QST

July 1980 $2.50

devoted entirely to
Amateur Radio

tempo...

the first in synthesized portables gives you the broadest choice at the lowest price

Shown with optional touch tone pad

...the new S-5

* The only synthesized hand-held offering 5 watts output. (Switchable for 1 or 5 watt operation)
* The same dependability as the time proven S-1. Circuitry that has been proven in more than a million hours of operation.
* Heavy duty battery pack.
* External microphone capability.
* The S-5's exciting low price...only $299.00
* With touch tone pad $339.00

SPECIFICATIONS

Frequency Coverage:	144 to 148 MHz
Channel Spacing:	Receive every 5 kHz, transmit Simplex or ±600 kHz
Power Requirements:	9.6 VDC
Current Drain:	17 ma-standby 900 ma-transmit
Antenna Impedance:	50 ohms
Dimensions:	40 mm x 62 mmx 170 mm (1.6" x 2.5" x 6.7")
Weight:	17 oz.
Sensitivity:	Better than 5 microvolts nominal for 20 db

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

OPTIONAL ACCESSORIES
12 Button touch tone pad (not installed): $39 • 16 Button touch tone pad (not installed): $48 • Tone burst generator: $29.95 • CTCSS sub-audible tone control: $29.95 • Rubber flex antenna: $8 • Leather holster: $16 • Cigarette lighter plug mobile charging unit: $6 • Matching 30 watt output 13.8 VDD power amplifier (S30): $89 • Matching 80 watt output power amplifier (S80): $149

The new improved Tempo S-1

- The first and most thoroughly field tested hand-held synthesized radio available.. 800 channels in the palm of your hand.
- Simple to operate. (You don't need a degree in computer programming)
- Heavy duty battery pack allows more operating time between charges.
- External microphone capability
- The lowest price ever...$259.00
- *The S-1T (With touch tone pad installed)...$289.00*

The Tempo line also features a fine line of extremely compact UHF and VHF pocket receivers. They're low priced, dependable, and available with CTCSS and 2-tone decoders. The Tempo FMT-2 & FMT-42 (UHF) provides excellent mobile communications and features a remote control head for hide-away mounting.
The Tempo FMH-42 (UHF) and the *NEW* FMH-12 and FMH-15 (VHF) micro hand held transceivers provide 6 channel capability, dependability plus many worthwhile features at a low price. FCC type accepted models also available.
Please call or write for complete information. Also available from Tempo dealers throughout the U.S. and abroad.

The Tempo S-2

Tempo is first again. This time with a superior quality synthesized 220 MHz hand held transceiver. With an S-2 in your car or pocket you can use 220 MHz repeaters throughout the U.S. It offers all the advanced engineering, premium quality components and exciting features of the S-1. The S-2 offers 1000 channels in an extremely lightweight but rugged case.

If you're not on 220 this is the perfect way to get started. With the addition of the S-25 (25W output) or S-75 (75W output) Tempo solid state amplifier it becomes a powerful mobile or base station. If you have a 220 MHz rig, the S-2 will add tremendous versatility. Its low price includes an external microphone capability, heavy duty ni-cad battery pack, charger, and telescoping whip antenna.
Price...$349.00 With touch tone pad...$399.00

TEMPO VHF & UHF SOLID STATE POWER AMPLIFIERS

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

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

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

TOLL FREE ORDER NUMBER: (800) 421-6631
For all states except California.
Calif. residents please call collect on our regular numbers.

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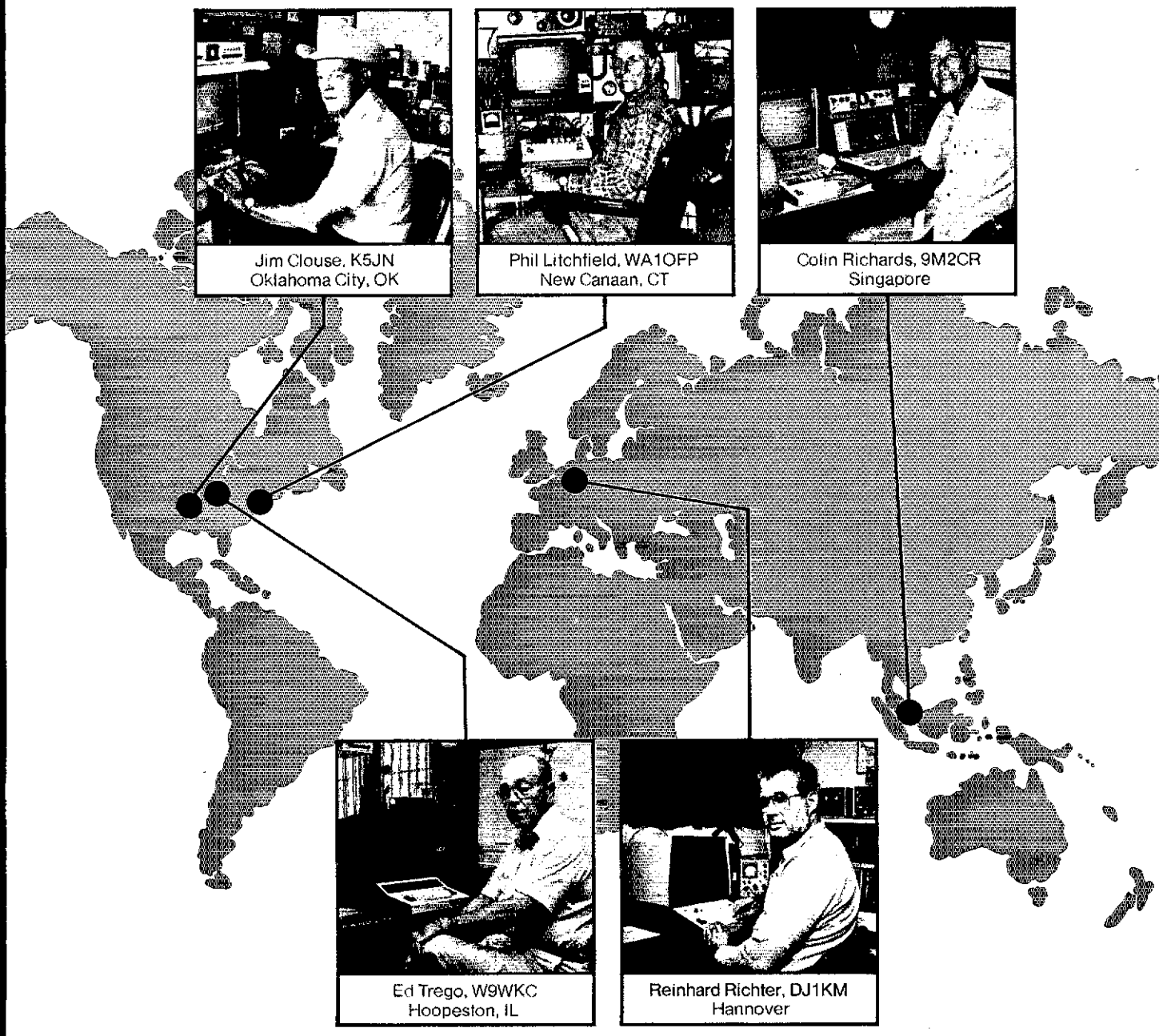
Henry Radio

Prices subject to change without notice.

WHEN OUR CUSTOMERS TALK... WE LISTEN.



From around the world their RTTY messages read loud and clear.

At HAL we *want* to hear what our customers have to say about RTTY practices, problems, and possibilities. So when they talk . . . we listen . . . and respond.

The result is that HAL Communications equipment stays at the leading edge of RTTY design with . . . features that open up new capabilities for greater enjoyment of RTTY operation. And with performance reliability so certain, we offer a full one-year warranty.

Write or give us a call. We'll be glad to send you our new RTTY catalog.

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Urbana, Illinois 61801
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IC-720

The New Standard in Ham Radio

You're looking at the next generation in ham radio design. The ICOM IC-720 has standard features offered elsewhere as options... or not offered at all:

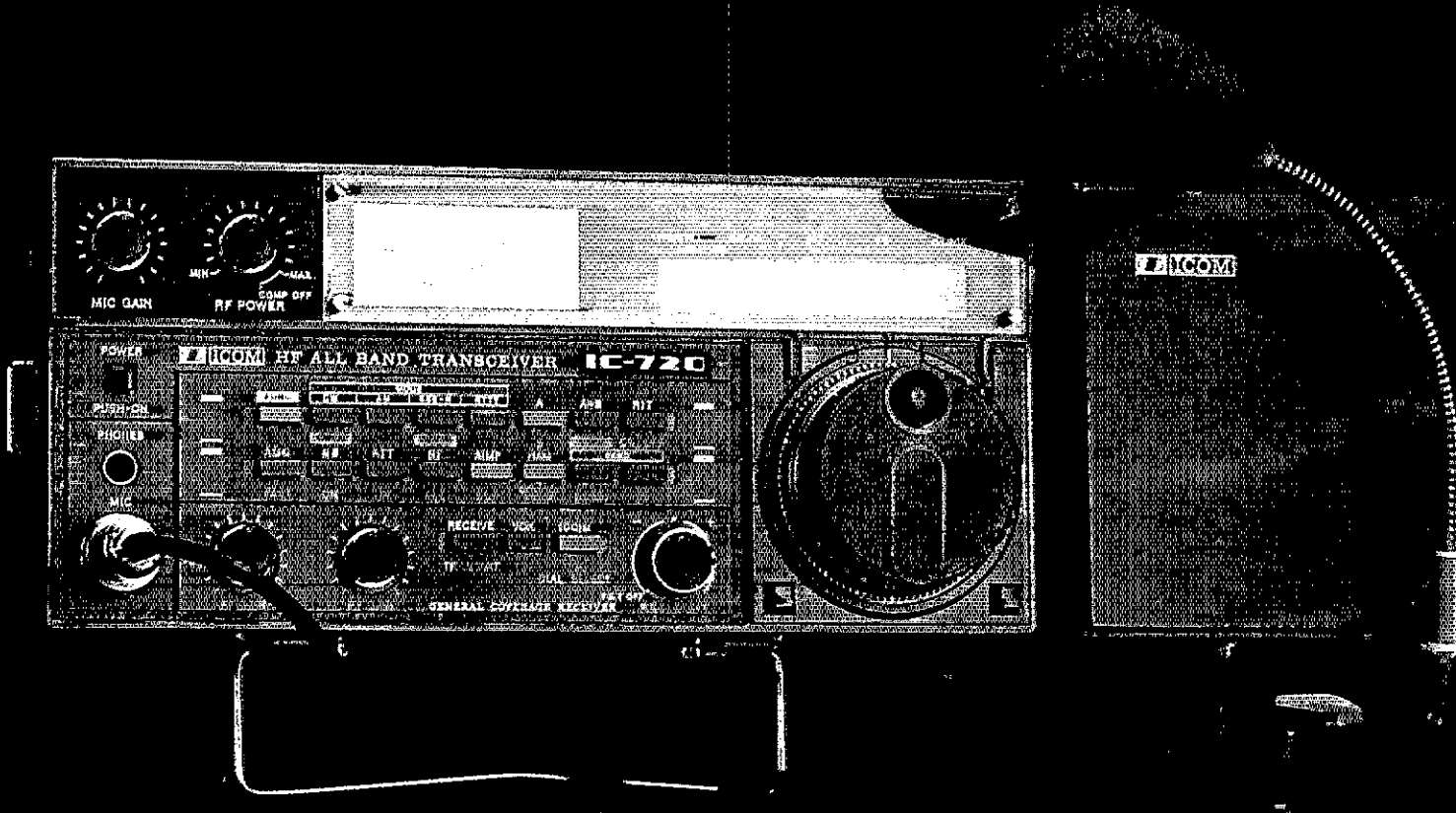
Transmit on all 9 HF bands...

Receive from .1 to 30 MHZ... with just a push of a button.

Dual built-in VFO's.

Automatic sideband selection (reversible). All solid state. Fully synthesized. Etc., etc., etc., etc.

There isn't enough room to list all of the specifications and features of this exceptional radio. So, please visit an authorized ICOM dealer or write to the address below for additional information.



ICOM

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Volume LXIV Number 7

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THE COVER

This is just one of the many splendid sights available to those who make their way to Seattle for the 1980 National Convention, July 25-27. *(photo courtesy Rudy B. Schroeder, W7FCB)*

Contents

Rack Attack from DenTron

Components are the latest in communication systems adapting to your stations' needs. The DTR-3KA and DTR-1200L are equipped with heavy-duty handles for easy rack mounting and rack brackets that can be easily removed. The DTR-1200L linear amplifier provides 1200 watts SSB and 1000 watts CW input continuous duty. It features large 3½" shadow box, back lit meters for easy reading, and tuned input for compatibility with solid state or tube transceivers. The DTR-3KA antenna tuner handles a full 3KW PEP. It features a built in 2KW dry dummy load with thermostatically controlled forced air cooling, a remote sensor box to insure meter accuracy and 50 OHM impedance. Component racks available at your DenTron Dealer.

DTR-1200L Linear Amplifier

Frequency Ranges:

80 Meter Band	3.45 - 4.6 MHz
40 Meter Band	6.00 - 9.0 MHz
20 Meter Band	10.00 - 16.00 MHz
15 Meter Band	20.95 - 23.50 MHz
10 Meter Band	Export Model

Modes: USB, LSB, CW, RTTY, SSTV
Power Input: 1200W - SSB, 1000W - CW
Power Requirements: 234/117 VAC 50/60 Hz
RF Drive Power: 150 Watts maximum and 65 watts minimum for 1 KW DC input.
DC Plate voltage: Idle + 2300V approximate
Duty Cycle: 100% SSB, CW, RTTY, SSTV
Input Impedance: 50 Ohms nominal
Input VSWR: 1.5 to 1 average
Output Impedance: 50 Ohms nominal
Antenna load VSWR: 2 to 1 maximum
ALC: negative going, adjustable from front panel
Spurious Emissions: IMD - greater than 30 db down
Harmonics - greater than 40 db down
FCC Type Accepted
Size: 5¼" H x 17" W x 13" D (19" W with rack brackets)
Weight: 46 pounds
Switchable 12VDC accessory output voltage
Multimeter:

Plate Voltage	0 - 3000VDC
Plate Current	0 - 500ma
Relative Output	Adjustable

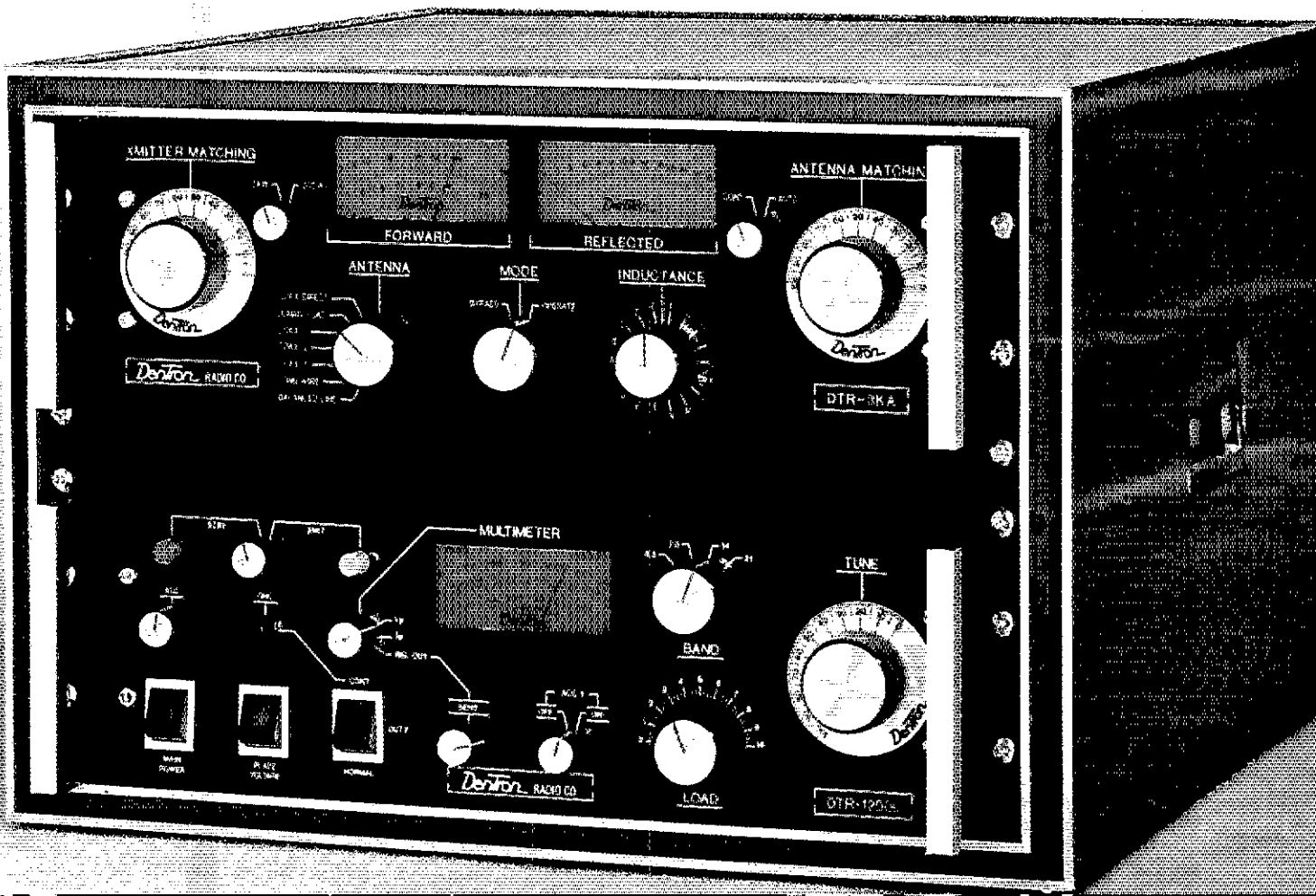
Front Panel Plate Voltage Switching

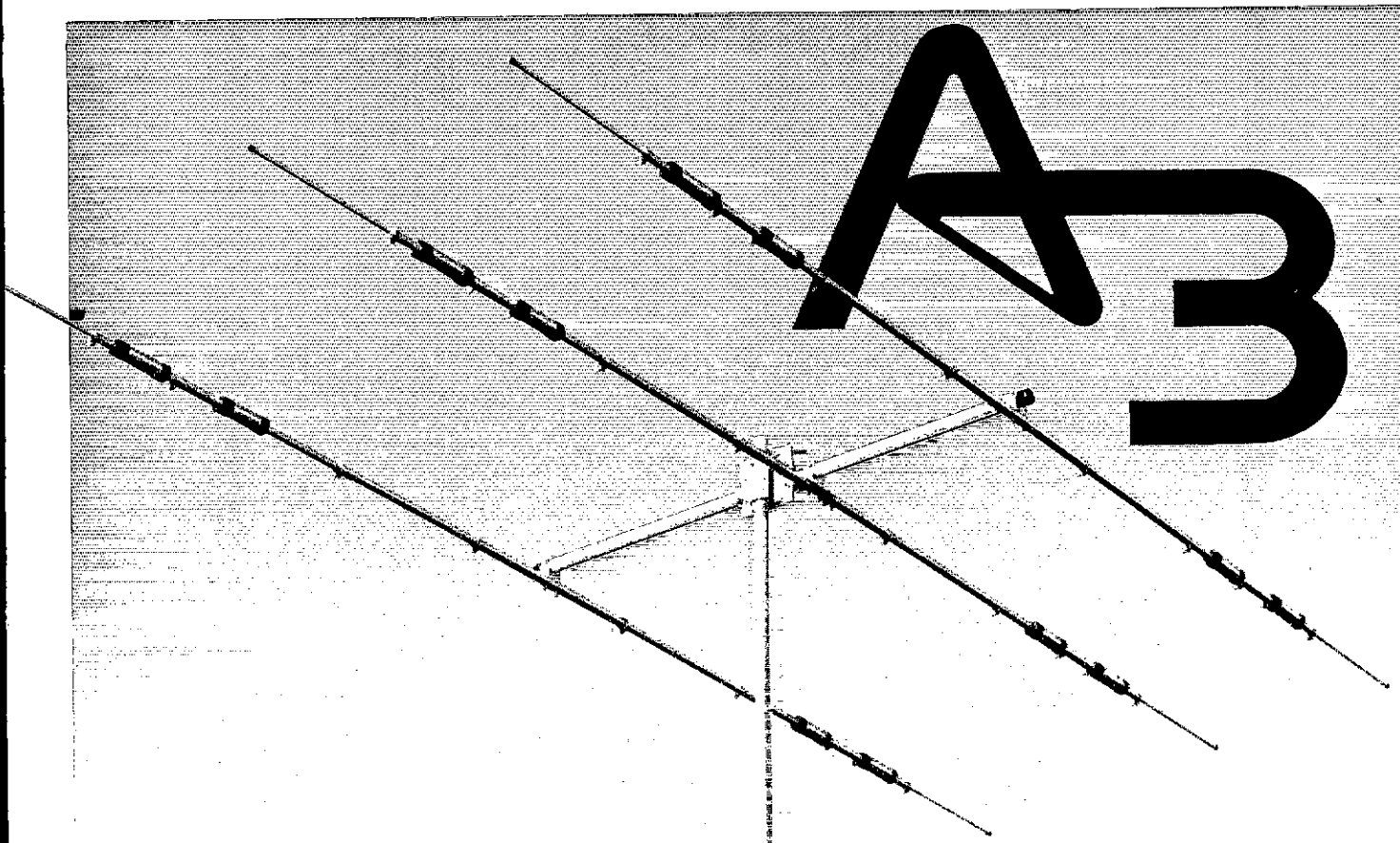
DTR-3KA Antenna Tuner

Frequency Coverage: 1.8 - 30 MHz continuous
Built in 2 KW PEP Dummy Load - Forced Air Cooled
Input Impedance: 50 ohms (Resistive) to transmitter
Antenna Inputs
- Coax 1, 2 & 3 - unbalanced—may range from a few ohms to a high impedance
- Long wire - low to high impedance
- Balanced line - 75-660 ohms

Power Capability: 3000 watts P.E.P.
Wattmeter: 200 watts forward
2000 watts forward
200 watts reflected
Accuracy: ± 5%
Remote sensor box
3½" backlit meters
Dummy Load: with manual or automatic forced air cooling.
Integral 3KW Balun

DenTron®
Radio Co., Inc.
1605 Commerce Drive
Stow, Ohio 44224
(216) 688-4973





$219.95

The full power, full performance 20-15-10 meter beam.

V.S.W.R.	1.2-1 Typical
Average Bandwidth	500 KHz
Power Rating	2000 w PEP
Feed Point Impedance	50Ω
Connector	Twin terminal stainless steel takes all coax.
Boom	1⅝"-1½" x 14'
Elements/Longest	1⅛"-½" x 27'9"
Wind Sfc. area	5.6 Feet²
Weight	35 Pounds
Turn Radius	15'6"
Mast Diameter	1¼" min. 2" max.
Material	6063-T832 Seamless aluminum
Fasteners	Zinc Plated Steel
Telescope Method	Taper tubing with full circle clamps

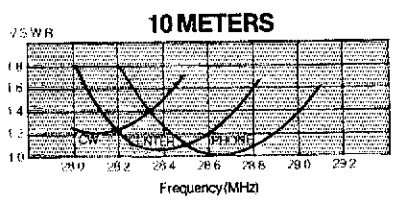
UPS Shippable

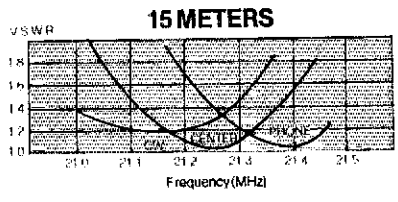
No balun required

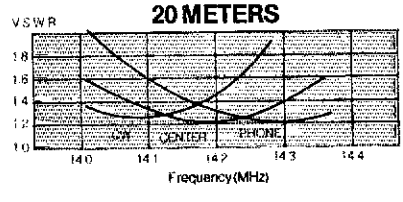
Enjoy the thrill of working rare DX with excellent A3 forward gain. Increase the pleasure of your daily contacts with A3 interference reducing front to back ratio. Use your linear amplifier with confidence in our new A3 high power traps.

Make friends of your neighbors with A3 compact dimensions, low profile, and small turn radius. Satisfy your budget with A3 economy pricing.

The Cushcraft engineering team has again created that unique combination of quality materials, easy assembly and high performance with A3, the three band beam for the eighties.







A LEADER FOR OVER 30 YEARS

cushcraft CORPORATION

The Antenna Company

48 Perimeter Road, P.O. Box 4680
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KENWOOD
...pacesetter in amateur radio

Hand-shack.

Synthesized, big LCD, 10 memories, scanning, DTMF

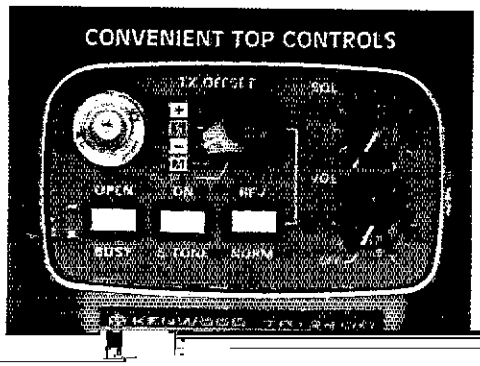
Touch-Tone®

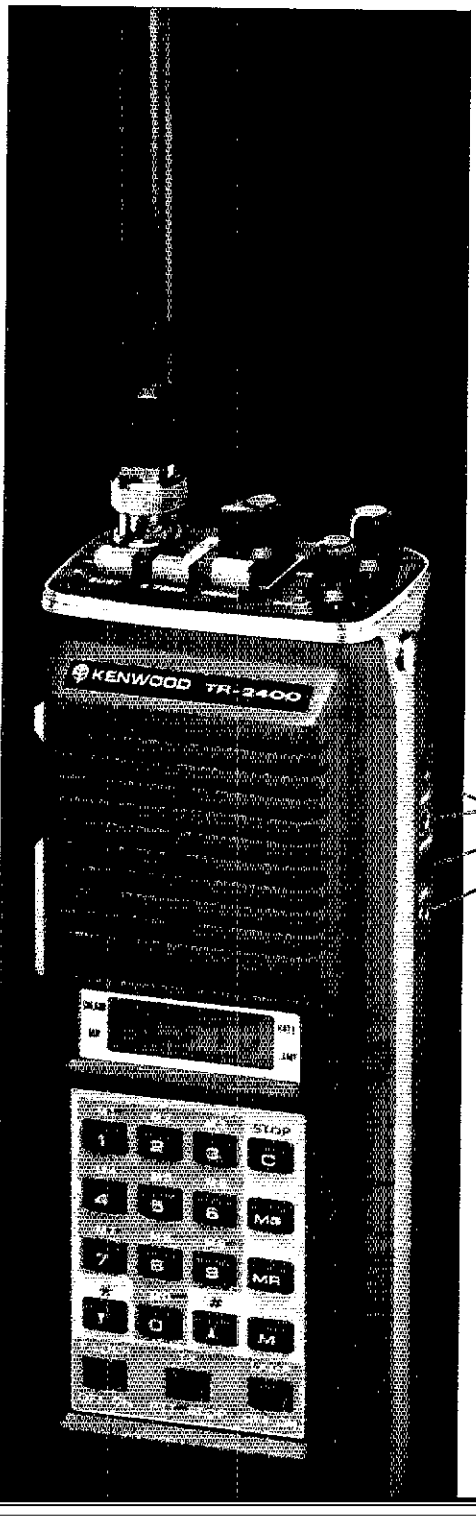
TR-2400

Put a ham shack in your hand. The TR-2400 is the ideal hand-held for 2 meters FM. It features a large LCD readout that can be read in direct sunlight or in the dark, 5-kHz-step PLL synthesized operation, 10-channel memory, scanning, and 16-button autopatch DTMF encoder.

