W2H) 4415-59-14-ABD

Western New Jersey

K2YCO 17,856-354-14-ABCDE
W2ZNC 15,548-287-16-ABD
WB2JL 13,760-321-10-ABD
WB2RJL 11,240-281-10-AB
K2RHS 10,260-285-8-AB
N21Y 9626-259-8-ABCD
WA2HE 9602-169-19-AB
WA2YEK 9520-280-7-AB
AF2K 8960-320-4-AB
WB2KIV 8760-277-3-AB
K2LZF 8668-129-2-AB
W2VYV 8128-254-6-AB
WB2RHJ 7940-266-6-AB
DL7KX/W 7890-230-7-B
K2JVF 7728-276-4-AB
W2GV 7638-196-9-ABD
WB2GGI 7514-129-17-ABD
WA2JWL 7420-281-10-AB
WB2DSR 6940-232-5-AB
W2PQW 6812-288-7-AB
WA2CFR 6812-288-7-AB
W2COW 6720-197-6-ABD
K2QEQ 6624-207-6-AB
WB2ASH 6592-254-6-AB
K2MFP 6480-206-6-AB
K2LZD 6484-206-6-AB
W1LIS 6448-249-3-AB

K2SPO 6318-243-3-AB
K2KKE 6032-232-3-BC
K2RJ 4616-220-7-BCD
K2PGN 4582-233-2-BC
K2S 4440-208-7-BCD
K2HC 5408-208-3-AB
WB2QK 3408-150-6-ABCD
WB2GK 3398-180-2-AB
WA2APL 3398-180-2-AB
W2SLE 3356-206-4-AB
AB2J 3352-223-7-BC
WB2ZPI 3276-194-2-AB
K2BZU 3208-217-2-AB
WB2YJH 3200-200-3-AB
WB2VPH 3092-134-7-AB
K2G 3040-30-18-B
K2OS 5000-125-10-B
W2G 5032-148-7-BC
WA2EKT 5016-208-2-BC
K2S 5000-125-10-B
W2G 5032-148-7-BC
WA2EKT 5016-208-2-BC
WA2GJ 4982-208-2-BC
W2BFB 4968-207-2-BC
WA2KUP 4968-207-2-BC
WA2WAB 4944-206-2-BC
W2NES 4896-204-7-BC
W2LUBD 4872-203-2-BC
K2OZT 4854-202-2-AB
WB2ZFS 4752-198-4-AB
K2VFR 4830-155-6-BCD
WB2HJV 4776-199-2-BC
WB2ZS 4776-199-2-BC
W2EKS 4752-198-4-AB
W2H 4752-198-2-AB
WB2KVP 4680-196-7-AB
WB2H 4676-194-2-AB
W2HJV 4536-144-7-BC
WA2WHL 4512-188-2-BC
WB2PH 4440-188-2-BC
WB2PT 4316-167-2-AB
WA2CT 4344-181-2-BC
WA2MCCB 4344-181-2-BC
K2IWI 4224-192-1-AB
K2H 4200-175-2-BC
AG2K 4200-175-2-BC
K2EAW 4176-174-2-BC
WB2MYG 4176-174-2-BC
W2H 4176-174-2-BC
WA2HGS 4088-146-4-AB
K2YA 4026-160-3-AB
N2AMJ 4056-160-2-AB
WB2HPT 3916-137-2-AB
K2JIA 4032-168-2-BC
K2H 4026-164-1-AB
WB2RG 3960-155-2-BC
W2H 3938-179-1-AB
WB2MCO 3912-163-4-AB
WB2AMC 3892-139-4-AB
K2MPE 3822-91-1-AB
WB2HWO 3816-180-4-AB
WB2NVZ 3768-157-2-BC
N2V 3762-171-1-BC
WB2LR 3696-132-4-AB
AG2QU/W2 3696-168-1-BC

W1PI 3676-133-2-BC
W2KUN 3652-115-2-BC
W2H 3676-149-2-BC
WB2HNL 3592-111-6-BC
WB2GAM 3486-144-7-BC
K2OJL 3484-151-7-BC
WB2TT 3472-156-7-BC
WA2ECC 3410-155-1-AB
W2RKO 3384-141-2-BC
WB2MOP 3372-151-3-BC
N2H 3368-137-2-BC
WB2MQR 3288-137-2-BC
K2LZF 3274-147-1-AB
W2HG 3212-146-1-BC
W2TOM 3192-133-2-BC
WA2ISA 3180-145-1-BC
KB2BL 3124-147-1-BC
WB2LJG 3102-141-1-AB
WA2JWL 3072-141-1-AB
N2HS 3072-141-1-AB
N2APB 3036-138-1-AB
WB2FR 3024-126-2-BC
N2H 3024-126-2-BC
AG2NS 3002-74-9-ABD
W2GUM 3000-128-2-BC
WB2MTP/Z 2998-107-4-AB
K2H 2928-122-1-BC
WA2EUD 2928-122-1-BC
WB2LW 2904-121-2-BC

Rules, 1979 IARU Radiosport Championship

No matter if you like to communicate around the block or around the world, on phone or on cw, the Radiosport Championship is the contest that lets you, the operator, choose how you will play July 14-15.

Hardly seems possible that two years have elapsed since the inception of the IARU Radiosport Championship, but the time for number three is rapidly drawing near. The Radiosport Championship is unique among the Amateur Radio world's major contests. First, it is the only worldwide contest sponsored under the auspices of the IARU. Second, it is a contest in which each and every participant has an equal chance to "win." This is a contest in which strategy and operating technique are even more important than the size of your antenna farm and how many kilowatts of power you can manage to effectively radiate from that jungle of aluminum. Judiciously choosing operating times and taking time to search out the less common multipliers are factors every bit as important to a "winning" effort in the Radiosport as how "big" the station is.

Last but not least the single-operator station is not forced to suffer through the contest period using his least favorite mode of operation. One can choose to run phone or cw or any combination of the two for as much of the con-

test period as he chooses. Awards are available for various achievement levels: for making 250 QSOs, 1000 QSOs and/or 50 total multipliers.

One point is earned for a QSO with a station in your own ITU zone. Three points for a QSO with a station outside your own ITU zone, but on your own continent. And five points for a QSO with a station on a continent other than your own. The rules for 1979 are explained fully, below. Read on . . .

Entries from U.S. and Canadian amateurs will be accepted *only* if made on official log sheets and summary sheets or a *reasonable* facsimile (available upon request). Send a large, self-addressed stamped envelope to ARRL Headquarters, 225 Main Street, Newington, CT 06111, USA. Log sheets contain space for 100 contacts per sheet of paper; don't forget also to request CD-77 forms for keeping track (in matrix form) of W/VE contacts, and form CD-175 for DX contacts. Such forms or *reasonable* facsimiles (filled out) are required with any U.S. or Canadian entrant making a total of more than 200 contacts.

Eligibility: All amateurs worldwide, in

single-operator and multioperator, single-transmitter categories. No multitransmitter allowed. Separate categories of competition for single-operator stations will include the following: cw only, phone only, and mixed phone and cw. Mixed-mode only for multioperator entries. Guidelines for single-operator and multi-single are the same as for the ARRL International DX competition (page 86, January 1979 QST).

Contest Period: July 14 and 15, 1979 (UTC). Maximum 36 hours for single-operator entries. Off times must be *at least* 30 minutes in length. No time limit for multi-single stations, although once a multi-single station commences operation on a particular band, it must remain on that same band for *at least* 10 minutes.

Valid Contacts: All amateur bands, 160 through 2 meters. Each station may be worked once per frequency band, regardless of mode. Crossband contacts not allowed. Contacts made by retransmitting either or both stations do not count for contest purposes. Contacts within one's own ITU zone count one point;

Listed by prefix, alphabetically, are the countries of the world and the ITU zone of each.

A2	67	EA6	37	HH	11	KH6	61	SM	18	UMB, UK8M, N	31	VR1	62	ZK2	82	5V	46
A3	62	EA8	36	HI	11	KJ/KH3	61	SP	28	UC5, UK50	29	VR3, 7	61	ZL	80	5W	62
A4	39	EA9	37	HK	12	KL	01	ST	46	UP2, UK2B/P	29	VR6	63	ZM	62	5X	46
A5	41		27	HKØ	11, 12	KM/KH4	61	SU	38	UQ2, UK2G/Q	29	VR5	54	ZP	14	5Z	46
A6	39		46	HP	44	KP4	11	SV	28	UR2, UK2R/V	29	VR6	44	ZS	57	60	46
A7	39	EL	40	HP, HM	44	KP6/KH5	61, 62	T2	65	VE1	09	VR9	41	ZS2	57	6W	45
A9	39	ET	48	HR	11	KS6/KH8	62	TA	39	VE2	04, 09	VR9K	39	ZS3	57	6Y	11
AP	41	F	27	HS	49	KV/KP2	11	TF	17	VE3, 5	04	VU	41	18	50	70	39
AV	44	FB8Z	68	HT	28	KW/KH9	65	TG	11	VE4, 5	03	VU7	49	3A	27	7P	57
BY	42, 43	FB8W	68	HZ, Z2	39	KX	65	TI	11	VE6, 7	02	VU7	41	3B6, 7	53	7Q	53
C2	65	FB8X	68	IL, T	28	KZ	11	TJ	11	VE8	02, 03	XE	10	3B8	53	8P	37
C3	27	FC	28	IS	28	LA	18	TJ	47		04, 75	XF4	10	3B9	53	8R	12
C5	46	FG	11	J3	11	LZ	17, 18	TL	47	VX	09	XT	46	3C	47	8R	39
C6	11	FH	53	JA	45	LU	24, 16	TN	52	VY	09	XU	49	3CØ	52	8Z4	12
C9	53	FK	56	JB	45	LZ	28	TR	47	VK1, 2, 3, 5, 7	59	XV	49	3D2	56	9A(M)	26
CE	14, 16	FL	48	JT	32	OA	12	TT	47	VK4, 8	55	XW	49	3D6	57	9G	46
CE#A	63	FM	11	JW	18	OD	63	TU	46	VK6	56	XZ	49	3V	47	9H	26
CE#Z	14	FO	10, 63	JX	18	OE	28	TY	46	VK8	60	YA	40	3X	45	9J	53
CE#X	14	FP	09	JY	18	OH	18	TZ	46	VK9	60	YB	54	3Y	67	9K	46
CM, CO	11	FR	53	W1	08	OHØ	18	UA, UK, UV	18, 20	VK9	54	YD	59	4S	41	9L	39
CN	37	FS	11	W2	08	OJØ	18	UW1, 4, 6	29, 30	VK9	55	YE	56	4U1ITU	28	9M2	54
CP	12, 14	FW	62	W3	08	OK	28	UA1, UK1	75	VKØ	68	YK	39	4U1UN	08	9M6, 8	54
CR5	47	FY	12	W3	08	ON	27	UA2, UK2F	29	VKØ	60	YN	11	4W	39	9N	42
CR9	44	G	27	W4	08	OP	05	UA, UK, UV, UW9-Ø	20-35	VP1	11	YO	28	4X, 4Z	39	9Q	52
CT	37	GD	27	W5	07	OQ, XP	18	UB, UK, UT, UYS	29	VP2	11	YS	11	5A	38	9V	52
CT2	36	GI	27	W6, 7	06	OZ	18	UC2, UK2A/C/I/L	29	VP2A	11	YU	28	5B, ZC	28	9V	54
CT3	36	GJ	27	W8, 9	08	P2	18	O/S/W	29	VP2B	11	YV	12	5H	53	9X	52
CX	14	GM	27	WØ	07	PA	51	UD8, UK8 C/D/K	29	VP2D	11	YVØ	11	5N	46	9Y	51
D2, 3	52	GU	27	KC4	67, 69, 70	PJ	11	UF6, UK6F/O/Q/V	29	VP2M	11	ZA	28	5R	53		
D4	46	GW	27		71, 72, 73	PY	13, 15	UH8, UK8G	30	VP2K	11	ZB	37	5T	46		
D5	46	HA	51	KC8	65	PYØ	13	UH8, UK8H	30	VP2S	11	ZD	66	5U	46		
D6	53	HA	28	KC6	64	PYØ	13	UI8, UK8	30	VP5	11	ZD8	66				
DJ	28	HB	28	KG4	11	PZ	12	UJ8, UK8J/R	30	VP8	16	ZD9	66				
DM	28	HBØ	28	KG6/KH2	64	S2	41	UL7, UK7	30	VP8	73	ZE	53				
DU	50	HC	12	KGØR, S, T	64	S7	53			VP9	11	ZF	11				
EA	37	HC8	12	KH1	61, 62					VQ9	41	ZK1	62				

outside of one's ITU zone but within one's own continent count three points; and outside of one's own continent count five points.

Multipliers: The sum of the number of different ITU zones worked on each band.

Exchanges: Signal report and ITU zone.

Scoring: Final score equals number of QSO points times the zone multiplier.

Reporting: All entries worldwide to be sent to IARU Headquarters, Box AAA, Newington, CT 06111, USA. All U.S. and Canadian entrants *must* use official log sheets and summary sheets, or a *reasonable* facsimile. Entries *must* be accompanied by dupe sheets if 200 or more QSOs were made. Entries *must* be postmarked no later than August 27, 1979. Any entry received after mid-October 1979 *may* not be in time to be included in the printed results. All entries become the property of the IARU and none can be returned. In cases of dispute, the decisions of the IARU/ARRL Awards Committee are final.

Conditions of Entry: Each entrant agrees to be bound by the provisions as well as the intent

of this announcement, the regulations of his licensing authority and the decisions of the IARU/ARRL Awards Committee. Incomplete or illegible entries will be classified as check logs.

Disqualifications

If the claimed score of a participant is reduced by two percent or more, the log *may* be disqualified. Score reduction does not include correction of arithmetic errors.

Score reductions may be made for taking credit for unconfirmed QSOs and/or multipliers, duplicate contacts, banned countries, and/or other scoring discrepancies.


An entry with more than two-percent duplicate contacts left in the log or an entry where more than two-percent "rubber clocking" (altering the actual time to increase the operating time so that it is greater than the allowable limit) is detected *will be automatically disqualified*.

If a participant is disqualified, he will be barred from submitting an entry in the next Radiosport Championship. The calls of all dis-

qualified participants will be listed in the *QST* contest report. Any participant on the border line of disqualification but not actually disqualified may receive a warning letter.

For each duplicate contact that is removed from the log by Hq., a penalty of three additional contacts will be exacted. The penalty will not, however, be considered part of the two-percent disqualification criterion.

In all cases of question, the decisions of the IARU/ARRL Awards Committee are final.

Awards: A certificate will be awarded to the highest scoring cw-only, phone-only and mixed-mode entrant in each ARRL section, each ITU zone, and each DXCC country. In addition, achievement-level awards are available. A certificate and/or endorsements are available for making 250 QSOs, 1000 QSOs, and/or making a total of 50 or more multipliers. In the case of multiple award levels achieved, only the highest award will be issued. Additional awards may be made at the discretion of each country's IARU member-society. 

Field Day Rules

Neither rain nor snow nor sunburn nor insects nor . . . shall stay the Field Day operator from his appointed QSOs on June 23-24.

Seems that you just finish nursing the wounds and repairing the equipment from that last Field Day when another sneaks right up on you. Well, surprise, it's that time again. Just a few short weeks left to finalize those FD plans and send an s.a.s.e. (self-addressed, stamped envelope) to Hq. to get your official Field Day entry forms. You will need one summary sheet for your entire FD operation and one dupe/checksheet (CD-77A) for each band/mode (one for 80-meter phone, one for 80-meter cw, etc.) that you plan to operate. If you have facilities to make photocopies, please request one dupe sheet and run off as many copies as you will need. A business-sized s.a.s.e. is required to process requests for FD entry forms.

The Field Day rules for 1979 are basically the same as those in 1978 with the exception that there will be *no* Club Aggregate Mobile Score Listings. There will, of course, be a Mobile Category for those stations wishing to operate mobile during Field Day.

We are well aware of the fact that stations that are portable/mobile, etc. are not required by FCC regulations to sign /portable or /mobile, *but* since the Field Day rules allow fixed (permanent type) stations to work only those stations portable or mobile for FD purposes, we need a way to distinguish fixed and other (portable/mobile) type stations which are participating in FD. For Field Day participa-

tion purposes, all stations operating portable (not from permanent station locations) or mobile *will* so indicate their portable or mobile status *each* time their call sign is given and at

least once during each QSO made for Field Day scoring credit. OSCAR 8 was scheduled to be in Mode A-J (both available). At press time the schedule for the Russian Radiosport satellites



The Tidelands ARS call their generator a "power source and mosquito fogger" (note exhaust smoke at upper right of photo). That sucker looks big enough to supply the electricity needs for a small town. K5YYD and WB5QXZ tend the beast for the K5CA/5 (5A) 1978 Field Day effort.



Field Day is fun for all ages. The 1978 bash brought out three generations of the Hileman family. From the left they are Doc, WB8OSQ, Ralph, K6HD, and Don, WB6NFA. They operated K6HD/6 (5A).



When all else fails, there's nothing to lose by trying a little meditation to get a different perspective on the Field Day situation. The Fongo Hill RC ran N6RZ/6 (3A Batt).

was not available.

Be sure to read the rules *very carefully!*
Good luck!

Rules

1) **Eligibility:** The Field Day is open competitively to all amateurs in the ARRL Field Organization (plus Yukon and N.W.T.). Foreign stations may be contacted for credit but are not eligible to compete.

2) **Object:** For portable and mobile stations, to work as many stations as possible. For home stations, to work as many portable and mobile stations as possible.

3) **Conditions of Entry:** Each entrant agrees to be bound by the intent as well as the provisions of these rules, the regulations of his licensing authority, and the decisions of the ARRL Awards Committee.

4) **Entry Classifications:** Entries will be classified according to the number of transmitted signals, simultaneously on the air at any one time during the FD period, followed by the designation of the nature of the individual or group participation. Once a transmitter makes a contact on a band, it must remain on that band for at least 15 minutes. During this 15-minute period, the transmitter is considered to be transmitting a signal, whether it is or not, for purposes of determining transmitter class. Class A: Club group (or nonclub group with three or more licensed amateurs) set up specifically for operation in the FD and using portable identification. Such stations must be located in places which are not regular station locations and must use no equipment or facilities installed for permanent station use, nor any structures installed permanently for FD use. Stations must be operated under one call (except when a Novice/Technician position is used, as provided by miscellaneous rule 9c) and under control of a single licensee or trustee for each entry. All equipment (including antennas) must lie within a circle whose diameter must not exceed 1000 feet. All contacts must be made with transmitter(s) and receiver(s) operating from a power source independent of

commercial mains. Entrants who, for any reason, operate a transmitter or receiver from commercial mains for one or more contacts, will be listed at the end of their class. Class B: Nonclub stations set up and operated by not more than two licensed amateurs. Other provisions same as for Class A. Class C: Stations located in vehicles capable of operation while in motion and normally operated in this manner, including antenna. Class C stations may operate stationary, but no stationary equipment or facilities may be used. A Class C station may not be used as a station in any other class. The operator of a Class C station may also operate from another station during the FD period but scores for his mobile operations must be submitted separately. Class D: Stations operating from permanent or licensed station locations, not portable or mobile, using commercial power. Class E: As above, but using emergency power for transmitters and receivers.

5) **Field Day Period:** FD operation starts at 1800 UTC the fourth Saturday of June and lasts until 2100 UTC the following Sunday, a period of 27 hours. Class A and Class B entries who do not begin any setting-up operations until 1800 UTC on Saturday may operate the entire duration of the FD period. Others may operate no more than 24 consecutive hours; i.e., once FD operation has started it must cease 24 hours from that point.

6) **Bands:** Each phone and each cw segment is considered as a separate band. All voice contacts are equivalent and RTTY is counted as cw. A station may be worked once on each band. Crossband contacts are not allowed. The use of more than one transmitter at the same time in a single band is prohibited, except that a Novice/Technician position may operate on any Novice band segment at any time. Contacts made by retransmitting either or both stations do not count for scoring purposes.

7) **Exchanges:** Stations in the U.S., possessions and Canada must exchange ARRL section (see page 8 in any *QST*) and signal report. Valid contacts with stations outside of a section

consist of sending a signal report and section and receiving a signal report and country from the foreign station.

8) **Valid Contacts:** A valid contact is defined as a two-way exchange (see above) between stations. Class A, B or C stations may contact any station. Class D or E stations may contact any Class A, B or C station.

9) Miscellaneous Rules:

a) Operators participating in the FD may not, from any other station, contact for point credit the FD portable station of a group with which they participated. This is intended to outlaw any kind of manufactured contacts.

b) A station used to contact one or more FD stations may not subsequently be used under any other call during the FD period. This rule is intended to outlaw multiple contacts on the same band with the same station, using different calls. It is not, however, intended to prohibit the use of jointly owned stations which are normally used under different calls by members of the same family.

c) Any Class A group whose entry classification is two or more non-Novice transmitters may also use one Novice/Technician operating position (to be set up and operated only by Novice and Technician class licensees) without changing their basic entry classification. The Novice/Technician position must keep their own logs and check sheets. The Novice/Technician position QSO total may be added to the group QSO total before multiplying.

10) **Scoring:** Scores are based on the number of valid contact points times the multiplier corresponding to the highest power used at any time during the FD period, plus bonus points. Phone contacts count one point each, and cw contacts count two points each. Power multipliers: If all contacts are made using a dc input power of 10 watts or less and if a power source other than commercial mains or motor-driven generator is used (e.g., batteries, solar cells, water-driven generators, etc.), multiply by five. If any or all contacts are made using a dc input power of 200 watts or less on cw and

400 watts PEP or less on ssb, multiply by two. Multiply by one if any or all contacts are made using a dc input power over 200 watts dc (400 W PEP) and up to 1000 watts dc (2 kw PEP). Batteries may be charged while in use for Class C entries only. For other classes batteries charged during the FD period must be charged from a power source independent of the commercial mains.

11) **Bonuses:** The following bonus points may be added to the score (after the multiplier is applied) to determine the final score. Only Class A and B stations are eligible for bonuses. Do not add bonuses to your final score — all applicable bonuses will be added at Headquarters.

a) 100 points for 100-percent emergency power per transmitter classification. All equipment and facilities at the FD site must be operated from a source independent of the commercial mains.

b) 50 points for public relations. Publicity must be obtained or a bona fide attempt to obtain publicity must be made, or operation conducted from a public place (example: a shopping center). Evidence must be submitted in the

Operating Period — 1979

Starts	Ends
Saturday, June 23 1800 UTC	Sunday, June 24 2100 UTC

form of a clipping, a memo from a BC/TV station stating publicity was given or a copy of material sent to news media for publicity purposes.


c) 50 points for message origination. A message must be originated by the club president or other FD leader, addressed to the SCM or SEC, stating the club name (or nonclub group), number of operators, field location and number of ARES members participating. The message must be transmitted during the FD period and a fully serviced copy of it must be included with the FD report. The message must be in standard ARRL message form as explained in *Operating an Amateur Radio Station*. The message must be correct in all respects or no credit will be given.

d) 5 points for each message received and

relayed during the FD period, up to a maximum of 50 points. Copies of each message, properly serviced, must be included with the FD report.

e) 50 points can be earned by completing at least one QSO via satellite during the FD period. The repeater provision of rule 6 is waived for satellite QSOs, as is the 15-minute provision of rule 4. A satellite station does not count as an additional transmitter. On the summary sheet show satellite QSOs as a separate "band."

12) **Reporting:** Entries must be postmarked no later than July 23, 1979. The official summary sheet plus a list of stations worked on each band and appropriate proof(s) for bonuses constitute an entry. *An entry that does not include check sheets will be classified as a check log. Incomplete or illegible entries will be classified as check logs.* A copy of your FD log is *not* required unless specifically requested later by ARRL. Send a stamped addressed envelope to ARRL hq. for FD forms which include a summary sheet and check sheets.

13) **Disqualifications:** See January 1979 *QST*, page 85. 

June VHF QSO Party

Join the fun above 50 MHz. June 9-11.

Summertime conditions are always a welcome change from the slow going during the winter. This year, with solar activity at its highest point in 20 years, the vhf bands should produce a considerable variety of DX and crowded bands.

The contest format for the 1979 contest is identical to that of the 1978 June VHF QSO Party. Only the dates are changed to protect the innocent.

A word to the wise. More than a few entries in the 1978 contest were severely reduced in score for the simple fact that full documentation was not included for each QSO claimed. As in all contests the *full* exchange must be recorded for each and every contact claimed as a valid contest QSO. In the case of the VHF QSO parties, the full exchange includes call sign, frequency used, *time in UTC* for each contact, and the complete exchange, which consists of the "name-of-section" for every QSO.

Official entry forms are available from Hq. for an s.a.s.e. Official forms or a *reasonable* facsimile must be used.

Good luck!

Rules

1) The 1979 June VHF QSO Party begins at 1900 UTC, Saturday, June 9, and ends at 0600 UTC, Monday, June 11. Entrants may operate

no more than 28 of the 35 hours. The seven hours of off-time must be taken in increments of 30 minutes or more. Listening time counts as operating time. All contacts must be made on amateur bands above 50 MHz using authorized modes of emission.

2) Name-of-section exchanges must be acknowledged by both operators before either may claim contact point(s). A one-way exchange does not count.

3) Fixed, portable or mobile operation under one call, from one location only, is permitted. A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by FCC/DOC). Multitransmitter operations are limited to *only one signal per band* (6, 2, 1-1/4, etc.).

While no minimum distance is specified for contacts, equipment in use should be capable of real communications (i.e., able to communicate over at least a mile).

Contacts made by retransmitting either or both stations do not count for contest purposes. In addition, use of the 146- to 148-MHz segment of 2 meters is restricted as follows: Contest contacts may be made only on these recognized simplex frequencies: 146.49, .52, .55, .58 and 147.42, .45, .48, .51, .54, .57 MHz. Contest contacts may *not* be made on any other frequency between 146 and 148

MHz; this restriction includes all repeater frequencies (including 146.76 and 146.94 MHz). Also, use of the national calling frequency (146.52 MHz) is restricted to four hours total operating time for each participating station during the contest period (including both listening and transmitting time). These four hours may be taken in operating periods of not more than one hour each and must be clearly indicated in the log. After each operating period on 146.52, the participating station may not transmit on 146.52 MHz for at least 15 minutes.

4) Scoring: 1 point for *completed* two-way exchanges on 50 or 144 MHz; 2 points for such exchanges on 220 or 420 MHz; 3 points for such exchanges on the higher uhf bands. The sum of these points will be multiplied by the number of different ARRL sections and different DXCC countries *not* included in an ARRL section, worked per band. Crossband work does not count. Aircraft mobile stations cannot be counted for section multipliers.

5) Foreign entries: All contacts with foreign countries count for score. Each different DXCC country (*not* included in an ARRL section) worked per band counts as a separate multiplier. Foreign stations may only work stations in ARRL sections for contest credit and will give their country name as part of the exchange.

6) A contact per band may be counted for each station worked. Example: W3HQT (MD)

works KA4DCF (NC) on 50, 144 and 220 MHz for complete exchanges. This gives W3HQT 4 points (1 + 1 + 2) and also 3 section-multiplier credits. (If W3HQT contacts other North Carolina stations on these bands, they do not add to his section multiplier but they do pay off in additional contact points.) Each station may be worked only once per band, regardless of mode.

7) Each section/country multiplier requires a complete exchange with at least one station. The same section/country can provide another multiplier point only when contacted on a new vhf band.

8) Awards: Entries must be postmarked no later than July 9, 1979, and should be made on ARRL form CD-68 or reasonable facsimile. Incomplete or illegible entries will be classified as

check logs. A certificate will be awarded to the high-scoring single-operator station in each ARRL section. In addition, the high-scoring multioperator station will receive a certificate in each section from which three or more valid multiple-operator entries are received or where exceptional effort has been displayed.

9) Disqualifications: See January 1979 QST, page 85.

Armed Forces Day Tests

This year's observance of Armed Forces Day will mark three decades of communications tests between the Amateur Radio fraternity and military communications systems. Since 1950, this May event has emphasized a continuing climate of mutual assistance and warm esteem. The 30th Annual Armed Forces Day will be held Saturday, May 19, 1979.

A highlight of the nationwide celebration will be the traditional military-to-amateur crossband communication tests, which give amateurs an opportunity to demonstrate their individual technical skills and to receive recognition from the Secretary of Defense or the appropriate military radio station for their proven expertise. The proceedings will include operations in cw, ssb, RTTY and SSTV.

Special commemorative QSL cards will be awarded to amateurs achieving a verified two-way radio contact with any of the participating military radio stations. Those who receive and accurately copy the Armed Forces Day cw

and/or RTTY message from the Secretary of Defense will receive a special commemorative certificate from the Secretary.

The military-to-amateur crossband operations will be conducted from 1300Z May 19 to 0245Z May 20, 1979. Military stations will transmit on selected military frequencies and listen for amateur stations on the portions of the amateur bands indicated. The military operator will specify the particular frequency in the amateur band to which he or she is listening. Duration of the contact should be limited to three minutes.

CW Receiving Test

The cw receiving test will be conducted at 25 words per minute. The broadcast will be a special Armed Forces Day message from the Secretary of Defense to any amateur operator desiring to participate. A 10-minute CQ call for tuning purposes will begin at 0300Z May 20. The Secretary of Defense message will be

transmitted at 0310Z May 20 from the following stations on the listed frequencies.

Transmitting Station	Frequencies (kHz)
NAM (VA)	4005, 7380, 14,400
GXH (Scotland)	7394, 14,520
NPG (CA)	4010, 7347.5, 13,922.5
NDT (Japan)	7430, 15,500
WAR (Washington, DC)	4030, 6997.5, 14,405
AIR (Washington, DC)	4025, 7315, 13,997.5

RTTY Receiving Test

The Radioteletype (RTTY) receiving test will be transmitted at 60 words per minute. Radio station "AIR" will transmit using 850 hertz (wide) shift. All other stations will transmit using 170 hertz (narrow) shift. A 10-minute CQ call for tuning purposes will begin at 0335Z May 20. The special Armed Forces Day message from the Secretary of Defense will be transmitted at 0345Z May 20. This test is to exercise the technical skill of the amateur operator in aligning and adjusting equipment. Transmission will be from the same stations and on the same frequencies as previously listed for the cw receiving test.

Submission of Test Entries

Transcriptions should be submitted "as received." No attempt should be made to correct possible transmission errors.

Time, frequency and call sign of the station copied as well as the name, call sign and address (including ZIP code) of the individual submitting the entry must be indicated on the page containing the message text. Each year, a large number of acceptable copies are received with insufficient identification information, or the necessary information attached to the transcript has become separated, thereby precluding the issuance of a certificate.

Entries should be submitted to the appropriate military command and postmarked no later than May 25, 1979.

Stations copying NAM, GXH, NPG or NDT submit entries to Armed Forces Day Test, Chief, Navy-Marine Corps MARS, BLDG 13, NAVCOMM WASHINGTON, Washington, DC 20390. Stations copying WAR submit entries to Armed Forces Day Test, Commander, United States Army Communication Command, ATTN: CC-OPS-MARS, Fort Huachuca, AZ 85613. Stations copying AIR submit entries to Armed Forces Day Test, 2045th COMM GP/DONV, Andrews Air Force Base, Washington, DC 20331.

NAV (Headquarters, Navy-Marine Corps MARS, Washington, DC)

Military Frequency (kHz)	Appropriate Amateur Band (MHz)
7385	7.00-7.050 RTTY
14,455	14.25-14.35 RTTY
13,975.5	14.225-14.250* SSTV

NNN0NCG (U.S. Coast Guard MARS Radio Station, Alexandria, VA)

4005	3.5-3.65 cw
6970	7.150-7.300 Isb
14,385	14.0-14.1 cw
20,988.5	21.25-21.45 usb

NNN0NHZ (CINCLANTFLT MARS Radio Station, Norfolk, VA)

7380	7.2-7.3 Isb
14,440	14.1-14.25 usb

WAR (Headquarters, U.S. Army MARS, Washington, DC)

4001.5	3.5-3.75 cw
4020	3.775-4.0 Isb
4030	3.65-3.775 RTTY
6997.5	7.0-7.15 cw
14,405	14.0-14.2 cw
20,994	21.25-21.45 usb

*SSTV from NAV will run from 1300-2100Z May 19, 1979.

AIR (U.S. Air Force MARS/SITFA Radio Station, Washington, DC)

4025	3.9-4.0 Isb
7305	7.25-7.30 Isb
7315	7.025-7.20 cw
13,977.5	14.025-14.20 cw
14,397	14.275-14.350 usb

NPG (Navy Communication Station, Stockton, CA)

4001.5	3.775-4.0 Isb
4005	3.5-3.65 cw
4010	3.65-3.75 cw
6989	7.00-7.025 cw
7301.5	7.150-7.300 Isb
7365	7.050-7.075 cw
14,375	14.00-14.025 cw
20,983	21.0-21.2 cw
20,998.5	21.27-21.40 usb

NNN0MET (USMC Air Station MARS Radio Station, El Toro, CA)

7347.5	7.075-7.1 RTTY
13,922.5	14.075-14.1 RTTY

NPL (Navy Communication Station, San Diego, CA)

14,390.5	14.225-14.250** SSTV
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**SSTV from NPL will run from 1600-2400Z May 19, 1979.

They All Wear White Hats

Like the TV ad says, all the good guys wear white hats. And the guys on the ARRL Awards Committee (we have no girls just now) wear white hats. They embrace apple pie, baseball and the IARU flag. Goody two-shoes perhaps, but this rather august group passes on such heavy matters as disqualifications from contests and DXCC. Anyone active in the operating activities of the League should be familiar with the committee and its role in promoting fair play. The duties, membership and modus operandi of the ARRL Awards Committee are the subject of this treatise.

Minute 80 of the July 1978 Board of Directors meeting officially sanctioned the ARRL Awards Committee, which had previously operated under the guise of the Headquarters Awards Committee with its function mostly advisory. With its role having become somewhat ceremonial, it was one of the priorities of your new communications manager to resurrect, reconstitute and refurbish the ARRL Awards Committee.

By direction of the communications manager, that role has expanded considerably to the following meaningful functions: (1) provide binding interpretations of the rules for contests, DXCC and other awards; (2) upon review of all available evidence, to provide binding decisions on awards and contest disqualifications; (3) advise on rule changes for contests and awards; (4) fulfill any other tasks assigned to it by the Board of Directors.

Since the committee necessarily deals with privileged information demanding timely response, utilizing the Headquarters staff is a must. And there was no difficulty finding a plethora of expertise. Membership was solicited from the Headquarters staff with the following criteria as prerequisites: (1) DXCC membership; (2) submission of a valid contest entry within the past year; (3) an avid interest in contests, DX and awards.

The selections produced a cosmic cast of uniquely qualified (we feel) active amateurs, as follows: W1GNC, W9KDR, W1VD, W1SE, K1ZZ, K1K1, W3AZD and W1XX. Alternates are K1XA and K1WJ.

The mechanics of the committee's operation are such that the person presenting a case to the committee for consideration cannot vote. For example, contest disqualifications are presented by contest administrator K1K1, who then cannot vote on disqualification. To speed the process of the committee's deliberations, an alternate votes in place of any absent member, rather than await his return. Also, the committee meets in person to discuss all phases of the action under consideration with a simple majority the final decision of the committee.

There are times that the committee may potentially rule on matters having international implications that might prove counterproductive to U.S. international policy and/or Amateur Radio in general. The general

manager reviews such sensitive situations prior to submission to the Awards Committee. He does not, however, supersede the authority of the committee in exercising its decision-making process.

To promote an operating program of the highest standards, it is necessary to sustain the confidence of the participants in the integrity of those activities. This writer feels the presently constituted Awards Committee fosters that faith in the ARRL contest and awards program.

How's it going so far? The best way to proceed is "by the book." So far, it looks as if the committee is "hard-nosed." So a word to the wise. In contests, be careful of those call signs and exchanges. If you don't "QSL," don't count it. Don't guess. On two contest disqualification criteria, the committee does not

have latitude for judgment: "Rubber-clocking" and unremoved duplicate contacts in excess of 2 percent "shall be cause for automatic disqualification." These two conditions, mandated by the Board of Directors, require only that the ARRL Awards Committee confirm the presence of either to result in automatic disqualification. Each contest announcement has a reference to the disqualification criteria; it's a good idea to read the disqualification criteria as carefully as the rules and awards portions of the announcement.

The purpose of the Awards Committee is not to instill the fear of God in anyone, but rather to preserve the integrity of the extensive League operating program. We hope you look at it this way and appreciate the efforts of the "guys who wear white hats," whose decisions are indeed "final."

W1AW Schedule

April 29-October 27, 1979

W1AW code practice and bulletin transmissions are sent on the following schedule:

MTWThFSSn = Days of Week Dy = Daily

UTC	Slow Code Practice	MWF: 0200, 1300, 2300; TTh: 2000; S: 2000; Sn: 0200, 2000
	Fast Code Practice	MWF: 2000; TTh: 0200, 1300, 2300; S: 0200, 2300; Sn: 2300
	Cw Bulletins	Dy: 0000, 0300, 2100; MTWThF: 1400
	RTTY Bulletins	Dy: 0100, 0400, 2200; MTWThF: 1500
	Voice Bulletins	Dy: 0130, 0430
EDT	Slow Code Practice	MWF: 9 A.M., 7 P.M.; TThSSn: 4 P.M., 10 P.M.
	Fast Code Practice	MWF: 4 P.M., 10 P.M.; TTh: 9 A.M.; TThSSn: 7 P.M.
	Cw Bulletins	Dy: 5 P.M., 8 P.M., 11 P.M.; MTWThF: 10 A.M.
	RTTY Bulletins	Dy: 6 P.M., 9 P.M., 12 P.M.; MTWThF: 11 A.M.
	Voice Bulletins	Dy: 9:30 P.M., 12:30 A.M.
CDT	Slow Code Practice	MWF: 8 A.M., 6 P.M.; TThSSn: 3 P.M., 9 P.M.
	Fast Code Practice	MWF: 3 P.M., 9 P.M.; TTh: 8 A.M.; TThSSn: 6 P.M.
	Cw Bulletins	Dy: 4 P.M., 7 P.M., 10 P.M.; MTWThF: 9 A.M.
	RTTY Bulletins	Dy: 5 P.M., 8 P.M., 11 P.M.; MTWThF: 10 A.M.
	Voice Bulletins	Dy: 8:30 P.M., 11:30 P.M.
PDT	Slow Code Practice	MWF: 6 A.M., 4 P.M.; TThSSn: 1 P.M., 7 P.M.
	Fast Code Practice	MWF: 1 P.M., 7 P.M.; TTh: 6 A.M.; TThSSn: 4 P.M.
	Cw Bulletins	Dy: 2 P.M., 5 P.M., 8 P.M.; MTWThF: 7 A.M.
	RTTY Bulletins	Dy: 3 P.M., 6 P.M., 9 P.M.; MTWThF: 8 A.M.
	Voice Bulletins	Dy: 6:30 P.M., 9:30 P.M.

Code practice and cw bulletin frequencies: 1.835, 3.58, 7.08, 14.08, 21.08, 28.08, 50.08, 147.555 MHz.

RTTY bulletin frequencies: 3.625, 7.095, 14.095, 21.095, 28.095, 147.555 MHz.

Voice bulletin frequencies: 1.835, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

Slow code practice is at 5, 7-1/2, 10, 13 and 15 wpm.

Fast code practice is at 35, 30, 25, 20, 15, 13 and 10 wpm.

Code practice texts are from QST and the source of each practice is given at the beginning of each practice and at the beginning of alternate speeds. For example, "Text is from February 1979 QST, pages 9 and 82" indicates that the main text is from the article on page 9 and the mixed number/letter groups at the end of each speed are from the contest scores on page 82.

Cw bulletins are sent at 18 wpm, Teletype bulletins are sent at 60 wpm with 170 Hz shift.

Bulletins may be sent on Teletype and voice but omitted on cw.

W1AW is open for visitors Monday through Friday from 7:30 A.M. to 1 A.M. EDT and on Saturday and Sunday from 3:30 P.M. to 1 A.M. EDT. If you desire to operate W1AW, be sure to bring the original copy of your license with you. W1AW is available for operation by visitors between 1 and 4 P.M. Monday through Friday.

In a communications emergency, monitor W1AW for special bulletins as follows: voice on the hour, RTTY at 15 minutes past the hour, and cw on the half hour.

W1AW will be closed on May 28, July 4 and September 3.

Station staff: Chief Operator/Asst. Communications Mgr. C. R. Bender, W1WPR; Chris Schenck, W1EH; Charles Chadwick, K8AXL.

*Communications Manager, ARRL

FREQUENCY MEASURING TEST

On February 11, the umpire measured frequencies for the early run at 14,109,893, 7062,351 and 3590,360. The late run was checked at 14,155,397, 7052,454 and 3554,256.

A total of 2202 measurements were taken by 142 participants. 106 entries measured within 100 Hz of the umpire (class I OO qualifications). They are listed as follows with average error shown preceding their calls: (0 Hz) W1JH W1PLI WB3AHL K4BE W4NTO W4RHZ W5FMO W5OS WD6FMG W7ANF W8CUJ W8OK W9TJ W0RWG W0USL VE1BAF W1BGW (1) K1VHO W2YRH WA2ZKD WA4AXA W4HU W4IBU K5DL K5JW W5QIV WB6AAL W7SC W8RQI WB8SIQ W0RWH K0VM VE6OM (2) W2KP K2TO A1ZX W4DRF AA4KB W6CBX W6RQ BX-7HM WA7PHD K7ST W9HPG WD0EDD K0QVF VE3AC (3) N2LI WB2WQA K6MZN K0BRS WB0UFQ (4) K2FS K2RG K9WNP K0YHO (5) W2DW N6PE W9FN W9TG (8) N4WH WA000Y (9) WA7HGB (11) W1HJP (13) W0KL (16) W1DDO WA6IQL W8MHG (18) W1AYG N1QY W8LX K5FA (19) W6SSB (20) K5OH WA6VPI (22) K8FI (23) W9PVS (29) K8JH WB8LUPN (31) WA6IHF WA6NQF WA0YCY (32) K1OGF (34) WB4RUA (38) W4UCL (40) WA8SQL (41) W2ND (42) K3CKB N7ANC (43) VE3GIV (49) WA7AE (57) WB2YIZ WA4WS W7SK (58) N1DM (59) W4QN (63) W4PKD (70) W9TGN (74) K4AO VF2JN (83) K6CL (89) W2RUK (92) KH6CZ (95) N1CC (97) K2OPJ (98) W2XQ (100) K4IAA. Feedback: W6SSB scored 87 Hz instead of above 100 Hz as indicated for the November 4 FMT. K6ASK has been identified as the "mystery entry" in the November 4 FMT with a score of 70 Hz. — *Jeanne DeMaw, W1CKK*

SCM ELECTION NOTICE

To all ARRL members in the Southern Texas, Colorado, San Francisco, British Columbia, Sacramento Valley, Los Angeles, Georgia, West Virginia and Washington sections: You are hereby solicited for nominating petitions pursuant to an election for Section Communications Manager. A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures on that petition.

Petition forms (CD-129) are available on request from ARRL headquarters, but are not required. The following form is suggested:

(Place and date)

Communications Manager, ARRL,
225 Mam Street, Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Communications Manager for this Section for the next two-year term of office. (Signature . . . Call . . . City . . . Zip . . .)

SCM candidates must have been a member of the League for a continuous term of at least two years and a licensed amateur of General Class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, June 8, 1979.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on July 2, 1979, and returns counted August 21, 1979. SCMs elected as a result of the above procedures will take office October 1, 1979.

If no petitions are received for a section by the specified closing date, such section will be resolicited in October (QST), and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager. You are urged to take the initiative and file a nominating petition immediately.

John F. Lindholm, W1XX
Communications Manager

SCM ELECTION RESULTS

The following elections were conducted for two-year terms of office beginning April 1, 1979:

Balloting Results: In the Arizona Section, Willard L. Haskell, AC7D, received 701 votes and Ray T. Warner, W7JU/K7JU, received 178 votes. Mr. Haskell is declared elected. In the Kentucky Section, Joseph E. Miller, K4DZM, received 290 votes, Ted H. Huddle, W4CID, received 246 votes and Anthony W. DePrato, WA4JQS, received 145 votes. Mr. Miller is declared elected. In the North Dakota Section, Lois A. Jorgensen, WA0RWM, received 90 votes, Dean R. Summers, WB0AUM, received 40 votes and Robert G. Arndt, AL0Y, received 31 votes. Ms. Jorgensen is declared elected.

