QST

devoted entirely to Amateur Radio

December 1978 $2.00

The IARU "Project Goodwill" Transmitter

Page 11

Shown with accessory touch tone pad

800 channels in the palm of your hand

Tempo presents the S1 SYNCOM...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 shown in the illustration adds greatly to its convenience and we have available a 30 watt solid state power amplifier designed to give the SYNCOM S-1 the flexibility of operating as a mobile and base station as well.

SPECIFICATIONS

Frequency Coverage:	144 to 148 MHz
Channel Spacing:	Every 5 KHz
Power Requirements:	9.6 VDC
Current Drain:	17 ma - standby 400 ma - transmit
Batteries:	Ni-cad battery pack included
Antenna Impedance:	50 ohms
Dimensions:	40 mm x 62 mm x 165 mm (1.6" x 2.5" x 6.5")
RF Output:	Better than 1.5 watts
Sensitivity:	Better than .5 microvolts

SUPPLIED ACCESSORIES

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

OPTIONAL ACCESSORIES

Touch tone pad, tone burst generator, CTCSS chips, Rubber flex antenn

Price ... $349.00 (or with touch tone pad ... $399.00)

Tempo also offers a complete line of solid state power amplifiers, pocket receivers, the FMH-2, 5 & 42 portables, the VHF/ONE PLUS mobile transceiver, and the FMT-2 & FMT-42 remote control mobile transceive All available from Tempo dealers throughout the U.S. Call or write for full information.

11240 W. Olympic Blvd., Los Angeles, Calif. 90064 213/477-6701
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Henry Radio

Prices subject to change without notice.

ICOM & HENRY RADIO
...two leaders in Amateur Radio present the
IC-701

ICOM's superior LSI technology takes the lead in Amateur HF. The extremely compact **IC-701** delivers 100 watts output from a completely solid state, no tune (broad band design) final on all modes and all bands, from 160–10 M. With single knob frequency selection and built-in dual VFO's, the LSI controlled **IC-701** is the choice in computer conpatible, multi-mode Amateur HF transceivers.

The **IC-701**'s single frequency control knob puts fully synthesized instant turning at a single finger tip. **Wide** bandspread, with 100 Hz per division and 5 KHz per turn, is instantly co-ordinated between the smooth turning knob and the synthesizer's digital read-out with positively no time lag or backlash (no waiting for counter to update: less operator fatigue). And at the push of the electronic high speed tuning button, the synthesizer flies through megacycles at 10 KHz per step (500 KHz per turn).

The computer compatible **IC-701** LSI chip provides input of incremental step or digit-by digit programming data from an external source, such as the microprocessor controlled accessory which will also provide remote band selection and other functions.

Full band coverage of all six HF bands, and continuously variable bandwidth on filter widths for SSB, RTTY, and even SSTV, help to make the **IC-701** the very best HF transceiver ever made. **IC-701** includes two CW widths, all of this standard at no extra cost.

Sold complete with the high quality electret condenser base mic (SM-2) and AC power supply/speaker as shown, the **IC-701** is loaded with many ICOM quality standard features. Standard in every **IC-701** are two independently selectable, digitally synthesized VFO's at no extra cost. Also standard are a double-balanced schottky diode 1st mixer for excellent receiver IMD, and RF speech processor, separate drop times for voice and CW VOX, optionally continuous RIT, fast/slow AGC, efficient IF noise blanker, fast break-in CW, and full metering capability.

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And if you can't come into one of Henry Radio's stores, please call or write. Let us answer your questions and then ship one of these exciting new rigs to you. Henry Radio offers the most complete selection of famous name amateur radio equipment, plus easy financing. 10% down or trade-in down, no finance charge if paid in 90 days. Good reconditioned equipment, nearly all makes & models. Our reconditioned equipment carries a 15 day trial, 90 day warranty and may be traded back within 90 days for full credit toward the purchase of NEW equipment. Write for bulletin. Export inquiries invited.

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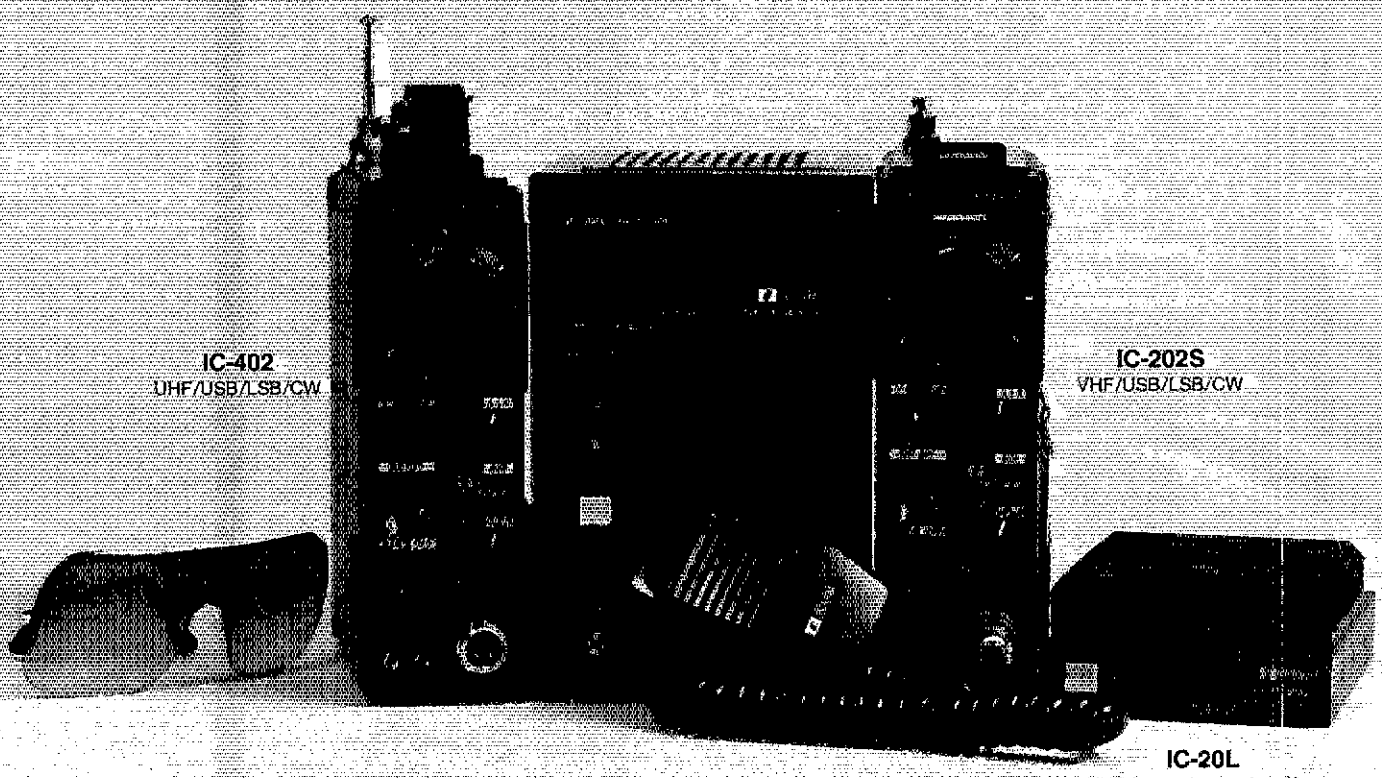

OSCAR the easy way!

WITH ICOM'S TRANSPORTABLE SIDEBANDS SIDE BY SIDE

The excitement and pride of operating through the OSCAR series of satellites is now totally transportable with ICOM's new **IC-202S** and **IC-402.** These are the world's only SSB portables, they both operate USB and LSB, and together they form an efficient, compact ground station that makes OSCAR communications much less complicated and much more fun.

Your OSCAR station can be quickly set up in any suitable location, and your two SSB portables will perform in tandem. Just use the **202S** as the uplink (transceiver) for OSCAR VIII, mode "J" and as the downlink (receiver) for OSCAR VII, mode "B"; and tune the **402** to the complimentary channels.* Space Age radio has never been simpler.

Get into the excietment of satellite communications with the **IC-202S** and the **IC-402,** ICOM's high quality transportable sidebands.

*Crystals for this configuration are optional at extra cost.

All ICOM radios significantly exceed FCC specifications limiting spurious emissions.

Specifications are subject to change without notice.

Specifications:	IC-202S	IC-402
Frequency Coverage:	144-146 MHz	430-435.2 MHz in any four 200 KHz bands
Antenna Impedance:	50 ohms	50 ohms
Power Supply:	13.8V DC negative ground	13.8V DC negative ground
Current Drain:		
Tx	A3J, approx. 540ma	A3J, approx. 670ma
Rx	Approx. 90ma with no signal	Approx. 100ma with no signal
Size:	183mm(h) x 61mm(w) x 162mm(d)	183mm(h) x 61mm(w) x 162mm(d)
Weight:	2.0 Kg including batteries	2.0 Kg
RF Output Power:	A3J, 3W PEP, A1, 3W	A3J, 3W PEP, A1, 3W
Carrier Suppression:	Better than 40 dB	Better than 40 dB
Opp. Sideband Suppression:	Better than 40 dB/1 KHz	Better than 40 dB/1 KHz
Spurious Radiation:	Better than −60 dB	Better than −60 dB
Microphone Impedance:	600 ohms	600 ohms
Receiver Type:	Single Superheterodyne	Double Superheterodyne
Intermediate Frequencies:	10.7 MHz	57.6-57.8 MHz, 1st I.F. 10.74 MHz, 2nd I.F.
Receiver Sensitivity:	0.5 uv at 10 dB SINAD	0.5 uv at 10 dB SINAD
Spurious Sensitivity:	Better than −60 dB	Better than −60 dB
Selectivity:	±1.2 KHz or better at −6 dB ±2.4 KHz or better at −60 dB	±1.2 KHz or better at −6 dB ±2.4 KHz or better at −60 dB
Audio Output:	More than 1W	More than 1W
Audio Output Impedance:	8 ohms	8 ohms

HF/VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

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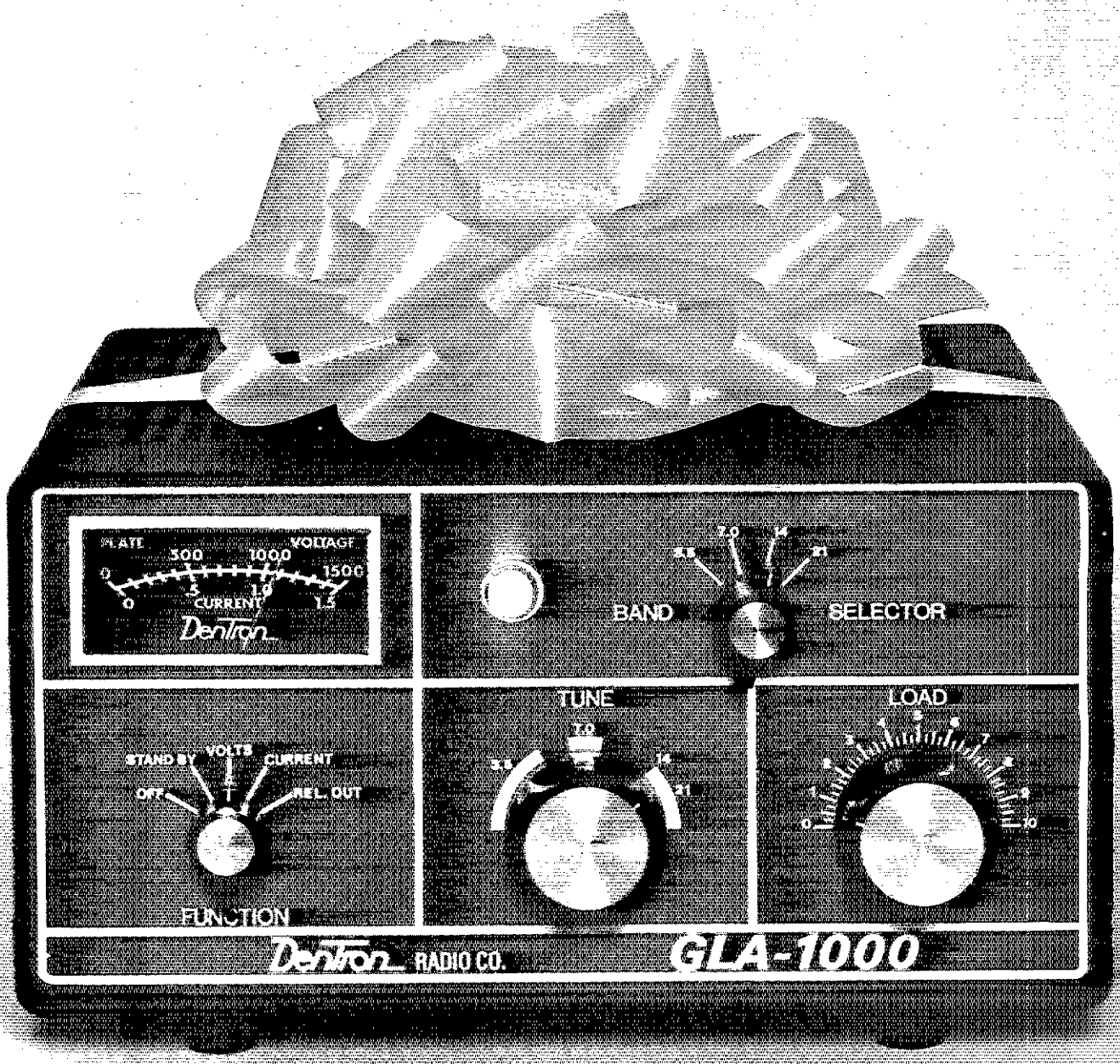
THE COVER

What better gift is there to amateurs-to-be around the developing world than the IARU 20-meter pair? The transmitter is described, beginning on page 11.

Contents

The New GLA-1000™
Just In Time for Christmas



DenTron's newest linear, the GLA-1000 is an exciting gift for the ham in your life. It's a power packed 1200 watt PEP SSB 1KW CW amplifier that covers 15-80 meters. The GLA employs 4 D-50 A tubes in the final, (similar to 6LQ6 tubes), thus keeping the cost down. Our Great Little Amp makes a great little gift!

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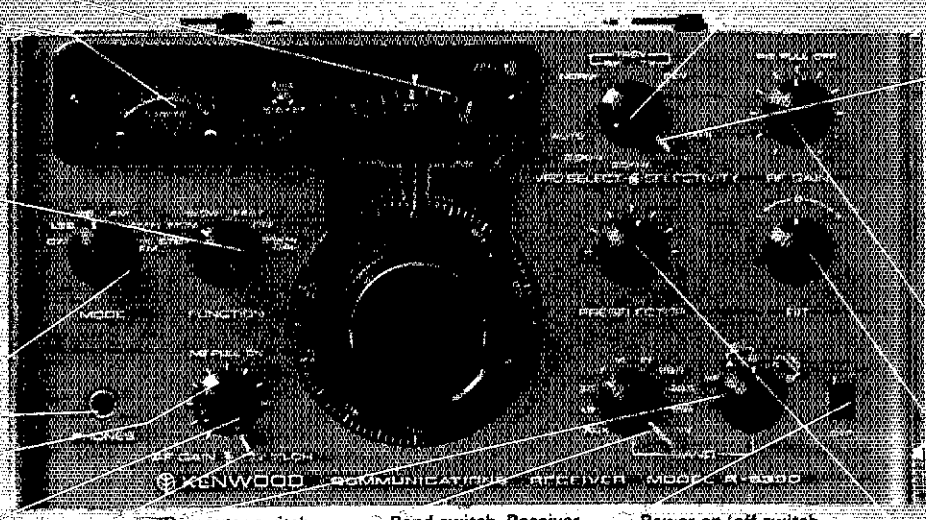
Your choice will obviously be Kenwood.

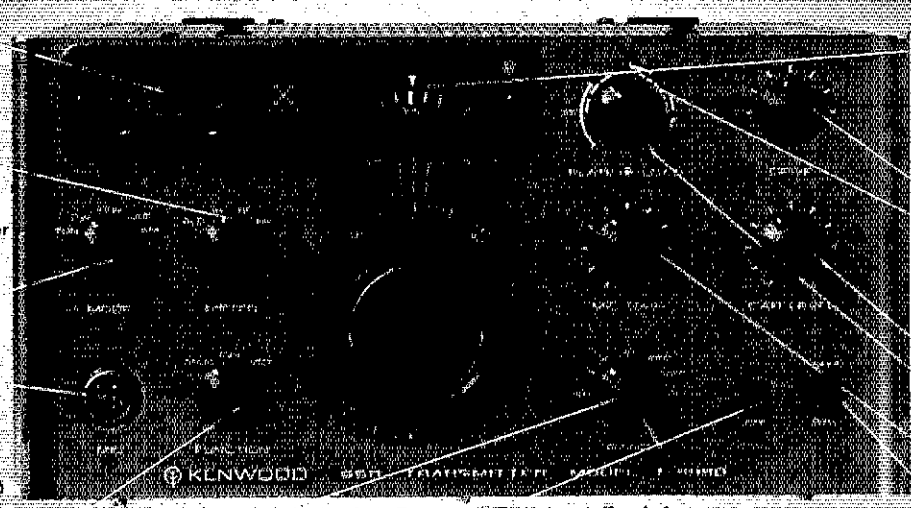


- Highly stable VFO with easy-to-read 1-kHz readout. An oscillator is provided for five fixed channels.
- Highly accurate S-meter.
- Function switch selects standby mode, monitor (for listening to transmitter audio), AGC (slow, fast, and off), and 25-kHz crystal calibrator.
- Mode switch allows reception of CW, sideband, upper sideband, AM, lower and FM (useful on high end of 10 meters and with VHF converters, especially with R-599D's squelch control).
- Headphone jack.
- Effective noise blanker is built in.
- RF gain control. Audio output is more than 1 watt into 8-ohm load.
- Squelch works on all modes.
- VFO selector provides independent frequency control with R-599D and T-599D transceive frequency control with either R-599D or T-599D, and control of R-599D frequency with T-599D VFO and T-599D frequency with R-599D VFO.
- Selectivity switch allows selection of 0.5-kHz, 2.5-kHz, 5-kHz, and 25-kHz bandpass, including automatic selection with mode switch. An 8-pole SSB, an 8-pole CW, and a 6-pole AM filter are built in. A 6-pole FM filter is available.
- RF gain control and RIT switch allows operation in presence of unusually strong signals.
- RIT (receiver incremental tuning) allows tuning off frequency without affecting transceive VFO frequency.
- Noise blanker provides added sensitivity and selectivity.

Converter switch selects normal HF operation and lower and upper 2-MHz ranges on 6 meters and 2 meters (with optional converters).

Band switch. Receiver covers 160 through all of 10 meters. WWV (10 MHz), and an auxiliary band.

Power on/off switch. Operates on 100/117/200/240 VAC, 50/60 Hz, and 12-15 VDC.



- "Combination" meter.
- Meter switch selects ALC, final plate current, relative RF output and high voltage.
- Mode switch selects tune position and operation on CW, lower sideband, upper sideband, and AM (an increasingly popular mode on 10 meters).
- Microphone connector.
- Function switch selects push-to-talk or VOX operation, or provides "spot" signal for zero-beating with R-599D receiver. Transmitter also features anti-VOX, semi break-in CW, and sidetone.
- Highly stable VFO features easy-to-read 1-kHz readout and four-way flexibility, including transceive operation with R-599D receiver.
- Drive control.
- Plate tuning control for final amplifier. Driver and final are only tubes in otherwise all-solid-state transmitter.
- Carrier level control.
- Antenna load control (efficient pi network).
- Microphone gain control.
- Band/standby switch.

Band switch. Transmitter covers 80 through all of 10 meters.

Power on/off switch. Operates on 100/117/200/240 VAC, 50/60 Hz, with built-in power supply.

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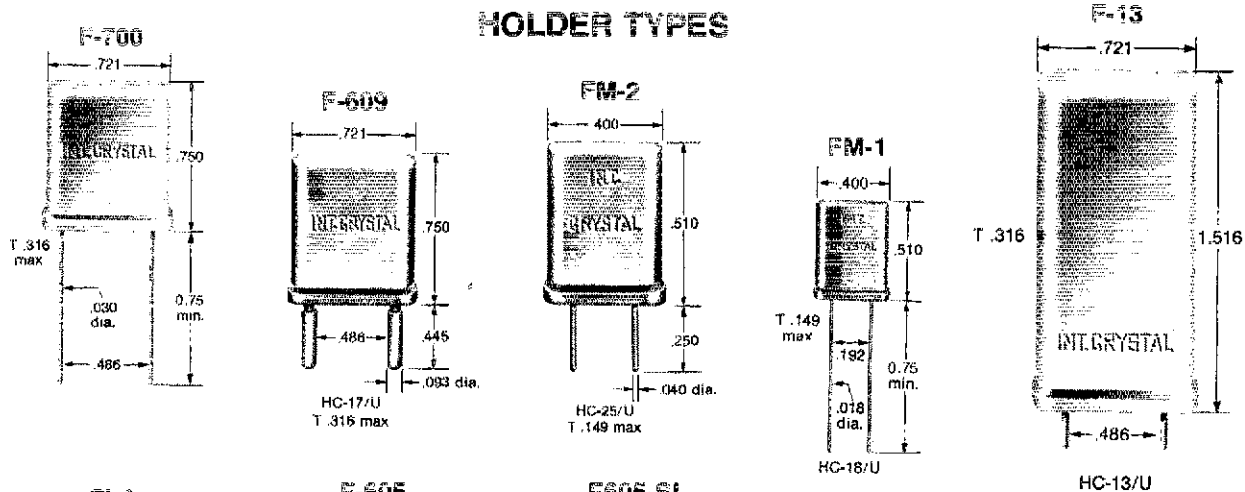

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West Indies — Jose R. Lebron, KP4JL, 666 Manzanillo, Venus Gardens, Rio Piedras, PR 00926

Southwestern Division

Arizona — Marshall Lincoln, W7DQS, Box 1490, Wickenburg 85358
Los Angeles — Perry Masterson, W6RHS, 485 S. Euclid Ave., Pasadena, CA 91101 (213-793-8557)
Orange — William E. Heitritter, WB6AKR, P. O. Box 521, Hemet, CA 92343 (714-658-3936)
San Diego — Arthur R. Smith, W6INI, 4515 Melisa Way, San Diego, CA 92117 (714-273-1120)
Santa Barbara — D. Paul Gagnon, N6MA, 3800 So. J St., Oxnard, CA 93030 (805-484-1951)

West Gulf Division

Northern Texas — Leland F. Heithecker, W5EJ, 1409 Cooper Dr., Irving 75061 (214-438-8038)
Oklahoma — Leonard R. Hollar, WA5FSN, RFD 1, 710 South Tenth St., Kingfisher 73750 (405-375-4411)
Southern Texas — Arthur R. Ross, W5KR, 132 Sally Ln., Brownsville 78521 (512-831-4458)

THE AMERICAN RADIO RELAY LEAGUE, INC.

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

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

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

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

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

"It Seems to Us . . ."

WARC-79

A year from now, in December of 1979, WARC-79 will have ended. That 10-week conference will have determined for the rest of this century how the radio-frequency spectrum is to be allocated to the various services.

And, if history is any teacher, before long an increasing number of people will become aware of the significance of WARC-79 and will begin to urge the League to "do something." No, we're not being cynical — it's just that we've been through this before. Most recently, just prior to WARC-59, the amateur bands were full of dire predictions as to what would happen to the Amateur Radio Service in Geneva in 1959, and the ARRL Board of Directors called a special meeting to consider the problem. After discussion, the Board concluded that preparations were well in hand and that unrest was more from lack of knowledge than from lack of performance.

We don't want you to be complacent about WARC-79, nor to come to any conclusion which might indicate that Amateur Radio does not have its act together. Thus, this is a good time to review some of the highlights of the past few years, so that you can help set straight those who might be misled about the status of WARC preparation.

About 15 years ago it became obvious that there would be another World Administrative Radio Conference along about 1980 and that we ought to get started in our preparation for it. One of the first things we did was to contract with Stanford Research Institute to produce a study which described the many technological, economic and sociological ways in which a healthy Amateur Radio can be of benefit to a country. With that report in hand, we began "selling" Amateur Radio all over the world (including here in Canada and the United States). Our first thrust was through the International Amateur Radio Union, exhorting our sister societies in the IARU to educate their administrations as to the value of Amateur Radio. In addition, at every possible opportunity, we participated in ITU meetings in order to become better acquainted with telecommunications delegates from the various countries, to convince them too of the benefits of Amateur Radio, and to make personal friendships which we hoped would bear fruit at a future WARC.

In the early 1970s a government committee here in the United States, armed with statistics gleaned from IARU files, made an extensive study of the Amateur Radio Service — past, present and future — and deduced what it believed were the spectrum allocation needs of Amateur Radio through the year 2000. That report became valuable ammunition on two fronts, domestic and international.

On the domestic front it was adopted by the FCC Advisory Committee for Amateur Radio, and the major portion of it was recommended to be a part of the U.S. position for WARC-79. On the international front, the substance of the report was adopted by the IARU, which urged its member-societies to take that amateur allocation position, along with supportive material which was prepared by various IARU working groups, and sell the position to their administrations. This was done, and it was a unique achievement never before attained in Amateur Radio preparation for a World Administrative Radio Conference. In previous conferences, differences between amateur positions in various parts of the world were thrashed out only after arrival at the conference — this time, our international position has been thoroughly discussed and resolved prior to the conference, giving us a unique position of strength. It is probably accurate to say that no other radio service (there are a couple of dozen) is so well unified on a common international basis as we are.

This is not to say that WARC-79 will be an easy conference. Although WARC-79 will address mainly technical issues, unfortunately many of the decisions will be political. Whether the conference is discussing the Amateur Radio Service, or the Aeronautical Service, or the Maritime Service, it will tend to make political decisions, because of the growing insistence by some of the developing countries that they have a larger role to play in international telecommunication policy. So, it will be a difficult conference, but we are better prepared nationally and internationally than ever before, come what may.

Amateur Radio is a well-established service that has much support throughout the world. Doomsday cries in some other segments of the Amateur Radio press serve little useful purpose, and only result in uneasiness on the part of those who may not have had the time or opportunity to be more fully briefed.

Nevertheless, we know that membership anxieties and concerns about WARC will build up during the early part of 1979. Share those concerns with us and let us keep you posted on what is being done to protect your Amateur Radio Service.

And don't panic! — *WIRU*

League Lines...

The USSR has launched two Amateur Radio satellites named Radio 1 and Radio 2. WIAW OSCAR bulletins carry orbit information. See p. 54 of this issue for other details!

The Dayton Hamvention folks have boosted Project Goodwill with a very generous $10,000 donation! When matched by the Northern California DX Foundation's challenge program of 50 cents on each dollar donated, the Project received a total of $15,000. We hope the thousands of amateurs who have attended the Dayton event over the years share our warm regard and gratitude for the members of the Dayton Amateur Radio Association, who voted unanimously to support the ARRL/IARU efforts to promote the growth of Amateur Radio in developing countries. Think WARC!

Surinam and the United States have concluded a reciprocal operating agreement, effective October 12, 1978. If you are planning on visiting Surinam and want to operate your amateur station in that country, contact the International Services Office at ARRL hq. for details.

Advanced class licensees will be eligible to request a call sign change on their applications for license renewal on or after January 1, 1979, but no earlier than 60 days before the end of an applicant's current license term. Those requesting a change will be assigned a Group B call sign. Advanced class operators already holding a Group B call sign are not eligible for a change under this policy. More information will appear in next month's QST.

Eligible Amateur Extra Class licensees have until January 1, 1979, to request call sign changes to Group C or B. After that date, an Extra Class operator not already holding a Group A call sign may request a Group A call sign only.

The ARRL-organized technical session for IEEE MIDCON in Dallas, TX is scheduled to run as Session 34, Thursday, December 14. The theme is "RF Communications Equipment -- Present and Future." W1FB is session organizer. Speakers are W2FMI, W1VD and engineers from R. L. Drake and Heath Company. Amateurs will want to attend Session 34.

DXCC December Listing: Due to the heavy backlog of new applications and endorsements, plus staff turnaround, the usual December listing of DXCC credits will not appear until January.

Complete details on the ARRL International DX Competition will appear in January QST. The 1979 contest has been shortened to one 48-hour weekend per mode (March 3-4 phone, March 17-18 cw). The changes were recommended by the ARRL Contest Advisory Committee and adopted by the ARRL Board of Directors.

In response to requests from those who have G & H Insurance Administrators' ARRL-sponsored theft and fire insurance, we are happy to announce that at renewal time each insured will receive a computerized listing of his equipment. Any comments you have should be directed to Policyholder Service Department, 8330 Moberly Lane, Dallas, TX 75227.

Help wanted: Features Editor, QST, to be responsible for editing and writing general interest material. Amateur Radio license, and journalism degree or experience required. Send resume and writing sample to Joel Kleinman, ARRL hq.

"Happenings" is worth a good look this month. It features the FCC's prohibition of autopatch on automatically controlled repeaters, a Notice of Inquiry regarding a new CB service at 900 MHz, and remarks delivered by FCC Commissioner White at the ARRL New England Division Convention. Be informed -- read "Happenings"!

ARRL hq. is looking to hire two Communications Assistants: a W1AW Operator and a Department Assistant for the DXCC Branch. If you are interested, send your resume to Personnel Manager, ARRL hq.

A 20-Meter, VXO-Controlled, 6-Watt Transmitter

Here's a mate for the 20-meter, high-performance, direct-conversion receiver featured in April 1978 QST.

By Jay Rusgrove,* W1VD

Rockbound with 6 watts on 20 meters. . . . Somehow that just doesn't sound very appealing. Everyone *knows* you need at least 100 watts and a beam to barely make contacts, let alone bust pileups. Not so!

During the initial testing period, this 20-meter transmitter was operated from the ARRL laboratory station, W1INF, using an 80-meter dipole for the antenna. Solid contacts were made with W9, WØ, W6, W7 and a KV4 station, with the worst report received a 549. Heartened by this turn of events, several 3 × 3 CQs were sent and sure enough a chirpy, somewhat-frequency-unstable UD6 station answered the call. Several exchanges were made with the UD6 and all pertinent data were recorded. A few minutes later, amidst the snickering of a few onlookers, the writer was handed a homemade UD6 QSL card. At that point it began to sink in. There, across the laboratory, was a signal generator, straight key and a few clip leads — my UD6 contact. Snookered again!

*Senior Asst. Technical Editor, ARRL

The Circuit

The circuit diagram of the transmitter is shown in Fig. 1. Q1 and associated components comprise a variable-frequency crystal oscillator (VXO). With this circuit the frequency of the crystal can be "pulled" above and below the natural crystal frequency, the amount dependent on the type crystal and the frequency. With 14-MHz, fundamental-type crystals at Y1, a total swing of 10 kHz was obtained with the circuit shown.

C2 is a front-panel-mounted variable capacitor that is used to adjust the operating frequency. C1, in parallel with C2, is included in the design to limit the oscillator frequency span. Without this limit capacitor, the oscillator stage may no longer be under the direct control of the crystal. When this happens the oscillator frequency stability is rather poor.

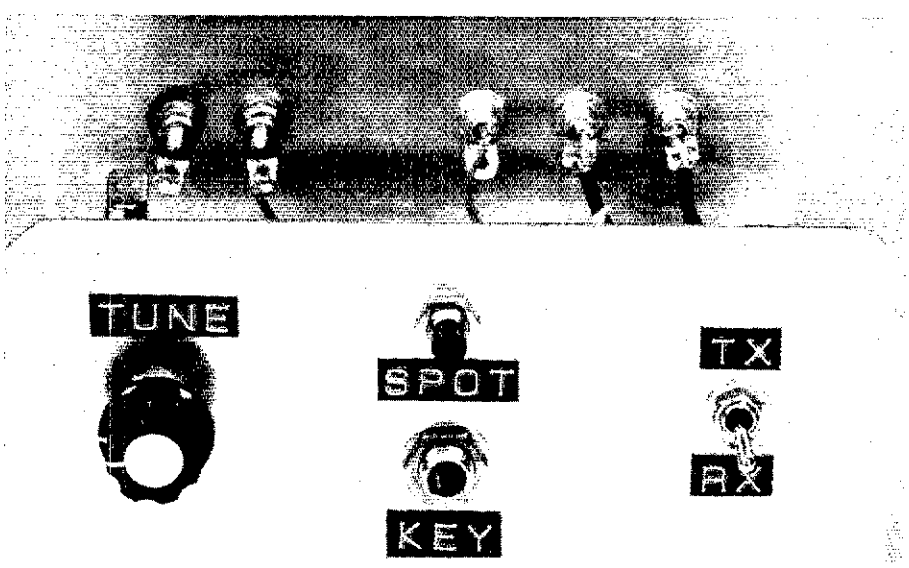
A Zener diode is used to regulate the dc voltage supplied to the oscillator stage. Operating voltage is present at the oscillator only during transmit and spot periods. Since the oscillator operates on precisely the same frequency as that being received, some means must be included to shut down the oscillator during receive. A section of S2 performs this function.

The oscillator is lightly coupled through a 50-pF capacitor to the buffer stage. In addition to providing approximately 10 dB of gain, this stage effectively isolates the oscillator from the succeeding keyed stage. This buffering prevents pulling and chirp. A 2N2222A transistor in a grounded-base configuration is used at this position.

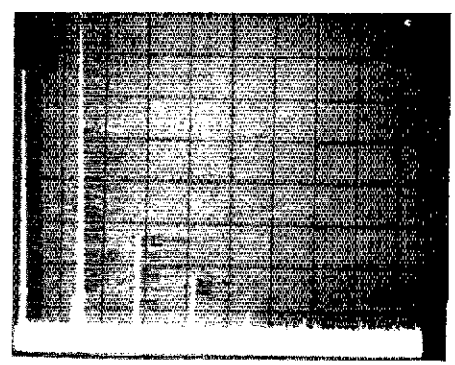
Q3, a rugged 2N3866 transistor, serves as the driver. This is the only keyed stage in the transmitter. The base and emitter resistors are grounded through J1. This stage uses series and shunt feedback to stabilize the input and output impedances in the vicinity of 50 ohms. The 0.1-μF capacitor across the key connection shapes the transmitted waveform. Although the keying is rather hard, there is no evidence of clicks.

Q4 and Q5 are used in a Class C,

The front panel of the 20-meter VXO-controlled transmitter described in this article.



Spectral output of the transmitter, as displayed on a spectrum analyzer. The pip at the far left is generated inside the analyzer. The vertical scale is 10 dB per division, and horizontal scale is 10 MHz per division.



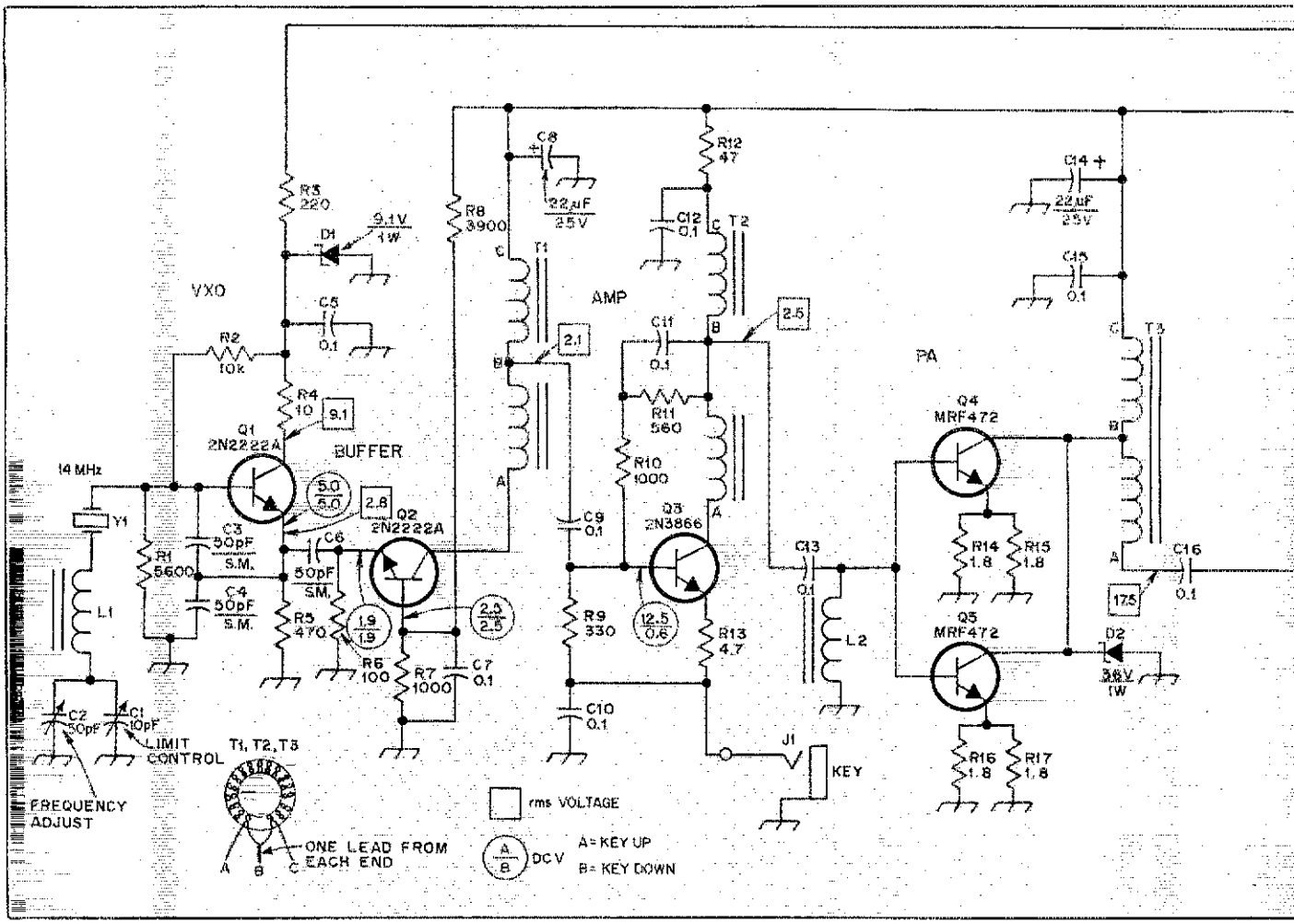


Fig. 1 — Schematic diagram of the transmitter. All resistors are 1/4-watt composition types with the exception of the 1.8-ohm resistors, which are 1/2-watt composition. All capacitors are disk-ceramic or Mylar types except for the ones noted as silver mica or polystyrene or those with a polarity marking. Polarized capacitors are electrolytic or tantalum. Numbered components not listed below are identified for circuit-board placement.

C1 — Miniature trimmer, 10 pF maximum.
C2 — Panel-mount variable, 50 pF maximum.
C3, C4 — Polystyrene capacitor, 240 pF.
D1 — Zener diode, 9.1 V, 1 W.
D2 — Zener diode, 36 V, 1 W.
D3 — Rectifier, 50 V, 2 A.
J1 — Key jack, builder's choice.
J2, J3 — Binding post, builder's choice.
J4-J6, incl. — Coaxial receptacles, builder's choice.
L1 — Toroidal inductor, 36 turns no. 32 enam. wire on a T37-6 core.
L2 — Ferrite-bead inductor, 8 turns no. 26 enam. wire on an FB-73-801 core.
L3, L5 — Toroidal inductor, 16 turns no. 24 enam. wire on a T50-6 core.
L4 — Toroidal inductor, 19 turns no. 24 enam. wire on a T50-6 core.
Q1, Q2 — Transistor, 2N2222A.
Q3 — Transistor, RCA 2N3866.
Q4, Q5 — Transistor, Motorola MRF472 or HEPS3044
S1 — Spst, normally open, momentary, push button.

final-amplifier stage that operates at the 10-watt input level. The efficiency is on the order of 60 percent. L2 is a choke wound on a ferrite bead and is used as a base return. The MRF472 transistors were designed primarily for use in rf power-amplifier stages in citizens band communications equipment. The rated power dissipation is 10 watts per device with a good heat sink. A relatively large margin of safety was gained by using two of these devices in parallel. T3, a broadband transformer, steps up the collector impedance to 50 ohms. A five-pole Chebyshev filter consisting of L3, C3, L4, C4 and L5 is used to reduce the harmonic energy reaching the antenna. The second and third harmonics are 55 and 63 dB, respectively, below the carrier level. D2 is provided to clamp the collector waveform should the transmitter be inadvertently operated into an open circuit or a very high-SWR load. The transmitter is designed to operate into a load of approximately 50 ohms resistive.

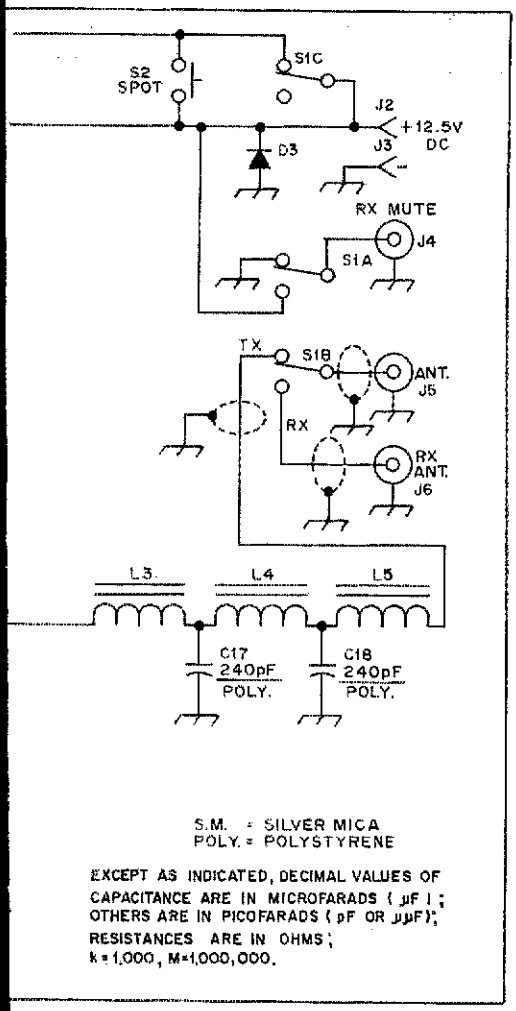
S2 is used to transfer the station antenna to either the transmitter or the receiver, turn off the oscillator during receive periods, and provide a means for muting the receiver. A three-pole, double-throw switch is used at S2. S1 is a normally open, momentary-type toggle switch which is used to activate only the oscillator. If this button is pressed during receive, the frequency of the oscillator can be adjusted without sending out a signal over the air.

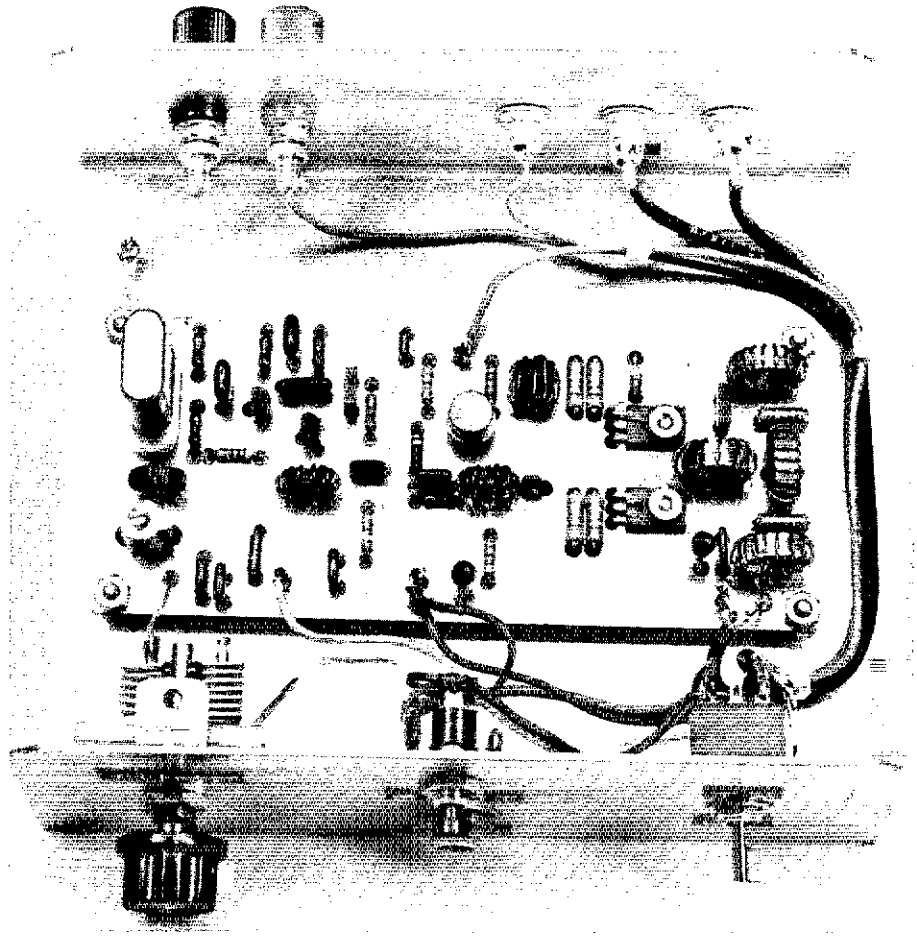
Construction

The majority of the circuit components are mounted on a double-sided circuit board (one side of which is a groundplane) that measures 2-1/4 × 5-1/4 inches (57 × 133 mm). The black etching pattern is shown in the "Hints and Kinks" section of this issue and the parts overlay is displayed in Fig. 2. Q4 and Q5 are mounted to the groundplane side of the board using the circuit-board foil as a heat sink. Mica insulating washers and a small amount of silicone grease should be used between the transistor and the board. No. 4 hardware is used to secure the transistors to the board. Tighten the screws securely, but do not overtighten.

The chassis used to house the transmitter was cut from a piece of scrap aluminum and formed into the shape of a U. The dimensions are 6 × 5 × 2-1/2 inches (152 × 127 × 64 mm). Mounted to the front panel are the frequency-adjust capacitor, transmit-receive switch, spot switch and key jack. The rear panel supports the power-supply binding posts and the antenna, receive antenna and mute receptacles.

Insulated hookup wire is used for all dc connections between switches, receptacles and the circuit board. Miniature coaxial cable (RG-174/U) is used for all rf runs.





Inner workings of the 20-meter transmitter. D3 should be mounted directly at the power-supply binding posts. Cable ties are used to dress the leads.

S2 — 3pdt, toggle.
T1, T2 — Toroidal transformer, 11 bifilar turns no. 26 enam. wire on an FT37-61 core.
T3 — Toroidal transformer, 11 bifilar turns no. 26 enam. wire on an FT50-61 core.
Y1 — 14-MHz fundamental crystal.

Dymo labels affixed to the front panel complete the unit.

Alignment and Interconnection with Mating Receiver

Alignment of the transmitter involves only one adjustment, that of C1. This capacitor should be set so that the maximum frequency excursion obtained with the oscillator is limited to 10 kHz. This can be done with the aid of a calibrated receiver or a frequency counter. Should the frequency span exceed the 10-kHz figure, simply increase the amount of capacitance at C1. If it is less than 10 kHz, decrease the amount of capacitance.

In order for the transmitter to be used with the high-performance receiver featured in April 1978 *QST*, a slight modification must be made to the receiver. This involves mounting an additional phono connector to the rear panel. It will be necessary to connect a length of hookup wire from the center connection of this receptacle to the end of R9 that originally was connected to the 12-volt bus. This can be done easily by standing the resistor on end. The end of R9 that is connected to the mute receptacle should not be connected to the 12-volt bus in the receiver.

Chances are that *you* won't be snookered by a bogus contact. However, it might seem so when you start working your share of DX with 6 watts!

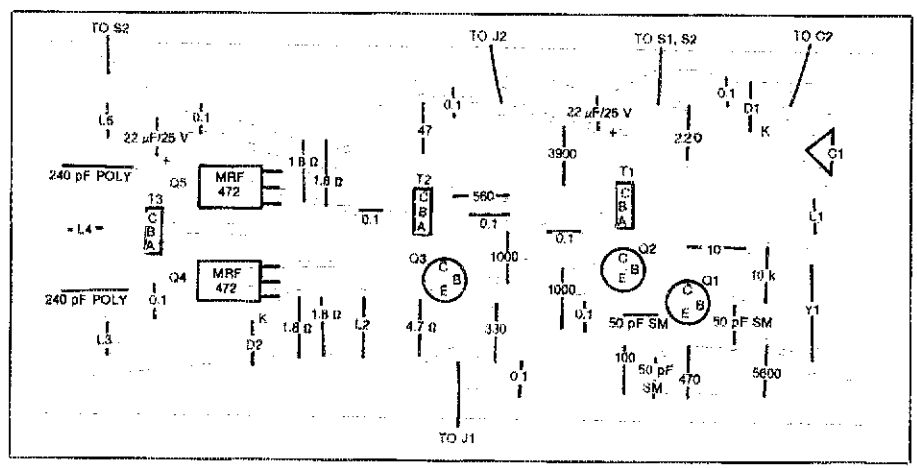


Fig. 2 — Parts-placement diagram for the transmitter circuit board. The board has foil on both sides, the side on which the components are mounted being only a groundplane. Component-lead clearance holes in the groundplane may be etched or drilled. The shaded area here represents an X-ray view of the interconnecting copper pattern, shown in the "Hints and Kinks" section of this issue. Whole-number values with no units represent resistances in ohms. K indicates the cathode of a diode. Transistors Q4 and Q5 are mounted to the board using mica insulating washers and silicone grease. POLY = polystyrene; K = cathode; SM = silver mica.

A Baseband Communications System

Part 2: The technology behind the NBVM system, circuit details, and most important of all, how you can get one on the air are included in this part.†

By Dr. Richard W. Harris* and J. F. Cleveland,** WB6CZX

The first part of this article describes the development of a baseband system which allows significant communications improvements in a narrow bandwidth. In this concluding part, detailed hardware and development information is given to allow the reader to build or procure the system.

By way of brief review, the baseband transceiver system operates just after the microphone on transmit and just prior to the speaker on receive. It uses the newly developed frequency compandor and the well known but not extensively used amplitude compandor.[5] The use of both of these devices within the same baseband system provides significant improvements in adjacent-channel rejection and signal-to-noise ratio (SNR).

Tests of the frequency compandor conducted for the FCC[9,10] indicate that an interfering signal can be 40 dB stronger and only 2 kHz away and yet be essentially eliminated. Results of amplitude-compandor tests showed that background channel noise can be reduced so significantly that an increase of 13-15 dB SNR is obtained. The use of the baseband system offers up to 50 percent bandwidth savings with the frequency compandor. This bandwidth savings translates to an improvement of 3 dB SNR.

System Options

During the hardware evolution it became apparent that several optional modes of operation could be made available to enhance the overall capability of the baseband system. During on-the-air tests thus far conducted, it has become apparent that a 1600-Hz transmission bandwidth with a shape factor of 1.3:1 is a very narrow system indeed. In some cases a wider system, between the narrow 1600-Hz audio and the typical 2400-Hz audio used, for example, by the ICOM IC-245 and the Kenwood TS-820, would be desirable. Thus the system developed uses two frequency-compandor modes, 1600 Hz (50 percent bandwidth savings) and 2100 Hz (33 percent bandwidth savings). These savings are compared to a 2:1 shape factor audio filter of 2400-Hz bandwidth.

With the 2100-Hz option available it becomes obvious that use of a 2100-Hz stand-alone audio filter may be very useful, particularly if the user's transceiver does not already have a very narrow i-f or audio filter. Use to date has shown both the 2100-Hz frequency compandor and stand-alone audio filter modes to be valuable additions. Although the frequency compandor has a very sharp transceiver filter and on ssb reception eliminates audio frequencies outside the voice-frequency range of the desired signal, elimination of undesired signals in the "opposite" sideband is dependent primarily upon the receiver i-f filter. (Some receivers may not have sufficient opposite-sideband rejection.) Use of the 700-Hz high-pass filter within the frequency compandor in conjunction with either the 1600-Hz or 2100-Hz low-pass filter provides a very narrow band-pass filter which helps significantly to reduce opposite-sideband interference while allowing reasonable intelligibility. (The 2100-Hz low-pass filter is preferable to the 1600-Hz filter.)

Many amateurs compress their audio level on transmission to allow higher average transmitter power, but few amateurs take advantage of audio expansion on reception. As long as the amplitude expander has sufficient signal level to use as a reference, suppression of channel noise and interference significantly improves the received audio SNR. Independent switches for the amplitude compressors and for the expander seem to be very desirable. This feature has been included in the baseband system and allows the use of the expander as a stand-alone feature on receive to allow expansion of amplitude-compressed signals.

The narrow band-pass filter (BPF) option from 700 Hz to 1600 Hz offers the user a moderate bandwidth with sharp skirts for cw use. Furthermore, preliminary tests using the amplitude expander in conjunction with the BPF indicate that exceptionally quiet code reception can be obtained. This increased SNR provides fewer decoding errors and less annoyance, particularly for weaker signal contacts.

The baseband system described here has evolved over a period of three years. It

*President, VBC, Inc., 1111 W. Robinhood Way, Suite Z, Stockton, CA 95207
**305 Germaine Ave., Santa Cruz, CA 95065
†Part 1 of this article appeared in November 1978 *QST*.
[5]Notes and references appear on page 20.

Active Filters

Filter	Type	Number of Poles	Cutoff freq., Hz	Shape Factor (–6 to –60 dB)
VBC-0600L	Low Pass	6	600	2.50
VBC-0700H	High Pass	6	700	2.80
VBC-1600L	Low Pass	16	1600	1.28
VBC-2100L	Low Pass	16	2100	1.28
VBC-2500L	Low Pass	8	2500	1.25

provides many options for communications improvement so that, depending upon the environment, the user may select several modes for optimizing radio communications.

Choice of Hardware Technology

The system was developed for use by a potentially large number of users. Several technologies were considered, such as digital, hybrid analog, and discrete analog devices.

A system providing good control and versatility is one which uses an analog-to-digital (A/D) converter and then processes the signal in a fast microprocessor to obtain the bandwidth compression. It then converts the digital signal back to analog (D/A) form for transmission. On reception another A/D converter would be used with the microprocessor for bandwidth expansion, followed by a D/A converter to present an analog signal to the user. Cost is a major reason why such a system was not used. Cheap microprocessors are available, but not *fast* cheap microprocessors. Cycle times on the order of 100 nanoseconds are required. The digital filtering necessary in performing the frequency compandoring would require the use of several 8-bit digital multipliers with multiply times on the order of 100 to 200 nanoseconds. These devices currently cost $100 to $200 each. This cost, when added to the cost of the A/D and D/A converters and other associated fairly high-power digital electronics, is currently prohibitive for widespread use.

Discrete analog-device implementation was also considered. This technology uses mainly discrete resistors, capacitors and operational amplifiers. To perform the audio filtering it is necessary to use low-sensitivity realizations of active filters. The achievement of fast roll-off filter characteristics (shape factors as low as 1.3:1) requires the use of multiple-pole filters having part tolerances of one percent or less. Consideration of the assembly time and high parts cost as well as the overall reliability of such circuits using discrete components led to the conclusion that hybrid-chip technology was a better hardware solution.

The baseband system developed uses six high-performance hybrid chips with laser-trimmed one-percent resistors, very stable long-life capacitors, and low-noise operational amplifiers. This modular system provides flexibility in interconnections for future improvements. The hybrid chips operate over a wide temperature range (0-70°F or −18 to +21°C), dissipate very little power (the greatest being 0.25 watt), occupy very little volume (1.25 cubic inches or 20 cm³ including all six hybrid chips), and provide excellent reliability.

Detailed Hardware Discussion

In the paragraphs which follow, a detailed discussion of the hardware used in the baseband system is given. Reference may be made to the block diagram (Fig. 7, Part 1 of this article). Considered during development of this system were cost and performance (audio and electronic) to provide many improvements in radio communications for a wide variety of environments and user equipment.

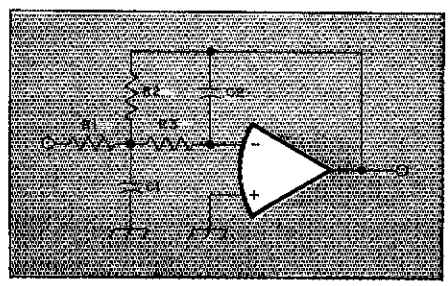
Audio Filters

Four active audio filters are basic to the frequency compandor. All are based on 0.1-dB-ripple Chebyshev low-pass prototypes. Higher ripple could be tolerated to obtain faster cutoff rates than with these filters, but another important factor must be considered. It is well known that all filters exhibit delay, and this delay is not constant across the passband of Chebyshev filters. The delay variation (also known as differential-delay distortion) across the passband of the filter can be quite large for audio filters compared to similar filters at radio frequencies. Voice information can only tolerate up to about 10 ms of delay distortion over its spectrum before garbling begins to occur. Since the voice information must pass through the four filters of the frequency compressor at the transmit end and four more filters at the receive end, each end can have about 5 ms total differential delay distortion. The filters used here each exhibit an average of about 1 ms delay distortion, so the total is 4 ms on transmit and 4 ms on receive. Thus the 10-ms maximum is adhered to.

Table 3 lists the characteristics and typical performance of the five filters used. It is important to note that the 1600L and 2100L are not used simultaneously. The two 16-pole filters each consist of two identical cascaded eight-pole designs to minimize delay distortion. Each two-pole pair requires a stage such as shown in Fig. 12 for the low-pass case. From this information the experienced amateur may duplicate these filter designs with discrete components, if he so desires.

The advantages of the hybrid implementation of these circuits are significant. High-order discrete filters were built by the authors in early stages of development, but they can be very difficult to tame. Problems which arise with discrete layouts are the unavailability of an infinite variety of resistor values, instability, inadequate ultimate rejection, and excessive noise. Size is also important when one is talking about a total of 26 active filter stages, not to mention the oscillator, mixer and switches.

Fig. 12 — The basic diagram of one two-pole, low-pass filter section.



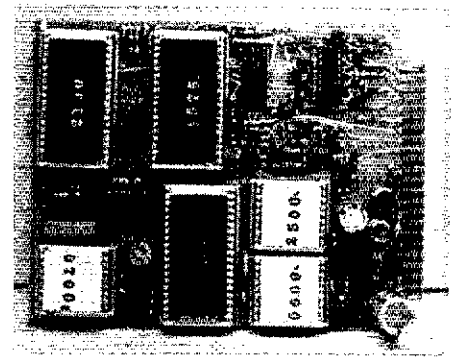


Fig. 13 — The entire circuit except for controls and switches is built upon a single circuit board as shown here. The board must be mounted in a shielded enclosure to prevent rf feedback problems.

The hybrid approach allows the total prototype system minus external controls to be contained on a standard 4-1/2 × 6-inch (114 × 152-mm) plug-in printed circuit card (see Fig. 13). The 16-pole active filters each measure 1 × 2 inches (25 × 51 mm) and the other filters are 1 inch (25 mm) square. Texas Instruments' TL074 low-noise bi-FET quad op amps are used throughout. Since the audio passes through about 20 op amps in each direction, low-noise amplifiers are critical to attaining adequate dynamic range. Typical ultimate rejection is improved from 50 dB in the discrete version to 65 dB in the hybrid version. Feedback and unwanted oscillation is easily controlled and power supply decoupling is less critical. Dc offsets in the direct-coupled stages are minimized by low input currents of the TL074 op amp. Laser trimming of the thick-film hybrid resistors assures reliable reproduction of the desired filter characteristics in quantity production. The low temperature coefficients of the thick film-resistors and COG-dielectric capacitors assures that the filter will remain in specification over a wide temperature range (limited only by the op-amp performance with temperature). All filters have band-pass gains near 0 dB and can handle +10-dBm inputs with a total supply voltage of 10. They were designed for so-called single-supply operation. Supply voltages used in this device are regulated at +10 and +5 dc. Supply sources must exhibit very low impedance at audio frequencies.

Control Circuit

The control hybrid (VBC3000C, shown in Fig. 14) contains the 3100-Hz oscillator,

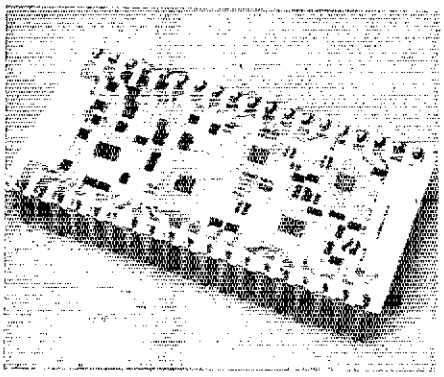


Fig. 14 — Here is an interior view of the hybrid control circuit used in the processor.

balanced mixer, mic preamplifier, CMOS analog switches and buffer amplifiers for the basic frequency compandor. The oscillator uses two op amps and has amplitude limiting to minimize harmonic distortion. Frequency trim and output connections are externally available. The doubly balanced mixer is a TI TL442 which operates reasonably well at audio frequencies. Signal input is about −20 dBm at the rf port, −10 dBm at the LO port, and output is about −20 dBm at the i-f port.

Most voice signals throughout the control chip are at −10 dBm to allow plenty of headroom below the +10-dBm saturation limit of the filters. In addition to the filter inputs and outputs shown in the block diagram, other external connections allow for additional carrier balance, buffer gain and logic reference adjustment.

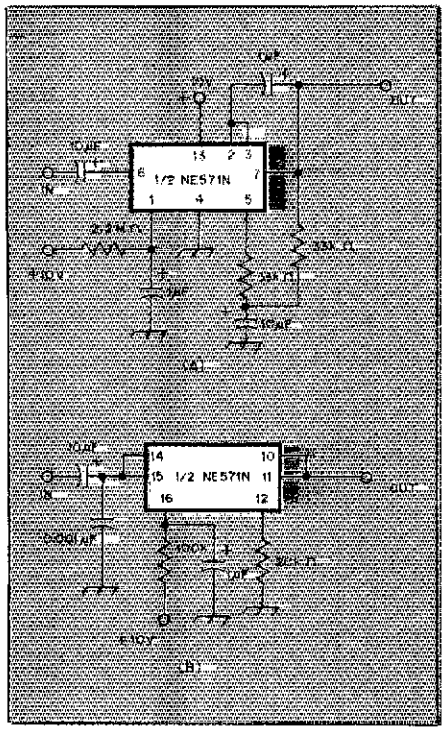
The peripheral circuitry includes an extension of the switching capability for receive-only filtering. Spare op amps in the 0600L and 0700H filters are used for the additional buffer amplifiers. An LM380N is used to provide about 1 watt of audio-output capability into 8 ohms. The gain of this device is reduced to 10 with negative feedback from the speaker terminal to the inverting input. This reduces instability problems and microphonics inherent with the LM380 when used at its maximum gain of 50.

Fig. 15 is a schematic of the actual connections to the NE571 amplitude compandor. At A, the 100-Hz time constant for the internal rectifier is set with an internal resistor and the external 1-μF capacitor. The 2.2-MΩ resistor provides the transfer curve mistracking at low levels, as described earlier. The combination of two 33-kΩ resistors and the 10-μF capacitor sets the dc gain of the compressor internal op amp. The 20-kΩ resistor in Fig. 15B biases the expander internal op amp to +5 V dc for maximum signal-handling capability.

The total system is powered from a 12.5- to 20-V dc source at 75 mA idle and approximately 300 mA at 1 watt audio output. All circuitry, excluding the LM380, is powered from +10- and +5-V dc regulators (LM340LAH-10 and -5).

One last circuit was devised to provide interface between the radio transmitter key line and the audio transceiver accessory. Since differing transmitters have a variety of voltages and impedances on the key line during key-up conditions, the circuit in Fig. 16 was developed to handle most situations. The circuit requires a low-impedance ground closure to go into the transmit mode. If the impedance becomes very high or the voltage exceeds ±0.5 from ground, the unit returns to the receive mode. This allows for positive or negative key-up voltages and assumes a grounded line during transmit. There is no load on positive key lines and approximately a 100-kΩ load on negative key lines. Key-line voltages must remain within the reverse breakdown voltage of the diode-transistor combination (about 60 volts).

Fig. 15 — Amplitude compressor circuit (A) and expander circuit (B).



Construction

The schematic diagram of the voice processor is shown in Fig. 17. Figs. 18 and 19 show the control circuitry and the connections to the circuit board. An etched circuit board with all necessary parts to complete a basic processor board is available commercially.[11] [The etching patterns for the double-sided board, not available from the authors in time for printing in this issue of *QST*, are offered separately.[12] — Ed.]

Layout of a printed circuit board for this application is tricky at best. Ground loops are hard to avoid and can make the whole unit sound like a squawking chicken. Keeping the local-oscillator signal out of where it doesn't belong is the hardest part since it is a coherent tone and is audible at levels lower than normal voice sounds. Additional power supply decoupling of the oscillator stages is helpful. Rf bypass capacitors are used liberally on the audio input and output lines. *The unit must be mounted in a well-shielded enclosure.* Stray rf getting into any of the audio circuitry can cause "gravelly" sounding audio or even blocking.

One of the photos shows the prototype-unit front panel, which includes control switches, mic input, mic level control, and the receive volume/on-off switch. The rear panel uses phono and phone jacks for other inputs and outputs. The 12.5-volt power is provided by an external dc power pack such as those used for calculator recharging. A 13-volt automobile system is also suitable.

Interface with a radio transceiver is quite simple. The unit is connected permanently, since its functions can be bypassed if desired. The station microphone is connected to the processor front-panel mic jack. The push-to-talk line is routed directly to the processor mic output jack (and is tapped by the audio processor control circuit). A shielded cable is installed between the processor mic and PTT output and the equivalent transceiver input. The receive audio is brought from the station transceiver speaker or earphone output (after the volume control) and is connected to the receive input on the voice processor. A speaker or earphone is connected to the appropriate audio output jack. In operation, the voice processor volume control is preset to a desirable listening level and the receiver volume control is then used to adjust volume to keep the input level to the voice processor fairly constant with varying signal strengths. If the station receiver has very good age characteristics, volume adjustment requirements will be minimal. If not, the volume will need periodic adjustment to keep strong signals from overdriving the amplitude expander, since a 1-dB increase in level at the input is converted to a 2-dB increase at the output of the amplitude expander. (Future pilot-carrier narrow-bandwidth ssb systems will have an absolute age reference, and this potential overdrive problem will be minimized.)

The unit can be used with simple double-sideband transceivers which use direct-conversion receivers. The audio filters provide abundant selectivity so all that is needed is a "front end" with a low-noise audio preamplifier to receive ssb or dsb transmissions and an rf balanced modulator and rf amplifier fed from the high-level microphone audio output to transmit dsb. The authors are investigating low-cost but high-quality hybrid

active audio phase-shift networks which would allow construction of simple phasing ssb transceivers as well.

Audio-System Performance

Two measures of audio-quality performance are intelligibility and acceptability of the reproduced voice by the user. Intelligibility can be measured as the percentage of correctly received words or phrases that were transmitted, while acceptability involves the difficult task of assessing user opinion regarding voice tonal qualities and speaker recognition.

There are many statistical tests used to measure intelligibility characteristics, such as the Fairbanks Rhyme Test, the Modified Rhyme Test, Harvard Test Sentences, Harvard P-B Word Test, and the Diagnostic Rhyme Test. Of these, the Diagnostic Rhyme Test is widely accepted by the military and has a considerable data base available, particularly for digital systems.

A prototype VBC frequency-compandor system that uses about 60-percent less transmission bandwidth than a normal baseband communications system scored 90 percent on a male speaker and 87 percent on a female speaker. (Typical long-distance telephone conversations score about 93 percent.) An amateur ssb system (ICOM IC-245) scored 95 percent using the same male speaker.

Since the last major system improvements have been made, at least 50 people have heard the audio quality at baseband, under varying conditions. Virtually all of those listening have stated that from an intelligibility standpoint the VBC 1600-Hz system provides adequate performance.

When no comparison between the frequency-compandored mode and the nonfrequency compandored mode was available, the listeners did not state that the system lacked acceptable voice quality. To these listeners sufficient identifiable speech characteristics were present and the speech quality was acceptable.

When the straight-through mode (no frequency compandor present) is compared with the 1600-Hz frequency compandor, nearly all of the listeners prefer the straight-through mode. However in communications practice, as later tests have shown, there are conditions when communication using the straight-through mode is seriously degraded or not possible. This occurs when heavy adjacent-channel interference or noise is present. In many cases use of the frequency compandor does allow communication to be established or to continue even in the presence of heavy interference.

Listener tests of the wider bandwidth VBC 2100-Hz frequency compandor have been very positive. There is little degradation in voice quality in comparison with the straight-through mode at baseband. In use on radio communications the straight-through mode may be preferred on very high SNR contacts (about 30 dB, which rarely occurs). However when the SNR is in the range of 10-25 dB (which is usually the case) the 2100-Hz frequency compandor mode is often preferred over the straight-through mode. This is primarily because the 33-percent reduction in bandwidth reduces background noise and significantly reduces adjacent-channel interference.

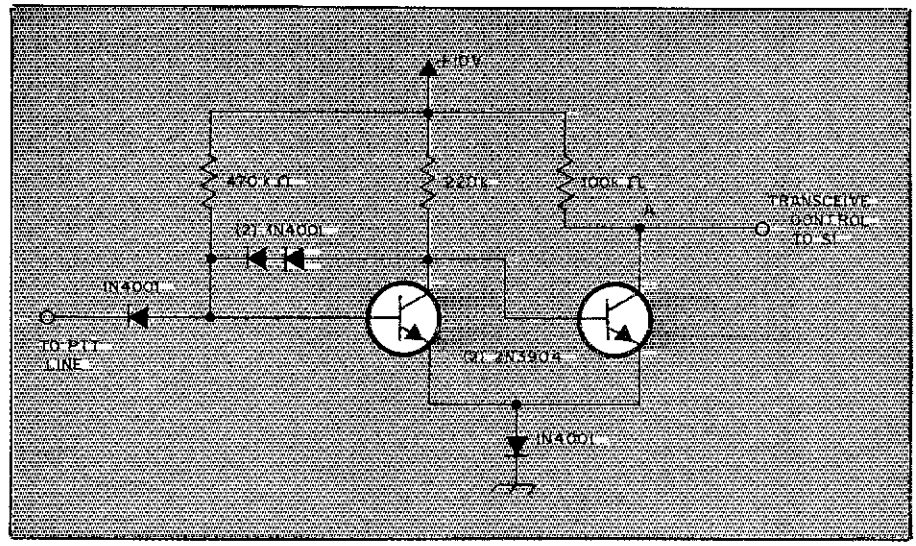


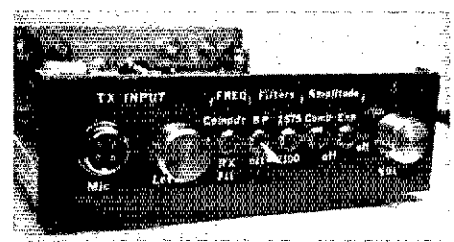
Fig. 16 — PTT-line interface to voice processor. Point A is at +10 V dc during receive and +0.5 V dc during transmit.

The amplitude compandor (Signetics NE571) does not degrade audio quality. It should be noted that some care must be taken to use proper signal levels. When proper signal levels are used, performance over the range from 5 to 30 dB SNR is excellent.

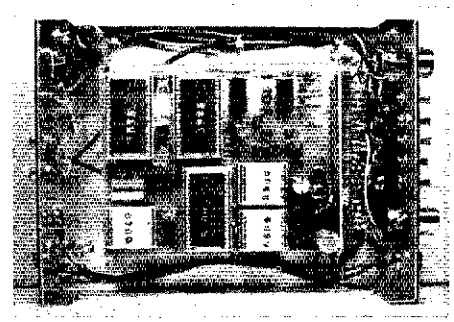
Prior to August 1978, two preliminary tests and three rather extensive tests involving several amateurs were completed. (These tests do not include the extensive bench and field tests made for the FCC in the mobile radio bands in the fall 1977.) The first extensive test was performed during the afternoon of July 19, in San Mateo, CA. Amateur participants were Tom Lott, VE2AGF/W6; Marvin Kolber, K6PJU; Bill Burris, WA6CXJ and Bob Ferrero, K6AHV/W6RJ, along with R. W. Harris. A major goal of this test was to determine the performance of the 1600-and 2100-Hz frequency-compandor interference rejection.

Three stations were set up. Kolber was using a Drake TR-3 transceiver, Burris a Kenwood R-599/T-599, and Lott a Collins KWM-2. Tom Lott and Marvin Kolber each had baseband systems and Bill Burris operated with a normal amateur ssb transceiver. To facilitate the tests a secondary communications net was set up by all three stations using 2-meter transceivers.

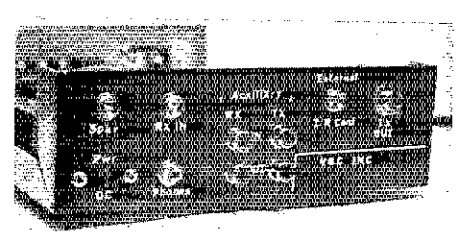
For this test, Tom Lott transmitted the "wanted" signal and Bill Burris provided



Front-panel view of a prototype compandor system. As outlined in the text, considerable flexibility has been designed into the system. Various modes of operation can be selected with the flip of a few switches.



A peek directly into the compandor system prototype. The edge connector for the circuit board facilitates easy removal.



This view shows the rear panel of the processor. Layout is not particularly critical, but leads should be kept as short as possible. The use of a completely shielded enclosure is mandatory.

the "unwanted-interference" signal. At the receive station of Marv Kolber, manned by Kolber, Ferrero and Harris, the performance quality was assessed. To begin with, all three stations were on the same frequency in the 40-meter band. Transmitter power was adjusted to provide comparable SNR and audio level for the wanted and unwanted signals as received at Kolber's station. Then by request, Burris moved off frequency until the characteristic "Donald Duck" close-interference sound was heard. At this point Tom Lott was asked to talk continuously, as was Bill Burris, providing the interference signal. So far in the test all 40-meter rigs were being operated in the straight-through mode. A good assessment of the interference level was made and then the frequency and amplitude compandors were switched in (sometimes separately).

In nearly all cases the compandor circuits provided a dramatic reduction in the interference signal, the exception being when the interferer was virtually on top of the wanted signal. The dramatic improvement occurred because the major portion of the interferer's voice was being filtered out by the sharp reception filter of the frequency compandor, while the transmitted voice was narrow enough to be properly received. The amplitude compandor also significantly aids in this rejection because it suppresses unwanted lower level interference with the amplitude expander. It has the effect of making the reception filter skirt seem even sharper.

The above adjacent-channel interference test was repeated several times. We also assessed the effects as the interferer was made stronger than the wanted signal. Again, the interference was significantly reduced by use of the compandors. These results verified the earlier extensive tests made for the FCC on the 2-meter mobile band.[9,10] Significantly, however, they were being performed on the air instead of on the bench, as was primarily done in gathering data for the FCC report.

In addition to adjacent-channel tests, several tests in the presence of heavy noise were performed using the compandors. When the SNR was low, but high enough to hear the wanted speaker (about 5 dB), use of the amplitude compandor dramatically reduced background noise and interference. In several instances a nearly unusable voice signal sounded like it jumped out of the noise and became a pleasantly readable signal. When the transmitting signal dropped until the SNR was about 0 dB, the amplitude compandor did not improve communications. This effect indicates, as predicted, that sufficient signal must be present to obtain a reference.

Several of the receiving modes such as stand-alone filters and expander only on the baseband system were also tested. The general conclusion of those present was

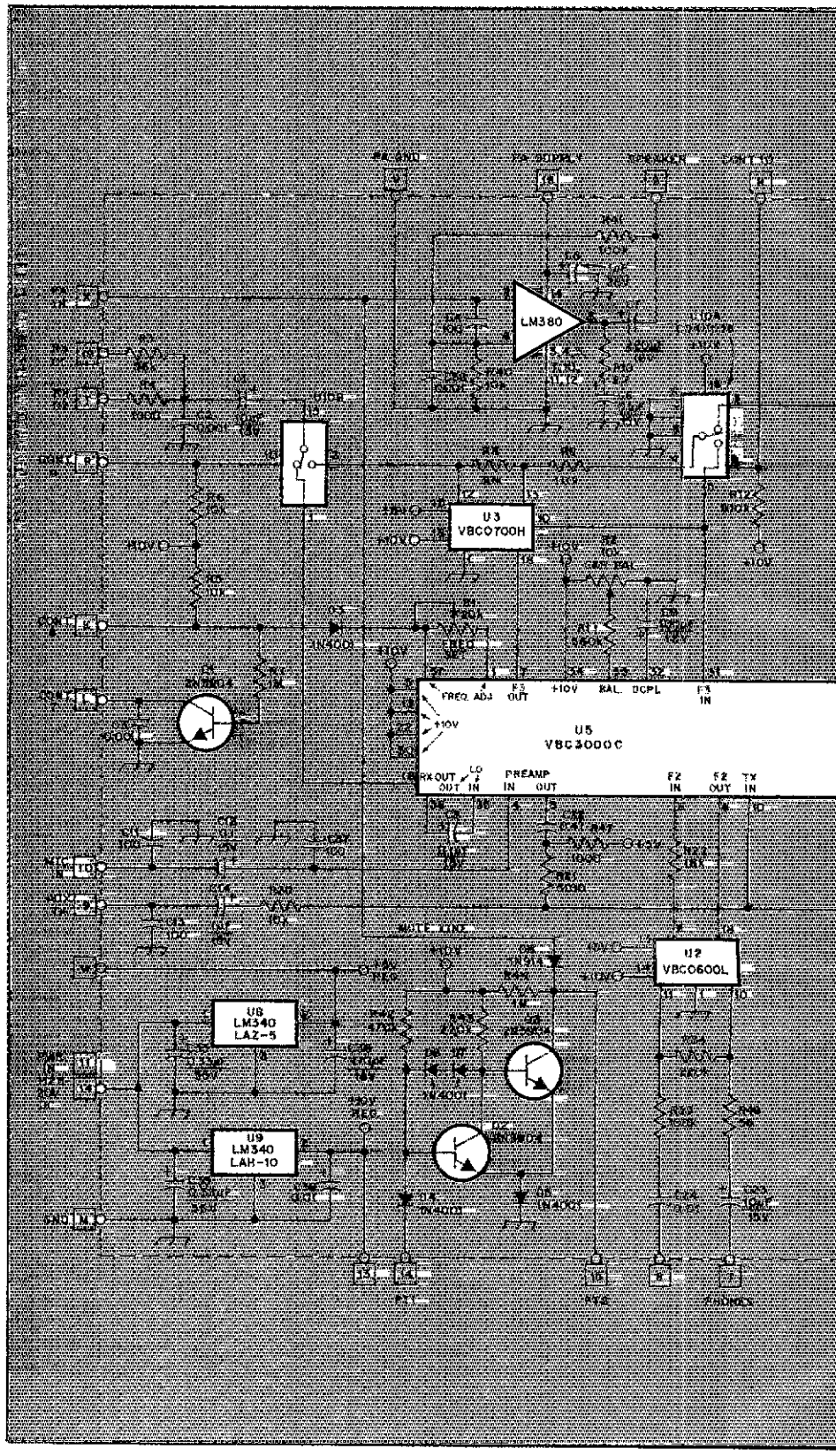
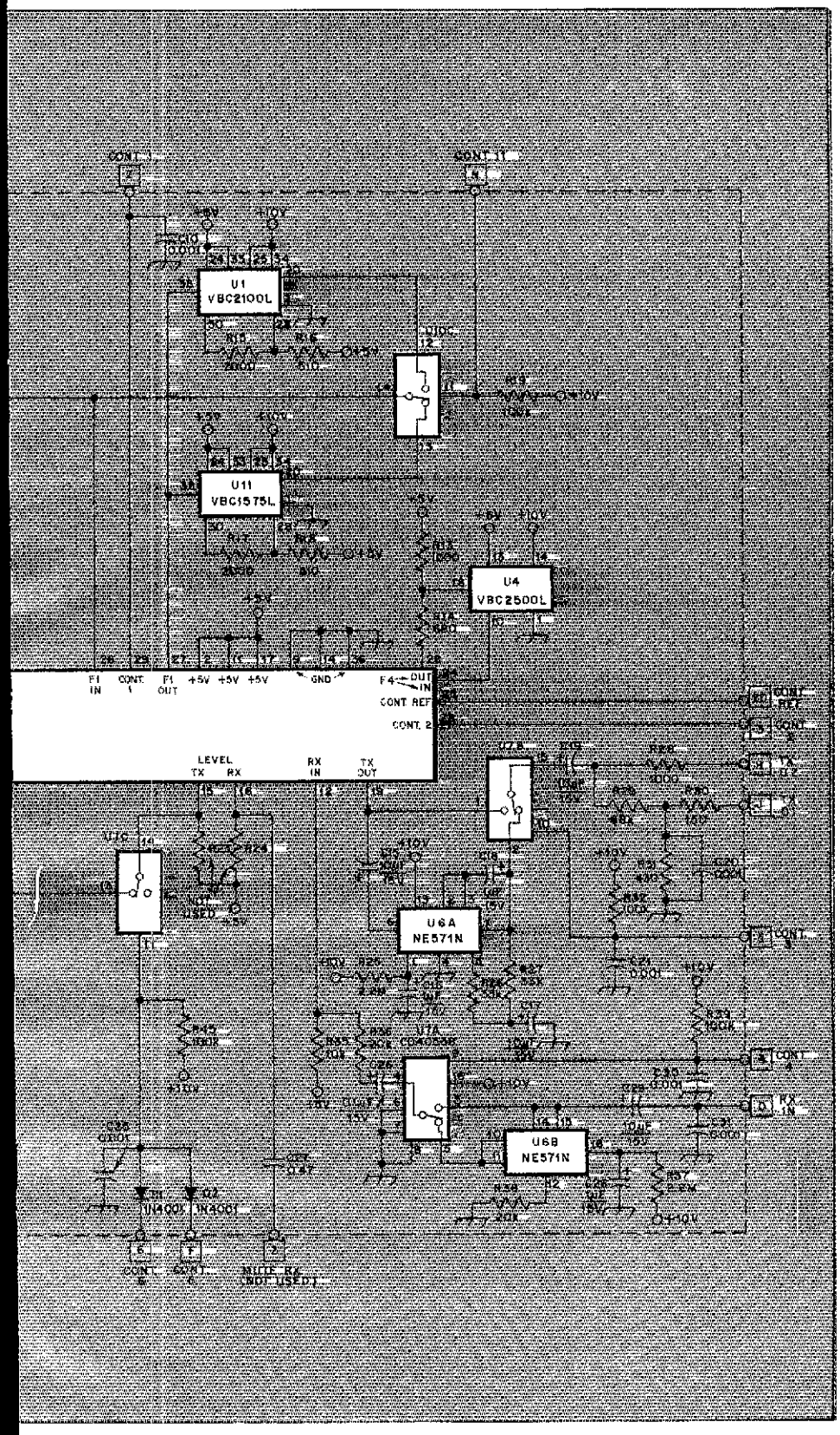


Fig. 17 — The schematic diagram of the compandor system. All numbered squares represent circuit board foils which mate with a standard edge connector.

C1, C15, C17, C19, C23, C29 — 10 μF, 15 V, electrolytic or tantalum.
C2, C3, C10, C20, C21, C25, C30, C31, C32 — 0.001 μF, 50 V, disk ceramic.
C4, C11, C13, C37 — 100 pF, disk ceramic.
C6, C8, C12 — 0.1 μF, 15 V, tantalum.
C7 — 220 μF, 16 V, electrolytic.
C9 — 100 μF, 15 V, electrolytic.
C14, C16, C18, C28 — 1 μF, 15 V, tantalum.
C22 — 0.47 μF, nonpolarized.
C24, C38, C40 — 0.01 μF, 50 V, ceramic.
C27 — 0.047 μF, 15 V nonpolarized.
C33, C35 — 0.33 μF, 35 V, tantalum.
C36 — 470 μF, 16 V, electrolytic.
C39 — 22 μF, 15 V, tantalum.
C41 — 1000 μF, 25 V, electrolytic.
D1-D8, incl. — 1N4001, or equiv.
D9 — LED.



J1 — Edge connector, 22 pin, 44 contact.
J2-J12, incl. — Builder's choice.
Q1-Q3, incl. — Switching transistor, 2N3904.
R48 — Potentiometer, 50 kΩ.
R49 — Potentiometer, 25 kΩ.
S1 — Toggle switch, dpdt.
S2-S5, incl. — Toggle switch, spdt.
S6 — Toggle switch, spst.
U1 — Hybrid circuit, VBC2100L.
U2 — Hybrid circuit, VBC0600L.
U3 — Hybrid circuit, VBC0700H.
U4 — Hybrid circuit, VBC2500L.
U5 — Hybrid circuit, VBC3000C.
U6 — IC, Signetics NE571N or equiv.
U7, U10 — IC, CD4053B or equiv.
U8 — Voltage regulator, LM340LAH-5.
U9 — Voltage regulator, LM340LAH-10.
U11 — Hybrid circuit, VBC1575L.
U12 — Audio amplifier, LM380.

that the baseband system would be a valuable addition in a wide variety of amateur operational conditions.

On July 17, a short test session used baseband systems at two stations on 15 meters. Fred Cleveland, WB6CZX; Dale Dunmire, W6SJV and R. W. Harris performed transmitting and receiving tests. These tests were primarily voice-quality tests to aid in performing the later, more extensive tests on July 19. Results of these tests, using several different speakers, indicated good intelligibility and communicability for the frequency-compandor systems.

On several other occasions Dunmire tested the system in various receive modes for several hours. The results were very positive as to the communication enhancement provided. This was particularly so when using filters only and when using the expander only. Dunmire also reported several instances when he used the expander to test whether the voice signal being received was compressed on transmission. When compression was being used he noticed a significant reduction in background noise when he switched in the expander on the baseband receiver system.

Another extensive test was performed on July 24, between Tom Lott and Dale Dunmire, with R. W. Harris being present at Dunmire's station. Again the test was performed on 40 meters, but the contact was over a longer distance than before, approximately 75 miles. Good results were obtained. Audio quality was reported to be adequate in both frequency-compandor modes. Several times the amateurs noted how quiet and free of interference the background was when compandors were being used.

Future Amateur Participation

Although tests to date have been very successful, many more tests are desired on other bands and under varying conditions. Large numbers of amateurs should be involved. Only then will a sufficient data base be established as to the full usefulness of the baseband system. The results may provide guidance for future improvements.

As currently designed, the baseband internal local oscillator is fixed at 3100 Hz. This choice was made to allow a wide range of transmission and reception filters to be used with cutoff frequencies between 1500 Hz and 2500 Hz. Hardware for amateur use now provides filters of 1600 Hz and 2100 Hz. VBC is also making an 1850-Hz filter for mobile radio bands, which could be obtained as an option for amateur use. Many amateurs may wish to experiment by using their own transmission and reception filter designs. It is hoped that amateurs will be heavily involved in the evolution of the system. Results of their experimental work will prove very valuable for future efforts in

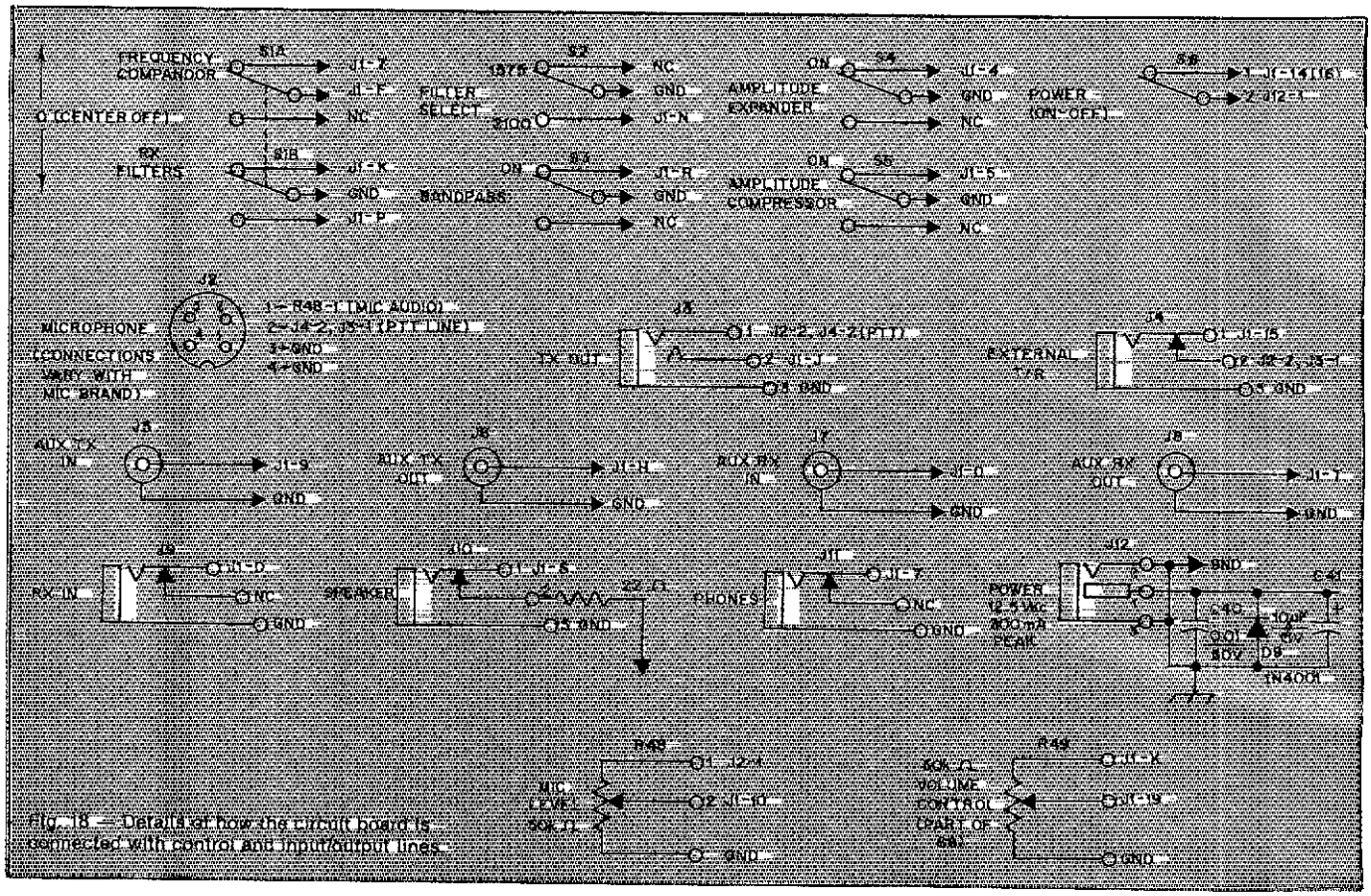


Fig. 18 — Details of how the circuit board is connected with control and input/output lines.

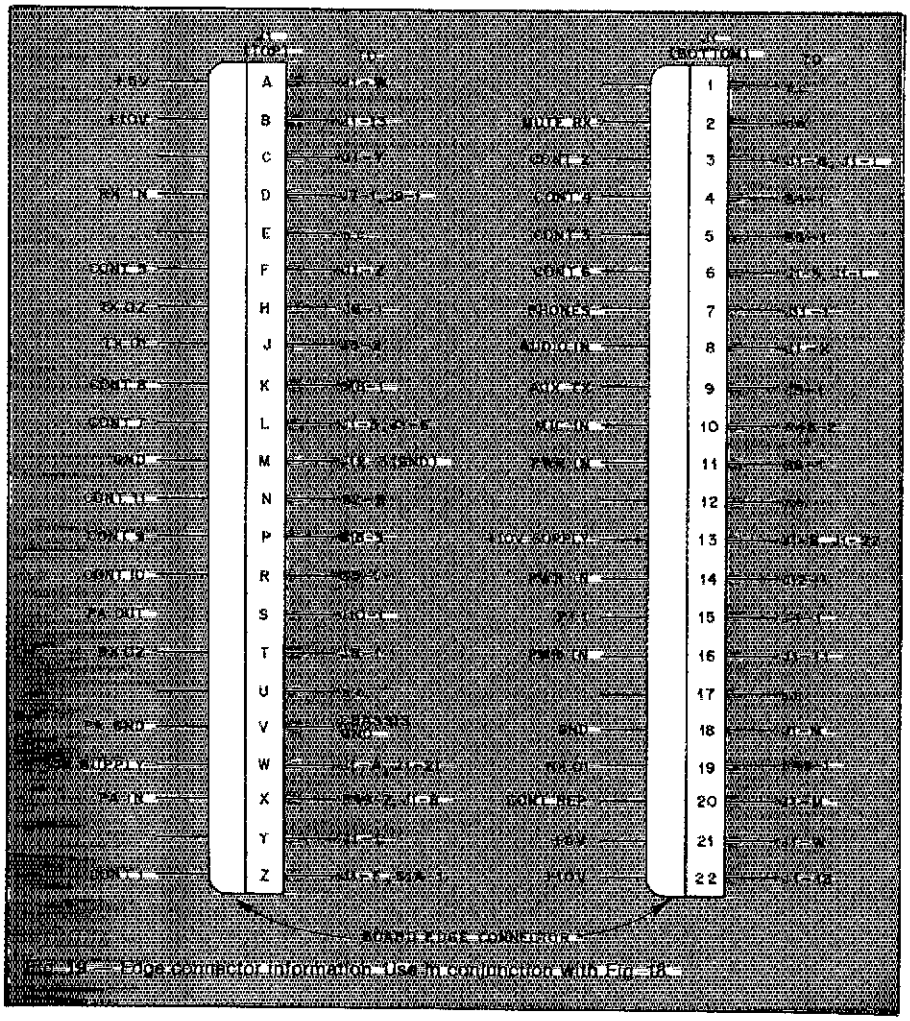


Fig. 19 — Edge connector information. Use in conjunction with Fig. 18.

bandwidth and power conservation.[1]

Future Improvements and Conclusions

VBC, Inc., is now participating in a shared FCC contract with Stanford University (directed by Dr. Bruce Lusignan) to produce prototype ssb transceivers for potential use in the 30- to 50-MHz mobile radio band. This work includes the development of a convenience circuit to allow automatic frequency control (afc), automatic gain control (agc), tone-operated squelch, and selective calling. Progress to-date is encouraging. Upon completion, these circuits will be made available to amateurs. Important to amateur users will be the potential use of the narrow-band technology (including compandors and the convenience circuits) in the vhf and uhf amateur bands. In these bands a channelized format similar to that of commercial land-mobile bands is used.

The combination of these newly developed baseband technologies in several bands is expected to continue to evolve for many years to come. The ultimate goal is a better and larger number of communications opportunities for all users. The authors hope to continue to be engaged in pursuing this goal.

Notes and References

[1] A frequency compandor compresses signal bandwidth on transmission and expands signal bandwidth on reception. An amplitude compandor compresses signal amplitude on transmission and expands signal amplitude on reception.

Wilmotte and Lusignan, "Spectrum-Efficient

Technology for Voice Communication," *UHF Task Force Report*, Office of Plans and Policy, FCC, Washington, DC, February 1978.

[10]Lusignan, "Single Sideband Transmission For Land Mobile Radio," *IEEE Spectrum*, July 1978, pp. 33-37.

[11]For further information on chips or products, write VBC, Inc., P. O. Box 1289, San Mateo, CA 94401, or call 415-348-8400.

[12]Write to ARRL, Dept. TD-NBVM, 225 Main St., Newington, CT 06111. To expedite mailing, please include a stamped return business-size envelope and 50 cents to cover handling (IRCs accepted from outside the U.S.).

[13][Editor's Note: Because the portion of the speech spectrum containing most of the intelligence is inverted by the processor for transmission, the communication may not be readily understood when the received signal is tuned in the normal manner. However, a compandored ssb signal *can* be tuned for some degree of intelligence (but with degraded fidelity) without processing equipment at the receiving end. Tune the signal as if it were on the opposite sideband, to receive the inverted portion of speech in right-side-up fashion. Because the signal is not coded in a way to obliterate intelligence, no STA is required for transmission.]

New Books

The Radio Amateur's Handbook for 1979, 56th edition, by the ARRL headquarters staff, Newington, CT. 544 pages in an 8-1/4 × 11 inch (210 × 280 mm) format. Paperback edition: U.S. and possessions, $9.75. Canada, $10.75. Elsewhere, $12. Clothbound edition: U.S. and possessions, $15.75. Canada and elsewhere, $18. Weight: approximately 2-1/4 lbs.

First introduced more than a half-century ago, the *Handbook* has come to be regarded as virtually indispensable; not only in every ham library, but to many electronics industry professionals as well. It has long set the pace in the evolution of radio technology, while providing a wealth of practical and proven designs.

This edition is the most highly revised in many years. Some of the more "weighty" theory material has been replaced by new text which is easier to comprehend by those with minimal electronics knowledge. However, the editors have avoided "talking down" to the more experienced readers. Mathematics have been kept at the high school algebra level, for the most part, and worked-out examples of the equations are included where applicable.

What's in this dramatic new edition? A highlight is complete, practical coverage of narrow-band voice modulation (nbvm), a discovery hailed by some as a major technological breakthrough which reduces the bandwidth required for single-sideband signals. Sections rewritten in full or in part include Electrical Laws and Circuits, Solid-State Fundamentals, Power Supplies, and the six sections of hf and vhf/uhf transmitting, receiving and antennas. Considerable data has been added on the use of ferromagnetic devices (toroids, etc.) in narrow- and broadband applications.

The semiconductor chapter has been completely rewritten and doubled in size! It contains data on PIN and impatt diodes, GaAs FETs, solar-electric cells, VMOS power FETS and KEDs plus excellent coverage of standard semiconductor devices. There are 80 schematic diagrams in this chapter which clearly illustrate the applications of most of the semiconductor devices used by amateurs and engineers today.

The theory portions of the hf and vhf/uhf transmitting chapters emphasize frequency stability, spectral purity and state-of-the-art design techniques. Likewise, the receiving chapters emphasize low noise, dynamic range and high performance. Circuit examples abound and are clearly explained.

The new *Handbook* is also a bonanza for the workshop enthusiast. Construction projects are presented in progression from simple beginner-type transmitters and receivers to a complex receiver project and high-power linear amplifiers. Also, the Antennas chapter has new projects for all kinds of vertical and beam antennas.

This heavily revised *Handbook* is one that no amateur will want to pass up when updating his or her technical library. Professional electronics persons will find this volume essential as an important reference in the field of rf communications. — *John Nelson, W1GNC*

The VNR Concise Encyclopedia of Mathematics, published by Van Nostrand Reinhold, division of Litton Education Publishing, Inc., New York, NY. Clothbound, 6-1/2 × 9-1/4 inches, 816 pages. Price: $14.95.

Let's see now . . . if my new repeater can be heard 50 miles away in all directions, how many square miles of coverage do I have . . . . hmmm, A = 2 pi r . . . no, that's wrong — oh yeah, A = pi r squared! Wow! 7854 square miles of coverage!

Going to school is great. You learn all those neat (and some not so neat) equations, theorems and formulas so you can solve any problem that comes your way. But the old noggin doesn't remember all that stuff unless you keep using it. If you've kept all your old text books, you may have all the references you need, but if you sold them, or pitched them into the senior bonfire, this new volume from VNR should fill the bill.

As an encyclopedia, this book does not attempt to *teach* as much as to provide an easy reference guide. Practically every specialized area of mathematics is explained concisely in this compact edition. Illustrations play a key role in the presentation, with more than 700 of the 950 diagrams, drawings, photographs and plates containing at least one color (in addition to black). Important definitions and formula groups are highlighted by yellow, examples by blue, and theorems by red. These and other colors are also used to point up notable features in the diagrams.

The encyclopedia is systematically subdivided and contains numerous sectional headings. Part I deals with history and the traditional areas of elementary math. Part II introduces diverse aspects of higher mathematics, and Part III contains surveys of various facets of contemporary math. Examples are interspersed with straight text, using both traditional and metric units, and with an emphasis on practical applications in science and technology.

The VNR Concise Encyclopedia of Mathematics should be a welcome addition to the library of anyone wishing to improve his understanding of mathematics, or who wants a complete yet handy reference for the fascinating science of mathematics. — *Jim Bartlett, K1TX*

Season's Greetings from the Hams at ARRL/IARU Hq.

(Listed in alphabetical order of call sign.)

Kathy Kearman	WB1AAE
Craig Clark	N1ACH (ex-WA1QWW)
Bobbie Chamalian	WB1ADL
Michele Bartlett	N1AGD (ex-WB1FAU)
Jim La Porta	N1CC (ex-W5LA)
Jeannie DeMaw	W1CKK (ex-W8REI)
Garry Bartels	WB1CPM (ex-WB2CFE)
Don Waters	WB1CUJ
Laird Campbell	W1CUT (ex-W5TQD)
George Grammer	W1DF
Chris Schenk	W1EH (ex-WB2SEZ)
Michelle Fuini	WB1ENT
Steve Place	WB1EYI (ex-WB2IGW)
Doug DeMaw	W1FB (ex-W1CER)
Jim Westbrook	K1FD (ex-WA4ZUI)
Hal Steinman	K1FHN
Marian Anderson	WB1FSB
Marge Tenney	WB1FSN
Barbara Johnson	WB1GHT
John Nelson	W1GNC (ex-WØDRE)
Stan Gibilisco	W1GV/WAØOKV
Ed Tilton	W1HDQ
Lew McCoy	W1ICP
Stu Leland	W1JEC
Joe Moskey	W1JMY
Clarke Greene	K1JX (ex-WA1JLD)
Tom Frenaye	K1KI
Stan Horzepa	WA1LOU
Jeanie Zaimes	AB1P (ex-WB1FAH)
George Woodward	W1RN (ex-K3TQM)
Dick Baldwin	W1RU (ex-W1IKE)
John Huntoon	W1RW (ex-W1LVQ)
Lee Aurick	W1SE (ex-W2LE)
Rosalie White	WA1STO (ex-WB9FJT)
Jerry Hall	K1TD (ex-K1PLP)
Jim Bartlett	K1TX
Perry F. Williams	W1UED
Jim Morris	K1UJ (ex-KH6HQG)
Jay Rusgrove	W1VD (ex-WA1LNQ)
Arline Bender	WA1VMC
Rita Tilley	WA1WEV
Bill Jennings	K1WJ (ex-WA1AHI)
Chuck Bender	W1WPR (ex-W3ODU)
Bob Halprin	K1XA (ex-WB2NOM)
Bob Myers	W1XT (ex-W1FBY)
Jim Kearman	W1XZ
Sandy Gerli	AC1Y (ex-WA1EEA)
Joel Kleinman	WA1ZUY
Dave Sumner	K1ZZ/K1ZND
Don Search	W3AZD
W. Dale Clift	WA3NLO
Louise Moreau	W3WRE
Bill Tynan	W3XO/W3KMV
Bruce Johnson	WA6IDN
John Troster	W6ISQ/N6IQ
George Barker	WB8PBC
Bernie Glassmeyer	*W9KDR*
Maxim Memorial Station	W1AW

Some Experiments with High-Frequency Ladder Crystal Filters†

For the radio amateur, ladder filters have several advantages. These include no matching, grinding or etching, and low insertion loss. They're simple to build, and effective!

By J. A. Hardcastle,* G3JIR

Although electrical-network textbooks have long acknowledged the existence of high-frequency ladder crystal filters, almost nothing has been written about them in Amateur Radio journals. Perhaps this article will rectify the situation and will show how simply an effective filter may be produced using only a handful of crystals and capacitors. The crystals used are of identical frequency, while the capacitors having a two-percent tolerance are of the silver-mica and preset trimmer type. An experimental approach has been adopted throughout, and full details of test procedures and the results obtained are given.

Half-Lattice Filters

Early attempts by the author to make high-frequency crystal filters using 8.3-MHz 10X and type FT-243 surplus crystals in the familiar half-lattice, four-crystal configuration (Fig. 1) produced such poor results that they never progressed beyond the breadboard test stage. They suffered from too narrow bandwidth (2 kHz), poor stop-band discrimination (40 dB), and numerous spurious responses immediately adjacent to the hf cut-off frequency. While they would be suitable for an ssb upper-sideband filter for a transmitter, they were considered unusable in a receiver.

Ladder Filters

Ladder type filters are not so vulnerable to the effects of the additional series resonances present in the crystals. This is so because of the unlikelihood of these resonances occurring at identical frequencies in all crystals. Therefore, the resonances of one section are attenuated by all the other sections.

Armed with this knowledge, the author sought an inexpensive source of suitable crystals. Fortunately, HC-9/U crystals were being advertised in *Radio Communication* at an attractive price and the advertiser readily agreed to supply a batch of his choice of frequency between 9 and 10 MHz.

Crystal Measurements

The width of the passband of any crystal filter is dependent on the spacing of the series resonant frequency and the parallel-resonant frequency of the crystal. The test circuit shown in Fig. 2 was made so that these frequencies could be checked, and comprises a signal generator, a digital frequency meter, and a sensitive hf electronic voltmeter. A typical test measurement made with this equipment is shown in Fig. 3. In order to demonstrate the presence of numerous series and parallel resonances the response has been drawn out in full, but it is generally sufficient to check only the first pair of these frequencies. Table 1 summarizes measurements made on a number of different types of crystals. Immediately apparent is that the plated type of crystal is capable of a much wider bandwidth than the older type which utilizes a clamped mounting. Clearly the 9.6-MHz HC-6/U crystals will readily achieve the 2.4-kHz bandwidth required for an ssb filter.

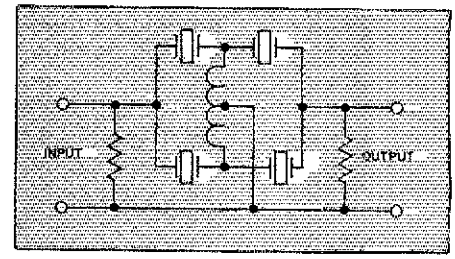


Fig. 1 — Four-crystal half-lattice filter.

First Steps

Before attempting to produce a high-performance, multiple-section ladder filter, two shunt capacitors were added to the test circuit of Fig. 2, transforming it into a simple band-pass filter (Fig. 4).

In order to obtain some idea of the size of components required for a full-sized filter, various values of capacitance for C1

Table 1
Crystal Measurements

Nominal Frequency f_o (kHz)	Case Reference	Mounting	Series Resonant Frequency f_s(kHz)	Parallel Resonant Frequency f_p(kHz)	$f_p - f_s$ (kHz)	$\frac{f_p - f_s}{f_p}$ %
8,300	FT-243	Compression	8,310.99	8,312.45	1.46	0.018
8,300	CR1AR	Compression	8,306.09	8,308.2	2.11	0.025
8,300	10X	Compression	8,309.7	8,312.52	2.82	0.034
8,325	10XJ	Plated	8,324.05	8,328.86	4.81	0.057
3,250	HC-6/U	Plated	3,250.8	3,254.7	3.9	0.12
40,500 (13,500)	HC-6/U	Plated (overtone)	13,507.6	13,524.1	16.5	0.12
9,681.2	HC-6/U	Plated	9,672.55	9,687.95	15.4	0.16

*82 Acacia Ave., Huyton, Liverpool, England L36 5TP

†Adapted from an article of the same title in *Radio Communication* (RSGB) for December 1976.

and C2 were used and the frequency responses were measured. The result of one of these tests is shown in curve B of Fig. 3, where C1 and C2 were each rated at 150 pF.

An Intermediate Stage

Expanding the simple filter of Fig. 4 to three sections proved to be an easy operation. When three identical filter sections (Fig. 5A) are combined, the resulting circuit becomes that of Fig. 5B. Note how connecting similar stages in tandem results in the end-section capacitor being half the value of the others.

A quick scan over the frequency band disclosed that the circuit was behaving like a band-pass filter with a sharp cutoff on each side of the passband. The shape of the passband, however, left a great deal to be desired and the test setup was insufficiently sensitive to enable adequate stopband measurements to be made.

In order to solve the sensitivity problem, a simple superhet receiver, shown in broad outline in Fig. 6, was constructed. All the tests described subsequently were made using this receiver.

The shape of the passband was improved by providing the correct source and load impedance in the form of preset variable resistors, as shown in Fig. 7. The frequency characteristics of these two filters (Fig. 8) show how careful adjustment of R1 and R2 resulted in a band-pass ripple of less than 1.5 dB. R1 is a shunt resistor that reduces the output impedance of the buffer amplifier and R2 is a series resistor to increase the input impedance of the rf amplifier. When the filter is used in a circuit of the correct impedance, R1 and R2 will no longer be required, but for the purpose of these tests, they enabled a variety of filters to be tested quickly, without the necessity of continually modifying the test equipment.

Note the fringe of spurious responses which were found above 9710 kHz. More than six of these extremely sharp responses were found. They are only about 100 Hz wide. Reference to Fig. 3 shows how they correspond with two of those shown there. However, as mentioned previously, they have been greatly attenuated by the other two stages.

Bandwidth

The bandwidth of the three-section filter can be controlled by selecting the size of the shunt capacitors. By increasing their capacitance, the bandwidth can be reduced, but this also reduces the filter impedance and so necessitates the readjustment of R1 and R2. Fig. 7 and curve B of Fig. 8 show the result of a 50-percent increase in capacitance which reduced the 3-dB bandwidth from 3500 Hz to 2600 Hz. Achievement of a completely satisfactory band-pass ripple by adjusting R1 and R2 was impossible, but when C4 was reduced to 50 pF, a ripple of 1 dB was obtained. Note also how the stop bands have been affected by the change (the lf being improved and the hf being degraded).

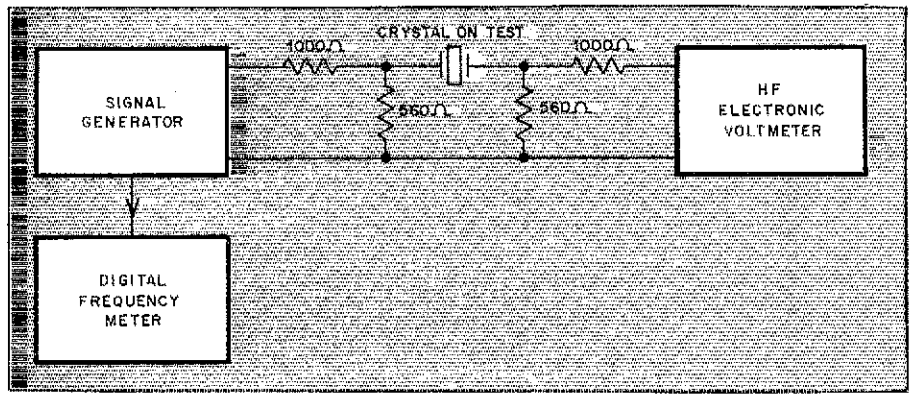


Fig. 2 — Crystal measurement circuit.

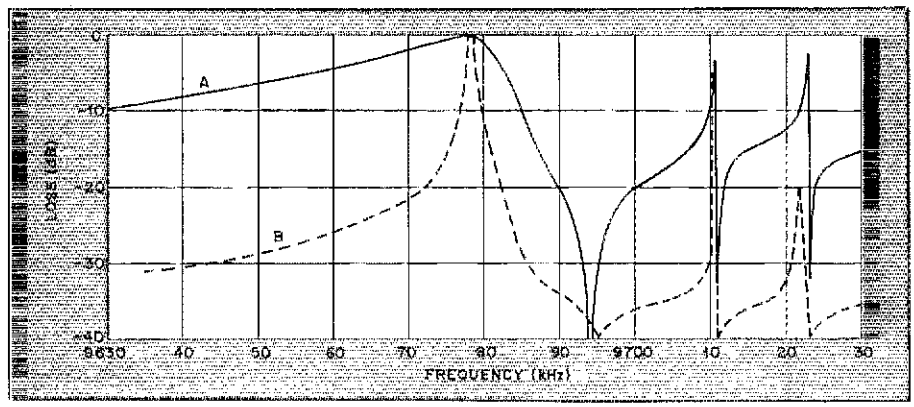


Fig. 3 — Curve A represents the function of parallel and series resonances. Curve B is for a simple band-pass filter.

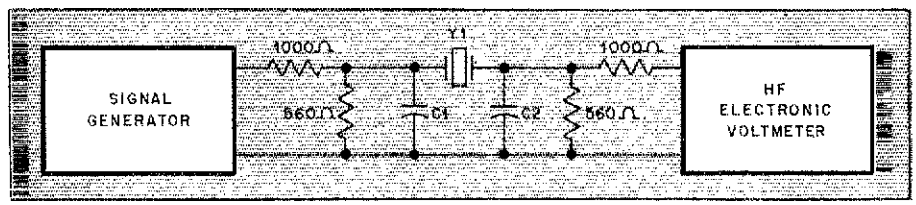


Fig. 4 — Single-section band-pass filter.

Six-Section Filter

By adding three more crystals, the filter in Fig. 9 was produced. Values used for the capacitors were derived from the three-section filter described previously. As expected from the previous measurements, stop bands of greater than 70 dB were easily produced and the region requiring the most effort was again the passband. Besides adjusting R1 and R2, adjustment of C1 and C7 also became necessary. In fact, C7 was eventually removed altogether, stray capacitance alone being sufficient in this position. As a final contribution to a flat passband, C2 and C6 were also slightly reduced and the resulting ripple in the response dropped to 1 dB.

The bandwidth at −3 dB is 2757 Hz, at −6 dB 2923 Hz, and at −60 dB 6698 Hz, giving a 60:6-dB shape factor of 2.29:1. The insertion loss, measured between points A and B in Fig. 9, is 3 dB. Fig. 10 shows the full frequency response.

Filters with the same capacitor values,

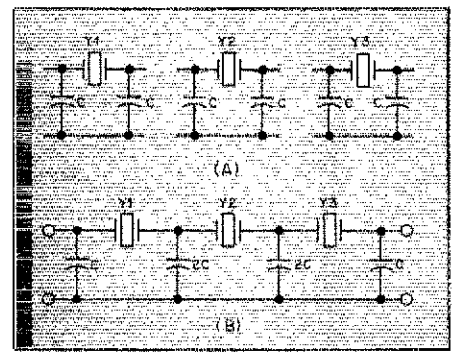


Fig. 5 — Addition of three single-filter sections (A) to produce a three-section filter (B).

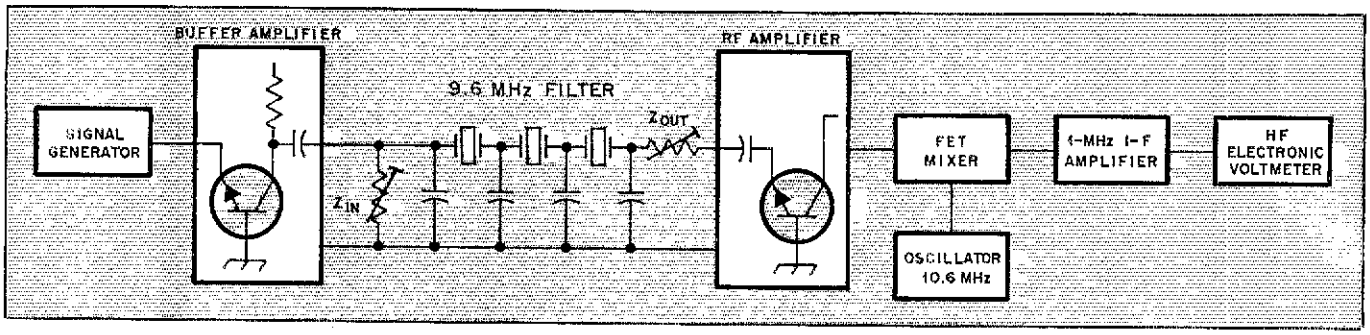


Fig. 6 — Filter test set.

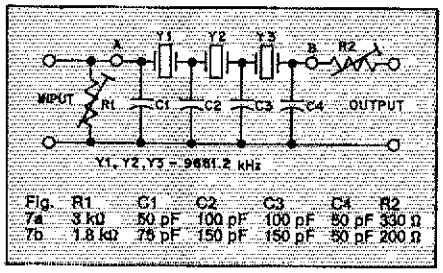


Fig.	R1	C1	C2	C3	C4	R2
7a	3 kΩ	50 pF	100 pF	100 pF	50 pF	330 Ω
7b	1.8 kΩ	75 pF	150 pF	150 pF	50 pF	200 Ω

Fig. 7 — Three-section filters. The tabulation shows the effect of a 50-percent increase in capacitance values.

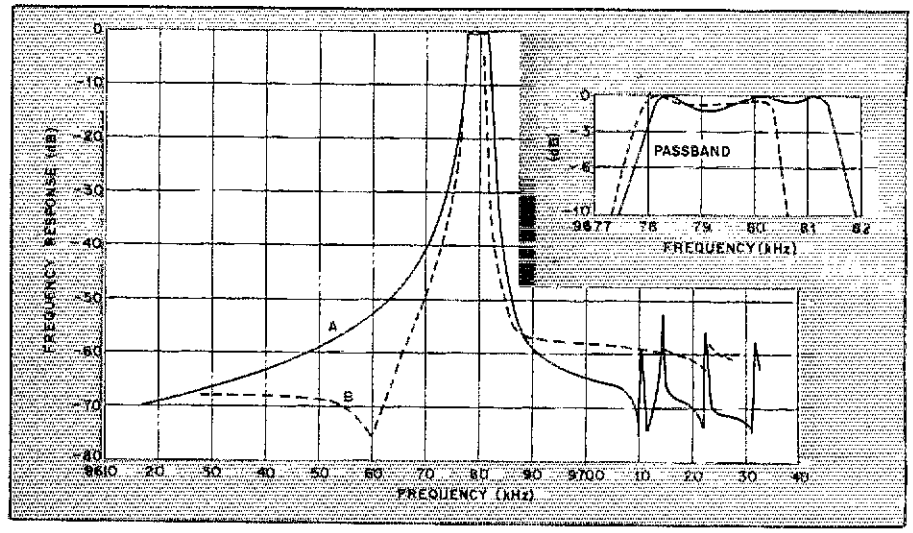


Fig. 8 — Three-section crystal ladder filters. See text concerning bandwidth.

using five and seven crystals, were also checked. The characteristics of these filters have not been given here, but the five-crystal filter had a shape factor of 2.93:1 and the seven-crystal filter exhibited a shape factor of 1.89:1. In both cases the 6-dB bandwidth was almost identical with the six-crystal filter. The response, at −60 dB only, is plotted in Fig. 10 for ease of comparison.

Conclusion

These experiments with high-frequency ladder filters have led the author to conclude that they have several advantages over lattice-type filters where usage by amateurs is concerned. They may be summarized as follows:

1) All crystals are of the same frequency and no matching, grinding or etching is required.

2) Spurious responses are not so detrimental to overall performance of the filter and, for filters having more than four sections, may be virtually undetectable.

3) Filters may be constructed using an odd or even number of crystals. This is a useful attribute when one is dependent upon surplus sources for the supply of crystals.

4) The only other components required are two-percent-tolerance silver-mica capacitors and preset trimmers, which are readily available.

5) Because of the very low equivalent series resistance of modern crystals, the insertion loss of these filters is very low.

Job lots of suitable HC-6/U crystals have been offered by advertisers in *Radio Communication*, usually as batches of "our choice of frequency." Perhaps these may become available as lots of one frequency, or an enterprising crystal manufacturer may decide to mass-produce 9-MHz crystals at a price attractive to amateurs. Finally, when buying groups of crystals, remember to buy an extra one for use as a carrier crystal.

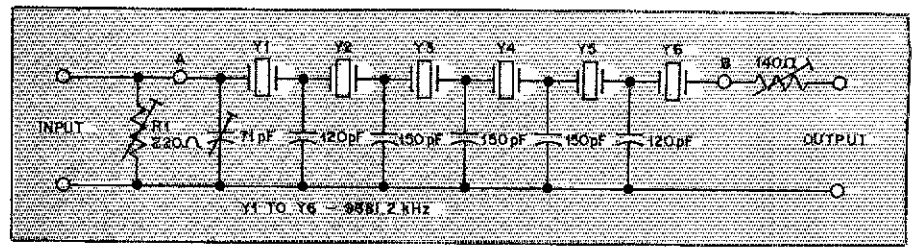


Fig. 9 — Six-section crystal ladder filter.

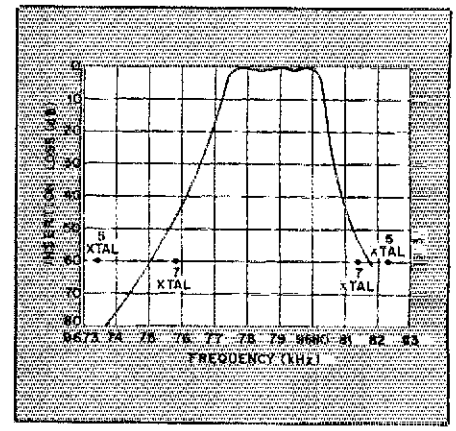


Fig. 10 — Six-section filter response. Response of five- and seven-section filters is also indicated.

Bibliography

Hamish, "An Introduction to Crystal Filters," *RSGB Bulletin*, January and February 1962.

Hirst, "PE Wideband HF Communications Receiver," *Practical Electronics*, February 1970.

Sykes, "A New Approach to the Design of High-Frequency Crystal Filters," *Bell System Monograph 3180*.

Zverev, *Handbook of Filter Synthesis*, John Wiley and Sons, 1967.

What Next After Moonbounce? Venus Bounce!

Moonbounce has become old hat these days. So have home computers. Merge the two technologies and head for Amateur Radio's next frontier!

By Richard A. Simpson,* W6JTH (ex-K1KRP)

Radio echoes from the moon were first obtained in 1946, by a U.S. Army Signal Corps team. Their achievement was heralded in the world press. *Time* mused that this longest distance human communication said nothing. Held to kilowatt power levels, it was 1953 before radio amateurs were successful in receiving their own echoes. From its simple beginnings, the moonbounce work developed into the field now known as radar astronomy — study of the solar system using controlled radio waves. Research on celestial mechanics, planetary surfaces and atmospheres, solar physics, and other topics is carried on today from several major facilities. Among them are the National Astronomy and Ionosphere Center, in Arecibo, PR, and the Goldstone Tracking Station, near Barstow, CA. Using transmitters with hundreds of thousands of watts output, state-of-the-art receivers, and sophisticated signal-processing techniques, these observing stations have gone far beyond the capabilities of the individual radio amateur, or even the well-funded professional scientist. Radar echoes were obtained from Venus in 1961, Mercury in 1962, and Mars in the following year. The frontier now is at the satellites of Jupiter and the rings of Saturn.

With recent developments in hobbyist computers, EVE (Earth-Venus-Earth) experiments are now within the range of radio amateurs. Advances in microwave-component technology and somewhat more tolerable price levels are helpful. In this article I'll discuss some technical aspects of the problem and make an estimate of EVE potential for amateur-scale operation.

Radar Equation

To estimate the amount of signal returned from a planet or other target, the "radar equation" is used. If the transmitted power is known, this expression can be used to account for factors such as antenna gain, distance to and reflectivity of the target, and give the power which reaches the receiver. Though many of the factors in the equation are imperfectly known, the equation can be used to at least estimate the detectability of a target. For the general case, let's say that our transmitter has a power output of P_T watts. When connected to an isotropic antenna, the power would be radiated uniformly into space. The power *density* at a distance R from the antenna would be equal to

$$P_D = \frac{P_T}{4\pi R^2} \qquad \text{(Eq. 1)}$$

That is, power would be evenly distributed over a spherical surface of radius R meters. An antenna at R with a collecting surface area A would intercept

$$\frac{P_T A}{4\pi R^2} \text{ watts}$$

Instead of an antenna, we have a planet at R, which first intercepts the outgoing wave, then scatters part of it back toward our receiver. We can visualize the process by supposing that we replace the planet with a transponder; this analogy relates rather directly to the mathematics of the radar equation and will lead easily to the concept of "radar cross section." A transponder is a device which sends out a signal proportional to the one it receives. In this case, the transponder input terminals are connected to a receiving antenna with effective collecting area of σ meters. Assume this particular transponder radiates exactly the same amount of power as it receives. If a power density of one watt per square meter reaches it, then σ watts will be taken in by the antenna and reradiated isotropically; at a distance R_x from the transponder, the power density of the new wave will be

$$\frac{\sigma}{4\pi R_x^2}$$

Our hypothetical receiving antenna of area A will collect

$$\frac{\sigma A}{4\pi R_x^2} \text{ watts}$$

Radar workers use σ to describe the efficiency of a target. The stronger the signal reaching the receiver, other factors remaining the same, the higher the radar cross section, which is the name associated with the σ previously discussed. Highly absorbent targets may have small radar cross sections, even if they are physically large. Physically small targets which behave like corner reflectors will have high radar cross sections. In general, for natural targets such as planets, radar cross section is proportional to the area of the projected disk.