TR-2400 FEATURES:

- **Large LCD digital readout**
  Readable in direct sunlight (better than LEDs). Readable in the dark (with lamp switch). Virtually no current drain (much less than LEDs) and display stays on. Rugged and dependable in hot or cold temperature ranges. Shows receive and transmit frequencies and memory channel.
- **5-kHz-step frequency selection**
  PLL synthesized keyboard channel selection system. No "5 up" switch needed. Selects from 144.000 to 147.995 MHz.
- **UP/DOWN manual scan**
  Single or fast continuous 5-kHz steps from 143.900 to 148.495 MHz for Amateur and MARS or CAP simplex or repeater operation.
- **10 memories**
  Retained with battery backup (only 0.8 mA). "M0" memory may be used to shift the transmit frequency any desired amount to operate on repeaters with nonstandard split frequencies.
- **Built-in autopatch DTMF (Touch-Tone®) encoder**
  Uses all 16 buttons of keyboard while transmitting.





- **Repeater or simplex operation**
  Convenient mode switch shifts transmit frequency +600 kHz or -600 kHz or to the frequency stored in "MO" memory.
- **Reverse operation**
  Nonlocking switch shifts receiver to transmit frequency and transmitter to receive frequency.
- **Extended operating time**
  With LCD and overall low-current circuit design. Only draws about 28 mA squelched receive and 500 mA transmit (at 1.5 W RF output), for longer operating time between charges.
- **Two lock switches**
  Prevent accidental frequency change and accidental transmission.
- **BNC antenna connector**
  Easy to connect external antenna.
- **LCD "arrow" indicators**
  Show "ON AIR," "MR" (memory recall), "BATT" (battery status), and "LAMP" switch on.
- **High-impact case and zinc die-cast frame**
  Extremely rugged with antenna counterpoise.
- **External PTT microphone and earphone connectors**
  Easily accessible on right side of transceiver.
- **Compact and lightweight**
  Only 2 13/16 inches wide, 7-9/16 inches high, and 1-7/8 inches deep. Weighs only 1.62 pounds (including antenna, battery, and hand strap).

Microphone PTT and audio terminals

Charger terminal

Earphone Jack

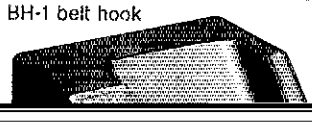
STANDARD ACCESSORIES INCLUDED:

- Flexible rubberized antenna with BNC connector
- Heavy-duty (450-mAh) NiCd battery pack
- External-standby (PTT) plug
- AC charger
- External-microphone plug
- Hand strap
- Earphone

NOTE: *Price, specifications subject to change without notice and obligation.*

OPTIONAL ACCESSORIES:

- ST-1 base stand (shown) which provides 1.5-hour quick charge and automatic switch to trickle charge, floating charge (operate while charging), 4-pin connector for dynamic microphone, and SO-239 antenna connector
- BC-5 DC quick charger (1.5 to 2.0 hours)
- LH-1 deluxe leather case (top-grain cowhide)
- PB-24 extra battery pack with charger adapter
- BH-1 belt hook



TRIO-KENWOOD COMMUNICATIONS INC.
1111 WEST WALNUT / COMPTON, CA 90220

Easy selection.

15 memories/offset recall, scan, priority, DTMF Touch-Tone®

TR-7800

Kenwood's remarkable TR-7800 2-meter FM mobile transceiver provides all the features you could desire for maximum operating enjoyment. Frequency selection is easier than ever, and the rig incorporates new memory developments for repeater shift, priority, and scan, and includes a built-in autopatch DTMF encoder.

TR-7800 FEATURES:

- **15 multifunction memory channels, easily selectable with a rotary control**

  M1-M13...memorize frequency and offset (±600 kHz or simplex).
  M14...memorize transmit and receive frequencies independently for nonstandard offset.
  M0...priority channel, with simplex, ±600 kHz, or nonstandard offset operation.

- **Internal battery backup for all memories**

  All memory channels (including transmit offset) are retained when four AA NiCd batteries (not Kenwood-supplied) are installed in battery holder inside TR-7800. Batteries are automatically charged while transceiver is connected to 12-VDC source.

- **Priority alert**

  M0 memory is priority channel. "Beep" alerts operator when signal appears on priority channel. Operation can be switched immediately to priority channel with the push of a switch.

- **Extended frequency coverage**

  143.900-148.995 MHz, in switchable 5-kHz or 10-kHz steps.

- **Built-in autopatch DTMF (Touch-Tone®) encoder**

- **Front-panel keyboard**

  For frequency selection, transmit offset selection, memory programming, scan control, and selection of autopatch encoder tones.

- **Autoscan**

  Entire band (5-kHz or 10-kHz steps) and memories. Automatically locks on busy channel; scan resumes automatically after several seconds, unless CLEAR or mic PTT button is pressed to cancel scan.

- **Up/down manual scan**

  Entire band (5-kHz or 10-kHz steps) and memories, with UP/DOWN microphone (standard).

- **Repeater reverse switch**

  Handy for checking signals on the input of a repeater or for determining if a repeater is "upside down."

- **Separate digital readouts**

  To display frequency (both receive and transmit) and memory channel.

- **Selectable power output**

  25 watts (HI)/5 watts (LOW).

- **LED bar meter**

  For monitoring received signal level and RF output.

- **LED indicators**

  To show: +600 kHz, simplex, or -600 kHz transmitter offset; BUSY channel; ON AIR.

- **TONE switch**

  To actuate subaudible tone module (not Kenwood-supplied).

- **Compact size**

  Depth is reduced substantially.

- **Mobile mounting bracket**

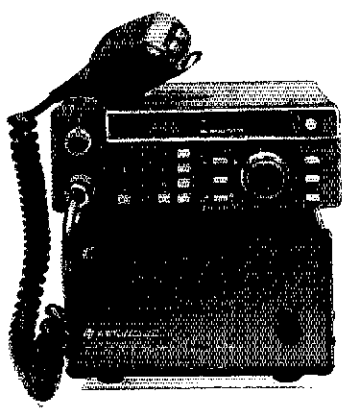
  With quick-release levers.

See your Authorized Kenwood Dealer now for details on the TR-7800...the remarkable 2-meter FM mobile transceiver!

NOTE: *Price, specifications subject to change without notice and obligation.*

MATCHING ACCESSORY:

- KPS-7 fixed-station power supply



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Reports Invited: The ARRL Board of Directors (see list at left) determines the policies of ARRL. The 16 divisions of the League are further arranged into 73 administrative "sections," each headed by an elected Section Communications Manager. Your SCM welcomes reports of individual and club activity. ARRL Field Organization appointments are available covering a wide range of amateur radio operating interests. Whatever your license class, your SCM has an appointment available. Check with your SCM (below) for further information. Section boundaries are defined in the booklet *Operating an Amateur Radio Station*, free to members.

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THE AMERICAN RADIO RELAY LEAGUE, INC.

"It Seems to Us..."

Press On

Persistence

Nothing in the world can take the
place of persistence
Talent will not; nothing is more common
than unsuccessful men with talent.
Genius will not; unrewarded genius is
almost a proverb.
Education will not; the world is full
of educated derelicts.
Persistence and determination alone
are omnipotent. The slogan "Press On"
has solved, and always will solve, the
problems of the human race.

On Friday, May 23rd, amateur space activities suffered a disappointment when the Ariane launch vehicle failed and dumped AMSAT-OSCAR Phase 3 (AMSAT-OSCAR 9) into the ocean (see page 45). A lot of money and hardware went, literally, down the drain. An even greater loss was the amount of volunteer time that had been invested in the project — hundreds of hours of volunteer labor gone with nothing to show for it.

With nothing to show for it? Not so! The reactions of support that have flowed in since May 23rd have showed the depth of commitment to the amateur space program and have showed the faith of amateurs around the world that persistence and determination will indeed prevail.

Prior to the attempted launch, the president of the League and this writer had assured the new president of AMSAT that the League would continue to provide any desired and necessary support for AMSAT. Little did we know how soon that pledge would have a most significant meaning! Immediately after the launch failure, the president of the League and the president of the ARRL Foundation initiated discussion on how we could best provide the kind of tangible support that AMSAT would need so that it could regroup and get underway again. Funds are, of course, a major consideration, and help appears to be coming from many quarters. It has been heartening, at amateur conventions since the launch failure, to find that there is both concern and optimism. The League and the ARRL Foundation share this concern, and they share this optimism — and stand ready to assist AMSAT in its fund-raising activities in any way that AMSAT feels is most appropriate. As of this writing (June 3rd) it is too early to specify the time schedule for AMSAT's renewed activity. We do believe, however, that all of those who have a vital interest in amateur activity in space have the necessary talent and genius and education. More than that, we believe they have the persistence and the determination to solve the problems and to provide the leadership which is so essential.

Press on!

Richard L. Baldwin, W1RU

League Lines...

Details on two late-breaking developments can be found in this issue. On page 28 you will find K7UUH's description of how the Mount St. Helens eruption buried a remote camera project the Tektronix Employees Radio Amateur Club was involved with. Also, highlights of the ill-fated launch of the first AMSAT-OSCAR Phase III spacecraft, including transcripts of communications from the launch site, appear on pages 45 and 51.

FCC has decided to permit standard bandwidth fm, 16F3, from 50.1 to 54 MHz. The present rules allow standard bandwidth fm on the 6-meter band from 52.5 MHz to 54 MHz only. The new rules becomes effective 30 days from its publication, a date which was not known at presstime. See "Happenings" next month for details.

ARRL will be petitioning FCC for more amateur privileges on the 160-meter band, now that LORAN-A (Long Range Aid to Navigation) on that band is being phased out. Details will appear in a future issue of QST.

The Board of Directors of the Canadian Radio Relay League has accepted, with regret, the resignation of Ron Hesler, VE1SH, as president and appointed Mitch Powell, VE3OT, presently vice president, as the new president. Ron Hesler, with a long and impressive record of service to Canadian Amateur Radio, was formerly ARRL Canadian Division vice director and director. A founding member of CRRL, he was its first president.

Last chance for legislation this year: Amateurs are urged to remind their U.S. Senators of Senate Bills 611 and 622 which, if adopted, would amend the Communications Act. For details, refer to "It Seems to Us . . . " in May 1980 QST.

The FCC has adopted the text prepared by its staff to discontinue licensing new club, RACES and military recreation stations. However, those who have club, RACES and military recreation stations can keep them. This confirms the FCC's initial decision in Docket 21135.

Please give the FCC a little help. Friends of a deceased ham should make sure the silent key's license gets back to FCC for cancellation to prevent its misuse by unlicensed persons. Otherwise, such call signs remain in the Commission's files at least until expiration (and probably for a year afterward). Send these licenses to FCC, Gettysburg, PA 17315.

ASCII Bulletins on W1AW! Effective July 1, 1980, each RTTY bulletin transmission (beginning at 0100, 0400 and 2200 UTC daily, and at 1500 UTC Monday through Friday) will be followed by a repeat on 110-baud, 170-Hz shift, ASCII.

The Hq. Technical Department is accepting applications for career positions as Assistant Technical Editor and Laboratory Technician. Interested persons with experience and an Associate Degree or higher in electronics should contact K1TD or W1FB at Hq.

The ARRL offers a low-cost insurance package to its members to protect your ham gear against fire, theft and other losses. The package does not include antenna systems, but it covers your rig and accessories whether at home, in your car, or even at a Field Day site. If you don't have this policy you're missing out! For an application form, send an s.a.s.e. marked "Insurance" to us here at Hq. If you have specific questions, and reside outside of Texas, Hawaii, Alaska or Canada, you may call the insurance administrators directly at their toll-free number: 800-527-3304. Residents of Texas, Hawaii, Alaska and Canada may call 214-388-4455.

The FCC began using new Amateur Radio examinations at all Commission offices in June. The new examinations are based on FCC study outlines which appeared in March 1980 QST, pages 55 to 58. All classes of license, Novice through Amateur Extra, are affected.

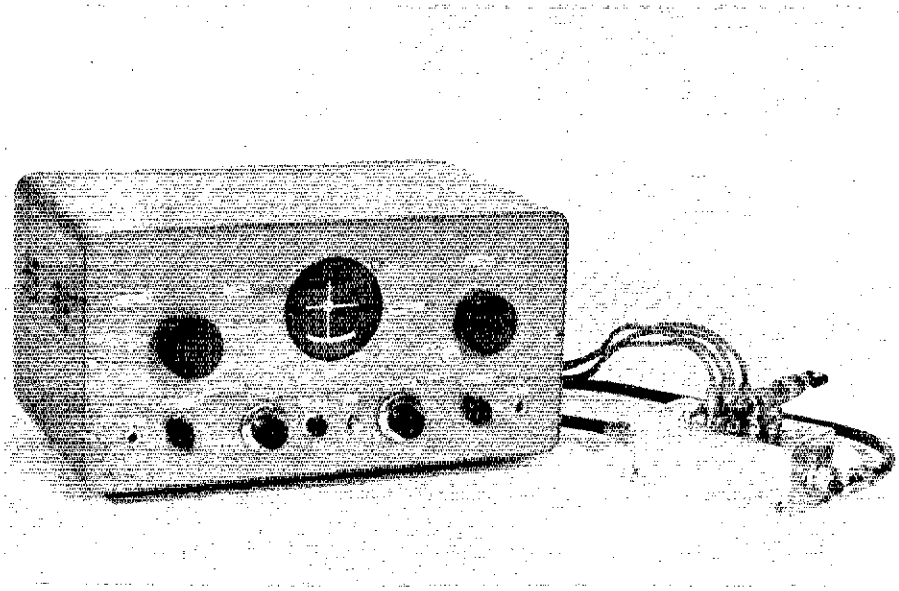
The ARRL Board of Directors will meet in Seattle, Washington, on July 23 and 24. The Board is the policy-making group for the League; each Division has its own representative to speak for it. Now is the time for you to tell your director what's on your mind -- names and addresses are on page 8.

Speaking of directors, nominations are now open for directors and vice directors in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions. See "Happenings", page 50 of this issue, for more details.

The Impedance-Match Indicator

Use this rf-impedance and phase-angle indicator instead of an SWR bridge to match antennas quickly and conveniently. Painless theory is included so you'll know the "why" as well as the "how."

By David Geiser,* WA2ANU



The impedance-match indicator, control unit on the left and sensor unit on the right. The control unit uses a novel surplus dual-movement meter, mounted in the center of the front panel.

The impedance-match indicator (IMI) gives a person tuning an antenna or transmission line more helpful information than a standing-wave ratio (SWR) bridge does, but is not much more difficult to build. Tuning is easier with the IMI, and the adjustment can even be made automatic using the IMI output.

Though the basic IMI is more than 30 years old and in fairly common use by the military, amateur use has been rare. This article gives the basic theory and construction of a simple IMI designed for use with transmitters rated at 50- to 500-watts output over the frequency range of 3.5 to 29.7 MHz. The IMI is calibrated by, and is almost as accurate as, the station dummy load.

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†Notes appear on page 16.

The SWR bridge tells its users the degree of mismatch a transmitter or transmission line sees, but does not tell the user how to correct the match. The IMI tells the user whether the impedance is too high or too low, and whether it looks capacitive or inductive.

Introduction

A matched transmission-line load is a set resistance, usually 50 ohms for amateur transmitters. If the resistance is greater or less, or if there is some uncompensated inductance or capacitance in the load, the match will not be perfect. (A perfect match is indicated by a 1:1 SWR.) A small mismatch (a 1.2:1 SWR, for instance) can be tolerated by almost all transmitters, and many will operate well with larger mismatches.

Any load is made up of resistance and perhaps either capacitive or inductive reactance at a given frequency. The combination, called impedance, is simply E/I, and is indicated by a circuit in the IMI that determines whether the ratio is more than, less than, or equal to 50. The IMI also indicates phase angle. The phase angle is the difference between the phases of the rf voltage and current, and results from the presence of uncompensated capacitance or inductance. If the current lags the voltage, the load is inductive. If the current leads, the load is capacitive. If there is no phase difference, the load is purely resistive.

Sampling Voltage and Current in the IMI

Three voltage-sampling methods are shown in Fig. 1. A resistive voltage-divider (A) may be used, but resistors tend to be troubled with shunt capacitance, and they dissipate power. The inductive or autotransformer divider (B) may be troubled with stray capacitance and self-resonance. The capacitive divider (C) was chosen as the starting point because capacitors are easily found that have low loss and little inductance (air-variable and silver-mica capacitors, for example).

Two current-sampling schemes are shown in Fig. 2. In A, a small-value resistor is placed in series with the coaxial center conductor and the developed voltage is proportional to the current.[1] This sample, however, is above ground potential at the full rf voltage and, when rectified, may be difficult to return to rf ground.

Another method of sampling current, using inductive pickup from the coax line, is shown in Fig. 2B. A coil or single-turn loop with its axis parallel to the magnetic field of the center conductor will pick up a usable signal. Unfortunately, the sample voltage is proportional to both the current and frequency. This means that 1 ampere of rf at 29.7 MHz would give a sample 8.5 times larger than that given by 1 ampere of current at 3.5 MHz. This is acceptable,

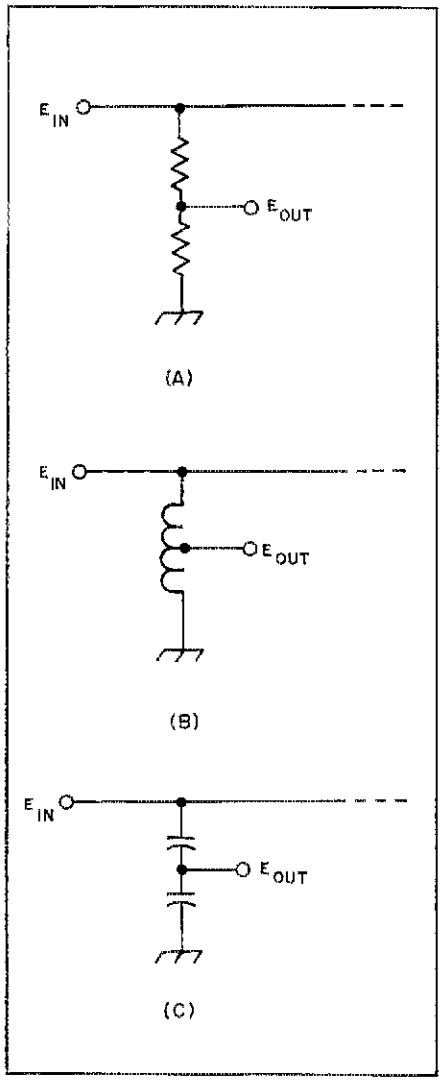


Fig. 1 — At A, a resistive voltage divider, at B, an inductive voltage divider, and at C, the capacitive voltage divider used in the IMI.

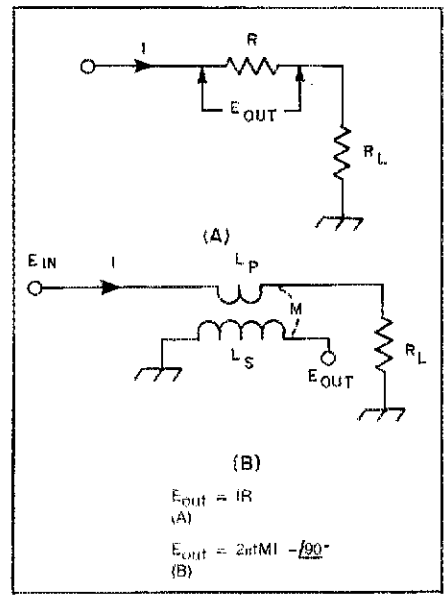


Fig. 2 — At A, a resistive current sensor, and at B, the inductive current sensor used in the phase indicator. Note the frequency sensitivity. M is the magnetic coupling between L_P and L_S.

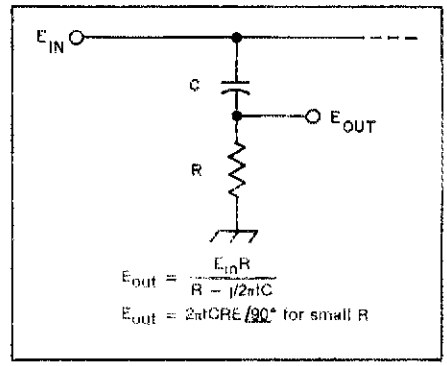


Fig. 3 — An R-C voltage sensor. Note the frequency sensitivity.

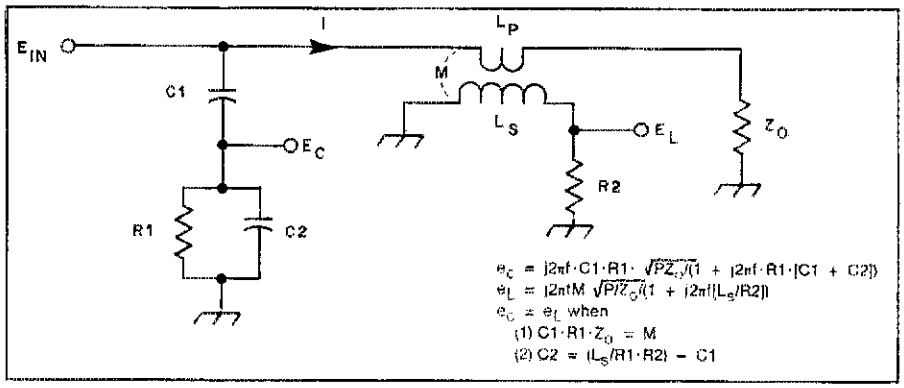


Fig. 4 — The frequency-compensated voltage (E_C) and current (E_L) sensors used in the impedance indicator.

however, since the modified capacitive sampler shown in Fig. 3 has the same response. Note that when the voltage sample in Fig. 3 (2π fCRE$\angle$90°) is divided by the current sample from Fig. 2B (2πfMI $-\angle$90°) to determine impedance, the term for frequency cancels out.

An increase of 3.16 times in both voltage and current will occur as the power level is increased from 50 to 500 watts (the IMI power-level design range). This means that if a sample of 1 volt were obtained at 3.5 MHz from 50 watts of rf, we could expect the sample to be 27 volts at 500 watts and 29.7 MHz. With an appreciable SWR, the voltage could be even higher. This makes the choice of diode rectifiers critical. Thus, a flattening of the sampler frequency response would be very desirable.

A bit of ingenuity was required to produce the circuit of Fig. 4. The voltage sampler (left) and the current sampler (right) give equal outputs when the equalities shown, (1) and (2), are satisfied. When the denominators of the sample-voltage equations (E_C and E_L) have an absolute value of about 2 at the lowest design frequency, the output flattens rapidly with increasing frequency. My goal was to have the output only about 25% higher at 29.7 MHz than at 3.5 MHz.

Measuring Impedance (The E/I Ratio)

Because of the way the samplers are set up, a 50-ohm impedance at any phase angle would give the same sample rf voltages. These voltages, when rectified to dc, would also be independent of phase. With voltages equal, the same type of rectifier can be expected to respond equally to each sample.

These samples could now be provided to a divider microcircuit which, after considerable processing, would display a good big number "50." There is, however, a much simpler way to determine if the sample voltage ratio is 1:1 (50 ohms). Make one of the samples (E_C, for instance) positive and the other negative. Add them. If the result is zero, the ratio is 1:1. If the result is positive, then E_C is too high for the load to have been 50 ohms or less. If the result is negative, the impedance is less than 50 ohms. If the dc output of both samples were made positive, then a microammeter (used as a millivoltmeter) could be connected between the two outputs to determine which is larger.

Note that neither of the methods will calculate the exact impedance, but only whether the impedance is above, below, or exactly 50 ohms. Zero-center microammeters are ideal for the display, and may usually be found at flea markets for two or three dollars. Uncalibrated ones are just fine, for the only really important point on the scale (zero current) can be calibrated by turning the rig off!

Phase Indicator

In order to determine the unknown phase, we must have two independent sets of samples, one whose output is always in phase with the voltage being sampled and one whose output is phase dependent. The capacitive voltage divider in Fig. 1C provides the former set of samples. For the latter, the inductive current sensor from Fig. 2B is useful. The rf sample (when feeding a resistive load in the primary circuit) lags the primary current by 90°. If we reversed the secondary winding, that sample output voltage would lead the primary current by 90°. Fig. 5A shows the capacitive voltage sampler connected to

one normal and one reversed current sampler. Here we obtain equal rf outputs (E_{lead} and E_{lag}) when we feed a purely resistive load, as in Fig. 5B. (That isn't strictly true, but is true enough if the reactance of L_P is very small compared to R_L.) When these rf voltages are rectified and compared, as in the impedance meter just discussed, they will indicate zero when there is zero phase angle between the load voltage and current.

The picture changes when the load becomes somewhat capacitive. The load current leads the load voltage by some angle, A° in Fig. 5C. The current-sensing samples E_{M1} and E_{M2} tilt the same amount, and now E_{lead} is greater than E_{lag}. The dc output corresponding to E_{lead} is greater, and I chose polarities to swing a zero-center meter to the right. For an inductive load, conditions reverse, with E_{lag} now larger, and the meter swings left of zero. (This is done as a memory aid: Left = L = inductance.)

The frequency sensitivity of the phase-indicator sample voltages distressed me (remember they change 8.5:1 from 29.7 to 3.5 MHz) until I reexamined Fig. 5. In the worst case (pure inductive or capacitve load), the greatest difference possible between E_{lag} and E_{lead} is twice E_C. The solution came in a flash: Make E_C smaller than either E_M at the lowest operating frequency. This can be done by making C3 smaller, C4 larger, or both. Remember, E_C is not frequency sensitive, so the maximum output difference for a given impedance is *not* frequency sensitive.

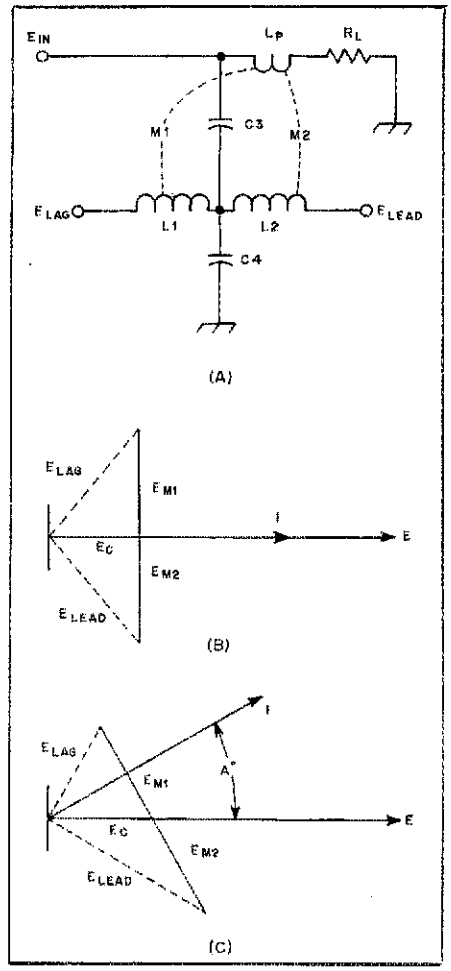


Fig. 5 — Phase sensor circuit and phase relations. Vectors with E and I in phase are shown at B. At C is the effect of current-leading phase.

Adding and Displaying Indicator Signals

The dc sampling voltages may be "added" with a pair of resistors. In Fig. 6, if R_A and R_B are equal, the deflection of the meter will be proportional to the sum of E_1 and E_2. Of course, if the two voltages have opposite polarity the deflection is proportional to their difference. With a 50-ohm impedance and zero phase angle, the voltages will be equal but opposite, so the deflection ideally would be zero.

Variations in components used, frequency, or power can be expected to make some change in the sensor output voltages. The resistor-value ratio can be changed to still give zero indication at "ideal" conditions, the easiest way being the replacement of the two equal resistors with a potentiometer, as shown in Fig. 6B.