OSCAR 7			OSCAR 8			SOVIET RS			
DATE (UTC)	Ref. Orbit	Time (UTC)	Long. W.	Ref. Orbit	Time (UTC)	Long. W.	Ref. Orbit	Time (UTC)	Long. W.
1 May	20387	0043:48	73.8	5877A	0037:08	53.7	2235	0108:30	174.8
2 May	20400	0138:05	87.4	5891X	0042:19	55.2	2247	0113:13	177.6
3 May	20412	0037:25	72.2	5905A	0047:29	56.3	2259	0117:56	180.3
4 May	20425	0131:42	85.8	5919A	0052:40	57.6	2271	0122:38	183.6
5 May	20437	0031:02	70.6	5933J	0057:51	58.9	2283	0127:21	185.7
6 May	20450	0125:19	84.2	5947J	0103:02	60.2	2295	0132:03	188.5
7 May	20462	0024:40	69.1	5961A	0108:13	61.5	2307	0136:46	191.2
8 May	20475	0118:57	82.7	5975A	0113:24	62.8	2319	0141:28	193.8
9 May	20487	0018:17	67.5	5989X	0118:35	64.2	2331	0146:11	196.5
10 May	20500	0112:34	81.1	6003A	0123:46	65.5	2343	0150:53	199.3
11 May	20512	0011:54	66.0	6017A	0128:57	66.8	2355	0155:36	202.4
12 May	20525	0106:11	79.6	6031J	0134:08	68.1	2367	0200:19	204.7
13 May	20537	0005:31	64.4	6045J	0139:18	69.4	2378	0004:38	177.2
14 May	20550	0059:48	78.0	6058A	0001:16	44.9	2390	0009:20	179.9
15 May	20563	0154:05	91.6	6072A	0006:27	46.2	2402	0014:03	182.7
16 May	20575	0053:26	76.4	6086X	0011:38	47.5	2414	0018:45	185.4
17 May	20588	0147:43	90.0	6100A	0016:48	48.8	2426	0023:28	188.1
18 May	20600	0047:03	74.9	6114A	0021:59	50.1	2438	0028:11	190.8
19 May	20613	0141:20	88.5	6128J	0027:10	51.5	2450	0032:53	193.6
20 May	20625	0040:40	73.3	6142J	0032:21	52.8	2462	0037:36	196.3
21 May	20638	0134:57	86.9	6156A	0037:32	54.1	2474	0042:18	199.5
22 May	20650	0034:17	71.8	6170A	0042:43	55.4	2486	0047:01	201.7
23 May	20663	0128:34	85.4	6184X	0047:54	56.7	2498	0051:44	204.5
24 May	20675	0027:55	70.2	6198A	0053:05	58.6	2510	0056:26	207.2
25 May	20688	0122:12	83.8	6212A	0058:16	59.3	2522	0101:09	209.9
26 May	20700	0021:32	68.6	6226J	0103:27	60.6	2534	0105:51	212.6
27 May	20713	0115:49	82.2	6240J	0108:37	61.9	2546	0110:34	215.3
28 May	20725	0015:09	67.1	6254A	0113:48	62.3	2558	0115:17	218.1
29 May	20738	0109:26	80.7	6268A	0118:59	64.6	2570	0119:59	220.8
30 May	20750	0008:46	65.5	6282X	0124:10	65.9	2582	0124:42	223.5
31 May	20763	0103:03	79.1	6296A	0129:21	67.2	2594	0129:24	226.2
1 June	20775	0002:24	64.0	6310A	0134:32	68.5	2606	0134:07	229.1
2 June	20788	0056:41	77.6	6324J	0139:43	69.8	2618	0138:50	231.7
3 June	20801	0150:58	91.1	6337J	0001:40	45.3	2630	0143:32	234.4
4 June	20813	0050:18	76.0	6351A	0006:51	46.6	2642	0148:15	237.1
5 June	20826	0144:35	89.6	6365A	0012:02	47.9	2654	0152:57	239.9
6 June	20838	0043:55	74.4	6379X	0017:13	49.2	2666	0157:40	242.6
7 June	20851	0138:12	88.0	6393A	0022:24	50.6	2677	0001:59	245.1

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

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 29.490 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 Isb); (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 28.737620° W. per orbit in a period of 114.944836 minutes. O 8 progresses an average of 25.807932° W. in a period of 103.227260 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) ARRL OSCARLOCATOR for OSCAR 7 and 8 and the Russian RS-1 and RS-2, and much more, is now available in one package, "Satellite Communications." It is available from your dealer or directly from ARRL for \$4.75 U.S. (\$5.50 elsewhere) postpaid.

Further information on the radio amateur satellite program can be obtained free of charge from ARRL hq.

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Tom Frenaye,* K1KI



MAY

2
West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0400Z. The run takes place at 9 P.M. PDT the night of May 1. 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.

5-6

Florida QSO Party, April, page 95.
New York State QSO Party, April, page 95.
Vermont QSO Party, April, page 95.
LIARS 10-X QSO Party, April, page 95.

8

WIAW Qualifying Run, 10-35 wpm at 0200Z (10 P.M. EDT May 8). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. Other details per the May 2 listing.

12

Frequency Measuring Test, 0300Z (evening of May 11) and 0600Z. Complete details in April, page 95.

12-13

Russian Contest (CQ-M), April, page 95.
World Telecommunications Day Contest, phone, April, page 95.

19

Armed Forces Day, page 88, this issue.

19-20

EME Competition, Part 2, February, page 79.
Massachusetts QSO Party, sponsored by the Greater New Bedford Contesters, 1200Z May 19 until 2200Z May 20. Work stations once per band, cw and ssb separate. No crossband or repeater QSOs. Exchange signal report and MA county or state/province. Score two points per ssb QSO, four points per cw QSO. MA stations multiply QSO points by total number of states/provinces and MA counties. Others multiply QSO points by total MA counties worked. Awards. Suggested frequencies: cw, 1810 3560 3720 7060 7120 14,060 21,060 21,120 28,060 28,120; ssb, 1820 3960 7260 14,290 21,390 28,590 50,110. Cw in cw bands only. Usual log summary. Mail by June 30 to Arthur

*Assistant Communications Manager, ARRL.

Marshall, W1HJ, 60 Meadow Rd., Westport, MA 02790. S.a.s.e. for results.

Canal Zone QSO Party, full 48-hour period UTC, first of three weekends, KZ5 stations will be out in full force. Balboa certificate awarded to those with QSOs with five members of the CZARA, KZ5 Award for 25, 50 or 100 confirmed QSOs with any KZ5 station. QSL cards not required. Entries to Canal Zone ARA, Box 407, Balboa, Canal Zone.

26

WIAW Qualifying Run, 10-35 wpm at 2000Z (4 P.M. EDT). See May 8 for more details.

26-27

Iberoamerican Contest, sponsored by Spanish society URE (Union de Radioaficionados Espanoles), from 2000Z May 26 until 2000Z May 27. 80-10 meters, operate only 20 of 24 hours. Exchange signal reports plus serial number. A QSO must be between Spanish and Portuguese-language stations and the rest of the world (prefixes: CE-CO-CR-CT-C9-CX-C31-DU-EA-HC-HI-HK-HP-HR-KP4-LU-OA-PY-TG-TI-XE-YS-YV-ZP). One point per QSO. Final score QSO points times DXCC countries (max. 24 per band for non-Spanish/Portuguese-language countries). Ssb only. Mail by July 1 to EA3FP, P. O. Box 262, Granollers, Spain.

World Telecommunications Day Contest, cw, April, page 95.

CQ WPX Contest, cw January, page 91.

JUNE

2-3

Nebraska QSO Party, full 48-hour period UTC. Phone stations use the top 25 kHz of each band. Cw stations 50-75 kHz from the bottom. Trophies to the top-scoring Nebraska cw and phone station (one point for each out of state QSO). Entries to Tom Bracket, KØJFN, 1820 East 3rd St., Fremont, NE 68025.

Minnesota QSO Party, from 1800Z June 2 until 2359Z June 3, sponsored by the Heartland ARC. No mode or time restrictions. No multitransmitter; no crossband QSOs. Novices compete with other Novices; same with Technicians. Exchange signal report and county if in Minnesota. Others exchange signal report and ARRL section (or DX country). One point per phone QSO, two points per cw QSO. Five points for /N or /T QSOs. MN stations multiply QSO points by sections plus DX countries. Others multiply QSO points by MN counties worked (87 max). If more than 50 QSOs are made, enclose check sheet for each band/mode. Log in UTC (Z). Contacts with club station (WBØITZ) count 10 points per band/mode. Sug-

gested frequencies: cw, 3600 3725 7075 7125 14,075 21,050 21,150 28,050 28,150; phone, 3950 7275 14,300 21,400 28,700. Net QSOs not valid. Awards. Send s.a.s.e. for awards and results. Usual disqualification criteria. Postmark logs by July 1 to HARC, Scott Nelson, WDØLZF, 421 W. Wisconsin Ave., Staples, MN 56479.

7

West Coast Qualifying Run, 10-35 wpm at 0400Z (9 P.M. PDT on June 6). See May 2 for more details.

9-10

VHF QSO Party, this issue, page 87.

13

WIAW Qualifying Run, 10-40 wpm at 0200Z (10 P.M. EDT June 12). See May 8 listing for more details.

16-17

West Virginia QSO Party
VK/ZL/Oceania DX Contest
All Asian Contest, phone

23-24

Field Day, see this issue, page 85.

30-1

7-Land QSO Party

JULY

14-15: Radiosport Championship
HK Contest

21-22: VHF Space Net Contest
QRP Summer Contest

Scanner Contest, cw
28-29: Danubian Bent Contest (HA)

County Hunters Contest

AUGUST

4-5: UHF Contest

SEPTEMBER

8-9: VHF QSO Party
16: Frequency Measuring Test

OCTOBER

6-7: Simulated Emergency Test

1957-1

Strays



SLED DOG RACE NET

The Anchorage ARC, KL7AA, provided communications for the 22nd running of the World Championship Sled Dog Races at the three-day Anchorage Fur Rendezvous. The communications net operated via the club's 34/94 repeater from 17 checkpoints scattered around the 25-mile course. The AARC also erected a visual display board of the entire course so spectators and officials could watch the progress of each dog team.

MICHIGAN AWARD

Hams in Michigan can win an Achievement Certificate from the governor by publicizing their state during Michigan Week, May 19 to 26. For details, contact Oak Park ARC, W8MB, Oak Park Community Center, 14300 Oak Park Blvd., Oak Park, MI 48237.

AWARD CERTIFICATES OFFERED

The North Texas High Frequency Association (NTHFA) offers several award certificates. For a list of rules and description of awards, contact the NTHFA, W5VJT, DX and Awards Chairman, Rte. 2 Box 1091, Denton, TX 76201.

CANADIAN AWARDS

The St. Joseph Island Repeater Assn. has announced sponsorship of two new certificate awards, the Sault Ste. Marie Award and the Northern Ontario Award. For details, contact Gord Woroshelo, VE3EYW, 15 Grandmont Cres., Sault Ste. Marie, ON P6B 3W1.

QST congratulates . . .

J. H. Sanders, WB4ANX, vice director of ARRL's Delta Division, who was elected a vice president of Eastman Kodak and was appointed an assistant general manager of the Eastman Chemicals Division. Sanders currently is president of Eastman Chemical Products, Inc.

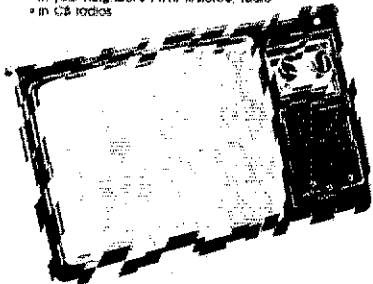


An unidentified ham operates an AIV color camera as part of the communications coverage at the 1979 Tournament of Roses Parade in Pasadena, CA. Eighty-six amateurs joined in the volunteer effort. The hams were linked together on 2 meters for voice and 1265 MHz for video and 434.00-MHz video and sound transmission. (K6PGX photo)

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CANADIAN DIVISION

ALBERTA: SCM, S. T. Jones, VE6MJ — SEC: VE6XC, Net Mgr.; (APSN) VE6AR, Net Mgr.; (ACWN) VE5BBL, VE6RP and VE6ON are presently in the K1B1 and Congratulations to VE6AQO on obtaining his license. Those of you who are interested in UHF work may find a beacon on 432 014 MHz using low power (25 mW) under the call VE6UHF. This beacon is operated by the UHF group in Edmonton. Reports of reception would be appreciated. It is with regret that we list another local amateur in the Silent Keys. VE6WR passed away on March 2nd. Congrats to VE6EA on receiving a plaque denoting fifty years membership in ARRL. Traffic: VE6CEY 107, VE6HO 57, VE6XD 20, VE6AG 18, VE6AA 13, VE6XC 13, VE6MJ 7, VE6CUT 8, VE6CE 6, VE6WV 6, VE6ZV 5, VE6D 5, VE6C 5, VE6AFJ 4, VE6YW 4, VE6QV 3, VE6CFO 2, VE6WV 2.

BRITISH COLUMBIA: SCM, H. Ernie Savage, VE7FB — BCEN new Asst. Net Mgr. is VE7COA and the Net Mgr. VE7GY has returned from a well deserved vacation in West Indies. The QNIs and QTCs have improved greatly. BCARPSO phone Net Mgr. VE7OC reports an average of 145 check-ins per night, with an increase in messages. BCFM Assn. started an information net Thur. at 1930 PST on 34/94. Fifteen Section Net Certs were awarded for 1978 service to the Nets. This month was also a test of our antenna systems with the high winds. VE7TT reports he lost his forty Mtr elements. Surrey ARC reported an active Swap meet in Surrey. Have you looked into VE7RSI's improvements and your support? Variable Max repeater machines for sale boats. Traffic: VE7ZK 163, VE7FB 76, VE7DFY 69, VE7COA 66, VE7HO 41, VE7BLO 18, VE7BLS 10.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst. SCM: VE4JP, SEC: VE4TH, NMS: VE4S TE NM VJ IZ. We are grateful to the following who participated in the St. John's Boys School snowshoe race: VE4S HK AE DD AGC AGH AGS AEL ADY ACT AHQ DV LX AFO VP9IB and Connie. A large number of amateurs were also involved in the solar eclipse activity. Results will be covered in the Manitoba publications, as well as QST. So far 1979 has been an active year for Manitoba Amateurs. Good work fellows. MPEP QNI 1270, QTC 66, sess. 28, MTN QNI 203, QTC 98, sess. 28, MMN QNI 610, QTC 54, sess. 28, VRN QNI 76, QTC 1, sess. 4, Traffic: VE4AP 154, VE4AD 44, VE4ZJ 36, VE4CJ 36, VE4C 26, VE4QU 33, VE4JA 28, VE4TE 27, VE4CR 26, VE4IS 20, VE4LH 18, VE4AE 17, VE4JK 17, VE4EE 15, VE4NE 14, VE4HR 13, VE4FK 11, VE4LB 11, VE4ID 9, VE4JP 9, VE4AE 8, VE4JI 8, VE4AM 4, VE4MN 4, VE4PA 4, VE4X 3, VE4MG 3, VE4AA 3, VE4ACX 2, VE4BE 2, VE4OD 2, VE4YE 2, VE4CF 1, VE4OE 1.

MARITIME-NFLD: SCM, Aaron D. Solomon, VE1OC — AS/CM: VO1FG, STM: VE1WF, SEC: VE1ASW, NPN Mgr.: VO1JN, Silent Key: VO1OM, Hosp. VE1s AFU AHU AOP GD QM RO VK, VE1 Phone LOLA White Cane Contests great success. VE1s UT SJ and PV conducted tests — solar eclipse. VE1WB relates in IRG Bull. how VE1AGL & K1HHC "climbed" a mountain to restore WR1AGW repeater. VE1CS new Dealer NS, VE1BM chief cop. ex. VE1ARI now VE4VX writes abt. Larry's abt. CB Bull. VE1CL & VE1ER — IRG Bull. VE1E in NBARA Bull. VE1CGG has Comp. Prog. for Dist. & Bearing to Set. Loc. VE1AKL gave Computer demo. at SARC. VE1WF writes abt. Traffic Handling in NBARA Bull. Fred. ARC VE1AC, pres.; VE1ALM, vice-pres.; VE1BGV, secy. WB2RLK/VE1 VE1BNN VE1ASJ working 6-meter DX. New to Hfx area: VE1AWF VE1BKA, Mar. Slo Net 3770 kHz 2000Z Su. CB Swap Shop 3745 kHz 1730Z Su. APN sess. 28, QNI 187, QTC 107/95, NPN sess. 27, QNI 115, QTC nil. Traffic: VE1E 10, VE1W 10, VE1H 50, VE1BS 28, VE1OC 20, VO1PR 13, VE1KR 10, VE1BT 8, VE1AMR 4, VE1CB 2 (Jan.), VE1CH 89, VE1BS 14.

ONTARIO: SCM, Larry Thivierge, VE3GT — SEC: VE3APK, STM: VE3GOL. To further increase VE participation on the air, Scarborough ARC has introduced several attractive certificates. Details available from VE3GGO or club members. Clubs providing communications for various snowmobile rallies throughout the Section included the Champlain Regional Repeater Assn., Bruce ARC and the Nipissing FM Assn. VE3s ISW and ITY have joined the dual mode gang. ONS certificates have been issued to VE3s JIR GYD and JRT. Repeater VE3KSR automatically reverts to emergency power when the hydro fails. OVS VE3FN has 37 states confirmed on 2 meters. VE3FGU has received his 40-watt sticker. Hamilton ARC's winter project consisted of building a computing VSWR indicator. Congratulations to VE3KAY who recently was presented with the Diamond Jubilee Award during the celebration of the CNIB's 60th year of incorporation. Quinte ARC's man of the year award was presented to VE3HBB. This is the month to finalize those Field Day plans for June 23 and 24. Info on the '79 ARRL National Convention available from P. O. Box 891, Baton Rouge, LA 70821. Convention dates are July 20-22. Special Event Station XJ3TBC, celebrating the bicentennial will be active during Homecoming Week Aug. 1-10 to 18th. CW and phone bands, special awards and QSL available. P. O. Box 631, Bancroft, Ont., K0L 1C0 has the details. Station appointment holders are reminded that activity reports should be in my hands by the 5th of each month. Those wishing listing in the PSHR column should have their reports, by category, in at the same time. Apr. QST has the details on the new PSHR point category. Traffic: (Feb.) VE3GOL 339, VE3ISW 186, VE3JRT 181, VE3GPN 177, VE3CYR 152, VE3FGZ 149, VE3KK 147, VE3HGF 140, VE3SB 131, VE3DPO 127, VE3GT 116, VE3FGU 84, VE3GYD 60, VE3JJK 56, VE3APK 48, VE3GJG 41, VE3HCS 38, VE3ATR 37, VE3GNN 33, VE3FHZ 31, VE3WV 30, VE3DUR 26, VE3DVE 25, VE3ANJ 24, VE3FPZ 23, VE3BZ 22, VE3FGV 21, VE3JRO 21, VE3BVG 19, VE3JUN 12, VE3FRG 9 (Jan.), VE3AWE 36, VE3IFP 33, VE3BZR 32, VE3WM 26.

QUEBEC: SCM, Harold Moreau, VE2BP — On June 24, 1979 the Happy Gang Net will be 6 years old. This net originated and operated by blind amateurs, has been in

operation daily at 0800 (local) on 3.765 MHz without missing a day since that time. Totals as per Dec. 31st, 1978: check-in 31,223, traffic, 3,234, phone patch 1,954, time 2,467 hrs. 23 minutes. Hats off to this fine group of blind amateurs. Few appointments are open, please contact your SCM. Congrats to new OBS VE2DYD. Plusieurs appointments sont libres, c'est a dire personne est la pour s'en occuper. S.V.P. contactez votre SCM. Traffic: (Feb.) VE2UN 153, VE2APT 42, VE2FJ 19, VE2EC 14, VE2DEA 5 (Jan.) VE2NL 13.

SASKATCHEWAN: SCM, P. A. Crosthiwaite, VE5RP — The Saskatchewan Amateur Radio Club had their spring ball Feb. 24/79. It was a very successful evening with two awards handed out. VE5RJ receiving an award from the city of Saskatoon and the EMO for his work performed as communications officer on behalf of the Amateurs and the EMO. VESCU received his award for his work as an SEC since 1954 to 1979. I would like to congratulate both gentlemen for their excellent work they performed for the public on behalf of Amateur Radio. Traffic: VE5WM 32, VE5AE 15, VE5HG 15, VE5RP 8, VE5OL 7, VE5BO 3, VE5NJ 3, VE5QI 3, VE5KS 2, VE5HB 2.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ, STM: W3QQ, W3WD, PSHR: W3PO 49, K3JL 46, N3AKC 44. Delaware's W3DQ became a Silent Key Feb. 19th. Willard had been on the air since the early 1900s. Sympathy also to WA3ZRY and Marie over the loss of her Mother. WB3FOE WA3QPX and WA3QLS set up an Emergency Communications Center at Del. Amateur Radio Supply by the "Wizard" operating on all bands and with 2 FWD vehicles available, the answered emergency calls and got several Nurses and Drs. to the Bissell Hospital over otherwise impassable roads. DEP, Tlc. 11, QNI 87, DTN, Tlc. 122, QNI 388. Traffic: (Feb.) W3PO 179, N3AKC 136, W3CQ 61, N3A0A/WA3GAY 45, W3DKX 38, WA3WY 25, WB3DUG 19, W3WD 16, K3JL 15, WA3DLH 10, WB3GXD 10 (Jan.) W3PO 312, WA3RAU 46, N3ADA 31, WB3GXD 18.

EASTERN PENNSYLVANIA: SCM, G. S. Van Dyke, Jr., W3HK — SEC: WA3PZO, NMS: K3KW, W3VA, K3NGN, W3IAZ, Net pres.: PFN QNI 360, QTC 1239, AREC(2) QNI 11, LVN QNI 1, QTC 8; EPA QNI 691, QTC 528; PTN QNI 394, QTC 189, EPC/EPATN QNI 357, QTC 153. OVS rept.: W3GOA, W3KCL, K3YD, WB3JA, WA3BJO, WB3CUT, QO rept.: W3KEL, W3CL, B3S rept.: W3TI, N3AU, W3CL, K3EBZ, W3DO, W3VA, B3S, W3GUL, WA3ZRY, W3VR, WA3SOP, W3BI, WB3JA, WB3JGP and WA3ATQ PSHR: WB3JGP, WB3JA, W3DP, WA3RFP, WB3CAI, W3OY, Art Jacoby an old timer to EPA is now in a nursing home, Maple Farm Nursing Center, Akron, PA 17501. It would be nice for the EPA gang to send him a card or a letter of those near by to visit him! Officers of Penn ARC WB3DQG, pres.; WB3CTP, vice-pres.; K3DLS, rec. secy.; WB3CPW, corr. secy.; W3PR, treas. Lehigh Valley ARC are again sponsoring a Tri-Club Hamfest on July 15, 1979 at the Allentown Police Academy, all are invited. Traffic reports really high this month. W3WJ and W3VH busy at the new "Wizard" party. WA3WOP has added RTTY. Welcome to KA3CHG! K3KW reports 100% rept. from EPA NCS! AD3X looking for a keyer that sends correctly regardless of operator! New officers: WB3KCV, ARC, N3AIU, pres.; WB3HIZ, vice-pres.; WB3KWE, secy.-treas. RF Hill ARC, WB3GXC, pres.; WB3HMV, vice-pres.; WB3EWP, secy.; W3CZ, treas. The EPA gang might get together in Tamaqua this year. W3EU reports small rig put out large signal and vice versa. Club papers still looking real professional. Let's get all those dream antennas up now that the WX has improved. Don't forget to work a Novice once in a while. Traffic: (Feb.) W3WJ 776, W3VH 715, W3WOP 715, W3VR 650, W3BI 549, WB3JA 519, WB3JGP 517, WA3ATQ 464, K3KW 463, AA3B 254, K3NGN 244, W3JPF 198, AD3X 168, W3PFA 112, N3AIU 100, W3DP 98, WB3JYZ 91, W3VA 90, WB3CAI 67, WB3GZV 64, WA3YDC 46, W3ID 39, N3CD 38, WA3RFP 25, WA3VIL 23, K3NB 22, W3ADE 21, K3YD 20, W3CL 14, W3BUR 8, WA3CKA 8, K3EBZ 7, W3TI 7, W3HK 4, WA3BJO 3, K3AI 1, K3AIZ 1, W3EU 1, W3GKM 1, W3GOA 1, W3KEK 1, W3WRE 1 (Jan.) W3AYDC 20, W3BUR 1, W3KEK 1.

MARYLAND-DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — W3HJH is the MDC SEC. Get on his emergency team! Congrats to WB3G2U Feb. BPL and high tic. man in the Sect. '79 MDC QSO Party K3KX mobilized from all countries with at least 10 QSOs each and a new high of 141 QSB points. Congrats. Also runs and county winners: WA3RS WA3VUO N3SL, WB3IRS K3IXD, WB3CFD N3IC, W3VJD3, K3ORW, N3AI and a check log from W3FYZ. W3XE says 1979 is his last after 14 years of conducting! Thanks Andy. Detail SET reports from the Mountain ARC had 31 member stations take part with so much traffic that their Hq. group had to call a recess! K3ORW had the MPEP well organized with a different NCS for each of the ten sessions, and 17 counties represented. WA3HEM had his group for real in the 3-hr. snow emergencies mid-Feb. Many others were active and ready — congrats to you all! QSO reports from W3ML, B3 and W3WBV. Congrats to N3RL, W3AZ (Phone certificate winner), W3ZNE gone, FSK working. K3HPG reports major activity is snow removal! WA3WTQ upgrades to Extra, congrats, WB3EPN out with the old car in with the new one. N3IT makes the early morning nets. W2HXT is permanent in Reisterstown. W3CEN lost his voice for ten days. KB3AP had antenna problems during the worst of the WX. AD3H is gainfully employed, WB5F1X/3 is a short timer. N3SU is really putting Hebron on the map. AA3S is making quickie trips. W0VJD3 made lotsa deliveries in the DC area. N3QA opens time is not on his side. WA3FIJ is an MPEP NCS. WB3CES has competition in Taneytown. W3FZY was in the QCW party, and worked Saipan. WB3JRW is into traffic big with the new repeater Sessions. Traffic: (Jan.) MPEP/AA3S 312/430. 2. Topper and WA3ZRY. Others: W3ADQ, WB3BKF, W3DKX, W3FA, WB5FI, AD3H, WA3IHW, and WA2FM, WR, PON, W3DWF 183/122.5, MDC, PON, W3OY 4/25/24.5. The Hagerstown net meets

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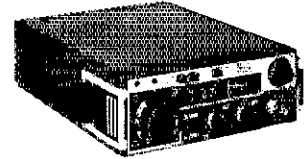
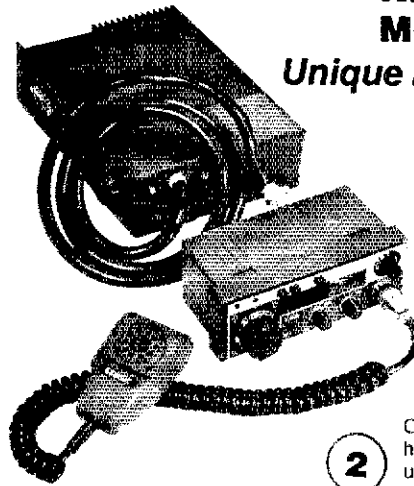
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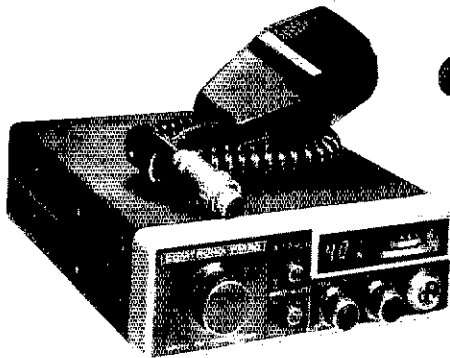


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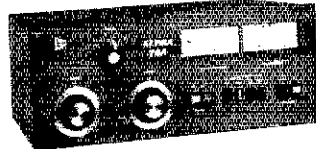
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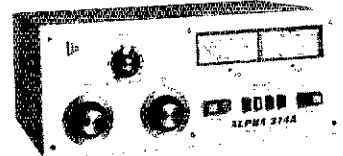
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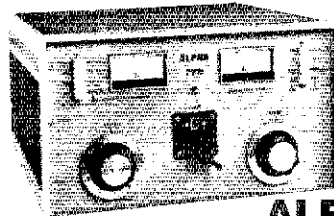
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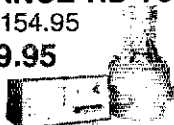


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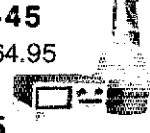
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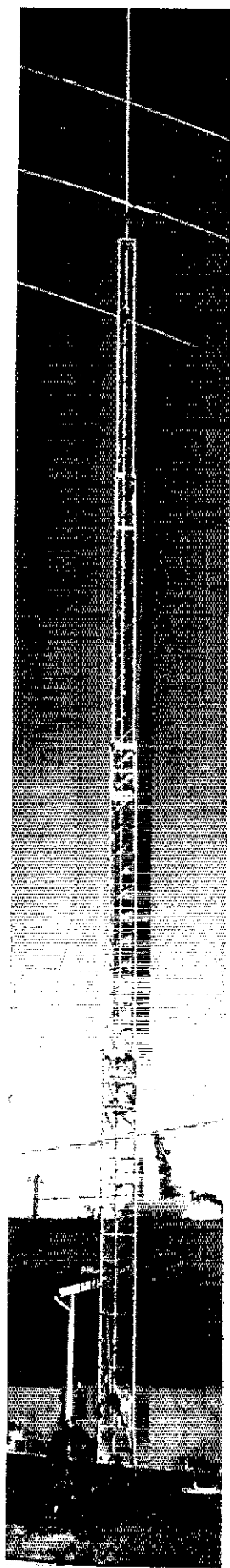
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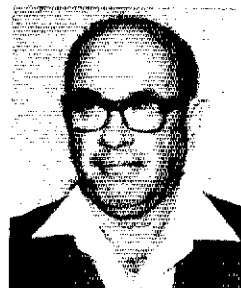
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TOWER MASTER

Tue 1900 local time 146.34/94. WB3GEJ and WA3EOP
 NCS: Traffic (Feb.) WB3GZU 442, WB3JRW 148,
 W0VJD3 147, W3FA 112, N3S1 99, K3JRW 79, AA35 44,
 W3FZV 33, N3QA 30, KB3AP 25, N3IT 13, W0WBY 12,
 WA3FUJ 10, WB5FIX 8, W3ZNF 6, WB3GES 2 (Jan.)
 N3IT 9, W2HXT 5 (Dec.) W2HXT 11.
SOUTHERN NEW JERSEY: SCM, Bill Luebkemann,
 WB2LCC — SEC: W2HOB

Net	Mor.	Time (PM)	Freq.	Sess.	QNI	QTC
NJNE	AF2L	7	3695 28	503	337/285	
NJNL	AF2L	10	3695 28	290	239/168	
NJPN	K2VX	6	3950 32	544	446/387	
JSARS	WA2HEB	8:30	91 28	287	67/59	
MCN	AA2H	10:30	075 28	280	111/94	
SPARTN	KB2EV	10:30	94 28	211	97/84	

Feb. showed a great influx of Official Traffic Station applications, so a word about these is probably in order. The OTS is available to anyone who handles traffic on any mode or frequency, provided it is in accordance with ARRL procedure and good operating practice. Applicants must report monthly on the form provided or, ideally, by radiogram. If you are interested in this or any other appointment, please contact me for details. By the time you read this, my expanded monthly column should be appearing in all club newsletters throughout the section. If your club newsletter is not getting it, why not invite the editor to contact me for details, or do so yourself. I'll be more than happy to add all interested clubs to the mailing list. Traffic: W2ZQ 584, KB2EV 180, WB2LCC 188, AA2L 148, W9SWF 147, N2AFN 142, WA2KWW 77, K2UL 64, N2AJG 53, W2JL 47, WA2HEB 39, WA4RDI 39, WB2FJE 38, WA2STJ 32, W2HOB 32, WB2PIW 18, N2ALS 17, WB2AIO 14, AG2O 14, N2ABY 12, WB2JGA 12, W2KP 9, N2FC 5, WB2HZH 4, W4NLC 4, WA2WVC 4, WB2VBV 3.

WESTERN NEW YORK: SCM, Lonnie J. Keller, WA2AOG — SEC: WB2FX, SIM: W2MTA. Welcome to new appointees WB2SYK (OTS), OBI, WA2JCU (OTS), WB2NAO (EC, OES), BPL to WA2SDY, W2ZJ and WA2JCU PSHR to N2TW, W2MYA, WA2ZJP, WB2PJU and WA2MFV. A special congratulations to WA2JCU on his BPL in his first month in traffic handling! Traffic system handled the "Valentine's Day Massacre," as the Syracuse ARC's message blitz has been termed, extremely well considering the volume in such a short time. NLI missed very much in this exercise. Note the WA2SDY traffic total! The new STJARC is comprised of AD2K (ex-WA2JPG), N2DI, WA1VMI and AA2S. Congrats to N2TW for the flood in stride! W2RQF on his way to SSTV DXCC on 28.880 MHz. NM appointment to WA2MFV, mor. of the OCTEN, 146.19.79 2330Z daily, serving the Oneida area. WA2VCM now has the Auburn ARA newsletter and mailing list on his computer. Cayuga County RACES activated for a week during the Port Byron ice jam emergency, impressing many County officials. WA2BAK now resides in Virginia, and wakes up Washington DC each AM on WPRW radio. WB2JXF and N2CU now is in Texas, WB2JXF tagging along with hubby WA2RUK. Congrats to new upgrades WA2REM (General), WB2SIR (Advanced), WA2RS (Extra), KA2CKX (General), WB2PCP (Advanced) and Novice KA2EGC and KA2EGZ. Hope to see you all at the ARRS and EC meeting at the Rochester Hamfest May 25-27, 1979. Traffic: (Feb.) WA2SDY 1849, W2ZJ 544, WA2ELD 409, WA2JCU 276, N2TW 264, WA2MFV 246, WB2PIU 221, W2MTA 187, N2APB 93, WA2AOG 85, W2RUF 84, W2PZL 66, WB2OMZ 63, WA2ZJP 58, AF2K 52, K2GWN 44, W2RQF 40, W2FR 32, WA2AV 29, WA2ORS 21, WB2ZTC 12, WB2KHT 8, K2VR 6, WB2NAO 4, WB2FPI 2. (Jan.) N2TW 434.

WESTERN PENNSYLVANIA: SCM, Otto I. Schuler, K3SMB — ASGM: N3FM, SEC: WA3VUP, Asst. SECs: WA3LJW and WA3IBQ, NMs: W3NEM, W3KUN and W3MML.

Net	Sess.	QNI	QTC	Freq.	Time Day
WPACWN	28	507	796	3585	7:00 P Dy
WPAPTN	28	Not recvd	3983		6:30 P Dy
WPA2MTN	28	547	179	146.28/88	8:00 P Dy

W3YO and WB3PAV/3 tied the nuptial knot on Mar. 3, ARL 41 to them. We have two Silent Keys K3SAD and WB3BOA, our sympathies are with their families. New Novice is KA3CFL. New Tech is KA3ALV. New Generals are WB3AMR, KA3AVD, N3ANP and WB3HUO, congratulations to all. I hear that W3GQJ's XYL is a new Novice in Detroit. Her call is KA8EJM. Look out John, we hope you can get to the rig. Our congratulations to W3GU, who is now Penn State University. Excellence in Teaching Award. He is in the Electrical Eng. Dept. He has helped many amateurs get their ticket through his giving his free time to them. The Point Radio Operating Society in Pch. is 100% ARRL. Penn State ARC officers are WA3ZUS, pres.; W3AS, vice-pres.; WA3LE, treas.; WA3JUL, secy.; WA3WKN, sta. act. Port Venango Mike and Key Club officers are WB3DJM, pres.; WA3TDF, vice-pres.; N3AIT, secy-treas.; WA3YDO, act. dir. I would appreciate receiving all new reports before the 4th of the month. PSHR W3YO AC3N WA3EY11 and WB3GZR. Trc: (Feb.) K3CR 1278, WA3PKA 386, W3EGJ 247, W3NEM 181, N3EF 122, N3FM 107, W3SMV 103, W3Q 90, AC3N 86, K3SMR 72, W3BPA 73, W3MML 59, K3HCT 46, N3NR 43, W3KUN 43, WA3INX 40, N4DR 40, WB3EY 39, W3RUL 39, W3SN 37, AF3B 36, WB3IA 31, WA3GNT 27, N3KB 18, WB3GWJ 18, K3CV 12, K3UA 11, AB3X 8, WB3GZR 3, W3LOD 3, K3MS 1. (Jan.) W3AS 382, W3NEM 270, WB3BOA 221, W3SMV 75, K3DEJ 14. (Dec.) K3CR 434.

CENTRAL DIVISION
ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst. SCM: W9RYU, SEC: W9ALS, MNs: WA9KFK and W9JSH, Cook County EC: W9HPG.

Net	Freq.	Times/Day	Trc	Sess.
ILN	3690	0030/0400 Dy	315	56
Ill. Phone	3915	2245 Dy	213	28
NCPN	3915	1300/1800 Dy	140	45
IEN	3940	1400 Su	no report	
W9VEY				8

Mem Stn)
 For info on '79 National Convention write P. O. Box 891, Baton Rouge, LA 70821. This promises to be the big one. W9OK demonstrated amateur radio to Georgetown High School classes. 3915 was active March 6 for a state (radio) Drill with WB9LR, WA9LU, K9VA, W9LIG, W9OK and W9KXN (on emergency) participating. W9OYL has a new Century 21. W9HQ1 reports that the Ninth Region Daytime net passed 169 messages during 54 sss. and IL participation was 100% with W9JJ, W9YGE, W9NXG, W9FVV and W9HOT participating. N9ALC chasing DX with the help of OM W9LNO, K9IW, W9TKR, N9LE, WA9SLD, W9NM are proud owners of new TRS 80's. W9LIG is recuperating at home after a serious

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- 60-130 WPM Baudot
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Every ham sooner or later thinks he would like to design his very own transceiver. The hams at DenTron are no different.

The HF-200A is the finest expression to date of a high quality, uncomplicated solid state transceiver, designed by American hams for amateurs around the world.

But, as ever, the finest expression of any transceiver is in the performance. We are proud of the superior receiver incorporated within the HF-200A. One example: the receiver signal passes through 4 individually tuned shielded band-pass coils before it ever reaches the mixer. The result is a superior immunity to front end over load and out of band interference.

It's a ham's basic nature to explore and tinker. We invite you to tinker to your heart's content with the HF-200A. There are no critically adjusted circuits, no sections labeled "do not touch" or "factory only."

The HF-200A was designed for you! You'll even be able to service and align the radio without the addition of expensive test equipment.

The HF-200A by DenTron. Doesn't it sound like the radio you designed?

Specifications:

General:

- Frequency coverage:
3.450 MHz - 4.050 MHz
6.950 MHz - 7.550 MHz
13.950 MHz - 14.550 MHz
20.950 MHz - 21.550 MHz
28.000 MHz - 30.000 MHz
*28.500 MHz - 29.000 MHz
*standard from factory (crystals available for entire range)
- Modes of operation: USB, LSB, CW, RTTY, SSTV
- Frequency stability: PTO; total drift is less than 100 Hz after warm up. Total frequency change is less than 100 Hz over 11 - 16 V-dc input supply change.

- Frequency readout accuracy: better than ± 4 KHz between 100 KHz calibration points.
- Power supply requirements:
13.6V nominal
13.6V-dc regulated 2A
13.6V-dc unregulated 20A
750MA receive-full audio
16A transmit
- Weight: 11 pounds
- Size: H4"W10"D15" including heat sink extrusion.

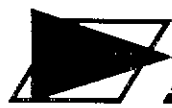
Receiver:

- Sensitivity: less than 0.25μ V for 10dB S/N
- Intermodulation: intercept point + 20dBm
- Selectivity: 2.4KHz at -6dB and 4.4KHz at -60dB (1.8:1 shape factor)
- Ultimate selectivity: greater than 100dB
- Agc: I-F and A-F derived - less than 4dB output variation for 80dB input signal change 191 milliseconds rise time, 3.285 second decay time.
- I-F frequency: 9 MHz
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- Spurious response: greater than 60dB down
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Transmitter:

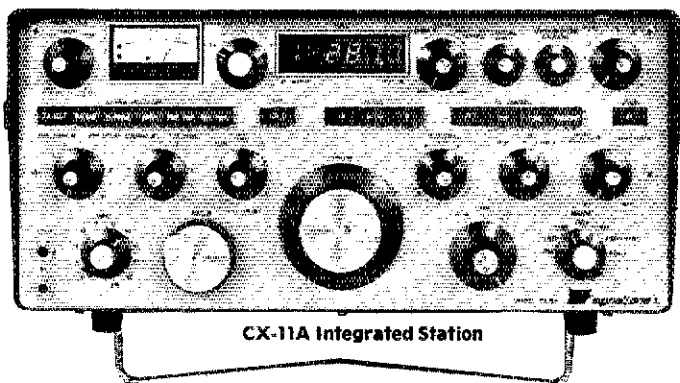
- Power input:
SSB - 200 watts PEP
CW - 200 watts
RTTY and SSTV - 100 watts
- Load impedance: 50 ohms, nominal
- Spurious output: greater than 50dB down
- Harmonic output: greater than 40dB down
- IMD: 30dB below PEP
- Carrier suppression: greater than 50dB
- Undesired sideband suppression: greater than 50dB @ 1KHz
- Microphone input: low impedance - dynamic
- CW keying: requires a closed circuit to ground
- VSWR: no internal shut down of power amplifier at any SWR ratio. - Recommend 2:1 SWR maximum for continuous operation.