If the characteristics of the transmitting and receiving systems are known, and we can model the planetary target as a transponder, it should be possible to estimate the amount of transmitted power returned in an echo. This value is given by the radar equation, the development of which we can now complete. Antennas having gain increase the transmitted power density in some directions and diminish it in others. If the transmitting antenna has a gain of G_T, the power density at distance R will now be

$$\frac{P_T G_T}{4\pi R^2}$$

rather than the value given in Eq. 1 for an isotropic source. Invoking our transponder model of the planet located

*3326 Kipling St., Palo Alto, CA 94306

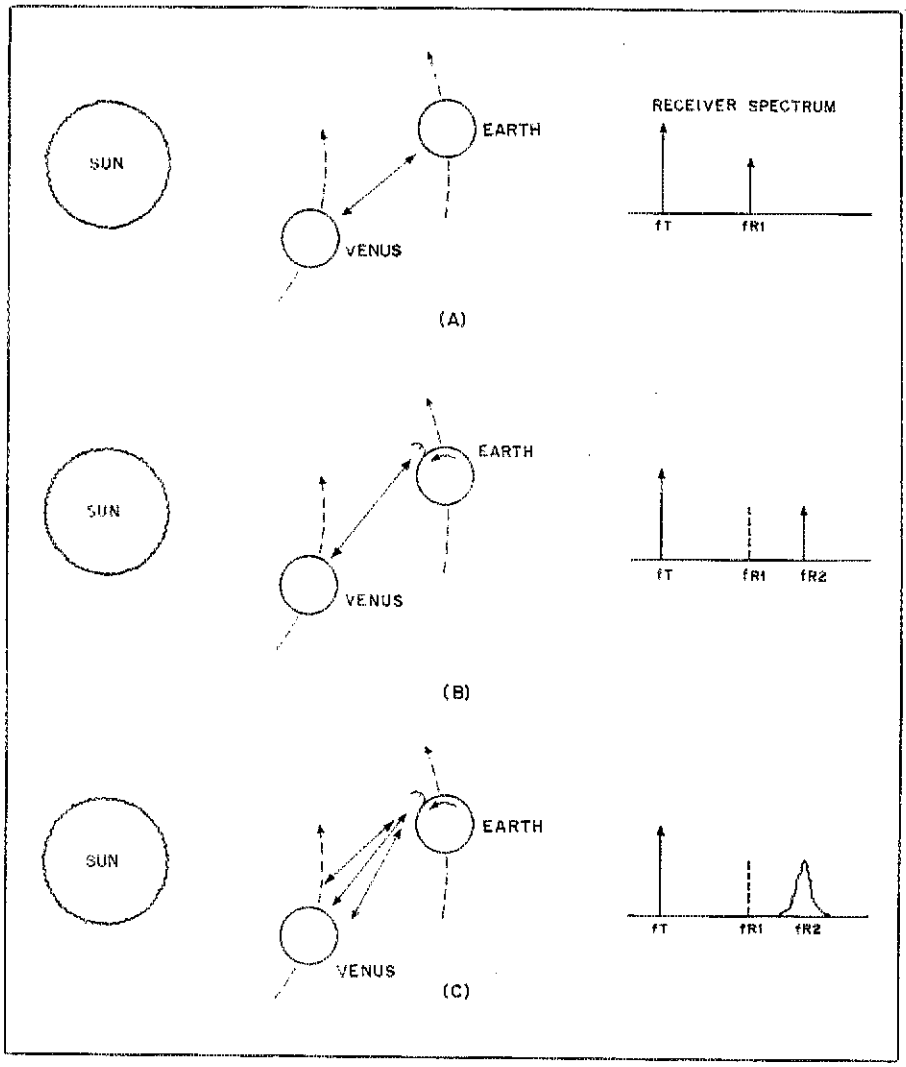


Fig. 1 — The effects of Doppler shifts caused by planets in motion with respect to each other, and the result of planetary rotation. At A, net motion of Venus toward Earth causes the echo to be received at a frequency greater than the transmitted signal ($f_{R1} > f_T$). At B, rotation of Earth causes station velocity to be superimposed on net motion. At Venus rise, net velocity is increased and the echo is shifted upward to f_{R2}. At C, rotation of the target causes a broadening of the echo, which is centered at f_{R2}.

at R, we find it takes in and reradiates

$$\frac{P_T G_T \sigma}{4\pi R^2} \text{ watts}$$

A receiving antenna of area A at a distance of R_x from the planet will collect a power of P_R, which is equal to

$$\left(\frac{P_T G_T}{4\pi R^2}\right)\left(\sigma\right)\left(\frac{1}{4\pi R_x^2}\right)\left(A\right) \text{ watts}$$

The statements of this equation contained in parentheses correspond to the transmitter factor, target factor, reradiation factor and receiver factor, respectively, of the general or bistatic form of the radar equation. In most radar systems however, the same antenna is used for transmitting and receiving. In these, the equation may be simplified by substituting R for R_x. We can also take advantage of the rule of thumb that gain and collecting area are related by

$$G_T = \frac{4\pi A}{\lambda^2}$$

where λ = signal wavelength.

These two modifications give

$$P_R = \frac{P_T \sigma A^2}{4\pi R^4 \lambda^2}$$

By substituting plausible values, we can estimate the detectability of the target.

Doppler Shift Effects

Although the radar equation gives the total power we expect to be returned from a target, it tells us nothing about how that power is distributed in frequency. Because our target is moving relative to Earth, the echo will not appear at the transmitted frequency; in fact, for Venus the echo frequency will not even be constant. Relative motion of Earth and Venus causes a shift, f_D, of

$$\frac{-2V}{\lambda}$$

where V = velocity between the two bodies measured along the Earth-Venus line (see Fig. 1A).

We adopt the convention that negative values of V mean that the two bodies are approaching each other; in this case the echo will be slightly higher in frequency than the transmitted wave (f_D is positive).

In addition to gross planetary motion, we must also include planetary rotation in predicting Doppler shifts. Because Earth spins on its axis, there will be a velocity component either toward or away from Venus of up to 400 m/s, owing to motion of the station resulting from the rotation. When Venus appears to be rising in the eastern sky, the station is moving toward the planet and the echo will be slightly higher in frequency; when Venus appears to be setting, the station is moving away and the frequency will be lower. But Venus also rotates, albeit slowly, so that the response from the approaching part of the planet will be at a higher frequency than the response from the receding part (Fig. 1C). If we transmit a continuous carrier, it will be reflected as a smeared (or broadened) replica of the original because of the different amounts of Doppler shift imparted by various parts of the target.

As if the Doppler shifts and spreadings were not annoying enough, we should also note that they all vary with time. The Doppler *spreading* caused by rotation of Venus does not vary much during the course of a day, but the *shifts* can change drastically. The solar system is on such a large scale that we often forget that the planets are quite literally hurtling through space, by terrestrial standards. For example, on July 1, 1978, Earth was traveling at over 30 km/s. At the same time, Venus was approaching at a relative velocity of more than 12 km/s. Of course we didn't collide because the trajectories of the two planets are ellipses which do not intersect, but Earth and Venus do pass within 40 million kilometers from time to time. In 1978, this "inferior conjunction" occurred on November 9. At conjunction, the Doppler shift passes from positive through zero to negative, and the planets then drift apart. During the 24-hour period around the time of closest approach, the Doppler shifts from gross planetary motion will change by about $1000/\lambda$ Hz; Earth rotation superimposes another $1600/\lambda$-Hz shift between Venus rise and Venus set. The echo, which is only a few hertz wide, can best be detected with the aid of a narrow-bandwidth

receiver. However, because the signal is constantly drifting, the passband must be constantly relocated. This combination of narrow bandwidth and accurate tuning is a challenging hardware requirement for today's radio amateur. Let's discuss the implications of these challenges.

Prospects

In this final section we consider the requirements for detecting a Venus echo and match the requirements against capabilities of state-of-the-art equipment. Not all of this equipment is within range of a typical radio amateur's budget. The possibility exists, however, that enough of it could be assembled by a team of technically adept amateurs, and the feat accomplished within a few years. First consider the radar equation. At its closest approach on November 9, Venus was at a distance R of approximately 4.0×10^{10} meters from Earth. From astronomical studies, the radar cross section of Venus is known to be in the neighborhood of 10 percent of its disk area, or $\sigma = 10^{13}$ m^2 (the radius of Venus is about 6100 km). If we have a parabolic antenna 10 m in diameter, this gives us a geometrical area of about 80 m^2. Taking an efficiency factor of 50 percent, we're left with 40 m^2 for reception. The gain-to-area rule of thumb translates this to 45 dB gain at 2300 MHz. If we assume the transmitter final amplifier power input is 1000 watts and its efficiency is also 50 percent, $P_T = 500$ watts. From these values the radar equation allows us to compute the expected received power,

$$P_R = \frac{(500)\,(10^{13})\,(40)^2}{4\pi\ (4.0 \times 10^{10})^4\ (0.13)^2}$$

$$= 1.5 \times 10^{-23} \text{ watts}$$

Because Venus rotates, this power is spread over approximately 4 Hz under typical conditions, leaving us with 4.0×10^{-24} watts/Hz power density in the received spectrum. This isn't much, but under good conditions it might be distinguished from the background noise.

Noise power which appears at the output of a receiver system arises from two principal sources. First are the natural emissions of the target and of the deep-space background. Venus has a surface temperature on the order of 800°K (1000°F), which makes it an important source of microwave energy. The planet occupies such a small portion of the beamwidth of the 10-meter-diameter antenna, however, that its radiation is effectively lost in the much colder background and it may be neglected here. When Venus is closest to Earth, it will be viewed against a background of maximum solar radiation, however, decreasing the possibilities for success of this experiment. Observations earlier or later than inferior conjunction will move the planet away from the sun and result in less solar noise but at the cost of increased range, which enters the radar equation as R^4. The critical factors for determining optimum observation dates will be the beam pattern and distribution of solar noise across the sky. These can be obtained on a station-by-station basis and the results evaluated in terms of the EVE problem. For the remainder of this article we will assume that solar noise is not a problem. In practice, however, the probability for detection based on the conditions given here would have to be reduced somewhat.

The second source of noise is the receiving system itself, and for 2300-MHz work is more important than natural noise. Microwave maser front ends are capable of equivalent noise temperatures less than 25°K; we will assume that the receiver available for amateur work is not quite this good — say T = 50°K, which corresponds to a noise figure of about 0.7 dB. The noise power, P_N, produced can then be computed from the simple equation

$$P_N = kTB$$

where k = Boltzmann's constant
(1.38×10^{-23}) watt-seconds/°K
B = receiving system bandwidth

For the sake of simplicity, we will keep things on a per-unit bandwidth basis and set B = 1 Hz. The 50°K system then has a noise-power density of about 7.0×10^{-22} W/Hz, or about 175 times that of our hypothetical echo! Readers who have trouble reading S5 signals on 40 meters may detect a problem lurking here.

This is where the story of the Doppler drifts comes in. It is possible to take recordings of a large number of signals buried in noise and average them together to improve overall signal to noise ratio, if the signal is the same in each case. This may be done in either the time or frequency domain. Since we are already working with W/Hz, we'll continue to use the latter and assume that some kind of spectrum analyzer is available to be attached to the receiver output. If the noise characteristics of each echo are the same (in a probabilistic sense), the random fluctuations will tend to cancel out when they are averaged, and the deterministic components of the signal will begin to peak through. Probability theory tells us that if N is the number of averages performed, the random fluctuations die out as $\sqrt{N}$. If we want our Venus echo to have approximately a 50-percent chance of being detected in the noise, we must boost its prominence by a factor of about 175, or average together about 30,000 signals. If we obtain one spectrum each second from the analyzer, over eight hours of data are required. Under normal circumstances, several days would be needed to accumulate this much data.

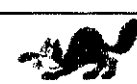
Over an eight-hour period, the echo will have drifted a considerable amount, so it is important that tuning to compensate for Doppler shifts be accurate. Otherwise, the echoes will be averaged with noise, instead of with each other. The easiest solution to the tuning problem is to use a programmable local oscillator in the receiver; its frequency could be controlled by a small computer operating on predictions available from any number of sources. The computer might also be able to handle the spectral analysis and averaging, leaving the operator to monitor and control the transmitter and antenna.

This combination of 10-meter-diameter parabolas, kilowatt 2300-MHz transmitters, narrowband receivers with 50°K equivalent noise temperatures, and small computers operating programmable local oscillators is not to be found in every ham's garage. Receiver front-end components with noise figures in the 1.5-dB range are available in the $100 price class and single-digital ICs are obtainable to perform the spectral analysis. The practical problems associated with signal detection, such as insuring that both transmitter and receiver frequencies are accurate to at least 1 Hz over periods of several days, are imposing enough that even the equipment described here would probably be insufficient to obtain echo detection. It is likely that those who obtain the first echoes from Venus will find short cuts through the radar-equation calculations given in this article — using a shorter wavelength might have some advantage, for example. Use of a larger antenna would lead to an immediate improvement in signal-to-noise ratio. Though the task will never be easy, there are now individuals in the amateur ranks with the necessary expertise to work EVE. The prospects for two-way communication (with exchange of signal reports) are quite discouraging, but successful detection of the echo itself sometime in the not-too-distant future should not come as a complete surprise.

Acknowledgements

The helpful suggestions supplied by W1XZ, W6HD, K6HWJ and WA6VBA during preparation of this article were appreciated.

Strays



***QST* congratulates . . .**

☐ Ronnie Milsap, WB4KCG, who received the coveted Best Country Western Album of the Year award for his latest one, "It Was Almost Like a Song." Last year Ronnie was recognized for having earned the titles of Entertainer of the Year, Best Single Recording, Best Album and Best Male Vocalist in the country western area.

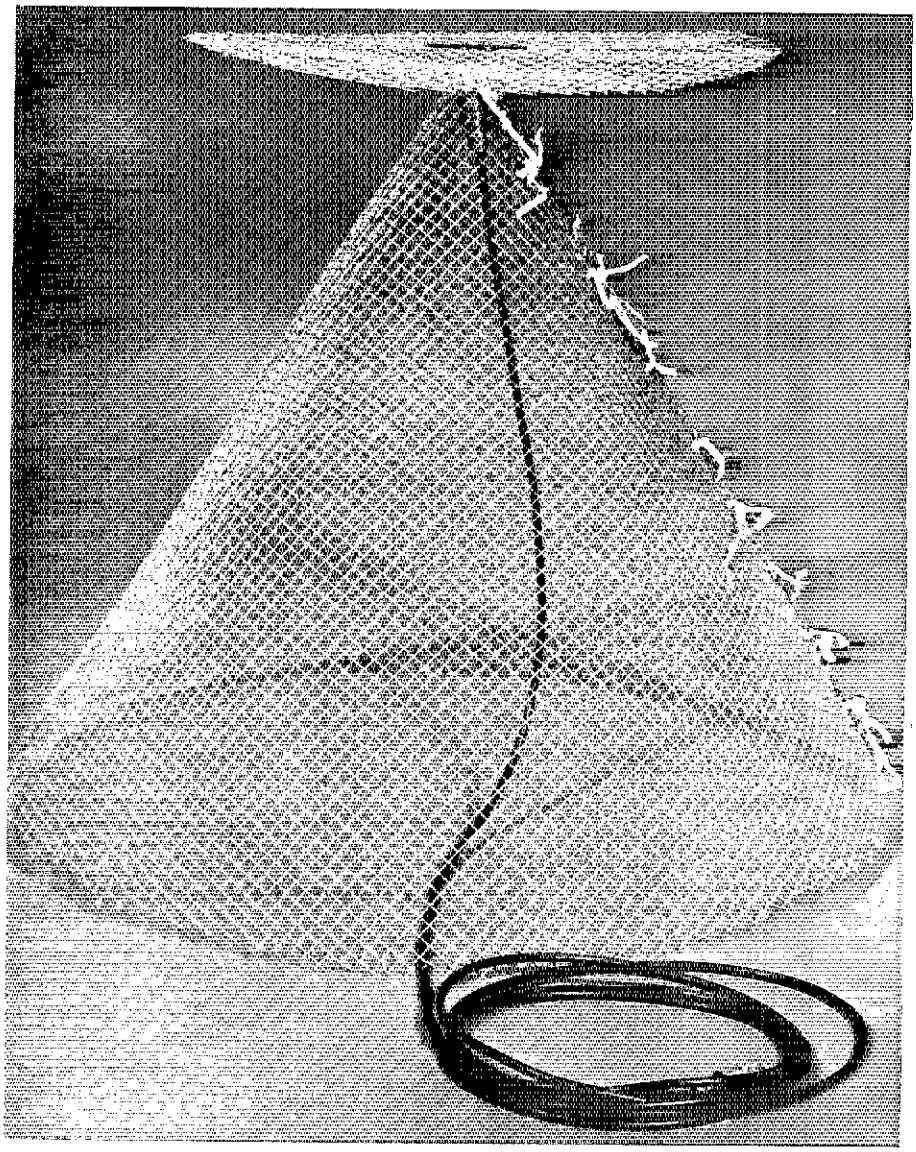
An Inexpensive Multiband VHF Antenna

A low-cost discone antenna, usable on 144, 220 and 420 MHz.

By David Geiser,* WA2ANU

When I brought my new 2-meter transceiver home, I wanted to get on the air quickly to try it out. Needing an antenna, I tried a quarter-wavelength rod. It worked, but after a few contacts I began to worry about high SWR and the effect it might have on the transmitter PA transistor. Remembering some work I'd done several years ago, I decided to build a disc-cone, or discone antenna. While my antenna was made cheaply and simply, and intended for installation in the attic, I've given some hints to help you ruggedize your discone for outdoor mounting. If you think you might want to use a single vhf antenna on more than one band, or if you just want to try something different, you may decide to build a discone, too.

A completed discone antenna suitable for use on the 144-, 220- and 420-MHz bands. This antenna wouldn't last long in the outdoors, but is fine for indoor use. For outside installation a more robust construction is required.



How It Works

The discone antenna functions as a wide-bandwidth, impedance-matching transformer, coupling a low-impedance transmission line to the higher impedance of free space. In the process, it radiates with a pattern similar to that of a quarter-wavelength vertical antenna above a groundplane. Waves form at the feed point (cone apex) and travel on the antenna surface to the edges of the cone and disk. The dimensions and geometry of the antenna are chosen so as to make the impedance at the edges similar to that of free space. We know that maximum energy transfer occurs when impedances are matched, so the antenna radiates. A discone antenna acts like a high-pass filter. Below some cutoff frequency, the SWR will increase rapidly. Above this frequency, the antenna SWR remains low up to a maximum of 10 times the cutoff value, depending on the design

*RD 2, Box 787, Snowden Hill Rd., New Hartford, NY 13413

proportions. The unit described here shows less than 2:1 SWR from 140 to 450 MHz. At 1300 MHz, the SWR measured 5:1. Fig. 1 gives dimensional information for the antenna. The slant height and diameter of the cone are the same, about 110 percent of a quarter wavelength at the lowest operating frequency. Diameter of the disk is about 66 percent of a quarter wavelength.

Construction

At first I planned to use roofing copper to build the antenna, but quickly dropped that idea when I found that material would cost nearly $30. I spotted a roll of hardware cloth, sometimes called "chicken wire," and decided to use that instead. It cost less than $5 for a five-foot-long piece of two-foot-wide (1.5 × 0.6-m) material. The galvanized-steel wire that makes up the hardware cloth is spaced 1/4 inch (approximately 6 mm).

Cutting information for the discone may be ascertained from Fig. 1. A felt-tip marking pen is useful for drawing a pattern on the hardware cloth. Forming the cone may require some help. Leather-palmed gloves will protect your hands from the sharp ends of the wire. While my wife held the cone in position, I used bread-wrapper ties to hold the edges together. To make sure it stayed in place, I soldered the seam in a few locations. This was only for mechanical reasons — current flows down the cone, not around it, so electrical continuity isn't required. I found it easier to use the bread-wrapper ties if I formed them into the shape of a J, pushed the bent end through from the outside, then pulled it back out so that the loop formed around the wire. After the seam is soldered, the ties should be removed.

A 1 × 3-inch (25 × 76-mm) piece of sheet copper is supported by the SO-239 connector, and is soldered to the disk. The connector is soldered to the cone with its threaded end pointed down. The disk is supported about 1/2 inch (12 mm) above the cone.

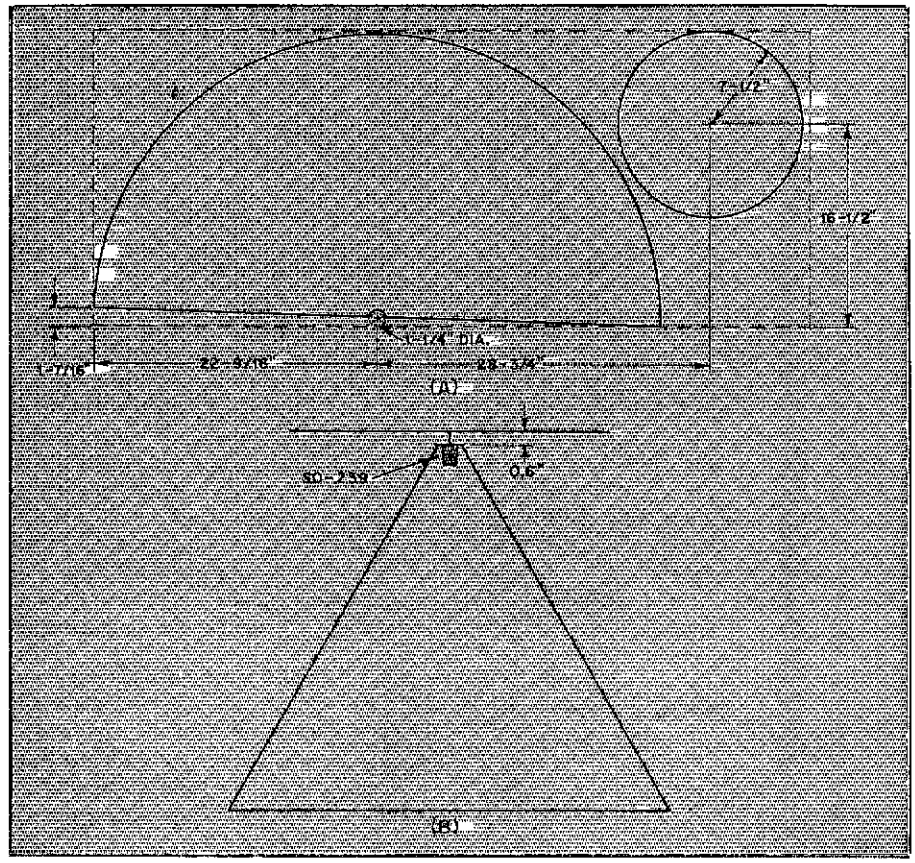


Fig. 1 — At A, cutting dimensions for the 140- to 450-MHz discone. At B, placement of the disk above the cone. Dimensions given may be scaled for other frequencies. Inches × 25.4 = mm.

It Works!

Naturally, as soon as I'd finished building the discone I placed it on a table, hooked up the rig and tried it out. From my rural location I could key three repeaters (it helps to live on a hill). The next day I took the antenna to work and measured its SWR in the lab. At 146 MHz it measured 1.6:1, rising to only 2:1 at 440 MHz. That night I took the antenna home and installed it in my attic. Now that it's up higher and above the aluminum siding, it works very well. The lower edge of the cone is at the same potential all the way around, allowing the antenna to be mounted on a metal surface, although this will change the radiation pattern somewhat. A support mast that extends into the cone will have little effect on the antenna performance. Lower frequency discones may be built using a number of individual wires to make the cone and disk. The disk may be approximated with metal rods if desired. If necessary, thin, nonconductive insulators may be used to support the disk. QST

Strays

QST congratulates . . .

☐ Phil Goetz, N6ZZ (ex-W6DQX), who has been promoted to methods and procedures manager of the Transamerica Insurance Group, Los Angeles.

OOTC PRESIDENT

☐ Ray Meyers, W6MLZ, former Southwestern Division director, assumed duties as president of the Old Old-Timers Club recently, as Col. Fred Elser, KH6CZ, resigned to pursue a doctoral degree at the University of Hawaii at Manoa.

I would like to get in touch with . . .

☐ judges who are radio amateurs, especially other federal judges. J. Foy Guin, Jr., W4RLS, 354 Federal Courthouse, Birmingham, AL 35203.

SOCAL FAST SCAN

☐ Southern California amateurs who are interested in uhf ATV may obtain information from the Southern California ATV Club, c/o John Ruckert, WB6ZPN, Secretary, 953 S. Beacon Ave., Los Angeles, CA 90015, or call the club station, WA6EVQ, on 146.43 MHz.

ROBERT E. FOX, WA6TXI

☐ Among those involved in the September 25 midair collision over San Diego was the PSA copilot, Robert E. Fox, WA6TXI. Licensed as a General since 1973, he had lived in nearby La Mesa.

KA6-TO-KA6 TRANSPACIFIC

☐ KA6AKF/California and KA6DX/Okinawa report what they believe to be the first KA6-to-KA6 QSO across the Pacific.

Product Review

ICOM IC-211 Multimode 144-MHz Transceiver

Think ham radio is expensive? On the contrary, a good argument can be made that amateur gear is reasonably priced and is getting more reasonable all the time, at least as a long-term trend. Consider this: Back in 1961, when the ham population on 2-meter a-m reached its peak, the standard of comparison for self-contained 144-MHz rigs was the Gonset Communicator IV. According to the *QST* review published in that year, for $375 the purchaser of a fourth-generation Communicator got a 20-watt input a-m transmitter with six crystal-controlled frequencies, a tunable a-m receiver covering the entire band, and a self-contained ac/dc power supply. Thousands of hams who were using earlier "Gooney Boxes" and "Benton Harbor lunch boxes" (Heath Twoers) must have drooled over the features of this little beauty.

There's no need to dwell on what the ensuing years have done to the Consumer Price Index, except to say that for today's equivalent of 375 1961-dollars you can select one of several multimode 2-meter rigs having features undreamed of in that year. The one that probably best illustrates our point — that your Amateur Radio dollar buys a lot more these days — is the ICOM IC-211. This handsome black and gray box sports capabilities which were simply inconceivable in the days before manned space flight and large-scale integrated circuits. The IC-211 will not operate on a-m; but that's about all it won't do. This is a reflection of the changes in mode preference on the band, not of the capabilities of the ICOM engineers.

The key word in any description of the IC-211 is *versatility*. It's equally at home on the local repeater (regardless of what "split" is being used), on OSCAR, chasing DX or ragchewing on ssb/cw at the low end. The heart of this versatility is found behind the VFO tuning knob. Here reside not one, but two VFOs, controlled by a common knob, yet capable of completely independent operation. For normal repeater operation, one VFO can be programmed to track the other, 600 kHz away. If you encounter an oddball split — something other than 600 kHz — just uncouple the VFOs. A front-panel switch reverses the transmit and receive frequencies instantaneously, so you can monitor the repeater input frequency or go from a "low-in" to a "high-in" repeater. The two VFOs also permit you to select one of two calling frequencies on ssb without touching the tuning knob. On fm (and on any mode above 146 MHz) the VFOs tune in 5-kHz steps; on ssb and cw below 146 MHz, in 100-Hz steps. A push button near the tuning knob overrides the 100-Hz step tuning if you want to go to the other end of the band in a hurry; another push button locks the frequency so it won't change if the knob is accidentally bumped. The accuracy of the frequency readout appears to be extremely good; comparisons with several other IC-211s never resulted in as much as a 1-kHz discrepancy.

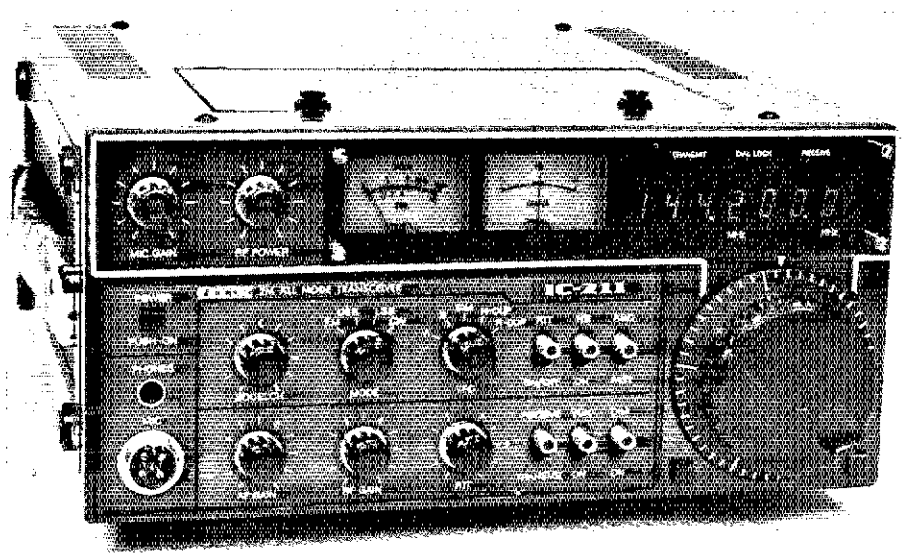
The tuning knob itself has two different degrees of "drag" that are automatically selected, depending on how fast the knob is being spun. At normal tuning speeds there is enough resistance to give "feel" to the knob, but if you want to QSY in a hurry, a faster spin on the knob releases an electrical brake and allows the knob to freewheel with a minimum of resistance.

In addition to the features you might expect to find in a 2-meter multimode transceiver in this price range, the IC-211 has separate signal strength and discriminator meters, selectable age (fast or slow), a front-panel control to adjust fm power output for anything from 1 to 10 watts, a built-in SWR indicator, separate delay controls for cw and VOX operation, and some limited — but nonetheless impressive — ability to be controlled remotely. The last of these is worth special mention. What ICOM has done is to provide access to the frequency-control LSI through a rear panel connector. Ingenious amateurs already have used this feature to good advantage in such applications as mountaintop installations of "remote bases" and the like.

For operating from a fixed-station location, the IC-211 leaves little to be desired. An ac supply is built in. For mobile operation, however, its versatility actually becomes something of a disadvantage. Unlike a set of click-stop switches, the continuous-tuning knob that controls the frequency gives no clue as to where you are in the band unless you take your eyes off the road to look at the digital readout display — a display that is not easy to read in bright sunlight. There are enough other controls and switches on the front panel to cause confusion if you're reaching for the squelch or audio gain without looking down. The SWR-protection circuitry can cause some strange effects on ssb when the rig is operating into an antenna with a high SWR, as sometimes encountered in mobile operation. If you remove the rig from its source of power, such as to stow it in the trunk when parked, the programming of the VFOs is erased and you have to start all over again — a job that takes only a few seconds, but which is still an annoyance. While the IC-211 is very compact, considering all of its features, it is substantially larger and heavier than the average fm rig. If your mobile operating is limited to occasional forays, the IC-211 will fill this need, but you're more likely to consider it for fixed-station operation than for regular mobile use.

Chances are, if you are interested in

Front-panel view of the ICOM IC-211 144-MHz multimode transceiver.

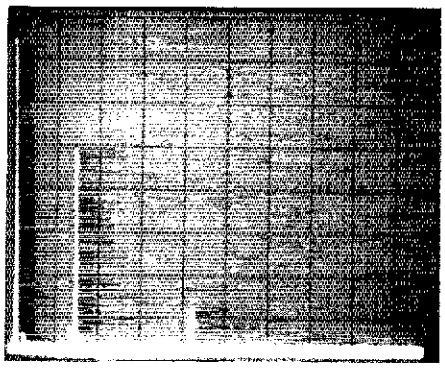


ICOM IC-211 Specifications

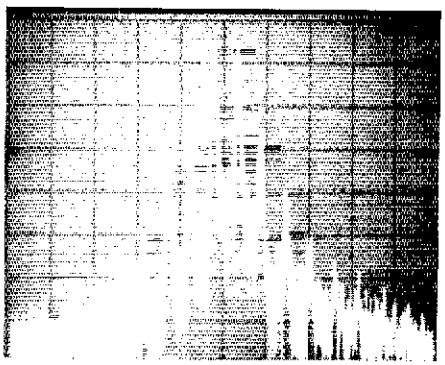
	Claimed by manufacturer	*Measured in ARRL lab*
Power output (minimum, 144-148 MHz):	10 watts.	15 watts.
Spurious radiation	Better than −60 dB.	Better than −66 dB (third harmonic)
Maximum current drain @ 13.8 V:	3.3 A (tx). 1.1 A (rx).	3.0 A. 1.2 A.
Receiver sensitivity (ssb):	0.5 microvolt for 10 dB S+N/N.	0.14 microvolt for 10 dB S+N/N.

Size (HWD): 4-3/8 × 9-1/2 × 10-3/8 inches (111 × 241 × 264 mm) exclusive of knobs, connectors, and feet.
Weight: 15 pounds (6.8 kg).
Price class: $850.

Importer: ICOM West, Inc., Suite 3, 13256 Northrup Way, Bellevue, WA 98005.



Spectral display of the IC-211 transmitted signal at 15 watts output on 146.52 MHz. The vertical axis is calibrated in steps of 10 dB per division; horizontal scale is 100 MHz per division. The large pip at the far left edge of the display 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, at 439 MHz, is down approximately 66 dB with respect to the unnotched fundamental. Other spurious outputs are all down at least 75 dB. The IC-211 complies with the FCC regulations regarding spurious emissions.



The IC-211 output during a two-tone IMD test. The horizontal scale is 2 kHz per division; vertical scale is 10 dB per division. Third-order distortion products are down approximately 28 dB from the PEP output. Individual tone outputs are down 6 dB from the PEP output.

investing this much money in a 2-meter rig you intend to do something more than just key up local repeaters. Operation on cw and ssb with the IC-211 is very much like what it would be on hf with a similar transceiver. The 100-Hz step tuning is not too difficult to get used to, and the receiver incremental tuning (RIT) can be used for fine adjustments of the receive frequency. (Incidentally, the RIT goes off automatically whenever the main tuning knob is turned.) For cw and ssb operation, a transceiver such as the IC-211 has a couple of disadvantages when compared with an hf transceiver and transverter. For one, there is no provision for a cw filter. For another, receiver noise figure (sensitivity) likely will not be as good as can be obtained with a high-quality converter. Finally, there is no provision for actuating an external amplifier; if you want to boost your power, you will have to use an additional switch or an rf-sensing circuit. On the other hand, for many operators these disadvantages are more than outweighed by the desirability of having a complete station in one small, independent, attractive package. This reviewer caught his first-ever 2-meter Es opening because the IC-211 happened to be tuned to the new ssb calling frequency of 144.2 MHz on a Saturday morning. The main station was tuned up on hf at the time, since everybody *knows* nothing is happening on 2 meters at that hour. Four stations in Florida were worked as a result, including one who was using a barefoot IC-211 and an indoor antenna! — *David Sumner, K1ZZ*

ALDA 103 HF TRANSCEIVER AND PS-130 POWER SUPPLY

There is a trend today toward solid-state hf-band transceivers. In general, they're smaller, lighter and easier to operate than their tubed counterparts, the most obvious convenience being no-tuneup operation. The Alda 103 is a fully solid-state newcomer to this area.

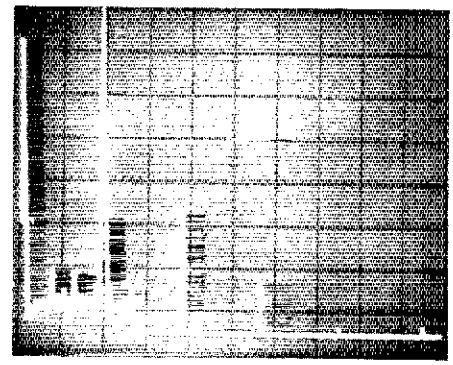
The '103 offers up to 250 watts input on cw or ssb with a power requirement of 13.8 V dc at 15 A. Cw operation is semi break-in. The power level is adjustable from the front panel; the operator can have any level he wishes, from QRP to full output.

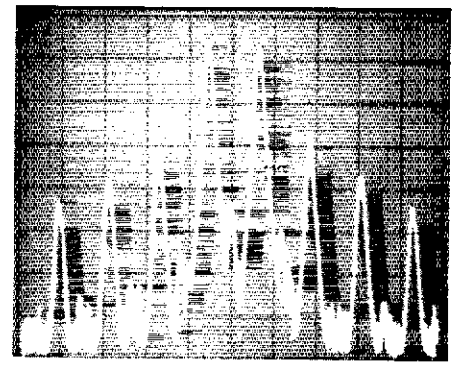
The broadband final amplifier stage, cooled by a large heat sink, gives reasonable power output even with a mismatched load. Approximately 80 watts output has been measured at this writer's QTH with an SWR level of approximately 3:1. Also, the PA is completely protected against transistor failure due to excessive SWR. I encountered an open-circuit condition temporarily with full output applied: No damage occurred! It was discovered that the manufacturer regularly demonstrates this feature at conventions by operating the '103 on, and then off a dummy load! The unit has a sidetone that is adjustable for a comfortable level via the audio-gain control. Ssb operation is by means of push-to-talk only, as no VOX is available on this transceiver. Alc is built-in, so the microphone gain is not particularly critical except under conditions of high background noise. Band coverage on 80/75 meters goes up to 4050 kHz, making the '103 suitable for MARS use, and additional coverage is provided up to 7500 and 14,500 kHz.

Cw operation is afforded by tone modulation of the ssb transmitter, using audio from the sidetone oscillator — approximately a 1000-Hz note. The initial tests with the spectrum analyzer showed a pair of discrete spurs (related to this oscillator) about 35 dB down with respect to the carrier. The manufacturer was informed of this, and adjustment instructions were promptly sent to correct the difficulty. There have been no further problems, and the unit meets current FCC requirements for spectral purity of emissions.

The receiver section of the Alda 103 is impressive for such a small rig. RIT, often standard on more elaborate hf transceivers, is also incorporated in the Alda. It is effective for minimizing QRM in crowded bands. Frequency readout resolution is to 5 kHz on 80 meters, and to 10 kHz on 40 and 20. The dial drive is a two-speed device: The user tunes past the desired signal at a 6:1 ratio, then can back up at a much slower 30:1 ratio — more than adequate for careful tuning, even during mobile use.

Two options worth noting were included in the review unit: a noise blanker and a two-position crystal calibrator. The blanker has





The Alda 103 transmitter output as displayed on a spectrum analyzer. The photos were both taken with the '103 operating at full rated input power. In the top picture, the operating frequency was 3.9 MHz. The vertical axis is calibrated in steps of 10 dB per division; the horizontal scale is 2 MHz per division. The large pip at the far left edge of the display is generated internally by the analyzer. The fundamental is shown here full scale, and the most significant spurious output, at 7.8 MHz, is down approximately 46 dB with respect to the fundamental. All other spurious outputs are down at least 60 dB. The Alda 103 complies with FCC regulations regarding spurious emissions. For the bottom photo, the Alda was operated at 7 MHz during a two-tone IMD test. The vertical scale is 10 dB per division; the horizontal scale is 1 kHz per division. Third-order distortion products are down approximately 30 dB from the PEP output. Individual tone outputs are down 6 dB from the PEP output.

Alda 103 Transceiver

Frequency range: 3.5- to 14.35-MHz amateur bands.
Modes: Cw, lsb and usb.
Maximum power input: 250 W PEP, ssb; 250 W, cw.
VFO stability: Less than 100 Hz/hour drift from cold start to approx. one hour later, at 25°F to 65°F (3°C to 18°C).
Sensitivity: Approx. 0.5 watt audio output for 0.5-μV input.
Selectivity at −6 dB: 2.5 kHz, ssb or cw.
Audio output: Approx. 3 watts at 8 ohms.
Power requirement: 13.8 V dc at 15 A, nominal, negative ground.
Dimensions (HWD): 3.25 × 9 × 12.5 inches (83 × 229 × 317 mm). Weight, 8-1/4 pounds (3.66 kg).
Color: Two-tone gray with brushed aluminum front panel.
Price class: $500, transceiver only. 30-A supply, $150.
Available options: Noise blanker; 100/25 kHz crystal calibrator; 15-A unregulated power supply; 30-A regulated supply.
Manufacturer: Alda Communications, Inc., 215 Via El Centro, Oceanside, CA 92054.

The Alda 103 and its optional 30-A supply, the PS-130. The dial on the '103 is available in Braille for the blind ham.

been quite effective in reducing ignition-pulse interference, and this writer's car has a particularly noisy ignition system! I'm fairly sure that the pulse noise could have been eliminated if some basic ignition shielding had been employed. However, an effective noise blanker makes one lax about taking care of this type of problem at its source. The optional calibrator has ample output; it is heard easily amongst the outside signals. The 10-kHz setting is particularly convenient. The "dial set," used in conjunction with the calibrator, rather than the usual mechanical type, is a variable capacitor in the VFO circuit. Reducing the rf gain was particularly effective in helping to separate strong stations from weaker ones, indicating some tendency toward strong-signal overloading. This was especially noticeable when the '103 was used with the audio gain "up full" under noisy mobile operating conditions.

A six-pole crystal filter provides good selectivity, and the 3 watts of audio output are more than enough for home or car use. VFO stability is good, appearing to have less drift than the 100 Hz per hour claimed by the manufacturer — even from a cold (25°F/−4°C) start in a car. The S/rf meter, although not damped for smooth readings during ssb operation, nevertheless gives adequate relative signal-strength readings.

Operating Impressions

This writer has found the Alda 103 to be a versatile and easy rig to operate. Having been used to tube-type rigs, I found that this solid-state, broadband, "no-tune" unit to be convenient, indeed. Excellent audio reports have been received from all stations contacted on ssb, and cw QSOs have yielded reports of clean, crisp keying. Mobile operation, which requires little space with this rig, has been an enjoyable experience; the combination of noise blanker, slow tuning feature, and rf-gain control make signal reception fairly simple. The Alda has more than adequate power to drive modern linear amplifiers: The writer's SB-220 mated very well with the '103 during the evaluation test period. There is one area that might distress some who are used to 1-kHz readouts: The Alda has, as mentioned previously, 5-kHz readout at best. It seems to be adequate, though, and really is a convenience in mobile operation, especially the wide dial pointer, which is very readable. Important! Alda has available at no charge a full Braille dial for the '103. Hats off to the manufacturer! This is just the sort of step we'd like to see other amateur-gear manufacturers take.

The power supply, model PS-130, is a husky piece of gear, indeed. It is rated at 12 volts at up to 30 A continuous duty. It has a 20 percent overload safety factor, so there's plenty of power to run the Alda 103, with room to spare! A smaller, unregulated 15-A supply is available as well. Zener-diode regulation is built into the transceiver, so a fully regulated power supply is not a necessity.

The Alda 103 transceiver is manufactured by Alda Communications, Inc., 215 Via El Centro, Oceanside, CA 92054. Price class for the '103 is $500, and for the PS-130 is $150. — *Sandy Gerli, AC1Y*

DAYTRONICS MIMIC PROGRAMMABLE MEMORY KEYER

If the prices of some commercial memory keyers have kept you from trying this nifty type of sending device, maybe you should consider a kit version. The MIMIC, by Daytronics, is a four-memory, programmable keyer that sells for about $80 in kit form, and can be assembled easily in one evening by most hams who have building experience.

The low price is aided through the elimination of a few controls. The MIMIC contains no volume or pitch control for its built-in sidetone oscillator. Also deleted is a weighting control. A repeat feature can be added to the keyer, however, by connecting a switch and two wires to the terminals provided on the printed circuit board.

Construction

All components for the MIMIC — except for the voltage regulator, speed adjustment potentiometer, a couple of jacks, eight push buttons and two LEDs — are mounted on one double-sided, plated-through, G-10 epoxy pc board. Soldering the 18 ICs and various other parts on the board doesn't take much time, but the finished board must then be connected to the switches, jacks and other controls. This requires soldering both ends of about a dozen 24-gauge wires. It takes a while, but when all the leads are dressed neatly against the board, the insides of the MIMIC look uncluttered.

A step-by-step set of directions is provided by Daytronics. Most builders' questions have been anticipated and answered in the literature. When the keyer kit was completed and the unit was turned on, it "played" the first time.

However, two problems were observed: First, the keyer sidetone seemed to "pull," decreasing just slightly in pitch as a string of dits was sent, and would then return to its normal pitch on the last bit after the paddle lever was released. A number of paddles were tried, and the problem remained. A quick call to the manufacturer revealed that the problem we were experiencing was due to a poor ground path on the keyer board. A wire was added in a location indicated by Daytronics, and the problem disappeared. The manufacturer informed us that this "hint" would be included in the instructions provided with future MIMIC kits sold.

The second problem involves the MIMIC's tendency to make a leading dit (when first starting to send a charcter) longer in length than those following it. The difference in length is slight, and in fact was not noticed at first until pointed out by a good friend, W1JA. According to the manufacturer, this is because the MIMIC's triggered clock does not run continuously, thus running only when characters are being sent. This makes the first dit sent slightly longer. There seems no way to correct this except to replace a 7413 IC — Daytronics provides these free of charge when necessary. This problem doesn't seriously affect operation of the keyer, however, and is difficult to notice unless you are listening for it.

Operation

Operation of the MIMIC is similar to that of most other memory keyers in many respects, although a number of differences do exist. The MIMIC is an iambic keyer providing either negative (for grid-block keyed rigs) or positive (for cathode-keyed or solid-state final rigs) keying. It has both dit and dah paddle memories, self-completing characters, automatic letter and word spacing, and automatic weighing.

Four 512-bit memories can be programmed, played back, erased, and so on, all from the front panel. (Each can contain 256 dits or dahs.) Eight push-button switches control all functions associated with the memory operation except for REPEAT, which is turned on by an optional switch located on the rear panel if desired. The buttons on the front panel select the desired memory, access the memory for "writing" or storing information, and SEND or play back the contents in a particular memory.

To record a message, press the memory number you wish to use. After the "write" button is pressed, an LED lights telling you the memory is set for recording. The message is then keyed in with a paddle, just as if you were sending "live." The triggered clock helps here, because it allows much more margin for operator error without causing a mistake to be recorded.

When the halfway mark is approached in each memory, the sidetone shifts lower in pitch to let you know you've used half of the total memory space of 256 bits. Although this is a nice feature, it takes a little getting used to. The first few times the sidetone jumped pitch, I made errors and had to start over, especially if I was going pretty fast to begin with. The dual-pitch sidetone functions in the playback mode also, letting you know how much message is yet to be sent.

At the end of a recorded message, the END button is pressed. This releases the clock, letting it run out the rest of the unused memory bits placing spaces or blanks in them. (Since the MIMIC uses a triggered clock, when you stop sending the memory will not automatically continue spacing itself — eating up memory — but will insert a maximum of three spaces and mark time until you resume sending or push the END button.)

Unlike some programmable keyers, with the MIMIC you can rerecord or edit the tail end of a message if it is incorrect without disturbing the rest of the message. For instance, if the message "now is the time for all good *med* to . . ." was sent in, you could stop the recording, hit the END button, let the memory light go out, and then play back the message to the point just before the error ("med") occurred. At the end of "good," simply hit the WRITE button, and anything else keyed in after that erases what was already in those memory bits. Therefore, if you want to store fairly long messages, and you're the type who gets nervous (and sloppy) when you know you're being recorded, this feature will allow you to correct your mistakes more easily.

As with most memory keyers, the MIMIC will stop sending from memory whenever you hit the RESET button or tap the dit side of the paddle. When the keyer is in the REPEAT mode, however, the message cannot be stopped by these means. If a programmed message that is being played back is stopped by tapping the paddle, the memory is not reset to the beginning, thus allowing you to insert an RST or serial number and continue with the rest of the message by pressing the SEND button again. To reset a memory to the beginning after stopping a message part way through, simply press the RESET button.

An interesting feature of the speed control on the MIMIC is that it also functions as a tune switch, depending on the exact setting. With the potentiometer at full counterclockwise setting — just clockwise from the off position, or about 9 o'clock — if the paddle is tapped the keyer locks up, sending a continuous note for tune-ups, or other functions. To unlock, you simply increase the setting to 11 o'clock (or farther clockwise), as which point the keyer shuts off and is ready to run at 5 wpm or more. The MIMIC is capable of sending at speeds from 5 to more than 60 words per minute.

Daytronics MIMIC Programmable Memory Keyer

Speeds: 5 to 60 wpm.
Keying: Transistorized; grid block (negative) or cathode/solid-state (positive). Will key up to 60 volts at 600 mA. (250 volts at 1 A with optional 2N3440 transistor — $1.75.)
Memory: Four 512-bit memories, each individually accessible.
Features: Dot and dash memories, automatic weighting, automatic spacing, built-in sidetone monitor, iambic compatible.
Power requirements: 117 V ac (with wall plug), or 8-15 V dc (400 mA at 12 V dc).
Size (HWD): 2-1/2 × 4 × 6 inches (64 × 101 × 152 mm).
Weight: 1 lb (0.45 kg) with wall-plug transformer.
Price class: $80 in kit form, $100 wired and tested.
Manufacturer: Daytronics Co., P. O. Box 426, Selden, NY 11785.
Optional features: Repeat switch, straight-key jack.
Warranty: 90 days parts and labor (limited).

The Daytronics MIMIC programmable memory keyer with triggered clock.

The MIMIC power supply arrangement is a convenient one, consisting of a full-wave bridge rectifier and dc regulator circuit inside the keyer and an external wall-plug transformer with 12-volt output. The two power supply leads going to the MIMIC can be attached to the screw terminals on the wall transformer, or connected directly to a dc power supply to provide from 8 to 15 volts. Polarity of the power leads is not critical, since a bridge rectifier is used inside. Thus, the keyer is protected against improper connection of the power supply leads.

The cabinet is an all-metal LMB enclosure with a two-tone (blue and white) paint job. Four rubber stick-on feet keep the keyer from scratching or sliding across tabletops. A two-circuit, 1/4-inch (6.3-mm) phone jack is used to accept keying input from any squeeze-type paddle, and the transmitter keying output is through an RCA-type phono jack.

As a final note of interest, Daytronics has done a considerable amount of rf bypassing inside the MIMIC cabinet. During operation on the 80- through 10-meter bands at power levels up to 1000 watts input, no rf-related problems were encountered. — *Jim Bartlett, K1TX*

THE HAMCO SCOTIA PADDLE

When the original W8FYO paddle appeared on the market more than 15 years ago, a few lucky souls managed to get their hands on one of these jewels. Several years ago, HAL Communications came out with their double-levered version of the "FYO" paddle that was compatible with iambic keyers. In addition to the fact that HAL has since ceased production of their paddle, another problem faces the prospective buyer of such a paddle, if he can find one — it has a tendency to "fly apart at the handle," if you will, whenever it is knocked a bit hard in the wrong direction. (I've had to go hunting for the spring on hands and knees several times after such an experience.)

Recently, several new versions of W8FYO's paddle hit the amateur market. One is manufactured by HAMCO of California. A small outfit, HAMCO purchased all inventory, jigs and rights from HAL, and after a considerable amount of design work, came up with a *new* double-paddle version they christened the Scotia.

When the box is opened, your immediate reaction is a soul-satisfying "Ahhh!" A combination of brush-finished solid brass and polished hardwood, the Scotia is definitely a fine piece of workmanship. This paddle is so aesthetically pleasing that you shouldn't mind placing it next to anything else in the house (although it might make your old boat anchors seem inadequate). Stability is the next obvious plus. At just under two pounds (1 kg), the Scotia is heavy to say the least. Even the most "jack-hammer" operator will find *this* paddle stays put. Three broad, low-profile, rubber feet also play an important role in keeping the Scotia in place.

All three variables are adjustable to match the most finicky ham's taste. Two sizes of Allen wrenches and a small screwdriver are required — not supplied by HAMCO. Paddle width can be set from extra wide to almost touching. The contacts, which are solid silver, by the way, can be adjusted from the point where they actually touch to any gap desired.

Finally, we come to tension. By now you've probably noticed the absence of springs on the Scotia. Instead of a spring which might wear out, become stretched by little fingers, or otherwise be placed out of commission, HAMCO has utilized a unique *magnetic* tension system. Each of the paddle arms has a strong, permanent bar magnet behind it providing the constant pull necessary to keep each set of contacts separated. The magnets slide forward and backward in their slots providing a wide range of tension at the paddle tips. Once the optimum tension is reached, the magnets can be secured with Allen-head setscrews that press down from the top. There is absolutely no way to derail the Scotia's paddle levers, and each lever can be adjusted for a different tension.

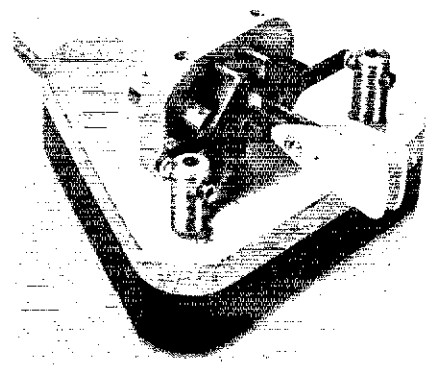
HAMCO thoughtfully includes an attached length of two-conductor shielded cable and a two-circuit, 1/4-inch phone plug. The plug is not attached to the wire, thus allowing you to wire to match your keyer, and select left- or right-hand operation. All connections between the cable and contact points are made *inside* the paddle base, leaving no exposed connections or wires underneath the paddle.

As with a toothbrush, a paddle or key and its *feel* are things which can be very personal, and agreeing on the "ideal" setting may be subjective to say the least. However, I can't imagine anyone not being able to set the Scotia to his individual taste. HAMCO does ship the Scotia with reasonable preset adjustments. Only slight changes were necessary to make mine play the way I wanted it to.

The Scotia's paddle tips are made from ABS plastic, the same material used in telephones. (ABS should not chip or crack, probably the reason HAMCO selected it.)

The final note of pleasure is the warranty.

The Scotia paddle is a handsome combination of brass and hardwood. A total of five separate adjustments make the unit easy to adapt to individual operator preferences.



HAMCO provides the original owner with an *unlimited lifetime* warranty on the Scotia. They say that means "If it breaks, we fix it."

The Scotia is manufactured by HAMCO, P. O. Box 3042, Eureka, CA 95501. Price class: $55, plus shipping. Other available models similar in design to the Scotia, are the Trinidad (engine-turned finish on brass) at $65, and the Carson (hand-polished smooth-brass finish, with personalized call- or name-plate) at $75. — *Jim Bartlett, K1TX*

RIW 432-19 19-ELEMENT 432-MHz YAGI

K2RIW's 432-MHz Yagis are well-known to most vhfers. In the past, however, these antennas had to be built by hand, as none were available commercially. For you who were waiting for the day when you could go out and buy one of Dick Knadle's antennas, here it is: the RIW Products 432-19.

Last May, we received a long cardboard tube from George Flanagan, W2KRN, the manufacturer of these antennas. George is a mechanical engineer, and he said he had worked with Dick, using Dick's original specifications, to come up with a commercial version that would be durable, easy to assemble, and a good performer.

"Yipes," I thought. "This guy's taken an antenna that has been proven to be a winner, and changed it around to make it easier to manufacture! Sure hope he knows what he's doing." Well, it didn't take too long to convince myself that George *did* in fact know what he was doing. That night, with the help of a well-written and generously illustrated set of instructions, I had the antenna put together in just under an hour. The next morning, the 19-element array took the top spot on my mast as a weather-beaten 15-element quagi was gingerly lowered to the ground. Now we'd find out how the antenna *worked*, I thought.

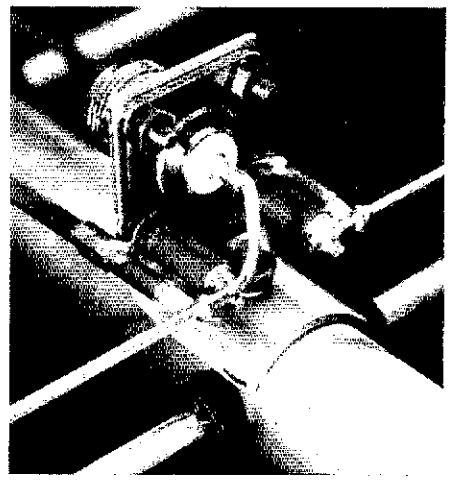
Performance

I'd neglected to check the SWR of the 432-19 before installing it, and was therefore a little nervous about hooking up the transmitter. With a Bird model 43 wattmeter in the line, however, I measured the SWR at 432.1 MHz to be just over 1.1:1. I didn't make too many contacts on 432 right off the bat, but several weeks later I had the opportunity to use the antenna in the June VHF QSO Party. It worked very well with 10 watts of transmitter output netting me seven states on 432, including Virginia (during an Es opening). Several Connecticut stations who had worked me previously when I was using the homemade quagi commented that my signal was much better.

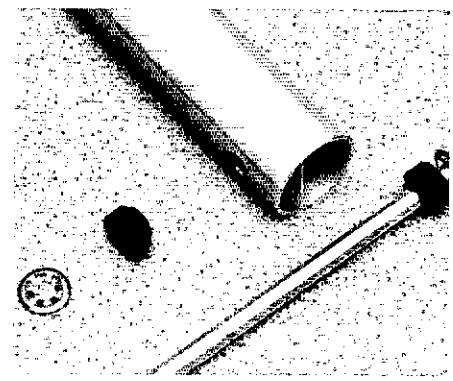
Actually, though, contests aren't much help in testing the performance of an antenna. What *is* impressive is the fact that the 432-19 won its class in the 12th annual East Coast VHF Society Antenna Measuring Contest held at Trenton (NJ) State College. Compared with an EIA reference antenna assumed to have a gain of 7.7 dB over a dipole, Dick's RIW 432-19 measured a gain of 14.3 dBd. He also entered an array of four RIW Yagis [6-foot (1.8 m) stacking], which measured a gain of 18.6 dBd.

Construction

The 13-foot (4-m) long Yagi is quite light at 2.8 pounds (1.27 kg). The three-section boom bolts together, and all 19 elements are installed *through* the one-inch (25-mm) boom, yet are



The driven element on the 432-19, with the feed point, T-match, balun and element mounting scheme all visible.



The RIW element mounting system, with the insulating shoulder and retaining ring already in place on one side. The element is then placed through the boom, and the other shoulder and ring are installed, holding the element tightly in place, yet insulated from the boom. Assembly of each element takes less than one minute.

insulated from the boom. The elements are color-coded both in the middle where they go through the boom, and on the ends so that each can be identified even after assembly. A set of Delrin insulator shoulders and stainless steel retaining rings are used to isolate each element from the boom. During assembly of the review antenna, I accidentally reversed the order of two of the elements part way down the boom. The retaining rings are "one-way" jobs with little fingers that grip the solid aluminum elements once they're in place. This presented no problem, though, as the antenna was supplied with a half-dozen extra rings just in case some fool were to do what I did! The misinstalled rings were snapped off with needle nose pliers, the elements were swapped, and new rings slipped onto the elements using the tool supplied with the antenna.

The 432-19 is supplied with a weatherproof type-N connector, a 4:1 balun, and all necessary hardware. Except for the mast-mounting hardware, which is zinc-plated steel, every nut, machine screw, retaining ring, and washer supplied is solid stainless steel to prevent rust. All plastic parts are UV-stabilized to withstand long exposure to sunlight without deterioration.

A T-match is used on the 432-19 with all but two connections soldered. Two compression joints are used, although they are placed at high-impedance points so that any resistance or capacitive reactance that may occur in the joints should have a negligible effect on performance. A preformed 1/2-wavelength section of RG-402/U hardline cable forms the 4:1 balun used for matching to 50 ohms.

One final design detail of interest is the use of *two* reflectors on the 432-19 instead of the typical single one found in almost every other Yagi. According to the manufacturer, K2RIW added the second reflector in order to maximize the antenna forward gain and simultaneously reduce the strength of the minor lobes in the pattern.

Another version of this antenna is also available for use in the ATV segment of the 440-MHz band. The 441-19 has identical specifications to those of the 432-19 except for its frequency coverage (the 441-19 is centered at 441 MHz). — *Jim Bartlett, K1TX*

RIW 432-19 Yagi

Elements: 19; 16 directors, 1 driven element, 2 reflectors.
Boom length: 13 feet (4 m).
Weight: 2.8 lbs. (1.27 kg).
Input impedance: 50 ohms, with integral balun.
Connector: Type N.
Power rating: 1 kW cw, 2 kW PEP.
VSWR: Less than 1.2:1 at 432 MHz; less than 1.6:1 from 426 to 438 MHz; less than 2:1 from 424 to 442 MHz.
Mounting: Clamp assembly fits masts up to 1-1/2 inches (38 mm) OD.
Price class: $60.
Manufacturer: RIW Products, Box 191, Babylon, NY 11702.

NEW BOOKS

English-German QSO Language Instruction for Amateur Radio Operators, by Leo Craven, G4EQI.

"Thousands of operators across the world QSO with only a hundred words in a second language. It gives them great satisfaction and a sense of achievement and hundreds of contacts which would otherwise have been impossible," says the author in this new booklet published privately in England.

Lest any readers be scared off by the ominous title, let us assure you that the booklet is small, easy to read, and only 23 pages in its entirety. Yet the author has done in these few pages a masterful job of providing clear instruction for the use of German on the air. Sample QSOs are offered, along with all the phrases one might want to use during a complete contact. The German-language version of the phonetic alphabet is included, along with the numbers, time expressions, etc.

Almost every radio amateur has at least once sensed the warm delight of a fellow amateur when he's tried a simple "gracias" or "danke." The use of other languages on the air goes far toward promoting international goodwill — something for which radio amateurs are worldwide renowned.

The booklet may be purchased for $3.50 U.S. (International money order) sent to Mr. Leo Craven, G4EQI, "Grass Moor," Radford Rd., Alvechurch, Birmingham B48 7DT, England. — *Bruce Johnson, WA6IDN*

The Club Filter

Let this simple, inexpensive cw filter become your club's next project. It's both fun to make and useful. A bit of magic for cw!

By Spencer Schubbe,* N8AP (ex-WB8GBD)

Keeping radio amateurs actively interested in a radio club and maintaining its vitality is a matter of concern for many radio associations. Once the club radio station has been built and is on the air, the fun and enthusiasm of the construction days often give way to a measure of lethargy unless steps are taken to prevent that from happening.

Our Eastern Michigan University ARC maintains members' interest by planned programs in which they actively participate. For instance, at a recent meeting a decision was made to find a simple project that each member could build. Because the majority of members were Novice-licensed college students (their fortunes yet to be made!), our plan included these requirements for choosing a project: It had to be (1) simple, (2) useful, (3) inexpensive and (4) educational. Selection of the project fell into my hands, mainly because I was the senior member and staff advisor.

With those four objectives in mind, I searched through several radio publications for ideas. What caught my attention was an active filter described on page 271 of my 1973 *Handbook*. Could that fill the bill? Would there be real interest in it among the members? I rationalized that most members operated on 40-meter cw. The device seemed well suited to their needs, as it would be economical to build, simple and, indeed, educational. Would the members respond favorably to the plan? I felt that if I could produce a demonstration model that proved the value of an active filter to these brass pounders, their acceptance would be won. So, off to the workbench I went.

The initial performance of my active filter, somewhat disappointing as it was, led me to consider some modifications that resulted in what the members found to be a superior filtering device. Their approval was most heartening.

Modifications

By changing the 1300-Hz band-pass filter frequency to 750 Hz, the audio response closely matches that produced by most receivers when a cw signal is centered in the passband. Use of the 1300-Hz band-pass frequency would necessitate detuning the receiver during filter operation.

An additional output (half filter) modification of the original circuit is included in Fig. 1. This change allows the signal to be taken from the first stage of the filter and makes tuning in a cw signal easier. This is so because the effects of the narrow passband of the full filter and the squelch action of diodes D1 and D2 are overcome.

The absence in Fig. 1 of Q1, which appears in the original filter diagram shown in the *Handbook*, resulted from the removal of a faulty transistor I had placed in my filter. I found the additional gain offered by Q1 was unnecessary; a good cw note was produced without it and a better match for low-impedance headsets is available at the output of the MC1741CP.

Proper shielding, bypassing and grounding are important for trouble-free

The author's club filter, housed in a contemporary style enclosure, rests atop his transceiver. Position of the mode switch and the presence of the straight key indicate his operating preference. The LMB model CO-3M enclosure is used for this unit.

*11315 W. Clement Cir., Livonia, MI 48150

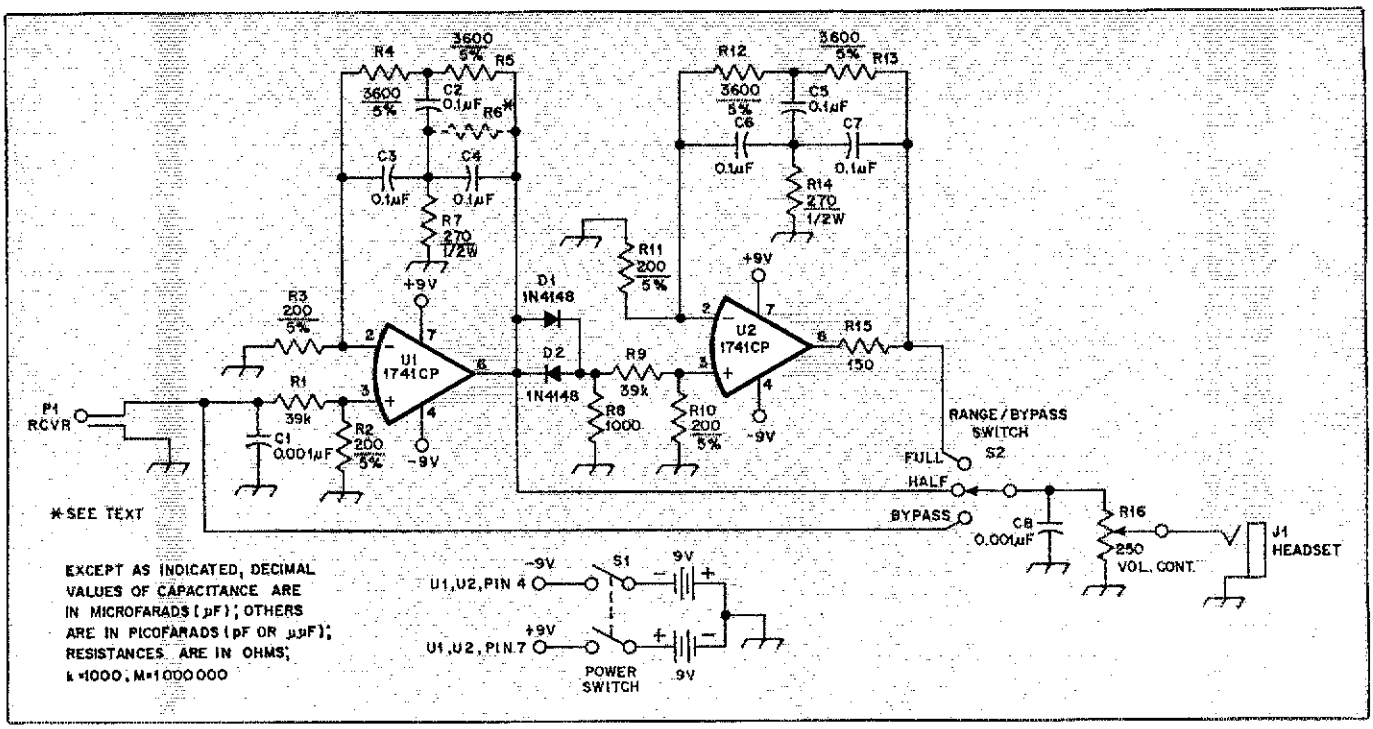


Fig. 1 — An audio-filter circuit for the cw operator. Capacitors are ceramic or Mylar. Fixed-value resistors are 1/4-W composition except as indicated. See text concerning R6, R7 and R14.

C1, C8 — 0.001 μF.
C2-C7, incl. — 0.1 μF.
D1, D2 — Silicon switching diode, type 1N4148 or equivalent.
J1 — 1/4-inch (6-mm) phone jack, Radio Shack no. 274-324 or equiv.
P1 — 1/4-inch (6-mm) phone plug, Radio Shack no. 274-1539.
R1, R9 — 39 kΩ.
R2, R3, R10, R11 — 200 ohms, 5 percent.
R4, R5, R12, R13 — 3600 ohms, 5 percent.
R6 — 50 kΩ (see text).
R7, R14 — 270 ohm, 1/2 watt (see text).
R8 — 1000 ohms.
R15 — 150 ohms.
R16 — 250-ohm linear-taper potentiometer, Allied Electronics no. 753-8329 or equiv.
S1 — Dpdt slide or toggle switch.
S2 — Three-position slide, push-button or rotary switch.
U1, U2 — Type 741 operational amplifier, Motorola MC1741CP or equiv.

operation of active-filter circuits. Some annoying squeaks, squawks and miscellaneous grunts occurred when I first tried the filter during transmissions. With higher transmitting power the filter even became silent. Simply by providing rf bypassing of the input and output circuits, these problems were eliminated.

Construction

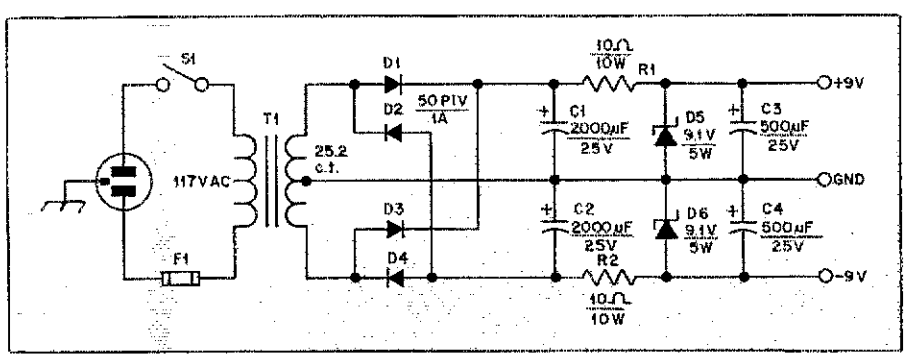
The circuit layout is not critical and may be readily constructed on Vectorbord or in printed-circuit form. Type 741 operational amplifiers are available in several case designs. I selected the eight-pin type MC1741CP because of the smaller size and availability. If another version of the 741 operational amplifier is used, the builder should note that the pin designations may be different from those shown in Fig. 1.

Individual builders may prefer other ways of switching power and filter output than the method shown in Fig. 1 in order to take advantage of switches on hand. I selected miniature toggle switches for compactness and as a means of combining power and bypass functions, although slide or rotary switches would generally be more economical.

Batteries are used to power the filter, as the current requirement is less than 5 mA. A more affluent builder may want to consider the ac supply illustrated in Fig. 2. The 0.1-μF capacitors should be Mylar or ceramic. All resistors can be 1/4 watt except R7 and R14, which should be 1/2 watt. A 5-percent tolerance for resistors is specified.

Fig. 2 — Circuit diagram of the club filter power supply.

C1, C2 — 2000 μF, 25 V, electrolytic.
C3, C4 — 500 μF, 25 V, electrolytic.
D1-D4, incl. — Diode rectifier, 50 PIV, 1 A.
D5, D6 — Zener diode, 9.1 V, 5 watt.
F1 — 1/4 A.
R1, R2 — 10 ohms, 10 watt.
S1 — Spst switch, Radio Shack no. 275-602 or equiv.
T1 — Low-voltage rectifier transformer, 117-V primary, 25.2-V secondary. Radio Shack no. 273-1386 or equiv.



Using the Filter

The filter is designed to have an input cable that is plugged into the headset jack on the receiver. The phones are then plugged into an output jack at the rear of the cw filter. To adjust the filter, set the filter volume control near maximum and, with the filter power off, turn on the receiver. If all is well, normal receiver operation should be observed. Next, tune the receiver to a portion of a band where no signals are heard. With the filter power turned on and the selector switch set at the FULL position, advance the receiver af gain control to a point where a pinging sound is heard. This is the 750-Hz component of the background noise. Lower the

af gain until the pings are infrequent or just disappear. Set the filter selector to the HALF position and tune in a cw station. If necessary, use the filter volume control to set a comfortable listening level, but do not change the receiver af gain setting. As the receiver is tuned across the cw signal, the 750-Hz tone will be greatly amplified while other frequencies will remain rather low. After the signal has been properly tuned in, the FULL position may be selected to give maximum quieting outside the 750-Hz note. A slight receiver tuning adjustment may be necessary to maximize the signal in the narrower band-pass region.

Conclusion

I find that the HALF position of the selector switch is best for general receiving. When the QRM gets really rough, the FULL position works like a magic wand.

Most of the filters constructed by club members performed well once wiring errors and dead batteries were eliminated. Two problem areas did turn up. The first was with R7 and R14, the wattage values of which seem to be fairly critical. All the filters employing 1/2-watt resistors for R7 and R14 worked while those using 1/4-watt resistors failed. The solution was obvious. The other problem was the gain of the type 741 operational amplifiers. While all had good gain, some had exceptionally high gain, producing a ringing or echo effect on the cw note. To correct the problem a 50-kΩ resistor, R6, was placed in the first stage (see Fig. 1) which restored a natural cw note.

With appropriate instruments and operating under controlled conditions, all of the constructed units and a commercial unit were tested for band-pass sharpness and frequency, and gain. I mention this only to report that the commercial unit failed to match the others. Even with maximum filtering this particular commercial filter would have been considered defective had it been one of our constructed units operating in just the HALF position.

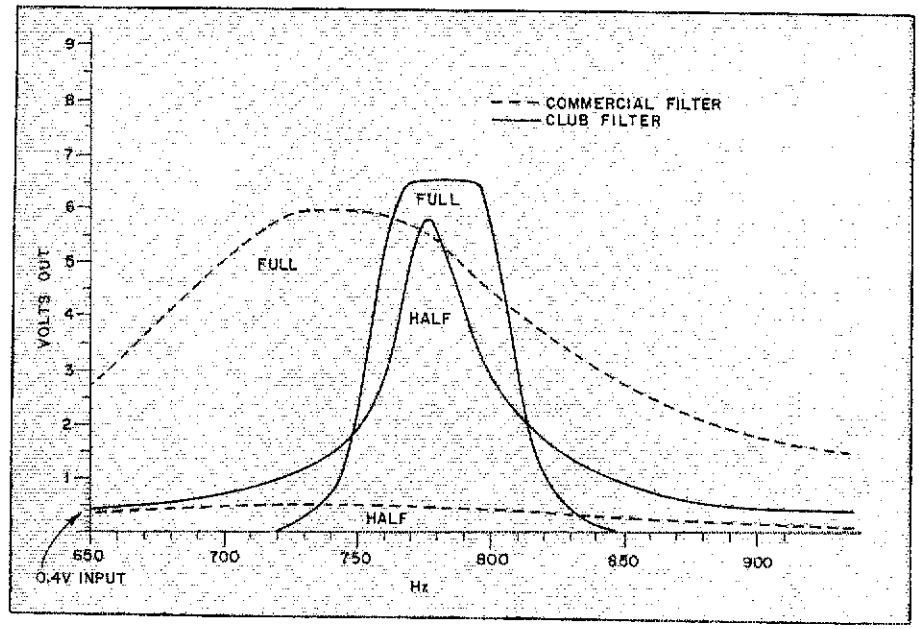


Fig. 3 — Response curves for the club filter. Broken lines represent the response of a commercial filter used for comparison. The effect of full filtering, employing both filter stages, is compared to half filtering, in which only one stage is engaged.

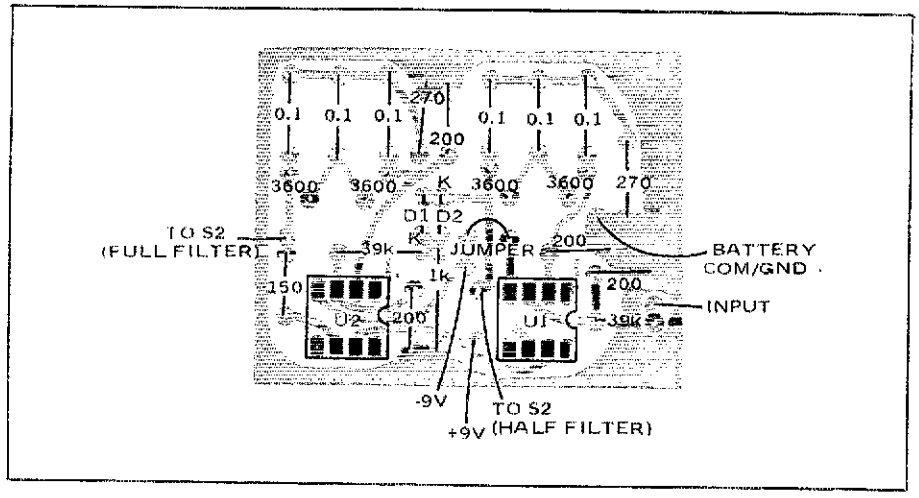


Fig. 4 — Parts placement guide for the club filter. Parts are placed on the nonfoil side of the board; the shaded area represents an X-ray view of the copper pattern. (The etching pattern appears in the "Hints and Kinks" section of this issue.) Whole-number values with no units represent resistances in ohms; k = 1000. Decimal-value numbers alone represent capacitance in microfarads. K indicates the cathode of a diode. C1 and C8, 0.001-μF bypass capacitors shown in Fig. 1, are mounted off the circuit board.

Strays

CIRCUIT BOARD SUPPLIERS

☐ Spectrum Research Laboratory, Inc., P. O. Box 5824, Tucson, AZ 85703, no longer supplies ready-made etched circuit boards for amateur projects. Their company is listed in the current (1972) edition of *FM and Repeaters for the Radio Amateur* and in earlier League technical publications such as the *Handbook*. A current list of board suppliers may be obtained by sending a stamped return envelope to ARRL Hq., 225 Main St., Newington, CT 06111.

Arizona Senator Barry Goldwater, K7UGA, is getting the feel of the bug belonging to Carl Glock, W3NFW, center, president of the Pennsylvania Bar Association. Peter Roper, W8YPJ, the Bar's new executive director looks on. Sen. Goldwater spoke at the annual meeting of the association in Pittsburgh recently.

THE BIG SCRUB

☐ Now the films you borrow from the ARRL training aids library are in good condition thanks to a superb cleaning job by Dick O'Keefe, WB1GDH. Dick did about 15 to 20 films each week. It took all summer, but after his tireless effort all our films are reconditioned and can look forward to a longer life! Thanks, Dick. — *ABIP*

I would like to get in touch with . . .

☐ Federal Reserve System hams interested in establishing an FRS net and newsletter. Jerry Anderson, WDØBJR, Federal Reserve Bank of Minneapolis, Minneapolis, MN 55480.

Hints and Kinks

OSCAR MOBILE WITH THE IC-245

My versatile ICOM IC-245 is a great performer for both mobile and portable use. One disadvantage, a lack of the lower-sideband function, almost meant "Goodbye OSCAR mobile!" To correct this limitation, I developed a simple, neat modification that does not upset the appearance or performance of the set.

The IC-245, with sideband adapter attached, consists of the two main frames. The smaller ssb unit is attached by four bolts to the larger transceiver frame. Removal of the two front bolts and loosening of the two in the rear will provide access to the necessary pads on the circuit board of the ssb adapter. Directly between the front panel and the circuit board there is space between the RIT and the CW-T controls to perform the simple changes.

First, one should carefully remove the 10.6985-MHz usb crystal and replace it with two 2-1/2-inch (64-mm) lengths of no. 22 insulated solid wire, leaving 1/4 inch (6 mm) of bare wire on each loose end. From the underside of the circuit board, solder a 3-1/2-inch (89-mm) piece of no. 22 insulated wire to the common junction of D1, R93, R94 and the tuning network C64, C65 and C66. Route this wire to the vacant area between the RIT and the CW-T controls, leaving a bare end for future use.

Next solder the 10.6985-MHz usb crystal to one of the outside pairs of the dpdt toggle switch. On the opposite side, solder one lead of the 10.7015-MHz lsb crystal to the switch. Slip a 1/2-inch (13-mm) length of spaghetti sleeving over the bare crystal lead.

Notice the wires from the former usb crystal position. Solder the lead from the base of Q20 to the switch wiper contacts common to both crystals. Solder the other lead to the other wiper contact on the toggle switch.

The remaining wire is connected to the tuning network consisting of a 0.7- to 0.9-pF ceramic trimmer padded by a 24-pF silver-mica capacitor. Solder the remaining lsb crystal lead to the other end of the tuning network. Except for drilling a small hole to accommodate the switch, this completes the modification.

Tuning is accomplished by connecting a frequency counter to CP-1 adjacent to Q21 and adjusting the appropriate trimmers to obtain correct frequencies. The 10.6985-MHz usb frequency and the 10.7015-MHz lsb frequency should be set and rechecked. Carefully reassemble the unit and use it for receiving OSCAR 7 on lsb. — *Bob Kile, WA7GCI*

ONWARD WITH RIT FOR THE HW-8

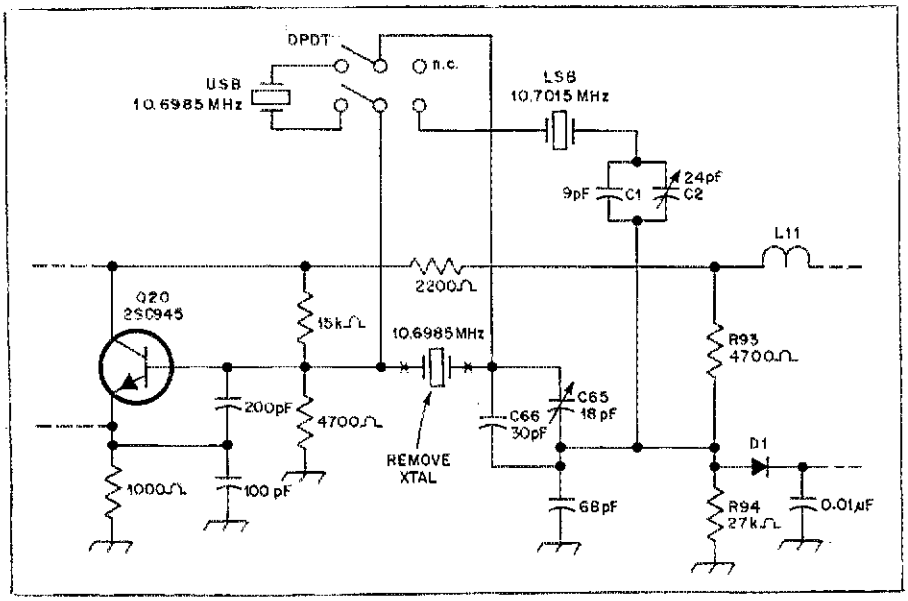
Receiver incremental tuning (RIT) might be the best cure for QRM, short of turning off the rig. A slight receiving-frequency shift often makes the difference between solid copy and going QRT in disgust. It helps, too, in digging weak signals out of QRN because fine tuning can make a big dB difference (audio peaking) with devices like the narrow HW-8 filter.

Some HW-8 owners had trouble finding the Sprague Q-line (QRT) parts specified in Ben Saylor's article "Full Break-in and RIT for the HW-8" appearing in July 1977 *QST* (see "Feedback," November 1977 *QST*). Alternatively, one can try substituting parts that may be readily available.

The af-amplifier silicon transistors, Q101 to 103 are used for low power dc switching and probably are not critical. I used Radio Shack 276-2014 transistors. One might expect more critical requirements for the varactor diode, CR1, which acts as part of the VFO. Remembering that Jay Rusgrove and Stan Brindle had used a pair of 1N914 diodes in a similar way in "The CB Slider" (March 1977 *QST*), I successfully substituted a 1N914 for the QRT-262 in the HW-8 RIT circuit. However, my transmitting frequency was affected by changes in the RIT adjustment. Therefore, I substituted a jumper for R108, bypassing the RIT potentiometer entirely during the transmit mode. Also, I omitted R109 with no sacrifice in performance of the RIT, while providing a maximum frequency shift of ±5 kHz. The purpose of R108 and R109 was apparently to minimize the effects of temperature variations on the RIT divider. I find little disadvantage in the omission of these resistors. I am pleased with the assurance of a fixed transmitting frequency while adjusting the RIT control to the extremes.

As Andy Thall ("Hints and Kinks," January 1978 *QST*) pointed out, the wide-selectivity switch on the HW-8 is useful for copying ssb. Instead of removing it altogether, I relocated it on the rear panel. The long run of cable from the rear of the circuit board is tied at an inaccessible place under the main VFO tuning assembly. I cut off all that was not needed to reach the rear panel. For sideband listening with the HW-8, the RIT control acts as a fine-tuning clarifier. — *Phil Emerson, WD8IZA*

Modification of the ICOM IC-245 transceiver for receiving the lsb transmissions from OSCAR 7. Required parts include a dpdt miniature toggle switch, a 0.7- to 0.9-pF ceramic trimmer capacitor (C1), a 24-pF silver-mica capacitor (C2), and a 10.7015-MHz series-resonant crystal in an HC-25/U holder for a 30-pF load (available from crystal suppliers advertised in *QST*).



REGENCY HR-2B MODIFICATION

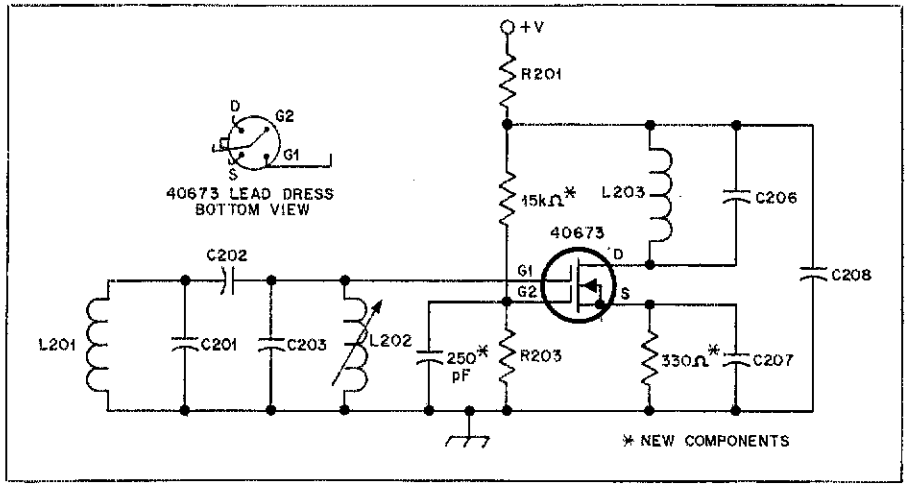
This simple two-hour modification will improve the strong-signal characteristics of the Regency HR-2B receiver without harming the sensitivity. Prior to the change, I had considered purchasing a new 2-meter rig, but now I find the set quite satisfactory.

The modification requires removal of C204 (3.9 pF), R204 (1000 ohms), R202 (4700 ohms) and Q201 (rf amplifier). Use a small pencil iron and solder wick. A solder wick substitute can be improvised by using fresh, stripped, small-diameter stranded wire.

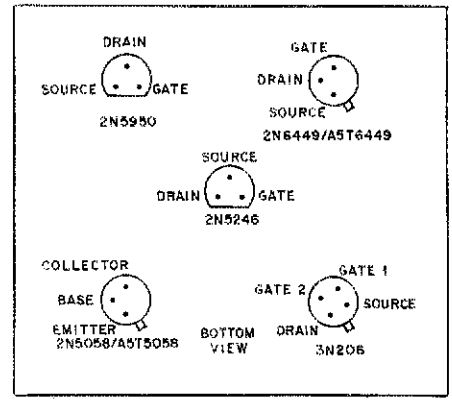
Next, cut the circuit element which connects the collector of Q201 to the tap on L203. Make the opening as close to the L203 connection pad as possible. Then drill a small-diameter hole in the circuit board for the ground connection of the 250-pF capacitor to be added. Refer to the diagram. This hole is drilled beside the ground connection for R203 (a 10-kΩ resistor).

Jumper the "hot" end of L203 to the original collector pc strip for Q201, which was cut as instructed above. Use a scrap of bare, tinned, copper wire. Proceed with the installation of the following components: a 330-ohm resistor in place of R204; a 15-kΩ resistor in place of R202; a 250-pF capacitor from the original base connection of C204 to the ground hole drilled in an earlier step.

At this point, form the 40673 leads as shown in the illustration. Extend the G1 lead with small-diameter bare wire if necessary. To install the 40673, the drain is connected to the



Performance of the Regency HR-2B is improved by this circuit modification.



These pin diagrams, furnished by AA6PY, will be helpful to those who wish to make semiconductor replacements for vacuum tubes based on W5DA's "Solid Tube" article in the April 1977 *QST*.

original Q201 collector. Then make these connections: the source to the original Q201 emitter; G2 to the original Q201 base; G1 to the original C204 pad connected to L202. Next, realign the receiver front end. To prevent the front end from oscillating, the 40673 drain must be wired to the hot end of L203 and not to the original tap. — *Bob Novas, W3DK*

SALVAGING COAXIAL FITTINGS

Salvaging PL-259 coaxial cable fittings can be frustrating when using a soldering gun or heavy copper iron. W1VON and I agree that much of the frustration can be avoided by drilling the solder out of the holes of the connector with a drill that is the same size or slightly larger in diameter than the openings to be cleared. Carefully drill just through the coaxial cable braid: Seldom does the solder run under the thimble. Next, hold the fitting with pliers and give the cable a short twist, loosening the connector. The center conductor is then unsoldered and the cable may be pulled free. Excess solder should be cleaned off with a hot iron and a small brush, following which the coaxial connector should be in almost new condition. — *"Twisty" Ljongquist, W1CQS/W4DWK*

VARIABLE VOX-DELAY CURE FOR 32S-3

The VOX-delay time constant of my Collins 32S-3 seemed long when the transmitter was first turned on; it only became normal after a 45-minute warm-up period. The original time-constant capacitor, C119, was apparently a low-cost ceramic unit. I replaced this 0.02-μF (0.05 μF on later models) capacitor with an Elmenco dipped type. A new diode for CR8 (1N458A) was installed at the extremity of the diode leads to remove it from heat-producing R89 and R112.

This change, an improvement, fell short of being entirely satisfactory. My next move was to remove the two hot 68-kΩ, 2-watt resistors (R89 and R112) connected to the cathode of V11A-T8. Two .7-watt paralleled 68-kΩ resistors were used as replacements. Both were placed vertically on the chassis and on the outboard side of the V11 socket. The VOX delay now functions normally under all operating conditions. Incidentally, these resistors in the later 32S-3A have been replaced with a single 34-kΩ, 5-watt wire-wound resistor, which I'm informed also runs very warm. — *J. H. Buck, W6TCO*

QST PATTERNS

I am glad to see etching patterns printed in *QST* with black ink rather than gray or some other color. This way, the pattern may be lifted directly from the magazine using an acrylic-polymer medium. I use the product called Liquitex no. 5016. It is available at many art supply stores. After coating the circuit layout in the magazine with four or five coats of polymer and allowing it to dry between coats, one will obtain a very fine negative of the pc board after soaking the dried polymer in warm water to remove the paper.

I've used this sytem often; it allows me to get projects under way quickly without having to order the needed boards from a supplier. — *Robert J. Gumm, W9RG*

HINT FOR MAKING SOLID-STATE TUBES

W5DA's article in April 1977 *QST* on the design of solid-state devices to replace vacuum tubes was very informative. It should enable the average experimenter to make replacements with little difficulty. The pin designations which were not shown in the article are not readily available. Therefore, guessing at the correct hookup can lead to destruction of the devices.

I am furnishing the missing information, as provided in the Texas Instrument *Transistor and Diode Data Book*. The TIS131, however, was not shown in that publication, but is electrically equivalent to the 2N5058/A5T5058 in the accompanying illustration.

Another problem for the experimenter is locating the seven- and nine-pin plugs to fit into the existing tube sockets. Those plugs seem nearly impossible to find. But a good way to circumvent this problem is to make the plugs. This is done easily by obtaining printed circuit seven- and nine-pin tube sockets, then soldering short pieces of no. 18 solid wire in the tube side of the socket. This upside-down tube socket can then be used like a plug. One should not forget that the upside-down socket, in effect, reverses the pin order so that pin no. 1 becomes pin no. 7 on the plug. — *J. Craig Caston, AA6PY (ex-WA6PXY)*

EXPANDED-SCALE AC-LINE MONITOR

My intention was to build a simple ac-line monitor for use at my workbench and with portable generators during Field Day activities. I realized that the usual simple system has a voltmeter scale with much space devoted to the low-end voltages while the voltages of interest are crammed into a small segment of the scale, as shown at A in my illustration (next page). My first proposed solution to this problem resulted in the incineration of a fine old junk-box meter movement. This led to the following idea.

A Variac with a 0- to 132-volt output was connected to the primary of a filament transformer and the voltage set at 80, as shown at B. The rectified output of the transformer was measured at this voltage setting and a Zener diode which matched that dc value was acquired. The idea is that the Zener diode can be put in series with the meter so that no current will flow until the Zener breakdown voltage is reached. (See part C of the drawing.)

The minimum ac reading desired was 80 volts, and 130 was chosen as the maximum. These figures were selected because I had a meter with 50 divisions on the scale, the equivalent of one volt per division. (See illustration D.)

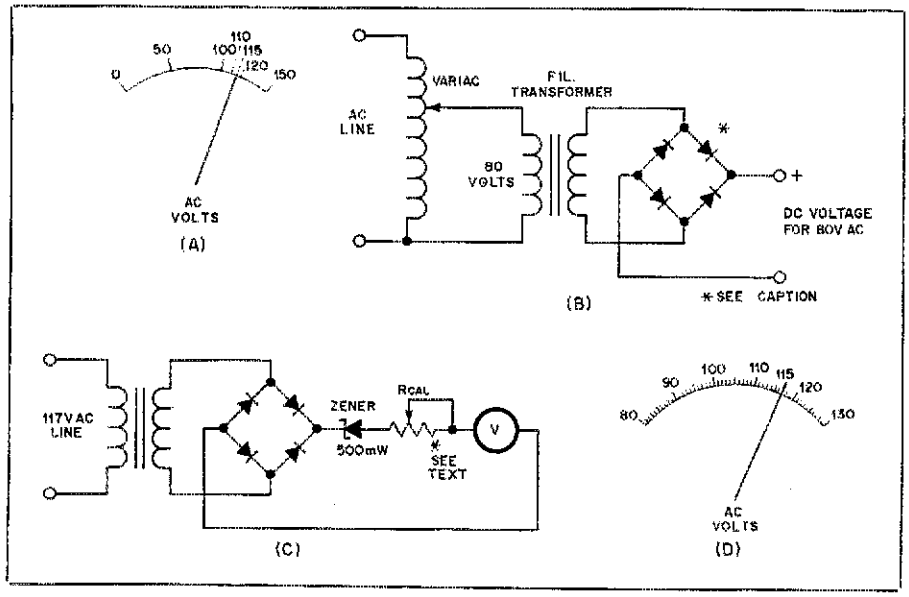
A current-limiting calibration resistor was placed in series with the meter and the value was computed by the formula

$$R = \frac{V_{DC\ MAX} - V_{ZENER}}{\text{Meter Current}}$$

For instance, if the maximum dc output of the secondary is 13.2 volts, the Zener diode output is 8.2 volts, and the meter has a 1-mA movement, then the resistor would be determined as follows

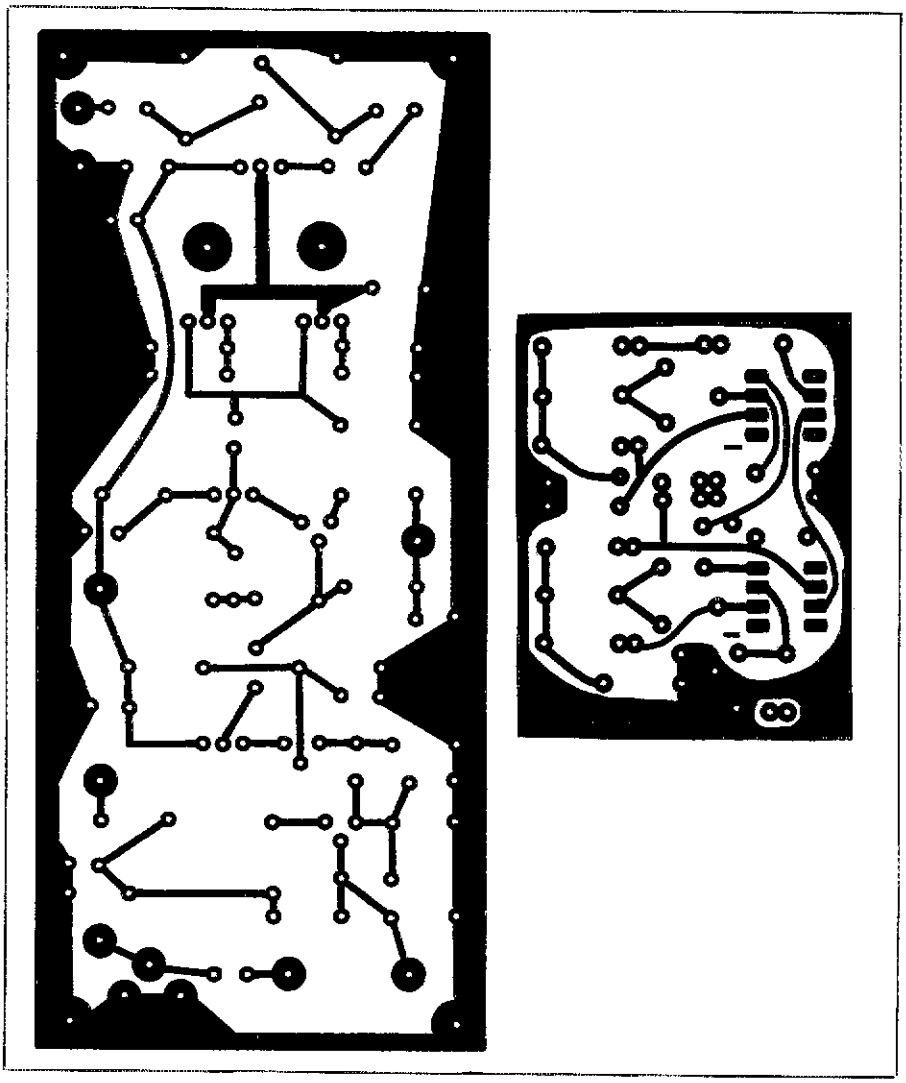
$$R = \frac{13.2\ V - 8.2\ V}{0.001\ A} = 5000\ \text{ohms}$$

I used a Bourns 10-turn potentiometer which works well. The meter is calibrated by adjusting the potentiometer for maximum resistance, then setting the Variac for 130 volts of output. The potentiometer is then adjusted for 100-percent deflection of the meter movement. Next, check different voltage settings of



These illustrations show how N7JJ reworked his line-voltage meter to better display the range of commonly used voltages. See text for details. Diodes should be selected according to the voltage and current chosen. In drawing C, the Zener diode must be reverse biased. Observe polarity!

Circuit-board etching patterns for construction projects contained in this issue of *QST*. The boards are single-sided. They are shown here at actual size, from the foil side. Black represents copper. At the left is the pattern for the 6-watt VXO-controlled transmitter (see Fig. 2, page 13). At the right is the pattern for the active club filter (see Fig. 4, page 37).



the Variac and note the corresponding meter readings. A slight adjustment of the calibration resistor might be desired in order to have the 115-volt reading line up with a major scale marking. Once calibration is accomplished, the Variac can be removed.

My monitor is accurate to within 1 volt. As for the Zener diode, if it is an 8.2-volt device with 1 mA flowing through it, the power dissipated by it is only 8.2 mW. For this application a 400-mW Zener diode is quite adequate. — *John Lapham, N7JJ (ex-WA7LUJ)*

DIGITAL SPEED READOUT IDEAS

☐ The article, "A Digital Speed Readout for the Electronic Keyer," in July 1978 *QST* was interesting. I'm sure a lot of amateurs are collecting parts and building the unit now. Here's a tidbit of information that may help them until they have their units completed. To clock the speed of an electronic keyer, close the dash side of the keyer and count the number of dashes sent in a five-second period. This number is approximately equal to the speed in words per minute. — *Al Brogdon, K3KMO/N3AL*

☐ I'd like to suggest an alternative time base for the "Digital Speed Readout for the Electronic Keyer." No additional ICs would be required to count down the 60 Hz available through the power source. Two programmable dividers such as 8281s or 74191s could be used so that the time base of 1.2 seconds would always be determined by the line frequency. By using 6 × 6 × 2 or 9 × 4 × 2 arrangements, the final 2, in each case, could serve with one of the spare sections of the 7400 to obtain the 180° outputs needed for the counting section. Also, in case of 50-Hz line frequency being available, a 6 × 5 × 2 division could be employed. — *Vern Parks, K4IGO*

NPN OR PNP

For those who can't remember npn from pnp try this simple recall method: pnp — *p*oints *in* proudly; npn — *n*ot pointing *in*. — *Jim Bartlett, K1TX*

HINTS

☐ Keeping spare fuses in a plastic 35 mm film container that is taped to the power cord is a good idea for Field Day operators. — *Kenneth Nollet, KØEN*

☐ Applying liberal amounts of water to the ground where a ground rod is being installed can make the work easier. — *Margaret Noblet, WB8CLG*

☐ I resolved an unwanted frequency shift in my old Viking II VFO through removal of the dark deposit on the bandswitch by carefully applying a silver dip liquid to the contacts. The residue should be rinsed away with alcohol or warm water. — *Paul Atkins, K2OZ*

☐ Prevent nearby business or Amateur Radio stations from interfering with HW-7 or HW-8 transceivers by inserting a 1- to 2-mH choke between the switch terminal and the + terminal of the Heath power connector. — *John H. Czap, WB2LGS*

☐ Want to quiet a 14-watt Muffin Fan to the level of a 7-watt whisper fan? Then series connect nine 50-ohm, 10-watt resistors (Radio Shack no. 271-133 or equivalent) in one of the ac leads. A light dimmer also works, providing a variable fan speed. — *Charles E. Ficklin, WB3LBW*

Give Your Repeater Some Identity

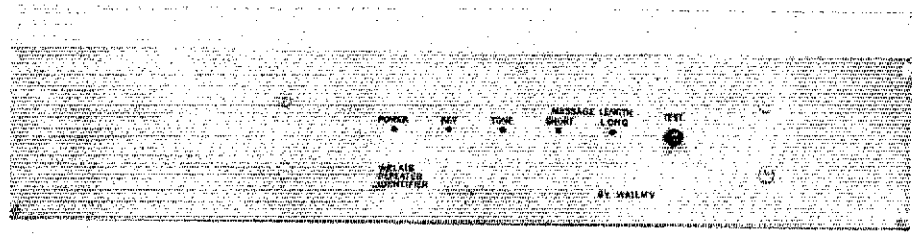
Let your repeater have a chance to tell people about itself instead of merely saying who it is.

By Rick Swenton,* WA1LMV

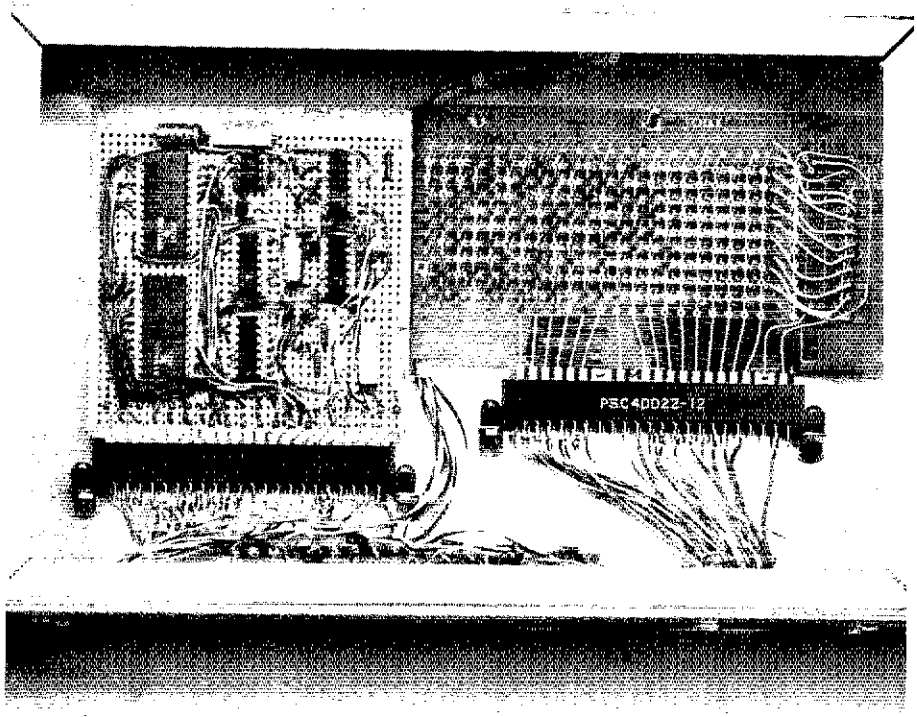
If you think this is just another diode matrix identifier article, don't stop reading yet. Most i-d units function well in the station identification mode, but very few i-d units tell a story! Did you ever have a repeater function that you wished to be indicated on the air as to its status . . . is it on . . . or off? The old trick was to change the pitch of the i-d tone to signal the function status. An example of this is the method of indicating a commercial power failure at WR1ABM in Bristol, CT. When the repeater is operating on emergency power, the i-d tone changes from its usual low pitch to a higher pitch. This signals the users to conserve battery power. But wouldn't it be nice to have the cw i-d send a message indicating such a status? Here is such a circuit.

This i-d unit performs the usual station identification. It is user programmable with diodes in a read-only memory (ROM) matrix. There are 256 positions (or bits) in the memory. Most repeater identifiers (such as DE WR1AAA) will occupy less than 100 memory locations. This leaves about 150 memory locations for the special message. Such a message might be EME PWR indicating emergency power operation, or LINK indicating a cross-band link is activated. The difference between this i-d unit and other units is the presence of a control input which selects either the station i-d only or the station i-d plus the message. The circuit uses inexpensive, reliable TTL ICs which are readily available at most outlets such as Radio Shack.

The circuit diagram of the identifier is shown in Fig. 1. U1 is a 555 timer IC used as an astable multivibrator. This provides pulses to the counters, U2 and U3. The code speed of the identification is adjusted by the 10-kΩ pot connected to pin 6



Front panel of the dual-purpose identifier from the WR1AIB 450-MHz repeater. It is built on a standard rack panel and has LED indicators to display the status of the various functions.



The control logic for the identifier is located on the board at the left. The board on the right contains the diode matrix, and was obtained from surplus (original manufacturer was Cubic Corp.). Both boards can be unplugged to simplify servicing or modification of the units.

*19 Allen Street, Bristol, CT 06010

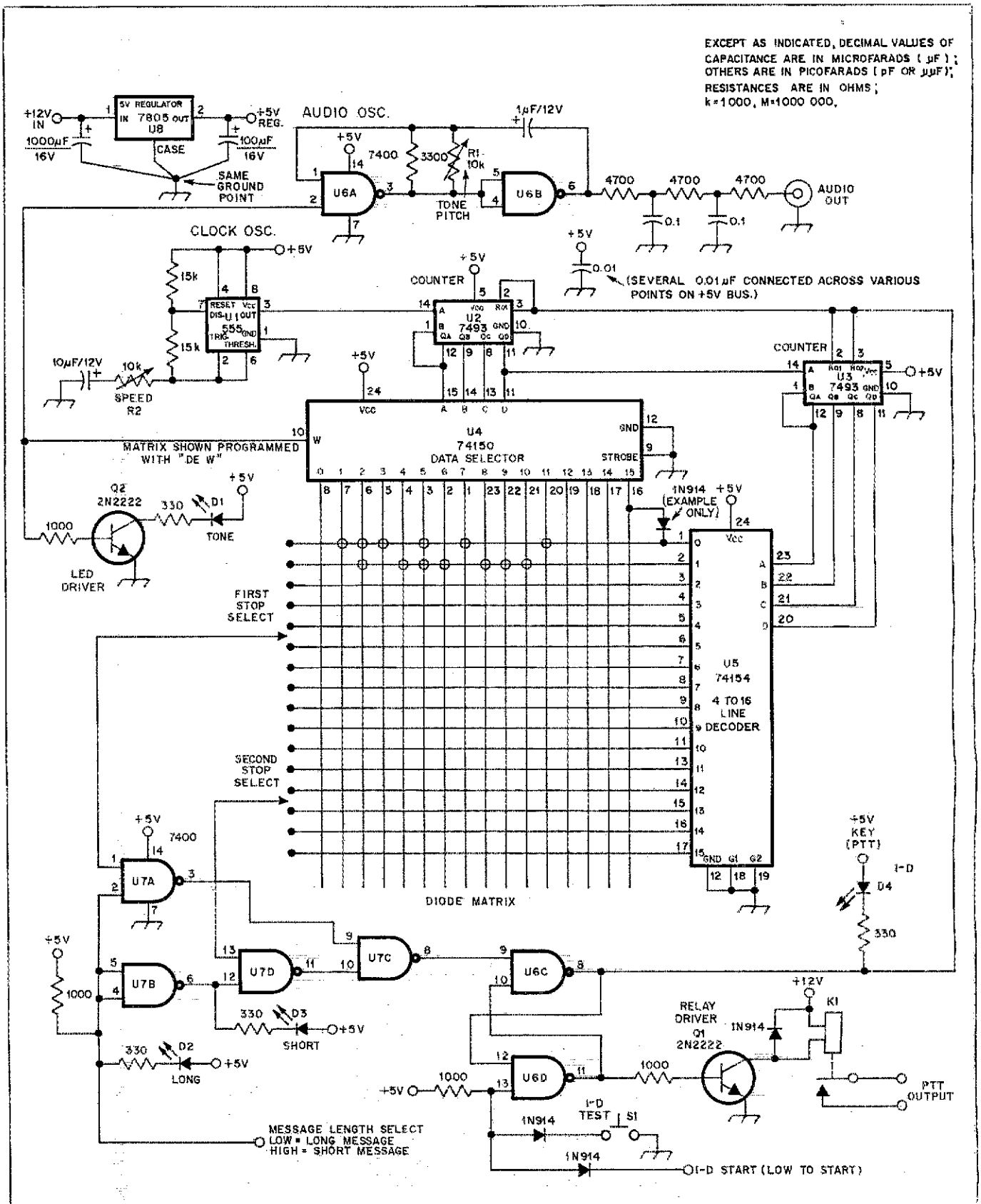


Fig 1 — The schematic diagram of the identifier with the message DE W programmed. The 1N914 diode shown in the matrix is only given as an example to illustrate the proper method of installation. Diodes are soldered into the matrix at all the intersecting points marked with a circle in this example. All resistors are 1/4-watt. Capacitors with polarity markings are tubular electrolytic; others are mica.

D1-D4, incl. — LED, Radio Shack 276-041 or equivalent.
K1 — 12-volt relay, Radio Shack 275-003 or equiv.
R1, R2 — Trimpots.
S1 — Momentary contact push-button spst.
U1 — Timer, NE555.
U2, U3 — TTL counter IC, type 7493.
U4 — TTL multiplexer IC, type 74150.
U5 — TTL 4-line to 16-line decoder IC, type 74150.
U6, U7 — TTL quad NAND gate IC, type 7400.
U8 — 5-volt regulator, type 7805.

on U1. Speeds from a slow crawl to an almost impossible rate can be achieved. The counter ICs U2 and U3 provide the 256-bit count. The binary count from the outputs of the ICs U2 and U3 (7493) are converted from binary to two separate groups of 16 lines. These two groups of lines perform the diode matrix "scanning." The 74150 IC, U4, is a data selector. Its function is to select and thereby scan the matrix columns. The 74154, U5, is a four- to 16-line decoder. It enables the matrix rows. While U4 is scanning the columns, U5 is enabling the rows by pulling each low, one row at a time. (The other 15 rows remain high.) The output of U4, pin 10, feeds U6A, a 7400 IC used as a tone oscillator. The 10-kΩ pot connected between pins 1 and 5 on U6 A and B adjusts the pitch of the i-d tone. Q2 is a driver for D1 which flashes along with the i-d tone (this circuit is optional). An RC low-pass filter eliminates the harmonics of the square wave produced by U6 A and B to provide a clean sine wave at the output of the i-d unit. U6 C and D and all of U7 provide the start/stop and message-length select control. The i-d is started by either grounding the i-d start line or pressing the test switch. The i-d stop signal will come from either the first or second stop-select lines. The connection of the stop-select lines is described below in the matrix programming instructions. U7, a 7400, performs the stop-signal selection. Depending on the logic level present on the message-select line, the i-d will be either a long message or a short message. Grounding the line will provide the total message. Allowing the line to float or go to +5 V will provide a short message. U7 selects which stop-select line will reset the i-d. The PTT relay in the collector circuit of Q1 should be any small, general-purpose 12-V dc relay. The relay is energized when the unit is identifying. The 7805 IC, U8, provides regulated 5 V from a 12-V dc source.

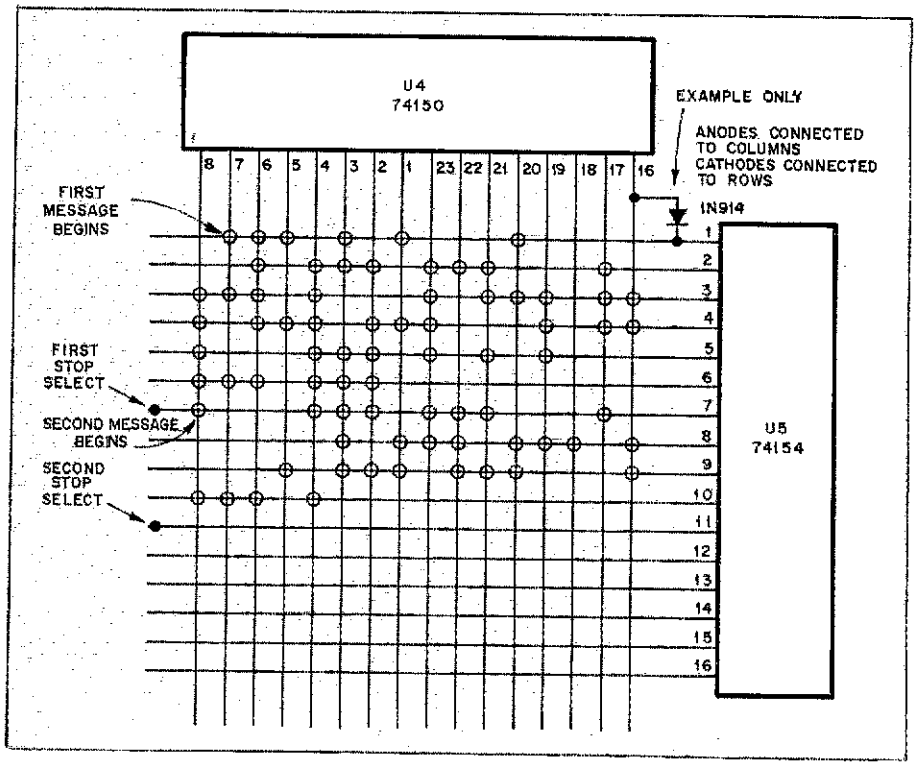


Fig. 2 — The diode matrix is shown with the message DE WR1ABM EME PWR programmed. A diode is installed at each circled position. For normal operation, only DE WR1ABM will be sent. For the first stop select, start the second message on a new line. Connect the first stop select to the line which begins the second message. For the second stop select, connect the second stop select to the next line after the second message ends.

Programming the Matrix

Type 1N914 silicon diodes are used in the matrix. Do not place the first diode in location "00"! When the i-d is in the reset mode, the first memory location is addressed. If you place a diode in the first location, there will always be a tone present on the output when in the reset mode.

Three diodes in a row constitute a dash, one diode constitutes a dot. Three spaces in a row constitute a space between letters. One space constitutes a space between code elements. I used six spaces to constitute a space between words. (Although "perfect machine-sent code" calls for seven spaces, the difference between 6- and 7-unit spacing is hardly noticeable by ear, and the saving in matrix bits may be significant on long messages.) The diodes are placed in the matrix just as the code appears on paper in a dot-dash format as shown in the example in Fig. 2.

To wire the stop-select lines, connect the first stop-select line to the row line which contains the beginning of the second message. Note that you should not begin the second message on the same row where the first message ends. The i-d will reset itself to zero on the signal which begins to read the row containing the start of the second message.

The same is true for the end of the matrix. Don't place any diodes in the last row. This line is reserved for the second stop-select signal if the matrix is fully loaded to the second-to-last row. The example in Fig. 1 shows how the stop-select lines are implemented.

Your repeater can now tell the users about itself. This feature can pay for itself by helping to extend operating time when the repeater is on emergency power. Also it can help keep autopatch testers in the woodwork when the patch isn't working.

Strays

OSCAR 8 GOES TO SCHOOL

☐ OSCAR 8 went to class in more than 30,000 junior high schools this fall, in the form of an article and a 45-rpm record included in the October issue of *Current Science* magazine. Editor Vincent Marteka and Science Editor Charles Piddock contacted ARRL headquarters for assistance in preparing the piece.

Steve Place, WB1EYI; Jeanie Zaimes, AB1P and Bernie Glassmeyer, W9KDR, put together a tape of OSCAR sounds and supplied background information to Xerox Educational Publications, which puts out *Current Science*. Published as the feature article, the piece was entitled "OSCAR 8 Is Number One With Student Hams." Also included was a two-page science quiz sheet. The whole production was a first-class effort, and our hats are off to Xerox for a job well done.

We are told that 500,000 copies were printed and distributed. The article will reach at least 2,000,000 students. Copies are available from Xerox Education Publications, Middletown, CT 06457. No copies are available from ARRL hq. — *Bernie Glassmeyer, W9KDR*

GEORGIA TRAINING NET

☐ Georgia hams can now learn how to handle traffic, improve their code speed or just have a change of pace by checking into the Georgia Training Net. GTN meets daily on 3.718 MHz at 2230 UTC. More information available from Tim Lemmon, WA4OMQ, 5599 Coronation Ct., Atlanta, GA 30338.

Aerial Performers of the Radio Circuits

Basic Amateur Radio. Part 2: Why do some antennas get out better than others? Here are some practical answers plus all you need to know for building a simple coax-fed, half-wave dipole.†

By Margaret Koerner,* KØIQ (ex-WBØBEM)

A few miles west of this writer's amateur station, many of the mountain sides are dotted with gold mines, most of them long since abandoned. Out of those mines came ore — tons of ore from which a comparatively few ounces of coveted gold were laboriously obtained.

Producing a radio signal can be compared to a gold-mining operation, even though the coveted "gold" is not measured in ounces but in *watts* — units which indicate power. As in the mining of metallic gold, a great deal of labor is involved, a great deal of refining is necessary, and the amount of power which makes up the finished product may be small compared to the amount needed to produce it.

With a poor antenna installation, evidence of this last fact can be dramatic. To illustrate: Let's assume we have a transmitter which draws about 400 watts of alternating-current power from a wall outlet in order to generate 200 watts of radio-frequency power. This loss of 50 percent within the transmitter is basically beyond our control since it is dependent on equipment design. The 200 watts of rf power must then be sent through a feed line and antenna (which together make up the antenna system) before a signal can be radiated into space. The efficiency of the antenna system will determine whether the 200 watts will be utilized to the fullest advantage or be further reduced in strength. If our hypothetical antenna system is a "lossy" one, as much as three-fourths of that 200-watt output strength can be dissipated as heat, leaving as little as 50 watts of actual power to be radiated from the antenna. This means that of the 400 watts we started with, only 50 watts remain — a total power loss of 87.5 percent!

*2133 9th St., Boulder, CO 80302

†Part 1 apeared in November 1978 *QST*.

The left side of Fig. 6 shows the losses in the lossy feed line and antenna just described. In contrast, the right side shows the same transmitter, a low-loss feed line, and a well-constructed, 3-element beam antenna — a system which shows "gain" rather than loss. If you compare the illustrations, you can see where losses and gains occur. Now it's time to take a closer look at what we mean by decibels and gain.

Decibels

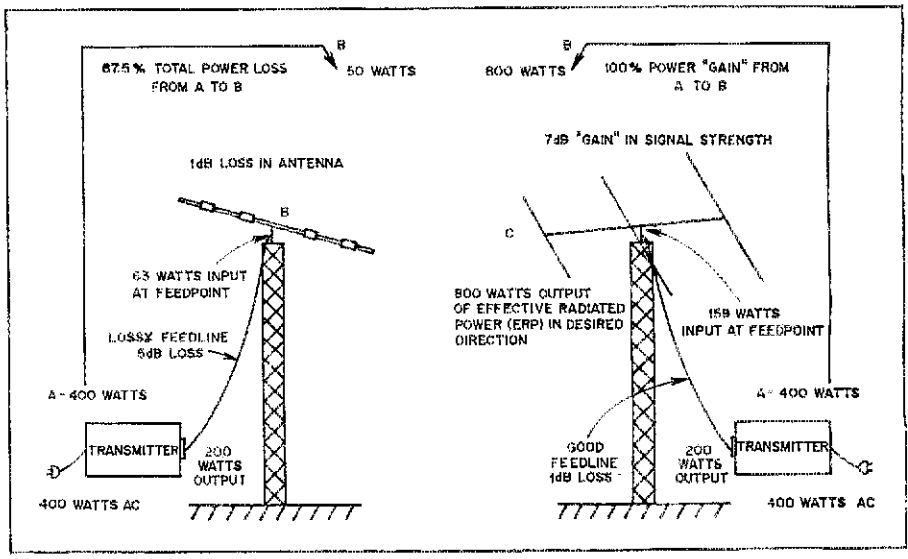
The actual output power of a radio signal is measured in watts. In Amateur Radio discussions and in the exchange of signal reports on the air, however, we usually hear signals compared in terms of *decibels.*[1]

Decibels are units of comparison between two power levels. Used initially in audio engineering, a decibel (dB) is a just-detectable change in sound level under ideal conditions. Table 2 is a tabulation of some useful dB comparisons.

The power of an Amateur Radio signal as it leaves the transmitter and travels through the feed line to the antenna can be measured at the transmitter output in units of *actual* power — watts. After the signal has been radiated from the

[1]The bel was named in honor of Alexander Graham Bell. A decibel equals 1/10 of a bel.

Fig. 6 — The antenna system at the left is lossy, resulting in an 87.5 percent loss of power from transmitter input to antenna erp (effective radiated power). Total loss is 6 dB due to power dissipation in the transmitter, poor connectors at the transmitter output and antenna feed point, lossy feed line, and poorly constructed and installed antenna. At the right, there is an overall power "gain," despite the same 3-dB power loss in the transmitter. A good-quality feed line has brought only 1 dB of loss, while a beam antenna has added 7 dB of "gain." Total erp from this antenna system is 800 watts.



antenna, its strength is usually expressed in decibels of *relative* power, as shown on a receiver's *S meter* (signal strength meter). S meters are marked in divisions which indicate decibels and groups of decibels. The groups are known as *S units;* the number of decibels in each S unit (usually 5 or 6) depends on receiver design. The meters themselves vary as far as design, readability and reliability are concerned, and unless they are calibrated against a signal of known accuracy, they do not, as a rule, indicate the actual strength of a signal. Instead, they show each signal's relative strength compared to (1) other signals, (2) the noise level, or (3) a change in strength of that same signal.

Comments concerning the strength of signals may indicate that one station is 6 dB louder than another, that a signal lost 2 S units when the transmitting station switched from one antenna to a different one, or that a signal increased 10 dB when an amplifier was turned on. You may be told that your signal is the strongest one on the band, that it is way down in the noise, or that it is anywhere in between. Many things affect the strength of a signal, but the antenna system, composed of feed line and antenna, always plays a major part.