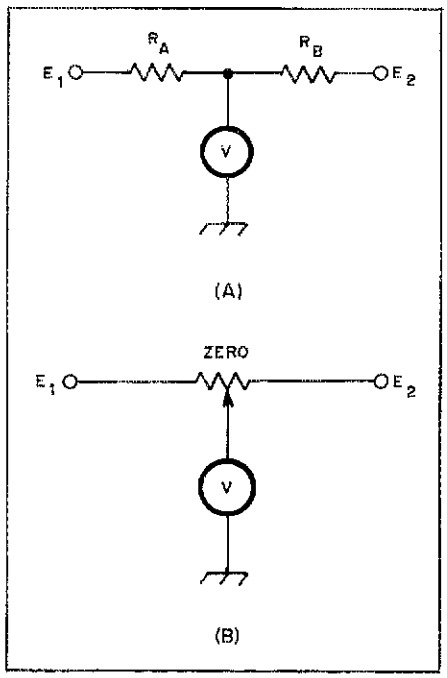


Fig. 6 — An analog addition circuit. A potentiometer, as shown at B, allows meter zeroing with somewhat unequal voltages of opposite polarity.

Construction Details

The schematic of the fully evolved IM1 is shown in Fig. 7. The two critical parts are the transformer and the sensor case. The core from the Amidon kilowatt balun kit was chosen because many amateurs have one or more spares in the junkbox. If not, it is still available from the manufacturer. This core will fit snugly in the standard-size box chosen for the sensor assembly, with good winding separation. Coupling to the coaxial center conductor is low, but this is even something of an advantage. After the transformer was wound, the critical secondary and mutual inductances of the impedance-sensing current winding measured 1.72 and 0.104 μH, respectively.[2] Details of the transformer are given in Fig. 8. Since the case is part of the transformer primary circuit, the case cover must be held securely in place. The case screws must also be tight; if one of the self-tapping screws strips the mating hole in the case, get a larger screw and make a tight joint. Sensor wiring should be concentrated along the case walls to minimize unwanted inductive pickup by the wiring. Sensor dc outputs should be bypassed with capacitors having short leads. This should be done very close to the output connectors.

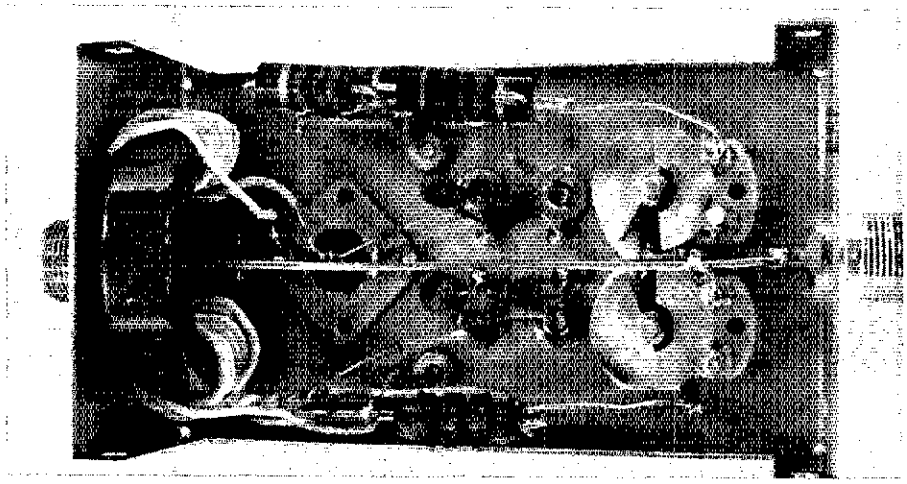
Variable capacitors C1 and C3 may be compression-mica or glass-piston types if the power level in use is 200 watts or less. Although the IM1 works well with a fixed capacitor for C2 as shown in Fig. 9, there is some advantage in making C2 variable. As may be noted from the equations in Fig. 4, (conditions 1 and 2), practically every factor in the impedance-indicator section of the IM1 may be balanced if C1 and C2 are both variable. I used 680-pF ceramic capacitors for C5 through C10. This value was used mainly because they were available; any value up to 0.001 μF is fine.

A moderate amount of power is dissipated in R1 and R2 when operating at the kilowatt power level or with a high SWR. Each of these resistors was made of four 2-watt composition resistors. R1 consists of four 220-ohm resistors in a series-parallel combination. R2 is four 100-ohm resistors in parallel. (R2 may also be a pair of 50-ohm CB dummy loads paralleled with a coaxial T adapter.)

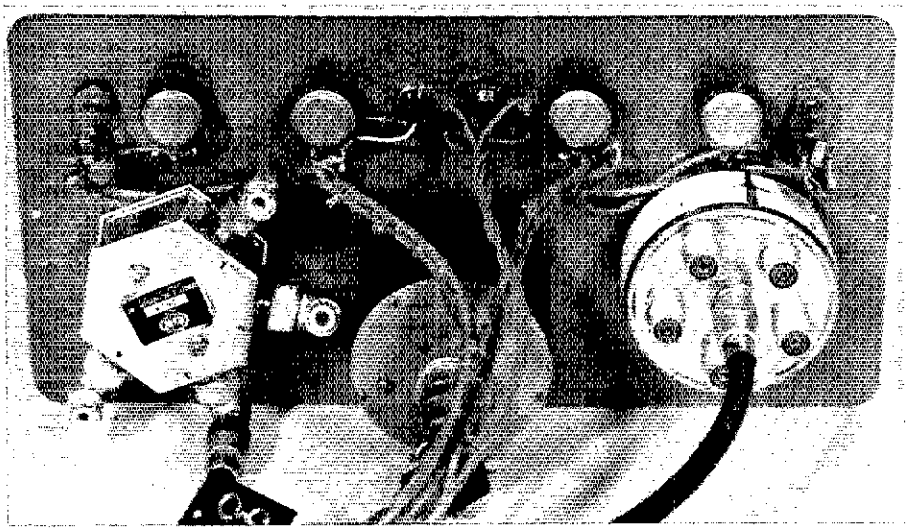
Since any adjustment of the load tends to make both meters swing, I like to have the meters as near each other as possible to avoid getting cross-eyed! Meters whose sensitivity ranges from 50-0-50 to 500-0-500 μA should be suitable. The low-current meters may have to be shunted to keep from pinning the needle. High-current meters should have a long scale so that small deflections can be seen easily.

The indicator unit that I built for fixed-station use uses an aircraft blind-landing indicator having two microammeters (250-0-250 μA) in one case at right angles to each other.[3] An AN (or MS) 3100-14S-2S plug and an AN (or MS) 3057-6 (or -6A) cable clamp adapter can be used to mate with this meter. However, it is not necessary to use these military connectors for this meter. The pins may be contacted with a wire wrap, or with the correct-size contacts salvaged from a nonmating connector.

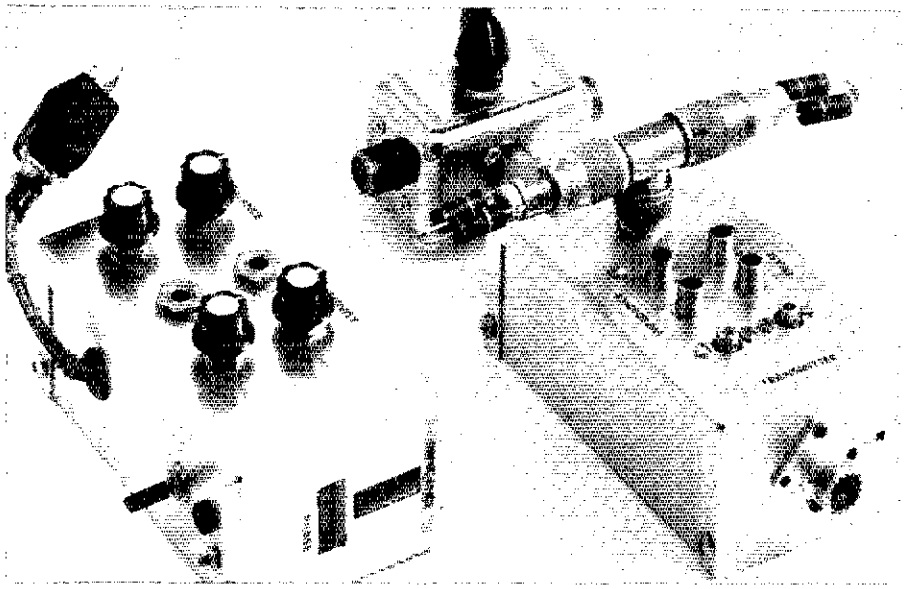
Dc leads from the sensor to the indicator unit were made of shielded audio patch cords which, because they are quite



An inside view of the rf sensor. The toroidal transformer is against the antenna end of the sensor case and may be held in place with whittled slabs of Styrofoam inside the core.



A rear view of the control panel. Liberal use of shielded wire minimizes rf pickup by the dc circuits.



At the left is a stripped-down balancing and indicator section for mobile use. Note that on the near end of the surplus tuning indicators are mounted close together and at right angles to each other. S1 has been replaced with a dpdt center-off switch (Radio Shack 275-664) to permit either remote keying or tuning motor operation. A 1.5-V battery, 15-mA lamp and push-button switch are included for night-time meter illumination.

lossy at rf, provide additional filtering. I also built a smaller indicator unit for mobile use, and used two surplus fm tuning indicators (100-0-100 μA) instead of the cross-pointer meter.

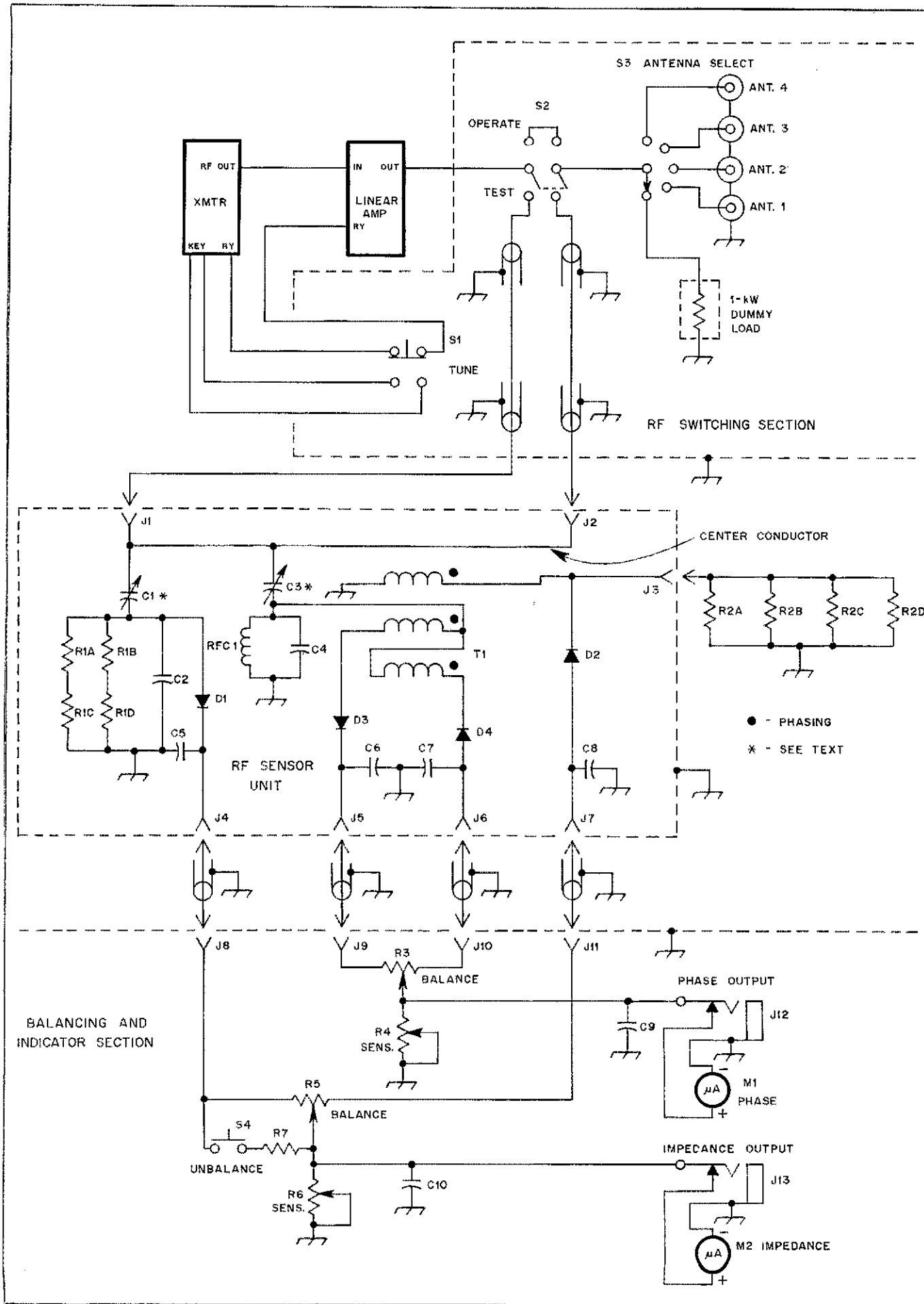
Added Features

I put a test switch, S1, on the indicator unit so the transmitter could be keyed (with the linear amplifier, if any, turned off) from the test position. With a little practice using this test switch, it is possible to perform the full tune-up with a few one-second squirts of rf. S2 is a transfer switch to remove the IMI completely from the circuit. The detector diodes will generate some harmonics, and any harmonics that might cause TVI are too much for my taste. S3 is an antenna-changing switch. It permits calibration by the station dummy load and permits easy change to the antenna or transmission line under test. S4 unbalances the impedance-balancing potentiometer to check for the presence of rf when testing into the dummy load or other well-matched load.

An output jack is provided so the mismatch dc signals can feed an automatic control system which retunes the antenna or transmission line when changing frequency or load.[4] It is good to use capacitors that will rotate 360 degrees when a motor-driven automatic control system is used, for while the motor may drive it in the wrong direction for half a

Fig. 7 — The IMI schematic and connections to related equipment. Much of the rf switching section is optional (see text). Details of T1 are given in Fig. 8. All balancing- and indicator-section wiring is run in shielded cable such as Radio Shack no. 278-1277. The sensor unit case is a 5-1/4" × 3" × 2-1/8" aluminum box (Radio Shack 270-238). Part numbers below are Radio Shack unless otherwise indicated.

C1, C3 — Air variable, 4-35 pF (see text).
C2 — Silver mica, 300 pF, 500 V, 10% tol.
C4 — Silver mica, 510 pF, 500 V, 10% tol.
C5-C10 incl. — Disc ceramic, 680 pF, 500 V (see text).
D1-D4, incl. — 1N4148, 276-1122. For a low-power IMI, use 1N34, 276-1133.
J1-J3, incl. — SO-239 coaxial jack, 278-201.
J4-J11, incl. — Phono jack, 274-346.
J12, J13 — Telephone jack, two-conductor, closed-circuit, 274-255.
M1, M2 — Dual 250-0-250 μA zero-center meter, Signal Corps I-101D (see text).
R1A-R1D, incl. — Composition, 220 Ω, 5% 2-watt. A single 220-Ω, 2-watt resistor will suffice for an rf power level of 100 watts or less.
R2A-R2D, incl. — Composition, 100 Ω, 5% 2-watt (see text).
R3, R5 — Carbon control, 10 kΩ, linear taper, 271-1715.
R4, R6 — Carbon control, 500 Ω, linear taper, 271-226.
R7 — Composition, 10 kΩ, 1/4 watt, 271-034.
RFC1 — 1-mH, 3-pie rf choke, J. W. Miller type 4662.
S1 — Momentary switch, two-circuit NO/NC, Alcoswitch MPA-206R.
If only key function is desired, use Radio Shack 275-609.
S2 — Coaxial rf transfer switch, B&W model 551A.
S3 — Coaxial 5-position antenna switch, B&W model 590G.
S4 — Push button, NO, 275-609.


S3 ANTENNA SELECT
ANT. 4
ANT. 3
ANT. 2
ANT. 1
S2
OPERATE
TEST
RF OUT
XMTR
KEY RY
IN OUT
LINEAR AMP
RY
1-kW DUMMY LOAD
S1
TUNE
RF SWITCHING SECTION
J1
J2
CENTER CONDUCTOR
C1 *
C3 *
J3
R2A
R2B
R2C
R2D
R1A
R1B
R1C
R1D
C2
D1
RFC1
C4
T1
D2
D3
D4
C5
C6
C7
C8
* - PHASING
* - SEE TEXT
RF SENSOR UNIT
J4
J5
J6
J7
J8
J9
J10
J11
R3
BALANCE
PHASE OUTPUT
BALANCING AND INDICATOR SECTION
R4
SENS.
C9
J12
M1
PHASE
R5
BALANCE
S4
R7
UNBALANCE
IMPEDANCE OUTPUT
C10
J13
R6
SENS.
M2 IMPEDANCE

turn, it rotates in the proper direction for the other half.

Alignment

Connect the IMI as shown in Fig. 7, but install a coaxial T adapter at J2. Connect the cable from S2 (or dummy load) to one port of the T adapter. The other port will be used in a later test. Unplug the cables at J8 and J11 and temporarily connect the center contacts of J8 and J11 together. Connect an ohmmeter from this connection to ground, and adjust the IMPEDANCE BALANCE potentiometer, R5, for a minimum ohmmeter reading. (This current goes through the indicator, so use a low-current ohmmeter.) The ohmmeter reading should be in the vicinity of 5 kΩ. Reconnect the cables to J8 and J11.

Load the transmitter into the dummy load at about 3.5 MHz and adjust C1 for an impedance-meter indication of zero. Switch the transmitter to 28 MHz and readjust R5 to cut the meter deflection in half. Switch back to 3.5 MHz and repeat the C1 adjustment. Go back to 28 MHz for a repeat of the R5 adjustment. It may be necessary to adjust R5 to exactly zero-current on a particular band of interest (see "Operation" paragraphs), but the adjustment should hold over that entire band. (If C2 is adjustable, it should be used instead of R5 for the rf adjustments.)

If there is a problem, check the voltages at J4 and J7 with a 20,000-ohm/volt voltmeter. They should be approximately equal in value but of opposite polarity. If they are not equal, the transformer inductances may not have duplicated mine, or there may be a loose case screw. Moderate differences may be corrected by changing the value of C2 slightly. If the voltages are not of opposite polarity, one diode is reversed.

Key the transmitter at 3.5 MHz, and adjust the PHASE BALANCE potentiometer, R3, for a phase meter indication of zero. Make up two capacitors (or calibrate two air-variable capacitors) for the values of 640 pF and 107 pF approximately, and connect them across the open port of the T connector at J2. These will cause an equal SWR and phase mismatch at 3.5 and 21 MHz. Starting with C3 at minimum, note the phase deflection at 3.5 and 21 MHz; the two should be approximately equal. Increase the value of C3 (but not above 10 pF) for greater deflection and recheck at the two frequencies. If the deflections are no longer equal at the two frequencies, the value of C3 should be reduced until they are.

The test capacitors cause a 2:1 low-impedance capacitive SWR temporarily, so the test transmitter used should be able to withstand the mismatch or be lightly loaded. Both needles of the IMI will be deflected into the low-impedance capacitive region: This will give a check on the meter movement connection polarity. Disconnect the test capacitors and remove the T connector after the adjustment of C3 is completed.

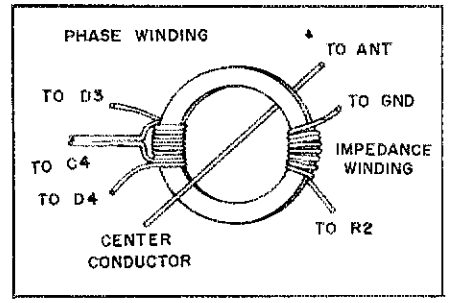


Fig. 8 — The core of T1 is an Amidon T-200-2. This is the same core as used in the Amidon kilowatt balun kit. The primary is a straight length of no. 14 A.W.G. wire connected between the center contacts of two SO-239 connectors, which are centered in opposite ends of the sensor case. The impedance-indicator secondary is eight turns of no. 20 A.W.G. wire. The phase-indicator secondary consists of two bifilar windings. Each winding is five turns of no. 20 A.W.G. wire.

If there is a problem with the phase-indicator section, check the open-circuit voltages at J5 and J6. They should be equal but opposite, as in the impedance-indication section. The balance should be best on the lower frequencies. A marked difference here is a clue that one of the halves of the winding has one more turn than the other.

Operation

It is best to install the IMI just before the antenna tuner. Indications will then be directly related to the tuning or matching adjustment without having to take transmission line effects into account. It is almost as helpful to have the IMI at the transmitter if you remember that the connecting length of transmission line might make high impedances look low, reactances change from capacitive to inductive and vice versa. In that case, the most important thing to remember is that when the IMI says the line is 50 ohms and purely resistive, it really is, regardless of the length of interconnecting transmission line.

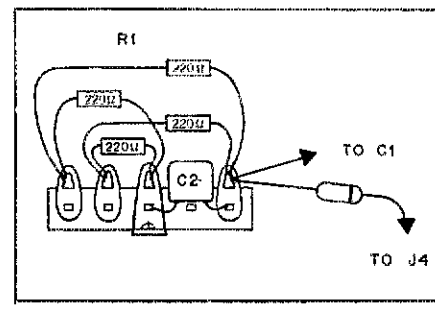


Fig. 9 — The four resistors of R1 are wired as shown to display as low an inductance as possible. A five-lug terminal strip is used. Their distributed capacitance forms a part of C2. The resistor values shown are in ohms.

The IMI procedure recommended is to first switch the IMI to the station dummy load, turn on the transmitter and adjust the BALANCE potentiometers, R3, and R5, for a meter indication of zero. Calibration will hold for that band, at least. Next, switch the IMI to the antenna for a brief rf burst. You can learn much in a one-second rotation of an antenna-tuner variable capacitor. Another burst is given while tuning the other capacitor. (It is not a good idea to tune a roller inductor with full power!) The two capacitor swings should tell you if circuit inductance is approximately correct. Ideally between the swings, the indicated impedance should change between high and low, and the reactance change type. If not, inductance change may be needed and should be done without rf power applied.

When the desired change is seen and the meter indicators approach center, longer bursts should allow exact zeroing (using the antenna tuner) without danger to the rig. Remember that exact meter zeroing means the IMI is seeing the same load impedance and phase as that presented by the station dummy load. Less than 20 pF of shunt capacitance is added by the IMI when it is in the line. This will increase the SWR seen by the transmitter to no more than 1.2:1 at 29.7 MHz. Switching out the IMI after tuning presents the perfect load to the rig.

One good rule to remember: Conduct antenna tests at the lowest possible power and for the briefest possible time. This protects equipment and causes the least interference.

Afternote

As this article is going to press we note that surplus automatic antenna tuners for 2 to 22 MHz have come on the market.[5] While the average amateur may find the 28-V dc and 400-Hz power requirements impossible, the components (including the sensor head) are available separately and should be an excellent foundation for an 80- to 15-meter automatic tuner. This article is dedicated to Virgil True and the many other engineers and amateurs who have worked with this idea for the past few decades.

Notes

[1] The M. C. Jones (Bendix) Micromatch SWR bridge Model 261 does this successfully.

[2] A description of the method of measurement and resulting impedance sensor design procedure will be furnished by the author if the request includes a self-addressed, business-size envelope with postage for one ounce.

[3] The I-101D has been a stock item at Fair Radio Sales for more than 20 years. At the time this goes to print it is offered for $5 reconditioned, and $2.95 with broken glass. They do offer an unused similar item, the ID-304/APA-70C at $7.95. Herbach and Rademan, Inc., offers a similar indicator, TM21K840 (Catalog Vol. 45 No. 4), for $7.50. Both sources are subject to prior sale.

[4] Imamura, "An Automatic Antenna Tuner," *QST*, April 1980.

[5] Fair Radio Sales offers the CU-991 antenna coupler and several of its components in their catalog WS-79, pages 1 and 36.

Active Filters

Why not build one of these nifty filters or use the design information to customize your own!

By Alan Bloom,* N1AL

One of the triumphs of modern technology is that you can build "tuned circuits" and all kinds of other filters entirely without coils. Those generations of RTTY enthusiasts who grew up depending on the ubiquitous 88-mH toroidal inductors might be shocked to discover that you can replace up to four of these bulky items with a single IC. Besides their size and expense, coil-capacitor filters at audio frequencies are notoriously hard to tune — it's just hard to find variable coils or capacitors big enough to do the job. Many active filters can be tuned with an inexpensive potentiometer.

What *is* an active filter? Well, what is a *filter*? We generally consider a filter to be any circuit designed to attenuate some frequencies more than others. A *high-pass* filter passes high frequencies with little attenuation while providing greater attenuation to the lower frequencies. See Fig. 1A. The *cutoff frequency* of a high-pass filter is the lowest frequency that passes with relatively little attenuation. The region above the cutoff frequency is the *passband*, and the region of high attenuation is the *stopband*. A *low-pass* filter has its passband below the cutoff frequency and its stopband above. A *band-pass* filter has two stopbands — one above and one below the passband, and a *band-stop* filter has a stopband between a pair of passbands. See Fig. 1B.

An *active* filter is simply a filter that uses an active device to improve the attenuation characteristics. That Q-multiplier in your old receiver is an early type of active filter. While most active filters these days use operational amplifiers (op amps),[1] you can make some type of active filter with almost any device that has power gain.

RC Active Filters

It's quite possible to design active filters using coils. We've already mentioned the antediluvian Q-multiplier as one example, and we'll look at a couple of others later. But today, most people try to design inductors *out* of their circuits, at least at audio frequencies. As previously mentioned, coils for audio frequencies are often large and frequently expensive. Although passive LC (inductance-capacitance) filters require no power supply, you have to design them carefully to minimize loss, paying careful attention to input and output impedance matching. Active filters, on the other hand, can easily be designed for almost any desired input and output impedances, and can give considerable gain to boot! RC (resistance-capacitance) active filters are especially useful at low audio frequencies where the large inductances needed for LC filters become impractical.

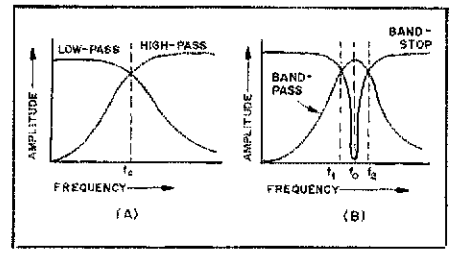


Fig. 1 — At A, plots of relative output versus frequency for high-pass and low-pass filters; f_c is the cutoff frequency. At B, plots of relative output versus frequency for band-pass and band-stop filters; f_0 is the center frequency. The area between f_1 and f_2 is the passband of the band-pass filter and the stopband of the band-stop filter.

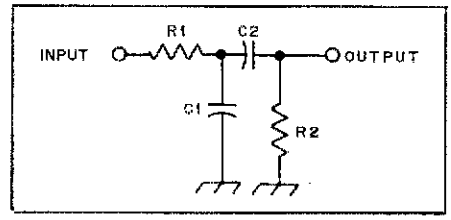


Fig. 2 — A passive RC band-pass filter. Maximum Q obtainable is only 1/2.

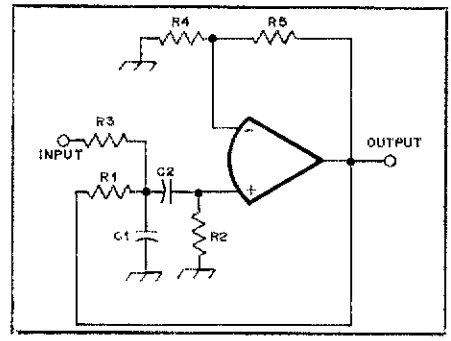


Fig. 3 — An active RC band-pass filter. To design a filter using this circuit, make all the frequency-determining resistors and capacitors equal: R1 = R2 = R3 and C1 = C2. Choose a convenient value for C and then $R = \sqrt{2}/(2\pi Cf_0)$, where R is in kΩ, C is in μF, and f_0 is in kHz. $Q = f_0/B$, where B is the 3-dB bandwidth in kHz. R4 and R5 determine the Q: $R5/R4 = 3 - (\sqrt{2}/Q)$. The voltage gain is $2Q\sqrt{2} - 1$.

Band-Pass RC Active Filters

You *can* make an RC filter without any active devices. Look at Fig. 2. At high frequencies, most of the signal is shorted out by C1. At low frequencies, most of the signal is blocked by C2. Thus the circuit of Fig. 2 is a band-pass filter. The limitation is that the maximum Q possible with this type of filter is only 1/2.