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CX-11A Integrated Station

GENERAL SPECIFICATIONS AND FEATURES

- **SYNTHESIZED FREQUENCY COVERAGE:** All amateur bands 1.8-30 MHz in full 1 MHz bands, plus 4 additional 1 MHz bands for future expansion.
- **TWO PTO'S:** dual receiving, transceive on either, or split operation
- **POWER SUPPLY BUILT-IN:** 115/230V, 50/400 Hz, Hypersil[®] transformer completely self-protecting — both thermal and current overload
- **MODULAR CONSTRUCTION:** Glass epoxy etched boards utilizing gold plated sockets for easy removal of all transistors and IC's, plus mass termination ribbon cable system
- **T/R SWITCHING:** QSK, full break-in CW, PTT, or fast-attack VOX
- **OFFSET TUNING:** Both receive and transmit ± 3 KHz
- **SERVICING:** Easy removal of all circuit boards, front panel, and cabinet
- **COOLING:** Massive heat sinks, final transistors cooled by quiet whisper fan when in transmit mode, thermostat controlled
- **AMERICAN-MADE:** All parts and labor 100% American-made, all military, computer grade
- **ONE SELF-CONTAINED PACKAGE:** 16 1/4" W X 7 1/4" H X 14" D, 40 pounds

RECEIVER SECTION

- **SENSITIVITY:** 116 dBm (.25uv) for 10dB S/N at 28 MHz (2.4 KHz band width)
- **SELECTIVITY:** dual matched 2.4 KHz 8 pole crystal filters deliver 16 pole 1.4:1 shape factor (6dB/60dB), plus post detection 1.5, 1.0, .4, and .1 KHz band width selectives
- **DYNAMIC RANGE:** 98dB with a 2.4 KHz band width
- **ACTIVE MIXERS:** Two quad JFET silconix[®] mixers
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Illness. WA9WXC reports the DuPage County ARES Net meets at 8 PM on Wed. evenings on 146.01/81. The Starved Rock Annual Hamfest will be held Sun. June 3rd at the Fairgrounds in Princeton. The Six Meier Club of Chicago will host their annual picnic on Sun. June 10th at Santa Fe Park. This column's sympathy to the family and friends of W9MAP of Rockford who recently passed away WB9ZK had 952 contacts on cw. WA9HRN WB9VIV K9SPL K9IW and K5VOL are the new officers of Libertyville and Mundelein ARES. CAND total messages was 578 during 56 sess. and the 9th region participation was 98.2% with Ill. stations W9HOT W9NXG W9LJJ and K9DAC checking in. W9LJJ is the only BPL recipient for Feb. from K9SPL 194, W9NXG 184, K9BVE 143, WB9JSR 139, N9JFK 121, WA9KFL 121, W9HOT 117, WD9DSG 114, WD9DMV 107, W9OK 93, WD9REX 79, K9EEA 75, W9KR 73, W9OBS 50, W9YCE 38, W9LNG 28, WA9JJE 27, W9OYL 27, N9FX 27, WB9ZED 23, WB9PUK 22, W9PRN 22, K9SW 9, W9HPG 9, WA9AON 8, K9DQU 5, K9BK 4

INDIANA: SCM, J. M. Kell. W9LJU — SEC: W9UMH. NMS: K9CGS (TN), W9JUU (QIN) WB9YXN (RCN), W9PMI (VHF PAM). Feb Net reports, time in UTC and freq. in kHz

Net	Freq.	Time	QNI	QTC	Sess.
IFN	3910	1330/2130/2300 Dy	1365	338	84
QIN	3656	1430/0000/0300 Dy	930	398	84
ICN	3708	2315 Dy	289	81	35 (Jan)

Feb report VHF nets from W9PMT: QNI 329, Ttc. 9. Ind was represented 100% on D9RN in Feb. Please note the time changes for ICN and QIN. In answer to several inquiries, this column is written by your SCM. I wish to thank all the Clubs that have put me on the Club Newsletter mailing list. I also welcome any news or reports you have. My address is on page 6 of any GST. Hamfest season begins with Dayton (does it ever really end?). Wabash and Evansville will be May 20th. Several more in June. Indianapolis Hamfest will be July 8th. New this year at Indy will be an antenna measuring contest and an ERP contest for portable 2m rigs. Several hams lost antennas in the Feb. ice storm. K9FG found the director and reflector parts cost as much as a new antenna. WB9OPN 11 tied out Feb. in Grand Canyon signing CF2CK. Meanwhile N9NS went north to ND to view the eclipse of the sun. Field Day will be here soon. Anybody planning to the Fort Wayne effort this year? Rushville repeater has a good net on Tue. Nites. WD9JJE became silent Kex. Traffic: (Feb) W9JUU 961, W9FC 205, W9QLW 147, WB9YJU 111, W9EJ 77, W9XD 74, WA9OCF 70, W9DKP 68, WB9VJE 53, WB9JUF 48, WD9CIS 45, W9DLE 34, N9AFI 33, WA9OKK 30, N9AKI 28, W9PMT 25, WB9GXW 22, W9IHO 21, WD9FIC 18, W9RTH 15, W9CMT 12, AA9U 12, K9RPZ 12, K9CGS 11, WA9OHX 11, N9PS 8, K9FG 8, K9SSSF 7, W9SHU 6, W9NAA 5, W9WEL 4, WA9KAG 3, W9BDP 1. (Jan) WB9VJE 36, N9RC 28, K9SBW 9, K9EQT 7

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9OAK. NMS: W9AYK WB9ICH W9JEM WB9DM W9DGM K9LGU K9EN Nets, Freq. Time, QNI, QTC, Mgr. BWN, 3985, 1245Z M-S, 713, 624, W9AYK, BEN, 3985, TB00Z Dy, 620, 125, W9JEM, W9BN, 3985, 2300Z Dy, 1061, 298, WB9ICH, WNN, 3725, 2315Z Dy, 71, 7, WB9ZRE, WIN-E, 3663, 0100 Dy, 323, 107, W9DM, WIN-L, 3663, 0400 Dy, 259, 106, K9LGU, WRN, 3663, 0130 Sat., K9EN, WI Ex PO, 3925, 1801 M-P, 479, 29, WA9NIX, New EC Winnebago County WB9KZH. WB9DAP is now Advanced. W9MY is now in Morganton NC. PSHR is improvised watch for details or listen in on 3985. W9DM new NM for WIN-E, please give him your full support. Thanks to WB9KFX for his term as NM, also our deepest condolences to Bob and his family on the loss of his dad. WD9CIC is now AF9I. New EC for La Crosse County is W9LZQ. New EC for Washington County is WB9DQX. Last month's report K9DCCS should be K9CDE Wisconsin Dells. New Novices in La Crosse area KA9DPW KA9DKI KA9DSC. W9OAK new SEC for Wisconsin. All ECs are requested to give him their full support. K9LJU is new PRA. WNN certificate to KA9CVL. W9ZGU made BPL. W9YCV has R4C and T4XC. Traffic: (Feb) W9ZGU 820, W9YCV 286, W9DND 242, K9FHI 177, W9JEM 147, WD9DHF 92, AF9I 86, WD9RC 69, W9YCV 69, W9AYK 64, WD9EAD 60, AD9X 58, W9DM 53, N9CDE 52, W9RFA 50, WB9ICH 48, WD9AJA 46, K9LJU 46, WD9ESZ 43, W9TKB 41, K9AO 34, K9JPS 38, W9UCJ 37, K9AKG 33, K9ANV 32, W9IWH 32, WB9YFY 32, W9BCC 29, WB9MPE 29, K9HDF 27, K9VSY 27, WA9WY 27, W9FYD 25, W9YYL 25, WB9ZRE 25, WB9BRE 24, W9LDO 24, WB9RRU 24, W9JUU 24, WB9FSM 22, K9LJU 22, KA9CPA 21, K9BCV 21, WB9JSW 21, W9MTL 20, WD9BK1 19, WB9LKC 17, WB9YPZ 13, W9ZBD 6, (Jan.) K9ASG 2, K9BGI 2

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WB9HOX — SEC: K9HJC. STM: AF9C

Net	Freq.	Time	QNI	QTC	Mgr.
MSPN	3944	12:05 P	120	36	K9ZBI
MSPN	3929	5:45 P	678	163	W9DUW
MSN E	3885	6:30 P	258	86	W9RIO
MSN 2	3689	10:15 P	120	36	K9PIZ
MSSN	3710	5:30 P	182	55	AF9C
MWX	3925	6:15 P	365	243	WB9UKI
PAW	3925	9:12-1:5	311	268	WA9YVT

Congratulations to new Tech N9ARW and KA9CSB who upgraded from Novice to Tech. By the time you read this WA9YVA and WB9MJW will have become OM and XYL. We all wish you both the best of everything. WD9HOX received the POPPOTIA award in Feb. Congratulations! W9VB and K9TS are working with the Olmsted County Chamber of Commerce on the plans for emergency preparedness. For info about the ARRL National Convention slated for July 20, 21, 22 write to Bill Mixon, P. O. Box 891, Baton Rouge, LA 70821. I am looking forward to meeting many of you there. Any two number nets that are operating please ARL & 7 the call, time, date and freq., to K9HJC and yours truly. We hope to get a pamphlet out soon and do not want any nets left unmentioned. SEC K9HJC reports ARES cooperating with the Weather Bureau on a snow depth measuring program for flood forecasting purposes. Traffic: WA9YV 331, WA9FC 186, AF9C 126, W9RFA 126, K9PIZ 61, WB9QEU 87, W9DUW 80, WB9UKI 80, WD9CJM 77, N9AHA 76, WD9BFR 73, WB9NJB 51, W9OPX 48, K9CSE 47, WB9ZU 47, K9ZBI 47, K9HJC 42, WB9RCV 30, WD9FSL 24, K9BJP 21, K9TS 20, K9AIT 14, K9LJU 13, WB9SYT 10, K9BDU 6, K9FLT 6, WB9GYQ 6, WB9ZBJ 5, K9RMX 4, A9OM 2

NORTH DAKOTA: SCM, Lois Jorgensen, WA9RWM — SEC: WB9TEE — Congrats to new Novices KA9DPL and KA9DBS. WD9CLD very active on the Solar Eclipse net working with NOAA and 7-Land. Anyone interested in Skywarn during the summer looking for storms contact

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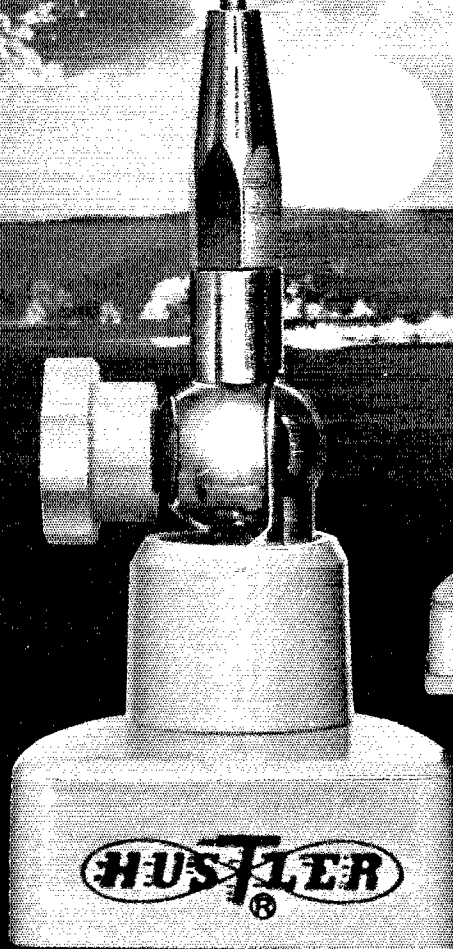
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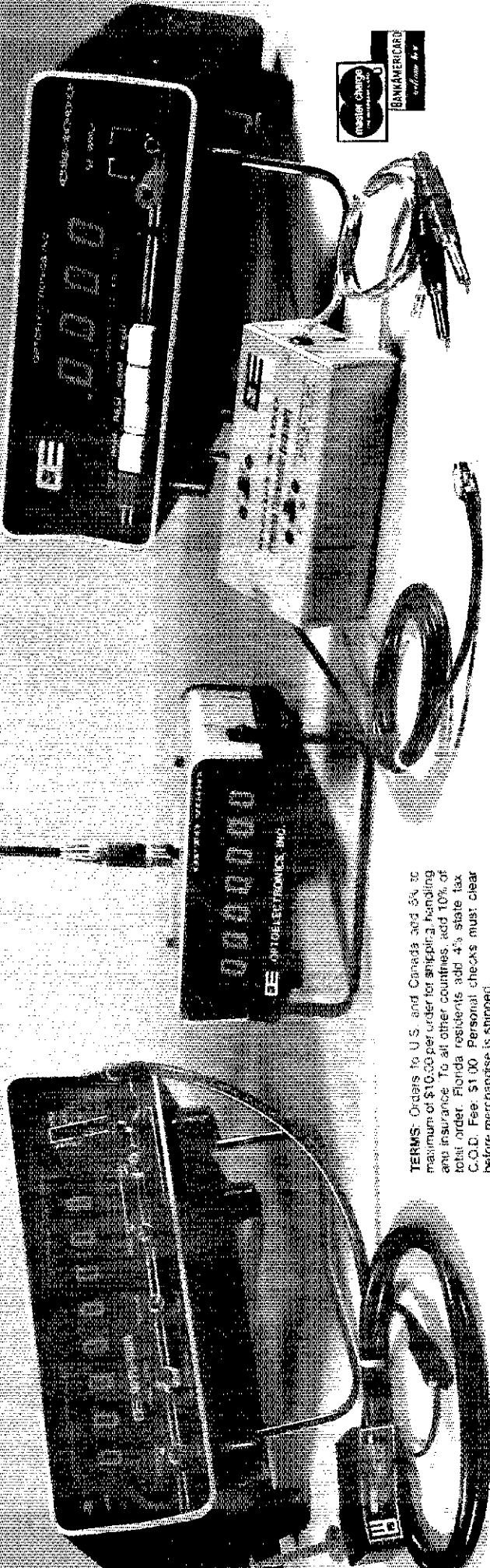
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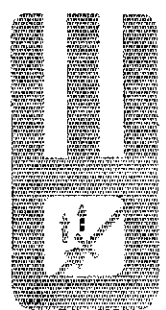
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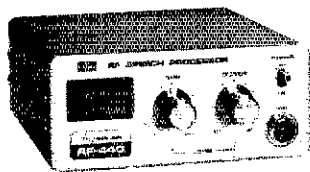
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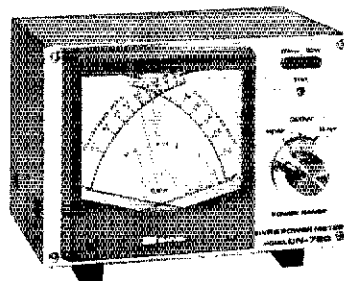


RF Speech Processor Model RF-440

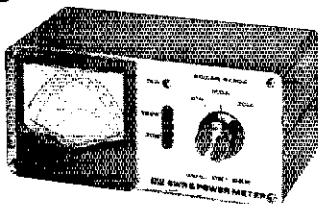
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CN-620

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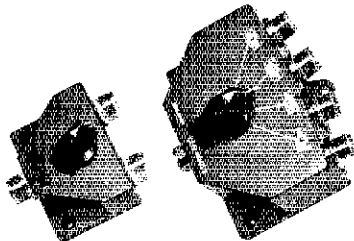
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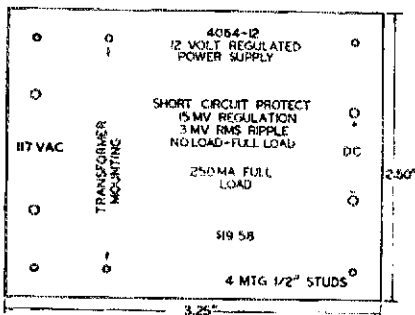


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WB0TEE or WA0RWM. The Goose River Radio Club will have their annual picnic at Mayville June 3rd. WA0WLP WB0TEE have been busy on 6 meters and are members of the SMIRK WD0BQY very active on CAN. W0OSP needs 4 counties in ND to complete ND; he is on the DATA net. Thanks to all members for sending their ballots to ARRL.

Nets: KHz CST/Days Sess QNI QTC Mgr.
Goose River 1990 0900 Su 4 45 1 W0CDO
DATA 3986.5 1830 Dy 28 360 132 WA0CHR
YL WX 3997 0730 Su 28 586 578 WA0RWM
Traffic: (Feb.) WA0RWM 663, WA0CRH 202, K0FRP 191,
WB0OAJ 101, WB0WIB 91, W00ECS 85, N0AFP 73,
W0CDO 62, WB0JGM 37, K0GGJ 36, W0FNZ 23, W0DM 4,
(Jan.) W00ECS 67.

SOUTH DAKOTA: SCM Lydia S Johnson, W0KJZ --
Asst. SCM: W00VB, SEC: WA0TNM. NMS: W05 WE 2WL
UFN A0BTM. Election by NJO and SDEN members voted
WA0RE W0NEO and W0WE as net managers. Our
ARRL Communications Mgr. is John Lindholm, W0XX,
who replaced W1NJM. A revised PSRR will be effective
with June report. The minimum qualifying total is 60;
with June report the minimum qualifying total is 60;
and Techs/Novices 40 points. Phone Nets: WA0RIS
QTS/OBS/NM for W0WE. QTS: WA0ARZ, W0B10
WA0NZ4 W0HOJ K0RA QVS, K0VXM. Cancellations
due to inactivity or request: EC, WA0RIQ W0WE, QTS
W0SMV; EC, A0AX, K0VXM can be heard on 6-7-432 mtrs.
with 1S-600, TS-700 and 432 Microwave modules. ARRL
National Convention in Baton Rouge, LA, July 20-22; and
Dak. Div. Oct. 5-6-7 Sioux Falls, SD. Traffic: W0ZWL 738,
W0M21 469, WA0VRE 215, W00VB 140, W0H0L 132,
WA0UEN 131, W00BMR 104, WA0TNM 87, W0KJZ 33,
K0FRE 24, K0ZMA 20, W00VEQ 11, W0IG 8.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UJU -- SEC:
WA5NVN NM: AD5D W5MYZ W5POH WA5ZVZ. Nets:
Time/Day, QNI, QTC, Mgr. ARN 3995, 0030/Dy, 1:55, 54
AD5D OZK, 3760, 0100/Dy, 2:36, 16, W5MYZ ASN,
3740/Tr-S, W5WPV NEAWN, 146, 28/88, 0130/Tr-S, 182,
14, W5WJH, SCAAC, 28, 765, 84, 5, W5DHC, APN,
3937, 1200 M/S, 938, 50, W5POH, M-Bird, 3928, 7230/M-F,
893, 39, WA5MYZ, W5KL lost most of his ant. due to ice
storm. W5B1Y has Kenwood twins. WA5MWJ &
W50FN new Denton Clipperton L. W5B1KM new
Wilson MK IV. WA5TJN has Heath HW-16 & HG-10. K5AS
lost his Quad due to ice storm. CAREN's 10-meter net on
28 600 at 7:30 PM Thurs. PSRR: W5POH 43, QBS
W55WA WA5UJU 2 Traffic: W5BLP 38, AD5D 25,
W5POH 24, WA5YUJ 24, W5JL 23, W5KL 18, K5DW 15,
K5BIL 12, W55WVA 7, W55GQ 3.

LOUISIANA: SCM, S. T. "Tom" Losny Jr. K5TL -- Asst.
SCM: K5DPG, SEC: W5B1YH, STM: N5YL, Net Mgr.:
W5GHP N5EB N5HB W5B1YH W5BCDX K5DGP
WA5TQA W5B1BR N5EK N5ES WA5SXK K5ARRH
WA51QU all active on DFN5 L5N certs to K5BIL
W5C5WK W5D1QW W5B1BR W5B5NXM W5B1PG
WA4VLT W55WAQ W5WPV W5B5YR1. Special mention
to W5B1OE and the MTA ARC for participation in recent
SET and their fine efforts with Emergency Hospital Net.
Attended Ruston Hamfest in Feb. Officers for GNOARC
are W5E2ED, press: W5D5XT, vice-pres: W5MNM,
secy: N5RH, treas. Newly formed ACADIANA DX ASSN
in Lafayette elected W5D5BV, chmn. Congrats to
W5B1RI on upgrading to General, also the proud papa
of new baby boy. Contact: K5S1D or W5N1Z. Is you'd
like to help at this year's National Convention in Baton
Rouge. Don't forget Shreveport Hamfest May 5th and
6th.

Net	Freq.	Time/Day	QNI	QTC	Mgr.
LAN	3615	7 & 10 PM Dy	388	256	W5GHP
LIN	3910	6:30 PM Dy	551	127	N5ES
LRN	3703	7:30 PM M-F	134	14	N5IB
LRN	3587.5	6:30 PM Su-W	10	8	N5RH
RACES	3993.5	8:00 AM Su			W5B1YH
TRF	3910	9:00 AM Su			W5B1YH

Traffic: (Feb.) W5GHP 220, K5TL 154, N5RB 153, N5ES 145,
N5YL 140, W5B1BR 131, W5BCDX 100, K5DPG 69,
W5M1 55, N5IB 44, N5EK 33, K5ARRH 33, W5500M 28,
W5D5GJB 6, W5YN 4, W5B1KT 2, (Jan.) W5M1 215.
MISSISSIPPI: SCM, E. Ed Robinson, W5XT -- SEC:
W5B5XA. DXers note -- Magnolia DX Assn. Net (N5FG)
Sun 8:30 PM CST 28,750 MHz averaging 50 cks/mo.
Also noted below. Section nets reporting up, however,
station activity reports off. Please get yours in. Congrats
to W5D5HRA new Extra. W5B5FHA sporting SB200 linear
and working DX. W5GWD active on 160. Best wishes to
K5FC and XYL new daughter (Dec. '79). All stations
please note my QTC change (W5XT-SCM) to P. O. Box
181, Jackson, MS 39216 and try to put up with tempo-
rary communication problems -- link in on 7th Na-
tional Convention, Box 891, Baton Rouge, LA 70821.
DRN5 -- (W5BCDX) sess. 28, QTC 430, Ms. REP 92% by
W5EDT K5DMD W5D5GNR N5AXH W5B5OEK, CGCHN
(WB4PGB) sess. 28, QNI 2810, QTC 215, MSBN (K5W5C)
sess. 28, QNI 2171, QTC 93, MTN (K5OAF) sess. 28, QNI
136, QTC 36, MSN (W5D5GNR) sess. 11, QNI 86, QTC 12.
Ms. RACES (N5AMK) sess. 4, QNI 191, MN (WA5JWD)
sess. 28, QNI 613, QTC 14, Capital AEN (W5D5KD) sess. 4,
QNI 85, QTC 6, JGARGEN (W5D5CDI) sess. 21, QNI 225,
QTC 21, MENS. FMN (W5B5DDP) QNI 250, QTC 7, Traffic:
W5D5GNR 200, K5OAF 159, W5B5EHA 94, W5EDT 74,
K5AKM 34, W5XT 29, W5B5KI 21, W5B5N5B 16, W5B5BY
6, K5MK 6, W5D5CSU 6, W5B5SKP 2.

TENNESSEE: SCM, O. D. Kersey, WA4GLS -- Asst.
SCM: W5B5PF, SEC: W54DYJ, STM: W4ZJY, WB4BGC
in Mar. OST should be WA4BGC. GATS starting classes
at APSU. MS Chapter of GCWA was organized in Jan.
with 30 members. Officers are: W4SCF, pres.; K4BSI,
vice-pres.; K4GMU, secy-treas. WB4B1N N4APN,
WB4YPO & WD4KWV handled communications for in-
jured Boy Scout in getting help from LaFollette
Hospital. Recent appointees as QES are WA4EAV
WB4RHQ & WA4WHO. Recent Net Manager appointees
are: WA4XVW & WA4SKM. DRN5 participation by
WA4CNY K4CNY K4WWQ WB4ZSZ & W4OGG is greatly
appreciated. IPN certificates issued to WB4GLW &
84UUC & CAN. Participation by WD4GX & WA4P
WB4ZSZ & W4OGG is appreciated. Phone Nets reports
154 sess, 6826 QNI & 886 QTC. CW Nets reports 80
sess, 533 QNI & 185 QTC. Still need QNI to the TN area
and late sessions, contact W4ZJY for details. Tenn. is
considering the proposal of joining the Carolinas-
Virginia Repeater Association; in my presentations to
the clubs & repeater groups I am finding overwhelming
approval. Everyone plan to attend the Humboldt
Hamfest on May 20, contact W4IGW for details; and the
Knoxville Hamfest and ARRL state convention on May
26 & 27. These events are always well attended and en-
joyed. Get your ideas to W4WHN so he can incorporate
them into policy at the board meetings. I shall be atten-

OMNI HAS IT ALL. All the advantages and capabilities, all the new conveniences and new levels of performance you need, whatever your HF operating specialty. All built-in, ready to use.

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ALL VOX AND PTT FACILITIES built-in; 3 VOX controls plus PTT control at front and rear jacks for external PTT switch.

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ALL FILTERS INCLUDED: 4-position CW/SSB filter (150 Hz bandwidth with 3 selectable skirt contours) plus 8-pole Crystal filter (2.4 kHz bandwidth, 1.8 shape factor.)

ALL MODE SWITCH puts all filters to work in any mode.

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ALL-SENSITIVE RECEIVER; from $2 \mu\text{V}$ on 160 m to $0.3 \mu\text{V}$ on 10 m (10 dB S+N/N) for ideal balance between dynamic range and sensitivity.

ALL OVERLOADS HANDLED; dynamic range typically exceeds 90 dB and PIN diode switched 18 dB attenuator also included for extra overload protection.

ALL LINEAR/ANTENNA BANDSWITCHING FROM FRONT PANEL; auxiliary bandswitch terminals on back panel for external relays or circuits are controlled simultaneously by the OMNI bandswitch.

ALL INTERFACE JACKS FOR PHONE PATCH; access to speaker and microphone signals.

ALL-LEVEL ADJUSTABLE ALC; set output from low power to full, retain low distortion at desired drive to power amp.

ALL SIDETONE ADJUSTMENTS; pitch and volume.

ALL-POWERFUL, ALL-WARRANTED FINAL AMPLIFIER. 200 watts input to final. Proven design with full warranty for first year and pro-rata warranty for additional 5 years.

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ALL-MODE POWER: basic 12 VDC for easy mobile use, external supplies for 117/220 VAC operation.

ALL FRONT PANEL MICROPHONE AND PHONE JACKS. Convenient.

PLUS ALL THE OTHER HANDY BUILT-INS: "Timed" 25 kHz crystal calibrator in OMNI-A with automatic 5-10 sec. "on" time for easy 2-hand dial skirt adjustment... Zero-Beat switch for placing your signal exactly on CW listening frequencies... SWR bridge switches "S" meter to read SWR each time you transmit for continuous antenna monitoring... Separate receive antenna capability... Dual speakers for greater sound at lower distortion... Plug-in circuit boards for fast, easy field service.

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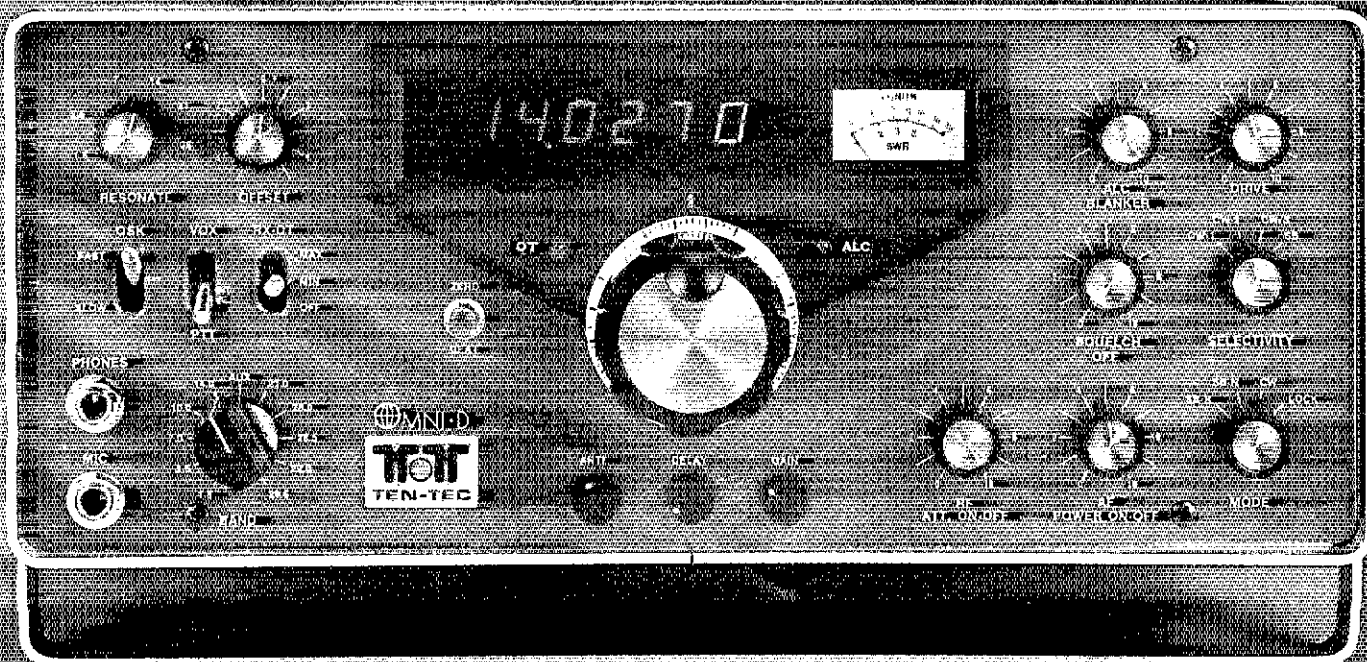
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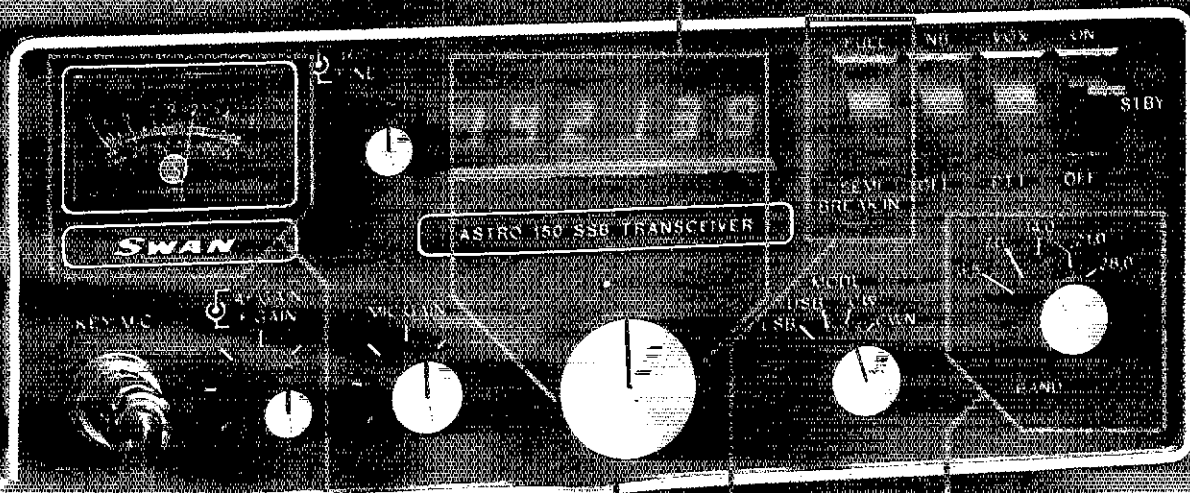
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*in lieu of 10M band on Model Astro 151

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			HW-12 Transmitter	75	
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	GT-500A Xcvr	329	AC-400 Supply	79	
	AC-400 Supply	79	FM-270 2M FM	95	
	FM-270 2M FM	95			

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7553B Receiver	7551 Receiver	349	Com II 6M	69	
KWM-2 Xcvr	KWM-2 Xcvr	395	Com IV 2M	129	
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R4-B Receiver	R4-C Receiver	349	SX-99 Receiver	79	
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MS-4 Speaker	2NT Transmitter	19			
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QR-666 Receiver	250 C 6M Xcvr	339	FM 2X2M Xcvr	FM 2X2M Xcvr	349
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Knight	T-40 Transmitter	\$ 39	Lafayette	HA-800 Receiver	\$ 89
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TR-108 Trancur 2M	TR-108 Trancur 2M	79	HE-45 Transceiver	HE-45 Transceiver	49

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			90451-A Grid Dipper	90451-A Grid Dipper	95

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NCX-SMKII Transcwr	NCX-SMKII Transcwr	299	HR-25 2M FM	HR-25 2M FM	225
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NCX-500 Transceiver	NCX-500 Transceiver	199			
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NC-105 Receiver	NC-105 Receiver	69			

SBE	SB-34 Transceiver	\$249	ICOM	IC-21 2M FM Xcvr	\$299
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SB-144 2M FM	SB-144 2M FM	175	IC-22A 2M FM Xcvr	IC-22A 2M FM Xcvr	185
SB2-LP Linear	SB2-LP Linear	179	IC-30A 432 MCFM	IC-30A 432 MCFM	269

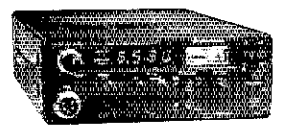
Tempo	Tempo one Xcvr	\$299	Ten Tec	PM-3 Trnsur	\$ 49
AC One Supply	AC One Supply	79	Argonaut Xcvr	Argonaut Xcvr	199
FMH 2M H.T.	FMH 2M H.T.	149	KR-40 Keyer	KR-40 Keyer	79
CL-220 Trncur 220 MC	CL-220 Trncur 220 MC	179	RX-10 Receiver	RX-10 Receiver	49
FMH 2M w/Talkie	FMH 2M w/Talkie	149	S-30 Signalizer	S-30 Signalizer	29
			Triton II	Triton II	479

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FL-101B Xcvr	FL-101B Xcvr	549	5 3/54A Plug-in wide band preamp	5 3/54A Plug-in wide band preamp	75
FL-2100B Linear	FL-2100B Linear	295	Hickok 695 Generator	Hickok 695 Generator	69
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			Hewlett Packard 400C	Hewlett Packard 400C	75
			Precision E-400 Signal Generator	Precision E-400 Signal Generator	125
			Electro Impulse Spectrum Analyzer	Electro Impulse Spectrum Analyzer	395
			Dyna/Sciences Model 330 Digital Multimeter	Dyna/Sciences Model 330 Digital Multimeter	195
			Hewlett Packard 4905A Ultra Sonic Detector	Hewlett Packard 4905A Ultra Sonic Detector	550
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			PACO Scope Mod-S-50	PACO Scope Mod-S-50	75
			Singer FM-10C	Singer FM-10C	3495
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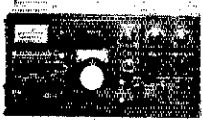
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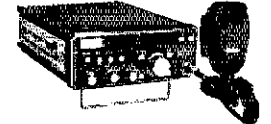
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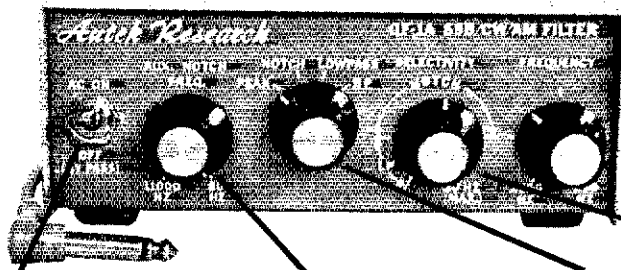
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Four main filter modes for any QRM situation.

Continuously variable main selectivity (to 20Hz.)

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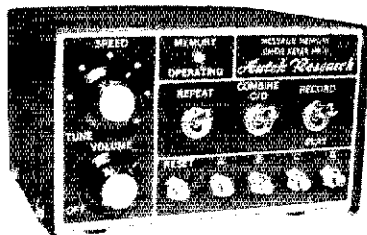
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Due to cost and panel-space limitations, even the latest rigs only include a fraction of the QF-1A features. We recommend you buy the best rig you can afford, spend \$3,000 or more, then add a QF-1A and listen to the improvement! WORKS WITH Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Collins, Heath, S/I, etc., ANY RIG!

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Calls CQ while you relax.

Also remembers name, QTH, contest exchanges.

Record anything you want in seconds!

Model MK-1 \$99.50 ppd. U.S.A.

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

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This "state-of-the-art" keyer pleases beginners and CW "pros" alike. DOT AND DASH MEMORIES. TRIGGERED CLOCK. IAMBIC. SELF COMPLETING. JAM PROOF. 5 to 50+ WPM. LATEST CMOS FOR LOW CURRENT. Built-in monitor, speaker. Widely adjustable tone, volume. Perfect weighting at all times. No fiddling with an adjustment that varies with speed. NEW: DUAL TRANSMITTER OUTPUTS key ANY modern (post

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COMING SOON for memory buffs: Memory expander plugs into memory socket of ANY MK-1 ever made. Allows 16 messages, 400 chars. . . Well under \$50. Installs in less than 30 minutes. Buy your MK-1 now, and easily add memory later if you like!

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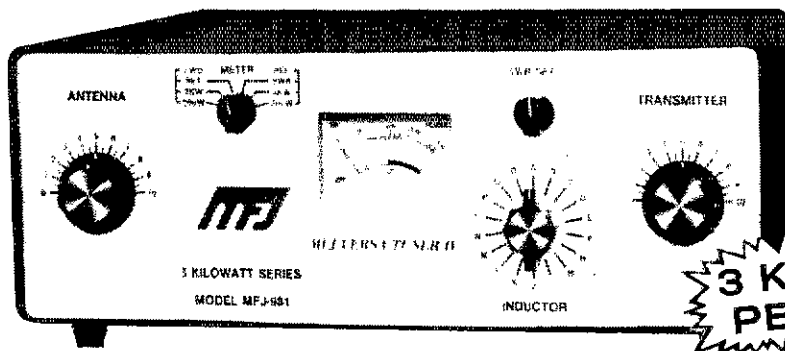
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NEW MFJ-981 3 KW Versa Tuner IV

For \$199.95 you can run up to 3 KW PEP and match everything from 1.8 thru 30 MHz: coax, balanced lines, random wires. Built-in balun, SWR, dual-range forward and reflected power meter.



Built-in balun, SWR, dual-range forward and reflected power meter.

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The NEW MFJ-981 3 KW Versa Tuner IV lets you run up to 3 KW PEP and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire.

This gives you maximum power transfer to your antenna for solid QSO's and attenuates harmonics to reduce TVI and out-of-band emission.

An accurate meter gives SWR, forward, reflected power in 2 ranges (2000 and 200 watts).

A new all metal, low profile cabinet gives you RFI protection, rigid construction, and sleek styling.

Black finish. Rich anodized aluminum front panel. 5x14x14 inches. A flip down wire stand tilts tuner for easy viewing.

Efficient, encapsulated 4:1 ferrite balun. 500 pt, 6000 volt capacitors, 18 position dual inductor. 17 amp, 3000 volt ceramic rotary switch. 2% meter. SO-239 coax connectors, ceramic feedthru for random wire and balanced line. Binding post for ground.

Every single unit is tested for performance and inspected for quality. Solid American construction.

quality components. Full one year limited warranty.

For your nearest MFJ dealer, call toll-free 800-647-1800. Stop by your dealer. Compare it feature for feature with other tuners. Compare its value, its quality and its performance.

After a truly side by side comparison, you'll be convinced that its value, quality and features make it a truly outstanding value.

Why not visit your dealer today and see the NEW MFJ-981 3 KW Versa Tuner IV? If no dealer is available order direct from MFJ.

MFJ-982 3 KW VERSA TUNER IV has balun, 7 position antenna switch. Matches everything: coax, balanced lines, random wires continuously from 1.8 to 30 MHz.

Flexible 7 position antenna switch lets you select 1 coax thru tuner and 2 coax thru tuner or direct, or random wire and balanced line.

Up to 3 KW PEP. Match any feedline from 1.8 to 30 MHz: coax, random wire, balanced line.

Gives maximum power transfer. Harmonic attenuation reduces TVI, out of band emissions.

Black metal cabinet, anodized aluminum front panel. Flip down wire stand. 5x14x14 in.

Encapsulated 4:1 ferrite balun. 500 pt, 6000 volt capacitors, 18 position dual inductor, 17 amp

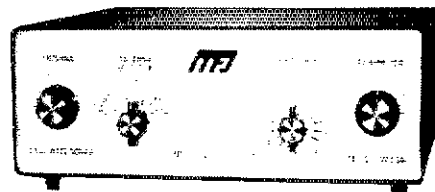
- 7 position antenna switch
- 4:1 ferrite balun for balanced lines

\$199⁹⁵

ceramic switches. SO-239 coax connectors, ceramic feedthru for random wire, balanced line, binding post for ground.

Made in USA. One year limited warranty.

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If you already have a SWR/wattmeter, the MFJ-982 is for you.

MFJ-980 3 KW VERSA TUNER IV has built-in balun for balanced lines. Matches coax, balanced lines, random wires, 1.8 to 30 MHz.

Up to 3 KW PEP. Match any feedline from 1.8 to 30 MHz: coax, random wire, balanced line. Heavy duty encapsulated 4:1 ferrite balun.

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500 pt, 6000 volt cap., 18 position dual induc-

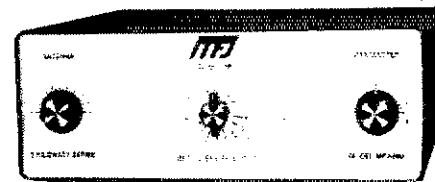
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Kantronics' Field Day Morse Code/teletype reader and code-speed display reads code signals right off the air. Its powerful microcomputer system picks out signals, computes their speed, and reads even sloppy copy up to 80 words per minute!

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Field Day is simple to use. You plug it into your station receiver just as you would a set of headphones.

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Field Day displays incoming or outgoing code speeds for you at the touch of a button. An accurate code speed-sampling program shows the speed right on the front panel. Everything is enclosed in a single, lightweight package that's small enough to fit in with the rest of your station.

2. Pay a little, get a lot.

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Day has the specifications that make it a truly great code reader.

Modes: CW, RTTY and speed display. **Speed Range:** 3-80 WPM. **RTTY Speeds:** 60, 67, 75 and 100 baudot. **Code Display:** 10 alphanumeric displays. **Special Characters:** AS, AR, SK, BT, /, ? (), comma, period, colon, semicolon, "understood", attention, and error. **Filtering:** Active, 750 Hz center, 200 Hz bandwidth. **Input Impedance:** 1,000 ohms. **Power Requirements:** 117 Vac, 20 watts. **Dimensions:** HWD 3.44" by 8.50" by 9.25". **Warranty:** Limited, one year parts and labor. **Price:** \$449.95 shipments after 3/1/79.

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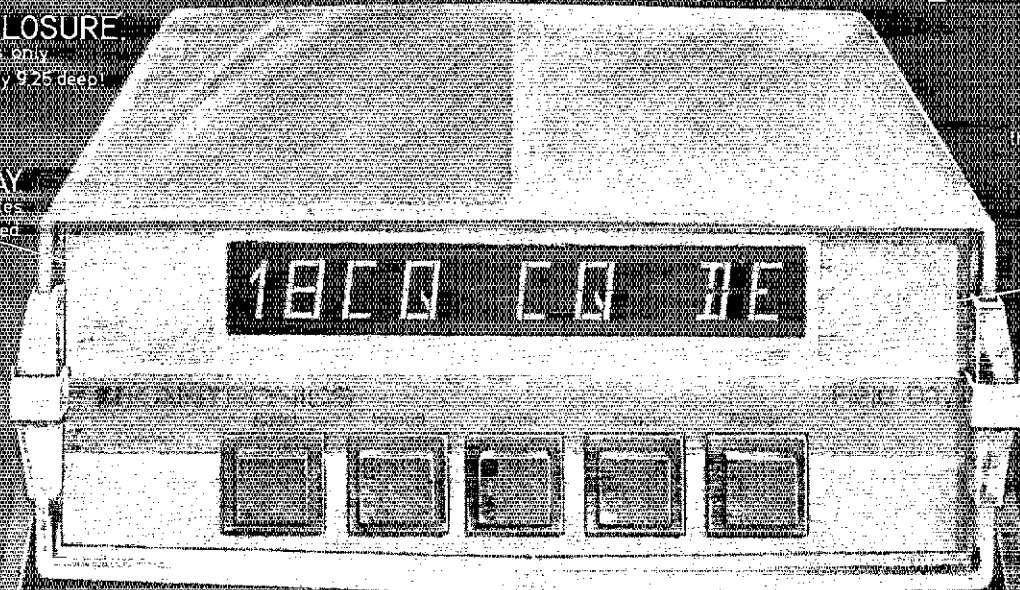
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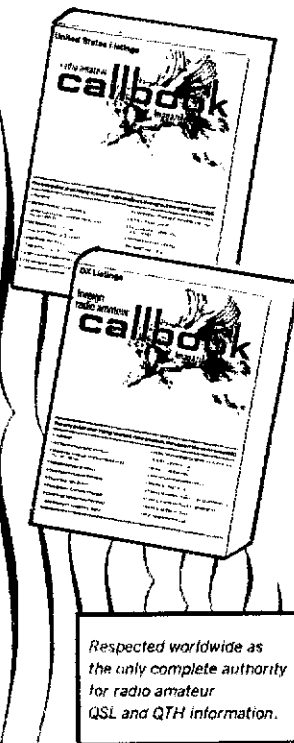
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ding as many hamlets as possible this year and will be available to discuss your ideas with you, so don't hesitate to call them to my attention. See you there. Traffic: WAACNY 385, WA4NF 206, CA4JGW 154, AF41 152, WBABK 123, NAUC 110, W40GG 104, K4CNY 95, K4WOP 63, K4XE 49, K4G 37.

GREAT LAKES DIVISION

MICHIGAN: SCM, Stanley J. Briggs, W8MPD/K8SB - Asst. SCMs: WA8DHB W8SOP SEC: WA8EFK. STM: WB8MTD. NMs: K8LNE K8BAI K8RV K8KMQ WB8YDZ WD8LSV.