In addition to *seeing* relative strength responses on a meter, we can often *hear* relative strengths of signals as they emerge from a speaker or headphones; our ears have the ability to respond to relative loudness, just as the meter responds to relative power. These responses are logarithmic (see Table 2), which means (1) it takes a really substantial increase in actual power to make any noticeable difference in signal strength, and (2) doubling the power increases a signal's relative strength by 3 dB. This holds true no matter what amount of power is being increased by a factor of two — 10 watts to 20 watts, 500 to 1000, or 1000 to 2000. Each of these increases raises the relative power by 3 dB.

If power is *decreased,* the same thing happens in the opposite direction: When power is cut from 1000 to 500 watts, the strength of a signal is reduced by 3 dB.

Table 2
Useful dB Comparisons

Gain in dB	*Increase in Relative Power**
0	1.0
1	1.3
2	1.6
3	2.0
4	2.5
5	3.2
6	4.0
7	5.0
8	6.3
9	8.0
10	10.0
20	100.0
30	1,000.0
40	10,000.0
50	100,000.0

*0 through 9 dB power increases are approximate; others are exact.

Gain Questions

The assigned work of any transmitting antenna system is to radiate as much of the energy sent to it from the transmitter as possible. An antenna cannot, and therefore does not, *generate* any energy. All it can do is *radiate.* Question 1, then, is this: Why do we refer to antenna "gain"? Gain over what? (Question 2) And why is it that some antennas put out much stronger signals than others receiving the same amount of power from a transmitter? (Question 3)

Questions 1 and 2 can be answered together. Whenever we discuss any type of gain, we are comparing one thing with something else. A train, for example, gains speed — its speed increases over what it was; there are gains in the stock market today, compared to yesterday's listings. Gain indicates a *comparison,* and a signal's gain in power is also a comparison — a comparison against a standard, or point of reference. The standard may be a certain type of *practical* antenna, usually a half-wave dipole, or the standard can be a *theoretical* antenna called an *isotropic radiator.* The isotropic antenna can (in theory) radiate equally in all directions. Practical antennas, on the other hand, always radiate more energy in some directions than in others. If you read an antenna advertisement that says a certain type of antenna has dBi gain, the i indicates that the comparison reference is an isotropic antenna. If it says dBd gain, the second d means that the gain is calculated by using a half-wave dipole as a standard. (Incidentally, a half-wave dipole shows a 2.1-dBi gain.) If the ad merely states that the antenna has "gain," it's anybody's guess what it refers to.

Now for Question 3, concerning how gain is achieved. In Part 1 of this antenna article (November *QST*) we discussed beam antennas — directive types such as Yagis and quads, which, if properly constructed, radiate stronger signals than less-directive types such as commonly used dipoles and verticals. They achieve this extra strength (the so-called gain) not by generating additional energy but by concentrating the energy they receive from the transmitter and radiating it in a chosen direction at the expense of other directions, much as a flashlight does. Certain antenna types, then, can produce what we call gain.

Some antenna systems show gain over others because they have a better location. An antenna system can also show gain by keeping losses to a minimum. By eliminating loss sources, thereby lowering the amount of total loss, an antenna system of any type can show signal gain over a more lossy antenna system. It can even show gain over its former self when improvements are made, such as replacing defective feed lines, tightening connections, increasing height above ground, and increasing the number of radials. The gain is usually expressed in decibels of relative power. Power *loss* (also expressed in decibels), which can occur in either feed line or antenna, is determined by the antenna system's efficiency — the ratio of its input power to its output or radiated power. In any type of antenna system, high efficiency is achieved by careful and proper construction and installation, including matching of feed line to antenna, particularly when coax is used.

Proper Construction and Installation

Those words represent our present-day responsibility in our radio mining operation. During the past hundred years or more, by ingenious labor, thousands of radio amateurs, as well as other engineers, scientists and experimenters, made our present amateur equipment and communication possible. Because of their efforts and experiments we can obtain alternating current (ac) at 60 hertz (cycles per second) from a simple wall outlet; can change that ac to direct current (dc) by rectification; can utilize the dc in transistors and tubes to again generate and amplify ac (this time at radio frequencies of millions of times per second), and can send that rf energy to an antenna system to be radiated into space. This last step is our responsibility; our job to see that the "gold" that has been produced in our transmitter gets shipped out efficiently and profitably to its various destinations. If we send our precious rf power to a lossy feed line, we have allowed our gold to be hijacked en route. If we send it to a poor antenna, we have for all practical purposes (though unintentionally) thrown most of it onto the mine dump.

Here, then, are three things to remember about antennas:

1) Antenna work involves *work.* Extra work on feed lines as well as on antennas can yield extra watts and extra decibels of precious rf power.

2) A well-constructed beam antenna, by concentrating most of its energy in one direction, can produce a signal 10 to 20 times (or in very large installations, even more than 20 times) greater than that of an equally well-constructed but nondirectional antenna. But (and this is good news for everyone) it is also true that an antenna *of any type* that performs well by keeping its losses to a minimum can also radiate a far stronger signal than that of an antenna system with low efficiency. And all this relative increase is without the use of a separate power amplifier.

3) A good small — even simple — antenna, such as a dipole or a vertical, can produce a better signal than a lossy big installation, no matter how impressive the latter may look.

So as you put up your first antenna (and later ones, too), set your sights and

your antennas high, and the "gold in them thar hills" can then be yours.

So Which Will It Be?

One of the questions beginners always ask is this: *Which kind of antenna is best?* And it is no wonder they wonder. All about them, in commercial ads, on roofs and on towers, in conversations on and off the air, they see or hear about all sorts and species of antennas: the most common ones — dipoles, verticals, Yagis, quads and longwires; the less-common windoms, rhombics and Zepps (that last kind so-called because they were first used on the Zeppelin dirigible); and a few antennas with such strange and wonderful names as six-shooter, bobtailed curtain, Beverage and fishbone — the last two receiving antennas only. All of these are billed as skilled aerial performers in the radio circuits. Each, too, is a deciding factor (possibly *the* deciding factor) between a signal that really "gets out" and one that really doesn't.

The answer to the question of which one is best is simple: There is no such thing as one best antenna for everyone, but there *is* a best antenna for *you*, depending on your own special situation. Answering the following questions should help you evaluate your situation:

1) How much room do you have for your antenna installation? It's amazing how small a space can, if necessary, be enough.

2) How much money can you afford to spend for this part of your amateur station? You can get by on only a few dollars, or on what we will simply call "more."

3) Do you intend to build your first antenna or buy a commercial one? Materials for the construction of a simple wire dipole are easily available to almost everyone.

4) Are there neighborhood (or domestic) problems to be worked out?

Look at antennas and talk about them with others. Read about them in books and periodicals (five common types were described briefly in Part 1 of this article). Look again at your own situation. If, after that, you decide to put up a coax-fed, half-wave dipole that is inexpensive and relatively easy to build, the accompanying information should be of practical help. For that matter, even if your choice is different, you might read the section anyway and perhaps "mine" something of interest from it.

Constructing and Installing a Simple, Coax-fed, Half-wave Dipole

This section[2] will provide a step-by-step guide to building your own one- or two-band (see text), half-wave dipole antenna. It's the type most Novices (and some higher class licensees) use, and it just may be the right one for you.

Materials Needed

1) *Wire.* For a dipole antenna, both the wire size (gauge) and length are important. For a straight dipole supported at the ends, the wire must be strong enough to mechanically support both the dipole and the weight of its coax feed line. Wire sizes no. 12 to 18 are recommended, the smaller number indicating the larger size. The wire should preferably be of the copper-weld type, which has a steel center to give it strength and prevent it from stretching, and a copper outer layer bonded to the steel center to make it a good conductor. Electric fence wire, either copper-covered or galvanized, can also be used effectively.

If you are putting up a space-saving, drooping dipole (also known as an inverted V), you can use any of the above-mentioned kinds of wire or the softer all-copper wire, since this type of dipole has the coax and antenna weight supported at the middle by a mast.

The amount of wire needed for either type of dipole will depend on the band or bands for which the antenna is being constructed. The total length of wire will be approximately one-half wavelength long for the desired band; measuring from the center, each side of the dipole will be about one-quarter wavelength long plus a little extra for making connections. (See Table 3.)

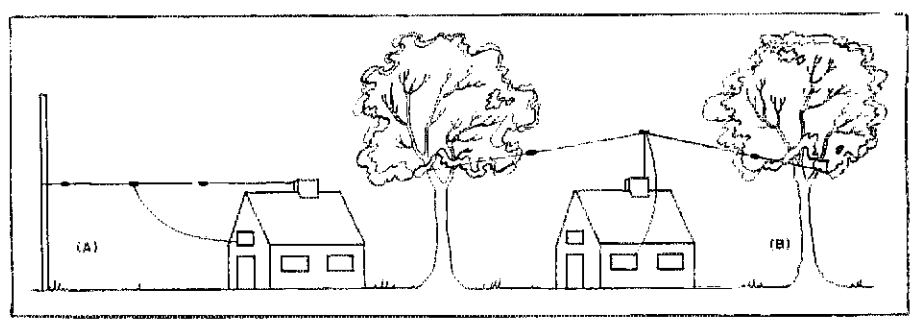
2) *Insulators.* Insulators are used at the center of the dipole and at the far ends of the two dipole wires. A center insulator is needed to keep the two halves of the dipole electrically separated and to provide an anchor for the two dipole wires and the feed line. This center insulator can be a commercial one or it can be made from a piece of acrylic or phenol-type plastic, such as the type shown in Fig. 8A, or it can even be made of wood. If it is made of wood, the wood should be saturated with hot paraffin or treated with varnish or some other coating to make it weatherproof.

Other insulators, usually made of porcelain, ceramic or glass, will be needed for the far ends of the dipole wires. The so-called egg insulator (Fig. 8B) or some other type of compression insulator, as well as "dog bone" type insulators (Fig. 8C) are in common use. Wood is not satisfactory for insulation at the ends of the dipole, as the rf voltage is much higher there than in the middle; if wood is used you may end up with high energy losses.

3) *Coax.* Get a good grade of 50-ohm coax for your dipole feed line. (See Fig. 1, November *QST*, page 43). If you can see through the braid to the insulation underneath, the braid's copper coverage (called "shield continuity") is probably inadequate. When you have installed the coax, be sure that none of the braid is left exposed, since exposed braid can soak up water like a wick. Use a silicone rubber compound (such as GE RTV) to weatherproof all connectors. You can also wrap connectors with electrical tape, cover them with a battery clamp "rubber boot," or use a combination of all three methods.

The antenna is fed directly from the transmitter, via the coax, at the center insulator, using a connector socket and plug (Fig. 8A). Use an SO-239 socket or its equivalent for the center connector and a PL-259 plug for the antenna end of the

Fig. 7 — At A, a typical half-wave dipole installation. Sturdy rope is used to connect the ends of the antenna to trees or other supports. At B is an inverted V, a half-wave dipole with the center part of the antenna raised. The ends should be as far apart as possible, for best results. Be sure to leave the ends of this type of antenna high enough above the ground so they can't be touched; someone could get an rf burn by touching the wire while the station is operating.



Credit for the practical information in this construction section (as well as for many helpful suggestions and important items of information in previous sections) must go to Jim Snyder, W0UR/KØZCM.

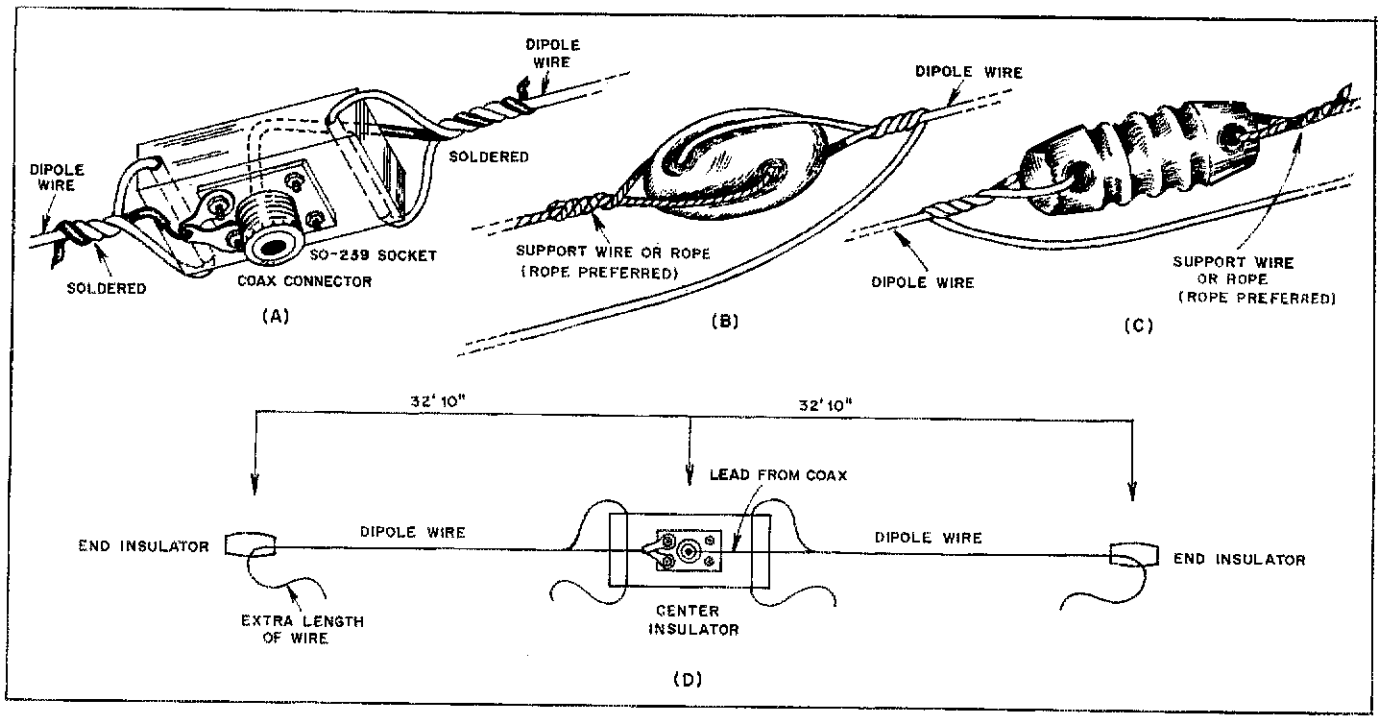


Fig. 8 — At A is a homebrew center insulator. This type is also available commercially. The "egg" type compression insulator (B) and the "dog bone" type (C) are common end insulators. A diagram of a 40-meter half-wave dipole is at D. All wire connections should be soldered. Trim the extra length of wire in (B) and (C) for minimum SWR. *(drawings based on originals by G. Ladwig)*

coax. The other end of the coax must have a connector that fits your rig. Using a properly installed connector at the feed point of the antenna, rather than splitting the coax (as is sometimes done), prevents water from getting into the coax.

4) *Supports.* For an inverted V, you will probably need a center support to get the high (middle) portion of the antenna up in the clear. This center support, called a mast, may be a metal pipe, a TV push-up mast, a 2 × 4 or some other type of center support strong enough to stand up against wind, ice and the antenna's weight.

For either the inverted-V or straight dipole, you will need to fasten the far ends of the dipole wires to sturdy objects. Plan ahead to determine what these objects will be — a roof, tree, pole or anything else convenient for the purpose. Have the antenna ends as far apart as possible.

Assuming that you or someone else in your family has a tool box with screwdrivers, pliers, wire-cutters and other essentials, the only expenses for your first antenna will be coax, wire and perhaps a few insulators and connectors. You may know an amateur who will bring some of his own equipment and perhaps contribute needed materials to the cause. Most amateurs have overflowing junk boxes and, since they are probably traders and scroungers themselves, will be happy to help other scroungers, particularly beginning ones, any way they can.

Preliminary Construction (things to do on the ground)

1) Measure the wire according to the following table, but *before cutting* it be sure you have included an additional length needed to go through the insulators and secure them, and another bit extra if you are putting up a drooping dipole instead of a straight one.

2) If you are using bare copper wire that has become tarnished, clean off the ends for several inches with steel wool so that it will be possible to make good solder connections. If insulated wire is used, remove the insulation at both ends with wire strippers or a knife.

3) Always use *rosin-core solder* on all connections. Acid-core solder will cause the wires to corrode.

4) Put the coax connector on the center insulator block and attach the dipole wires to the coax leads from the connector, as shown in Fig. 4.

5) Measure the two dipole wires again (now that they are attached to the center insulator), and mark the points which indicate the length needed for each side, using the band measurements listed in Table 2. Attach the end insulators, as shown in Fig. 8. Be sure to note the wiring illustration for the egg insulator. Wired as shown in the illustration, the dipole will not come apart, even if the insulator breaks.

6) Cut the length of 50-ohm coax you will need, allowing for some slack, and put on the two connectors. Put the connector sleeves on the coax before soldering the main part of each connector. *The Radio Amateur's Handbook*[1] contains complete information on installing coaxial connectors.

7) If you have access to an ohmmeter, test the coax for continuity and shorts after putting on the connectors. Place one probe on the *center conductor* at one end of the coax and the other probe on the *center conductor* of the other end. The ohmmeter should indicate less than 1 ohm of resistance — a virtual dead short. Again using the ohmmeter, touch the probes to the *braid* at both ends. Again, the result should be a virtual dead short. Finally, touch one probe to a center conductor and one probe to the braid (either at the same end of the coax or at the two ends) and you should get an infinity reading — infinite resistance. Failure to show these readings indicates a break in the coax or bad solder connections for the first two tests, and a short in the coax or connectors for the last one.

8) For your safety and for best operation of the antenna system, a ground

Table 3

Wire Lengths* for a Straight Half-Wave Dipole

Novice Band	Length Each Side (1/4 λ)***	Full Length (1/2 λ)
80 meter	62' 10"	125' 8"
40 meter**	32' 10"	65' 8"
15 meter	11' 1-1/2"	22' 3"
10 meter	8' 3-1/2"	16' 7"

*Before cutting the wires for either a straight or drooping dipole, be sure to add extra lengths of wire to go through the insulators and secure them. See Fig. 8. For a drooping dipole, also add about 2 percent extra to the lengths shown in the table, provided the antenna is up high enough so that the ends of the dipole wires are not close to the ground or to other objects.

**A 40-meter dipole can generally be used effectively on 15 meters, without change.

***Feet × 0.3048 = m; inches × 25.4 = mm.

[1] *The Radio Amateur's Handbook*, ARRL, 56th Ed., 1979, pp. 17-5, 17-6.

connection is necessary. Run a metal rod (4-8 feet/1.2-2.4-m long) into the ground outside the shack. Attach a piece of heavy bare or insulated copper wire (12 gauge or larger) or a strap of copper or galvanized metal to this rod and attach the other end to the chassis of the rig.

9) A Blitzbug or some other kind of lightning arrestor should also be properly installed in the coax line.

Installing the Dipole

Only general directions can be given for this process since each situation is different and your resourcefulness will be needed to determine where and how. Certain suggestions may nevertheless prove helpful.

1) Get your antenna as high as the given situation will permit.

2) Keep your antenna wires away from power lines; *never* go over or under them. If you fail to follow these precautions you may not even live to regret it.

3) Treat your coax with great care. Don't walk on it and don't put mechanical stress or strain on it.

4) As you pull the antenna into position, watch that the wires do not kink. Our apologies for not telling you *how* to pull it into position or how to fasten it to the mast; you'll have to figure out how to do this for your own situation.

5) For either the drooping or straight dipole, bring the coax down vertically as far as possible.

6) If your antenna end support is a living tree, put a piece of rubber hose around the tree (for the tree's protection) and run the support wire or rope through the hose. There should be an additional length of cord or wire, after the end insulator, to secure it in place via the rubber tubing.

7) Be sure to solder and, where necessary, weatherproof all connections carefully. The antenna and upper part of your coax will not be readily accessible like other parts of your station. Eventually any weak spot is sure to be damaged by the wind and other elements, and will have to be repaired. Ultraviolet light from the sun can weaken guy ropes, so use strong cord such as plastic clothesline with a polyethylene center for your supports. *Never* use rope with a wire center as a support for any type of antenna.

8) Even though there is a legitimate use for a piece of equipment called a *balun* (rhymes with gallon and is derived from the combination of balanced and unbalanced), it is usually not needed as an electrical balancing device for this type of simple, coax-fed antenna. Feeding the coax directly to the antenna and using the connectors as described cuts down the cost and makes the entire installation simpler.

9) You may hear someone talking about an antenna matching or tuning unit, such as a match box or Transmatch. These are useful or even required in some situations, but since most modern rigs are made to operate into a nominal 50-ohm load, a matching unit for this coax-fed dipole should not be necessary. You can learn more about matching (and baluns) in *The Radio Amateur's Handbook*.

10) You will also hear people talking about SWR meters or the SWR (standing wave ratio) of their antenna systems. They may report SWRs of 1:1 (known as 1 to 1), 1.7:1 or 3:1. SWR could take up an entire article, but we will limit our discussion of it to one brief statement. Antennas are supposed to be tuned to a desired resonant frequency (usually a frequency at about the middle of a desired band). The use of an *SWR meter* or *SWR bridge* is one way of finding out whether the tuning of a coax-fed antenna has been properly achieved. A *change in length* is usually the means by which simple antennas are adjusted to take care of the tuning. If it is determined from an SWR meter reading that the resonant frequency of your antenna is lower than you desire, you can *raise* the resonant frequency by *shortening* both sides of the dipole, equally. If the resonant frequency is *higher* than desired, you can *lower* the resonant frequency by *lengthening* both sides of the dipole equally. See Fig. 8.

But don't worry too much about the SWR of your simple, coax-fed half-wave dipole. If you use good 50-ohm coax, cut your dipole wires the proper length, make sure all connections are tight, and put your antenna up as high and in the clear as possible, you should be able to "mine" your share of the radio spectrum for years to come.

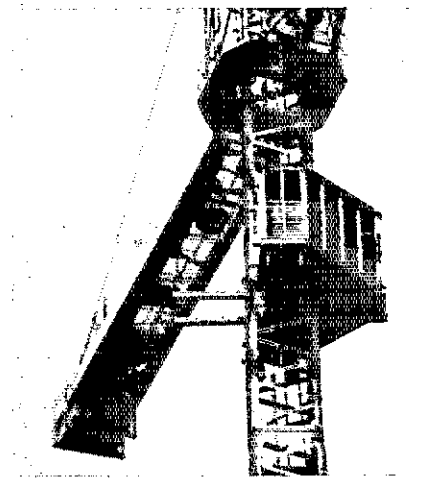
Strays

At the Los Angeles Energy Fair '78 Pete Matthews, W6UIA (left), holds a 25-watt solar-panel array toward the sun while Dr. Norm Chalfin, K6PGX, operates on 2-meter fm. During the late September event, the solar array was used "raw," except for a series regulator to maintain 11.56 V out. The cells have an open circuit output of 20 volts.

These four teachers found that they could get in-service credits and a new hobby all at once. The Washington, DC, schools offered two hours of credit for completion of a Novice level Amateur Radio course. Its purpose was to create a pool of qualified people to operate and maintain the school system's amateur equipment. The teachers are (l-r) Oliver Ellis, KA3BBF; Cliff Harewood, KA3AUK; Brazzilia Nowlin, KA3AUV; Charles Leonard, KA3BBG and their instructor, John Thayer, K3DDS.

CQ, SEKIU

☐ Out near the tip of the Olympic Peninsula in the state of Washington, lies a small fishing village named Sekiu. It's pronounced precisely the same as CQ. — *W7YF*



Dale Williams, WD5AJC, of Sugarland, TX, doesn't use a typical ham station. His shack is a wooden structure built on the side of a construction crane 200 feet in the air above Houston. His antenna is a sloper stretching from the top of the crane down to the counter jib where the electric motors are mounted. The crane rotates 360 degrees and is the most extravagant rotor we've heard of, costing $200,000.

The Contester

By John G. Troster,* W6ISQ/N6IQ

"Hey Charlie, are ya listening on the Cat's Net?"

"Yeah, where ya been? I mean I haven't heard ya on since I seen your picture on the cover of *QST* climbing that tower."

"Aw yeah, Charlie, I been restin' up. I guess ya seen I won the DX contest."

"Ya really won it? I thought it was a spelling mistake in your call 'er somethin'. You never was in a contest in your life . . . unless it was hog calling. So how could you win with your old MOPA rig and that dipole in the attic?"

"Aw, come on Charlie. I been playin' radios since the old days. I just got interested that's all . . . ahhh . . . and then these fellas asked me if they could use my call. So they gave me . . . ahhh . . . a little help and I . . . err . . . just set a new world scoring record."

"What fellas?"

"Well, me and Marge was rockin' on the porch of an evening looking off across the valley and these nice-looking young fellas come drivin' up listening on one a them portable sets in the car. They was hams and said they was lookin' for a nice place to set up a radio and work in a contest and they asked if maybe I'd let them put their radio here some place on my hill."

"You let them?"

"Aw sure. They just had that dinky little radio in the car and a little aluminum aerial, so I says, 'OK.' And they said they'd be back in a few days to put up their set."

"They use that radio in the car?"

"No, not exactly. That Thursday afternoon two big trucks come chuggin' up the hill. We thought we was gettin' new neighbors. But it's them fellas. One truck full of towers and aluminum and the other full of radios. And they said they was gonna get ready for the big DX contest."

"Where'd they put the radios?"

"They was real nice and asked if they could move the furniture outa the living room and dining room and bedroom into the garage. They didn't want to damage anything, ya know."

"And what did Marge say?"

"She allowed as how it was a good chance to clean the house . . . why not? So, they filled up the house with radios, and then they started putting up them big towers and aerials . . . one in the garden, one beyond the garage and one in the front yard."

"And you was climbin' towers?"

"Well . . . kinda. This one fella with a camera told me to climb up three or four rungs on the tower and look down and wave, and he lay down on the ground and they took my picture danglin' up there. That was the *QST* cover you seen. Then they left."

"And they left you to run all that gear in the contest?"

"Nope. They just said they had to rest up for the contest and would come back next day. But me and Marge had to go to a motel 'cause the beds was folded up in the garage."

"So then?"

"They showed up Friday afternoon . . . real nice fellas . . . and said it would be a real thrill for them if they could use my call in the contest. So I don't want to hurt their feelings . . . so I says OK. Then they asked me if I would read off a few words they had written on a card. So they hold up five mics and I read off, 'CQ CQ CQ contest from N6IQ,' and they recorded what I said and told me I had a voice like Ezio Pinza."

"Who?"

"I dunno. Then they said, 'read this into the mics: '59 California,' and they says I must of been takin' talking lessons from Lowell Thomas."

"You was that good?"

"Oh sure. But then all of a sudden they all turn around and start turning dials and playin' my record into the radios. There I was saying 'CQ Contest' into five radios and it begins to sound like D-Day."

"That was the contest?"

"Yeah. They'd punch one button on their record player and I'd call 'CQ' and then they'd punch another button and I'd say '59 California'."

"You was really workin'."

"Aw yeah, things was really runnin' like a Astronaut Control Center. Well, after a few hours Marge says they looked hungry and she goes out in the kitchen . . . they hadn't moved the kitchen . . . and begins makin' sandwiches and lemonade for all them boys."

"They let you work on the radios?"

"Oh sure. They let me push my 'CQ' and '59' button now and again, but then I got too busy runnin' sandwiches. Then Marge got down to the last jar of peanut butter and I started drivin' forth and back up and down the hill luggin' groceries every few hours. They'd put the old car outside the garage so's to save the furniture. And Marge was fixin' sandwiches and I was runnin' 'em. They was hungry fellas."

"How long that go on?"

"Ahhh . . . I kinda lost track, but I think it was Sunday afternoon they finally quit."

"So they left all that gear for you?"

"No. They come back on Monday and took the towers down and cleaned the house and moved the furniture back. Real nice young fellas. Then they come back the other day and brought Marge a basket of flowers and tilled the garden and mowed the grass and gave me a box of cigars and told me I'd won the contest. So Marge baked 'em a cake."

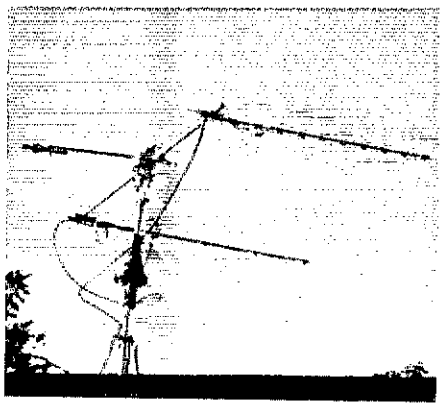
"Guess Marge liked them."

"Oh yeah. Thinks they're great. She invited 'em back for the next contest. Wants them to paint the living room next time."

"Bet she's gonna be out takin' sandwich making lessons too . . . haw!!"

"Naw. Now that I won my contest she wants to win one of her own. So she's down at the school taking public speaking and mountain climbing lessons. They want her to read a card for the next contest that says 'CQ Sweepstakes' and she wants her picture in *QST* from the *top* of the tower. Guess I'll have to make the sandwiches."

*82 Bellbrook Way, Atherton, CA 94025



The Easy Way to OSCAR 8 Mode J

Part 1: If you're now enjoying Mode A contacts, double your pleasure with Mode J, OSCAR 8's uhf transponder.

By Bernie Glassmeyer,* W9KDR

If you have had no experience with vhf/uhf other than your own TV and an fm-only rig, OSCAR 8 is just the vehicle to get you there. Thousands of hams are already operating in the vast regions of uhf, where the future of Amateur Radio lies. Why not join them via OSCAR 8, Amateur Radio's latest and most sophisticated satellite...

As detailed in the ARRL booklet, *Getting to Know OSCAR — from the Ground Up*, it doesn't take a great deal of effort or expense to equip your station for uhf OSCAR work. Once it is ready, you'll be set for point-to-point uhf communication as well, and will have a head start on the revolutionary Phase III amateur satellites, scheduled to be launched as early as next year.

Mode J

In contrast to its 2- to 10-meter Mode A transponder, OSCAR 8's Mode J is all-new for this satellite. Designed and constructed by JAMSAT, the Japan Radio Amateur Satellite Corporation, it has an input (uplink) of 145.9-146.0 MHz, and an output (downlink) of 435.1-435.2 MHz. The telemetry beacon is at 435.095 MHz. For a schedule, see "Operating News," elsewhere in this issue.

A Mode J Ground Station

There were many simple antennas to use for 435 MHz. The simplest is the groundplane, used on Mode J mostly by mobile operators. Fred Merry, W2GN, uses them for both the uplink and downlink for his mobile Mode J station.

Another basic antenna suitable for Mode J is the turnstile with reflector, which has helped many an OSCAR enthusiast get started in satellite communications. Details for building one can be found in the ARRL book, *Specialized Communications Techniques for the Radio Amateur*.

Even if they aren't the primary antennas, groundplanes and turnstiles can be switched in and out of a receiving system to complement other antennas. In addition, they can be used for local repeaters and other terrestrial communications.

The most effective method of using any OSCAR mode is with a gain antenna and azimuth/elevation control (see photo). The best thing about all 435-MHz antennas, of course, is their small size and light weight.

Antennas cut for 432 MHz can be used for OSCAR 8 Mode J, but very few exhibit any gain at 435. A preamp is required with a 432 antenna, and is recommended for all OSCAR receiving modes.

This quagi for 435 MHz was built by Clarke Greene, K1JX, in the ARRL lab. The boom is made of fiberglass, directors are 1/8-inch brass welding rods, loops are no. 12 TW wire, and loop spreaders are insulated dowels. *(AB1P photo)*

Another effective antenna for both Mode J and terrestrial work is the quagi.[1] Fig. 1 shows the details of a quagi for 435 MHz.

The main thing to remember about any gain antenna for satellite work is to avoid an overabundance of gain. Eight to 10 elements seems to be the limit, if one is to avoid having to aim the antenna precisely because of high directivity.

Polarization

Since space communication began, polarization has been a hot topic of discussion, for two reasons: Conditions between the satellite and the earth are changing constantly, and the attitude of the satellite varies from horizon to horizon. The optimum system would use a switch at the operating position or a relay at the antenna to change the "sense" of the antenna, thus compensating for polarization changes.

Another method is to use dual antennas, one horizontal and one vertical, as shown in Fig. 2. A matching stub is connected from each to a T connector, then to the feed line. This system receives and transmits vertical and horizontal waves simultaneously. Despite a theoretical 3-dB loss, the advantages outweigh the drawbacks. Power output is divided in half and fed equally to each antenna, as in this example: If 10 watts output to a 10-dB gain antenna = 100 watts erp, then 10 watts output to a 10-dB vertical gain antenna and a 10-dB horizontal gain antenna = 50 watts erp, vertical and 50 watts horizontal polarization. Circularly polarized Yagis, available from several

*Satellite Coordinator, ARRL

[1]For a detailed description of the quagi antenna, see Overbeck, "The VHF Quagi," April 1977 *QST*, pp. 11-14. A photocopy is available for $1 from ARRL hq.

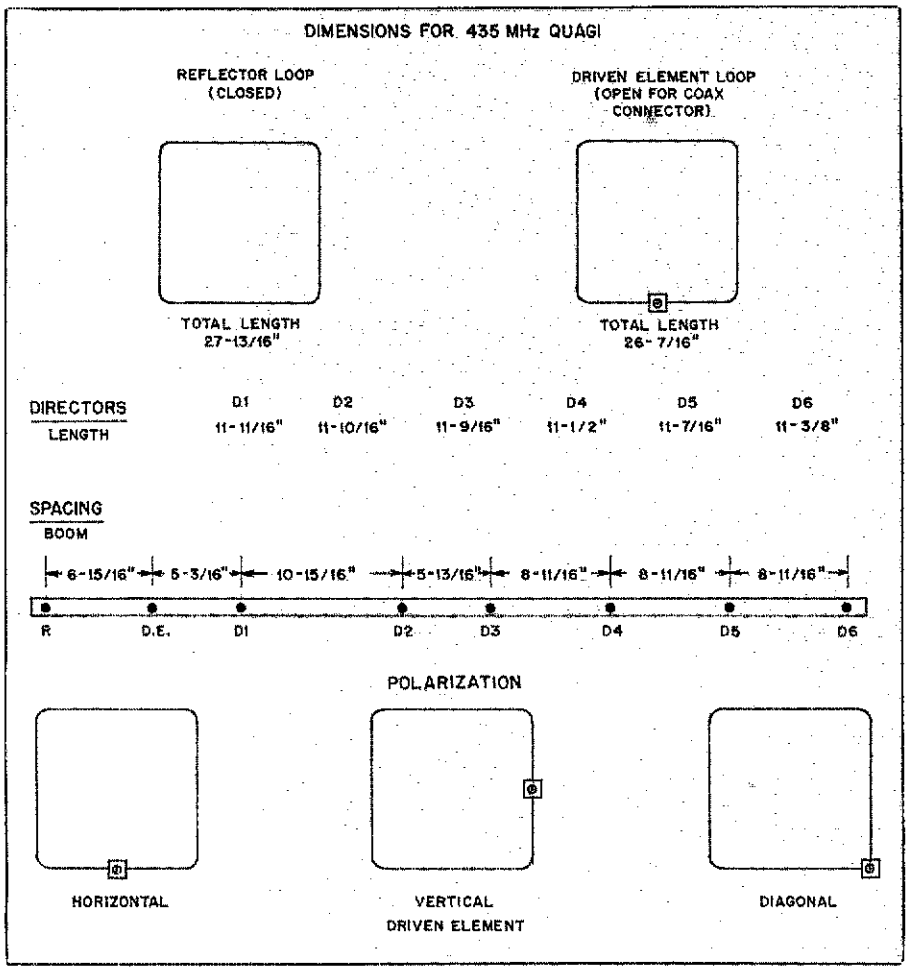


Fig. 1 — Construction of the 435-MHz quagi is quite simple. The quad elements for reflector and driven elements are actual measurements, so allow extra length for solder connections. Drill boom for mast "U" clamp between the first and second director. Select angle when drilling boom to allow for element position to polarization desired. If wood is substituted for fiberglass, treat with protective coating. After taping, spray all antenna connectors with an acrylic coating.

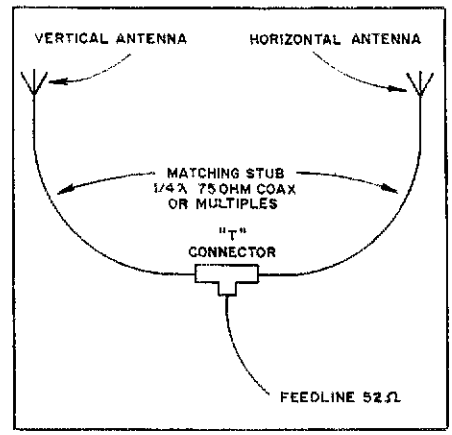


Fig. 2 — Dual or diagonal polarization can be used as a trade-off for switching antenna "sense." This is done using a "twist" type antenna having a single boom or separate horizontal and vertical antennas stacked side by side (or over and under), spaced at least 1/2-wavelength apart.

manufacturers, are often expressly designed for OSCAR operation. Check the display ads in *QST*.

Feed Lines

They come in many forms, but the amateur contemplating uhf operating would do well to consider hardline. Most of the new types are all aluminum. A potential source is a local cable TV contractor, who may want to dispose of excess or defective line when installing or renewing a system.

This writer found several hundred feet in a junkyard recently. Because of kinks, it had been sold for scrap by a cable TV company. Several 100-foot pieces were salvaged at the cost of scrap aluminum.

Since losses increase dramatically at uhf frequencies, some so-called low-loss types of coax are virtually unusable for Mode J. RG-8/U is acceptable only if used for relatively short runs, and anything smaller should not be used at all. A reputable dealer will have specifications available. Look for tight-weave foam coax. Long runs can be avoided by mounting a 435 transverter at the antenna — it can be done easily and works well.

Connectors

You can get by using PL-259 and SO-239 connectors, but to do it right, use type N constant-impedance connectors. They are available in both 50- and 70-ohm sizes. The military has used this connector for years, so it is available on the surplus market. But be sure of the impedance — the pin size is larger with 50-ohm type N connectors. Assembly details can be found in the ARRL *Radio Amateur's Handbook*.

Connectors for hardline cable are somewhat more expensive than for other types, but a communications repair company may have them at reasonable cost.

Desense Filter Cures Common Problem

The 2-meter uplink harmonic causes a desense problem that can be cured in several ways. The least costly is to build a 4 × 3 × 5 coaxial filter. It has a very narrow band pass and works on both sides of its design frequency. Although it doesn't eliminate the third harmonic itself, it does effectively reduce the noise and intermod associated with it. For a copy of the plans, a parts list and description, send a business-sized s.a.s.e. to League hq. and ask for the information sheet on the 4 × 3 × 5-MHz filter.

Preamps and Converters

Several manufacturers, encouraged by the explosive growth of interest in uhf OSCAR activity, offer 435-MHz equipment. Write to them and ask for their latest brochure.

Advanced Receiver Research, Box 1242, Burlington, CT 06013

ARCOS, 35 Highland Dr., E. Greenbush, NY 12061

Hamtronics, 182 Belmont Rd., Rochester, NY 14612

ICOM, 3331 Towerwood Dr., Suite 307, Dallas, TX 75234

Janel Laboratories, 33890 East Gate Cir., Corvallis, OR 97330

KLM, 17025 Laurel Rd., Morgan Hill, CA 95037

Lunar Electronics, P. O. Box 82183, San Diego, CA 92138

Microwave Modules, c/o Texas RF Distributors, Inc., 4800 West 34th St., Suite D-12A, Houston, TX 77092

Vangard, 196-23 Jamaica Ave., Hollis, NY 11423

VHF Engineering, 1017 Chenango St., Binghamton, NY 13901

A very effective and inexpensive 435-MHz preamp is described in the June 1978 *AMSAT Newsletter*. In it, Joe Reisert, W1JR, provides data on a circuit that can achieve 12-dB gain with a noise figure of less than 2 dB. It uses a Motorola MRF 901, costing about $1.50. The article is available from ARRL hq. for an s.a.s.e.

Now that your ground station is well-equipped to work through OSCAR 8 Mode J, you need to know the ins and outs of operating through this exciting mode. Part 2 of this series will cover that — and more — in detail.

Region 2 Amateurs Review WARC Progress

Panama conference reaffirms Miami decisions of two years ago; review shows Amateur Radio has much support in North and South America.

By David Sumner,* K1ZZ

The first weekend in September found radio amateurs from throughout North and South America converging on Panama City, Panama, for the Sixth Triennial Conference of IARU — Region 2. This Regional Division of the International Amateur Radio Union has as members the national amateur societies of nearly every country in the hemisphere. ARRL was the host for the previous conference, held in Miami in April 1976; this time it was the Liga Panamena de Radio Aficionados which shouldered the responsibility. The conference was held a year earlier than usual, to permit a timely review of preparations by all member-societies for the ITU World Administrative Radio Conference (WARC) scheduled for the last quarter of 1979. Other issues of concern to Region 2 amateurs were addressed, but the theme of the conference was definitely WARC.

In all, 20 member-societies were represented in person, and another six who could not attend gave their proxy votes to someone who could. A total of 139 delegates and observers registered, many from the host society or from the Radio Club Boliviano, which sends a large delegation representing all parts of the country to each Region 2 conference. The ARRL was well represented too, although most of the League contingent was actually representing the IARU on this occasion. ARRL President Harry J. Dannals, W2HD, carried the vote of the United States and was assisted by Vice President Carl L. Smith, WØBWJ. Canadian Division Director Ron Hesler, VE1SH, represented his country. ARRL First Vice President Victor C. Clark, W4KFC, who serves at the present time as president of IARU — Region 2, was chairman of the conference. IARU headquarters was represented by Union President Noel B. Eaton, VE3CJ, and Assistant Secretary David Sumner, K1ZZ.

Committees Recommend Action

Region 2 conferences are organized along the lines of miniature ITU conferences. In Panama, the opening ceremonies took place on Monday morning, September 4, followed by the first plenary assembly in the afternoon. At this first working session, the delegates' credentials are verified and delegates volunteer to serve on one of several committees. Most of the work of the conference is performed in committees, just as at ITU conferences. Proposals made in advance by member-societies are assigned to the committees for study, as appropriate. The committees are responsible, respectively, for administrative and operational matters (Committee A), technical matters (Committee B), and electoral matters (the process of electing the Executive Committee), credentials, and finance (Committee C). The committees met Monday afternoon, Tuesday and Wednesday, to formulate recommendations for action on each of the proposals submitted and any proposals which the committees themselves might wish to make. Thursday was a "catch-up" day for the Secretariat, which must produce documents and reports in both English and Spanish covering all of the points of

The "official photograph" caught most of the official delegates, but only a handful of the observers.

*Assistant Secretary, IARU

Region 2 Countries Represented at Panama	
Antigua*	Grenada*
Argentina	Guatemala
Bahamas*	Jamaica
Barbados*	Netherlands Antilles*
Bermuda	Nicaragua*
Bolivia	Panama
Brazil	Paraguay
Canada	Peru
Chile	Surinam
Colombia	Trinidad & Tobago
Costa Rica	Uruguay
Dominican Republic	United States
El Salvador	Venezuela

*by proxy

At the closing banquet (l-r) LPRA President HP1DI and wife, IARU President VE3CJ, and ITU Secretary-General M. Mili.

discussion. Then on Friday, another plenary assembly took formal action on the committee recommendations.

Because WARC preparation was assigned to Committee A, and because the topic was regarded as being so important by everyone present, Committee A functioned essentially as a "Committee of the Whole." Members of Committee B, who were also busy with their own work, sat in on the Committee A sessions whenever possible.

The most important action of the conference was to conduct a country-by-country review of the status of the Amateur Service as we enter the most critical period of WARC preparations. The review painted a very encouraging picture. It was clear that the member-societies have been doing a great deal of work to convince their administrations to support the Amateur Service. In particular, the excellent record of Amateur Radio in providing communications during and after natural disasters is widely recognized and appreciated. While final positions have not been adopted in any country, including the U.S. and Canada, in general, administrations are supporting, at the very minimum, the status quo with respect to the amateur allocations. In a few cases, such as 160 and 80 meters, where the Amateur Service now has relatively wide allocations which are shared with other services, administrations are promoting the concept of narrower, exclusive allocations. This approach is not endorsed by the IARU unless the exclusive segments can be made available *within* shared bands of at least the present width.

HF Most "Economical"

In the high-frequency bands, the most pressure is found below 12 MHz, as developing countries continue to find hf to be the most economical way to provide medium-range domestic communications. In the long run, these countries would be better off to invest in high-capacity cable, microwave, and domestic satellite facilities to carry this load, since the hf spectrum cannot begin to support the amount of communications which will be demanded as the countries reach more developed stages. In the meantime, however, it is difficult to convince some administrations to relinquish Fixed Service allocations in the lower hf region. Support for new amateur allocations at 18 and 24 MHz is more evident than at 10 MHz, for this reason. Even so, several societies were able to report that their administrations were favorable toward the 10-MHz amateur requirement.

Especially noteworthy was the fact that there was no support for International Broadcasting reported by the countries south of the U.S. In general, governments in the Americas are more favorably inclined toward increased allocations to the Amateur Service than to International Broadcasting.

Of course, there were exceptions to the favorable reports. Quite a few countries, especially among the smaller ones, have not even begun to address the WARC issues; in fact, in more than one instance it was apparent that the amateur society was running well ahead of the administration in this regard! Expected changes in the governments of a number of countries make extensive preparations a futile effort at the moment. In other countries, more work needs to be done to convince the administration to go beyond the status quo in its support of the Amateur Service. Few countries invite public participation in the WARC preparatory process to anything like the extent we are used to in the U.S. and Canada, so the government positions as they are being formulated are not a matter of public record.

Many Accomplishments

The exchange of WARC-related information which took place in Panama served several important purposes. First, it motivated the conference attendees to go home and redouble their efforts to ensure the support of their administrations. Second, it identified some areas where more attention is needed, and where the Region 2 Executive Committee should concentrate its efforts in the months to come. Third, it identified opportunities for placing amateurs on the delegations of their countries — a very important objective. Finally, it identified those arguments which societies had used successfully in presenting amateur requirements to their administrations — arguments which might prove equally effective in other countries. It is fair to say that even the optimists were pleasantly surprised at the results of the country-by-country WARC review.

In other actions related to WARC, the conference

— committed $15,000 of Region 2 funds for the expenses of two members of the IARU team which will be in Geneva next year;

— voted to not support any proposal that the ITU designate segments of the amateur bands for emergency operations (the feeling being that this would limit our flexibility in emergency situations);

— strongly urged that Article 41 of the ITU Radio Regulations be retained in its present form, especially with regard to maintaining a code proficiency requirement for operation below 144 MHz;

— requested each member-society to submit monthly activity reports to assist the Executive Committee in assessing WARC preparatory activities in the coming months;

— affirmed the importance of the Amateur Service allocations which are used primarily for experimental operation;

— strongly urged member-societies to

ARRL President Dannals pins a Life Membership pin on the newest League LM: Colonel Rodrigo Garcia Ramirez, HP1RGR, honorary president of the conference. The LPRA awarded the Life Membership to Colonel Garcia in appreciation for his support.

continue to press for new amateur allocations in the vicinity of 10, 18 and 24 MHz, in accordance with the basic worldwide IARU position.

Other matters of significance addressed by the conference included

— the substitution of message traffic for phone patches where possible, to encourage brevity in third-party traffic and to permit the relaying of messages;

— the need for more prudent use of phone patches;

— the encouragement of continued investigation of vhf and uhf propagation across the equator, especially at 220 MHz, because this band is available only in Region 2 (October 1978 *QST*, page 11);

— the formation of a volunteer committee to encourage and stimulate vhf and uhf activity within this hemisphere;

— the establishment of an international registry of emergency and traffic nets within the Americas, to facilitate the handling of emergency communications.

Optimism Prevails

The volunteer efforts of the staff of *Region 2 News*, the Intruder Watch, and the Executive Committee were singled out for special commendation. Finally, with an eye toward keeping the present Region 2 team intact through the 1979 WARC, the Executive Committee was reelected by acclamation.

The Region 2 Executive Committee: HI8LC, OA4AV, W4KFC, YV5BPG, VP9GO, CE3ABZ and YN1FI.

The highlight of the closing banquet, on Friday evening, was an address by ITU Secretary-General M. Mili. Mr. Mili's remarks were reported in "International News" last month. His presence at the conference was greatly appreciated by the attendees, and his words of praise for the Amateur Service were very reassuring.

The next Region 2 conference is scheduled for Lima, Peru, in 1980. By then, the results of the 1979 WARC will be history; for better or worse, the years of preparation will be over. No one can say with any certainty what the outcome of that all-important ITU conference will be. But for those of us who have seen firsthand, in conferences such as Panama City, how much time, talent and expertise are being marshalled in all corners of the world on behalf of the Amateur Service, it is difficult to be pessimistic. QST

Feedback

☐ The full-color picture of *El Hombre y la Mar* expedition (November *QST*, page 24) should be credited to Tim Chapman, courtesy of the *Miami Herald*.

☐ A winner in the First Annual ARRL Photo Contest (November *QST*, page 90) was left out of the list. Norman Buckley, of Ewa Beach, HI, captured a second place for a color slide in the "Unusual Modes of Operating" category.

☐ In "Transmitter Design — Emphasis on Anatomy," Part 3 (July *QST*, page 23), two errors occurred in Fig. 8 on page 24. The 10-ohm resistor that goes from the base of Q11 to ground should be a 0.01-μF capacitor (as shown correctly in the schematic). The T2 secondary is shown with an unmarked component across it. That component should be marked as a 10-ohm resistor.

☐ Amateurs in the U.S. Coast Guard Third District ("Hams' Ears Help . . ., October *QST*, page 17) should note that the Operations Center telephone number has changed to 212-668-7055.

☐ Re "How's DX" for October, the vice president of Northern California DX Foundation is Bob Ferrero, W6RJ. John Troster, W6ISQ/N6IQ, is a foundation trustee.

Strays

TWO RUSSIAN AMATEUR RADIO SATELLITES LAUNCHED

☐ There are now two Soviet Amateur Radio spacecraft in orbit. Moscow Domestic Service and TASS International announced the launch of one carrier rocket with artificial earth satellites Radio 1, Radio 2 and COSMOS 1045. Estimated time of launch was 0600 UTC October 26. COSMOS is a continuing series designed to perform precise measurements of the elements of an orbit.

Radio 1 and Radio 2 identify in cw telemetry as RS and RS RS. The orbit period is 120.4 minutes. Increment is 30.12 degrees west longitude. Information for a recent orbit (no. 40) follows: 29 Oct.; 1450:57 UTC; EQX at 96.06° W.

The launch apogee of 1724 km and perigee of 1688 km place the satellites in the Van Allen belt. No information on shielding provisions has been revealed. Beacons from the RS satellites are at 29.400 MHz, plus or minus Doppler. Two telemetry formats have appeared. One is a seven-group readout with four characters each; the other has 15 groups with four digits each. Example: PØIU C17U F34U, etc.

The band-pass downlink appears to be very narrow compared to OSCARs 7 and 8. RS RS was measured at 30 kHz. An uplink signal of 145.900 appears in the 10-meter downlink at about 29.380.

There are times the transponders are turned off, but the telemetry beacons remain on. The Soviets use a transponder receiving system that will turn off if the uplink signal is too strong. Users are cautioned to use only enough power to maintain communications; 10 watts erp *maximum* is recommended. Telemetry data should be sent to AMSAT and ARRL headquarters for analysis. W1AW is including RS orbits in its OSCAR bulletins.

Radio 1 and Radio 2 were designed and built by students of Moscow's higher schools and Amateur Radio enthusiasts of the voluntary society for assistance of the Army, Air Force and Navy of the USSR (DOSAAF). The Soviets will use these satellites for training and experimenting in the classroom, much the same as we are using the OSCAR series.

The first known USA-to-Europe QSO was on RS RS between G3IOR and W9KDR on Orbit 8 at 2328 UTC on October 26. Both cw signals were 589.

Update: Latest information, as published in *Sovetskiy Patriot*, 29 October: The two spacecraft differ in size, onboard equipment, antenna systems and solar batteries. Uplink passband is 145.880-145.920; downlink is 29.360-29.400, for both satellites. The transponders are active 24 hours a day except Mondays and Wednesdays, which are reserved for scientific and educational uses. — *Bernie Glassmeyer, W9KDR*

Three Feet of Rain

The Lone Star State, experiencing one of the worst natural disasters in its history, pulled through with Amateur Radio's assistance.

By Stan Horzepa,* WA1LOU

A gentle rain began to fall in the awakening hours of August 3 and it seemed as if relief was in sight for drought-stricken Texas. However, the relief turned out to be too much of a good thing — in 27 hours nearly three feet of rain fell on areas that normally average only two feet in an entire year.

As a result, creeks and rivers flowed over their banks and turned farms and ranches into lakes. Flash floods ripped through communities, stranding people in treetops and on rooftops awaiting rescue. The ravaging waters tore down power and telephone lines, disrupting communications. Amateur Radio was the only means of communication available and hams throughout the stricken areas stepped in to do the job.

W5KR, the Section Communications Manager of Southern Texas, relates the following episode. "The Medina River, which is normally about 100 feet wide, had swollen to approximately three miles wide. No houses were visible, but we could hear people calling for help.

"I ran home and hooked up a 12-volt automobile battery to my 2-meter transceiver, broke into a QSO on the San Antonio repeater, WR5ADJ, and hollered, 'Break!' seven times (my voice was trembling). K5YFW answered my call and I asked him to call for helicopters to rescue people from the treetops. The choppers arrived in less than 30 minutes; four people were rescued, but eight perished."

Servants of the Public

When disaster strikes, some hams go out of their way to help. The hams in Texas did the same and W5TNJ tells about members of the Lake Country Amateur Radio Club of Graham, who drove to Albany under adverse conditions to assist in the emergency. "They found highways and bridges washed out, making their entry into the city virtually impossible. Finally, they found a flooded crossing that looked passable; however, the next few minutes were filled with terror as the car was literally floating and being swept off the road by the intensity of the current. Somehow, they reached dry land and were the last vehicle to make it into Albany that night.

"Once in the city, they were on an island; an island with no communications to the outside world. At the local hospital, a station was hastily set up on 2 meters and then the real work began — the health and welfare traffic was overwhelming. The recipients of this traffic fell into two categories: There were those who knew nothing about the disaster and probably did not experience real relief that their loved ones were safe until they viewed the horrible scenes on television; then there were those who did know about the floods and were frantic about their loved ones, but had no one to turn to for information. Can't you just feel the public service Amateur Radio was providing?"

A Voice in the Gloom

In an emergency, communications are needed to coordinate the relief operations. In some emergencies, however, there are no communications. So, sans Amateur Radio, the relief efforts would be stymied. WA5QZI's account describes Amateur Radio's role in such a situation. "All telephone lines into the towns along the headwaters of the Guadalupe and Medina Rivers were down. Thus, ham radio had quickly become the primary, and in most cases, the only communications link to the outside world for the stricken communities at a time when communications were needed most.

"As the waves of water continued to flow, mobile units were dispatched to gather flood gauge readings and rainfall amounts and to aid the National Weather Service via the SKYWARN Radio Network in determining the extent of flooding along the rivers. Meanwhile, the San Antonio Radio Club station, W5SC, was providing the only communications available from the disaster areas to the Red Cross Headquarters."

Lifesavers

The Texas disaster was a harrowing experience for all involved. The hams who volunteered their time and energy in this emergency experienced the ugly side of the calamity. But they also found the experience rewarding because lives were saved on account of their involvement.

How many saved lives can be directly attributed to the training that hams received is impossible to calculate, but surely the experience gained in the Amateur Radio Emergency Service and National Traffic System programs was a contributing factor. The Texas hams were well prepared for the disaster which befell their state, and they all should be congratulated for their fine efforts. QST

K3WGF and WA5FSR relayed critical weather information from the National Weather Service office via WA5UNH, the San Antonio Repeater Organization station.

W5TNJ was among the many hams who fought their way through the devastating flood to establish communications in disaster-stricken Albany.

*Communications Assistant, ARRL

Amateurs Have Their Say on the Communications Act of 1978

Will the FCC become the CRC? Yes, if the rewrite of the Communications Act of 1934 becomes law. It could have a significant impact on the Amateur Radio Service.

By Harold M. Steinman,* K1FHN

Did you ever wonder where the Federal Communications Commission came from? To younger readers, the FCC has just "always been there." But in reality it was created by Congress in the Communications Act of 1934. The purpose of this law was to assert the federal government's authority over the field of telecommunications and to centralize this authority within a single agency — the FCC. The Communications Act of 1934 provided the rules and regulations governing the entire communications industry. Despite many amendments, it remains with us.

Revolutionary changes in the art of communications have occurred since 1934; certainly the framers of the 1934 act did not envision satellite communications, cable television, or CB radio, for example. There are some who feel that the Communications Act of 1934 is long due for a major overhaul — that it should be rewritten from scratch to incorporate all present technology and the flexibility to deal with future technology.

Thus was born H.R. 13015, a bill introduced into the House of Representatives jointly by Representatives Lionel Van Deerlin (D-CA) and Louis Frey, Jr. (R-FL). The bill is known interchangeably as the Communications Act of 1978 and the Rewrite of the Communications Act of 1934. It was introduced on June 7, 1978, and the Subcommittee on Communications of the House of Representatives held hearings on the bill during the summer. The ARRL was among those invited by the Subcommittee to present testimony on H.R. 13015.

H.R. 13015 would replace the FCC with a five-member Communications Regulatory Commission (CRC). The CRC's members would be appointed for 10-year terms, versus the seven-year terms of the present seven-member FCC. The CRC's powers would be somewhat more limited than the FCC's. H.R. 13015 would create still another agency, this time in the Executive Branch of the government, the National Telecommunications Agency (NTA). It would replace the present National Telecommunications and Information Administration, and have authority to establish criteria for use of the radio-frequency spectrum by all its users, both government and private. Presently, the Executive Branch controls only the spectrum allocations of government users. (Amateur Radio operators are private users of the spectrum, so their spectrum allocations are governed by the FCC.)

Perhaps the most controversial aspect of H.R. 13015 is the method it proposes to assess license fees on users of the spectrum. License fees would be determined by two factors: (1) the cost to the Commission of processing the license, and (2) the scarcity value of the spectrum being assigned. It is the second factor that has

*Washington Area Coordinator, ARRL

League President Harry J. Dannals, W2HD (at the mic) and General Counsel Robert M. Booth (to Dannals' left) appear before the Communications Subcommittee of the House of Representatives on September 15, 1977.

caused amateurs some concern. Fortunately, as it turns out, amateurs have nothing to worry about in this regard, as noncommercial radio services would be exempt from the "scarcity value" provision of the license fee.

What Your League Is Doing

The ARRL's interest in the Rewrite of the Communications Act of 1934 actually began in July 1977 when the League Board of Directors moved that ". . . the president, first vice president, general manager and general counsel, as conditions warrant, represent the League until further notice at hearings held by committees and subcommittees of the Senate and House of Representatives of the United States Congress including the drafting and submission of proposals: (a) to permit the Federal Communications Commission to delegate, by contract or otherwise, the conducting of amateur operator examinations and the issuance of temporary operator or station licenses or permits to successful applicants; (b) to permit the Commission to adopt and enforce rules and regulations prohibiting the sale of manufactured equipment suitable for or capable of operation in amateur bands to persons not then holding a valid amateur operator's license; (c) to grant the Commission jurisdiction to enforce its rules and to impose cease and desist orders, fines and forfeitures on unlicensed stations and operators; (d) to modify and clarify the secrecy provisions of Section 605 of the Communications Act to specifically exclude from its terms all stations in the personal radio services including stations of the Amateur Radio Service, and all unlicensed stations; (e) such other matters as may be appropriate at the time." By a later motion it was voted to include a proposal to provide for lifetime station licenses in the Amateur Radio Service in the legislative program to be submitted to Congress.

Perhaps the most controversial aspect of H.R. 13015 is the method by which it proposes to assess license fees on users of the spectrum.

In compliance with the Board's directive, League President Harry J. Dannals, W2HD, presented to the House Subcommittee on Communications in September 1977 the League's recommendations for revisions of the Communications Act of 1934. The Subcommittee was holding a series of hearings to gather input on which to base its forthcoming draft of the Communications Act Rewrite. After those hearings the Subcommittee staff went to work on the draft, and came up with H.R. 13015.

Some of the League's recommendations are incorporated in H.R. 13015. The new bill would allow the CRC to accept the uncompensated services of volunteers, for example. It also increases the maximum allowable license term from five years to 10 (not quite lifetime, but a step in the right direction). Coincidentally, earlier in the year Congress had amended the Communications Act of 1934 to increase the FCC's fine and forfeiture power, and more specifically to authorize the FCC to impose fines and forfeitures against unlicensed persons who were formerly outside the Commission's jurisdiction.

But many of the League's suggestions did not appear in H.R. 13015, and there was also the worry that amateurs might have to pay a fee based upon the "scarcity value" of the radio spectrum. So again, on September 22, 1978, the ARRL went to Capitol Hill. Washington Area Coordinator Hal Steinman, K1FHN, appeared on behalf of President Dannals to thank the Communications Subcommittee for the positive changes that had been included in H.R. 13015 and to press for further action on the League's legislative program. It was also suggested that the substance of the radio-frequency interference legislation submitted by Rep. Vanik (H.R. 8496) and Sen. Goldwater (S. 864) be incorporated into any rewrite of the Communications Act. In addition, a strong case was made for exemption of the Amateur Radio Service from the scarcity value provision of the license fee proposal of H.R. 13015. ARRL's statement reads, "The League cannot envision how the value of an amateur license might be determined because, by definition, an amateur is a 'person who is interested in radio technique solely with a personal aim and without pecuniary interest.' The Amateur Radio Service does not use the spectrum to make a profit nor as a means to make a profit. Amateur Radio's payment for use of the spectrum is the service rendered to the public as summarized in Section 97.1 of the Commission's Rules. . . ."

The League received immediate assurance from Subcommittee Chairman Van Deerlin that the concept of scarcity value was never intended to apply to noncommercial users of the spectrum:

Chairman Van Deerlin: I was a little troubled in your testimony at your conclusion that the question of scarcity value was going to be applied to Amateur Radio licenses in the fee charging. Do you really read that into the bill?

ARRL: We feel some clarification is necessary . . .

Chairman Van Deerlin: I think we can set that fear at rest; but if it takes additional language, we will try to find it.

What Others Are Doing . . . and Can Do

In addition to the hearings held in Washington, DC, the Communications Subcommittee held field hearings on H.R. 13015 at other locations throughout the country. Through the hard and able work of volunteer amateurs, Amateur Radio made its case at these hearings also. Most notably, Barry D. Bayer, K9CFV, appeared before the Subcommittee in Chicago, IL; and Peter J. Nord, WB8FGE, spoke before the Subcommittee at Cincinnati, OH. Both did a fine job.

Some people say it is the League's job to represent Amateur Radio before Congress and federal agencies, and that therefore individual amateurs shouldn't have to testify at Congressional hearings. This is only partly true. It *is* the League's job to represent the Amateur Radio Service when necessary, but it is not our job *alone*. Congressmen know that the ARRL will not be voting them in or out of office. *You* will be doing that! Congressmen are interested in grass-roots reaction to issues. Perhaps a single individual cannot sway a Congressman's opinion, but if enough individuals express similar views on an issue, the Congressman will quickly get the message. This is a fact of political life.

What Next?

There is a long way yet for the Communications Act Rewrite. Subcommittee Chairman Van Deerlin is hoping to have a House-passed bill presented to the Senate by the beginning of 1980. Before that happens, however, the present bill (H.R. 13015) must be analyzed and a new version introduced in the House early next year. Another round of hearings would have to be held by the Communications Subcommittee next spring, and then the subcommittee would have to report to its parent committee, the House Interstate and Foreign Commerce Committee. After consideration by that committee, the Rules Committee would decide whether the bill should be sent to the full House. Approval by the full House would have to occur late in 1979 to adhere to Chairman Van Deerlin's schedule. If the bill makes it to the Senate, that body's Communications Subcommittee will decide whether to have hearings, and so on.

There's a *long* way to go. Indeed, no one can say for sure whether there will ever be an all-new Communications Act.

There's a *long* way to go. Indeed, no one can say for sure if there will ever be an all-new Communications Act. We can assure you, however, that whatever the future holds for the Communications Act of 1978, the ARRL will be there watching out for the interests of the Amateur Radio Service.

Happenings

Conducted By W. Dale Clift,* WA3NLO

FCC Prohibits Autopatch on Automatically Controlled Repeaters

The FCC has formally ruled that autopatch over automatically controlled repeaters is prohibited. This ruling came at a meeting held October 19, 1978, as the result of a formal interpretation of Section 97.79(d) of the amateur rules. Any autopatch now must be monitored by a repeater control operator.

An automatically controlled repeater is a station which uses devices and procedures for control so that a control operator does not have to be present at the control point at all times. (See Section 97.3(m)(3) of the amateur rules.) However, once a control operator begins monitoring the operation at a control point, the repeater is no longer considered to be under automatic control.

All Amateur Radio operators with stations in repeater operation must not allow autopatch for those periods of time when no control operator is on duty. The only exception to this rule would be in the event of an emergency.

The controversy over autopatch on automatically controlled repeaters began to gain the attention of the Amateur Radio fraternity on April 5, 1978, when the FCC released a communique, which stated, in part:

"Section 97.79(d) states that 'the licensee of an Amateur station may permit any third party to participate in Amateur radio communication from his station, provided that a control operator is present and continuously monitors and supervises the radio communications to insure compliance with the rules.' "

The Commission, in the same notice, also ". . . noted that this clearly *prohibited autopatching and reverse autopatching through automatically controlled repeater stations* and required a control operator to be on duty at all times during these operations." [emphasis added]

ARRL General Manager Richard L. Baldwin, W1RU, fired off a letter to the Commission challenging this interpretation. His letter, dated April 19, 1978 and reported in June *QST*, pages 54-55, stated the League's disagreement with this interpretation:

"While we agree with the intent of the public notice, we must disagree on one point: the statement that Section 97.79(d) ', . . clearly prohibited autopatching . . . through automatically controlled repeater stations and required a control operator to be on duty at all times during these operations.' In fact, to the contrary, the Commission clearly intended that third-party traffic be *permitted* on a repeater operating under automatic control. In its Notice of Proposed Rulemaking in Docket 20112, the Commission stated, 'Depending upon the actual situation, there are several steps the licensee of a repeater station desiring to operate his station by automatic control can take to preclude many of the abuses encountered with amateur repeaters. For instance, if commercial third-party traffic by automatic telephone system interconnect becomes a problem, this function could be discontinued during periods of automatic control.' "

The FCC did not accept ARRL's arguments, however, and ruled that an interpretive problem between text and a rule should be resolved in favor of the rule. The rule, 97.79(d), thus overrides the text in Docket 20112.

Whether or not this latest ruling by the FCC is partly to serve as a warning to the Amateur Radio fraternity to make more of an effort to control third-party abuses is sure to be a topic of conversation among many hams. Further fuel is added to this theory when one considers another paragraph from the FCC News Release of April 15, 1978:

"The FCC said the rapidly increasing role of unlicensed third parties in Amateur communications did not fall within any of the purposes of the service. On the contrary, it emphasized, the present use of telephone interconnection at Amateur stations to facilitate third-party communications was becoming increasingly similar to the situation in the Personal and Business Radio Services."

FCC COMMISSIONER WHITE: PUBLIC SERVICE NEVER MORE IMPORTANT THAN NOW

In a unique opportunity to hear one of the government officials whose decisions so directly impact on Amateur Radio, banquet-goers at the ARRL New England Division Convention heard FCC Commissioner Margita E. White give hams praise, warnings and some friendly advice. The following is a summary of Commissioner White's remarks. She was the main speaker at the convention banquet at Boxboro, MA, on October 14, 1978.

Public Service All-Important

"Through your contributions to technological innovation you have adapted to the growing congestion in the amateur bands. In the process you have contributed to the state of the art itself. Yet I would venture to speculate that in today's electronics age, the public's awe for your technical wizardry may not be as great as it was in days gone by. Moreover, again in the public's mind, I suspect that you increasingly are seen as sophisticated consumers rather than as experimenters and builders.

"I raise these points not to criticize, but to suggest that at no time has the public's perception of your contributions to serving the public interest been more important, that the public recognize that you are enhancing 'the value of the Amateur Service to the public as a voluntary, noncommercial communications service, particularly with respect to providing emergency communications.'

"Adherence to Part 97.1 of the FCC Rules is not only a matter of law, but one of enlightened self-interest.

"Throughout your history, the Amateur Service has provided vital contributions in times of emergencies. Your several networks are capable of providing communications during a variety of disaster and other emergency situations. Many dedicated amateurs voluntarily give of their time and pursue the training to provide these services when disaster strikes. Yet now is not the time to pat yourselves on the back, but to pursue even greater efforts to increase the participation of amateurs in these emergency services and to ensure that your networks can adequately respond to the volume of traffic in actual emergencies."

Her Regulatory Philosophy

"So far as my regulatory philosophy is concerned — as I have said in the same words to organizations representing other spectrum users — I am a regulator for less rather than more regulation. I am convinced that in most cases the public can better identify the "public interest" than officials in Washington, DC. I believe the people themselves can better articulate their needs and intersts through the competitive marketplace of ideas and products than through the more remote, less flexible and bureaucratic processes of government. . . .

"If I could put a label on the way I deal with these issues, I would prefer to call it a common sense approach to regulation.

"For example, I believe my opposition to the ban on linear amplifiers was consistent with both my regulatory philosophy and common sense."

Speaking of the Amplifier Ban . . .

"As you probably know, twice in the past year I was the lone dissenter to the Commission's ban on the manufacture, importation and marketing of external radio-frequency amplifiers or "linears" capable of operating in the 24- to 35-MHz band. . . .

"There is no question that there is an increasingly serious problem of TV interference or TVI caused by the use of linear amplifiers operating on or near the 27-MHz CB band. Our Field Operations Bureau has found that half of all complaints of CB-related interference result from the illegal use of external

*Asst. Manager, Membership Services, ARRL

amplifiers. We also get many complaints from CBers operating with legal power who are blocked by individuals using the amplifiers illegally.

"I believed that the type-acceptance program was all that was necessary, that a linear ban would not be effective and that to include it was regulatory overkill for cosmetic purposes. . . .

"Finally, I felt the Commission did not adequately explore the proposal from the industry to provide an opportunity for self-regulation through the proof of license at point of sale. An amateur simply would have to present a valid amateur license to buy an external amplifier from a retailer. Although there may be some problems with this proposal, such as in the case of mail orders where license verification would be difficult, it was certainly a more reasonable and fair approach than the ban."

Hams Most Responsive Group to WARC Notices

"The 1979 World Administrative Radio Conference will determine international spectrum allocations through the end of the 20th century. Hence, the United States' recommendations and final decisions made there will have a vital impact on the future of Amateur Radio as well as on other spectrum users. As you know, through nine notices of inquiry, the Commission has sought to elicit the most factual and comprehensive comments possible from all spectrum users. The amateur community was the most responsive group to these notices and I wish to personally commend you for your contributions to the Commission's decision-making process.

"While I cannot prejudge or predict the Commission's final recommendations, I can assure you that to the extent feasible, the Commission will seek to accommodate your needs. I am not sanguine about the possibility of satisfying your need for a low-frequency allocation, in view of the reality of power-line carrier use of these frequencies and the difficulty of frequency coordination. On the other hand, I am hopeful that we can agree on allocating an exclusive band to the Amateur Service at 1860-1900 kHz and in recommending the restoration of the 3950-4000 kHz band to the Amateur Service, especially in view of the latter's use in emergency communications. So far as the higher frequencies are concerned, you are far more familiar with the difficulties than I, but I hope we can arrive at the most fair accommodation of all interests involved."

Communications Act Rewrite

"Much already has been said and written about what optimistically has been entitled the Communications Act of 1978. I have testified before the Van Deerlin Committee three times, endorsing the deregulatory thrust of the bill while expressing reservations and concern over other provisions, including some which seem to me to contradict its free marketplace orientation.

"Let me focus on two aspects of the bill which trouble me greatly and should be of concern to you.

"First, the bill would centralize the power of spectrum allocation in a proposed executive branch agency, to be called the National Telecommunication Agency, while leaving the licensing functions to the regulatory agency succeeding the FCC, the Communications Regulatory Commission.

"I believe it would be a mistake both to give such pervasive power to an Executive Branch

FCC Commissioner Margita E. White

agency and to separate the allocation and licensing functions. . . .

"The second troublesome aspect of the bill is its provision for a licensee fee, based on a 'scarcity value' of the spectrum, which would be deposited in a separate fund to support public broadcasting, rural telecommunications and minority broadcast ownership.

"I do not oppose fees per se. . . . Fees based on the value to the user may have the benefit of promoting more efficient usage of the spectrum. The questions are whether it is possible to determine a fair price for spectrum users, what are the benefits or losses to the public interest of any given fee formula, and what should be done with the fees. . . .

"What is the rationale for the Amateur Radio licensee to pay a higher fee to support public broadcasting? While a reasonable lease charge, deposited in the U.S. Treasury, may be both permissible and appropriate, a "tax" to redistribute income among communications services likely is neither."

International Goodwill, Not QSLs and Kilowatts

"There is another provision in Part 97 which is of special interest to me, and that is your role in enhancing international goodwill. As a former assistant director of USIA (United States Information Agency), I appreciate the tremendous value of people-to-people diplomacy. Through your grassroots dialogues with amateurs in other lands, you have a unique ability to project this nation's image abroad.

"However, goodwill is not promoted if American amateurs use their mighty kilowatts to drown out others of more modest means. Nor is goodwill enhanced through the collection of proof of contacts with foreign stations if such contact is limited to an exchange of accurate signal reports. On the other hand, goodwill does result when this DX activity is pursued not only to collect QSL cards, but also to make friends. And goodwill surely will be the result of the program to both donate and sell at cost inexpensive and easy-to-assemble amateur kits to the lesser-developed countries in Africa and Asia.

"The article in the October issue of *QST* which described this project, I might add, also explained this program as a means of ensuring sufficient growth of the Amateur Radio Service to justify your requests for more frequencies at WARC. What that suggests, of course, is that enhancing goodwill — like improving emergency communications services — not only is in the public interest but in your self-interest as well."

The Radio Amateur's Continuing Challenge

"How well you continue and improve your service to the public will have very much to do with how well you fare as Congress and the Federal Communications Commission grapple with assigning the values that go along with the use of the spectrum. If the value of the spectrum to you as a hobby is balanced against the value to the public of your use of the spectrum to serve the public interest, common sense suggests that a future spectrum fee should not inhibit the Amateur Service.

"Your continuing challenge will be to impress upon legislators, regulators and the public at large that the Amateur Radio Service is a national and international resource which deserves governmental and public support.

"I, for one, am confident you are equal to that challenge."

Margita Eklund White was appointed to the FCC by President Ford in 1976. Born in Sweden, she emigrated to the U.S. in 1948, became a U.S. citizen in 1955, and was graduated magnum cum laude *in government by the University of Redlands (CA) in 1959. Mrs. White received her master's degree from Rutgers (NJ) in 1960.*

Commissioner White brings to the Commission her experience as an assistant director of the United States Information Agency (USIA), assistant White House press secretary, and director of the White House Office of Communications. She is the commissioner specializing in defense communications.

FCC PICKS 900 MHz OVER HAMS' 220-MHz BAND FOR PROPOSED NEW CB

The FCC dealt a severe blow in October to the latest CB threat to Amateur Radio's 220-MHz band. It directed its staff to prepare a notice of inquiry regarding creation of a new personal radio service at 900 MHz. The Safety and Special Radio Services Bureau advised FCC that 900 MHz was preferable to 220 MHz for this proposed new service for the following reasons: (1) There is a better chance of coordination with Canada and Mexico. (2) There would be less TVI. (3) There would be no necessity to relocate present users. (4) It would be less expensive for the FCC to administer the service at 900 MHz. (5) More spectrum for the new service would be available at 900 MHz.

The Safety and Special Radio Services Bureau's original recommendation was that the frequency range for a new 900-MHz service be incorporated into a notice of proposed rulemaking (a firm commitment to rulemaking), and that the nature of the new service (*precise* frequencies, width of band, number of channels, emission type, etc.) be incorporated

into a notice of inquiry. However, FCC Commissioner Margita White raised the question of whether there was a need for a new service at all. She said that it was her experience that the present 40 CB channels were not efficiently utilized. FCC Commissioner Tyrone Brown concurred. As a result, both the frequency range and nature of the service will be treated in a notice of inquiry.

There was some discussion of the possible radiation hazards at 900 MHz, but experts indicated that this would not be a problem except possibly for handheld units. FCC Chief Engineer Raymond Spence said that this potential problem could be dealt with by either banning handheld units in the new service or limiting their power. He said that his staff was preparing a notice of inquiry on the general subject of radiation hazards for release in several weeks.

Commissioner Brown voiced concern that the Commission should think now about ways to make sure that its enforcement program is sufficient to allow the new service to accomplish its objectives.

For the complete story of the FCC's search for a new personal radio service leading to and including its latest directive for a notice of inquiry, watch for a special article in next month's *QST*. — *Hal Steinman, K1FHN, ARRL Washington Area Coordinator*

Bob and Ellen White, W1CW and W1YL, receive honorary Ph.D.s (Doctors of Amateur Radio) from Kansas City, MO, Mayor Charles Wheeler, at the 1978 ARRL Missouri State Convention. The mortar boards are sometimes informally referred to as "Ph.D. lids." No doubt the high power emitted by those twin antennas caused the interference to Bob's tie. *(photo courtesy of PHD Amateur Radio Assn., Inc.)*

FCC ON THE MOVE IN FLORIDA AND MISSOURI!

The FCC office in Tampa has moved to the ADP Building, Suite 601, 1211 North Westshore Blvd., Tampa, FL 33607. The telephone number remains the same. The Kansas City office is now located in the Brywood Office Tower, Suite 320, 8800 East 63rd St., Kansas City, MO 64133. — *Michele Bartlett, N1AGD*

FCC DISMISSES PETITION TO CURB BAD NET PRACTICES

In an order released September 28, 1978, FCC dismissed RM-2167, a petition for rulemaking that addressed certain practices by Amateur Radio nets. The petitioner, the Amateur Radio Journalistic Society, asked the Commission to adopt special rules to curb the following practices in which some nets are engaged: (1) operation for commercial purposes, (2) transmission of improper third-party communications, and (3) exclusive, continuous occupation of particular frequencies.

In giving reasons for dismissing the petition, the Commission pointed out that while there are currently no regulations specifically directed at Amateur Radio nets, there are rules applicable to individual amateur stations which address most of the problems raised. "As the commercial and third-party practices cited in the petition violate the existing Commission Rules, the Commission sees no need to adopt new rules solely applicable to networks," declared FCC. "Section 97.112(a) of these Rules states that 'An amateur station shall not be used to transmit or receive messages for hire, nor for material compensation, direct or indirect, paid or promised.' Section 97.114 prohibits 'international third-party traffic except with countries which have assented thereto.' Also prohibited are third-party communication involving compensation to any person, and, except for emergency communications, third-party communication 'the purpose of which is to facilitate the regular business or commercial affairs of any party.' "

The Commission also discussed the problem of prolonged, exclusive use of frequencies. It pointed out that when it had proposed over a year ago, in Docket 21033, that the amateur rules be amended to grant priority use of a frequency to a station occupying it and to require that all frequencies be shared, the comments it had received were overwhelmingly negative. "The general feeling seemed to be that the current rules were working reasonably well and that, barring a compelling reason for change, the Commission should take no action," said FCC in considering comments in Docket 21033.

In conclusion, the Commission stated that since the subject had already been considered, and that the petitioner had raised no new arguments, RM-2167 *is dismissed.*

ANNE JONES NOMINATED TO REPLACE FCC COMMISSIONER WHITE

President Carter has nominated Anne Jones to replace Margita E. White on the FCC. The nomination came too late to allow Ms. Jones to replace Mrs. White prior to January 1979, because the U.S. Senate will not be able to confirm a nomination until the new Congress convenes.

Anne Jones is presently general counsel of the Federal Home Loan Bank Board. She is a former law school classmate of FCC Chairman Ferris and graduated second in her law school class.

STAFF NOTES

It's good-bye snowshoes, hello water skis as two long-time Hq. staffers take a well-deserved R and R. Bob White, W1CW, has retired from his position as ARRL overseas QSL bureau manager, and with his wife, Ellen, W1YL (former ARRL deputy communications manager), has moved to the sunny beaches of Florida.

Bob served the League for many years as an assistant communications manager and supervised the DXCC program until the inception of the highly popular overseas QSL bureau. Ellen was directly responsible for ARRL contests, DXCC, awards and the administrative branches of the Communications Department at ARRL hq. She founded the San Diego chapter of YLRL and was San Diego SCM during 1950-52. Ellen also recorded *QST* and other material for distribution to the blind through the Library of Congress.

Bob and Ellen share many interests, including photography and commercial broadcasting (both hold FCC First Class Radiotelephone and Second Class Radiotelegraph licenses), and, of course, ham radio! Knowing the energetic Whites, it won't be long until they put their talents on the job market again.

So if you're patrolling the sands of southern Florida in your dune buggy this winter and see a couple passing a Minolta back and forth, trailed by three Siamese cats, tap out a "didididit didit" and see if they look up. If it's the Whites, give them our 73. — *Michele Bartlett, N1AGD*

Canadian NewsFronts

Conducted By Ron Hesler,* VE1SH

DOC Creates New Amateur License Class

On September 15, the Department of Communications revealed rules for the proposed Experimenter class of license, now called the Amateur Digital Radio Operator's Certificate. The new name is considered to better describe the function of this new license. Digital and pulse techniques are permitted on specified vhf and uhf amateur bands.

It now is up to the amateurs to take up the challenge of these new techniques and to show that we can indeed develop and exploit new technology, just as we did in the fifties with single sideband. The Department is to be congratulated for encouraging Canadians to become proficient in the organization of radio and computing equipment for accomplishing resource sharing in man-to-machine and machine-to-machine networks.

Considerable consternation occurred when this new license was first proposed. Many briefs were filed with the Department, and symposia were conducted across the country to obtain input from amateurs. The resultant rules and regulations promulgated on September 13 show the results of this consultation. We believe the new Amateur Digital Operator will be welcomed into the ranks of Amateur Radio and will prove fully compatible with present amateurs and amateur operation.

In summary, the new regulations provide that:

☐ Licensed Amateur Radio operators operating in the 220- to 225-MHz band may continue to do so in accordance with the applicable schedules.

☐ All existing holders of both the "Amateur Radio Operator's Certificate" and the "Advanced Amateur Radio Operator's Certificate" will be allowed all of the operating privileges of the "Amateur Digital Radio Operator's Certificate" with the exception of pulse emissions.

☐ Holders of the "Advanced Amateur Radio Operator's Certificate" will be authorized the use of pulse emissions upon successful completion of the pertinent section of the "Amateur Digital Radio Operator's Certificate" examination.

☐ Holders of the "Amateur Digital Radio Operator's Certificate" are only permitted to operate above 144 MHz.

☐ Holders of the "Amateur Digital Radio Operator's Certificate" will be issued an "Advanced Amateur Radio Operator's Certificate" upon successful completion of the Morse code test at 15 wpm.

☐ An ASCII mapping of the call sign of the station shall be transmitted within the packet header whenever packet transmissions are used and at each exchange of communication with another station. The use of any secret code or cipher as any part or the whole of any packet transmission is not permitted.

☐ Except as noted below, dc power input to the final rf stage is limited to 1000 watts.

☐ The final stage rf output power used for packet transmission shall not exceed 100-watts peak power and 10-watts average power.

☐ The final stage rf output power limitation for pulse emissions below 1215 MHz is restricted to 100-watts peak power and 10-watts average power.

☐ The final stage rf power limitation for pulse emissions at or above 1215 MHz is restricted to 2.5-kW peak power and 25-watts average power.

☐ The particular modulation techniques or emission types to be used in packet transmissions are to be determined by experimentation by the amateurs.

Allocations on the 144-MHz band are the same as at present, except that pulse modes PØ and P1 are permitted from 145.5 to 145.8 MHz. For pulse, maximum bandwidth is 15 kHz and maximum power 100-watts peak and 10-watts average. On the 220-MHz band, allocations are as follows:

220.0-220.1 — Reserved exclusively for nonpacket transmissions. Long-distance communications, weak signal. Emission types AØ, A1, A2, A3, A4, F1, F2, F3 and F4 are permitted.

220.1-220.5 — All transmission modes including packet are permitted. Packet emission bandwidth — 10-kHz maximum.

220.5-221.0 — All transmission modes including packet are permitted. Packet emission bandwidth — 100-kHz maximum, for interrepeater links.

221.0-223.0 — Reserved exclusively for packet transmission. Packet emission bandwidth — 25-kHz maximum.

223.0-223.5 — All transmission modes including packet are permitted. Packet emission bandwidth — 100-kHz maximum, for interrepeater links.

223.5-225.0 — Reserved exclusively for nonpacket transmissions. Emission types AØ to A4 and F1 to F4 permitted.

Allocations on the 420-MHz band are the same as at present, except that:

433.0-434.0 — Reserved exclusively for packet transmissions. Packet emission bandwidth — 100-kHz maximum, for inter-repeater links. F5 permitted on all except 433.0 to 434.0 MHz.

434.0-434.5 — Nonpacket, but pulse modes PØ, P1, P2 and P3 are allowed, with maximum bandwidth of 30 kHz and peak/average power of 100/10 watts.

The 1215-, 2300-, 3300-, 5650- and 10,000-MHz bands remain as at present, except that pulse modes PØ, P1, P2, P3, P4, P5 and P9 are permitted with peak power limited to 2.5 kW, and average power of 25 watts. Packet transmission is not permitted.

The 24,000-MHz band also remains the same, except that packet is permitted from 24,000-24,010, and pulse modes PØ, P1, P2, P3, P4, P5 and P9 are allowed from 24,010-24,050 with peak power of 2.5 kW and average power of 25 watts.

*Director, Canadian Division

NEW RULES FOR AMATEUR EXAMINATIONS

A new Telecommunications Regulation Circular, TRC-24, dated October 1, 1978, is available without charge from local offices of DOC. This is entitled "Information for the Guidance of Candidates Preparing to Attend Examination for an Amateur Radio Operator's Certificate, or an Amateur Radio Operator's Advanced Certificate, or an Amateur Digital Radio Operator's Certificate." It describes the new method of periodic examinations, and the new study curriculum to qualify for examination for all three classes of certificate. It is available in English and French. Anyone planning on taking examinations is advised to obtain a copy.

REGULATIONS NOW CONSOLIDATED

Regulations made under the Radio Act to govern the Amateur Experimental Service have been difficult to comprehend because there have been so many revisions over the years. Now they are consolidated in one easy-to-read document available free of charge from DOC. This is Telecommunications Regulation Circular TRC-25, Issue 3, dated September 30, 1978, and titled "Extracts from General Radio Regulations, Part II, Made Under the Radio Act — Amateur Experimental Service." Each amateur should obtain a copy from his local DOC office. This issue incorporates recent changes made in conjunction with the Amateur Digital Operator Certificate. — *VE3AR*

From the director, vice director and all officials of the Canadian Radio Relay League — Merry Christmas and a Happy New Year.

Strays

I would like to get in touch with . . .

☐ male or female pen pals with hobbies besides ham radio. Rick Todd, KA8AKL, 21951 Kennison Ave., Euclid, OH 44123.

☐ U.S. hams who are also stamp collectors. Aleksander Ciesiar, SP9ABE, ul Spoldzielcow 16/9, 43-303 bielsko-Biala, Poland.

☐ anyone who would like to exchange programs, written or on cassettes, for the TRS-80 microcomputer. Greg Baltanz, WB1ACJ, 28 Old Viking Rd., Glastonbury, CT 06033.

☐ hams who are active in retail merchandising in supermarket, discount or department stores. Aaron Ascoli, 4Z4LP, 7 Taran St., Rehovot, Israel.

☐ members of the Good Sam RV International Club interested in starting a net for Region 1 (Pacific Northwest and Alaska). Leslie L. Huff, W7CVI, 3601 Lincoln Ave. N.E., Renton, WA 98055.

☐ anyone owning a *Hammarlund Model FM-50A* Outercom. Melvin O. Johnson, Rte. 3, Box 72B, Inverness, FL 32650.

Washington Mailbox

Conducted By Michele Bartlett,* N1AGD

The 610: FCC's (Almost) All-Purpose Application Form

Q. I just sent in a form 610 to get an appointment to upgrade my license the next time the FCC comes to town. Now I'm worried that I may have done something wrong. Help!

A. Okay. Let's start with what a form 610 is, and what it isn't. Use one if you are applying for a new, modified or renewed license, Novice through Amateur Extra Class. Use it to (1) change your station location, mailing address, or name, (2) to renew your license, (3) to request a new call sign if you are eligible, (4) to upgrade, and (5) to request a volunteer examiner if you are blind or disabled, or to request a Novice exam if you are a volunteer examiner.

Q. I don't understand the distinction between mailing and station location addresses.

A. Your mailing address is where you receive mail from the FCC. It can be a post office box, a rural route number, your parents' address — any place from which mail can be forwarded to you. It can even be in another state from that of your primary station location. Usually, the mailing address and station location are one and the same. If, however, you live overseas, your mailing address must be a U.S. address from which your mail will be forwarded. (The station location must be within the jurisdiction of the Commission. If you do not have a station location established, you may list your U.S. mailing address as your station location. You cannot use a P. O. box, a rural route number, General Delivery or APO/FPO for a station location.) If a numbered street or road address cannot be given, then give the distance from a major road or intersection, e.g., "Route 2, three miles west of Charred Stump, Wyoming."

Q. What are some other instances in which my mailing address and station location may differ?

A. You may prefer to receive your mail at your business, or to use a P. O. box to hold the tons of QSLs you receive. By the way, the mailing address that you give the FCC will be the one that will appear in the *Radio Amateur Callbook*, unless you write to the *Callbook* and request a different listing. And you are responsible for FCC mail sent to your mailing address. If you fail to respond to a citation or other official correspondence, you could lose your license.

Q. I think I understand. You said earlier that an FCC form 610 is used by the blind and disabled to request a volunteer examiner. Please explain.

A. Right. The FCC, in addition to permitting volunteers to administer Novice exams, now allows applicants who are legally blind or disabled and unable to travel to request a volunteer to administer any class of license exam. (Part II of the form 610 is for volunteers for the Novice exam only.) If you are blind or chronically unable to travel, the FCC will assign a volunteer of its choice for you.

Q. I'd heard that volunteers could administer exams to people who are, because of protracted disability, unable to travel, but I never heard they they could also help with the blind. Is this something new?

A. Yes. It's true, as of early 1978. In both cases — inability to travel and legal blindness — a physician must complete Part III of the form 610 and certify the applicant's disability.

Q. I sure would like one of those new call signs. How do I apply?

A. First determine if you are eligible. You must be (1) a newly licensed operator or (2) an Amateur Extra Class licensee, or (3) you must upgrade, or (4) change your *mailing* address to a new call-sign district.

If you are a newly licensed operator, you will automatically receive a call sign from the group of calls for which you are eligible. If you travel to a field office to upgrade, complete the form 610 and fill in line 13 upon arrival. If you are requesting an appointment for an exam when the FCC journeys to a testing center near you, fill in line 13 when you mail the 610 to the field office in charge of your area. (See "Washington Mailbox," September 1978, for the office address nearest you.) If you are changing your mailing address to a new call area or are upgrading, but don't want a new call, leave line 13 *blank*. If you check the little box, even if you don't specify a call-sign group, you will find yourself with a new call!

Q. Will you please explain what the groups are and who gets what?

A. Group A is for Amateur Extra Class licensees. The calls are of the 2 × 1 variety, e.g., AC1Y. Group B is for Advanced or Amateur Extra Class licensees, and the calls are 2 × 2s, e.g., KB6AK. Group C consists of 1 × 3 call signs like N1XYZ, which are available to Amateur Extra, Advanced, General or Technician class licensees. And Group D consists of good old 2 × 3 call signs like KA4AGK, available to anyone — Novice through Extra, within the restrictions of the preceding answer. Note: If you move and request a new call, you are only eligible for one of the format you already have. For instance, if you are WA9XYZ, you may become KA4ABC, even if you are an Advanced class licensee.

Q. Whoa! Back up. You say that if I want to take an exam when the FCC comes to a nearby testing site, that I send the 610 to the nearest field office? I thought I was supposed to send it to Gettysburg!

A. No, they don't want it, and will just return it to you. Please don't send it to ARRL hq., either. If you'd like a schedule of exams and field office addresses, you may write to the FCC in Washington, DC 20554, and they'll be happy to provide the information. Ask for form FO-28.

Q. I have a form 610 that's dated 1976. May I use it?

A. Yes; old 610s can be used, but Hq. doesn't recommend them because they increase the chances of error. The new 610 is designed to better describe the action you wish to be taken. If you need a current 610, please send a self-addressed, stamped envelope to ARRL, Newington, CT 06111, or write to any FCC field office. (FCC does not, however, request that you send a s.a.s.e.) You may do the same if you have a current 610 but are missing the three-page attachment of instructions.

Q. What else could I possibly do wrong?

A. You must sign and date the 610, and make sure that the name printed or typed at the beginning agrees with your written signature. This is essential; your application will be returned if it's undated or the names are not exactly the same. Also, please remember to attach a photocopy of your current license to the upper right-hand corner of the form. (Of course, this doesn't apply if you are not yet licensed.) It's a good idea to keep a photocopy of your completed form 610, in case it goes astray. This is especially important when you're renewing your license.

You may as well renew your license whenever you modify, and spare yourself the trouble later on. You probably know by now that there are no fees at this time, and to enclose a check or money order will only slow the progress of your application.

Q. What other forms does the FCC use that I might be interested in?

A. You should use a 610-B to renew your club station license, a RACES station license, or a military recreation station license. However, you may not use the 610-B for new licenses of these types, as there is a freeze on new licenses of this sort.

Many amateurs hold (or would like to hold) commercial class licenses. The form for renewal or application is 756. It was revised in April 1978, but you may still use the old 756 forms.

And since a recent survey showed that 50 percent of all amateurs have or have had citizens band licenses, you may want to know that form 505 is used to apply for or renew a CB license. Form 555-B is a temporary permit to allow you to get on the air until your CB license arrives.

Q. I have a ham friend from Germany who is coming to visit next year, and he'd like a reciprocal license. How can he get one?

A. Visitors from countries which have a reciprocal operating agreement with the U.S. may use form 610-A. A reciprocally licensed alien will sign his own call, "portable W" and the district number. Visitors from other countries must sit for and pass a U.S. exam to operate here. A person (or for that matter, an alien who lives in the U.S.) who passes the FCC exam receives a U.S. call sign. Canadian amateurs who want to operate in the U.S. may use FCC form 410, available from ARRL or from FCC, to obtain a reciprocal permit.

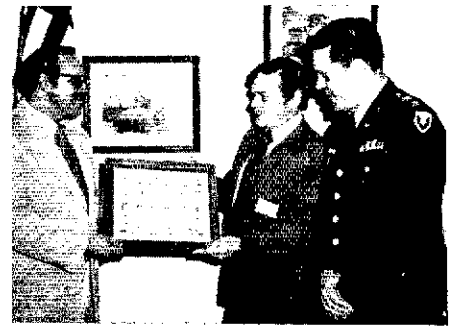
*Membership Services Assistant, ARRL

Club Notes

One hundred percent club. What's that? A club that's all club? Nope. A club we're proud of — one whose every voting member is also an ARRL member! An old, old-timer club, St. Louis (MO) ARC, which originally affiliated under the name of St. Louis RA in 1920, then reactivated in 1931, touts the 100 percent club claim. On the other hand, Point Radio Operating Society (PA) and Talladega County ARS (AL), brand-new affiliates as of mid-September of this year, are 100 percent clubs. Year after year, many of these clubs continue to keep their 100 percent status. Two councils even boast each *member club* as an ARRL affiliated club. With all of the new people coming into Amateur Radio and joining clubs, the 100 percent goal is not easily attainable. But what better way than this for a club to show support of the League?

The actual requirement for affiliation is for just over half of the voting members to be League members. The 100 percent achievement is way above and beyond the call of duty. Affiliation is a two-way street where there are benefits to and advantages for the club and the League. Your club can become affiliated, and as a higher goal, aim for the 100 percent club classification. Interested? Let us know. We're proud of all of our 200-plus affiliated clubs. Feats of all kinds are accomplished by them, such as running a district QSL bureau, putting on a bang-up national convention, sponsoring IARU receiver and transmitter kits to less-developed countries. But to top it all off, many of these clubs also support the ARRL by each member joining the League.

Each of these clubs, a 100 percent club, receives an attractive certificate to hang on the club shack wall or in the meeting room. Congratulations clubs! Ada ARC (OK), Aeronautical Center ARC (OK), Alamo DX Amigos (TX), Alamogordo ARC, Inc. (NM), AR Explorer Post 9120 (IL), AMT ARC (CA), Arizona DX Club (AZ), Ashtabula County RC (OH), Atomic International Rocketdyne (CA), Azalea Coast ARC (NC), Bolivar County ARC (MS), Boulder ARC (CO), Buffalo Area DX Club (NY), Carl Sandburg ARC (IL), Central Florida DX Assn. (FL), Central VA Contest Club (VA), Charles River Wireless Society (MA), Chicago Radio Traffic Assn. (IL), Cincinnati Buckeye Netters (OH), Columbia ARS (FL), Comm. for AR (OH), Communications Club of New Rochelle (NY), Coney Island ARC (NY), Connecticut ARS (CT), Connecticut Wireless Assn. (CT), Crystal RC (NY), Delta DX Assn. (LA), Dorchester ARC (MA), Eastern Iowa DX Assn. (IA), Eaton County ARC (MI), Electron Club of Denver (CO), Empire AR Service (NY), FDR VA ARC (NY), Federal Brass Pounders ARC (MI), Foothill High School ARC (CA), Ft. Wayne DX Assn. (IN), Fountain City RC (TN), Glenhurst RS (NY), Hockanum Valley ARS (CT), Holmdel ARC (NJ), Hudson AR Council (NY), Kensington H.S. Society for Propagation of Hertzian Waves (PA), Lake Area RK (SD), Lake Cumberland ARA (KY), Laurel Lasses (PA), Los Angeles Area Council of ARC (CA), Loudon County ARC (TN), Miami Valley FM Assn. (OH), Mid-South DX Assn. (TN), Mile High DX Assn. (CO), Milltown ARS (IN), Murphy's Marauders (CT), Norfolk County RA (MA), Norfolk RC (NE), North Augusta Belvedere RC (SC), Northeast Nebraska RC (NE), Northern California DX Club, Inc. (CA), Northern Illinois DX Assn. (IL), Oak Park ARC (MI), OBP RC Chapter no. 1 (MO), Ohio Valley ARA (OH), Opelousas Area ARC, Inc. (LA), Opequon RS (WV), Owensboro ARC (KY), Peter Rouget ARS (NY), Plateau ARC (TN), Pocono ARK (PA), Point Radio Operating Society (PA), Potomac Area VHF Society (MD), Radio Amateur Transmitting Society (TN), Rockaway ARC (NY), Rome RC (NY), St. Louis ARC (MO), Sand Creek Jr. H.S. ARC (NY), Scarsdale H.S. ARC (NY), Seneca Repeater Assn. (OH), Sheboygan County DX Assn. (WI), Skagit ARC (WA), Skokie Six Meter Indians (IL), Skylands ARC (NJ), Smoky Mountain ARC (TN), Society for the Preservation of Amateur Radio (MO), South Queens Boys Club ARA (NY), Southeastern LA University ARC (LA), Springbrook Operating and Transmitting Society (TN), Sussex County ARC (NJ), Talladega Co. ARS (AL), Tri-City ARA (NJ), Twin City DX Assn. (MN), Vanderbilt University ARC (TN), W/K ARC of Greater Milwaukee (WI), W. T. Clarke H.S. ARC (NY), Wellington ARC (KS), Westchester ARA (NY), Wide Area Data Group (NV), York County ARS (SC). — *Rosalie White, WA1STO*



Stan Briggs, W8MPD, Section Communications Manager of Michigan, presents a charter of affiliation to officials of an affiliated club, Federal Brass Pounders ARC, a 100 percent club.

Strays

AMATEUR NETS FOLLOW VOYAGERS TO LANDFALL

☐ Amateur Radio operators by the dozens were right in there "doing their thing" as a five-month journey over the high seas ended in triumph with the arrival of three replicas of Spanish galleons on September 6 at Santander, Spain. (See November *QST*, page 24.)

Vital Alsar, XF1LM, and his 15 crew members made the trip from Tampico, Mexico, to retrace a 9000-km (5600-mile) gold and silver route, arriving "only a little behind schedule." Forty thousand people were on hand to greet them, based on three days of advance notice afforded by many hams along the Spanish coast who kept in touch with the marine mobile contingent via their 2-meter repeater network.

The voyagers were welcomed by Santander's mayor as they arrived at the well-known Playa de la Magdalena beach fronting the royal palace. A reception hosted by city officials followed immediately.

XF1LM stressed the importance of the Amateur Radio aspect of his trip to the local media covering the arrival. He called hams his "guardian angels" whenever he was in danger during his five months at sea.

Juan Granados, WD4LCD, who maintained contact with the expedition on 20-meter ssb, reported the first ham to see XF1LM was EA1SL in Ribadeo. He was in continuous contact with him on 2 meters for 48 hours, and warned the local fishing fleet of the impending arrival of "all these hairy people."

The galleon replicas were built in Ecuador, and were later sailed downstream to the Amazon and the Atlantic port of Belem, Brazil. The voyage was made to prove language barriers could be overcome and that man could rise beyond personality differences and the "spoils" of modern living.

Radio amateurs handled all communications throughout the voyage with net operations on 14.135 and 14.280. Roberto Romero, XE1NF, acted as net control from the Mexican end, and Manolo Estevez, EA1II, performed the same task in Spain.

Where will the adventuresome XF1LM be heading next? Well, he is talking about going on another expedition . . . to the Arctic, perhaps. — *Mike Saul, W1DHP*

"El Capitan," Vital Alsar, XF1LM, surveys his ship before leaving on a five-month journey across the Atlantic. *(photo courtesy* Radio Frequencia)

QUICK COINCIDENCE

☐ If an amateur stays in the game long enough, he'll probably work someone with the same call-sign suffix as his own. But it only took Bob Benefiel, WD9IOS, 17 contacts to bump into John Netterville, WD4IOS.

GE COMMEMORATION

☐ General Electric is 100 years old now and some of its loyal troops out Ohio way will mark the occasion from special-event station WD8COS/GE 100 on December 2-3. Frequencies: 3940 7240 14,340 21,360 26,560.

EIA INTERFERENCE BOOKLETS

☐ The Electronics Industries Assn. has available free two comprehensive publications on interference: "Consumer Electronics Service Technician Handbook — Television Interference" (40 pages) and "Consumer Electronics Service Technician Handbook — Audio Rectification." Write to Consumer Electronics Group, Electronics Industries Assn., 2001 Eye St., NW, Washington, DC 20006.

QST congratulates . . .

☐ Warren Decker, W8ILD, who founded the Chippewa Hills (MI) Amateur Radio Club, WD8PWJ, and brought eight of his neighbors into the ranks of Amateur Radio operators.

Does W1AW QSL? Does the sun really rise in the east? Here, W1WPR holds 170 QSLs made out by visiting hams for contacts they made operating W1AW on August 23. Just one day's mailing! *(W1YL photo)*

YL News and Views

Conducted By Louise Moreau,* W3WRE

1978: YLs on the Move

1978 was quite a year of YL activity. The DX picture increased when four new countries, Togo, Malawi, Malta and Kenya, issued licenses to their first YL operators. The growing interest of women in Amateur Radio has increased the membership in the many national clubs around the world. This interest, in turn, has sparked a desire among the members to encourage their women to meet and know the YLs in other countries by opening their nets to everyone interested.

In the U.S., where the YL census is well past the 20,000 mark, the growing interest in fm repeater activity has sparked three different YL groups. Led by the Laurel Lasses, who built and operate their own repeater, the activity spread to the Shenandoah Valley Club with a desire to schedule linkups with Blue Ridge repeater YLs. And earlier this year the Houston YL Club organized a 2-meter repeater net.

We have seen YL participation in SSTV grow from just three gals who had been the hard core of YL activity in this mode to 13 women, with inquiries about slow-scan coming from many others who have more than just a casual interest.

During 1978 YLs placed high in the RTTY Sweepstakes, while others placed high in division and the state code contests. And several women were named "Ham of the Year" by their local clubs.

It was a year of many new things: new nets, both club sponsored and state- or nationwide, all with the purpose of getting to know other YLs here as well as internationally. There was greater activity by the members in the many contests sponsored by YLRL and CLARA, while the May QSO party of YLISSB had one of the largest numbers of participants in the system's history.

The year 1978 saw the completion of the YL suffix in all 10 call areas of the continental U.S. as well as Hawaii through the new N and AA prefixes that opened this distinctive call to YLs with Amateur Extra Class licenses. It was a year of doing and growing that had been foreseen when Miss Lillian Todd became Amateur Radio's first YL in 1909.

1979 YLRL OFFICERS

The following women have been elected to serve as officers of the Young Ladies Radio League for the coming year: Phyllis Shanks, W2GLB, president; Margaret Williams, WA4FTJ, vice president; Ione O'Donnell, WA2DMK, secretary; Carrie Lynch, WA4BVD, receiving treasurer; Sandra Heyn, WA6WZN, disbursing treasurer. District Chairwomen: Jean Thompson, K1TVT, 1st; Lois Ierlan, WA2RXO, 2nd; Ruthanna Pearson, WB3CQN, 3rd; Dot Bedford, K4AOH, 4th; Cindy Jones, W5ZPD, 5th; Rose Fischman, WA6LRW, 6th; Bertha Roylance, K7CHA, 7th; Lucy Benner, WA8BWD, 8th; Marilyn Backys, WB9TDR, 9th; Lovelle Pedersen, WBØJFF, 10th; Eleanor Kimitsuka, KH6YL, KH6; Mary Moore, KL7JDI, KL7; Thelma Woodhouse, VE3CLT, VE. (Note the YLRL districts correspond to the call areas. These women report the activities of the members in *YL Harmonics*, the club publication.)

*YL Editor, *QST*. Please send all news notes to W3WRE's home address, 305 N. Llanwellyn Ave., Glenolden, PA 19036.

NOVICES IN YL CONTESTS

The major YL contests scheduled each year by YLRL are open to all classes of Amateur Radio operators. Novices are encouraged to enter the contests and a special certificate is awarded to the Novice who submits the log with the highest score. All Novice operation must be done in the Novice band, and must be done under the call of the station that is operating under the regulations for Novice class licensees. YLRL contest participants have been and will be active in the Novice section of the bands looking for contacts in all YL contests.

The rules and dates of all YL club contests can be found in the "Operating Events" column of *QST*.

SPECIAL NOTICE

All pictures sent to the YL column must be black and white for use in *QST*. It is requested that they be clear glossy pictures, not fuzzy or clouded. Also, pictures should be at least 4 × 4 inches (102 × 102 mm) in size, preferably 5 × 7 inches (127 × 178 mm) or larger for good reproduction. QST

The 1978-79 officers of the MINOW Net (l-r): Margaret Egerer, WA7RBR, president; Ruth Bennett, WA7RVA, vice president; Marion Dixon, WA7TLL, secretary-treasurer. (*photo courtesy of WA7RBR*)

50 Years Ago

December 1928

☐ A new constitution has been adopted by the International Amateur Radio Union — completing the conversion from individual memberships to a coalition of national amateur societies.

☐ W9BWI is unhappy with the loop-modulated (and thus broad) phone signals he hears in the 3500-3550 kc. voice band, and so shows us his design of a modulated crystal-oscillator circuit driving a 50-watter.

☐ W9NY gives us some useful but rather deep info on design of choke coils. W9FEF points out you don't need to keep your remote control relay coil energized all the time if you use his latching device. Further debunking some critics claims that *QST* is entirely a Down East product, another Midwesterner (W9DRD) shows us how easy it is to get crystal blanks and grind them to frequency in preparation for the new 1929 regs.

☐ Also most helpful for 1929 ham activity is W3AIH's tabulation of ideas for a monitor, and W8CMP's concept of building a frequency meter inside the receiver cabinet.

☐ Forerunner of today's versatile VTVM is Lou Hatry's design of a "vacuum tube ammeter" using voltage-drop measurements.

☐ W1CEI of the Hq. staff takes another step toward transmitter stability with push-pull circuits which reduce the effects of inter-electrode capacitances.

☐ The Byrd expedition will be equipped for communication with amateurs.

25 Years Ago

December 1953

☐ W8GBT has just about the ultimate in mobile rig design — VFO or xtal, bandswitching, phone or c.w., 30 watts. And you can go all the way by adopting K6DY's and W6WOY's ideas for remote resonating of the mobile antenna.

☐ Transistors may be the coming thing — we really oughta catch up on our theory by reading W9JRO's excellent presentation of solid-state basics.

☐ The Editor notes that after two years of existence the Novice license has not increased the amateur population much more than in the past, and opines that it is the personal help and guidance from older hams which pave the way to success for aspirants.

☐ The pictures in W1DX's article may look familiar — it's an update of his earlier presentation on small receiver design, changing the mixer and several other components to improve performance.

☐ Filters of 50 or so db. attenuation cost a fortune commercially, but with ferrite-slug inductances WØASO finds we can build our own for one-tenth the price.

☐ The new double-conversion strips to get u.h.f. reception on older TV receivers pose a threat to amateurs in that the first i.f. falls near the 2-meter band, W1HDQ warns.

☐ Those BC-696s in surplus are a good bargain, but you may have to add a buffer and some filtering per W9UUV's suggestions if you live in a fringe area.

☐ W1HDQ and W1VLH complete their 220-Mc. station design with this month's modulator and accessory description. A separate picture story of huge v.h.f. antenna arrays should inspire us to hurry construction. — *W1RW*

Correspondence

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

DAMAGE DIAGNOSIS

☐ I read your "Double-Digit Damage" article in October *QST* and I know what you are going through. I have seen the rapid expansion of the knowledge and complexity of the field to the extent that the average layman can no longer comprehend the present technical approaches taken by most books. This, coupled with such a wide choice of transmitters and receivers available, means there is no longer the urge to build your own equipment. I suggest you write in layman's terms a series of troubleshooting manuals for various commercial sets used by amateurs. Although I am not operating now and am not licensed, I am still interested. — *Paul Howard, Millington, MD*

☐ Let's look at it this way. We get a $2 publication for $1 and everything else is free. I would think the dues should be raised. The code practice from WIAW alone has been worth more to me than the dues. — *Floyd Adams, Middletown, CT*

☐ I would like to offer several suggestions, not criticisms. End "freebies" such as the *Repeater Directory*. If possible, send them out by bulk mail and charge a dollar, postpaid. You were kind enough to send at my request, substantial matter on antenna and tower cases. I am grateful, but I feel that it could have been sent at book rate. It certainly is educational matter and if collated and stapled, it would be a book. Let's take the *Handbook*. Why not come out with a revised edition every five years? You mentioned six delegates to WARC. Why not two? If things get desperate in spite of all economies appeal to the members for monetary contributions. It's not immoral to do so since we are a nonprofit educational and public-spirited group. — *Lou Roth, W2DKH, Jamesburg, NJ*

☐ It's the same story everywhere, rising costs and additional expenditures. We all recognize the income to be realized from advertising. Don't discourage it. The literature — it's not competitive. It is not "easy reading." Economize, especially in the area of services to nonmembers. I am really an old-fashioned American and am naturally fond of tradition, but when we face times like this and such escalating financial problems, tradition be damned. Close down Hiram Percy Maxim's old station and the "similar programs" you refer to. I don't want you meddling in everything or taking unnecessary travel, but I want you to be there when my interest is best served. I want to pay for my needs but not the freeloaders. I don't want to take up the fight against wrongdoers, manufacturers, peddlers, CBers, etc. I'm in Amateur Radio to enjoy and communicate. — *Ron Desautels, WD6AYM, Sun Valley, CA*

☐ Recently I passed the General class examination. I live far from anywhere and getting to the nearest class for upgrading was practically impossible on a regular basis. The new *License Manual, ARRL Antenna Book, Understanding Amateur Radio*, along with the WIAW code practice, made it all possible. So a good deal of credit for this joyful accomplishment goes to you. Without the League ham radio would have been closed to me. — *John Clark, WB1FLR, Burkettville, ME*

☐ Raise the price of *QST*. It's worth it. You pay as much for junk magazines. How about attracting more Life Memberships? If I were 30 years old a Life Membership would look attractive to me. — *Frank Parker, WA6RBD, Sacramento, CA*

☐ Your services are worth at least $25 a year as far as I'm concerned. Please don't skimp on *QST*. It's still the best Amateur Radio magazine ever. — *Al Carpenter, WA8REC, Spencer, WV*

☐ *QST* seems to be better each month. I have all *QST*s since 1920 and the October issue beats them all. The 208 pages of excellent reading and your colorful ads are very interesting. *QST* beats all the other publications. I've tried them. — *Basil Cutting, W1JB, Suncook, NH*

☐ I'd like to offer some suggestions. For years now the best part of *QST* has been the ads. Publish a supplement. I'll pay $10 a year for it. Hire someone from an electronics company to design a simple single-conversion crystal filter and transistors. Design the circuit board and help the home builder make or acquire the board. I know you transmit bulletins, code practice, etc., but for $45,000? The average ham doesn't sit around waiting for your bulletins. Make ARRL more visible by having it heard. Get on the air and talk to the hams around the USA. — *Jim Conner, K4DMI, Merrit Island, FL* [Editor's Note: The use of WIAW for such activity is limited by Section 97.112 of the regulations.]

☐ Thank you for the code practice sessions. Thanks to the confidence and skill I developed by constantly copying WIAW, I was able to pass the General class examination on the first try. I had been a Technician since 1956 but you changed that. — *Gerald Skinner, K4LVZ, Miami, FL*

COURTESY, SPORTSMANSHIP AND ASSISTANCE

☐ During my 32 years of hamming I have never experienced anything but the utmost courtesy, gentlemanliness and sportsmanship. This alone makes one proud to belong to such an outstanding fraternity. However, back in July the tranquility was rudely disturbed by a distressing episode on 20 meters. It began with a few requests by different members of a mobile group for an individual to vacate the frequency since they considered it their own for net purposes. The individual refused to move claiming to have been there for an hour or so before them. The dispute quickly degenerated into a most discourteous and foul harassment of the individual by the mobile group. It consisted in part of throwing heterodynes on frequency, repeated blowing into the mikes, foul language, and general conversation by the group preventing an intelligible QSO by the individual with other stations. Behavior of this sort injures the entire amateur fraternity. I hope that if members who took part in this disgraceful episode see their offense described they will feel properly ashamed, and decide to grow up and act like adults. — *Herman Milatz, W2TLC, N. Merrick, NY*

☐ There are so many violations of common courtesy on the phone bands that something had better be done before the apathy spreads. — *Ben Piller, K9CSM, Monee, IL*

☐ The 2-meter fm repeater situation more and more resembles 11 meters: all form and no substance. The recruitment of CBers into the ham ranks is questionable. An all-out effort should be made to bring them into the amateur fraternity by making them aware of accepted amateur practice. — *Philip Vinson, K5MFE, Fort Worth, TX*

☐ So many times I copy the mail and want to go back to a station but the operator slurs his call. I am proud of my call and try to give it clearly and slowly. If you introduce yourself you wouldn't say, "This is Jomm Smmm" for John Smith. Let's clean up the act. — *Charles Henry, WB8TKT, Hamilton, OH*

☐ Please give an honest signal report. I had a sked with WA6FAA across town to check the calibration of my transceiver. I was dismayed to hear, "Walt, you have a big chirp." I checked the *Handbook*, replaced the OA2, and cured the chirp. A 573 or 579C report is not an insult. It's the first constructive step toward a signal one can be proud of. Robert Burns wrote, "O would some power the giftie gie us to see ourselves as others see us." I paraphrase, "Would other hams not soothe or fear us, but give reports the way they hear us." — *Walt Bilofsky, N6QH, Sherman Oaks, CA*

☐ I've been on the air about 50 years. When I called CQ I have always given my location. I felt that many amateurs wanted to know where the call was coming from. There is always a chance they may have traffic for my location. I would like to suggest that everyone give their *QTH* and call sign. I'm sure most of the old-timers feel the same way. — *Russell Garlin, W5UKA, Albuquerque, NM*

☐ I spent 40 minutes or so listening to several East Coast stations having QSOs with a YI1. He was extremely weak and it was obvious that the majority of Ws were unable to hear him. However, they were completing the contact with the help of an OE6. I have to agree with a G station who broke in a couple of times accusing my fellow hams of cheating. If this sort of subterfuge is allowed to exist and continue I intend to discontinue by support of the DXCC activity. —

☐ When I think of some of the problems Amateur Radio has in its efforts to keep on the right side of people, I often think how important it is for us to speak as often as we can about the plusses of the hobby. I was operating mobile and had an opportunity to see Amateur Radio in action in time of need. Scotty, W3AIC, was driving ahead of me when he spotted a fellow traveler having difficulty with his automobile. I heard him say that he would stop to see if there was anything he could do. He called for assistance on the WR3AIZ repeater. Randy, WA3VUP, answered and offered to call an emergency station along the way. Soon he reported that help would be along in about 30 minutes. Ten minutes later I came on the scene and there was the emergency assistance. I think it is just great that Amateur Radio operators have repeaters to meet the needs of travelers. It's a feather in the cap of those who are trying to do their part to make Amateur Radio stand out in its purposes to be a worthwhile hobby. — *Edmund Peterson, K3LJP, Washington, DC*

LINEAR REACTION

☐ In September *QST* "Happenings," Mr. Horne of the FCC is quoted as saying that the ban on 10-meter amplifiers had been successful in ridding the marketplace of amplifiers capable of being illegally used in the CB service. This is not true. Makers of CB linears continue to manufacture and sell them openly. Other manufacturers make "ew transmitters" accompanied by anonymous notes on how to convert them into linears. Mr. Spence, the Commission's chief engineer, was quoted as agreeing that CB linears were off the market but attributed this to the Commission's rigid type-acceptance specifications. Mr. Spence is equally mistaken. These devices are being manufactured illegally. The makers are lowering their standards. The FCC is living in a dream world. There is no way to ban a device that several hundred thousand Americans are capable of building in their cellars. The cure lies in removing the conditions that make linears desirable. Unless they get a handle on this soon the government will simply lose control of the air waves — CB, amateur and commercial alike. — *Name withheld by request, Glenhead, NY*

☐ I compare the method used by the FCC in handling the amplifier question with the prohibition amendment. Remember how well that worked? Soon we will not be able to own a car because there are too many unlicensed drivers driving. There are already plenty of laws, we must simply put them to use. — *Ben Piller, K9CSM, Monee, IL*

International News

Conducted By Bruce Alan Johnson,* WA6IDN

Africa, Asia and Amateur Radio

North Americans and most Europeans take it for granted that when they tell their neighbors and friends that they are radio amateurs, all is understood. But this is by no means the case in the rest of the world. Indeed, there are quite a few languages which don't even have a word or phrase that equates to or describes the concept of "radio amateur"!

This is but one of the many problems and challenges confronting the IARU member-societies in Africa and Asia as they prepare to receive the IARU Kitsets being prepared for shipping at this writing, under the label of Project Goodwill. The generosity of the clubs and individual amateurs in North America has been nothing less than overwhelming, and it is thanks to you that many new and impoverished amateurs in developing countries will soon be on the air with their own stations. We thought you might like to know a little about some of the societies who are earmarked to receive the kits.

While space limitations prevent us from listing all the societies, we have responsible Amateur Radio societies and/or individuals slated to receive kits in the following countries: Algeria, Botswana, Egypt, Gambia, Ghana, Ivory Coast, Kenya, Liberia, Morocco, Nigeria, Senegal, Sierra Leone, Swaziland, Zaire and Zambia; India, Indonesia, Jordan, Malaysia, Pakistan, Papua New Guinea, Sri Lanka, Syria and Turkey (receivers only at the present time).

If there are readers who are not familiar with the problems facing these societies, please see August 1978 *QST*, page 53. Pakistan is only one case, but the problems of its amateurs are held in common with those of almost every country listed in the preceding paragraph.

To overcome the problem of the unfamiliarity of the public and some government officials with Amateur Radio, the Nigerian Amateur Radio Society undertook a few months ago to set up a special Amateur Radio exhibit and demonstration at the Nigerian Army Week Exhibition. (Please see accompanying photos.) A state of emergency in Nigeria has made it necessary for the government to stop licensing new amateurs for a short period, but the society hasn't let that stop them from pointing out to the Nigerian public that Amateur Radio plays an important role in Nigeria's technical and industrial development. (Indeed, one is frequently surprised to find that it is most often the smaller societies of developing countries that are the quickest to perceive that Amateur Radio is the only hobby-like activity in the world which depends solely on multilateral international agreements for its very existence.)

NARS used 50 square yards of floor space to set up 5N2NAS/2 and the publications and training materials of the amateur societies of several other countries. Sixty contacts were made with 15 countries during the week of the exhibit, and the signs in the photos show clearly the pride taken by NARS in educating the general public and government officials. Many attendees expressed enthusiastic interest in Amateur Radio, and look forward to the day when they might pursue their licenses.

If you're interested in helping with Project Goodwill, it's not too late. Donations (tax-deductible) to the ARRL/IARU WARC Fund received at Headquarters before 31 December 1978 will be generously matched at the rate of 50 cents on the dollar by the Northern California DX Foundation. But even if you must wait until the New Year to help, there are an awful lot of new amateurs in the developing countries who will be grateful for your support.

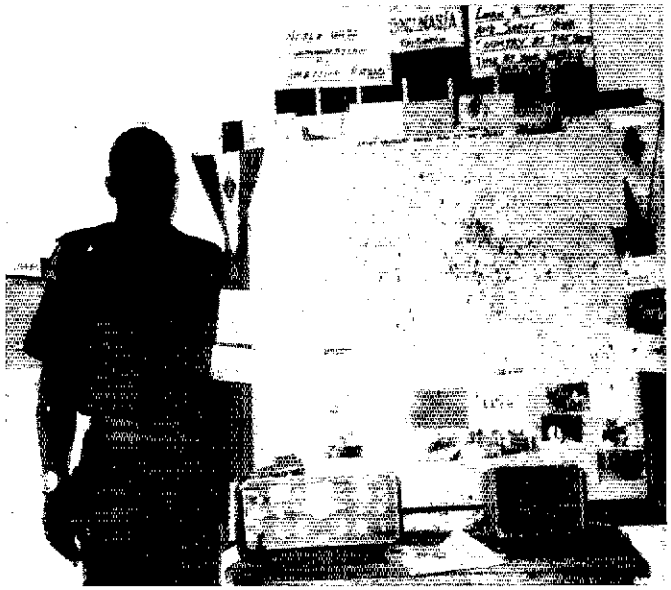
*International Services Officer, ARRL

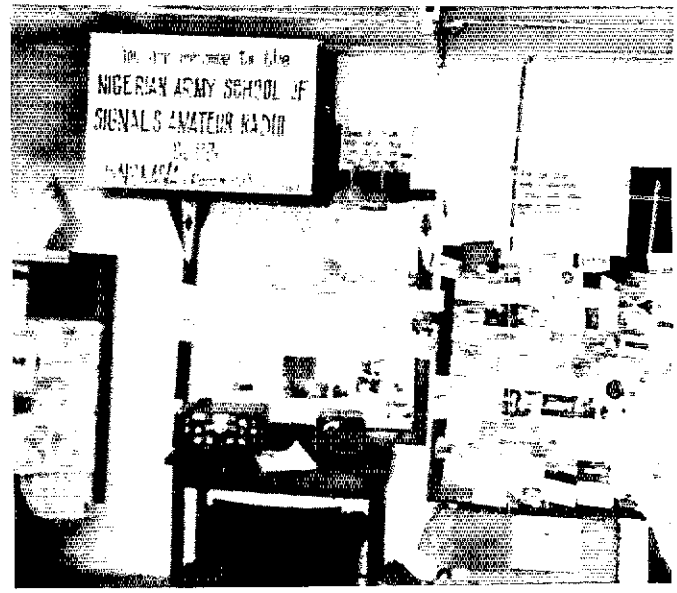
AMATEUR RADIO IN MONGOLIA

Funkamateur, the monthly journal of the Radioklub der DDR (German Democratic Republic) reports that while Amateur Radio got off to a slow start in Mongolia some years ago, today the Mongolian Peoples Republic boasts five licensed and active amateurs: JT1AG, JT1AI, JT1AS, JT1AN and JT1AT. Each has built his own hf transceiver, based on circuit designs provided by UW3DI. More transceivers are presently being built, and the Shortwave Section of the Mongolian National Youth Club (MNYC) has registered with the national authorities 34 club stations soon to be used by persons currently studying for their licenses in club-sponsored training programs.