Those familiar with Q-multipliers or regenerative detectors may recall that one way to increase the Q of a tuned circuit is to introduce a little positive feedback around it. (If you apply too much feedback, the circuit will oscillate.) The same trick works for an RC bandpass filter. See Fig. 3. Here R3 has been added to couple in the signal. You can use a number of different resistor and capacitor values to achieve the desired filter characteristics, but for simplicity we usually make the two capacitor values the same and also let R1 = R2 = R3.

Let's say we want a 1-kHz band-pass filter with a 3-dB bandwidth of 600 Hz. The bandwidth is just the center frequency divided by the Q so we have $B = f_0/Q$ or $Q = f_0/B = 1000/600 = 1.67$. So using the equations from Fig. 3, $R5/R4 = 3 - (\sqrt{2}/1.67) = 2.15$. The actual values of these resistors are not too important — it's the *ratio* of the two that determines

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[1]Notes appear on page 21.

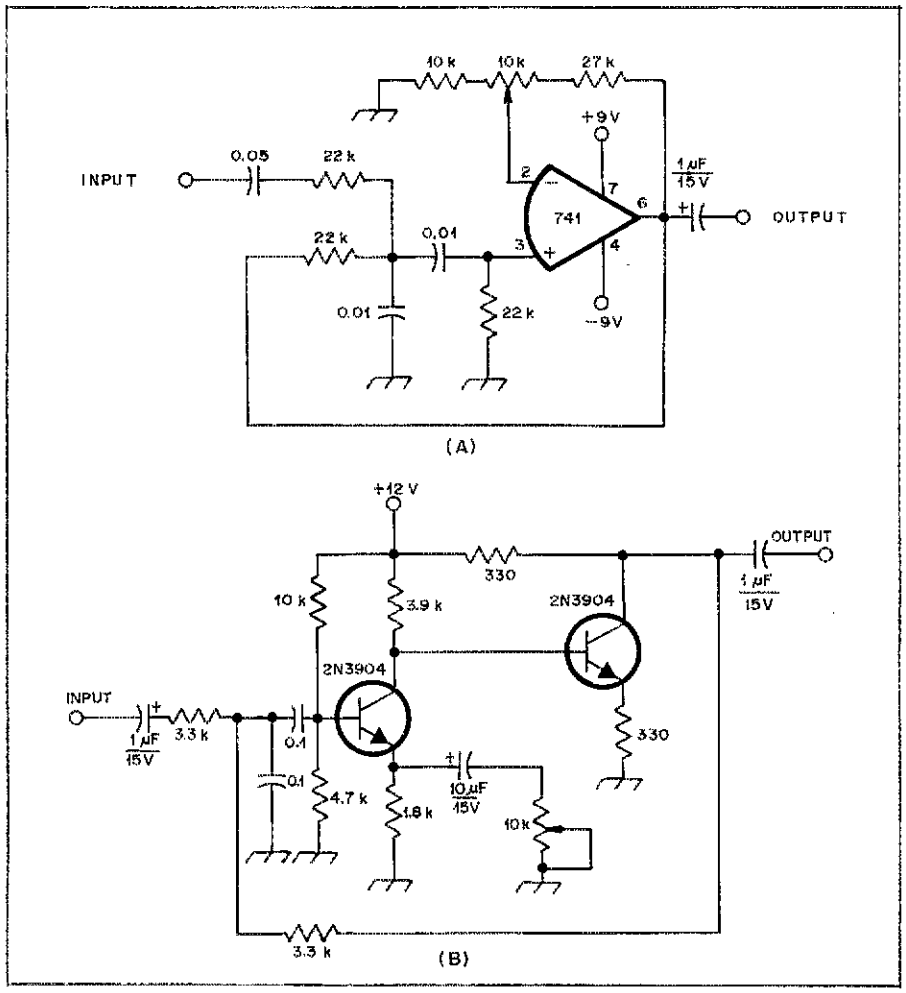

Fig. 4 — A practical audio filter is shown at A, based on the design in Fig. 3. The Q can be varied by adjusting the 10-kΩ potentiometer. A band-pass filter using discrete transistors is shown at B. R2 in Fig. 3 is the parallel combination of the 4.7-kΩ and 10-kΩ resistors in Fig. 4B (about 3 kΩ).

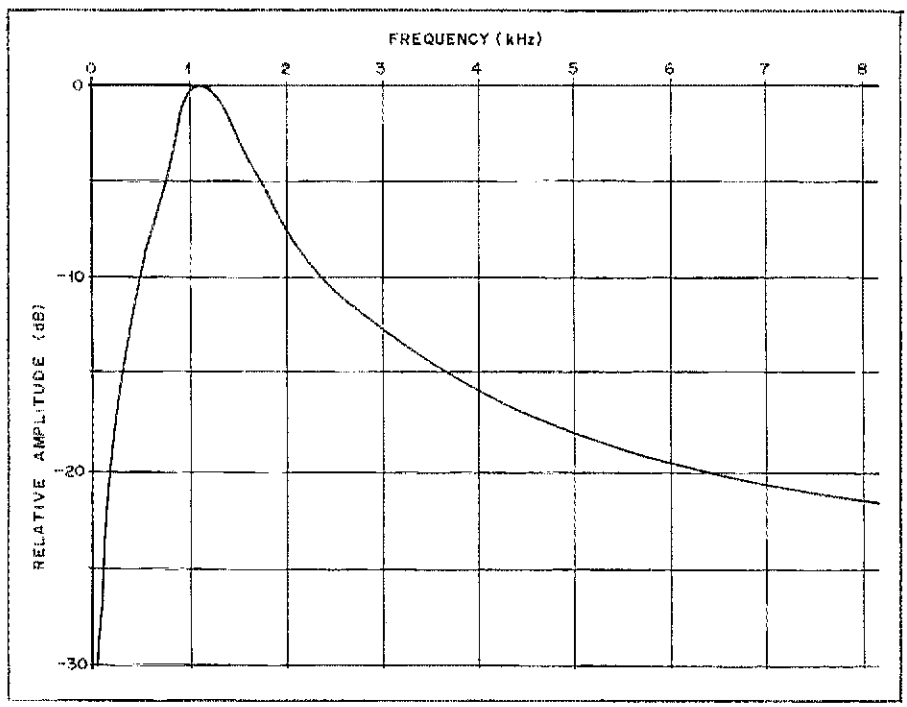

Fig. 5 — Measured frequency response of the filter of Fig. 4A. The center frequency and bandwidth are not exactly as predicted because of component tolerances.

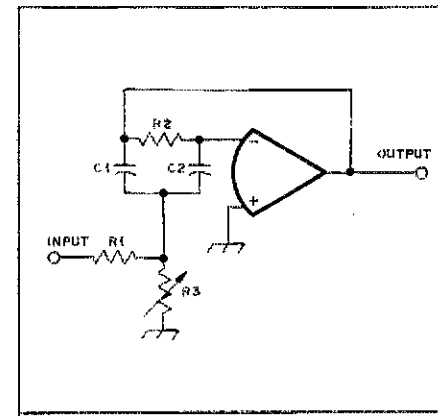

Fig. 6 — A tunable band-pass filter. After choosing a value for C (C1 = C2), then R2 = 1/(πBC), where R2 is in kΩ, C is in μF, and B is the bandwidth in kHz. R1 (kΩ) = R2/2G, where G is the desired numerical voltage gain at resonance.

$$R3\ (k\Omega) = \frac{1}{2\pi C\,[(2f_o^2/B) - BG]}$$

where f_o is in kHz. Insert the minimum and maximum values of f_o into the above equation to get the maximum and minimum values for R3.

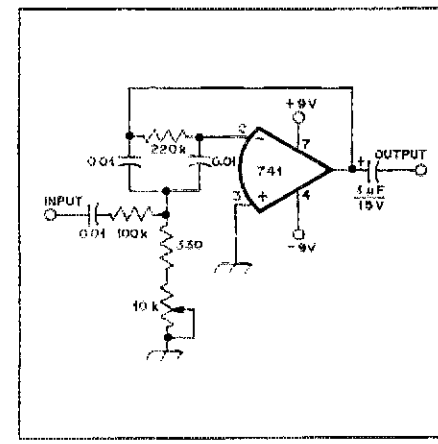

Fig. 7 — A practical band-pass filter that tunes from 350 to 2000 Hz.

the Q and gain. Let's choose R4 = 15 kΩ. Then R5 = 2.15 × 15 kΩ = 32 kΩ. (If R5/R4 = 3, the Q is infinite and the circuit becomes an oscillator.) To allow for resistor tolerances you usually use a potentiometer to adjust the gain to get the exact Q you want. See Fig. 4A. With the potentiometer set to the middle of its range, the effective values of R4 and R5 are 15 kΩ and 32 kΩ respectively, as desired. Next, choose a value for R or C. Let's let C = 0.01 μF. (All of the formulas in this article express capacitance in microfarads, resistance in kilohms, and frequency in kilohertz.) Then R = $\sqrt{27}(2\pi Cf_o)$ = 22.5 kΩ or about 22 kΩ. Fig. 5 shows the measured frequency response of the circuit in Fig. 4A. You can raise or lower the Q by adjusting the potentiometer. If you want to tune this

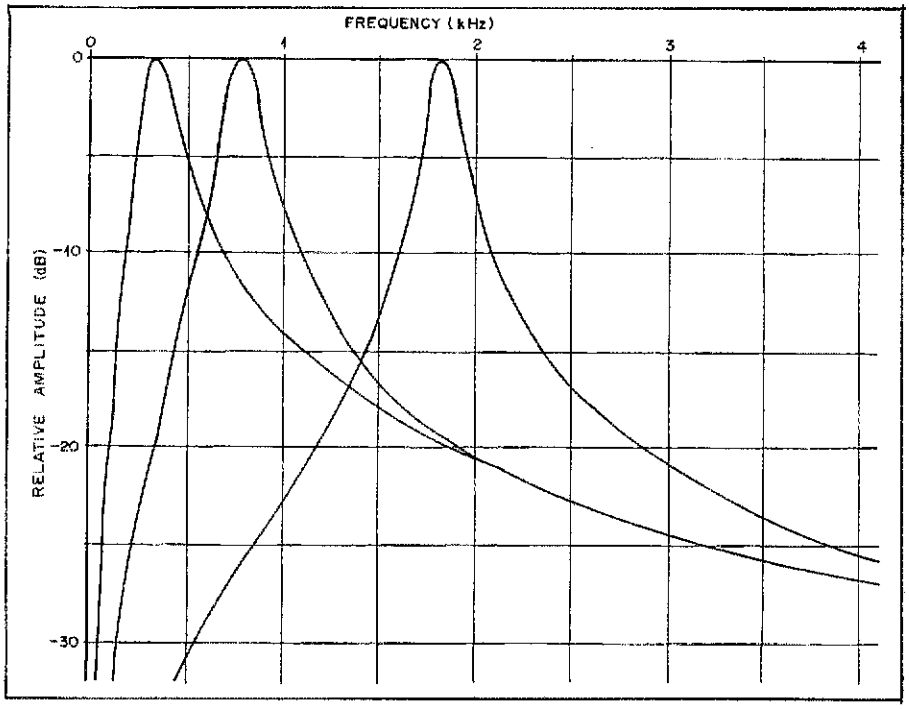

Fig. 8 — Measured frequency response of the circuit of Fig. 7 for three settings of the potentiometer.

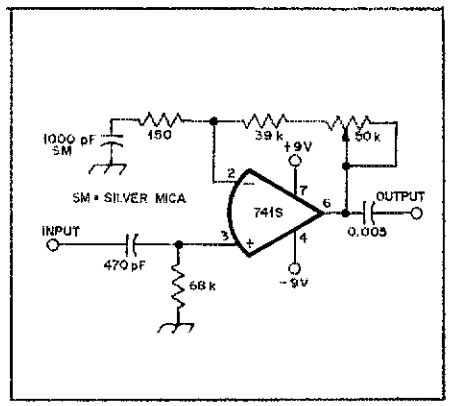

Fig. 13 — A 50-kHz band-pass filter. Calculated voltage gain is 200 and the Q is 10, giving a bandwidth of 5 kHz. Since a standard 741 op amp does not work well above 10 kHz, a high-slew-rate version is used. To design for other frequencies, first choose a value for C1, then $R2 = GB/(2\pi C1 f_o^2)$, where GB is the gain-bandwidth product of the op amp (1000 kHz for a 741 or 741S). Choose Q using $Q = f_o/B$ or $Q = Gf_o/GB$. Then

$$R1 = \frac{R2 f_o}{GB}\left(\frac{1}{Q} - \frac{f_o}{GB}\right).$$

The highest possible Q is GB/f_o and the highest possible gain is QGB/f_o.

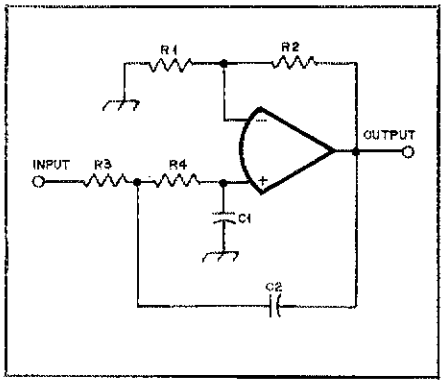

Fig. 9 — A low-pass active filter. For Q greater than one, a low-pass filter has a peak in the frequency response similar to that of a band-pass filter. For relatively narrow bandwidths, Q is approximately f_o/B. $R2/R1 = 2 - (1/Q)$. For a given value of C (C1 = C2), $R3 = R4 = 1/(2\pi f_o C)$, where R is in kΩ, C is in μF, and f_o is in kHz. The gain at f_o is $3Q - 1$.

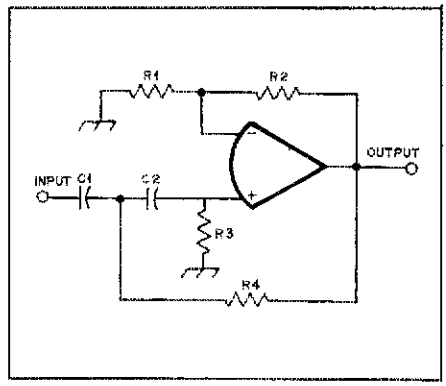

Fig. 11 — A high-pass filter. For fairly narrow bandwidth (high Q), the Q of a high-pass filter is approximately f_o/B. $R2/R1 = 2 - (1/Q)$. For a given value of C (C1 = C2), $R3 = R4 = 1/(2\pi f_o C)$, where all quantities are expressed in the same units used in the previous examples. The gain at f_o is $3Q - 1$.

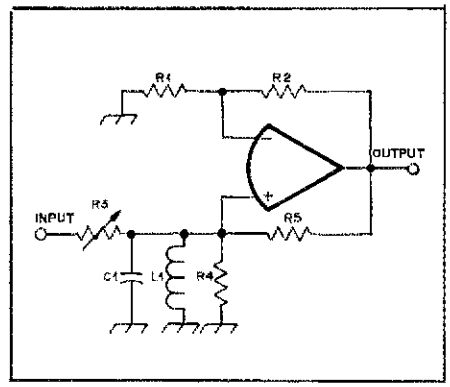

Fig. 14 — A band-pass LC active filter. $Q = f_o/B$. Choose a convenient value for L1, then

$$C1 = \frac{1}{(2\pi f_o)^2 L1}$$

where L1 is in henrys and C1 is in μF. $R3 = QX$, where X is the inductive or capacitive reactance in kΩ ($X = 2\pi f_o L$). The gain is $1 + R2/R1$. $R2/R1 = R5/R4$. R4 includes the losses in L1.

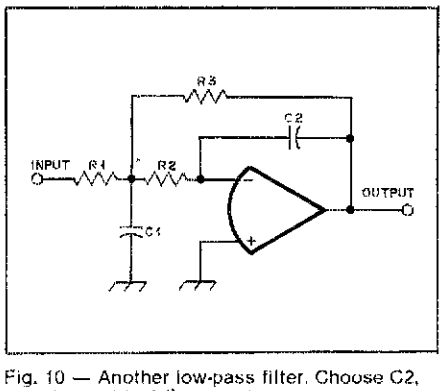

Fig. 10 — Another low-pass filter. Choose C2, then $C1 = C2(3Q)^2$. $R1 = R2 = R3 = 1/(2\pi f_o \sqrt{C1C2})$, where R is in kΩ, C is in μF, and f_o is in kHz. The gain is equal to Q.

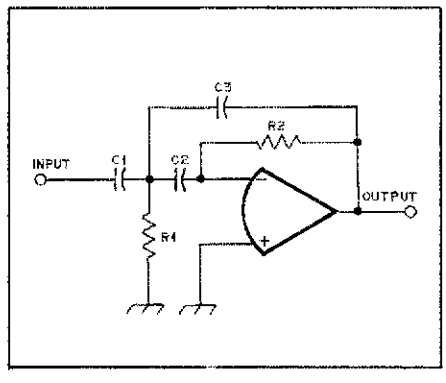

Fig. 12 — Another high-pass filter. Choose R1, then $R2 = R1(3Q)^2$. $C1 = C2 = C3 = 1/(2\pi f_o \sqrt{R1R2})$. The gain is equal to Q.

filter without changing the Q, you would need three ganged potentiometers to replace R1, R2 and R3.

Don't get the idea that all RC active filters must be made with op amps. The design of Fig. 3 works fine using a pair of transistors. Fig. 4B is a practical example. The center frequency is about 700 Hz, and the bandwidth is determined by the setting of the 10-kΩ potentiometer.

The filter of Fig. 6 has the interesting property that you can tune the center frequency without changing the gain by varying a single resistor, R3.[2] In addition, the

Q increases with frequency in such a way that the bandwidth stays constant for all tuning settings — a sort of "poor man's passband tuning!"

To design one of these filters, you first choose the bandwidth (B), gain (G) and the lowest and highest frequencies to be tuned (f_{min}, f_{max}). Let's say you want to tune 350 to 2000 Hz (0.35 kHz to 2 kHz) with a bandwidth of 150 Hz (0.15 kHz) and a gain of one. Again we'll choose 0.01 μF for the capacitor value. From the formulas in Fig. 6, R2 = 1/ ($\pi \times 0.15 \times 0.01$) = 212 kΩ, R1 = 106 kΩ and the minimum and maximum values of R3 turn out to be 300 Ω and 10.7 kΩ. Using the nearest standard resistor values, we get the circuit of Fig. 7. Fig. 8 indicates the measured frequency response for the circuit. If your calculations give you a negative value for R3, then your lower frequency limit is too low or your gain is too high. Choose new values and recalculate.

Low-Pass RC Active Filters

If you need attenuation of *higher* frequencies only (such as adjacent-channel ssb interference), a low-pass filter will fill the bill. Representative designs are given in Figs. 9 and 10.

The circuit of Fig. 9 can be tuned by ganged potentiometers at R3 and R4. The Q can be adjusted by inserting a potentiometer between R1 and R2 as in Fig. 4A.

While it's not as easy to tune, the circuit of Fig. 10 has better stability than that of Fig. 9. For high values of Q, the gain and Q of the latter filter will change markedly for small changes in any of the resistor or capacitor values. If you need only a fixed-frequency filter, the one in Fig. 10 is a better choice.

High-Pass RC Active Filters

In principle, you can convert any RC low-pass filter into a high-pass filter by substituting resistors for all the capacitors and capacitors for all the resistors. The circuits of Figs. 11 and 12 correspond to the low-pass filters in Figs. 9 and 10, respectively. Their characteristics are similar except that they are high-pass in nature. Actually, for high values of Q, the frequency responses of band-pass, low-pass and high-pass filters are pretty much the same close to the peak frequency. It's only when you get well away from the passband that you start to notice differences in attenuation.

Fig. 13 is a band-pass filter that uses the internal frequency compensation of the op amp to replace one of the capacitors in the feedback network. This circuit has very high gain at low frequencies. Even at 50 kHz, the tuned i-f amplifier shown has a gain of about 200, which requires careful attention to circuit layout to

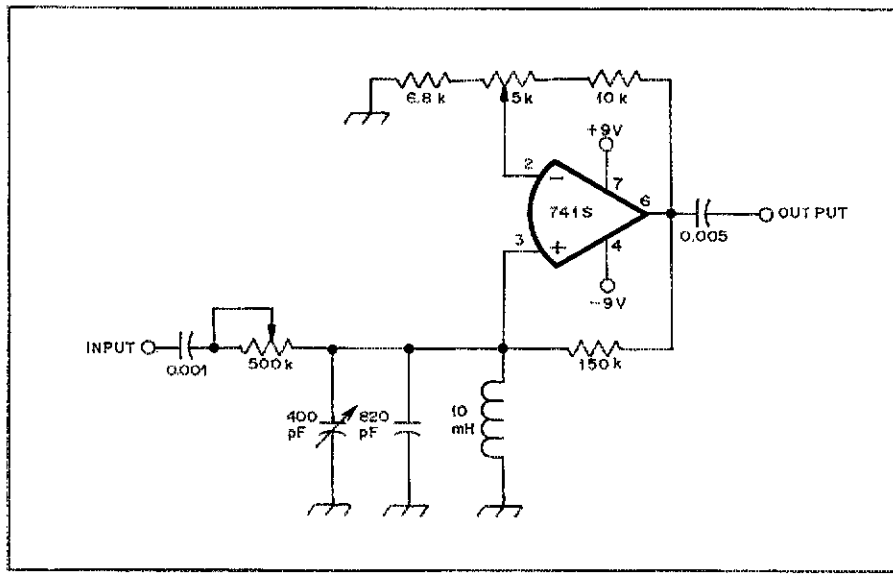

Fig. 15 — A tunable 50-kHz amplifier patterned after the circuit of Fig. 14.

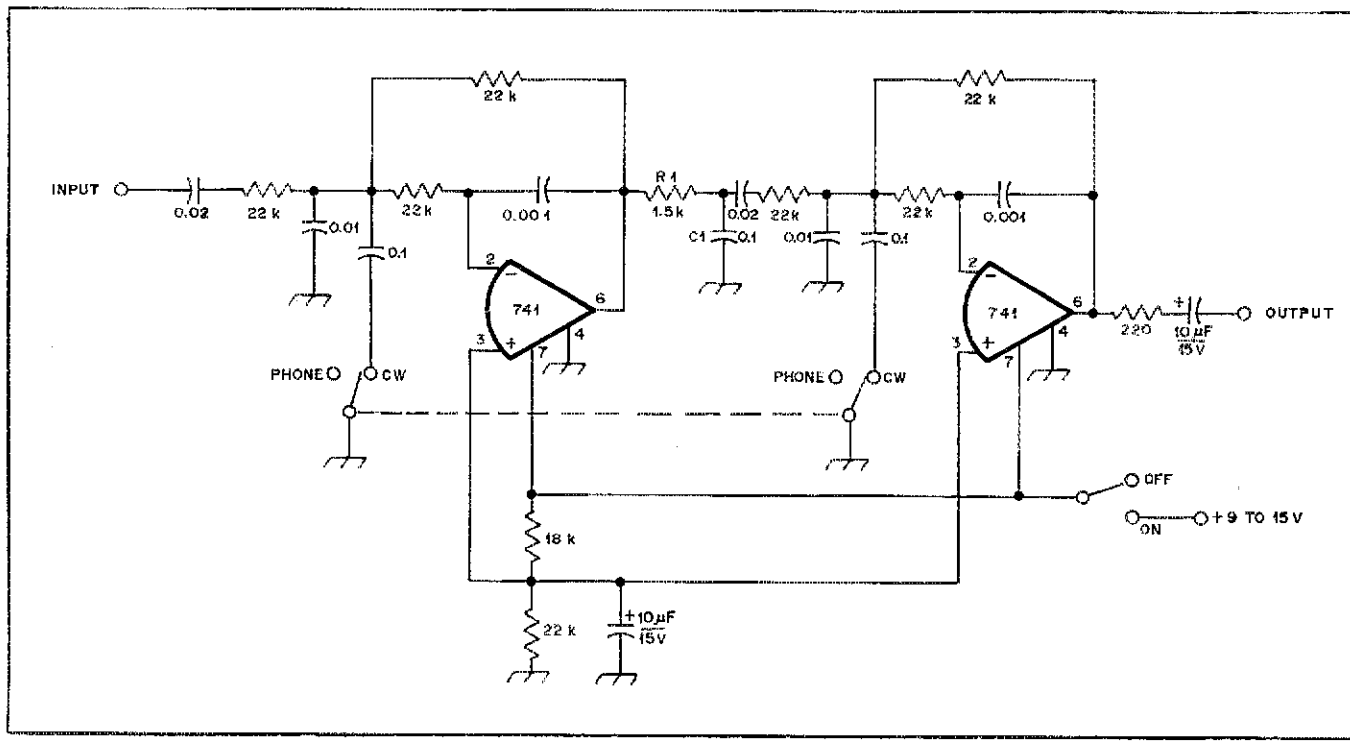

Fig. 16 — A combination phone and cw audio filter.

ensure stability.

LC Active Filters

One of the big advantages of active filters is that you can build high-Q filters without coils. On the other hand, if you *like* coils, you can still use them in active filter designs. In fact, this will sometimes result in a more stable and reliable circuit. Fig. 14 is an example. This band-pass filter circuit increases the effective Q of the coil by means of positive feedback through R5. You can set the Q by adjusting R3. In this circuit, changing the bandwidth does not alter the gain. When properly adjusted, this filter is more stable and easier to use than some RC circuits, especially at high frequencies.

For example, you can build a practical 50-kHz tuned amplifier (Fig. 15) that is less critical to construct than one based on an RC design. My 10-mH coil had a measured Q of only 37 at 50 kHz, but it was easy to obtain bandwidths less than 370 Hz, indicating an effective Q of over 130. To align this filter, disconnect the input and adjust the 5-kΩ potentiometer until the circuit is on the verge of oscillation with the variable capacitor adjusted for the desired center frequency. With the input reconnected, the filter should be unconditionally stable.

Cascading Active Filters

Cascading passive filters can create problems, in that connecting the output of one filter to the input of another causes the impedances to interact, affecting the frequency response in ways you might not expect. Cascading active filters, however, is easy because the high-impedance input of each op amp doesn't affect the low-impedance output of the preceding stage. The total frequency response is the product of the responses of the individual filters — that is, the total attenuation (in dB) at any frequency is the sum of the attenuations of the individual stages. Cascading filters greatly improves the stop-band attenuation. For example, if one filter has 20-dB attenuation at some frequency, two such filters in cascade will have 40 dB, three filters will have 60 dB, and so on.

Let's Build One

Enough theory; let's build one! Fig. 16 shows a useful circuit consisting of a pair of cascaded filters of the type described in Fig. 10. With the switch in the "phone" position, each section is a 2300-Hz low-pass filter with a Q of about one. R1 and C1 were added to further reduce the high-frequency response. Switching to CW adds extra capacitance, which not only lowers the resonant frequency to about 800 Hz, but also raises the Q to about 3.5. The two 0.02-μF coupling capacitors roll off the frequency response below 300 Hz, which helps to block any hum present on the input. The frequency responses for both modes are plotted in Fig. 17.