Net	Freq.	UTC/Day	QNI	QTC	Sess.
MiTN*	3953	0000 Dy	650	284	28
OMN	3663	2300/0300 Dy	1729	777	84
MACS*	3953	1600 Dy	984	273	28
GLFTN	3932	0230 Dy	1042	342	28
UPN	3922	2330 Dy	782	285	32
MNN*	3722	2330 Dy	330	65	27
WSSBN	3935	0000 Dy	800	51	28
BR	3930	2230 Dy	409	33	19
MEN	3930	1400 Su	148	7	4
ARES	3932	2230 Su	77	14	4
			886	31	56

VHF Local Nets: 14 Reports

*NTS Section Nets. The MACS Net honored WB8TTA as Amateur of the Year. Congratulations. The 1979 Officers of the Detroit Area Amateur Radio Council are: K8SIA, pres.; K8JGF, vice-pres.; W8DNE, secy.; W8SWI, treas. Be sure your Detroit area club sends a rep. to the con-con. Contact K8SIA for more info. The repeater clubs of Houghton, Marquette, Crystal Falls and Iron Mountain provided communications for the "Press on Regardless" road race. Good PR project. Asst. SCM W8DHB reports that there are now 698 hams in the IIP and still growing! I am very sorry to report the following Silent Keys in the Mich. section: WA8ARK W8MYL WD8OSN WB8TCA K8WRJ. QO reports received from: K8JH and K8RCT. OBSs N8AG K8NKB W8SOP AC8Y. More up-grades: Extra Class: K8SIA, Advanced: W8BCCAL, General: K8RCKM WD8JES. Technician: W8BEGR WD8KOJ NBATN. Congratulations. From the looks of many club bulletins, Field Day planning is well under way. Traffic: Feb: W8BMTD 315, W8YFW 314, K8KMQ 222, WD8DZY 197, W8MPD 168, WD8NKA 138, K8DTG 128, K8RV 119, WD8EGO 116, WD8LRT 104, WA8DHB 94, AF8V 91, K8BAI 91, WD8DMX 80, AC8Y 77, K8RGC 73, WD8CSA 68, K8LNE 61, W8BYRY 61, W88YDZ 60, W8YIO 59, N8ABA 56, WD8LSV 44, WD8OFE 43, WD8IBY 40, W8SOP 39, W8VZ 38, W8NOH 34, W8SCW 33, W8HIN 32, WD8OKU 32, WA8VZ 32, K8BBZ 30, W8IHX 29, W88ZY 29, WA8QAF 26, W8BPOL 25, W3GGJ 24, N8AKY 23, W8CUP 23, W88SYA 23, K8RCP 21, W8RTA 20, K8ZJU 20, W8BT 17, AC8F 17, WD8PAF 17, WA8VY 17, K8KXV 16, K88T 15, W8BAK 14, W8HTT 14, K8NKB 14, W88CYU 13, W88YIG 13, WA8AXF 12, W8LXJ 12, W8LCL 12, WA8RJI 12, W88VVF 12, WD8BSE 11, K88CK 10, WA8VWV 10, W8TBP 10, N8AGF 9, W8OFO 9, N8ACL 8, W8GVS 8, W8LDS 8, W8SDB 8, K8RCLT 7, W8RNV 7, W88VAI 7, W8PBO 7, W88HSN 6, W88AFO 6, W88TG 6, W8EQI 6, W88BNN 5, W8WVL 5, W8JUP 5, K88BS 4, WD8NJC 4, W88UZM 4, W88NDB 4, K8DIY 4, W8JLD 4, W8MAM 3, N8ACA 3, K8BFK 3, K8QZ 3, AC8U 3, W8BFX 3, W8HKL 2, W8UJU 1, W8BIEK 1 (Jan.) W8MFM 369, WD8CSA 86, K8AT 10, K8NKB 7.

OHIO: SCM, Harold C. Chapman, W8BJGW - Asst. SCMs: WA8MCR W8T N4VY SEC: K8AN. NMs: AF8A N8CV W8DIL W88YDZ K8OZ W88GW.

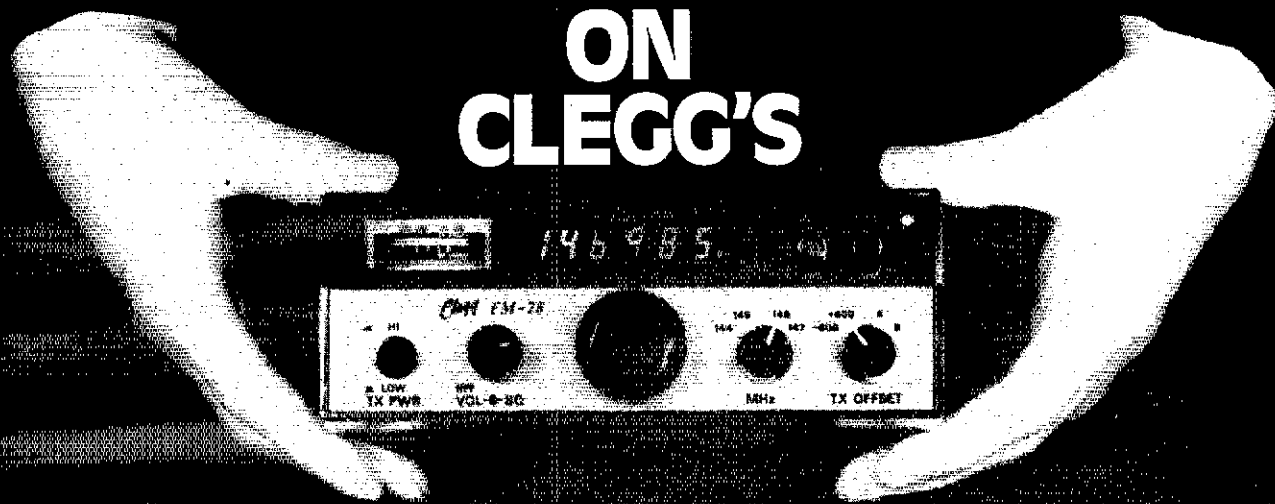
Net	QTC	Sess.	Time(Z)	Freq.
OSN	266	174	28	3.577
OSSBN	2693	746	84	1530/2115/ 2345 3.9725
BNR	123	252	28	2300 3.605
BN	541	228	53	0300/2345 3.577
ObmN	336	54	28	0200 50.160
ONN	82	56	24	2330 3.708

Winter is over - I hope! It's time to think of growing beans, peas, corn, tomatoes and antennas. Plans should be well formulated towards Field Day and the Oct. SEI as the usual summer rush gives many AREC groups the opportunity to participate in worthwhile public service activities. Have you taken advantage of all your efforts and made arrangements for publicity on the local level to reap some rewards for your group and amateur radio in general? Findlay ARES group and Findlay Radio Club cooperated to provide seven hours of communication for the Boy Scout Klondike Derby. WD8KBW is the most persistent individual I know - if you lose a piece of traffic put him on the trail and he will probably come up with an answer! Sure enjoy reading all the club bulletins, but I am prone to miss important information. If you have something which you feel should receive recognition please call it to my attention. Middletown Dist Radio Club Officers for '79: WD8DEZ, pres.; WA8AGQ, vice-pres.; W8BMOG, treas.; W88AVM, secy.; K8INF, activity mgr. Appointments: EC: N8ASH Monroe County, W88LOA Mercer County, QES: WD8OTO W8RG W88YJ, DL: W88LA. OTS: W8BGMT WD8KBW. Local net reports BRTN: QNI 256, QTC 108, sess. 28. EOTN: QNI 231, QTC 43, sess. 28. MASER: QNI 135, QTC 15, sess. 4. TSARC: QNI 724, QTC 68, sess. 25. VV Co. Em. Net: QNI 40, QTC 1, sess. 4. Traffic: (Feb.) K8AAZ 597, W88KWD 517, W8PMJ 374, W8ENI 252, W88WTS 216, K8OZ 130, K8BYZ 116, WD8MKC 107, WA8HCH 101, W8BMT 94, W8DIL 84, W8TBP 83, W88JGW 83, WD8RKBW 80, K8AN 79, W8MOK 79, W8BMO 75, W88SJO 74, W8QZK 73, W8TH 69, W88URR 69, W88SSI 68, WD8LLD 67, N8TM 62, K8DL 61, W8GGX 61, WD8QMP 61, W88SFC 59, K8FE 58, N8CW 52, AF8A 46, WD8CDA 44, W88MEK 40, W8WEG 40, WD8JTT 39, WD8LPP 37, N8AKS 33, W88TRK 33, WD8PEI 32, WD8QZM 30, W88OHV 28, W88SDO 25, W88YGW 23, W88CJU 22, K8PE 22, W88TTP 22, W88VLR 22, W88RNM 19, N8AUH 18, N8JR 18, W88YTI 18, K8CKY 17, K8CYX 17, WD8DTG 17, W88EM 17, W88DJP 16, W88KX 15, W88PHY 15, K8YJW 15, WA8HCH 14, W88KAZ 14, N8A 13, W88GG 13, W88RKN 13, W88MGA 13, W88RQ 13, W8LZE 13, W88MHL 11, W88TSX 11, K88GG 10, WD8OYK 10, W88VZX 10, WD8JIL 9, WD8NAD 9, WD8HJH 9, W88R 9, WD8DMF 8, W88MIH 8, AB8P 8, W8RGT 7, W88LWY 7, W88WNH 7, K88ZM 6, W88EK 6, W88IM 6, W88LUP 6, W88OCU 5, W88UP 5, W88GTX 4, N8FU 4, K8JA 4, K8ONA 4, W8XT 4, A8A 3, W88HL 3, K8DDG 3, WD8DOS 3, WD8EKI 3, W88BNI 3, N8AA 2, K88BOE 2, W88KKI 2, W88LOL 2, W8LT 1 (Jan.) W88TTP 30, WD8BOB 14, WD8DOS 7.

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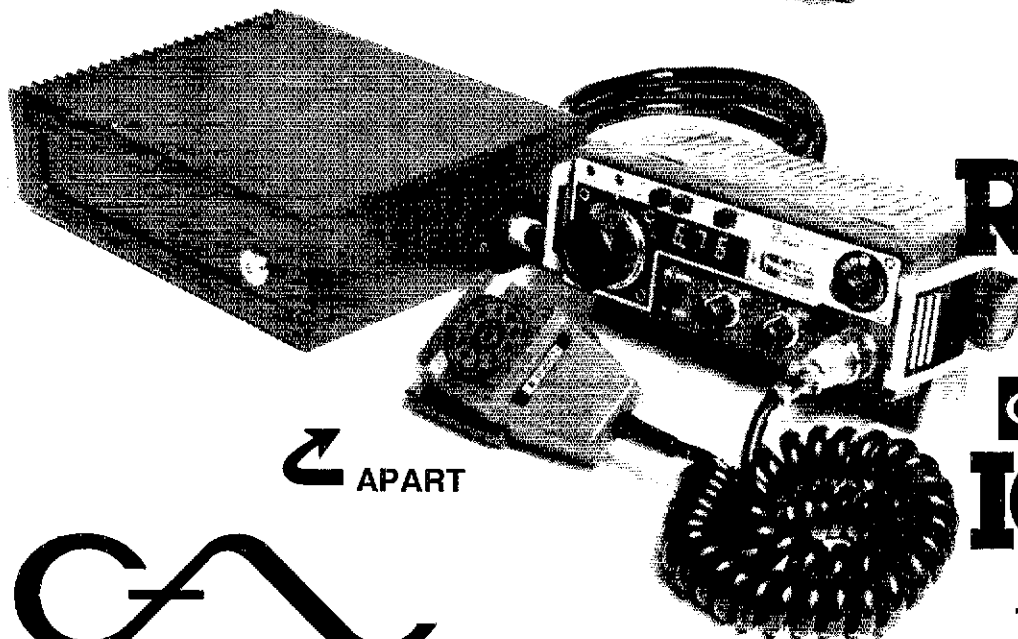
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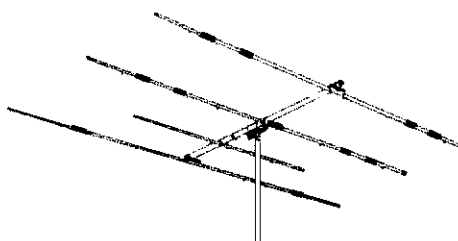
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ARX-450	435 Mhz. Ringo Ranger	39.95	32.95	A432-20T	430-436 Mhz. Beam	59.95	49.95
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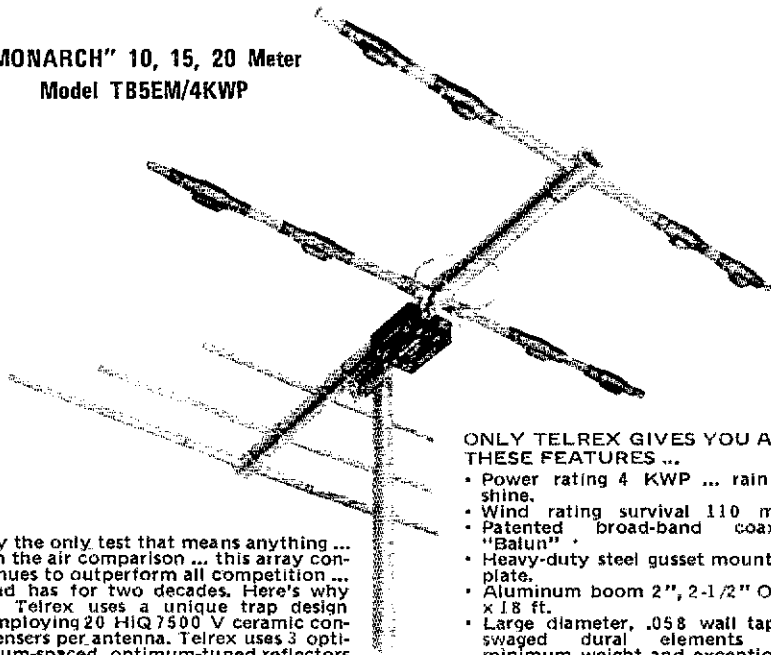


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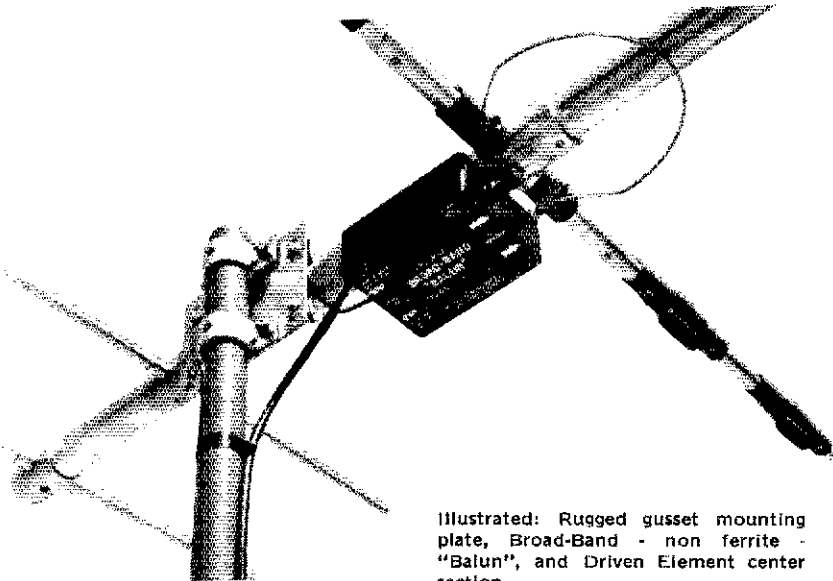


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SEC: WB2VUK. STM: WA2SPL. NMs: W2CS W2WSS WA2MKO WB2QOH. Nets: NYPON 5 PM 3913, ESS (slow) 6 PM 3925, NYSPTEN 6 PM 3925, NYS 7 & 10 PM 3677, SDN 9:30 PM M-F 66/06, HVN 7:30 PM M-F 37/97. Congrats to new ECs W2IT (Westchester), N2ADJ (Dutchess), WB2JZZ (Saratoga, Warren & Washington). Also welcome aboard to new NMs WA2MKO (SDN), WB2QOH (HVN), from former QRP. Congrats to hear W2DPV on the mend. Congrats to WB2LAC, who is going to be independent Clearing House Net. WB2COTY & K2NW gave well received RTTY talk at Overlook Mtn. AFC meeting. Congrats to new General WB2MZL, new Novices KA2LBI KA2DZL. Note formation of Second Area Young Ladies ARC (SAYLARC). Has a net Fri. 9 AM 3945 kHz. Dutchess ARES activated Feb. 24 at request of Dutchess Red Cross to provide comm's for imminent flood evacuation along Wappingers Creek. Amateurs deployed at requested sites. Luckily for residents, water began to recede before they had to pull out. Participating K2s NW JXU KA2ABZ N2ADJ, W2s AAK RTE GIC, WA2s KJL KOF JKN LJM AHR, WB2s GQJ UWP MCO W2ZADL, Feb PSHR: WB2Ea WA2SF WB2KDC RFB WA2SPL WA2GTC. Traffic: WA2SPL 1000, WA2OTC 541, WB2EAG 357, WB2KDC 309, K2AV 183, W2YJR 117, WA2EQW 87, W2BIW 83, WB2VUK 59, WA2ZSG 39, AD2X 34, WA2CJY 27, K2RRR 6.

NEW YORK CITY - LONG ISLAND: SGM, Paul Lindgren, WA2UWA - Asst. SGM: Steve Bloom, WB2IDP. STMs: WB2BNY WA2JKG. NM: WB2LIG, NM/ASCM: WB2EUF. The following are major ARES nets, join one please. Bronx 28.64, 50.35, 146.88 fm; Kings 28.64 MHz, 50.35 MHz, 146.88 fm; Richmond 146.88 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; Oyster Bay 147.315 fm; Huntington 145.59 am, 147.21 fm; Smithtown 28.65 MHz, 147.21 fm; Babylon, 146.685 fm; Islip 146.715 fm; Brookhaven, 146.715 fm; East Setauket 146.715 fm. Note: net times mostly between 2000 and 2100 local on Mon. Thanks again to K2IZ for all his help. I can't believe it has been 5 years. Congratulations to WA2JKG who has been appointed STM with special duties in the NYC area. Long Island Hamfair '79 sponsored by LIMARC will be held June 3rd at the Islip Speedway from 9 AM to 4 PM. For more information contact WB2ALW. WA2BGE has formed a 2nd call area YL club. Please contact her for further information. Congratulations to the following upgrades, WB2MDD and KA2DTD to Advanced and WA2OLF to Technician. Following new licensees from the Hall of Science K2ZJZ, DLJ DZJ DYN DWY DVD BTE D'D DWJ DTA GTC DTH DTR DTS DSZ DWM DEW DXH DXM DUS DRF DRG DRH DSP DRK DRN DRP DRQ DRR DRS DCS DDU DDL DRM DRQ DUJ DVE DWI DVU DXR DXP DUG DUN DVS DTX DWN DRU. N2s: ATG AUN AUH KB2GR and WB2DOU. Congratulations to all. FCC will be coming to Stony Brook May 21. 2 new hams in WB2YUJs family. No calls received yet. Club bulletin editors: your SCM needs your club bulletin urgently. The various club bulletins are where I get the information for the column and if I don't get your information then the column suffers. Traffic: (Feb.) WB2GKZ 200, K2LJH 187, WA2UWA 167, K2GGE 68, WB2NJV 46, WB2LIG 39, WB2COT 37, W2DBQ 18, K2IZ 10, N2MG 5, WB2IDP 3, Jan. W2GKZ 180.

NORTHERN NEW JERSEY: SGM, Robert E. Neukomm, WA2MVQ - SEC: WB2VUK. STM: W2XD. NH: AF2L K2VX WA2LHV WB2RMI & WA2OPY

Net	Mgr.	Freq.	Time/Days	Sig.	QRP
NJN	AF2L	3695	7 PM Dy	28	503 285
NJN	AF2L	3695	10 PM Dy	28	290 168
NJPN	K2VX	3950	6 PM Dy		
			9 AM Su	32	644 367
UCEN	WB2RMI	146.085/28.085	274	137	

OBTTN WA2OPY Dy 28 312 101
NJSN(Jan) WA2LHV 49/49 Dy 28 28
UCEN(Jan) WB2RMI Dy 31 448 379
I really appreciate receiving club newsletters so keep them coming. Tri-County, The Cachunker, Bara "OSQ" all received with excellent reporting. The "550 Club" is starting a newsletter with W2MJA as editor. I'd appreciate hearing from others too! K2ZFI recovering nicely from a heart attack and we're glad to hear him back on NJN. New officers for BARA: W2GHV, pres.; WA2AIU, vice-pres.; WA2WLG, secy.; WA2ASC, treas. TCRA newsletter advises W2BUB an SK, his station was given to the Aerospace Program of the Newark Board of Education. We thank W2BUB's XYL for the thoughtfulness. K2Nj moving to Hunterdon Co. WB2RU now G2R, KB2HM, Asst. mgr. of OB1 FN has an active ham family. Her son, WA2WJC, just upgraded to General. The OM past Novice and awards call letters. W2NZI is the "Top Op" of '78 awarded by the Belleville ARC. W2OJ modifying Signal-One to improve receiver. WB5RZX operates in Westfield during the summer months on 80-10 & 2 and during the school year operates from Davis, CA with weekly skeds with N2TM & WA2IKB. WB2HJW es XYL have a new "harmonic." Morris County CD office has authorized the use of WR2ANF as a "back-up" repeater to help relieve heavy traffic from WR2AHD. Txn. It is appreciated! RACES & ARES units associated with WR2ANF were on ALERT status on Feb. 19 during the "Big Snow" emergency. An additional Morris County CD Repeater should be operational on 222.04/223.64 from Randolph Twp. The Split Rock ARA also passed a resolution allowing their repeater be used to handle traffic (WR2ADB) and they use "Speed-Dial" to expedite emergency calls direct with selected Police Authorities in NNJ. This is great news from all repeater groups - more repeaters TAKE NOTICE! BARA has a program topic of putting 11-meter rigs on 10. This is "catching on" with a lot of clubs. Union County "hams" were very active during the recent SET and passed a lot of traffic TNX to K2NS: OBTTs handled 147 QSPs during SET with 30 stns active. WA2MVQ attended a 2-week course in Internal Medicine at the Univ. of Maryland. K2VX advised following the SET, that we still need more "repeater" liaison to do a better job. W2XD has a new harmonic. Welcome W2SDTR W4NLC, WA2GXU & WA4RDI to NNJ NJN Traffic: (Feb.) WB2RMI 679, W2SQ 406, K2VX 258, W2CQB 256, KA2CHK/1 200, WB2RMJ/T 199, AF2L 165, N2IC 162, W2TCA 160, W2XID 153, W2UEZ 93, WA2MVQ 90, WA2QWR 78, N2NS 64, WB2MCO 52, W2ZEP 50, KB2HM 42, KA2CHK/T 33, WB2KAK 33, W2UH 29, WB2AIU/T 30, WB1JOO/T 30, WB2HSG 27, WA2NPP 25, WB2KLF 21, WA2EPK 19, W2KR 18, K2ZFI 17, W2CC 15, W2DTR/2 15, N2CR 14, WB2DL2 7, K2SE 6, WB2CNF 4, W2AKR 2. (Jan.) W2ZEP 47, WB2KAK 8, N2CR 1.

MIDWEST DIVISION

IOWA: SGM, Max R. Otto, W0LFF - SEC: W0IYW. OH-

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350-PS AC supply 149	CAL-35 Xtal cal 9	61 Viewfinder 189
210X Xcvr 475	SC-35 Speaker 15	SPECTRONICS
PS-200 AC supply 69	R-530 SW Rcvr 695	DD-1K Dig (Kenwood) \$109
200CS/VX-5 AC ps 99	R-1530 SW Rcvr 895	DFD/K Dig (Kenwood) 109
MT-1 Transformer 19		SC-250 Counter 129
UMK Mobile mt 29	GENAVE	STANDARD
CIR	GTX-10 2m FM (Fla) \$ 99	146A 2m FM HT \$149
Astro 200 Xcvr \$699	GTX-200 2m FM (Fla) 129	USA-2 Charger 34
BPS-200 AC ps 99	GONSET	CMA Mobile adapt 12
CLEGG/SQUIRES-SANDERS	GC-105 2m Am Xcvr \$ 69	14U 2m FM Xcvr 199
418 DC supply/mod \$ 35	901A AC supply 39	SWAN
Interceptor VHF Rcvr 99	HAL	400 Xcvr/VFO/ps \$199
416 AC supply 75	RVD-1005 \$295	117B AC supply 69
22"ei FM series 25 139	HALLICRAFTERS	P-1215 AC supply 49
FM-27B 2m FM Xcvr 179	SX-117 Ham Rcvr \$189	PS-20 AC supply 95
031 AC supply 49	HT-40 Transmitter 49	160X 160m Xcvr 299
COLLINS	SR-400 Cyclone II 425	270 Cygnat Xcvr 329
75A-4 Rcvr 3880 \$399	SR-400 Cyclone III 499	14A DC conv 39
75S-1 Ham Rcvr 299	P-500AC AC ps 75	350B Xcvr 449
75S-3 Ham Rcvr 485	HA-1 Keyer 59	500 Xcvr 309
75S-3B Ham Rcvr 695	HA-10 LF tuner 19	500C Xcvr 339
75S-3B Rcvr (round) 795	HAMMARLUND	500CX/SS-16B Xcvr 419
75S-3C Ham Rcvr 795	HQ-110 Ham Rcvr \$109	700CX Xcvr 459
75S-3C Rcvr (round) 995	HQ-110A Ham Rcvr 149	750CW Xcvr 499
32S-1 Transmitter 349	S-100 Speaker 15	117C AC supply 65
32S-3 Transmitter 699	S-200 Speaker 24	512 DC supply 59
32S-3 Xcvt (round) 795	HEATHKIT	117XC AC supply/spkr 95
312B-3 Speaker 29	HR-10 Ham Rcvr \$ 39	117X Basic AC ps 65
312B-4 Console 199	HA-1680 Ham Rcvr 199	405X MARS osc 39
KWM-2 Xcvr 595	HA-1660 Speaker 19	DD-76 Dig display 119
3510-2 Mob mount 75	HP-23A AC supply 49	600R Dustom Rcvr 375
516F-2 AC supply 149	IM-4100 Freq counter 119	ICAF Notch/peak 19
516E-1 KWM-1 DC PS 75	IB-1103 Freq counter 299	WM-3000 Wattmeter 59
MP-1 DC supply 119	IM-1177 Utility VOM 29	250 6m Xcvt 199
GC-2 Carrying case 49	ICOM	FM-2X 2m FM Xcvt 99
COMDEL	IC-230 2m synth Xcvt \$229	404 Hand mic 19
CSP Speech proc \$ 89	IC-22A 2m FM Xcvt 159	TEN-TEC
DENTRON	IC-202 2m SSB Rcvr 199	Triton II Xcvt \$399
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R-4R Ham Rcvr 339	PA4-80BL 2m amp 159	VARI-TRONICS
R-4C Ham Rcvr 449	PA30-140B 2m amp 129	FM-208M Booster \$ 39
4NB Blanking 49	KENWOOD	PA-50A 2m amp 49
FL-1500 Filter 35	TS-900 Xcvt \$450	WILSON
MS-4 Speaker 19	PS-900 AC supply 89	Mk II 2m FM HT \$179
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SC-6 6m conv 69	TS-820 w/dig 799	1405 2m FM HT 149
CPS-1 Conv ps 19	JR-599 (trio) Rcvr 249	1405 HT/TTP 179
CC-1 Conv console 39	T-599D (transmitter) 375	BC-1 Charger 29
MMK-3 Mobile mt 5	TR-2200A 2m FM Xcvt 139	T-15NC Charger 24
TR-4 Xcvt 389	MIDLAND	WC-14 Charger 12
TR-4C Xcvt 449	13-500 2m FM Xcvt \$119	YAesu
ZNT Transmitter 99	13-520 2m FM HT 99	FT-401B Xcvt \$489
T-4X Transmitter 339	NATIONAL	SP-101PB Sp/patch 49
T-4XC Transmitter 449	NCCX-3 Xcvt \$169	FT-301D Xcvt 575
AC-3 AC supply 85	NCCX-A AC supply 69	FV-301 VFO 89
AC-4 AC supply 89	NYE VIKING	FT-901D Xcvt 895
DC-3 DC supply 65	Kw matchbox/SWR \$199	FRDX-400SD Rcvr 249
1-4B Linear 695	REGENCY	DC-200 DC supply 75
MN-4C Matcher 119	HR-212 2m FM Xcvt \$ 99	FV-250 2m Xcvt 189
MN-7 Matcher 119	HR-2MS 2m FM Xcvt 129	FT-221 2m Xcvt 399
TR-22 2m FM Xcvt 129	HR-440 450 FM Xcvt 239	FT-2FB 2m FM Xcvt 149
LN-4 Line filter 9	P-110 12v supply 39	FT-2 Auto 2m Xcvt 169
TV-5200LP Low pass 19	AR-2 2m FM amp 69	200R 2m FM Xcvt 199

(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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AR TECHNICAL	reg. NOW	13-510 2m FM synth Xcvt \$399 299	
Dafong CW filter \$179 129		13-510A 2m FM synth Xcvt 399 349	
ATLAS	reg. NOW	13-509 220 FM Xcvt 179 159	
350-XL Xcvt 1195 995		13-513 220 FM synth Xcvt 449 349	
350-XL/DD6-XL Dig Xcvt 1424 1199		NYE	reg. NOW
350-PS AC supply 229 199		250-25-3 500w tuner/relay \$212 149	
302 Clock/patch 229 199		250-25-4 500w tuner 202 149	
350-PS/302 Console 458 399		REGENCY	reg. NOW
305 Remote VFO 155 129		DFS-5K Dig selector - Whamo \$199 89	
DMK/XL Mobile mt 65 59		HR-312 2m FM Xcvt 269 169	
311 Xtal oscillator 135 119		P-110 12v power supply 62 49	
210X/NB Xcvt/blanking 810 689		EC-175 175 MHz counter 449 299	
215X/NB Xcvt/blanking 810 689		SIGNAL ONE	reg. NOW
220-CS AC supply 155 129		2 4 KHz SSB wide filter \$ 30 15	
B & W	reg. NOW	SILTRONIX	reg. NOW
373-6 6m coaxial filter \$ 45 29		FC-1 5 KHz 40 MHz counter \$169 89	
CES	reg. NOW	SPECTRONICS	reg. NOW
800-YS Scanner. FT-227R \$ 99 79		UD-1K Kenwood display \$169 119	
225 Encoder mic 44 34		SC-30 30 MHz counter 169 119	
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Astro 200/CW tilt 1045 799		Horizon 2 2m FM Xcvt 298 188	
Astro 200A Xcvt 1095 799		C-118 2m FM HT 280 279	
Astro 200A/CW tilt 1145 845		SWAN	reg. NOW
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SPR-200 Speaker 30 24		SI-1 Antenna tuner 189 139	
SPS-200 AC ps/spkr 165 139		SI-2 Ant tuner w/meters 249 199	
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MIC-STA Desk mic 38 30		WM-1500 Wattmeter 74 59	
COLLINS	reg. NOW	PS-20 AC supply 179 129	
MM-2 Boom mic/earphone 240 199		FC-76 40 MHz counter 169 119	
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160-10AT Ant tuner 129 109		1202 2m 5-15/80-120w amp 239 169	
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160-10M Monitor tuner 299 189		TEN-TEC	reg. NOW
Jr. Monitor Ant tuner 79 49		544 Digital Xcvt \$869 749	
MT-2000A Ant tuner 199 179		252G Power supply w/VOX 179 99	
MT-3000A Ant tuner 349 299		251 12v 10A power supply 85 69	
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DRAKE	reg. NOW	570 Century/21 Xcvt 299 269	
34PNB Blanking - TR-4CW \$100 95		WILSON	reg. NOW
K-4C Receiver 699 575		1402 2m FM HT \$254 199	
T-4C Transmitter 699 575		1402/TTP HT w/touch tone 316 249	
AC-4 AC supply 150 125		4502 450 FM HT 429 379	
MS-4 Speaker 33 25		The following model 2m HT's are without the high/low pwr. switch & batt. LED.	
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300 Speaker/Q-mult 49 45		Mk II As abv. ITP installed 332 279	
7072 Hand microphone 19 14		Mk IV As abv. ITP installed 362 299	
AN-5 Shortwave ant 8 5		Note: High/low switch may be installed on Mk II/IV by AES for \$20.00.	
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ELECTRA	reg. NOW	FT-901MD 160-10m Xcvt 1459 1199	
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BC-250 Synthesized scanner 399 299		FT-901DE Xcvt 1259 1059	
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Fuzzbuster II Radar detector \$129 99		FT-301A DIG 200w PEP Xcvt 935 749	
GALAXY	reg. NOW	FT-101F Xcvt 799 699	
22M Mobile floor mount \$ 6 2		FT-101FE/EE Xcvt 759 659	
R-1530 General cov Rcvr 1550 995		SP-101B Speaker 25 23	
SC-1530 Speaker 60 35		SP-101PB Speaker/patch 67 59	
GENAVE	reg. NOW	FV-101B Remote VFO 137 129	
TE-1 Touch tone pad \$ 79 29		YO-101 Monitor scope 320 288	
HY-GAIN	reg. NOW	YO-601B Digital display 235 209	
THD6X 6 el beam (truck) \$299 239		FV-650B 6m transverter 239 199	
THMk3 3 el beam (truck) 229 183		FV-250 2m transverter 278 239	
ICOM	reg. NOW	FT-7 20w PEP Xcvt 499 439	
IC-701 Xcvt/ps/mic 1699 1389		FR-101S Receiver 599 449	
IC-280 2m FM Xcvt 469 389		FR-101 DIG Receiver 749 549	
IC-211 2m Xcvt 899 749		FL-101 Transmitter 649 499	
IC-202 2m SSB port Xcvt 299 249		FL-2100F 80-15m Linear 515 399	
ITH-230 Touch tone handset 99 79		YO-500S 500 MHz counter 399 349	
IC-21 VFO Receiver VFO 119 69		YO-100 Monitor scope 246 229	
IC-21A 2m FM Xcvt 399 249		SP-401PB Speaker/patch 59 49	
IC-3PA Power supply/spkr 99 69		FT-625RD 6m Xcvt 895 769	
KLM	reg. NOW	FT-225RD 2m Xcvt 895 769	
Force 5 Xcvt 1095 695		FT-227R 2m FM synth Xcvt 385 299	
15PS AC ps/spkr 249 199		FT-227RA 2m FM synth Xcvt 399 329	
Multi-2000 2m Xcvt 679 499			
Echo 70 440 SSB Xcvt 349 399			
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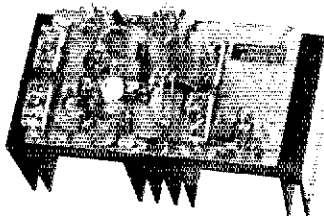
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XV2-5	28-29	145-146
XV2-6	26-28	144-146

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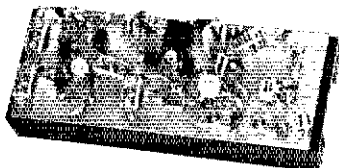
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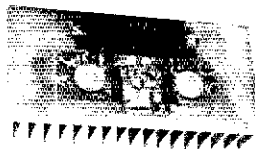


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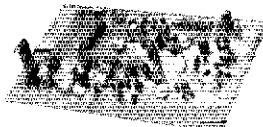
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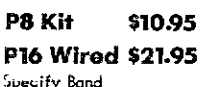
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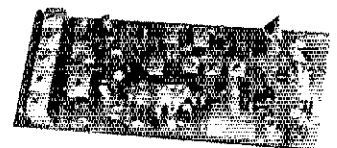


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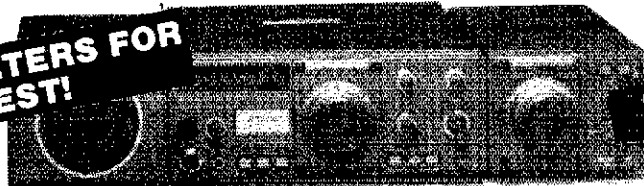
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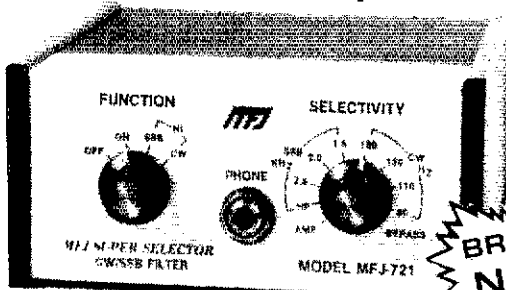
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BRAND NEW \$59⁹⁵

This New MFJ-721 Super Selector CW/SSB Filter gives you a combination of performance and features available only from MFJ: • Razor sharp 80 Hz non-ringing CW filter • Steep skirt SSB filter • Selectable peak and trough noise limiting • Plugs in phone jack • Two watts for speaker • Simulated stereo reception • Inputs for 2 rigs • Speaker and phone jacks • Auxiliary 2 watt amplifier, 20 dB gain.

The CW filter gives you 80 Hz bandwidth and extremely steep skirts with no ringing for razor sharp selectivity. Lets you hear just one CW signal on the crowded Novice bands.

Bandwidth is selectable: bypass, 80, 110, 150, 180 Hz. Response is 60 dB down one octave from center freq. for 80 Hz BW. Center freq. is 750 Hz. Up to 15 dB noise reduction.

8 pole active IC filter. Low Q cascaded stages eliminates ringing. Hand matched components.

The SSB filter dramatically improves readability by optimizing audio bandwidth to reduce

sideband splatter, remove low and high pitched QRM, hiss, static crashes, background noise, and hum.

Makes listening for long periods pleasurable and less fatiguing. Ideal for contest and DX.

IC active filter includes 375 Hz highpass cut-off plus selectable lowpass cutoffs at 2.5, 2.0, 1.5 KHz (36 dB per octave rolloff).

Switchable automatic noise limiter for impluse noise; trough clipper removes background noise.

For Simulated Stereo, the raw signal goes to one ear and the filtered signal to the other. The signal appears in both ears and the QRM in only one. The ears and brain reject QRM yet off-frequency calls can be heard. Requires stereo phones.

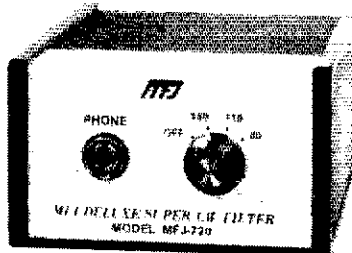
Switch selects one of two rigs. OFF position connects speaker to rig. Speaker disables when phones are used. Requires 9 to 18 VDC, 300 ma. max. 5x2x6 inches. Optional AC adapter is \$7.95. Order yours now.

This New MFJ-720 Deluxe Super CW Filter gives you 80 Hz BW, no ringing, 2 watts out.

Same 8 pole Super CW Filter as in MFJ-721. 80 Hz BW, extremely steep skirts with no ringing for razor sharp selectivity. Selectable BW: 80, 110, 150, 180 Hz. Center freq. 750 Hz. Automatic noise limiter. Plugs in phone jack to drive speaker to 2 watts. 2x4x6 in. Requires 9-18 VDC, 300 ma. max. Optional AC adapter, \$7.95.



\$44⁹⁵



These MFJ active filters are the most copied in Industry.

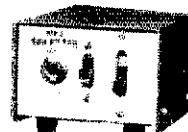
CWF-2BX MFJ SUPER CW FILTER

SBF-2BX MFJ SSB FILTER

\$29⁹⁵ each



But performance is not copied. Only MFJ hand selects components so the center frequency of each CW stage is within one Hz of each other.



CWF-2BX and the SBF-2BX are the same CW and SSB filter as in the MFJ-721 but less speaker amplifier and noise

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filters at low-III. ARC: W0J1, pres.: N0AEF, vice-pres.: WA0MJC, secy: W0BIN, treas. U of I. ARC: W0BCHP, pres.: W0BFRQ, vice-pres.: W0BYAX, secy: treas. M. Pleasant will soon have a repeater. W0BQND for 1st class confirmed on 2M. Congrats to W0BRHZ for 1st Class ticket with radar endorsement. Iowa 100% NTS-TEN via W0SS AF0R W0YLS N0SM W0BPYD W0BUPF K0GP W0GDL K0EVH and K0FLY. Davenport can be very proud of their Hamfest. W0D0CF W0D0XF K00FI and the lorty that checked in on Ft. Dodge repeater, gave a 9-year-old boy suffering with leukemia some cheer with Valentine greetings. Thanks to all who sent OSI cards to him. Iowa is 100% on DTRN via WA0ALX W0PY K0UPG and WA0NSH Congrats on upgrades to: KA0AXM Tech., W0BUE KA0BYK and KA0BYI General. W0GDLI Advanced. W0BYK has new TRS-80 microcomputer. W0GAP building RCA Cosmac microcomputer and W0EIF is homebrewing one. The Cedar Valley ARC box was found by W0BLBI in 53 minutes. Anamosa has a brand new ARC.

Net	Freq.	Time/Days	QNI	QTC	Sess.
Iowa 75M	3970	1730 M-S	1345	115	24
WA0VZH					
Iowa 75M	3970	2300 M-S	810	58	24
W0YLS					
ILCIN	3580	2330 Dv		132	86
W0YLS		0200			
Iowa Code	3713	2359 MWF	62	20	11
W0NSS					

Traffic: (Feb.) WA0AUX 608, W0YLS 120, W0BPYD 115, W0SS 101, AF0R 87, W0GDL 83, W0UPX 62, W0BUPF 55, K0GP 48, W0BKH 30, W0LFF 24, K00FI 16, KA0BYI 15, W0HND 2, N0CT 1, K0IR 1. (Jan.) W0HND 5.

KANSAS: SCM, Robert M. Summers, K0BFX — We will miss OT W0FHU who joins the ranks of Silent Keys. W0KJL reports 868 active amateur operators listed in ARES. It appears all activity has slackened since SET. This will be a short report due to typewriter breaking down. Will try and add other news next month. Net reports for Feb.: QKS-SS QNI 151, QTC 41, CSTN QNI 116, QTC 74, QKS QNI 466, QTC 191, KPN QNI 275, QTC 33, KSBN QNI 1231, QTC 174. Traffic: W0B0BH 237, W0D0ACG 168, W0AM 129, W0C0DH 104, W0DFBP 91, K0E2 86, W0FIR 73, W0FT 55, W0H 104, W0PB 41, W0K 40, K0BFX 36, W0C0JB 22, W0D0ESF 19, K0MXJ 19, N0IN 15, KA0BT 15, K0YTA 12, W0D0SF 11, W0RBO 11, W0RT 4.

MISSOURI: SCM, Larry Wilson, K0RWL — Asst. SCM: W0OTF, SEC: W0BKY. Congrats to WA0ZHY on his recent marriage and it's good to hear him back on the air with his TS-202S and DG-5. W0UHN and W0NWX both in the hospital. W0UHN recently had surgery and is doing fine. Best wishes to you both and get out of there as soon as you can. For more info on the new TNT slow-speed net now in operation, please call W0B0IE. The Heart of America RC was asked to participate again in the annual leukemia-Thon. Many amateurs took part and spent many hours in various activities helping to make this event a success. We hope to have a more complete report next month.

Net	QNI	QTC	Net	QNI	QTC
HBN	339	46	MON	217	206
METN	231	99	MON2	139	59
MEOW	450	49			

Congrats to the following new licensees: Novice: KA0DHB; General: N0AJF, W0D0LM, W0HFHU; Advanced: W0B0IJ; Extra: AF0F, AG0G, W0B0UF; 1st Fone: N0AJF and W0B0LNS. Thanks to everyone for the increase in reporting both stations and nets. If you come across any items of interest, let me know and we can research it and make sure it gets into the Dst. Traffic: W0BMA 964, K0ONK 427, W0H 317, W0B0EV 209, W0OTF 94, W0BV 86, W0CUI 80, N0WMM 60, K0SSN 61, AE0L 47, W0B0VHN 47, K0SI 43, W0D0EVT 31, W0BVL 29, W0B0IE 24, W0B0OKK 24, W0D0FJZ 30, W0B0MC 14, W0QAU 14, N0JL 6, AG0K 6, W0B0ZH 1.

NEBRASKA: SCM, Ed O'Donnell, W0GWR — The tornado season is upon us, and this is especially true in NE, which ranks 4th in the nation for the number of tornadoes 75 Mtr. and 2 Mtr. ARES nets ready to be activated and are looking for reliable operators, who can participate in the nets. Congrats to new Novices in the state and to state Hams who have upgraded. Net Reports: 160 Mtr. WX Net, QNI 51, QTC 4; Cornhusker Net, QNI 812, QTC 33; Morning Phone Net, QNI 1310, QTC 28; Nebr. ARES 75 Mtr. Net, QNI 155, QTC 11; Nebr. Storm Net, QNI 1352, QTC 55; Pawnee ARG 7 Mtr. FM Net, QNI 125, QTC 0; PM Net, QNI 302, QTC 4; UAWA Net, QNI 85, QTC 0; Sandhills WX Net, QNI 137, QTC 0; Western Nebr. Net, QNI 484, QTC 52. Traffic: W0VEA 96, K0AIE 75, W0FQB 48, W0ZNI 22, WA0BOK 18, K0BRS 18, W0G0E 17, W0B0GWR 14, W0B0RG 13, KA0BDZ 12, W0B0NG 12, WA0EQX 12, W0B0GK 11, W0VYX 11, W0EUT 10, K0TUH 10, K0D0F 8, W0B0QX 8, W0B0MQ 7, W0FT 7, W0LJF 7, W0JUU 4, W0B0K 4, W0YFR 4, WA0LOY 3.