According to *Radio* (the monthly journal of Soviet radio amateurs), one need only listen to the Russian-sponsored "CQ-Mir" contest to note the JT1 activity: JT1AT is active on 3.5- and 7-MHz cw and ssb, and JT1AN will soon show up on 3.5 MHz, too. Thanks to the MNYC, Amateur Radio in Mongolia is on the rise, with heavy emphasis being placed on the need for Mongolian amateurs to be construction-oriented, active, self-training, technical experts. QST

Sgt. Oyekunle Ajayi, IARU liaison officer of the Nigerian Amateur Radio Society, stands proudly beside the Amateur Radio exhibit sponsored by the NARS at Nigeria's recent Army Week Exhibition. Many inquiries were received from the public as a result of this display and demonstration, as Nigerians were introduced to an activity which results in great personal achievement as well as the enrichment of their country. *(5N2NAS photo)*





How's DX?

Conducted By Clarke Greene,* K1JX

Winter DX Wonderland

The long cold nights of December inspire many a northern ham to cuddle up to his rig, enjoying the DX of the season. The seasonal conditions responsible for the hostile December weather are also the cause of radio propagation unique to the year's end. The source of these mixed blessings is Sol, our sun. To understand how the seasons affect radio propagation, we should examine what causes the seasons.

The Earth's rotational axis (the imaginary line between the two poles about which the Earth rotates) is tilted with respect to the Earth's orbital plane about the sun. As the Earth revolves around the sun, the angle of the Earth's axis changes, but *only with respect to the sun*. This is shown in Fig. 1. Since solar radiation, like radio waves, travels in a straight line, much of the radiation arriving at the Earth does not fall *directly* upon the Earth's surface. Rather, it arrives at an angle. The angle at which this radiation hits the Earth depends upon the point on the Earth where the radiation is falling, and the angle that the Earth's axis is making with the sun.

In Fig. 2 the Earth is at a point where the Northern Hemisphere is enjoying (?) winter. The sun's rays are striking the Northern Hemisphere at a greater angle than they are striking the Southern Hemisphere. This is because the Northern Hemisphere is inclined away from the sun, while the Southern Hemisphere is inclined toward the sun. The intensity of the radiation on the slanted surface (the Northern Hemisphere) is less because the radiation is spread out over a larger area. The radiation *intensity* becomes smaller as the angle of arrival is increased. This phenomenon explains why it is warmer in the summer than it is in the winter, and why the seasons are reversed in the Southern Hemisphere from the Northern Hemisphere.

The tilt of the earth's axis also causes the seasonal variations in the number of hours of daylight. As the earth revolves around the sun, the number of hours of sunlight at any given point in the Northern Hemisphere becomes smaller during the winter. Since a greater area of the Northern Hemisphere is illuminated during the summer and the Earth's rotational velocity is constant, a point is in sunlight for a greater time period during the summer.

Benefits from solar radiation are not limited only to illuminating and warming the Earth's surface. Solar radiation also ionizes the various layers of the Earth's atmosphere. This ionization is what causes the DX chaser's closest ally, radio propagation. The various propagation mechanics are detailed in *The ARRL Antenna Book* and *The Radio Amateur's Handbook*, so we won't dwell on them here.

Now that we have tied together the relationship between the seasons and ionization, let's look at how all this affects DX possibilities during December. The time when Earth's axis is at its greatest angle to the sun is called the *solstice*. Every year, there are two solstices — one signals the first day of winter; one the first day of summer. The first day of winter, the winter solstice, is the shortest day of the year. No, the day isn't less than 24 hours long; the number of hours of sunlight is the least it will be all year. The winter solstice usually falls on December 21 or 22, in the Northern Hemisphere.

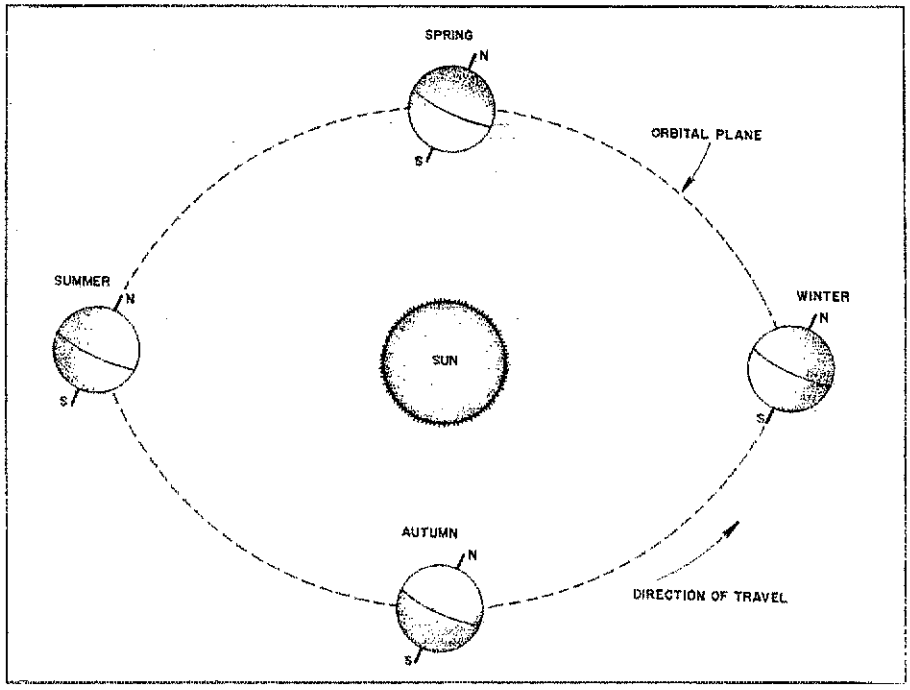
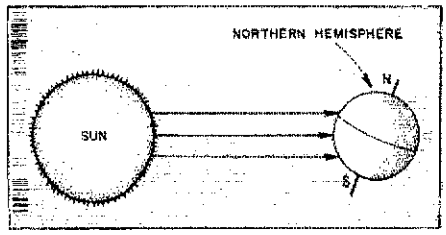


Fig. 1 — The Earth's position relative to the sun for the various seasons.

The shortest day means the longest night. At night, when solar radiation cannot ionize the atmosphere over the areas of darkness, the maximum usable frequency falls to a point where long-distance communication on the 40-, 80- and even 160-meter bands is likely. The more time the atmosphere has to dissipate its ionization, the lower the muf, and the better the lowband DX opening. This is reflected in the propagation charts elsewhere in this column.

Do the longer nights mean that 20 meters and above will be useless? Hardly. During the daylight hours, the muf might not rise as high as it would if the atmosphere were exposed to the longer hours of more direct radiation, but with the high solar activity levels we are now enjoying, 20, 15, and 10 meters will bring their share of DX openings during the day.

Fig. 2 — Solar radiation strikes the earth at differing angles for different latitudes. This variation in exposure angle causes the seasonal propagation trends.



Long Path Can Facilitate DX

While the Northern Hemisphere is experiencing the minimum sunlight of winter, the Southern Hemisphere is enjoying the maximum sunlight of the summer. The ionization in the Southern Hemisphere is at its greatest. How does that help the Northern Hemisphere-bound DXer? Simple: While the path from one particular location to another may not be open over the traditional "short path," the path over the more heavily ionized "long path" may well be open for communication. Even though the path length may be greater, with resultant lower signal strengths, any opening is better than no opening!

What the old-timer (in experience, anyway) realizes is that it is often far easier to contact a station via the "long path" than over the conventional "short path." The reasons are many,

*c/o ARRL, 225 Main St., Newington, CT 06111

so let's examine each one individually:

1) Less competition. Let's assume that you are a KA3 trying to work your first Australian station. Normally, if you have a beam, you point your antenna almost due *west*. Unfortunately for you, a few other fellows want to work "your" VK. Some of the competition in the pileup may be other third-call-area types, but chances are stations from all across the continent who are one, two, or even three skip zones closer to Australia are in there, too. Results: You end up hating W5s. Unless you have a real rock-crushing signal, that VK may be your day's source of frustration.

Now, consider the long-path opening later that afternoon. Now you point your beam due *east*. What is between you and Australia? An all-water path and Africa. Does the competition sound a little fairer? Now the W5s hate *you*. The Africans you might find while looking in that direction do compensate for the frustrating morning, at least a little.

2) Avoiding the auroral zone. Every time your beam is pointed north, your signal travels through the auroral zone. Unfortunately, the journey is not a pleasant one. An encounter with the aurora borealis leaves a signal weak and gasping. The overly dense ionization up north not only attenuates your signal, but distorts it as well, greatly reducing intelligibility. Both of these effects make it desirable to avoid the auroral zone like the plague, if you can. Since the long-path opening often occurs over a path directly opposite that of the short path, many times it is possible to avoid the auroral zone entirely during a long-path opening.

3) Convenience. Not everyone wishes to rise with the roosters and set with the owls. A late afternoon opening to southeast Asia may allow you a shot at the goodies you can't fit into your morning schedule. More importantly, a long-path opening might conform to the DX operator's schedule, putting him on the air when the band is open to you.

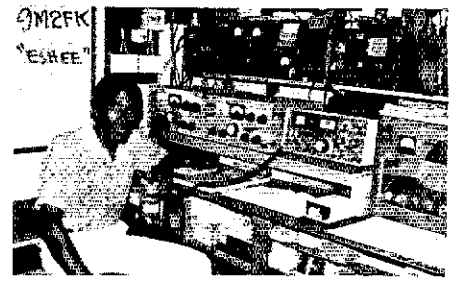
As a prime example of what is possible, early one September morning W1XK awakened and examined the 10-meter band. Stan didn't hear much coming through until he tuned across the band and heard a station from Hong Kong. The two promptly worked each other, with reasonable signals. By the way, the antenna at W1XK was a dipole!

THE DX PORTFOLIO

QSL Managers are a blessing to many a DX station. For little thanks and much aggravation, managers reply with QSLs that otherwise might take months or years to arrive. The following altruistic amateurs have graciously volunteered to become QSL managers. Give them all the help you can.

AB1U, WA1TZY, WA1TZX, N2HA, WB4HOI, W6UQF, WB7FAT, WD9CIV and SM5AAO.

Special Prefixes occasionally pop up on the bands. Sometimes they're only on the air for short commemorative periods; other times they become permanent. Some new prefixes are appearing from Yugoslavia. QSL information for these are as follows: YU9CDL via YU2CBM, YU9CBR via YU2CBM, YT9MI via YU2CBM, YU9RJT via YU2RJT, YU9RXK via YU2RXK, YU9RKY via YU2RKY, YU9RMG via YU2RMG, YU9RTW via YU2RTW, YU9ROJ via YU2ROJ.



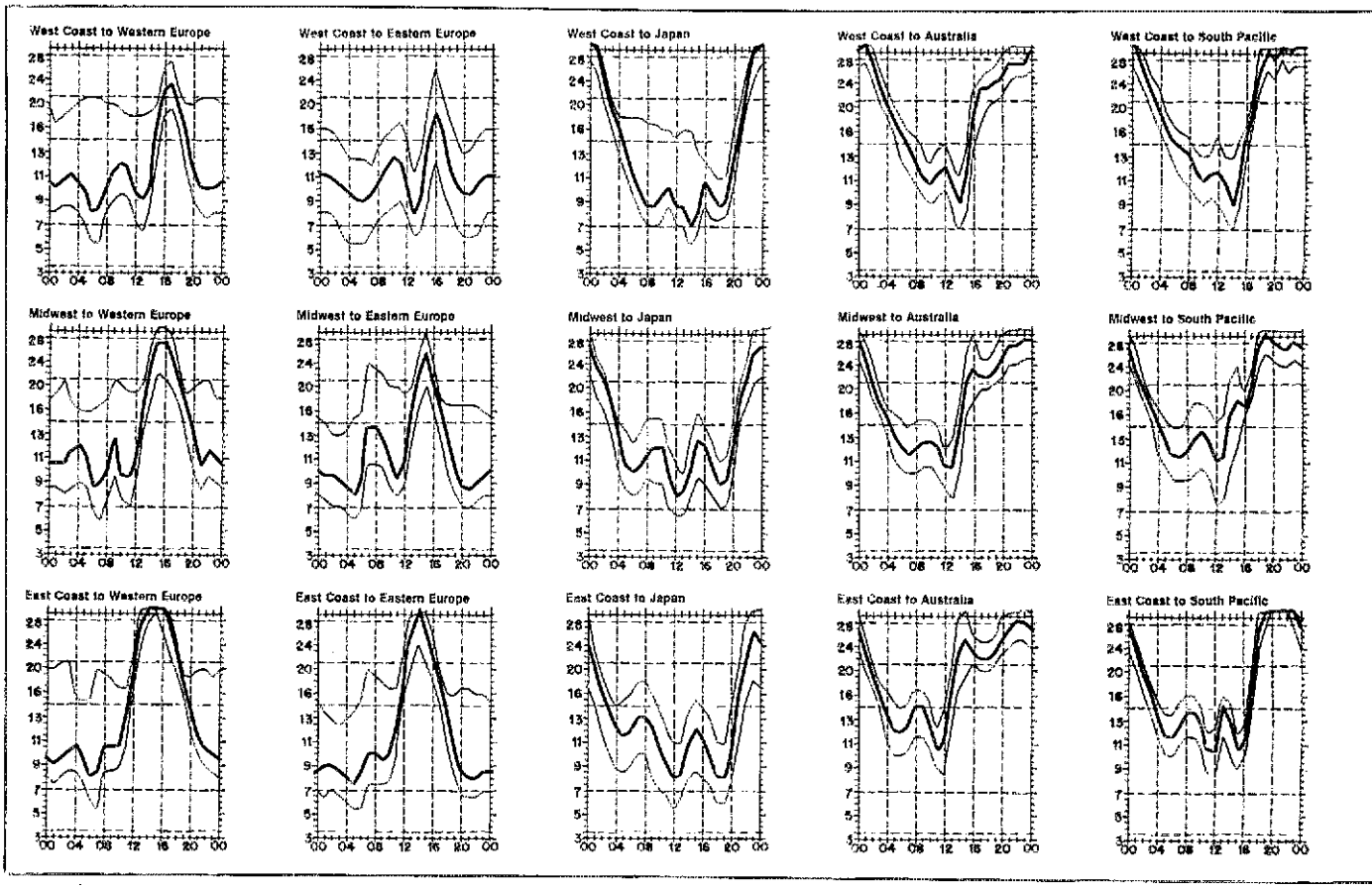
A rare catch on any band, 9M2FK can be found almost daily holding forth between 14.040 and 14.145 MHz. Eshee looks for USA stations from 1130 to 1230 UTC. *(photo courtesy W3VW)*

Club station YT9MI will be active in almost all International DX contests. (YU2RVS)

Some countries issue call signs by geographical distribution. Brazil is one of these countries. See Table 1 for the breakdown in Brazil along with the area abbreviation.

Licensing classes aren't restricted only to large countries of the world. The Amateur Radio Club of Tonga, A35FI (for Friendly Islands), has been running a class, and expects a whole new flock of hams on the band after they sit for their tests in November. There are four licensed native Tongans on the air now: A35TV, A35SM, A35EK and A35PT. The club will be acting as QSL Bureau. For Tongan contacts the address is Amateur Radio Club of Tonga, Box 220, Nuku Alofa, Kingdom of Tonga, South Pacific.

According to A35DE, the club station is active from 0700-0900 UTC Thursdays on the low end of 7-MHz cw.

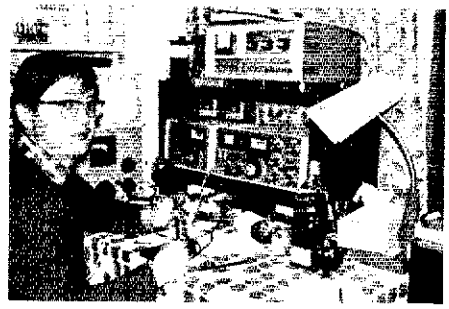


When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be 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

Table 1
Call-Sign Prefixes for Brazil

Prefix	*Area*	*Abbreviation*
PP1	Espirito Santo	(ES)
PP2	Goias	(GO)
PP5	Santa Catarina	(SC)
PP6	Sergipe	(SE)
PP7	Alagoas	(AL)
PP8	Amazonas	(AM)
PR7	Paraiba	(PB)
PR8	Maranhao	(MA)
PS7	Rio Grande do Norte	(RN)
PS8	Piaur	(PI)
PT2	Brasilia	(DF)
PT7	Ceara	(CE)
PT8	Acre	(AC)
PU8	Amapa	(AP)
PV8	Roralma	(RR)
PW8	Rondonia	(RO)
PY1	Rio de Janeiro	(RJ)
PY2	Sao Paulo	(SP)
PY3	Rio Grande do Sul	(RS)
PY4	Minas Gerais	(MG)
PY5	Parana	(PR)
PY6	Bahia	(BA)
PY7	Pernambuco	(PE)
PY8	Para	(PA)
PY9	Mato Grosso	(MT)
PYϕ	Ilhas	(—)

Green stamps are often a DXer's way of saying thanks to a foreign station for the promise of a QSL. The exchange of currency may cause problems for the DX station, though. It seems many governments frown on the importation of foreign currency. An advisory from 5Z4QS relates that the government of Kenya is but one which is sensitive to the situation. Eager QSLers should be sure before sending currency, lest they get their foreign friends into difficulty. (NINA)



An active DXer, JA1BUI was a recent visitor to ARRL hq. while visiting the United States.

Stan Davies, VS6FE, in the act of conducting a Southeast Asia Net session. Lots of rare Asian goodies can be found on SEANET, which meets on 14.320 MHz at 1200 UTC daily. (Thanks W3VT).

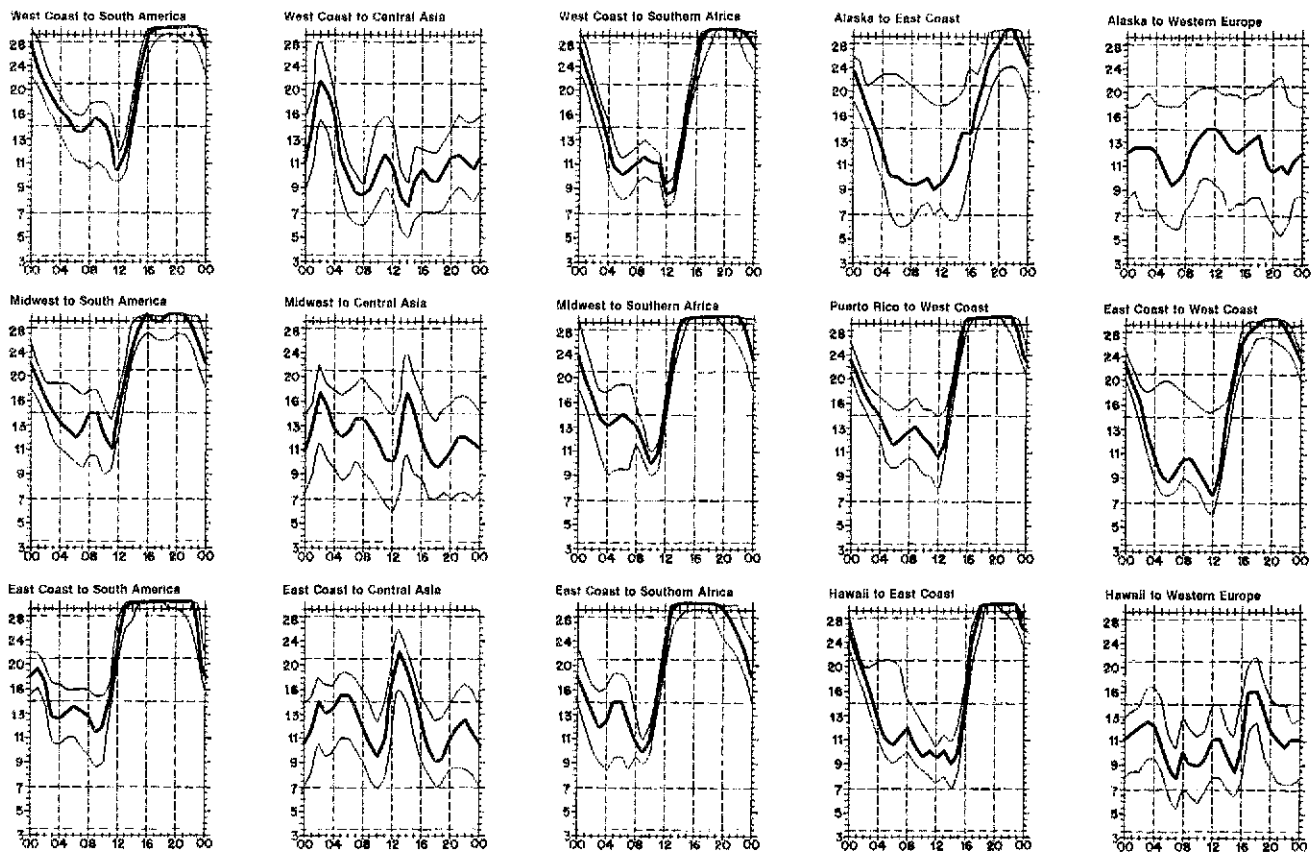
Shortwave listening is a step in the licensing structure of many countries. SWLs have to demonstrate receiving ability and technical competence before even applying for a ham ticket. The RSGB even sponsors operating events for these potential hams (see Table 2).

"A series of set listening periods (SLPs) for the shortwave listener has been arranged for 1979. They will be of two-hours' duration and will be held during the first full weekend of every month in 1979. All the six amateur bands (10 m-160 m) will be used; modes of reception will be phone and cw alternately. SWLs are asked to log every station heard in the set two-hour period.

"The objective of the exercise is to test propagation at a given time and to compare reception reports

Table 2
Set Listening Periods 1979

Month	*Date*	*Time*	*Band*	*Mode*
January	7	1500-1700	21 MHz	Phone
February	4	0700-0900	1.8 MHz	CW
March	3/4	2300-0100	3.6/3.8	Phone
April	7	1600-1800	28 MHz	CW
May	6	0700-0900	14 MHz	Phone
June	3	0500-0700	7 MHz	CW
July	7	0500-0700	7 MHz	Phone
August	4	1000-1200	21 MHz	CW
September	2	1300-1500	28 MHz	Phone
October	7	0600-0800	3.5 MHz	CW
November	3	0600-0800	1.8 MHz	Phone
December	1	1800-2000	14 MHz	CW



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, and September 1977 *QST*, page 35, for a complete explanation. The horizontal axis shows Universal Coordinated Time (UTC); the vertical axis, frequency in MHz. Asterisk *indicates long-path circuits. Data are provided* by the Institute for Telecommunication Sciences, Boulder, CO. These predictions for December 15 to January 15, 1978, assume a sunspot number of 116, which corresponds to a 2800-MHz solar flux of 160.

throughout the world. The SLPs are being published in all the world's DX magazines and news sheets. All logs will be summarized once a month and SWLs wishing to obtain a copy of the summary must send an s.a.e. or one IRC if living outside Great Britain. Logs must show station heard, station being worked/called, time (UTC) and RST. All reports to be sent via the R.S.G.B., c/o Mr. D. A. Whitaker, Hillcourt, 57 Green Lane, Harrogate, North Yorkshire HG2 9LN, England, as soon as possible after each SLP. Brief details of each SWL's equipment should be shown plus comments on band conditions during the listening period. Although these SLPs are in no way a contest, it is hoped to award a small prize at the year end to the SWL submitting the best selection of SLP entries."

QSL Corner

Administered By R. L. White, W1CW

It is that time of year again and even though it will be a few days early in most cases, the best of Season's Greetings. May Santa fill your stocking with all kinds of good QSLs.

DXers who do a lot of operating, as opposed to DXers who are the "stalker" type who seldom transmit unless it is to work something new, quite often find they are receiving a lot of SWL reports in their cards coming from the bureau. Replying to those SWL reports can get just as expensive as replying to QSLs for contacts that were made. Replying to the SWL reports can be done via the Overseas QSL Service. Just put your replies with the cards going to the country in which the SWL lives and they will be sent to the bureau in that country. This would apply only to SWL cards going outside the U.S., of course. The foreign SWL is quite often working toward his amateur license and, in some countries, SWL confirmations are part of the license requirement. Why not give the SWL a break and reply to those SWL reports? Using the Overseas QSL Service makes it easy.

Speaking of the Overseas QSL Service, in the September "QSL Corner" there was information on the requirements for making use of the service. All the things were there but one: Where you should send the cards when making use of the Overseas QSL Service! One sometimes has trouble seeing the trees because of the forest. Cards being sent to the Overseas QSL Service should go to Overseas QSL Service, 225 Main St., Newington, CT 06111.

For those who may have doubts about Santa filling their stocking with QSLs, here is some QTH and QSL Manager info that just might be what you need. If it helps, great. No guarantee though; they are what was sent in.

KC6JJ, Box 358, Yap, WCI 96943
OD5BC, P. O. Box 1746, Beirut, Lebanon
VK1AW, Embassy of Uruguay, Canberra, Australia
W4ORX/SU, Box 26410, Tel Aviv, Israel
WA2WYR/CX, American Embassy Uruguay, APO NY, NY 09879
ZE1FS, Box 229, Borrowdale, Salisbury, Rhodesia
ZL2BJU/K, Box 10116, Wellington, New Zealand
5B4PA, Box 1059, Nicosia, Cyprus
9I2BO, Box 208, Kitwe, Zambia

A9XCS (K4PG)	VP2DD (W2OB)
AP2TN (W8QFR)	VP2EKK (WA3HUP)
C31KY (DA1OJ)	VP2ER (WD4BRE)
C31PH (F6BKI)	VP2KJ (WB2TSL)
CN8CX (WB0MSZ)	VP2VEN (K5GOE)
E39EY (WA6QDR)	VP8PU (WA4JQS)
EI2SM (WA2DHF)	VP8QH (G3NKO)
EP2LI (WA4PYF)	VR3AK (KH6AHZ)
EP2SI (JF1KHK)	VR3AN (K6ESD)
FB8XS (F5VU)	VR3AR (W7OK)
FB8YE (F6DZL)	WB4LBJ/DU6 (K7LAY)
FR0DYV (F6CVY)	WD0EHG/HC1 (WB0RIJ)
HH2SD (VE3CVZ)	XP1AB (July 20-29, '77 WA2UUK)
HK0QA (K4TXJ)	YB0PG (WA2DWE)
KL6BZ (KH6JHE)	YS1RVF (WA0IYJ)
KZ5RO (WA6IIZ)	ZB2CS (W9JVF)
LZ2JF (WA4WTG)	ZS3LK (DK3GI)
OD5EL (W5OG)	ZS4GH (KB4FW)
PZ2AC (WB4RRK)	ZS6ASO (KB4FW)
S79DF (ON6FN)	4D88UT (JA1UT)
S79MC (N4NW)	4S7EA (WB9QQU)
SJ9WL (SM0BMG)	4Z30GH (K5JBC)
T12BEV (W4MYA)	5B4DI (K4BF)
TR8AC (WB4RZN)	5N2AIF (DJ9VT)
TR8GDC (WB4RZN)	5U7AG (K1VSK)
TR8NWL (WB4RZN)	5V7AH (DL1HH)
VK9NK (W6ELDN)	5W1BN (KH6JEB)
VP1DX (WB4INC)	

6O1FG (I2MQP) 9K2EZ (WA1ZGR)
8P6JV (W9VA) 9K2FX (W4KA)
9G1MB (WA4OOM) 9L1CA (WA3NCP)

To the following contributors, JA1VOK, K3CL, K7ICW, KB4FW, NØRF, WB2ENW, WA2UUK, WA3EEE, W5OG, W6UQF, W7XA, W9VA, WBØRJJ and 9K2EZ, a large helping of thanks. May you never have to give more than a one by one.

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 Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.

☐ Fourth Call Area: All single-letter prefixes — National Capitol DX Assn., Box DX, Boyce, VA 22620.

☐ Fourth Call Area: All two-letter prefixes — Sterling Park Amateur Radio Club, P. O. Box 599, Sterling Park, VA 22170.

☐ Fifth Call Area: all calls* — ARRL W5 QSL Bureau, Box 1690, Sherman, TX 75090.

☐ Sixth Call Area: all calls* — ARRL Sixth (6th) District DX QSL Bureau, P. O. Box 1460, Sun Valley, CA 91352.

☐ Seventh Call Area: all calls — Willamette Valley DX Club, Inc., P. O. Box 555, Portland, OR 97207.

☐ Eighth Call Area: all calls — Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.

☐ Ninth Call Area: all calls — Northern Illinois DX Assn., Box 519, Elmhurst, IL 60126.

☐ Zero Call Area: all calls* — WØ QSL Bureau, Ak-Sar-Ben Radio Club, P. O. Box 291, Omaha, NE 68101.

☐ Puerto Rico: all calls* — Radio Club de Puerto Rico, P. O. Box 1061, San Juan, PR 00902.

☐ U.S. Virgin Islands: all calls — Graciano Berlardo, KV4CF, P. O. Box 572, Christiansted, St. Croix, VI 00820.

☐ Canal Zone: all calls* — KZ5 QSL Bureau, Box 407, Balboa, CZ.

☐ Hawaiian Islands: all calls* — John H. Oka, KH6DQ, P. O. Box 101, Aiea, Oahu, HI 96701.

☐ Alaska: all calls — Alaska QSL Bureau, 4304 Garfield St., Anchorage, AK 99503.

☐ SWL — Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

☐ QSL Cards for Canada (VE and VO) may be sent to: CRRL Central QSL Bureau, P. O. Box 663, Halifax, NS B3J 2T3. Or, QSL cards may be sent to the individual bureaus.

☐ VE1* — L. J. Fader, VE1FQ, P. O. Box 663, Halifax, NS B3J 2T3.

☐ VE2 — A. G. Daemen, VE2IL, 2960 Douglas Ave., Montreal, Quebec H3R 2E3.

☐ VE3 — The Ontario Trilliums, P. O. Box 157, Downsview, Ont. M3M 3A3.

☐ VE4* — W. A. Stunden, VE4BJ, 578 Oxford St., Winnipeg, Man. R3M 3J9.

☐ VE5* — A. Lloyd Jones, VE5JI, 2328 Grant Rd., Regina, Sask. S4S 5E3.

☐ VE6* — G. D. Holeton, VE6AGV, 4003 1st St., N.W., Calgary, Alta. T2K 0X2.

☐ VE7* — Howard Martin, VE7AFY, No. 45-9960 Wilson Road, Ruskin, BC V0M 1R0.

☐ VE8* — Al Sturko, VE8NS, P. O. Box 72, Fort Smith, NWT X0E 0P0.

☐ VO1, VO2 — CRRL VO QSL Bureau, P. O. Box 6, St. John's, Nfld. A1C 5H5.

*These bureaus sell envelopes or postage credits. Send an s.a.s.e. to the bureau for further information.

QSL bureaus for other areas can be found in December 1975 *QST*, page 64.

Strays

QST congratulates . . .

☐ John Ramsey, newly appointed chief engineer of radio station WWUH, who earned his Novice and Technician licenses just before passing his Second and First Class Radiotelephone tests.

☐ Nancy L. Buchanan, K4OVS, recently named deputy commissioner of the South Carolina Commission for the Blind. She and husband Bob, WB4UTH, are blind.

☐ two amateurs among the 40 high school seniors recently named winners in the 37th annual Science Talent Search. They attended a five-day Science Talent Institute in Washington, DC, and will share the $67,500 Westinghouse Science Scholarships and Awards. The two are Philip G. King, WB2IYZ, of Rumson, NJ; and William H. Collins, WB6OTG, of Canoga Park, CA.

I would like to get in touch with . . .

☐ anyone who has successfully modified a DenTron MI A-2500 for 6-meter operation. Howard M. Sherer, WB2RBG/3, 1905 Stirling Drive, Lansdale, PA 19446.

NEVADA TRIPLE 7 CERTIFICATE

☐ All contacts for the Nevada Triple 7 Certificate must be with 10-X Net members on 10 meters after January 1, 1978. Of the 21 QSOs required, seven must be with Nevada stations and one with each of the other 7-land states, plus seven DX stations with a seven in their calls. Send $1 plus 28 cents postage to N7SD. All inquiries with an s.a.s.e. are answered.

NATURAL POWER NETS

☐ "Windheads Net" meets on 3898 kHz on Monday and Wednesday evenings at 2130 Mountain time. Much practical information is exchanged in the field of wind power. Check in with WD5GQN, net control. — *W6AMO*

"Alternate Sources of Energy Net" meets every Sunday at 1430 Eastern time on 14,344 kHz. Check in with W4VPD to exchange information on solar power. — *WA1OCK*

Phone patches for personnel aboard the Scripps Institution of Oceanography research vessel *Alpha Helix* were provided by George T. Mitchell, K6ZE, K6ZE/PY8, VP1GTM. As radio electronics officer, he has participated in far-ranging expeditions to the Philippines, Borneo, the Amazon and the Caribbean.

FM Repeater News

Conducted By Lew McCoy,* W1ICP/WR1ABH

A Simple Matter of Courtesy . . .

Those of us who regularly monitor a local repeater can usually tell when the FCC examiners have been in town: At about 10 A.M. when the testing is over, the repeater will start buzzing with activity. But the calls will be unfamiliar to those of us who know the old gang.

In our area we get a deluge of interim ATs[1] and our association is always ready to welcome the new Technicians, Generals and so on with open arms. However, we also know that for the next few weeks we will spend a great amount of time listening to operating habits that are less than what we'd really like them to be.

Obviously the reader will understand that even some of the old-timers have operating habits that are not up to snuff. And there is really no excuse, given their years of experience. But often the newcomer just needs someone to take him under his wing and explain a few things. After all, it's better to help these newcomers before they take a trip out of town and try some of their procedures on other machines or before someone calls them down publicly. Here are some common-sense items to remember.

1) Listen before you speak. With the availability of inexpensive crystal rigs many Novices go ahead with the purchase of a 2-meter rig and anxiously await the moment when they will become interim ATs. But as soon as you get that ticket, hold off on the urge to key the mic and start talking; first *listen* to what is going on. Is the repeater being used by two hams to discuss a short private matter? Though nothing on the air can be completely private, sometimes two hams need to chat about a matter and not be disturbed for a few minutes. If this is the case, they probably will not want you dropping in just to say hello. Wait until you get the drift of the conversation. If it seems that they are discussing a personal matter, wait until they are through before joining the conversation. When it is obvious that they have finished their discussion, feel free to introduce yourself properly. Make sure you don't key down during an autopatch or a net. If you are a Novice now and have a 2-meter rig, use your time to monitor your favorite repeater so that you will be ready to get on when you receive your upgraded ticket.

2) Don't yell "break," unless you have an *important* message to relay. Many associations frown on the use of break to enter a conversation. Besides, it is much easier to break *with your call.* That way, the hams on frequency can let you into the conversation with ease. Otherwise the conversation will probably stop and there will be a period of confused silence. Then, both stations will double, and finally someone will have to ask for the call sign of the breaking station. It's not only a matter of courtesy to give your call; it's a matter of law.

3) Don't kerchunk the machine (key the mic and bring the repeater on the air without identification). If you will simply listen for a few minutes the repeater will either identify itself in code or voice or someone will come on and probably call someone else. If the urge is just too strong to bear, key your mic and *give your call.* It won't break your jaw and besides someone might respond and chat with you for a while!

4) Know the limits of the repeater. Don't try to key the machine with your handheld if you know you are on the fringe. All you'll do is kerchunk the machine and your audio will probably not come through. It is irritating to listen to scratchy, in-and-out signals. Always try to hit the machine "solid" if you can. Remember, 2-meter fm is line of sight for the most part. Know the location of the repeater. If you are behind a mountain it should be obvious that you are not going to get into the machine full quieting. Also, do not try to bring up the autopatch if you are marginal; you might bring up the dial tone and not be able to shut the patch off. So always check to see if you are patch quality, simply by asking someone.

5) Don't abuse the autopatch. Remember, it is against the law to make business calls via amateur repeaters. In your excitement to call someone from your car, don't be guilty of ordering pizzas or making calls to your office to check on your calls. Also remember to use proper identification procedures *before* you bring up the dial tone. Don't punch up the patch and then take it down just to see if your pad works. Remember to observe all rules concerning third-party traffic.

6) Learn the proper fm jargon. Many hams nowadays come from the ranks of 11 meters. Some who were avid CBers tend to carry over the jargon they learned. To many old-time hams this kind of jargon is not acceptable. Some hams will not chat with those who insist on using CB jargon on a repeater.

7) Don't be a freeloader. Most associations will let you use the repeater for a while until you decide which group you want to join. If the repeater is entirely open there is no problem. But if the association operates a closed repeater, don't continue to use it without making your intentions known. The repeater cost quite a lot, aside from the monthly telephone charges if it has autopatch. So don't expect to freeload on the machine and attempt to get by with using the autopatch. After all, hams form associations to foot the cost of the repeater but also to authorize members to use the machine as per FCC regulation 97.85. So pay your dues. It is a matter of courtesy.

There are probably many more suggestions that we all need to be reminded of. But if all of us, old-timers and newcomers, will remember the Radio Amateur's Creed, we will find that it reminds us that amateurs are courteous. And after all, that is what makes a good impression on many who are looking to join the ranks of the best hobby of them all. — *Ron Johnson, WB4GWA*

[1]"Interim AT" is the designator that allows those who upgrade in the area served by the FCC's Atlanta office to operate immediately with their new privileges. Each district office has its own two-letter designator.

*c/o ARRL, 225 Main St., Newington, CT 06111

Coming Conventions

January 27-28
South Florida Section, Miami, FL

March 2-4
Southeastern Division, Orlando, FL

ARRL NATIONAL CONVENTIONS

July 20-22, 1979
Baton Rouge, LA

July 25-27, 1980
Seattle, WA

March 13-15, 1981
Orlando, FL

Hamfest Calendar

Minnesota: The winter hamfest of PICONET and the Handi-Ham System is December 2 at the Eagles Club in Fairbault. Registration at 9, dinner at noon. Program, equipment sale and prizes.

Strays

STATEN ISLAND AWARD

☐ The Staten Island Award is earned by contacting 10 stations on Staten Island, NY. Applicants should submit QSL cards with return postage for the cards to G. W. Ryan, WA2ZPG, 14 Seacrest Ave., Staten Island, NY 10312. Enclose $1 to cover costs.

I would like to get in touch with . . .

☐ amateurs from India living in the U.S. N. Vijayan, M.D., 1332 Notre Dame Dr., Davis, CA 95616.

☐ section newsletter editor for Tennessee cw nets would like to meet other lonely editors for idea exchange. Morris Jones, AA4KB, 1044 E. Walthal Cir., Memphis, TN 38111.

☐ anyone with information on the G4ZU "birdcage" antenna. Stephen F. Brown, N6OE, 2501 Brigden Rd., Pasadena, CA 91104.

☐ other amateurs using heart pacemakers. Joseph Schwartz, K2VGV, 43-34 Union St., Flushing, NY 11355.

Silent Keys

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

W1APL, Antonio J. Roncalli, Springfield, MA
W1DHL, Raymond L. Walker, Watertown, MA
W1DJN, John A. Hickey, Waltham, MA
W1HJJ, Clayton F. Sennett, Greenwich, CT
W1KKM, John J. Grzegorowicz, Hartland, VT
K1QKY, George H. Sheldon, Greenfield, MA
W1TZI, Charles C. Clark, Shrewsbury, MA
WA1ZFI, Kermit A. Danforth, Dover, NH
W2AB, Lawrence L. Lekashman, Oyster Bay Cove, NY
Ex-2BPG, Harry A. Bremer, Newark, NJ
K2BZU, Edward F. Vogel, Whippany, NJ
K2DZV, Frederick A. Tompkins, Rochester, NY
WB2FNL, Elmer J. Hollander, Brightwaters, NY
WA2GFE, Stanley F. Clark, Staten Island, NY
W2GGN, Charles A. Esto, Glendale, NY
W2GSW, Benjamin C. Hiatt, Tuckerton, NJ
W2IL, Telfer C. Cooper, Haddonfield, NJ
WB2INM, Richard W. Henkel, Secaucus, NJ
W2IPH/WA6AVM, Clem J. Quinton Jr., Sonora, CA
W2MHX, George A. Samuelsen, Denville, NJ
W2MUW, Robert A. Sidur, Chatham, NJ
WA2OME, Douglas M. Mathes, Jamaica, NY
W2PTL, John E. Chorlian, Port Washington, NY
W2PXA, Donald A. Muir, Syracuse, NY
K2QIN, Edward O. Nestor, Princeton, NJ
Ex-K2QWB, Robert C. Lank, Hudson, NY
K2QWU, James B. Hall, Hancock, NY
W2TPF, George O. Downs, Bridgeton, NJ
K3ACB, Paul T. Criswell, North Apollo, PA
K3AN, Karl G. Niskanen, Latrobe, PA
W3CBN, J. Brymer Roberts, Bangor, PA
W3GRX, Garland L. Moore, Cheswick, PA
W3LFQ, John M. Staude, Pittsburgh, PA
W3RDT, Donald McClure, Bradford, PA
W3RXW, Ray L. Ferber, Sr., Slatington, PA
W4AAB, Frances Propst, Fort Myers, FL
W4ADJ, Charles C. Bell, Townley, AL
WB4AKL, James G. Whitten, Thomaston, GA
W4EYY, Capt. Hugh C. Griffis, Jr., East Point, GA
WA4FOQ, LeRoy N. Rogers, Belleview, FL
W4GEN, Charles E. McIntosh, Cunningham, TN
W4GJ, Walter E. Kinney, Miami, FL
K4HBW, Roy S. Howell, Talladega, AL
WA4JJB, Johnny B. Turner, Forest Park, GA
WD4LXE, Robert W. Stockwell, Mt. Juliet, TN
*W4NXY, Charles D. Garoutte, Greenville, NC
K4PMY, Henry F. Buchanan, Louisville, KY
WB4RHL, John W. Fargis, Reidsville, NC
W4RKT, Robert J. Billingsley, Gadsden, AL
W4TDK, Naomi Spence, St. Petersburg, FL
K4ZHA, George W. Cole, Roanoke, VA
W4ZOI, Sylvia I. Brigman, Kannapolis, NC
WD5DDF, Angela R. Blair, Plano, TX
WB5EZA, Milan R. Sisk, Houston, TX
W5GZN, William N. Terrell, Tulsa, OK
K5HAP, John A. McCullough, Okmulgee, OK
W5IFA, John R. Burns, Oklahoma City, OK
WA5JFK, George R. Matland, McAllen, TX
W6BJ, F. Dean Burnett, San Diego, CA
W6BNF/ex-W7NDG, Acy N. Fall, Los Osos, CA
W6BQ, Harry M. Kiyomura, Gardena, CA
W6DVG, Albert A. Duggar, Livermore, CA
W6ERK, George W. Mesher, San Francisco, CA
WB6FNG, Bern S. Fuller, Carmichael, CA
K6GGU, Wilfred L. Lagomarsino, Jackson, CA
WA6HAA, Henry J. Halladay, Fresno, CA
WB6IWI, Willard J. Stallworth, Seaside, CA
WB6JRB, Lynn D. Knapp, San Diego, CA
K6KCO, James A. Lighthipe, Long Beach, CA
WB6KHT, Matthew J. Lotysh, Dixon, CA
WB6KSV, Robert F. Edwards, Gustine, CA
W6LYX, Don Stanton, Inyokern, CA
WB6NSJ, Ray Biederman, Burbank, CA
W6NUZ, William A. Ware, Jr, Acton, CA
WB6ORN, Marvin S. Bassett, Walnut Creek, CA
W6PEV, Richard B. Ferguson, Monterey, CA
W6RCN, Harold Greyerbiehl, Alhambra, CA
WA6SEA, George R. Murphy, Shingletowne, CA
WA6TXL, Robert E. Fox, La Mesa, CA
W6WKO, Ralph A. Gowling, Los Angeles, CA
WB7BOZ, Donn D. Shankland, Lilliwaup, WA
W7CHX, George L. Machin, Seattle, WA
W7DBZ, George R. Johnson, Medford, OR
W7EXA, Lucille M. Spargo, Apache Jct., AZ
W7JAJ/ex-W3GUS, F. Parker Burkart, Jr., Sun City, AZ
W7LIO, Louis W. Placek, Seattle, WA
W7LLH, Victor Drahble, Ogden, VT
WA7UPR, Evelyn V. Fischer, Sun City, AZ
WA8DKW, Robert L. Brown, Port Huron, MI
K8QYG, George K. Folk, Martinsburg, WV
W9ADK, Harley W. Pasewald, Reeseville, WI
W9AOW, Mahlon J. "Scotty" Hoard, Spooner, WI
W9CDC, Eugene W. Capelle, Adell, WI
Ex-W9DN, Carl J. Meyers, Elgin, IL
W9EKZ, Ingvald "Bud" Johnson, Edgerton, WI
W9FVX, Theodore W. Dresen, Madison, WI
K9GWQ, Roy W. Kohlhaas, Palatine, IL
K9KFM, Olen Coulter, Jr., Hobart, IN
W9SOX, Troy S. Burdick, Watseka, IL
W9VUM, Samuel J. Wise, Skokie, IL
WD0BKM, Priscilla A. Parks, Osage, IA
K0CPW, T. Kenneth Norrie, Rochester, MN
K0DDD, Lowell D. Schuler, Elkhart, IA
K0HNA, Marion L. Hughes, Shambaugh, IA
W0JHV, Arthur E. Schuck, Minneapolis, MN
*WB0KWL, Junior R. Renne, Piedmont, SD
WB0LOO, Clara M. Carothers, Batavia, IA
W0MXI, Donald E. Rose, Wentzville, MO
W0NSB, George E. Berg, Lawrence, KS
W0PSR, Elmer D. Underwood, Alamosa, CO
W0WAM, Forrest S. Sailors, Raytown, MO
VE3AA, William G. Crumb, Iroquois Falls, ON
VE3AHT, Leonard S. Whalley, Welland, ON
VE3ARJ, Ray Dagenais, Ottawa, ON
VE3AXK, Norman Smith, Kingston, ON
VE3AXR, C. E. Dunham, Cardiff, ON
VE3FBL, William W. Wylie, Willowdale, ON
VE3JQR, Raymond Seabrook, Stittsville, ON
VE3KHR, William H. Robinson, Ottawa, ON
VE3OD, William F. Sturgess, Georgetown, ON
VE7BLV, John F. Lenaghan, Victoria, BC
VE7DDM, Eric Kwong Lun Joe, Victoria, BC
GM5PV, Theodore Sagar, Stirling, Scotland
HP6SM, Manuel Spiegel, Santiago, Panama
TG7BY, Antonio M. Briskey, Izabal, Guatemala

*Life Member

Strays

JUST CALL GERITOL

How about a shot of Geritol (the Geritol Net, that is)? If you've got your Extra, why not zero in on the net, which meets on 3787 kHz each Friday and Saturday night, starting at 0100 UTC from October through April.

All award-interested participants will be assisted in acquiring ARRL's special endorsement for working all states using two-letter calls in the Extra Class portion of 75 meters (request a WAS application CD-217 from Hq.). The ARRL award is a prerequisite to obtaining the unique Geritol Net-sponsored "Unbelievable Operating Achievement Award." Sound like the challenge you're looking for? Send your request for further details, along with an s.a.s.e. (U.S. postage) to Harold Thornhill, K5BG, Box 4001, West Biloxi, MS 39531. — *W1CKK*

WHISTLE UP A CQ

The Oregon Emergency Net's annual picnic was in full swing at Columbia Gorge when an Amtrak passenger train came roaring out of the canyon. Sounds such as train whistles reverberate off the mountains and are heard over long distances. As the locomotive approached, the musical whistle started sending cw. A perfectly sent CQ and a couple of HIs were received before the train disappeared into the east.

Engineer Andy Holmes, W7GER, says he has already received several QSL cards as a result of the "transmission." — *K7BT*

160 SSB TEST?

Any amateurs interested in a 160-meter ssb contest, contact Bill Gosney, WB7BFK, Whidbey Island DX Club, 2665 N. 1250 East, Oak Harbor, WA 98277. Please state your ideas and enclose an s.a.s.e.

BERMUDA CONTEST WINNERS

The Radio Society of Bermuda announced the following overall winners in their 1978 Bermuda Amateur Radio Contest: K1DG — 91,905; GW3NWS — 235,480; VE3BMV — 78,515; VP9IB — 1,246,080. — *VP9CP*

MIDCONTINENT QRP

All QRP stations are invited to participate in the Midcontinent QRP Net at 1800 UTC (1 P.M. Eastern local time) Saturdays on 7060 kHz and at 0200 Thursdays (9 P.M. Wednesday EST) on 3560 kHz. A certificate is awarded for 20 check-ins.

POETIC JUSTICE

At Ed White High School in Jacksonville, FL, Linda M. Turner, WD4OCI, is a math teacher who assigns homework even on the last day of school. Last year she received her last-day assignments in various forms: One was in French, which she doesn't know; another was on microfilm. The most difficult to grade, however, came from Steve Nissen, WD4ITK. It was on a cassette tape, in flawless Morse code, at 30 wpm. Linda, who is not equally skilled in cw and math, needed several hours and two aspirin to grade the assignment. Steve received a 100.

I would like to get in touch with . . .

schools serving youngsters between the ages of 10 and 13 years, that have Amateur Radio stations, and junior high school teachers who are General or above. Gary Miller, WA4HHC, Dunnellon Middle School, P. O. Box 609, Dunnellon, FL 32630.

checkers players for on-the-air games. Leon Whitton, WD4FQO, 2532 Ashton Rd., Sarasota, FL 33581.

teenagers interested in joining the Teenage American Net, which operates on 80-10 meters, phone, cw and Novice cw. Enclose s.a.s.e. TAN, Dave Vitkus, WN9RXV, 8066 Wicker Ave., St. John, IN 46373.

As if it isn't difficult enough to get Worked All States, someone goes creating a new state — well, almost. Both K8TV and W8RSN discovered their new license plates came with Ohio spelled backward. Or is it upside down? Or inside out?

The World Above 50 MHz

Conducted By William A. Tynan,* W3XO

Not Like Rolling Off a Log, But a Lot More Fun!

Few facets of vhf can match the thrills offered by meteor scatter (m.s.). Nevertheless, this mode is confusing to many and contacts made via it are often surrounded by controversy.

There are several reasons. Except under unusual conditions involving relatively long overdense bursts, 2-meter m.s. signals are fleeting wisps at best. That characteristic is even more apparent on the higher bands. Why bother, one may ask, if the mode is so difficult? For many that is exactly why they do bother. After all, if one merely wants to ragchew with stations halfway across the country, 20 meters is probably the best choice. Those who get the most out of the world above 50 MHz are certainly those who utilize its various propagation modes to the fullest. M.s. is important among these modes and once more is very reliable in terms of its probability of occurrence in comparison with modes covering similar distances such as long-haul tropo and Es. If one wants to work a particular state, say 1000 miles (1600 kilometers) away, the chances are better doing it via meteor trails than waiting for the band to open for one of the other types of propagation. Then too, the very challenge of completing contacts via a mode which causes signals to pop in out of nowhere for a few seconds at a time is sufficient reason for many to spend hours at the game.

Because of its "now you hear it, then you don't" nature, m.s. operation is usually conducted on a schedule basis, although there are many who get a special thrill from calling CQ during peak times just to see who comes back. In order to be certain that both stations are not each transmitting and receiving at the same time, a custom has evolved: The more westerly station transmits during the first and third quarter of each minute, while the other station takes the alternate 15-second periods. Many use high-speed cw but ssb is gaining in popularity. High power is nice to have but even 10-watt stations have made m.s. contacts. Certainly, don't be afraid to try if you have 100 watts or so. A good antenna is important but it definitely does not have to be of EME proportions. In fact a broader beam width than moonbounce arrays generally display is probably advantageous.

Especially for newcomers to the mode, the best time to try m.s. is during one of the showers that occur throughout the year. The *Radio Amateur's VHF Manual* contains a complete list including optimum times and other useful data. Coming up between December 10 and 14 is the Geminids, one of the year's best. Schedules can be made by mail, telephone or on the hf bands. The Central States Net which meets each Sunday evening at 2030 CST (0230 UTC Monday) on 3818 kHz is a fine way to get together with others wishing to set up schedules. One very important caution, however: If you do use the phone or hf to set up your sked, be sure that such auxiliary communications links are not in use during the sked period. In this way you can be sure that if you both communicated the necessary information for a valid contact, it was exchanged on the vhf band in question, not via the other link. Failing to adhere to this rule has, in scattered instances, led to some of the controversy surrounding m.s. contacts.

The other chief source of controversy concerns the information which must be exchanged and the procedure for doing so. It is generally conceded that a valid contact on any band via any mode of propagation takes place if calls and one other piece of information are exchanged and acknowledged by both stations. Note that it is important to be certain that the station you are attempting to work is working you. I have heard quite a few hf DX contacts in which two or three stations all thought they worked the same station at the same time. It can happen on m.s., too. Make sure you hear your call as well as his before transmitting an acknowledgement.

What other piece of information should be transmitted in order to produce a valid contact? Usually a signal report. In the case of contests, the information required for the particular contest is sufficient. In m.s., a system has evolved in which a report based on the length of the bursts has customarily been used as a signal report with S1 denoting short pings in which little information can be received, S2 bursts of a few seconds, and so on. There has been so much confusion over this system that, at its annual conference held last August, the Central States VHF Society brought forth an entirely different approach. It was proposed that, instead of sticking to a reporting system that everyone interprets differently, it would be better to use some other piece of information in addition to the call to constitute a valid QSO. It was suggested that the state or province be used in lieu of S2, S3, etc.

To illustrate how this system would work and just what procedure should be followed, I cite the material in Table 1 supplied by the CSVHFS meteor-scatter committee.

It is hoped that this discussion will clear up some of the mystery surrounding m.s. operating and that the simplified procedure proposed at the Central States VHF Conference will remove much of the confusion associated with the old reporting system.

Try m.s. It isn't easy, but it sure is fun as well as a good way to garner new states.

Table 1
Meteor-Scatter Operating Guidelines

When You Hear	*Reply With*	*Meaning*
A) nothing or incomplete calls	calls only	I have not yet positively identified who you are, or whether you are, in fact, calling me.
B) complete calls	calls and state, province or country	I am certain of who you are and also, that you are calling me. I am sending you a piece of information which, in this case, is the name of my state, province or country (on cw, use two-letter state code).
C) calls and state, province or country	roger and state, province or country	The other operator has positively identified me, and the fact that I am calling him specifically. I indicate receipt (roger) of the 'information' and, in turn, send the name of my state, province or country.
D) roger and state, province or country	multiple 'rogers'	The other operator is confirming receipt of both calls and the information I sent. I am confirming receipt of the information sent to me (the name of the other operator's state, province or country).

Examples

Normal Exchange
1) W2AZL WØPN - - - -
2) WØPN W2AZL NJ - - - -
3) R MN - - - -
4) R R R - - - -

Random Exchange
1) CQ WØPN, CQ WØPN - - - -
2) WØPN W2AZL - - - -
3) W2AZL WØPN MN - - - -
4) R NJ - - - -
5) R R R

Improper response to a random CQ:
CQ W2AZL, CQ W2AZL - - - -
W2AZL WØPN MN - - - -
This response is improper since, by sending the state name, WØPN is indicating satisfaction of the conditions for item 'B.' By careful study, it can be seen that those conditions have *not* been satisfied. (WØPN *is* certain of who W2AZL is, but *not* certain that W2AZL is calling him.)
This improper response is the one most commonly encountered.
The requirements for a valid contact have been defined as:
1) Positive Identification
2) A Confirmed Exchange of Information

ON THE BANDS

6 Meters — This section was written at the last possible minute in hopes that E2 or TE would break for those of us who live in the northern portion of the country. As of 15 October, nothing had happened (see below), although WB2VWW reported British televi-

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD or call 301-384-6736 and record your message.

sion audio signals around 41.5 MHz and French audio carriers near 41.25 MHz for several consecutive days. Tom also mentions that he frequently hears the VE1SIX beacon, although weakly. On most days of a recent week, this conductor heard Los Angeles police calls on 39.82 for three or four hours each day.

So much for the "close but no cigar" department. The southwestern part of the country has been having much better luck than the rest of us. The best session reported to date occurred the evening of October 6 (the 7th UTC time). K5EFW, Albuquerque, called to list the following stations worked: KZ5NW, TI2NA (beacon heard), XE1GE, PY2CSS and PY2XB, in addition to LUs 2DEK, 8AHW, 2DAU and 7FA. Hamp said that KA5CEB, formerly WA1NNW, was in on the action also, completing QSOs with LU8AHW and 3EX. Signals were not particularly strong, and the fact that Central American stations were in, indicates an Es to TE hookup.

From the West Coast, W6XJ, Mt. Palomar, reports the same opening. Gary lists contacts with PY2CSS at 0100 UTC, LU8AHW at 0200 and, hold your hats, FO8DR, Tahiti, at 0530. Apparently stations as far north as the Bay Area and as far east as Phoenix worked FO8DR. K5ZMS notes that the South Americans were into San Antonio but no farther east, despite the fact that WA5UUD, New Orleans, and K5CM, Muskogee, OK, were being heard on backscatter. Ray adds that Caribbean and South American F2-propagated signals just below the band have been heard on many days in late September and early October when no amateur stations could be heard. He laments that many in both Americas are missing some good contacts. Another interesting part of K5ZMS's report concerns very strong multiplex signals heard in San Antonio in the late afternoon peaking southwest. The frequencies are 49.95 and 50.3. Can anyone shed any light on the source of these?

From the other end of the path, LU3EX sends along a detailed list of stations heard and worked throughout the first three weeks of September. Alfredo records reception of the TI2NA beacon on many occasions as well as such other calls as W4UWH/KP2/KV4KV, KP4AAN, XE1GE, KH6EQI, YV6ASU, PJ2DW, W8FSD/VP2S and numerous LUs and PYs.

A very interesting article in the September issue of *Sky and Telescope,* passed along by N5AF, predicts a smoother sunspot maximum in the neighborhood of 205 occurring near the end of 1979. This forecast is the work of R. P. Kane of the World Data Center for Solar-Terrestrial Physics, Boulder, CO,. Dr. Kane bases his prediction on a correlation between the average "A" index for the low-solar-activity year at the beginning of each new cycle. The "A" index is an average of geomagnetic activity. For 1976 Dr. Kane notes that the number was 22.2. This leads him to his prediction of 205 plus or minus 45. The 1957 peak, which brought worldwide DX to 50 MHz, was slightly under 200. It should also be noted that Mail-a-Prop is now beginning to mention the possibility of 6-meter openings.

Speaking of worldwide DX on 50 MHz, the Greater Pittsburgh VHF Society sponsors a very attractive and worthwhile certificate, the 50 MC/Quarter Century DX Award, which goes to anyone who can show proof of working 25 countries on 6 meters. To date, there are only four who have qualified: W4UCH, W8CMS, W2IDZ and W3BWU. For information on this and another, more attainable award for the rest of us, drop an s.a.s.e. to Edward Lips, W3BWU, 3302 Hazelhurst Ave., Pittsburgh, PA 15227.

After this column was in the mail, things began to happen. On October 18, backscatter of either F2 or Es origin was widespread in the eastern part of the country. W3HFY, K5ZMS and others reported working HKs on fm at about 50.12. There is some question as to whether F2 or multihop Es was responsible. From HI, KH6HI observed the muf to the East Coast between 47 and 48 MHz between 2000 and 2200 UTC. Bert also reports working VKs 2XDY, 2BXT, 5KK and 5LP (*Amateur Radio*'s VHF column conductor). This is reported to be the first time since 1947 that VK5s have worked KH6! On the 22nd about 2300 UTC, TY2XB reports hearing the ZB2VHF beacon at 539. Earlier that day WB3AIT had a QSO with K4ERO portable HC1 about 1510 UTC.

A Petition for Proposed Rule Making has been filed by the Southern California Repeater and Remote Base Association to allow wideband fm operation on all of 6 meters except the cw portion, 50.0 to 50.1 MHz. The petition has been designated RM-3207. Comments were due November 1.

2 Meters — All of the propagation modes prevalent on our 2-meter band hold their own particular fascination, but for those who covet WAS, or at least a spot near the top of the standings, EME is the one mode that will allow them to turn the trick. Except for very special instances, the maximum distance attainable via the terrestrial modes is about 1800 miles (2900 km). For example, I have yet to be informed of a bona fide 2-meter contact across the U.S. on any mode but EME. Thus when one has worked all the states which can be worked from a particular QTH, EME offers the only hope of ascending the list any further. That describes the situation with this conductor, after having picked up six new states during last summer's Perseids. Thirty-seven states is about the limit from here on the East Coast. The West Coasters have it much tougher. WB6NMT was at 18 following Perseids, but since then Louis has become operational on EME and as of early October had added five new states plus YV5ZZ and JA6DR. The antenna system consists of an array of eight 10-element Japanese Yagis with a 70-cm system comprised of eight of the new 19-element RIW beams inside it. Another who has taken the moonbounce plunge is WB4EXW, NC. Watson has four 16-element F9FTs in operation but will probably put up a larger array by spring. As of early October he had netted four new states via EME. WA1JXN, VT, is one who decided that, because of his poor location, moonbounce was the only way to go. Lance has an 8877 feeding eight 16-element F9FTs through 120 feet of gas-filled Heliax. A 3N211 preamp is tower mounted. The setup must work, as it has resulted in five new states in the first few weeks of operation including providing number 50 for K5JL.

K2QR, Endicott, NY, reports several days of aurora at the end of September. On the evening of the 26th Dick worked W8IDU and WB8AAX, MI. The next evening he hooked up with W1JR and W1HHE, MA, WA1TZV, NH, and K1WHS, ME. The following evening he logged some of the same New England stations plus K1PAI, CT. The following morning between 1130 and 1215 UTC nine stations in IL, MO, MA, VA, NJ and NC were contacted. Dick says that this morning period produced undoubtedly the best conditions of the session.

WA9JFM, Milton, WI, wonders if his 650-mile mobile-to-mobile contact with W4FVV on the Blue Ridge Parkway near Asheville, NC, constitutes a mobile to mobile record. It certainly doesn't equal the 2500 miles from the West Coast to KH6 which has been worked by mobiles, but it may be an overland record. Can anyone beat it?

WB5LBT, LA, reports that he learned via a 10-meter contact that on October 18 at about 2330 UTC LU1EKA, running just 10 watts, worked KP4EOR. This follows an earlier report from YV5ZZ noting the opening of the 2-meter TE, or FA1, passed between LU and YV October 4.

Watch for the VE1SIX beacon, now operating on 144.070 as well as 50.088.

WB6JNN surfaces a problem which has cropped up in the Bay Area and may also occur in other parts of the country if the right kind of liaison is not established soon between the various groups using the 2-meter band. Jim notes that an fm repeater has come on the air on the frequency pair planned for his area's first 2-meter linear translator. It behooves us all to get together with our fm brethren, especially area frequency coordinators, and emphasize that 144.5 to 144.6 and 145.1 to 145.2 should be reserved for linears. Most ought to agree that this is a small price to pay for the additional space which repeaters have recently received. Besides, linear machines can accommodate all modes, including fm.

70 Cm — There is little doubt that ssb and cw activity around 432.1 is increasing markedly in many areas of the country. This trend can be seen in my mail, particularly following a major tropo opening. There is another trend, however, that is evident from these reports, and it may not bode well for continued activity growth. A number of new 70-cm operators say that they have a ball working many stations but are disappointed when it comes to receiving QSLs to confirm their newly worked states. KØALL, ND, is one who reports having this experience. Ron has 80 watts to a pair of stacked F9FTs at 75 feet and is available for schedules anytime, except for those who won't QSL! Another new convert to the band is KØWLU, SD. September 5 was Bill's first night of operation. With just 2-1/2 watts from a Carmichael transverter and an 11-element J Beam he came up with 16 QSOs in 10 states. He should have his RIW amplifier going by the time this appears.

The *432 EME Newsletter* put out by K2UYH reports excellent conditions during September. Moon-reflected signals were so good that a number of ssb QSOs took place. Al himself held a one-hour ragchew with VE7BBG. That must be something of a record and should make for an unusual RCC certificate. Good ssb signals were copied from K3NSS, WB5LUA and K8WW. K3NSS, with their big 84-foot dish in MD, completed voice hookups with K2UYH, exchanging 4 × 2 reports and with WB5LUA swapping 5 × 3s. A familiar call will soon be heard on 70-cm moonbounce. VE4MA, now held by Barry, Andy's son, says that he will have up an array of 19-element RIWs possibly to be replaced by a dish next spring. Those wishing to contact VE4MA, address Barry Malowanchuk, 65 Mellow Mead Cove, Winnipeg, MB R2G 2L9. Another new one is PA0ZN/W6. Rein's setup consists of a single 4CX250B feeding a 20-foot dish. Receiving is helped by a 88000. Don't be surprised if you hear ADIC. That's the new call of WA1UHA, W1JR's son, Jim. He and Joe should be quite active using their array of 16 F9FTs.

K2UYH has been experimenting with operating 88000 GaAsFETs at zero bias which seems to improve the noise figure. Those wishing more information may address an s.a.s.e. to Dr. Allen Katz, Department of Engineering Technology, Trenton State College, Hillwood Lakes, P. O. Box 940, Trenton, NJ 08625.

In the ATV department, WAØNHD sends along a detailed description of the ATV repeater being installed by the RMVHFS in Boulder, CO. The repeater will receive on 439.25 and have an output on 421.25 with a vestigial sideband filter to keep radiation within the band. Jim describes in some detail the pains to which they have gone to be sure that they have a clean and reliable system.

BRATS, the Baltimore Radio Amateur Transmitting Society, announces the reactivation of their ATV repeater. The new system has an input of 439.25 and output on 426.25 with the sound on 430.75. Soon a 1234.25 output will be added in parallel with the 70-cm output.

23 Cm and Down — From up in Winnipeg, VE4MA writes that he is soon to be active on 23 cm. Barry has a 2C39 producing 10 watts and will put up either a 10-turn quad helix or a 6 × 3 foot dish. Those wishing to set up skeds can contact him at the address listed in the 70-cm section. EME on 23 cm seems to be coming in for increasing attention. Stations known to be active or are about to be include SM6CKU, SM2AJD, G3WDG (new call for the G3OUR group), VK5MC, PAØSSB, W6YFK and WA8ULG (listening). I predict that this, the band on which the first amateur two-way EME work was accomplished, will become increasingly important for moonbounce.

There has been a lot in these pages about band plans in recent months. The Europeans have been doing quite a bit of band planning also. The various amateur microwave bands came in for discussion at an IARU Region 1 conference held in Hungary last April. A system was proposed based on establishing 2-MHz-wide weak-signal calling and working spots in the various bands which are harmonically related to 1152 MHz. This frequency is the eighth harmonic of 144 and is also exactly 144 less than 1296. Thus, the proposed weak-signal areas in the various bands would be 2304 to 2306, 3456 to 3458, 5760 to 5762, 10,368 to 10,370 and 24,192 to 24,194 MHz. The 3-cm band comes in for the most detailed breakdown, undoubtedly because of its great popularity on the Continent. The proposed plan for that band is shown in Table 2. The VUAC will undoubtedly be looking at all of these European proposals with a view toward suggesting them, or something similar, for this country. Your input will certainly be welcome. W3BSV, Salisbury, MD, is one 3-cm enthusiast who is not waiting. One of Cy's current projects is a 10,368 source, using a 48-MHz crystal and multipliers to 432, which drives a harmonic mixer in a waveguide. Another creation is a 32-dB gain, 27-inch diameter dish made from a $6.95 snow sled. How is that for bang for the buck?

Table 2
Proposed 3-Cm Band Plan

MHz	
10,000	Band edge
10,080-10,082	Second channel 10,368-10,370 MHz, 144 MHz i-f
10,224-10,226	Narrow-band duplex, 144 MHz i-f
10,226-10,228	Narrow-band repeater, 144 MHz i-f
10,260-10,300	TV duplex, 175 MHz i-f
10,300-10,335	Wide-band telephony, 100 MHz i-f
10,338-10,340	Narrow-band duplex, 30 MHz i-f
10,368-10,370	Narrow-band working frequencies
10,368.0	Narrow-band beacons
10,368.9	Narrow-band spot frequency
10,400	Wide-band beacons
10,400-10,435	Wide-band simplex and duplex, 30 MHz i-f
10,435-10,475	TV duplex, 175 MHz i-f
10,475-10,500	Proposed space allocation
10,500	Band edge

Public Service

Conducted By Robert J. Halprin* K1XA

A Unique Service Rendered

Unusually high winds and heavy rains had caused flooding and wind damage in Ventura County, CA. On February 10, 1978, the local Amateur Radio Emergency Service conducted a damage survey for the county and Red Cross. Ojai, Santa Paula, the Rincon Beach area, and the Santa Rosa Valley all had serious damage (a total of 250 homes were affected). The results of this survey were passed to a federal and state team of assessors, which accepted it, resulting in a Presidential disaster declaration for the county. This declaration made possible Small Business Administration aid and various other federal loans and grants, which would not have been available otherwise, to repair the damage. The speed with which the information was gathered (requested 1530 Friday; available 0900 Saturday) meant that we got our request in first and were therefore the first in line for aid in Southern California.

More rains in the weeks that followed hadn't helped matters any and when a series of large storms moved in from the Pacific, we knew we were in trouble again. The local reservoirs filled and overflowed (one for the first time since it was built), farm fields flooded again and Sespe Creek broke its banks to flood a section of the town of Fillmore. Evacuations began on the morning of March 4 and an amateur monitoring on the local police/fire/flood control frequencies advised me on WR6AOX at 0630. Since Red Cross must shelter evacuees (and is notified in advance), I alerted them and dispatched several operators to Red Cross hq. to set up a net control station. Over the next few days, more than 70 local amateurs provided communications between Red Cross hq. and shelters in Fillmore, Ojai and Ventura. Over 300 messages were handled by them for Red Cross, flood evacuees and motorists stranded in the county by flooded freeways (including those on their way to the OSCAR 8 launch). Red Cross housed and fed more than 1000 at the height of the disaster. An ARES team went into Fillmore on March 6 and once again their report was immediately accepted, resulting in a second Presidential declaration of disaster.

How did all this come about? Well, we (the ARES) recognized that the first need in a disaster is for accurate information on the degree and type of disaster damage *as early as possible*. This allows for transmission of requests for any additional personnel and supplies and makes it possible for them to arrive in time to do some good. It also serves as a basis for a request for that Presidential disaster declaration and all the goodies that go with it. In Ventura County, each amateur surveys a two-block area and transmits that to the net control station, where the information is compiled and evaluated in a matter of an hour or two. It is then released to various relief agencies such as County Disaster Services, Red Cross, Salvation Army and Sheriff's Office. This survey would take a minimum of three to five days if conducted by already overworked law-enforcement people in a disaster. Amateurs can provide it by doing a few minutes work before departing for an assigned location. We have a standard damage survey report which contains the number of homes in each damage category (totaled, major, minor, no damage), utilities working or not working, road blockage, and operator location. It is kept brief to expedite the survey and its transmission.

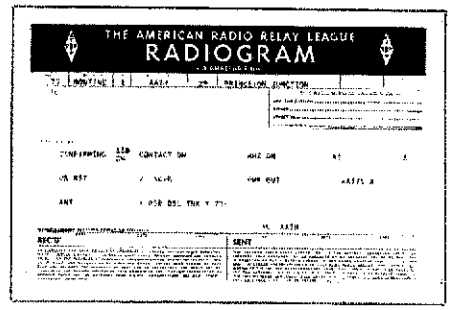
It is really something to sit at Red Cross and watch the picture build from the reports sent in by a patchwork of amateurs across the county. During the SET, the imagination shown by the locals is worthy of a soap-opera writer! [The SET is coming up; see announcement this issue. — Ed.]

We also realized that Red Cross is in the shelter business so we are prepared to furnish operators to tie all shelters to the Hq. site. As each disaster (and therefore the need for particular shelters) is unique, we simply assign whoever is available at the time.

If we can see a natural disaster coming (and during the disaster), we keep several operators busy monitoring local police, fire and other public-safety communications. They provide us with timely intelligence on the current situation and forewarning of developing problem areas. This allows us to anticipate situation changes and communications needs to be sure that we can meet those requirements as they arise.

Because in our area different emergencies require separate responses, we feel that a detailed disaster plan with individual assignments would result in most of the available people heading for all the wrong places. Instead, we provide operator training in net operations, traffic handling and general policy guidance and let the person in charge decide on how many nets and what type of nets are needed. This has worked well for us in the past and provides a loosely structured, highly flexible organization capable of meeting any need.

I believe that the use of amateurs for systematic damage survey and reporting immediately after a disaster is rather rare and deserves special attention in *QST* because of its potential for real community service. It's rather simple — without the damage survey information, you can't get the federal disaster declaration. And without the declaration you can't get the SBA help and other federal money needed to repair damages to homes and businesses. The city, county and state governments just aren't equipped to do the job quickly; it will take days to weeks if they have to do it. Each day that we, Amateur Radio, can save, means one more day that the taxpayers don't have to pay someone's motel bill and one day less before someone can move back home. The survey also means that the county will have an almost immediate indication of where they need to concentrate their efforts. This minimizes the confusion factor for all concerned. — *Ray Mote, Jr., W6RIC, Emergency Coordinator, Ventura County, CA*



Al Conte, AA2H, sports a rather unique QSL card. Al is Emergency Coordinator for Mercer County in New Jersey.

*Asst. Communications Mgr., ARRL

The ARRL Ham Radio Newsline: 203-667-0138

Our Public Information Office's 24-hour Newsline 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*

PUBLIC SERVICE DIARY

☐ Jackson, MS — August 29. Three tornado warnings and two confirmed sightings were reported in this area and a local emrgency net was activated and remained in session until weather conditions returned to normal. (K5AKM)

☐ Carribean Sea — September 16-20. While Hurricane Greta made an appearance in this area, WA1KKP, K4CRU, W4PPC and K4RHL relayed weather information to the National Hurricane Center in Miami.

☐ West Poland, ME — September 22. The Central Maine Emergency Net was activated to provide a communications link between the site of a plane crash and the FAA and law enforcement authorities until landline communications were established. (WA4UJJ)

☐ *Repeater Log.* According to reports received to date, repeaters and fm simplex frequencies were used in conjunction with 95 vehicular emergencies, 11 crime reports, four search and rescues, two fires, two medical emergencies, two weather emergencies and 18

miscellaneous incidents. Repeaters involved were WR1s ADS AIW, K2ASF, WR4s ADZ ALL AVD, K4s HY KGO, WR5s ABA ABE ABY ACB ADP AIB, WC5AAJ WA5KNV, WR6AFY, WR7s ACE ACY AEL AFO, WR9s ABO ACX ADU AGS.

AMATEUR RADIO EMERGENCY SERVICE REPORTS

Albuquerque, NM — August 1-31. New Mexico amateurs assisted mountain rescue units in the search and rescue of seven persons from mountain accidents. Three were carried out of the Sandia Mountains, two who were more seriously injured were evacuated by helicopter and two victims of a flying accident near Alamogordo were located through CAP and Amateur Radio teamwork. (W5PDY, SCM NM)

Crow Creek, AK — August 8. KL7DC and KL7JDH responded to a request from the Alaska Rescue Council to provide communications between Anchorage and Crow Creek, which was the site for the rescue of a member of a hiking team who had fallen 40 feet down the face of a glacier. (KL7DC, EC Anchorage)

Ocean County, NJ — August 31. The entire business section of New Egypt experienced a flash flood incapacitating all municipal operations, paralyzing business and knocking out electrical power and telephone lines. Members of the Jersey Shore Amateur Radio Society and the Old Barney Radio Amateur Society were among the local hams who stepped in to provide communications throughout this emergency. (W2HOB, SEC SNJ, WB2EVL and William Hayes, c.d. coordinator, Ocean Co.)

Monroe, LA — September 14-15. As extensive flooding struck this area, local amateurs handled emergency traffic and provided communications for the c.d. (WA5QVN, EC La Zone 8)

SEC Reports. For September, 38 SEC reports were received denoting a total ARES membership of 16,339. This represents a 9-percent increase in reports received one year ago (35) and a 24-percent increase in ARES membership (13,234). Sections reporting were Alta, Ariz, Ark, Colo, Conn, Del, EBay, ENY, EMass, Ga, Ind, Iowa, Kans, Man, Mar/NFld, Mich, Mo, Nev, NH, NC, NHa, NTex, Ohio, Okla, Ont, Org, SDgo, SIV, SCV, Sask, SFla, SNJ, Utah, Va, Wash, WVa, WMass, WPa.

NATIONAL TRAFFIC SYSTEM

The Simulated Emergency Test announcement appears elsewhere in this issue. It's time to get ready, get SET!

September Reports

Area Nets

(evening sessions) (daytime sessions)						
1	2	3	4	5	6	7
EAN	30	1751	58.4	1.413	97.8	
EAN	59	967	16.4	.661	81.1	
CAN	30	1110	37.0	.964	100.0	
CAN	60	395	6.6	.257	96.1	
PAN	30	1080	36.0	.954	95.4	
PAN	29	280	9.7	.271	91.1	
Region Nets						
1RN	84	597	7.1	.453	93.9	86.7
2RN	119	760	6.4	.448	91.3	90.0
3RN	90	487	5.4	.515	99.3	97.8
4RN	120	1285	10.7	.367	73.1	98.9
RN5						100.0
RN6	88	735	8.4	.359	87.5	96.7
RN7	120	883	7.4	.459	97.4	94.4
8RN*	59	400	6.8	.391	93.3	94.4
9RN	113	586	5.2	.364	89.0	98.3
TEN	83	530	6.4	.302	50.1	95.8
ECN						96.7
TWN	90	513	5.7	.286	88.2	92.2
TCC						
TCC Eastern	171[1]	861				
TCC Central	200[1]	776				
TCC Pacific	115[1]	713				
Sections[2]	5103	17206	3.4			
Summary	6257	31915	5.1			
Record	6261	32403	15.4			

*Incomplete report
[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (141): AENB AEND AENJ AENS (AL), APSN (AB), ASN (AK), ATEN HARC (AZ), OZK (AR), BCEN (BC), NCN SCN SDNN (CA), CN CWN (CO/WY), CN CPN NVTN WESCON (CT), FAST FMTN FPON FPTN NFPN PBTN QFN QFNS SPARC TPTN (FL), CVEN GCN GSN GSSBN GTN MAEN NGSN WGN (GA), IMN (ID/MT), ILN (IL), ICN ITN QIN (IN), 175mN TLCN (IA), KPN K5BN QKS (KS), 5DARES K5N KYN SEKEN (KY), LRN LSN LTN (LA), AEN CMEN PTN (ME), MEPN MMN MTN (MB), MDCTN MDD (MD/DC), EMRIPN EMRISS RIEM2mTN (MA/RI), MACS MiTN MNN QMN (MI), MSN MSSN PAW (MN), MS MSBN MTN (MS), MEOW NEMOE (MO), WNN (NE), NHCWN 34/94CRN (NH), MCN NJN (NJ), RRN (NM), NLI NYS WDN (NY), CN NCSSBN SCSSBN THEN (NC/SC), BN BNR ONN OSN OSSBN 06mN (OH), OAN OLZ OPEN OTWN (OK), CMN GBN GBSSN LN ODN OPN (ON), ARESTN BSN JCARES OARES OSN PAARES (OR), EPA EPAEPTN PITN WPA WPAP&TN WPA2mTN (PA), WQV/UHF (PQ), SATN (SK), PX (SC), SDN (SD), HCN TEX TTN (TX), BUN UCN (UT), SVSN VFN VN VNTN VSBN VSN (VA), WVN WVNN WVPN (WV), BEN BWN WIN WNN WSBN (WI).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVG.
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

Certificates: W5JOV N5NG (TCC-P), W5KLV WA5BHF WA5INJ WB5NKC WB5NKD WB5SDD WD5GNR W9JIJ W9JUJ NØSN WBØZAL (TCC-C-D).

	2	3	4	5
Eastern	180	95.0	2305	861
Central	210	95.2	1502	776
Pacific	120	95.8	1426	713
Summary	510	95.3	5233	2350

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (September): Eastern Area (VE3SB/N2YL, Directors) — W1s KX NJM OD, WA1s UNC UWF ZAZ, WB1AIU, K1s BA EIR GN PAD SSH XA, W2s CS GQB EFU FR GKZ MTA RQ, WA2s ERT/1 ICB SPL, K2NY, N2YL, W3s FAF PQ YQ, WA3WQP, K3s KW NGN, N3HR, W4s MEE SQQ UQ, WA4CCK, WB4PNY, K4s BKX KNP, N4KB, W8PMJ, K8KMQ, VE3s GOL SB. Central Area (W5GHP/W9NXG, Directors) — AA4KB, W4ZJY, W5s KLV RB, WA5s BHF INJ IQU RKU, WB5s FDP NKC, NKD SDD, WD5GNR, K5s GM MC, N5s TC TS YL, W9s CXY DND FC JIJ JUJ NXG, N9TN, WØs AM HI, WAØTNM, WBØZAL, KØEVH, NØSN. Pacific Area (K5MAT, Director) — N5s MR NG, W5s JOV KH, K5s KPS MAT, N6s GW PZ WP, W6s EOT IPL OA VZT, K6OE, N7s AM NO, W7s DZX EP GHT VSE, K7s HLR IWD, ADØA, WØKON, KØs BN DJ, WBØTAQ, VE7ZK.

Independent Nets (September)

1	2	3	4
Amateur Radio Telegraph Society	30	1785	286
Central Gulf Coast Hurricane	30	187	1845
Clearing House	30	237	515
Empire Slow Speed	28	99	348
Hit & Bounce Traffic	60	797	440
IMRA	26	386	933
North American SSB	26	251	218
North American Traffic and Awards	30	133	880
Southwest Traffic	30	94	234
Washington Region PON	18	20	285
20 Meter ISSB	26	304	516
75 Meter ISSB	30	604	1085
7290 Traffic	40	334	2351

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll September 1978

This listing is available to amateurs whose public service performance during the month indicated qualifies for 40 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 10; (2) Checking into phone/RTTY nets, 1 point each, max. 10; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned liaison, 3 points each, max. 12; (6) Phone patches, 1 point each, max. 20; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly with a disaster area, 1 point each message; (9) Serving as net manager for entire month, 5 points. This listing is available to Novices and Technicians who achieve a total of 20 or more points.

69
W7VSE
68
WA1ZXB
64
W5KLV
WA6UAZ
W8SOP
W9JUJ
62
AA2H
61
W1TN
WA1YMN
WA1ZAZ
WD4COL
WB4ZOJ
W7GHT
WB8MTD
WB8YDZ
WØOYH
WBØZAL
60
WB5NKC
59
WB2KDC
WA2SPL
WA4JDH
N4NK
K5TL
58
AF2L
W4OGG
57
WB5SDD
WA7YCM
56
K1BSO
W1KX
K4BKX
WN4KKN
WB4OBB
VE4PG
WB4PNY
N4WA
W5GHP
WB5NKD
W6OA
W6RNL
55
W1RWG
K5SOR
WD8JYM
54
W4FMN
N5RB
53
WB2EAG
K3HI
N5ES
WD9CQC
52
WA4CCK
WA3NAZ/4
WØOTF
50
W1GUX
W2SQ
W2XO
VE3GT
W6RFF
WD8JYN
49
VE1WF
W2MLC
VE3DPO
VE3GOL
K3ORW
W3PO
AA3S
WA4YIU
WB5RPU
WB6PVH
WB6UZX
K7GXZ
WA7MEL
W8VPW
WA8WPW
WB8WTS
W8YIQ
WØFT
WAØTNM
47
WB1DXR
WB3JGP
WB4FAS
WD5AHH
W5JOV
K5QEW
N8CW
WD8DMX
46
WB1CDF
WB4OXT
WR5FTD
WA6NTI
KØDJ
45
W2MTA
K2VX
WD4ISN
WA5JWD
N8ABA
WB9KPX
44
WB1EMU
K1QQG
K1PAD
K2GCE
WA2LHV
WB2PJU
VE3FHG
K4EJ
K4EV
AA4GA
VE4IZ
KB4N
VE4QU
K4VHT
WA4VLT
AA4WJ
WB5EMU
WD5GNR
AA5J
WB5LBR
W5VMP
WB6AMP
WA7JRC
WB7PSP
WD8NYN
W9NXG
K9PNG
KØFRE
43
K3JL
WB4HXE
W4JK
WD4LUG
WB5IYH
W6JXK
KØPVI
42
N2CR
WB2JAY/4
W3BBN/4
WB5ASD
WU5DRK
WA5VBM
W6AIJC
WA6LBO
KB8BZ
WB9ZED
41
VE3FHZ
W3YQ
N4VY
WB5LAT
N6WP
WD8CSA
W9JSR
40
WA1HYN
WA1TBY
N3AIU
N5MR
K5OWK
WA5HVT
WBØVHN
24
WA1SMY/T
22
WB2RMJ/T
WD4BAJ/T
WA4QGV/T
WA4VKD/N

Brass Pounders League September 1978

BPL Medallions (see December 1973 *QST*, page 59) have been awarded to the following amateurs since last month's listing: WB4PNY, WB5SDD.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

1	2	3	4	5	6
K3NSN	1431	1738	1738	128	5035
W3GUL	426	1090	1363	72	2951
WØWYX	53	1110	434	676	2273
WA4JDH		720	707	6	1433
WB4PNY	12	476	451	24	963
WAØHJZ	30	432	30	462	954
WA2SPL		377	400	29	806
W3VR	299	150	346	10	805
W9JUJ		397	363	11	771
W9ZGQ		549	1	219	769
N4NK	177	185	383	6	751
W4JK	1	320	371	3	695
WD4KPG	40	325	300	2	667
W7VSE	12	316	294	24	646
WA3ZHY	43	277	301	12	634
WB6EIG	15	295	295		605
W3BBN/4	202	92	207	53	554
W7DZX	20	262	268	2	552
WA4YSK	7	264	266	12	549
WB5SDD	16	232	275	20	543
WA4CCK	2	254	253	10	519
WB2RMI	9	249	238	11	507
WA3WQP	55	191	239	12	507
W5KLV	3	257	231	11	502
W9JIJ	34	234	3	231	502
WB6EIG (August)	12	347	347		706
WB6EIG (July)	12	297	297		606
WB6EIG (May)	9	306	306		621
WB6EIG (April)	10	248	248		506

BPL for 100 or more originations-plus-deliveries:

WA3ATQ	260	K7NTS	137
W4LX	156	K9PNG	135
VE3KK	141	WØBMA	132
		WDØAIT	101

Multioperator station:

WB6OFC (July)	187

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Simulated Emergency Test Announcement

January 27-28 and October 6-7; the new schedule is finally SETtled.

By Robert Halprin,* K1XA

Hundreds of communities across the U.S. and Canada will be beset with tornadoes, hurricanes, blizzards and other (we hope) simulated disasters in January and October. The purpose? To simulate realistic emergency conditions under which Amateur Radio operators can provide valuable emergency communications. It's sort of like the out-of-town tour of a play headed for Broadway, Broadway being a full-fledged emergency. The playwrights are people such as ARRL Emergency Coordinators (ECs) who create scenarios and write the scripts for the local Amateur Radio Emergency Service (ARES) and other interested amateurs. The League's National Traffic System (NTS) will hold extra and extended sessions as needed to facilitate the handling of formal message traffic from coast to coast.

But why two SETs in 1979? In the last couple of years, we've had some bad luck with the nonsimulated weather during the January weekend. Many amateurs have suggested that SET be moved to another season and this possibility was publicized in *QST* and elsewhere. And the actual dates were endorsed by the ARRL Emergency Communications Advisory Committee.

Beginning in 1980, there will be one annual SET, falling on the first weekend of October. Two will be held in 1979 simply because a gap of 22 months (from January 1978 to October 1979) is just too long between tests of our emergency capability. A historical footnote to this business is that the January SET is actually the SET for the previous year, as there was no SET held in 1967, when the test was moved *from* October to January.

SET is returning to the fall because more favorable weather will permit Amateur Radio groups to hold their activities out in the open in all sorts of places, which will increase public awareness of our service. And some of these simulated activities can be fascinating — like the search for King Kong in southern California, an attempted terrorist takeover in the Midwest (the hams were on the side of the police), a runaway barge filled with toxic chemicals in Ohio, or a plane crash in Colorado. So it goes.

If this sparks your interest, then you're wondering "How do I participate?" Here's how. Most local activity will center on 2 meters. If you have a 2-meter fm radio of some sort, you're all set. The next step is to contact your local Emergency Coordinator. If the identity of the EC is unknown to you, ask your Section Emergency Coordinator (see page 74) for help.

Advise your EC of your availability and he/she will clue you in on what will be going down during SET. He may invite you to join the local ARES group, which only requires you to complete a simple form denoting your band capabilities and your

Register with the Amateur Radio Emergency Service, using CD-98. This form should be submitted to your EC, if known, or your SEC.

1. Name: | 2. Call:

AMATEUR RADIO EMERGENCY SERVICE
REGISTRATION FORM

3. Address:

4. City: | 5. State/Prov.: | 6. Zip:

7. County: | 8. Home phone: | 9. Bus. phone:

10. License Class: | 11. Primary radio interest:

12. (Circle bands you can operate)
CW: 160 80 40 20 15 10 .....
PHONE: 160 75 40 20 15 10 6 2AM 2FM .....
MOBILE: 160 75/80 40 20 15 10 6 2AM 2FM .....

13. Can your home station operate without commercial power? ☐ YES ☐ NO
If yes, what bands? 160 75/80 40 20 15 10 6 2AM 2FM .....

14. Request FULL membership ☐ LIMITED membership ☐

15. Signed: | 16. Date: 19.....

Detach and send this card to ARRL, 225 Main St., Newington, CT 06111 or directly to your EC (if known)
CD98 (377)

*Asst. Communications Mgr., ARRL

Section Emergency Coordinators of the American Radio Relay League

Canadian Division

Alberta
E. Roy Ellis, VE6XC
RR 1, Box 2, Ft. Saskatchewan, T8L 2N1

British Columbia
H. E. Savage, VE7FB
4553 West 12th Ave., Vancouver, V6R 2R4

Manitoba
Brian J. Lenius, VE4TR
Box 18, Group 4, RR 1, Anola, R0E 0H0

Maritime/New Foundland
Harvey J. Epton, VE1DI
Box 2021, Stn. A, Moncton, E1C 8H7

Ontario
L. P. Thivierge, VE3GT*
34 Bruce St. W., Renfrew, K7V 3W1

Quebec
Adrien Michaud, VE2DEA
1630 St. Croix Blvd., Montreal, H4L 3Z8

Saskatchewan
W. H. Parker, VE5CU
214 McMaster Cres., Saskatoon, S7H 4E3

Atlantic Division

Delaware
David R. Elzey, W3PQ
513 Woodmere Rd., Milford, 19963

Eastern Pennsylvania
Robert A. Josuweit, WA3PZO
9 Derwen Dr., Havertown, 19083

Maryland-DC
Rupert D. Phillips, W3HJH
Rte. 3, Box 350, Mechanicsville, MD 20659

Southern New Jersey
Austin B. Prestwood, Jr., W2HOB
6 Kingsley Rd., Mount Holly, 08060

Western New York
James Collinsworth, N2JC
1040 W. Walworth, Macedon, 14502

Western Pennsylvania
Gerald R. Patton, WA3VUP
1504 Third Ave., Duncansville, 16635

Central Division

Illinois
R. G. Martin, Jr., W9AES
2134 W. Ridgeview Dr., Decatur, 62521

Indiana
Bruce B. Woodward, W9UMH
6208 Bramshaw Rd., Indianapolis, 46220

Wisconsin
John LaBlonde, W9FZC
404 Berwyn Dr., Madison, 53711

Dakota Division

Minnesota
Dr. Peter Cross, WØSA
6915 Buckthorn Rd., N.W., Rochester, 55901

North Dakota
Mike Mankey, WBØTEE
1318 Pocatello Dr., Bismarck, 58501

South Dakota
James M. Nance, WAØTNM
Rte. 2, Box 69, Colome, 57528

Delta Division

Arkansas
Charlie Young, WA5VNV
5004 W. 34th St., Little Rock, 72204

Louisiana
Gary Uldriks, WB5IYH
2844 Anita Ave., Baton Rouge, 70805

Mississippi
Charles E. Bardsley, WB5FXA
2425 Pascagoula St., Pascagoula, 39567

Tennessee
Milo Ward, WB4DYJ
Rte. 3, Box 360C, Laurel Rd., Clinton, 37716

Great Lakes Division

Kentucky
Gerald Hite, WB4ZML
3517 Schaffner Dr., Louisville, 40216

Michigan
Dale R. Williams, WA8EFK
291 Outer Dr., Dundee, 48131

Ohio
Ralph A. McDonough, K8AN
Box 240, RD 2, Adena, 43901

Hudson Division

Eastern New York
Paul S. Vydareny, WB2VUK
259 N. Washington St., North Tarrytown, 10591

New York City-Long Island
Charles Haubeil, K2HTX
205 8th Ave., East Northport, 11731

Northern New Jersey
Robert Weingaertner, WB2VUF
4 Leddell Rd., Mendham, 07945

Midwest Division

Iowa
Harold M. Rozenberg, WØIYW
104 Lincoln, S.E., Bondurant, 50035

Kansas
W. D. Bemmels, WØKL
40 Rockwood Dr., Ottawa, 66067

Missouri
Robert Steve Mulford, WBØFKY
1406 Peggy Cir., Lee's Summit, 64063

Nebraska
Stephen O. May, WAØASM
2830 S. 42nd St., Lincoln, 68506

New England Division

Connecticut
John F. Lindholm, W1XX
151 Deercliff Rd., Avon, 06001

Eastern Massachusetts
Don F. Guptill, W1AOG
17 Park Street Ct., Medford, 02155

Maine
Martin B. Bernstein, WA1YUW
6 Frye, Lewiston, 04240

New Hampshire
John Johnston, K1RSC
RFD 1, Lake Rd., Exeter, 03833

Rhode Island
John B. Mann, AB1D
60 Slater Ave., Providence, 02906

Vermont
H. A. Preston, W1VSA
RFD 1, Charlotte, 05445

Western Massachusetts
Robert H. Phoenix, WA1DNB
23 N. Washington St., Belchertown, 01007

Northwestern Division

Alaska
Andrew Watkins, KL7ISB
21-660 F. Apricot St., Elmendorf AFB, 99506

Idaho
Lemuel Allen, W7JMH
1800 S. Atlantic, Boise, 83705

Montana
Joe D'Arcy, W7TYN
1916 Haggin Ave., Anaconda, 59711

Oregon
Dwight J. Albright, W7HLF
1678 Orchard Home Rd., Medford, 97501

Washington
Joseph N. Winter, Sr., WA7RWK
819 N. Mullen St., Tacoma, 98406

Pacific Division

East Bay
Charles R. Breeding, K6UWR
3130 Raleigh Ct., Freemont, CA 94536

Nevada
George V. Lyle, K7ZAU
1047 Mark Way, Carson City, 90701

Pacific
Stan Cook, KH6JMK
98-1247 Kaahumanu St., Aiea, HI 96701

Sacramento Valley
Norman A. Wilson, N6JV
Rte. 1, Box 730, Woodland, CA 95695

San Francisco
Kenneth S. McTaggart, N6KM
272 Fourth St. E., Sonoma, CA 95476

San Joaquin Valley
Leland Rhoy, WA6YAB
4817 N. Crystal, Fresno, CA 93705

Santa Clara Valley
Edward A. Gribi, Jr., WB6IZF
P. O. Box 984, King City, CA 93930

Roanoke Division

North Carolina
C. F. Bino, K4CJZ
2401 Deverow Pl., Greensboro, 27407

South Carolina
Bill McCollum, WB4TNS
108 Timberlane, RFD 9, Greenville, 29609

Virginia
Ralph B. Atkinson, WB4ZNB
RFD 1, Box 48, Courtland, 23837

West Virginia
Delf A. Norona, WA8NDY
P. O. Box 523, Buckhannon, 26201

Rocky Mountain Division

Colorado
Robert W. Poirier, KØDJ*
1884 Pepperwood Ln., Colorado Springs, 80910

New Mexico
R. B. Goodman, W5ALR
3909 Camiono de la Sierra, N.E., Albuquerque, 87111

Utah
Larry Jacobs, WA7ZBO
5655 S., 4060 W., Salt Lake City, 84118

Wyoming
Gregg G. Wood, WB7EIN
901 Cahill Dr., Cheyenne, 82001

Southeastern Division

Alabama
Robert B. Folsom, K4WYT
1105 Scenic View Dr., Dothan, 36301

Canal Zone
Oscar Leigh DuPre, KZ5OD
P. O. Box 284, Balboa Heights

Georgia
William Douglas McDowell, K4SWJ
4533 Chamblee-Tucker Rd., Tucker, 30084

Northern Florida
Fred K. Marchman, AA4FG
901 E. Missouri Ave., New Port Richey, 33552

Southern Florida
William J. Johnson, WB4ALH
1119 Lady Elaine Dr., Valrico, 33594

West Indies
Julio Negroni, KP4CV
269 Georgetown St., Rio Pedras, PR 00927

Southwestern Division

Arizona
Marshall Lincoln, W7DQS*
Box 1490, Wickenburg, 85358

Los Angeles
Ben Vickers, WB6FRM
621 N. Hendricks St., Montebello, CA 90641

Orange
Jim Varner, W6AQB
1504 Del Norte Dr., Corona, CA 91720

San Diego
Arthur R. Smith, W6INI
4515 Melisa Way, San Diego, CA 92117

Santa Barbara
Ray L. Mote, Jr., W6RIC
3610 Oarfish Ln., Oxnard, CA 93030

West Gulf Division

Northern Texas
Phil Clements, K5PC
1313 Applegate Ln., Lewisville, 75067

Oklahoma
H. O. Townsend, WA5MLT
2346 Louise Ln., Norman, 73071

Southern Texas
Don C. Weir, WB5LHK
100 Tangerine Blvd., No. 87, Brownsville, 78521

*No appointed Section Emergency Coordinator, SCM listed.

willingness to participate in ARES exercises.

Many ARES groups work closely with civil defense (RACES), Red Cross, Salvation Army and other public-safety agencies. So if there is not an EC assigned for your area, perhaps you or another local amateur could volunteer to organize some emergency-preparedness operations. Contact your SEC or SCM (*QST*, page 8) for details.

Another way to get in on the SET action is to participate in your local or section National Traffic System net. Most every ARRL section has at least one net meeting on 75 and/or 80 meters and local nets convening on 2 meters. We suggest you familiarize yourself with traffic-handling procedures; getting a copy of the new *Net Directory*, which contains complete how-to-do-it information, is a good start. In an emergency, it is imperative that all stations go about handling communications and messages according to a standard form while using maximum efficiency. If possible, report into net sessions before the SET to get to know the routine and check with the net managers to determine what the net's schedule will be during the shindig. And we hasten to add that Novice-band nets play an important role too.

Although January 27-28 is the official weekend, groups are free to hold their SETs on any two-day period between January 1 and February 28 to coincide with the time when amateur activity, public-service value and mass-media exposure can be the greatest. (It's possible that the fall SET will make this leeway unnecessary.) In any case, all SETs held within the SET "period" will be included in the SET results article of a future *QST*. There will also be another SET announcement in the September issue.

All amateurs are invited to send at least two messages during SET. One can be to your SEC and another can be to a friend or relative in a distant part of the country.

For the SET, all nonroutine test messages should carry the word TEST before the precedence, e.g., Test Priority on phone or TEST P on cw. As a further step to insure test messages will not be construed as the real thing, use the words TEST MESSAGE in the first two words of the text. Do not use TEST in the precedence or in the text of a routine message. A routine message is a routine message, regardless of whether or not it was drafted for the SET. For improved efficiency and less Excedrin headaches, try to avoid using long words such as participating, communications, etc., in texts whenever possible.

To prevent SET messages from dragging out beyond the SET period, the handling instruction HXB is used. Loosely interpreted, HXB means "cancel message if not delivered within the SET period; send a service message to originating station." For SET messages sent during exercises held on a date other than the primary weekend, use HXB followed by a number, e.g., HXB48, which means "cancel message if not delivered within 48 hours of filing time; send a service message to originating station." If the message is not a test message and you would like to have it delivered even after the SET is over, don't use HXB at all.

Repeater public service coordinators, independent net managers, monitoring service directors, radio officers and others who don't hold ARRL leadership appointments, should request the SET bulletin and reporting forms from Hq. The SET is open to all amateurs and groups. Don't forget to report your activities to Hq. promptly — the deadline is March 15. A compilation of timely reports is the only way we can demonstrate our rapidly improving emergency capability in black and white.

Would you be able to communicate if you suddenly lost electrical service? This happens in many emergencies. Some exercises and net sessions will operate on the assumption that commercial power has been disrupted. Equip yourself with some sort of emergency-power source or battery-operated rig.

Experience has shown that when real emergencies develop, most amateurs are willing to assist. Yet history has also demonstrated that amateurs without adequate training can be more of a detriment than a help. Don't let other interests prevent you from becoming familiar with a few emergency procedures. Instead of being an innocent bystander, why not take an active role in the exciting SET scene?

Here is an example of a routine SET message to an SEC. Complete info on message handling can be found in a copy of the ARRL *Net Directory*. Send us a 9 × 12-inch s.a.s.e. with 41 cents postage and you'll get your copy by return mail.

THE AMERICAN RADIO RELAY LEAGUE
RADIOGRAM
VIA AMATEUR RADIO

NUMBER	PRECEDENCE	HX	STATION OF ORIGIN	CHECK	PLACE OF ORIGIN	TIME FILED	DATE
1	R	B	K5OWK	5	ARDMORE OK		JAN 27

To

H O TOWNSEND WA5MLT
2324 MORGAN DRIVE
NORMAN OK 73069

THIS RADIO MESSAGE WAS RECEIVED AT
AMATEUR STATION _____ PHONE _____
OWNER _____
STREET ADDRESS _____
CITY AND STATE _____

TELEPHONE NUMBER 979 7245

THIS STATION ACTIVE IN 1979 SET X 73

K5OWK

SENDER'S ADDRESS AND PHONE NUMBER FOR REFERENCE

REC'D — FROM — DATE — TIME

THIS MESSAGE WAS HANDLED FREE OF CHARGE BY A LICENSED AMATEUR RADIO OPERATOR WHOSE ADDRESS IS SHOWN IN THE BOX AT RIGHT ABOVE. AS SUCH MESSAGES ARE HANDLED SOLELY FOR THE PLEASURE OF OPERATING, NO COMPENSATION, DIRECT OR INDIRECT, PAID OR PROMISED, CAN BE ACCEPTED BY A STATION OWNER FOR THE SAME REASON, NEITHER EVENTUAL DELIVERY NOR ACCURACY OF COPY CAN BE GUARANTEED. ANY PARTY MAY BE FILED WITH THE STATION DELIVERING THIS MESSAGE TO YOU. FURTHER INFORMATION ON AMATEUR RADIO MAY BE OBTAINED FROM A.R.R.L. HEADQUARTERS, 225 MAIN STREET NEWINGTON CONN. 06111

SENT — TO — DATE — TIME

THE AMERICAN RADIO RELAY LEAGUE, INC. IS THE NATIONAL MEMBERSHIP SOCIETY OF AMATEUR RADIO AMATEURS AND THE PUBLISHER OF QST MAGAZINE. ONE OF ITS FUNCTIONS IS PROMOTION OF PUBLIC SERVICE COMMUNICATIONS USING AMATEUR OPERATORS. TO THAT END, THE LEAGUE HAS ORGANIZED AN AMATEUR RADIO PUBLIC SERVICE CORPS (ARPSC), CONSISTING OF THE AMATEUR RADIO EMERGENCY CORPS (AREC) FOR WORK DURING EMERGENCIES, AND THE NATIONAL TRAFFIC SYSTEM (NTS) FOR DAILY NATION-WIDE MESSAGE HANDLING. THE TWO DIVISIONS SUPPLEMENT EACH OTHER IN DAILY OPERATION. MORE INFORMATION IS AVAILABLE FROM A.R.R.L. HEADQUARTERS, NEWINGTON, CT. 06111 U.S.A.

Rules, 32nd VHF Sweepstakes

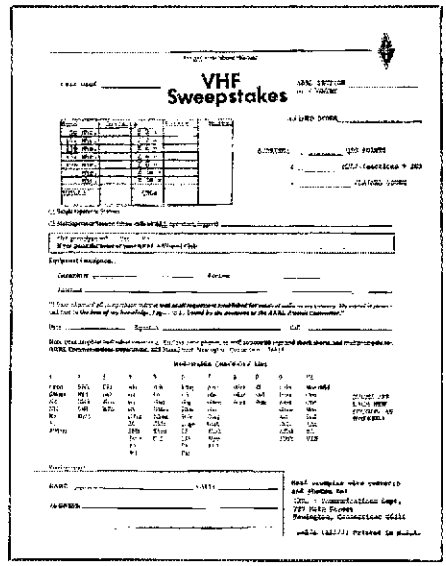
The increased point value for contacts on 220 MHz and up instituted last year seems to have been received well. A couple of minor rule changes have been approved for the 1979 version of the VHF Sweepstakes.

The starting time will be 1800 UTC on Saturday (1 P.M. EST, 10 A.M. PST). Multioperator stations may now elect to give out blocks of consecutive serial numbers rather than one consecutive series for all bands.

The three-tiered club competition rules, instituted with the November Sweepstakes, will continue, with three club gavels awarded — one for each category (see page 66 of August 1978 *QST* for full details).

Remember to note complete exchanges — signal report, section and serial number — in the log and check for duplicate QSOs. Watch the deadline for mailing your log.

Send an s.a.s.e. in early to get summary and log sheets. Please ask for only one of each unless you are unable to make copies.



Rules

1) *Eligibility:* Amateur operators in any ARRL section (see page 8) operating at home, or mobile or portable *under one call,* on or above 50 MHz, are invited to take part. Yukon-N.W.T. (VE8/VY1) counts as a separate multiplier.

2) *Object:* Participants will attempt to contact as many other stations in as many ARRL sections as possible.

3) *Contest periods:* The contest begins at 1800 UTC Saturday, January 20, and ends at 0400 UTC Monday, January 22, 1979.

4) *Exchanges:* Amateurs in the U.S. and Canada transmit the signal report, ARRL section and a consecutive serial number (starting with 001). Multioperator stations may elect to give out blocks of consecutive serial numbers on each band. Foreign stations will give their country name rather than ARRL section. One-way or partial contacts for partial point credit are *not* permitted.

5) *Scoring:* (a) Complete contacts on the 50- and 144-MHz bands count two points each, complete contacts on the 220- and 420-MHz bands count four points each, contacts on the 1215-MHz band are worth eight points each and contacts on 2300 MHz or any higher amateur band count 16 points each. A section only counts once for multiplier credit regardless of band. (b) Foreign entries: All contacts with foreign countries (such as Mexico and the Bahamas) count for score. Each foreign country counts as a separate multiplier. Foreign stations may only work stations in ARRL sections for contest credit. (c) Final score is obtained by multiplying total contact points by the sum of the different ARRL sections worked plus 10. (See the example.)

6) *Conditions for valid contact:* (a) Repeat contacts on different bands may be counted for each different station worked. (Example: K4QIF works W3HMU on 50, 144 and 1215 MHz; 2 + 2 + 8 = 12 contact points, but only one section multiplier.) (b) Crossband work may not be counted. (c) Portable or mobile station operation under one call, from one location only, is permitted. (d) A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest (with the exception of family stations, where more than one call is assigned to one location by FCC/DOC). (e) Contacts with aircraft mobiles cannot be counted for section multipliers.

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.

7) *Awards:* Entries will be classified as single or multioperator, a single operator being defined as one manned by an amateur who neither receives nor gives assistance to any person during the contest period. Certificates will be awarded in each ARRL section to the top-scoring amateur in the single-operator classification. Multioperator work will be grouped separately in the official report of results in *QST;* outstanding multiop efforts will receive certificates.

8) *Conditions of entry:* Each entrant agrees to be bound by the provisions of this announcement, the regulations of his licensing authority, and the decisions of the ARRL Awards Committee.

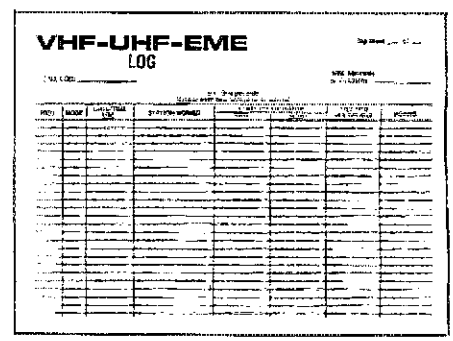
9) *Reporting:* The log should indicate the date/time, band, call sign, signal report, section and serial number for each QSO. Reports must be postmarked no later than February 12, 1979, to be considered for awards.

10) *Information on affiliated club competition is on page 66 of August 1978* QST *and disqualification criteria are on page 83 of February and page 48 (item 26) of September 1978* QST.

Scoring Example

Band	Contacts	QSO Points
50 MHz	5 × 2 =	10
144 MHz	17 × 2 =	34
220 MHz	3 × 4 =	12
432 MHz	3 × 4 =	12
1215 MHz	2 × 8 =	16
2300+ MHz	2 × 16 =	32
Totals	32 QSOs	116

Final score = (number of QSO points) × (the number of ARRL sections).



Hertz, not Parts . . . A Sine of the Times

September 17 Frequency Measuring Test results.

By Jean DeMaw,* W1CKK

Accompanying the FMT entries were many reports of horrendous lightning flashes, thunder and the usual amount of QRM. While expecting a direct lightning stroke momentarily, the umpire managed to get five out of the six W1AW transmissions (the late 20-meter run was nonexistent). Umpire measurements of W1AW for the early run were 14,139.337, 7046.900 and 3513.104 kHz; late run, 7088.790 and 3531.189 kHz.

As stated in September *QST*, Honor Roll listings will be comprised of the top 10 percent of total entries that qualify (within 100 hertz of the umpire). There were 140 participants in this FMT submitting a total of 2183 measurements. Of the participants, 102 numbered within 100 hertz (Class 1 OO qualification). Twenty-six shared the Honor Roll (top 10 percent) for the month of September. They are *K1BC WB1BGW W1PLJ W2AXT WA2ZKD W3KEK W3FSV K4NWE K5JW W5OS K5QH W5QIV WA5QMI W6CDF K6MZN W6RQ W7ANF W7SC W8CUJ WA8NOI W8OK W9LCK W9TJ WØKL KØVM WBØUFQ*, all measuring without error (0 Hz). Well within the 100-Hz limit, with an average error shown preceding their calls, were (1 Hz) W1JH N2LI WA4AXA W4IBU W4NTO WB5AOH W5FMO W5IJW K5RY WB6AAL W6CBX W6CLM ex-7HM W8JLJ KH6CZ, (2) W1HJP WØCZ WØRWG WØRWH, (3) AD4Q W8YZ, (4) N1AS W4RHZ W4YOK K7ST K9WMP WØVQL, (5) W4DRF VE1BAF, (6) WA5NOM VE6QM, (7) W9FN, (8) WB8GUU WØGW, (9) K1VYQ W8LX W8QX, (10) W1DDO, (11) Herr, (12) W3BFF KØBRS, (17) K5DL, (18) WA8QBJ, (20) VE3GIV, (22) W1VH, (23) WAØYCY, (29) K1EB W4HU, (30) AA4KB K8EF W8NWU, (33) WA7HGB, (35) WBØFTU, (44) K6EPX, (47) AA4WF, (49) N1DM K1SF, (50) W7SK, (51) WØSS, (56) W2JJQ, (57) WB9VUO, (62) WA6NQF, (63) VE2JN, (64) WB3ERE, (68) W4NQ (70) W5THT, (74) VE6MJ, (77) WA6IQL, (79) W6NAL, (83) K6HI, (84) W7LBK, (86) K6CL, (87) AD7G, (88) W1SPP, (93) WB4KCL, (95) N2KR.

Stations who failed to meet the 100-Hz criterion, but whose participation is appreciated, include K1MKP, K1OGF, W2DX, W2ND, K2PH, W2RUK, W2XQ, W3ADE, W3DXK, W3PLI, WA3YIV, K4AO, WD4APM, W4AWS, WA4LWO, W4TK, W4TL, W4WWD, K4ZN, K5FSA, N5LB, WB5NGF, WB5UER, K5VRF, W6AEE, WB6BWZ, W6SSB, WB6VWK, W7FIS, WA7OBH, W7HZL, WB7SUW, W8AYI, W8PN, W8XT, WØHRH, WØYRL and WØZHB.

The next Frequency Measuring Test is scheduled for February 12, 1979. Full rules will be in January *QST* under "Operating Events."

*Communications Assistant, ARRL

Strays

HARD WORK OVERCOMES MULTIPLE HANDICAPS

☐ "Ham radio taught me the most important lesson of my life. That is: If you work hard enough, make friends, and have a little luck, you can make something of your life, no matter how severely handicapped you are."

Those are the words of Daryl L. Smith, WB4ALW, of Moulton, AL. Daryl was graduated last May with highest honors with an Associate Degree in Science (general education) from Calhoun College. He is now a junior at the University of Alabama in Birmingham. Pretty remarkable, for a guy who never made it past first grade.

When Daryl was seven, he contracted a rare skin and muscle disease called dermatomyositis which left him blind, unable to walk and unable to use his fingers to read Braille. He's always had an incredible appetite for knowledge, however. With the help of friends, family, tutors and readers, he passed a high school equivalency exam. From there, he attended Calhoun by telephone. Daryl attends classes now via a phone hookup provided by the Vocational Rehabilitation Service.

Daryl became interested in ham radio in 1964, when he listened to a class on Alabama Educational TV. Selton Campbell, K4COY, taught a course in basic Amateur Radio theory and code. Daryl didn't think he'd ever get his ticket, but he enjoyed listening.

One day, his father ran into two friends while he was out buying a used receiver for Daryl. George A. "Pete" Armor, WA4TLD and Leonard Burch, WA4FYO, told him that Daryl could take the FCC amateur exam at home. Everett Fischer, WA4TAL, wrote to the FCC and received permission to administer the test to Daryl. In June 1965, at age 19, Daryl received his Technician license, and got on 6 and 2 meters.

Today, Daryl has a Drake TR-4C, a good antenna system and a 2-meter rig. He says he's not very active on the ham bands, with most of his time being taken up with school work. But he credits ham radio with giving him the impetus to tackle the academic life. When he is graduated from U.A.'s school of Social and Behavioral Sciences, Daryl wants to get a master's degree. He'd like to make a contribution — as a psychologist-consultant to the multi-handicapped. — *Michele Bartlett, N1AGD*

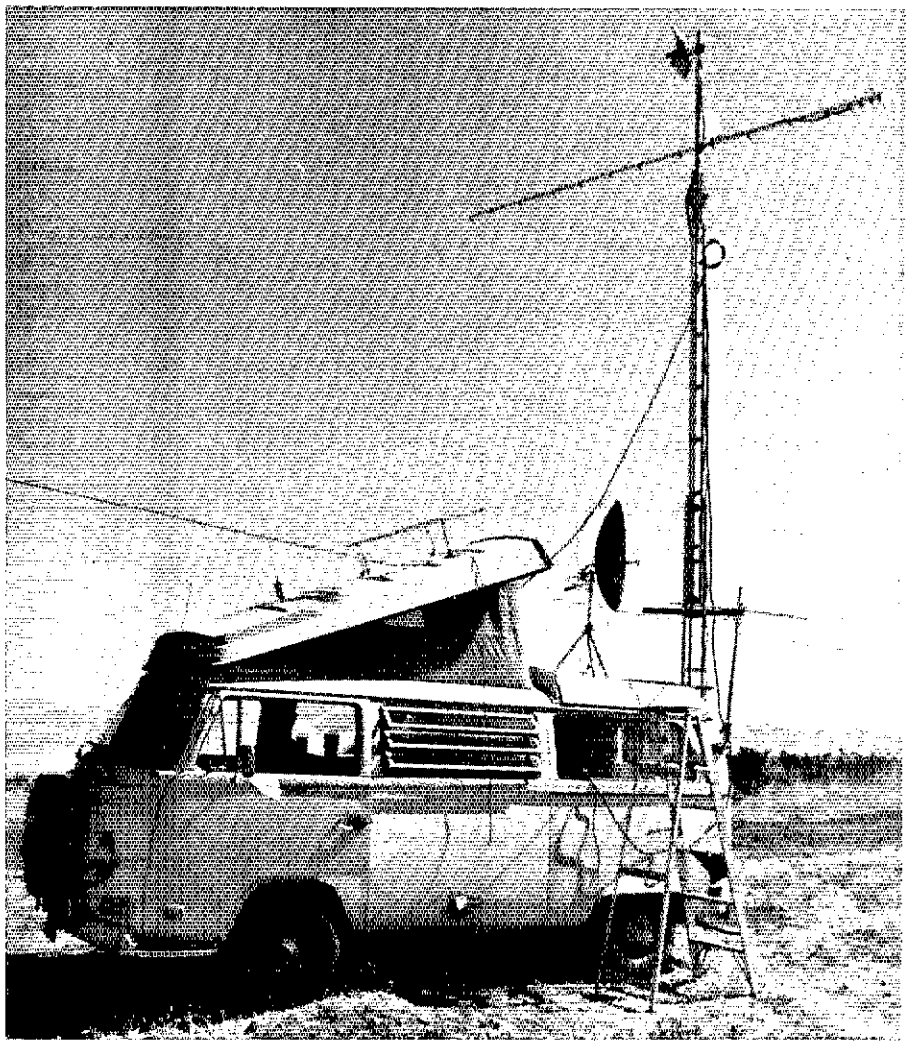
Results, First ARRL UHF Contest

Uhf: Plenty of room and a big challenge!

By Tom Frenaye,* K1KI

The first ARRL UHF Contest can best be summed up by saying that enthusiasm was very high, while the conditions were no better than average and the participation a bit less than expected. All in all, the contest is off to a good start.

Fourteen multioperator and 104 single-operator entries were received. Participation from areas between Illinois in the East and California in the West was mighty slim, but then the population density is pretty low.



The winning Pacific Division score came from N6TX. Paul's Mt. Umunhum effort was made possible by his mobile microwave van.

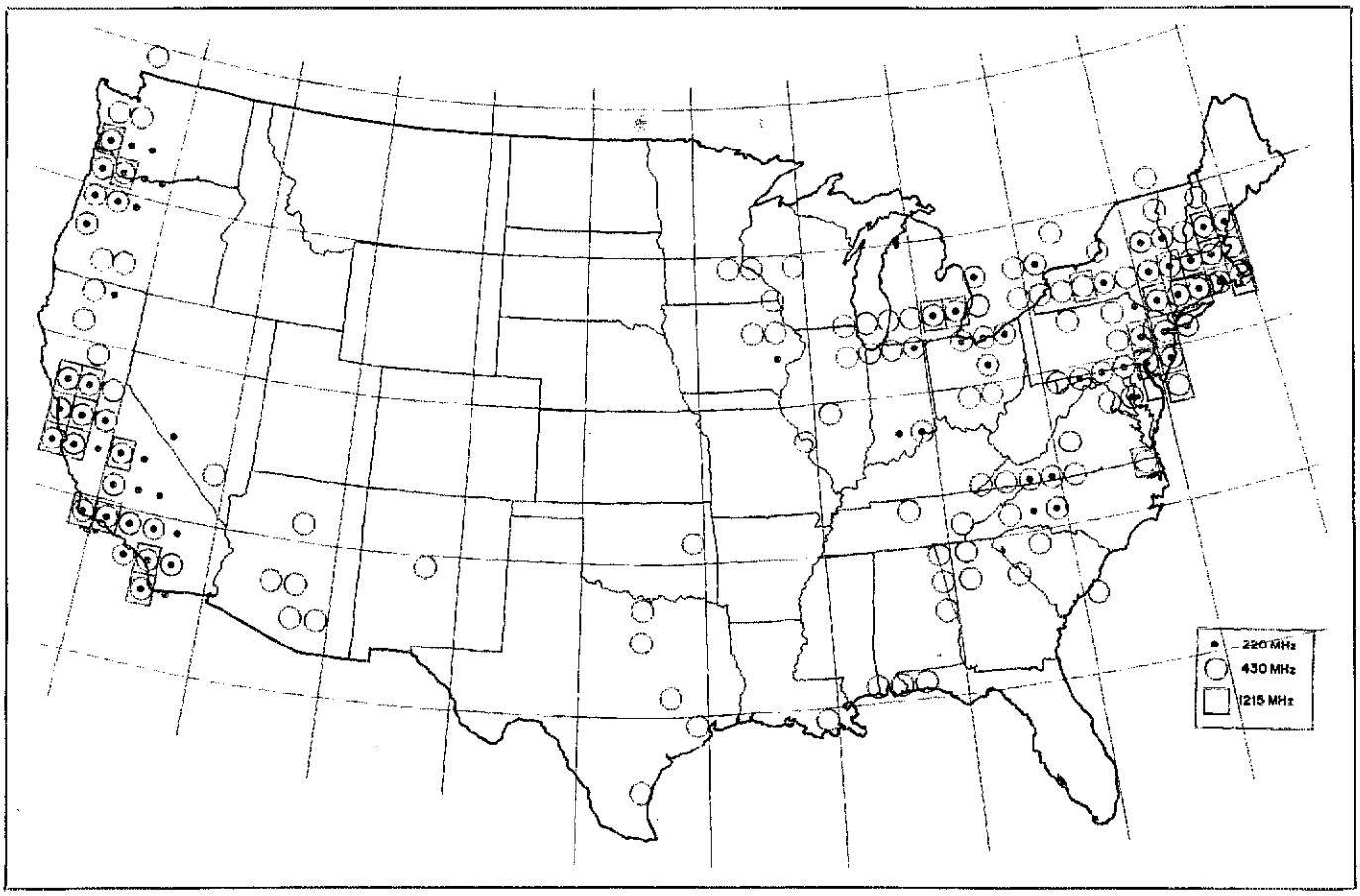
It is not really possible to judge scores on a nationwide basis because of the widely varying numbers of active uhfers. A score of 1500 from Wyoming would have been truly outstanding, but one of 7500 from Connecticut wouldn't have won the division! A comparison of multipliers worked per band will give a better idea of which station/operators deserve the kudos.

Several scores do merit special attention. N6NB cleaned up in the West with 138 QSOs and 37 multipliers from his favorite spot on Mt. Pinos. In the East, K1FO copped the honors with 96 QSOs and 40 multipliers. The W2SZ/1 group blew everybody away in the East with an outstanding score approaching 30,000 points, from their golden mountaintop. In the West, the K7AUO/7 gang used some ingenuity in building up their 7425 point effort. The club (Tektronix Employees RAC) operated from a hill west of Portland, while a satellite group (K7WW/7) headed out on the road — making microwave contacts over 20- to 50-mile paths.

The operating strategies also varied in the single-operator category, with the 220 crowds sharply divided on fm versus ssb. A fair number of 220 fm-only logs were received along with a few stating "no fm," so the battle still rages. N6NB's fine score was greatly aided by his 220-fm setup, though the score would have won the division without fm.

Multipliers on 430 MHz seemed to be easy for K8WW and his four 13-el beams at 85 feet. His total of 27 shows that the Northeast doesn't have it all. WB9SNR, with 21 and VE3BQN at 17 also show that being away from the crowds can be an asset. Of course W3OZ and K1FO may point out that it doesn't hurt to be in the crowd either. N5EX worked everything to

*Assistant Communications Manager, ARRL



The feast or famine levels of uhf activity can clearly be seen on this map. The Northeast has the most concentrated activity, with the 220-, 430- and 1215-MHz bands well represented. Except for a few pockets of 1215 and 220 activity, the rest of the East had to make do with 430 MHz. To the west, pickings were very slim until the West Coast was reached and several areas showed good activity. How will the 1979 map look?

be found within 300 miles and only totaled four.