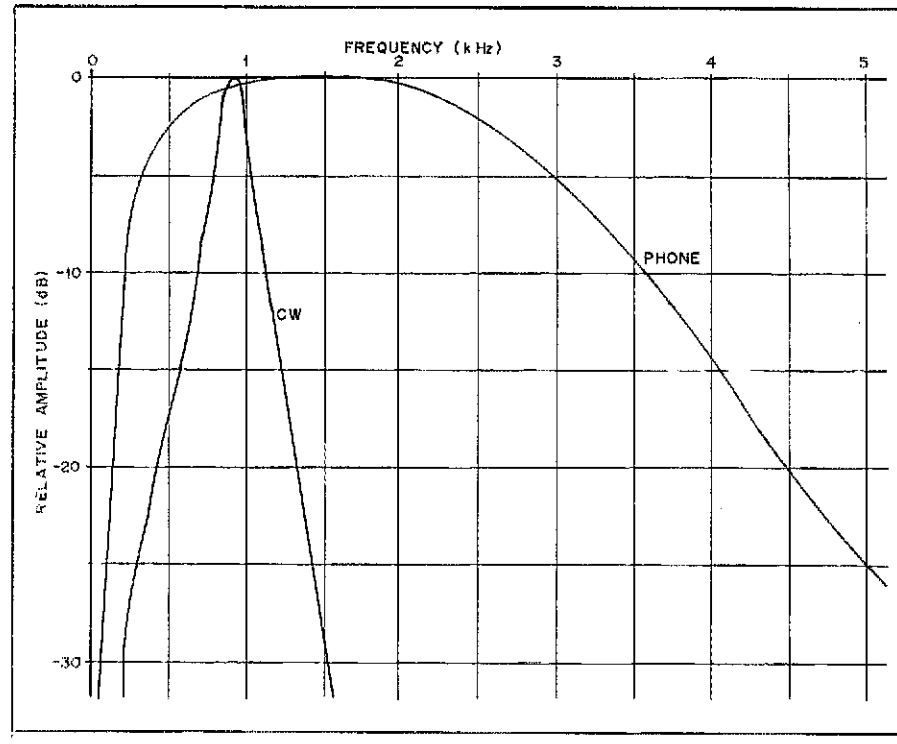

Fig. 17 — Frequency response of the phone/cw audio filter. In the phone mode, the frequency response is 250 to 3100 Hz with a measured gain of 0.85. On cw, the gain is about eight, with a 6-dB bandwidth of 300 Hz centered at 920 Hz.

The filter may be driven by any audio source having less than about 2-kΩ output impedance and a voltage swing less than about 8 volts pk-pk on phone and 1 volt pk-pk on cw. (The gain is about one on phone and about eight on cw.) The output is sufficient to drive headphones of any impedance, but you should add an amplifier to drive a speaker.[3]

By the way, it's not necessary to use two separate integrated circuits to build this filter. You can buy ICs with two or even four op amps to the package. For example, the Motorola MC1747 and MC4741 are the dual and quad versions of their MC1741 operational amplifier.

I hope this article has given you some idea of what can be done with active filters. In fact, there isn't much gear in the average ham shack where one of these little giznos *wouldn't* come in handy. Drop one into your next construction project and see! QST

Notes

[1]Woodward, "A Beginner's Look at Op-Amps," *QST*, April 1980, p. 15 and June 1980, p. 25.
[2]Nicosia, "Adjustable Audio Filter for Cw," *Ham Radio*, August 1970.
[3]Shriner, "A Handy Audio Amplifier," Hints and Kinks, *QST*, December 1979, p. 56.

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[1]Budak, *Passive and Active Network Analysis and Synthesis*, Houghton Mifflin, 1974.
[2]Lam, *Analog and Digital Filters*, Prentice-Hall, 1979.

Strays

Apart from the usual "long and short of it," wouldn't it be great to have this chap available on that next antenna-erection exercise? The photograph shows ARRL Technical Secretary Marian Anderson, WB1FSB, after she tried to persuade "Shorty" to lend a hand with some roof-top antenna work she has planned for this summer. He was a promotional attraction in the entrance area of IEEE ELECTRO/80 at the Hynes Memorial Auditorium in Boston. Marian served as chairperson for the ARRL-organized technical sessions 5 and 8 on May 14.

Maverick Trackdown

You can be effective in locating the source of malicious ham-band interference! A simple loop antenna with preamplifier will help you find the "outlaws" in your area.

By Doug DeMaw,* W1FB

We amateurs seem to have a surplus of "who-dunnits" in our hf and vhf bands these days — persons unknown, who, because of some personality quirk, derive satisfaction from causing malicious interference to net operations on 40, 75 and 80 meters. These same skulkers focus their attention on DX QSOs in the 10-, 15- and 20-meter bands. This scofflaw attitude is not new to our amateur spectrum: It's been prevalent for decades. But as the number of licensed (and unlicensed) operators grows, the problem seems to become more pronounced. It appears necessary to develop area task forces to track down those persons who are bringing shame to the good name of Amateur Radio in the USA.

FCC, in these days of federal budget-cutting, lacks resources to deal with all the problems that come to its attention. If, however, well-disciplined local interference committees can do the initial investigation of malicious interference, solve some of the less-severe cases through persuasion, and catalog operating habits, hours, days of the week, frequencies and general vicinity from which the interference is coming, FCC may be able to use its diminishing forces more effectively on the hard cases. Conversations between Jim McKinney, new chief of the Field Operations Bureau, and Carl Smith, WØBWJ, and Gar Anderson, KØGA, of ARRL's Ad Hoc Committee on Malicious Interference, have been most encouraging.

The Technique of Triangulation

Let's assume that an interference committee has been formed and that the members are equipped with receivers and directional, rotatable antennas for the hf band in question — 10, 15 or 20 meters. (We'll deal with the lower frequencies later in this article.)

If the source of the malicious interference is within the ground-wave contour of the maverick-hunters' stations, and if the "hunters" are a few miles apart, triangulation can be used to determine the general location of the maverick. This is illustrated pictorially in Fig. 2. Stations 1, 2 and 3 rotate their beam antennas to obtain maximum response from the maverick's signal. The beam headings are noted, compared, and plotted on an area map. At the point where the three headings converge is the approximate location of the maverick.

This kind of exercise is rather impractical when dealing with sky-wave signals. The QSB complicates things by preventing accuracy in obtaining a peak signal reading on the receiver S meter. Furthermore, the beamwidth of an hf-band beam is too broad to yield good resolution at great distances. So, what is our next step in pinpointing the exact geographical point from which the offending signal is being sent? We can comb the area at close range with hand-held loop antennas. This will enable us to find the exact neighborhood of the maverick, and finally nail him down at his QTH. This can be done with relative ease by placing an hf-band transceiver or receiver in an automobile, locating the vehicle in the general area of the interfering signal, then standing outside the car and rotating the loop for maximum signal response. The scheme requires two or three mobile stations which can be situated as shown in Fig. 2, but only a mile or less from the bandit. A pocket compass is necessary to determine the headings for correct triangulation. Coordination with other hunters can be effected by telephone as the committee closes in on the offender (*coded messages are not legal over the air*).

To avoid ambiguity from the bidirectional response of loop antennas we can build our direction finders to yield a cardioid (heart-shaped) response. This is done by adding a sense antenna to the loop, along with a phasing network. We'll see how that's done later in the article.

The problem of locating the bandits on 40, 75 and 80 meters is a bit more

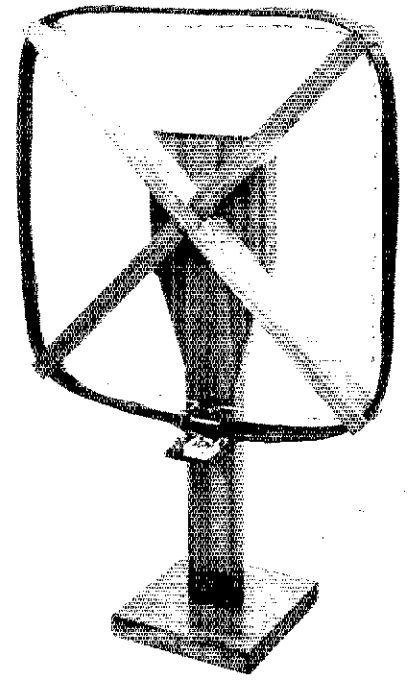
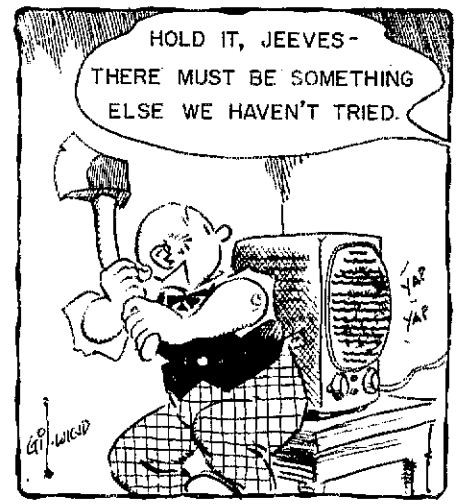


Fig. 1 — An assembled table-top model of the W1FB 4T-ES electrostatically shielded loop which is made from a length of RG-58/U cable



Locating bandits on 40, 75 and 80 meters is a bit more complicated.

*Senior Technical Editor, ARRL

complicated. This is because beam antennas are somewhat impractical that low in frequency, even though some of the super DX stations have antennas of that type.

The practical answer to direction finding at these lower frequencies lies in the use of an Adcock antenna[1] for effective searching from one's home QTH. Alternatively, a small loop with sense antenna can be built for the frequency of interest. It should be used out of doors so that house wiring and plumbing will not "confuse" the loop while a correct compass heading is sought. This may require placing a receiver on a table in the back yard and running an extension cord to it for power. Once a triangulation has been effected, it will be time for the committee to move afield with the mobile units for close-in bandit hunting.

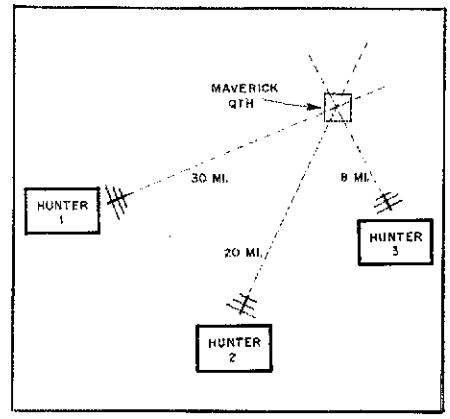


Fig. 2 — Method for triangulation when locating a signal source.

Loop Circuits and Criteria

A somewhat comprehensive article on the subject of loop antenna design was presented earlier in *QST*.[2] It described frame loops, ferrite-rod loops, sense antennas and loops with electrostatic shielding. Other data can be obtained from the references given in the bibliography.

No single word describes a loop of high performance better than "symmetry." In order for us to obtain an undistorted response pattern from this type of antenna we must build it in the most symmetrical manner possible. The next key word is "balance." The better the electrical balance, the deeper the loop null and the sharper the maxima.

The physical size of the loop is not of major consequence: a 4-foot (1.2-m) loop will exhibit the same electrical characteristics as one which is only 1 inch (25 mm) in diameter. The smaller the loop, however, the lower its efficiency. This is because its aperture samples a smaller section of the wave front. Thus, if we use very small loops, we will need to employ preamplifiers to compensate for the reduced efficiency.

Loop Choices

The earliest loop antennas were of the "frame antenna" variety. These were unshielded antennas which were built on a wooden frame in a rectangular format. The loop conductor could be a single turn of wire (on the larger units) or several turns if the frame was small. Later, shielded versions of the frame antenna were popularized to provide electrostatic shielding — an aid to noise reduction from such sources as precipitation static.

Some years after wire loops gained widespread application, we began using magnetic-core loop antennas. The advantage was reduced size, and this appealed to the designers of aircraft and portable radios. Most of these antennas contain ferrite bars or cylinders, which provide high inductance and Q with a small number of coil turns. A 7-inch (178-mm) rod, 0.5-inch (13 mm) OD, of Q2 ferrite (μ_i = 125) is suitable for a loop core from the bc band through 10 MHz. Maximum response is off the *broadside* of a rod loop, whereas the maxima occurs in the *plane* of a frame type of loop. The performance of the two antennas is otherwise similar.

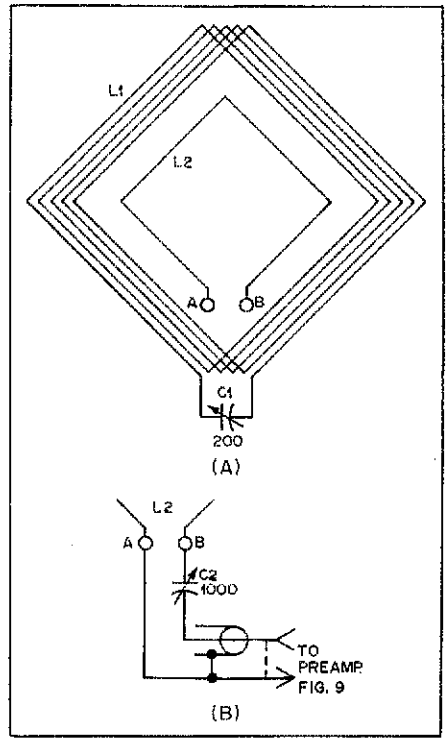


Fig. 3 — A multiturn frame antenna is shown at A. L2 is the coupling loop. The drawing at B shows how L2 is connected to a preamplifier.

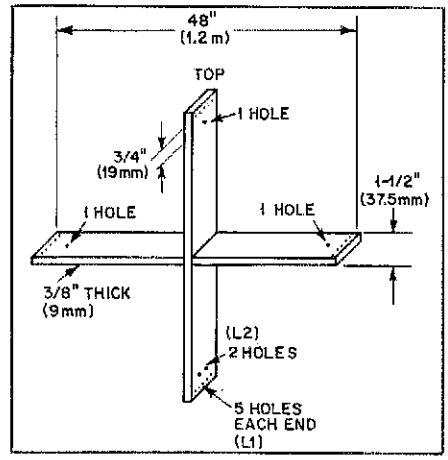


Fig. 4 — A wooden frame of this type can be used to contain the wire of the loop shown in Fig. 3.

Frame Loops

Fig. 3 illustrates the details of a practical frame type of loop antenna. The circuit at A is a 5-turn system which is tuned to resonance by C1. If the layout is symmetrical, we should be able to obtain good balance. L2 helps to achieve our objective by eliminating the need for direct coupling to the feed terminals of L1. If the loop feed was attached in parallel with C1, which is common practice, the chance for imbalance would be considerable.

L2 can be situated just inside or slightly outside of L1; a 1-inch (25-mm) separation works nicely. The receiver or preamplifier can be connected to terminals A and B of L2 as shown at B of Fig. 3. C2 controls the amount of coupling between the loop and the preamplifier. The lighter the coupling, the higher the loop Q, the narrower the frequency response, and the greater the gain requirement from the preamplifier. It should be noted that we are making no attempt to match the loop impedance to the preamplifier: The characteristic impedance of small loops is very low — on the order of 1 ohm or less.

A supporting frame for the loop of Fig. 3 can be structured as shown in Fig. 4. The dimensions given are for a 1.8-MHz frame antenna. For use on 75 or 40 meters, L1 of Fig. 3A will require fewer turns, or the size of the wooden frame will have to be made somewhat smaller than that of Fig. 4.

Shielded Frame Loops

If electrostatic shielding is desired we can adopt the format shown in Fig. 1 (W1FB "4T-ES Loop," Ref. 2). In this example, the loop conductor is made from RG-58/U coaxial cable with ample turns to permit resonance at the operating frequency. A 3-turn link connected to the loop feed terminals can be probed with a dip-meter to check the resonant frequency (tuning capacitor C1 of Fig. 3A must be connected and set at midrange for this test).

Larger single-turn loops of this kind can be fashioned from aluminum-jacketed Hardline, if that style of coax is available. In either case, the shield conductor must be opened at the electrical center of the loop, as shown in Fig. 5 at A and B. The design example is based on 1.8-MHz operation.

In order to realize the best performance from an electrostatically shielded loop

[1]References appear on page 26.

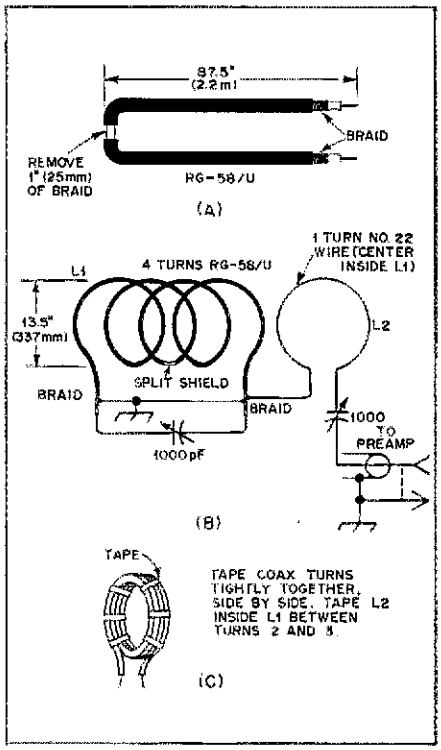


Fig. 5 — Components and assembly details of the 4T-ES shielded loop.

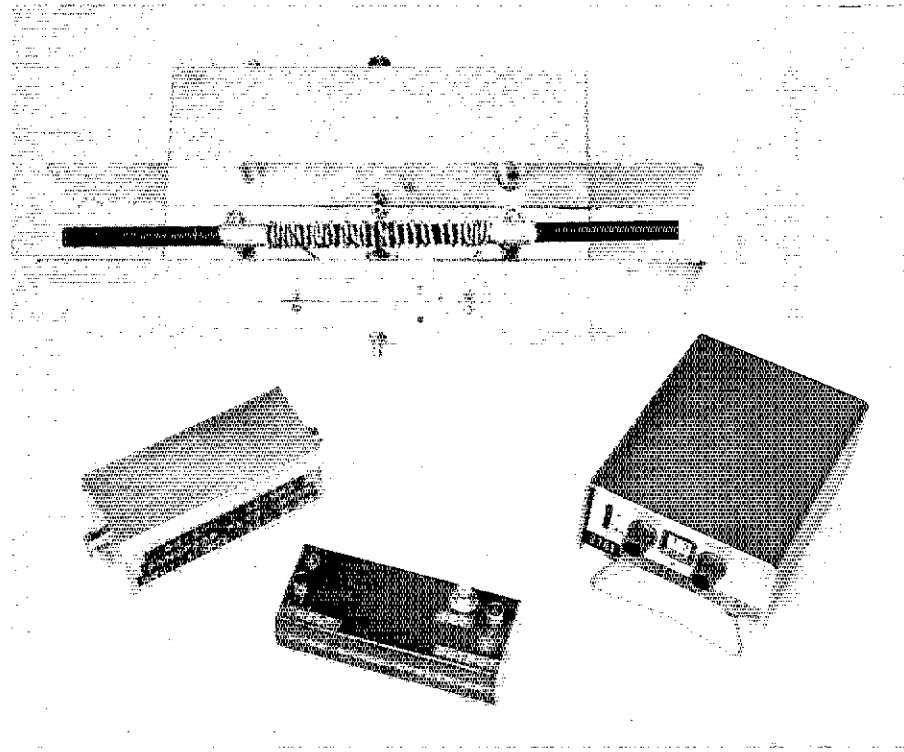


Fig. 7 — The assembly at the top of the picture is a shielded ferrite-rod loop for 160 meters. Two rods have been glued end to end (see text). The other units in the picture are a low-pass filter, broadband preamplifier (lower center) and a Tektronix step attenuator (lower right). These were part of the test setup used when this type of antenna was evaluated.

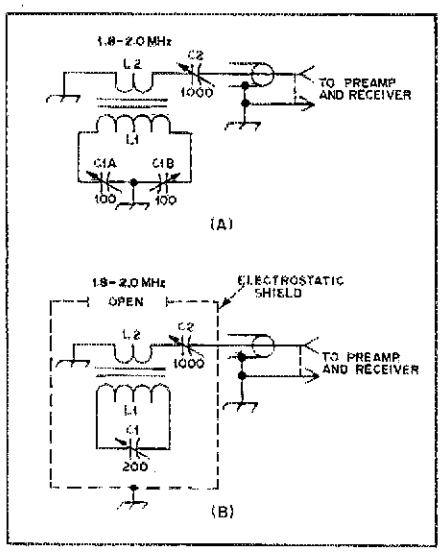


Fig. 6 — Diagram of a ferrite loop (A). C1 is a dual-section air variable. The circuit at B shows a rod loop contained in an electrostatic shield channel (see text). A low-noise preamplifier is shown in Fig. 9.

antenna, we must operate it near to and directly above an effective ground plane. An automobile roof (metal) qualifies nicely for small shielded loops. For fixed-station use, a chicken-wire ground screen can be placed below the antenna at a suggested distance of 1 to 6 feet (0.3 to 1.8 m).

Ferrite-Core Loops

Fig. 6 contains a diagram for a rod loop. The winding (L1) has the appropriate number of turns to permit resonance with C1 at the operating frequency. L1 should be spread over approximately 1/3 of the core center. Litz wire will yield the best Q, but Formvar magnet wire can be used if desired. A layer of 3M Company glass tape (or Mylar tape) is recommended as a covering for the core before adding the wire. Masking tape can be used if nothing else is available.

L2 functions as a coupling link over the exact center of L1. C1 is a dual-section variable, although a differential capacitor might be better toward obtaining optimum balance (not tried). We can control the loop Q by means of C2, which is a mica compression trimmer.

Electrostatic shielding of rod loops can be effected by centering the rod in a U-shaped aluminum, brass or copper channel which extends slightly beyond the ends of the rod loop (1 inch or 25 mm is suitable). The open side (top) of the channel can't be closed, as that would constitute a shorted-turn condition and render the antenna useless. This can be proved by shorting across the center of the channel with a screwdriver blade when the loop is tuned to an incoming signal. The shield-braid gap in the coaxial loop of Fig. 5 is maintained for the same reason.

A photograph of a shielded rod loop is offered in Fig. 7. It was developed experimentally for 160 meters and uses two 7-inch (178-mm) ferrite rods which were glued end-to-end with epoxy cement. The longer core resulted in improved sensitivity during weak-signal reception. The other items in the photograph were used during the evaluation tests and are not pertinent to this discussion. All of the loops we have discussed thus far have bidirectional responses (∞ patterns).

Obtaining a Cardioid Pattern

Although the bidirectional pattern of loop antennas can be used effectively in tracking down the mavericks by means of triangulation, an essentially unidirectional loop response will help to reduce the time spent when on a "hunting" trip. Adding a sense antenna to our loop is simple to do, and it will provide the desired cardioid response we need.

Fig. 8 shows how this can be accomplished. The link from the rod loop or frame loop is connected via coaxial cable to the primary of T1, which is a tuned toroidal transformer with a split secondary winding. C3 is adjusted for peak signal response at the frequency of interest (as is C4), then R1 is adjusted for minimum back response of the loop. It will be necessary to readjust C3 and R1 several times to compensate for the interaction of these controls. The adjustments are repeated until no further null depth can be obtained. Tests at ARRL hq. showed that null depths as

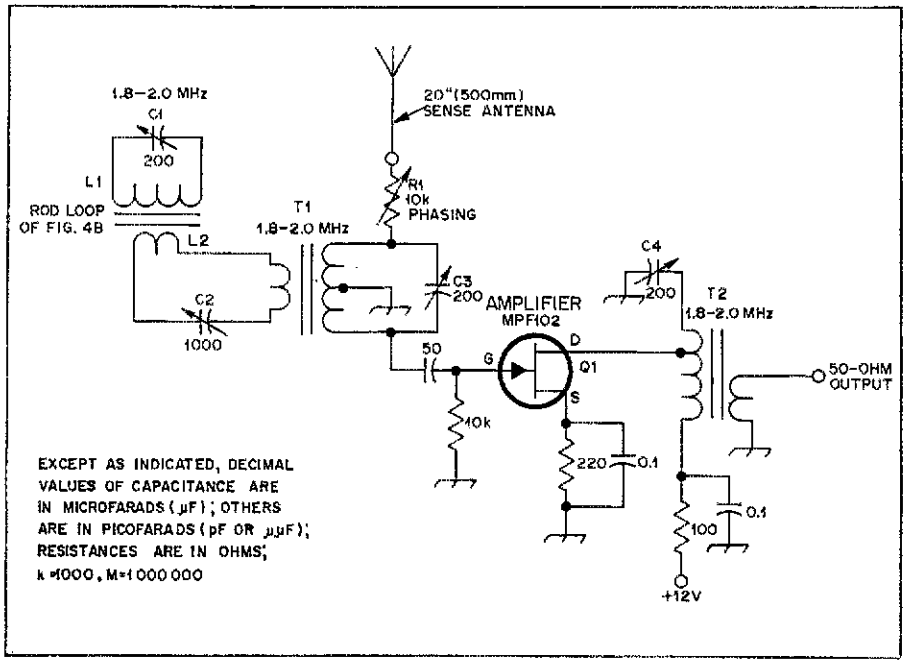


Fig. 8 — Schematic diagram of a rod-loop antenna with a cardioid response. The sense antenna, phasing network and a preamplifier are shown also. The secondary of T1 and the primary of T2 are tuned to resonance at the operating frequency of the loop. T68-2 or T68-6 Amidon toroid cores are suitable for both transformers. Amidon also sells the ferrite rods for this type of antenna.

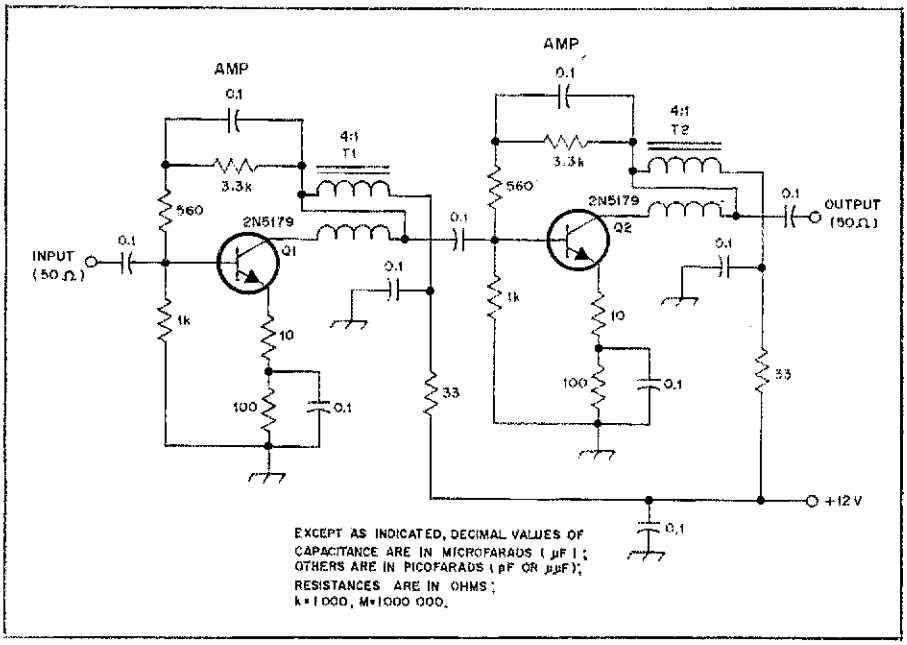
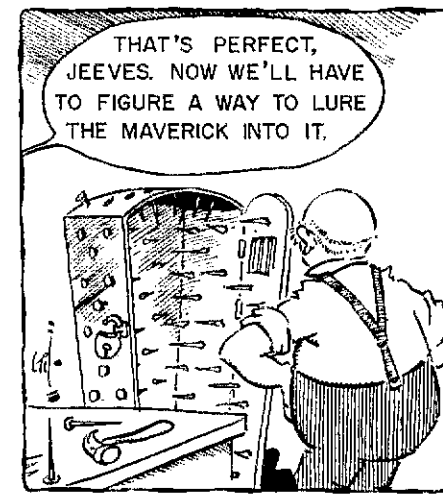


Fig. 9 — Schematic diagram of a two-stage broadband amplifier patterned after a design by W7ZOI. T1 and T2 have a 4:1 impedance ratio and are wound on FT-50-61 toroid cores (Amidon) which have a μ_i of 125. They contain 12 turns of no. 24 enam., bifilar wound. The capacitors are disc ceramic. This amplifier should be built on double-sided circuit board for best stability.

great as 40 dB could be obtained with the circuit of Fig. 8 on 75 meters. A near-field weak-signal source was used during the tests. The greater the null depth the lower the signal output from the system, so plan to include a preamplifier with 25 to 40 dB of gain. Q1 of Fig. 8 will deliver approximately 15 dB of gain. The circuit of Fig. 9 can be used following T2 to obtain an additional 24 dB of gain. In the interest of maintaining a good noise figure, even at 1.8 MHz, Q1 should be a low-noise device. A Siliconix U310 JFET would be ideal in this circuit, but a 2N4416, an MPF102, or a 40673 MOSFET would also be satisfactory. The sense antenna can be mounted 6 to 15 inches (150 to 380 mm) from the loop. The vertical whip need not be more than 12 to 20 inches (300 to 500 mm) long. Some experimenting may be necessary in order to secure the best results. It will depend also on the operating frequency of the antenna.