NEW ENGLAND DIVISION

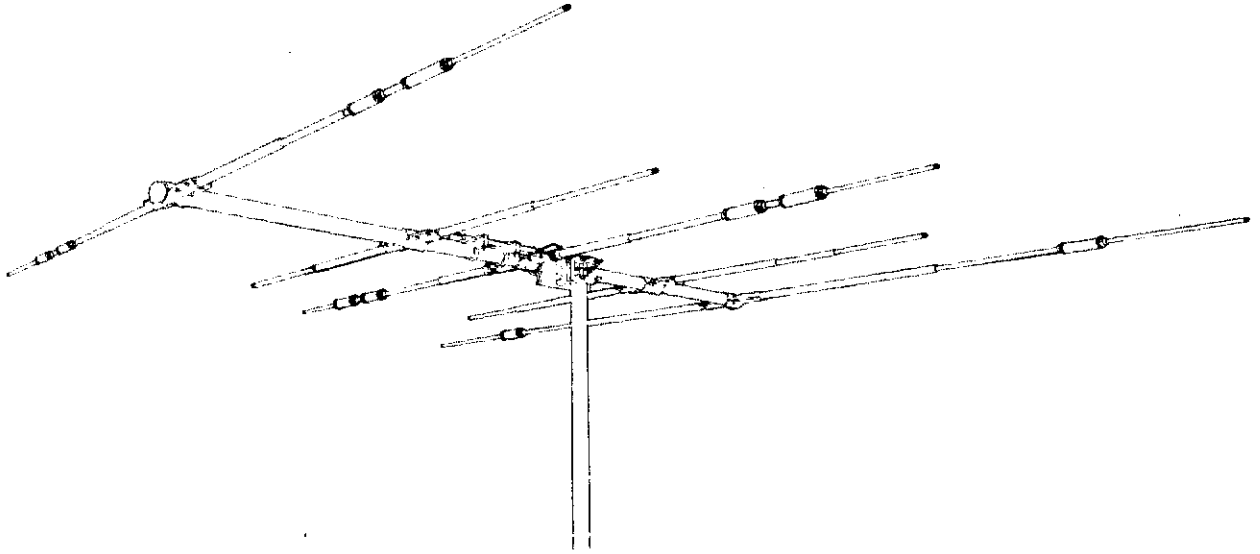
CONNECTICUT: SCM, William J. Pace, WH1D — SEC: W1SY, STM: W1AIU, N1MS: WA1LOU, K1EIR, K1EIC, WA1ELA, EC: K1DFS.

Net	Freq.	Time/Days	Sess.	QNI	QTC
CN	3640	1900/2200 Dv	56	353	230
CPN	3965	1900 M-S	28	448	148

Nutmeg	28/88	2130 Dv	28	420	124
WESCON	78/18	2030 Dv	28	650	132

High QNI — CN — W1WK K1EIR W1EFP WA1UUA. High QNI — CPN — 1BSB K1ACE W1HJM AD1D. The FARA News announces formation of the Milford Repeater Assn., which is sponsoring the installation of a new repeater on the old Nike site at Milford. The freq. is 146.325/146.925. The huge Pioneer Valley Repeater Assn. has announced its June 15 election meeting. Recommended reading is the terrific article by W1G0Z on power and ri grounding in the current SARA SQUELCH BURST. Congrats to W1GBH who made Extra almost a year to the day he started working for his Novice ticket! This has to be some kind of record! The latest convert in the back-to-AM drive by WA1YKR is W1E0D who is sporting a "brand-new" 75A-3 for the purpose. Details on the May 12 and 13 week-end for the W1AW Work-the-World complete All are urged to give this "no-pain, no-gains" local DXpedition a try if you are curious how it feels on the other end of a pile-up. Contact your SCM for further details. WA1LOU sweating out the results of his bar-exam. It appears that all the CT. traffic nets are steadily increasing, not only the QNI count, but the QTC counts as well. This can be attributed largely to the aggressive and encouraging at-

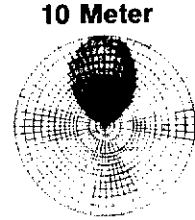
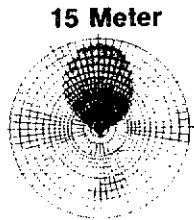
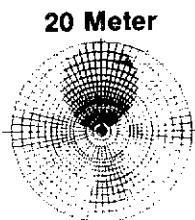
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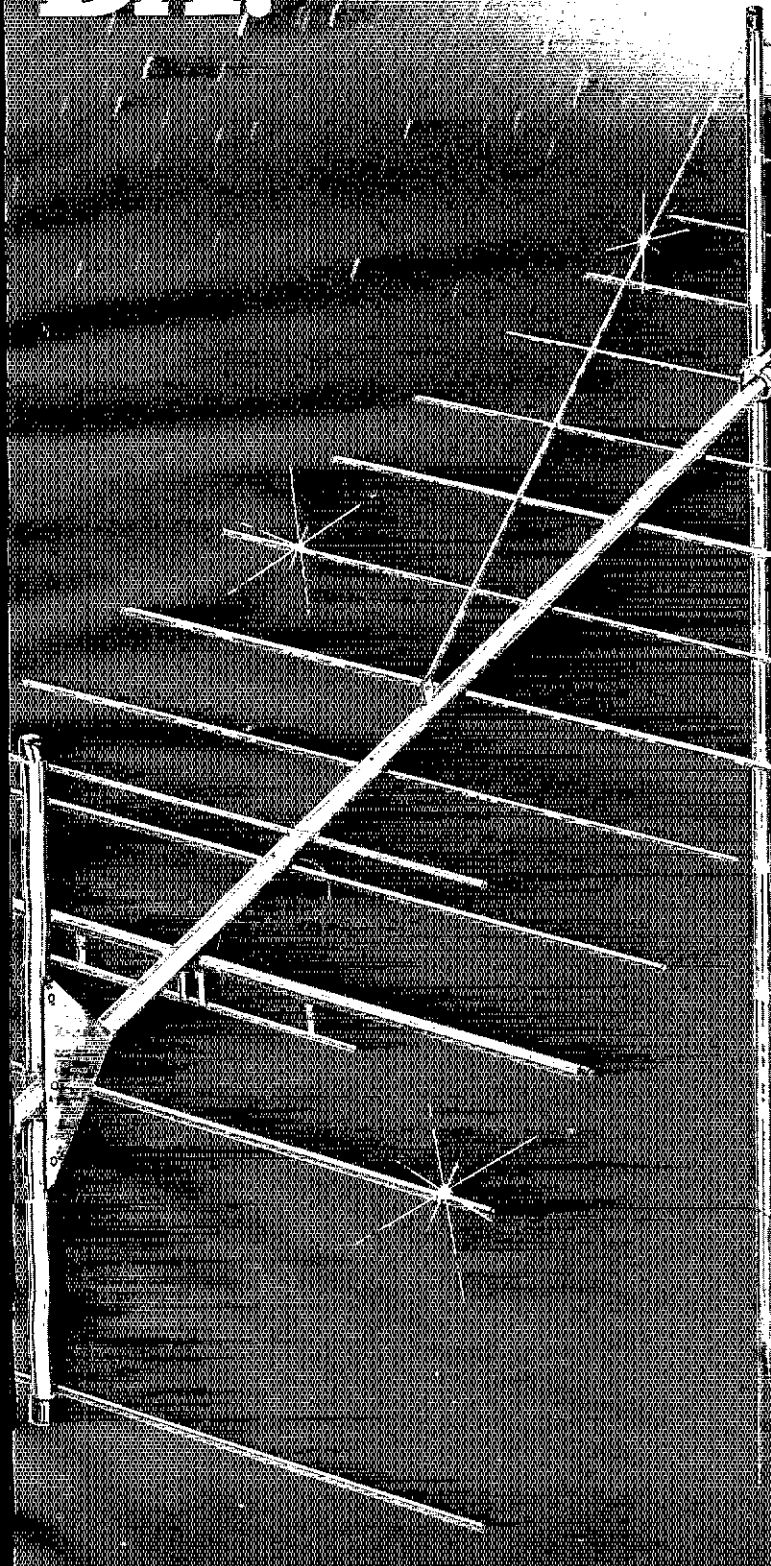
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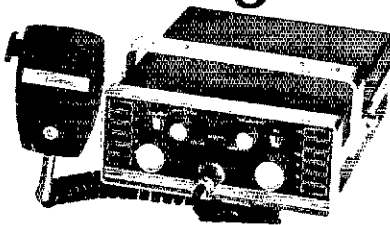
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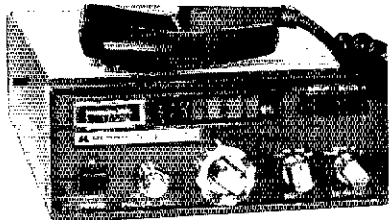
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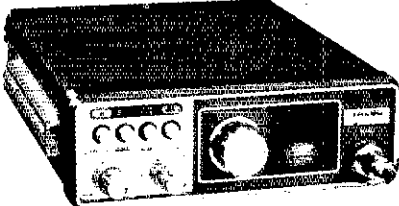


MIDLAND 13-510A 2m FM Transceiver. 12vdc, 25/1w, 143-149 MHz. PLL synth. 1200 ch in 10KHz steps with 5 KHz up-shift. 4 offsets, + or - 600 KHz and 2 optional positions. Size: 2-5/8"H x 6-3/4"W x 9-5/8"D. Mic and mobile mt included. (Reg. \$399.95) **SALE \$349**

13-513 220 MHz FM Transceiver. Looks like 13-510. 20, 10 or 2 watts output. 100 frequencies between 220.00 and 225.00 MHz in 10 KHz steps with a 5 KHz shift-up. 4 offsets, + or - 1.6 MHz supplied, 2 optional. (Reg. 449.95) **SALE \$349**



13-509 220 Mhz FM Xcvr - 10w, 12ch w/223.50 Mhz, mic & mt. (Reg. \$179.95) **SALE \$159**



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titudes displayed by all Net Mgrs. in keeping their respective nets active and interesting! The Waterbury local DX contest going hot and heavy with early risers N1ADE and K1TGX knocking off the choice ones at 6 AM!!! WB1DQP doing a great job with his invisible, in-door, switchable dipoles! Condolences to the family of W1FPT who became a Silent Key in early March. A little known fact about Ernie is that he did much of the pioneer work in the early days of the CT repeater service. To start your day with a chuckle, tune in on the early morning net on the 7/8T machine at 5:45 to 6:15 AM. Traffic: W1EFW 211, K1GK 199, WB1LJIA 166, W1OD 163, W1DFT 121, WB1AIU 118, WB1CFF 117, WB1DQP 113, K1DQG 93, WB1DGR 71, W1HMJ 56, WA1LOJ 55, K1AQE 51, WB1DN 51, K1E1C 35, K1EUW 25, W1KV 21, W1GVT 19, W1JA 17, W1AIV 19, W1JTD 10, W1QV 10, K8AXL 10, W1CJH 7.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD — SEC: WA1BLG. Appointees K1K NINA ECA; K1ZFN. WA1PLY OBS; K1B5O OTS; WA1IDA QES/OVS; EC reports received from W1ALP, K1PNB, W1XA, WA1IGG, W1PJ, W1UQ, K1-MM and W1LLI (Jan.); OO reports from W1AUG, W1NF and WA1NAE; extensive OVS report from W1JH.

Net	Freq	Time/Dy	QNI	QTC
EMRI	3.66	19/2300 Dy	454	306
EMRIPN	3.898	1730 Dy	384	211
HEFTN	04/64	2730 Dy	346	125
NCEPN	3.945	0830 Su	55	14
EM2MN	30/30	2000 MWF	35	23
EM2MN	145.8	2000 TH		

Quannapowitt Radio Assn: W1EHS, W1ZEN, W4CQG and W1PL trying to organize and revive QGWA (contact W1PL to help). WA1OQV announced candidacy for pres. KA1C8Y (age 12) now Novice. Chelmsford ARA; N1RH gave a talk as new EC for Chelmsford Wellesley ARS; WB1BUQ and N1ADY running Novice course with 23 students, club members helped with BAA Marathon in Apr., WB1FD now General, WB1EGR now Extra. Framingham ARS: CD Director and Red Cross people impressed with SEI, so says WA1IGL. MIT Radio Society: WA1SHO, pres.; WB1CWO, treas.; N0ND sta. mgr.; K1SX, act. coord.; Maine: M. J. Sully, K1F5U, pres.; K1HTN, vice-pres.; WB1FMA, M. J. Sully, K1FOO, treas. Sturdy Memorial Hospital ARC: active in St. and running Novice class. All clubs preparing for Big D efforts. Your SCM wants to receive nominations for a Public Service Award to be given at the next NE Convention. EMRI and EMRIPN put out bulletins. WA1VAR NM for both sets of EMRI. W1FJL has an Emergency Plan for EMRIPN. Attention Novices: check in to Eastern Mass-Rhode Island Slow Speed Net on 3.715 MHz weekdays. ARES: work continues on the Emergency Plan for Eastern Mass. and it will be available in June for all ECs and anyone else interested. W1EGE: looking for operators to help with Vintage Sports Car Club Vermont Hill climb on Mt. Equinox June 9/10. Sounds like lots of fun. Wait Butterworth, formerly with Boston EOC, ex-K4VH, ex-W1GM now W1BI living in Dunedin, FL. Very interesting article on W1ESI was in local Ravanhham paper. K1TCC in hospital. W1FZH, W1HZG and W1TRD Silent Keys. AD1V, ex-K1HNP, AE1P, ex-WA1AG1, AB1C, ex-WB1FEZ, AG1N, ex-K1WGI, AD1R, ex-K1NOJ, AE1O, ex-W1QWG, W1DMS has Kenwood 7400 W1QHP has Advanced. W1JR reports WAS on 2 meters by GW4CQT, also SV1DH and SV1AB both worked Z56DN on 2 meters. W1LVV of Falmouth moved to Virginia. W1DYS vacationing in FL. Traffic: (Feb.) K1RA 337, WA1TBY 222, WA1VAB 178, WA1BXY 210, W1BXP 208, K1GN 193, WB1DXR 127, W1AYM 127, W1AYW 125, WA1Z 122, W1FJL 120, WA1VEI 103, WB1EMU 100, WA09NE 86, K1B5O 81, W1DMH 64, W1AIX 60, WB1EFT 49, WA1FNM 31, KA1CC 31, WA1VKB 18, K1LCO 12, WA1HE 10, WA1QAJ 9, WB1GEX 8, K1PNB 3, W1XA 2, Jan.) WA1VEI 229, W1EMG 23, K1PNB 18, W1DDB 6. MAINE: SCM, Bill Mann, W1KX — SEC: WA1YIIV, STM: W1RWG. New appts: W1WCI NM (CMEN); N5YX1 OTS. WA1SMY did much work as first CMEN NM. Aroostook ARA provided 2 meter comms for snow sled race on Feb. 17. Androscoggin ARC entered second year and rpt. planned. Mbrship in Waldo Co. ARA now 28. Coming events: May 12 — Hoss Traders annual tailgate swapmeet, Deerfield, NH. May 19 — Miccoast Snow Bowl Festival, Camden, May 28 — Portland AWA swap & Shop, USM Campus. Gornham Job change has required me to resign as SCM. Please give returning SCM, WA1MUX, your support. Thanks and 73. Feb. rpts. Secs./QTC/QNI PTN 28/142/275, SGN 24/147/1029 AEN 4/053, CMEN 20/8/63, MP5N 4/6/59, SPSN 10/14/36 Traffic: N5YX1 116, W1RWG 95, WA1QFX 66, WA1JZP 53, WA1MUX 48, W1HDC 47, WB1BYR 47, W1BJ 43, N1RP 35, W1KX 31, W1AHM 29, W1ISO 20, WA1JCN 8, WA4UJH 8, WA1YNZ 7, W1BMX 5, WB3HYD/1.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1SWXW1NH — SEC: K1R5C NMs: N1NH & W1TN. The GSPNH had 366 check-ins & 194 traffic. W1ACC's tower is raised & lowered electrically. K1UOX vacationed in VP9-Land & chatted with VP9GL. New AF MARS director for NH & VT is WA1PEL. New mgr. of the VTSSB Net is WB1DSW. CW DXer K1FWE works at Ham Radio Mag. N1AFD uses Drake TR7. Dentron MLA2500 & Tribander UN 55-foot tower. W1GUX was active in the eclipse-eastern on 3600 kHz. W1PH has new ATV-34 on 75-foot tower. W1ACC W1BI W1CNK W1IN W1KJ W1NH & W1ONH enjoyed get together at the Market place in Bedford. W1OMZ & N1AIX ex NH Legislators. W1GNH acquired a 75A3 at the Interstate Repeater Auction. W1EXM has a new TS-520 N1NH still pleading for help on the CW Net. The USM Net had 345 check-ins & 98 traffic. W1B5Y was active in the NH OSC Party, the best ever. Ambassador-at-large, N1CGB has new F1Z77. K1HDO working the rare ones in the South Pacific. WA1FS2 now working at Microwave Assn. WA1RWP vacationed in VP7. Traffic: (Feb.) K1B5C 572, W1TN 232, W1GUX 102, N1NH 71, WB1HF1 50, W1SWX 10, K1UOX 9, W1CUE 5, WA1PEL 4, W1BYS 4, (Jan.) W1MWH 18, W1GUX 12, W1BYS 2.

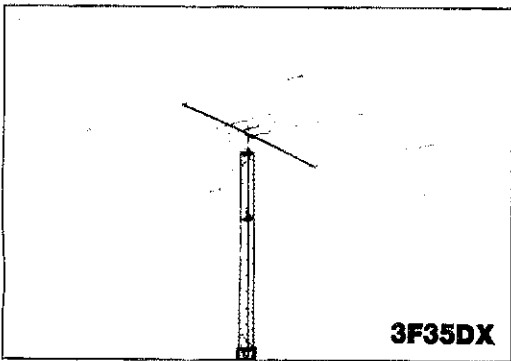
RHODE ISLAND: SCM, J. Titterton, W1E0F — K1AO moved to Hopkinton, KY. good luck. RIEM 2-mtr 11c. Net reports QNI 208, Tlc 58. Even though NCRB repeater went down twice during month, net functioned all sessions—good job! W1OP has new 60-foot tower. K1DT teaching radio classes at Bryant. Please note: Newport County HC meeting is moved up one week to May 14th. Plans for RI Mini-Convention are moving forward, for details contact WA1VZ7. Our congratulations to KA1BWW on making General. W1CGM still working for ECARS. He has health problems, pay him a visit. WA1TMZ reports the Ocean State 10-D Net in full swing and growing. Hope Valley Rptr. readying a new repeater. Upgraded: K1JCM to Advanced and WA1RNF to Extra

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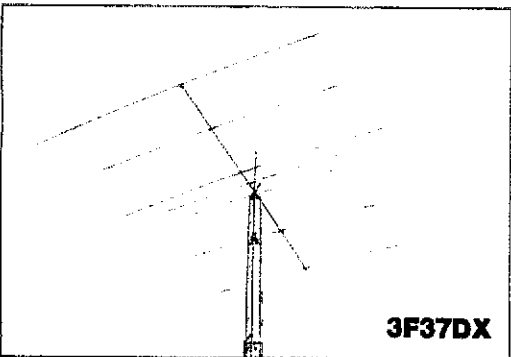
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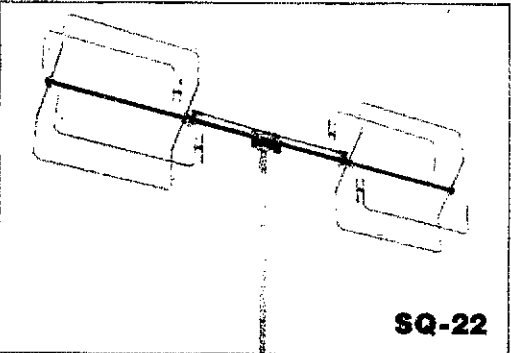


3F35DX



3F37DX

MODEL		3F37DX	3F35DX
BAND		14 21 28	14 21 28
ELEMENTS		7	5
ELEMENTS PER BAND	20m	3	3
	15m	5	3
	10m	5	3
ANTENNA GAIN	20m	Excellent	
	15m		
	10m		
FRONT BACK RATIO		Excellent	
MAX. POWER INPUT		3kw	3kw
VSWR		1.5 ^{or better}	1.5 ^{or better}
IMPEDANCE		50 Ω	50 Ω
MAX. ELEMENT L.		10.5m	10.5m
BOOM LENGTH		7.5m	5.0m
BOOM DIAMETER		50mm	50mm
TURNING RADIUS		5.3m	5.25m
WIND RATING		40m/sec.	40m/sec.
SUITABLE MAST		50mm	50mm
WEIGHT		23kg	17kg



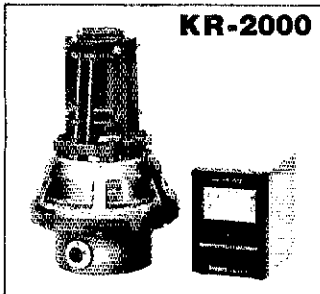
SQ-22

"SWISS QUAD VHF SERIES"

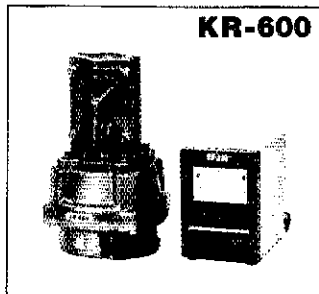
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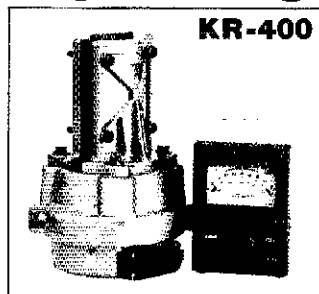
KEN PRO ROTATORS



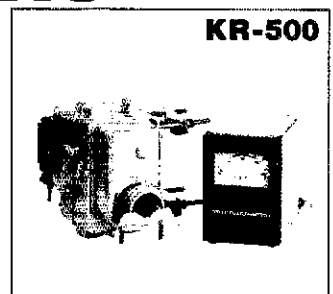
KR-2000



KR-600



KR-400



KR-500

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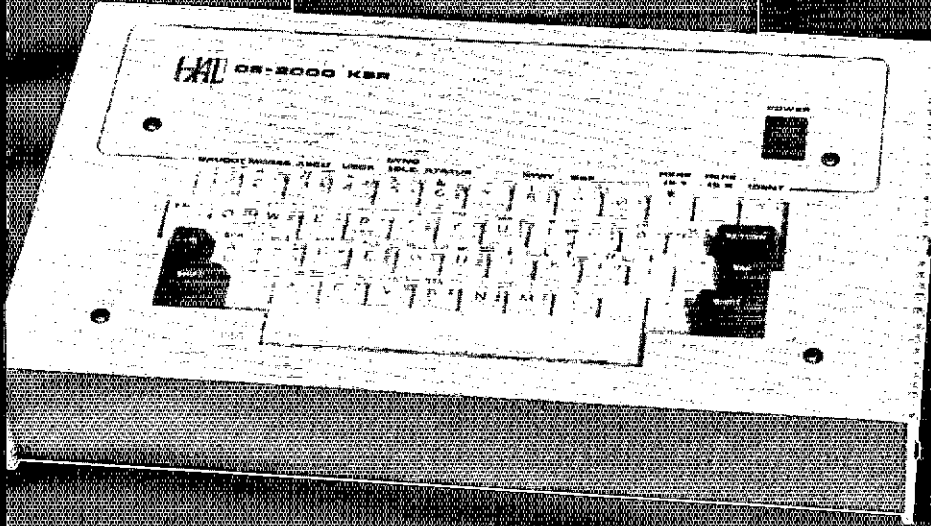
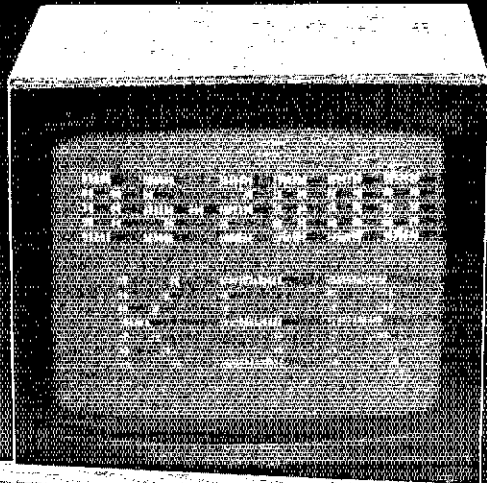
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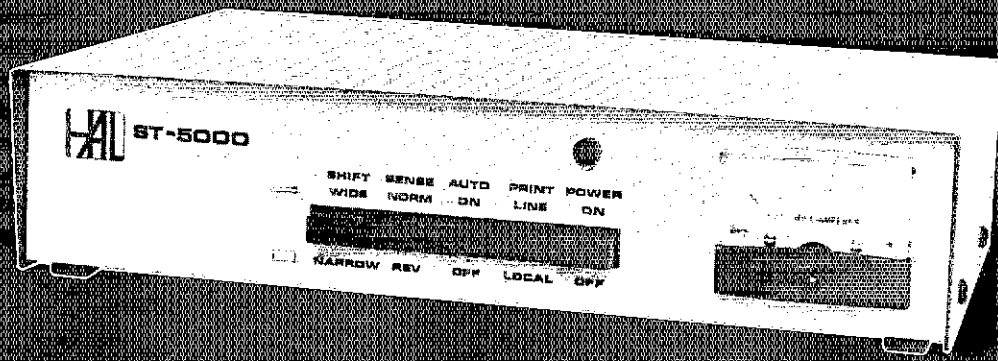
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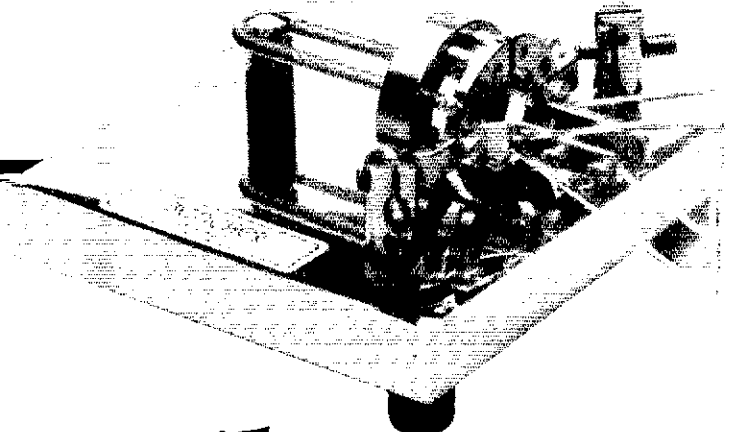
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with new call, AF1I. Congratulations. Traffic: W1E0F 48, WA1YUH 36, N1RI 35, WA1CSO 20, WB1FDM 6, WA1TF7 1.

VERMONT: SCM, Robert Scott, W1RNA — SEC: W1VSA, W1HNA vacationing in Southern CA. Bob will be back for next month's report. Interesting discussion took place on 3494 Mt. Mansfield regarding message quality on amateur nets. It was generally agreed that a lot of traffic was similar to the Post Office's junk mail. Our public may be not as great now as it was in the past. Public assistance on amateur repeater rates for billing. Report all traffic assisting accidents and stranded motorists to your repeater trustee. Repeater trustees relay to the SCM of VT. W1AIM worked Gibraltar on six meters (Z2BL). W1DSW new mg. VT SSB net. SWOT net now meets 1930 EST. Total participants in all nets reporting, indicated 1237 amateurs handled 99 messages. Traffic: K1BQB 138, WA1BZR 12.

WESTERN MASSACHUSETTS: SCM, Bill Lowe, W1TM — SEC: WA1DNB STM, W1KK, NMS: W1UD WA1MJE, ECs: W1GAJ, K1IQA W1JTL, W1KZS, WA1YJN now Asst. EC, Berkshire Co. W1DWW recuperating after short stay in hospital. K1IJU and XL1 K1IJV along with W1JP and XL1 WB1ABF planning vacation at VP2M5J. N1CQ experimenting with Dog race reporting system. enjoying excellent 10M openings. SCM visited HCR and heard excellent presentation by W1UED, also some discussion on third-party traffic. SEC moving to new QTH in South Hadley. Silent Keys: W1LRE and W1SAN, both well known in WM. Stations with official appointments must submit activity reports to SCM each month. A radiogram will be accepted. This section in need of NTS representation in Central and South Worcester Co. Traffic: WA1MJE 384, W1TM 148, N1CQ 40, WB1ALV 39, WB1EHS 33, W1DOY 31, W1EFG 25, K1JHC 22, W1ZPR 21, W1BVR 19, WA1OPN 15, W1YJW 10, W1KZS 4.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davie, KL7CJ — KL7IAB reports the SEE-SAW Net operates 7 days a week at 0230 GMT on 3900 kHz and requests participation. The Eiton Club at Fairbanks which is the ARTIC FLUTTER holds its meetings the 2nd Fri. at 1930 local time. The Anchorage Club provides communications for the Worlds Championship Blind Dog race. See report in another section of QST. The Alaska Ed. Assn. look for new members. Several stations have upgraded. Please see the ARES article on page 51 of Mar. QST it is very good. The new ARES-RACES repeater will soon be active in the Anchorage area, the freq. will be 147.90 in, 147.30 out. Details in a later report. The Juneau Club again in full operation with KL7IAB as pres. Traffic: KL7JDI 76, KL7CJ 18, KL7JDH 18.

IDAHO: SCM, Lem Allen, W7JMH — Emmett ARES (EARS) officers for 1979: WB7FAI, pres.; N7AGE, vice-pres.; W7WVD, secy.; KARS new officers: W7LQI, pres.; WB7WIA, vice-pres.; WB7DBA/7, 2nd vice-pres.; K7MM, 3rd vice-pres.; W7VUB, secy.; WB7WBZ, editor. K7MM and K7ETJ put up a new ant on the repeater — thank! Plans are for a Swap and Raffle at the Fairgrounds May 12. Be there! KA7COI new EC for Elmore Co. WA7GPZ writes that Blackfoot hams are thinking of forming a club. WA7GPZ has HW-104, FT277 rigs for HF and VHF, teaches Novice, General, Tech classes 7-9 PM at High School, has 13-yr-old son KA7AQS, 9-yr-old daughter studying for Novice.

Net	Freq.	Time/Days	Sess.	QNI	QTC
FARM	3935	7 PM Dy	30	1487	118
CD	3990	8:10 AM M-F	24	590	27
IMN	3635	8:30 PM M-F	20	177	88
Mini-Cassia	148.94 fm	8 PM S	4	13	7
Elmore CEN	148.52		4	24	4

Traffic: W7GHT 229, AC7P 80, W7JMH 31, K7TM 10, WB7PFT 6, KN7WLF 6.

MONTANA: SCM, Robert Leo, W7LR — WB7NFK Carbon Co. EC. KB7BI Park Co. EC. IMN QNI 177, QTC 88, KB7BI QSO 71. DX 40 Net QNI, WB7NOZ QSV to AZ, Hitteroot ARC social mtg. VHF report mtg. K7WNE, Missoula 28/88 net. Th 7 PM. VHF Club officers K7WNE K7IOA WB7SFF W7PX. K7IOA builds 450 link for 28/88 net to 3797 rpts. W7DB sends ARRL QBS, QSO KH6 6 mtrs. WA7CAC back from ZL trip. KB7BJ new 1H6DXX up. WB7FBW WB7STG print 6 page Gallatin RHC newsletter. WA7OBH 170 countries with H5COA, 30 OSCAR states. 15 in Hardin code theory class. W7DXQ reports on eastern Mt. SET. KA7CBV headed big Mont. SET with Idaho counties. WB7DP made 25 QBS transmissions in Feb. WA7ZV is the net pres. of the Salem ARC. WA7OEM is the new Handovic club pres. The Eugene Hamtair will be held July 21-22. New calls in the Medford area: KA7DFI, KA7DFH, KA7DFO and KA7CZX. K7TSV is trying for WAP — Worked all Planets.

W7LT lost his antennas due to weather and is rebuilding. N7DB is still working good DX on 6 meters. A comprehensive list of Northwest Two-meter Repeaters can be had for an s.s.s. to the Oregon Region Relay Council, Inc., P. O. Box 10672, Portland, OR 97210. Just in time for the travel season. Traffic: Feb 1 W7VSE 650, WA7IBS 247, K7KVV 221, K7NFS 212, WB7OEX 103, WB7BOG 87, K7PWP 48, W7HLE 31, K7WWR 29, W7LV 17, W7GUH 8, (Jan.) W7HFL 93, WB7BOG 62.

WASHINGTON: SCM, Bob Klepper, W7IEU — Former SCM, Art Henning, W7PI, has become a Silent Key. Although Art was not active in the last few years he still had an interest in what we were doing. Other SKs are W7JJI and W7IT. WB7FGC gave report on SET at Spokane Red Cross Disaster Committee lunch. N7GG instructing members of Clallam City ARC on making circuit boards. Mount Baker ARC has a total of 143 members, 93 active, 48 associated, and 2 honorary. The big wind storm took its toll. Western Wash DX Club rpts K7SS, W7WKM, W7ISX, N7XX and W7RM were hit hard with extensive damage to antenna systems. Many thanks to those who kept the repeaters open for vital communications. West Seattle ARC has donated 2 more sets of ARRL publications to local libraries. W7JIE



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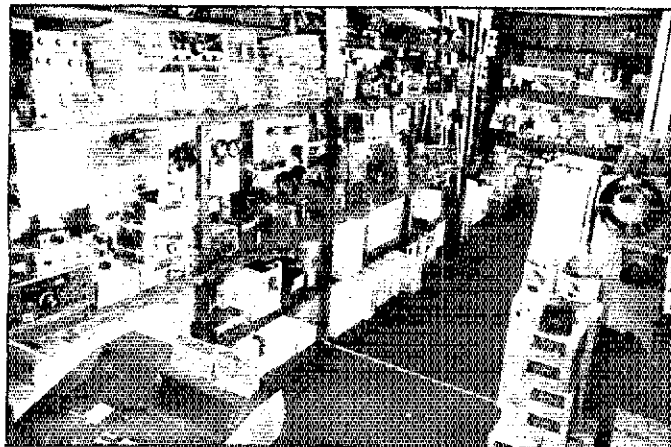
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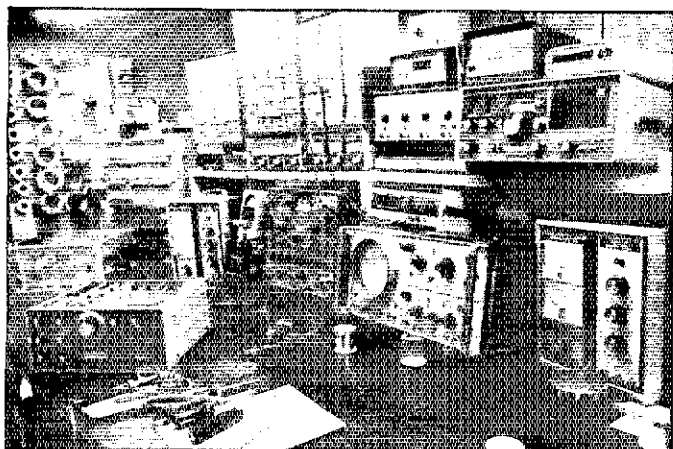
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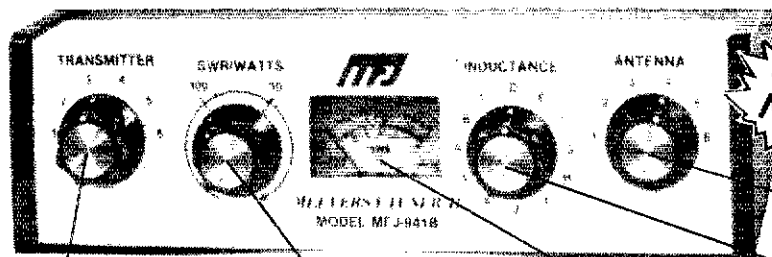


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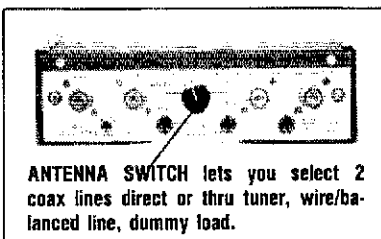
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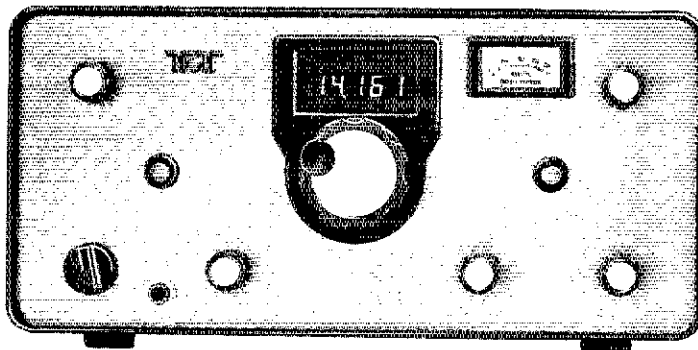
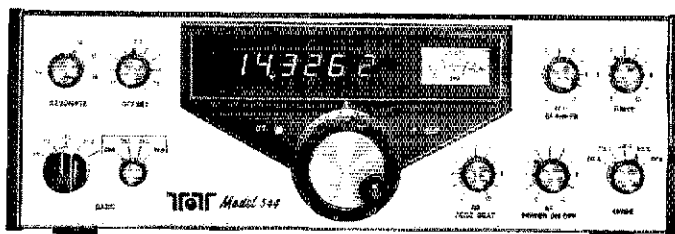
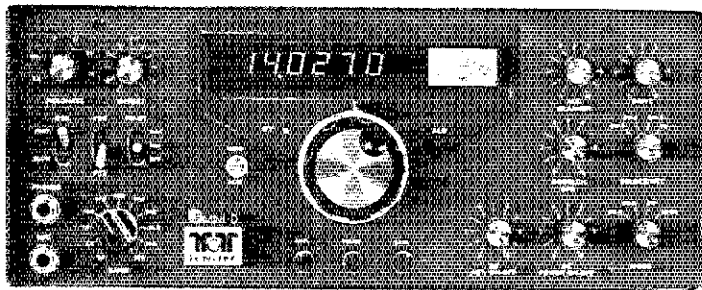
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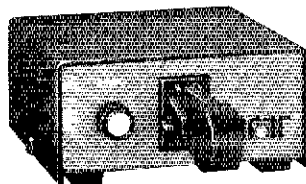
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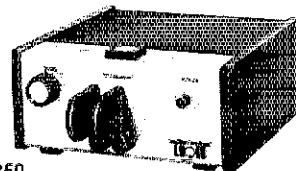
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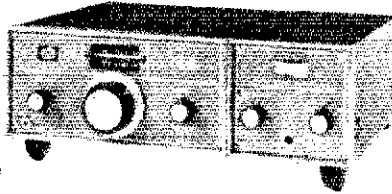


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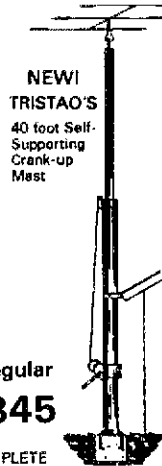
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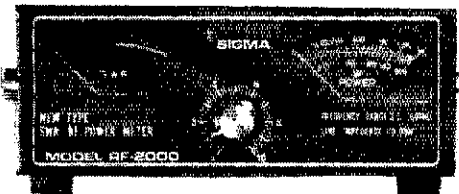
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gave talk to SCCARC on emergency comms. Silent Key is WB6FZR, AC6Z back in the Santa Cruz area after a job in Saudi Arabia. WB6BWO passed Advanced Class exam. K8BDK down with pneumonia and flu. New member of SCCARC is WD6FAL. Officers of LEHA ARC are: W6TWU, pres.; WB6WLL, vice-pres.; KA6AIT, treas.; WB6PCW, secy.; WA6RRN, bulletin editor. WA6JNT gave talk to LEHA ARC on "Morse on a Chip," and new members are KH6IRX, WB6QOD and W6JAK. FARS held their annual banquet in Cupertino, and W6ZYH showed film of his trip thru the Caribbean. New ones of EMARC roster are N6YE, WD6ALW and WA6OKX. EMARC and FARS members helping to keep the Electronic Museum open on the weekends. WVARA meets 1st and 3rd Wed. at Red Cross in Los Gatos. WB6CD is pres. SCVRS members working on new controls for WA6AE. New ECs are W6TIC and WB6TSS. Twelve SCV stations made the NCR Honor Roll: WD6AFR, W6DFH, KA6CGO, WD6GUA, WA6KRA, WK6ZJ, WA6NMG, W6RFF, W6BYB, N6YE, K6YK and WA6ZFK. W6CF ORL with work but wkd Bouvet for new one. WA6HAD active on NCR. Traffic: (Feb.) W6YBV 238, W6AUC 129, WK6ZJ 22, W6RFF 34, WA6HAD 14, W6CF 2. (Jan.) WB6ZF 25, WA6GBQ 6.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Bill Parris, AA4R — More area clubs are getting involved with the National Weather Service and learning more about their operations. Forsyth ARC and Cabarrus ARS had programs devoted to this growing area of interest. Brightleaf ARC has large group active in DX circles with WA6HP being the club winner in the recent ARRL Phone DX Contest. Brightleaf club also running a Net on 52 for those who want to learn Spanish or increase their proficiency. For those in the Mantec area, a new club is being formed, the Reginald A. Fessenden ARC. Contact W4PCN for more information. WCARS (Asheville) reports Novice Classes going well with K4TTN, WA4QGN & W4DYW handling the chores. New appointees this month include WB4WII (OTS), WD4IYA, EG Brunswick Co., WD4FTR, EC New Hanover Co., & WD4LWM, EC Columbus Co. Your SCM had the pleasure of meeting with the Azalea Coast ARC. Try for the invitation. Plans are underway all over the state as clubs get ready for Field Day next month plus the VHF Contest. Support your club in their plans. Congrats to WA1ZI who upgraded to Extra but had to go to Chicago to do it. See you at the Hamfests in Gastonia on May 6 and Durham on May 19-20. Congrats to the top 10 traffic handlers in NC in 1978: WA4YSK, WB4ZIO, W4EAT, WB4MXG, K4MC, W4FMM, K4VHT, W4QFO, K4FTB, AA4NC, Traffic: (Feb.) WD4CNO 235, K4VHT 134, WB8NYN 126, WB4MXG 112, K4DHF 104, W4EAT 101, WA4SRD 94, AB4S 90, WD4EPO 84, WB4ZIQ 79, K4FTB 75, N4UE 70, WB4RGS 66, W4QFO 60, KB4IZ 48, WA4UYS 44, WB4WII 42, N4ZH 42, WD4AE 35, WD4ABZ 32, WD4JIM 29, WB4WII 28, WD4DFE 27, AB4S 26, K4TFP 26, W4AIF 22, WB4VQZ 22, WA4UTC 21, WB4CYN 20, WA4CLUD 19, WB4OXT 18, N4BEX 16, W4EHF 15, N4ALE 12, W4FMM 12, WA4WFY 12, W4ACY 10, WD4CNS 9, K4POY 9, WD4HYM 8, WA4AKB 7, K4AI 6, WD4NTE 5, WA1ZI 2, WB4VHE 2. (Jan.) AB4S 32, WD4CNS 26, A14O 13. (Dec.) W4QFO 90, AB4V 48.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — Asst. SCM, WB4UDK. STM: W4ANK. NMs: WA4SJS, KD4D. Check-ins/Traffic: (Feb.) SC9BN 1723/175. (GN/E) 249/102. Blue Ridge 2M Net (Jan.) 675/6. 658/7. Laurens City. ARES (Jan.) 40/0. 45/0 Dillon City. ARES 28/0. Congrats to new Novice KA4GUT. Columbia Hamfest May 12 & 13. N4JK & WD4BUH on last scan TV on 480. W4YMU on Slow Scan w/new robot gear. Congrats to Western Carolina ARC for good job during ice storm. Thanks to ECs for their good reports. Traffic: (Feb.) N4PQ 619, K4ZN 336, WD4AWN 114, W4ANK 100, W4ANTO 67, W4NQL 53, W4MTK 45, W4FMZ 44, WB4UDK 38, K4FRX 37, KD4D 34, WB4HVL 31, K4EAR 20, K4PFC 19, WB8TCT 14, WD4EDU 13, WA4SJS 13, KA4BGX 11, AF4E 11, N4BCD 11, WA4AFP 10, W4DRF 8, WA4EOD 8, WD4EDM 8, WD4FEU 7, WD4FJP 6, W4OCC 5, WA4VYS 4, N4EE 4, WA4YAF 2, WD4QLV 1. (Jan.) KD4D 30.