On 1215 MHz, WA3JUF led single-operator entries with eight multipliers — the pair of 7289s and a 4-ft parabolic dish were put to good use.

Above 1215, it was all W7TYR and N6TX, with help from a few friends and some portable gear.

Only a handful of entries showed any operation above 1215 MHz. That will change in future contests with parts becoming available at less expensive prices and the extra points to be gained (though the incentive may still be too low for many).

A bit of DXpeditioning was undertaken by K6KH and K7WW/7 (+WB7CHK). K6KH made a foray into the mountains to the northeast of Los Angeles on 220 MHz, and the K7WW/7 crew explored Oregon with gear for 220 MHz through 10 GHz (except for 1215 MHz). That's a fine way to see how well your gear works over greater distances, if it can be used in a portable/mobile setup.

The logs show that a total of 80 one-by-one-degree multiplier blocks had 220-MHz activity, 139 on 432 MHz, and 31 on 1215 MHz. Compare that to the 900 or so available and you'll see that there is plenty of room for newcomers to the uhf frequencies.

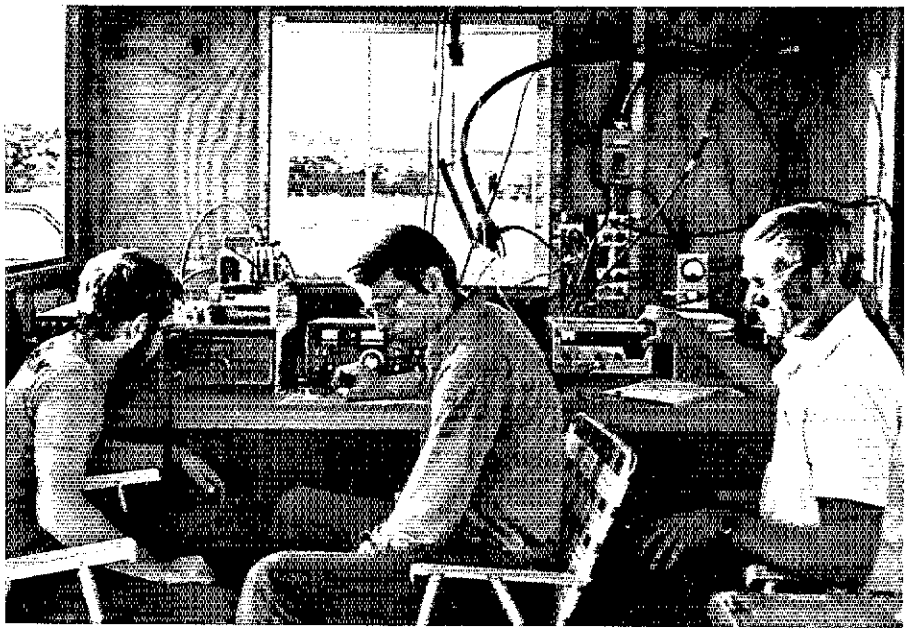
Division Leaders — Single Operator

Canadian Division	VE3BQN	2112
Atlantic Division	W3HMU	8964
Central Division	WB9SNR	1890
Dakota Division	—	—
Delta Division	WB5KIA/ W5UCY	36
Great Lakes Division	K8WW	3645
Hudson Division	K2CBA	5775
Midwest Division	KØDAS	159
New England Division	K1FO	12,480
Northwestern Division	W7TYR	1404
Pacific Division	N6TX	7482
Roanoke Division	K4QIF	1296
Rocky Mountain Division	—	—
Southeastern Division	WB4AEG	90
Southwestern Division	N6NB	15,651
West Gulf Division	N5EX	60

Multiplier Leaders

220 MHz		*432 MHz*		*1215 MHz*			
N6NB	20	K8WW	27	WA3JUF	8		
W2EIF	15	W3OZ	25	N6TX	6		
K2CBA	15	WB9SNR	21	W3HMU	6		
K1FO	14	K1FO	20	W2EIF	6		
W3GPY	12	VE3BQN	17	K1FO	6		
W3HMU	12	W3HMU	17	K3IUV	4		
W1GXT	10	W3IP	17	K2CBA	4		
K6JKQ	10	WA2FUZ	17	W1JR	4		
WN6CND	10	W1JR	17	—			
W2SZ/1*	20	W2SZ/1*	32	W2SZ/1*	10		
WA2SNA*	18	K2UYH*	30	K2UYH*	8		
2.3 GHz		*3.4 GHz*		*5.8 GHz*		*10 GHz*	
W7TYR	2	W7TYR	2	W7TYR/N6TX	1	N6TX	4
K7AUO/7*	3	K7AUO/7*	3	K7AUO/7*	3	K7AUO/7*	1

*Multioperator stations



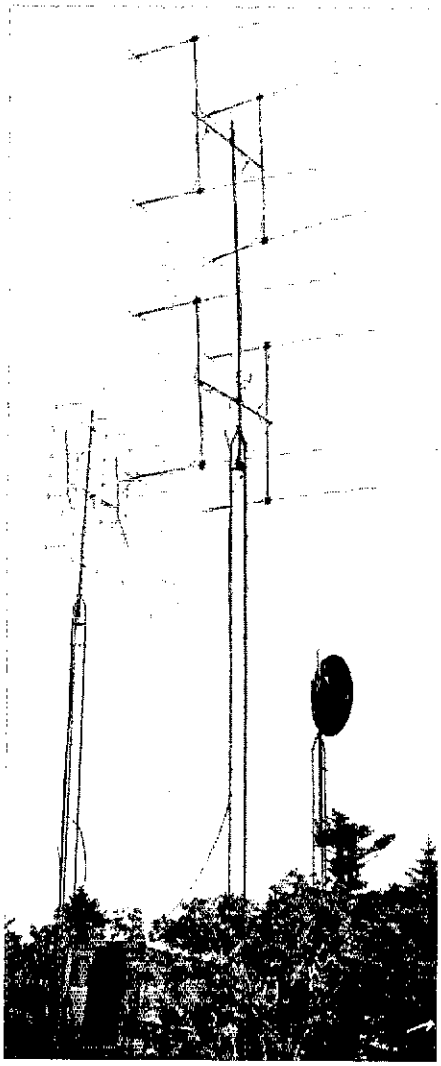
The WB8BKC multiop effort placed first in the Great Lakes Division. Left to right: WA8EUU, WA8HGX, WB8BKC.

The biggest almost of the contest was the "almost QSO" on 432 MHz between WB6NMT and KH6HME. KH6s were heard on 144 MHz on Saturday evening with S7 signals. 432 skeds were made between NMT, HME, KH6BZF, KH6IAA and N6NB with no results. By 8:30 on Sunday morning signals were down to S3 and continuing to drop. Additional skeds were arranged by telephone. WB6NMT reports, "After the 2 P.M. local test, I could hear what was *very* weak scratching on 432.000. It was just too weak to tell if it was Paul (KH6HME), or if it was a TV birdie, or whatever. I made my 2-1/2-minute transmission, and when I stopped (now 432.005), the same weak scratching noise was now on my frequency. It was too weak still to tell just what it was but had a strange feeling it might have been Paul. Just got the confirmation I've been waiting for, it apparently was Paul. He copied my signals S3. I was running 35-W output cw. The signal I was hearing, using a 3-dB NF converter with a 1-1/2-dB loss filter in front, indicated signals were at least 10 dB below the noise, which was virtually nil. I even took the filter out but it remained the same. I suspect that Paul's output power must have been in the very few milliwatts at best. Right after this period all signals (KH6) at my QTH ceased on 144 and 146 MHz. As has been suspected, this apparently followed the same sequence (at least on die out) — the bands may open high, drop down in frequency, and then as the duct goes out, go back up in frequency."

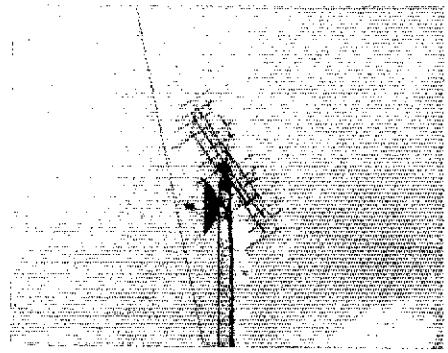
All good things come to those who are patient and persistent. The KH6/W6 432-MHz story isn't finished yet!

Certificates will be awarded to all division winners. In divisions where five to 10 entries were received, the second-place

The uhf setup from Mt. Greylock (W2SZ/1): (left to right) 96-el on 432 MHz; 88-el on 220 MHz; 6-ft solid surface dish for 1296 MHz.



The K2UYH skyscraping antenna consists of a 128-el Yagi array on 432 MHz and a 5-ft dish at 100 feet for 1296 MHz.



The top Canadian score came from VE3CRU, operating from VE3BQN.

Scores list:

Call sign, total score, QSOs, multipliers, bands operated (C = 220 MHz; D = 430 MHz; E = 1215 MHz; F = 2.3 GHz; G = 3.4 GHz; H = 5.8 GHz; I = 10 GHz).

Canadian Division

VE3BQN(VE3CRU,opr) 2112- 6- 5-C ONT 26-17-D
VE3AEA/3(VE3s FDP IQZ,oprs) 120- 8- 5-D ONT

Atlantic Division

W3HMU 8964-25-12-C EPA 34-17-D 10- 6-E 1- 1-F
W2EIF 8910-38-15-C SNJ 36-12-D 8- 6-E
K3IUV 4884-22- 4-C EPA 34-16-D 9- 4-E
W3OZ 4125-55-25-D MD
K2BWR 3243-11- 8-C SNJ 36-15-D
WA3JUF 2808-20- 8-C EPA 2- 2-D 16- 8-E
W3IP 1995- 2- 2-C MD 33-17-D
K3BPP 1638- 7- 1-C EPA 17- 8-D 7- 3-E 1- 1-F
WB3EFM 1248-26-16-D MD
K2LZF 855-11- 9-C WNY 8- 6-D
W3GPY 828-23-12-C EPA
W3CXU/2 594- 6- 5-C SNJ 6- 6-D 3- 2-E
WB2ELB/2 378-14- 9-D WNY
K2EVJ 336- 6- 5-D WNY 4- 3-E
K3GAS 324-12- 2-C EPA 2- 2-D 2- 2-E
AA3W 210-10- 7-C EPA
W3CL 189-21- 3-C EPA
WA3DMF 120- 2- 2-C MD 6- 3-D
W2MRB 90- 6- 5-D WNY
WA3TEM 66-11- 2-C EPA
W3ETB 54- 9- 2-C EPA
WA3VVG 48- 4- 4-D EPA
K3AKR 48- 4- 4-D MD
W3GNR/3(+K3TFL,WA3FFC,WB3DDA) 210-10- 7-D WPA

Central Division

WB9SNR 1890-30-21-D ILL
K9EA 1173- 4- 4-C IND 19-13-D
WA9AHZ 480-16-10-D ILL
K9XY 72- 6- 4-D WI
WA9HCZ 60- 5- 4-D WI

Delta Division

WB5KIA 36- 4- 3-D LA
W5UCY 36- 4- 3-D MISS
WB4JGG 3- 1- 1-D TN

Great Lakes Division

K8WW 3645-45-27-D OH
WB8BEM 2016- 5- 5-C MI
WA4IPI 1581- 6- 2-C KY 27-16-D 17-14-D 2- 1-I
K8DW 1071- 3- 3-C OH 18-14-D
W8IDU 1056-17-11-D MI
K8DIO 990-22-15-D OH
WB8PAT 504-14-12-D OH
WA8ULG 378-14- 9-D MI
K8ZES 270- 3- 3-C OH 7- 6-D
WA8ZCO 84- 2- 1-C MI 3- 2-D 1- 1-E
K8ATQ 27- 3- 3-C OH
WB8BKC(+WA8s EUU HGX) 2997- 8- 7-C MI 27-19-D 1- 1-E

Hudson Division

K2CBA(WB2BYP,opr) 5775-22-15-C ENY 23-16-D 5- 4-E
WA2FUZ 2142-42-17-D NLI
N2CB 1485-33-15-D ENY
K2SHB 720-20-12-D ENY
WA2TEO 351-13- 9-C ENY
WA2EUS 120-10- 4-D NLI
K2UYH(Multiop) 11628-69-30-D NNJ 16- 8-E
WA2SNA(K2BJG,N2AAZ,W2LVT,WA2s DTJ JUO UPK,WB2s LBP LHG UXA, WD2AAI,oprs) 10856-48-18-C NNJ 34-14-D 7- 5-E

Midwest Division

K9DAS 159- 1- 1-C IA 12- 6-D

New England Division

K1FO 12480-29-14-C CT 59-20-D 8- 6-E
W1JR 6048-12- 7-C EM 44-17-D 4- 3-E
WA1TZV 3180- 5- 3-C NH 46-16-D 1- 1-E
W1FMF 2322-12- 5-C NH 31-13-D
W1GXT 2214-21-10-C EM 20- 8-D
K1CM 1665-37-15-D EM
K1MNS 1584- 6- 3-C NH 23-11-D 2- 2-E
W1UHE 1512-36-14-D RI
W1XP 1440-11- 6-C EM 11- 6-D 5- 3-E
WA1FSZ 1260- 7- 3-C NH 19-10-D 1- 1-I
K1ZZ 1218- 2- 2-C CT 27-12-D
K1LPS/1 726-22-11-D VT
W1AIM/1 676-16-12-D VT
K1VYU 480-16-10-D CT
AA1A 384-16- 8-D EM
WA5IOD/1 336- 5- 2-C EM
W9KDR/1 336- 1- 1-C CT 13- 7-D
W1JOT 150- 8- 4-D EM 1- 1-E
WA1HYN 150- 2- 1-C CT 5- 4-D
WA1SQB 84- 7- 4-D CT
K1SU 30- 5- 2-D CT
WA1ECR 24- 4- 2-D EM
WA1RWU 24- 4- 2-D EM
K1LJL 18- 3- 2-D VT
WA1STP 12- 2- 2-D CT
W2SZ/1(WA1UGE,WB1CBH,N4CD, W2GN,N2FU,K2TR,WB2s BXP GFP MHR QCJ,oprs) 29202-41-20-C WM 76-32-D 20-10-E
W1XM(W1XG,K1MK,WA1WTU, W3HQT,WA4TTG,N9AL,oprs) 10830-25-11-C EM 50-21-D 10- 6-E
W1NY(W1KK,WA1RWU,WB1CAC, KA1APR,oprs) 4212-18-12-C EM 36-14-D
WA2JHR/1(+WB4RVA) 3800-14- 6-C EM 38-11-D 4- 3-E

Northwestern Division

W7TYR 1404- 2- 2-C ORE 4- 3-D 3- 2-E 2- 2-F 2- 2-G 1- 1-H 1- 1-I
K7ND 594- 8- 5-C WN 10- 6-D
W7ZSL/7 84- 7- 4-C WN
K7HSJ 72- 5- 3-C ORE 1- 1-D
K7AUO/7(W7s ADV UDM,WB7s FMF UBD,oprs) 7429-20-11-C ORE 11-10-D 2- 2-E 3- 3-F 3- 3-G 3- 3-H 1- 1-I
N7DB/7(+K7TSV) 27- 3- 3-D ORE

Pacific Division

N6TX 7482-22- 5-C SCV 30-12-D 11- 6-E 1- 1-F 1- 1-H 1- 1-I
K6JKQ 2040-16-10-C SJV 14- 8-D 2- 2-E
WB6JMM 576-24- 8-D SJV
WB6KBZ 540- 2- 2-C SCV 13- 7-D 1- 1-E
WA6EKH 72- 8- 3-D SF
K7ZOK 27- 3- 3-D NEV

Roanoke Division

K4QIF 1296-20-12-D VA 4- 3-E
WA4ZIA 660- 4- 3-C NC 16- 8-D
WA4SBC 594-18-11-D VA
K4LHB 390- 8- 6-C VA 5- 4-D
W4MHQ 144- 8- 6-D VA
K4PKV 108- 6- 6-D NC
WA4WZQ/4(+K4YBL,WA4WZP, WB4UDS,WD4s GQU HBU) 540- 3- 3-C NC 15- 7-D

Southeastern Division

WB4AEG 90- 6- 5-D GA
WA4CQG 45- 5- 3-D ALA
W4CSS 18- 3- 2-D NFLA

Southwestern Division

N6NB 16651-99-20-C SB 36-14-D 3- 3-E
WB6NMT 2052- 6- 5-C SDGO 24-11-D 3- 3-E
AC6C 1872-35- 7-C ORG 13- 6-D
WN6CND 1140-38-10-C LA
W6CN 816-34- 8-C LA
W6NXB 540-30- 6-C LA
WA6DCT 483-23- 7-C LA
W7LUX 144- 8- 6-D AZ
K6IBY 108- 7- 5-C ORG
K6TZ(WA3YYG,N6AJA,W6YJO, WA6s ATE MBZ,WB6OUZ,WB9KMO, oprs) 1833-27- 7-C SB 10- 6-D

West Gulf Division

N5EX 60- 5- 4-D NTX
WB5UER 42- 7- 2-D STX

DXpeditions*

K6KH (116-34) 270-15- 6-C ORG
(117-33) 3- 1- 1-C ORG
(117-34) 3- 1- 1-C ORG
(118-33) 6- 2- 1-C LA

K7WW/7(+WB7CHK)
(122-44) 840- 6- 5-C ORE 2- 2-D 2- 1-E 2- 1-G 1- 1-H
(123-43) 48- 2- 2-C ORE 2- 2-D
(123-44) 108- 4- 4-C ORE 2- 2-D 1- 1-F 1- 1-G 1- 1-H
(123-45) 378- 3- 2-C ORE 3- 2-D 1- 1-F 1- 1-G 1- 1-H

* Numbers in parenthesis refer to the longitude/latitude QTH for each entry.

Check Log

K4EJQ/4(K4FJW,WA4s BGS DFS, oprs)

entry will receive a certificate and where more than 10 entries are received, the top three will receive one. Congratulations to all!

Soapbox

The inclusion of 220 MHz (even if it can be argued that 300 MHz and up is true uhf) will hopefully stimulate more cw/ssb activity on that band. Very good. (W3GPY) Thanks to ARRL for providing an opportunity to concentrate on the higher bands in a contest/activity environment. (W3HMU) Much activity on 23 cm. Let's do it again next year! (W1JR) Why longitude first? Since the birth of the latitude-longitude system of coordinating, latitude is first. As an old navigator, I consider this *heresy*. (WA5IOD) The contest did bring some old-timers out of the woodwork. (W7LUX) Cool, dry air did nothing good for tropo. Activity was not at all up to my expectations. (WB9SNR) Of the contests you have created and sponsored, this is the most worthwhile. (K8ATQ) I don't know how I worked anyone on 1296 — when I checked the transmitter I could not find the output on a 1-watt scale!!! (W2EIF) The station will have many changes for the next contest in August 1979. Contacts on 5.8 and 10 GHz should be worth more than the 12 points — perhaps 20 points to increase the interest and payoff for effort expended. Contacts above 10 GHz should be worth 30 or 40 points, as long as equipment is not just commercial signal generators. (W7TYR) We got eight members to take part and you will get logs from most. (W6CN for the Northrop Radio Club) I've had more contacts on a normal weekend. (AC6C) How about multipliers on the basis of *differential* in lat/long? This would encourage more DX work. (K7HSJ) [How about it? — Ed.] My dog watched, does that make me multiop? (WA8ULG) Met a few new stations, but no new states. (WA4IPI) Conditions were average with no special propagation enhancements evident and plenty of rain at most locations. (K2UYH) I was pleased to hear all of the OSCAR users trying terrestrial operation. (W1AIM) Best DX from here (on 432) was K2UYH — 335 miles. Even K1ZZ with his low power was no problem. I don't know if I dare suggest the adoption of the grid-coordinate scoring system for all vhf contests. It would likely be a burden on 6 m. Still . . . it would be a nice way to come up with a scoring system that would give the stations in the boondocks a fighting chance. (K1LPS)

Strays

***QST* congratulates . . .**

☐ Bill Leonard, W2SKE, who has been named executive vice president and chief operating officer of CBS News. Recipient of many professional awards, he has been licensed since 1935 and has many operating achievements, including a DXCC total over 200.

☐ Alvino Rey, K6UK, who was inducted into the Steel Guitar Hall of Fame. His plaque read: "Big-band pioneer, sound effects and tuning innovator, and father of the pedal steel guitar."

☐ Dr. William C. Hess, W6CK, upon acceptance of his manuscript, "Pioneer Radio," for publication as a hardcover book with the assistance of the Pasadena (CA) Public Library.

Results, 1978 September VHF Contest

From the "fabled Northeast" to Pike's Peak to Guam, mediocre conditions couldn't stop the enthusiasm this year.

By Tom Frenaye,* K1KI

Ho hum! Another September VHF Contest is over. Was it as dull as usual? Well, not quite. The usual complaints about September conditions were there, and in greater numbers since the increasing sunspot levels were supposed to help out on 6 meters at least. And, the usual numbers records were broken.

So, where was the action? The recent single-operator king of the West Coast (N6NB) decided to do battle from the Northeast and nearly pulled off another top score. Last year's top multioperator group (W2SZ) was cooked by the microwave equipment from W1FC. Some very interesting DX entries even came through and the intense competition this year produced more than a normal level of complaints.

First, some of the numbers. A total of 338 entries was received, not much different from the total last year. Thirteen new division records were set, up from last year's 10. Both multioperator and single-operator records were set in the Atlantic, Dakota and Southwestern Divisions. Three records from before 1970 were topped. The 14-year-old multiop record of WØDK/Ø from the Rocky Mountain Division was more than doubled by the NØKV group from the top of Pike's Peak, and the 1966 Midwest Division multiop record set by the WØLB group was almost tripled by KØTLM and crew. Eastern Pennsylvania provided the new Atlantic Division single-operator record score of WA3AXV, which topped K3IPM's 1969 effort. The contest family at K5CM more than tripled the old West Gulf Division multioperator record.

Average scores were well up over last year. The smallest score in the top ten single-operator listings is more than 9000 points higher, and the number 10 multioperator score is more than 17,000 points above the 1977 scores. This seems to accurately display the growth in vhf/uhf activity especially on 430 and 1215 MHz reported by many participants.

A look at the top ten scores nationwide shows nothing but W1s, W2s and W3s making it in the single-operator category, while the W4BFB/4 group and W8VP managed to invade the multioperator top ten list. Those west of Ohio are hurt by the lack of numbers and sections to be worked.

A listing of the top five scores west of the Mississippi should give some recognition to those a bit handicapped: Single operator — W6YKM, N6TX, W6XJ, N6CT, WB6NMT; Multioperator — WB6KBZ, K6KLY/6, K5CM, WA6EJO, K6MEP. Of course, those in Wyoming or New Mexico probably will always have to be satisfied in other ways.

The big multioperator battle was between W2SZ/1 and W1FC this year. The W1FC mob showed the group from RPI that just having gear from 50 to 1215 MHz isn't enough anymore. Couple that with a hefty edge in 2-meter contacts and the W2SZ multiplier total just didn't make it. The WA2RIU-WA2SNA battle for third was close but RIU's edge in contacts made up for SNA's edge in multipliers.

The single-operator battle between K1FO and N6NB/1 was a classic. Put together K1FO's years of experience from his New England lowland QTH and N6NB's Vermont mountaintop location and West Coast contesting background and the stage was set for a rough battle. Add to that lost luggage, 4-1/2 hours of lost operating time, freezing temperatures in Vermont and the cozy, familiar operating position in Connecticut, and K1FO was smiling. The difference was the 220/430-MHz contacts for the most part. N6NB is making no excuses, however, and is planning to have at it again from the "fabled Northeast."

The lack of lengthy 6-meter openings in the continental U.S. didn't seem to discourage KG6JIH (N6AJ). From his Guam QTH he managed a staggering 358 6-meter QSOs, including such catches as Hong Kong, Australia, and Papua New Guinea in addition to 348 contacts with Japan. Not too bad when you consider Japan is 1450 miles away! The log from PAØXMA showed 96 European contacts and eight multipliers but the contest rules say those outside of the ARRL sections can only count QSOs with stations in

*Asst. Communications Manager, ARRL

Top Ten

Single Operator		*Multioperator*	
K1FO	45,676	W1FC/1	88,740
N6NB/1	44,226	W2SZ/1	77,441
WA3AXV	43,128	WA2RIU	62,720
W3HMU	24,310	WA2SNA	56,924
W2EIF	23,205	W3AD	50,281
K2CBA	23,100	W4BFB/4	45,480
WA2DPU	22,272	K3LZ	40,032
N3AHL	22,072	K2GE	38,055
WA1NGR/3	21,417	W1XM	36,010
W1JR	21,056	W8VP	33,123

WB4CHZ (left) and WB4OUT, doing a little 6-meter action at 3 A.M. on Sunday. George and Dave were with the WB4LHD/5 multiop expedition to Arkansas.

WA3AXV, the number 3 single operator in the 1978 September VHF QSO Party.

Division Leaders

Single Operator			*Multioperator*	
Call	*Score*	*Division*	*Call*	*Score*
*WA3AXV	43,128	Atlantic	*W3AD	50,281
*K9KFR	20,351	Central	W9NWE	26,910
*KØCJ	1,392	Dakota	*KØVXM	6,222
*WB4JGG	9,456	Delta	WB4LHD/5	5,022
WA8OGS	9,560	Great Lakes	W8VP	33,123
K2CBA	23,100	Hudson	WA2RIU	82,720
*WBØZXU	3,456	Midwest	*KØTLM	3,799
*K1FO	45,676	New England	W1FC/1	88,740
WA7KYZ	1,649	Northwestern	K7MM/7	155
W6YKM	12,635	Pacific	*WB6KBZ/6	31,995
WA2FGK/8	8,077	Roanoke	W4BFB/4	46,480
WA7KYM	308	Rocky Mtn	*NØKV	2,325
*WA4FBH	5,670	Southeastern	*W4VO	15,121
W6XJ	6,335	Southwestern	WA6EJO	9,900
WB5WJT	806	West Gulf	*K5CM	18,630
VE3BQN	12,054	Canadian	VE3AEA/3	2,373
JE1HYR	1	DX	K4GFG/C6	124

*Indicates new division record.

ARRL sections, thus his score of zero with eight multipliers. Any enthusiasm out there for a rule change?

Now for the problems. More than the normal number of complaints were received this year, and warnings have gone out to a few. The most abused rule seems to be the one transmitter per band rule, with several stations claiming to have heard others on both 2-meter fm and ssb at the same time. A few single-operator stations were noted transmitting on more than one band at once — another no-no. The fm versus no-fm debate still appears to be raging, but the compromise four-hour limit on .52 and limited simplex frequencies seem to be the best solution for the time being.

A number of complaints also pointed to stations not using portable i-ds. If you are out of the call area your call sign indicates, you must sign portable (K1KI portable in ENY must sign K1KI/2 but when portable in VT, just K1KI is sufficient).

Another problem that gives fits to those checking the logs is the multioperator station that works every operator at the station on 2 meters or works one of its members on 10 GHz in the next state. Is it fair to count QSOs with your own operators? Some logs show a 15-20 QSO or several multiplier increase in the score. What say on this one? Comments appreciated.

While on the subject of problems, logging and the associated paperwork with submitting a valid vhf contest entry come to mind very quickly. A few tips to help overcome this obstacle are in order: First, log contacts in *UTC*, not local time. Makes it easier on us and easier when going back in your own log for QSLing purposes. Next, duplicate contacts left in the log are a surefire way to some heavy-duty score reduction. Remember, you can only work a station *once* per band, regardless of mode used. And finally, in logging the contact for contest purposes, be sure to supply all the needed information for each and every contact: date, time (in UTC), freq./band, call sign of station worked, and the *complete* exchange required for a valid contest contact. The paperwork might be a drag, but a top-notch contest score very rarely results from a sloppy, incomplete entry.

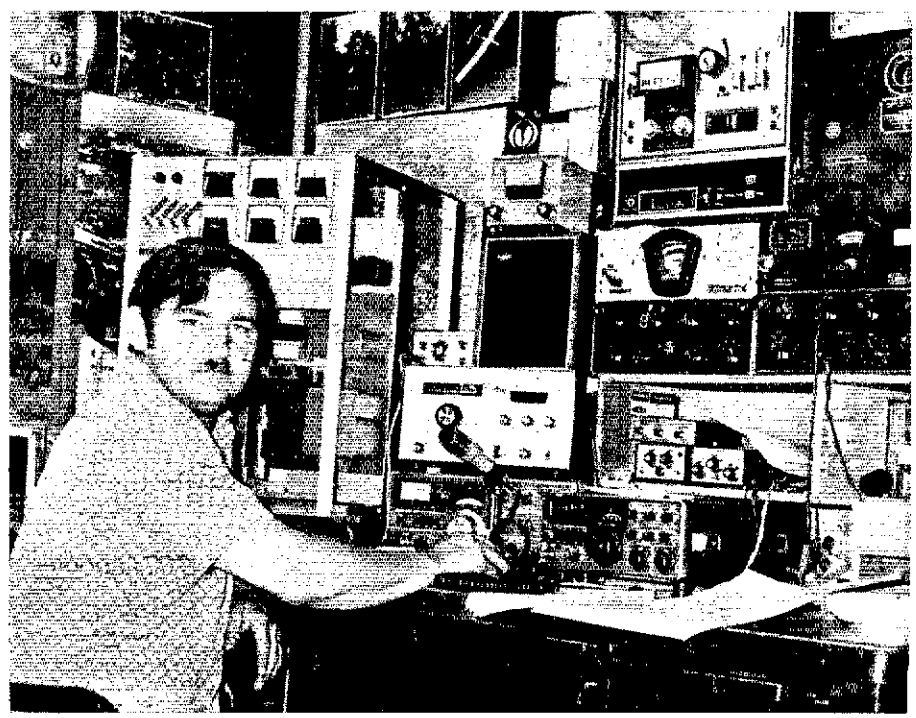
That about puts the wraps on another September VHF QSO Party report. If you liked it, tell us so. If you didn't like it, let us know that, too. We are always looking for ways to improve our reporting, but we don't know if you don't tell us.

CU in the January VHF SS.

Soapbox

Steve and I planned to operate from Mt. Equinox in Vermont. Neither Steve nor I had ever operated in a contest before and we thought that Vermont would be a needed state for the fellows in the NY-NJ metro area. Boy, were we surprised. After driving for over four hours from NJ, we climbed Mt. Equinox and spotted a 2-meter beam above the motel on the top of the mountain. We later learned that K1BF, Bart, was also going to operate in the contest from the mountain. Bart, Steve and I (WB2CZB) agreed that one station would be operated near 144 MHz and the other station would be operated higher up, about 144.200 MHz or so to minimize QRM. It looked as though we could work it out. Just before the contest started, N6NB, Wayne, arrived atop the mountain, all the way from California. Could three stations operate the contest, separated by only several thousand yards? You bet we did. Bart operated mostly cw

The number 1 single operator from the Western Pennsylvania Section, WA3CPH.



QSO Leaders

Multioperator

50 MHz		144 MHz		220 MHz		430 MHz		1215 MHz	
W2SZ/1	258	W4BFB/4	556	WA2RIU	144	W2SZ/1	101	WB6KBZ	14
W3AD	256	W1FC	532	K6KLY/6	90	WA2FUZ	69	W1XM	13
WA1LUJ	240	K6KLY/6	366	WB6KBZ	82	K2GE	64	W1FC	13
W1FC	212	WB6KBZ	351	K6MEP	75	W1XM	62	WA2RIU	11
WA2SNA	201	K2GE	347	K3LZ	67	WA2SNA	60	K6KLY/6	10

Single Operator

KG6JIH	358	WB2WIK	467	W6NXB	51	K2RIW	94	N6TX	17
N6NB/1	196	K9KFR	273	WA3AXV	51	K2UYH	92	K2UYH	16
WA8OGS	178	K1FO	266	WB6FTW	49	K8WW	72	W1JR	10
K2CBA	156	W9IP	237	W2EIF	46	K1FO	70	WA3JUF	9
W9OEH	141	VE3BQN	233	W3HMU	40	WA3AXV	69	WA6GYD	9
								W6XN	9

at the low end of 2. Steve and I operated ssb above 144.150. And Wayne operated the other bands as much as possible, using 2 when our station was off the air. We were all able to operate with a minimum of QRM to each other. (WB2CZB/1) We checked 6 meters constantly. Even took the rig to the beach with us, but no Es. Very disappointing! (K4GFG/C6) Activity on 6 meters for the contest seemed rather low. Scatter conditions were excellent from this area, supplying many needed multipliers. (WB8IWI/4) Until this contest, I have pretty well had the band to myself here in Ottawa. But, VE3ASO moved to town just before the contest and now talk about QRM! I can appreciate what it must be like in the NLI-NJ-EPA area. (VE3FN) Very disappointed in conditions. Two meters produced beautiful contacts into the NYC area. When will the 6-meter boys smarten up and leave 50.1-50.125 for cw operations? Tremendous signals on 432 from VE3-land. 220 MHz stunk. (WA2FGK/8) It may sound a little bit weird, but would like to see "altitude kilowatts" appropriately handicapped. A system similar to the one used by the FCC to figure repeater output power would work just fine. I would not propose to regulate erp based on altitude, but only to regulate input power, so as not to penalize an ingenious antenna system. TGFTOFTT means Thank God For Tropo On Four Thirty-Two. (KB4BT) Getting the score that we had is all the more remarkable considering that the site was shut down for a few hours because of tornado warnings. However, as soon as the winds died down, the crew remanned the site rather than shutting down permanently. No Delaware Section again. I make a motion that if we don't work them next time, that Delaware be canceled for lack of interest. (W3GNR) These signal reports on ssb are guesses only. I think we should drop the "S" meter readings in these contests and use only "Q" readability. (K9ZNK/8) Can't ever remember working so many Vermont stations as in this contest. (K1FO) Finally made my goal of 50 QSOs on 432. (W1JR) While our lowly 16 points may sound like we weren't trying, my wife, WB7OSC and I have concluded that working a vhf contest from a rural area, away from major populated areas, is just about hopeless. We were somewhat limited in that we only had 2-meter fm, but we did borrow an amplifier. It might be interesting to note that we worked only one active contest station (W7DG) and all seven others were just passing by the frequency or dragged away from the repeaters. I called and called until I was blue in the face, but nobody answered those calls. We also left the rig on 146.55 all night, while we slept, but nothing was heard. See, I told you it's dead around here on vhf! (WA7PTM) After operating 6, 2 and 220 during vhf contests from southern Ontario, it was sure different up here in northern Ontario. Every contact had to be earned. I was disappointed with the number of sections worked, but pleasantly surprised by the number of stations worked, helped a great deal by the fm activity from Sault Ste. Marie, some 160 km (100 miles) away. Highlight of the contest was a successful sked with KØMQS in Delta, IA, 957 km (595 miles). I've worked him three times in as many weeks, but there was no inversion this time. (VE3EMS) I always thought 432 MHz was a hard band to get on and even harder to make a contact on. With the help of W2AZL, WA2DPU and WB2IFC, I was able to get on 432 for the contest with a borrowed rig. What a surprise, I worked 10 states and 12 sections in the contest. Best DX was W1FC in New Hampshire about 250 miles away. (WB4NXY/2) Many violations of the rule requiring "no transmitting of two modes on the same band at the same time" were noted. (WB2RJL) WA4GPM, watch out — next June, I'm going to be number 1 in Virginia. (N4CD) Never turned on the 5894 amplifier and still snagged 13 sections on 3 watts of cw on 144 MHz. (WA2ANZ) Generally a poor contest. . . . Just like last year. The whole contest period sounded like an extended version of the Sunday morning tropo sessions that we used to have from Wisconsin to pick up those East Coast sections. Lots of tantalizing signals, but nothing lasting long enough to work, save a few very short openings. (WØRIB)

Update

The log from VE2DFO was delayed due to Canadian postal problems: 11,001-178-57-ABD.

Multiplier Leaders

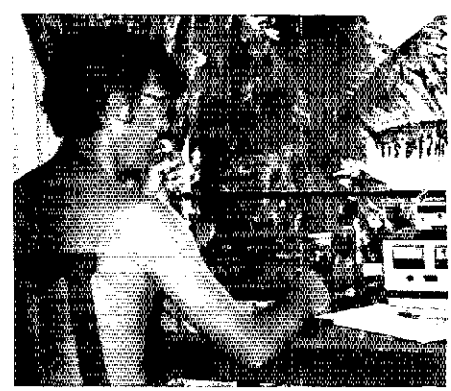
Multioperator

50 MHz		144 MHz		220 MHz		430 MHz		1215 MHz	
W9NWE	31	W3GNR/3	23	W2SZ/1	17	W2SZ/1	21	W2SZ/1	7
W3AD	30	W2SZ/1	23	K3LZ	14	WA2FUZ	19	W1FC	7
WA1LUJ	28	W3AD	22	WA2SNA	13	K2BWB	19	W1XM	6
W8CCI	28	VE2DFO	22	WA2RIU	13	WA2SNA	18	WB6KBZ	4
K5CM	27	W2OW	21	W1FC/1	11	K3LZ	16	K6KLY/6	4
		K3LZ	21	W3AD	11				

Single Operator

WB8IWI/4	34	WB2WIK	23	N6NB/1	13	K2RIW	21	K2UYH	9
WA8OGS	31	W2AV	23	K1FO	12	K2UYH	21	WA3JUF	7
WA4FBH	31	N6NB/1	22	W3HMU	11	W3OZ	20	K2CBA	6
WB4JGG	30	K1FO	22	WA3AXV	11	K2LGJ	19	K1FO	6
W9OEH	30	VE3FN	21	W3GPY	11	K8WW	18	W1JR	6
		VE3UH	21			W3HMU	18		
						WA3AXV	18		

If there was a competition for the best scenery in the September vhf bash, WB4KGY operating the multiop station, K4GFG/C6, would have won, palms down.



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-50 MHz, B-144 MHz, C-220 MHz, D-430 MHz, E-1215 MHz, F-2304 MHz, G-3300 MHz, H-5 GHz, I-10 GHz).

U.S.A.

1

Connecticut

K1FO 45,676-463-76-ABCDE
K1EM 6758-218-31-AB
K1TX 3264-159-28-BCD
WA1ZNT 4588-148-31-AB
W9KDR/1 3906-115-31-ABD
WA1CVN 2525-101-25-AB
K1ZZ 1530- 83-18-BC
KA1BU 1120- 80-14-B
W1WHL 1104- 69-16-A
W1JA 1014- 78-13-B
K1UJ 663- 47-13-BC
W1FAJ 585- 37-13-BC
K1JD 432- 36-12-B
K1KI 396- 33-12-A
WA1UJR() 364- 33-11-B
WA1LQU 207- 23- 9-B
WH1FAU 161- 18- 7-BD
WA1LUJ(K1ZKR,WA1s HYN LMZ RLV,oprs) 27,144-458-58-ABCD

Eastern Massachusetts

W1JR 21,056-237-64-ABCDEF
W1GXT 5728-132-32-BCD
K1GVM 4805-135-31-ABD
W1CRL 1848- 67-24-ABD
WB1FKF 1751- 89-17-BD
WB1FQD 1140- 60-19-AB
K1MHC 351- 39- 9-B
W1JOT 124- 16- 4-BDE
WB1F0K 108- 15- 6-BD
W1XM(K1MK,N1RC,W1XG, WB1CQR,WA4TTG,oprs) 36,010-443-65-ABCDE

Maine

K1TOL 3380-130-26-A
WB1AAF/1(+K1JO,WA2NKL) 3450-129-25-BD
K1CZ(+K1TMJ,KA1BFK, WA1JAS) 1260- 63-20-AB

New Hampshire

W1EJ 15,174-228-84-ABCDE
WA1FSZ 10,481-193-47-ABCDE
AC1J 4216-122-31-ABD
W1JSM 520- 40-13-B
W1EC(+W1s CF KXL LMZ IBX DUW DVC,K1s KA KEC RX EA VB JZS PGO PEK LL GW, WA1s ZSF ZPA FSZ ZTC AMU, N1s AAP BCI 88,740-869-87-ABCDEGHI
WB1CAG(K1ZJY,WA1SUH,WB1s FGV FGW,oprs) 442- 34-13-AB

Rhode Island

WA4MMP/1 3190-110-29-AB
W1BAT(K8BGZ,opr) 2210-130-17-B
WA1PBR 1702- 37-37-ABC
WA1CSO 1665-111-15-B
W1OH(+K1GNW,KA1BT) 4292-148-29-AB

Vermont

N6NB/1 44,226-454-81-ABCDF
K1LPS/1 4644-101-36-ABD
W1AIM 4212-105-36-ABD
K1GVT 810- 27-15-AB
W1EXZ 160- 20- 8-A
WH2CZB/1(+WB2ZJH) 4218-222 19-B
K1COW/1(+WB1DRW) 4080-134-30-ABD
WB1FPT(+WB1s B2R CNF) 550- 46-11-BD

Western Massachusetts

K1JX 1395- 93-15-B
WA1UOL 686- 43-16-AB
K1TK 392- 56- 7-B
K1JG 204- 17-12-B
W2SZ/1(WA1s HCO UGF,WB1CBH, K2TR,N2FU,W2GN,WA2s FKS SPI,WB2s BXP GFP PKO, WA2USA,oprs) 77,441-676-91-ABCDE
W1NY(AC1T,K1BE,KA1APR, W1KK,WA1s CYK ECR RWU, WB1CAC,oprs) 25,704-459-56-ABCD
WB1AKT(+WA1s UWX WRK WRM) 3120-130-24-AB

2

Eastern New York

K2CBA(WB2DNE,opr) 23,100-270-70-ABCDE
K2OY 9576-207-42-ABC
K2SHB 2948- 98-26-AB
WA2ANZ 819- 63-13-B
W2IP 231- 21-11-B
WA2PVV(+K2WF,KA2APE, WB2MJS,WB4BMZ) 12,408-233-47-ABD
WA2FPF(+KA2AKS,K2QE,WA2s FPG OQN YGE,WB2F PL) 2495- 95-26-AB

New York City - Long Island

K2RIW 3948- 94-21-D
WA2SLY 3260-113-21-B
WA2DZD 627- 51-11-BL
WA2EUS 374- 30-11-BD
WA2FUZ(+WA2YJF) 18,200-281-52-ABD
K2OVS(Multiop) 7272-202-36-AB

Northern New Jersey

WB2WIK 10,741-467-23-B
WB2WIH 4760-170-28-AB
WB2CUT 3971-209-19-B
WB2NCF 3015-201-15-B
WB2IZC 2208-147-15-B
W2AQJ 1216- 64-19-B
WB2TFH 680- 40-17-AB
WB2CHE 660- 55-12-B
WA2RIU(+K2KJI,WB2YEY) 62,720-680-70-ABCDEI
WA2SNA(K2BJG,N2AAZ,W2IHM, WA2UPK,WB2s ARS JCP JUO LBP LHG QEA QOQ,oprs) 56,924-636-76-ABCDE
K2GE(K2s FD KFE KZ MS YSR ZGF,KA2AVV,N2AAR,W2s JDH TIN,WA2s CHN GUM NXK OJH TGA,WB2s BUR DRZ MSQ NXK ONA PLU SNN UYX,K9ZBV,pprs) 38,055-557-59-ABCD

Southern New Jersey

W2EIF 23,205-257-65-ABCDE
WA2DPU 22,272-322-58-ABCD
WA2KOK 11,270-204-46-ABCD
WB4NXY/2 10,350-197-46-ABD
K2UYH 7080-108-30-DE
W3CXU/2 6200-108-40-ABCDE
W2PAU 5740-164-35-ABC
WB2YEH 4440-134-30-ABC
W2HXF 532- 48-14-B
K2BWR(+K2ZRJ) 18,147-200-69-ABCD
WA2DKB(+WB2s JGQ MIC VWW) 7320-156-41-ABD

Western New York

K2YCO 8924-158-46-ABCDE
W2AV 3059-133-23-B
K2UBC 2356- 62-19-D
K2EVJ 1794- 56-23-ADE
WA2BPE 1404- 78-18-AB
K2KGE 1014- 78-13-B
N2JY 988- 76-13-AB
WA2AWX 750- 50-15-AB
W2WGL 720- 45-16-B
K2TTI 671- 58-11-BD
K2OEQ 560- 53-10-ABD
WA2MQP 116- 58- 2-B
W2OW(AA2M,K2OC,N2HR, WA2s BSN IKO RXY THS WYQ, WB2s GXW SGJ,oprs) 15,870-332-46-ABC
WB2RJL(+WA2KGM,WB2s IEY KWT) 11,400-286-38-ABD
WA2ZJF(K2BKW,KA2s AJV AJW,WA2RQC,WB2s FBP NFB MYY MYZ MMA,oprs) 9760-230-40-ABD
WA2ZKD(+W2s AV HYI,WA2s EWU VCM,WB2s FKY KAO, WB8RKV) 7378-198-34-ABCD
W2DUC/2(+N2AFR,W2GPT) 2982-142-21-AB

3

Delaware

K3SXA 5220-139-29-ABCD
W3BDP 1456- 91-19-B
AC3T 114- 12- 6-BC
W3CGV 100- 10- 5-D

Eastern Pennsylvania

WA3AXV 43,128-479-72-ABCD
W3HMU 24,310-268-65-ABCDE
N3AHJ 22,072-313-62-ABD
WA3JUF 7800-157-40-BCDE
WA3VJU 6365-185-29-AB
WB2RBG/3 4224-132-32-AB
W3IT 3484-109-26-ABC
K3IUV 3392- 71-32-ABCDE
N3ET 3200-160-20-B
W3CLQ 2755-145-19-B
W3ETB 1786-113-25-ABC
W3CL 1547- 64-17-ABC
K3KEL 1350- 75-18-B
WA3ETR 988- 52-19-B
W3GPY 528- 24-11-C
AA3W 510- 30-17-B
WB3FTD 120- 24- 5-B
W3FMF 80- 16- 5-AB
W3AD(K2NE,KB3AP,N3s EG KT, WA3s RKM WUL,WB3s CIL CTU, oprs) 30,281-685-77-ABCD
K3LZ(+WB2YEH,K3UU,WA3s KPP LBI NAY PUL TUL WAK ZFD) 40,032-449-72-ABCD
W3L(PW3s GFN JUZ,WA3JXW, opr) 5082-154-33-AB

Maryland - D.C.

WA1NGR/3 21,417-296-59-ABCD
W3XO 17,576-298-52-ABD
K3HCE 14,112-256-48-ABD
W3OZ 3320- 83-20-D
W4NVW/3 1997-103-18-ABC
W3HQX 1495-115-13-B
K3AKR 882- 45-18-ABD
W3MSN 390- 38-10-ABC
W3BOU 60- 20- 3-B
W3PGA/3(K3s CWZ FRX PHH ROJ YZY,N3IT,W3s JDF VRD,WA3s FHV HZJ LAW OTZ QKB,WB3s ACE BGS BIT,oprs) 14,688-271-48-ABCDE
WB3DPN(+WA3NQU) 3384-141-24-AB

Western Pennsylvania

WA3CPH 2550-150-17-B
WB3CBB 2373-113-21-A
W3BWU 1240- 62-20-AB
W3GNR/3(+K3s PS TFL,W3INK, WA3s BUX FFC GQU FFN,WB3s DCZ DDA DVR,oprs) 21,106-419-57-ABD
W3KWH(K3RYA,W3s ION SVJ TVB,WA3FYJ,WB3s BRV EHQ, oprs) 5973-181-33-AB

4

Alabama

WA4NPL 1760- 80-22-AB
WA4CQG 975- 53-15-BD
KA4AOK(+KA4CFZ) 112- 14- 8-AB

Georgia

WA4FBH 5670-135-42-AB
N4QH 1410- 93-15-AB
N4UZ 60- 20- 3-AB
AK4T 40- 20- 2-B
W4VO(K4CKS,WA4KPU,WB4s AEG REX YWK,oprs) 15,121-295-48-ABCD
WD4IIS(+WB4NMA) 6690-210-30-ABD

Kentucky

WA4IPI 6510-145-29-BCD
WB4PUV 4200-210-20-AB
W4SMU 1020- 99-10-BD

North Carolina

WA4GBE 832- 45-16-ABC
W4BFB/4(AA4s SC ZZ,AI4A,K4s BF LVV SE SLC,N4AFY,WA4VCC, WB4s FDU NDB PCS TLX,WD4s ABZ LMM ODM,oprs) 46,480-776-56-ABCD
KB4BT(+N4s SM YN,WD4s AAY MCH) 6200-178-31-ABCD
W4GG/4(W4s ACY AKU ANM MR, WA4MYQ,oprs) 1092- 71-13-ABC
WA4WZQ/4(+K4YBC,WA4WZP, WB4s HIE UDS,WD4s GQU HBU) 980- 28-28-ABCD

Northern Florida

WA4LYS 448- 56- 8-B
W4NVV 440- 40-11-AB
W4CSS 372- 26-12-ABD
W4EQR 315- 28- 9-BD

South Carolina

WB8IWI/4 4046-119-34-A
K4GMJ 750- 50-15-AB
WB4FEV 500- 50-10-AB
WB4NBK 200- 25- 8-AB
N4JK(+W4FVV,WA4JWC, WB4JWR,WD4EUH) 1008- 88-16-AB

Southern Florida

WB8IGY/4 360- 30-12-AB

Tennessee

WB4JGG 9456-185-48-ABD

Virginia

N4CD 5850-189-30-ABCD
WD4MUO 5016-216-22-BD
WA4GPM 4698-124-29-BD
K4LHB 3688-120-26-BC
W4DFK 3465-165-21-B
WA4SBC 3025- 95-25-ABD
W3IY/4 2160-108-20-AB
K4JST 1032- 86-12-B
W4MHQ 988- 57-13-ABD
K4FJW 616- 44-14-AB
WB2JAY/4 60- 10- 3-C
K4EJQ(+AA4OO,W4ATC,WA4s BGS CBX DFS KMG OFP QYK, WD4s AGO MBK,oprs) 13,332-275-44-ABCD
K32J/4(+WD4s OQW RMJ) 1615- 95-17-AB

5

Arkansas

WB5JAR 444- 37-12-AB
WA2QVI/5 270- 30- 9-AB
WB4LHD/5(+WB4s CHZ NWE OVT, WD4JHD,WA5s BHS UMP) 5022-154-31-ABD
N5DL(+WD5s CAN CAP CLR, N0ACI) 1900- 95-20-AB

Louisiana

K4CHE/5 312- 26-12-AB
WB5LBT 256- 33- 7-BD

Mississippi

W5UCY 441- 39- 9-BD
WA0DXZ/5 198- 22- 9-B

Northern Texas

K5GMX 516- 43-12-AB
WB5KTC 384- 47- 8-ABD

Oklahoma

K5CM(+K5s MWH SW,N5KW, WB5HLR)18,630-312-54-ABD

Southern Texas

WB5WJT 806- 53-13-ABD
WB5UER 432- 61- 6-BD

6

East Bay

N6AMG 1150-115-10-AB
K6KLY/6(+WA6JUD) 28,730-596-38-ABCDE

Los Angeles

WB6OKK 2760-138-20-AB
W6GGV 1596- 68-21-ABD
WA6HXD 639- 71- 9-B
W6NXB 408- 51- 4-C
W6CN 342- 32- 6-BC
K6PHE 116- 29- 4-A
N6YB 110- 16- 5-BC
W6PFE 76- 19- 4-B
WB6TAM(WA6NIS,WD6EBJS CGF DRI,oprs) 2299-150-11-ABC

Orange

WA6PMX 1664-128-13-AB
WB6MFW 198- 22- 9-AB

Santa Barbara

W6HDO 792- 26- 8-BD
WA6EJO(+W6OAL,WB6IMM, WB9KMO) 9900-219-33-ABCDE
K6MEP(+K6VMN,WA6s FPX IJZ, WB6EDA) 8096-285-22-ABCD
K6HXW(+WA6WTH) 5632-146-32-ABCD

Santa Clara Valley

N6TX 10,980-206-36-ABCDEFHI
WA6GYD 3960-142-22-ABCDE
W6XN 3610-121-19-BCDE
K6SLQ(K6MO,opr) 150- 17- 6-BCD
WB6KBZ(+K6GSS,WA6s HCI TJO) 31,995-561-45-ABCDEF

San Diego

W6XJ 6335-172-35-ABD
WB6NMT 4864-127-32-ABCD
WB6FTW/6 3840-191-16-ABC

San Francisco

N6CT 5903-207-26-ABD

San Joaquin Valley

W6YKM 12,635-301-35-ABCDE
WA6ALA 490- 49-10-B
W6DPD 120- 10-10-ABC
N6PR 102- 17- 6-B
N7EU/6(+KB6DK,WA6s OEF RAK, WB6QYM,WD6GVZ) 759- 69-11-AB

Guam

KG6JIH 2154-359- 6-AB

Hawaii

KH6BZF 1- 1- 1-B

7

Arizona

WB4PBC/7 1- 1- 1-B

Idaho

KB7AQ/7 216- 24- 9-AB
K7MM(+KA7AGR,WB7s RNW WBZ WIA) 159- 31- 5-AB

Montana

WB7CLS/7 10- 10- 1-B

Nevada

N7AKB(+K7ICW) 684- 56-12-ABD

Oregon

W7TYR 540- 49- 9-ABCDE
K7HSJ 432- 40- 8-ABCD
N7DB 144- 13- 8-ABCD
WB7OSC(+WA7PTM) 16- 8- 2-B

Washington

WA7KYZ(K7BBO,opr) 1649- 84-17-ABCDE
K7ND 957- 67-11-ABCD
W7IDZ 138- 23- 6-AB

Wyoming

WA7KYM 308- 28-11-AB

8

Michigan

WB8BGY 9146-255-34-ABD
WB8DU 4284-127-28-BCD
WD8QWP 3360-152-20-ABD
WA8ABN 1743- 83-21-AB
WB8AAX 720- 90- 8-B
WB8WIM(+WB8UHS) 490- 49-10-AB

Ohio

WA8OGS 9560-239-40-AB
K8NXI 6960-157-40-ABD
K8DIO 3542-134-22-BD
WA8TTS 3432- 52-32-ABD
K8WW 2592-144-18-D
K8DW 2508- 88-22-ABD
K8ZES 1296-101-12-BD
WD8DVD 180- 30- 6-A
WD8RMT 115- 23- 5-B
WD8NMY 80- 20- 4-AB
WD8RDA 78- 25- 3-B
W8VP(K8AL,KA8AME,W8s LBB PR,WA8AHD,WB8s DQE ERB ONY SXT TSI,WD8s AHV AKI KTK LVJ QJB,oprs) 33,123-478-61-ABCD
W8CCI(W8s DJY UL,WA8WMH, WB8s EEX NFJ,oprs) 22,446-353-58-ABD
WA8PLZ(WA8SVV,WD8s MSF ROD, oprs) 4698-162-29-AB
W8GOH(+WB8HEG) 2112-132-16-B

West Virginia

WA2FGK/8 8077-174-41-ABCD
WB8AEC 4158- 96-33-ABD
K9ZNK/8 2831-149-19-B
WB2DIN/8 2295-153-15-B
K3LNZ/8(WA3s EOQ NZL,W4PSJ, oprs) 18,352-313-54-ABCD

9

Illinois

GW3NJY/W9 11,439-245-41-ABD
K9HDE 1701- 66-21-ABD
W9IVI 1190- 70-17-AB
W9ABA 1062-118- 9-B
WB9SNR 860- 43-10-D
K9RQL 529- 47- 7-B
W9MTS 132- 22- 6-D
WA9AHZ 88- 22- 4-B
W9NWE(+K9CT,N9SS,WB9YUN) 26,910-371-65-ABCD
W9IP(+K9s AKS PW VV) 14,520-330-44-AB
W9ZX(+WB9s SKB VOV) 2958-102-29-AB

Indiana

K9KFR 20,351-398-47-ABD
W9OEH 12,584-286-44-AB
WA9PKL 4154-134-31-AB
WB9NTL 4152-173-24-AB
WB9LCN 1781-137-13-B
WB9FNR 423- 43- 9-BD
W9ERW 140- 20- 7-B
K9SLQ(+K9MRI) 7770-236-30-ABD
K9IU(WA2s BIJ ECZ,W3EP,WB9s BEH VVV,oprs) 2565-135-19-AB

Wisconsin

WA9JFM 1595-145-11-B
K9XY 897- 56-13-ABD
WA9SNU 832- 57-13-BCD
N9TD 315- 35- 9-B
WA9SUJ 154- 22- 7-AB

0

Colorado

WB0TTW/0 249- 83- 3-B
WH0YS/0 198- 66- 3-B
N0KV(+WA0GFS,N0BZ,W0MBZ) 2325-150-15-ABD

Iowa

WB0ZXU 3456-133-24-ABD
K0DAS 2014- 88-19-BD
WB0VYV 1598- 94-17-AB
W0RAP 1458- 66-18-BD
W0XF 1248- 71-16-BD
K0CY 579- 48-11-BD
WA0TAQ(+W0MJP,WB0BUO, WD0AQP) 385- 35-11-AB

Kansas

N0LL 480- 32-15-AB
W0RT(+KU0BY) 108- 18- 6-B

Minnesota

K0CJ 1392- 72-16-ABD
W0RLI 1284-107-12-AB
WD0EKL(+WB0SYL,WD0FFA) 1144-104-11-AB

Missouri

WB0UFQ 1944-101-18-AB
K0TLM(+WA0WPJ,WB0IRJ) 1798-114-29-ABCDE
WB0RJR(+WB0GLT) 420- 35-12-AB

Nebraska

WA0IWF 1620-114-12-ABCI
K0US 405- 45- 9-B
WA0MRH(+W0EKB) 1800- 90-20-AB

North Dakota

W0RIB(+WB0s QVC TEE UOR YJG) 112- 16- 7-AB

South Dakota

K0VXM(+WB0TEM) 6222-166-34-ABD

VE

Maritime - Newfoundland

WB2RLK/VE1 21- 7- 3-A

Quebec

VE2KW 660- 44-15-AB

Ontario

VE3BQN(VE3ABG,opr) 12,054-289-41-ABCDE
VE3UH 11,154-266-39-ABD
VE3FN 1870- 85-22-B
VE3EMS 1034- 94-11-B
VE3FHM 800- 45-16-ABD
VE3EVW 495- 24-11-BD
VE3AEA/3(VE3s FDP IQZ,oprs) 2373- 93-21-BD

British Columbia

VE7XF/7 392- 56- 7-AB

DX

Bahamas

K4GFG/C6(+K4XF,WB4KGY) 124- 31- 4-AB

Japan

JE1HYR 1- 1- 1-A

Netherlands

PA0XMA 0- 0- 8-BD

Check Logs

WB3AIT,W4MNZ,W7FN,WB8GEX

Operating Events

DECEMBER

2-3: 160-Meter Contest, EA Contest phone, **Telephone Pioneers QSO Party, Connecticut QSO Party, International Island DX Contest, Flatland Farmer 10-X QSO Party, Garden City Contest,** November, page 94. **Alexander Volta RTTY DX Contest,** from 1200Z December 2 through 1200Z December 3. Sponsored by the *Associanzione Radioamatori Italiani* for the 14th annual event. Stations make two-way RTTY contact on all hf amateur bands. Work each station once each band. Contacts with your own country are not valid. Contacts on 7 MHz count double, and on 3.5 and 28 MHz count triple points. QSOs within your own ITU zone count 2 points only. Scoring: Total exchange points as above times the ARRL DXCC countries, U.S., VE and VK call districts worked, plus 1000 bonus points for each I/IS/IT station worked on all five bands during test. Awards. Logs for each band should be air mailed not later than January 20 to A.V. RTTY DX Contest Committee, c/o SSB & RTTY Club, P. O. Box 144, 22100 Como, Italy, Europe.

7: West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z. The run takes place at 9 P.M. PST the night of December 6. Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send to ARRL for grading. Please include your full name, call (if any) and complete mailing address. A large, stamped, self-addressed envelope will help to expedite your award/endorsements.

9-10: 10-Meter Contest, EA Contest cw, **HA-DX Contest,** November, page 94.

15: W1AW Qualifying Run, 10-40 wpm at 0300Z. This is 10 P.M. EST on December 14. Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 and 147.555. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send to ARRL per the instructions under the December 7 listing.

16-17: 10-X Winter CW QSO Party, SOWP Christmas CW QSO Party, November, page 94.

17: 75th Anniversary of Powered Flight, 24-hour period starting at 0000Z December 17. Sponsored by the FAROUT ARC. Special-event station WB8SMC will operate on 3.9 7.23 14.28 on ssb and 3.53 7.03 and 14.03 on cw. Certificate of commemoration for all stations who contact WB8SMC. Send QSL and large, stamped, self-addressed envelope to Frank B. Stilwell, WB8OFR, 5326 Brainard Dr., Kettering, OH 45440.

24: HA-WW Contest, November, page 94.

27: W1AW Qualifying Run, 10-35 wpm at 1400Z. This is 9 A.M. EST on December 27. All other details per the December 15 listing.

JANUARY

1: Straight-Key Night, the full 24-hour period. This is a friendly meeting on the air, using straight keys; from 0000-2400Z. Suggested areas of operation on 80, 40 and 20 are 60-80 kHz up from the bottom edge of the cw band; 10 kHz up from the bottom of each Novice segment. When participating, please use SKN in lieu of RST, preceding the 3-digit report, to clue in "passersby." Following SKN, send a list of the calls of the stations worked plus your vote for the best fist heard during that period (not necessarily one you've worked). This is not a contest and we aim to keep it that way! Vote too for the most interesting QSO of the period. With your report include any interesting appropriate photos for consideration. See page 72 of October's issue for a bit of flavor from the July running of SKN.

3: West Coast Qualifying Run, (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z. This is 9 P.M. PST the night of January 2. All other details per the December 7 listing.

6-7: CD Party, phone, open to all appointees and officials, notified separately by bulletin. (Eligibles operate any 20 hours of the 30-hour period; times off 15 minutes or more. Party starts 2300Z January 6 and ends 0500Z January 8.)

9: W1AW Qualifying Run, 10-35 wpm at 0300Z. This is 10 P.M. EST on January 8. Other details per the December 15 listing.

13: SARC VHF Contest, a six-hour contest sponsored by the Schaumburg Amateur Radio Club. For rules and log sheets send a stamped, self-addressed envelope to the club at P. O. Box 94641, Schaumburg, IL 60194.

13-14: VHF SS, details this issue, **CD Party,** cw, see details under January 6-7 listing. (Starts 2300Z January 13 and ends 0500Z January 15.) **YU-DX Contest,** cw, from 2100Z January 13 through 2100Z January 14. Sponsored by the SRJ, operation is on 80 meters only. Work any station calling CQ YU. Scoring 1 point for contacts with stations in your country, 2 points for same continent, 5 points for different continent and 10 points for each YU worked; multiply times the ARRL DXCC countries worked and each YU prefix worked. Single and multioperators. Awards. Logs with summary to YU-DX Club SRJ, P. O. Box 48, 11001, Belgrade, Yugoslavia, postmarked by March 15.

26: W1AW Qualifying Run, 10-35 wpm at 2400Z. This is 7 P.M. EST on the night of January 26. Other details per the December 15 listing.

27-28: Simulated Emergency Test, details this issue, **CQ 160-Meter Contest, French Contest,** cw from 0000Z January 27 through 2400Z on January 28. Limited to 36 hours for single operators. Sponsored by the *Reseau des Emetteurs Francais* (REF). Contact only with French-speaking countries (multipliers are the 95 French departments shown as two numbers after the call sign of an "F" station, DA1 and DA2 signing /FFA; OZ stations — 9 provinces, DA2 stations signing /FBA; HB stations with 22 cantons (two letters) and others with prefixes HH/LX/OD/VE2/3B/9Q/9U/9X). Exchange RS(T) followed by serial number of the QSO. Scoring 3 points for each QSO on the same continent, 10 points for different continent. Multiply QSO points times multipliers. Awards. Logs with multiplier list for each band must be submitted to: REF French Contest, Sq. Trudaine 2, 75009 Paris, France, Europe.

28-29: 1979 Classic Radio Exchange, from 2000Z on January 28 through 0300Z on January 29. Sponsored by the Southeast Amateur Radio Club, K8EMY. Open to all. Work any stations calling CQ CX on cw and CQ Exchange on phone. Noncontestants may be worked for credit. Suggested frequencies cw up 60 kHz from the bottom end of each band; 3.91 7.28 14.28 21.38 28.58 on phone and 3.72 7.12 21.12 and 28.12 for Novices. Object is to enjoy older equipment. A Classic Radio is any gear built since 1945, but at least 10 years old. Exchange name, RS(T), QTH, receiver and transmitter type (homebrew send PA tube, e.g., "6L6"). Scoring: Add the different transmitters, receivers, states/provinces/countries for each band, multiply by the total number of contacts. Multiply that total by the total years old of all transmitters and receivers used, three QSOs minimum per unit. For transceivers, multiply years old by two. (No multiplier for gear less than 10 years old). Logs to Stu Stephens, K8SJ, 2386 Queenston Rd., Cleveland Heights, OH 44118. Send s.a.s.e. for results.

FEBRUARY

1: West Coast Qualifying Run, (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z. The run will take place at 9 P.M. PST the night of January 31. Other details under the December 7 listing.

3-11: Novice Roundup, details next month.

7: W1AW Qualifying Run, 10-35 wpm at 0300Z. This is 10 P.M. EST on February 6. Other details per the December 15 listing.

11: Frequency Measuring Test, details next month.

17-18: YL-OM, phone from 1800Z February 17 through 1800Z February 18. Sponsored by the YLRL, open to all. OMs work YLs and vice versa. All bands may be used. Contact each station once per band and mode. Exchange RS and ARRL section or DXCC country, as applicable. Scoring one point per QSO times sections/countries worked. Awards. Logs not later than March 18 to Margaret Williams, WA4FTJ, 965 Redwood Circle, Virginia Beach, VA 23462.

21: W1AW Qualifying Run, 10-35 wpm at 2100Z. This is 4 P.M. EST on February 21. Other details per the December 15 listing.

24-25: French Contest, phone details shown under January 27-28 listing. QST

MARCH

3-4: DX Competition, phone
17-18: DX Competition, cw

APRIL

21-22: Earth-Moon-Earth Competition (Part 1)

MAY

19-20: Earth-Moon-Earth Competition (Part 2)

JUNE

9-10: VHF QSO Party
23-24: Field Day

Strays

QST congratulates . . .

☐ Sergeant First Class Dennis D. Watters, WBØTAX, who has been selected as the U.S. Army (active) Drill Sergeant of the Year. A 13-year veteran, Watters went through five levels of screening and was selected for technical competence, devotion to duty, and superior performance. His favorite amateur activity is cw on the low ends of 40 and 20 meters.

☐ Greg McIntosh, WDØAJY, who, at the age of 13, passed the Amateur Extra Class exam.

☐ Ivan Coggeshall, K1AVG, recipient of the Haraden Pratt Award for outstanding service to the Institute of Electrical and Electronics Engineers.

☐ Dr. Thomas W. Comstock, N5TC, who recently received the Distinguished Service Award from Texas A & M University for his work as faculty advisor to W5AC, the university club station.

☐ Nolan E. Kienitz, WB5WAX, recently named assistant chief of communications of the Associated Press, NY.

☐ Pat West, W7EA; George Jacobs, W3ASK and Robert Duggan, Jr., N4IA, who were among the 15-member IEEE delegation to the USSR 1978 Popov Society Congress, held in Moscow during May.

☐ Dr. Tom Gavan, N8TG, recipient of the 1977 Outstanding Contribution to Microbiology award from the South Central Association of Clinical Microbiology.

I would like to get in touch with . . .

☐ members of WAMCATS during 1927-30. WAMCATS (Washington-Alaska Military Cable and Telegraph System) was a component of the U.S. Army Signal Corps until just before WW II, and handled all commercial communications within Alaska, and between Alaska and the continental U.S. George Maki, W6BE, 1417 Pacific Ave., Santa Barbara CA 93109.

Operating News

Conducted By George Hart,* W1NJM

Forty-Year Reminiscences

The note in the annual reports. The new W1AW. The need for a second operator. The gleam in the eye. The application. The encouraging response. The trip to New York. The Class A exam. The 3 A.M. arrival in Hartford. The fleabag hotel. The breakfast with Ed Handy. The hiring. The search for a room. The row of gleaming W1AW kilowatts. The euphoria of operating them. The glamor of dedication day. The late night hours. The getting used to the routine. The settling down. The courting trips to Northern Pennsylvania. The ceremony. The two-day honeymoon. The return to the grind. The new home in Newington.

The war. The extension of W1AW. The closing of W1AW. Draft jitters. The moving of efforts to 38 La Salle Road. The temporary departure of Handy. Assistant communications manager. The departure of Huntoon. Acting communications manager. Draft deferments. WERS. Equipment Bureau. Meters for Unk Sam. Keeping field organization alive. Greeting, 1-A. Basic training. AACS headquarters, Asheville. Hams, hams, hams. Officer Candidate School, San Antonio. New second looey. AAFTAC. Back to AACS, different stature. RTTY detachment. Air Force Communications Reserve plan. The atom bomb. The surrender. The thrill of hearing W1AW again. Overseas. D4ALS. Separation at Fort Dix.

Back to ARRL headquarters. The new training program. The departure of Hill. National Trunk Line manager. Assistant communications manager, cw. The departure of Hayes.

*Communications Manager, ARRL

National Emergency Coordinator. The start of NTS. Lousy conditions. The start of RACES. The frustrations and disappointments. The extensive traveling. NSCDARA. USCDARA. Smooth sailing. Good times. FCDA. OCDM. OCD. Hamfests, conventions, club meetings. Growing children. Unproblem problems. The new Headquarters. Moving problems. The rehabilitated W1AW. An assistant NEC. The prospective Ed Handy retirement. The anxiety. The sleepless nights. The wrestling with temptation. The weighing of alternatives. The promotion. The expanded responsibilities. The reorganization. Personnel problems. Turnover. No respite. Always something. The settling down. The acclimatization. The routines. Red Cross. Advisory Committees. Area Staffs. NCS, DCPA, FDAA, MARS, NWS, FCC and other government alphabet soup. The confusion. Board Meetings. Departmental investigation.

The Huntoon retirement. New boss. The club program separation. Headquarters reorganization. Still newer boss. The expansion. New concepts. More sleepless nights. More personnel problems. Morale. The approaching date. The decision. The approach of WARC. The anticipation. The relaxation.

Literary buffs (of which I am supposed to be one, but ain't) probably have a word for the kind of style exemplified by the above, the purpose of which is to cram a great deal into a small space. Indeed, reminiscences of 40 years at Headquarters could occupy several volumes, as those who have retired before me with this much service or more can readily testify. The above account terminates three weeks short of retirement date, so it didn't seem right to put a final period on it.

By the time you read this, the writer will have left Headquarters and will be on the way south to enjoy a winter free (we hope) from New England horrors. But we leave behind much family and many friends and shall not long tarry there. You can expect to hear W1NJM at the usual places doing the usual things again next spring.

A parting message? We have already given several of them in more private circumstances. To you the member and the reader we can only say that this is your magazine and your organization and your desires, in the final analysis, shall shape it. If you dislike what it is or seems to be becoming, look for the solution in yourselves, not in "the ARRL" (Headquarters) or the directors (whom you elected). Ask not what the ARRL can do for you. Ask . . . . .

ELLEN WHITE RESIGNS

When Ed Handy, a dear and beloved friend of us all, retired in 1967 and I became (for lack of someone better being available) communications manager, I raised multitudes of eyebrows by selecting Ellen White as the deputy communications manager, the no. 2 person in the department. Personally, I had not the slightest hesitancy about doing this, and if I had the choice to make all over again would hesitate even less, raised eyebrows to the contrary notwithstanding. Ellen was well versed in those specialties which were not a part of my own conditioning, and possessed all the other leadership requirements and qualifications in addition. During our 11+ years of working together, Ellen supervised one side of the department, I the other, with a considerable amount of give and take, but guess who had to make the final decisions and take the responsibility for them? Oh, we had our differences of opinion on many issues, but, especially on those having to do with matters on her side of the department, I didn't always cause my own views to

W1AW Operating Schedule (October 29, 1978-April 29, 1979)

PST	CST	EST	UTC	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
6 A.M.	8 A.M.	9 A.M.	1400	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]		
7	9	10	1500	←	←	Cw Bulletins[3]	→	→		
8	10	11	1600	←	←	RTTY Bulletins[4]	→	→		
1 P.M.	3 P.M.	4 P.M.	2100	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Slow[1]
2	4	5	2200	←	←	Cw Bulletins[3]	→	→	→	→
3	5	6	2300	←	←	RTTY Bulletins[4]	→	→	→	→
4	6	7	0000	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Fast[2]
5	7	8	0100	←	←	Cw Bulletins[3]	→	→	→	→
6	8	9	0200	←	←	RTTY Bulletins[4]	→	→	→	→
6:30	8:30	9:30	0230	←	←	Phone Bulletins[5]	→	→	→	→
7	9	10	0300	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Fast[2]	Slow[1]	Slow[1]
8	10	11	0400	←	←	Cw Bulletins[3]	→	→	→	→
9	11	12	0500	←	←	RTTY Bulletins[4]	→	→	→	→
9:30 P.M.	11:30 P.M.	12:30 A.M.	0530	←	←	Phone Bulletins[5]	→	→	→	→

[1]Slow code practice on cw bulletin frequencies, 8 minutes each session: 5, 5, 7-1/2, 7-1/2, 10, 13, 15 wpm.
[2]Fast code practice on cw bulletin frequencies, 8 minutes each session: 35, 30, 25, 20, 15, 13, 10 wpm.
[3]Cw bulletins, 18 wpm, on: 1.835, 3.58, 7.08, 14.08, 21.08, 28.08, 50.08, 147.555 MHz.
[4]RTTY bulletins 60 wpm/170-Hz shift on 3.625, 7.095, 14.095, 21.095, 28.095 147.555 MHz.
[5]Phone bulletins on 1.835, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.
Please note that all footnoted frequencies are approximate.

Normal W1AW visiting hours are 3:30 P.M. to 1 A.M. seven days a week (local Eastern Time). The station address is 225 Main St., Newington, CT 06111 (about seven miles south of Hartford). Note: ARRL office-visiting hours are 8 A.M. to 5 P.M. Monday through Friday. Maps with local street detail are available upon request. If you wish to operate when visiting, you must have your original operator's license with you. The best time for visitors to operate is on weekdays between 1 and 4 P.M. local time. (Schedules can also be arranged to work W1AW.) The station will be closed December 25, 1978 and January 1, 1979. *Staff:* Chief Operator/Asst. Communications Mgr. C. R. Bender, W1WPR; Chris Schenck, W1EH; Bruce Brightman, WA1PAL.

In a communications emergency monitor W1AW for special bulletins as follows: *phone* on the hour, *RTTY* at 15 minutes past the hour, *cw* on the half hour.

To improve your fist by sending in step with W1AW (but not over the air!) and to allow checking the accuracy on certain tapes, note the UTC dates and *QST* text to be sent in the 0300 practice from the issue of *QST* two calendar months past: December 1, It Seems to Us; December 5, World Above; December 11, League Lines; December 14, Public Service; December 20, Happenings; December 29, Operating News.

prevail. It was strictly a harmonious working relationship, and it did work.

One of the things "wrong" with Ellen White is that she is a wife and a mother — in other words, a woman, a complete woman. Now you may say that the concept that a woman belongs in the home is out the window, but there are still many (not surprisingly, almost all males) who cling to this idea and fight for it. A woman communications manager? Somehow, the idea didn't seem to appeal to a great many male members. An OM operator taking orders from a YL operator? It was a hard concept for many to swallow. Well, we have a YL club and training manager, don't we? Yes, but the concept is a little different. Club and training is an educational sort of thing, and women teachers are acceptable to male chauvinists. Why, shucks, we have never even had a YL director.

In any case, Amateur Radio and the League have lost a great asset.

The question naturally arises, who will now be the ARRL communications manager? At the moment of writing, we cannot answer this. Whoever it is, be (or she) has our best wishes and perhaps a little bit of our sympathy. We think the Hart/White act just may be a difficult one to follow. — *W1NJM*

SCM ELECTION RESULTS

The following were elected for two-year terms of office beginning January 1, 1979.

Uncontested

NYC and LI	Paul A. Lindgren, WA2UWA
MO	Larry G. Wilson, KØRWL

Appointments

In the North Dakota Section, Lois A. Jorgensen, WAØRWM, was appointed to complete the term (until April 1, 1979) of Mark J. Worcester, WAØWLP (resigned).

MEET YOUR SCM

Manitoba SCM Pete Guenther, VE4PG, was first licensed in 1951 (although holding an interest in Amateur Radio dating back to pre-WW II, in 1940). Pete holds an Advanced class license, and was formerly VE4AK; born in Steinbach, currently residing in Morris, Manitoba. He is a self-employed freelance advertising salesman, and when time permits enjoys fishing, hiking and camping in beautiful Manitoba. Annually, VE4PG participates in the Simulated Emergency Tests, as well as the "real thing" when it happens. Equipment in his shack includes a Kenwood TS-520 and an ICOM IC-22S. Favorite bands include 80/75, 10, 2. The K9 in the photo seems to be the second op.

Manitoba SCM Pete Guenther, VE4PG.

OSCAR 7				OSCAR 8			
Ref. Orbit	*Date (UTC)*	*Time (UTC)*	*Long. W.*	*Ref. Orbit*	*Date (UTC)*	*Time (UTC)*	*Long. W.*
18495	1 Dec.	0009:15	62.7	3771A	1 Dec.	0119:51	61.7
18508	2 Dec.	0103:32	76.3	3785J	2 Dec.	0125:04	63.0
18520	3 Dec.	0002:53	61.2	3799J	3 Dec.	0130:18	64.3
18533	4 Dec.	0057:10	74.8	3813A	4 Dec.	0135:31	65.7
18546	5 Dec.	0151:27	88.3	3827A	5 Dec.	0140:44	67.0
18558	6 Dec.	0051:48	73.2	3840X	6 Dec.	0002:43	42.5
18571	7 Dec.	0145:05	86.8	3854A	7 Dec.	0007:57	43.8
18583	8 Dec.	0044:26	71.6	3868A	8 Dec.	0013:10	45.1
18596	9 Dec.	0138:43	85.2	3882J	9 Dec.	0118:23	46.4
18608	10 Dec.	0038:04	70.1	3896J	10 Dec.	0023:36	47.8
18621	11 Dec.	0132:21	83.7	3910A	11 Dec.	0028:49	49.1
18633	12 Dec.	0031:42	68.5	3924A	12 Dec.	0034:02	50.4
18646	13 Dec.	0125:59	82.1	3938X	13 Dec.	0039:15	51.7
18658	14 Dec.	0025:20	67.0	3952A	14 Dec.	0044:29	53.0
18671	15 Dec.	0119:37	80.5	3966A	15 Dec.	0049:42	54.3
18683	16 Dec.	0018:57	65.4	3980J	16 Dec.	0054:55	55.7
18696	17 Dec.	0113:15	79.0	3994J	17 Dec.	0100:08	57.0
18708	18 Dec.	0012:35	63.8	4008A	18 Dec.	0105:21	58.3
18721	19 Dec.	0106:53	77.4	4022A	19 Dec.	0110:34	59.6
18733	20 Dec.	0006:13	62.3	4036X	20 Dec.	0115:47	60.9
18746	21 Dec.	0100:31	75.9	4050A	21 Dec.	0121:00	62.2
18759	22 Dec.	0154:48	89.5	4064A	22 Dec.	0126:13	63.6
18771	23 Dec.	0054:08	74.3	4078J	23 Dec.	0131:26	64.9
18784	24 Dec.	0148:26	87.9	4092J	24 Dec.	0136:39	66.2
18796	25 Dec.	0047:46	72.8	4106A	25 Dec.	0141:52	67.5
18809	26 Dec.	0142:04	86.3	4119A	26 Dec.	0003:51	43.0
18821	27 Dec.	0041:24	71.2	4133X	27 Dec.	0009:04	44.3
18834	28 Dec.	0135:41	84.8	4147A	28 Dec.	0014:17	45.7
18846	29 Dec.	0035:02	69.6	4161A	29 Dec.	0019:30	47.0
18859	30 Dec.	0129:19	83.2	4175J	30 Dec.	0024:43	48.3
18871	31 Dec.	0028:40	68.1	4189J	31 Dec.	0029:56	49.6
18884	1 Jan.	0123:57	81.6	4203A	1 Jan.	0035:09	50.9
18896	2 Jan.	0022:17	66.5	4217A	2 Jan.	0040:21	52.2
18909	3 Jan.	0117:35	80.1	4231X	3 Jan.	0045:34	53.6
18921	4 Jan.	0016:55	64.9	4245A	4 Jan.	0050:47	54.9
18934	5 Jan.	0110:13	98.5	4259A	5 Jan.	0056:00	56.2
18946	6 Jan.	0010:33	63.4	4273J	6 Jan.	0101:13	57.5
18959	7 Jan.	0104:51	77.0	4287J	7 Jan.	0126:26	58.8

Have you listened to OSCAR 8 yet? This newest of amateur satellites is available to anyone with a good-quality, 10-meter or 70-cm receiver. To track it, you'll need an OSCARLOCATOR and the above reference-orbit information (also available on W1AW bulletins). It orbits the earth every 103 minutes; the morning and evening passes occur at approximately the same times each day. Decoding the telemetry from the beacon is a simple matter using the ARRL OSCAR telemetry forms, available from Hq. for an s.a.s.e. When you return it, we'll send you a colorful OSCAR 8 QSL card.

To keep abreast of the latest developments, tune in to the regular phone and cw bulletins over W1AW, AMSAT bulletins transmitted around 29.440 MHz on Mode A, 145.960 MHz on Mode B, during O 7 reference orbits, and AMSAT nets (East Coast at 0100 UTC Wednesdays; Mid States at 0200 UTC; West Coast at 0300 UTC, all on 3850 kHz lsb); (international net at 1800 UTC Sundays on 14,280 kHz usb).

Notes

1) All time and date references are in UTC.
2) The times and longitudes are for OSCAR's first equator crossing each day, which is called the reference orbit.
3) Due to spacecraft problems, OSCAR 7 will not be maintained in any specific mode.
4) *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.*
5) The OSCAR 7 Mode B and OSCAR 8 Mode J transponders invert signals. Upper sideband into the uplink becomes lower sideband on the downlink.
6) O 7 progresses an average of 28.737647 degrees west per orbit in a period of 114.945255 minutes. O 8 progresses 25.808409 west in a period of 103.229831 minutes.
7) O 8 modes of operation are Monday, Tuesday, Thursday and Friday — Mode A. Saturday and Sunday — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D.

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

This schedule of orbits for OSCAR 7 and OSCAR 8 is a regular feature of *QST*. Tune in W1AW bulletins for updated reference orbit data. Further information on the radio amateur satellite program can be obtained free of charge from ARRL hq. Also, the popular and informative series of *QST* articles for the beginner has been reprinted in book form. *Getting to Know OSCAR — from the Ground Up* covers OSCAR 6, OSCAR 7, the newest satellite, OSCAR 8, launched in early March, and the exciting Phase III program scheduled for late 1979. It includes the OSCARLOCATOR, a tracking device that lets you know which passes you can access and where the satellite is in the Northern Hemisphere at any given moment. The book is available for $3 postpaid ($3.50 outside the U.S.), from the ARRL.

Station Activities

SCM ✕ AREC ✕ ORS ✕ OVS ✕ SEC ✕ OBS ✕ TCC ✕ OO ✕ NTS ✕ WAC ✕ CP ✕ A-1 OPR ✕ EC ✕ DXCC ✕ CLUBS ✕ RM ✕ OPS ✕ RCC ✕ PAM ✕ WAS

CANADIAN DIVISION

ALBERTA: SCM, Sydney T. Jones, VE6MJ — SEC: VE6XC. Net Manager, VE6AFO. Congratulations to the Calgary Amateur Radio Club for the excellent manner in which they organized and staged the 78 symposium Sept. 30 and Oct. 1. VE6ASL has left on an extended trip to Europe and will not return for several months. The Peace Country Amateur Radio Club have elected new officers with VE6AIC, pres.; VE6NM, secy. VE6TD is about all set for working OSCAR this winter, with new antenna and gear. Traffic: VE6HO 67, VE6XD 28, VE6AFO 22, VE6AMM 22, VE6AKY 15, VE6AAT 14, VE6BBL 14.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — NM VE7CDF has moved into Vernon, no antennas yet. VE7GY BCEN Net Mgr. is on holidays after bad year with forest fires. Saturday's net of Senior Citizens Nanaimo repeater honored VE7CEL's 56th wedding anniversary. Surrey ARC officers are VE7ARL, pres.; VE7CDC, vice-pres.; VE7CTB, secy.-treas. The club held a very impressive amateur display of two units in the Surrey Shopping Mall which included a full working station on the parking lot. Traffic: VE7ZK 162, VE7COA 152, VE7FB 45, VE7BLS 9.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst. SCM: VE4JP. SEC: VE4TR. NMs: VE4IZ VE4TE VE4NM VE4VJ. Congratulations to VE4IZ who is now MTN net mgr. Our thanks to VE4GJ for holding down the fort in the summer. Band conditions are now slowly coming back to normal. Looks like a big roster of new hams coming up if enrollments in ham classes are any indication. MTN QNI 144, QTC 45, 25 sess. MMN QNI 246, QTC 33,30 sess. WRIN QNI 76, QTC 1, 4 sess. MEPN QNI 853, QTC 41, 30 sess. Traffic: VE4PG 144, VE4IZ 67, VE4IX 67, VE4QU 26, VE4TE 24, VE4QJ 19, VE4AAD 9, VE4ID 9, VE4JP 8, VE4LU 6, VE4NE 5, VE4AED 3, VE4DS 2, VE4IM 1, VE4PO 1.

MARITIME-NFLD.: SCM, Aaron D. Solomon, VE1OC — ASCM: VO1FG. SEC: VE1DI. NM: VO1JN. APN Mgr.: VE1WF. Condolences to VE1AFR, VE1AY, ex-VE1EF, VE1PV, VO1FG who recently lost family members. Hosp: VE1MK VE3CJ VE1SH rpts. DOC creation of Digital Experimenter's License; new policy re exams and RFI. Further details in Can. NewsFronts this issue. VE1VE has FB story "Keeping in touch" in AF pub. "Sentinel." VE1RI notes changes in CB repeaters. VE1FQ rps new RTTY repr. on Nutby Mtn. E. of Truro, NS. CNIB ARC lists 49 White Cane VE1/VO1 amateurs. Shelburne Co. ARA now organized. Recent VE1 visitors incl: VE2KFI; VE3s CRA CLJ ALK DJZ EGS FSG GER; VE4TN. Welcome back VE3IQ/VE1. VE1AMC hits H.F. with cw. We need more of this. APN sessions 30, QNI 105, QTC 55/49. Traffic: (Sept.) VE1WF 180, VE1BFV 45, VE1LCR/RO 36, VE1OC 22, VE1LJ 13, VE1ASW 12, VE1HJ 4. (July) VE1ASW 94.

ONTARIO: SCM, Larry Thivierge, VE3GT — Asst. SCM: VE3GOL. At the annual Guelph ARC banquet, VE3GOL, who was guest speaker, was presented with the ARRL Award of Merit by VE3BMG. Congratulations: VE3UM is the call of the Cambridge DX Society, a new club with VE3CTY as prez. South Waterloo ARC held successful amateur radio demos in two city malls during amateur radio week. Regretfully I announce the following have become Silent Keys, VE3s HN QH DTT BBC and RDH. New TOT members are VE3s IIY HBB and BLW. VE3s KKV BVJ BXQ DAY IXM and EC have become members of the QCWA Southern Ontario Chapter. Congratulations to VE3EMJ on receiving the Order of Canada for his work in the scholarly publishing field. After many months I have finally contacted AI4J. Repeater VE3SJI on St. Josephs Island has been on the air for over three years and improvements have added battery power and increased coverage. Hamilton ARC reports a membership total of 206 while Ottawa ARC reports a membership of 385. VE3GFN making sweet music on cw with a Viking Ranger. VE3IFP is the new NM of the Laurentian Net, taking over from VE3FGT who has resigned. VE3s CNC GAN GUO and COW sporting new tribanders. VE3BCV is now VE3GI. VE3IWP active on fast scan TV from the Belleville area. VE3HNW is now VE1PT. Oakville ARC participated in the Milton Steam Era Show with VE3s FZG APK HGJ JTH FLI JUZ BMC ITM IUN ITL IBF AXA FYR KTE FRG and W9ITI/VE3. Nipissing FM Assn. practice their call-out plan monthly as a reminder of Club meeting nights. VE3GYD now an OTS. Univ. of Ottawa station, VE3UDO active on HF and OSCAR, VE3JKC is the trustee. Special thanks to VE3KLX for his help in preparing certificates. Windsor ARES participated in a mock air crash at Windsor airport. VE3GFS has VE3EWD and KUB as Asst. ECs. VE3s JNS JNR IVU and IVC have their Advanced. VE3s LF IPI FJO GUO and DVE pleased with their crop of new amateurs. I hope you all have a very Merry Christmas. Traffic: (Sept.) VE3KK 373, VE3GOL 365, VE3HGJ 234, VE3SB 233, VE3ISW 139, VE3DPO 130, VE3JIR 126, VE3FRG 94, VE3FZG 88, VE3GT 85, VE3DVE 62, VE3GYD 61, CF3IFP 47, VE3GNW 46, VE3FGU 40, VE3EWD 38, VE3JRT 26, VE3ATR 19, VE3FHZ 14, VE3HSF 10, VE3IMR 10, CF3APK 8, VE3GJG 6, VE3IZC 4. (Aug.) VE3IMR 40, K6GMU/VE3 38, VE3BZR 24, VE3GJG 24, VE3ATR 23, CF3APK 21, VE3AWE 15.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ. STMs: W3QQ W3WD. PSHR: W3PQ 49, K3JL 44. Del. Ham Campout North at AOK Campground had campers WB2JGP WA3QLS WA3DLH W3TCI WB3EOU WB3GXD and visitors AD3M W3EKO WB3FUP WA3KZX and WB3FOE present. New Extras, WB3DDS K3JLY and AC3T Advanced. The 92 members of the Del. Valley ARS elected for '78-'79 WB3JVX, pres.; WA3UYJ, vice-pres.; WA3PCW, secy.; WB3CTT treas. This Club is operating WR3AGQ on 146.355-955. AWARE RC AC3U, pres.; WA3AUP, VP; WB3KKX, secy.; KA3BAQ, treas.; N3ACU, act. mgr.; WB3DPJ trustee. Del. ARC; K3SM, pres.; N3AHC VP; WB3ENF, secy.; WB3GXD, treas.; WA3WIH, pr. DTN QNI 327. Tfc 51; DEPN QNI 72, Tfc 4. Traffic: W3PQ 268, N3ND 71, W3QQ 62, W3DKX 31, WA3WIY 23, W3WD 15, WB3DUG 14, K3JL 10, W3FEG 8.

EASTERN PENNSYLVANIA: SCM, G. S. Van Dyke, Jr., W3HK — SEC: WA3PZO. NMs: K3KW K3NGN W3VA W3IAZ. Net rpts: EPAEPTN QNI 406, QTC 83; PFN QNI 306, QTC 565: EPA QNI 724, QTC 361: PTTN QNI 379, QTC 135; AREC(2) QNI 8. OVS: W3GOA WA3BJQ; OO: W3KEK K3NSN; OBS: K3NSN W3CL W3AVJ N3AIU W3VA; PSHR: WB3JGP N3AIU AA3B; BPL: K3NSN W3CUL W3VR WA3WQP WA3ATQ. W3CUL says bands are better, must be! WA3WQP working on new license, DRIVERS! WA3ATQ away for a while. K3KW mending from serious accident. WB3JGP got that last state for WAS. WA3YJZ now N3AIU. W3VA says you oughta try 160. WA3YBN now AD3X. WB3GZV says school OK he can operate. WA3UDD! W3ID busy with plumbing chores. W3GMK working hard on new vertical for CD test. W3AXA back on active list. Another rope broke at W3EU, suggest he try underground antenna. The winter is moving in fast so I hope all the antenna work is done for the fall and winter contests. Club papers are a credit to those preparing them. OOs report little to report! Reports are getting a little late again so lets mark the calendar. PTTN welcomes the folliwing new members: K3CKB WB3JZA W3LCX and WB3JYZ. New upgrades WB3JUC to A, KA3AHX to G. WB3HFU and KA3AUD to Tech, now keep going! There is an interesting MAZE problem in the WARA News Bulletin! The Atlantic Div VHF Conference was a great success, many interesting speakers. Looks like the Jan. VHF contest will be a dandy as more competition develops. Traffic: K3NSN 5035, W3CUL 2951, W3VR 805, WA3ZRY 634, WA3WOP 507, WA3ATQ 397, K3NGN 254, K3KW 252, W3BI 249, WA3THT 218, WB3JGP 158, W3IPX 138, W3FAF 134, N3AIU 113, AA3B 93, W3VA 55, WB3BKV 50, WA3YBN 49, W3DP 48, W3ADE 26, WB3GZV 24, N3CD 20, WB3CAI 17, W3ID 14, W3GL 12, WB3JZA 12, K3EBZ 9, N3GP 7, WA3YOE 6, W3HK 5, W3AVJ 3, WA3BJQ 2, K3AI 1, W3AXA 1, W3EU 1, W3GMK 1, W3GOA 1, WB3HPV 1, K3IAZ 1, W3KEK 1, WA3VDQ 1.

MARYLAND-DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — SEC: W3HJH. Support him and the ARES. The Green Mountain Rptr. Assn. has W4MLR W3RMQ K3KWV WA3WTQ and W3MZG as the new board. W3SW presented the certificate of affiliation. K3RA tells the members of BARC how to get involved. The Anne Arundel club finally got water in their private club house. The FAR is looking for a logo. OO reports from K2SCU/3 W4MLR WA3SXH AND W3WBY. W3IK was off to Europe. W3PQ became MDD net manager Sept. 1. The Mountain ARC held a hidden Xmtr hunt with high a low power to confuse the hounds. WB3IVO is our multi op OBS and traffic mover. WB3CGG looks forward to the coming club elections. WB5FIX is permanent at Gambrills. WB3EPN a 2nd year law school man with a new QTH. N3RL has some respite from his travels. W3ZNW needs a little time and energy for antenna work. W3EOV is still looking for graphology experts. W3ECN made 10 ck-ins on the phone nets. W3JPT earned the AMSAT OSA and the ARRL "600," now for OSCAR WAS. WA3FYZ found his antenna in the bean patch. WB3FTN is done with his summer fling. N3IT attending some summer classes. WA3SXH back to college full time. W3CDQ off to the QCWA and ARRL conventions. WA3EHK is pushing for more tfc on the Columbia 2-mtr net. AA3S makes quick trips to Calif. and back. N3QA raised his antenna and his signal strength after his visit to ARRL Hq. W3CDG is a Carroll County regular. K3ORW has been getting ready for winter. W3FZV says keyers are tough but sound good. WB3GZU applies for OTS. WB3CES reports by radio. K3IU is very QRL on his new assignment. With the nets: Net/Manager Sessions/TFC/-QNI Avg. MDD/W3PQ 60/224/8.6. Top Brass N3CL K3IU and WB3KPX. MEPN/AA3S 20/90/24.8. 100 percent W3HJH. Others W3ADQ AA3S and WA3ZRY. MDCTN/K3ORW 17/53/15.1. Top Honors to WA3ZRY, K3ORW and W3DKX. WR PON/W3DFW 18/20/15.8. MDC PON/W3OYY 4/13/21.5. Columbia ARA/WA3EHK 3/1/15.1. and for Aug. MDD/W3QQ 60/150/6.7 with Top Brass WB3KPX and N3CL. Traffic: (Sept.) W3FA 91, WA3EHK 75, N3QA 71, WB3GZU 69, K3ORW 53, K3IU 47, W3EOV 42, W3FZV 38, WB3IVO 36, AA3S 32, WB3CGG 12, WB3CES 12, W3WBY 8, WB5FIX/3 6, N3IT 5, W3CDG 3, WA3SXH 2, WB3FTN 2, W3ECN 2. (Aug.) WB3IVO 133, N3CL 65, WB5FIX/3 16, WB3CGG 4.

SOUTHERN NEW JERSEY: SCM, Raymond F. Clancy, WB2GTE — SEC W2HOB reports 9 ECs active this month. WA2YAV Atlantic, K2OIJ Burlington, WA2ONW Camden, N2AHQ Cape May, K2OO Cumberland, WA2SEA Gloucester, AA2H Mercer, K2IB Ocean, WB2ZJF Salem Counties, 100 percent with 337 AREC members helping out. FB! NJN-NJNYN-NJPM lists about 100 hams active in these nets thanks to Mgr W2XD asst. Mgr. AF2L Mgr. WA2LHV, Mgr WB2LGC. WR2ADE has improved signal to south sez K2AAR. Upgrades: KA2AQJ to Adv. WA2ZBO to Gen. WA2GWS is 14. W2PU makes DXCC. KA2CFP got ticket. WA2GDZ new Extra. W2EWN NCS for new 2M net. KA2BEW 11 years wkd 9 states 7 European countries. SJRA held picnic Sept. 24. SJRA started new classes Sept.-Nov. Novice-Gen. Adv. 8.00 Haddonfield Memorial High School eves. W2EZM has new vert. ant. K2TJ vacations after DX contest. WA2WXP new Gen. WB2IQV Advanced. W2FDE es K2SNK make Extra. DVRA plans Xmas pty Dec. 9 at Landwehrs. WJRA held picnic. K2SVX works Chan. 6 Phila. WB2MKI upgrades. AA2H received Public Service Award from ARRL for the blizzard of '78. With the conversion of CB rigs to 10M ham rigs about 300 are on in section and K2JF reports much DX from car. Traffic: AA2H 133, W2IU 92, K2KBT 6, W2PU 2.

WESTERN NEW YORK: SCM, Lonnie J. Keller, WA2AOG — Thanks to all of you who sent me congratulation wishes over the past months. I hope to see all of you at hamfests and meetings. If I can be of service, don't hesitate to let me know. I will be checking into the Western Region Net on 146.04/64 as much as possible, so you can get your month end traffic totals to me there as well as all the other nets, or of course your reporting forms. A big thank you to WA2PUU and RAGS for their super hospitality during their Hamfest on Oct. 7th. A panel discussion with your ARRL President, Division Director, FCC Area 20 Engineer-in-Charge and yours truly drew a good crowd and enlightened many. W2ZOJ is back on the air with his IC-245 after a repair job and performing his Sept. OBS duties with an HT. WA2ECA is sporting a new Alpha 76 and an entire new antenna system to help crack the DX pileups. The Livingston Amateur Repeater Society's Sept. 2nd picnic was a tremendous success due to the generous N2EI plus committeemen WA2HVT WA2CBT WB2MQV AF2K and auctioneer WA2CBU. The Buffalo Area DX Club is looking for new members. If you are seriously into DXing and contesting, they'll be glad to hear from you. Contact me (WA2AOG) if you're interested. Traffic: (Sept.) WA2ELD 225, WB2PJU 171, W2RUF 139, WA2HSB 110, W2MTA 97, W2PZL 41, WA2AOG 32, W2RQF 32, AF2K 18, WA2NPO 11, WA2AIV 9, K2VR 8, W2ZOJ 8, WB2FPI 6. (Aug.) WA2ELD 227, W2MTA 133, W2RUF 86, W2PZL 54, WA2AOG 43, W2ZOJ 21, K2VR 9.

WESTERN PENNSYLVANIA: SCM, Otto Schuler, K3SMB — SEC: W3VUP. Asst. SEC: WA3LJW. NMs W3YQ K3LL W3NEM W3KUN W3MML.

Net	kHz	Time/Day
WPA CW Tfc	3585.0	7:00 PM Dy
WPA Phone & Tfc	3983.0	6:30 PM Dy
PA Traffic & Training	3610.0	6:30 PM Dy
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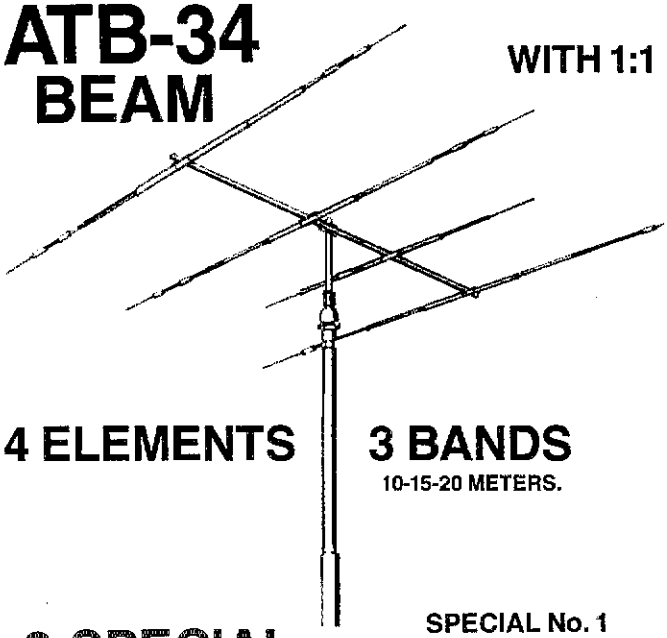

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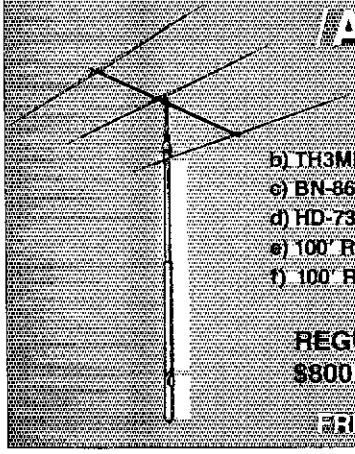

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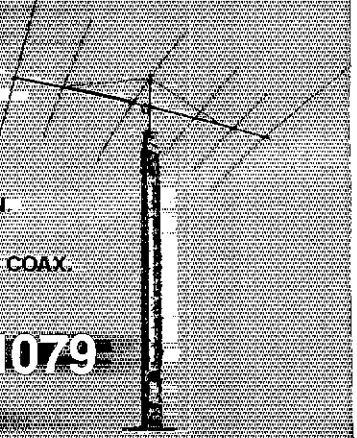

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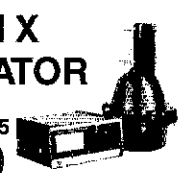

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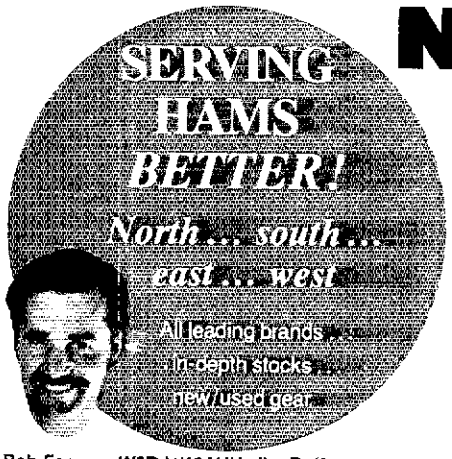

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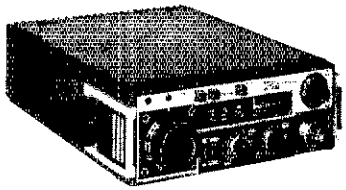

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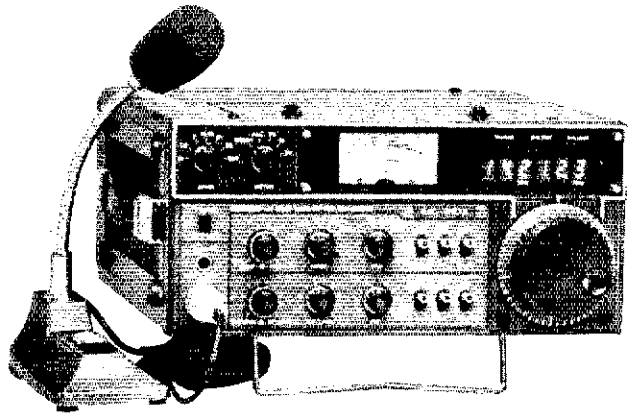

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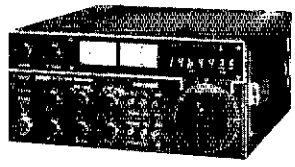

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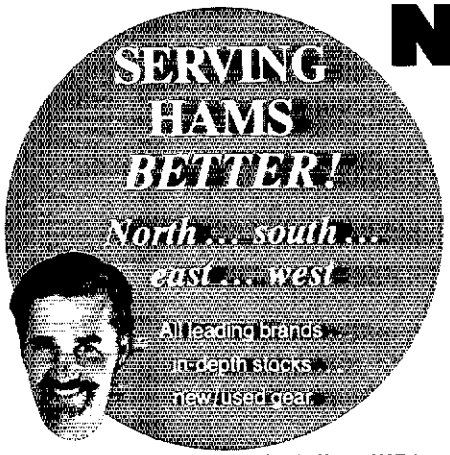

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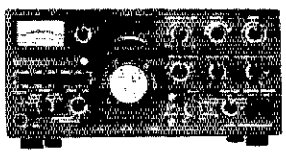

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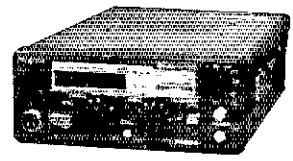

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disaster drill, Greater Pgh. Airport, Sept. 23. WACOM (Washington County) ops work on March of Dimes Bike-a-thon. Jefferson County hams do FB job with July WX emergency. Beaver Valley FMA putting new 220 rptr on air, expect mid-Dec. operation. Also provide coverage for SET held at Community College. Red Cross HQ, Pittsburgh, installs complete HF/VHF station for disaster service work. Bravo! Butler hamfest a great success. WPA RACES meeting held, was well attended. Fort Venango Mike & Key Club updating 72/12 rptr (Franklin) with a new machine. WPA Section picnic at Cook Forest had good showing of CW net ops, thx to W3KUN. Get well to WA3UNX. Upgrades: KA3BGU to Novice, WB3LNX WB3KJH to Tech. WB3COA WB3IYM to General. WB3BRD N3AIT to Advanced. WB3GTH to Extra. Congratulations to all. (Sept.) WPA CW sess. 30, QNI 411, QTC 167. (Aug.) sess. 31, QNI 377, QTC 187. WPAP&TN sess. 30, QNI 337, QTC 74. WPA 2MTN sess. 30, QNI 604, QTC 134. Traffic: WB3HGT 226, K3HI 140, W3NEM 135, W3EGJ 129, W3SMV 104, N3FM 89, AG3N 67, WB8PAV/3 65, WB3DKT 64, W3YQ 64, N3EE 50, N3WS 49, W3MML 40, K3HCT 39, WA3QNT 36, K3LL 28, W3EXC 23, W3SN 22, WB3IAB 20, W3KUN 20, K3SMB 20, WA3UVX 20, W3RUL 18, WB3EML 15, W3AB 11, WB3GWJ 10, W3ATQ 8, K3UA 7, N4DR/3 7, WB3GZR 6, W3AS 4, AB3X 4.

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ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst. SCM: Harry Studer, W9RYU. SEC: W9AES. NMs: WA9KFK and WB9JSR. Cook County EC: W9HPG.

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NCPN	3915	1200/1700 M-S	125	52
IEN	3940	1400 Su	no report	

The W9VEY memorial Station passed a traffic total of 14 messages. WA9VLK received his CP 25 wpm endorsement and WAC award. The Sangamon Valley Radio Club, The Chicago FM Club and the Peoria Amateur Radio Club Hamfest were very well attended and the Sept. weather helped swell the ranks of many in "person" QSOs. Harry Dannals, W2HD and Edmond A. Metzger, W9PRN spoke at the QCWA dinner at Mundelein Sat. Noon on Sept. 30th. They were also guest of the Starved Rock Radio Club at their annual appreciation dinner that same evening. W5KLV reports that the CAND had a traffic score of 395 during 60 sess., 9RD representation was 96.07 and Ill. stations participating were W9NXG W9JIJ and W9JS. New calls heard in Dewitt Co. are WB9UTZ and KA9CBV. WD9FOD is a new Extra Class licensee. The club also has a new club room. WD9FYA and WD9GOW (XYL's of K9IW and WB9RZW) have upgraded to Tech. Class. WB9VIV is the VP of LAMARS. W9NZD has moved to Austin TX and is now N5AIT. WB9FAT received his EE from the U of I and living in New York City. W6TOL back in Chicago with his old call of K9AQJ. W9HOT reports that the 9RND passed 79 messages in 57 sess. with Ill. stations W9JIJ W9NXG and W9HOT participating. W9KR was reelected Net Mgr. for the North Central Phone Net and W9KXN was elected Net Mgr. for the Ill. Phone Net. WA9VGW resigned due to his health. WD9FED recovering from throat surgery. WB9ZFJ's new QTH is W4-Floridaland. New officers of MCWA (McHenry County Wireless Assn.) are N9HF K9XI WB9SIE and WD9HQG. The club will be on repeater WD9GMZ for 2 meters and K9XI on 220 MHz. WA9BFV is a new OTS appointee. WB9WHB is the proud father of new male harmonic. This column's sympathy to the families and friends of W9ZUI WB9KLA W9AXT W9KBC W9PTQ W9DVN and W9NKL who recently joined the ranks of Silent Keys. N9EP K9GI K9PW and WB9OEP were elected officers of the Synton (Champaign) Amateur Radio Club. Clinton's new repeater frequency is 147.00/60. W9NWN and his family has moved to Dallas, TX. WB9ZHB now N9AJB. KA9CHY is a new Novice in the Granite City area. WB9OUB and WD9EHM have upgraded. WD9CIP was named Ham of the Month by the Sterling-Rock Falls Amateur Radio Club. W9JIJ and K9PNG are BPL recipients for the month. Traffic: (Sept.) W9JIJ 502, W9NXG 400, K9PNG 352, WD9DMV 204, WB9JSR 191, W9OK 94, N9TN 75, W9KR 72, N9DR 60, W9OBS 55, W9HBI 54, W9LNQ 48, WA9BFV 45, K9EEA 44, WB9ZED 43, K9SW 42, W9HOT 34, AB9M 32, N9MX 23, WA9AQN 22, W9PRN 22, WA9VLK 22, WB9RFC 14, K9BVE 14, K9DQU/WB9AIE 1. (Aug.) WB9ZED 89, K9SW 36.

INDIANA: SCM, J. M. Kell, W9LTU — SEC: W9UMH. Net Mgrs.: K9CGS (ITN), W9JUJ (QIN), WB9YXN (ICN), W9PMT (Hoos VHF). Net times in UTC and freq. in kHz.

Net	Freq.	Time(Z) Days	QNI	QTC	Sess.
ITN	3910	1330/2130 2300 Dy	3502	377	90
QIN	3656	1400/0100 0400 Dy	884	428	90
ICN	3737	0015 Dy	127	36	28
IPON	3910	1300 Su	75	0	3

Congrats to W9JUJ for her third BPL in a row. BPL is not easy to make and three in a row is hard work. Warrick Co. now has new club. Officers are K9TKE, pres.; W9BKQ, VP; KA9AZS, secy-treas. K9VMG reports new club being formed in Putnam Co. New 2M repeaters in Bloomfield, Rochester, and Valparaiso. IRCC will publish a list of Hamfest dates for next year in an effort to avoid conflicting dates. Contact WB9DFD to get your date listed or for checking prospective dates. Beginning mid Nov. thru the end of Dec. is the peak of the traffic (message-handling) season. Your participation in the section nets during this time will be appreciated. If you're new to traffic nets wait till towards the end. If you want to try cw nets I suggest the two slow speed nets. QIN morn at 1400Z or ICN evening at 0015Z. You'll find it's an enjoyable part of our hobby. Delivering Christmas messages helps you enjoy the true meaning of the season. May you and yours have the merriest Christmas ever. Silent Keys W9MNY and WB9SXC. Aug. Hoosier VHF net report QNI 183, QTC 0. Traffic: (Sept.) W9JUJ 771, W9OLW 124, W9XD 104, WB9IHH 102, W9IOH 74, W9JBO 73, WA9TJS 59, W9TG 46, W9DLF 37, W9ZW 33, W9BF 28, WD9GXW 24, WA9QCF 24, K9CGS 18, WA9GJZ 17, N9PS 17, W9DKP 12, W9HUF 11, W9UEM 11, WA9OHX 10, AA9S 7, W9BDP 6, W9FIC 6, K9IKE 3. (Aug.) W9PMT 12.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9FZC. NMs: W9AYK W9IEM K9UTQ WB9ICH K9KSA WB9KPX K9LGU K9EN. Nets, freq., time, QNI, QTC, Mgr.: BWN, 3985, 1145Z M-Sa, 669, 566, W9AYF; BEN, 3985, 1700Z Dy, 519, 105, W9IEM; WSBN, 3985, 2330Z Dy, 628, 215, K9UTQ; WNN, 3725, 2215Z DY, 11, 0, WB9ICH; WSSN, 3662, 2330Z M-W-F; Summer Vac., K9KSA; WIN-

E, 3662, 0000Z Dy, 267, 136, WB9KPX; WIN-L, 3662, 0300Z Dy, 232, 86, K9LGU; WRN, 3662, 0030A Sat., K9EN; Wi Ex PD, 3925, 1701Z M-F, 500, 28, WA9NIX. KA9ACJ has Tech license. W9GGN has Extra. I hope your club has a real good start with radio classes. WB9UQS is now N9AGF. WD9HWY has General. If you hold an ARRL appointment and change your call without notifying your SCM, your appointment will be cancelled. K5IUW family from TX stopped in Juneau for breakfast Sept. 9. K9FHI and KA9BAC visited with them. WB9ADB has Extra. K9ANV is one of the Asst. SECs in the state, we will be appointing more as time progresses. Anyone who was a ham in the spark days, please contact K9UTQ. W9ZGQ made BPL. KA9CAW new Novice in Superior. WB9FTC passed Extra. Thanks to all clubs who send their club paper to me. Traffic: (Sept.) W9ZGQ 769, W9DND 262, W9CXY 220, W9IEM 173, WD9COC 162, W9SFL 151, WB9KPX 126, K9LGU 112, K9FHI 103, WD9DHF 76, W9SQJ 50, W9IHW 63, W9AYK 58, WA9GJU 58, K9RTB 57, WB9ZRE 47, WB9YPY 45, K9AKG 41, K9UTQ 40, W9TXB 39, W9DM 38, WB9FTC 32, WB9MPF 32, WB9JSW 31, WB9ICH 26, WD9AJA 26, K9JPS 25, W9FDY 25, K9UU 24, WB9ESM 23, WA9ZTY 17, K9ANV 15, WD9BKT 9, WB9RRU 9, W9UW 7, WA9LWJ 6, WA9GYF 5, WB9YPZ 5, K9VSO 4, W9ZBD 4, W9UT/9 3, WD9EAQ 3. (Aug.) WB9FTC 30, WA9LWJ 23.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX — SEC: WØSA. Minn. Nets.

Net	Freq.	Time/Day	QNI	QTC	Manager
MSN 1	3685	6:30 P	234	87	NØHY
MSN 2	3689	10:15 P	126	47	KØPIZ
MSPN N	3945	12:05 P	505	51	WBØJYT
MSPN E	3929	5:45 P	607	146	WØDUW
PAW	3925	9-12/1-5	2283	48	WAØYVT
MWX	3925	6:15 P	263	200	WBØUKI
MSSN	3710	5:30 P	180	25	WBØZAL

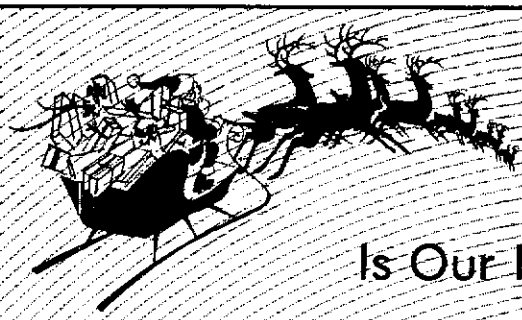
From Marshalltown, IA we welcome the latest OM and XYL team WAØPUJ and WBØQIG to the growing Rochester, MN amateur population. Congratulations to the Rochester 2 meter club for the PR Sept. 30 to the bike-a-thon, walk-a-thon sponsored by the K of C, and for the PR work on Oct. 1 with the 3 miles and 10 kilometer run sponsored by the A.A.U. FB! Congratulations to new Novices KAØs CDC CBC CBD and BQA. WDØGUB has upgraded to Tech., WDØFRX to General and WBØZAL to Extra. Congrats to all. By the time this reaches you our friend George Hart, W1NJM will have retired. George on behalf of myself and the MN Section I would like to say we will miss you but we wish you many years of Happy Retirement. Good luck in all you do. Yours truly just received word that the new tower I needed is here so by the time you read this I will be back on the air in my new QTH which will be 16 N.E. 7th Ave., Rochester, MN 55901. My phone will still remain the same 507-288-2437. Persons who would like to be an EC for their county should still ARL 7 myself or the SEC. We are still lacking in some counties. Traffic: WBØZAL 207, WAØTFC 132, WAØYVT 125, WØHKF 115, WØDUW 102, WØHY 89, WBØUKI 84, KØPIZ 73, KØCSE 47, WBØNZB 45, WBØPKG 40, WDØFSL 34, WAØCCA 30, WBØHOX 24, WAØQIT 24, WBØONK 14, WBØSYT 14, NØJP 11, KØZBI 10, KØFLT 9, WDØBFR 8, WBØZBJ 4

SOUTH DAKOTA: SCM, Lydia S. Johnson, WØKJZ — Asst. SCM: WØDVB. SEC: WAØTNM. NMs: WØHOJ WØMZI WAØTNM KØTVJ WAØVRE WAØUEN. Congratulations to newly licensed Pickstown Novice KAØBBU. KØJV put up new four-element 20-mtr beam, worked 8R1X also scored 779 pts in Scandinavian contest. WAØTNM and KØFRE made PSHR. SD representatives in CAND were WAØFUZ NØABE. IEN and CAN were WAØTNM KØFRE WØKJZ WBØEVQ. New pres. for Sioux Valley Repeater Assn. is WBØUZC. SFARC newly elected officers are, WBØYFH, pres.; WBØZPS, vice-pres.; WBØYQT, secy., WAØARZ, treas. Interested S.F. Hams with news items may contact any of these "Feedback" staff officers: WØNRW WBØOOZ WAØRIQ WBØUZB WBØYQT. Former Asst. SCM WAØDEM is ADØV on receiving his Extra Class. WAØNZA on SSB and CW looking for new counties. MN twin-YLs KØJA and KØJE visited on their return travels from western Canada. All ARRL appointees check your certificates for renewal; also, all active operators in nets who have not received Section Net Certificates contact me. All reports and news items should reach me by the 4th of each month so that I can meet my ARRL deadline. Thanks much gang! Morning, QNS 338, QTC 44, sess. 26: NJQ Noon, QNS 693, QTC 23, sess. 26; Evening, QNS 1092, QTC 60, sess. 26; SDN, QNS 87, QTC 63, sess. 28. Traffic: (Sept.) KØFRE 182, WAØTNM 180, WØDVB 92, WØHOJ 75, WAØUEN 59, KØAIE 56, WAØVRE 50, WØKJZ 19, WDØBMR 14, WØIG 4. (Aug.) NØABE 22.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU — SEC: WA5VNV. NM: K5MEW W5MYZ W5POH WA5ZWZ. Nets, kHz, Time/Day, QNI, QTC, Mgr.: ARN, 3995, 0030/Dy, 1126, 123, K5MEA; OZK, 3760, 0100/Dy, 134, 19, W5MYZ; APN, 3937, 1200/M-S, 924, 53, W5POH; M-Bird, 3928, 2230/M-F, 615, 36, WA5ZWZ; SCARC, 28.7, 55, 3, WD5HDC: NEAEWXN, 28/88, 0230/Dy, 195, 26, WB5WJH. Ft. Smith Area ARC have radio classes for Novice and General Mon. and Thur. nights and will finish Dec. 7. For more info contact WA5DMT or N5SD. New or upgraded licensees KA5ADC KA5BRS WA5AIO WB5IIY WD5IKM. KA5BV, ex-WB5NUN, AC5D, ex-WB5KOD, KB5DQ, ex-WD5BWT, N5ALU, ex-WD5IQZ, K5WWT now Extra. WD5CAA OTS-2. W5KL has new TS520S and L4B. K5MEA resigned as ARN mgr. due to other commitments. AD5D has taken over as new ARN mgr. Oct. 1st. OBS WB5WWA 3, K5MEA 9, W5UAU 3, PSHR W5POH 27. Traffic: K5MEA 41, K5AO 30, W5UAU 25, W5POH 24, WB5WJH 23, W5KL 10, WB5GWU 10, WB5KUI 6, WB5WWA 2, WB5GQH 1, WD5CAA 1.

LOUISIANA: SCM, S. T. "Tom" Losey, Jr., K5TL — Asst. SCM: K5DPG. SEC: WB5IYH. STM: N5YL. Net Mgrs.: N5IS N5ES N5IB N5RB WB5IYH. Congrats to N5YL on her selection as Section Traffic Mgr. WB5TPG WD5BCC and WB5YLD now Extra Class. WB5WNN WD5ELL WB5UVX WD5GLJ and WD5GJK now Advanced Class. WD5FLL now General Class and KA5CAL and KA5CJN new Novices. WB5LSH has Second Phone. KA5BOL pres. of new LaSalle ARC in Trout. WB5CDX W5GHP WA5IQU and N5YL all CAN staff members. K5BLV WB5CDX and WB5LBR active on DRN5. Jefferson ARC 2-meter and 450 MHz repeaters now in operation. N5UR and WB5SSD full members of Delta DX Assn. RN5 Net Certs to W5GHP W5GKV WA5CAV N5HB WB5LBR WA5PRI N5YL WB5OOM N5ES K5ITC N5IS W5MI. WB5IYH reports Louisiana Emergency Net on Sun. do-



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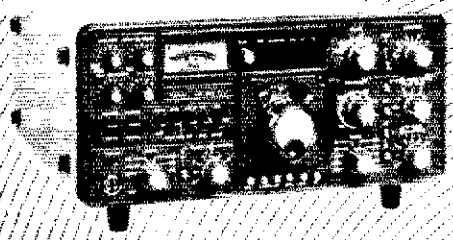

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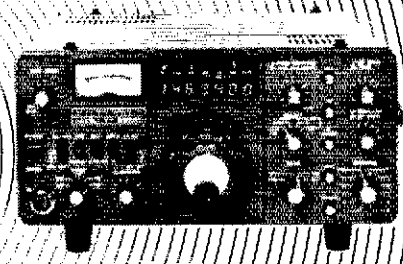

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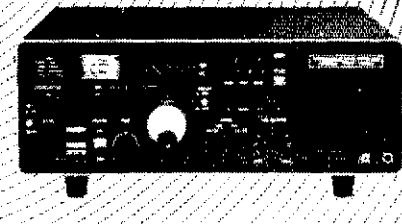

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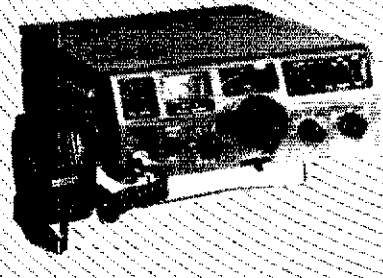

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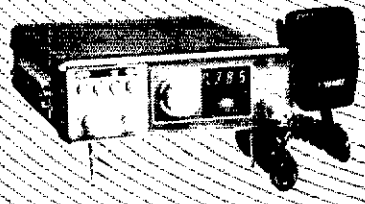

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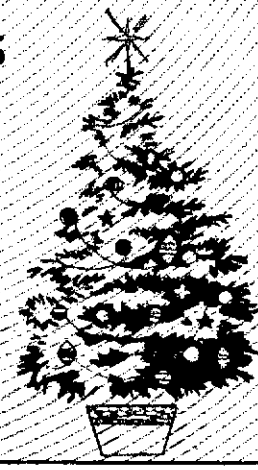

ing just great. Training sessions going on at present and more participation is needed statewide for the net to be more effective.