Never act like "night riders" — follow the "due-process" doctrine.

Summary

We have examined the options for building an effective tool for hunting down the hooligans who are bent on molesting the upright operators in our amateur bands. We urge coordination with your local interference committees as they are established. Above all else, we should never act like true "night riders" when we find the source of the interference. The committees will be following the "due-process" doctrine, which is the only way to resolve this worsening problem.

Once the offenders in your area are decommissioned, you can still use your loop antenna for low-noise reception on the 160- or 75-meter bands. It might be a neat gadget to have around the shack for later use during hamfest treasure hunts or when tracking down nearby sources of manmade noise! QST

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[1]Dorbuck, "Radio Direction-Finding Techniques," *QST*, August 1975, p. 30.
[2]DeMaw, "Beat the Noise with a Scoop Loop," *QST*, July 1977, p. 30.

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The New Look for QST's Antenna Patterns

Antenna radiation patterns can be very useful in Amateur Radio. But using the wrong coordinate system for the plot may obscure important pattern information.

By Jerry Hall,* K1TD

What's the front-to-side ratio of that new vertical phased array featured in *QST*? Perhaps you've noticed, the background grid for antenna patterns appearing in recent issues is new to *QST*. It's designed to let you determine answers to this kind of question easily. If you didn't notice the new coordinate system, you may want to peek again at page 19 of April 1980 *QST*,[1] and at page 32 of the May 1980 issue.[2] Why did we change to this particular grid? Some background information on this system of coordinates appears in the paragraphs that follow.

Let's examine Fig. 1 for a moment. Fig. 1A shows the theoretical azimuth plot of the signal radiated from a half-wavelength horizontal dipole antenna. Fig. 1B is the theoretical azimuth plot of two 1/4-wave vertical antenna elements placed 1/4 wavelength apart and fed equal currents 90 degrees out of phase. These two plots show the type of polar or circular grid-coordinate system which has been used for years in *QST* and other ARRL publications.

What Do These Plots Mean?

How do we interpret patterns? It's not difficult. Imagine that the horizontal dipole antenna is installed above a large, flat desert. At some distance away, say 20 wavelengths or more, we erect a horizontally polarized receiving antenna at the same height as the dipole. We excite our test dipole antenna with a transmitter — a watt or less is sufficient. Now suppose we somehow move our receiving setup in a large circle around the dipole, always keeping our receiving antenna pointed toward the dipole and always staying the exact same distance from the center of the dipole.

As we move around the dipole, the signal picked up by our receiving antenna will change in strength. The strength will be maximum when we are looking broadside at the dipole, and will be minimum (theoretically zero) when we are looking directly at either end of the dipole. The effect would be exactly the same if our receiving position were fixed and, instead, we rotated the test dipole.

The pattern of Fig. 1A tells us exactly this. The azimuth scale, indicated in degrees around the outside edge, shows us the angle of departure of our receiving setup from the reference or starting point. Broadside to the dipole conductor (0- and 180-degrees azimuth in Fig. 1A) we receive maximum signal. Ninety degrees away from broadside, off the ends of the dipole, we receive nothing. At intermediate angles the strength is somewhere between these two extremes. Here is where the circular coordinate system comes into play; we can read these intermediate signal strengths directly from the plot.

Calibration of the Polar-Coordinate Scale

Let's say we calibrate our test setup with the receiving antenna located broadside to the dipole. We adjust the transmitter power so that exactly 1 millivolt of rf is measured at the receiving antenna terminals. Fig. 1A now becomes simply a plot of the millivolt reading we would obtain at the receiving antenna as it is moved around the circle. The scale is linear, having a range of 0 to 1 millivolt.

If we were to increase our transmitter power to obtain a reading of 1 volt in a direction broadside from the dipole, the plot of the antenna pattern would remain unchanged. Here our coordinate system would simply represent the signal response on a linear scale of 0 to 1 volt. You see, everything is *relative* to the full-scale value of the plot! We could also prepare a plot in *absolute* values of signal strength, such as might be measured in microvolts or millivolts per meter, although very few amateurs have the test equipment needed to perform such measurements. The shape of the pattern would be unchanged.

Even if we were to reverse our transmitter and rf voltmeter locations, using the dipole to receive and our second antenna to "illuminate" the dipole with radiated energy, the pattern would not differ. This is true because the radiation pattern of a given antenna is the same whether it be used for transmission or for reception, assuming that proper terminations are maintained at both ends of the transmission line.

The plot of Fig. 1B reveals the same type of information for the phased vertical array. Imagine here that instead of being located in a desert, we place ourselves and the antenna array on a gigantic sheet of solid copper, a perfect conductor. Of course we now use a receiving antenna that is vertically polarized. As we move our receiving setup in a giant circle around the array (or as we rotate the phased-array system), the signal strength will vary with the angle of departure from the array axis as shown in Fig. 1B. Maximum signal is received when our receiving setup is in line with the two radiating elements and in the direction of the element having the lagging phase (0-degrees azimuth in the plot of Fig. 1B). In the opposite direction on the array axis (180-degrees azimuth) the signal strength is theoretically zero. The circular coordinate scale is again relative, as explained for Fig. 1A.

So what's wrong with this coordinate scale? Why change? A moment's reflection will reveal some good reasons. First of all, none of us ever bothers to trot an rf voltmeter out to the terminals of our antenna to measure signal strengths

*Technical Editor, *QST*

[1]References appear on page 28.

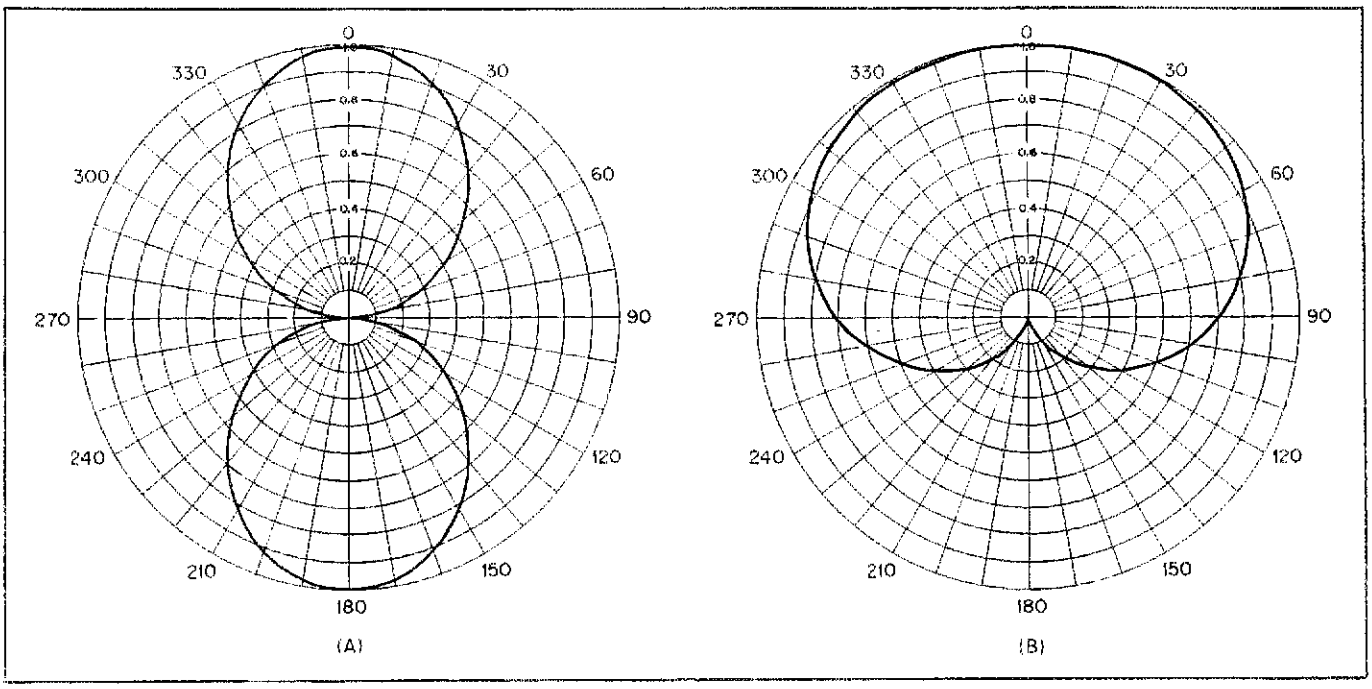


Fig. 1 — At A, a theoretical azimuth plot of the signal radiated from a horizontal half-wavelength dipole. The axis of the conductor lies along the 90/270-degree line on the chart. At B, the theoretical azimuth plot of two 1/4-wave vertical elements spaced 1/4 wavelength apart and fed 90 degrees out of phase. The two elements of the array lie along the 0/180-degree line, with maximum signal being radiated in the direction of the element that is lagging in phase. In these plots the linear system of concentric circles represents signal strength in voltage units, with zero at the center.

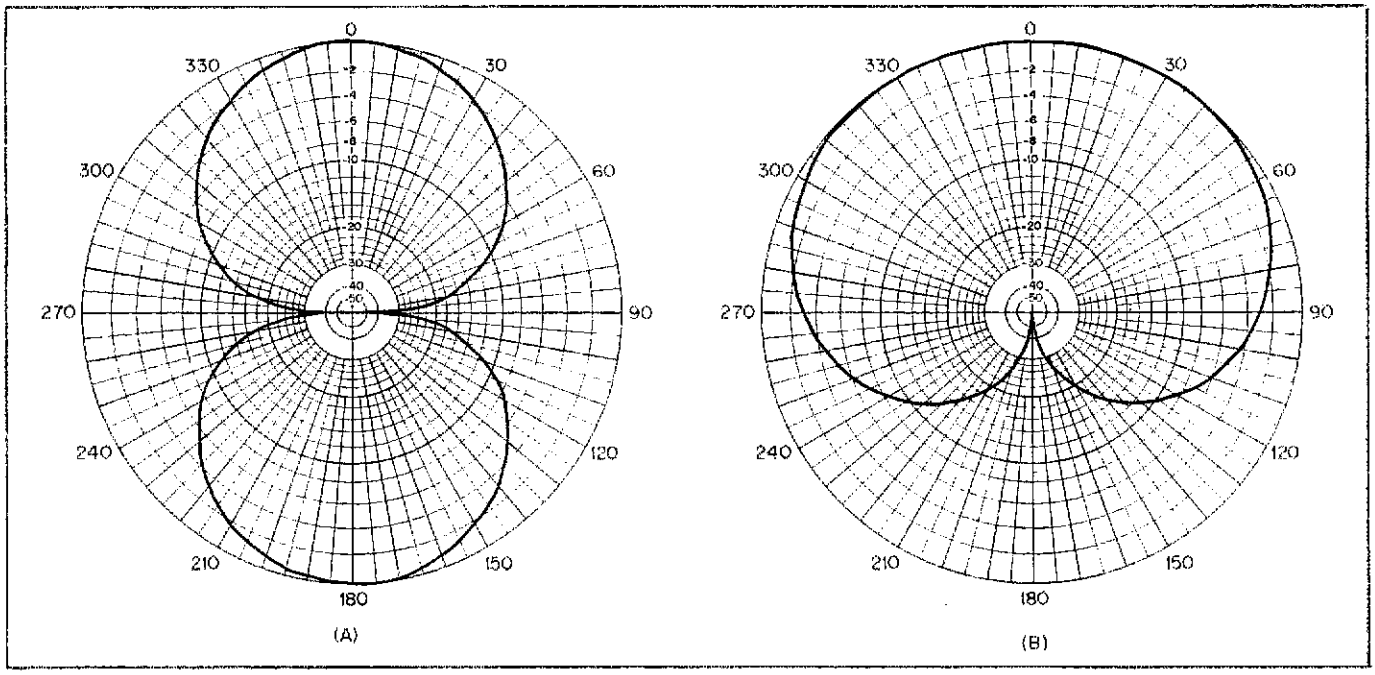


Fig. 2 — "New look" azimuth plots for the same antennas plotted in Fig. 1. The patterns have a slightly different shape but are quite recognizable to those who may be familiar with various antenna patterns. The log-periodic system of concentric circles represents signal strength in decibels relative to that in the direction of maximum radiation, with – 100 dB at the center.

because of the impracticality. As a result, we're just not accustomed to thinking of signal strengths in terms of rf millivolts, microvolts, or whatever, especially when everything is relative. Instead, most of us have become accustomed to thinking in terms of decibels, or dB. Receiver manufacturers have made it extremely more than bare essentials sporting an S meter. Nearly all of these meters indicate S units to S9, and indicate decibels above S9. How many times have you heard this kind of an expression? "You're 40 dB over S9 here, solid copy!"

The two plots of Fig. 1 don't give us much help directly if we're looking for array? Or how much is my signal down at a particular DX station if he is 60 degrees away from broadside of my fixed dipole? Sure, we can find the answers to these questions by taking information from the plot and applying the familiar equation, $dB = 20 \log E_1/E_2$. But why not plot the pattern on a coordinate system of decibels

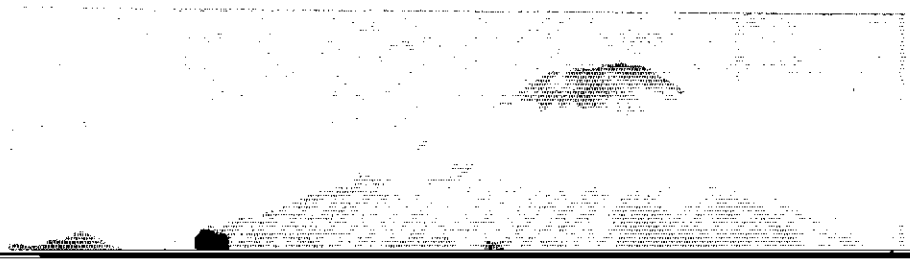
our minds at ARRL headquarters as we were considering the change.

The New Look

Now please examine Fig. 2. These pattern plots are for the same antennas as those of Fig. 1. The only difference is that the plots are made on a nonlinear polar-coordinate system graduated in decibels.

We pondered various decibel-coordinate systems for quite a while before arriving at the chosen one. A linear scale in dB is easy to work with when making plots, for example, but has one serious drawback which I'll explain. In a

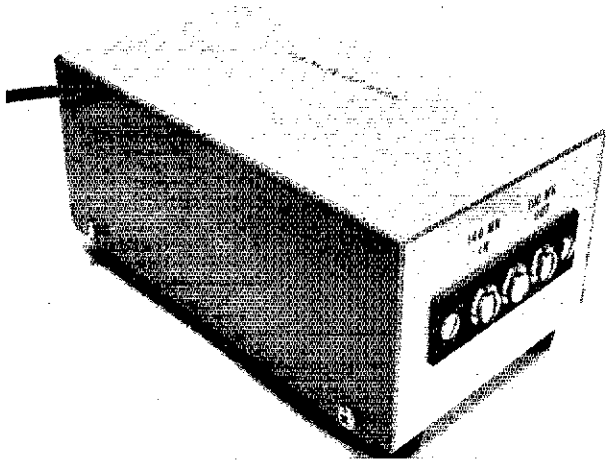
Strays



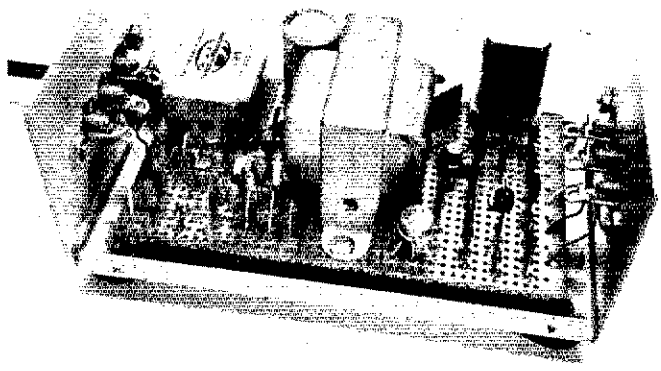
The Little Gem Mixer Box

Be sure your 2-meter fm transmitter is toeing the mark. Set the deviation precisely with this dependable instrument. It facilitates checking the frequency response and serves as a monitor, too!

By Harold E. Jones,* W6BWH



The Little Gem Mixer Box. This 2-meter test mixer is designed to help radio amateurs maintain fm transmitting equipment in accordance with the best practices. It even takes the place of an expensive deviation meter.



Use of perforated circuit board provided a convenient means for neatly arranging the components shown in this inside view of The Little Gem Mixer Box. The International Crystal Co. OE-1 crystal oscillator is visible at the upper left, while the 46-MHz third-overtone crystal is at the upper right. T1 is mounted in the center.

This simple little gadget is useful for performing at least three test and repair functions on your fm transmitter. It facilitates checking the frequency response, it monitors the output of the transmitter and it permits making a precise measurement of the deviation. Monitoring the output is a must when checking for hum, noise or intermittents. A particular benefit is that you don't need an expensive deviation meter. The Little Gem provides a means of making these important tests with equipment you probably have already.

The Little Gem may be considered a premixer. It serves somewhat in the manner of a preamplifier connected to the input of the appropriate a-m or fm receiver. The input signal to the mixer can be provided from a foot or so of wire lying on the bench next to the transmitter, the output of which is fed to a dummy load. Such a procedure will work for transmitters in the 10-watt or larger class. Lower power transmitters may require closer coupling. What the Little Gem does is to convert a sample of the output of a transmitter to another frequency where it may be received on an appropriate receiver for measurement and observation. This idea is offered in furtherance of the belief that making a few simple measurements is better than just sitting there looking at a piece of equipment and guessing what it may be doing.

Evaluating Performance

A standard fm broadcast tuner or receiver, if in reasonably good condition, is capable of reproduction far in excess of what an amateur transmitter is capable of putting out. It is, therefore, a good instrument to have for evaluating performance of a ham rig. In using an fm tuner to make measurements, you must remember that an fm tuner has a 75-microsecond R-C roll-off filter that results in a response curve as shown by the de-emphasis graph (Fig. 2). Values from this graph must be added to any readings produced by the tuner. In other words, if the transmitter is adjusted to have a flat on-the-air response, the results measured at the output of an fm broadcast tuner should agree with the curve of the graph. The response is not down a great amount out to 5000 Hz. Besides, there are precious few commercially built amateur transmitters sold in recent years that have any kind of measurable response at 5000 Hz.

Checking the frequency response of your transmitter can be somewhat academic unless you intend to do something to improve it. In the situation where you have reports of hum, distortion, noise or an intermittent condition, listening to the results of your efforts to remedy the problem can be useful. If you have a second transceiver, fine; but most of us have only one. Therefore, letting the family fm tuner serve this purpose can be most useful.

Concerning Deviation

Setting the deviation can be a pretty

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"iffy" thing unless you have some measuring equipment and you can find out what the deviation is supposed to be.

At one time, for the uhf bands at least, 15 kHz was the accepted standard. For the last four or five years, on 2 meters, the move has been to accept 5 kHz as the standard. Whatever the accepted standard may be, very few operators are able to accurately measure and adjust the deviation of their equipment.

There are two commonly accepted solutions to the deviation problem. One is to take the set to a shop that has a deviation meter. The other is to get on the air and try to find someone to guide you into making a proper adjustment. With the latter approach and a little luck, one can usually get in the ball park, but if the deviation ends up within plus or minus 1 kHz of what it should be, something of a miracle has been accomplished. The variables here include the frequency response and distortion characteristics of the transmitter and receiver, the aural evaluation abilities of the receiving operator and the voice characteristics of the transmitting operator. Some people have a heavy, full-sounding voice. They just plain sound loud no matter what. Others have weak, anemic voices that sound weak even if they are overmodulating the transmitter. Not a very exact or scientific approach to the problem!

Precise Deviation Measurements

With the Little Gem Mixer Box, a low-band ssb or cw receiver and a source of audio, a precise measurement of the deviation is possible. This procedure is based on Bessel functions. A description of this function may be found on page 13-5 in the 1980 *Radio Amateur's Handbook*. The subject is also covered in other engineering texts. Fundamentally, the theory says that for any given pure sine-wave audio modulation frequency, the fm carrier will disappear at certain mathematically predictable degrees of modulation. In practice, this point of disappearance is extremely sharp. If not, the presence of other signals (hum and distortion) is indicated.

To make this test, all that is needed is a source of audio and a method of detecting the disappearance of the carrier. The audio source can be a simple single fixed-frequency audio oscillator of the R-C phase-shift type. Information on building one of these can be found in the *Radio Amateur's Handbook*.

For the test, a frequency in the 200-Hz range is generally most satisfactory, making identification of the various beat notes easier. Also, using a frequency somewhere near that to which the transmitter is most responsive is most desirable. A frequency run will determine this response, but as a general rule, most commercially built ham rigs will peak in the 1000- to 2000-Hz range.

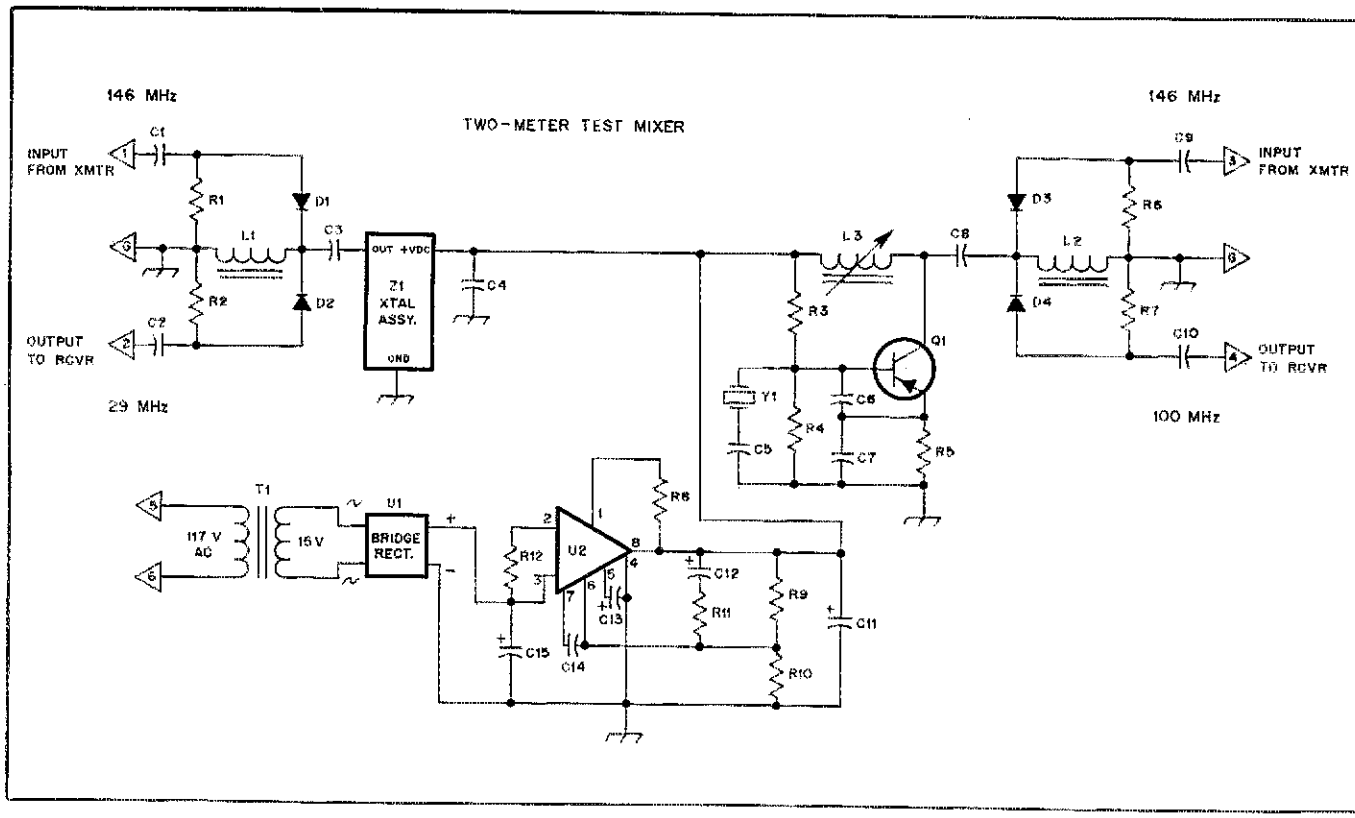

Fig. 1 — Schematic diagram for the Little Gem Mixer Box. Terminals 1 and 2, and 3 and 4, are symmetrical and interchangeable, but to avoid confusion, terminals 1 and 3 are labeled as input from the transmitter under test. Terminals 2 and 4 are therefore chosen for the output to the appropriate receiver. With a Z1 frequency of 122 MHz, as indicated below, a 146-MHz signal will appear at 24 MHz on terminal 2. If Z1 is changed to 117 MHz, the signal on terminal 2 will be 29 MHz. The 117-MHz crystal is probably the best frequency for use with a ham-band receiver. Terminal 4 can feed a standard fm broadcast receiver at 100 MHz.

C1-C3, incl., C9, C10 — 0.001 μF, 50 V.
C4 — 0.01 μF, 50 V.
C5, C14 — 20 pF, 50 V.
C6 — 10 pF, 50 V.
C7, C8 — 47 pF, 50 V.
C11 — 5 μF, 20 V tantalum.
C12, C13 — 2 μF, 20 V tantalum.
C15 — 500 μF, 30 V electrolytic.
D1-D4, incl. — 1N914.
L1, L2 — 1-mH iron-core choke.
L3 — 7 turns no. 26 enameled wire on Miller cup core no. 53A-2-2. Must tune to 46 MHz.
Q1 — Germanium pnp 300-mW high-speed switching or rf transistor, 2N706A or equiv.
R1, R2, R6, R7, R11 — 1 kΩ.
R3 — 4.7 kΩ.
R4 — 2.4 kΩ.
R5 — 470 Ω.
R8 — 5.6 Ω.
R9 — 24 kΩ, 5%.
R10 — 4.7 kΩ.
R12 — 22 Ω.
T1 — Transformer, 120-V pri., 14 or 15 V sec., 0.1 A.
U1 — Bridge Rectifier, HEP RO801, Sylvania ECG-166 or equiv.
U2 — RCA CA 3055 or CA 3085.
Y1 — International Crystal Mfg. Co., 46-MHz third-overtone crystal.
Z1 — International Crystal Mfg. Co., OE-1-122 MHz oscillator.

Table 1 taken from the *Radio Amateur's Handbook*, gives the deviation for various audio frequencies. For instance, at an audio frequency of 2079.2 Hz, the first null is at 5000-Hz deviation.

Detecting the Null

To detect the null, some form of a-m detector with a good sharp filter ahead of it is needed. The best thing to use is a low-band a-m/cw receiver with a narrow cw band-pass filter. A sideband receiver will do quite well, however, although a bit of operator concentration is required. This is a requirement that results from the great number of sidebands produced in the fm process.

In a-m, with a single audio tone and barring distortion, only a single pair of sidebands will be produced. Their amplitude will vary directly with modulation percentage. In fm, an infinite number of sidebands are produced, although only the first three or four are of any significance. The rest are of such low level as to be considered nonexistent for any practical purpose. The sidebands go through null points like the fundamental but at different frequencies and different amounts of deviation, performing independently.

The resultant sound heard from a cw or ssb receiver is not unlike several cats sitting on a fence during a warm moonlit night at mating time. To pick your cat from the mess will require a bit of concentration. This can be facilitated best if, when the fm carrier is tuned in, the receiver is adjusted to produce a beat note in the low audio range, around 200 Hz. Then if a modulation frequency in the upper audio range, around 2000 Hz, is introduced, there will be considerable difference between the 200-Hz beat note that you want to hear and the modulation beat notes that you don't care about. Advance the modulation control until the 200 Hz beat note disappears, indicating that the fm carrier has disappeared.

At this point, using Bessel function math, you can calculate the deviation, or if you have used the proper audio frequency, you can read the deviation from Table 1. The table is much easier to work with. I might add that my understanding is that all deviation meters trace their calibration accuracy back to a Bessel function series.