VIRGINIA: SCM, Rick Genter, K4BKX — ASCM: Buddy Smith, W4YE. STM: W4SQO. SEC: WB4ZNB. Chief OQ: W4HU. Chief OVS: WA4PGI.

Net	kHz	Time (PM)	Sess.	QTC	QNI	Mgr.
VNTN	3907	Noon	25	435	433	WA4FDV
VSN	3947	6/10:15	57	874	1474	WA4JK
VSN	3680	6:30	28	175	437	WA4YU
VN	3680	7/10	56	497	942	WB4FLT

WA4PGI, our new Chief OVS will be developing our Virginia OVS "club." Anyone interested in 50-MHz-and-up experimentation should contact Gene at 1349 S. David St., Covington, VA 24426. Gene is presently active on 50, 144, 432, 4296, 5650 and 10,300 MHz. Let's support Gene and the OVS program in VA. Nice report from W4OOL. N5BA worked 100th country; now needs cards. W4JK busy with OSCAR and has new day-TCC sked. WA4CCK, W4SHJ & WB4PNY attended 4RN meeting in Orlando, FL. N4SD has new Wilson Mark IV. WA4RXY has new 2-meter HT. N4RF has new station. K4LEF busy talking Ham radio to civic clubs. W4KFC busy with snow shove — we're not that bad. Vic — do you mean W4JHF is now K4K. N4IF busy with QutZ-ZurZ. WD4GVU is away from WAS. N4DW received 5BWAS. W3BBQ busy with health & welfare traffic during midwest snowstorm. WA4PBG in sunny FL 'til April. New ARES nets being reported. N4OT now on two meters. WB4QAX has new 75 antenna. K4BKX and WA4FDV enjoyed seeing many of you at Winterfest. After this notice, traffic totals received after 10:30 PM on the 4th of each month will no longer be listed in this column. Appointees must still report and all traffic-counts still help the section total at Hq. Traffic: (Feb.) WB4PNY 876, WA4CCK 515, K4KJ, 467, W5SQO 450, W4JK 436, N4NK 391, W4NWM 216, N0ZO 215, WB4FLT 214, WB4DBK 207, K4F4 166, W3BBN 177, WA4YU 158, N4BA 134, K6LG 134, N4FJ 123, K4BKX 120, WD4AZI 113, WA4SD 101, WA4FDV 98, N4LE 95, K4EJ 94, WA4ISA 91, W4YVG 85, K4GR 81, N4IF 79, K4JM 79, N4RF 74, WA4RX 74, WA4ONR 71, WB4KIT 67, WB4LAB 64, WD4RDF 58, WA4YUD 57, WB4ZWT 56, AA4CK 54, KB4N 53, W3BBQ 52, W4OKN 51, WB4DQZ 50, K14W 47, WD4PIH 43, WA4RWY 42, N4SD 34, W4SHJ 28, W4TZC 25, WB4MAE 20, WA4WQG 19, K4ITV 18, W4OOL 18, K4VWK 17, W4KFC 12, W4SUS 12, WB4TPT 12, WB4FNW 10, N4ATT 7, N4DW 7, K4JK 6, K4LE 6, WA4RTS 6, N4BBX 5, K4MLC 5, WD4ABS 2. (Jan.) K4KJ 468, K4JM 116, AA4CK 118, WB4CAK 100, N4RF 85, K4DHB 48, WA4ISA 26, N4YQ 16, N4UY 15, WA4PBG 14, K4VWK 13, WB4ZKN 13, WB4FNW 12, WD4GVU 12, N4FP 10, N4BJX 8, WA4LWC 4, W4PRO 2, N4OT 1, W4PVA 1, WB4UHC 1.

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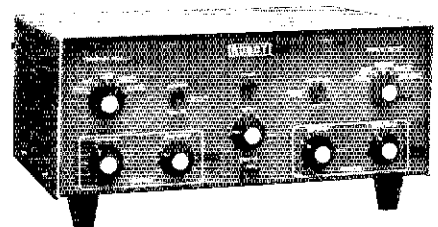


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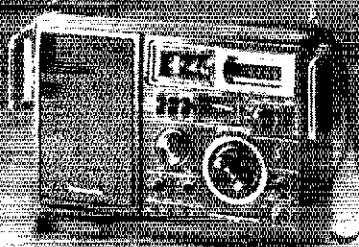
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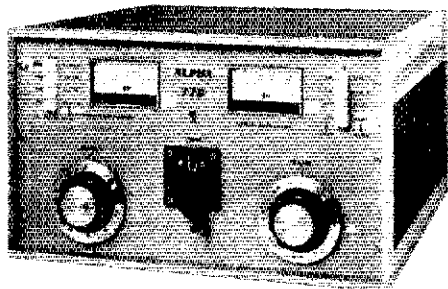
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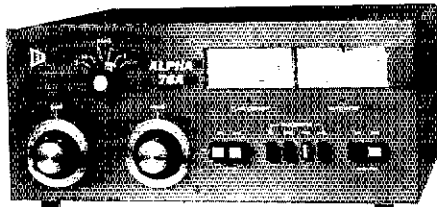


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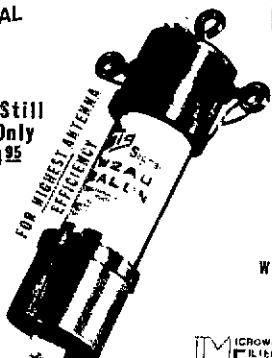
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WEST VIRGINIA: SCM, Karl Thompson, K8KT — SEC: K8QEW, NMS: W8YP, WA8WPW, WD8JYM, Tri-County Ham FC being formed at St. Albans. Contact W8YP for details. WFT June 15-17. For info contact WD8JYN. Weather meeting in Parkersburg in Feb. very well attended. West Virginia Silent Key: WB8DRW, W8DYB, W8RFD and W8CCF, WD8CNO now AIBI. Huntington Hamfest June 3, contact WB8FER for details. For EC information in your county contact K8QEW. Participation needed on WV CW Net. AREC Net on alternate Thur. following Phone Net on 3890.

Net	Freq	Time(Z)	Ck-In	Tic.	Sess.
Hillbilly	14290	1700 Sfr	186	64	4
Novice	3730	2215 Dy	131	30	27
Phone	3980	1700 Dy	445	28	24
Phone	3980	2300 Dy	1070	124	27
CW	3557	0000 Dy	194	68	27

Traffic: WA8WPW 94, W8YP 66, WD8DY 44, WB8ZA 39, WD8DHC 32, WD8JYM 30, WB8AKQ 29, WB8JWX 24, WB8JYN 20, WB8CKX 16, N8AJC 16, K8KT 14, K8QEW 11, K8ZDY 11, K8BT 10, K8MHR 9, W8ETF 6, W8LYV 5, WD8IGN 5, WB8PKF 4, K8BTD 4, WB8VAZ 3, K8YL 3, N8ALU 3.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Robert W. Poirier, K0DJ — SEC: W0GOW, STM: W0MCL, NM: K0CNV, W0ZQG. Plans are being finalized by Colo. Springs area amateurs for this year's USOC Sports Festival. W0YKH will soon be active on RTTY. Murphy appears to be back among our ranks with K0SPR reporting his Swan 500 ill and W0DYK and W0WYX losing sky hooks to recent wind storms. W0GW operated from Denver Museum of Natural History during the total eclipse that took place in the Northwest. Several others were active from NOAA in Boulder and much data was passed on HF and two meters. AD0A sporting new SB-201. W0UWE checking into nets from a newly installed HF mobile rig. SEC W0GOW and myself attended a very cordial meeting of the Big Sandy ARC in Genoa. Those of you who intend to bring friends and relatives into the mountains, remember there are several areas where more than one repeater may be accessed on one frequency pair. Net 11c, Feb.: Columbine 28 sess., QNI 1231, QTC 63, Informals 141, CWN 28 sess., QNF 231, QTC 198, QNF 924; HNN 28 sess., QNI 1099, QTC 130, Informals 210, QNF 1293; SSN 28 sess., QNI 158, QTC 25, QNF 772. Traffic: (Feb.) W0WYX 2459, K0YFK 1050, WA0HJZ 557, WB0FBS 372, WB0MTA 363, WB0ZQG 158, WD0AIT 107, W0EJD 93, K0DJ 91, AD0A 80, W0LAE 60, W0MST 51, W0GO 43, W0GW 24, W0UWE 22, W0YKH 22, K0PVI 6, (Jan.) W0MTA 364.

NEW MEXICO: SCM, Joe T. Knight, W5PDDY — SEC: W5ALR, NMS: WD5AHH, K5KPS. Southwest Net (SWN) meets daily on 3585 kHz. at 2000 local time and handled 155 msgs with 205 stations reporting in. New Mexico Roadrunner Net (NMRRN) meets daily on 3939 kHz at 1800 local and handled 127 msgs with 1132 stations reporting in. New Mexico Breakfast Club meet daily on 3940 kHz at 0700 local, handled 126 msgs with 792 check-ins. Yucca Net (YCN) meets on 1676 kHz — 1676 meets daily with 41 check-ins. With deep regret report passing of W5TWZ, retired, active ham over 50 years, member QCA. He will be deeply missed. W5IXR elated with 50 MHz contact with JE1CZV. FB on new Yucca 2-meter net 0161 & 1616 (Caprock). W5UH doing good job on ARTS. Traffic: W5UH 564, N5NG 330, W5DAD 242, W5AHH 164, W5JW 150, K5KPS 96, KL7HSF 94, WA5MIY 4.

UTAH: SCM, Carl R. Ruthstrom, W7GPN — K7OIP's widow was posthumously presented with a "Military Citizen of the Year" award by the Fort Douglas Military Museum Association. K7OIP died Jan 5. He was one of the prime developers of Navy sonar and radar equipment in World War II. He was commissioned in 1924 and retired a Captain in 1947. New officers for the UVHFS are K7HFV, pres.; WB7VCI, vice-pres.; WA7TNZ, secy.; WB7SGF, treas.; K7GRC, freq. coord.; and W7CRU, rptg. eng. Goals of the Society for '79 include improved membership and information about Section repeaters. K7JL reports that the solid-state repeater on Hidden Peak should soon be back in service. He's been working DX on 20, 15, and 10 meters, as well as being active on 29.6 MHz FM. WA7MEL worked SW1BZ on 80 meter cw. Active section nets are BUN, daily at 1930Z, on 7272 kHz and UCN daily at 0215Z, on 3710 kHz. Traffic: K7HLR 238, WA7JFC 67, WA7MEL 47, N7JFC 67, W7CCX 20, KB7DC 12, W7BL 8, WB7UFV, W7UTM 3.

WYOMING: SCM, Chester C. Stanaway, W7SDA — Asst. SCM: K7IKO, NMS: WA7WFC, WB7NHR and W7LYA. The Sheridan Amateur Radio League will be sponsoring the Wyoming Hamfest this year. Contact the Hamfest committee, K7KSA or WB7NVS for more details. More news later about the hamfest. If you are interested in CW work contact W7LYA. New Novices KA7DGD and KA7DDK. KA7DDK is 54 years old and blind. W0QGH now resides in Cheyenne. It is with deep regret report W7EKR, ex-W7CSI and W7IAP both of Sheridan. WY are now Silent Keys. WB7NHR reports the Wyo. Cowboy held 20 sess. with 696 QNI and 12 QTC. Traffic: W7LYA 344, WA7GYO 59, WA7SGG 24, W7BKI 8.

SOUTHEASTERN DIVISION

ALABAMA: SCM, William E. Scates, WA7JYU — SFC: K4WYT, STM: WA4JDH. New appointments: W4UP as OTS, WD4DAT Tuscaloosa Co. EC. New officers for Muscle Shoals ARC are: WA4LBX, pres.; WA4NPN, vice-pres.; WB4WRO, secy-treas.; WD4FXC, dir. Enterprise ARC: WA4YQT, pres.; WB4JSO, vice-pres.; K4HKR, art. mgr.; KA4CRV, secy-treas. WA4YQT reports good Gen/Tech license class in progress. New officers for Huntsville Area Young Ladies' ARC (Haylark) are: WA4MLK, pres.; WB4RIV, vice-pres.; WA4AXA, secy.; WA4JUV, treas.; WD4GSO, pub. ch. BARC active in two public service activities in same day, CAP drill and a marathon race. Many thanks to W4BLI, AEFM and WB4CXD, Jefferson Co. EC for a well organized tornado alert, Feb. 26, '79. All AL is grateful to the line bunch of amateurs that helped with this alert for the eight-hour sess. AEFM — 2337 check-ins, 143 messages, DRN5 — 28 sess., traffic 430 AL represented 96% of sessions by WA4JDH, WB4RCF, W4IBU, WB4EXA, W4CKS. Traffic: WA4JDH 1301, WA4VKD 130, WNAKKN 101, WA4KPZ 49, W4UP 43, K4AOZ 40, W4AGZV 39, WA4FYO 32, WB4RCF 29, WA4JYU 25, WB4AYO 24, W4IBU 24, WB4KSL 21, WB4TKU 18, W4EF 15, K4UMD 8, WB41VY 5.

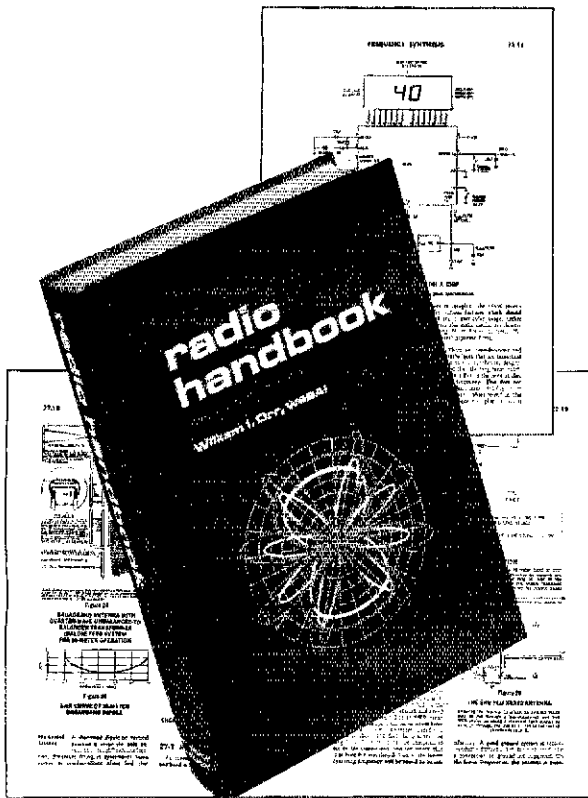
CANAL ZONE: SCM, Alvin Shok, KZ5AS — The primary topic of discussion at the CZARA meeting was how to effect an orderly transition from the KZ5 prelix to the HP1 or HP2 prelix when the Canal Zone no longer exists

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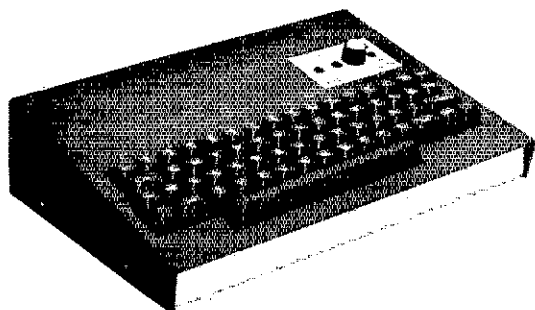
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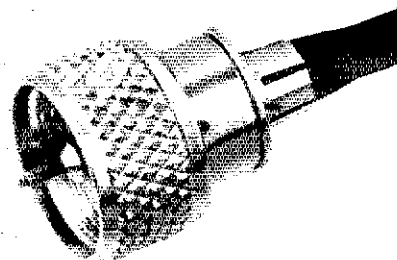
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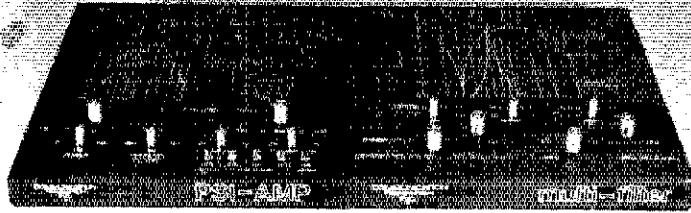


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on Oct. 1, 1979. Thus far, attempts to find a simple solution have been unsuccessful. The FCC has denied our request to retain the K25 prefix upon returning to the U.S. because the K25 prefix is not issued by FCC but is issued by the Canal Zone Government.

GEORGIA: SCM, A. H. Stakely, K4WC — SEC: K4SWJ, NM: K4JNL, WA3NAZ. Congrats to WA3NAZ, WB4Z0J, WA4PZD, K4EV, W4WXA, W4HON making PSHR and to W4WXA, WA4PZD and AA4GA making PSHR during Jan. Sadly we report W4SOF is a Silent Key. Congrats to W4GKW (now K14Y) and WB4IWN making Extra, and to WD4IBP making General. NGSN QNI 28, CVEN No. 1, QNI 64, QTC 8 and QNI 145, QTC 46 for Jan. WGN QNI 120, QTC 7 with QNI 140, QTC 62 for Jan. GTN QNI 284, QTC 71 for Jan. CGVNFN QNI 97, QTC 6. WGN in weather for the first time. WB4Z0J finally got WAS on his birthday. W4MMIOT 137/3, Albany ARC located in Sylvester 650 ft. AMSL covers 1-75 from Cordele to Tilton. W4WXA has new Century 21 which enabled battery operation for SET. Southern Piedmont ARC Cornelia reported in this month. N4UZ has new Regency HR312. WB4BDP reported skywarn net during tornado test. WA4PZD as NWS liaison had a busy time with 2 emergency and 3 standby statewide sessions. A great job done by all. We are fortunate to have an excellent emergency setup with K4SWJ and WA4PZD providing the lead. Continue to give them your support. W4WXA got snowed in in the woods with Boy Scouts and ham radio helped out the anxious parent's fears. This will be the last column of K4WC as your SCM. I am tendering my resignation effective March 31, 1979. Please accept my thanks for your terrific support. Traffic: (Feb.) WA4ADV 232, WA4PUP 192, WA3NAZ 166, WB4Z0J 96, W4GH 91, WA4PZD 78, K4WC 68, W4WXA 64, AK4T 55, W4HON 52, AA4T 50, K4NM 44, AA4GA 38, K4EV 37, N4BHX 34, W4CZ 30, N4UZ 30, W4AAY 12, W4BIA 12, K4BAI 8, WB4BDP 5, W4MPJ 1. (Jan.) AA4GA 117, WA4PZD 83, WD4NHV 3.

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RH

Net Freq Time/Days QNI QTC Mgr.
NFPN 3950 kHz 2330 Dy 1339 297 W4PGB
QFN 3651 kHz 0000/3000 Dy 932 776 W4JVP
CFN 7272 kHz 1730 Dy 303 303 W4WNY
SNCS earned by W4DTS K4EJW, W44EYU, W4HHHC, W4IWW and W44Z0Y on FPTN. W4HIF active on D-RN5 and CAN-D. D-4TN now operating on 14,322 kHz. N4UF, WB4FVV and W4FZX appointed Asst. NMs for FMTN by WB4AID. WA4PFK new Asst. NM of QFN. WD4HXS appt'd Asst. NM of TPTN. WB4PNJ now KB4JP. Amateur radio provided CD communications when Pensacola was hit by flood recently. K4HYV, WB4SKI and many others helped out. The phone patch has been removed from WR4ACZ, 16i76, until new control system is implemented. Sorry to report WD4RJA a Silent Key. WA4AEJ and WB4RBD making good progress on second repeater for Fort Walton — solid state, microprocessor-controlled. WA4CLL showed slides from his visits to Africa and India at recent Chopla ARC meeting. The FL Legislature has a ham member — WB4LJ. One of his goals is to revise laws for ham license tags. WD4MDM new Cert. Mgr. for NOFAHS WWD Net. WA4VZF moved to new QTH. WB4UKX is pres. of Vanderbilt ARC in Nashville. N4ATX active from Fernandina Beach. K4RNS received her 21st endorsement for YLCC certificate. W4GZT got all continents and nearly all states on RTTY in past three months! W4RHE provided only reliable communications between US and Iran for several days. His interview on national TV brought ham radio much favorable publicity. Seminole County ARE Mon. at 8:30 PM on 147.45 MHz. WB4JH making vests for CLF ARC members. WB4VO monitors 145.50 from the new CD office in Brooksville. Traffic: (Feb.) WD4HIF 490, AA4FG 403, WA4CHI 357, WB4RIS 252, K4RZM 232, N4WA 179, WD4IO 147, WB4TZR 140, W4MGO 139, WD4HXS 136, W4FZX 107, W4KIX 101, WD4NYY 79, WD4LUG 78, WB4VAP 75, N4ARJ 64, WD4PDK 64, K4RNS 54, KB4B 48, W4JL 47, W4RH 44, W4LDM 40, WA4STZ 36, WB4QBB 35, W44EYU 33, WB4ADL 27, W4MVG 23, WB4GHU 22, KF4U 20, KB4LD 18, WA4CLY 15, WB4DTS 13, N4BBY 5. (Jan.) WD4LUG 267, WA4STZ 49.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst. SCM: W4KGJ, SEC: AA4WJ. Our statewide SET Feb. 3 and 4 was highlighted by simulated hurricane "Bill" sweeping up the Florida peninsula inflicting simulated damage enough to give us all a good workout. More about this may be in SET report elsewhere. Ham radio got good publicity on TV news (Tampa Channel 8) where Hillsborough and Pinellas County amateurs, including AA4WJ, K4SCL, W4CF, K5IHH/4 and K4NAN, appeared for a total of 181 seconds, ending with a commentary to the effect that here is one organization that will be ready! I sure hope the young lady is right, but as usual, the drill showed up weak spots that need attention. While more and more people are learning to recognize a message in ARRL form, few understand what we mean by "a copy fully serviced." The word "service" may mean a number of things. For example, in one sense, to service a message is to send another message, perhaps addressed to the originating station, telling him his message cannot be delivered for such and such reason. And the message so sent is called a service message. In another sense, to service a message is simply to write down on the form the time of receipt (TOR), station from which received, and date. That's the receiving service. Sending service would be TOD (Time of Delivery), station to which sent, and date. Without being thus fully serviced, how would you answer a request for XYL Traffic? K4TH 600, R4SCL 598, WA4PFK 487, W4MVG 394, WB4MVG 347, WD4CO 271, WA4SCK 256, K4ZK 240, K4EUK 236, WB4FVV 208, W4YCL 206, WA4EIC 189, WA4FKE 154, W4GYR 150, N4KB 147, W4DUG 130, WB4AID 127, W4IRA 127, WD4ISN 119, W4GPL 115, WB4PIB 110, N4AUO 92, W4NTE 78, K8PXM 73, WA4JPV 72, W3QOJ/4 61, W4WYR 59, WB4CDQ 47, WB4GSV 32, WA4MJT 32, W4SMK 31, W4AZJ 28, W44HXU 24, WB4SNX 23, K4GRM 22, K4SJH 20, W4TJM 19, WD4HMC 16, W4TJM 14, W4MPV 13, KF4O 10, WD4PLV 10, W44BYT 9, W4ROA 6, WB4DWU 4, N4XR 3, W4JM 2.

WEST INDIES: SCM, Jose R. Lebron, KP4JL — By the time you read this there will be at least 20 new Novices on the air, product of the Novice classes. WR4AIE has a new ID using the voice of KP4CL. The PRYL club aside from the very good and attended monthly get-togethers, is also doing some FB civic work. Keep up, girls. This year's Hamfest will be held at El Comodoro Holiday Inn the 28th & 29th of April. On Sat. there will be technical talks and on Sun. the main Hamfest. If you need to stay

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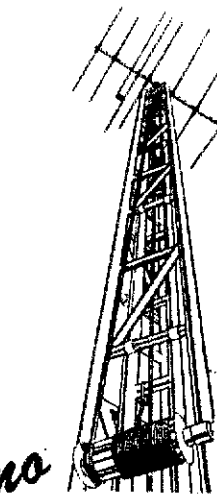
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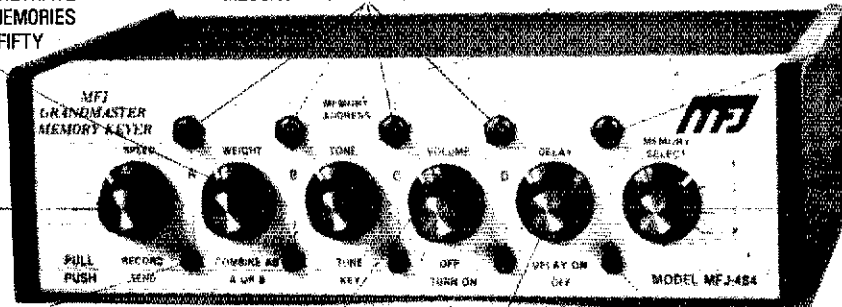
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DELAY REPEAT CONTROL. (0 TO 2 MINUTES). PULL FOR AUTO REPEAT.

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 flexibility 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.

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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.

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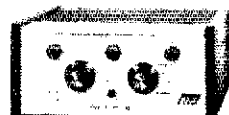


Similar to MFJ-484 but with 1024 bits of memory, less delay repeat, single memory operating LED. Weight and tone controls adjustable from rear panel. 6x2x6 inches. 110 VAC or 12 to 15 VDC.

THIS MFJ-481 GIVES YOU TWO 50 CHARACTER MESSAGES.

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- Tune function
- Built-in memory saver

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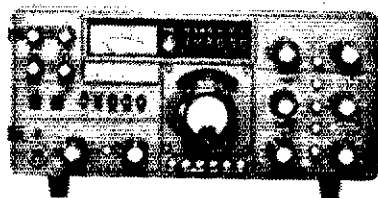
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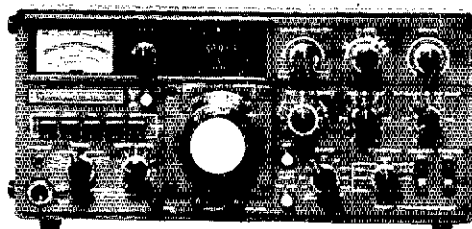
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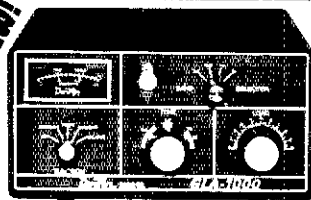
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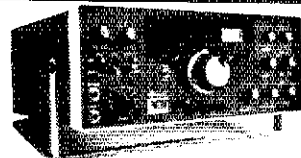
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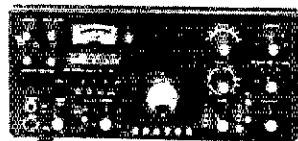


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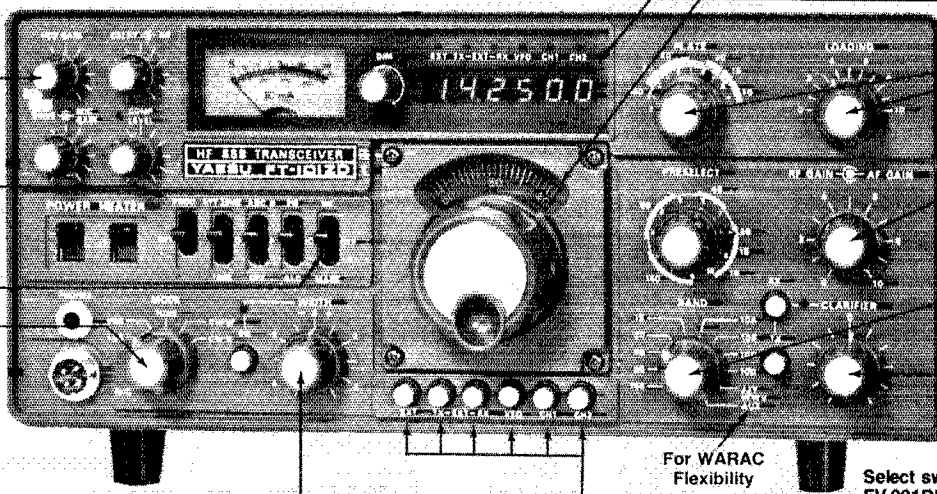
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Equipped for SSB and CW operation. Choice of wide or narrow bandwidth for CW (with optional CW filter installed)

Continuously variable IF bandwidth: 300 Hz to 2.4 KHz



Digital plus analog frequency readout. Digital display resolution to 100 Hz

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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

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Select switches for use with FV-901DM synthesized scanning VFO (option). FV-901DM provides scanners plus 40 frequency memory bank.

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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) x 157 (H) x 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:
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in the hotel, please contact KP4BSQ. He has made special arrangements. I plan to be there both days, so if you need any information or are willing to accept any position let me know. See you at the Hamfest.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Marshall Lincoln, W7DQS -- NMs: WA7KQE W7UQ W7EP. New officers of the Superstation ARC are WB7PPR, pres.; WA7UWG, vice-pres.; WB7FDF, secy.; WB7FAJ, treas.; WB7PGM W3CWY WB7QZB WB7PKR and WB7TAI, board. WA7IVA continues as membership chmn, and WB7PGM will be in charge of the Club library. WA7SRC reported a Silent Key. Club members provided communications for Lost Dutchman Days. WB7NOU put a 146.25/85 repeater up in the Parker area, the Hualapai ARC has reported. The Old Pueblo RC is among several which started Field Day preparations several months before the big week end. This looks like good procedure, since it seems harder each year to get a large number of hams interested in one of our oldest demonstrations of our ability to provide communications under adverse conditions. WB7UJK new editor of the Desert Air Waves, published by the AZ and Scottsdale ARCs. She has been designing cover illustrations using unusual and attractive arrangements of wiring diagrams. WA7VLA has resigned as treas. of AARC because of moving to CO, has been replaced by K7CEH. The Tucson Repeater Assn. provided communications for the Fiesta de los Vaqueros. Nets (Feb.): ATEN 193, SWN 155, Cactus 144. (Jan.): Cactus 162. Traffic: W7EP 285, K7LXB 117, K7NTG 96, K7MC 91, W7LV 80, WA7KQE 39, K7JKM 24, K7NMQ 23, WA7JCK 18, AC7D 12, W7DGS 12, WA7WEB 8, N7E 5, KB7DV 4.

LOS ANGELES: SCM, Perry Masterson, W6RHS -- In answer to my plea for more reports from clubs, this month W6ORG responded from the amateur TV group. This is a very active group working both black and white as well as color stations in color. Stations in color are W6ORG K6KUG K6VLM WA6MDT and W6YBI. W6YIE and WA6UDA have been challenging the Klingons via ATV. One of them will connect their Radio Shack TRS-80 Microcomputer to the ATV transmitter and operate the keyboard. The other station watches thru his ATV Receiver and gives instructions back on which keys to push on 146.43 simplex. Those now with computers: W6ORG K6KUF W6YIE WA6UDA W6YFT W6BJKW WA6BAV WA6MVD and K6ASR. Future plans include a crossband repeater with full bandwidth for color and 64 character computer graphics. Anyone who wants to join this group can contact W6ORG or WA6BAV on the National TV frequency of 146.43 simplex. Thanks to W6ORG for this fine report! W6INH now has 258 countries confirmed, soon to be 260. We are sorry to report the passing of W6LUE. Pat will be missed by his many friends. I guess everybody is so busy with the nice band openings to report this month. Would like to hear from the VHF clubs now. Traffic: W6INH 320, W6OEO 189, N6PZ 144, K5DY6 123, W6BYD 92, W6OAE 76, K6EA 55, W6BVG 40, W6BRO 33, K6CL 12, N6HE 6.

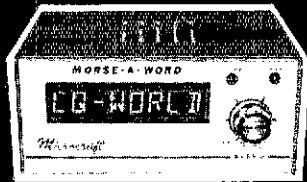
ORANGE: SCM, Fried Hevn, WA6WZO -- Asst. SCM: K6KNC. SEC: AE6N. NMs: W6BAKR W6CPB & K6JT. ECs: W6BARK W6DQR K6GG5 W6LKN WA6PLZ W6S6E & W6WPP. Many thanks go to W6DUK who on Feb. 24th completed 40 yrs. of continuous appointment as an OPS (OS) in this post. Congrats to top QTS W6BEG for making BP for two previous months in a row. Outstanding QO reports were received from WA6IQL N6PE W6TIO & W6TDI. N6PE & WA6IQL both participated in the Feb. FMT with N6PE averaging 13 cps. The SCM WA6WZO (who recently was appointed an Asst. Director) will for the time being assume STM duties. Director W6EJ recently appointed WA6JFP as a Public Relations Asst. who is heading the Amateur Radio display during Country Fair Days (April 7-15) at Knott's Berry Farm. K6VDS reported that W6COP (pres. of the Anza Valley RC), as requested by K3AF from the Pentagon, helped with the vital transmissions to Iran Feb. 14. QBS WA6GZ was elected as the OC of the OC RACES (which has both of its nets on Mon. at 7 PM using FM repeater 53.53.78 and 146.295.895. The new officers of HFEA-ARC are WA6WY, pres.; N6FY, vice-pres.; WA6SJA, secy.; N6MM, treas. Two newly formed clubs: S.C. Contest Group with W6LEN, pres.; N6PE, vice-pres.; W6BGEN, secy., & W6BZAI, treas., and the Western ARA (which has a repeater on 144.81/4) with N6ME, pres.; WA6SJP, vice-pres.; W6BIM, secy.; & WA6SKE, treas. The Victor Valley ARC has a new repeater 146.344 with the call of the club's pres. WA6FEW. For info on 79 Natl. Convention July 20-22) write POB 891, Baton Rouge, LA 70821 and for info on the '79 SW ARRL Div. Convention write POB 1227, Placentia, CA 92670. The Sun. OC ARES net has been moved back to 9 AM (3965 kHz). The SW Division Official's net is held every Sun. at 5 PM (3907 kHz). As this may be my last column depending on the "election," I would like to thank the great support so many of you have given me. In any case, I hope you will all support me in trying to obtain greater support for public service from the Directors and ARRL Hq. Traffic: (Feb.) W6BEG 361, W6DXL 174, W6G0BZ 146, W6RIE 111, W6B0BZ 84, K6KI 54, W6NIT 45, WA6J 41, K6W1 12, W6CPB 8, WA6WZO 6, N6PE 2. (Jan.) K6JT 80.

SAN DIEGO: SCM, Arthur B. Smith, W6INI -- SEC: W6INI. Asst. SEC: N6GD, STM: N6GW. North SD Co. clubs: Escondido ARC meets fourth Mon. at 1930, Glendale Fed. S & L, 1505 E. Valley Pkwy., Escondido; Palomar ARC meets first Wed., at 1930, Glendale Fed. S & L, East Vista Wy at Anza, Vista; Poway ARS meets third Tue. at 1900, First Baptist Church, 13604 Midland Rd., Poway. SD Repeater Assn. officers for 1979: N6LY, pres.; WA6BXO, vice-pres.; W6GIC, secy.; W6QR, treas. Upgraded: N6BDT to Advanced, WD6A0Z W6RIM to General. Poway ARS 1979 officers: W6OEEZ, pres.; N6ACK, vice-pres.; N6OQ, secy.; W6BMP, treas. Escondido ARS has been accepted as an ARRL affiliated club by the ARRL Executive Committee. The Feb. 17, 1979 SET involved nearly 150 operators in San Diego County. The simulated disaster was a widespread flooding necessitating the evacuation and sheltering of 6000 residents throughout the county. ARES nets were set up for the Red Cross to coordinate mass care centers, and for the county's fire departments for mutual aid rescue work. The Red Cross Director of Disaster Services and four Service Center Managers provided realistically worded traffic. Traffic: (Feb.) WA6UAZ 480, WA6AMK 397, N6GW 162, W6HUJ 149, W6BVPV 143, W6BHMV 128, K6HAP 97, N6AT 31, WB7SUA 26, WA6SJK 19, W6BUPY 19, WD6AXD 11, WA6HGA 15, WA6J 9. (Jan.) W6BMLB 60.

SANTA BARBARA: SCM, D. Paul Gagnon, N6MA -- ECs: W6RIC W6B0WZ N6AJA and WA6KAC. NMs: W6NS

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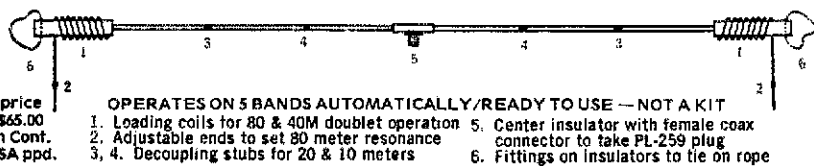
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RF 220 Kit	220 MHz RF front end 10.7 MHz out	18.50
RF 432 Kit	432 MHz RF front end 10.7 MHz out	29.50
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FM455 Kit	455 KHz IF stage plus FM detector	18.50
AS2 Kit	audio and squelch board	16.00

TX50 Kit	transmitter exciter, 1 watt, 6 mtr	44.95
TX50 W/T	same as above-wired & tested	71.95
TX144B Kit	transmitter exciter-1 watt-2 mtrs	34.95
TX144B W/T	same as above-wired & tested	65.95
TX220B Kit	transmitter exciter-1 watt-220 MHz	34.95

TRANSMITTERS



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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PA4010H Kit	2 mtr power amp-10w in-40w out-relay switching	69.95
PA50/25 Kit	6 mtr power amp, 1w in, 25w out, less case, connectors & switching	59.95
PA144/15 Kit	2 mtr power amp-1w in-15w out-less case, connectors and switching	49.95
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HLC 30/150	144 MHz	30W	249.95
BLD 2/60	220 MHz	2W	189.95
BLD 10/60	220 MHz	10W	169.95
BLD 10/120	220 MHz	10W	120W 269.95
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RPT144 Kit	repeater-2 mtr-15w complete (less crystals)	599.95
RPI220 Kit	repeater-220 MHz-15w complete (less crystals)	599.95
RPI432 Kit	repeater-10 watt-432 MHz (less crystals)	649.95
RPI144 W/T	repeater-15 watt-2 mtr	899.95
RPI220 W/T	repeater-15 watt-220 MHz	899.95
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DPLA220	220 MHz duplexer, wired and tuned to frequency	409.95
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TRX220 Kit	same as above except for 220 MHz	259.95
TRX432 Kit	same as above except 10 watt and 432MHz	284.95
TRC-1	transceiver case only	34.95
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COR2 Kit	carrier operated relay	23.95
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CWID	wired and tested, not programmed	59.95
CWID	wired and tested, programmed	64.95
TD3 Kit	2 tone decoder	39.95
TD3 W/T	same as above-wired & tested	64.95
HL144 W/T	4 pole helical resonator, wired & tested, swept tuned to 144 MHz ban	34.95
HL220 W/T	same as above tuned to 220 MHz ban	34.95
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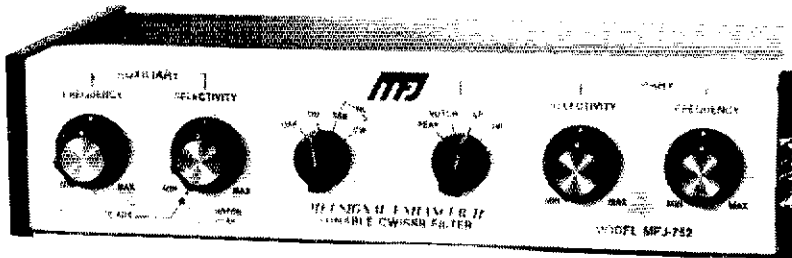
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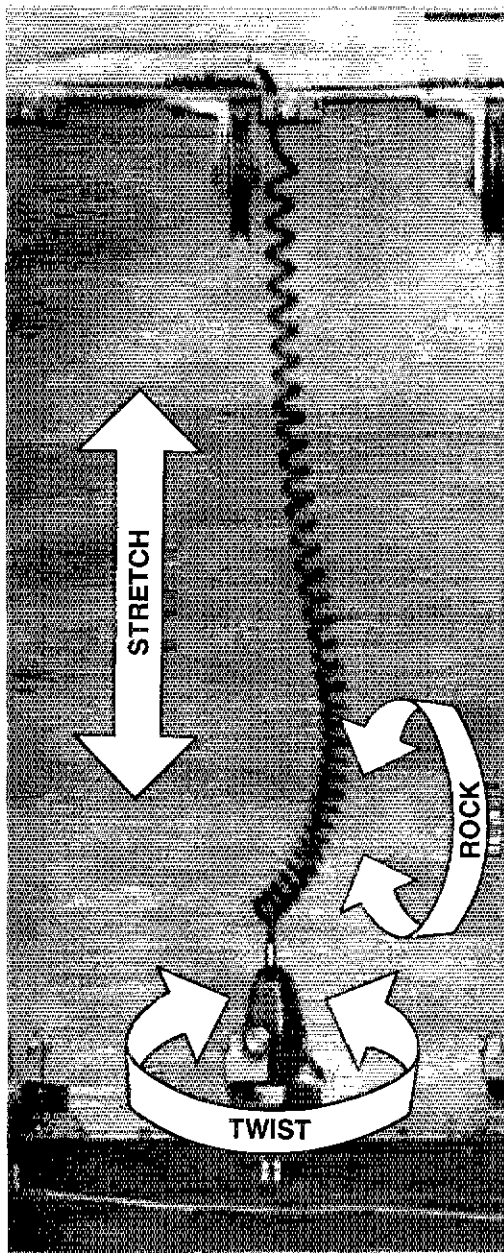
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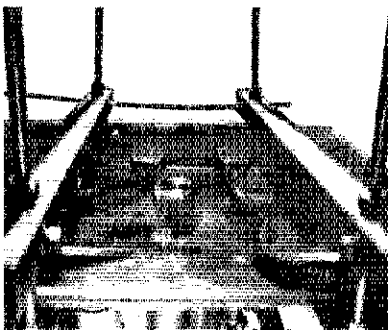


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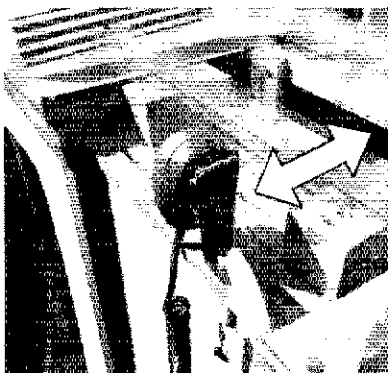
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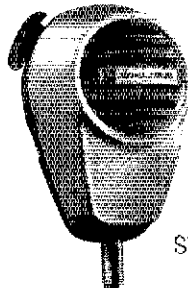
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Model VP-2, VHF Counter Preamp, 100 KHz to 200 MHz \$39.95

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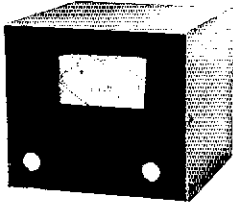
W6KPS W0KON. STM. N6WP. SEC. W8RIC. Section net meets on 3935 Wed. at 1900. Club speakers were WA6QDR on DX operation from EA/ZB2 at Ventura County ARC; W6RIC on ARES at Simi Settlers ARC; WD6FJD on Radio controlled aircraft at Poinsettia ARC; N6NB on mountaintopping at Santa Barbara ARC; W6OLE is picnic coordinator for Satellite picnic in Santa Maria. A0B1 is Chairman and WA6JZ is Vice Chairman for Sulphur Mountain Repeater Assn. WA6BRW is Field Day Chairman for Santa Barbara. WA6TMO is back on his feet after surgery. WB6WXX and TKMA have both been married recently. KA6EJL is a new Novice. W0KON is sporting a new Omni and WB6LHU a new 901. W6ZRR sent 123 bulletins in Jan. Santa Barbara AVERT team attended Red Cross Damage assessment training. PSHR: N6MA 22, N6WP 39, N6GC 47, WA6LBO 42, WD6EEN 51. Remember, it's your monthly reports that go into this column. Tic.: (Feb.) W0KON 309, N6WP 248, WA6LBO 64, WD6EEN 43, N6YH 27, N6GC 18, N6MA 15, W6POU 14, (Jan.) WA6MEZ 246.