Net	Freq.	Time(PM)/Days	QNI	QTC	Mgr.
LAN	3615	7&10 Dy	410	210	N5TS
LTN	3910	6:30 Dy	544	96	N5ES
LSN	3703	7:30 M-F	124	17	N5IB
LRN	3587.5	6:30 Su-W	10	9	N5RB
RACES	3993.5	8:00 AM Su			WB5IYH
LEN	3950	9:00 AM Su			WB5IYH

Traffic: W5GHP 255, N5ES 121, WB5EMU 107, W5MI 83, N5RB 67, WB5LBR 65, K5TL 42, WB5IYH 32, K5BLV 31, WB5USS 31, WA5PRI 26, N5IB 25, WB5ASD 16, N5EK 8, WD5GJB 6, W5YN 6, WB5IKT 2.

MISSISSIPPI: SCM, E. Ed Robinson, III, W5XT — SEC: WB5FXA. Big loss to MS is transfer of K5QNE to Washington D.C. Best wishes from all of us in your new position; new net mgr. for MSBN is K5WSC. MSN net certs to WB5SIJD W3TWD/5 WB5ZAG(WA5IDF). FB reports from OOs & OBS, WB5DCY W5XX W5EPW WD5DCK WD5CSU. Many upgrades reported this month: WD5BWI WB5NGF AF5V (ex-WA5SIM) are now Extra!! WB5RMG WD5BUS WD5DIJ WD5JIO all Advanced. WD5JOD WB5SXP WB5VKG WD5CRB WD5IGL now General. New Licensees in Tupelo area: KA5BMP KA5CFT, CAND-(W5KLV) sess. 60, QTC 395 with Miss. Rep. 100 percent by WD5GNR CGCHN (WD5BDC) sess. 30, QNI 1845, QTC 187, MSBN (K5WSC) sess. 30, QNI 2183, QTC 72, MTN (K5OAF) sess. 30, QNI 132, QTC 43, MSN (WA5IDF) sess. 11, QNI 71, QTC 5, MN (WA5JWD) sess. 26, QNI 420, QTC 8. Traffic: W5EDT 187, WD5GNR 101, K5OAF 76, K5AKM 52, WB5SNB 34, WA5JWD 31, W5XT 27, WA5OKI 12, WA5IDF 11, WD5DCK 8, AF5V 6, K5MK 5, W5XX 4.

TENNESSEE: SCM, O. D. Keaton, WA4GLS — Asst. SCM: WB4PRF. SEC: WB4DYJ. STM: W4ZJY. W4ZJY has been appointed STM, all Net Managers are instructed to forward your net reports to him. All net reports and station activities reports should reach their destination before the 5th of the month. Congratulations are in order to AA4KB for his fine work in the present Novice training class. WB4YBL has been awarded a Section Net Certificate to represent his work in the Early Morning Session of TPN. K4JGW was appointed OTS. The Traffic System is proud of K4CNY who at 78 years of age is still one of the top traffic handlers, does most of it on CW. The MTARS recently graduated 14 Novices, good work to you. Now that all our Hamfests are over for this year, lets concentrate on club activites, training classes and on-the-air activities. There is a movement in progress at this time proposing that the Tenn. Section join the Carolinas-Virginia Repeater Association. Will all repeater owners, both clubs and individuals give this serious consideration and then let me know what you think about it. The Phones Nets report 160 sess., 2652 QNI, 777 QTC. The CW Nets report 75 sess., 553 QNI, 219 QTC. Traffic: WA4CNY 376, WA4NIF 252, WB4PRF 240, AF4T 167, K4CNY 131, W4ZJY 130, WB4BKF 115, W4OGG 77, AA4KB 45, K4OG 36, N4UC 36, WB4GWA 35, WA4GLS 35, K4VM 35, KB4G 32, K4XE 32, WB4ZSZ 29, WB4GZF 28, WA4DKC 26, WB4YPO 21, W4PFP 16, W4TYV 12, K4WOP 11, WA4BDL 8, W4RUW 8, N4ZZ 8, W4VJW 8, WA4YTN 7, WA4WVW 7, W4PSN 4, K4UMW 4, W4OD 3, W4EWR 2, WA4WZJ 1.

GREAT LAKES DIVISION

KENTUCKY: SCM, Ted Huddle, W4CID — SEC: WB4ZML. New appointments: W4OJN WB4ABE as OBSs, WB4NHO as EC, Sept. Nets:

Net	QNI	QTC	Net	QNI	QTC
KRN	403	40	KYN	127	84
KTN	1136	156	KSN	97	24
KPON	72	5	SEKEN	25	2
5DARES	54	2	5DARES	47	5

Louisville's first two-day hamfest was a big success! They will be scheduling the same for 1979. Owensboro ARES has been busy lately retrieving submerged autos. KY loses two vy FB amateurs: K4UMN, K4UDZ will be missed by many who knew and worked with them. The Lexington BG ARC has a new club antenna system. Start making plans for the annual Section meeting the third Sun. of Jan. 1979 in Louisville. More details next month. Traffic: WB4NPD 108, WA4AVV 105, WD4ITJ 54, WA4JAV 53, W4CID 49, K4AML 48, WA4GAL 34, K4AVX 33, WD4KDG 30, WB4ABE 29, WB4AUN 24, WD4COF 22, WA4YPO 21, KB4CF 21, K4HOE 19, WA4FAF 18, W4HKT 18, WD4UIH 11, WA4AGH 7, WA4SAC 2.

MICHIGAN: SCM, Stanley J. Briggs, W8MPD/K8SB — Asst. SCMs: WA8DHB W8SOP. SEC: WA8EFK. STM: WB8MTD. NMs: K8LNE KB8AI K8RV K8KMQ WB8YDZ WB8ZNS.

Net	Freq.	Time/Day	QNI	QTC	Sess.
MITN*	3953	0000 Dy	751	323	30
QMN*	3663	2300/0300 Dy	805	295	60
MACS*	3953	1600 Dy	743	202	30
GLETN	3932	0230 Dy	981	147	30
UPEN	3922	2100 Dy	698	81	24
WSSBN	3935	0000 Dy	808	79	30
MNN*	3722	2230 Dy	288	66	30
BR	3930	2230M-S	472	24	24
SEMTN	147.69/09	315 Dy	49	9	12
Mi6M	50.7	0000 Dy	38	0	7
VHF Nets	7 reports		519	28	52

*NTS Section nets. 45 amateurs attended the ARPSC workshop in Lansing. Work on the Emergency Plan and traffic matters was done. Field appointments: OTS: K8AIT W3GQJ/8 WB8HPZ K8JP WD8PAF WB8TTA. OO: K8JP K8HXW. OVS: K8HXW. I am sorry to report the following Silent Keys: WD8ELF K8OMH. Club elections: Delta County ARS: WD8DXN, pres.; WB8ZOD, vp, WD8IBW, secy.; WD8BHM, treas. Motor City RC K8SIA, pres.; WD8CSA, vp; WD8KZX, secy.; WD8IQP, treas. Arrow Rptr. Assn. AD8X. Div. WB8UPM, secy.; WD8NJS, treas.; W8MNT, TD. Welcome to Mich's newest affiliated radio club; the Bay Area Amateur Radio Club. OO reports received fromm: K8AIT WB8IKJ K8JH K8RCT. OVS reports from WD8POK WB8RNY. OBS reports from: N8AG K8BAI WB8DJS WD8IXV K8NKB WD8POK. W8AP finished 5BWAS. Congratulations! Newaygo County now has one YL operator: KA8CUT. SET will be Jan. 27 & 28 — now is the time to start planning. Upgrades: Extra: W8GQP, WD8IDNJ to AD8X N8AFF, WD8MJJ to AB8G. Advanced: WD8DKL WD8DKM WD8JRL WD8LHM WD8OOY WD8SDX WD8WOM WB8UVQ. General, WD8NIJ to N8AKY, WD8LYI to N8ABA, WD8PLV to N8AMT, WD8POK, WD8JEM, WD8JYU, WD8KUS, WD8IYA, WD8IXZ, WD8ODK, WD8LVH. The best of seasons greetings to all from WB8AFO and myself!! Traffic: (Sept.) WD8YDZ 273, WB8MTD 237, KRKMQ 233, W8MPD 174, K8RV 140, WD8NYN 136, WD8NKA 122, W8SOP 111, WA8DHB 104, N8ABA 98, WB8ZNS 96, WD8CSA 92,

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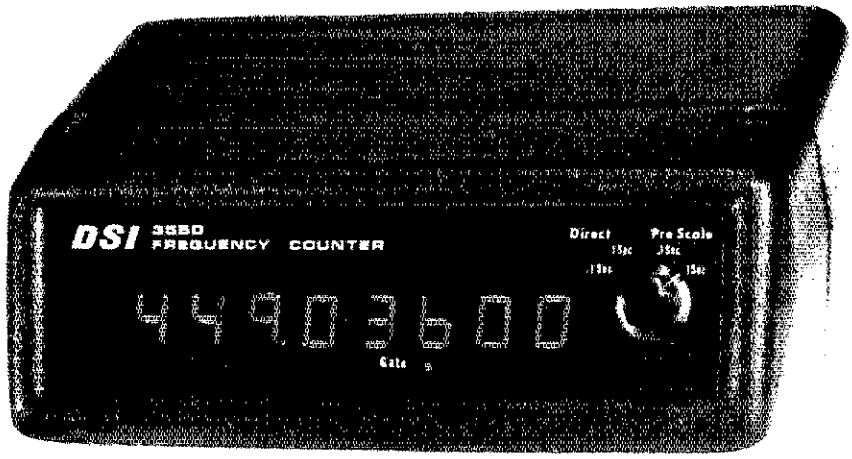

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Sensitivity 25MV 150 & 250MHZ 75MV 550MHZ
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OHIO: SCM, Harold G. Chapman, WB8JGW — Asst. SCMs: W8FU WA8MCR W8TP N4VY. SEC: K8AN. NMs: N8GW W8DIL WB8KWD K8OZ WA8SSI WB8WTS. Net reports (Sept.)

Net	QNI	QTC	Sess.	Time(Z)	Freq.
OSN	192	85	28	2210	3.577
OSSBN	2194	764	88	1430/2015/2245	3.9725
BNR	101	87	30	2200	3.605
BN	471	254	56	0200/2245	3.577
O6MN	754	67	30	0100	50.160
ONN	82	88	27	2230	3.708

Thanks to all my supporters who chose not to challenge my efforts in the recent election. Your continued support and cooperation is requested and necessary to keep Ohio at the top. Noted that DARA is equipping a van to be used for emergencies and educational and training purposes. Warren county (Lebanon area) forming ARES group. Club bulletins indicate continued efforts with Novice and upgrading classes — with some decrease in enrollments. The Ohio Sideband Service net now meeting at 2015Z daily as the afternoon session of OSSBN. K8BYH received the OSSBN award for 1977; well deserved — congrats OB. New appointments: ECs: K8EIJ Allen-Auglaize, AB8P Cuyahoga, WA8KZR Darke-Shelby, K8YRN Warren. OTSs: K8AAZ WD8DTG WD8MGP. Fairs and festivals continue to provide generous amounts of traffic. Local groups providing communications for special events: Central Ohio ARES, Highland Co. Radio Assn., Medina Co. ARES and undoubtedly others. This column intends to spread the word of what YOU are doing in the section. Please get any info to me by the 7th of each month. Your SCM is open to positive suggestions for improvement within the section. Traffic: (Sept.) W8PMJ 371, K8AAZ 268, WB8KWD 255, WB8OMO 231, WB8WTS 204, WB8CJU 195, WA8HGH 175, K8BYR 148, WB8OFR 148, K8AN 130, W8OZK 118, N4VY 116, K8OZ 115, WD8JTT 114, N8CW 94, WB8OHV 84, WD8DIP 78, WB8UBR 75, WD8QMP 74, WD8EIR 70, WD8CGR 69, N8IM 69, WB8JGW 67, WD8MTV 62, W8TP 62, WA8GMT 60, WB8SIO 60, W8MOK 57, K8DL 51, WA8SSI 46, WA8VWH 46, WD8DTG 45, WB8KKI 44, W8TH 40, W8CXM 34, K8CKY 33, WD8MGP 32, W8WEG 30, AB8P 27, WD8LIU 26, K3RC 24, WB8TRK 24, WB8YGU 24, WD8KBW 23, WB8MRL 23, WA8MHO 16, WB8PIY 15, W8IM 13, K8PE 13, WB8YTI 13, WD8LPP 12, WA8TSX 12, WD8KFN 11, W8CHT 10, WB8GGR 10, W8QCU 10, W8RG 9, WB8VZX 9, W8BHI 8, WB8SRC 8, WA8BOV 7, N8JR 7, K8CYX 6, WD8NAD 6, WD8OZM 6, WB8VLR 6, WB8GVI 5, W8MGA 5, W8UQV 5, W8JMD 4, WB8LWY 4, W8LZE 4, WD8EKI 3, K8HF 3, K8ONA 3, W8UPH 3, WA8RQQ 2. (Aug.) WB8KKI 89.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Guy L. Ollinger, K2AV — ASCM/SEC: WB3VUK. ASEC: K2AYO. STM: WA2SPL. NMs: W2CS W3WSS. Nets: NYPON 5PM 3913, ESS(slow) 6 PM 3590, NYSPTEN 6 PM 3925, NYS 7&10PM 3677, SDN 147.66/06 930 PM M-F. Please note the addition of the Southern District Net (SDN). I will list all traffic nets meeting at least weekdays. Congratulations in order to: WB2EAG for his 1st PSHR, WA2PSI making BPL for the umpth straight time, WB2KDA K2MBF WB2LUB KB2CU on making Advanced, WA2GYW on making General, KA2CLX and KA2BLB on making Tech. WB2GOJ reports Ulster County ARES held simulated rad disaster with Dutchess assisting. WA2MKQ lost his tiny pen. I read his report without a microscope. WA2UGN running a radio school at Maple Hill HS. K2QF and KB2CR teaching this fall's AARA Novice course. Note the increasing presence and traffic totals of W2YJR. Congressman Sam S. Stratton spoke at the ENY OCWA banquet. Showed slides of his trip to Russia. One of the Westchester Wits had a few words about the column, such as it is, but closed his remarks that I can't print what I don't get. Let's hear what's happenin. I'll print it. Get stuff to me by 10th of month for the QST out 7(seven) weeks later. Traffic: (Sept.) WA2SPL 806, W2YJR 235, K2AV 188, WB2PJU 171, W2IT 145, WA2OTC 86, W2ACQ 65, WB2KDC 63, N2EF 60, W2EFU 56, WB2EAG 51, WA2MKQ 35, WA2EOW 30, WA2CJY 16, K2BRR 13, WB2GOJ 5, WB2ELA 3, WB2VVS 2 (Aug.) WB2KDC 95, WA2EOW 30.

NEW YORK CITY-LONG ISLAND: SCM, John H. Smale, K2IZ — SEC: K2HTX. NMs: WB2EUF WA2UWA. The following are traffic nets in and around the section.

Net	kHz	Time/Days	Mgr.
NLI*	3630	1900/2200 Dv	WB2EUF
NLI Phone*	3928	1730 Dy	WA2UWA
NLS*	3728	1745 Dy	WA2UWA
ESS	3590	1800 Dy	W2WSS
NYSTPEN	3925	1800 Dy	WA2RSP

*Denotes Section Net, all times are local, please try to help out by checking in. The calender now reads December, another year gone by. On behalf of myself and my XYL and the three jr. ops, I want to wish everyone Merry Christmas, and a very Happy New Year. I can't believe this is the fifth time I've done it but, after Jan. 1, 1979, please send all the reports and club newsletters to WA2UWA, he will be the new SCM for the next term. I'm sure that a lot of you don't know Paul too well. Why not invite him to one of your club meetings and get to know him. I'm sure he would like to get to know you. As of 10/1/78, WA2KKJ is the EC for Eastern Suffolk. LIMARC's flea market was a great success. They were also active in helping out with the Boy Scout Jamboree at Eisenhower Park. W2DX now with rig for 220 MHz. WB2FGB is #6 in Rochester Minn. WB2ADZ now has NOAA Weather Radio capability. For those interested in listening, the system is tested every Wed. between 1100 and 1200 local. K2IZ was the speaker for the Traffic Forum at the Hudson Div. Convention. The Grumman ARC provided comm. for the third annual International Soccer Tournament held in July. Staten Island ARA has received an ARRL National Cert. of Merit

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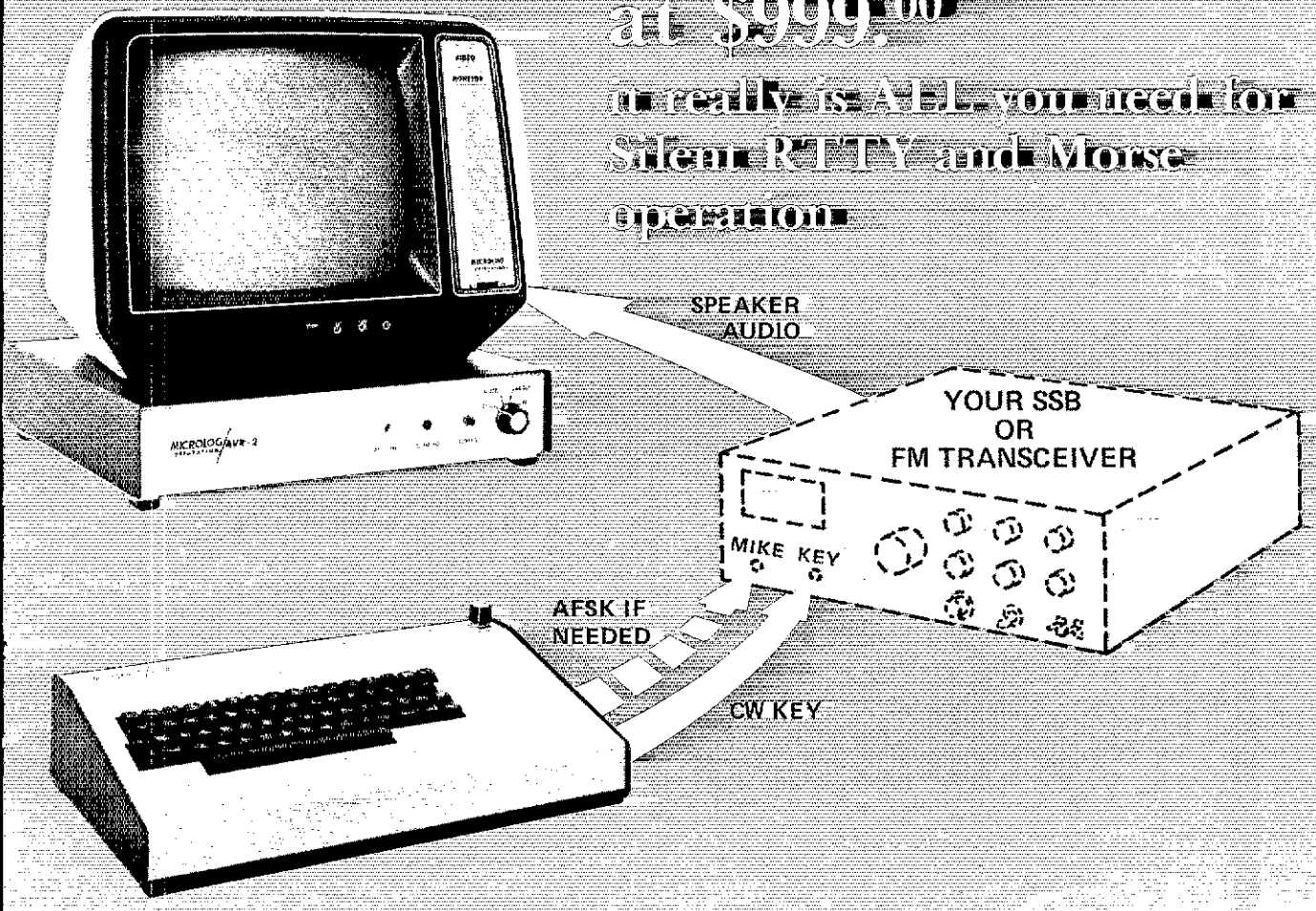

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TAKE ELECTRICAL DESIGN. Experience tells us: push the state-of-the-art. Example: we pioneered high power solid-state design for HF amateur radio gear. The advantages are numerous: efficient, small size, no lethal voltages, less heat, longer life, greater reliability. Example: broadband design. The advantages: easier operation for everyone, rag-chewers, DX chasers, even net operators. No out of resonance danger,no need for a dummy load to prevent tune-up QRM, no boring, time-consuming "tune-up" procedures. Another example: computer aid. In circuit design, in manufacturing, for speed and optimization. Example: computer compensating oscillator drift to achieve rock-like stability.

TAKE SERVICING. Experience tells us: make it easy, for everyone. So the 540/544 transceivers have modular design with plug-in circuit boards. And trouble-shooting (if it's ever needed) can be done by you with ordinary test equipment. (Of course, Ten-Tec service people are ready to help).

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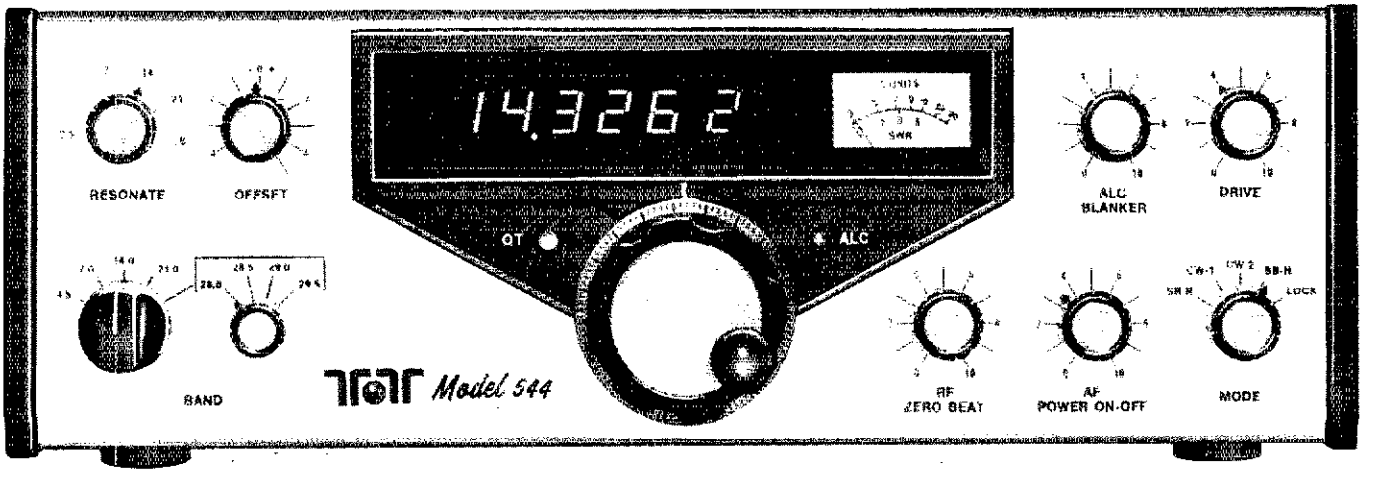

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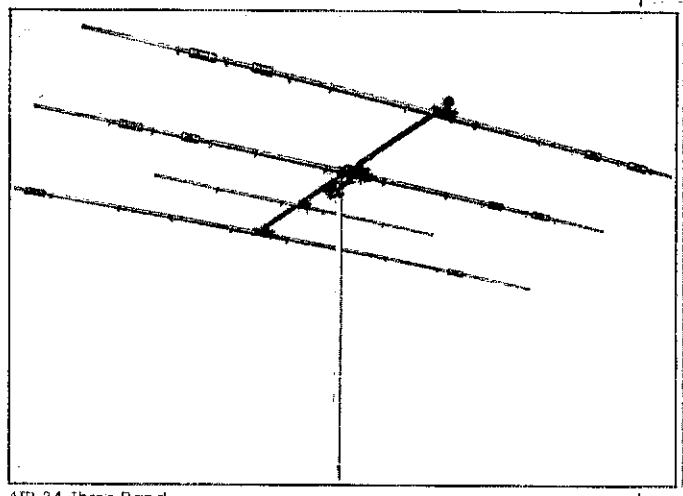
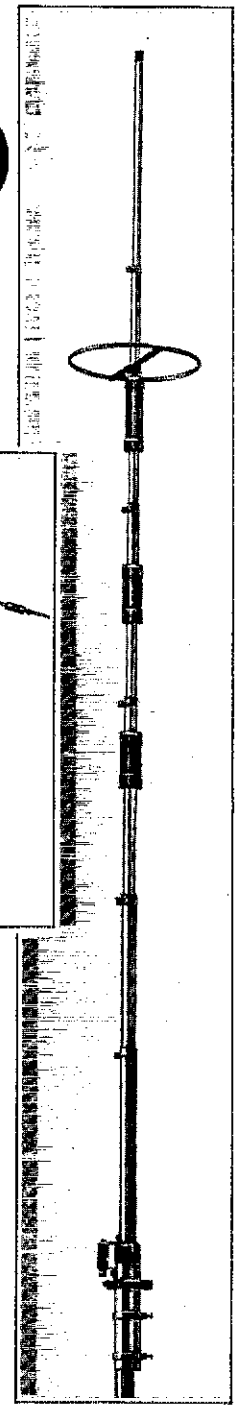


ATB-34, Three Band



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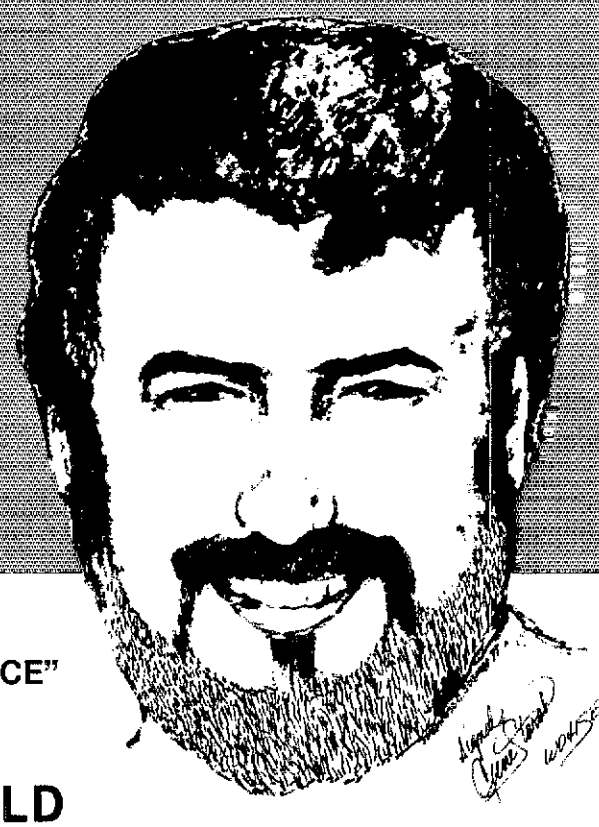

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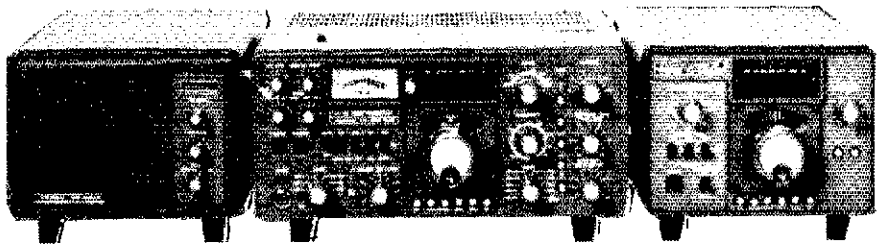

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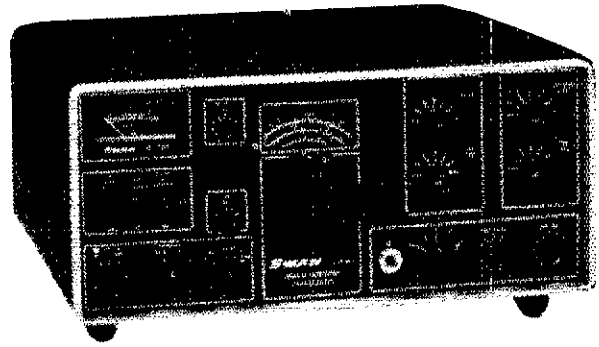

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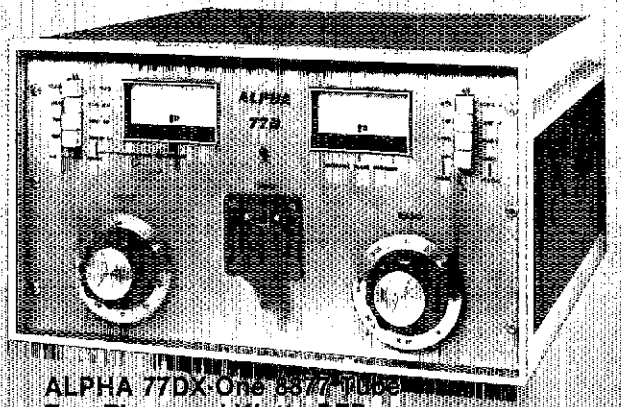

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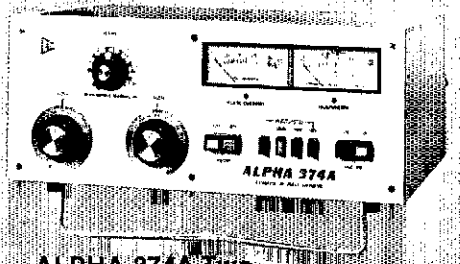

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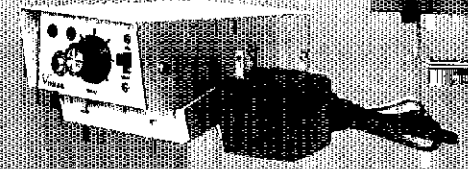

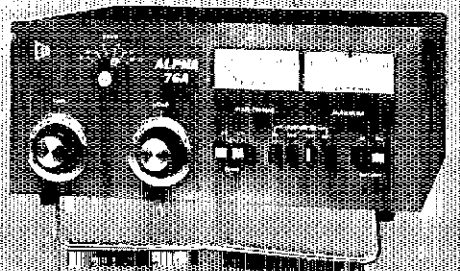

ALPHA 76A-Two 8874 Tubes
Hipersil Xfmr Alpha 76BA-Three
8874 Tubes Alpha 76CA-Three
8874 Tubes Hipersil Xfmr.

Export Inquiries are Invited.

for their PR work during Field Day. Wantagh ARC had K2SJO as a speaker for their Oct. meeting. I hope that everyone had a good time at the convention, it's nice to be able to meet so many of the people from this Section. K2OVS worked OK on 2 cw meteor scatter, this brings his states total to 32. Traffic: (Sept.) W2MLC 91, K2GCE 85, WB2EUF 24, N2LI 20, K2CRT 17, K2JFE 12, K2IZ 4. (Aug.) K2CRT 19.

NORTHERN NEW JERSEY: SCM, Bob Neukomm, WA2MVQ —

Net	Mgr.	Freq.	Time/Days	Sess.	QNI	QSP
NJN	W2XD	3695	7:00 P Dy	30	455	133
NJN	W2XD	3695	10:00 P Dy	30	311	115
NJPN	WB2LCC	3950	6:00 P Dy	30		
NJPN	WB2LCC	3950	9:00 A Su	4		
NJSN	WA2LHV	3735	7:00 P Dy			

Welcome new hams: WA2VJH WA2PSO WB2OUU WB2WAW WB2PPH KA2AUI WA2LXG WB2KEH WB2PIR KA2CPL WA1LWU KA2BLY and WA2TNN all students in the general and advanced classes at Ridgewood Adult School taught by WA2MVQ. WB2JVE is new EC for Union County. W2CVW has improved his KR-5 with new "Ham-Key" paddles plus a new IC-502 and IC-202 with Hamtronics 15W linears and added a sharp 7.5 kHz filter on his old SBE-144. K2VX is the new PAM for NJPN. WA2EPK will be operating as VP2VDP in Feb. AF2L qualified for DXCC in Sept. "Doc" WB2IWH is now AF2Y. K2OP and WB2EMB reported that they worked portable 3 at Camp Horse Shoe Scout camp teaching amateur radio and handling traffic. K2HLK is recovering from a heart attack at Englewood Hospital. Union County Emergency Traffic Net on 2 meters for Sept. had a QNI of 215, QTC 90. 2-meter repeaters take note and give 15 minutes evening time to traffic handling. N2TM is back at college and reports holding a very busy sked. WA2MVQ gave WA2PIP material for an inverted "V" so we can now hear him pound brass — has his 25 wpm cert. Time to get your antennas fixed for the winter traffic, contests and just plain rag-chewin. Hey gang only 2 club newsletters received this month! BARA reports Army Mars will continue "hands" on study of the VTVM and Oscilloscope. Nice new newsletter from Sussex Amateur Radio Club called "QSC" and has its constitution all lined up — a good newsletter! New OO W2TCA. Don't forget the "HARC" ARRL Hudson Division Convention at McAfee, NJ Nov. 11 & 12. Reservations to WA2GKC. See you there. Traffic: (Sept.) WB2RMI 507, W2RQ 183, K2VX 156, AF2L 133, WA2PIP 124, N2CR 93, W2SQ 92, K2OP/3 88, WA2LHV 62, W2XD 57, WA2MVQ 53, N2NS 52, WB2KLF 39, WB2RMJ 25, W2ZEP 19, W2CVW 9, W2SWE 9, W2CC 7, WB2CNF 6, WB2KAK 6, W2UH 4, WA2OVE 4, WA2WXM 3, N2TM 2, WA2EPK 2, WB2JVE 2. (Aug.) W2CVW 20. (July) W2CVW 17.

MIDWEST DIVISION

IOWA: SCM, Max R. Otto, W0LFF — SEC: W0IYW. Des Moines new repeater is 7/60/00. WD0GKA is now AD0B. Cedar Valley club members busy with outside events. WB0VVZ W0ERS WB0ZPY WA0EYG WD0AXU W0EIT W0GGO WD0EWV WB0PYD WB9LVR WB0HUQ WA0ZZG and WB0MMT helped 100 mile bike ride. WB0MMT W0ERS W0GON W0GGO W0KRW W0UTI and WB0PYD helped a tennis match. WA0VUY WB0MMT and K0KRU helped a Red Cross Disaster drill. NTS-TEN had 100 percent rep. by Iowa via W0SS W0YLS N0SM N5YX WB0YRH W0TIU WB0RWN WB0NSS and WD0FCI. WB0RMT has new 48 ft. tower. Congrats to KA0CAW and WD0GQD for new tickets, and to following upgrades: WD0AWG N0AFL WD0GSP KA0BIW WD0HMA and WD0AWK for Tech. KA0BXJ KA0BIS and WD0EFX for General. WB0VRN and WB0WAJ for Advanced, and WB0CSG for Extra. WB0YUI has new FT-227R and eleven elements on 2M plus 208 DXCC. WB0AVW is first OES appointment. WD0COW assisted at Grinnel tornado. Ft. Dodge has new RCA repeater on 6.31/91 and a 10M net on 28,755 kHz. T-T at 0030Z. W0RCW has new FT-227R and WB0YKJ has new FT225RD. At Storm Lake WB0AVW WA0WNT W0DFA and K0EVC helped a running marathon. A new fox hunt record of 10 minutes set by WD0EKP riding a motorcycle. Happy Noel. Nets: Iowa 75M, 3970, 0000Z M-S, QNI 918, QTC 51, Sess. 26, Mgr. W0YLS. 1830Z, QNI 1394, QTC 89, Sess. 26, Mgr. WA0VZH. TLCN 3560, 0030/0400 Dy, QNI 357, QTC 138, Sess. 59, Mgr. W0YLS. Traffic: (Sept.) WA0AUX 403, W0SS 169, W0YLS 149, W0LJW 62, WD0FCI 46, WD0GDL 36, WB0NSS 36, W0LFF 24, N5YX 19, WD0FGY 11, WB0KHO 9, WB0AVW 8, K0OFI 8, WB0PYD 7, W0BW 4. (Aug.) K0GP 28, K0OFI 13, WB0PYD 13.

KANSAS: SCM, Robert M. Summers, K0BKF — SEC: W0KL. Net Mgrs.: W0FT W0OYH WB0SZS WD0FBP. From the reports received this month, there were a number of KS hams at the National in SD recently. Did not hear of any big prizes coming back this way though. The last couple of hamfests I have attended, I received a few promises from a good number of newer hams in the state to start reporting each month. Only heard from WB4GSS/0, Wichita this month, however. Hey gang!! Remember!!! W0KL reminds us of the upcoming SET and the need to be award of who your EC is and what his plans are, (if any, and why not if?) for the 1979 SET. Ask who he, or she might be if you do not know and see if you can be a part of the plans. QKS-SS still needing new members to learn about this thing called traffic. 3737 kHz daily 8 PM contact WD0FBP for more details. Tim has recently become the net manager. Sept. Nets: CSTN, QNI 1009, QTC 6. KWN, QNI 688, QTC 383. KSBN, QNI 965, QTC 147. KPN, QNI 250, QTC 18. QKS, 459 QTC, 173 QNI. For frequency and times consult your new net directory. Traffic: WB0OBH 309, W0AM 156, W0OYH 135, W0HI 109, W0CHJ 100, N0SN 90, W0FIR 66, WA0LBB 66, W0FT 56, W0OAG 51, WD0FBP 47, K0BXF 32, W0RBO 27, W0PB 15, W0ZUX 14, W0KL 7, K0FPC 5, N0IN 4, K0KD 2.

MISSOURI: SCM, L. G. Wilson, K0RWL — Asst. SCM: Joe Flowers, W0OTF. SEC: WB0FKY. Congrats to WB0YBC who was voted the Midwest Amateur of the Year at the ARRL Convention in Kansas City. We are really sorry that we have lost him to the state of West VA, but we are sure that his public service efforts will be appreciated as they were here. The recent Heart of America Radio Club Picnic was a great success and "yours truly" even walked away with a prize or two. It was also noticed how quickly the tapper was emptied. Our deepest sympathy goes to the family and friends of W0ESN who joined the ranks of the Silent Keys and to W0RTT who lost his wife and WB0DRJ whose father passed away recently.

Net	QNI	QTC	Net	QNI	QTC
NEMOE	50	0	MON	221	181
MEOW	301	53	MON 2	143	42
SCEN	39	4	MOSSBN	880	78

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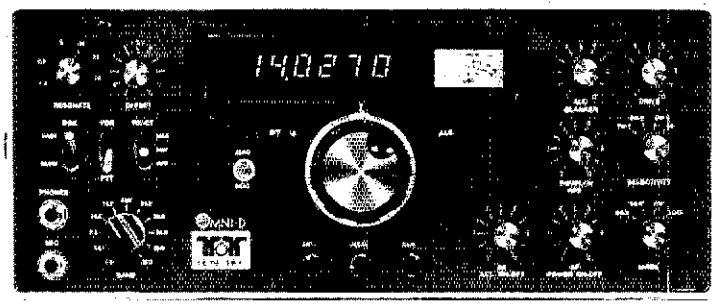

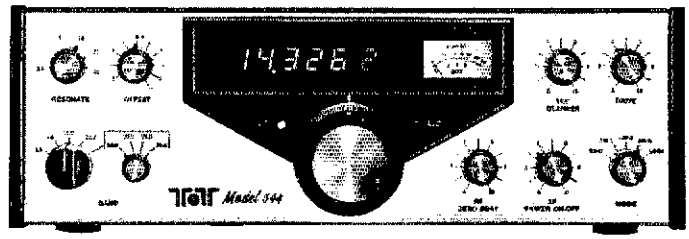

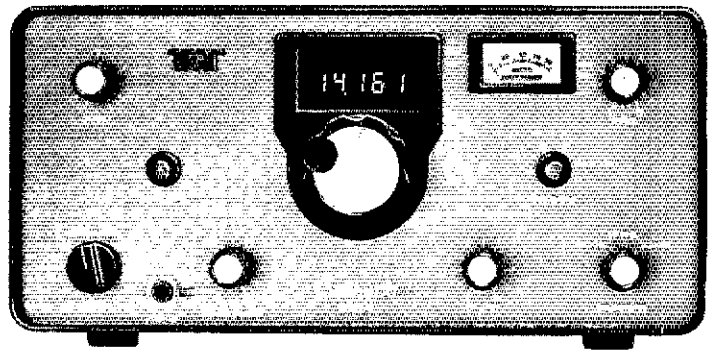

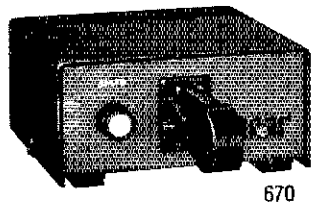

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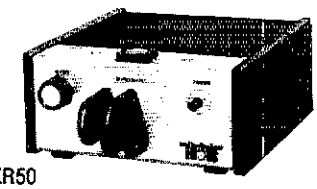

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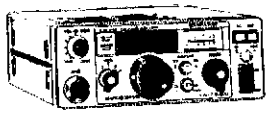

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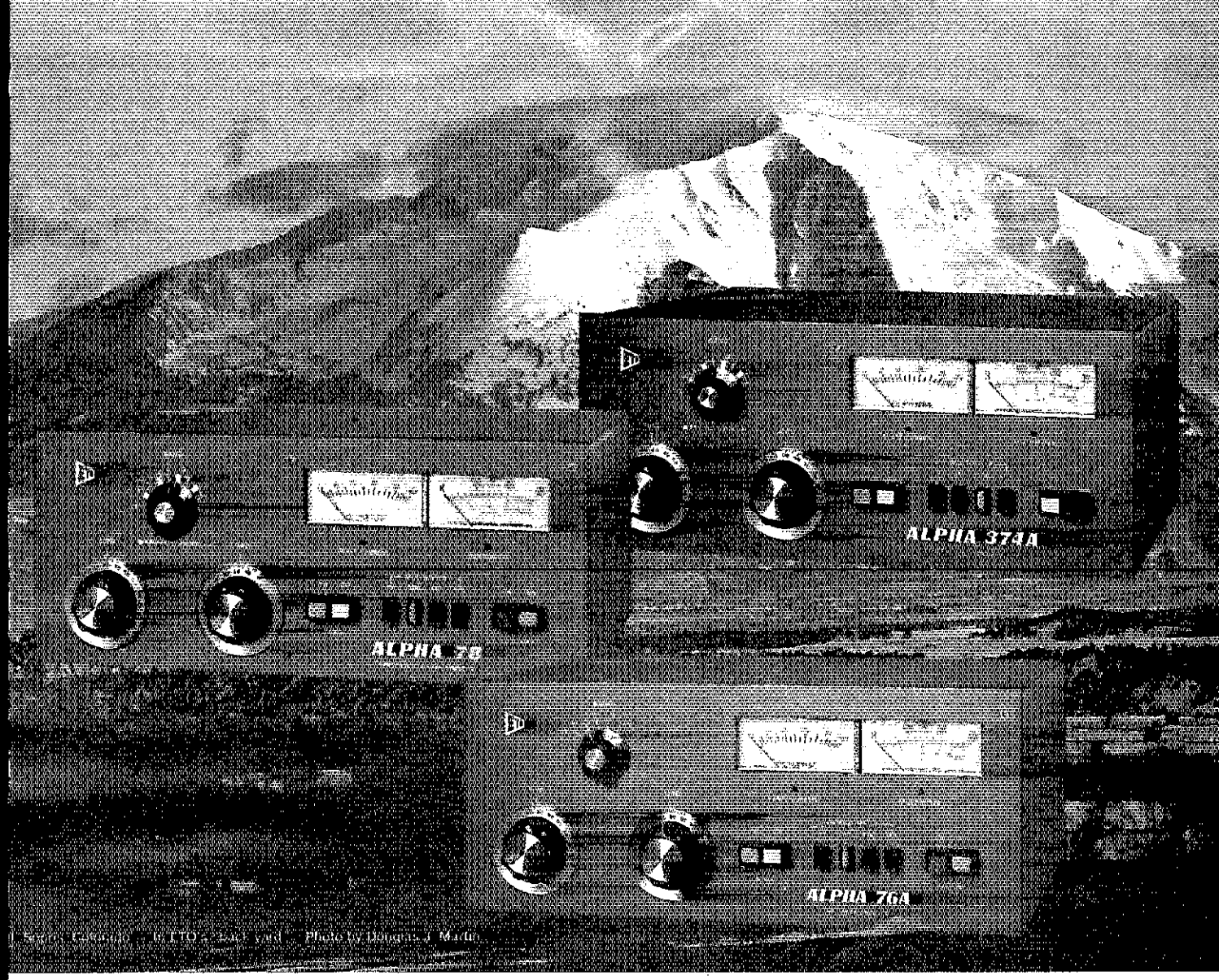

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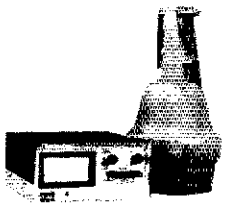

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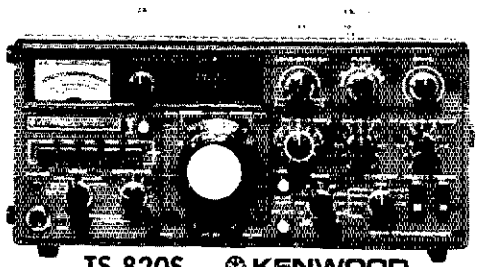

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3600A	50Hz - 600MHz	Oven .5 PPM 17° - 37°C	10MV	10MV	50MV	8	.5 inch	115VAC or 8.2 - 14.5VDC	2¼"H x 8"W x 5"D
3550W	50Hz - 550MHz	1 PPM 65° - 85°F	25MV	25MV	75MV	8	.5 Inch	115VAC or 8.2 - 14.5VDC	2¼"H x 8"W x 5"D

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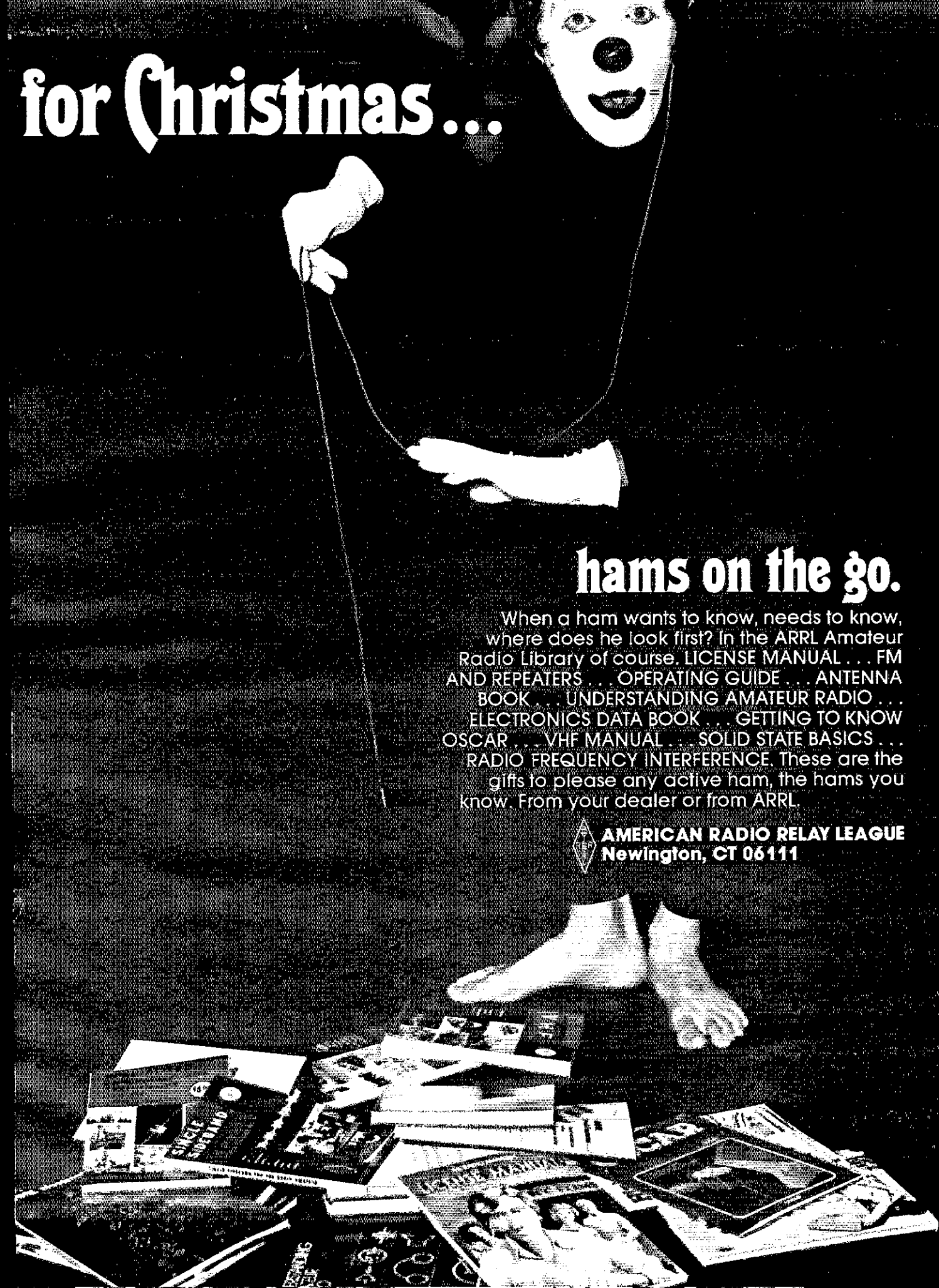
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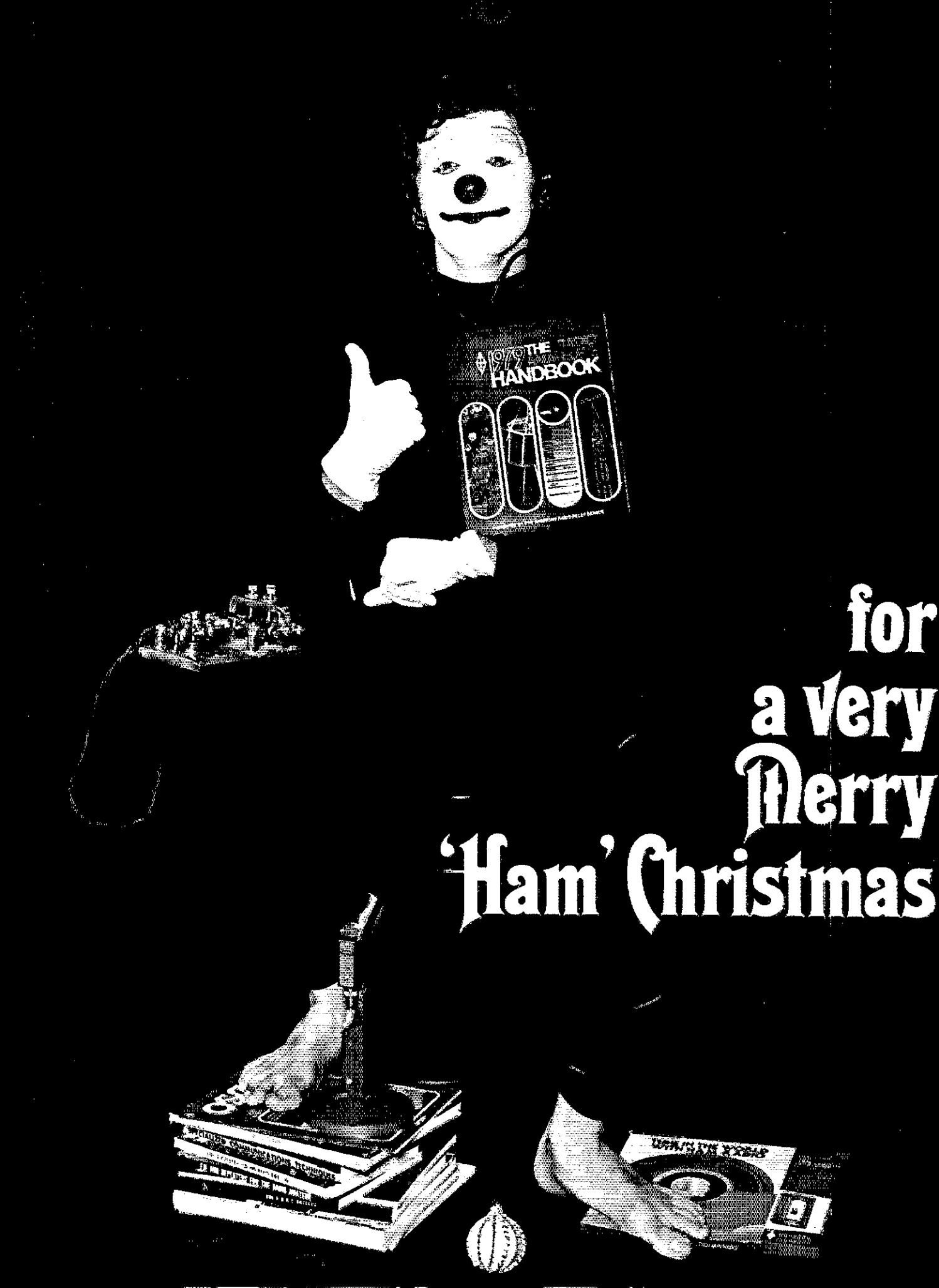
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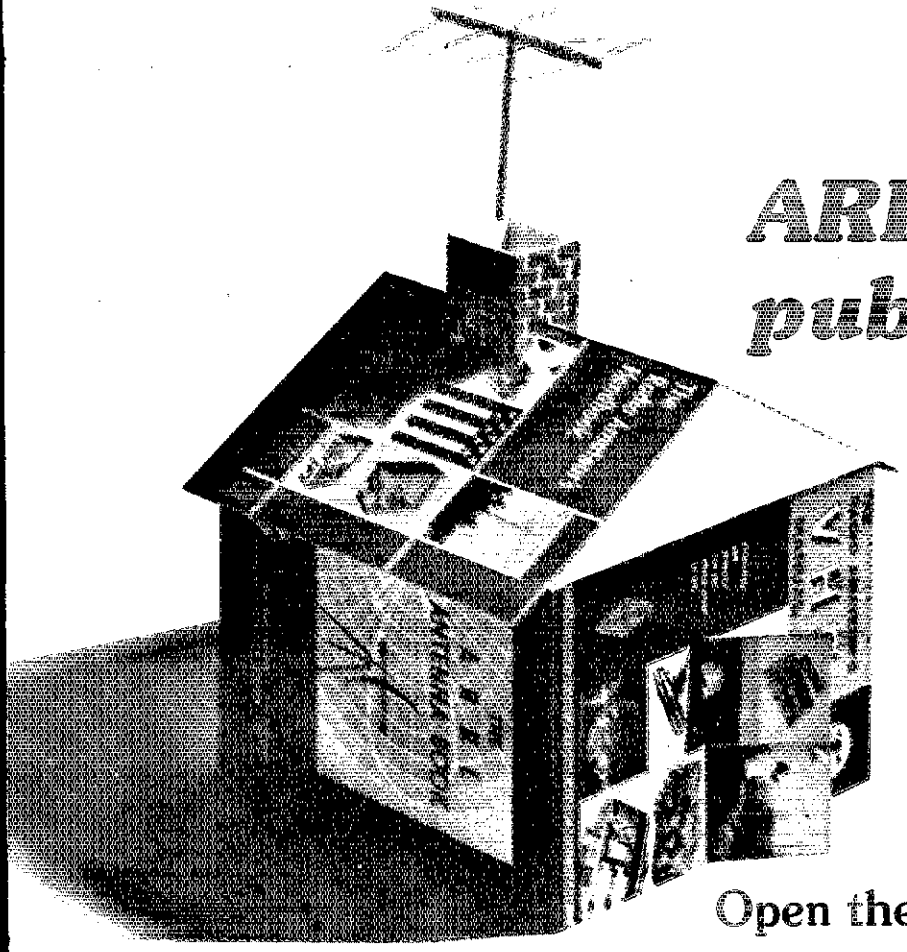

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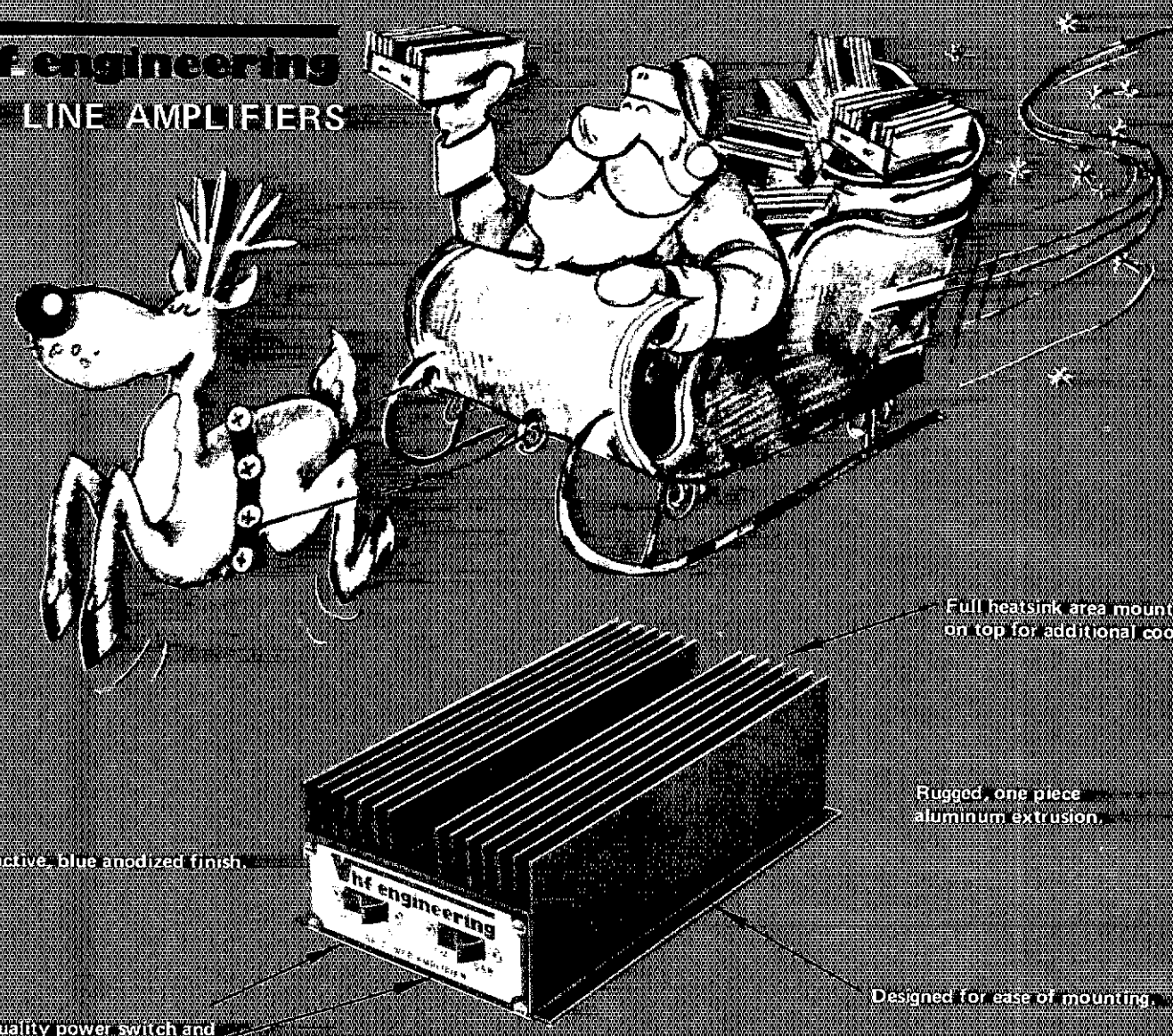

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BLC 10/70	144 MHz	CW-FM-SSB/AM	10W	70W	$149.95
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GENERAL SPECIFICATIONS

Semiconductors:	39 diodes, 23 transistors; 11 integrated circuits
Power Requirements:	Nominal 13.8 VDC input at 15 amps, negative ground only
Power Consumption:	Receive — 5.5 watts (includes dial and meter lamps); Transmit — 260 watts
Dimensions:	3-1/4" high x 9" wide x 12-1/2" deep (82.55 mm x 228.6 mm x 317.5 mm)
Weight:	8-1/4 lbs. (3.66 kg)

PERFORMANCE SPECIFICATIONS

Frequency Range:	80 meter band — 3.5 to 4.0 MHz 40 meter band — 7.0 to 7.5 MHz 20 meter band — 14.0 to 14.5 MHz
Modes:	CW; USB; LSB
RF Input Power:	SSB — 250 watts PEP nominal CW — 250 watts DC maximum (adjustable)
Transmitter:	
Antenna Impedance:	50 ohm, unbalanced
Carrier Suppression:	Better than −45 dB
Side-Band Suppression:	Better than −55 dB at 1000 Hz
Distortion Products:	Better than −26 dB
AF Response:	500 to 2500 Hz
Spurious Radiation:	Harmonics better than −45 dB below 30 MHz; better than −60 dB above 30 MHz
Frequency Stability:	Less than 100 Hz drift per hour (from a cold start at room temperature)
Microphone:	High impedance 3000 ohm
Receiver:	
Sensitivity:	Better than 0.5 watts audio output for 0.5 μV input
Signal-to-Noise Ratio:	Better than 10 dB S+N/N for 0.5 μV input
Image Ratio:	Better than −60 dB (typical with respect to 0.5 μV input: 80 meters — 130 dB; 40 meters — 100 dB; 20 meters — 75 dB)
IF Rejection:	Better than −70 dB (typical with respect to 0.5 μV input. 80 meters — 110 dB; 40 meters — 80 dB; 20 meters — 75 dB).
Intermodulation Intercept Point:	Better than 10 dBM
Selectivity:	2.5 kHz — 6 dB; 5.0 kHz — 60 dB
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Audio Distortion:	Less than 5% at 3 watts

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ALDA 103 is completely manufactured in the U.S.A.

Congrats to WBØOQV and Ruth on the birth of their new harmonic. Officers of the Kansas City DX Club for the coming year are: KØCS, pres.; KØVBU, vice-pres.; WØDHN, secy.; AEØK, treas. The Ozark ARS operated from the square Oct. 13th and 14th during Mt. Vernon Festival Days. This area now has an active Midwest YLARC. Just came home from the ARRL Midwest Convention. Everyone who worked on this convention deserves a big thanks. It was great and I think everyone had a good time. Cedar Rapids next. Congrats to the following new licensees: Novice: KAØ BUO BUV BUX BVC BVF BVN BWH BWR BWU BXA BXG BXR BXU BXW BYF BYG BZC BZG BZI BZT BZW BZZ CAH CAT though CAV,CBA CBB CBG through CBI, CBN CBO CBT CCA CCE CCK through CCM, CCO CCR CCT CCW CCZ CGG CGI CGL CFX CFY. Tech: WBØTVE WDØGNV NØAFT NØs AHV AHY AN, KAØAVG. General: NØs AGI AHT AJF AJI. Advanced: WBØMUU WDØGNX KBØCM. Traffic: WØBMA 442, WØHH 260, WØBV 93, WØOTF 91, KØSI 90, WBØVHN 58, WØQAU 57, KØSSN 56, KØONK 49, KØBM 34, WØBVL 25, KØRWL 16, WØGBJ 13, NØWM 11.

NEBRASKA: SCM, Ed O'Donnell, WB0GWR — The Platte Valley 2Mtr Net members provided communications for the Hunger Walk in Sept. WAØASM Nebr. State EC, has designed and installed a repeating storm alert on WRØACD (16/76). The alert is a series of the letter "S" preceeding the ID. Amateurs are asked if they hear this, please keep normal transmissions short as a net might be coming. Nebr. Cornhusker Net, QNI 1162, QTC 32; Mid-Nebr. ARES 2Mtr Net, QNI 213, QTC 2; Nebr. Morning Phone Net, QNI 1215, QTC 43; Nebr. ARES 75 Mtr Net, QNI 157, QTC 2; Nebr. Storm Net, QNI 903, QTC 39, Pawnee ARC 2Mtr Net QNI 150, QTC 0; PM Net, QNI 187, QTC 6; QCWA Net, QNI 57, QTC 0; Western Nebr. Net, QNI 433, QTC 23. Traffic: WØVEA 72, KØBRS 34, WØHOP 30, WAØPCC 15, WØVYX 13, WØFOB 10, WØZNI 10, WØLJO 9, WØNIK 9, WAØOEX 7, WBØNFG 5, WAØOQX 5, KØFJT 4, KØUDW 4, WØEUT 3, WBØGMQ 3, WØHTA 3, KØSFA 3, WØIXB 1.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, William J. Pace, W1ID — SEC: W1XX. NMs: K1EIC K1EIR WA1ELA.

Net	Freq.	Time/Day	Sess.	QNI	QTC
CN	3640	1900/2200 DY	58	272	188
CPN	3965	1800 M-S 1000 Su	30	435	142
WESCON	78/18	2030 Dy	30	585	60
Nutmeg	28/88	2130 Dy	30	639	87

High QNI: CPN — W1NQO K1BSB K1PZU W1HMJ, CN — W1KV W1EFW AA1G. This being the initial report for your new SCM it seems most appropriate to say thank you and a hearty well-done to my predecessor John McNassor for all the Conn. hams. His years of unstinting performance have established a record of service that will be very difficult to equal! A personal thank-you to all the well-wishers who have offered their kind words and help to continue the fine record John has established. I am amazed at the profusion of Club papers and delighted at having them as sources of news. All are very high quality periodicals and display a degree of professionalism that we all want our hobby to reflect! Noteworthy among these is the FARA News of the Fairfield group, the Tri-City FEEDBACK of New London, Norwich and Westerly, THE SQUELCH BURST from Stamford, SHORT-SKIP from Manchester. Note Club Secys: please keep them coming. Although space is at a premium we will cover all we can! CARA again scheduling the popular Conn QSO party from 2000Z Dec. 2 to 0200Z Dec. 4! This is a chance for the National Headquarters State hams to show how a QSO party is run. Let's all get on and make it a record year!! See recent QST for rules! Traffic: W1EFW 197, K1GF 178, W1QD 115, K1OQG 108, WB1AIU 97, WB1DGR 77, WB1CPF 73, WA1HYN 69, WA1RLV 46, W1GVT 38, K1XA 36, W1KV 29, W1JA 24, W1JTD 19, WA1LOU 17, K1DM 14, K1YYQ 12, W1QV 9, W1BDI 6, WA1JGS 5, K1AQE 5, W1CUH 4.

EASTERN MASSACHUSETTS: SCM, Frank Baker, W1ALP — Asst. SCM: WA1OWO SEC: W1AOG. STM: WA1ZAZ. WA1UNC, NM of EMRI, on 3660 daily 7 & 10 PM. WA1YMN, NM, EMRISS on 3715 at 6:15 PM. K1BZD, NM NEEPN, on 3945, Sun. at 8:30 AM. EASN, WB1DHW, NM 5:55 & 7:30 PM on 3726 daily. NFNN, N1GQ, NM daily on 3720 at 1830. EMRIPN, K1PAD NM, daily on 3898 at 5:30 PM. HHTN, WA1UWF NM, at 10:30 PM on 146.64 daily. EM2MN, WA1IFE NM onat 8 PM on 147.30 on MWF, Tue & Thur 145.8 AM. WB1DXR new OTS WA1BLG new OES. Silent Keys: W1BV W1DHL, very sorry to hear about K1JFQ. WA1JGG now AD1B. NEEPN had QNI 53, QTC 16. Ex-K1NOJ has Extra. W1ASB now WA4ASF. N5WX working in Chatham. ZL2TGH & ZL1VV here on visit. W1GPX/IBA are on 2. WB1EZS reports that the Pilgrim AWA is active. So. Shore Repeater Assn., WR1ACT an ARRL affiliate. HHTN had QNI 218,QTC 34, also had 318 QNI, 28 QTC. So. Shore ARC had meeting, also Cape Cod & Islands ARA. I9 Club met at W1KGH's. EMRI Net had 428 QNIs, 240 QTC in July, 448 QNIs, 249 QTC in Aug. WA1VAB Asst. Mgr. of EMRI. WA1AEK is ex-W1CGB. W1GXT worked WA1NGR/3 MD and K8III (OH) on 2. WA1ZGX leaving radio for 2 yrs. K1FB trying to start a WAS net on 40, teaching a General course at Wellesley ARA. WA1ZAZ received Public Service Award for '78 Blizzard. WB1DMP has MLA-2500. WA1UZH new four-element 20-mtr & six-element 10-mtr beams. WB1DXR has Advanced. WB1GEX has HW7. EMRIPN had QNI 353, QTC 183. So. Eastern Mass. ARA W1AEC WR1ADR WA1BZJ teaching Novices. K1PZU Editor of Net newsletter and will exchange copies with other Nets. K1PNB was NCS for Blind Walk-A-Thon in Townsend ARES and CD ops took part. WA1YWK has SB-101, 80 & 15 m dipoles. WA1FNM working on antenna system, busy in traffic net. W1PJ has Kenwood TS520S and a Mor-gain dipole. WB1FGD at Univ. of Mass. SEC W1AOG received reports from: W1BK W1BHD WA1BLG WA1HPS K1PAD K1NFW K1PNB K1FMM, W1NF sick with flu. W1LE active in Navy MARS. W1BK and his group provided a fine service to a resident when a respirator was needed and the power failed. K1UAQ reports that Area 1 has two GE Transceiver for 2. EC WA1BLG was at a bad fire in Medford. W1LID/7 writes from Tucson, AZ and is on 20. Officers of Middlesex ARA: WA1FMM, pres.; K1NUN, vice-pres.; WA1CDW, secy.; W1LJO, treas. K1TW is ex-K1VGM back on air again and on with a TR33C. N4PL is ex-W1UX. WB1ETU of the Coast Guard Aux. gave a talk at the Massasoit ARA. Officers of Framingham ARA: K1AZE, pres.; WA1UEH, vice-pres.; K1YHM, secy.; WA1VFJ, treas. K1NZO in Methuen. AB1N now Extra. Traffic: (Sept.) WA1ZAZ 369, WA1ZXB 260, W1PEX 227, WA1VAB 173, WA1EYY 166, WA1UNC 162, WB1DXR 146, K1PAD 120, WA1TBY 117, WA1YNM 115, W1FJI 98, K1BSO 97,

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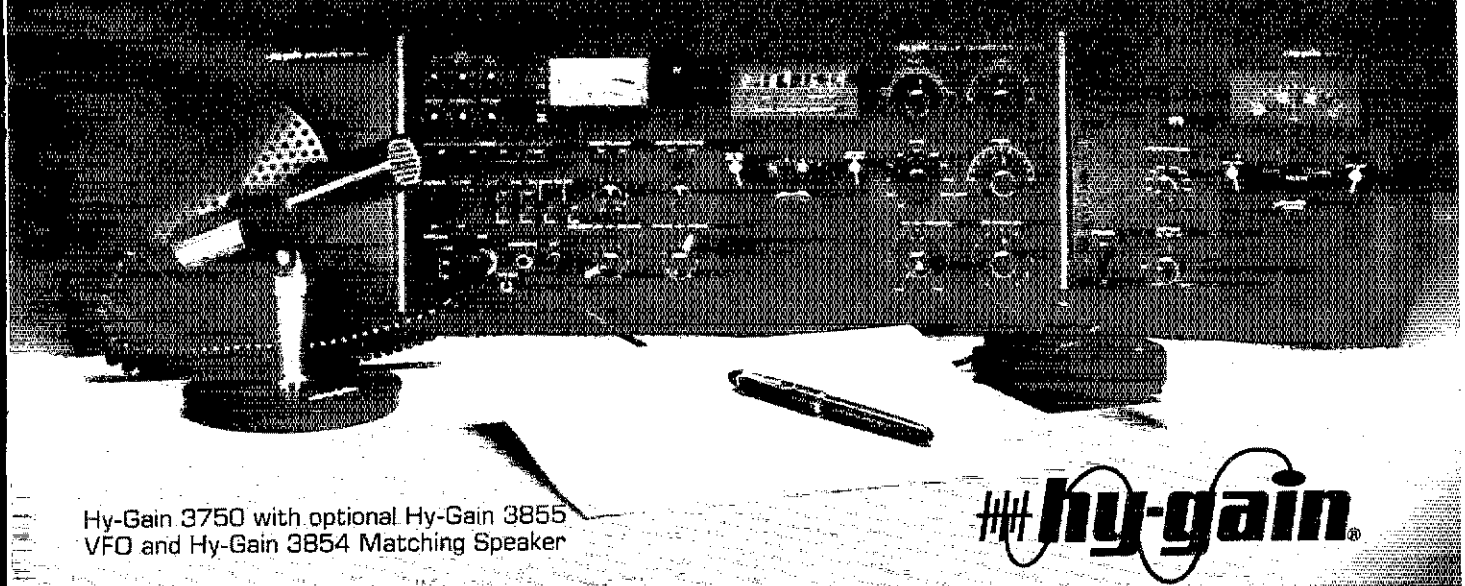
Hy-Gain's 3750 covers all amateur bands from 1.8 through 30 MHz. It utilizes advanced Phase-Lock-Loop circuitry, dual gate Mos Fet's at all critical RF amplifier and mixer stages, a narrow band SSB crystal filter and a 50 kHz T-notch filter.

The 3750 also incorporates audio and microphone compression circuits, ALC and specially developed S-2002 tubes.

Hy-Gain's optional 3855 VFO provides stable operation with less than 100 Hz of drift (after a 30 minute warm-up). Up to seven crystal-controlled frequencies may be selected on any band. The frequency of the 3855 is desplayed on the digital display of the main unit. Incremental tuning controls allow independent tuning of both the receive and transmit frequencies simultaneoulsy.

Hy-Gain also offers the 3854 matching speaker unit. This 5-inch PM Dynamic Speaker features a full four watts of input power to perfect the ultimate amateur radio communications system.



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Model 1346 Drake UV-3 (144-220-440)..... **$795.00**
Model 1504 Drake PS-3 AC Power Supply... **$ 89.95**
Model 1525 Drake 1525EM Encoding Mike .. **$ 49.95**
Model 1330 UMK-3 Remote Trunk-Mount Kit **$ 69.95**

Note: Other models are also available.

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— considers fm a vital part of a total communication system
— needs multi-band coverage in a single transceiver
— needs to continuously scan-monitor a priority amateur repeater dedicated to public service, weather, or DX alerts
— needs extra programmed channels for quick selection, in addition to the synthesizer...

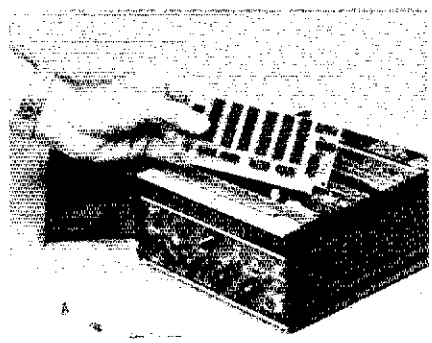
The Drake UV-3 provides it all!

- **Continuous priority channel scan**
- **Remote trunk operation (optional)**
- **Four extra diode-programmed channels on each band**
- **All three bands in a single bandswitched unit, or start with basic models and add extra band-modules later**
- **Non-standard offsets available for each band**

The Priority Channel Scan

You can diode-program your priority channel in one of the fixed channel positions. It can be continuously monitored from any other synthesized or fixed channel. If you're operating **on** the priority channel, or another programmed fixed channel, you can also scan-monitor any synthesizer frequency you choose.

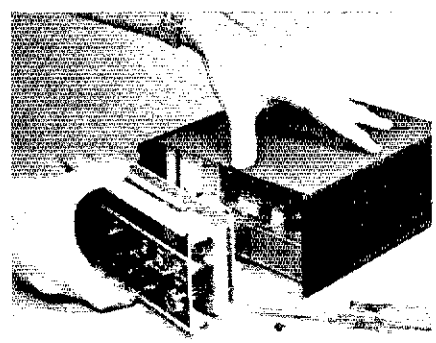
The Extra Diode-Programmed Channels



You can diode-program up to four fixed channels, with their offsets, for each band. This feature allows super-quick selection of favorite channels. The five-kHz synthesizer operates independently of these programmed channels. And best of all, soldering is not necessary for programming. The program board has special sockets mounted on it for direct insertion of diodes. We even provide the diodes.

Remote Trunk Mount Kit

The control panel of every UV-3 removes for installation in the UMK-3 Remote Kit. This provides for safety, as well as easy installation in small cars where under-dash space is limited.



Write for a fully illustrated brochure on the Drake UV-3 System.

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WB1GEX 95, W1DMS 77, W1DMH 60, WB1EMU 52, WA1LAD 51, K1GN 50, W1NF 46, W1CZB 32, K1BZD 22, WA1OWQ 21, K1PZU 20, W1ATX 18, K1PNB 16, W1EMG 14, WA1IFE 14, W1AOG 12, WA1FNM 11, WA1OAJ 11, K1LCQ 10, WB1EYE 9, WA1QMZ 4, W1SR 2. (Aug.) K1BA 266, WA1UWF 99, WA1YWK 97, WA1IFE 23, WA1FNM 19, K1LCQ 8, WA1YGJ 8, W1PJ 6, WA1FGD 2.

MAINE: SCM, Bill Mann, W1KX — New appts: STM: W1RWG. NM: WA1YUW. OTS: WB1CTR WB1CTS. OES: WB1DXM. West Poland, Sept. 22 — K1CXW, at scene of Navy plane crash, supplied initial radio contact. WA4UJJ made list of 54 hams available to aid in search comms. later, K1WUS and WB1CJX at crash site were link to W1GCX WA2PMV and AF2D at Brunswick NAS for Navy Comms. 2-mtr. rptrs invaluable. Bradley, Sept. 30 — Fire caused massive pwr. outage in Bangor area. WB1DKQ sent to fire and others to Forestry Service, F.D., P.D., Sheriff. N1DE control on 34/94 rptr. K1JCX assisted W5OPC in Double Eagle II Atlantic crossing. Barnyard Net celebrates 25th Anniv. Dec. 9. Correction: WA1SMY Yankee ARC V.P. Sass./OTC/QNI. PTN 30/70/170. CMEN 13/22/238. MPSN 4/12/63. BYN 26/29/974. Traffic: (Sept.) W1RWG 87, W1KX 66, WA1QFX 52, W1HDC 29, N1RP 28, K1TZH 27, W1AHM 26, WA1SMY 21, WA1FCM 12, W1JTH 9, WB3HYD/1 4, WA1JCN 3, W1GCM 2. (Aug.) W1BJ 45.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1SWX/W1NH — SEC: K1RSC. Holiday greetings to all. The NHVT Net had 97 check-ins, 148 traffic. Congrats to WB1ALR new EC for Carroll Co. WA1SXY & XYL have new baby boy. Rockingham Co. EC WA1VKM now KA1CB. By the time you read this W1BYS will be basking in the FL sunshine. WA1PEL has 200 confirmed for DX-CC. W1UQB moved from MA to tax free NH. WB1CTJ now Advanced. Ex-SCM W1JB received Public Service award for his outstanding job in the '78 Blizzard. WB1ALR has new 2-meter rig. The GSPN had 445 check-ins, 150 traffic. K1HI mobiled thru USA & Canada on 2 meters. N1AAI has moved to Manchester. EC KA1CB set up Amateur Radio demo at Plaistow old home days with Gov. Thompson & town selectmen sending greetings to Pres. Carter. W1GUX now mobile on 2 meters. N1JM moving to NY. It is sad to report WA1ZFI K1DQX are Silent Keys. The Concord Brasspounders Ladies night at the Cat & Fiddle was well attended. The 220 machine is back on & now in Derry on 222.86/224.46. W1UN has a new Yaseu & memorizer. Traffic: (Sept.) K1BCS 439, W1TN 140, WB1ELP 89, W1GUX 64, WA1PEL 15, WB1ALR 11, W1BYS 10, WB1CTS 8, W1JB 8, W1SWX 8, N1AAI 2. (Aug.) W1GUX 64, KA1CB 17, K1HI 14, W1JB 14. (July) WA1VKM 28, K1HI 20, K1DQM 11.

RHODE ISLAND: SCM, J. Titterington, W1EOF — NMs: N1RI N1DM. It gives me pleasure to tell you that we have a new SEC AB1D. Jack will need a lot of help to get the job done, so let's pitch in and give him a lift. New officers at Fidelity ARC: W1HVO, pres.; WA1LET, vice-pres.; KA1BI, secy. WA1UHT, treas. N1ABG makes Extra, an example of what determination will do. RI FM Rptr met at the Antique Wireless Museum. KA1BMI is new Novice. Traffic totals have been very low of late, gang — we can't put your output in QST unless we have input from you. WA1GSO, mgr. reports RIEM 2-M tfc totals QNI 189, Tfc 51. I wish you and your families a very Happy Holiday season and a prosperous New Year! Traffic: W1EOF 28.

VERMONT: SCM, Bob Scott, W1RNA — SEC: W1VSA. 2 mtr repeater now in operation on Jay Peak, under the call of WR1HSG, operating on 146.145 - .745. WB1CZC reports she now sports a 7BS after her call. CVARC is now back in opreation after being inactive for the summer. WB1ABQ reports working 87 DX with34 cnfd. VTRFD 52/21; VTSSB 651/100; GMN 466/46; Carrier 470/35; VTPN — sorry, if I revd the count I misplaced them. Traffic: K1BQB 97, AA1E 43, WB1ABQ 22, WB1FKQ 14, WA1OVW 5.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davie, KL7CUK — I regret to report the Silent Key of KL7BVY. Dave was one of the Old Timers and will be missed by every one. KL7JDI and KL7JDH worked on oil spill exercise in Homer and an actual body recovery with ARES and Alaska Rescue Council. KL7JHD reports that the AGN on 3735 kHz is growing. KL7HOV reports that the ASN now has 65 members. The APN had 20 sessions with 808 ck-ins. KL7OT was in Anchorage and enjoyed the bright lights of the big city. WB0BAY has gone back to Selby Lake for the winter. KL7JKW has a new Linear on HF. The DX association is working lots of DX these days. We now have a new club in Anchorage, it is the "Sohio Alaska Amateur Club." They have just affiliated with ARRL, congratulations. Traffic: KL7JDI 141, KL7JDH 31, KL7AF 6.

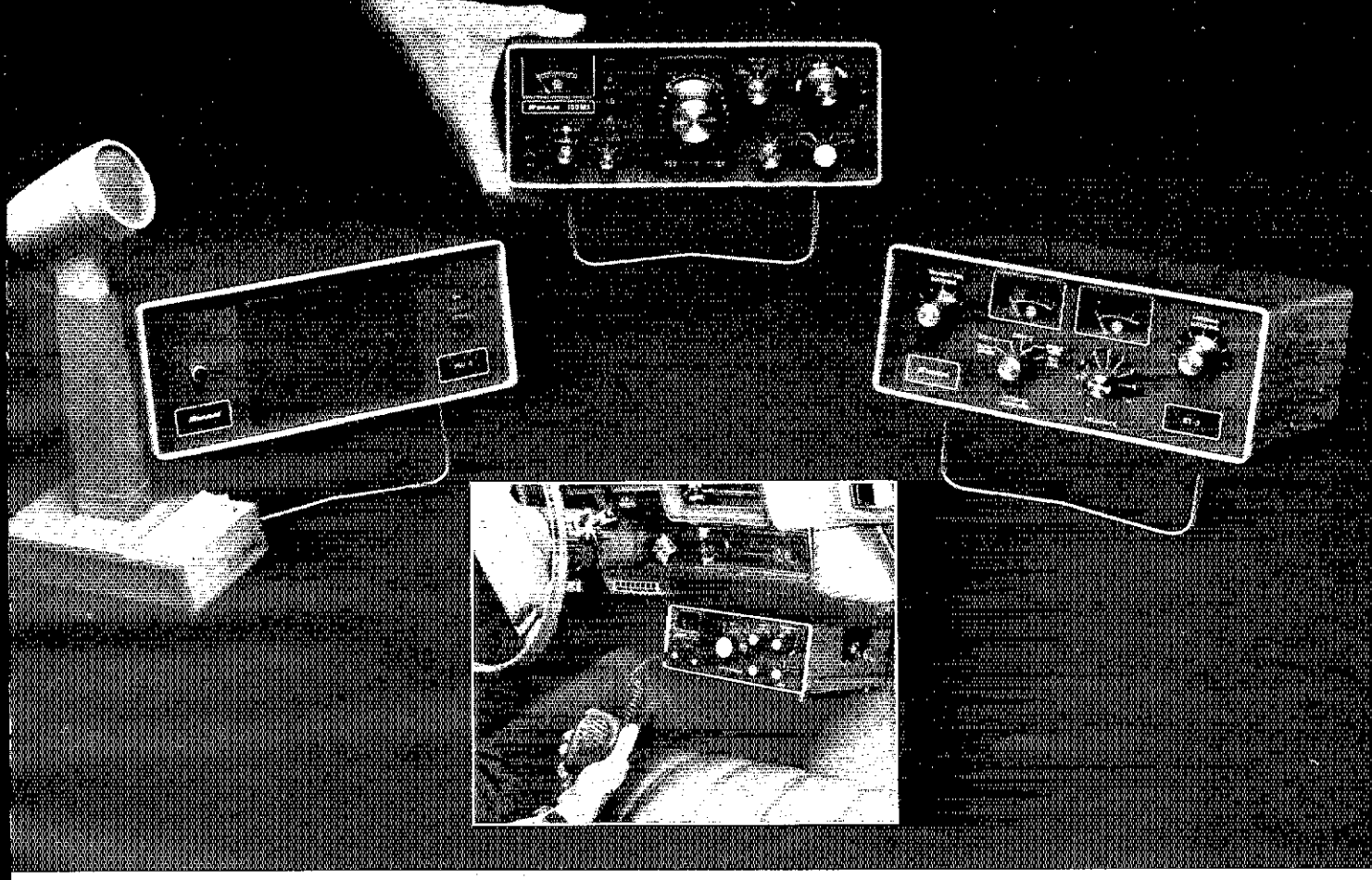
IDAHO: SCM, Lem Allen, W7JMH — The Nampa ARC meets each Thur. at 1130 AM at North's Chuck Wagon for lunch. Visitors welcome. HR1EPA from Honduras was a guest Sept. 8. The Nampa Rptr. on 147.96/36 on soon featuring Touchtone. The Cinnabar Repeater now operative on 147.84/24. The Cottonwood Rptr. near Grangeville on Sept. 9 on 147.99/39 and has good coverage in North ID and East WA. WB7BYY now AC7Y. W7LRP, EC Latah Co. reports AREC meets once per week on the 10/70 Rep. on two meters at 830 PM Thur. and convene at a selected (at the time) local restaurant — visitors welcome. The 146.10/70 repeater now planned for emergency battery power. The Gooding High School ARC led by advisor WA7RSZ and XYL WA7YOJ boasts a TS-520 and 14AVQ vert ant. Heath equipment, course, etc. all purchased thru student money raising projects. KA7ANT, pres.; WB7UGV, vp; WB7OGV, past pres. W7DMH EC Butte Co. now has Swan 500 CX and Hustler 4BTV w/80 m coil. The Pocatello ARC stated Code and Theory classes. Novice being conducted by W7PAV, General by WB7DNU, N7DN WB7RKF and W7GHT attended the ARRL Nat'l Convention in San Diego Sept. 22 24 and was initiated into the Royal Order of Wouff-Hong of the QCWA. Many ID hams attended the annual Walla-Walla Hamfest Sept. 23-24 at Milton Freewater. WB7QET hospitalized, now home with new Atlas 350XL. WB7PFQ building HW-101. W7JMH bought KDK/2015R and Argonaut at WW fest, using both on trips to give "scarce" counties to the County-Hunters. WB7NSW has new Century 21, beautiful new antenna farm in back yard! K7REX keeps the 2-meter repeaters busy on frequent trips.

Nets	Freq.	Time	Sess.	QNI	QTC
CD	3990	810 AM	21	472	19
IMN	3635	900 PM	21	175	58
FARM	3935	800 PM	27	977	42

Traffic: W7GHT 242, W7JMH 108, W7LLM 43.

MONTANA: SCM, Robert Leo, W7LR — In the last two monthly reports the section appointments were listed.

BREAKS THROUGH EVERY HF SOUND BARRIER —INSIDE AND OUT!



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Does Your Unit Cover The New Sub-band 144.5 - 145.5 MHz? The FM2015R Does, PLUS MARS-CAP!*

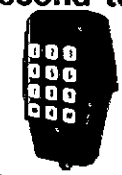
All Solid State-CMOS PL digital synthesized - No Crystals to Buy! 5KHz steps - 144-149 MHz-LED digital readout PLUS MARS-CAP and MULTIPLE OFFSET.*

• 5 MHz Band Coverage - 1000 Channels (instead of the usual 2MHz to 4MHz-400 to 800 Channels) • 4 CHANNEL RAM IC MEMORY WITH SCANNING • MULTIPLE FREQUENCY OFFSETS • ELECTRONIC AUTO TUNING - TRANSMIT AND RECEIVE • INTERNAL MULTIPURPOSE TONE OSCILLATOR • RIT • DISCRIMINATOR METER - 15 Watts Output - Unequaled Receiver Sensitivity and Selectivity - 15 POLE FILTER, MONOLITHIC CRYSTAL FILTER AND AUTOMATIC TUNED RECEIVER FRONT END, COMPARE! • Superb Engineering and Superior Commercial Avionics Grade Quality and Construction Second to None at ANY PRICE.

INTRODUCTORY PRICE

$439.00

Regulated AC/PS
Model FMPS-4R . . . $39.95



FMMC-1* Microphone with Built-in Touch Tone Pad.

WHY BUY LESS?
THE FMMC-1 HAS IT *ALL!*

- New! Auto key up
- Snap-Action Keyboard
- Adj. level and tone balance
- Use with any transceiver
- Only 3¼" x 2"

$49.95

- **FREQUENCY RANGE**: Receive and Transmit: 144.00 to 148.995 MHz, 5Khz steps (1000 channels) INCLUDING NEW BAND 144.5-145.5MHz + MARS-CAP and MULTIPLE OFFSET.*
- **LED DIGITAL READOUT.**
- **4 CHANNEL RAM SCANNER WITH IC MEMORY**: Program any 4 frequencies and reprogram at any time using the front panel controls—search for occupied (closed) channel or vacant (open) channels. Internal Ni-Cad included to retain memory (no diode matrix to wire or change).
- **MULTIPLE FREQUENCY OFFSETS**: Three positions A,B,C, provided for installation of optional crystals: EXAMPLE - 1 MHz offset. Duplex Frequency Offset Built in - 600 Khz PLUS or MINUS 5 KHz steps, plus simplex, any frequency.
- **INTERNAL MULTIPURPOSE TONE OSCILLATOR BUILT IN**: 1750Hz tone burst for "whistle on operation" and sub-audible tone operation possible by simply adding a capacitor across the terminals provided. Internal 2 position switch for automatic and manual operation, tone burst or sub audible tone PL - adjustable 60-203Hz (100 Hz provided).
- **AIRCRAFT TYPE FREQUENCY SELECTOR**: Large and small coaxially mounted knobs select 100KHz and 10KHz steps respectively. Switches click-stopped with a home position facilitate frequency changing without need to view LED's while driving and provides the sightless amateur with full Frequency Selection as standard equipment.
- **FULL AUTOMATIC TUNING OF RECEIVER FRONT END AND TRANSMITTER CIRCUITS**: DC output of PLL fed to varactor diodes in all front end RF tuned circuits provides full sensitivity and optimum intermodulation rejection over the entire band. APC (AUTO POWER CONTROL) - Keeps RF output constant from band edge to band edge. NO OTHER AMATEUR UNIT AT ANY PRICE has these features which are found in only the most sophisticated and expensive aircraft and commercial transceivers.
- **TRUE FM**: Not phase modulation - for superb emphasized hi-fi audio quality second to none.
- **RIT CONTROL**: Used to improve clarity when contacting stations with off frequency carrier.
- **MONITOR LAMPS**: 2 LED's on front panel indicate (1) incoming signal-channel busy, and (2) Transmit.
- **FULLY REGULATED INTEGRAL POWER SUPPLY**: Operating voltage for all 9v circuits independently regulated. Massive Commercial Hash Filter.
- **MODULAR COMMERCIAL GRADE CONSTRUCTION**: 6 Unitized modules eliminate stray coupling and facilitate ease of maintenance.
- **ACCESSORY SOCKET**: Fully wired for touch tone, phone patch, and other accessories. Internal switch connects receiver output to internal speaker when connector is not in use.
- **MULTI-PURPOSE METER**: Triple Function Meter Provides Discriminator Meter, "S" Reading on receive and Power Out on Transmit.
- **RECEIVE**: Better than .25uv sensitivity, 15 POLE FILTER as well as monolithic crystal filter and AUTOMATIC TUNED LC circuits provide superior skirt selectivity - COMPARE!
- **HIGH/LOW POWER OUTPUT**: 15 watts and 1 watt, switch selected. Low power may be adjusted anywhere between 1 and 15 watts. Fully protected-short or open SWR.
- **OTHER FEATURES**: Dynamic Microphone built in speaker, mobile mount, external 5 pin accessory jack, speaker jack, and much, much more. Size 2½ x 7 x 7½. All cords, plugs, fuses, microphone hanger, etc. included. Weight 5 lbs.

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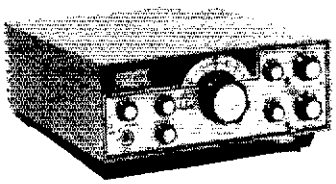

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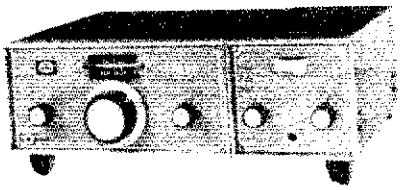
- **250 Watts**
- Superb Commercial Grade Quality and Construction
- Totally Solid State with Superior Audio Quality
- Modular Plug-In Circuit Board Assembly
- Dual Speed VFO Dial-Vernier
- Semi-Break in CW with Sidetone



ATTENTION NEW HAMS!!

ATLAS RX-110 RECEIVER

- CW and Normal SSB - Five Band Full Coverage
- Built in AC Supply and Speaker
- Converts to Five Band Transceiver

ATLAS TX 110 PLUG-IN TRANSMIT MODULE

- CW and Normal SSB - Five Band Full Coverage
- 15 Watts Input (200 Watts with Optional P.A.)

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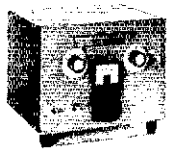
NEW! SIGMA MODEL AF250L
DEVIATION/MODULATION METER
Introductory Price
$169

FEATURES: Extremely stable local oscillator for easy measurement of HF, VHF, and UHF bands employing negative feedback, to insure extremely high stability ● Easy to read, accurate linear scale ● Direct off the air signal measurement capability. **OPTIONAL 12v DC Power Kit - $12.** ***FULLY CERTIFIABLE FOR COMMERCIAL USE.***

SPECIFICATIONS: Frequency: 1.8MHZ-520MHZ/3 range select (A,B,C,EXT), A range: 26.5 MHZ-40MHZ, B range: 48MHZ-60MHZ, C range: 140MHZ-156MHZ (generous overranges), EXT. range: 1.8 MHZ-520MHZ (Need Signal Generator) ● Input level: (1) Through type input level: IW-200W (RF Input Terminal), (2) Direct input level: More than 80db/50ohm impedance ● Amplitude modulation: 0-100% ● Frequency diviation: 0-20KHZ ● Accuracy: +/-3% of full scale ● Intermediate frequency: 10.7MHZ ● RF Attenuator: 0-60db variable ● Audio Signal oscillator: (1) Audio Frequency—1,000HZ (1 KHZ), (2) Output level—More than 1V RMS (variable) ● Power Source: AC117 ● Dimensions: H-5½" (140mm), W-10¼" (260mm), D-7¼" (184mm) ● Wt.: 7lbs.

SUPERB NEW WANZER Z-4 TRANSMATCH

- Roller Inductor
- Switchable Double-L or Pi
- In/Out Switch
- Commercial Grade Construction
- 160-10 Meters
- 3KW



Introductory Price
$139

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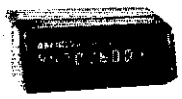

Fully Certifiable for commercial use

COMPARE!
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factory assembled not a kit

600 MHZ FREQUENCY COUNTER WITH CRYSTAL OVEN TIMEBASE

- Sensitive—No Direct RF Connection Required
- Accurate—.5PPM ● Selectable Resolution
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SPECIAL
NEW CDE HAM III ROTATORS—
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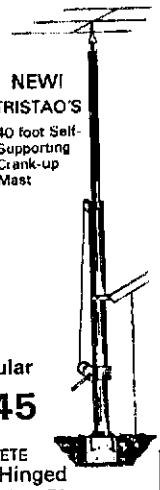

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40 foot Self-Supporting Crank-up Mast
Regular
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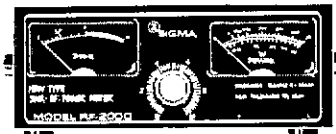
COMPLETE
With Hinged Mounting Plate And House Bracket
Our Price
$310
$19 Shipping Anywhere USA

SIGMA RF-2000 SWR & POWER METER



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Introductory Price

Cal PWR Scales 200W-2000W Freq Range 3.6-150 MHz. Please do not confuse the RF2000 with similar appearing lower priced units. RF2000 is an individually calibrated professional quality instrument. Unequaled at many times the price. Size 7" (w) x 2 1/3" (d).

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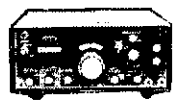
SUPERB! NEW ICOM IC-701 H.F. XCIEVER

ATLAS 210X-215X and 350-XL

Please write for special bonus and package offers.



FM2015R Accessories		KDK SPECIAL SALE FM144 Accessories	
FMSS	SUPER SCANNER 1000 Total Scanning Capability $112	FMOF-1	Offset Option Kit - 2 Extra Positions, Crystals Required . $5
FMPS-4R	Regulated AC/PS $39.95	FMOF-2	1 MHz Offset Option Kit (No Crystals to Buy) $5
FMMC-1*	Microphone with Built-in Touch Tone Pad..... $49.95		
MARS-CAP and Multiple Offset Kit* - Any Frequency, Any Split, No Crystals $5			
FMAT-1	½ Wave Portable Antenna for Hotel, Motel or Apartment $7.95		
Extra DC Cord & Plug $4.00			
MARS-CAP Option Kit - Any Frequency Any Split $12			
Mounting Bracket (Extra) $6.00			

NEW FMSS 800 CHANNEL PROGRAMMABLE SUPER SCANNER WITH FULL BAND SCAN CAPABILITY FOR KDK FM 2015R $99.95

New Standard 2 Meter FM Transceivers Model SRC 146A

	Special Package
SRC 146A	$259
4 Xtals 34-94 and 94-94	NC
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P1364 Leather Case	$12
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NEW!!! Touch Tone pad completely wired and ready to plug in - $49.95

Our Price **$289**
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DEALER INQUIRIES INVITED

Appointment meanings have changed as follows: ORS & OPS to OTS (Official traffic stn); RM & PAM to NM (Net Manager). OO, EC, OVS, OBS, SCM unchanged. Gallatin Ham RC, Bozeman, applies for ARRL affiliation with 37 members. W7BXL organizing MT OCWA net. W7LBK within 84 Hz on FMT with Collins RX, no freq. meter! WA7OBH WB7EQV busy on OSCAR. Many new Novice classes starting in MT. K7ABV got YI QSL, waits for two more for NO. 331 DXCC. W7DB sent 4 ARRL bulletins on MTN. IMN Sept. QNI 185, QTC 58. IMN changes to 0230Z end of Oct. W7BDE & XYL attend Sask. Conv. at Regina. W7GP W7OZH & others attend San Diego conv. K7MGM W7LBK W7TUN W7FJR N7AFB WA7CAC WB7DPQ got new rigs. K7ELW ham family: K7ELW OM, K7MOW XYL, sons WB7PBM N7AFB. WB7PBM new Army MARS member. K7KOY building MARS rig. WA7QBH builds airplane (real one). KB7BI W7GP visit Eaglehead repeater on horseback. W7LR & others develop steamboat Mt. repeater site. WA7IJN sends in 3 page OO report (TV blew, new callbook supplements, & hard work). Finds many Novice band problems due to old rigs and inexperience. Traffic: (Sept.) W7NEG 14, W7LBK 13, W7HAH 3, W7LR 3, W7DB 2. (Aug.) W7BKM 5.

OREGON: SCM, Dale T. Justice, K7WW — SEC: W7HLF. NMs: OSN, N7NO. BSN, WB7PQU. PDX ARES, K7WW. OARES, WA7RWM. JCARES, W7VSE. MIDWIL2, K7UGF. 1676, K7KVV. OEN, W7VIF. Net reports are coming in very well and results are summarized and listed in the Public Service section of QST. WA6KLA and W7LT attended the National Convention in San Diego. WB7SKC and WB7SKD moved to Parkrose. New appointments: K7JF as Asst. SCM and W7HKE as EC for Douglas County. Traffic: (Sept.) W7VSE 646, K7NTS 328, WA7IHS 291, W7HLF 47, WB7RAP 42, K7WW 24, K7OUF 22, WA4HRG 19, WB7OIJ 12, W7LT 11, W7GUH 8. (Aug.) WA4HRG 57.

WASHINGTON: SCM, Bob Klepper, W7IEU — NTN QNI 1381, QTC 52. WARTS QNI 2722, QTC 116. NWSSBN QNI 741, QTC 54. WSN QNI 416, QTC 188. Merry Christmas to all. W7GD W7CHX WA7NYJ WA7YCN have become Silent Keys. North Seattle ARC received renewal on club call W7DA. PSCARC and WWARA working on plans to coordinate info to be put on Western Washington repeaters. WB7EBP had 100% success with her first Novice Class. W7LG's net activities suffer while getting the Port Angeles 16/76 repeater on the air. H.A.M.S. club and ARES members provided communications for Marysville YMCA "Run-for-Fun." WB7FGC working on RACES plans for statewide operation. EC WA7KGT reports new ARES Repeater 144.71-145.31 to be used for ARES nets and activities in Kitsap/Mason Counties. EC W7ADM and assistants formulating new net procedures and simplex 2-meter message handling. LCARA club station W7DG made 495 contacts in the all Asia DX (cw) contest. New officers for CBN are: Mgr. WA7TNY secy. K7VUA; directors, W7EOJ W7GRM WA7JXL K7PIN K7UTT. WB7AHF taking EMT course. WB7QWC added Atlas 210X to Mobile then left for visit to HQ. K7MF added IC-211 to station with dual 11's for 2 meters. Everyone had good time and enjoyed the good wx at Walla Walla Hamfest. W7AXT feeling better and back on WSN occasionally. WB7AHF WB7NQB and W7TWS provided communications for Boy Scout Camporee Sept. 29-30. H.A.M.S. Club Pancake Breakfast successful with possibility of mini-hamfest for next year. K7SH K7WF will instruct LCARA's Novice Clases. W7AIB enjoyed vacation in Calif. but rpts wx below par. K7VSZ has 29 members in Island Cty ARES, all signed up in last 5 years are still active. N7AM says you're never too old to learn, after 40 years he has learned about beam spacing. WA7EJX AA7L WA7VBT used BEARS Stn K7NWS to put on demonstration at Northgate Mall in Washington Parks and Recreation Society sponsored activity. W7XT won first prize at Tacoma Hamfest, rest of the family (WA7VXB KA7ANF K7ADO) making good use of the rig. Clark Cty ARC provided communications for Vancouver Sausage Fest Sept. 8-10. KA7ACY and WB7OPZ are new editors for the Skagit Static, the journal of the Radio Amateurs of Skagit County (RASC) club. Traffic: W7DZX 552, W7AK 216, K7GXZ 140, N7AM 138, WA7BDD 98, WA7YCM 87, N7AJ 68, WB7PSP 65, K7RBR 60, W7APS 45, WA7PHD 43, W7BUN 36, W7EBU 32, WB7EBP 29, W7LG 28, WA7RCR 20, W7IEU 19, W7ZEV 14, WA7KGT 8, N7RV 6, WB7FDE 2.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — SEC: K6UWR. Asst. SCMs: K6UWR W6ZF VE2AQV/W6. PSHR for Sept.: W6OA WB6UZX WA6NTI W6JXK N5MR. The Board of Supervisors of Alameda Co. has adopted a ninety-foot tower ordinance. Special thanks to K6UWR who got the Amateur representation organized while still SCM, and to K6AN for taking time from his busy schedule to speak in our behalf at public hearings, and to WB2EMJ of Ed's law firm, W1YL spoke at the SBARA meeting. K6UWR spoke at the Silverado ARS meeting. WD6BMX passed the Advanced test. K6PMG in Angels Camp with new Ten Tec 570. K6XO operated in the North American Sprint. K6ARE hosted JA8LXQ for three days. New Section appointees are: WA6NTI, Net Mgr. and K6RV, OO. Traffic: W6OA 170, N5MR 112, W6JXK 94, WA6NTI 78, WB6UZX 46, WD6BMX 6.

NEVADA: SCM, Leonard M. Norman, W7PBV — SEC: K7ZAU. Radio Amateurs in the Reno area have formed the Western Nevada Amateur Radio Emergency Corps with K7WLY W7KJU and W7HOP at the Helm. W7JUO has worked WAZ. W7OK has new Quad. K7ZAU with XYL K7YVN vacationing in AZ. W7MWF with XYL K6HIT vacationing in Hawaiian Islands. KA7AGQ on 2M fm. W7VZS has new HF gear. WA7PHJ new mobile wheels. WA7SLQ in hospital for surgery. W7CYC has 07/67 repeater back on air. WB7BME working on his antenna farm. A number of NV Radio Amateurs attended the ARRL National Convention in San Diego. W7CTK thinks lightning struck his antenna guy wire. K7ZOK reports the Nevada Silver Dollar net on 28.777 very active. Traffic: W7ILX 276.

PACIFIC: SCM, George Morton, N7HR/KH6 — KG6JIC was a super host on my visit, and I met Dixie, queen of the Pacific Inter Island Net. She is one fantastic lady! Enjoyed meeting the Guam hams over coffee and goodies. Thanks to all. KA2SB provided a guided tour of Akihabara, the Tokyo radio district. Prices out-a-site! KH6BZF PSA aired at 0630 Sun. prime time in Hawaii, football follows live. KH6IHP now a CWO4 and bought FL-land with promotion $. Must be nice. K1LNJ looking for VHF antennas, will soon be on fm new KH6 QTH. KH6JJU looks for VT on 15m Novice band for WAS. Aloha! Traffic: KH6JJP 18, KH6BZF 12.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — Asst. SCM: W6NJU. N6WR is teaching another general licensing class at Freemont School. WA6VSQ is the new

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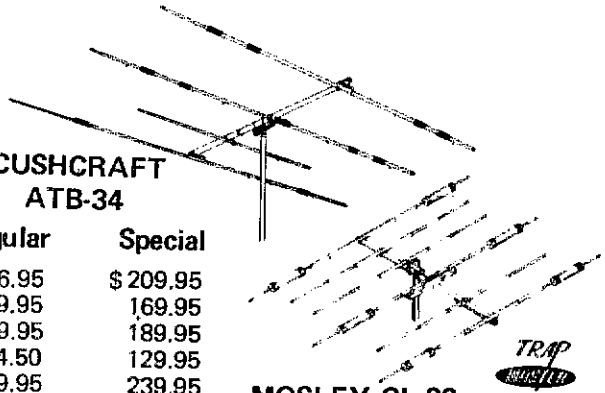

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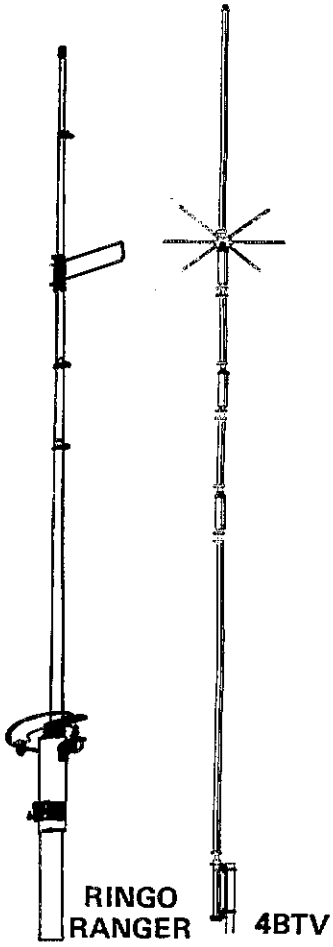

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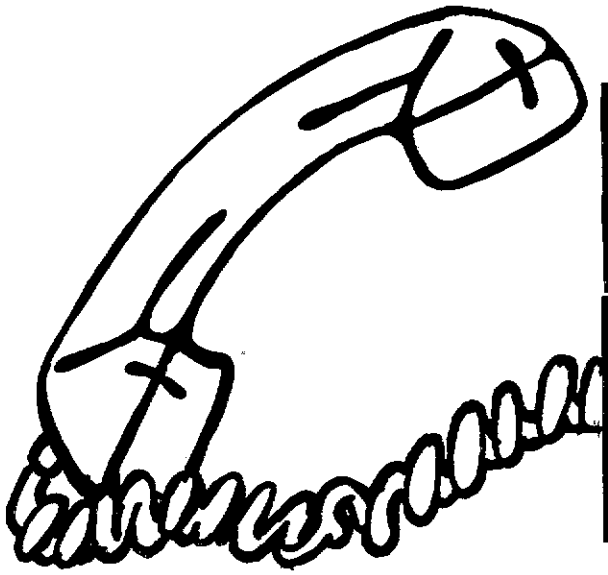

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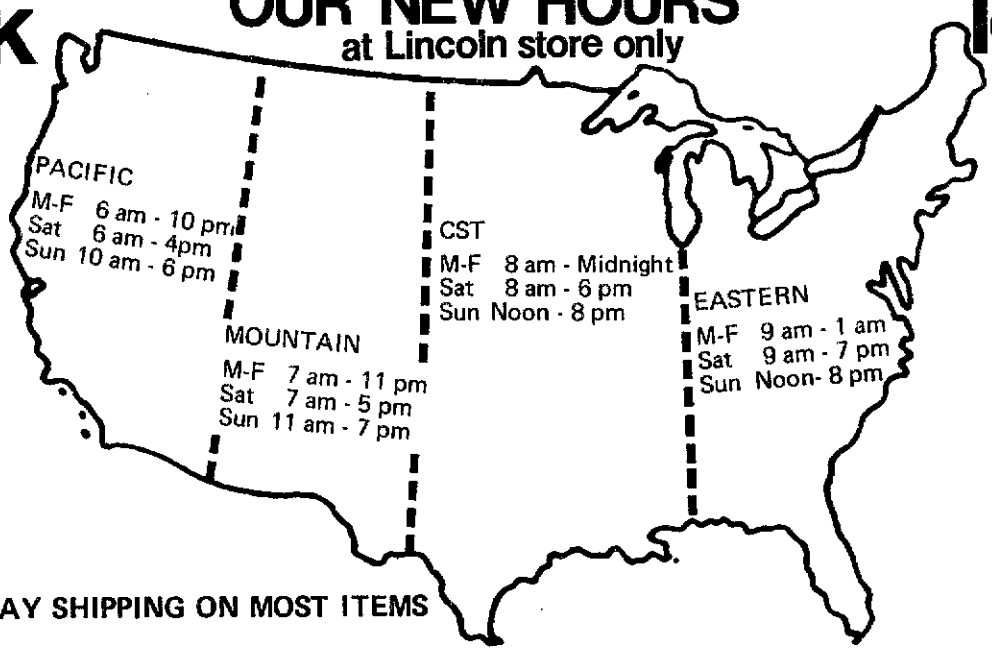

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editor of the RAMS News. KA6BWN is a new call in Sacramento. WD6BSW and KA6AWG have upgraded to General. K6ZY is cleaning and tuning up an old HT37. WB6GFJ is back from operating as FO0GFJ and reports that his operating time was shortened by local distractions. WB6VWF a new OTS but as he is a ship's radio officer he will be QRT about half of each year while at sea. A special meeting was held at the SMUD bldg on Oct. 2. K1TX of the QST staff gave a presentation on component identification and the Pacific Division Director, W6ZM, was available for League questions. The local SCM was recovering from back surgery and unable to attend and thanks W6NJU for making arrangements. Traffic: W6RSP 90, W6DEF 26, WB6VWF 15.

SAN FRANCISCO: SCM, Mark L. Nelson, AA6DX — SEC: N6KM. K6TP advocates the use of Phillip Code to increase traffic CW speed. N6CT has one heck of an antenna array for VHF. W6RQ is a 100-watt/Dipole DXer as well as OO. WB6AMP has new Bencher Key. ARTS meeting 7060 daily @ 5:30. Ex SF-SCM WA6AUD on Mission Trail and Idaho Farm Nets and publishing West Coast DX Bulletin. 7 new members reported by NCDXC. FWRA now has 97 members, up from 26 two years ago! FWRA members again provided communications for Humboldt Co. March of Dimes Bike-A-Thon, as did the Pioneer RC in the Bat area. W6BYS reports SFARC did the communicating for the Bridge-to-Bridge Run to support the Special Olympics. Greenpeace has a KW ham station at Ft. Mason. WB6SXJ has a big sig with his new amp! Traffic: W6IPL 253, W6RNI 222, W6NL 216, K6PB 155, WB6AMP 135, K6TP 89, W6GGR 14, WB6RTE 12.

SAN JOAQUIN VALLEY: SCM, Charles McConnnell, W6DPD — SEC: WA6YAB. Appt. renewed: WB6WFQ as OTS. ECs still needed in San Joaquin Counties. Officers of the Stockton Radio Club are WA6WRR, pres.; K6EKH, vp; K6JKQ, secy-treas. K6YK is trustee of W6SF. Officers of the Stanislaus ARA are WA6ZLO, pres.; W6QDL, vp; K6SNA, secy.; WD6CEV, treas. The club meets the 1st Thur. in Modesto. Officers of the Lemoore ARC are WA6SOM, pres.; WD6BPC, vp; WB6VYG, secy-treas. The club mets the 2nd Mon. It is my sad duty to add W6ZU and W6QLY to the Silent Keys. W6NTK has an IC701. K6CZO a TS820S. WA6ZCL a new beam. New calls in the section: WA6FZF is AA6R; AA6AM is AB6T; WD6CFG is KB6DH; K6EKH is N6ZU; WB6MHQ is KB6DG; WD6CKF is KB6GC; WD6GYF is AB6Y; K9YBM is N6AMA. W6FTA and WA6HWA are Advanced. WA6SZC and K6AYA are Extra. K4ZBG has more RTTY gear. WB6TSL the call of the Reedley College Electronics Club in Reedley. K6YK works 10m mobile. KA6CZR works 15m with a HW101 and a tribander. I wish everyone a Merry Christmas and Happy New Year. Traffic: W6DPD 19, N6AMA 15, WA6JDB 8, WA6YAB 6.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. NM: W6RFF. PAARA auction and flea market a big success. WA6ATB now AG6D with a new Extra Class ticket. WB6LML has a new QTH in Palo Alto. VE2AGF gave a talk to PAARA on NBVM. W6MMG and son WB6HBL were issued OTS certificates. W6CBX renewed OO appt. N6NF active as an OO. New affiliate club is Santa Clara Valley Repeater Society. Gill Cable TV is running Novice classes on Wed. nights. Nominated for West Valley ARA officers are WB6CDY, pres.; WA6MZF, vp; W6JQC, treas.; WA6AQA, dir. WVARA's auction had a good turn out and a lot of goodies changed hands. K6DRN is the new Radio Officer for Redwood City as K6UNN has retired after 14 years of service. W6ZRJ put in a new antenna feed system and is working on house repairs before winter sets in. SCV traffic stations making the Northern Calif. Net Honor Roll were K6BZO W6GJZ WA6JWK W6KZJ WA6NMQ W6RFF W6YBV K6YKG N6YE. K6DRN continues as OBS on W6WWJ. W6AUC ORL on five nets, four on 75 and one on 2 meters and made PSHR. WA6HAD QNI on NCN/2 often. W6YBV leads the Section in traffic as usual. W6RFF visited the WVARA and talked on traffic handling. The NPGSARC provided communications for the BSA Walkathon. W6OII also busy with nets and traffic handling. EMARC is getting their antennas ready for the SS Contest. SPECS will provide communications for the March of Dimes Walk-A-Thon for the 6th consecutive year. W6ASH is coordinating it. Traffic: (Sept.) W6YBV 265, W6RFF 57, W6AUC 55, W6OII 24, W6ZRJ 9, WA6HAD 6. (Aug.) W6OII 21.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Bill Parris, AA4R — SEC: K4CJZ. STM: N4UE. Good crowds reported at both Asheville & Eastern NC Hamfests in Oct. N4ANV reports membership in Eastern NC DX Club is up to 26, give Gene a call if you would like to join them. N4AGP reports Sandhill Tfc Net now meeting nitely on Laurinburg Rptr at 2100 local. Central Carolina ARS in Sanford now an ARRL affiliate, congrats. W4YIU K4RP & WB4MBB now on Fast Scan TV on 439.25 MHz. Upgrades this month include WB4KZG WA4BFT (Extra); WA4DAN (Advanced); WD4OPZ (General). WB4TTJ is now KB4C. NC VHF Traffic Window starts this month, don't know about it? Get on your local repeater between 8-9 PM each evening and let's pass some traffic, or, contact N4UE for more details. Christmas traffic will be picking up within the next week, get on the traffic nets and help us out. Congrats to WA4YSK who achieved the first BPL in NC in 1978. Activities this month include the NC QSO Party and the ARRL 10 Meter Contest -- see you there. Has your EC talked to your club about the SET next month? Ask him to outline SET plans at the next meeting. New appointees this month include W4IZI OES & WA4YSK OTS. W4OCZ reports Rowan ARS held successful demo at County Fair with much literature handed out & looks forward to a good Novice Class as a result. Traffic: (Sept.) WA4YSK 549, W4OFO 132, N4UE 118, WB4MXG 102, N4AGP 102, K4MC 96, W4FMN 91, K4VHT 68, AA4R 66, WD4SEP 62, K4FTB 57, W4EAT 55, AA4RW 45, WD4CNQ 42, WA4UYS 40, WD4DKF 34, W4ACY 32, WB4ZIQ 29, WD4EMK 27, WA4UTC 25, WB4VQZ 22, W4ATC 18, WB4CYN 18, WA4WFY 18, WD4MBV 16, WB4OXT 14, WD4CNS 11, N4ALE 10, W4EHF 10, W4YZX 9, W4WXZ 9, WD4KSI 8, W4EXU 8, W4TY 6, WD4FJM 6, WA4CEC 5, WD4NTE 4, W4IZI 4, WB4WII 4. (Aug.) WB4ZIQ 72.

VIRGINIA: SCM, Rick Genter, K4BKX - Asst. SCM: Buddy Smith, W4YE. SEC: WB4ZNB. STM: N4NK. NMs: VNTN/WA4CCK, VSBN/WB4DOZ, VN/WB4FLT, SVSN/W4JK, VSN/WA4YIU. Virginia Section Nets follow: (All times local).

Net	kHz	Time
Va. Noontime Tfc	3907	12 Noon
Virginia Sideband	3947	6/10:15 PM
Virginia Slow	3680	6:30 PM
Virginia	3680	7:10 PM

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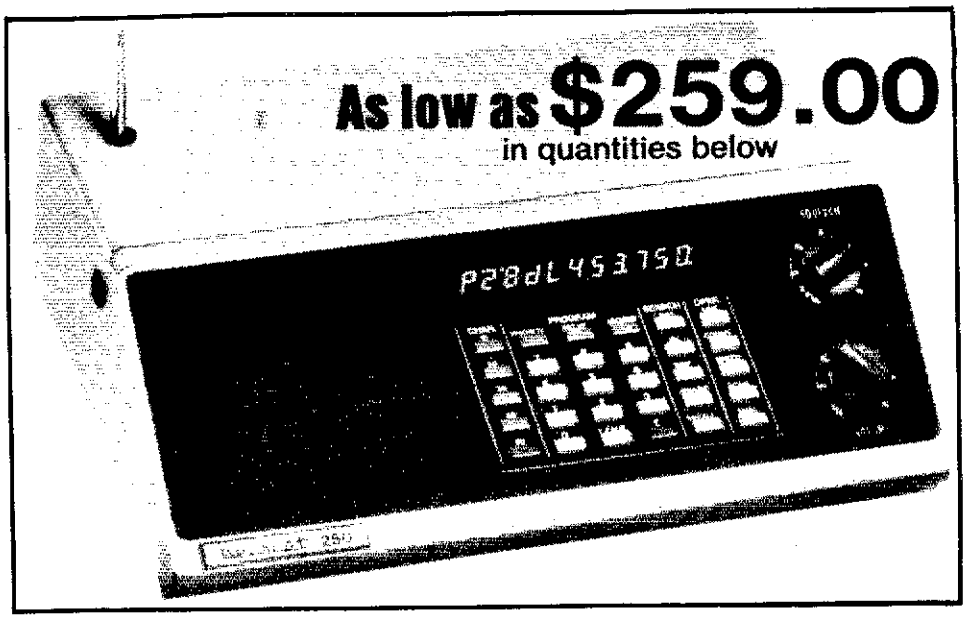

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2.27 Kilograms
(5 pounds)

Shipping Weight
3.18 Kilograms
(7 pounds)

Power Requirements
Note: 220 Volt AC export model may be available January 1979.
110-130 Volts, 60 Hz, 15 Watts
12-15 V dc, 8 Watts

Audio Output
At least 2.0 Watts rms

Antenna
Telescoping (supplied)

Scan Rate
Low 5 channels per second
High 15 channels per second

Sensitivity
0.4 microvolts for 12dB SINAD on VHF bands, UHF band slightly less

Selectivity
Better than
-60dB @ ±25 KHz

Audio Quality
The BC-250's audio is more noise-free and suffers less distortion than the *Bearcat 210* by a margin of 10 dB or more.

Image Rejection
The *Bearcat 250* rejects image frequencies by at least 70 dB better in all bands than the *Bearcat 210*.

Connectors
External antenna and speaker. AC & DC Power. Auxiliary control output. Tape audio output.

Accessories
Vehicle mounting bracket and hardware. AC & DC power cords.

The **Communications Electronics"** *Bearcat 250* even has an automatic count function that remembers how often any or all programmed frequencies were activated by transmissions while scanning. This will help you determine the value of your frequency selections. The *Bearcat 250* will literally search and serve active frequencies.

An important feature for professionals who must monitor a specific frequency is the priority channel, Channel 1. If desired, whatever frequency is programmed for this channel will be sampled every two seconds anytime the set is turned on.

THE INCREDIBLE, NEW BEARCAT 250 SCANNER.

LEADING THE WAY TO THE ALL EXCITEMENT

The *Bearcat 250* has an auxiliary output feature which can be programmed to activate external devices such as a light, alarm, motor, etc. Now law enforcement agents can activate a tape recorder by remote control when the *Bearcat 250* receives a transmission from a "body mike" or when any number of programmed frequencies are active.

Even when the set is turned off it's working—as a brilliant LED quartz crystal digital clock, displaying hours, minutes and seconds. Time is kept continuously, even when your *Bearcat 250* is performing other functions. You can always recall the time at the touch of a button.

The *Bearcat 250* will scan any or all 50 channels at selectable rates of 15 or 5 channels per second. This variable scan rate allows for more detailed scanning. With the lockout feature, you automatically skip unwanted frequencies in scan and search modes to hear only the action you want to hear.

Besides all the advanced features that put the **Communications Electronics"** *Bearcat 250* light years ahead of any other scanning radio, it has the superior engineering and "standard" features that have made *Bearcat* the greatest selling scanner in America. *Bearcat's* patented track tuning insures full band coverage for maximum reception. And a single electronically switched antenna eliminates the need for an additional low band antenna. A detailed service manual may be available by December 1978.