Table 1

Deviation for various audio frequencies, taken from the ARRL *Radio Amateur's Handbook*.

Audio Frequency (Hz)	*Deviation Produced 1st Null (kHz)*	*2nd Null (kHz)*	*3rd Null (kHz)*
905.8	2.18	5.00	7.84
1000.0	2.40	5.52	8.65
1500.0	3.61	8.28	12.98
1811.0	4.35	10.00	15.67
2000.0	4.81	11.04	17.31
2079.2	5.00	11.48	17.99
2805.0	6.75	15.48	24.27

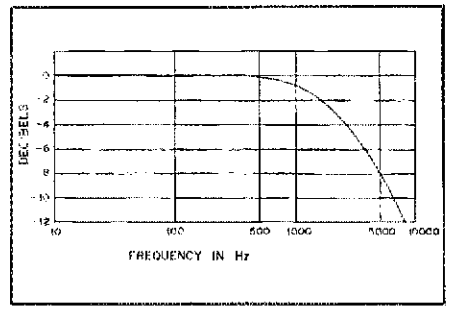

Fig. 2 — A 75-microsecond de-emphasis curve. Values from this graph are to be added to any readings produced when using an fm tuner in checking transmitter performance, as indicated in the text.

Power Supply

It will be noted that Fig. 1 illustrates a regulated power supply. Regulation is not really necessary, but pure dc is. An IC regulator gives more filtering action for the space occupied and cost than any other method I know of. Also, note that while a symmetrical diode mixer is used in this circuit, any kind of mixer can be tried. Other choices could be dual-gate FET, JFET or bipolar transistor. In some respects, one of these might be better. Sensitivity is not important in this application. Because the simplicity of the diode is appealing, I chose that for my design. Inputs and outputs are symmetrical and reversible.

Choice of Frequency for Crystals

There are some limitations and precautions in the area of the crystal frequencies to be selected. A 46-MHz crystal will convert 146 MHz to 100 MHz right in the middle of the fm broadcast band. The entire 2-meter band will fit between 98 and 102 MHz. Should there be a strong local fm broadcast station in or near this area, a search should be made to find a relatively interference-free spot on the dial and a conversion crystal frequency to convert the 2-meter band to this frequency should be used. Crystals from 40 to 56 MHz are practical. The choice of crystals for conversion to low-band receiver use may be a bit more involved. If a general-coverage a-m/cw receiver is employed, only one crystal is needed, allowing the choice of a wide range of crystal frequencies.

In my case, the International Crystal Co. OE-1-122 unit was available, having been left over from a previous project. It is a complete unit containing crystal, transistor and associated parts, all in a small package. The cost happened to be very little more than the parts. This oscillator unit converts 146 MHz to 24 MHz, where it can be received on a general-coverage receiver. Plug-in crystals are, of course, more flexible. Separate oscillators are needed because the crystals are third-overtone units and are widely separated in frequency. In the case where an amateur-band only receiver is used, a problem exists in that the 2-meter band is much wider than any of the low bands. The 10-meter band, which is the widest, is less than half as wide as the 2-meter band. This means that if the 10-meter band were used as the i-f, then three conversion crystals will be needed to cover the entire 2-meter band. For most tests, coverage of that part of the band worked most frequently is all that is necessary.

And So . . .

This simple little unit has proved most rewarding on several occasions. My hope is that it will be of value to other "homebrew artists" and "fix-it-yourselfers." Certainly it is far more economical to construct than purchasing a second transceiver. QST

Strays

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AFRTS AFN-EUROPE SOCIAL AT SEANARC '80

☐ Veterans or active-duty military persons with service in AFN-Europe or AFRTS anywhere are invited to a social gathering at ARRL-SEANARC '80 in Seattle, July 25 to 27. Information from Bill Pickering, W7NZD, 9653 — 48th SW, Seattle, WA 98136.

• *Basic Amateur Radio*

IMUS Control

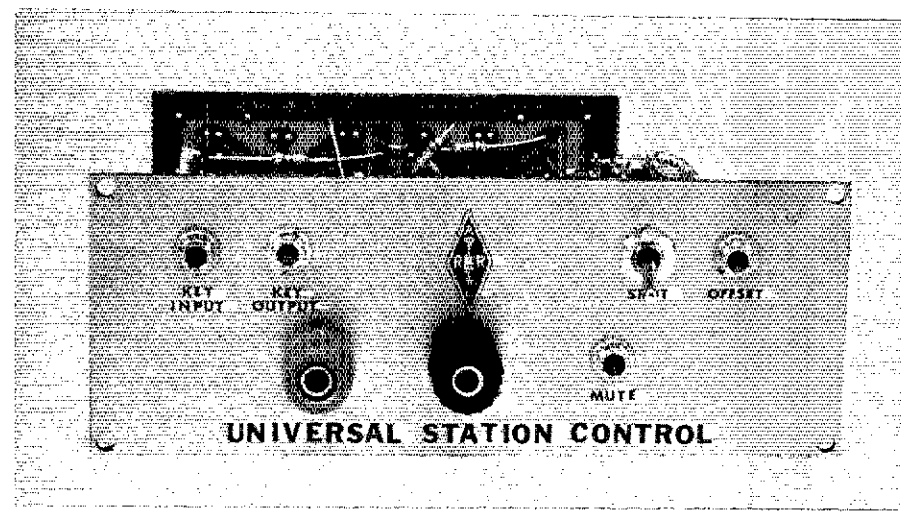
Tired of throwing 13 switches to go from transmit to receive? Want the convenience of semi-break-in? Get your soldering iron out — here we go again.

By Peter O'Dell,* AE8Q and Robert D. Shriner,** WAØUZO

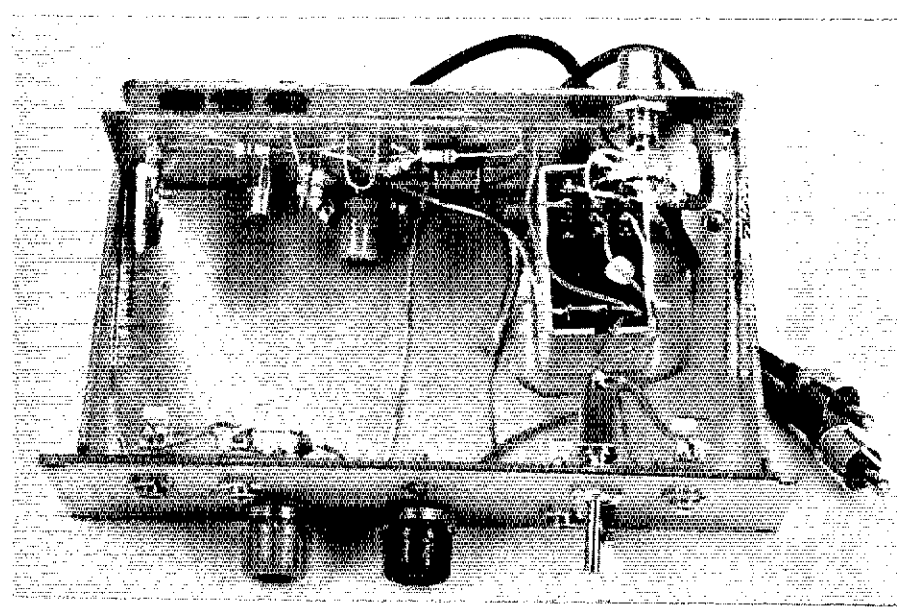
"Are you the clod who's responsible for putting these Basic Radio devices into my *QST*?" the voice screamed when I picked up the phone. Without giving me so much as a chance to respond, he went on: "Well, do you know what you've done to me? I'll tell you what you've done. Here I am enjoying getting on the air with a transmitter, receiver, keyer and those other accessories that I've built all by myself and you make me look like an idiot. How? I'll tell you how. It takes me an hour to switch from transmit to receive. I've been getting comments like 'thought you died,' and 'thought you went to sleep.' The ultimate insult came this morning when some recent convert from 11 meters asked if I had gone 10-100. Now that you bright guys have me hooked on using home-built equipment, what are you going to do to keep me from looking like a one-armed-paperhanger when I have to switch from transmit to receive?"

I told him that he was in luck because we were planning to run the IMUS Control. "IMUS Control!" he screamed, "What kind of gadget has a dumb name like that? I don't even own an IMUS and you are going to try to talk me into building something to control it. I don't have an IMUS, do I?" He was beginning to mellow a bit. Very calmly I explained to him that IMUS Control stood for Instant-Muting-Universal-Station Control and that this device, when properly connected to his Universal Transmitter[1] and Universal Receiver,[2] would allow him to switch from transmit to receive instantly by doing nothing more than keying the transmitter.

"How does this thing work? It sounds like it might just be what I am looking for." He was really calm now. I explained



Front-panel view of IMUS Control. The pc-board panel is styled to match the other units in this series.



Overhead view of IMUS. Although there are relatively few components involved, the unit does an excellent job. Some minor changes in component locations were made after this shot was taken.

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[1]Notes appear on page 35.

that it was an electronic switch that was wired in parallel with the keying jack of the Universal Transmitter. It uses a couple of op amps to do switching. Before I could go on to tell him that the op amps in turn drive a transistor, which in turn drives a relay, he was screaming again. "What's an op amp? Why do you keep trying to confuse me with these crazy terms?"

Rather than try to explain op amps to him, I recommended that he read George Woodward's two-part series on op amps in the Basic Amateur Radio section of *QST*.[3,4] I suggested that he pay particular attention to the section in part two dealing with op amps as switches. I went on to explain that the reason for using op amps is their capacity for high gain, which is useful when switching a relay drawing a relatively large amount of current with our keyer which is capable of sinking only a moderate amount of current. The relay can do several things for us simultaneously, because it has four sets of double-throw contacts. The obvious thing to do with it is to switch the antenna from transmit to receive. To add some further protection to the front end of the receiver, we can wire the relay such that it automatically grounds the receiver antenna input when the transmitter is switched on. It should be impossible to blow the front end that way. The other functions are for offset of the VFO and the muting function.

"What is this muting business?" he wanted to know, but he didn't seem quite so impatient as before. I suspected that the project was appealing to him. The driving force behind his questions had switched from frustration to curiosity. It would only be a matter of time until he would be digging out the soldering iron again.

Muting is simply a means of turning off the audio output of the receiver during transmit, I explained. It is particularly desirable if you are wearing headphones. We accomplish this by putting a transistor switch on the audio line ahead of the amplifier in the receiver. The switch is off during receive because the base of the transistor is grounded through the normally closed contact of the relay. When the relay is thrown, the ground is removed from the base of the transistor switch, thus allowing the transistor to go into saturation. This provides a low-impedance path for the audio signal coming out of the MPF102 audio amplifier. It is quite effective as a means of quieting an audio amplifier. I mentioned that I had noticed that some of the fm rigs on the market use a similar switch in conjunction with the squelch detector to provide squelch action.

"Don't you get some loud clicks in the headphones when you turn the transistor on and off so hard?" His question indicated that I had won him over. I explained that we did have that problem while working on the prototype. After trying several different schemes, we resorted to what might be called the brute-force method. We attached back-to-back germanium diodes parallel with the switch and parallel across the headphone jack. These diodes act as clamps and minimize any voltage swings. By using germanium diodes instead of silicon, we are able to reduce the amplitude of the spikes to 0.2 V instead of 0.7 V.

"Okay, you've sold me. Send me the schematic. Better yet, give me the parts list and I'll run over to Radio Shack and get started today." He was impatient again, but this time the source of his excitement was enthusiasm. Not wanting to dampen his enthusiasm (or rekindle his anger), I spoke slowly and softly, telling him that he was really coming along in understanding the basics of radio, which he was. I thought that he was ready for a new and bigger challenge. I bet him that based on the information I had given him and with his intense interest, he could design his own switching circuit — his own IMUS Control. Anyway, we could not mail out the schematic to him, because it was considered proprietary until it appeared in *QST*. We chatted for a few minutes more before he hung up, determined to add equipment design to his trophy case. Maybe he will drop us a note to let us know how his circuit compares with ours. There are numerous ways of doing most things; it's just a matter of playing with it until you find a good way of getting the job done — often using parts you already have on hand.

Nutshell Eye View

Simplicity is the word of the day for the circuit shown in Fig. 1. A reference voltage of 6 volts is established at the noninverting input of U1A (pin 3) by the voltage dividing network consisting of the two 100-kΩ resistors. Pin 2 is held high by the 100-kΩ pull-up resistor until the key input goes low. The key input goes low when a manual key is closed or when the output of an electronic keyer goes low, e.g., the Universal Keyer.[5] When the voltage on pin 2 crosses the reference voltage, pin 1 goes from near zero volts to near the supply voltage. The 47-μF capacitor is charged through D1. When the voltage on pin 5 passes through the

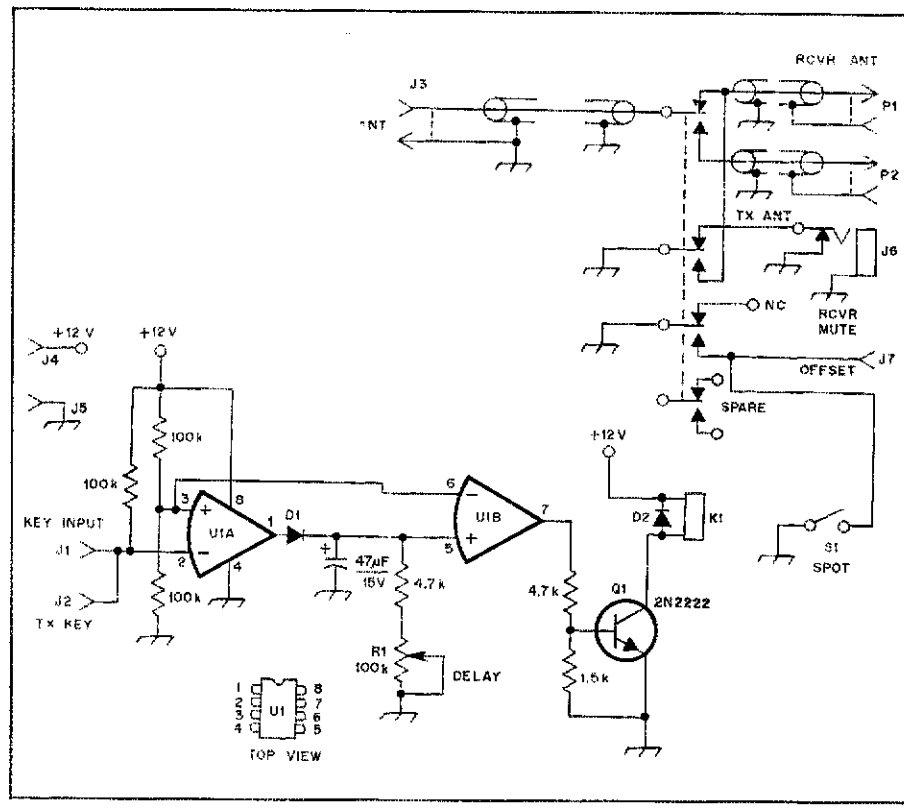


Fig. 1 — Schematic of IMUS Control. Fixed value resistors are carbon-composition, 1/2 watt or less. Resistances are in ohms; k = 1000, M = 1,000,000. Part numbers inside parentheses are Radio Shack parts suitable for use in this circuit.

D1, D2 — 1N914 or equivalent (276-1122).
J1, J2, J6, J7 — Closed circuit, 1/8-inch 2-conductor, phone jack (274-253).
J3 — Phone jack (274-346).
J4, J5 — Binding posts, one red, one black (274-662).
K1 — 12-V dc, 4-pole, double-throw relay (275-214).
P1, P2 — Phono plug (274-339).
Q1 — 2N2222 or equivalent (276-1617).
R1 — 100-k printed-circuit-board potentiometer (271-220).
S1 — Single-pole, single-throw toggle switch (275-612).
Miscellaneous — Cable, plugs, wire, epoxy cement.

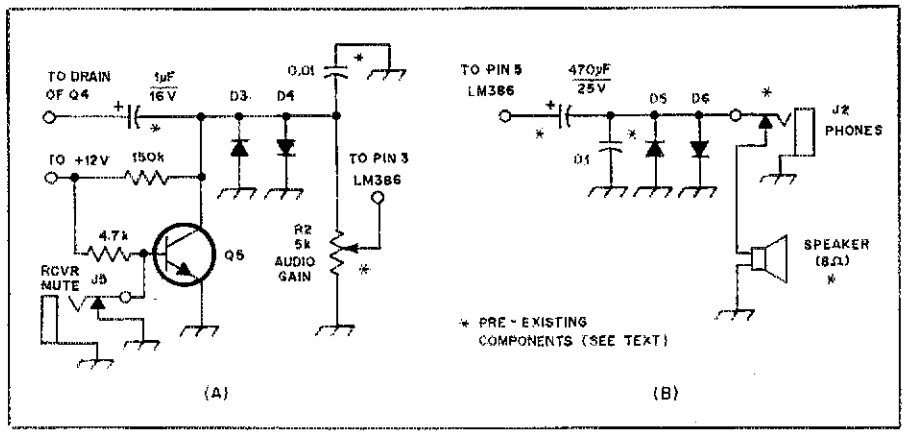


Fig. 2 — Portions of the schematic diagram of the Universal Receiver showing components that must be added for muting function. Refer to text for details of construction. Resistances are in ohms; k = 1000. Fixed-value resistors are carbon-composition, 1/2 watt or less. Part numbers inside parentheses are Radio Shack parts suitable for use in this circuit.
D3, D4, D5, D6 — 1N34, 1N270 or equivalent (276-1123).
J5 — Closed-circuit, 1/8-inch, 2-conductor phone jack (274-253).
Q5 — 2N2222 or equivalent (276-1617).

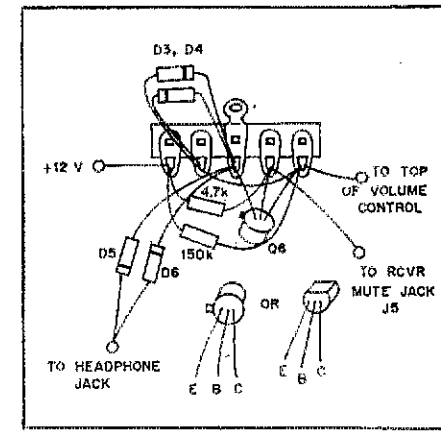


Fig. 4 — Parts placement of muting-switch circuit. Parts are mounted on a 5-lug solder terminal which is soldered to shield wall inside receiver. See Fig. 5.

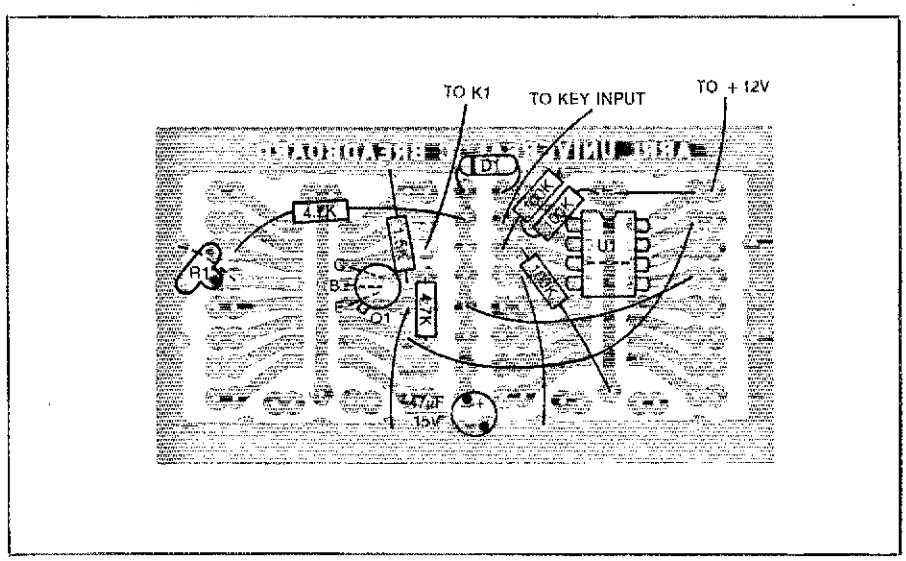


Fig. 3 — Parts-placement guide for the IMUS Control. Parts are mounted on the nonfoil side; the shaded area represents an X-ray view of the copper pattern. Resistances are in ohms; k = 1000, M = 1,000,000. Unmarked lines indicate insulated wire jumps. Broken lines indicate jumpers on foil side of board. The etching pattern of this board appears on page 42 of May 1980 *QST*.

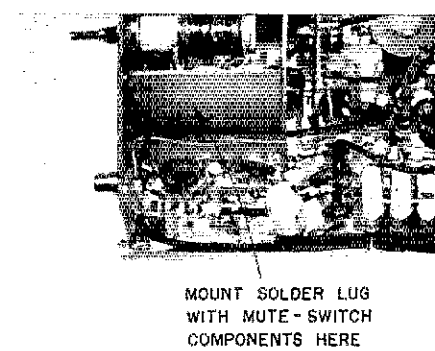


Fig. 5 — Suggested mounting position for solder lug and mute-switch components in the Universal Receiver. The mute jack is mounted on the rear panel above the antenna jack and the earphone jack.

reference voltage (pin 6 is tied to pin 3), pin 7 swings from near zero to near supply voltage. This voltage biases Q1 on, causing the relay to close.

When the key is released, pin 2 is pulled high through the 100-kΩ resistor, causing pin 1 to go low. D1 now serves to isolate the 47-μF capacitor from pin 1. The capacitor discharges through R1 and the 4.7-kΩ resistor. As long as the voltage on the capacitor is above the reference voltage, pin 7 will remain high. Thus, the capacitor and the resistors serve as a variable drop-out delay for the relay. Altering the values of the resistors and the capacitor will merely change the range of the delay; i.e., if you have a capacitor or resistor that is in the ballpark, try it, because it will probably work.

Fig. 2 shows the muting circuit that must be added to the receiver. Refer to the DeMaw and Shriner article, "The Nitty-Gritty of Simple Receivers," March 1980 *QST*, (page 26, Fig. 9). Notice that Fig. 2 here is simply selected portions of Fig. 9. In Fig. 2 those components appearing with asterisks next to them are part of the basic receiver as illustrated in Fig. 9. Components without asterisks are those to be added to enable the mute function to work. Note that the mute input jack, J5, has a shorting bar that is connected to ground. If this jack were left floating when nothing was plugged into the jack, the receiver would be permanently muted. When wired as depicted in Fig. 2, the receiver functions normally when it is disconnected from the IMUS Control.

The diodes (D3, D4, D5 and D6) serve to minimize any popping or thumping as the mute switch is turned on and off. If the prospective builder intends to use this circuit with a receiver other than the Universal Receiver, it is suggested that he experiment with positions along the audio chain for best results.

Fabrication

IMUS is constructed on the Universal IC Breadboard,* but there is nothing sacred about that. Any convenient construction system will work. A suggested parts layout is shown in Fig. 3 for those choosing to build on the Universal IC Breadboard. U1 is mounted on an IC socket to facilitate insertion and removal. The Universal IC Breadboard is mounted vertically as shown in the photograph. Relay K1 is cemented to the pc board chassis with fast-setting epoxy cement. Prepare two coaxial cables of the proper length to reach from the IMUS to the

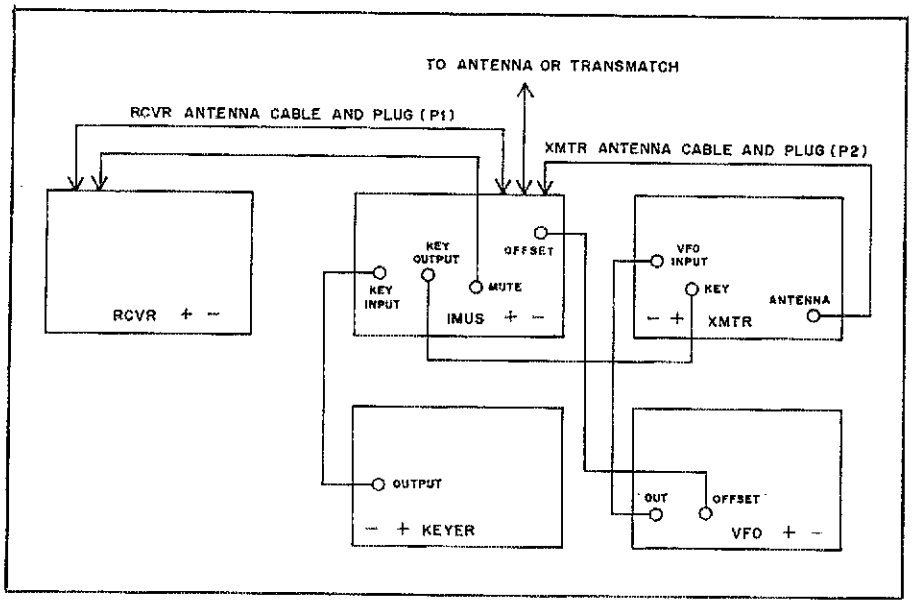


Fig. 6 — Pictorial of front panels and interconnection cables for IMUS and the other units of this series. Arrow heads indicate connections to be made on the rear of the unit. Power supply connections are indicated by + and −.

transmitter and the receiver. Solder a phono plug to one end of each and prepare the other ends for attachment to the relay. Run a short piece of coaxial cable from the antenna jack to the relay. Twist the three shield wires together and solder as close to the relay as possible. Wire the relay contacts as shown in Fig. 2 and complete the IMUS. Assembling the unit is a straightforward task that should create no problems for any one who has built any of the previous projects.

Modifying the receiver is, perhaps, slightly trickier. Using the mounting methods shown in Fig. 4 should minimize the difficulty. J5 is installed on the rear panel above the antenna jack. Check the action of the jack with an ohmmeter to make sure that the jack is grounded when nothing is plugged in. Assemble Q5 and the associated components on the five-lug solder terminal. If you happen to have a terminal that has a lug other than the center one grounded, rearrange the layout of the components so that the emitter of Q5 and the diodes are attached to the grounded lug. Attach the common ends of the two resistors to + 12 V in the receiver. Solder the terminal strip grounding mounting lug to the outer shield housing Q1 and its associated components as shown in Fig. 5. Solder a lead from the collector of Q5 and the ungrounded ends of D3 and D4 to the top of the volume control. Solder the ungrounded ends of D5 and D6 to the headphone jack. Connect the receiver mute jack to the base of Q5. At this point check the operation of the receiver. With nothing plugged into J5, the receiver should function normally. Mechanically open J5; the receiver should be muted at this time. If the muting circuit fails either of these tests, proceed no farther. Troubleshoot and correct the problem before going on.

Apply power to the IMUS; no smoke is a good sign. Short the key input to ground. You should hear the relay click; break the short and you should hear the relay click again, after some delay. Try this with R1 set at different values. If the variation in R1 does not offer a suitable delay at some point, try substituting a larger or smaller value for the 47-μF capacitor. A larger value will lengthen the delay, while a smaller one will shorten it for any given resistance.

Fast Switch

Connect the transmitter and receiver to IMUS (see Fig. 6). Attach the antenna to the antenna input of IMUS! Double check to make sure that all interconnecting cables are properly connected. Make a contact. The ease of operation should increase the enjoyment derived from using equipment that you have built yourself.

I just got another phone call — not the same fellow, though. You wouldn't believe what he insisted that we build next for this series! (Well, maybe you would.) We'll have to think about this some. There just may be a use for that spare set of contacts on the relay after all. QST

Notes

[1]DeMaw and Shriner, "Transmitter Fundamentals," *QST*, December 1979, p. 11.
[2]DeMaw and Shriner, "The Nitty-Gritty of Simple Receivers," *QST*, March 1980, p. 21.
[3]Woodward, "A Beginner's Look at Op-Amps," *QST*, April 1980, p. 15.
[4]Woodward, "A Beginner's Look at Op-Amps, Part 2," *QST*, June 1980, p. 25.
[5]O'Dell and Shriner, "The NOR-Gate Break-In," *QST*, May 1980, p. 22.
[6]The etching pattern for the Universal IC Breadboard appeared on page 42 of May 1980 *QST*.
[7]Circuit boards, negatives and complete parts kits for this project are available from Circuit Board Specialists, P. O. Box 969, Pueblo, CO 81002.