WEST GULF DIVISION

NORTHERN TEXAS: SCM. Ted Helthecker, W5EJ — Phil Clements, K5PC takes office as new SCM on April 1, 1979. Please address all correspondence and traffic to him at 1313 Applegate Lane, Lewisville, TX 75067; Tel. (214) 221-2222. New EC for Lynn and Garza Co's. is K5ERJ. EC WB5LAT rpts new wx net for Wichita Falls-Graham area on 2 mtrs. Meets Mon. night @ 1930 local time. Fine OD rpt. from W5QPX. New pres. for Hed River Valley ARC is WB5JPL. New 2 mtr. in Dallas/Ft. Worth area-DPW Metroplex Tic. Net, meets nightly @ 0045Z on 147.7818 rpt. for the purpose of training and tic. GSP. Now is your chance to learn all about tic. handling and an easy QRM-free outlet for your tic. AA5J is NM. Public Service Honor Roll for Feb. WB5LAT AJ5E AE5I W5WMP AA5J WB5SD K5SOR. Off. Emer. Stn. Appointment No. 1 for N. Tex. to WA5ZNZ. Who wants to be next!?! All appointees note: you must rpt. your activities at least four times per year to maintain your appt. EC annual rpts. show ARES Membership in Section at 743.35 ARES nets conducted 1212 drills/ess. last year. Let's make public service participation even bigger and better in 1979! Traffic: WB5SD 432, AA5J 244, W5TI 196, K5MC 120, W5HHK 97, AE5I 80, WB5LAT 75, AJ5E 68, W5OXE 67, W5SINJ 47, K5OKM 44, AE5Y 39, K5PC 37, K5SOR 35, W5WMP 25, N5WR 24, W5E2T 22, W5CTZ 15, KA5COZ 12, AE5U 12, N5BT 10, W5UHO 3.

OKLAHOMA: SCM. Leonard Hollar, WA5FSN — Asst. SCM. Raymond Miller, W5REC. SEC. WA5MLT. 3 BPLs this month, 2 of them had 100 plus originations, 1 said he could handle more traffic, if he did not have to work. WB5ELG off air with rig trouble, hope not for long. WD5ETB & WB5ETD both active in our Traffic Nets. ETB now helping with O.F. ONN and ETD with OAN CD appointees should read spring QCD real cns. Traffic handlers why not report your PSHR, beginning soon it will be worth a certificate. I notice that 19% of the ECs reported in Feb. I do not have SEI reports, will get them soon. WD5FUE putting up a new 2m beam. K5CRQ latest reported WAS. Also hear that K5CM has WAS on 8 bands, that's a lot of DXing. Now is the time to get your net registered for new Net Directory. Woodward has 2 classes going. I look at the traffic totals and see quite a difference in totals of receipts and deliveries. Have you

AHM



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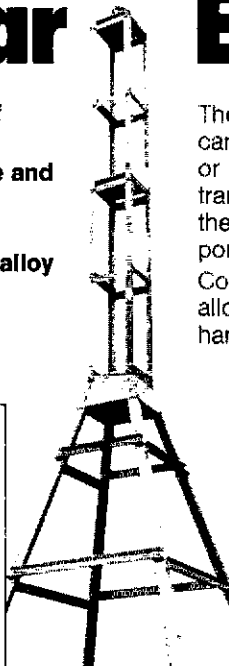
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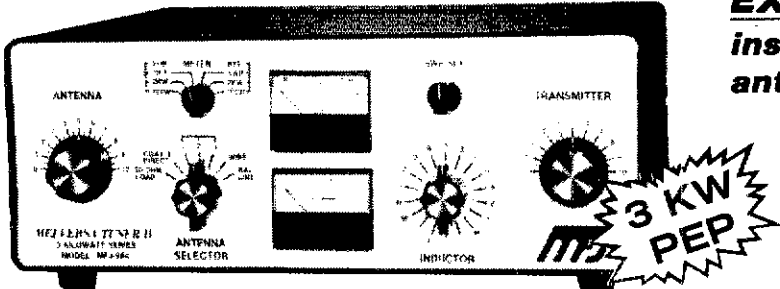
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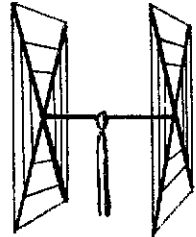
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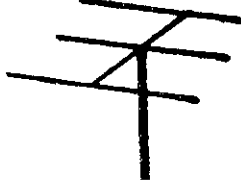
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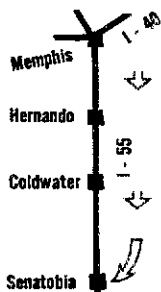
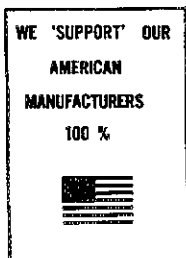
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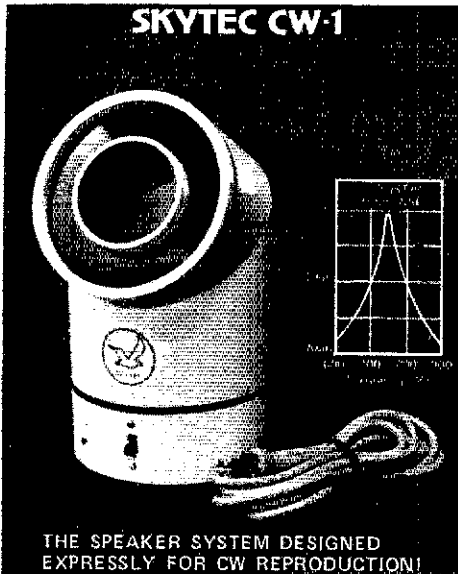
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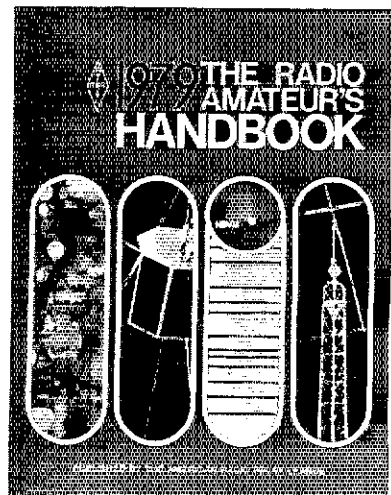
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rad "Operating an Amateur Radio Station" on counting traffic?? WB5KVA building new HF ant. K5OWK has new 2m rig. WB5HLR moving to Sallisaw. WA5TLJ recovering from eye surgery. Traffic: (Feb.) K5OWK 593, K5JGZ 577, WB5MVT 507, W5REC 281, WB5NKC 209, W5RE 190, WB5NKD 117, WB5KKT 80, WB5EAY 79, WB5YC 63, WA5OJUV 61, WB5ELG 59, WA5FSN 48, W4UYH 44, W4SUV 39, W5FKL 30, WB4AXH 28, W4VOR 24, K5CAY 22, WB5ULI 16, KA5DRD 15, WB5OVT 14, WD5ETB 13, WA5JTO 13, N5EO 10, W5HGH 10, W5J 6, WB5ONK 4, KB5EK 3. (Jan.) WB5ETD 159, WB5QFE 45, WB5TZZ 15, WB5KVA 9

SOUTHERN TEXAS: SCM Arthur R. Ross, W5KR — Asst. SCM. N5TC. Sec. WD5CZL. Net Mgrs.-at-large: N5TC. phone: WA5RKL, CW. QOs rptg. this month: WB5CIT K5DL. QVSS rptg. this month: WB5CIT N5AJQ. EC/OIS WA5RVT rptg.: WD5AAH used HT rig while in hospital; K5QQF has new TS-520S. QES W55PD testing various types of porable antennas for emergency use in low bands in field situations. AC5K (ex-WB5HD) has new atlas 350X and is busy on traffic nets again. N5TC has been appointed Asst. West Gulf Div. Director, in addition to his other duties: Tom talked traffic at Texas VHF-FM Society convention with more than sixty in audience. QV5 K5LA rptg. new 07167 rpt. at Sierra Blanca, TX; coverage has proved to be more than 100 mile radius; future plans call for linking the Guadalupe rpt. (13/73) with the new Sierra Blanca rpt. from HAMTIDES; bulletin of Tidelands ARS; WD5KAB WD5GPPV upgraded to General; KB5CY is new Advanced Class Op; new club officers: WD5CHJ, pres.; WB5ASA, vice-pres.; WD5GMS, secv.; WD5GPU, treas. K5WA put up new TH6DXX at 75 ft. and two-element 40-mtr. beam at 87 ft. in time for CW SS; rptg. new otrs of Tex OX Society are: K5DX, pres.; K5MA, vice-pres.; K5JS, secy-treas.; K5BZU, contests; K5RC, rptg.; K5NA, FD. QV5 N5AJQ busy with Science Fair project. Traffic: (Feb.) W5KLV 718, N5TC 305, W5AC 284, K5H2R 211, W5SBE 113, W5BGE 103, WB5CIT 90, K5GM 84, K5PE 75, WB5MMI 64, K5QEW 47, W5BHO 29, W5YOD 28, WB5JUR 24, W55PD 24, WA5SVT 18, W5AIR 10, W5KR 10, AE5X 9, WD5IEB 4. (Jan.) N5TC 442.



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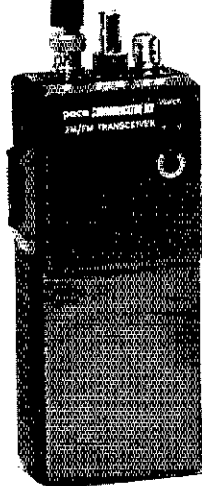
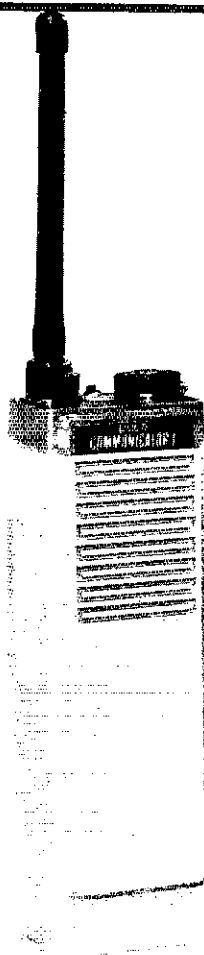
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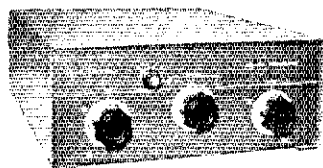
CALL TOLL FREE 800-421-1196



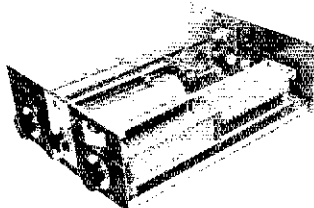
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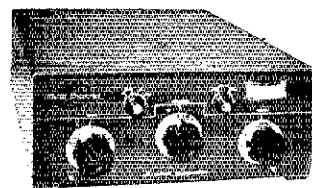
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12"Wx15 1/2"Dx5"H, 13 lbs. shipping wt.

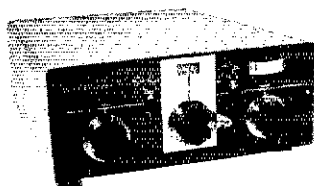
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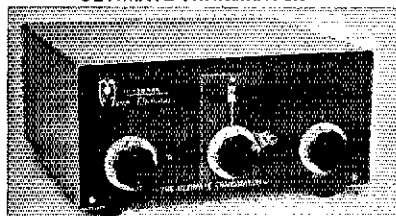
UT-160 M with meter, no balun \$212.75 + shipping
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NEW — The UT-2000B



- Continuous coverage 160-10 meters
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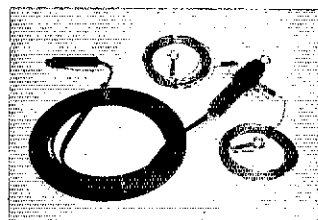


Similar to the one in Low McCoy's article
July 1970 QST also 1976 Handbook

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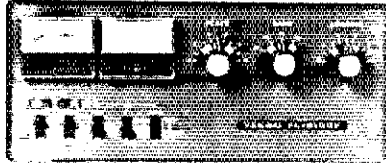
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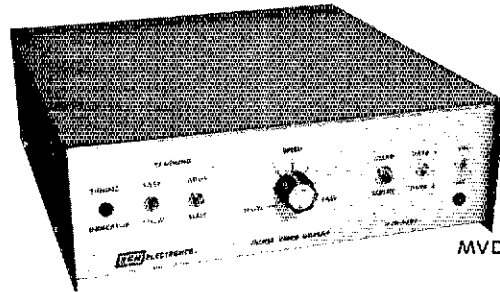
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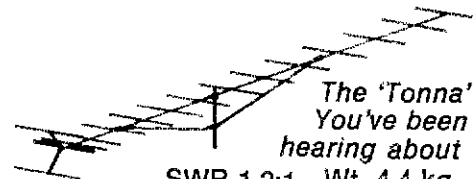
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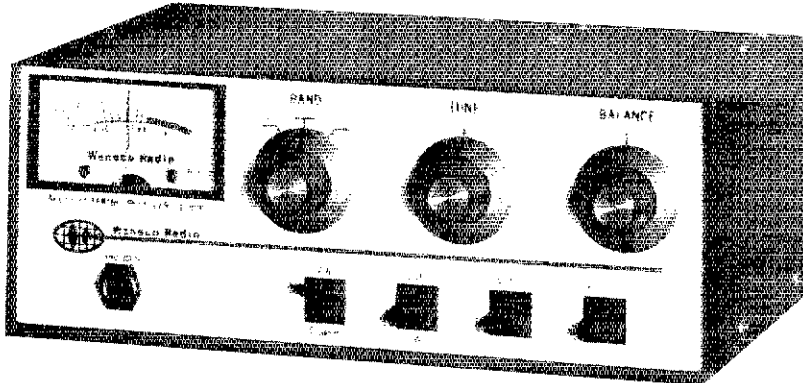
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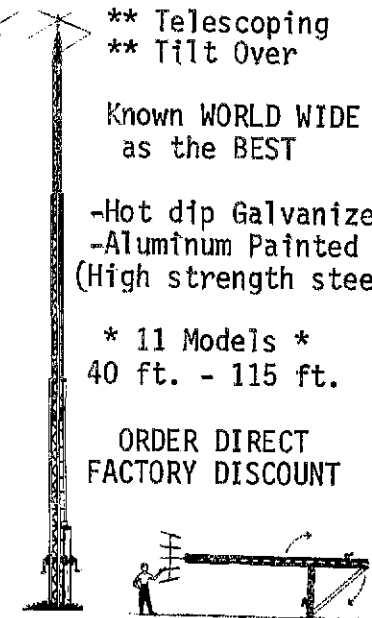
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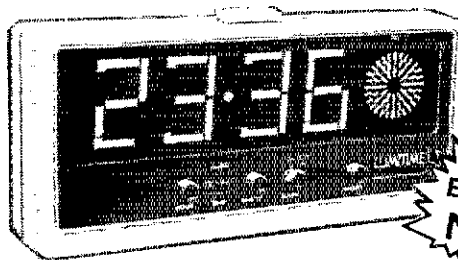


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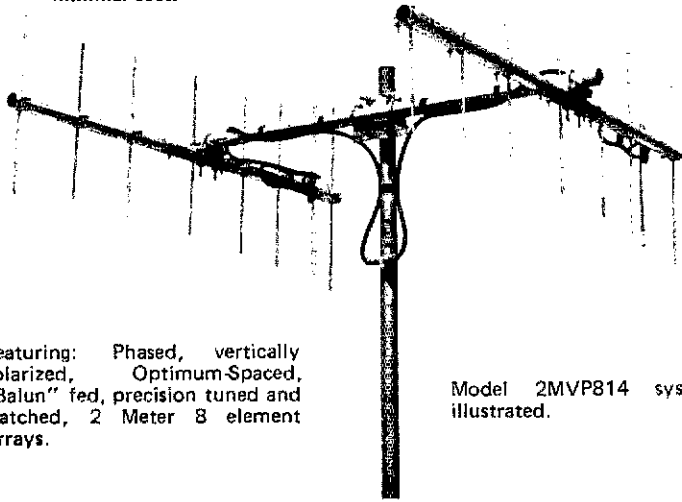
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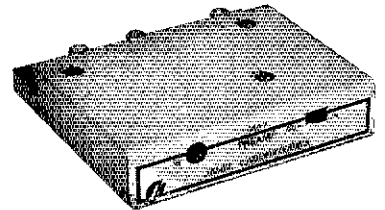
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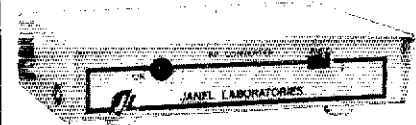
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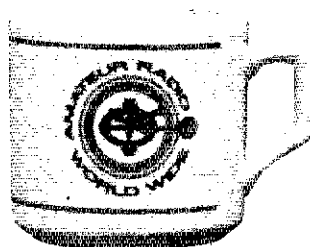
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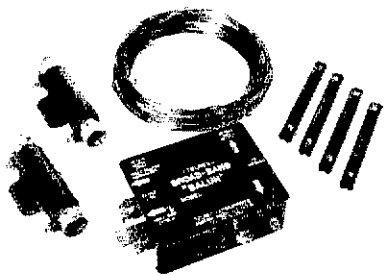
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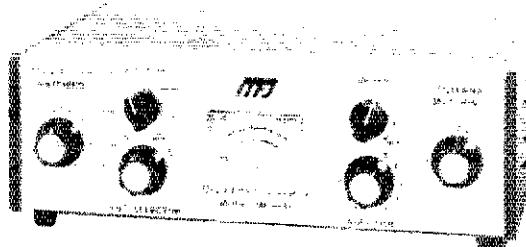
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SST-4 ULTRA TUNER DELUXE

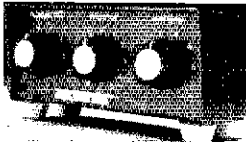


ULTRA TUNER DELUXE Matches any antenna—coax fed or random wire on all bands (160-10 meters). Tune out the SWR on your antenna for more efficient operation of any rig. Home, mobile, portable—only 9" x 2 1/4" x 5" • 300 watt RF output capability • SWR meter with 2-color scale • Antenna Switch selects between two coax fed antennas, random wire, or tuner bypass • Efficient Airwound Inductor • 208 pf, 1000V. Capacitors • Attractive bronze finished enclosure.

only \$64.95

SST-2 ULTRA TUNER

Tunes out SWR on any antenna—coax fed or random wire (160-10 meters). Any rig—up to 200 watts RF output. Rugged, yet compact: 5 1/4" x 2 1/4" x 2 1/4".



only \$37.95

SST-3 MOBILE IMPEDANCE TRANSFORMER

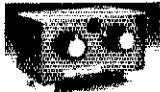
Matches 52 ohm coax to the lower impedance of a mobile whip. Taps between 3 and 50 ohms, 3-30 MHz, 300 watts output 2 1/4" x 2 1/4" x 2 1/4".



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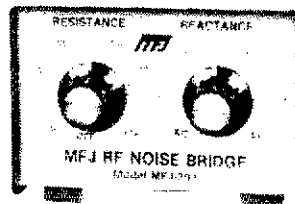
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lets you adjust your antenna quickly for maximum performance. Measure resonant frequency, radiation resistance and reactance. Exclusive range extender and expanded capacitance range gives you much extended measuring range.

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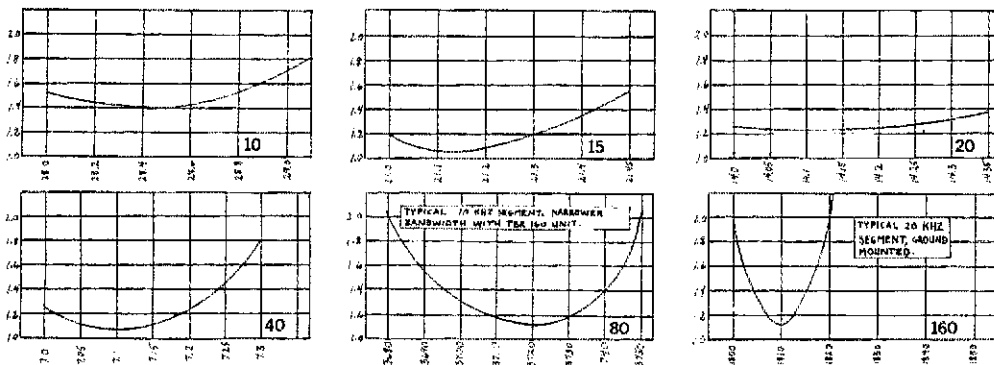
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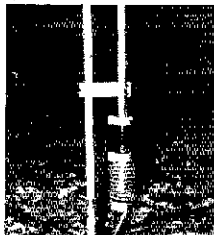
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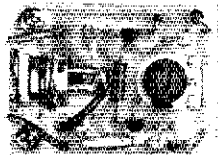
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PLUS A SPECIAL PATENTED CW PROCESSOR



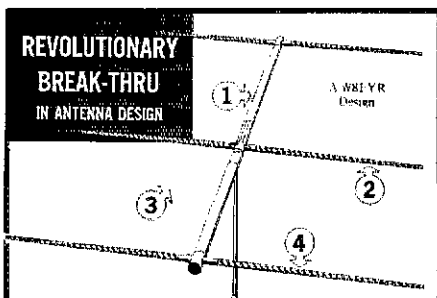
SL-56
AUDIO ACTIVE FILTER
(3.5 x 5.5 x 7.5 INCHES)

THE BRAND NEW SL-56 AUDIO ACTIVE FILTER SUPERCEDES OUR SL-55 IN BOTH CONCEPT AND PERFORMANCE. CONSOLIDATION OF MANY COMPONENTS HAS ALLOWED US TO MAKE 16 OPERATIONAL AMPLIFIERS (COMPARED TO 6 IN THE SL-55) INTO A FILTER GUARANTEED TO OUT PERFORM ANY OTHER AT A COST ONLY SLIGHTLY HIGHER THAN THE SL-55. THE FEATURES OF THE SL-56 ARE SO ADVANCED FROM ITS PREDECESSOR THAT CALLING IT THE SL-55A IS NOT JUSTIFIED. UNLIKE OTHER FILTERS THAT SIMPLY OFFER A CHOICE OF ONE OR TWO FILTER TYPES AT A TIME (NOTCH, BANDPASS, ETC.) SL-56 PROVIDES WHAT IS REALLY NEEDED --- THE SIMULTANEOUS ACTION OF A 6 POLE 200 Hz FIXED HIGH-PASS FILTER AND A 6 POLE 1600 Hz FIXED LOWPASS FILTER WITH A 60 dB NOTCH WHICH IS TUNABLE OVER THE 200-1600 Hz RANGE. THIS 3 FILTER COMBINATION IS UNBEATABLE FOR THE ULTIMATE IN QRM FREE SSB RECEPTION. ADJACENT CHANNEL QRM IS ELIMINATED ON THE HIGH AND LOW SIDES AT THE SAME TIME AND DOES NOT INTRODUCE ANY HOLLOWNESS TO THE DESIRED SIGNAL. ON CW THE SL-56 IS A DREAM. THE LOWPASS, HIGHPASS AND NOTCH FILTERS ARE ENGAGED ALONG WITH THE TUNABLE BANDPASS FILTER (400-1600 Hz) PROVIDING THE NEEDED ACTION OF 4 SIMULTANEOUS FILTER TYPES. THE BANDPASS MAY BE MADE AS NARROW AS 14 Hz (3dB). ADDITIONALLY, A SPECIAL PATENTED CIRCUIT FOLLOWS THE FILTER SECTIONS WHICH ALLOWS ONLY THE PEAKED SIGNAL TO "GATE ITSELF" THROUGH TO THE SPEAKER OR HEADPHONES (4-2000 OHMS). RECEIVER NOISE, RING AND OTHER SIGNALS ARE REJECTED. THIS IS NOT A REGENERATOR, BUT A MODERN NEW CONCEPT IN CW RECEPTION. THE SL-56 CONNECTS IN SERIES WITH THE RECEIVER SPEAKER OUTPUT AND DRIVES ANY SPEAKER OR HEADPHONES WITH ONE WATT OF AUDIO POWER. REQUIRES 115 VAC. EASILY CONVERTED TO 12 VDC OPERATION. COLLINS GRAY CABINET AND WRINKLE GRAY PANEL.

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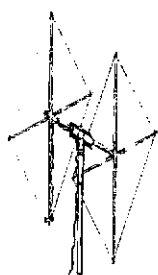
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(See 1 column
on page 10)

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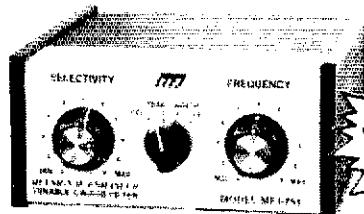
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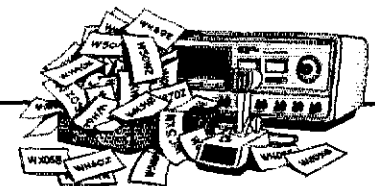
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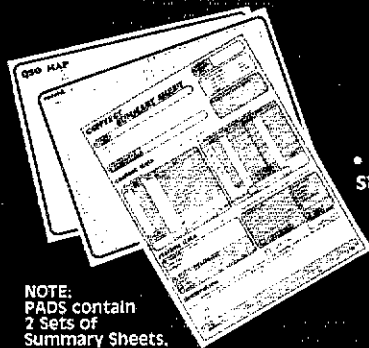
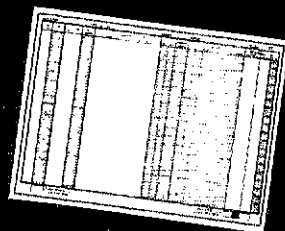
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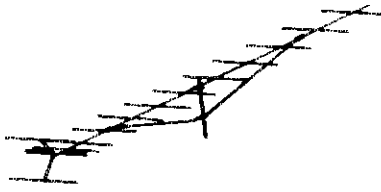


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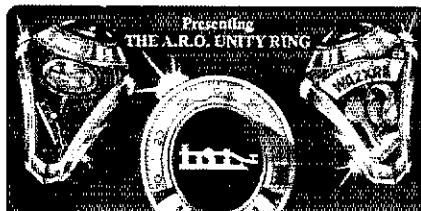
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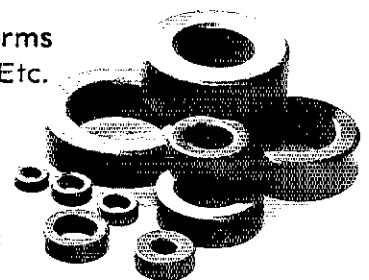
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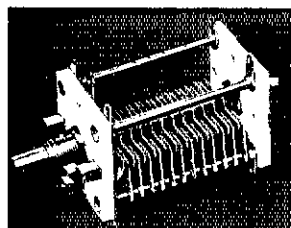
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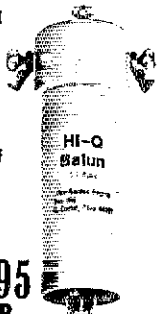
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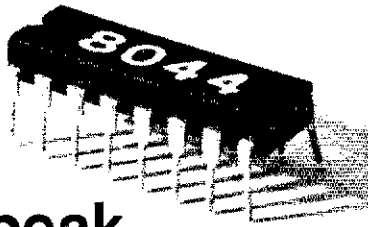


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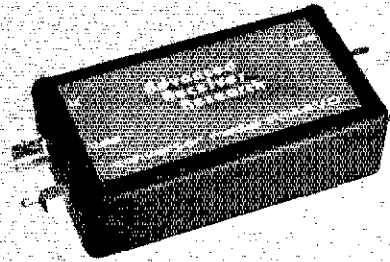
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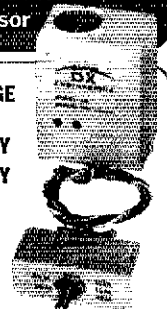
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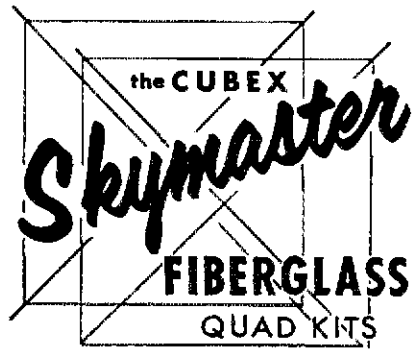
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ROCHESTER Hamfest & NY State ARRL Convention, May 25-27. Add you name to mailing list. Send QSL to Rochester Hamfest, Box 1388, Rochester, NY 14603. Phone 715-424-1100.

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.

STARVED Rock Hamfest — June 3 — See May Hamfest Calendar details via s.a.s.e. April WSMKS, P.R. no. 1 Box 171, Oglesby, IL 61348 — 815-667-4614.

SUPERFEST 1979 Peoria Illinois. Now two fantastic days — September 15th and 16th. Manufacturers (R.L. Drake, etc.), forums and excellent programs for the ladies. Great smorgasbord Saturday night. Advance tickets \$2. Exhibitors and advance tickets write: Peoria Hamfest, 5808 N. Andover Ct., Peoria, IL 61614.

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, W09BDZ, 555 Valley Brook Ln., Wabash, IN 46992. S.a.s.e. required.

WARREN, Ohio Hamfest — Sunday August 19, 1979, Trumbull KSU Campus; Ohio 45 at Warren Outerbelt. Our 22nd year with the big & famous flea market. \$2 registration. Prizes: Ten-ter 546, complete; Wilson Antenna system; Mark 2 HT; Atlas 110 special and more. Mobile check-in. Arrowsigns lead from interstates, main highways. For map, details, QSL: Hamfest, Box 809, Warren, Ohio 44482.

PACIFIC Northwest Hamfest, July 14 & 15, HAM Inc., Box 78442 Seattle, WA 98178.

FIFTH Annual Northwest Pa. Hamfest, Saturday, June 9, 1979, Crawford County Fairgrounds, Meadville, PA. Note date change. Gates open at 8 A.M. Bring your own tables. \$2 in. \$1 out to display. \$2. admission, refreshments. Commercial displays welcome. Talk in 0464, 87121, 63003. Details C.A.R.S. P. O. Box 653, Meadville, PA 16335 Attention: Hamfest Committee.

KENTUCKY Ham-O-Rama, Sunday, May 20 at Boone County Fairgrounds in Burlington, Kentucky, 10 miles south of Cincinnati, Ohio on I-75. Prizes, flea market, indoor exhibits, refreshments. Infr: N.K.A.R.C., Box 31, Ft. Mitchell, KY 41017.

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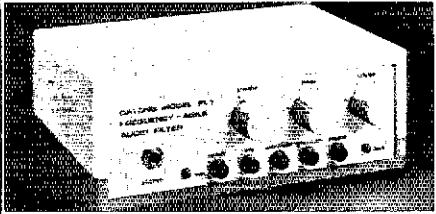
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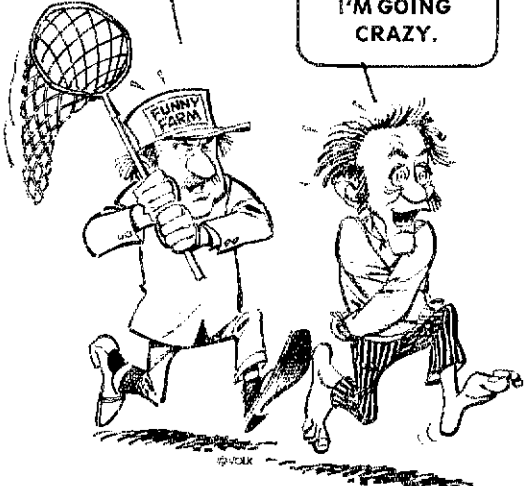
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*Kūlrod is a Registered trademark of Larsen Electronics, Inc.

HAMPHEST-Gastonia, North Carolina — Third Annual — ARRL sponsored. Sunday May 6, 1979, Ashbrook High School, one mile south of I-85 on Soth New Hope Road. Food and lodging, very large paved parking lot, plenty of indoor tables, ragchew area. Prizes: Swan TB4-HA, Ham IV rotor, coax and cable, 50 ft. tower. Contact: N4ATO or W4F5A.

MUSEUM for radio historians and collectors now open. Free admission. Old time amateur (WZAN) and commercial station exhibits, 1925 store and telegraph displays, 15,000 items. Write for details. Antique Wireless Assn., Holcomb, NY 14469.

MASSACHUSETTS NoBARC Hamfest July 21, 22 at Cumington Fairgrounds. Tech talks, demonstrations and dealers. Flea market. \$1; advance registration \$3 single, with spouse \$5, to Tom Hamilton, WA1VPX, 206 California Avenue, Pittsfield, Massachusetts 01201 or \$4/\$6 at gate. Mobile talk-in on 146.31/91. Gates open at 5:00 P.M. on Friday for free camping.

50TH Anniversary and annual hamfest Egyptian Radio Club, Inc., W9AIU, Granite City, Illinois, Sunday June 10th. Largest in Midwest.

RAIN or Shine — The Cass County Amateur Radio Club's second annual hamfest will be on Sunday, May 6, 1979, from 7:00 A.M. to 4:00 P.M. at the 4-H Fairgrounds. Go north of Logansport on Highway 25, turn right at road 100, follow QSY signs. Advance tickets \$1.50, \$2 at the gate. Outside set up free, undercover \$1. Bring your own tables. Free overnight camping, refreshments, ladies activities & prizes. Talk in: 146.52 & Logansport Repeater: 147.78-78. Write to: K9DVL, Dave Rothermel, RFD 4 — Box 146G, Logansport, IN 46947.

ROME Ham Family Day, June 10. Bring the whole family. Write: Home Radio Club, Box 721, Rome, NY 13440.

ELMIRA, New York International Hamfest — September 22, 1979. Tech talks, tree flea market, great food, contests — even more prizes than last year! For more info, contact W2FJM, John Breese, 340 West Avenue, Horseheads, New York, 14845.

THE North Hills Radio Club, Inc. of Greater Sacramento Area is having their 7th annual Ham Swap on Sunday, May 6, 1979, from 9 A.M. until 3 P.M. This will be at the Machinists Hall, 3081 Sunrise Blvd., Rancho Cordova, CA 95670. Take Highway 50 to Sunrise, turn left, and go to the signs. WB6PES.

NEW York City Electronic FleaMarket Sunday June 10, 9 A.M. to 4 P.M. bigger and better than ever — indoor, outdoor rain-shine. The municipal parking garage 82nd Ave. and 126th Street Kew Gardens, NY one block behind court house on Queens Blvd. Free parking for 1000 cars. Refreshments, fun, sellers \$2, buyers \$1 dealers \$5. Talk-in: 52/52, 96/36, info: 212-699-8400 or 212-739-3230. Sponsored by Hall of Science Amateur Radio Club Inc.

TRI County Radio Association, Inc. flea market will be held at the Passaic Township Youth Center, Stirling, New Jersey on Sunday, May 20, 1979. For information write the Association at P. O. Box 412, Scotch Plains, New Jersey 07076 or call W2CHA at 201-647-3461.

FLEA Market June 17, rain or shine, light lunches, etc. Talk-ins: 52, 84/24. Follow signs. CORG at fish & game property. K1BCI.

LONG Island Hamfair '79, June 3rd, Islip Speedway, Islip, NY. Over 250 sellers at the last show, with over 3000 attending. Southern State Pkwy to Exit 43 south 1 block on Rte 111 (Islip Ave.) or Lte to Exit 56 South on 111 to site. Watch for signs near site. Talk-in on 146.25/85 or 52. Hank Wener WB2ALW, 53 Sherrard St. East Hills, NY 11577. Day 516-829-5880, nite 516-484-4322.

NORWALK area mini-ham-fest, maxi-flea-market. Old Norwalk High School, East Ave., May 20, rain or shine. Prizes, refreshments, all buyers and sellers welcome. Talk-in 147.99/39.

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\$2.70 per 100 (10000 order). 30 original two-color styles. 125 cards minimum. We ship 2 weeks after your check clears or you may have your money back! Satisfaction guaranteed. Send 30c stamps for catalog. VP6QED Press: Box 1523-Boca Raton, FL 33432.

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QSLs, Catalog 45c N & S Print, P. O. Box 11184 Phoenix AZ 85061.

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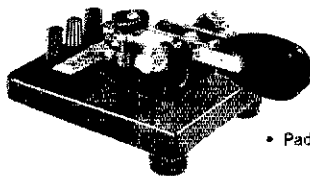


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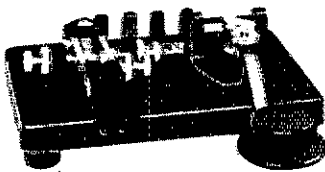


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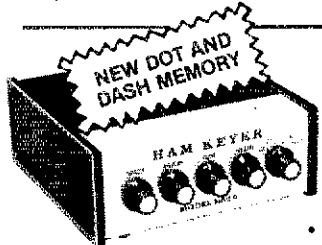
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CREATIVE QSL Cards — Personal attention. Imaginative new designs. Send 50c. Receive catalog, samples. Wilkins Creative Printing, P. O. Box 787-1, Atascadero, CA 93422

QSLs samples and catalog 50c. Ritz Print Shop, 5810 Detroit Ave., Cleveland, OH 44102.

QSLs. Reasonable cost. Samples 25c. N3QA Printing, Box 88, Stevensville, MD 21666.

QSLs — Printed from your design — samples 25c. Custom QSLs — 1301 Geil, Des Moines, IA 50315.

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QSLs by W7HUL. Samples 50c. 8511 19th Ave. N.W., Seattle, WA 98117.

BUDGI-CARD: Free samples, send 15 cent stamp, to Budgi-Card P. O. Box 73, Hooksett, NH 03106.

FREE samples — stamp appreciated. Conner, 522 Notre Dame Ave., Chattanooga, TN 37412.

CLUB call pins, 3 lines 1-14 x 3-14 \$1.55 each, call, first name and club. Colors: black blue or red with white letters. (Catalog) Arnold Linzner, 2041 Linden Street, Ridgewood, NY 11227.

ENGRAVED Call Pins by AG2P — 4 lines \$1.75; 3 lines \$1.50; 2 lines \$1.25. Assorted Colors. Locking pin. Richard Ivgar, 5 Chelmsford Drive, Wheatley Heights, NY 11798.

NAMETAGS — 1-1/2 x 2-1/2 One line \$2.50. Each additional line \$0.50. 12 colors. Tag-it Co., Box 2062, Indianapolis, IN 46206.

RUBBER stamps \$3 includes postage. NJ residents add tax. Clinton Hoar, W2JDO, 32 Cumberland Ave., Verona NJ 07044.

NAMETAGS 1" x 3" \$3.25. Engraved with name, call letters, QTH. Limit 20 letters per line. Red, blue, yellow black, walnut with white letters. Other colors available. Nielsen Communications Inman, NE 68742.

QUALITY QSLs, Samples 35c. Kleinheinz, 1313 Willow, Chippewa Falls, WI 54729.

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QSL plastic pocket display holders: protect your QSL cards while displaying them on your walls. Furnished in strips of 100 long by 2 pockets wide \$4.50, or 200 x 2, \$7.85. You cut to desired length. Satisfaction or full refund. Postpaid, North America. United Workers for the Blind 7216 Arlington Dr., St. Louis, MO 63117.

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QSLs — top quality — samples 50c — includes rubber stamp info — Ebbert Graphics Dept. 3, Box 70, Westerville, OH 43081.

General

CANADIAN surplus catalogs. Jam packed with goodies. Rush \$1. Etcox Electronics 183G Hymus, Pointe Claire, Quebec H9R 1E9.

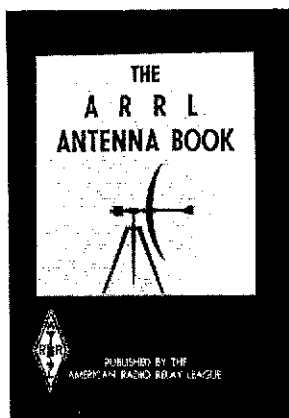
HELP — Wanted: Surplus power unit PE-103 and cord CD-501 for SCR-284. Harold Jahnke, SM7AP, Konvaliev. 14 23047 Akarp Sweden.

WANTED. PL172/8295A tubes. Have for trade Racal panoramic adapter RA66B with manual. William J. Ford VE3KHB, RR 6, Smiths Falls, ON K7A 4S7.

JOHNSON Viking Valiant 1, Viking ssb adapter, Hallicrafters 8-77. All excellent. Heathkit AT-1 with VFO good condition. Best offers accepted. Mark Strout, 1469 Dagenais, Sherbrooke, Quebec J1G 2B4.

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HA-14, heath mobile kW amp, for sale. 1000 watt PEP, 80m thru 10m mobile linear amplifier. Comp w/13.8 Vd.c. HP-14 power supply and cables. Also 110/220 VAC base station power supply, modified with new heavy-duty transformer for continuous duty on RITY/SSV. All manuals. Mint condition. First certified cheque for \$1000. U.S. takes it. Bill O'Conner, VE3KDM, 36 Keeler Blvd, Scarborough, ON M1E 4K5. 1-416-281-9454.



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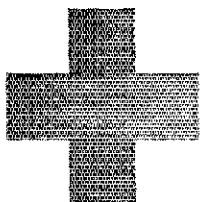
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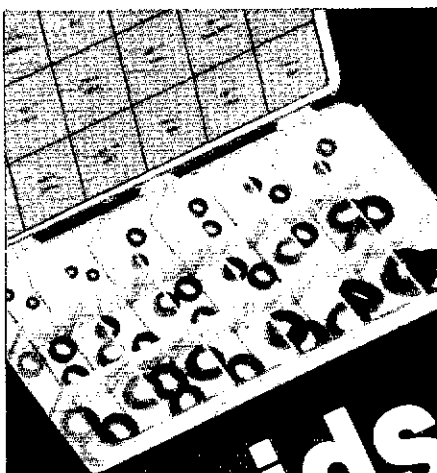
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Best pkg job I've ever seen! First licensed 6AAV in 1926. Now in operation — a sweetheart! W7LUP

This OMNI-D is my 3rd TEN-TEC rig this year. I'm sure it will perform as well as my Century/21 and 544. I'm very pleased with your products & service. KA3ADF

Highly impressed with excellent operation and general appearance of the unit — far exceeding my expectations! W0GGQ

The Omni is one of the finest Amateur transceivers I have owned. AJ5U

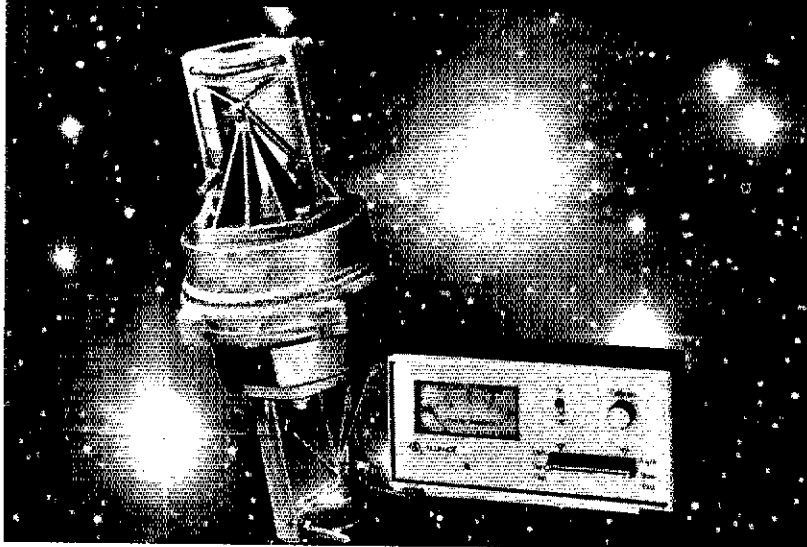
My visit thru your factory convinced me this was the American made gear for me. I certainly appreciated the red carpet treatment at Sevierville. W4BPK

Happy Birthday, W4DGJ! Hope you enjoy your OMNI-D.