The **Communications Electronics"** *Bearcat 250* is an extraordinary scanning instrument. It provides virtually any scanning function that the most professional monitor could require. The *Bearcat 250* lets those who need to know, know more. To ***get the fastest delivery*** of your super synthesized *Bearcat 250*, send or phone your ***order directly*** to our *Bearcat* Scanner Distribution Center." Mail orders to **Communications Electronics, Box 1002 – Department CM2, Ann Arbor, Michigan 48106 U.S.A.** Send $319.00 plus $5.00 for UPS shipping or $9.00 for UPS air shipping. Foreign orders invited at a slightly higher cost. International customers please read special shipping information (in our catalog) before ordering. Further price discounts are available to quantity buyers. Suggested list price is $399.95 but you can get 6 *Bearcat 250*'s @ $309.00, 12 units @ 299.00, 24 units @ $289.00, 48 units @ $279.00, 96 units @ $269.00. 252 units and up @ 259.00. Add $15.00 for each 6 scanners ordered for UPS U.S. ground shipping. Add $195.00 shipping charge for each 6 scanners on international shipments, or write for a proforma invoice. If you have a Master Charge or Visa card you may call and **order toll free** 800-521-4414 to place a credit card order. If you are outside the U.S. or in Michigan dial 313-994-4441. All telephone lines at **Communications Electronics"** are staffed 24 hours, however our *Bearcat* Scanner Distribution Center" and Export Division's hours are Monday through Friday from 14:00 to 21:00 Coordinated Universal time (9 AM to 3 PM E.S.T.).

Since this *Bearcat* scanner is the most popular unit ordered through our Scanner Distribution Center," you must **order your *Bearcat* 250 today**, to assure prompt delivery.

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ANSWERS TO OFTEN-ASKED

"WHY WORK RTTY?"

RTTY is one of those quickly growing "specialized" forms of amateur communications. The attraction to its devotees is probably a mixture of the magic of modern digital communications coupled with the convenience of written rather than coded or voice communications. If you participate in the popular autostart nets, it's not even necessary to be home when receiving a RTTY message—the printer or display will record the text for you to read at your convenience. RTTY is very popular among "rag-chewers" and "engineers" alike; in fact, you get to do a bit of both. The rapid growth of digital electronics has carried over to both RTTY and the new home computer hobby. ASCII communications between ham computers lacks only final FCC approval. If your "bag" is chasing DX, what could be more satisfying than a DXCC certificate for all RTTY? There are several DX RTTY contests sponsored every year with heavy participation. So, rather than ask "Why?" ask "How?"

"WHAT DO I NEED TO WORK RTTY?"

A ham RTTY station needs a transmitter, receiver, and antenna just like any RF communications system, in addition to some "special boxes" to make the RTTY part work. Some considerations for the equipment are outlined below:

1. RECEIVER - TRANSMITTER

   The RTTY receiver and transmitter (or transceiver) should be stable, well calibrated, and capable of *EXTENDED TRANSMITTER OPERATION*. When you are transmitting RTTY, the full carrier is on for longer periods of time than for CW or SSB voice. So, check your manual and manufacturer for RTTY specifications and, if in doubt, reduce transmitter power somewhat. For HF work, a good SSB rig in LSB mode works well with RTTY tones (more on tones, later). Most VHF-FM transmitters work with RTTY, but avoid overloading the transmitter as mentioned above

2. ANTENNA

   A good antenna will buy you the same benefits in RTTY as it does in other modes. One caution though, the traps on some antennas may not handle as much power in continuous RTTY operation as they do for CW or SSB voice. This can especially be true of trap yagi antennas for the HF bands.

3. RTTY DEMODULATOR

   The demodulator connects to the receiver audio output and converts the RTTY tones to keying pulses. The quality of your printed signal is determined more by demodulator performance than by any other portion of the system. Demodulators come in all shapes, sizes, and prices. HAL offers the feature-packed ST-6000 with active filters, scope, autostart, anti-space, ATC, DTH, and KOS, as well as the lower cost ST-5000. The popular ST-5 and ST-6 parts kits are also still available for the skilled technician.

4. TONE KEYER

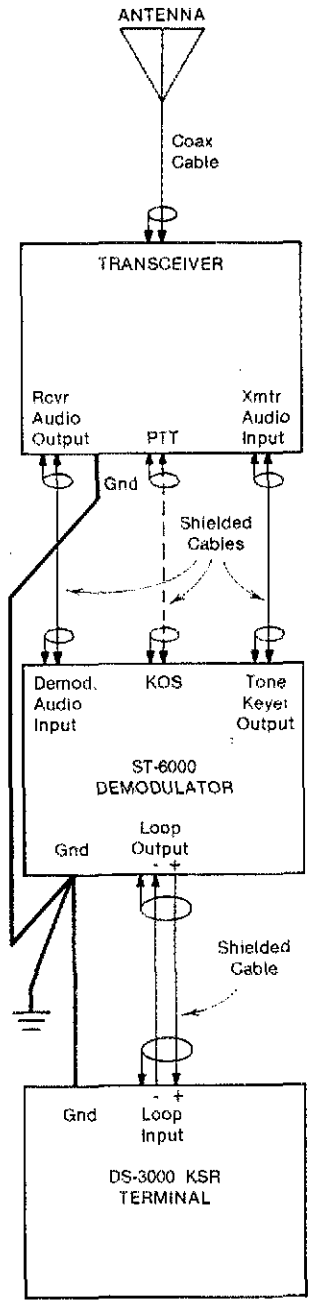
   The tone keyer circuitry converts the keying pulses from your keyboard into audio tones to drive the transmitter. Since this circuitry is closely related to that of the demodulator, both are supplied in the same cabinet in all HAL demodulators

5. TERMINAL

   The terminal is the device that prints or displays the received signals while allowing you to type your transmitted message. The terminal is sometimes divided into a keyboard and a printer or display section. The terminal can be as simple as an old surplus TTY machine or as exotic as the microprocessor controlled HAL DS-3000 KSR terminal. An important feature of HAL Communications terminals is that *ALL HAL RTTY EQUIPMENT IS LOOP COMPATIBLE WITH TTY MACHINES*. This means that you can add HAL electronic equipment to your RTTY system at any time. The advantages of the HAL electronic terminals are many; ranging from lack of noise and oil (keeps the XYL happy and your nerves soothed) to automatic operator features such as real-time editing of typing errors, programmable identification message, and automatic carriage return/line feed operations. Also, the speed of the electronic terminal is easily changed with a front-panel switch. Machines require an expensive gear box or a manual change of gears to change speed. HAL offers the DS-3000 KSR terminal in either RTTY only (Version 2) or RTTY and MORSE (Version 3) configuration. Both versions also work the standard ASCII computer code as well as the normal amateur BAUDOT code. HAL continues to offer the popular RVD-1005 Visual Display Unit and DKB-2010 Keyboard as separate units.

"HOW DO I HOOK IT UP?"

Probably the most frightening thing to the RTTY beginner is the thought of all those wires that must be connected to make it work. A particularly complicated RTTY station can have a real "rats-nest" of wires, but it didn't start that way. Make connections in a logical and step-by-step manner and all will work well. All transceivers are slightly different, but, in general, you will have to make these connections:



1. GROUNDING

   Before making any other connections, decide approximately where your equipment will be located and run short, low-inductance ground wires (shield braid recommended) between the cabinet grounds of all equipment AND MACHINES. Do not defeat the AC safety ground on the HAL power cords; run separate RF grounds in addition to the AC safety ground. *LACK OF ADEQUATE RF AND SAFETY GROUNDS CAUSES MORE PROBLEMS IN RTTY INSTALLATION THAN ANY OTHER SOURCE.*

2. RECEIVER TO DEMODULATOR

   Use shielded cable to connect a 500 ohm audio output of the receiver to the demodulator audio input jack. If you do not have a 500 ohm output, the 4-8 ohm speaker output will work, but not as well; a speaker to 500 ohm line transformer would be a good part to add when possible.

3. TONE KEYER TO TRANSMITTER

   Use shielded cable to connect the tone keyer output of the demodulator to the transmitter audio input. Often, a rear-panel "phone-patch" or "auxiliary" input is provided. If not, connect directly to the microphone connector.

4. DEMODULATOR TO TERMINAL

   Use shielded cable to connect the terminal to the demodulator. Use the current loop connection for each. When connecting to a solid-state terminal, be sure to observe the proper polarity as indicated in the operator's manuals. Be extremely careful when wiring the loop circuit—potentially lethal voltages are present when the equipment is turned on (200 VDC @ 60 ma). Also, be sure that no part of the loop circuit is connected to chassis ground in machines or other equipment. All RTTY equipment is connected in series when the current loop output is used.

5. CONTROL CIRCUITS

   Since the control requirements differ with manufacturer, study your transceiver manual carefully to determine how to control the transmit-receiver function. Usually, you can control the push-to-talk (PTT) line through a pin on the microphone connector, a front panel switch, or a rear panel accessory connector. Initially, try to manually switch between transmit and receive until you are familiar with RTTY operation. Eventually, you will probably want to take advantage of the automatic Keyboard Operated Switch (KOS) feature of the DS-3000 KSR and ST-6000. KOS is the RTTY equivalent to VOX; typing on the keyboard puts you into transmit mode. If you pause long enough, the KOS "drops-out" putting you back into receive mode. KOS is particularly convenient for short exchanges.

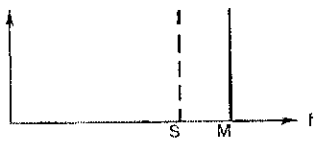
"WHAT IS THIS MARK AND SPACE BUSINESS?"

The RTTY signal from the terminal is a series of pulses. The amateur BAUDOT RTTY signal has 7 possible pulses for each character typed or printed, each transmitted one-after-another (serial). Each pulse can be either "ON" (current flow in the RTTY loop) which is called "MARK" or "OFF" (no current flow), the "SPACE" condition. To keep decoders synchronized, the first pulse of a character, the START pulse, is always a SPACE (current off); the last pulse, the STOP pulse, is always a MARK (current on). The 2nd through the 6th pulses can be either MARK or SPACE, depending upon the coding required for a character. The START and all 5 data pulses are the same length; the STOP pulse may be either equal to or longer than the others. The so-called computer ASCII code uses START and STOP pulses but has eight instead of five intermediate data pulses, thus allowing a greater number of characters to be encoded. Although all machines and HAL electronic terminals use pulses, the MARK and SPACE pulse conditions are converted into MARK and SPACE audio tones for easy radio transmission.

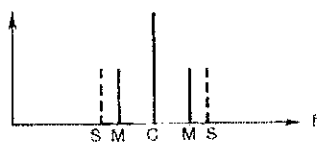
QUESTIONS ABOUT RTTY

"WHAT IS THE DIFFERENCE BETWEEN FSK AND AFSK?"

Transmitting RTTY signals via radio could be done like Morse code with on-off keying of the transmitter carrier. However, the interference received during off-times would give badly distorted printout. Rather, HF RTTY is transmitted with Frequency Shift Keying (FSK) so that the mark pulse condition corresponds to one radio frequency and the space to another. Amateur radio convention has it that the mark radio frequency is higher than space and that the separation or "shift" of the signal is standardized at 170 Hz or 850 Hz. (425 Hz shift is also used by commercial RTTY stations.) Most present-day amateur RTTY stations use 170 Hz shift exclusively. The FSK signal is received with the BFO turned on, giving two audio frequency tones for the mark and space conditions. The audio tones are, in turn, detected in the demodulator and the resulting pulses drive the display or printer. Note that changing the transmitter or receiver frequency (on purpose or through frequency drift) will change the audio output frequency to the demodulator. The HF system is therefore quite drift sensitive. Present HF equipment frequency stabilities are quite adequate for FSK RTTY, but it is only very recently that VHF equipment was available with similar stability. Therefore, VHF RTTY has traditionally been transmitted by first keying audio tones with the RTTY pulses and then using these tones as the audio modulation of an AM or FM VHF transmitter. This is called AFSK for Audio Frequency Shift Keying. Current amateur convention is to make the mark audio frequency lower than the space frequency by the amount of the shift. Since the RTTY data is audio modulation of the carrier, frequency drift of either transmitter or receiver is a lot less critical. The audio frequency of the tones transmitted is set to be the same as those in the receive demodulator.

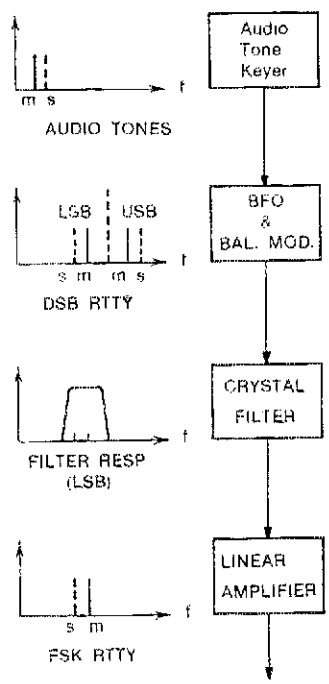


FSK RTTY



AFSK RTTY (AM)

The required radio frequency shift keying can be done in two different ways: shift the frequency of a transmitter oscillator directly with the RTTY pulses or use a SSB transmitter with audio tones. Direct FSK keying circuits are described in most amateur journals and are generally simple, but require modification of the equipment; generation of FSK with a SSB transmitter is as follows: If a Lower Sideband Transmitter (LSB) is driven with a 2125 Hz audio tone, the RF output of the transmitter will be at a frequency 2125 Hz *BELOW* the suppressed carrier frequency. A properly adjusted LSB transmitter will have *NO OTHER* output frequencies. If the input tone is changed to 2295 Hz (170 Hz shift), the RF frequency is now 2295 Hz BELOW the carrier frequency. Thus, audio tones into the LSB transmitter have produced FSK carriers out of the transmitter. Note that, because the LSB mode was used, the 2125 Hz standard mark tone for VHF AFSK has become the higher radio frequency. Thus, the same demodulator and tone keyer can be used for both VHF AFSK and HF FSK operation. Often, this use of audio tones with a SSB transmitter is mistakenly called "HF AFSK"—actually the resulting output is true FSK, IF the SSB transmitter has no spurious outputs (such as carrier or unwanted side-band). Most HF RTTY amateur radio stations use audio tones with a SSB transmitter. Although "standard" audio tones for VHF amateur operation have long been 2125 Hz for mark and 2975 Hz for space (850 Hz shift), limited audio frequency response of HF SSB transmitters and receivers has recently given rise to a second set of "standard" tones at lower frequencies ("Low-tones").



"HOW ABOUT HIGH- VS LOW-TONES?"

Historically, demodulator tones were set to 2125 Hz for mark and 2975 Hz for space reception of 850 Hz shift. When transmitter stability improved, 170 Hz shift was used and the space frequency changed to 2295 Hz (mark remained at 2125 Hz). These three tones were, and still are, a standard for U.S. Amateur RTTY. However, in the early 1960's, virtually all commercially available transmitters and receivers became filter-type SSB equipment with audio pass-band limited to speech frequencies, sometimes as narrow as 2.1 kHz (300 to 2400 Hz). Obviously, the 2975 Hz (850 Hz shift Space) tone will not pass-through such a filter and 850 Hz shift with these tones is not possible (although the 170 Hz shift is). Therefore, either the SSB equipment must be modified or different, lower-frequency tones must be used if 850 Hz RTTY shift is desired. Both approaches have their advantages and both are currently in use. The so-called "LOW-TONE" standard sets mark at 1275 Hz and space at 1475 Hz (170 Hz shift) or 2125 Hz (850 Hz shift), conforming to the European IARU standard. So, there are now two sets of "standard" tones, LOW and HIGH (as well as a myriad of others), all of which work *INTERCHANGEABLY* on HF RTTY. However, since the actual audio tone is transmitted for VHF AFSK operation, the two sets are NOT COMPATIBLE IN VHF AFSK applications. Current U.S. Amateur operation uses the HIGH TONES for VHF. Thus, to use a demodulator and keyer for both HF and VHF operation, it should be set-up for HIGH-TONE operation. Conversely, you may wish to have separate stations for HF and VHF, simplifying the cabeling, and providing simultaneous monitor/operation capability, as well as resolving the tone problem. The HAL ST-6000 and ST-5000 Demodulators are available for either HIGH or LOW-TONE operation.

"WHAT FREQUENCIES DO I USE FOR RTTY?"

HF RTTY Operation has evolved to heavy operation on the 80 and 20 meter bands (CW segments) with sporadic operation on other HF bands. 80 meter RTTY stations tend to operate between 3600 and 3650 kHz and 20 meter stations between 14.075 and 14.100 MHz. 170 Hz shift is used almost exclusively with mark being the higher radio frequency. 60 wpm (45 baud) is the most popular RTTY speed, but 100 wpm (74 baud) is gaining in popularity.

VHF RTTY operation in most areas is concentrated on 2 meter FM with 146.700 MHz being the popular operating frequency. Virtually all stations are now using the "High-tones," usually with 170 Hz shift. As with HF RTTY, 60 wpm (45 baud) is most popular on VHF. Some areas now have RTTY-only repeaters on 146.10/146.70 MHz.

"WHO DO I TALK TO ON RTTY?"

RTTY enthusiasts run the full range of ages and interests, but tend to be technically inclined. The typical RTTY'er is always moditving his station, likes to talk, and usually has more ideas than you have printer paper (or display screen)! Some operators are good typists; most aren't. The DS-3000 KSR letters-till and editing modes make even a poor typist look good. Recently, the home computer hobby has become quite popular with RTTY people and you may find a lot of help in debugging your programs if that's your interest. There are an increasing number of DX stations on RTTY.

"HOW MUCH DOES IT COST?"

RTTY is like any other hobby—it can cost as much or as little as you want it to. If you buy used machines and build kits or your own designs, the total RTTY cost can be quite low. Conversely, the DS-3000 KSR and ST-6000 offer an *ULTIMATE* RTTY station that is expensive. Because all of the HAL RTTY products are current loop compatible, you can add devices as your interests (and pocketbook) indicate. For the beginner, HAL has the following recommendations:

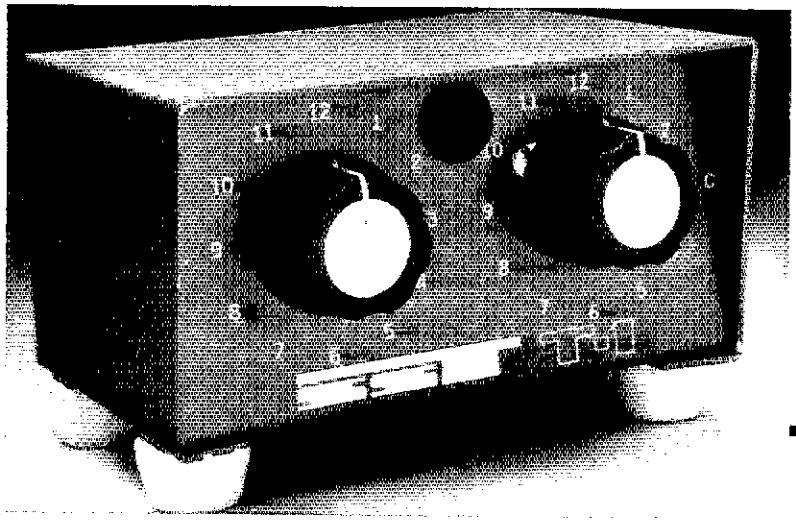
1. DEMODULATOR

   Assuming you already have a good transceiver and antenna, your first major RTTY purchase should be a good demodulator. The HAL ST-5000 makes a particularly good, cost-effective unit. If you select a high-tone ST-5000, it will be usable for either VHF or HF (170 Shift) RTTY operation: if you are only interested in HF RTTY (for short-wave-listening to press stations, for example), the low-tone unit may be a better choice. Conversely, you may wish to "jump-in" and get the ST-6000 from the first. Either way, put high priority on a *GOOD* demodulator.

2. TERMINAL

   You can spend very little or a lot on the terminal. A surplus machine can often be acquired at a hamfest for little cash investment. However, by the time you figure out how it works, fix it, and buy parts and manuals the total cost may not be so low. If you do, you'd better be prepared with tools, oil, and patience. Newer machines require less work, but also cost more. On a feature-for-feature basis, either the HAL RVD-1005 and DKB-2010 combination or the DS-3000 KSR are more cost effective than other terminals presently available. Certainly a "solid" beginner's RTTY station would be the RVD-1005, DKB-2010, and ST-5000. Some money-saving packaged "GOOD DEALS" are offered for a limited time on the back page of our catalog.

SST T-1 RANDOM WIRE ANTENNA TUNER



All band operation (160-10 meters) with any random length of wire. 200 watt output power capability—will work with virtually any transceiver. Ideal for portable or home operation. Great for apartments and hotel rooms—simply run a wire inside, out a window, or anyplace available. Efficient toroid inductor for small size: 4-1/4" x 2-3/8" x 3", and negligible loss. Built-in neon tune-up indicator. SO-239 connector. Attractive bronze finished enclosure.

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Tunes out SWR on any coax fed antenna as well as random wires. Works great on all bands (80-10 meters) with any transceiver running up to 200 watts power output.

Increases usable bandwidth of any antenna. Tunes out SWR on mobile whips from inside your car.

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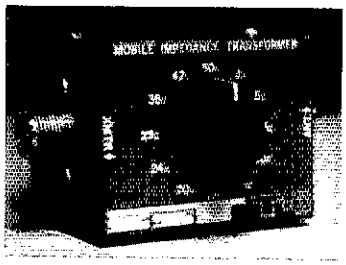

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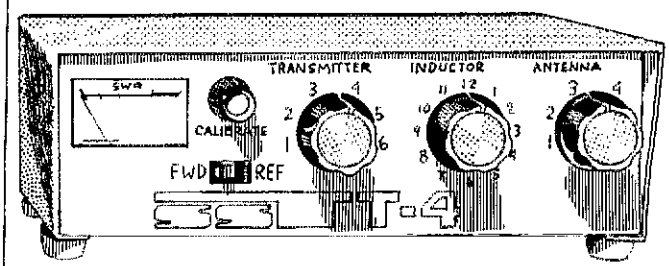
SST T-3
Mobile Impedance Transformer

Matches 52 ohm coax to the lower impedance of a mobile whip or vertical. 12-position switch with taps spread between 3 and 52 ohms. Broadband from 1-30 Mhz. Will work with virtually any transceiver—300 watt output power capability. SO-239 connectors. Toroid inductor for small size: 2-3/4" x 2" x 2-1/4". Attractive bronze finish.

SST T-4 ULTRA TUNER DELUXE



Matches any coax fed antenna or random wire. Works with any transceiver. Great for mobile, portable, or home operation. Antenna switch selects between two coax fed antennas, random wire, or tuner bypass. Attractive bronze finished enclosure with exclusive SST Styling. Compact size: 9" x 2-1/2" x 5".

Features:

- 300 watts **output** capability.
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DRAKE TR-7

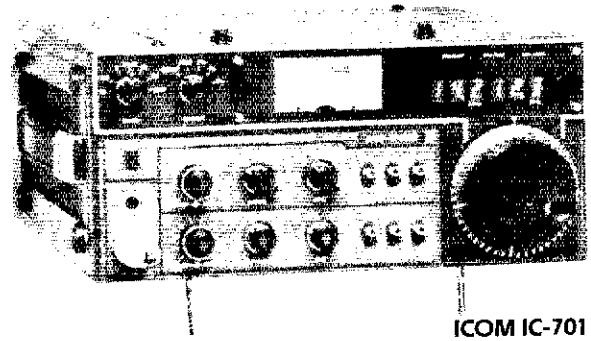
Drake's "7 SYSTEM" incorporates more innovative technical advances than any product we have seen in many years. Receiver dynamic range exceeds that of all others. If your QTH is in KW alley you'll experience a substantial relief from overload. If you've worried about changes in our bands after the WARC assemblage—the TR-7 can dispell your fears because it accommodates any future possible band relocations and new allocations. The frequency stability of Drake's "full-synthesis" and the large brilliant digital display add to the delight of any TR-7 owner. Space here is inadequate to define the numerous design and operational features of this superb transceiver. Call us for descriptive literature; better yet, drop by and try one in our demonstration room.

You'll discover—as we have—that Drake has created a real winner. One that the others will be hard pressed to equal for years to come. And if you prefer to operate with "separates" the forthcoming R7 Receiver gives you the performance of "twins" plus the convenience of a full performance transceiver for traveling or in the mobile.

YAESU FT-901

YAESU's FT901 system. If you're looking for a transceiver that not only outperforms others on any band from 160 through 10 meters but also has a single matching accessory to conveniently and efficiently cover 6, 2 and 3/4 meter bands, the 901 is it! Even if the VHF and UHF transverter doesn't interest you now, it surely will as OSCAR satellites become the way of life in the next few years. Of all the transceivers we've tested (both on the air and in the lab) none offers the superb control of receiver selectivity offered by YAESU's Variable Selectivity and Notch Filter. And if you work CW, the Tuneable Audio filter will delight you. Nor have we found another Speech Processor system that sounds as good while doing so much for signal punch as that on the 901. Add to this such features as a built in keyer plus both FM and AM detectors. Watch for a gigantic increase in membership in the Fox Tango Club when the gang discovers this great new transceiver.

Watch for YAESU's new matching SCOPE with "panoramic" display and the new synthesized external VFO accessories.



ICOM IC-701

ICOM's IC-701 has to rank very high on our list of best available transceivers. Most of its great features aren't immediately apparent when you first take it out of the box. In fact, after you operate it for a week you'll still be finding new things to like about this all solid state, sophisticated unit. The operating flexibility provided by the dual VFO feature appeals to everyone here at Clegg. It's the first unit that makes no compromise as a fixed station and yet so conveniently mounts in virtually any compact mobile. If you hop from band to band—or chase DX around any single band you'll love its frequency agility and large bright frequency display.

Also available is the matching IC-211 with all mode coverage of 2 meters.

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W4SHJ has a new Triton. K4LEF reports his new TH6DXX is performing superbly. Lightning took out most of W4PRO's station but Jim should be back on the air soon. KØJH/4 is back in Norfolk after three years at sea. W4YE was elected to Potomac Valley RC exec. comm. W4ZM is at home recuperating from surgery. WB4FNW enjoyed operating from FL and WB4ODZ is taking a few weeks going there by yacht. W4KFC, our 1st VP, spent a week in Panama at the IARU Region 2 conference. Vic attended the National in San Diego as did W4HU and W4IMP. N4ATT is working hard to develop a top ARES team. EC, K4BAV programmed an Alexandria RC display at local mall. Also on the project was K4DHB. AA4CK worked Mellish on cw and ssb. N4NK headed traffic handling operations with OEES (Civil Defense) from the state fair. The operation was a big success. WB4DBK and W4NWM have been DXing on 10 & 15. W4OOL misses VSN while rig is under repair. WA4LJI handled traffic from the Rockbridge Festival and N4FM did the same for the Apple Harvest Festival. OO reports rec'd from W4HIJ and WB4KCL. FB OVS report received from W4WWQ. WA4NTP presented a traffic program at the Pentagon ARC. I enjoyed seeing many of you at Norfolk Scope and regret that I didn't see everyone. BPL: W3BBN/4 WA4CCK W4JK N4NK WB4PNY. PSHR: W3BBN/4 K4BKX WA4CCK K4EJ WB2JAY/4 W4JK KB4N N4NK WB4PNY. Traffic: (Sept.) WB4PNY 963, N4NK 751, W4JK 695, W3BBN/4 554, WA4CCK 519, K4BKX 271, WB4FLT 239, K4KNP 228, WA4LJI 217, KB4N 208, W4SQQ 205, WB4DBK 174, WA4YIU 151, W4LXB 146, K8LGA 144, WA4STO 117, N4FM 116, W4OKN 114, W4NWM 104, WA4UYD 103, WB4DQZ 91, WB4ZNB 87, W4SUS 85, WD4OVR 84, W4UQ 80, AA4CK 68, W4SHJ 49, WA4FDV 47, K4EJ 36, WB4FNW 35, WB2JAY/4 32, W4YVG 32, K4ISW 27, W4YE 25, WD4CYX 23, WA4NTP 21, WA4FTJ 19, WA4QQI 18, WB4ZWT 18, WA4RXY 17, W4HIR 16, N4ATT 15, WA4WQG 13, W4KFC 10, N4LE 10, W4OOL 10, N4UY 10, N3RC/4 7, K4ITV 5, K4LEF 4, W4JUJ 3, N4AOP 2, W4KAO 2, WA4LTO 2, W4WWQ 2, W4DM 1. (Aug.) WA4ONR 77, WA4UYD 54, WA4ISA 28, WA4NYZ 27, N4FM 18, WD4CYX 10, K4DHB 9, WD4KUK 8, N4DW, K8LGA 2, W4DM 1, N4OT 1. (July) WA4ONR 66.

WEST VIRGINIA: SCM, Donald B. Morris, W8JM — Asst. SCM: K8KT. SEC: WA8NDY. NMs: Phone, W8YP; cw, WA8WPW; Novice, WD8JYM. Silent Keys: W8FUU and W8VAB. W. Va. Hams are coordinating with Nti. Wx. Svc. to establish Wx. alert liaison. Mtgs. have been held in Charleston and Logan, watch for mtg in your area. WB8UVM now N8AJC, WA8NXO now AD8D, WB8HEY now AD8K, W8MFJ now AD8L, WD8MCW now N8AMS. W8FCM now Extra Class. Kanawha ARC will hold annual installation dinner in Jan. WA4TAP has passed Extra, resides in Mt. Hope, call is AE8S. K8MS a student at Virginia Tech. Fri. is slow speed night on WVN, your participation needed. New Novice in area? Needed on Novice net.

Net	Freq.	Time(Z)	Ck-in	Ttc	Sess.
Hillbilly	14290	1700 Su	92	24	4
Novice	3730	2215 Dy	111	42	30
Cw (wvn)	3567	0000 Dy	171	61	30
Phone	3990	1700 Dy	518	25	30
Phone	3990	2300 Dy	854	100	30

Traffic: WA8WPW 140, WD8JYN 107, WD8JYM 53, W8YP 46, WD8CNM 28, W8CKX 27, N8AJC 21, WD8DHC 18, N8JC 12, W8FG 8, K8ZDY 8, WD8LDY 8, WB8SAW 6, K8KT 5, WB8VAZ 5, K8MHR 4, WA8LFW 4, W8HZA 3, WB8ZTL 3, K8YL WB8WRQ 3.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Robert W. Poirier, KØDJ — NM: KØCNV WBØZQG. WAØHLQ was forced to resign as your SCM due to increased workload with the railroad. I shall do the best I can while finishing out the remainder of his term. SEC KØFLQ also forced to resign and a replacement will be forthcoming. WDØDNM and WAØKHN now assistant ECs for Grand County. The latter also now sporting a new Swan 500 CX. WBØYKH aided in the evacuation of motorcycle rider who had broken his leg in an accident. Six meter antennas up again at WØDYK with two-meter yagis to be up shortly. New officers Colo. 10-X Bighorn Chapter KØLT, pres.; KØPVI, vp; WBØBLJ, secy. Colo. Sprgs. 37/97 again operational. Newly formed name for Granby Amateur Radio Club is Sheep Mountain Radio Technical Society. Happy turkey day! Net tfc Sept.: Columbine 30, sess., QNI 989, QTC 78, Informals 222, QNF 1110; SSN 30 sess., QNI 84, QTC 36, Informals 3, QNF 533; CWN 30 sess., QNI 190, QTC 230, QNF 795. Traffic: (Sept.) WØWYX 2273, WAØHJZ 954, KØDJ 305, WDØAIT 259, WØRF 93, ADØA 76, KØPVI 75, WAØYNP 54, KØZL 54, WBØYKH 22, WØNFW 12, WØGO 9, WDØDNM 4. (Aug.) WØNFW 81.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. NMs: W5JOV K5KPS. Southwest Net (SWN) meets daily on 3585 kHz. at 20:00 local time and handled 261 msgs with 207 stations reporting in. New Mexico Roadrunner Net (NMRRN) meets daily on 3940 kHz at 1800 local and handled 115 msgs with 1046 stations reporting in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 134 msgs with 762 check-ins. With deep sorrow we report the accidental passing of WB5YBY. W5ALR making good recovery after plane accident. Carlsbad members entertained Pecos Valley ARC with hotdogs & beans at Presidents Park. SAR activity at a new low . . . thanks. Traffic: W5UH 539, N5NG 315, W5JOV 215, K5KPS 160, W5DAD 136, WD5AHH 118, W5KH 89, WA5MIY 27, W5NUI 8, W5BWV 6.

UTAH: SCM, Carl R. Ruthstrom, W7GPN — On Sept. 8 & 9 WA7ZBO WB7PLY & WB7UGR provided 2-meter communications for the Boy Scout annual Mormon Trail "hoof in." On Sept. 16 S. L. County ARES supplied communications for a marathon run, called "Run For Life." Over 400 runners traversed the 6 mile course. K7MQ donated a 2-meter mobile rig for use in the S. L. County communications van. Your writer visited the Dixie ARC in Hurricane, on Sept. 16 to present their Club Charter, and discussion of matters pertaining to ARES. Members attending were WB7BZJ W7MUG W7MXX WB7NJB & XYL WB7NQS & XYL N7TJ W7UEX K7WG & XYL K7WS and W7YAI. W7YAI, pres.; WB7BZJ, vp; K7WG, secy/treas. W7LIM is new 28/88 repeater on Moccasin Pk., near UT/AZ border. WB7PLY & WB7VCI upgraded to General & W7DBO to Advanced. Traffic: K7HLR 176, WA7JRC 90, WA7MEL 71, W7UTM 12, W7RO 9, WB7ECL 8, WB7NDL 8, AC7K 6, W7OCX 5.

WYOMING: SCM, Chester G. Stanwaity, W7SDA — SEC: WB7EIN. NMs: K7KSA WA7WFC. WB7EIN is our new SEC. All ECs and all Wyoming amateurs are urged to give him their cooperation and help in the area of emergency planning. Anyone interested in serving as EC please contact either WB7EIN SEC or W7SDA SCM.

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John F Thompson, NRI President

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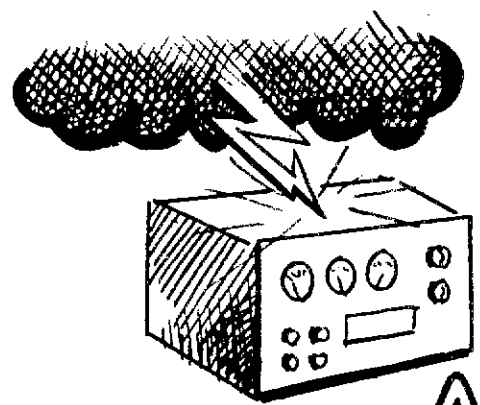

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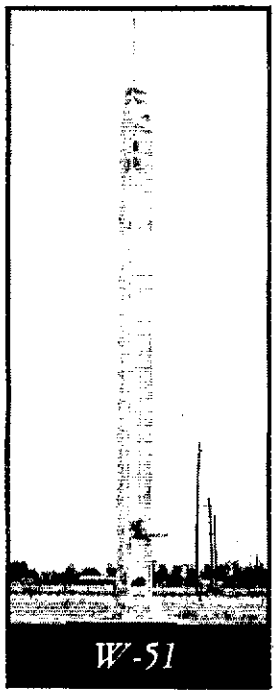
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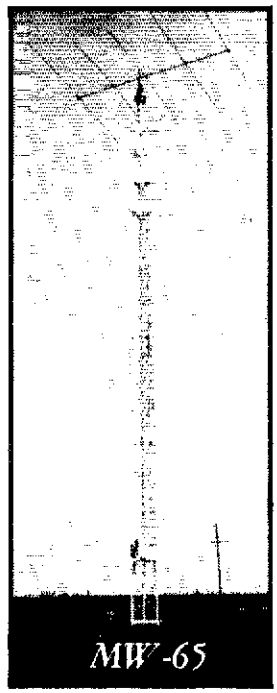
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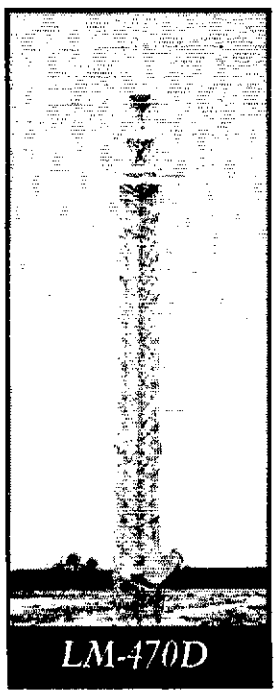
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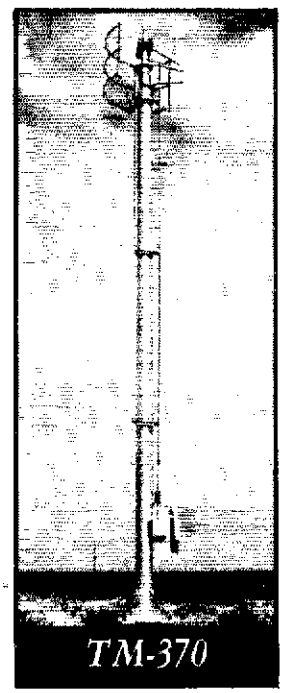
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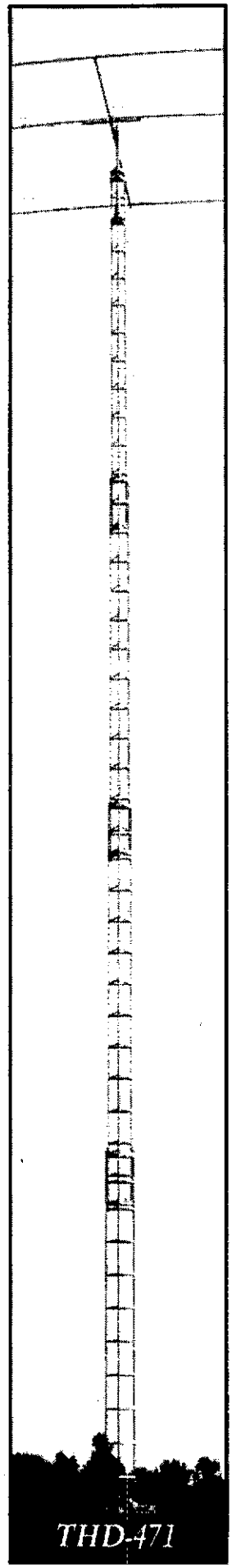
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KA7CCT is new Novice in Cokeville. K7CRL has moved back to Powell. W7VEW has been busy upgrading his VHF antenna system. WB7NHR Wyo. Cowboy Net mgr. reports 21 sess., 540 QNI, 22 QTC. Please get your news and traffic reports to me by the third of the following month. Traffic: (Sept.) W7SOT 307, K7VWA 203, W7LYA 140, WA7SGG 50, W7YWW 47. (Aug.) W7LYA 26.

SOUTHEASTERN DIVISION

ALABAMA: SCM, Frank S. Brown, W4LNN — SEC: K4WYT. STM: WA4JDH. NM: N4MD. New appointments: STM WA4JDH. OBS: WB4WOW. AENB QNI 212, QTC 215. Quad Cities Danny Thomas/St Jude Bike-A-Thon finally find dependable communications in N4AQS KA4COL WB4EWL WD4FXC W4FZC WA4HRV K4LGF WB4LQX WB4SRG WA4VOE WA4ZDW W4ZUP of the Muscle Shoals ARC. They receive praise from the Bike-A-Thon Chairman for a job well done. Congratulations gang. Tuscaloosa ARC sells ham radio at the West Ala State Fair and have a new 37/97 repeater. Enterprise ARS celebrate their first birthday with 43 members. Wiregrass ARC furnish communications for the annual Peanut Festival Parade. Twin Base ARC provide a Ham Radio demonstration for the Boy Scouts during their yearly Camporee at Maxwell AFB. WB4ZNL adds 6 meters to his shack. K4UMD busy running hospital tone traffic. EC K4HJX organizing Macon Co. now has 6 ARES members. WB4TCH finalizing plans for his Novice Class. WB4JSO chasing DX with a new Tri-Band beam. HAYLARC resume weekly code and theory sessions for members. BARC provide communications for the Shriners Parade. WA4ZPZ is now Sun. NCS for AENB. New NMs: WA4VKD AFND. WA4JPK AENJ. Traffic: (Sept.) WA4JDH 1433, WN4KKN 229, N4MD 182, K4AOZ 108, WA4VKD/N 89, WB4ZNL 27, WA4ZPZ 14, K4UMD 8, N4AIJ 4, WB4TVY 1. (Aug.) WB4ZNL 14, WB4AYO 2.

CANAL ZONE: SCM, Alvin Sholk, KZ5AS — The Panama Canal Chapter of the 10-10 Net is now a reality. It requires 5 contacts with KZ5 or HP1 charter members to qualify for one of the beautiful multicolor certificates. Copies of the log entry information of the 5 charter members should be mailed with $1.00 to KZ5FN or to the KZ5 Bureau for the certificate. The additional cost of the certificate and mailing will be absorbed by the CZARA. Endorsements can be had by working other certificate holders.

GEORGIA: SCM, A. H. Stakely, K4WC — SEC: K4SWJ. NMs: K4JNL WA3NAZ. Congrats to K4EV WB4FAS AA4GA WB4HXE WA3NAZ and WB4ZOJ making PSHR for Sept. and WB4DHC and WB4TEK for Aug. Congrats to AK4T and AF4X making Extra; to KB4DQ making Advanced; to N4AAZ N4ADE N4AGO WA4IYE N4AOR and N4ATI making General; to N4AEK N4AQB and WD4JJL making Technician; to KA4AAB KA4AXS KA4AYV KA4BUZ KA4BVA KA4BYC KA4CFO KA4CHA and KA4CUP making Novice. Sadly we report K4YNF is a Silent Key. KB4BV now AF4X WA4CAC is KC4I. WD4CQG is N4AQG. W4GKI is AK4T. WA4HAG is KB4DQ. WB4HNC is KA4C. WB4VPR now N4AOR. GVEN No. 1 QNI 35. GVEN No. 2 QNI 1052, QTC 69. GSN QNI 410, QTC 304. GTN QNI 260, QTC 119. NGSN QNI 40. WGN/FM QNI 54, QTC 3. WGN/CW QNI 33, QTC 39. W4AAY reports Augusta ARC cooperating with reorganized Augusta/Richmond Co. CD. W4HON trying new 75 mtr inverted vee. W4BIA transmits 4 Official Bulletins. WD4ADV reports Douglas Co. ARES received certificate for work in Walk for Mankind. WB4SPB trying to reach WB4MNF in Fiji Is. W4JM retired with first month a vacation in FL, hi! WB4FAS trying to bust 300 in tfc score. All Novices and Techs please check in to GTN at 2215Z on 3.718 daily. WB4HXE issuing CQ to all Fulton Co. hams to be ARES members. Emergency tone alert boards now available from him or K4SWJ. K4EV can now get Waycross ttc in on 2 mtrs. Cntrl GA VHF QNI 66, QTC 7. GSBN QNI 2024, QTC 257. Traffic: (Sept.) WB4ZOJ 327, WB4FAS 298, W4FOE 287, WA3NAZ 184, W4PIM 175, W4GH 131, K4WC 98, K4EV 86, N4UZ 71, WD4ADV 64, AA4GA 55, K4NM 44, W4HON 38, WD4EAP 25, W4BIA 17, W4AAY 8, AK4T 8, WD4PLD 6, WB4HXE 4, W4JM 4, K4BAI 3, WB4SPB 2, WA4VMV 2. (Aug.) WB4DHC 63, WB4SPB 38, WB4TEK 16, WD4EAP 12, WB4BDP 2.

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RH.

Net	Freq.	Time(Z)Days	QNI	QTC	MGR.
NFPN	3950	2330 Dy	1119	189	WB4PGB
QFN	3651	0000/0300 Dy	924	561	WA4JPV
QFNS	3715	0100 Dy	150	52	WD4LUG

New Appts.: N4ARJ as EC, Clay Co., W4OQX EC, Alachua Co., WA4ZFR EC, Union Co., WA4ZSX as OO; K4BT & WD4IIO as OTS; W4WHK as OVS. SNCs earned by K4HXP WD4IRU K4PPQ & WB4RCF on NFPN; by W4BKC on FMTN; by N4PL on FAST; and by W4BKC W4EPG & W4LPG on FPON. K4YX new Editor of FL Net Bulletin; 'phone net members will receive copies of their NMs supply addresses and a monthly report. New calls: WB4VDL now AI4S; WA4YVX now AK4V; WA4RAG now KA4A; WA4SIB now KB4L; WB4HKP now KB4T; WD4MVG now KB4GW; WB4EFP now KB4FZ; WD4SDY now N4AVK. Sorry to report WA4ZRF a Silent Key. Okaloosa hams under W4LRC reported voting totals from 34 precincts. WA4MED and W4WHK upgraded to Extra. WA4SHN/RPT is new 99/39 repeater in Panama City. K4KHV K4LYY K4PMO W4WNY KB4L and others meet nightly on 40m cw, around 7090 kHz. AA4US prepared an FB package for mail-out to anyone needing help getting a FL Amateur License Plate. The area's first 220 MHz repeater now operational from Jax Beach on 223.34/224.94. The 40/00 repeater was moved to Callahan, and is available for RTTY use; call is K4CP/R. K4UTE preparing updated NFDXA want-list. WB4RIS got a digital display for his FT-101. DBARA annd VEN awarded a Certificate of Merit for 20 years of public service. CARA donated set of ARRL publications to Inverness library. Traffic: N4PL 404, N4WA 259, WD4LUG 190, WB4RIS 165, WD4HIF 135, W4FZX 135, W4LDM 112, WD4IIO 84, W4DTV 81, W4JL 75, WB4FJY 72, WB4TZR 61, W4MGO 60, WB4QBB 58, W4MVG 42, W4RH 39, WA4VLT 28, WB4VAP 26, AA4FG 24, WA4OEM 24, KB4T 23, WB4DTS 23, WA4EYU 17, WA4CRI 15, K4RNS 11, WB4YKV 11, K4IEX 8, W4DFU 3, N4ARP 1.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst. SCM: W4KGJ. SEC: AA4WJ. As I start another term as SCM, Oct. 1st, I regret to announce that WB4AID has requested not to be reappointed as Asst. SCM, citing medical problems and business pressures. Al is on a stringent regime for his heart problem and also had a hernia operation this month. As Asst. ACM, he has served in an outstanding manner, and we will miss him. Our congratulations to WD4KPG on making

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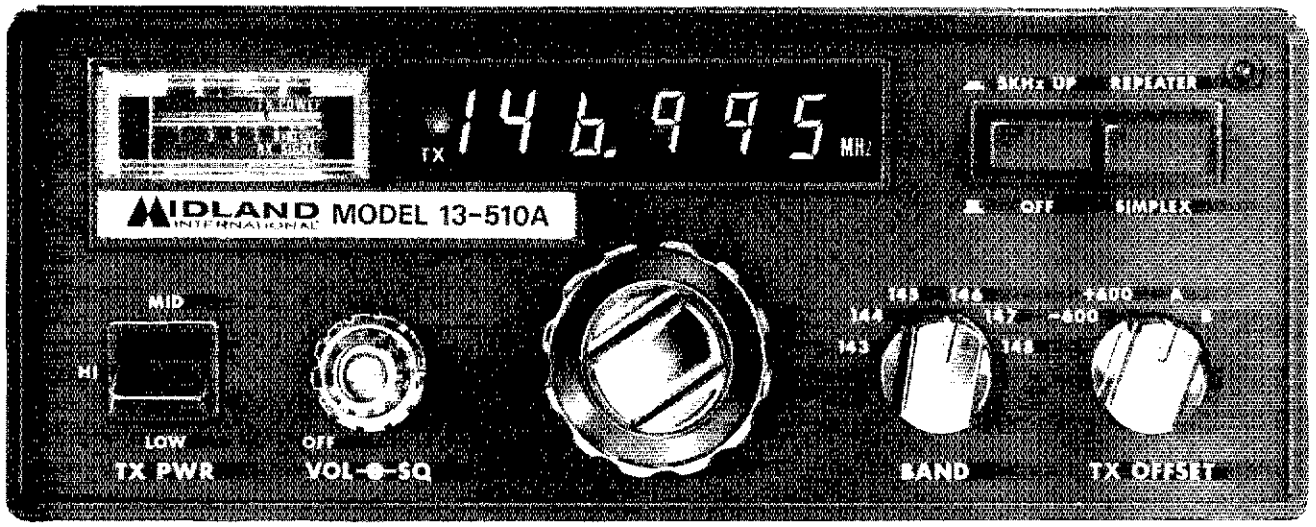
Our 13-510A Is Even Better!



NEW! The 13-510A P.L.L. synthesizer delivers 1,200 frequencies between 143.00 and 149.00 MHz . . . the full 2-meter band, plus MARS.

NEW! The 13-510A will operate with up to a 6 MHz split between TX and RX frequencies.

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NEW! The 13-510A has 3 transmitter outputs: 1, 10 and 25 watts.

Midland's 13-510, with its commercial-type modular construction, earned its reputation as one tough 2-meter FM mobile. Now Midland has made the 13-510A an even more versatile performer!

The 13-510A P.L.L. synthesizer splits the 6 MHz spread between 143.00 and 149.00 into 600 discrete frequencies, and a 5 KHz up-shift delivers 600 more for a total of 1,200 . . . shown directly on the digital display. In addition, there's access to 4 available offsets for repeater operation on ± 600 Hz with crystals supplied or up to 6 MHz spread with your crystals installed.

Inside the 13-510A, there's a highly sensitive (0.3 uV), highly selective (-70 dB at ± 15 KHz) dual conversion receiver with dual gate MOSFET RF and mixer stages, crystal filter in the 1st IF, ceramic filter in the 2nd IF, and helical resonators in the RF amplifier.

The transmitter is conservatively rated for 25 watts output, switchable to 1 or 10 watts for repeaters, and uses direct FM modulation to deliver natural sounding audio.

Other features making Midland's 13-510A the one to look at include automatic protection circuit for the output transistor, internal DC filtering and polarity protection, a deep-finned heat sink for the power transistors, and electronic switching that needs no mechanical maintenance. Mobile mounting bracket, base stand and push-to-talk microphone are included.

CHECK OUR SPECS:

RECEIVER. Type: dual conversion superheterodyne. 1st IF frequency: 16.9 MHz. 2nd IF frequency: 455 KHz. Sensitivity: Less than 0.5 uV for 20 dB quieting (0.3 uV for 12 dB SINAD). Spurious response: -60 dB. Squelch threshold: Less than 0.3 uV. Modulation Acceptance: ± 7.5 KHz. Selectivity: -70 dB at ± 15 KHz. Audio output power: 1.5 watts at 8 ohms.

TRANSMITTER. Outputs: 1, 10, 25 watts. Frequency deviation: Adjustable 3 - 16 KHz (normal 5 KHz). Audio Input: 600 ohms. Modulation system: Direct FM. Spurious Radiation: Less than -60 dB below carrier.

GENERAL. Power: 13.8 volts DC, negative ground. Current drain: Transmit, 2 - 7 amps.; receive, 0.8 amps. average. Antenna impedance: 50 ohms. Unit size: 2-5/8" x 6-13/16" x 9-5/8". Unit weight: 6.6 lbs.

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BPL and top traffic man in the Section. Also congrats to W4LX, Fort Myers club station, earning BPL in connection with Jerry Lewis MDA telethon. W4MEE has had to curtail activities because of illness of XYL. Sorry, Doug. WA4RLV reports he has to resign as manager of TPTN and drastically curtail activity because of a heart problem. WD4COL has been having antenna raising parties at his new QTH just built and almost ready to move into. Watch for his big signal on traffic nets and DX bands as well. AA4G reports working his 275th country — and with a vertical on limited real estate! Congrats, Joe. WB4VWO worked with Coast Guard on 15 meters about 26 hours during a maritime distress episode. More and more vessels using the ham bands — *and government* stations working them for their emergencies and having hams keep the frequency clear. New EC appointments: K4ZK, Martin County, and WB4FVV, Polk County. The St. Petersburg club is buying a brand new repeater to update WR4ALM — all solid state with more sophisticated control and autopatch. They are seeking donations to help pay for it. Looks like our Section has growing pains — problems in connection with Daytime National Traffic System. There was much discussion on this at Melbourne hamfest Sept. 9-10. We expect much more at Clearwater convention Nov. 25-26. Hope you will come and take part in the establishment of a Combined-Section Phone Net. We were happy to hear W4BK arriving home after a wonderful motor trip to San Diego convention. Also, K8PXM arrived at Tarpon Springs for wintering over and W4EXS arrived at Clearwater after spending summer in Ohio. Traffic: WD4KPG 657, K4SCL 414, W4LX 312, WD4COL 291, WB4FVV 287, W4YCL 234, WB4WYG 206, WA4EIC 202, WA4NBE 202, WA4GYR 184, WA4PFK 184, WB4NJU 180, WA4JPV 173, K4EUK 141, WA4SCK 123, K4YX 115, K4ZK 96, WB4AID 95, WA4RLV 93, AA4WJ 93, W4GPL 86, W4NTE 72, W4WYR 67, WD4EQT 64, W4ESH 60, WD4HYJ 59, WD4ISN 58, W4DVO 52, WB4PIB 46, N4KB 41, W4GDK 32, W4MPV 32, W4IRA 31, K4BLM 30, WB4KYE 30, WD4BAJ 28. W4QM 27, W4MEE 26, WA4QGV 20, N8GG/4 19, W4SMK 14, N4AUO 13, N4ET 13, WB4SNX 14, WB4GSV 12, W4ROA 4, N4XR 4, WB4DWU 1. (Aug.) W4FNK 106. (July) K4EUK 89.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Marshall Lincoln, W7DQS — NMs: W7EP W7UQQ WA7KQE. GM3PPE, an astronomer from Scotland, recently spent some time working at Kitt Peak and Mt. Lemmon observatories and stopped to visit WB7DGP. OPRC pres. W7TJV is the club call for the AR Society at ASU. WB7TPY is trustee and station mgr. ATV users in the state are using 434.0 MHz for video carrier and 438.250 MHz for audio as standard simplex frequencies. New officers of Explorer Post 599 are WB7RPG, pres.; WB7QGN, vice-pres.; KA7ATU, secy.; Joe Gordon, treas. W7YS reports a recent QSO with K2UHM, his high school teacher who started him in ham radio in 1939. WB7CDO was active last spring organizing communications for special winter olympics for handicapped children even before he became EC for Coconino County. K7ZUY, EC, and WA7UJG, RACES RO, both in Yavapai County, supervised an extensive emergency drill to demonstrate amateur radio capabilities for police and medical authorities. The Superstition ARC has an attractive new club newsletter format and very neat printing job. The SCM appreciates receiving newsletters from ALL clubs. This is the main way he finds news items for this QST column. Nets: (Sept.) SWN, 261; ATEN 107, Cactus 97. (Aug.) Cactus 298. Traffic: (Sept.) W7EP 238, K7NTG 78, WA7KQE 40, W7TFJ 10, K7NMQ 8, AA7Q 4, W7DQS 4, K7JKM 3, WA7NHQ 1. (Aug.) WB7WEB 12.

LOS ANGELES: SCM, Perry Masterson, W6RHS — The month of Sept. was a good month for the Section, judging from the activity reports received. We want to welcome WB5EKU to the Los Angeles Section. Don is settling in to the Granada Hills area. Judging from his letter, he has had a great deal of useful experience in the emergency field. W6BRO was at the National Convention this year. He said "it was great." K6CL reported that W6FD became a Silent Key on 9-25. W6FD will be missed by the amateur operators who knew him. K6ASK is a very active Scout Master. A good opportunity to encourage youngsters to become amateur radio operators. N6PZ made DXCC and received his certificate this month. AD6M is now back in the fold after being inactive for a few years. W6INH has big plans for antennas this year. He is planning a 2nd tower with a 15- and 10-meter duo bander. Then a five-element single bander on the big tower. Gene didn't say, but I suspect it is for 20. K6EA is back from his summer in the midwest, I'm glad he is back I missed his nice regular reports. W6BWG reports DXCC 242 confirmed with 258 worked, very nice. N6NQ is back on from Palmdale and is looking forward to some intruder watching. WA6FWY reports a busy schedule for this winter. I talked with W7FTX/W6AAX on 20. Clarice ask to be remembered to all the friends of hers in the section. Traffic: W6OEO 226, W6INH 172, AD6M 110, N6PZ 66, K6CL 57, W6BWG 20, WB5EKU/6 15, K6EA 14, WB6YID 10, N6NQ 8.

ORANGE: SCM, Wm. Heitritter, WB6AKR — ASCM: K6KNC. SEC: AE6N (formerly W6AQB). NMs: K6JT W6CPB. ECs: WB6ARK K6GGS W6LKN W6WPP and WA6YWS. New appointments: ECs: WB6PLZ (portion of Riverside Co.), WB6ARK (VHF in addition to HF for entire Orange Co.) and W6SQE (Palm Spring area); OTSs: WB6BZZ K6WI WB6DAB WB6SXR and WA6KHB; OBSs: WA6IKH and WB6PLR; OOs: WA6IQL K6RR and W6TD. WB6AKR has resigned as SCM due to his increased heavy work load and he has recommended WA6WZO for appointment for the remainder of his term (expiring Apr. 1, 1979). The Orange County Council of Amateur Radio Organizations (composed of HFEA-ARC, FRC, SJH-RC, AARA, SCATS, IEC-ARC, CRC, DERC, OCARC, EWRC) which met Sept. 18 formed an ad hoc committee (including WA6JQN WB6DCC WB6DCB WA6JFP WA6OPS WA6WZO and WA6WZN) for the purpose of planning a possible SW Division Convention for 1979 or 1980. Also the Council discussed the success of the Orange Co. Fair booth (headed by WB6QVY) as well as declaring OCARC the 1978 winner of the Orange Co. FD plaque. Many clubs in our Section offer classes from Novice to Extra. Also there are several colleges in or near Orange Co. which have Amateur Radio courses; they include Rio Hondo College, Cerritos College, Saddleback College, Orange Coast College and Coastline Community College. Congrats to WA6LFF on passing Extra Class as well as receiving No. 441 5BWAS, and to WA6WZN on being elected pres. of the YLRC of LA and disbursing treas. of YLRL. WB6IXN the historian of OCARC is looking for any information (including pictures and past newsletters) of the club (mainly 1933 thru

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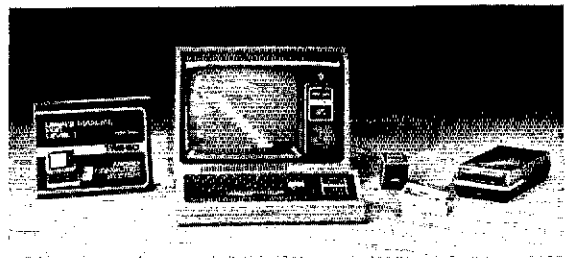

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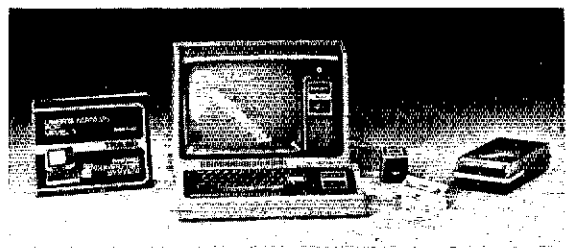

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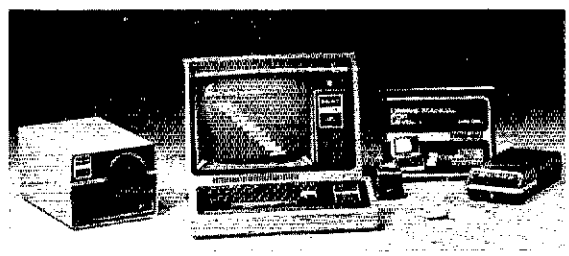

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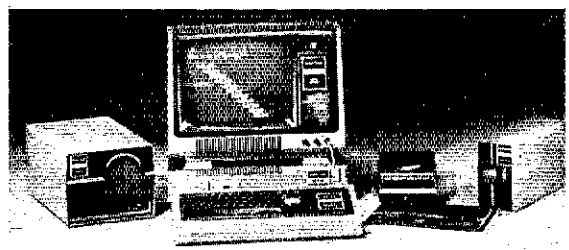

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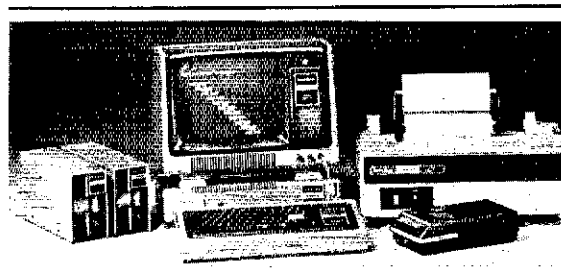

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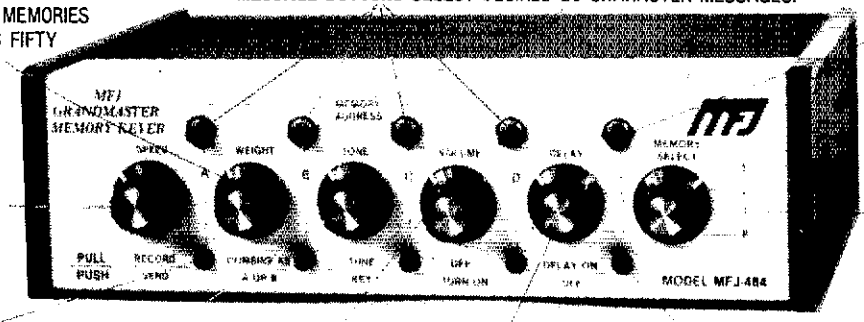

RESETS MEMORY IN USE TO BEGINNING.

SPEED CONTROL, 8 TO 50 WPM. **PULL** TO RECORD.

MEMORY SELECT: POSITIONS 1, 2, 3 ARE EACH SPLIT INTO MEMORY SECTIONS A, B, C, D (UP TO TWELVE 25 CHARACTER MESSAGES). SWITCH COMBINES A AND B. **POSITION** K GIVES YOU 100, 75, 50, OR 25 CHARACTERS BY PRESSING BUTTONS A, B, C, OR D.

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TONE CONTROL. PULL TO TUNE.

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NOW YOU CAN CALL CQ, SEND YOUR QTH, NAME, ETC., ALL AUTOMATICALLY.

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Up to twelve 25 character messages plus a 100, 75, 50, or 25 character message (4096 bits total).

A switch combines 25 character messages for up to three 50 character messages.

To record, pull out the speed control, touch a message button and send. **To playback,** push in the speed control, select your message and touch the button. That's all there is to it!

You can repeat any message continuously and even leave a pause between repeats (up to 2 minutes). **Example:** Call CQ. Pause. Listen. If no answer, it repeats CQ again. To answer simply start sending. LED indicates Delay Repeat Mode.

Instantly insert or make changes in any playing message by simply sending. Continue by touching another button.

Memory resets to beginning with button, or by tapping paddle when playing. Touching message button restarts message.

LEDs show which 25 character memory is in use and when it ends.

Built-in memory saver. Uses 9 volt battery, no drain when power is on. Saves messages in memory when power loss occurs or when transporting keyer. Ultra compact, 8x2x6 inches.

PLUS A MFJ DELUXE FULL FEATURE KEYER.

Iambic operation with squeeze key. Dot-dash insertion.

Dot-dash memories, self-completing dots and dashes, jamproof spacing, instant start (except when recording).

All controls are on front panel: speed, weight, tone, volume. Smooth linear speed control, 8 to 50 WPM.

Weight control lets you adjust dot-dash-space ratio; makes your signal distinctive to penetrate QRM.

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Ultra reliable solid state keying: grid block, cathode, solid state transmitters (−300 V, 10 ma. max., +300 V, 100 ma. max.). CMOS ICs, MOS memories. Use 110 VAC or 12 to 15 VDC. Automatically switches to external batteries when AC power is lost.

OPTIONAL SQUEEZE KEY

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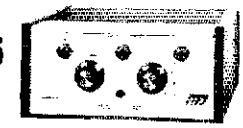

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IN ADDITION: all Mark Series Radios now have an LED Battery Condition Indicator conveniently mounted on the top plate. A quick peek will reassure you of a charged battery in the radio.

Wilson hand-helds have been known world-wide for exceptional quality and durable performance. That's why they have been the best selling units for years.

Now the Mark Series of miniature sized 2-meter hand-helds offers the same dependability and operation, but in an easier to use, more comfortable to carry size . . . fits conveniently in the palm of your hand.

The small compact size battery pack makes it possible to carry one or more extra packs in your pocket for super extended operation time. No more worry about loose cells shorting out in your pocket, and the economical price makes the extra packs a must.

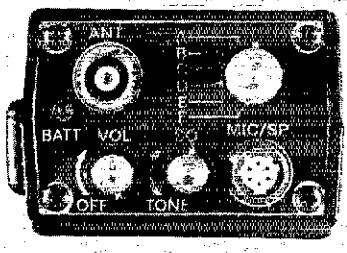
– NOW SWITCHABLE –

MARK II: ≃ 1 & 2.5 watts

MARK IV: ≃ 1 & 4.0 watts

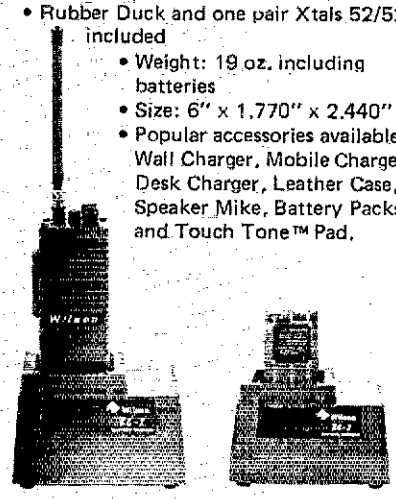
SPECIFICATIONS

- Range: 144-148 MHz
- 6 Channel Operation
- Individual Trimmers on TX and RX Xtals
- Rugged Lexan® outer case
- Current Drain: RX 15 mA
  TX - Mark II: 500 mA
  TX - Mark IV: 900 mA
- 12 KHz Ceramic Filter and 10.7 Monolithic Filter included.
- 10.7 MHz and 455 IKz IF
- Spurious and Harmonics: more than 50 dB below carrier
- BNC Antenna Connector
- .3 Microvolt Sensitivity for 20 dB Quieting
- Uses special rechargeable Ni-Cad Battery Pack
- Rubber Duck and one pair Xtals 52/52 included
- Weight: 19 oz. including batteries
- Size: 6" x 1.770" x 2.440"
- Popular accessories available: Wall Charger, Mobile Charger, Desk Charger, Leather Case, Speaker Mike, Battery Packs, and Touch Tone™ Pad.



Conveniently located on top of the radio are the controls for volume, squelch, accessory speaker mike connector, 6 channel switch, BNC antenna connector and LED battery condition indicator.

Optional Touch Tone™ Pad available.



Illustrated is Wilson's BC-2 Desk Top Battery Charger shown charging the Mark Series Unit or the BC-4 Battery Pack only.

To obtain complete specifications on the Mark II and Mark IV, along with Wilson's other fine products, see your local dealer or write for our Free Amateur Buyer's Guide.

Consumer Products Division

Wilson Electronics Corp.

4288 South Polaris Avenue • P. O. Box 19000 • *Las Vegas, Nevada 89119*
Telephone (702) 739-1931 • TELEX 684-522

Prices and specifications subject to change without notice.

1960); can you help? Traffic: (Sept.) WB6EIG 605, WB6BZZ 93, W6RE 77, AE6N 44, W6CPB 19, K6WI 19. (Aug.) WB6EIG 706, W6RE 185, WB6BZZ 126, W6CPB 54, K6JT 31. (July) WB6EIG 606, WB6OFC 376, WA6KHB 179, W6RE 136, K6JT 81, W6CPB 10. (June) WB6EIG 364, WA6KHB 117, K6JT 71, W6RE 64, WB6DAB 41, W6CPB 10, W6QBD 7. (May) WB6EIG 621, WA6KHB 227, W6RE 112, K6JT 43, WB6DAB 27, W6QBD 12, W6CPB 4. (Apr.) WB6EIG 506, WA6KHB 130, W6RE 72, WB6SXR 26, W6CPB 18, WB6DAB 16, K6JT 10.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — The acid test came during the ARRL National Convention, in San Diego, when, on Fri. and Sat. ARES members were called from the convention to assist the Calif. Dept. of Forestry with supplementary communications and a Red Flag Alert. Then came the fateful aircraft accident the following Mon. While WB6LUD masterfully served as NCS on SANDRA's 04/64 Otay repeater, N6AI KB6AL WA6BCC WA6DWR W6BKA WB6CRI WA6LWL assisted at the emergency collection station; N6PC W6OTE WB6NPT at Red Cross Hq; WA6LZG at the Salvation Army care center, and WD6AHX at the County Emergency Medical Services office. Assignments were coordinated by W6INI. Congrats to WA6UAZ for attaining a 25 wpm code proficiency award. AA6EE continues to distinguish himself with operating awards. He led the section in the 1977 IARU Radiosport contest, then first in Calif. in the ϕ-District QSO Party, and now section leader in the New Jersey QSO Party. Palomar ARC's 13/73 repeater insures success of ARES support of Calif Dept of Forestry. S. D. Teleprinter Soc. has been chartered as an ARRL Affiliated Club. Traffic: (Sept.) WA6UAZ 328, WB6PVH 194, WA6SKU 42, N6GW 40, WB7SUA 20, WA6ZZL 17, N6AT 16, W6HUJ 15, N6RD 15, K6LKW 10, WA6UFY 5, WA6HJJ 2. (Aug.) WA6BDW 17, W6TVY 8, W6UQF 6.

SANTA BARBARA: SCM, D. Paul Gagnon, N6MA — The National Convention in San Diego is history. WD6EEN has been on SCN CW NET (3598 daily 1830). He also is NCS on two Lompoc ARES nets. WD6CWJ has a new FT901. W6TSH is in Europe for an extended trip. WA6TLP passed First Class commercial test. KA6DAQ a new Novice, N6XT moved to Eureka. WD6FPO has new tower. N6WP now SCN Net mgr. W6RIC is the new SEC. W6ZRR sent 44 bulletins in Sept. on RTTY and FM. WB6MXM used his new CL-36 in the AA DX contest. WA6BLS passed Extra in San Diego. Ventura County ARES provided comms for the 100 mile Bikeathon with W6s JGS TSV RIC LHY — WB4CBZ, WB6s MAA RVA ZWZ EDA DHW; WD6ARV WD6AZP among those helping out. K6MEP again active in the VHF contest from Pine Mt. WA6EJO on Frazier and K6TZ on Santa Ynez. W6ZH spoke at Ventura Co. Club. WB6OBZ spoke at the Mike and Key Club in Camarillo on Lifesaving. N6MA and WD6ASD had a ham wedding with W6PNM, WA6DJS, WA6UEO and WA6IJZ participating. Thanks to all who attended. Very sorry to report W6IDU is a Silent Key. PSHR: WD6EEN 15, N6WP 41, K6YD 25, WB6MXM 16, WA6LBO 42, N6MA 20. Traffic: WA6MBZ 256, WØKON 209, N6WP 197, K6YD 65, N6YH 55, WA6LBO 45, WB6MXM 32, N6MA 15. AA6Y 8, NØFB 8.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Ted Heitheker, W5EJ — Asst SCM/SEC: K5PC NMs: W5GN AE5I. ODs rptg. this month: W5QPX W5TI WA5UBK & WA5ZNZ. OVS report from: WA5ZNZ. We now have all 145 counties in the section with active ARES units in service. Find out who your local EC is and register your capabilities and volunteer your services. New OVS: WB5UHO. New OTS: AA5J. Attn: ORS and OPS appointees: when your present cert. expires, you will be issued an OTS appointment, if you meet the qualifications, as ORS and OPS have been combined into OTS. New EC for Nacogdoches Co.: WD5EPY. K5HBU now has emer. pwr. unit. EC/WB5UTA has appointed 6 Asst. ECs and has developed a super ARES unit in Wichita Falls area. PSHR: WB5SDD W5VMP AA5J WB5LAT K5SOR WB5RPU and WD5DRK. W5TI rpts. ARTS Net has new format, with no NCS; just call "CQ-ARTS, list traffic, and listen! (1400-1500Z; 7060 kHz). WD5DRK with WB5QYZ operated mobile in hot air balloon in Smith Co. W5CTZ now /5 at lake Texoma. Attn ECs: time to finalize SET plans, and submit your annual report to K5PC by Mar. 1, 1979. Monthly Station Activity Reports can be sent via the Texas Tfc. Net or the TEX CW Net to W5EJ via K5PC. Saves stamps and increases tfc. count! Merry Christmas and much DX in 1979!! Traffic: WB5SDD 543, W5TI 444, W5VMP 151, AA5J 130, WB5LAT 80, K5MC 72, K5SOR 68, N5AE 55, K5PC 53, WB5RPU 42, WD5DRK 36, AE5I 35, WA5EZT 20, WD5JLF 18, WA5INJ 16, WD5AAT 14, W5YK 8, N5BT 7, K5HSZ 6, W5CTZ 4.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Sept. has not been my month. Barely got last month's report out, when XYL had to have surgery, now recovering at home. Our thanks to all for your prayers, cards and flowers. Sorry to miss Charter party for Bi-Centennial Club in Ok. City. W5REC filled in and did FB job. Traffic count down, but notice some new calls in the reports, which is FB. All of our nets can use some help, specially

POLY PAKS® DISCOUNT ALLEY

WE'RE PUTTING "GREENBACKS" IN YOUR POCKET!

10% OFF

That's right! Take 10% discount off any item in this ad! Or, for any $50 shipment, take 25% discount! POLY PAKS DISCOUNT ALLEY continues with the biggest discounts available anywhere!

1 AMP REGULATED POWER SUPPLY KITS $8.88

Easy to assemble! Uses LM340K positive voltage regulators. Reverse leads for a negative supply! Buy 2 for a plus/minus supply! Complete kit, nothing else to buy! (case not included) With step by step instructions. Wt. 4 lbs. Size 6¼ x 4 x 2¼"

Cat. No.	Volts
☐ 3854	5
☐ 3857	12
☐ 3858	15
☐ 3860	18

NEW! DIGITAL CAPACITANCE METER KIT

• 5 Ranges! • Four .5" digits! • You've seen it at twice the price! $69.95

Measure any capacitor value from 100 pF to 10,000 uF! Five ranges: 0-1uF, 10uF, 100uF, 1000uF, 10,000uF. Also tests leakage! Directly reads all types of capacitors at the touch of a button. Easy to assemble! Complete kit, nothing else required. With step-by-step instructions. Size 6¼ x 2¼ x 5¼" deep, vinyl covered wooden cabinet. Wt. 2 lbs.

Cat. No. 5238 Capacitance Meter Kit $69.95
Cat. No. 5239 Capacitance Meter Wired $85

3 AMP "TEFLON" RECTIFIERS

Order by Cat. No. 5270 and PIV

PIV	Sale
☐ 25	10 for .69
☐ 50	10 for 1.09
☐ 100	10 for 1.29
☐ 200	10 for 1.89
☐ 400	10 for 2.39
☐ 600	10 for 2.89

MOTOR SPEED CONTROL "BASIC"* KIT $2.95

Controls up to 10 AMps, 1000 watts! Works with noninductive type motors and incandescent lights. Varies from 5% to 95%. Wt. 10 oz. Cat. No. 5327

*Basic kits include all necessary electronic components, less PC board, case, line cord, transformer, or battery. Easy to breadboard, with instructions.

1N4000 EPOXY RECTIFIERS

Cat. No.	Type	PIV	Sale
☐ 2377	1N4001	50	10 for .49
☐ 2378	1N4002	100	10 for .59
☐ 2379	1N4003	200	10 for .69
☐ 2380	1N4004	400	10 for .89
☐ 2381	1N4005	600	10 for 1.09
☐ 2382	1N4006	800	10 for 1.49

Order by Cat. No.

BLOCK FANS $9.95

For cooling, flushing, heating and ventilating! Quiet & dependable. Lightweight, flame retardant. 5 blades or better (sorry, no choosing). Removed from new equipment. Ship wt. 1¼ lbs. Cat. No. 92CU3106

• Famous USA Makers! • 4-11/16" sq. 1½" deep.

30 WATT STEREO AMPLIFIER KIT $24.95

Easy to build, assembles in minutes. Uses two 15 watt Hybrid Amplifier Modules with heat sinks included! Power output 2 x 15W RMS, both channels into 8 ohms from 40-22,000 Hz. Total distortion less than 1%. Size: 5¼ x 2-3/4", Wt. 1 lb. Cat. No. 5406 *Made For Fisher!*

• Use with any preamp!

BARGAIN PRICED ONE-LINE SPECIALS

Item	Price
☐ ULTRASONIC TRANSDUCER, 42kHz, alarms, remote cont. (#5378)	1.49
☐ DYNAMIC MIKE, 500 ohm impedance, with stand. (#5330)	1.95
☐ LED RAY DIODES, emits coherent beam, 5-9W. (#3506)	4.95
☐ 12VDC BLOCK RELAY, 5A contacts, SPDT, 700 ohms (#4032)	1.00
☐ RED DISC SPECIAL, Erie, mostly marked, pop values (# 5341)	150 for 2.00
☐ LONG LEAD DISC CAPACITORS, pop values, asst'd. (# 2598)	100 for $2.00
☐ TRANSISTOR 'LYTICS, asst. pop values, upright, axial. (# 2747)	50 for $2.00
☐ MOLEX IC SOCKET PINS, cut to any length. (# 3144)	200 for $2.00
☐ AXIAL ELECTROS, asst'd values & capacitance. (# 3227)	40 for 2.00
☐ LED DRIVER IC'S, untested, like 75491-2, 50%+ good. (# 3360)	30 for $2.00
☐ JUMBO RED LEDS, 100% prime, long leads. (# 3369)	15 for $2.00
☐ LINE CORDS, 18ga, 2 cond, with plug, 5 ft. (# 3643)	8 for $2.00
☐ HARDWARE SURPRISE! screws, nuts, washers, and more. (# 3967)	500 pc for $2.00
☐ TUBULAR CAPACITORS, asst values from 100 pf up. (# 35A219)	70 for $1.00
☐ COILS AND CHOKES, RF, AF, osc, peaking, and more. (# 35A297)	60 for $1.00
☐ RCA PLUGS & JACKS, for audio, RF, etc. (# 35B402)	15 for $1.00
☐ SLIDE SWITCHES, pop types, from SPST up. (# 1495)	20 for $1.00
☐ 9 VOLT BATTERY SNAPS, fits std types. (# 2852)	6 for $1.00
☐ 1N4148 SWITCHING DIODES, like 1N914, 100% prime. (# 3060)	20 for $1.00
☐ UTILITY AC OUTLET, rect mounting. (# 3582)	6 for $1.00
☐ 1 AMP CIRCUIT BREAKERS, glass, thermal. (# 3905)	2 for $1.00
☐ CAPACITOR SPECIAL, discs, mylar, lytics, more (# 2738)	100 for 2.00
☐ VOLTAGE REGULATORS, hobby LM320, 340, TO-3 (# 3330)	10 for 2.00
☐ PANEL SWITCHES, slides, rotaries, mod, etc (# 3268)	30 for 2.00
☐ RESISTOR SPECIAL, ¼ to 1W, carbon, metal (# 3054)	200 for 2.00
☐ HALF WATTERS, resistors, carbon, metal (# 3048)	200 for 2.00
☐ NATIONAL IC BONANZA, linears, 7400s ROMS (# 2900)	100 for 2.00
☐ LM340T VOLTAGE REGULATORS, 5 to 24V, TO-220 (# 2635)	15 for 2.00
☐ POLYSTYRENE CAPS, asst'd values, voltage, hi-Q (# 2729)	100 for 2.00
☐ BRIDGES, untested, 2, 4, 6, amp, full wave (# 4022)	20 for 2.00
☐ MIXED READOUTS, hobby, untested, .127, .3, .5, etc. (# 3619)	15 for 2.00
☐ QUARTER WATTERS, resistors, metal film, marked (# 3413)	150 for 2.00
☐ PLASTIC TRANSISTORS, untested, TO-92 (# 2664)	100 for 2.00
☐ PREFORMED RESISTORS, ¼, ½, 1W, marked, asst'd (# 2666)	200 for 2.00
☐ PRECISION RESISTORS, ¼, ½, 1W, 1%, 2% marked (# 2428)	200 for 2.00
☐ DIPPED MYLARS, shiny finish, asst'd values (# 2507)	60 for 2.00
☐ VOLUME CONTROLS, audio, linear, asst'd values (# 3421)	30 for 2.00
☐ CLOCK CHIPS, National, hobby & untested, alarm (# 3066)	30 for 2.00
☐ MMS262 2K RAMS, hobby, untested (# 3940)	20 for 2.00
☐ PUSH SWITCHES, push-to-break, spst, alarms (# 5289)	10 for 2.00
☐ CD-4000 SERIES CMOS, untested, 50% useable yield (# 5284)	25 for 2.00
☐ CONDENSER MIKES, sensitive, 500 ohms 1.5 Volts (# 3178)	1 for 2.95
☐ UNMARKED CAPACITORS, polystyrene, molded, pop values (# 3005)	250 for 2.00
☐ IC SOCKETS, 14, 16 pin, solder tail. (# 3621)	8 for 2.00
☐ PC TRIM POTENTIOMETERS, thumbwheel, screwdriver ass't. (# 3348)	30 for 2.00
☐ SLIDE VOLUME CONTROLS, asst'd values, duals, singles (# 3057)	15 for 2.00
☐ CRYSTALS, may include CB, Ham & more (# 3250)	10 for 2.00
☐ TERMINALS STRIPS, from 2 lugs up (# 3136)	100 for 2.00
☐ NE-2NEON LAMPS, all 100% good (# 2613)	30 for 2.00
☐ SHIELDED CABLE, 1 cond, mikes, phones, (# 3577)	40 ft. for 2.00
☐ SOUND TRIGGER, sound triggers scr w/amp (# 3625)	3 for 2.00
☐ VEEDER ROOT COUNTER, 000-999, resettable, panel mt. (# 5081)	1 for 1.49
☐ DUAL GATE MOSFET, sim. to 3N200, 3N187, for RF & Mixer (# 5101)	2 for 1.00
☐ LCD THERMAL INDICATORS, 80-108°F, 7x1", flexible (# 5188)	2 for 1.00
☐ JOYSTICK, four 100K pots, (# 2808A)	1 for 2.95
☐ DECO THUMBWHEEL SWITCH, BCD, 0-7 (#2870A)	1 for 1.49
☐ PLESSEY TV SIDEBAND FILTER, for chan. 3 or 4 (# 3075)	1 for 1.95
☐ 9V NI-CAD CHARGER PAK, plug-in, 125ma, 125 VAC pri (# 4096)	2 for 1.49
☐ DATA ENTRY PUSH-SWITCHES, spst, norm open, for keyboards (# 5279)	30 for 2.00
☐ SN7400 TTL ICs, untested 50%+ yield, pop types (# 2415)	75 for 2.00
☐ MINI DIP ICs, linears, untested 50%+ yield, pop types (# 2248)	100 for 2.00
☐ LM380 AUDIO IC's, 2 watts on-a-dip 50%+ yield (# 5284)	30 for 2.00
☐ LINEARS, OP AMPS, untested 50%+ yield, amps-dips-minidips (# 2416)	75 for 2.00
☐ LED WATCH GUTS, men's, how good? We don't know (# 5287)	1 for 1.95
☐ SLIDE SWITCHES, asst pop styles (# 1495)	10 for 1.00
☐ UPRIGHT ELECTROS, asst'd values & capacitance. (# 3226)	40 for 2.00
☐ PREFORMED DISC CAPACITORS, marked values, asst'd (# 2605)	150 for 2.00
☐ CALCULATOR KEYBOARDS, 20 keys and up. (# 5371)	10 for 2.00
☐ ALARM WARNING STICKERS, for windows, 2-3/4" x 3" (# 5338)	3 for 1.00
☐ CALCULATOR SWITCHES, SPST-N.O., asst'd, ½" sq. (# 3624)	10 for 1.00
☐ ITT 6 DIGIT COUNTER, 110VAC, with mounting flange (# 5392)	1 for 1.95
☐ 2N2369 TRANSISTORS, NPN switch, like 2N2222. (# 1902)	6 for 1.00
☐ FACTORY REJECT DIODES, zeners, rect, signal, untested (# 3500)	2000 for 1.00

MICROPROCESSORS! MEMORIES! SUPPORT!

Order by Cat. No. 3459 and type

Type	Price	Type	Price
☐ 8008	$7.95	☐ 8259	19.95
☐ 8080A	9.95	☐ 2102-L1	$1.50
☐ 8212	3.50	☐ 1103	.79
☐ 8214	7.95	☐ MM5260	.99
☐ 8216	3.50	☐ MM5262	.39
☐ 8224	3.50	☐ MM5280**	3.95
☐ 8228	6.95	☐ MK4200P-11	3.95
☐ 8238	7.95	☐ MK4096	3.95
☐ 8251	9.95	☐ MK4116	19.95
☐ 8253	19.95	☐ 1702A	4.95
☐ 8255	10.50	☐ MM5202	2.95
☐ 8257	19.95	☐ 2708	10.95

GIANT SALE! MINI TOGGLE SWITCHES

• 8A 125VAC contacts or better!
• Top USA makers!

Cat. No.	Contacts	Sale
☐ 4036	SPDT	88¢
☐ 5065	SPDT*	99¢
☐ 4037	DPDT	1.29
☐ 5422	DPDT*	1.49
☐ 5434	3PDT	1.69
☐ 5067	4PDT*	1.95

*center off

TTL'S

Order By Cat. No. 1981 & Type No.

TYPE	SALE	TYPE	SALE
☐ SN7400	.12	☐ SN7492	.39
☐ SN7401	.12	☐ SN7493	.43
☐ SN7402	.14	☐ SN7494	.49
☐ SN7403	.12	☐ SN7495	.39
☐ SN7404	.14	☐ SN7496	.12
☐ SN7405	.14	☐ SN7498	.12
☐ SN7406	.12	☐ SN74100	.79
☐ SN7409	.20	☐ SN74107	.25
☐ SN7410	.12	☐ SN74109	.29
☐ SN7411	.19	☐ SN74113	.49
☐ SN7413	.49	☐ SN74114	.25
☐ SN7416	.25	☐ SN74121	.29
☐ SN7420	.12	☐ SN74123	.39
☐ SN7421	.25	☐ SN74132	.65
☐ SN7423	.12	☐ SN74140	.29
☐ SN7426	.12	☐ SN74145	.59
☐ SN7430	.14	☐ SN74151	.55
☐ SN7437	.12	☐ SN74153	.55
☐ SN7438	.14	☐ SN74155	.49
☐ SN7440	.12	☐ SN74156	.29
☐ SN7441	.49	☐ SN74157	.55
☐ SN7443	.29	☐ SN74160	.49
☐ SN7444	.12	☐ SN74161	.49
☐ SN7446	.65	☐ SN74163	.69
☐ SN7447	.65	☐ SN74164	.39
☐ SN7450	.12	☐ SN74165	.69
☐ SN7451	.12	☐ SN74166	.99
☐ SN7453	.12	☐ SN74173	.99
☐ SN7454	.19	☐ SN74174	.79
☐ SN7455	.12	☐ SN74175	.69
☐ SN7460	.19	☐ SN74177	.50
☐ SN7464	.12	☐ SN74179	1.49
☐ SN7465	.12	☐ SN74180	.39
☐ SN7470	.12	☐ SN74182	.29
☐ SN7472	.12	☐ SN74190	.79
☐ SN7473	.25	☐ SN74191	.99
☐ SN7474	.29	☐ SN74192	.69
☐ SN7475	.39	☐ SN74193	.69
☐ SN7476	.35	☐ SN74194	.69
☐ SN7480	.12	☐ SN74195	.19
☐ SN7482	.12	☐ SN74197	.69
☐ SN7483	.59	☐ SN74199	.79
☐ SN7485	.69	☐ SN74200	1.99
☐ SN7486	.25	☐ SN74251	.59
☐ SN7488	.79	☐ SN74284	2.49
☐ SN7489	1.25	☐ SN74285	2.95
☐ SN7490	.39	☐ SN74298	.99
☐ SN7491	.19		

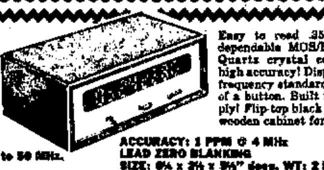
LINEAR "POP" OP AMPS

Type	Each	Type	Each
☐ LM300N	.49	☐ NE556N	.99
☐ LM300H	.49	☐ NE558V	.29
☐ LM301V	.25	☐ NE558K	.29
☐ LM301H	.25	☐ NE561N	1.99
☐ LM307V	.25	☐ NE565N	.89
☐ LM308V	.29	☐ NE565H	.79
☐ LM308H	.59	☐ NE567V	1.29
☐ LM309K	.99	☐ LM703H	.29
☐ LM311V	.29	☐ LM704H	.19
☐ LM320T-8V	.99	☐ LM706H	.19
☐ LM322N	.79	☐ LM710N	.29
☐ LM322H	.59	☐ LM711N	.39
☐ LM324N	.69	☐ LM723N	.49
☐ LM330N	.99	☐ LM733N	.59
☐ LM340K-5V	.99	☐ LM741V	.19
☐ LM340K-6V	.99	☐ LM741H	.19
☐ LM340K-12V	.99	☐ LM747H	.39
☐ LM340K-15V	.99	☐ LM1304N	.99
☐ LM340K-18V	.99	☐ LM1310N	.99
☐ LM340K-24V	.99	☐ MC1312N	2.49
☐ LM340T-5V	.99	☐ LM1414V	.49
☐ LM340T-6V	.99	☐ LM1458V	.29
☐ LM340T-12V	.99	☐ LM1800N	.29
☐ LM340T-15V	.99	☐ LM3028H	.69
☐ LM340T-18V	.99	☐ LM3900N	.29
☐ LM340T-24V	.99	☐ LM3900V	.69
☐ LM350N	.79	☐ LM4250H	1.99
☐ LM377N	1.49	☐ 75451	.29
☐ LM379S	4.50	☐ 75453	.29
☐ LM380N	.99	☐ 75491	.49
☐ NE531H	1.49	☐ 75492	.49
☐ NE532N	.25	☐ 75494	.69
☐ NE540H	2.50	☐ PA263	.77
☐ NE555V	.39	☐ DM8864	.99

Order by Type No.

Case code: T=TO-220 Power Tab; V=Mini dip; K=TO-3; H=TO-5; N=DIP.

8 DIGIT FREQUENCY COUNTER $77



• More features for the money!
• Easy to assemble and calibrate!

Easy to read .35" led digits, dependable MOS/LSI circuitry. Quartz crystal controlled for high accuracy! Displays internal frequency standard at the touch of a button. Built in power supply! Flip-top black vinyl covered wooden cabinet for easy access.

SPECIFICATIONS:
SENSITIVITY: 25mV to 35 MHz, 50 mV to 50 MHz.
FREQ. RANGE: 10Hz to 50MHz, optional prescaler to 500 MHz.
RESOLUTION: 1 Hz @ 1 sec, 10 Hz @ 10 sec.
GATE TIMES: 1 and 0.1 sec.
INTERNAL FREQUENCY STANDARD: 5.24288 MHz
INPUT IMPEDANCE: 1 megohm
ACCURACY: 1 PPM @ 4 MHz
LEAD ZERO BLANKING
SIZE: 6¼ x 2¼ x 5¼" deep. WT: 2 lbs.
POWER REQUIREMENTS: 110VAC, 60 Hz.

Cat. No. 4049 COUNTER KIT. . . $77
Cat. No. 4050 COUNTER WIRED & CALIBRATED. . . $112
Cat. No. 5433 COUNTER WITH PRESCALER WIRED & CALIBRATED. . . $139

DIP SWITCHES

Order by Cat. No.

Cat. No.	Switches	Sale
☐ 3668	2	.77
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☐ 3399	6.3	600mA	Metal Encased	$1.98
☐ 3323	24VCT	300mA	Open frame	$1.95
☐ 3407	14VCT	1A	Open frame	$3.95
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Cond	Sale	Cond	Sale
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☐ 34	3 ft. $1.98	☐ 50	2 ft. $1.98
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Order by Cat. No. 3939 and conductors.

FULL WAVE BRIDGE RECTIFIERS

PIV	2 AMP (#1346)	6 AMP (#2456)	10 AMP (#2447)	25 AMP (#2273)
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☐ 100	.69	.99	1.49	1.79
☐ 200	.79	1.25	1.69	2.25
☐ 400	.89	1.59	1.99	2.49
☐ 600	.99	1.75	2.25	3.75
☐ 800	1.19	1.95	2.50	4.50

Order by Catalog Number and voltage.

FREQUENCY COUNTER PRESCALER KIT

Fits inside our Frequency Counter Cabinet. Requires +5VDC, 100mA. With instructions.

• Works with all frequency counters! $24.95 kit
• Extends range to 500 MHz!

Cat. No. 5215 PRESCALER KIT $24.95
Cat. No. 5225 PRESCALER WIRED $34.95

SANYO AUDIO AMPLIFIER MODULES

Easy to build a complete audio amplifier for hi-fi, tape, AM. FM, PA, and more! Response 20-20,000 Hz, less than .5% distortion at full power. Efficient heat radiating construction. Output 8 ohms. Size 3¼ x 2 x ¼" thick approx. Wt. 8 oz. With instructions.

Cat. No.	Type	Watts-RMS	Sale
☐ 5350	STK-000	13	$8.88
☐ 5351	STK-013	15	11.50
☐ 5352	STK-028	20	14.88
☐ 5411	STK-036	30	18.88
☐ 5228	STK-050	50	26.88
☐ 5353	STK-014*	15x2	18.88

*Stereo

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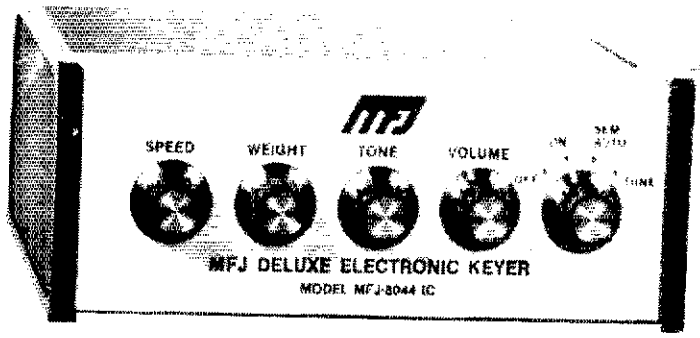
MINIMUM ORDER: $8

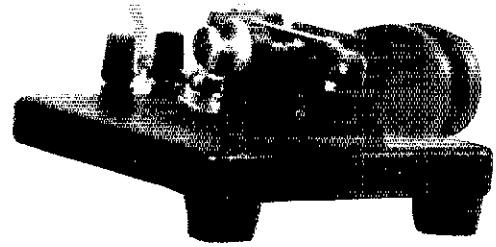
ORDERING INSTRUCTIONS: When ordering, always use catalog number, type no., the name of the magazine you are ordering from and the month

This NEW MFJ Deluxe Keyer at

$69.95 gives you more features per dollar than any other keyer available.

NOW WITH NEW CURTIS 8044 IC. DOT AND DASH MEMORIES AT NO INCREASE IN PRICE.





Based on the Curtis 8044 IC keyer-on-a-chip, the new MFJ Deluxe Keyer gives you more features per dollar than any other keyer available.

Sends iambic, automatic, semi-automatic, manual. Use squeeze, single lever or straight key.

Iambic squeeze key operation with dot and dash insertion lets you form characters with minimal wrist movement for comfortable, fatique-free sending.

Semi-automatic "bug" operation provides automatic dots and manual dashes. Use a manual straight key to safely key your transmitter or to improve your fist.

Dot and dash memories, self-completing dots and dashes, jam-proof spacing and instant start for accurate and precise CW.

Totally RF proof. No problems, whatever.

Ultra-reliable solid-state keying. Keys virtually any transmitter: grid block, −300V max., 10 ma, max.; cathode and solid state transmitters +300V max., 100 ma, max.

All controls are on the front panel: speed, weight, tone, volume, function switch. Smooth linear speed control. 8 to 50 WPM.

Weight control lets you adjust dot dash space ratio; makes your signal distinctive to penetrate thru heavy QRM for solid DX contacts.

Tone control. Room filling volume. Built-in speaker. Ideal for classroom teaching.

Function switch selects off, on, semi-automatic/manual, tune. Tune keys xmtr for tuning.

Completely portable. Take it anywhere. Operates up to a year on 4 C-cells. Miniature phone jack for external power (3 to 12 VDC).

Beautiful Ten Tec enclosure. Eggshell white, walnut sides. Compact 6x2x6 inches.

Three conductor quarter-inch phone jack for key, phono jacks for keying outputs.

Optional squeeze key. Dot and dash paddles have fully adjustable tension and spacing for the exact "feel" you like. Heavy base with non-slip rubber feet eliminates "walking". $29.95 plus $2.00 for shipping and handling. Optional AC adapter $7.95.

Order from MFJ and try it — no obligation. If not delighted, return it within 30 days for a refund (less shipping). This keyer is unconditionally guaranteed for one year.

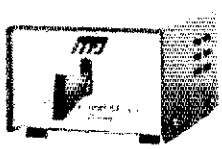
To order, simply call us **toll-free 800-647-1800** and charge it on your VISA or Master Charge or mail us an order with a check or money order for $69.95 plus $2.00 shipping/handling for the MFJ-8044 keyer and/or $29.95 plus $2.00 shipping/handling for the squeeze key.

Don't wait any longer to enjoy the pleasures of the new MFJ Deluxe Keyer. Order today.

All these MFJ Econo Keyers use the New Curtis 8044 IC.

Gives you dot-dash memories, weight control, instant start, self-completing, jamproof spacing, reliable solid state keying. Ultra compact: 2x3x4 inches.

MFJ-404 8044 ECONO KEYER HAS BUILT-IN PADDLE, SIDETONE, SPEAKER, WEIGHT, TONE, VOLUME, SPEED CONTROLS, AND MORE.



$54.95

BRAND NEW

Small enough to slip in your hip pocket!

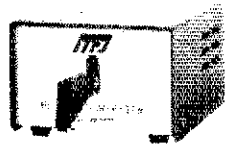
Only MFJ offers you a keyer this size with this much versatility at this price.

Paddle has adjustable contact travel.

Rear Panel: Speed control (8 to 50 WPM), 4 position switch for TUNE, OFF, ON, SIDETONE OFF. Phono jacks for external key and keying outputs.

Weight control gives distinctive signal for QRM penetration. Internal tone and volume controls.

MFJ-402 8044 ECONO KEYER HAS BUILT-IN PADDLE. WEIGHT CONTROL.



$39.95

BRAND NEW

For those with sidetone built into their rig.

The MFJ-402 gives you a quality inexpensive keyer with built-in paddle that has adjustable contact travel.

Same as MFJ-404 less sidetone and speaker, volume and tone controls, 4 position switch, jacks for external key.

Iambic operation with external squeeze key.

Reliable solid state keying: grid block, cathode, solid state transmitters (−300V, 10 ma. max. and +300V, 100 ma. max.). Uses 9 volt battery.

MFJ-400 8044 ECONO KEYER IS A RELIABLE, FULL FEATURE ECONOMY KEYER FOR USE WITH EXTERNAL KEY.

$39.95

BRAND NEW

Has sidetone, speaker, weight, tone, volume, speed controls. Tune switch.

Iambic operation with squeeze key. Dot and dash memories.

Internal weight control lets you adjust dot-dash-space ratio for a distinctive signal to penetrate QRM for solid DX contacts. Sidetone and speaker. Internal tone control.

Panel Controls: Speed (8 to 50 WPM), pull-to-tune; volume, on-off, 3 conductor, ¼ inch phone jacks for keying output and key paddle input. Uses 9 volt battery. **Optional squeeze key** (see above), $29.95 plus $2.00 shipping/handling.

For Orders Call toll-free 800-647-1800

Order any product from MFJ and try it. If not delighted, return within 30 days for a prompt refund (less shipping).

Order today. Money back if not delighted. One year unconditional guarantee. Add $2.00 shipping/handling.

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AX-190 Receiver	$159

Ameco
PV-50	$ 9
CN-50	29
CN-144	39
TX-62	79
621 VFO	45

B&W Waters
Nuvertor 2+6 Conv.	$ 75
6100 SSB Xmitter	395
670 SSB Adaptor	39
Co-Dax Keyer	95

Central Electronics
100V Transmitter	325
MM-2 Scope	69
20-A SSB Adaptor	79

Clegg
22'er FM	$129
66'er 6M Xcvr	115
99'er 6M Xcvr	59
Interceptor BRCUR	275
Ant Pre Amp	22
All Bander	69
HT-146	125
2 Vess	259
FM-27-B Xcvr	325

Collins
75 A4 Receiver	$395
75S3B Receiver	695
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KWM-2 Xcvr	595
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516 F2 AC Supply	139
312B5 Console	425
361D2 Mount	29

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2A Receiver	$149
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2AQ SPKR QMULT	29
R4 Receiver	289
R4-B Receiver	349
R4-C Receiver	399
MS-4 Speaker	19
2NT Transmitter	125
2NT Transitter	99
TR-6	695
TR-22 2 Meter	140
T-4X Transmitter	339
TR-72 2 Meter FM	225
AC 4 AC Supply	95
TR-4-C Transceiver	449
CC-1 Console	
CPS-1 Supply	
SC-2 Conv	
SC-6 Conv	
SC-1 Calibrator	
The above all assembled complete pkg.	Only $200

Dycomm
10-0 2 M Ampl	$125
35-0 40IN 110 Out	130
470-25 450 MC	120
P-1416 16 Amp Supply	95

Eico
720 Transmitter	$ 49
722 VFO	39
730 Modulator	39

Elmac
AF-67 Transmitter	$ 45
PMR-8 Receiver	79

Genave
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GTX-200 2M FM	149

Globe/Galaxy
VHF 6+2 Transm	$ 39
Chief Transmitter	39
Galaxy III Xcvr	159
Galaxy V Xcvr	189
Galaxy V Mk II	239
GT-550 Xcvr	279
GT-500A Xcvr	329
AC-400 Supply	79
FM-210 2M FM	95

Gonset
Com II 2M	$ 75
Com II 6M	69
Com IV 2M	129
GC-105 2M	115
G-28 Xcvr	149
G-50 Xcvr	149

Hallicrafters
S-108 Receiver	$ 99
SX-101 Receiver	159
HT-32 Transmitter	179
HT-32B Transmitter	269
SX-99 Receiver	79
SX-115 Receiver	349
HT-37 Transmitter	159
HT-40 Transmitter	49
SX-99 Receiver	99
SX-117 Receiver	189
SR-150 Xcvr	259
SR-160 Xcvr	159
SX-146 Receiver	175
HT-44 Transmitter	159
SX-111 Receiver	149
SX-122 Receiver	249
S-36 UHF Receiver	125

Hammarlund
HQ-110 A VHF Receiver	$189
HQ-110C Receiver	119
HQ-110AC Receiver	149
HQ-145X Receiver	169
HQ-170C Receiver	159
HQ-180 Receiver	379
HQ-215 Receiver	259
SP-600 Receiver	179
HX-50 Transmitter	169

Heathkit
SB-300 Receiver	$199
SB-301 Receiver	229
HR-10-B Receiver	69
SB-303 Receiver	269
SB-220 Linear Amp	449
SB-102 Trivcvr	379
DX-60B Transmitter	69
HW-32 Transmitter	85
HW-100 Transceiver	249
SB-100 Transceiver	299
SB-401 Transmitter	249
SB-101 Transceiver	349
SB-650 Digital Freq. Display	149
HW-30 Twoer	29
Also Sixer	29
H-10 Monitor	69
VHF-1 Seneca	79
HW-12 Transmitter	75
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HP-23B AC Supply	59
HW-202 2M FM Xcvr	159
SB-620 Spectrum Analyz	120
SB-102 Xcvr	369
SB-610 Scope	95
HA-20 6m Linear	125
SB-634 Console	175
SB-604 Spkr	29.50
SB-644 VFO	129.50
SB-230 Linear	359
SB-104 Transceiver	625

ICOM
IC-21 2M FM Xcvr	$299
IC-230 Demo	369
IC-22A 2M FM Xcvr	185
IC-30A 432 MCFM	269

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Courier Linear	139
Ranger I Transmitter	85
Ranger II Transmitter	139
Valiant I Transmitter	129
Invader 2000 Xmitt	495

Kenwood
T-599 Transmitter	$289
R-599 Receiver	289
TS-520 Tranc	429
QR-666	259
QR-666 Receiver	239
TV 502 Transvertor	179

Knight
T-60 Transmitter	$ 39
r-100 Receiver	59
TR-108 Trancur 2M	79

Lafayette
HA-800 Receiver	$ 89
HP-350 Receiver	149
HE-45 Transceiver	49

Midland
509 H.T.	$149

Millen
92200 Transmatch	$149
90651-A Grid Dipper	95

National
NC-270 Receiver	$119
NC-300 Receiver	129
NCX-5 Transceiver	279
NCX-5MKII Transcvr	299
NC-303 Receiver	199
AC-500 AC Supply	69
NCX-500 Transceiver	199
NCX-3 Transceiver	169
NC-190 Receiver	149
NC-105 Receiver	69

Regency
HR-2B 2M FM	$169
HR-220 FM 220 MC	185
AR-2 2M Amplifier	85
HR-25 2M FM	225
HR-6 Meter FM	189

SBE
SB-34 Transceiver	$249
SB-33 Transceiver	189
SB-144 2M FM	175
SBZ-LP Linear	179

Standard
SRC-146 HT	$149
826 M Trnscvr	195
SRC-144	395
SRC-851T	250

Swan
700-CX Xcvr	$459
260 Cygnet	289
279 Cygnet	329
500 Xcvr	299
500 CX Xcvr	389
117-XC AC Supply	95
14X DC Module	39
MK II Linear	475
KK VI 6 Meter	550
250 C 6M Xcvr	349
FM 2X2M Xcvr	169
FM-1210A 2M	249
350 Transceiver	269
350C Xcvr	299
600R Receiver	339
600T Transmitter	399
410 VFO	79

Tempo
Tempo one Xcvr	$299
AC One Supply	79
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CL-220 Trncur 220 MC	179
FMH 2M w/Talkie	149

Ten Tec
PM-3 Trnsur	$ 49
Argonaut Xcvr	199
KR-40 Keyer	79
RX-10 Receiver	49
S-30 Signalizer	29
Triton II	479

Yaesu
FT-401 Xcvr	$499
FRDX 400SD Rec	325
FT 2 Auto 2M FM	249
FT-101B Xcvr	549
FL-2100B Linear	295
FV-101 VFO	79
101E Xcvr Demo	695

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Tektronix 545A	950
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Hickok 695 Generator	69
Bendix BC221 Freq Meter	39
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Electro Impulse Spectrum Analyzer	395
Dyna/Sciences Model 330 Digital Multimeter	195
Hewlett Packard 4905A Ultra Sonic Detector	550
Hewlett Packard 120A Scope	250
TS-323/UR Frequency Meter	175
Hewlett Packard 4910B Open Fault Locator	650
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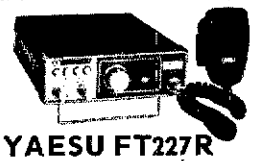
Measurements Mod 80	195
Nems Clark 1400	495
Ballantine 300H	175
PACO Scope Mod-S-50	75
Singer FM-10C	3495
Simpson 260 V.O.M.	49.50

The inventory quantities of the items shown in this list vary. There may be one or several of any item. Some items may be sold by the time you read this ad. It is also likely that we have items in stock that are not listed, as a result of the many trades we make each day. We reserve the right to sell accessories and power supplies with matching transceivers and transmitters. Please allow up to 10 working days to ship your order so that we may check and service the gear you purchase.

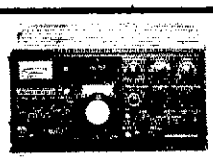


YAESU FT227R

Regular $349.00, save $50.00; buy a Yaesu FT-227R for $349.00 (no trades) and take a $50.00 credit for another purchase.

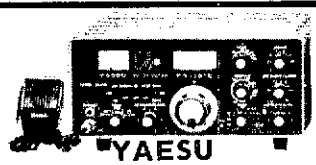
MIDLAND 13-510

Regular $399, save $50; buy a Midland 13-510 for $399 (no trades) and take a $50 credit for another purchase.



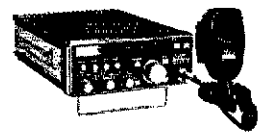
KENWOOD

TS820 — $1055.00
TS820S — $1249.00



YAESU

FT101E — $799.00
FT101EE — $759.00
FT101EX — $699.00



YAESU CPU-2500R

Regular $559, save $60; buy a Yaesu CPU-2500R for $559 (no trades) and take a $60 credit for another purchase.

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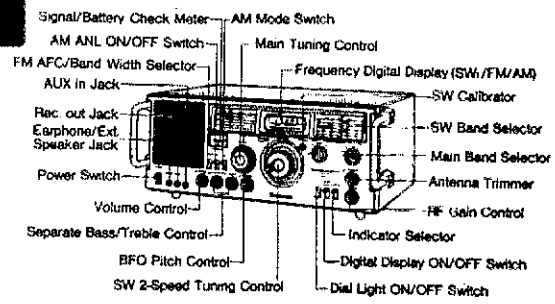
Introducing the Panasonic RF-4800

General Coverage Receiver

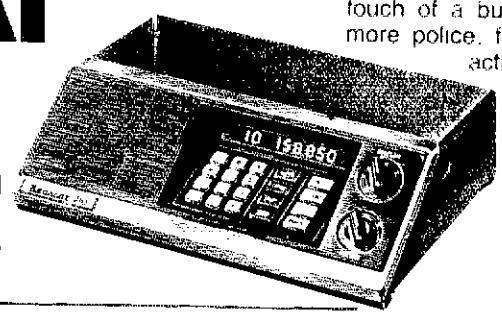


master charge

Communications Center
443 N. 48th, Lincoln, Nebraska 68504 In Nebraska Call (402)466-8402

BANKAMERICARD

$20 FACTORY REBATE WHEN YOU BUY A BEARCAT® 210 SCANNER



Get all the pushbutton ease and real excitement of a no-crystal, *Bearcat* 210 Scanner. And now, get a $20 rebate when your purchase is made between October 1 and December 31, 1978. Lock in the action—with the revolutionary, space-age circuitry of a *Bearcat* 210. Tune in all local public service frequencies at the touch of a button. Search out more police, fire, civil defense action, automatically. *Bearcat* leads the way to real excitement and real savings, with a $20 rebate when you buy a *Bearcat* 210. Stop in today and save

CALL TOLL FREE
1-800-228-4097

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Communications Center
443 N. 48th, Lincoln, Nebraska 68504 In Nebraska Call (402)466-8402

BANKAMERICARD

Net Controls and Traffic Liaison sta. I would like to see every repeater group in Ok. designate a liaison station to meet the daily HF Nets and relay traffic to and from the repeater coverage area. Too often traffic is cancelled, or mailed from a distance, causing delays in delivery. It is my belief that no message should stay in a station more than 24 hrs. WB5RAP and WD5ETB, new ECs brings us up to 29 out of a possible 77. BUT not that many are reporting each month. WHY? OVS reports were skimpy this month, but indicate some good activity in that area. Traffic: K5JGZ 333, W5REC 325, WB5NKC 292, K5OWK 206, W5RB 169, WB5NKD 103 WB5KKT 86, WD5ETD 83, W5BYC 61, W5UYH 49, WA5OUV 35, W5SUG 34, WB5ELG 33, K5CAY 28, W5VOR 23, WB5OCZ 22, WA5FSN 16, W5FKL 12, AB5J 10, WB5EAY 10, WB5TZZ 4, WB5UCM 3.

SOUTHERN TEXAS: SCM, Arthur R. Ross, W5KR — Asst. SCM: N5TC, SEC: WB5LHK. Net Managers at large: N5TC WA5RKU. OOs reporting this month: WB5CIT. OVSs reporting this month: N5AF N5AJQ K5LA WB5CIT. OVS N5AJQ says getting good results with 75-meter antenna having one leg under eave of house. OVS K5LA reports WD5FVP W5IDKD and K5LA installed new two-meter repeater (WB5AFV, 146.12/.73) in Guadalupe Mountains National Park area; coverage to Big Spring, Lubbock, Sweetwater, El Paso, Van Horn and Sierra Blanca. EC WA5CXG wrote nice article for publication in State Department of Highways & Public Transportation newspaper, circulation 18,000. Corpus Christi ARC's Hamfest/Swapfest was big success with over 350 attending; pretty good when there was a big March of Dimes Walkathon going on at same time with many Hams helping out. From Coastal Benda AR Digest (Corpus Christi) is news of upgrading: WD5GYG, WD5KAI WB5UTF (now KB5DT) to Advanced; WB5KVM and WB5OLT to Extra. Congratulations! EC W5ICL reports Orange County Club and Club Station W5ND had good workout while Tropical Storm DEBRA was approaching and going ashore; taking part were K5BBN W5ICL W5VLT K5SUB K5CNT WB5HHF WD5VFF K5VXP K5RZB WA5EES, WB5TZS and K5HMB. OVS WB5CIT and team provided communication for thirty-mile autocross in Bracketville Sept. 30, using WR5ACL. OPS K5HZR reports 7290 Traffic Net has new officers: K5HZR, Net Mgr.; N5FN, Asst. Net Mgr.; W5KLV, secy.; W5TYS, treas. N5DU getting ready for SS with two-element quad at forty feet for 2nd antenna; also chasing DX on 40 meters late at night. EC WA5RVT reports WD5AAH upgraded to Advanced and WB5VMK to General; WB5UVI has new TS-520. OES W5SPD has van equipped as mobile Emergency Operations Center, including portable generator. OPS WA5VBM had nice visit from OA4CYC/WA8JLF, back from five years in Peru. Traffic: W5KLV 502, K5HZR 183, K5QEW 38, WB5MMI 37, K5PE 19, W5KR 14, N5DU 10, K5RVF 10, WA5RVT 8, W5SPD 6, AE5X (WB5LTW) 4, WB5ZGW 1.

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION (Required by 39 U.S.C. 3685) (1) Title of Publication — *QST*; (1A) Publication No. 431340; (2) Date of filing — September 19, 1978; (3) Frequency of issue — monthly; (3A) No. of issues published annually — 12; (3B) Annual Subscription Price — $12.00; (4) Location of known office of publication (Street, City, County, State and ZIP Code) (Not printers) — 225 Main Street, Newington (Hartford County), Connecticut 06111; (5) Location of the Headquarters or General Business Offices of the Publishers (Not printers) — 225 Main Street, Newington (Hartford County), Connecticut 06111; (6) Names and Complete Addresses of Publisher, Editor, and Managing Editor: Publisher (Name and Address) The American Radio Relay League, Inc., 225 Main Street, Newington, Connecticut 06111; Editor (Name and Address) — Richard L. Baldwin, 26 Ridge Road, Simsbury, Connecticut 06070; Managing Editor (Name and Address) — E. L. Campbell, 18 Mohawk Drive, Unionville, Connecticut 06085; (7) Owner (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of the total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given.) — The American Radio Relay League, Inc. (an association without capital stock); 225 Main Street, Newington, Connecticut 06111; (8) Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages or Other Securities (If there are none, so state) — Connecticut Bank and Trust Co., Hartford, Connecticut 06103; (9) For Completion by Nonprofit Organizations Authorized to Mail at Special Rates (Section 132.122 PSM) The purpose, function, and nonprofit status of this organization and the exempt status for Federal income tax purposes (Check one) — have not changed during the preceding 12 months; (10) Extent and Nature of Circulation — Average No. Copies Each Issue During Preceding 12 Months — (A) Total No. Copies Printed (Net Press Run) — 176,316, (B) Paid Circulation — 1. Sales Through Dealers and Carriers, Street Vendors and Counter Sales — 7,833, 2. Mail Subscriptions — 160,839, (C) Total Paid Circulation (Sum of 10B1 and 10B2) — 168,672, (D) Free Distribution by Mail, Carrier or Other Means, Samples, Complimentary, and other Free Copies — 3,960, (E) Total Distribution (Sum of C and D) — 172,632, (F) Copies Not Distributed — 1. Office Use, Left Over, Unaccounted, Spoiled after Printing — 3,457, 2. Returns from News Agents — 227, (G) Total (Sum of E, F1 and F2 — Should equal net press run shown in A) — 176,316; Actual No. Copies of Single Issue Published Nearest of Filing Date — (A) Total No. Copies Printed (Net Press Run) — 175,460, (B) Paid Circulation — 1. Sales Through Dealers and Carriers, Street Vendors and Counter Sales — 7,268, 2. Mail Subscriptions — 160,525, (C) Total Paid Circulation (Sum of 10B1 and 10B2) — 167,793, (D) Free Distribution by Mail, Carrier or Other Means, Samples, Complimentary, and other Free Copies — 4,074, (E) Total Distribution (Sum of C and D) — 171,867, (F) Copies Not Distributed — 1. Office Use, Left Over, Unaccounted, Spoiled after Printing — 3,143, 2. Returns from News Agents — 450, (G) Total (Sum of E, F1 and 2 — should equal net press run shown in A) — 175,460; (11) I certify that the statements made by me are correct and complete. (signed) Richard L. Baldwin, Editor.

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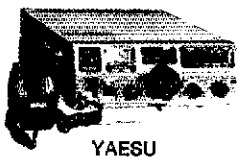
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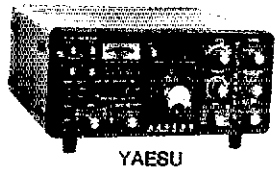
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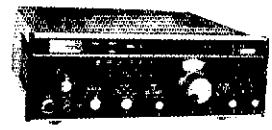
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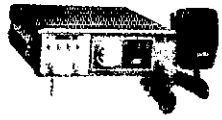
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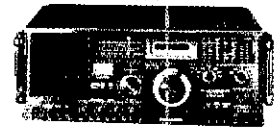
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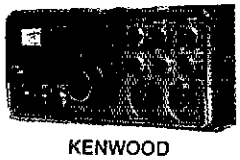
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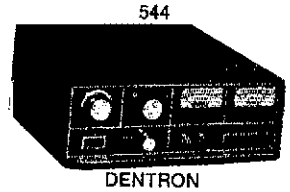
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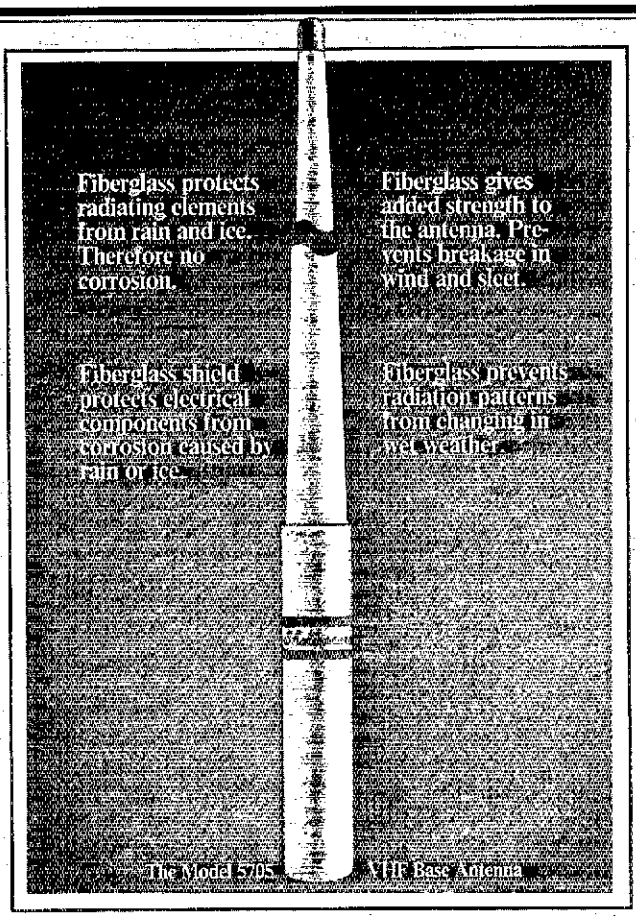
Look at our 5705 omnidirectional VHF base antenna, for example.

Its radiating elements are non-ferrous brass and copper, the finest practical material available for conductivity and corrosion resistance. Surrounding the radiating elements and electrical components is a tough, flexible fiberglass shield. A shield that gives the antenna the strength to withstand winds in excess of 120 miles-per-hour.

The fiberglass keeps out rain, sleet and snow too. So the antenna's radiation pattern won't change, no matter how bad the weather.



And you don't have to worry about radials breaking off, because the 5705 doesn't have any.

But it does have seven vertically polarized and phased 1/2 wave elements, stacked in colinear array.

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And here's another important piece of information: the 5705 is pre-tuned at our factory to operate in all environments. So you will never have to have it re-tuned.

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(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 70 cents per word. A special rate of 25 cents per word applies to hamfest and convention announcements, to individuals seeking to dispose of or acquire personal equipment, and to other advertising which, in our opinion, obviously qualifies for the individual rate.

(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 11" sheet of paper.

(4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received November 21 through December 20 will appear in February *QST*.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in *QST* advertising.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

Clubs/Hamfests

QCWA Quarter Century Wireless Association is an international nonprofit organization founded 1947. Any Amateur Radio Operator licensed 25 or more years is eligible for membership. Members receive a membership call book and quarterly news. Write for information. Q.C.W.A. Inc. 1409 Cooper Drive, Irving TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

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QST & CQ 1950-1975 issues for sale. Send s.a.s.e. if ordering 73, Ham Radio, or other QST and CQ issues. One dollar minimum order and all issues cost 25c each, including USA shipping. Send chronological list and full payment to W6LS, 2814 Empire, Burbank, CA 91504. Available issues and refund sent within one month.

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TROPICAL Hamboree — January — Miami. Take a sunshine break in mid-winter at the Tropical Hamboree & South Florida ARRL Convention. Meet your own Division ARRL Director here for the Board Meeting. Enjoy a real vacation in a tropical Latin city with no passport or currency hassle plus a big hamfest and manufacturers' show. Write Date Radio Club, Box 350045, Miami, FL 33135 for full information.

ROCHESTER Hamfest & NY State ARRL Convention, May 25-27. Add you name to mailing list. Send QSL to Rochester Hamfest, Box 1388, Rochester, NY 14603. Phone 716-424-1100.

1979 CLASSIC Radio Exchange: Jan. 28-29, 2000Z-0300Z. Info s.a.s.e.: K8SJ, 2386 Queenston, Cleveland, OH 44118.

INDIANA: South Bend Swap & Shop January 7, 1979 at New Century Center downtown on U.S. 31 Oneway North across from St. Joseph Bank Building. Half acre in one large room at ground level. Food, museum and Art Center in same building. Four lane highways to door from all directions. Talk-in: 52-52 & area repeaters. Contact: K9IXU.

RICHMOND, Virginia Frostfest-II, January 14, 1978, Bon Air Community Center. Richmond Amateur Telecommunications Society sponsor. Talk-in 28-88, 34-94. Technical symposium, home brewers contest — 2 divisions, over 18 and under, framed certificate to winner with the most original idea, best mechanical and best electrical construction. FCC exams starting 10:00 A.M. To take exam, mail Form 610 at least five days prior to Fest to address below. Commercial exhibitors by invitation only write for details. Indoor Flea Market (one table) $2.50, Outdoor Frost Bite tail gate $1. Admission $2.50, children under 2 free. RATS, Post Office Box 1070, Richmond, VA 23208.

INTER-AMERICA Traffic Net celebrated its 3rd anniversary November 1st, 1978. The Inter-America Net meets daily on 21.415 from 2000-2200 UTC for the purpose of running international third-party traffic wherever permitted. Stateside check-ins always needed - please join us. Net info sheet for s.a.s.e. to K4GOS, 1502 Cottonwood Terrace, Dunedin, FL 33528.

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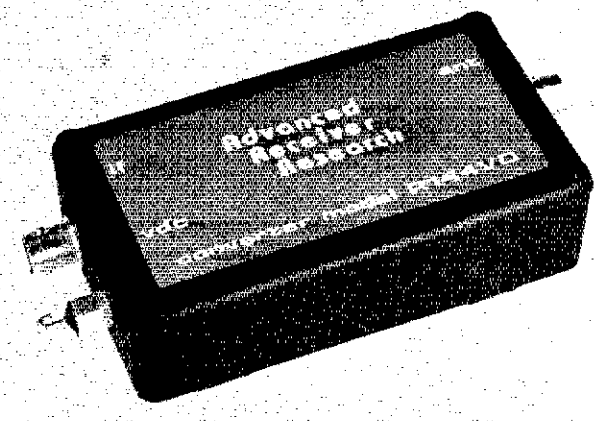

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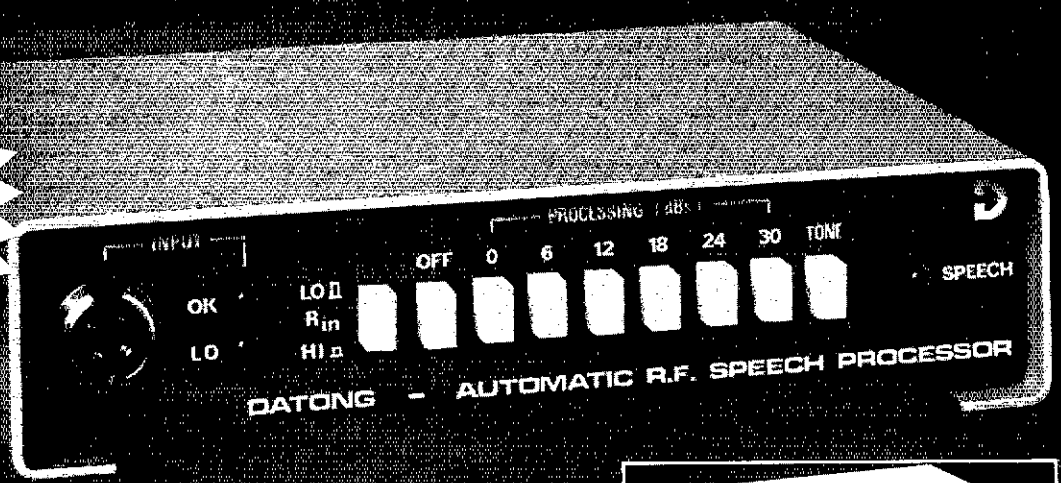

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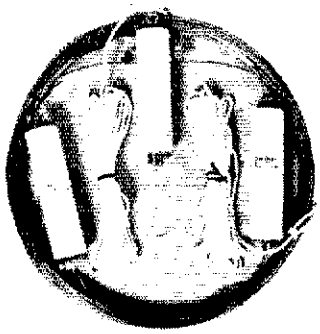

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VAC-2 collinear for 2 meter mobile---$29.50
VAC-6, VAC-10, VAC-15, VAC-20---$29.50
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OLD TESTAMENT

"Therefore the Lord himself shall give you a sign; Behold, a virgin shall conceive, and bear a son, and shall call his name Immanuel (which means God with us)."

Isaiah 7:14 740-687 BC

But thou Bethlehem, though thou be little among the thousands of Judah, from you shall come forth one who is to be ruler in Israel, whose origin is from old, from ancient days.

Micah 5:2 740 BC

NEW TESTAMENT

"... the angel Gabriel was sent from God to a city of Galilee, to a virgin betrothed to Joseph, of the house of David; and the virgin's name was Mary ... The angel said to her "Do not be afraid Mary, for you have found favor with God. And behold, you will conceive in your womb and bear a son, and you shall call his name Jesus."

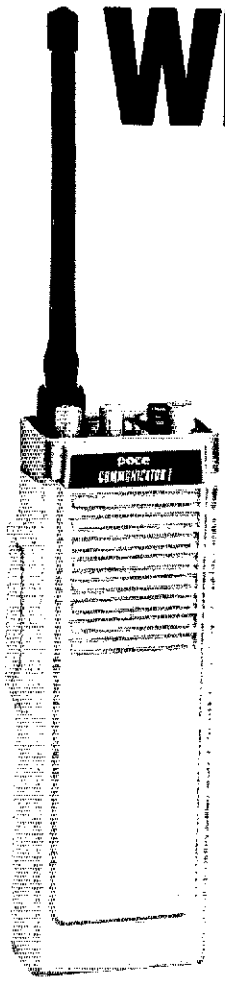
Luke 1:27-31 70-90 AD

King Herod was troubled and inquired where the Christ was to be born. They told him in Bethlehem of Judea; for so it is written by the prophet (Micah).

Mathew 2:4-5 60-70 AD

Historical evidence clearly points to Jesus as the man God, who fulfills the literal prophecies of Isaiah and Micah within 800 years. The same God who chose the Virgin Mary to bear Jesus and who chose Bethlehem for the birthplace reveals himself in holy scripture today. We thank him for the birth of Christ this Christmas.

WE KNOW YOU WANT THE VERY BEST!



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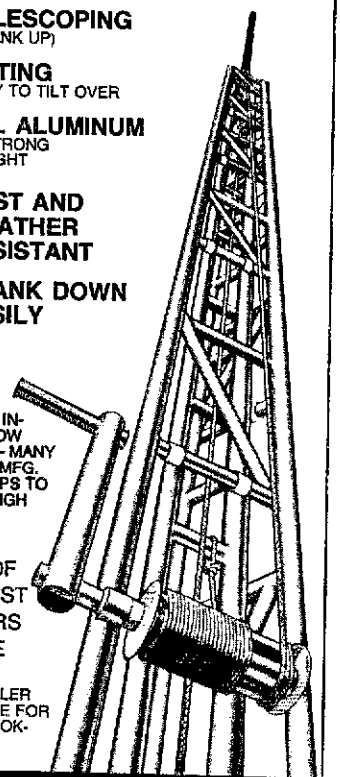

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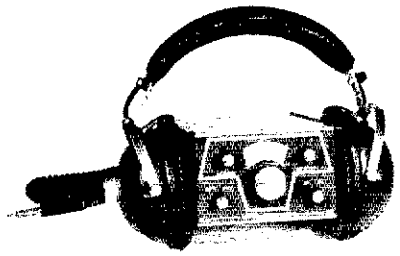

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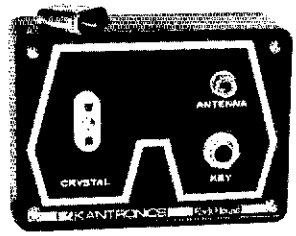

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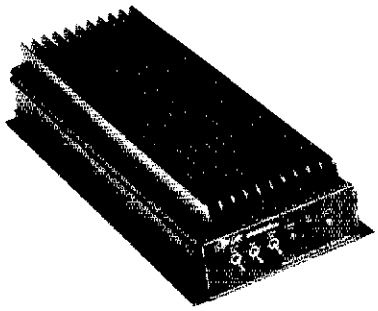

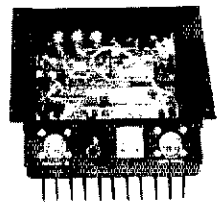

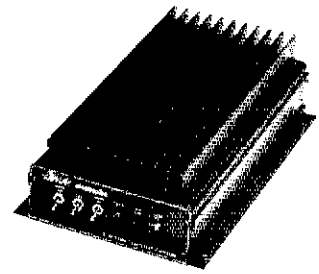

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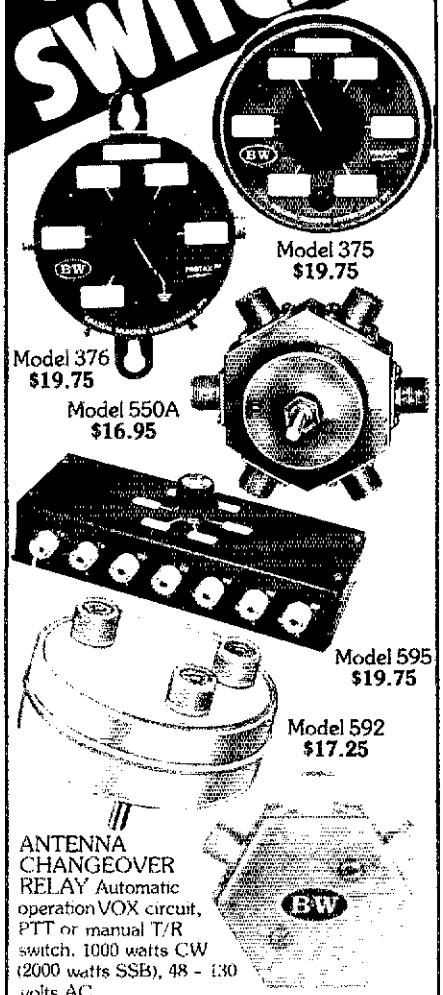

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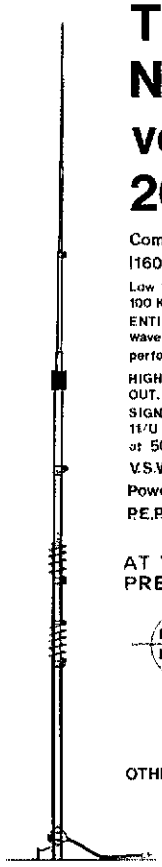

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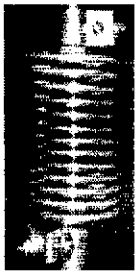

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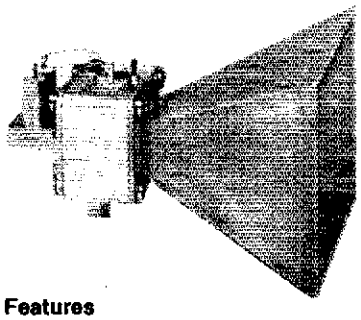

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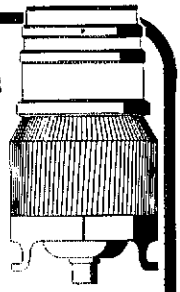

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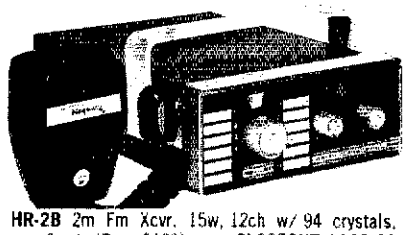

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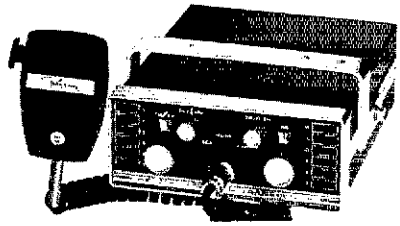

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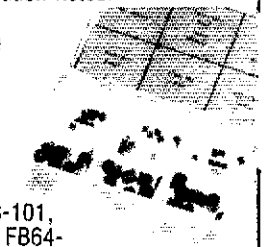

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WILSON WE-800 with 16-button touch tone pad. Mint. Includes batteries, charger, manual and two extra programming boards!! $435. Also, Western Electric TouchTone pad in housing, $20. Two Gel-Cells, 6V, 9AH, with charger, $15. Radio Shack 6 to 12V voltage inverter, $10. KB6CC, 1420 South Central Ave., Visalia, CA 93277. 209-733-4715.

DRAKE "C" line — R4C, T4XC, MS4/AC4, E-Tek freq. readout/counter, .5 and 1.5 Hz filters, n.b., 10 m xtals to 26.950. $1250, firm. WA2KNF, Trede, 516-751-8731.

FOR SALE: Like new heathkit IG-102 rf signal generator $25. Heathkit HM-2102 vhf wattmeter $25. Cushcraft 147-11 beam $25. Hustler G6-144 vertical $40. Karl Haley, WA7RGZ, Box 1662, Globe, AZ 85501. 602-425-2409.

TH-3 tribander beam, good condx, $135. W6RQZ 1330 Curtis, Berkeley, CA 94702.

SELL — Knight TR-108 w/VFO, Swan 350 w/p.s., Elco 753 w/p.s., Genave GT-200, Misc. Surplus. W4RRC, Cooper City, VL. Tel: 305-434-4245.

SPEECH Processor, complete kit per ARRL SSB Manual, $36. K2VAH.

WANTED!! Li'l Lulu 50 to 54 MHz receiver. Gregory Danzker, WA2ORO, 4000 Old Post Rd., Seaford, NY 11783.

KDK FM-2015R $375! Wilson mark IV with battery pack $250. Wilson System I $199.50. Pace synthesized 25 watt 2 meter mobile $326. Write for specials. Ben Franklin Electronics, 109 N. Main, Hillsboro KS 67063. 316-947-5751.

SSTV keyboard. Large letters. Very good condition. Best offer over $238. Wanted — 811A tubes, new condition. W2WHK, 210 Utica St., Tonawanda, NY 14150. 716-692-5451.

MILLION Dollar inventory! Radio Wholesale! We love trade-ins. KDK FM2015R $399. Yaesu FT227R $319. FT101EX $579. FT101E $669. TS-520 $649. Wilson Mark II $199. Mark IV $229. WE-800 $419. Cushcraft ATB-34 $189. Drake R4C $619. T4XC $619. TR4CW (RIT) $799 TR33C $199. Radio Wholesale, 2012 Auburn Avenue, Columbus GA 31906. 404-561-7000. Nites & Holidays 404-561-5300. John WB4JUN.

HW2036A, Micoder, matching p.s. books. $275. Radio works fine outside of case but erratic transmit when in case. Maybe poor ground path causing problem. You figure it out at that price. Used daily for 18 mos. First certitiec check takes it shipping prepaid to 48. Bill Stephens, 5301 West 15th Ct. Apt. 5, Topeka, KS 66604.

YAESU FT-901DM — Brand new in original carton, $1100 firm. Hallicrafters HT-37 excellent cond. and Gonset G-63 rcvr, make offer. Will ship prepaid anywhere in 48 states. Mark, WB2ZEU, 905 Hilltop Road, Cinnaminson, NJ 08077.

SELL: 432 linear kW with blower, p.s. and 8930 tubes. WB@SBG, 515-232-8353.

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REPLACE rusted antenna bolts with stainless steel bolts. Small quantities, free catalog. Elwick, Dept. 304, 230 Woods Land, Somerdale, NJ 08083.

COLLINS 75A4 s/n 5772, one of last produced, round emblem: All QST, CQ & 73 improvements. Cosmetically perfect. Built in Collins 136C-1 accessory noise blanker. Has .5, 2.1 & 6 kHz, mechanical filters. Excellent condition, $495. Also have 1.5 & 3.1 kHz filters at $30 each. Bob Sherman, K2SJP, 83 Fox Boulevard, Massapequa, NY 11758.

LINEAR amp — 2000 PEP — Dentron 160-10L. Purchased only a few months ago and I've earned my DXCC already. In new condition, $489 plus shipping. W3PI, 814-825-6305.

FOR SALE: Gertsch FM-3 frequency meter $100. Davis frequency counter $180. Both presently working fine. Charles Wall WB4MYA Route 3 Clarkesville, TN 37040. 615-552-2199.

HEATH SB-104 complete station less SB-230. Consists of SB-104, SB-604/HP-1144, SB-614, SB-634, SB-644. Professionally assembled. Trasnceiver factory updated and aligned, including new front end. Mint condition. 50 hours maximum air time. All boks. Will pre-pay UPS anywhere continental USA. $900 firm. WA4JEM, P. O. Box 40, Neptune, NJ 07753. 201-223-1949.

WILSON T1402-SM HT w/charger, seven xtal pairs, TT. Excellent cond. $190. Matt Dickinson, WB9MQK, 821 N. University, Peoria, IL 61606. 309-672-3123.

YAESU FT-620B with marker unit and Fist 100W bi-linear — never used — $495. Info-Tech Model 100 Tri-Mode converter and mod. 90 RTTY terminal unit. $625. Javelin CC 700 camera $275. KLM 10-70BL 2M $135. Ten-Tec KR-50 keyer — $65. Bird Model 43 with 2-30 MHz 1000W slug — $140. Tempo FMH-2 2M HT, six channels of xtals, desk-charger — $225. Kenwood TR-7500 and PS-6 $275. All in new condition. Will ship UPS prepaid to cont. 48. Certified check or money order only. Larry Ogburn, WB7RKC, 6960 SW Clinton St., Tigard, OR 97223. 503-639-5496. No collect calls.

JOHNSON 275W MatchBox with manual $50. Heathkit two meter HW-30, manual $20. WA2ZWB, 119 Hillsdale Rd., East Brunswick, NJ 08816.

HW-100 80-10 xcvr sb-cw with ac/spkr pwr supply, mobile pwr supply, cw filter. Factory aligned, manuals, immaculate. Will ship. $300. K1EPE 203-775-2117.

VERTICALS - DIPOLES - TRAPS - BALUNS

TRAP VERTICAL ANTENNAS
No antenna tuner needed—Full legal power limit—Fully assembled and ready for operation—No radials required—1:1 VSWR to 50 OHM coax.

Model	Bands	Ht	Price
TV-215	20 15	13'	$34.95
TV-4215	40 20 15	22'	$44.95
TV-84215	80 40 20 15	30'	$69.95

HIGH PERFORMANCE COMPACT VERTICAL ANTENNAS
Uses 'top loading' for reduced size and maximum efficiency—No antenna tuner needed—Folds to 5' package.

Model	Bands	Ht	Price
CV-160	160	23'	$44.95
CV-80	80	20'	$39.95
CV-40	40 15	15'	$34.95
CTV-8040	80/40/15	20'	$59.95

FULL SIZE VERTICAL ANTENNA
Full quarter wave which can be configured for 20, 15 or 10—No coils or traps—No tuner needed—VSWR less than 1.2:1 over each entire band—Folds to 5' package.

Model	Bands	Ht	Price
FV-201510	20 15 10	16'	$29.95

APARTMENT-PORTABLE-TRAILER AV-1 ALLTENNA
Use portable antenna anywhere—Mounts on window sill or patio railing—Solves landlord problems—80-10 meters—Change bands by switching preset inductance—Adjustable to 1:1 VSWR at any frequency—13' maximum extended height—light weight-under 10 lbs. Use on travel campers and vans—Mounts easily on ground post (included) or on side of camper or van—No antenna tuner needed—Full legal power limit—Fully assembled & ready for operation—No radials required—Folds to 5' package for easy storage.

Model	Bands	Ht	Price
AV-1	80-10	13'	$49.95

Z-1 BALUN $9.95
1:1 ratio, takes place of center insulator, helps eliminate TVI, coax fitting, full legal power.

A-1 Center Insulator $4.95

with antenna orders:

RG58AU & connector	50'	$5.95
	100'	$9.95
#8 Aluminum Radial Wire	100'	$3.99
Nylon Guy Rope-450# test	100'	$3.49

FULL SIZE DIPOLES

Model	Bands	Lgth.	Price
D-80	80/75	130'	$31.95
D-40	40 15	66'	$28.95
D-20	20	33'	$26.95
D-15	15	22'	$25.95
D-10	10	16'	$24.95

FULL SIZE PARALLEL DIPOLES—ONE FEED LINE

PD8010	80/75 40 20 15 10	130'	$41.95
PD4010	40 20 15 10	66'	$35.95
PD8040	80/75 40 15	130'	$36.95
PD4020	40 20 15	66'	$30.95

LIMITED SPACE DIPOLES

SP-160	160	130'	$38.95
SP-80	80/75	63'	$33.95
SP-40	40 15	33'	$30.95

NEW MSP8010 ALL BAND DIPOLE SYSTEM

MSP-8010	80-10	69'	$49.95
MSP-1	80/75 40 15	70'	$41.95

TRAP DIPOLES—Rated legal limit

TD-160	160 80/75 40	104'	$45.95
TD-8040	80/75 40	78'	$43.95
TD-4020	40 20	40'	$38.95

ANTENNA SHORTENER KITS—
Same coils as the SP & MSP series—use with your own antenna—complete instructions.

S-160	160	130'	$14.95
S-80	80/75	63'	$13.95
S-40	40 15	33'	$12.95

TRAPS ALONE—Complete instructions

T-160	160 80	$17.95
T-8040	80/75 40	$15.95
T-4020	40 20	$12.95

(Dipoles are complete with balun, No. 14 antenna wire, insulators, 100' nylon support rope, rated for full legal limit. Can be used as inverted V, MARS, SWL).

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Dipoles	$2.50
Verticals	3.00
Balun or Connector	1.00
Traps and Shorteners	1.50
Parcel Post add	2.00
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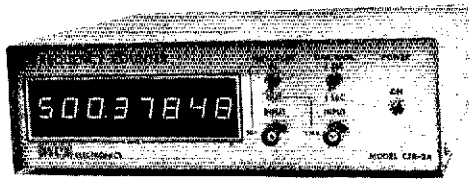

NEW Built-in Pre-Amp

1 us to 1 sec.

10 mv @ 150 MHz

The New Model CTR-2A Series Counters are designed and built to the highest standards to fulfill the needs of commercial communications, engineering labs and serious experimentors. With an accuracy of + .00005% (oven option) the CTR-2A can handle the most critical measurements and is about half the cost of other commercial counters.

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- Built-in Pre-Amp 10 mv @ 150 MHz
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- High Stability TCXO Time Base
- Built-in VHF-UHF Prescaler
- Automatic Dp Placement
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- Period Measurement (Optional)
- Input Diode Protected
- 12V-DC Operation (Optional)
- Oven Controlled Crystal (Optional) ± .5 ppm
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500 MHz Kit CTR-2A-500K	$249.95
500 MHz Assembled CTR-2A-500A	349.95
1GHz Kit CTR-2A-1000K	399.95
1GHz Assembled CTR-2A-1000A	549.95

OPTIONS . . . .

02) Oven Crystal	$49.95	05) 10 sec. Time Base	$ 5.00
03) .43" LED	10.00	06) Period	15.00
04) 12 V-DC	10.00	07) Handle	10.00

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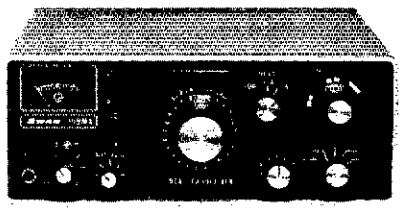

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100MX 80-10m 100w PEP Xcvr	$799.95
PSU-5 20A 12vdc power supply	179.95
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PSU-3 110/230vac supply/spkr	175.95
117X Basic 110vac supply	129.95
110v ac power cord	10.50
Interconnecting cord	6.00
230X Basic 230/110vac supply	129.95
14-117 12v supply	239.95
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SS-16B 16-pole filter kit	99.95
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WM-200A SSB PEP SWR/wattmeter	89.95
WM-1500 Wattmeter	74.95
WM-2000 Deluxe SWR/wattmeter	69.95
WM-2000A Wattmeter	89.95
WMD-2000 Digital SWR/wattmeter	229.95
WM-6200 6 & 2m 200w wattmeter	87.95
WMD-6200 6 & 2m digital wattmeter	269.95
TB2A 2 el tri-band beam	149.95
TB3HA 3 el tri-band beam	219.95
TB4HA 4 el tri-band beam	279.95
MB40H 2 element 40m beam	219.95
1040V 40-10m Trap vertical	122.95
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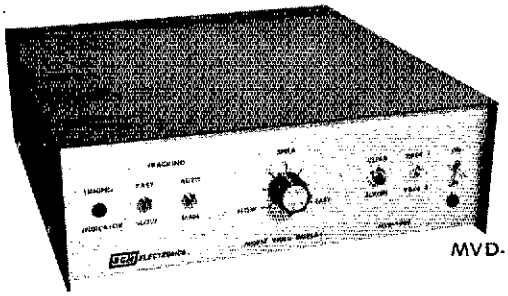

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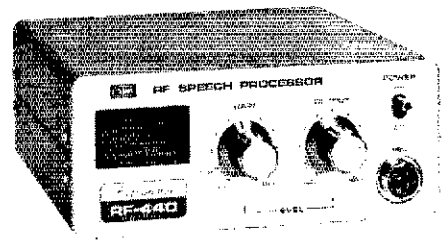

RF Speech Processor/Model RF-440
From DAIWA CORPORATION

Increases talk power with splatter free operation. RF clipping assures low distortion. Simply install between microphone and transmitter.

Talk Power: Better than 6 dB
Clipping Threshold: Less than 2 mV at 1 KHz
Bandwidth: 2200 Hz at 6 dB down
Frequency Response: 300-3000 Hz at 12 dB down
Distortion: Less than 3% at 1 KHz, 20 dB clipping
Output Level: More than 50 mV at 1 KHz
Power Requirement: 115 VAC, 60 Hz, 1.4 W; or 13.5 VDC, 55 mA
Dimensions: 150 x 70 x 150 mm; 5 x 2.5 x 5 in.

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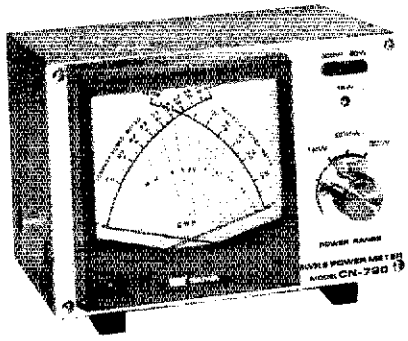

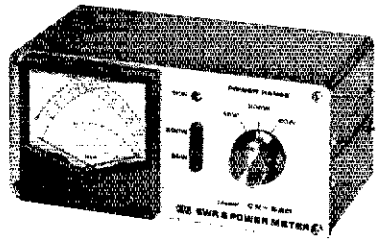

SWR & Power Meters Models CN-720 and CN-620
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Simultaneous direct reading SWR, Forward Power and Reflected Power

Frequency Range: 1.8-150 MHz
SWR Detection Sensitivity: 10 W Min.
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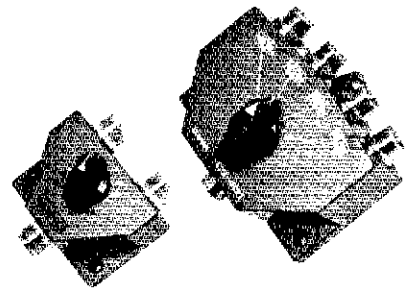

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2 Position/Model CS-201
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Professionally engineered cavity
Construction: High Isolation
Power Rating: 2.5 kW PEP, 1 kW CW
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Insertion Loss: less than .2 dB
VSWR: 1:1.2
Maximum Frequency: 500 MHz
Isolation: Better than 60 dB at 300 MHz; better than 45 dB at 450 MHz adjacent terminal
Connectors: SO-239

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WANTED: Schematic diagram for Tennelec Memory scan scanner model MS-1 or MS-2. John Dyrek, W9EHU, Box 406, Monon, IN 47959.

WANTED: Ham Radio, 1973-1977 complete; 73 magazine, 1973 to present. Will pay cash or trade American Rifleman. Lee Kent, RR-1, Box 293-K, Kapaa, HI 96746.

YAESU FT-227R 2-meter transceiver. $265. Larsen LM-150-K antenna and mount. $15. Paul Adler WA2ITK 716-381-8408.

YAESU FT-221R for sale, mint. Consider in trade: M.28 KSR, M.28 TD, ST-6, Dovetron, TRS-80. Wanted: info. from H.P. 202 low freq. Osc. manual. Mike Nelsen, 2145 "Q", Lincoln, NE 68503.

TEKTRONIX 310A scope, mint, $150; DigiEc model 262 digital VOM, $60; keyboard keyer, 64 character buffer, digital speed readout, $125; Heath HW-22A with HP-23-A, $50; VHF Engineering transceivr, 2 meter, 7 sets crystals, 25 watts — $100; HW-7 shell, parts, book $30; Eico 324 signal generator, $10; roller inductor & Groth turns counter, $17; homebrew 6-digit counter with 1 ppm timebase, $40; Astatic D-104 with grip-to-talk, $30; Janel 10 meter OSCAR preamplifier — new — $12; Kenwood 2-meter converter in case $25; all circuit boards and parts for QRP transceiver, $25; QRP transmatch $10; CushCraft 10 element OSCAR antenna, $25. WØXC, 35556 U.S. 550, Durango CO 81301.

SBE — SB-34 ssb transceiver w/ca1, VOX; LA-2 linear. Excellent condition. All manuals and cables. $350. A. Nelson, K3JNF, Box 571, Riverdale, MD 20840.

WANTED: Plug-in for Tektronix RM45A. WA4GGL, Box 766, Dahlgren, VA 22448.

WANTED — coil set for HRO-60. Pse state price and condx. in first letter. K7WZM, 439 SW 191 St., Seattle, WA 98166.

"DON and Bill" guaranteed goodies; Kenwood TR-7500A $249; Tempo VHF-1 plus $349; Bearcat 250 scanner; Yaesu FT-901DM call quote; Amcomm S225 $325; Hy-Gain 18V $19.95; 18AVT/WB + 100 ft. RG8X $100; TH6DXX $238; TH3MK3 $175. Bird 43, slugs stock, prepaid; Belden 9888 RG8 doubleshield RG8foam 39c/ft; 8214 RG-8 foam 25c/ft; 8448 8 wire rotor cable 16c/ft; Berktek RG8X, 52 ohm, kW 16c/ft; Telrex TB5EM $415 (stock). Amphenol PL259 silverplated 59c; BNC chassis 59c; 831R, SO-239 59c; .001/20kV capacitor $1.95; Aerovox 1000pf/500v feedthru $1.95; new Palomar transceiver preamp $89.50; Janel QSA5 $41.95. Prices FOB Houston, call items not listed. Madison Electronics, 1508-A McKinney, Houston, TX 77002. 713-658-0268. Nites 713-497-5683.

QST Blue library buckram bound Dec. 1915 to Dec. 1975 including unvolumned early sheet May 1919 and October 1919 pink sheet. 1976 and 1977 in ARRL Binders. Rest loose to date. Best offer over $3,000. plus shipping. S.a.s.e. for reply. Mrs. Al Maracy, 461 Third Avenue, South Patrick Shores, FL 32937. 305-777-1950.

FOR SALE: Drake TR-4CW w/RIT, mint condition — $650. Joseph Schwartz, 43-34 Union Street, Flushing, NY 11355. 212-461-3632.

SELLING: Heath SB620 Scanalyzer $75; HW-16 and HG-10 VFO $120; Turner Plus 3 mike $35; Bank check or MO and I ship UPS. Hugh Aitken, W1PN, 155 Amity St., Amherst, MA 01002. 413-549-5062.

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SPR-4 for sale. Ham and SWL crystals. Noise blanker, calibrator, TA-4, and manual. $400. WD6AWP. 213-431-7848.

KENWOOD TS-820 digital, mint, manual, original carton, $820 or B.O. Hammarlund HQ-105TR, mint, manual — $90. W1KO 617-878-1256.

DRAKE TR-33C 8 crystals — Heathkit HWA-7-1 power supply — Ringo Ranger antenna — whole package $225. Karl Haley, Wa7RGZ, Box 1662, Globe, AZ 85501. 602-425-2409.

WANTED: VFO for Hallicrafters HT-40; KA1BBZ.

SELL: Heathkit IM-13 VTVM less probe and manual. Very good $35. Timothy L. Kean, RR 1, Dawson, NE 68337. 402-855-2287.

SALE: Heath HW-16 and HG-10B $130. Bob Mattson, Plymouth Mobile Estates, Plymouth, MA 02360. 617-746-0872.

DRAKE TC-2 2 mtr. transmitting converter and CC-1, SC-2, CPS-1, SCC-1 receiving converter, console, power supply and crystal calibrator. One owner equipment in excellent condition. $450 lot, pickup only. W8NJR, 513-339-8108 after 6 P.M.

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SELL: HW-16, excellent condition — $100. Rich, WB2QJA, 914-946-2120.

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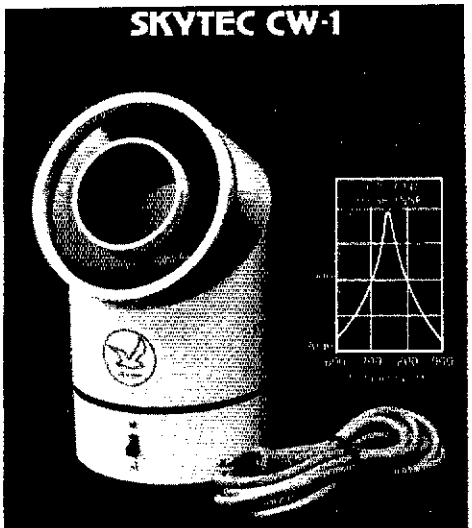

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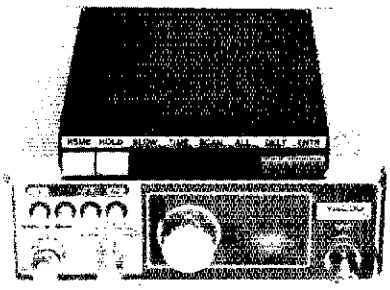

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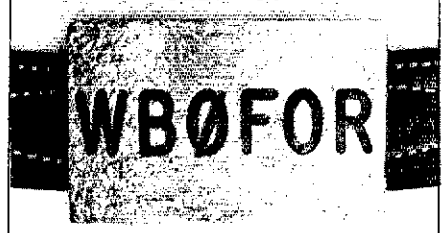

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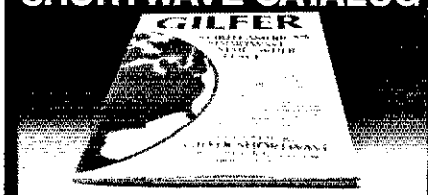

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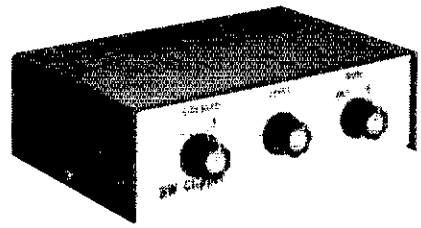

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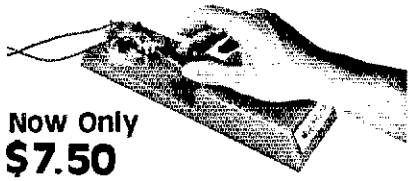

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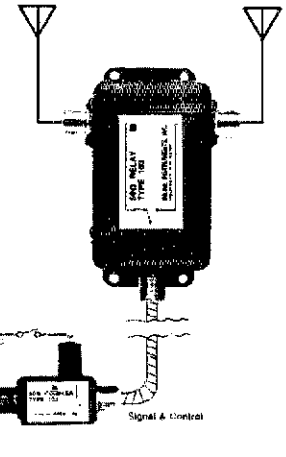

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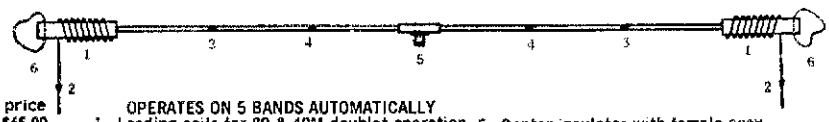

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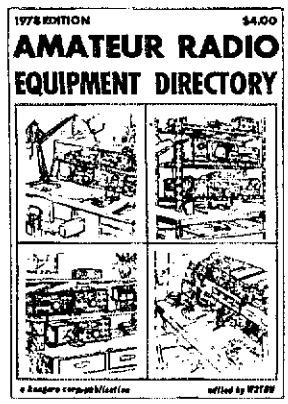

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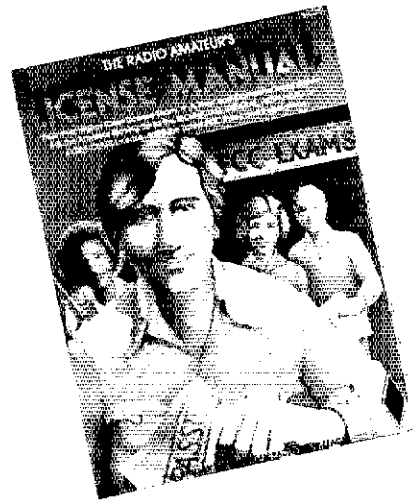

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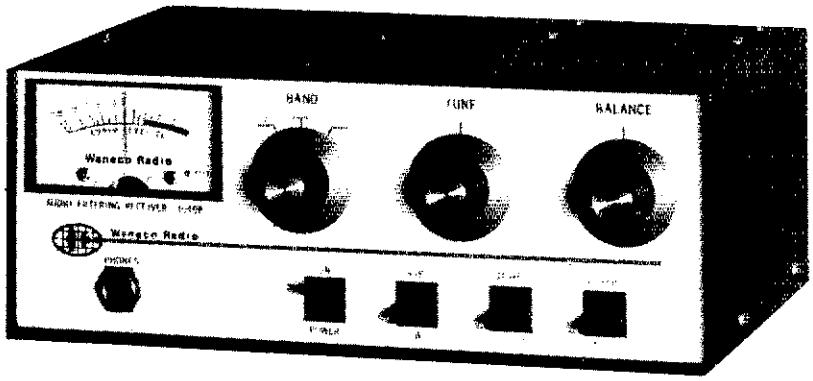

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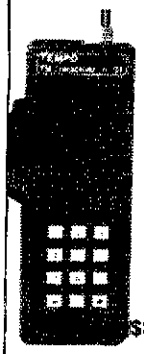

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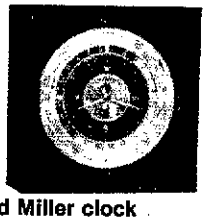

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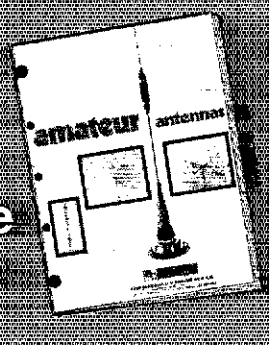

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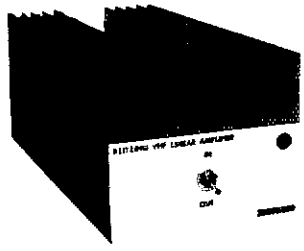

SPECIFICATIONS
Model: 2M10W100

BANDWIDTH:	143-149 Mhz.
OUTPUT @ 10 watts:	100 watts minimum
CURRENT:	12 amps nominal
DIMENSIONS:	4x8x3" approx.
VOLTAGE RANGE:	12-15 volts DC
Z IN/OUT	50 ohms

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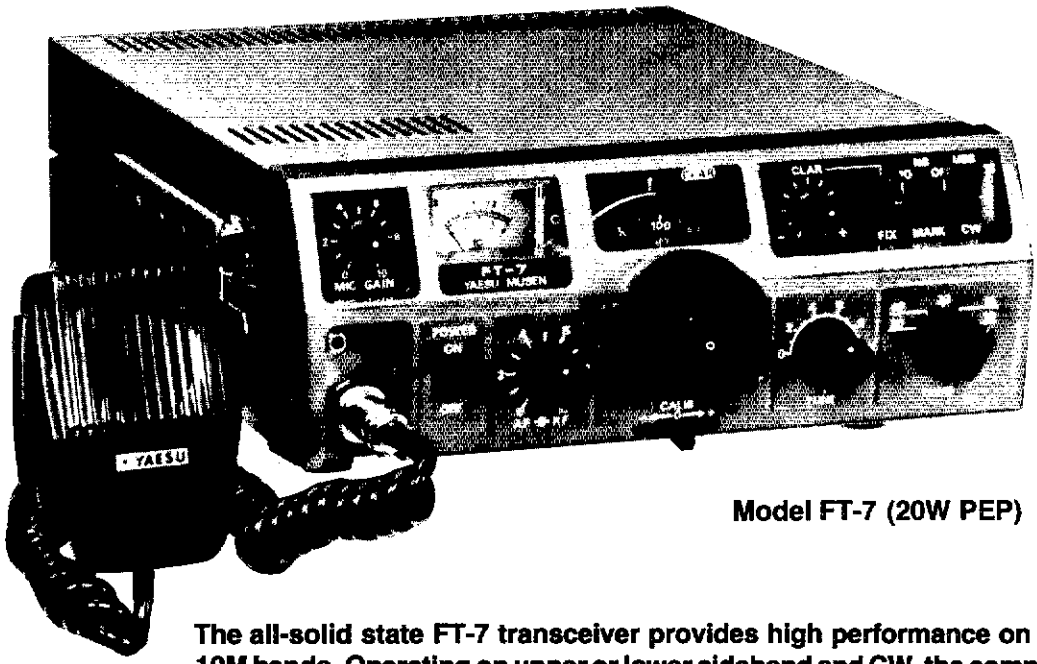
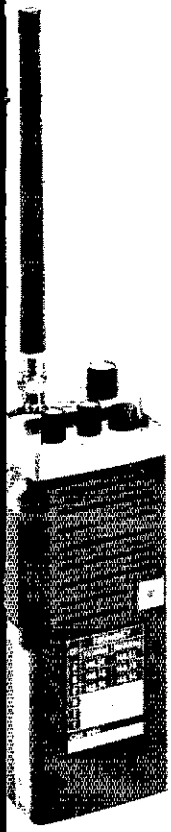
FT-7 MOBILE/BASE HF TRANSCEIVER



Model FT-7 (20W PEP)

The all-solid state FT-7 transceiver provides high performance on the 80M-10M bands. Operating on upper or lower sideband and CW, the compact package provides many features engineered for convenience while mobile. A single knob provides all transceiver tuning, and the state-of-the art noise blanker minimizes impulse-type noise found in mobile applications. The FT-7 is designed for operation directly from your car's 12 volt battery or from its matching DC Power Supply.

■ Single knob tune-up eliminates fumbling around panel searching for load and plate controls ■ Extremely compact size for installation under dashboard ■ 100 KHz calibrator is built in ■ Semi-break-in with sidetone ■ MOS FET receiver front end ■ Receiver offset tuning ■ Provision for crystal-controlled operation ■ Choice of frequency control between internal VFO, fixed channel, or external VFO ■ Power consumption 3A transmit, 0.4A receive (13.5VDC)



NEW . . . FT-202R HAND HELD

Tops for emergency work, tower and antenna adjustments, the Yaesu FT-202R is what you have been asking for! Small (67×49×171 mm) and lightweight (only 400g, less batteries), it has full 6 channel capability (3 supplied, 3 optional) wrapped in a tough impact-resistant ABS case. Complete with flexible helical whip antenna, S/power meter, squelch and tone burst, it's the affordable Handie you have been waiting for! At your dealer's now, ask for the Yaesu FT-202R—"THE HANDIE".

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COLLINS 75S-3B, 32S-3, 30L-1, 312B-4, 516F-2, Magnum 6, matching monitor scope, round emblem $2200 — KWM-2, 516F-2, wing emblem $550. Wanted — Yaesu FT221R. 1-303-343-8592. WBØRTZ.

MICA faced panel fronts made to your exact specs. Send layout for price quote to: Al, K4JAI Cabinetics, 19720 N.E. 10th Ct. Miami, FL 33179.

QRP rigs — HW-8 $115, Argonaut 509 $290. WØMS 303-798-6255.

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DRAKE TR-4 less than 5 hrs. airtime, factory carton, First certified check $425 prepaid to you. K. Rice, 319 Taylor, Grand Ledge, MI 48837.

TEMPO 2020. FB condx. $550 cashiers check. I ship. $500 local pickup. Al Martin, AH6N, Hilton Diamond Head Apts, 252 Paoa Place, Honolulu, HI 96815.

HENRY 2K-3, 80 through 10, works great, $750. 803-359-(4131 days, 3418 nights). WA4OSM.

BARKER & Williamson 6100 ultimate ssb xmtr. $295, HQ-170C (24 hr.) w/noise blanker, spkr, etc. $160, WRL Duo-Bander 84 (80/40 ssb xcvr) w/ac supply $125. All mint w/manuals. Howard, WA3IMG, 215-548-5633 after 9 P.M. EST.

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MOTOROLA 2-Meter receiver, 132-152 MHz. (13 transistors, 7 diodes), $67.50. Matching transmitter, $45. Both in case (hand-held portable) with microphone and tech manual, $125. Schematic and specs, $3. W6BKY, Box 1457, Campbell, CA 95008.

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QUAD Kits from $16.25 to $30. Send s.a.s.e. for information. WAC, 404 Sanders Rd., SW, Huntsville, AL 35802.

KENWOOD TS-520S — New $600. David Vitkus, 8066 Wicker, Saint John, IN 46373.

NEW 10 page list. Tubes, publications, receivers, transmitters, variables, dials, etc. antique — modern. Bargains. W4BLQ, B158, Edgewater, FL 32032.

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LINEAR SB-200 extra pair of new finals, mint: $350. Dentron W-2 dual wattmeter, $65. N6DR, 1014 Highland Woods, Chapel Hill NC 27514. 919-967-5893.

DRAKE R4C — $560; T4XC $560. AC-4 $120, brand new, never used; T4XB $400 factory rebuilt, never used; AC-4 $120 brand new; W2SHE, 87 Westmont, Elmira, NY 14905.

SELL: Two meter Drake TC-2; SC-2; CPS-1. W2EA — 609-429-5902.

REPEATER: 2 mtr split site, radio linked, all solid state $400. K5NI, 4120 Kipling, Beaumont, TX 77706. 713-892-0993.

HEATHKIT HW-7 and HWA-7-1 power supply both $70. WB1CPM 203-525-8878.

SELL: HQ-140X Hammarlund 550 MHz to 30 MHz general coverage receiver very good condition $145. Call 313-847-6247, George WA8SFT.

WANTED: Good Collins R-390 or 390-A. State price and phone number. Morgan, W3EAA, 133 East Kennedy Blvd., Bldg. 18, Apt. 5, Lakewood, NJ 08701.

COLLINS 312B-4 station control $195, MP-1 dc supply $95, both excellent. Don Burns, 4410 Reading Rd., Dayton, OH 45420. 513-256-0345.

SELL: Heathkit DX-60, A-1 shape with manual $65. WB2MJQ, 5 Sunny Lane, Monroe NY 10950. 914-783-4988.

MOTOROLA 2m HT-220's: must sell either 4ch Omni-univ. w/spkr-mike or 2ch Slimline. Both 1.8 wt, nicads, helix, chargers. $385, $285. K1LEC 802-886-8121.

CLUB call pins, 3 lines 1-1/4 x 3-1/4 $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.

SWAN 350 transceiver and 117XC p.s. with manuals. Absolute mint. $400. W4MGG, 2941 Kedron, Winston-Salem, NC 27106.

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Six channels and pocket sized, this two meter radio features a unique crystal saver circuit that permits you to transmit +600 KHz, −600 KHz or simplex with just 1 crystal. That means 18 channel capability with just 6 crystals . . . and each channel is individually adjustable for frequency. It operates on 146.94 simplex, 34/94 and 147.54/94 repeat and has excellent sensitivity and selectivity characteristics. The transmitter power output is 1 watt minimum.

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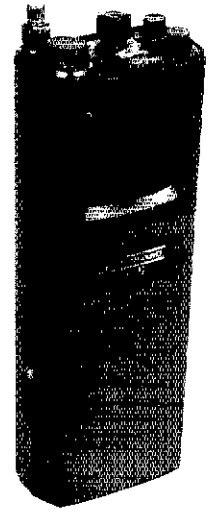
It has an output of 2 watts minimum with 5 channels each individually adjustable. This unit incorporates a built-in meter to monitor battery condition, a separate dynamic mike and has provisions for a remote speaker microphone. It is provided with crystals for 146.94 simplex and 34/94 repeat. All important specifications are equivalent to industrial units.



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SELL: HW-2036, 2 meter synthesized, with touch-tone mic. Needs alignment. $185. Jay, WA2HBM, 201-254-5860.

FOR SALE: Clegg HT-146, nicad, charger, ant, xtals, mic $160, ICOM 22S $230, SB-303 $260, all excellent condition. QST 71, 72, 75, 76; HamRadio 75, 76; $6/yr + shipping. K3SR 301-572-2872.

CODE practice cassettes — computer generated perfect code. High quality, full 90-minute cassettes. Plain language, code groups, or QSOs. Printed text included. Speeds available — 1 through 60 wpm. All cassettes $5.95 each ppd. 26 QSOs similar to FCC exam — 15 wpm order no. C7, 22.5 wpm order no. C8. S.a.s.e. for catalog. Master Charge and Visa accepted. K5SMG, John Tarvin, 810 Cardigan, Garland, TX 75040. 214-495-3604. Dealer inquiries invited.

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XTAL calibrator 206A Ten-Tec, brand new, $20. W. T. Carl, Tel 1-305-878-5912.

WANTED: Swan 117C speaker and power for model 350. Selowe, 135 Colfax Ave., Clifton, NJ 07013.

TS-497A/URR signal generator, military version of Measurements 80. Upgraded to 80R range of 5 to 470 MHz. Manual. $140. K6POU, 415-934-2962.

WANTED: Swan 510X crystal oscillator. Ned Wilde, W7DMH, Box 808, Arco, ID 83213. 208-527-3037.

ATLAS 215x, console p.s., used little, perfect in & out, original cartons, $575 + shipping. Yellin, WB2VIN, 1616 Sheffield, San Jose, CA 95125.

GALAXY G1000 dc power supply, new, unused, make offer, prepaid USA. Board, WB2YLJ, 2940 U. 5th St., Brooklyn, NY 11224. 212-266-9323.

JOHNSON kW Matchbox w/SWR meter, good condition, $180. W4CXG, Tel. 904-475-1758.

2-METER Tempo fm portable, 8 ch w/crystals, $85 ppd. WB3FZI, 525 Dutch Ln. no. 2, Sharon, PA 16146. 412-342-3048.

FOR SALE: TS-520, Shure mic., $500. Tel: 919-647-7231. Jim, WA4SGC.

BIRD slugs, new 250H, 50c $18 ea. WB6SCQ.

ROSS-December Specials: Yaesu FL101 display $489, FR101S new $449, FT-301D, FP301D, $940; FT225RD or FT625RD, $754; FT227RA $371.91; CPU 2500RK $505.80; FT-7 $439; FT-901DM $1,280. Wilson WE800 $414.50; Mark IV, TTP, nicad, charger $299.90; Tempo S-1, call; Like new Astro 200 with cw filter $650; Robot 400 SSTV scan converter, call; Icom 280, $395; 701-S $1,480; 245-SSB $549; 701, $1,275; used 245, $339; Drake TR7/DR7, call. AD-1 auto dialer, $99; Atlas 350XL, $1,185; 350PS, $190. Prices FOB Preston and subject to change. Large stock of gear. Call me at 208-852-0830, Ross Distributing Co. 78 South State, Preston, ID 83263.

MOTOROLA Metrum II 25 watts ±600 kHz and simplex on 12 crystals furnished. Includes 103.5 Hz PL and service manual. Factory modified with new PLL exciter board. new condition $250. W9CJX, John Green, R.R. no. 2, Bloomington, IL 61701.

WANTED: Heath SB-610 monitor. Write N4RU, Ray Smolenski, Box 16056, Plantation, FL 33318.

COLLINS 75S 3B/C owners: Improve your ssb reception with this 1500 Hz F455 FA15 mechanical filter. 60 dB bandwidth only 3.1 kHz compared with 4.5 kHz for standard 2.1 kHz filter. $140. N4KG, Tom Russell, 2027 Morningside, Huntsville, AL 35810. Home 205-539-6805, Work, 205-895-1800.

HEATH SB-104A, noise blanker, cw filter; HP-1144 power supply; SB-230 linear; SB-614 scope; Shure 444 mike. All mint. Complete station for $1100. Ed Kuck, WB2ADH, 153 Oak Pines, Pemberton, NJ 08068. 609-894-8701.

MOTOROLA HT-220, Omni, four channel, universal with external speaker/mike, case, accessories, $325. WA4BUS, 305-777-1217.

DX Life Stainless Company makes the antenna go the long haul with stainless hardware kits for the 14AVQ $11.95, 18 AVT $12.95, TH3-MK3 $21.95, TH6DXX $31.95, plus $1.50 postage. DX Lite Stainless Co., 7 Alta Place, Yonkers, NY 10710.

COLLINS 51S1 receiver mint condition $1250 — W6NUE, 427 Allan Lane, Corralitos, CA 95076. 408-724-2659.

SALE: DX-100, good working condition with manual, $60 plus shipping. George Morris, 817 Leeward Drive, Forked River, NJ 08731.

FOR SALE or trade: Excellent Kenwood TS-520 transceiver and MC50 mike for good Atlas 210x or 215x with ac supply. George Konnick, Apt. C-5, 1750 West Main St., Riverhead, NY 11901.

SIGNALONE CX-11 for sale, one year old, mint condition, $2600. Jay Sewell, W5SL, 2401 South 31st Street, Temple, TX 76501.

WANTED: Heath SB-650. Send info. W2YP, 8 Kenwood Dr., Cherry Hill, NJ 08034.

SELLING: Yaesu FT-101E with cw filter, fan and dust

cover. Used four months for 36 hours air time. No scratches, very excellent condition. $625 WD0EYC, Rudy Oborney, 580 I Street, David City, NE 68632.

TRANSMITTERS Wanted: Kenwood T-599, Johnson Navigator, ARC-5 (2.1 z- 3 mc) WA3IMG, Howard, 215-548-5633 after 9 P.M. EST.

HEATH HW-8 expertly wired, less than 2 months old, $125. heath HR-1680. Also less than 2 months old, $195. Bob, KA0AFG, 712-336-1354.

SELL-RTTY freq. shift converter Model X, solid state, all features, and manual incl., $400 or make offer. Mint Cond. R. J. Colarusso, P. O. Box 581, Alpena, MI 49707.

WANTED Johnson Valiant in top condition, no modifications. WB5WRW, 1104 Florida SE, Albuquerque, NM 87108.

SALE: Heathkit SB303, SB401, SB600, SBA300-3 and SBA300-4 (6 & 2 meter converters). UPS shipping — $450. Consider separate sale. WB4KSQ, Dave Klaiber, 5621 Brahma Rd., Roanoke, VA 24018. 703-774-8467.

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MICROPROCESSOR — Motorola Educator II, built, debugged, 256 byte RAM internal. External 2000 byte RAM. Octal keyboard. 3" CRT terminal. Complete specs. Sacrifice $200. Earl Gosnell, N7NZ, 298 Oregon Ave., Creswell, OR 97426.

HEATH SB-401 transmitter with crystal pack SB-303 receiver with rit n.l. and 3-stage audio filter built in. SB-600 speaker, SB-650 freq. display, Magnum Six speech processor, Turner 454 C mike, all cables and manuals, can be used as transceiver or separates, excellent condx, $600 complete. K2UZV, Box 174, Quogue LI NY 11959. 516-653-4142 evenings.

ELECTRONIC gear for sale. Surplus telemetering analysers and other gear suitable for ham use. Write or call for info. Jerry Ellis, c/o LSC, P. O. Box 432, St. James, NY 11780. 516-862-6505.

SELL: Yaesu 101E, cw filter, fan, ext. speaker used 6 months, mint. $600 firm. WB2LDT, Don Herr, 255D North PLK Road Newburgh, NY 12550. 914-562-1063.

FREQUENCY Counter: One IC chip, crystal, your junkbox give 650 MHz possibilities for $50 or less. Schematic $2.00. Chip and precision crystal $29.95. Crystals: 2m ($3.25) 10m conversion ($3.25) ham monitor. Rebel Electronics, 1101 Hwy. DD, Burlington, WI 53105.

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WILSON System One in stock for immediate shipping as low as $229.95 prepaid. System Two, $184.95. Also carry in stock yaesu FT-101-E, FT-101-EE, FT-301 digital, FP-301, Atlas, 210x/nb, Hy-Gain, TH-3MK3, 18AVT/WB, 14AVT, BN-86 and more. J.A.L. Radio, Canton, OH 44708. Tel: 216-484-5302.

TOWER Goodies: Factory Fresh! Galvanized guy cable — 3/16EHS $8.50/100', $80/1000'; 1/4EHS $10/100', $95/1000'; aircraft cable — 5/32" $7/100', $65/1000'; 3/16" $8/100', $75/1000'. Guy clamps — 3/16" 30c, 1/4" 37c. Heavy turnbuckles — 3/8" $5.50, 1/2" $7. Thimbles 25c. Preformed guy deadends — 3/16" $1.25, 1/4" $1.45. Rohn tower sections — 25G $36, 45G $68. CDE Ham III $111, Tailtwister $199. Beldan Rotor Cable 17c/ft. FOB K5GW, Texas Towers, 113 Starlite Dr., Plano, TX 75074. 214-423-2376.

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DRAKE T4XC $495 AC4 $85 both mint plus, 3 months old, 2A rcvr plus Q-Mult/speaker very good $160. John J. Romanovich, Jr., WB9PKO, 840 Summit, Bolingbrook, IL 60439. H-312-759-8610. B-312-782-3990 x265.

Jobs For Hams

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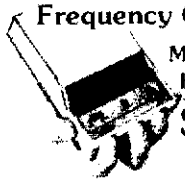

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2SB

TYPE	25-UP	10-24	1-9
2SB 22	.30	.35	.40
2SB 54	.20	.27	.30
2SB 75	.35	.40	.45
2SB 175	.20	.27	.30
2SB 186	.20	.27	.30
2SB 324	.30	.35	.40
2SB 337	.70	.80	.90
2SB 405	.30	.35	.40
2SB 407	.80	.90	1.00
2SB 434	.80	.90	1.00
2SB 435	.90	1.10	1.20
2SB 463	.90	1.10	1.20
2SB 473	.80	90	1.00
2SB 474	.70	80	.90
2SB 492	.60	.70	.80
2SB 507	.80	90	1.00
2SB 528D	70	.80	.90
2SB 595	1.10	1.40	1.50
2SB 596	1.10	1.40	1.50

2SC

TYPE	25-UP	10-24	1-9
2SC 281	.30	35	.40
2SC 372	20	27	.30
2SC 373	20	27	30
2SC 380	.20	.27	.30
2SC 394	.20	.27	.30
2SC 458	.20	.27	.30
2SC 495	.45	55	.60
2SC 509	.35	.40	.45
2SC 515A	.80	.90	1.00
2SC 517	2.50	2.70	3.00
2SC 535	30	35	40
2SC 634A	35	40	.45
2SC 696	1.00	1.20	1.30
2SC 710	.20	.27	.30
2SC 711	.20	.27	.30
2SC 730	3.00	3.20	3.40
2SC 732	.20	.27	.30
2SC 735	.20	.27	.30
2SC 756	1.50	1.80	2.00
2SC 756A	1.50	1.80	2.00
2SC 781	1.90	2.10	2.40
2SC 784	.30	.35	.40
2SC 799	2.00	2.20	2.50
2SC 828	.20	.27	.30
2SC 839	.30	.35	.40
2SC 867	3.20	3.40	3.70
2SC 867A	3.20	3.40	3.70
2SC 897	2.00	2.20	2.50
2SC 930	.20	.27	.30
2SC 945	.20	.27	.30
2SC 983	.50	.64	.70
2SC 959	1.10	1.20	1.30
2SC 1000BL	.35	.40	.45
2SC 1014	.50	64	.70
2SC 1018	.60	.70	.80
2SC 1030C	1.80	2.10	2.40
2SC 1061	.70	.80	.90
2SC 1079	3.40	3.55	3.90
2SC 1096	.45	.55	.60
2SC 1098	.50	.64	.70
2SC 1111	2.10	2.50	2.80
2SC 1124	.80	.90	1.00
2SC 1172B	3.20	3.60	3.95
2SC 1173	.50	.55	.60
2SC 1226	.50	.55	.60
2SC 1226A	.50	.55	.60
2SC 1239	2.20	2.70	2.90
2SC 1306	1.30	1.45	1.60
2SC 1307	1.90	2.10	2.40
2SC 1318	.35	.40	.45
2SC 1383	.30	.35	.40
2SC 1384	.35	.40	.45
2SC 1419	.60	.70	.80
2SC 1675	.20	.27	.30
2SC 1678	1.10	1.25	1.40
2SC 1728	.70	.80	.90
2SC 1730	45	.53	.59
2SC 1760	.70	.80	.90
2SC 1816	1.50	1.75	1.95
2SC 1856	.50	64	.70
2SC 1908	.30	35	.40
2SC 1909	1.80	2.00	2.25
2SC 1945	4.50	5.00	5.60
2SC 1957	.60	.70	.80
2SC 1970	2.10	2.50	2.80
2SC 1978	5.40	6.00	6.60
2SC 2028	50	.64	70
2SC 2029	1.50	1.80	2.00
2SC 2076	.50	64	.70
2SC 2091	.90	1.10	1.20
2SC 2092	1.80	2.00	2.25
2SC 2166	1.40	1.60	1.80

2SD

TYPE	25-UP	10-24	1-9
2SD 72	.50	.64	70
2SD 234	.60	.70	.80
2SD 235	.60	.70	.80
2SD 261	.35	.40	.45
2SD 287	2.50	2.70	2.90
2SD 313	.60	.70	.80
2SD 315	.60	.70	.80
2SD 325	.60	70	.80
2SD 427	1.80	2.00	2.25
2SD 525	.90	1.10	1.20
2SD 526	.60	.70	80

FET

TYPE	25-UP	10-24	1-9
2SK 19BL	.45	.55	.60
2SK 23	.70	.80	.90
2SK 30	.40	.45	.50
2SK 33	.60	70	.80
2SK 55	.60	.70	.80
3SK 22Y	1.40	1.60	1.80
3SK 39	.90	1.10	1.20
3SK 40	.90	1.10	1.20
3SK 41	1.30	1.45	1.60
3SK 45	1.30	1.45	1.60
3SK 48	3.40	3.55	3.90
3SK 49	1.30	1.45	1.60

IC

TYPE	25-UP	10-24	1-9
AN 214Q	1.30	1.70	1.90
AN 239	4.20	4.40	4.90
AN 247	2.50	2.70	3.00
AN 274	1.50	1.75	1.95
AN 313	3.00	3.20	3.40
AN 315	1.80	2.00	2.25
BA 511A	1.80	2.00	2.25
BA 521	1.90	2.10	2.40
HA 1151	1.50	1.75	1.95
HA 1156	1.60	1.80	2.00
HA 1306W	2.00	2.20	2.50
HA 1322	2.50	2.70	3.00
HA 1339	2.50	2.70	3.00
HA 1339A	2.50	2.70	3.00
HA 1366	2.50	2.70	2.90
HA 1366W	2.50	2.70	2.90
HA 1366WR	2.50	2.70	2.90
LA 4031P	1.80	2.00	2.25
LA 4032P	1.80	2.00	2.25
LA 4400	1.90	2.10	2.40
LA 4400Y	2.00	2.20	2.50
LA 4420	2.00	2.20	2.50
M51513L	2.00	2.20	2.50
STK 011	3.80	4.00	4.40
STK 013	7.60	8.00	8.80
STK 015	4.20	4.40	4.90
STK 435	4.50	5.00	5.60
TA 7045M	2.00	2.20	2.50
TA 7060P	.70	.80	.90
TA 7061P	.90	1.10	1.20
TA 7062P	1.10	1.25	1.40
TA 7089P	2.00	2.20	2.50
TA 7202P	2.50	2.70	2.90
TA 7203P	2.50	2.70	2.90
TA 7204P	2.00	2.20	2.50
TA 7205P	1.60	1.80	2.00
TA 7310P	1.30	1.45	1.60
TBA 810SH	1.90	2.10	2.40
TC 5080P	5.00	5.20	5.80
TC 5081P	3.00	3.20	3.40
TC 5082P	3.40	3.55	3.90
UHIC 002	4.20	4.40	4.90
UHIC 004	4.20	4.40	4.90
UHIC 005	4.20	4.40	4.90
UPC 20C	2.10	2.50	2.80
UPC 563	1.90	2.10	2.40
UPC 575C2	1.30	1.45	1.60
UPC 576	1.90	2.10	2.40
UPC 592HZ	.70	.80	.90
UPC 1001	1.90	2.10	2.40
UPC 1008C	4.20	4.40	4.90
UPC 1020H	1.90	2.10	2.40
UPC 1025H	1.90	2.10	2.40
UPC 1154	2.00	2.20	2.50
UPC 1155	2.00	2.20	2.50
UPC 1156	1.90	2.10	2.40
UPC 14305	3.00	3.20	3.40
UPD 861	8.00	8.40	9.50
UPD 857	8.00	8.40	9.50
UPD 858	6.00	6.30	7.00
PLL 01A	3.00	4.20	4.60
PLL 02A	5.00	5.30	5.90
PLL 03A	7.60	8.00	8.80

DIODES

TYPE	25-UP	10-24	1-9
1S 84	.45	55	60
1S 332	.35	.40	.45
1S 953	.16	.18	20
1S 1007	.35	.40	45
1S 1209	35	.40	45
1S 1211	.35	.40	45
1S 1555	20	22	25
1S 1588	20	.22	25
1S 1885	.16	.18	20
1S 2076	20	.22	25
1S 2093	.35	.40	45
1S 2473	16	.18	20
1N 34	12	.13	15
1N 60	12	.13	15
10D 1	30	.35	40
10D 10	45	55	60
V06B	30	35	40

ZENERS

TYPE	25-UP	10-24	1-9
WZ 071	20	22	25
WZ 075	20	22	25
WZ 090	20	22	25
WZ 120	20	22	25
WZ 192	20	22	25

MISC.

TYPE	25-UP	10-24	1-9
SG 613	5.20	5.40	5.95
78L05	.90	1.00	1.10
MPS U31	1.50	1.70	1.90

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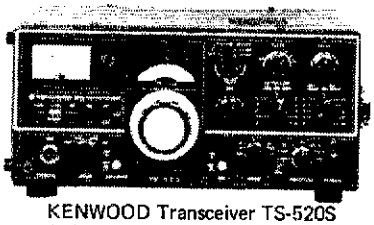

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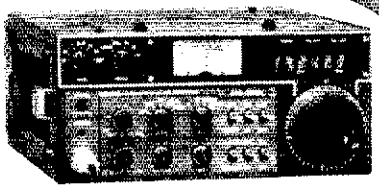

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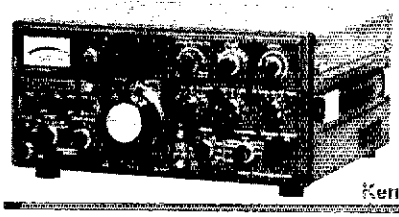

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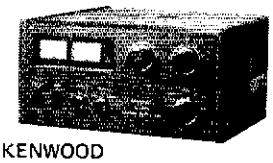

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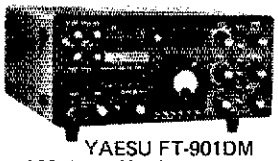

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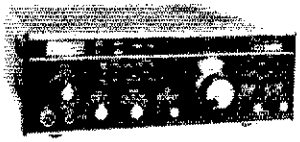

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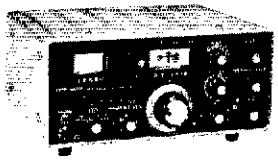

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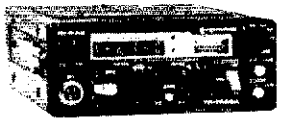

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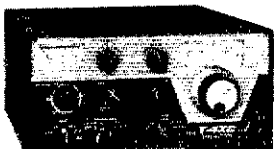

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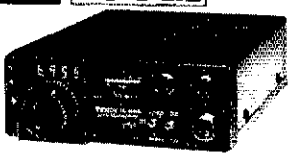

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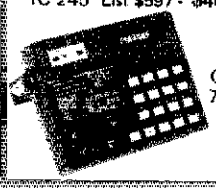

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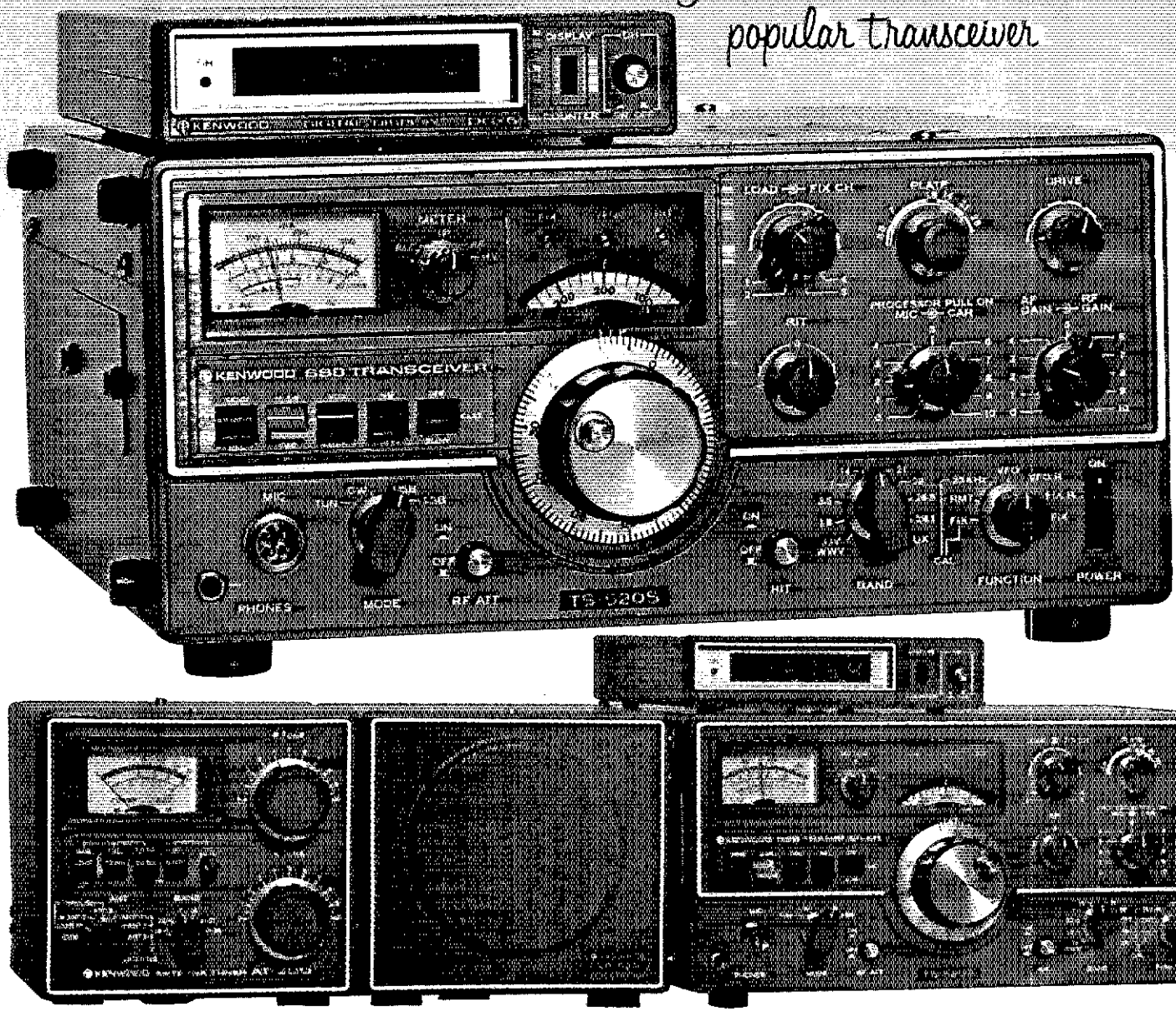

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The AT-200 is an antenna tuner, but it's also much more. It's an antenna switch, an SWR bridge and an in-line wattmeter. The **AT-200** reduces the clutter and increases the operating efficiency of your

SP-520

station . . . and at a surprisingly moderate price.

The **SP-520** matching speaker offers improved sound in a handsome cabinet.

The **DG-5** option gives you your exact frequency, while

TS-520S & DG-5

transmitting and receiving, in large easy to read digits by mixing the carrier, VFO, and heterodyne frequencies.

The **VFO-520** remote VFO is a perfect match for your TS-520S and provides maximum operating flexibility.

The **TV-502S** 2-meter transverter produces 8 watts on SSB and CW. It easily hooks up to the TS-520 and TS-820 series transceivers, providing an inexpensive method of get-

TS-520S

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FULL COVERAGE TRANSCEIVER

The TS-520S provides full coverage on all amateur bands from 1.8 to 29.7 MHz. Kenwood gives you 160 meter capability, WWV on 15.000 MHz., and an auxiliary band position. And with the addition of the TV-506 transverter, your TS-520S can cover 160 meters to 6 meters on SSB and CW.

OUTSTANDING RECEIVER SENSITIVITY AND MINIMUM CROSS MODULATION

The TS-520S incorporates a 3SK35 dual gate MOSFET for outstanding cross modulation and spurious response characteristics. The 3SK35 has a low noise figure (3.5 dB typ.) and high gain (18 dB typ.) for excellent sensitivity.

NEW IMPROVED SPEECH PROCESSOR

An audio compression amplifier gives you extra punch in the pile ups and when the going gets rough.

VERNIER TUNING FOR FINAL PLATE CONTROL

A vernier tuning mechanism allows easy and accurate adjustment of the plate control during tune-up.

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The TS-520S is completely solid state except for the driver and the final tubes.
Kenwood has employed two husky S-2001A (equivalent to 6146B) tubes. These rugged, time-proven tubes are known for their long life and superb linearity.

HIGHLY EFFECTIVE NOISE BLANKER

An effective noise blanking cricuit developed by Kenwood that virtually eliminates ignition noise is built into the TS-520S.

RF ATTENUATOR

The TS-520S has a built-in 20 dB attentuator that can be activated by a push button swich conveniently located on the front panel.

PROVISION FOR EXTERNAL RECEIVER

A special jack on the rear panel of the TS-520S provides receiver signals to an external receiver for increased station versitility. A switch on the rear panel determines the signal path... the receiver in the TS-820 or any external receiver.

CW-520 — CW FILTER (OPTION)

The CW-520 500-Hz filter can be easilly installed and will provide improved operation on CW.

AMPLIFIED TYPE AGC CIRCUIT

The AGC circuit has three positions (OFF, FAST, SLOW) for optimum operation on CW.

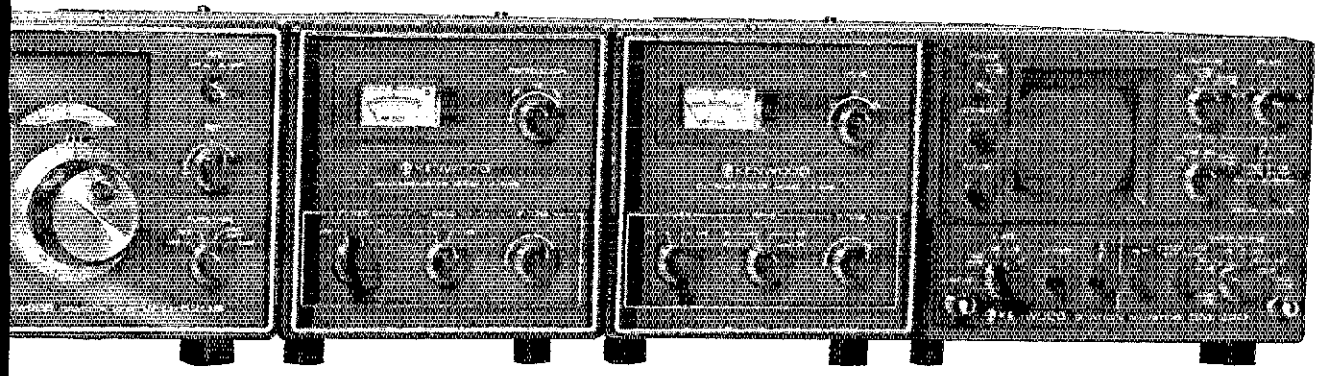
AC POWER SUPPLY

The TS-520S is completely self-contained with a rugged AC power supply built-in. The addition of the DS-1A DC-DC converter (optional) allows for mobile operation of the TS-520S.

EASY PHONE PATCH CONNECTION

The TS-520S has two convenient RCA phono jacks on the rear panel for PHONE PATCH IN and PHONE PATCH OUT.

The TS-520S retains all of the features of the original TS-520 that made it tops in its class: RIT control • 8-pole crystal filter • Built-in 25 kHz calibrator • Front panel carrier level control • Semi-break-in CW with sidetone • VOX/PTT/MOX • TUNE position for low power tune up • Built-in speaker • Built-in cooling fan • Provisions for four fixed frequency channels • Heater switch.



VFO-520S TV-502S TV-506 SM-220

ting on the 2 meter band.
The **TV-506** is an equally practical way of getting on the 6-meter band, providing 10 watts on SSB and CW.
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*With BS-5 or BS-8 pan display option

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TS-820S

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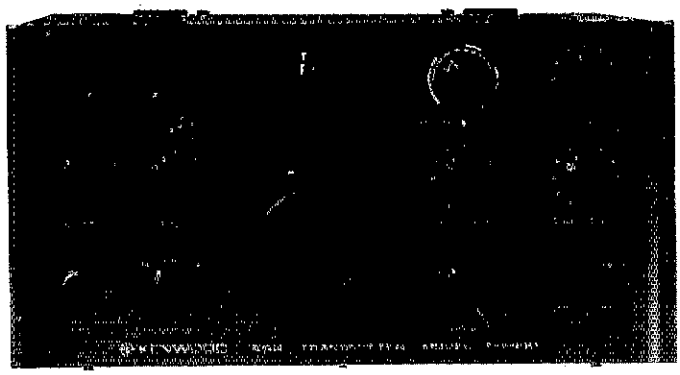
The Perfect Station

SP-820 TS-820S VFO-820 TV-502S TV-506 SM-220



T-599D

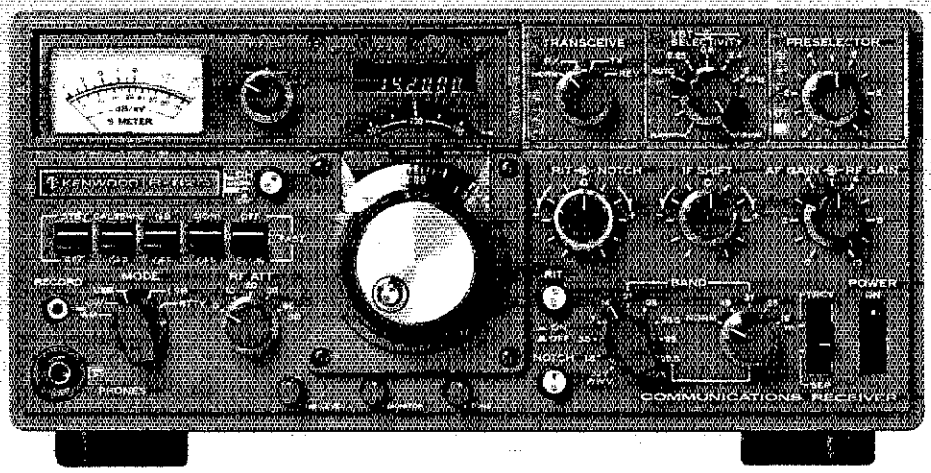
The R-599D and T-599D ...now less than $1,000

Kenwood developed the T-599D transmitter and R-599D receiver for the most discriminating Amateur

The T-599D transceiver is solid-state with the exception of only three tubes, has built-in power supply and full metering. It operates CW, LSB, USB and AM and, of course, is a perfect match to the R-599D receiver.

The R-599D is the most complete receiver ever offered. It is entirely solid-state, superbly reliable and compact. It covers the full Amateur band, 10 through 160 meters, CW, LSB, USB, AM and FM.

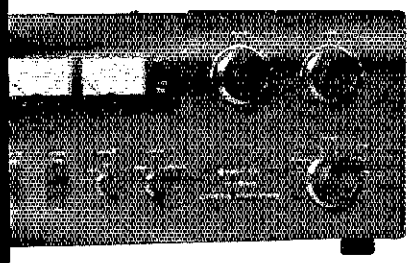
Your station isn't complete if it doesn't include the R-820



R-820

Introducing the ultimate in receiver design . . . the Kenwood R-820.
With more features than ever before available in a ham-band receiver. This triple-conversion (8.33 MHz, 455 kHz, and 50 kHz IFs) receiver, covering all Amateur bands from 160 through 10 meters, as well as several shortwave broadcast bands, features digital as well as analog frequency readouts, notch filter, IF shift, variable bandwidth tuning, sharp IF filters, noise blanker, stepped RF attenuator, 25 kHz calibrator, and many other features, providing more operating conveniences than any other ham-band receiver. The R-820 may be used in conjunction with the Kenwood TS-820 series transceiver, providing full transceive frequency control.

Additional features include: A monitor switch which allows the user to hear his own voice when using associated transmitter. Either VFO control or crystal control on four selectable frequencies. Digital hold . . . locks counter and display while VFO is tuned to another frequency . . . facilitates return to "hold" frequency. RIT/notch control . . . RIT allows receiver to be tuned off frequency, while not affecting transmit frequency when in transceive mode with TS-820S. Notch control tunes notch within IF passband for eliminating interference. Interfering signal remains notched even when IF shift is utilized. Built-in crystal calibrator, settable to WWV, provides signal every 25 kHz. Noise blanker/level control . . . for maximum reduction of noise interference. A transceive/separate switch enables receive VFO to control the receiver and TS-820 (or TS-820S) frequency (or the TS-820 VFO to control both), or, of course, both can function independently.

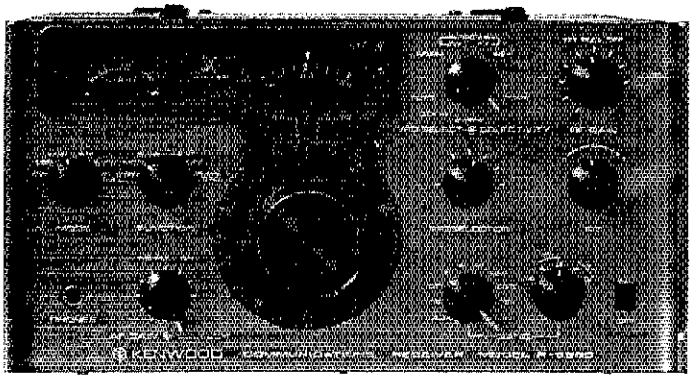


TL-922A

the most versatile pair on the air

If you have never considered the advantages of operating a receiver/transmitter combination . . . maybe you should. Because of the larger number of controls and dual VFOs the combination offers flexibility impossible to duplicate with a transceiver.

Compare the specs of the R-599D and the T-599D with any other brand. Remember, the R-599D is all solid-state (and includes four filters). Your choice will obviously be the Kenwood.

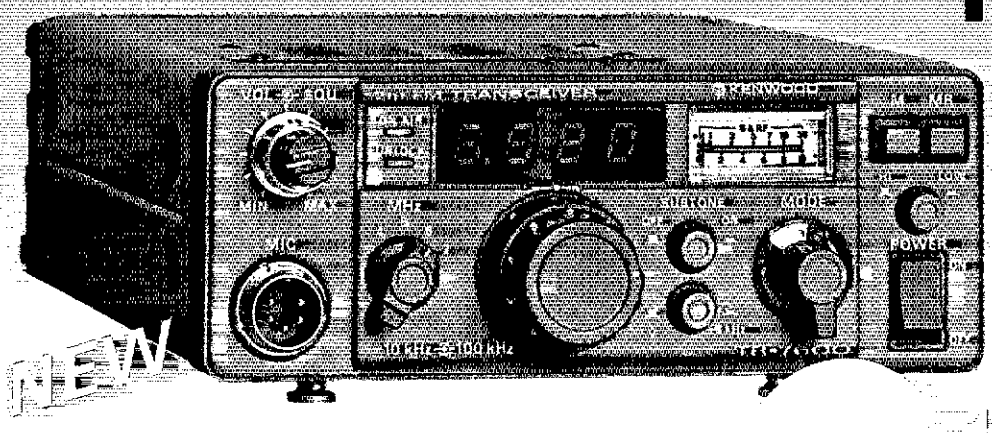


R-599D

KENWOOD

...pacesetter in amateur radio

10 WATT ...KENWOOD OFFERS A CHOICE



TR-7600

...THE RADIO THAT REMEMBERS

Every feature you could possibly want in a 2-meter FM rig is available now in the Kenwood TR-7600 and RM-76 Microprocessor Control Unit

The new TR-7600 gives you...

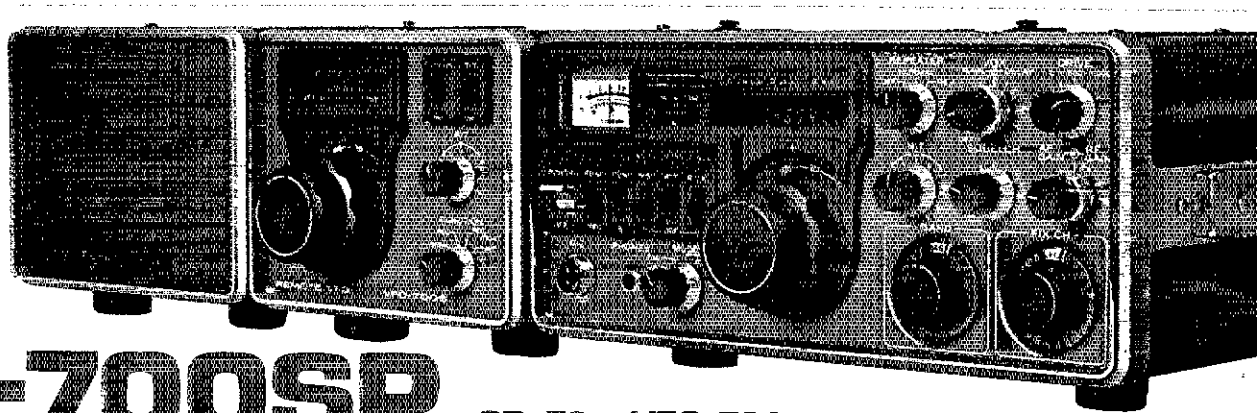
• Full 4-MHz coverage (144.000-147.995 MHz) on 2 meters • 800 channels • Dual concentric knobs for fast frequency change (100-kHz and 10-kHz steps) • 5-kHz offset switch • MHz selector switch...for desired band (144, 145, 146, or 147 MHz) • Mode switch for operating simplex or for switching the transmit frequency up or down 600 kHz for repeater operation...or for switching the transmitter to the frequency you have stored in the TR-7600's memory (while the receiver remains on the frequency you have selected with the dual knobs) • Memory channel...with simplex or repeater (plus or minus 600 kHz transmitter offset) operation. • Digital frequency display (large, bright, orange LEDs) • UNLOCK indicator...an LED that indicates transceiver protection when the frequency selector switches are improperly positioned, or the PLL has malfunctioned • 10 watts RF output (switchable to 1 watt low power) • Noise-cancelling microphone • Compact size (only 6-7/16 inches wide, 2-7/16 inches high, and 9-3/16 inches deep)

The RM-76 Microprocessor Control Unit provides more operating features to the TR-7600 2-meter FM tranceiver than found in any other rig! With the RM-76 Microprocessor Control Unit attached to your TR-7600, you can...

• Select any 2-meter frequency • Store frequencies in six memories • Scan all memory channels • Automatically scan up all frequencies in 5-kHz steps • Manually scan up or down in 5-kHz steps • Set lower and upper scan frequency limits • Reset scan to 144 MHz • Stop scan (with HOLD button) • Cancel scan (for transmitting) • Automatically stop scan on first busy **or** open channel • Operate on MARS (143.95 MHz simplex only) • Select repeater mode (simplex, plus transmit frequency offset, minus offset, or any of six memory transmit offsets) • Select transmit offset (1 MHz/600 kHz)

The Microprocessor Control Unit's display indicates frequency (even while scanning) and functions (such as autoscan, lower scan frequency limit, upper scan limit, error, and call channel).

Subject to FCC approval



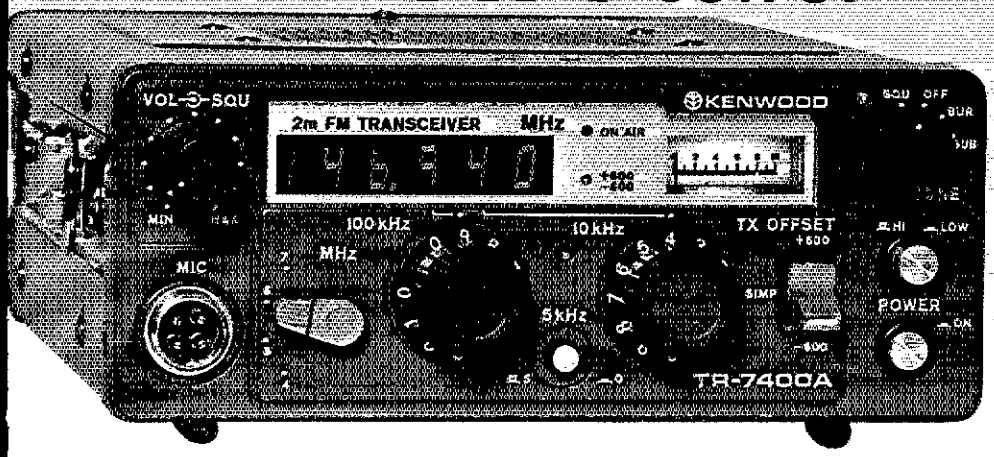
TS-700SP

SP-70 VFO-700S

Still the same fine, time proven rig. But now with the simple addition of a plug-in crystal, the TS-700SP will be able to utilize the new repeater sub-band (144.5 to 145.5 MHz). Still features all of the fine attributes of the TS-700S: A digital frequency display, receiver pre-amp, VOX, semi-break in, and CW sidetone. Of course, it's all mode, 144-148 MHz, VFO controlled... and Kenwood quality throughout.

Features: 4 MHz band coverage (144 to 148 MHz) • Automatic repeater offset capability on all FCC authorized repeater subbands including 144.5-145.5 MHz • Simply dial receive frequency and radio does the rest... simplex, repeater, or reverse. Same features on any of 11 crystal positions • Transmit/Receive capability on 44 channels with 11 crystals • Operates all modes: SSB (upper and lower), FM, AM and CW • Digital readout with "Kenwood Blue" digits • Receiver pre-amp • Built-in VOX • Semi break-in on CW • CW sidetone • All solid-state • AC and DC capability • 10 watts RF output on SSB, FM, CW • 3 watts on AM • 1 watt FM low-power switch • 0.25 μV for 10 dB (S+N)/N SSB/CW sensitivity • 0.4 μV for 20 dB quieting FM sensitivity.

OR 25 WATT OUTPUT

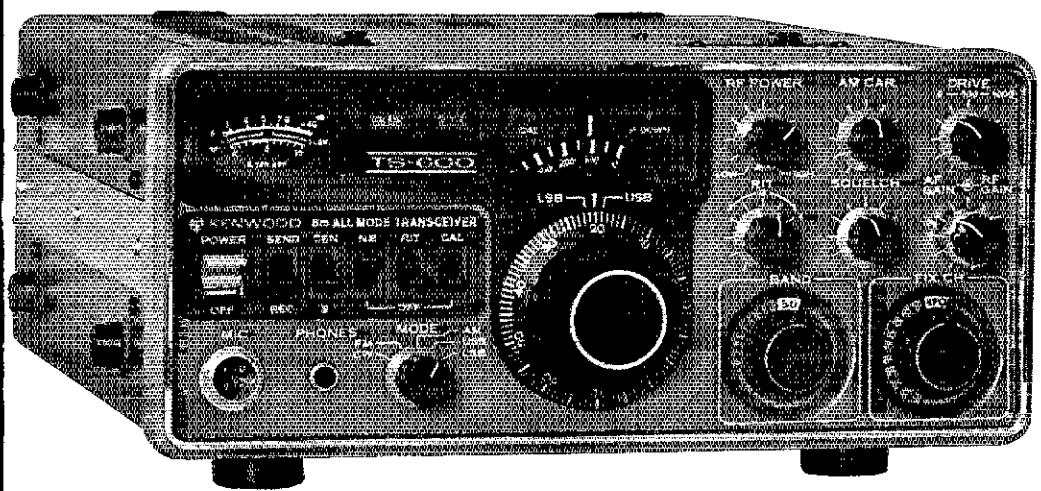


TR-7400A

The fully-synthesized TR-7400A 2-meter FM transceiver operates on 800 channels and features repeater offset over the entire 144-148-MHz range, dual frequency readout, six-digit display, and subaudible tone encoder and decoder. RF output is at least 25 watts!

The TR-7400A 2-meter FM transceiver provides fully synthesized operation, including 600-kHz repeater offsets, over the entire 144-148-MHz range. It can operate on any of 800 channels, spaced 5 kHz apart. RF output is at least 25 W, and typically 30 W. A low power position produces 5-15 W (adjustable). Included is a dual frequency readout with large six-digit LED display plus a dial readout. The subaudible CTCSS signaling feature may be used on transmit and receive, or transmit only. Optional tone-burst modules are available. Receiver sensitivity is better than 0.4 μV for 20 dB quieting. Large, high Q, helical resonators minimize interference from outside the band. A two-pole 10.7-MHz monolithic crystal filter provides excellent selectivity. Intermodulation distortion is down more than 66 dB, spurious rejection is better than —60 dB, and image rejection is better than —70 dB.

See your local Authorized Kenwood Dealer today, for a demonstration of the fantastic TR-7400A.



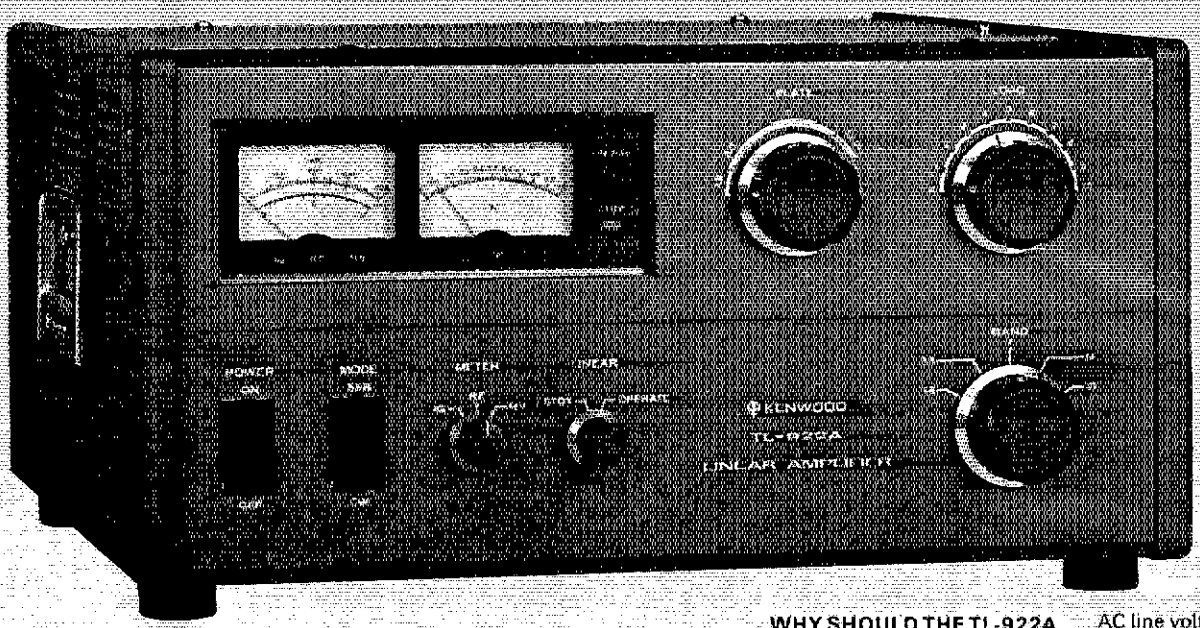
TS-600

Experience the excitement of 6 meters. The TS-600 all mode transceiver lets you experience the fun of 6 meter band openings. This 10 watt, solid state rig covers 50.0-54.0 MHz. The VFO tunes the band in 1 MHz segments. It also has provisions for fixed frequency operation on NETS or to listen for beacons. State of the art features such as an effective noise blanker and the RIT (Receiver Incremental Tuning) circuit make the TS-600 another Kenwood "Pacesetter".

TRIO-KENWOOD COMMUNICATIONS INC.
1111 WEST WALNUT/COMPTON, CALIFORNIA

KENWOOD

...pacesetter in amateur radio



Give your signal extra muscle

TL-922A

The Kenwood name has grown to represent the finest Amateur Radio equipment available. The TL-922A linear amplifier carries on that tradition. As a linear it gets your signal through today's crowded bands and provides the power to reach those far away places with ease. And because it's Kenwood you can count on its dependability. The TL-922A is FCC type accepted. It runs the full legal limit on all ham bands from 160-15 meters and is compatible with most amateur exciters. Contact your nearest Authorized Kenwood Dealer for complete specifications and the best deal.

WHY SHOULD THE TL-922A BE PART OF YOUR STATION? COMPARE THESE FEATURES AND SPECS...THE ANSWER WILL BE OBVIOUS.

Instant heating filaments — The 3-500Z tubes require no warm up period. Just turn it on and go!

Time delay fan circuit — Even after you turn the TL-922A off, the super quiet fan continues to work for approximately 2 minutes to greatly extend tube life.

Adjustable ALC output voltage — Lets you tailor the ALC voltage to your exciter.

Standby position — Provides amplifier bypassing without having to turn the AC power off.

Two independent safety interlocks — One disconnects AC line voltage and the second shorts B+ to ground when tripped.

Vernier plate control — For smooth, easy tune-up.

Diecast side panels—Includes functional carrying handles for easy transportation.

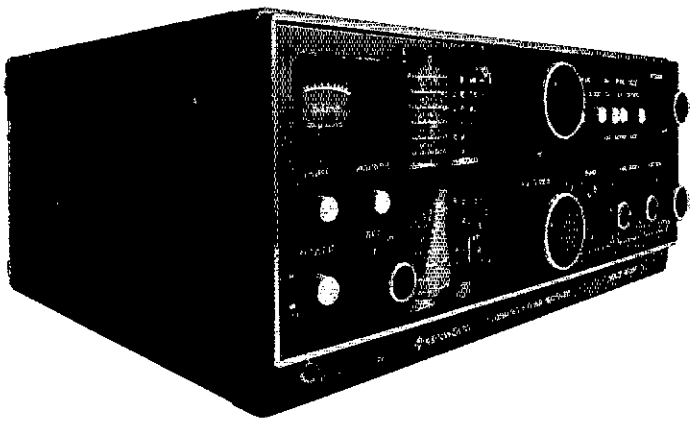
Thermal protection of power transformer — Amplifier automatically switches to standby if power transformer temperature exceeds 145°F.

Tuned Input Circuit — Means improved spurious characteristics.

Line voltage selector — Easily switched between 120 and 240 VAC.

Multimeter — Reads high voltage, relative output or grid current (selectable).

Plate Current Meter — Separate meter allows continuous monitoring of plate current.

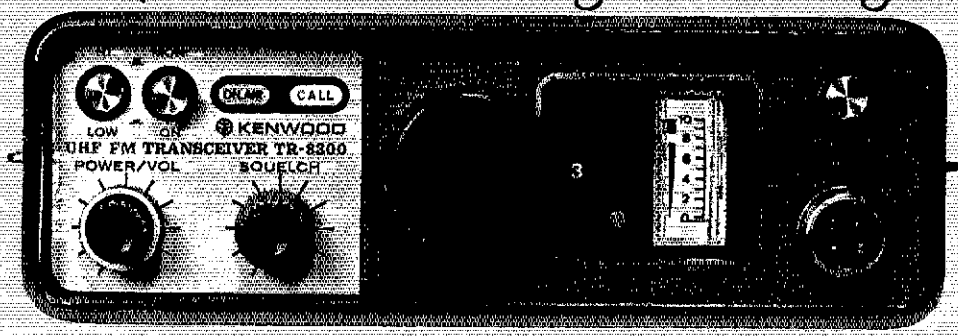


For the best in world listening

R-300

Dependable operation, superior specifications and excellent features make the R-300 an unexcelled value for the shortwave listener. It offers full band coverage with a frequency range of 170 kHz to 30.0 MHz • Receives AM, SSB and CW • Features large, easy to read drum dials with fast smooth dial action • Band spread is calibrated for the 10 foreign broadcast bands, easily tuned with the use of a built-in 500 kHz calibrator • Automatic noise limiter • 3-way power supply system (AC/Batteries/External DC)... take it anyplace • Automatically switches to battery power in the event of AC power failure.

Escape the rat race... try 440 MHz FM!



TR-8300

How would you like to work an uncrowded frequency . . . hear signals with less noise . . . or use a sophisticated repeater or remote base with better coverage? 440 MHz is the answer. It will surprise you. It will penetrate buildings where 2 meters won't, and often you can even work out from underground garages . . . where 2 meters is dead.

Best of all, it's easy to get on 440 MHz (70 cm) . . . with a Kenwood TR-8300 transceiver. High quality is critically important on VHF bands, and the TR-8300 is just what you need to meet all technical requirements.

- 10 watts RF output (switchable to 1 watt)
- 23 crystal-controlled channels (3 supplied)
- 445.0-450.0 MHz transmit range
- 442.0-447.0 MHz receive range
- Transmitter and receiver adjustable over any 5-MHz segment from 440 to 450 MHz
- 5-section helical resonator and 2-pole crystal filter in IF to reject intermod
- SWR protection in final amplifier
- Excessive-voltage and reverse-polarity protection circuits
- 0.5 μV for 20 dB quieting sensitivity
- Better than −60 dB spurious radiation
- 20 kHz (−6 dB), 40 kHz (−70 dB) selectivity
- Monitor switch that lets you check modulation and frequency "netting"
- Call CH switch that activates optional CTCSS (subaudible tone) function
- Large S meter

Move up to 440 MHz today . . . with a Kenwood TR-8300 . . . for more reliable communications!

Fine equipment that belongs in every well equipped station

HF LINES

820 Series

TS-820S . . TS-820 with Digital Installed
TS-820 . . . . 160-10 m Deluxe Transceiver
YG-88A . . . 6-kHz AM filter for R-280
YG-455C . . 500-Hz CW filter for R-820
YG-455CN . 250-Hz CW filter for R-820
DG-1 . . . . . Digital Frequency Display for TS-820
VFO-820 . . Deluxe Remote VFO for TS-820/820S
SP-820 . . . . External speaker with audio filters
CW-820 . . . 500 Hz CW Filter for TS-820/820S

520 Series

TS-520S . . 160-10 m Transceiver
DG-5 . . . . . Digital Frequency Display for TS-520 Series
VFO-520 . . Remote VFO for TS-520 and TS-520S
SP-520 . . . . External Speaker for 520/820 Series
CW-520 . . . 500 Hz CW Filter for TS-520/520S
DK-520 . . . Digital Adaptor Kit for TS-520

599D Series

R-599D . . . 160-10 m Solid State Receiver
T-599D . . . 80-10 m Matching Transmitter
S-599 . . . . External Speaker for 599D Series
CC-29A . . . 2-meter Converter for R-599D
CC-69A . . . 6-meter Converter for R-599D
FM-599A . . FM Filter for R-599D

HF ACCESSORIES

TL-922A . . . 160-15 m kilowatt linear amplifier
SM-220 . . . Station monitor, 10-MHz scope
BS-8 . . . . . SM-220 pan display for TS-820 Series
BS-5 . . . . . SM-220 pan display for TS-520 Series
AT-200 . . . . 200-W antenna tuner. SWR/power meter, switch
DS-1A . . . . . DC-DC Converter for 520/820 Series

SHORT WAVE LISTENING

R-300 General Coverage SWL Receiver

VHF LINES

TS-600 . . . . 6 m All Mode Transceiver
TS-700SP . . 2 m All Mode Digital Transceiver
VFO-700S . . Remote VFO for TS-700S
SP-70 . . . . . Matching Speaker for TS-600/700 Series
VOX-3 . . . . . VOX for TS-600/700A
TR-7400A . . 2 m Synthesized Deluxe FM Transceiver
TR-7600 . . . 2 m FM transceiver with 800 channels and memory
RM-76 . . . . Remote Controller for TR-7600 with six memories, scanning
TR-8300 . . . 70 CM FM Transceiver (450 MHz)
TV-506 . . . . 6-m Transverter for 520/820/599 Series
TV-502S . . . 2-m Transverter for 520/820/599 Series

POPULAR STATION ACCESSORIES

HS-4 . . . . . Headphone Set
MC-30S . . . low-impedance mobile noise-cancelling microphone
MC-35S . . . high-impedance mobile noise-cancelling microphone
MC-50 . . . . Desk Microphone
PS-6 . . . . . Power Supply for TR-8300
PS-8 . . . . . Power Supply for TR-7400A

Trio-Kenwood stocks a complete line of replacement parts, accessories, and manuals for all Kenwood models.

MORE ACCESSORIES:

Description	Model #	For use with
Repeater Subband Kit	RSK-7	TS-700A/S
Rubber Helical Antenna	RA-1	TR-2200A
Telescoping Whip Antenna	T90-0082-05	TR-2200A
Ni-Cad Battery Pack (set)	PB-15	TR-2200A
4 Pin Mic. Connector	E07-0403-05	All Models
Active Filter Elements	See Service Manual	TR-7400A
Tone Burst Modules	See Service Manual	TS-700A; TR-7400A
AC Cables	Specify Model	All Models
DC Cables	Specify Model	All Models

The Kenwood HS-4 headphone set adds versatility to any Kenwood station. For extended periods of wear, the HS-4 is comfortably padded and is completely adjustable. The frequency response of the HS-4 is tailored specifically for amateur communication use. (300 to 3000 Hz, 8 ohms).

The MC-50 dynamic microphone has been designed expressly for amateur radio operation as a splendid addition to any Kenwood shack. Complete with PTT and LOCK switches, and a microphone plug for instant hook-up to any Kenwood rig. Easily converted to high or low impedance. (600 or 50k ohm).

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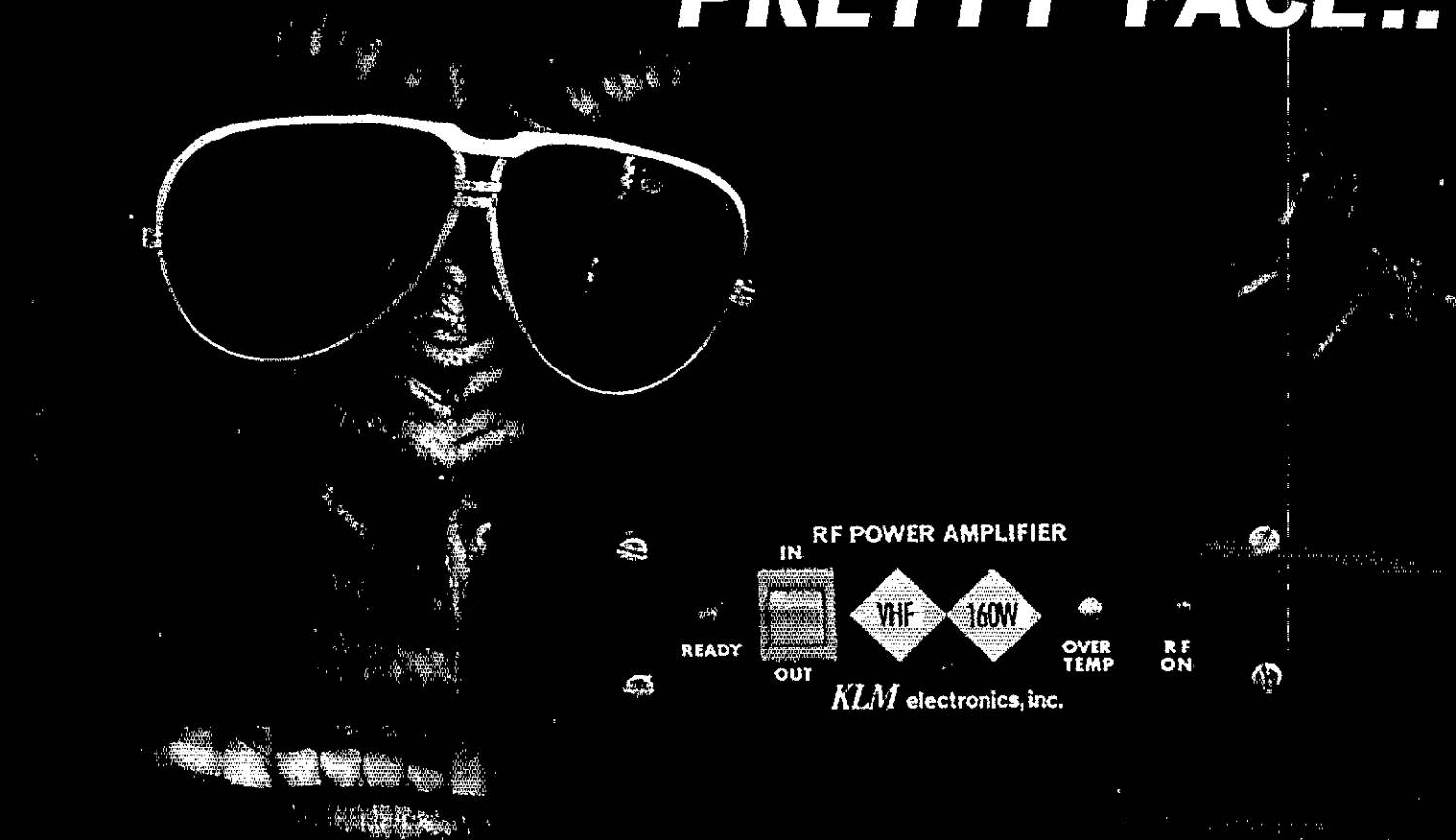
not just another PRETTY FACE..



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POWER AMPLIFIERS

RUGGED & RELIABLE INSIDE, WHERE IT REALLY COUNTS!

■ OVER TEMP PROTECTION ■ VSWR PROTECTION
■ REVERSE POLARITY PROTECTION
■ ALL MODELS EXCEED FCC SPEC'S LIMITING HARMONIC AND SPURIOUS EMISSIONS ■ ONE YEAR WARRANTY

A FULL SPECTRUM of MODELS FOR 2 Meters, 220 & 432 MHz

■ SEE YOUR LOCAL DEALER OR CONTACT:

KLM electronics, inc. 17025 LAUREL ROAD, MORGAN HILL, CALIF. 95037 (408) 779-7363

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HINTS & KINKS

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MISCELLANEOUS TECHNICAL

NEW BOOKS

OPERATING PRACTICES

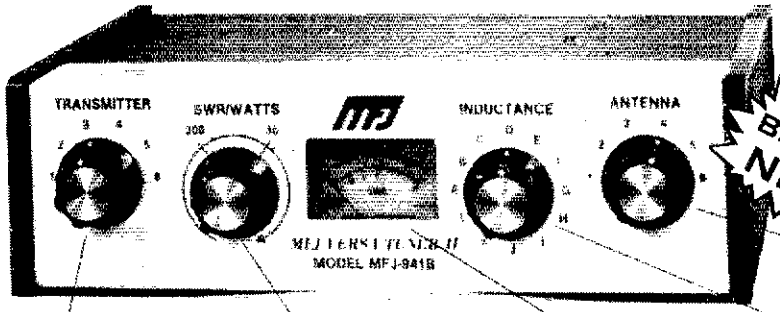
PICTURE TRANSMISSION AND RECEPTION

PRODUCT REVIEW

PUBLIC SERVICE

This NEW MFJ Versa Tuner II . . .

has SWR and dual range wattmeter, antenna switch, efficient airwound inductor, built in balun. Up to 300 watts RF output. Matches everything from 1.8 thru 30 MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.



BRAND NEW

NEW, IMPROVED MFJ-941B HAS . . .
- More inductance for wider matching range
- More flexible antenna switch
- More sensitive meter for SWR measurements down to 5 watts output

$89.95

Transmitter matching capacitor. 208 pf. 1000 volt spacing.

Sets power range, 300 and 30 watts. Pull for SWR.

Meter reads SWR and RF watts in 2 ranges.

Efficient airwound inductor gives more watts out and less losses.

Antenna matching capacitor. 208 pf. 1000 volt spacing.

Only MFJ gives you this MFJ-941B Versa Tuner II with all these features at this price:

A SWR and dual range wattmeter (300 and 30 watts full scale) lets you measure RF power output for simplified tuning.

An antenna switch lets you select 2 coax lines direct or thru tuner, random wire/balanced line, and tuner bypass for dummy load.

A new efficient airwound inductor (12 positions) gives you less losses than a tapped toroid for more watts out.

A 1:4 balun for balanced lines. 1000 volt capacitor spacing. Mounting brackets for mobile installations (not shown).

With the NEW MFJ Versa Tuner II you can run your full transceiver power output — up to 300 watts RF power output — and match your transmitter to **any** feedline from 160 thru 10 Meters whether you have coax cable, balanced line, or random wire.

ANTENNA SWITCH lets you select 2 coax lines direct or thru tuner, wire/balanced line, dummy load.

You can tune out the SWR on your dipole, inverted vee, random wire, vertical, mobile whip, beam, quad, or whatever you have.

You can even operate all bands with just one existing antenna. No need to put up separate antennas for each band.

Increase the usable bandwidth of your mobile whip by tuning out the SWR **from inside your car.** Works great with all solid state rigs (like the Atlas) and with all tube type rigs.

It travels well, too. Its ultra compact size 8x2x6 inches fits easily in a small corner of your suitcase.

This beautiful little tuner is housed in a deluxe eggshell white Ten-Tec enclosure with walnut grain sides.

SO-239 coax connectors are provided for transmitter input and coax fed antennas. Quality five way binding posts are used for the balanced line inputs (2), random wire input (1), and ground (1).

NEW 300 WATT MFJ VERSA TUNER II'S: SELECT FEATURES YOU NEED.

NEW MFJ-945 HAS SWR AND DUAL RANGE WATTMETER.

$79.95 BRAND NEW

Same as MFJ-941B but less 6 position antenna switch.

NEW MFJ-944 HAS 6 POSITION ANTENNA SWITCH ON FRONT PANEL.

$79.95 BRAND NEW

Same as MFJ-941B but less SWR/Wattmeter.

NEW MFJ-943 MATCHES ALMOST ANYTHING FROM 1.8 THRU 30 MHz.

$69.95 BRAND NEW

Same as MFJ-941B, less SWR/Wattmeter, antenna switch, mounting bracket. 7x2x6 in.

ULTRA COMPACT 200 WATT VERSA TUNERS FOR ALL YOUR NEEDS.

MFJ-901 VERSA TUNER MATCHES ANYTHING, 1.8 THRU 30 MHz.

$59.95 BRAND NEW

Efficient 12 position air inductor for more watts out. Matches dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax. 200 watts RF, 1:4 balun, 5x2x6 in.

MFJ-900 ECONO TUNER MATCHES COAX LINES/RANDOM WIRES.

$49.95 BRAND NEW

Same as MFJ-901 but less balun for balanced lines. Tunes coax lines and random lines.

MFJ-16010 RANDOM WIRE TUNER FOR LONG WIRES.

$39.95

1.8 thru 30 MHz. Up to 200 watts RF output. Matches high and low impedances. 12 position inductor. SO-239 connectors. 2x3x4 inches. Matches 25 to 200 ohms at 1.8 MHz. Does not tune coax lines.

For Orders Call toll-free 800-647-1800

Order any product from MFJ and try it. If not delighted, return within 30 days for a prompt refund (less shipping).

Order today. Money back if not delighted. One year unconditional guarantee. Add $2.00 shipping/handling.

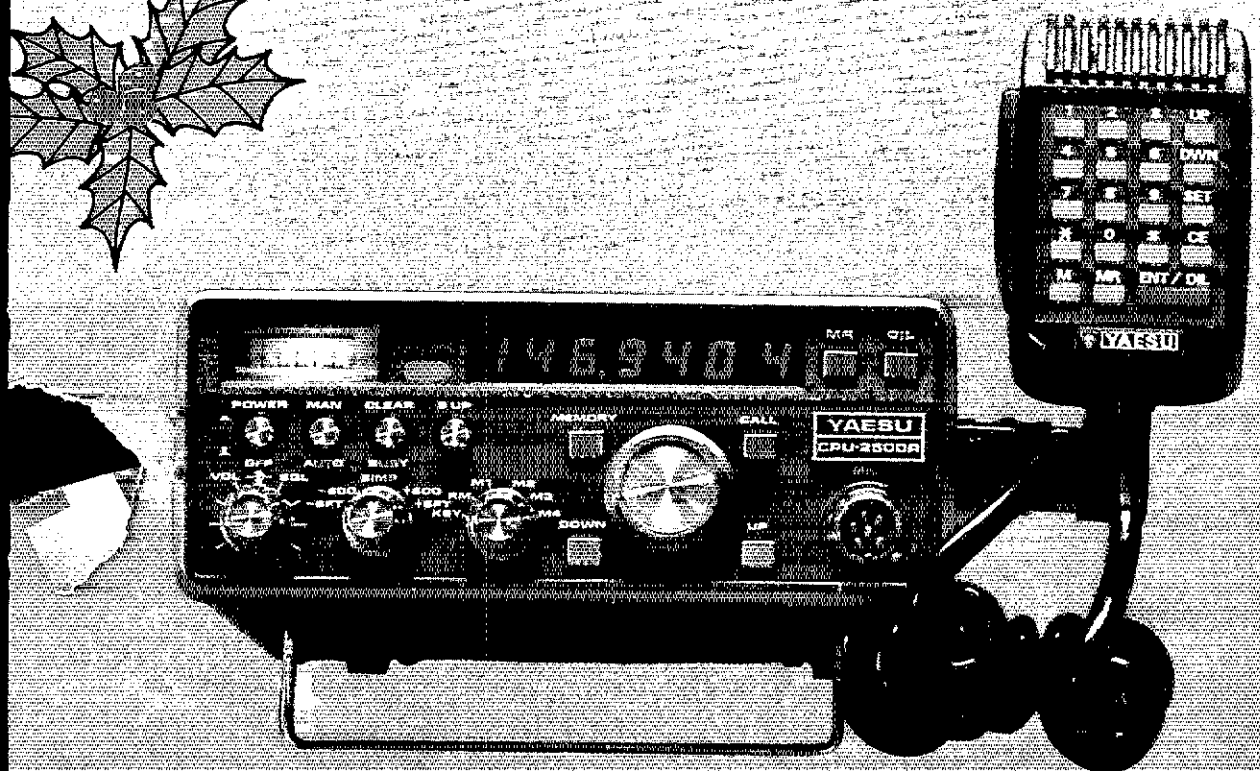
For technical information, order/repair status, in Mississippi, outside continental USA, call 601-323-5869.

Order By Mail or Call TOLL FREE 800-647-1800 and Charge It On VISA master charge

MFJ ENTERPRISES P. O. BOX 494 MISSISSIPPI STATE, MISSISSIPPI 39762

THE CHRISTMAS GIFT OF A LIFETIME!

YAESU ANNOUNCES THEIR SENSATIONAL COMPUTER AGE CPU-2500R/K 2-METER 25 WATT TRANSCEIVER



Again, Yaesu, THE RADIO, takes a giant step forward with their computer age 4-bit Central Processor Unit controlling the Phase Locked Loop. It allows selection of 800 PLL channels with touch button station selection built into the optional keyboard mike ..... *PLUS* automatic scan, up or down across the entire 2 meter band ..... *PLUS* four memory channels ..... *PLUS* optional tone squelch encoding ..... *PLUS* tone burst ..... *PLUS* high SWR and reverse voltage polarity protection ..... *PLUS* 3/25 watts of power ..... *PLUS* fixed ±600 KHz offsets ..... *PLUS* programmable offsets ..... *PLUS* tone pad microphone option ..... *PLUS* bright 3/8" LED six digit frequency display and another LED for memory display ..... and much more.

The CPU-2500R/K is a space age radio for discriminating amateurs utilizing the latest solid state techniques and it's on your dealer's shelf today!

Price And Specifications Subject To Change Without Notice or Obligation

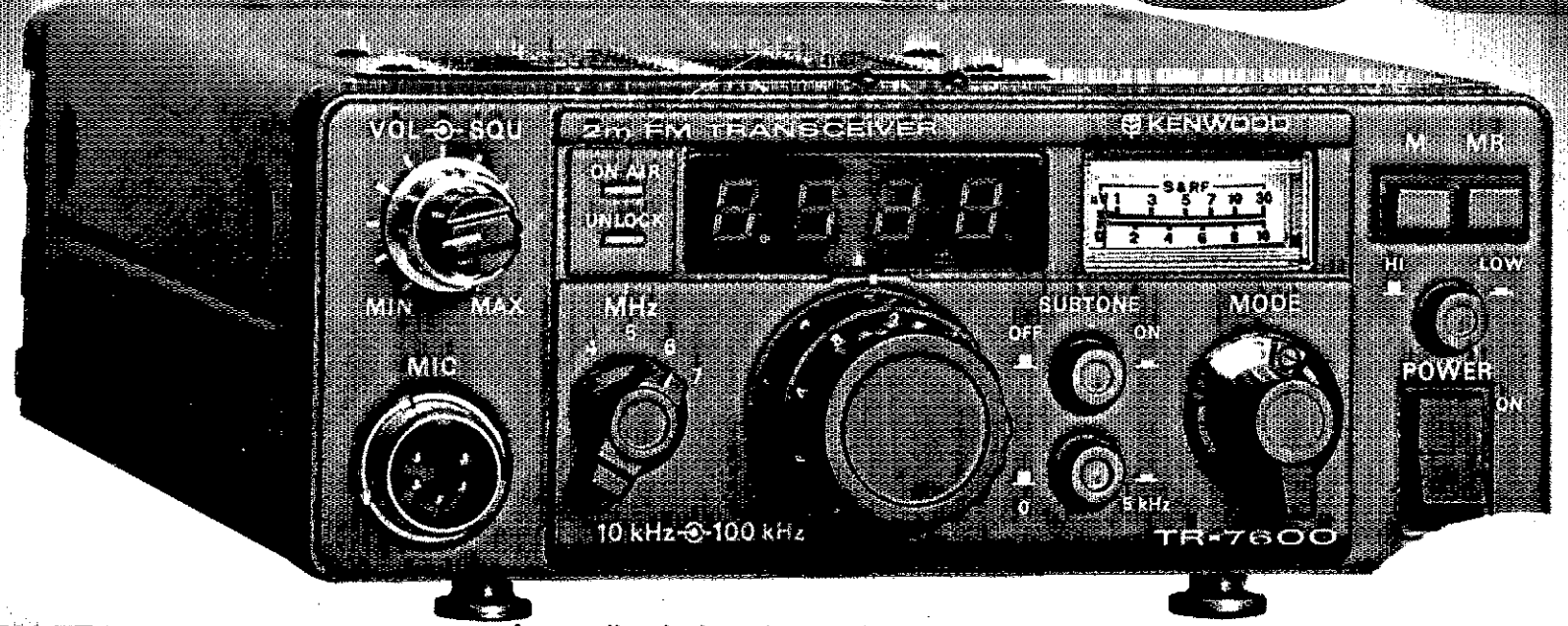
YAESU

YAESU The radio.

YAESU ELECTRONICS CORP., 15954 Downey Ave., Paramount, CA 90723 ● (213) 633-4007

THE ALL NEW

TR-7600



EVERY FEATURE YOU COULD POSSIBLY WANT IN A 2-METER FM RIG IS AVAILABLE NOW IN THE KENWOOD TR-7600

...THE RADIO THAT REMEMBERS

The new TR-7600 gives you...

• Full 4-MHz coverage (144.000-147.995 MHz) on 2 meters • 800 channels • Dual concentric knobs for fast frequency change (100-kHz and 10-kHz steps) • 5-kHz offset switch • MHz selector switch...for desired band (144, 145, 146, or 147 MHz) • Mode switch for operating simplex or for switching the transmit frequency up or down 600 kHz for repeater operation... or for switching the transmitter to the frequency you have stored in the TR-7600's memory (while the receiver remains on the frequency you have selected with the dual knobs) • Memory channel...with simplex or repeater (plus or minus 600 kHz transmitter offset) operation.

Actual Size

RM-76 Microprocessor Control Unit

The optional RM-76 Microprocessor Control Unit provides more operating features to the TR-7600 2-meter FM transceiver than found in any other rig! With the Microprocessor Control Unit attached to your TR-7600, you can...

• Select any 2-meter frequency • Store frequencies in six memories • Scan all memory channels • Automatically scan all frequencies in 5-kHz steps • Manually scan up or down in 5-kHz steps • Set lower and upper scan frequency limits • Reset scan to 144 MHz • Stop scan (with HOLD button) • Cancel scan (for transmitting) • Automatically stop scan on first busy or open channel •

Subject to FCC approval

TRIO-KENWOOD COMMUNICATIONS INC. 1111 WEST WALNUT/COMPTON, CA 90220

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