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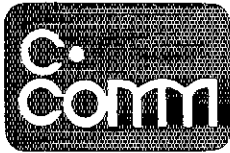
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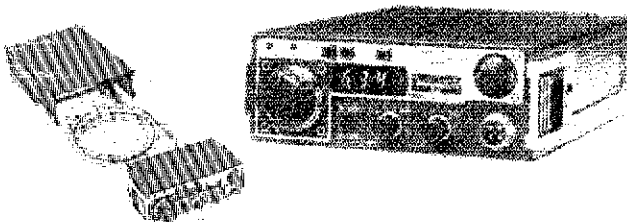
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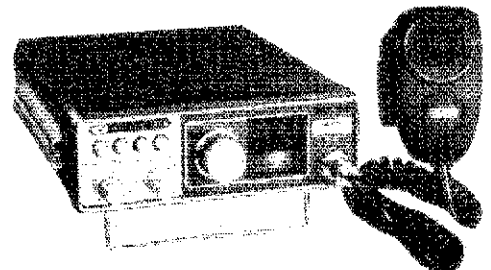
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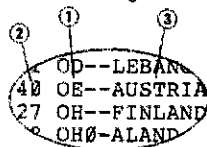


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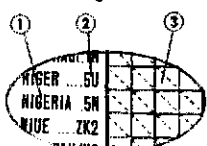
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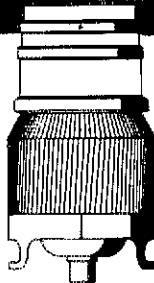
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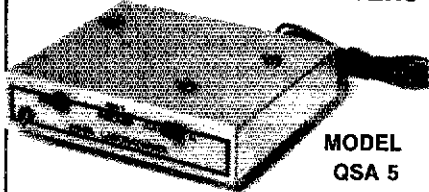
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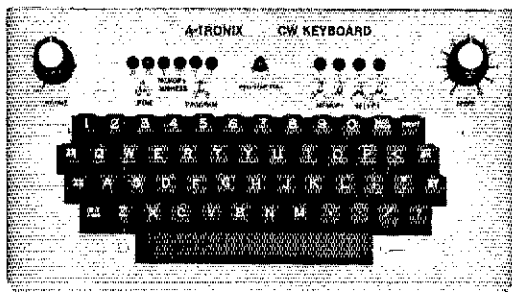
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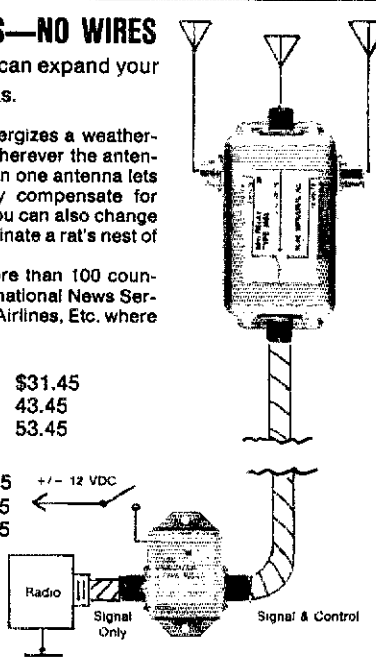
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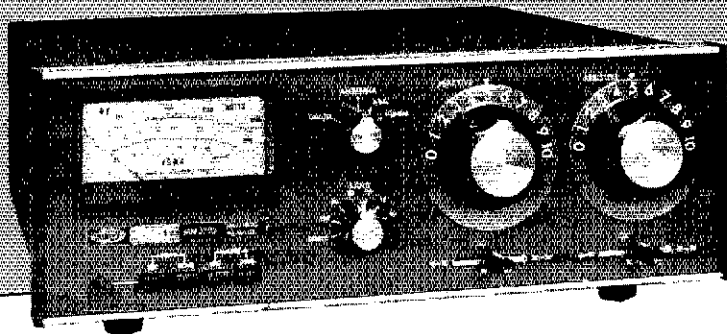
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Consider a typical all-band antenna set-up — a 135 foot doublet, center-fed with 60 to 70 feet of balanced line at a height of 45 to 60 feet. The Drake MN-2700/B-1000 will match this as a true balanced system on 80 thru 10 meters.

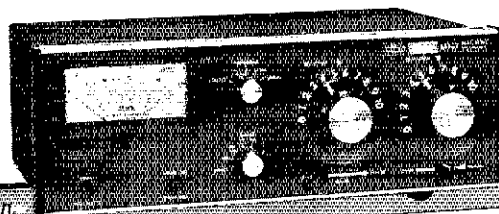
But what about 160 meters? Many amateurs recommend tying the feeders together and using the antenna as a vertical with a "top-hat". In fact, we suggest this ourselves in our manual.

However, the use of this or any vertical assumes you have a good ground or radial system for efficient operation. If you do not have enough room or do not wish to install such a radial system, performance may suffer. And if you do have radials, you still have to change the feeder connections each time you operate on 160 meters.

On the other hand, when you use the MN-2700/B-1000, simply leave the feeders in the balanced connection as you would for 80 thru 10, and move the special antenna selector switch to Position No. 4. This automatically converts half of the antenna and feedline to an inverted "L", fed through a 4:1 impedance transformer, with the other half operating as a counterpoise.

This system offers the convenience of "stay in your chair" operation, while providing an effective means of working 160 meters with a relatively small antenna.

The Drake MN-7 offers the same special switching design, and is rated for 250 watts output.



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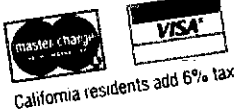
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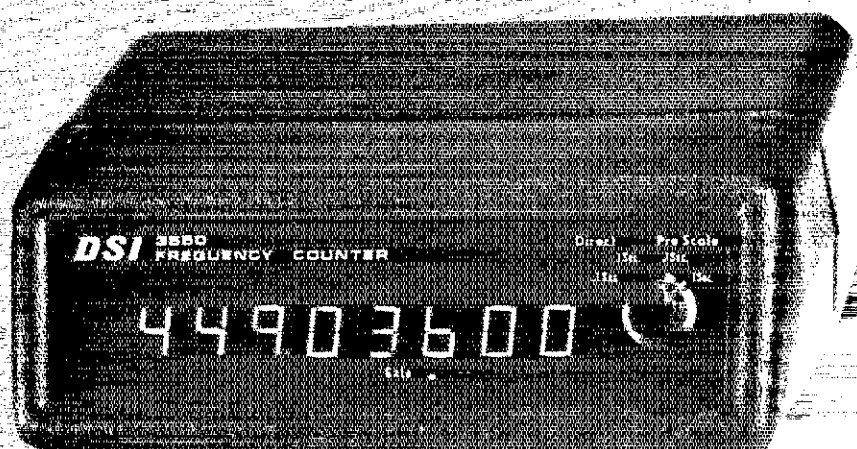
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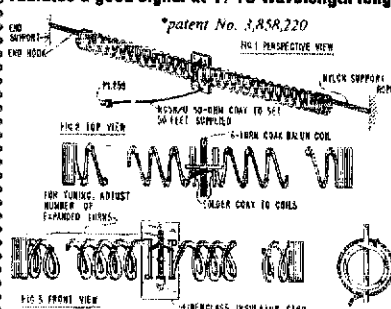
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SPECIFICATIONS

TT-45 TOWER

- Maximum height, 45'
- 800 lbs. winch with padlock feature
- 2800 lb. raising cable
- Totally freestanding with proper base
- Total weight, 189 lbs.

Recommended accessories:
RBRF-10, SBRF-10, CBRF-10.

The TT-45 is a freestanding tower. Ideal for installations where guys cannot be used. If the tower is not being supported against the house, the proper base fixture accessory must be selected.

SV-3 TRI-BAND ANTENNA

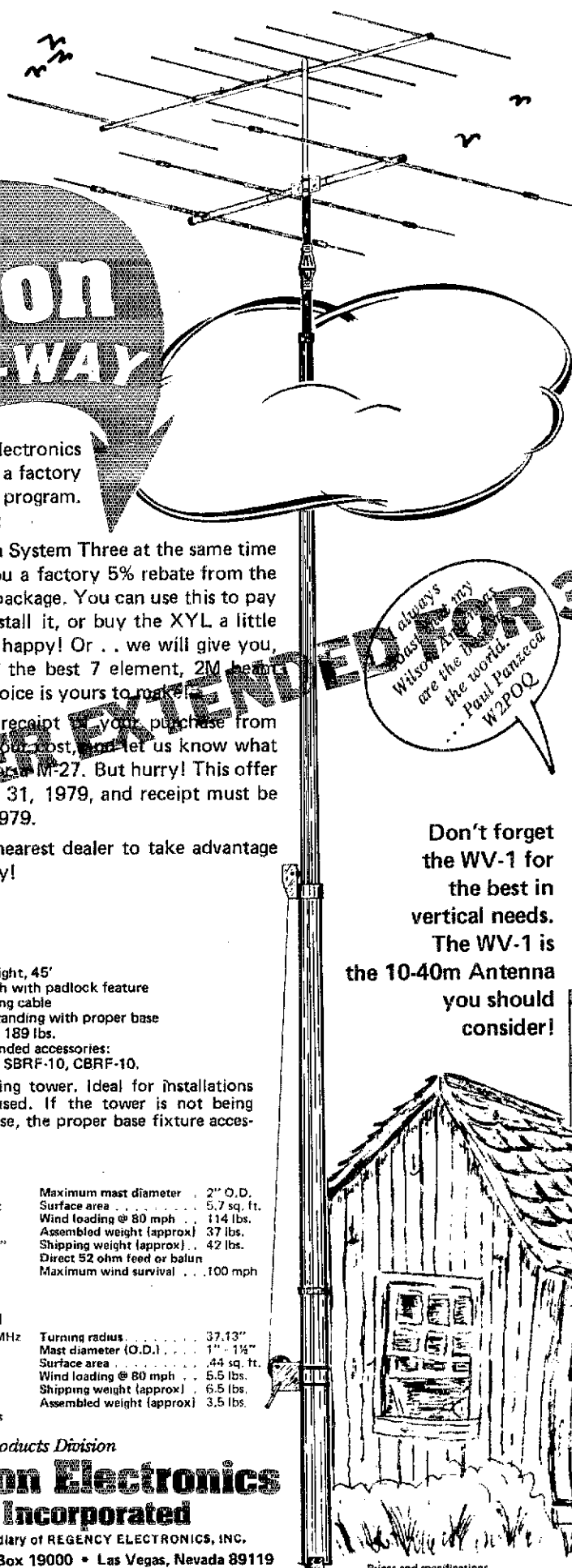
Band MHz	14-21-28
Maximum power input	Legal limit
VSWR at resonance	1.3:1
Impedance	50 ohms
Boom (O.D. x length)	2" x 14' 4"
No. of elements	3
Longest element	27' 4"
Turning radius	15' 9"

Maximum mast diameter	2" O.D.
Surface area	5.7 sq. ft.
Wind loading @ 80 mph	114 lbs.
Assembled weight (approx)	37 lbs.
Shipping weight (approx)	42 lbs.
Direct 52 ohm feed or balun	
Maximum wind survival	100 mph

M-27 - 7 ELEMENT 2M BEAM

Band MHz	144-148 MHz
VSWR	1.2:1
Impedance	50 ohms
Boom (O.D. x length)	1" x 64"
Number of elements	7
Longest element	40"
Beam width @ 3 dB pt.	27 degrees

Turning radius	37.13"
Mast diameter (O.D.)	1" - 1 1/4"
Surface area	4.4 sq. ft.
Wind loading @ 80 mph	5.5 lbs.
Shipping weight (approx)	6.5 lbs.
Assembled weight (approx)	3.5 lbs.



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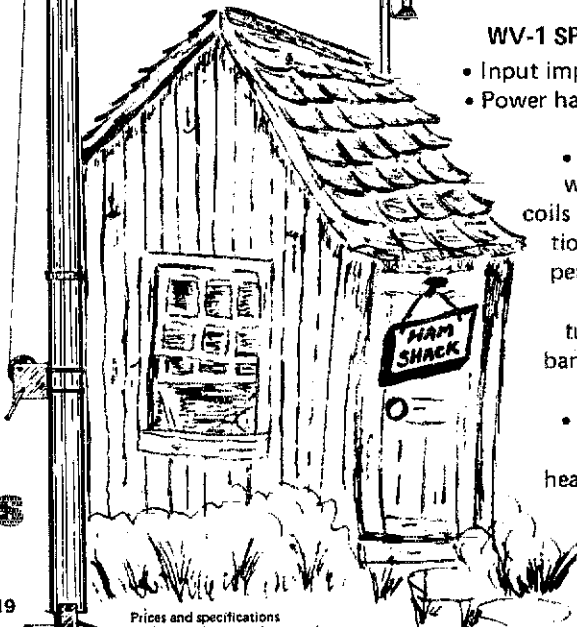
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WV-1 SPECIFICATIONS:

- Input impedance: 50 ohms
- Power handling capability:

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- Two High-Q traps with large diameter coils
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- Taper swaged aluminum tubing
- Automatic bandswitching
- Mast bracket furnished
- SWR: 1.1:1 on all bands
- 1 1/2" O.D. heavy wall aluminum tubing
- Does not require guying
- Overall length: 19' 8"



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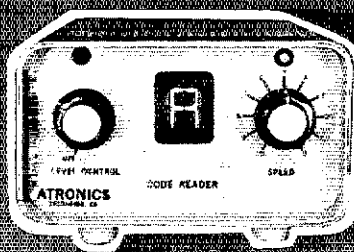
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R-274 D/FRR receiver 540KC --- 54.0 mc., with manual. \$325 FOB. Wanted: HRO-7 with all coils. L. J. Kistler, 207 W. Wolder Ave., Tampa, FL 33603, 813-236-7882.

COLLINS Filters: F455FA08 cw filter --- \$75. F455A21 --- \$50. W9ZR, 1-414-532-6643.

SELL: Yaesu FT-401B transceiver, matching speaker with phone patch, YC601 digital display, 9900. Lynda Lipsey, 205-773-4388, 1302 Sunset, NW; Hartselle, AL 35640.

HW32A, excellent. \$75 ppd. K3JZH.

COLLINS Wanted: S-Line, 301 L, etc. in any condition. W9QYH, 1605 Ridge Rd., Green Bay, WI 54304.

FOR SALE: Wilson Mark II 6 channel handheld v.g. \$260. 1000 watt 115V ac generator with motor v.g. \$75. Boonton St. Signal Generator 2/400 megacycles \$50. 505-897-0268 WA5OHI.

ATLAS RX-110, TX100-H, PS-110, brand new transceiver \$48. Kenwood TS-520, CW-520, SP-520, mint \$550. Yaesu FRG-7, mint \$235. KA4DGA, P. O. Box 3500G4, Miami, FL 33135.

SELL: Heathkit station, HR10 receiver, HG10 VFO, D60B transmitter, \$190 complete, shipped prepaid UPS. Never used after complete check by Heath. Kenneth Post, WB7RDP, 141 S. Pennsylvania, Casper, WY 82601.

SELL: Heathkit SB300 receiver \$150. Marauder HX10 --- \$150. With manuals. 3el Gotham 20mtr beam --- \$20. Pick up only. W2LSQ 201-427-4354.

WANTED: HW-101, HP23 pwr supply, HP-13B mobile supply, SBA 301-2 400Z crystal filter, mike, mobile bracket. Must be in excellent condition. Jim Clark, 12 Hampton Ave., Lowell, MA 01854. 617-453-7830.

SELL: 2000 Watt PEP linear KL-1, drive either low or high input. 4-400A finals. Also KS-1 power supply, will deliver full amp. at 3000 volts. Both \$300. unable ship. W1GSM 617-657-5696.

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SELL: Drake C-Line: R4C, T4XC, L-4B (80-10), AC-4, MS-4 --- mint, extras, \$2000 firm, not sold separately. John Avelis N9ADK, Rt. 1, White Heath, IL 61884. 217-762-5001.

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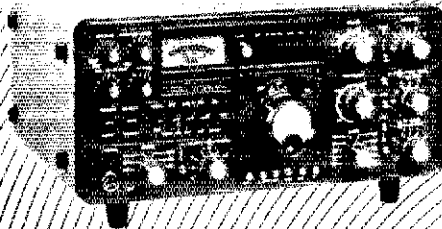
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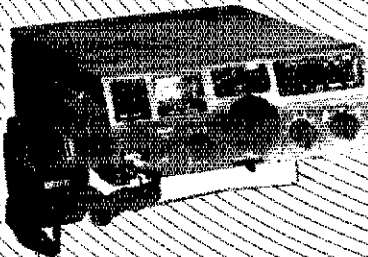
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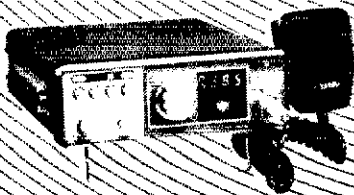
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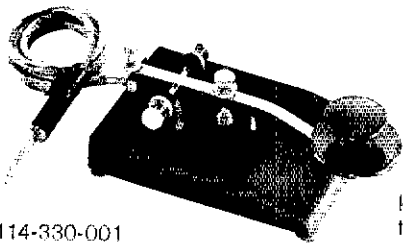
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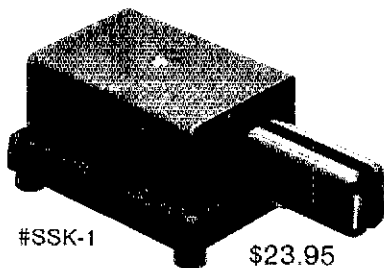
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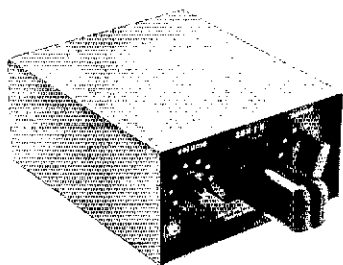


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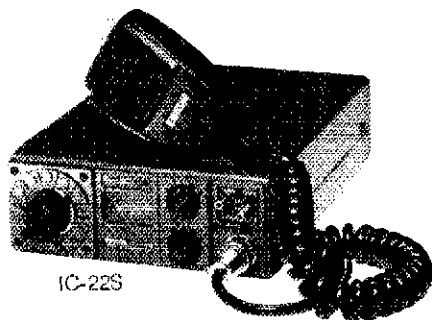
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HALLICRAFTERS service manuals. Amateur and SWL. Write for prices, specify model numbers desired. Ardcoc Electronics P. O. Box 95, Dept. Q, Berwyn, IL 60402.

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COMPLETE Novice station. Ten-Tec 70 Century Z1 and 276 calibrator; Swan SWR-1A SWR meter; Gotham V80 antenna; Kenwood HS-4 headset; Ham-Key HK-3 key; MFJ-901 antenna tuner. "package" only; you ship; \$375; new/mint. WA6EXD, Callbook; 512-379-7317.

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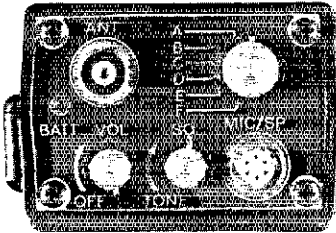
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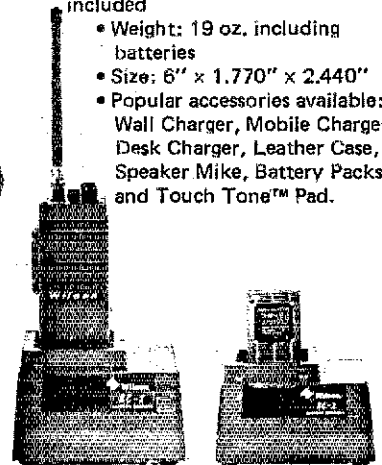
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50 watts	4A	4B	4C	4D	4E	4F
100 watts	500H	100A	100B	100C	100D	100E
200 watts	200H	200A	200B	200C	200D	200E
500 watts	500H	500A	500B	500C	500D	500E
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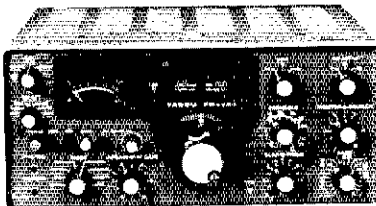
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SELL: Yaesu FT101B, 1an, cw filter, SP101B, \$500. VFO FV101, \$65. Drake MN-4 \$70. Data signal 21-B keyer \$50. Vibroplex deluxe paddle \$20. Vibroplex original deluxe, chrome \$35. Telex C 1210 \$15. Original owner, manuals, good condition. James L. Hensarling, 903 Cherry, Uvalde, TX 78801 512-278-5990.

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FOR SALE: Heathkit 2 meter HW-2036A, \$225; HW-202 amplifier \$40; DX-608, transmitter \$80; HR-10B receiver \$70; all in mint condition with manuals. Gary Utke; 1002 So. Lafayette, Shawano, WI 54186. Ph 715-626-3986.

SALE: Triband Beams - Wilson System I \$205, System II \$169, System III \$137; Cushcraft ATB34 \$205 HI Verticals - Taylor 10-40m \$44; 48TV \$67, 58TV \$90; Cushcraft ATV-5 \$78, ATV-4 \$64. Alliance HD73 \$95 with purchase of ht beam. Wilson MKII \$199, MKIV \$229. Accessories discount prices. LED, hi-low switch kits, MFJ tuners, filters 15 percent off list. GES 230A micencoder \$35.75, HQ-1 Mini Quad \$119, Tower Specials, Telex headsets 20 percent off. Cushcraft VHF, Hustler Mobile Antennas discount prices. Write or call for flyer. See you at the Manassas VA Hamfest June 3. EQF, Inc. 2410 Drexel, Woodbridge, VA 22192 703-494-7949.

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FT-101B 1an excellent \$500. W6IWR 12080 Country Sq, Ln., Saratoga, CA 95070, 408-253-3345.

ATLAS, Wilson, Kenwood, Midland, 350 XL rig, w/p s, and 305 VFO \$950. Mark II w/T.I. and 8 xtal pairs. \$225. H599A w/2mtr conv. \$225. 13510 \$240. All in mint or excellent condition. Certified checks or M.O. only. I ship UPS. K9CKA, Dr. Craig S. Taylor, 715-384-2505 days, 715-387-6217 nites.

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WANTED: KWS1, 75A4, SC-101, 8-3 Line, KWI, Alpha 70-V, KWM2A, 30S1, 30L1, KWM1, 51S1, 651S1, 310B3. Buy, or trade Kenwood, Icom, Atlas, etc. Craig Radio, Route One By-Pass, Kittery, Maine 03904.

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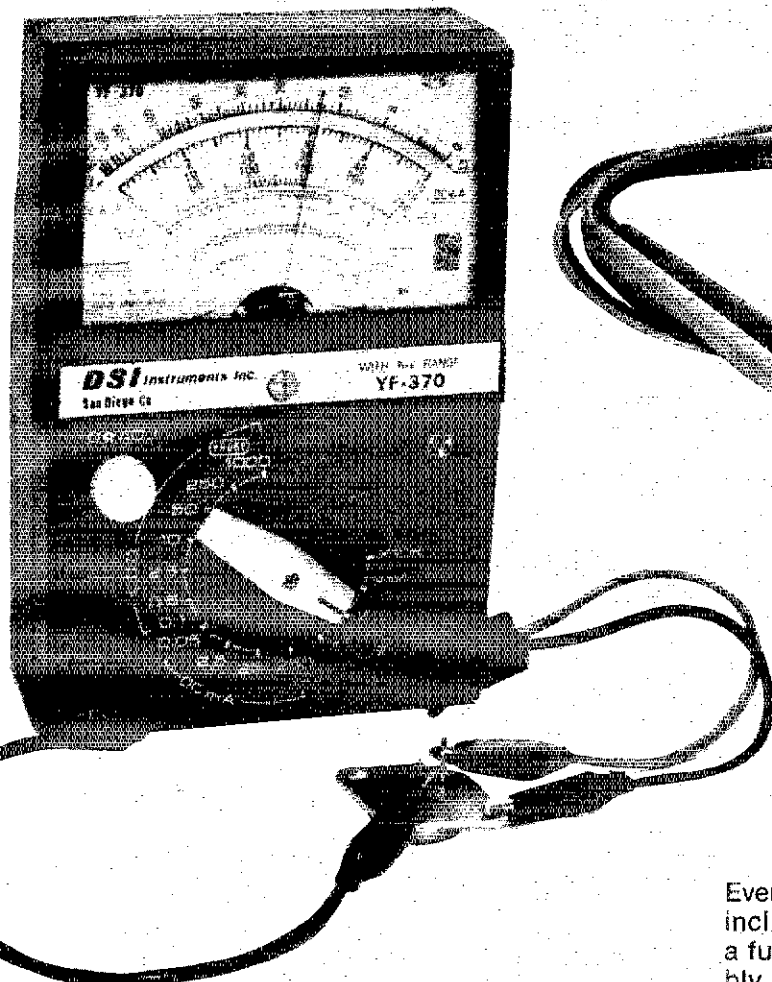
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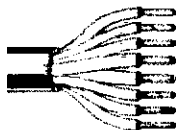
8214 25c/ft.	50	1.2	3.9
	100	1.8	5.9
	200	2.6	8.5
	300	3.3	10.8
	400	3.8	12.5



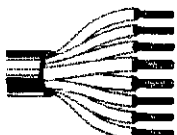
8237 21c/ft	100	2.0	6.6
	200	3.0	9.8
	400	4.7	15.4
	900	7.8	25.6



8267 25c/ft	100	2.0	6.6
	200	3.0	9.8
	400	4.7	15.4
	900	7.8	25.6



8448 No. of Cond. — 8
AWG (in mm) —
6-22, (7x30), [1.76];
2-18, (16x30), [1.19]
16c/ft



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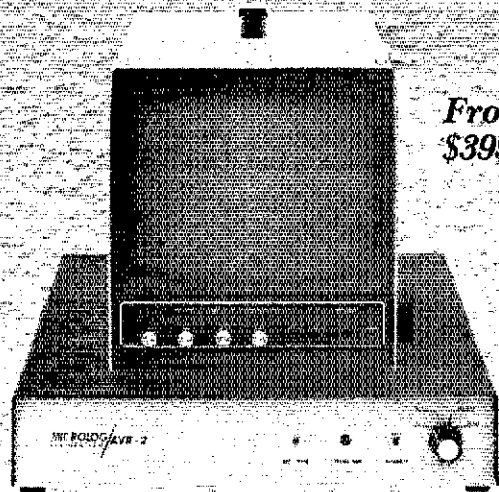
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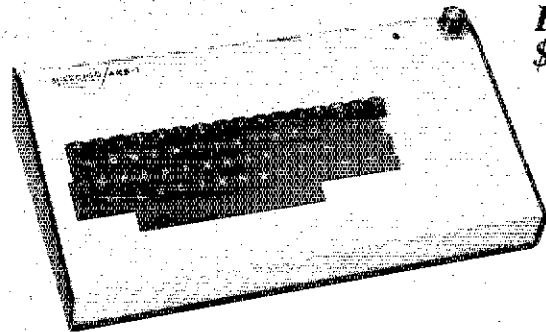
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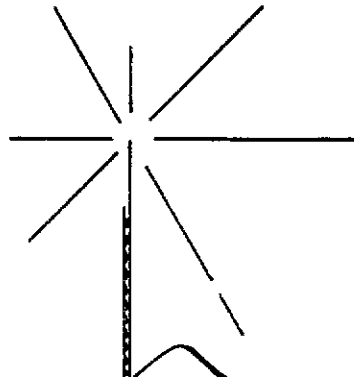
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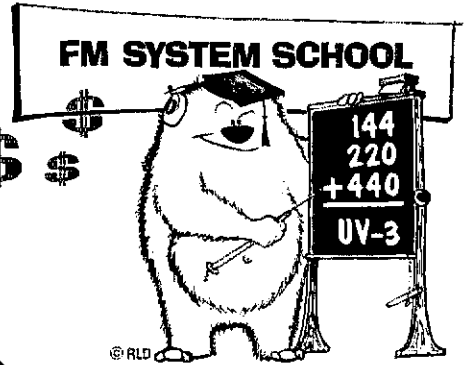
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WANTED: HW-7 or other QRP transceiver, not necessarily in working order. Scott Hall, KAØDAQ, 218 8th Street, N.W. Rochester, MN 55901.

AUDIO filter owners, builders. Experimenter wants schematics and impressions of homebrew and commer-

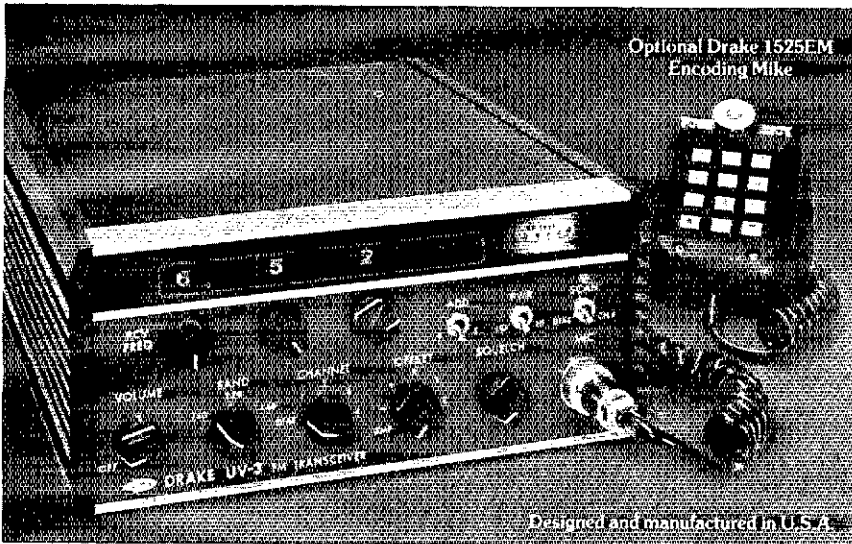
Dollar thoughts to consider about the DRAKE UV-3



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(That's just \$265 per band
—and fully synthesized
on all three!)



How does the cost of the Drake system really compare to alternative methods of getting on 144-220-440 MHz fm?

A First of all, there is no direct comparison possible, because the Model 1346 Drake UV-3 is the only rig in the world offering 144-220-440 MHz fm in a single box —and it is fully synthesized on each band.

B The nearest comparison would be to add the suggested list prices of three separate units of competitive fm rigs presently available. It would work out approximately as follows (and you would end up with three separate units to power):

2 Meters (Synthesized to 5 kHz)	.....	\$ 449.00
220 MHz (Synthesized to 5 kHz)	.....	449.95
440 MHz (23 channels, crystal)	.....	349.00
Crystals (Assuming 20 per 440 MHz radio)	.....	120.00
Total competitive price	.....	\$1367.95

But wait—even at those higher competitive prices you'd still be missing these features included in the UV-3:

1. Full synthesis on all three bands
2. Extra diode-programmable fixed channels on each band
3. Priority scan feature on each band
4. Everything in a single box!

For your homework, then, ponder the following—at a suggested amateur net of \$795.00, the Model 1346 Drake UV-3 (144-220-440) is, to say the least, an incredible value. It gives you a real reason to trade UP!

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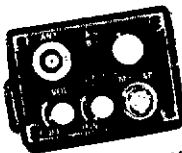
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cial audio filters. Will compile information and share with contributors. Also want modification ideas for Argonaut 505 and KWS-1. David Thompson K7DMT, 11740 NW West Rd., Portland, OR 97229.

YAESU YO-301 Monitor Scope with cables, manual; mint. \$175; I will ship. Bill Pearce 701-223-2890 (office), 701-258-9294 (home).

KWM-2 serial no. 15060. PM-2, GC-2, MM-1, \$800; IC-22 \$100; John Merrill, N1JMM, 7202 Rt. 31 East, Clay, NY 13041.

BUTTERNUT Vertical antenna 10-80M, 6 months old — mint. \$50. KA2CMJ 201-679-4155.

CAUTION: Don't let your license expire. Guaranteed notification 90 days before expiration date. Send call expiration date, and \$2 to Reuters, 2619 Brooklyn, Grand Rapids, MI 49507.

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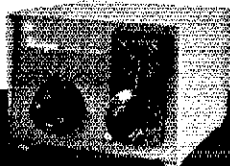
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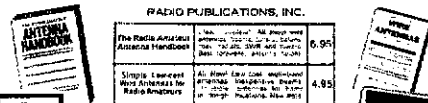
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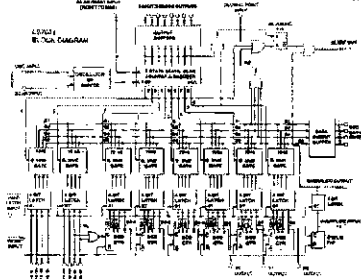
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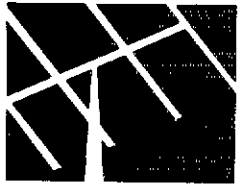
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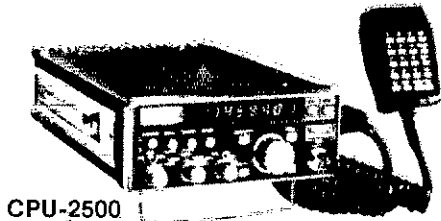


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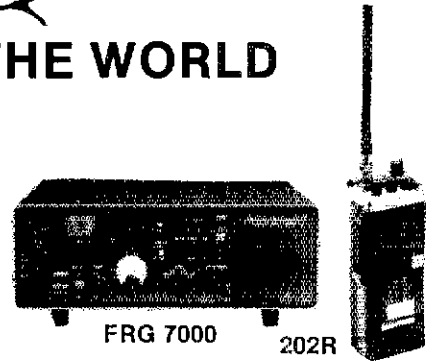


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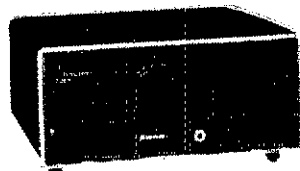
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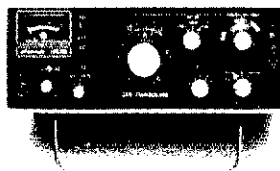
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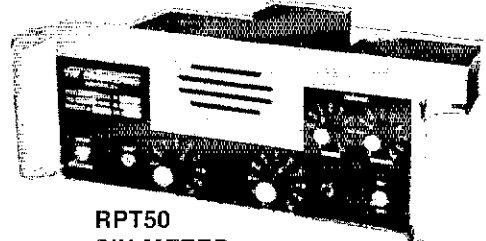
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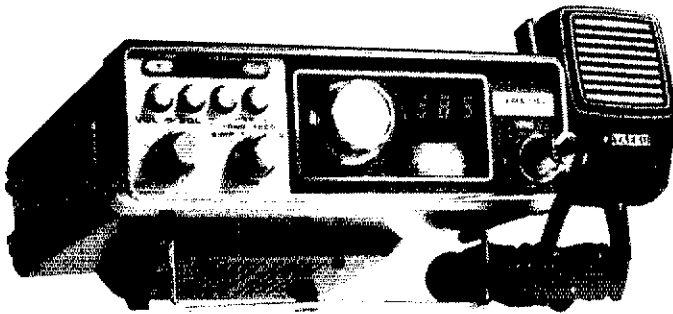
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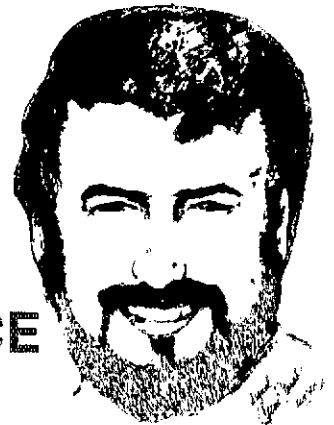
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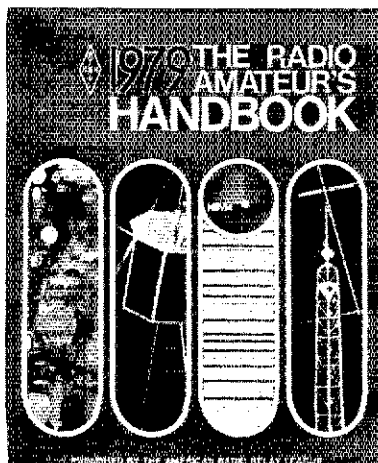
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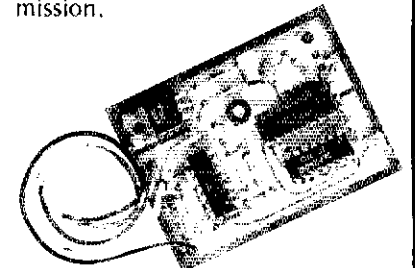
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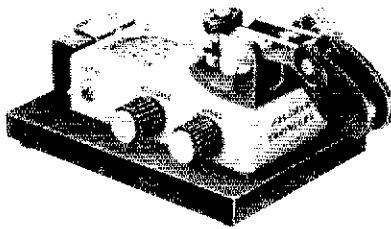
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COUNSELOR — Maine boys camp — Ham Radio — Electronics — Code — General license — May bring own equipment. June 20th — Aug. 18th. Write: R. Krasker, 95 Woodchester Drive, Chestnut Hill, MA 02167.

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COUNSELLOR: Penna. resident camp seeks ham radio man with a General license. Write full particulars to David Blumstein, 1410 East 24th St., Brooklyn, NY 11210.

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: To operate station, teach code, assist in building kits. Hockety also. Good equipment. Coad Camp near Kingston, NY. Mid-June to August 18th. WA2YHC, Camp Woodcliff, 62 Howard Avenue, Tuckahoe, NY 10707, 914-961-3786.

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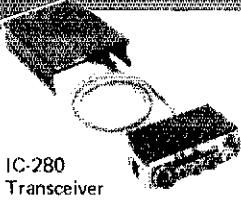
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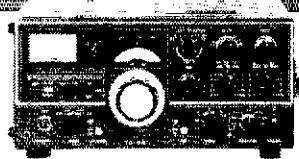
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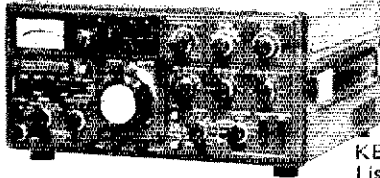


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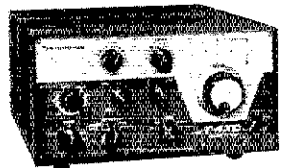
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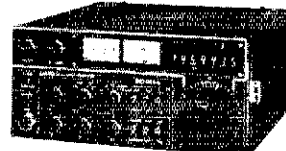
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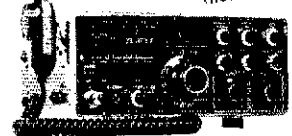
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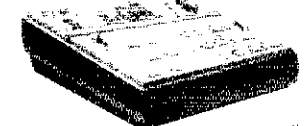
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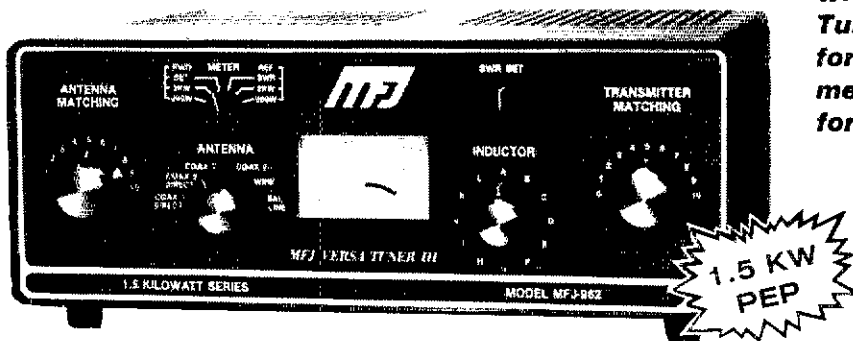
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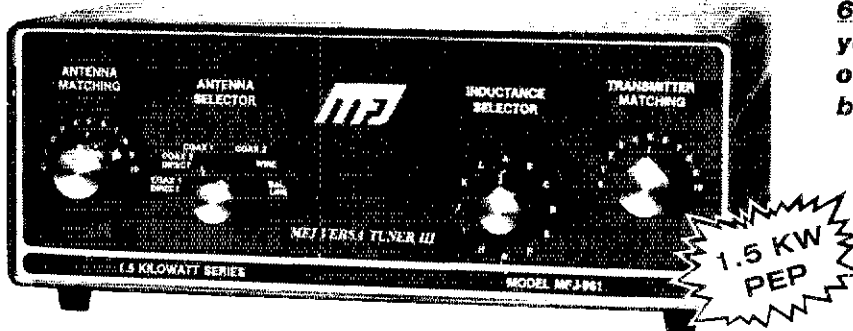
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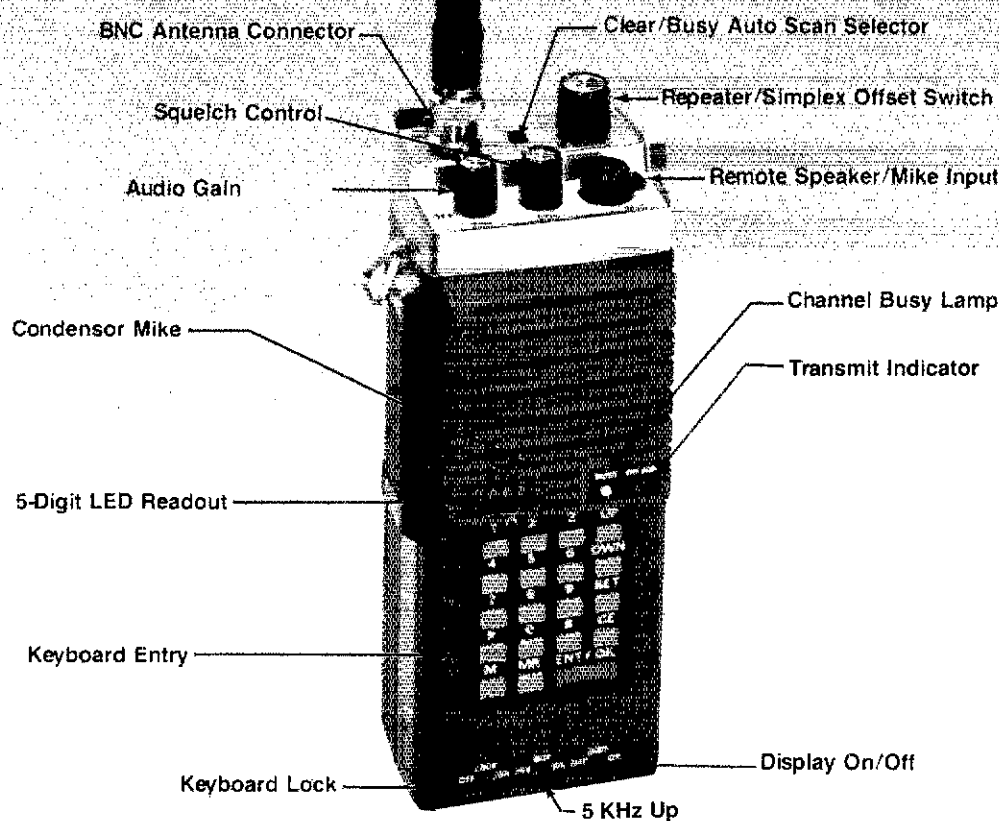


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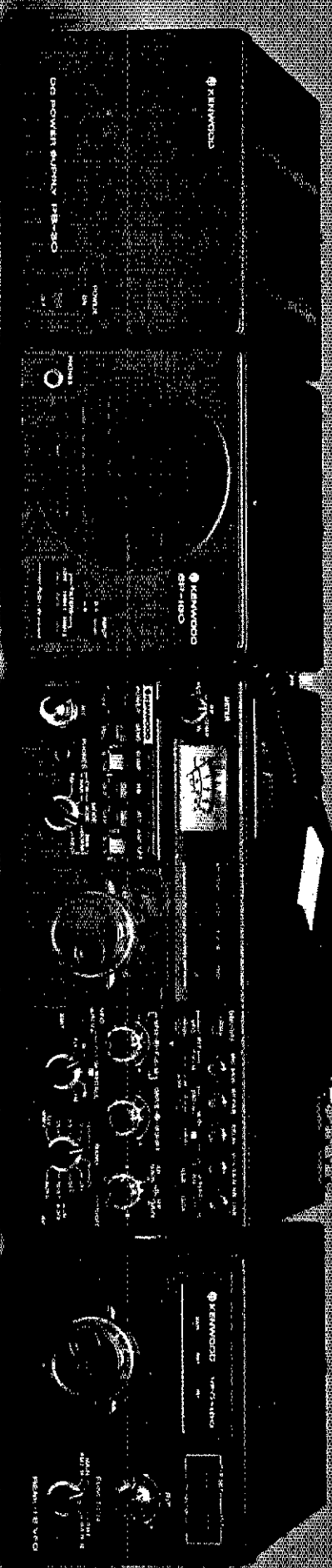


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