Strays

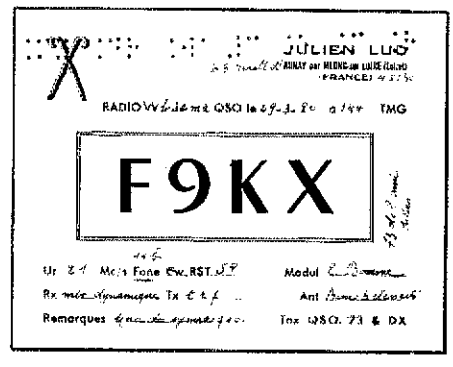
HOLY KAØW!

☐ A milestone in the history of Amateur Radio occurred recently when Dr. Tom Linde, KAØW, contacted N6AUP in Vallejo, California, using a 6-watt transceiver from his wheelchair. Linde, who has cerebral palsy, recently earned his Amateur Extra Class ticket. Dr. Linde is a psychologist at the Veterans Medical Center in Knoxville, Tennessee, and an active member of the HANDI-HAM System.

F9KX QSL

☐ Paul DeGlas, WB3EMR, of Morristown, Pennsylvania, enjoys talking to French-speaking stations. A QSL card from F9KX was the result of such a QSO.

The QSL card reveals an interesting story. Julien Luc, F9KX, is 83 years old and blind. War injuries have left Julien handicapped but, nevertheless, an active DXer. The handwritten message translates as "Dear Friend Paul, I was very happy to meet you. Thank you for the contact and your QSL. I hope to have the pleasure to meet you again. Julien is 83 years old, Doyen and President of Honor of UNESAF. Until we meet again dear friend Paul."



F9KX's QSL card sends a personal message in Braille as well as in French, English and Spanish. WB3EMR plans to frame this special card.

Hints and Kinks

Conducted By Stuart Leland,* W1JEC

MINI-MISER'S DREAM RECEIVER MODIFICATION

I constructed the Mini-Miser's Dream Receiver (September 1976 *QST*). With the few changes mentioned below, I find the performance is great. Initially I noticed that as the 12-volt supply voltage varied, so did the oscillator frequency. The fix was simple. I removed the 820-ohm mixer decoupling resistor and replaced it with a 100-ohm resistor connected to the regulated 8-volt supply. With this modification, the mixer still had the same gain with 7 volts applied. Now there is no oscillator-frequency change even though the supply voltage may vary from 10 to 16 volts.

In order to limit the audio response, I replaced the 1-μF detector bypass capacitor with one rated at 2 μF. Because of the use of a pair of crystals on the same frequency, I changed the BFO capacitor from 100 pF to 20 pF in order to obtain the correct shift.

Initially, C4 did not provide proper tuning until I added 200 pF across it. Later I learned that the diagram should have shown the turns ratio of T2 as 3:1 (9 turns and 3 turns).

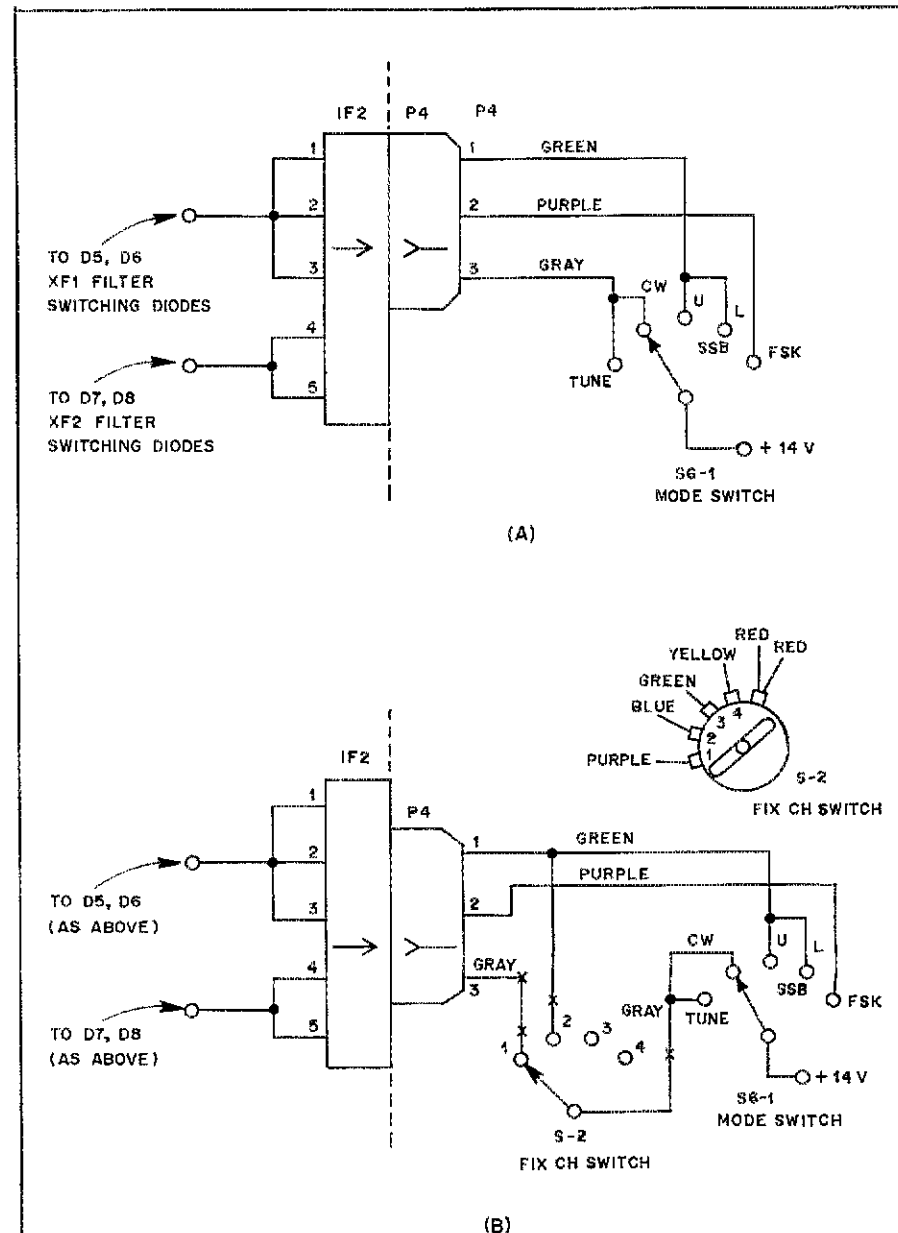
I wish to congratulate Doug DeMaw on all of the good work he has done in the field of Amateur Radio construction projects. Keep it up! — *Mike Branca, W3IRZ, Manassas, Virginia*

KENWOOD TS-820 CRYSTAL-FILTER SWITCHING

If operating your Kenwood TS-820 on cw is your pleasure, you should have the Kenwood cw filter. It separates signals marvelously. However, when the filter is plugged in, according to Kenwood instructions, a loss of "feel" for the band results. The reason for this is that the filter is in operation constantly. A solution to this problem is to make use of the FIX CH switch (common to the plate-loading control) to allow switching the filter out as desired.

You may be disenchanted with the performance of the filter if you make a common installation error. This mistake is the failure to be sure that contact is made with the common leads of the filter unit and the circuit board. The error can easily be made. The consequence is a semblance of filter action (far from what it should be) and an insertion loss that is greater than normal.

Whether or not you have the filter permanently installed and working properly, the following modifications will provide a pleasant improvement of cw operation when QRM is heavy. Carefully carry out the manufacturer's instructions for filter installation. Be especially careful in soldering the common pins to the common area of the board. The input/output pins are inserted by melting solder at the respective entry points on the board. The common pins, however, come through holes that have wide spaces around them and the common area of the board. This is where the problem lies. Be certain to spread solder from the common area of the board to each pin. Check the filter operation before going any further.



A crystal-filter switching circuit for the Kenwood TS-820. The unmodified TS-820 mode-switch circuit is shown at A. Modification of the circuit is shown at B. See text for information about faulty filter installation.

There should now be very little insertion loss and you should be able to separate signals nicely. If you have any doubts, recheck those pins!

Diode switching is used throughout the TS-820. The objective of this modification is to provide selectable switching of the +14-volt line to D5/D6 or D7/D8 on the i-f board. This will activate the ssb or cw filter.

Begin the installation by placing the TS-820 on its side. Locate the i-f board, the IF2 strip and plug P4. Move P4 over one pin to pins 2-3-4. Then proceed with the following steps to modify the Kenwood for filter switching.

1) P4 has three leads (green, purple and gray). Cut the gray lead two inches (50 mm) from the plug.

2) Strip the green lead insulation two or three inches (50 or 75 mm) from the plug.

3) Solder a length of wire to the green lead from P4 and one to each of the cut gray leads. (Three wires of different color make identification easier at the other end.)

4) Locate S2. Unsolder the two red leads from the wiper lug. Tape and tuck them away.

5) If you can't unsolder the purple and blue leads from lug positions 1 and 2 of S2, snip them a couple of inches (50 mm) away from the lug. Tape the loose ends that run back into the

*Asst. Technical Editor, *QST*

rig and tuck them away.

6) Connect the wire spliced to the green lead from P4 to the blue lead at S2. This provides the +14 volts to activate the ssb filter in position 2 of S2.

7) The wire soldered to the cut gray lead from P4 goes to the purple lead of S2. This provides +14 volts to activate the cw filter in position 1 of S2.

8) The wire soldered to the cut gray lead to S6-1 now goes to the point where you removed the two red leads from S2 (the wiper lug). This places +14 volts at S2 when S6 is in the cw position.

Combining the cw filter with an audio filter and making skilled use of the TS-820 controls, such as the IF SHIFT, AGC, RF ATTENUATOR and RF/AF gain controls, will provide a cw capability that only a zero-beat signal could upset. Credit for the modification circuit goes to Charles Hughes, K2LA. — *Vincent J. Luciani, K2VJ, Egg Harbor, New Jersey*

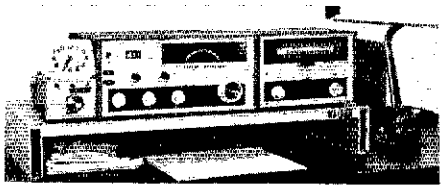
DESK-TOP EQUIPMENT SHELF

Want to organize your station, make it easier to operate and give it a new "look" all at once? If you do, build the equipment stand shown in the accompanying photograph.

The material is aluminum with 1/8- × 16- × 30-inch (3- × 400- × 760-mm) sheet stock serving as the top. Sides are 1- × 4-inch (25- × 100-mm) tubes with 1/8-inch (3-mm) thickness. Local machine shops often have this material available as scrap. Scrap dealers are an alternative source.

My stand is welded together. Machine screws or even self-tapping screws may be used instead. Although my stand retains a natural mill finish, paint could be applied to suit the individual's aesthetic taste. The result is a stand that is better appearing than a wooden one. Additional storage space is available beneath the stand. Equipment is placed at eye level.

One final note: I would suggest a power strip, such as manufactured by Waber Electric, be fastened to the back of the stand. This will eliminate all of the dangling cords commonly found behind Amateur Radio equipment. — *Daniel R. Shine, WA1GGN, West Haven, Connecticut*

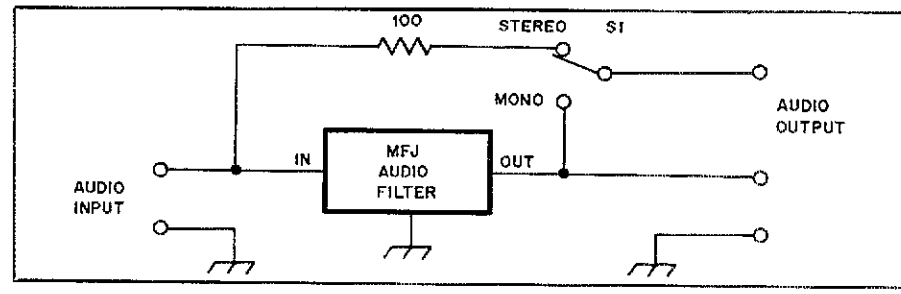


This desk-top equipment shelf, constructed of aluminum stock, is the work of Daniel Shine, WA1GGN of West Haven, Connecticut.

MFJ CW FILTER

My MFJ CWF-2 cw audio filter operates quite satisfactorily on a 9-volt transistor battery until the battery voltage drops. After a few hours of use, the filter begins to ring when the voltage drops. This problem is occasionally augmented when the filter is unintentionally left on overnight.

As a solution to the battery-power/ringing problem, I first decided to connect an external power supply to the filter. According to the manufacturer, the MFJ may be operated safely with up to 18 volts applied. I chose instead to tap the 15-volt supply in my receiver. As a result of this modification, I have not experienced the former ringing problem and the filter is shut off automatically whenever the receiver is switched off.



John Pane, AF3B, uses this arrangement to produce a simulated stereo effect when using his MFJ cw filter. With S1 in the STEREO position, one audio channel carries unfiltered audio from the receiver and the other channel carries filtered audio.

With the arrangement I now use, the filter functions on battery power whenever the power cord is not plugged in. I've also installed a miniature phone jack on the back panel to accommodate the dc input. Another miniature jack, inserted on the back panel, replaces the inconvenient audio-input terminal post.

Next I added a simulated stereo modification as indicated in the accompanying diagram. S1, mounted on the rear panel, selects normal operation or simulated stereo. The value of R1 is not critical. I chose 100 ohms, but other operators may elect a different value to suit a particular audio taste or to accommodate a different headphone impedance.

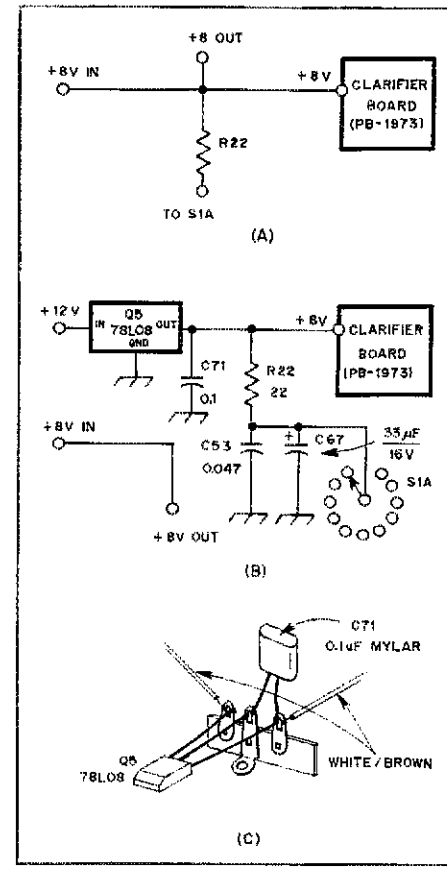
In order to use a stereo headset, I replaced the monaural phone jack (located on the front panel) with a stereo jack. The mono jack is now on the rear panel where it serves as an output for a speaker which carries the audio except when phones are used. As a concluding touch to the project, I added two LEDs to the front panel. One indicates POWER ON and the other SIMULATED STEREO.

After an operator becomes accustomed to the simulated effect, the modified MFJ filter will be found to be an invaluable aid to cw reception, especially during contests. There is ample room in the MFJ filter for these simple modifications, which should cause no difficulty for even the beginner. — *John Pane, AF3B, Baden, Pennsylvania*

FT-101ZD FREQUENCY SHIFT

Owners of early production FT-101ZDs (lots 01 through 06) may discover that operation of the DIM controls affects the VFO frequency slightly. The service manual relates a cure for this malady. Basically that change involves the addition of a terminal strip, two components and a minor wiring change. Part A of the accompanying drawing shows the original wiring of the circuitry involved. At B, the addition of a 78L08 8-V regulator (Q5) and a 0.1-μF Mylar capacitor (C71) is shown along with the wiring modification. In essence, this circuit change removes the CLARIFIER 8-V supply line from the original source and provides the board with a regulator of its own. All work is done on the underside of the transceiver.

A three-lug (center ground) terminal strip is mounted between jacks MJ1 and MJ2. Use a self-tapping sheet-metal screw to fasten the strip to the available chassis hole. Identify the white/brown 8-V lead from the CLARIFIER board to the second lug on the terminal strip immediately in front of the rectifier A board (PB 1967). Cut the lead at the terminal and relocate it to the lug immediately to the left (+12 V). This is easier than attempting to reach the 12-V lug on MJ1 as instructed by Yaesu. Cut the white/brown wire where it passes close to the newly installed terminal strip and solder the components to the strip as shown in Fig. B. Connect the ends of the previously cut white/brown wire to the proper terminals. The accompanying pictorial should be of help. When correctly installed, there should be +12 V at the input to the regulator and +8 V at the output of the regulator and at the CLARIFIER board. The frequency shift previously encountered during the DIM control operation should be absent. — *Paul K. Pagel, N1FB*



Yaesu has provided the above modification for eliminating frequency shift during DIM control operation of the FT-101ZD

Technical Correspondence

Conducted By
John C. Pelham,* W1JA

A LOOK AT OSCAR-7 TELEMETRY

☐ In October 1978, about four years after its launch, OSCAR 7 began to show signs of ailing. The battery voltages became erratic, and while in mode B, the telemetry often became garbled. The mode-B transponder would occasionally break into spurious oscillation. Reports started to come in of the satellite going dead when it passed into the earth's shadow.

These problems were symptomatic of a fault in the power systems of the satellite. A similar malfunction had apparently caused the demise of OSCAR 6, when cell after cell in its battery had shorted, resulting in an ever-decreasing battery voltage. Eventually, the battery voltage fell below the minimum necessary to operate the electronics, and the satellite went dead.

In the spring of 1979, it seemed highly likely that OSCAR 7 would end its life in much the same way. However, summer came and the satellite entered a period of continuous sunlight. This, it was hoped, would extend the satellite's life by taking some of the strain from the failing battery. We are now into 1980 and the satellite is still working, if somewhat erratically.

To try to find out what was happening up there, Pat Gowen, G3IOR, and I have been collecting telemetry data since August 1979. The Morse code telemetry system used by OSCAR 7 consists of 24 channels, each of which carries information about one spacecraft parameter. The 24 channels are transmitted sequentially in six lines of four channels. Each channel is transmitted as a three-figure number. The first digit is the line number, 1 to 6; the last two digits contain the information or data count. To convert the data count into meaningful units, there are formulas for each channel.

The first channel, called 1A, measures the total array current and has been faulty for many years. The next four channels carry information about the current from each of the four arrays of solar cells that supply the satellite with power. One panel is placed on each of the four sides of the satellite, there being no cells on the top and bottom. From their positions on the satellite, it is obviously impossible for the panels on opposite sides to receive direct sunlight simultaneously. However, on many occasions it was noted that the telemetered currents from opposing arrays were both large. This may be caused by the satellite rotating rapidly, but this seems unlikely since any rotation would tend to be damped out by the earth's magnetic field. The values for the array currents vary somewhat erratically between successive frames of telemetry.

The next channel, 2B, relates the power output of the mode-B transponder. When the satellite is in mode B, the telemetry indicates a reasonable power output of 2 to 4 W. In mode A, the telemetry indicates a full-scale output of about 8 W, which is obviously incorrect.

Channel 2C transmits the time as indicated by the internal clock of the satellite. During many passes, the time changed randomly, although on passes where the satellite was not being used, especially when in mode A, the clock appeared to function normally.

The next three channels, 2D, 3A and 3B, correspond to battery charge/discharge current, battery voltage and battery half voltage. The battery is a six-ampere-hour type. The half-battery voltage is the voltage of a point halfway up the battery string; in a normal healthy battery, it should be half the full battery voltage. In most of the recordings, the full potential is about 14 V, which is normal. The half voltage is now only about 1.8 V, however.

The charge/discharge current was typically within ±40 mA. This corresponds to a charge time of 150 hours, which is a very low rate. Charge/discharge currents of 10 times this value would be normal for this system.

Channel 3D measures the battery temperature. Typically, this remained fairly constant at 34° C over a period of several weeks, if not months. Comparing this with the telemetered temperatures for the baseplate of 31 to 38° C, and the temperatures of the +X and +Z panels of 29 to 35° C, we can see that the battery is not unduly hot. This is in direct contrast to OSCAR 6, whose battery temperature rose dramatically because of excessive power drain and overcharging.[1]

Channels 4B, 5A and 5C represent the temperature of the mode-A PA, the mode-B PA and the mode-A modulator. These temperatures depended on which mode the satellite was in. For example, channel 4B indicated a temperature of about 55° C when the mode-A transponder was active, and 35° C when it was off. It was also noted that when the mode-A transponder was being heavily used, its PA was about 6° C hotter than normal. This indicates that the telemetry was functioning normally, at least in mode A.

Channel 5B, the mode-A PA emitter current, was also shown to be dependent upon mode and the degree of loading. It varied from 0 to 35 mA in mode B and between 60 and 150 mA in mode A. Channel 6A contains information about the 10-meter power output. In mode A, the output read between 160 and 920 mW. The output did seem to be related to the observed usage of the downlink, but attempts to change the telemetered output by transmitting carriers of up to 200-W erp on the uplink passband were unsuccessful. The reason for this failure is not clear, as the passband was unused at the time. With 200-W erp, the transponder should have been well loaded. There was no indication of loading in any of the other relevant channels either. Perhaps I was just not using enough power.

Of the remaining channels, the only one of interest is 6D, the telemetry calibration channel. When the telemetry is working, this channel should read 50 ±2. However, during passes when the telemetry was relaying anomalous readings, 6D was frequently within the tolerance range. Occasionally, 6D would be way out of range, yet the rest of the telemetry would appear to be sensible. Of course when the satellite was very heavily loaded and the telemetry was sending rubbish, channel 6D was also affected.

On many occasions when the satellite is in mode B and being heavily used, the telemetry fails completely. The satellite beacon transmits the same number for each of the channels in one line. This sequence of numbers is repeated on successive frames; one of the numbers occasionally changes. It would seem that failure occurs when the battery voltage falls below about 10 to 11 V. It is also apparent that as the voltage falls the number of anomalies occurring increases dramatically. These anomalous readings become apparent by comparing successive frames of telemetry. The bad readings are not confined to any particular channel, and are characterized by a reading which is far from the normal operating range of that channel.

It would appear from these observations that the satellite is now working almost entirely from its solar cells, since when it passes into the earth's shadow, it goes dead.[2] In mode B, the power system can hardly supply enough current for the satellite to work. In mode A, where the solar cells can supply all the necessary current, the satellite functions properly.

In mode B, the telemetered battery voltage fluctuates by about 1 volt, indicating poor regulation under heavy loading. This is to be expected from the battery-charge regulator on its own. The on-board charge regulator has two functions: to limit the charge current to safe values, and to keep the battery voltage from rising above about 15 V. When the satellite is in mode B, the transponder tries to draw more than the regulator will supply, and the voltage drops. As the loading changes, the voltage varies. The poor regulation would account for the observed frequency modulation of the transponder output.

At first I thought that perhaps some of the cells in one half of the battery had shorted, the cells in the other half being overcharged to bring the full battery voltage up to 14 V. However, in view of the lack of any signs of large charging currents or an elevated battery temperature, this now seems unlikely. The second possibility is that a cell or connection has opened or developed a high resistance. This would explain the lack of regulation and the

*Assistant Technical Editor, *QST*

[1] Sweeting, "The University of Surrey AMSAT telecommand centre," *Radio Communication* (RSGB), June 1978.

[2] Roberts, "Oscar Seven Plays Elusive," *Oscar News*, Summer 1979.

absence of charging currents. If the fault occurred in the upper half of the battery, then it is feasible that the lower half would gradually discharge. This would produce the low half-battery voltage indicated by the telemetry.

As to the causes of any such battery failure, I can only speculate. Perhaps as a result of large current drains over Europe, thermal cycling has broken a connection in one of the cells. Who can say? We will probably never know the truth, unless someone takes a closer look! If my hypothesis is correct, it seems likely that OSCAR 7 will be with us for some time to come — that is until some other fault occurs. — *Nick Whyborn, G8OCJ, Kimberlin, Southwood Road, Beighton, Norwich NR13 3AB, England*

ULTIMATE TRANSMATCH IMPROVED

☐ Manufacturers have been copying the "Ultimate Transmatch" circuit for many years, apparently without thought toward harmonic suppression with that network. The original circuit was developed by the James Millen Co. for use in its 50-Ohmer Transmatch. It was made more flexible in terms of matching range, and was popularized in *QST* by W1ICP as the "Ultimate Transmatch."[1] Fig. 1A shows the classical T-network represented by this circuit. The W1ICP and subsequent-manufactured circuits of this type contained a dual-section variable capacitor at C1, with the half not shown being connected across the 50-ohm input terminal. The signal source was connected to the junction of the two halves of the capacitor. The lower capacitor is not necessary, as the circuit performance remains virtually unchanged with or without the extra capacitor section. Therefore, the cost of most homemade and commercial units has been higher than it needed to be.

[1]McCoy, "The Ultimate Transmatch," *QST*, July 1970.

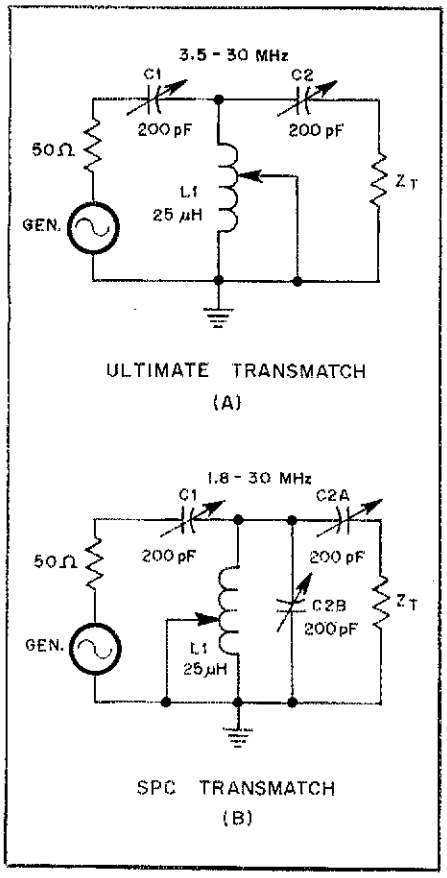


Fig. 1 — Circuit of the Ultimate Transmatch (A) and the SPC Transmatch (B).

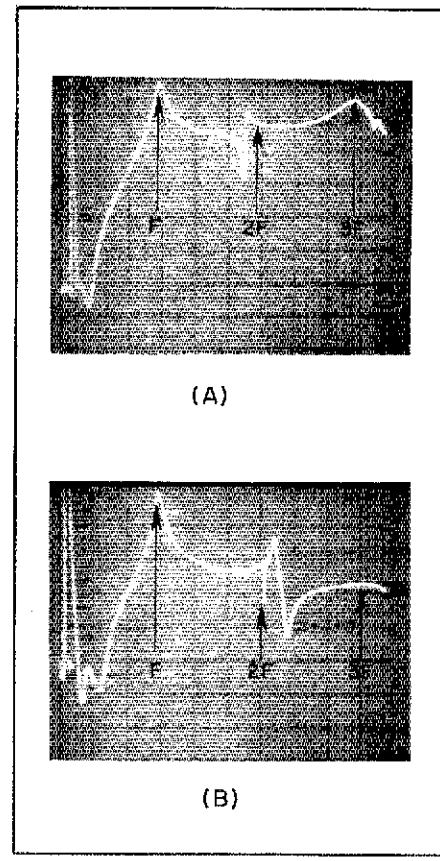


Fig. 2 — Response characteristics of an Ultimate Transmatch (A) and the SPC Transmatch (B) as viewed on a spectrum analyzer at 15 MHz. Horizontal divisions are 5 MHz, and vertical divisions are 10 dB each.

The unfortunate aspect of the circuit in Fig. 1A is that under some transformation conditions it degenerates into a high-pass network. This is most likely to occur when Z_T is a high value and C1 is set for a low value of capacitance. As a high-pass type of network, the harmonic attenuation in a worst-case condition will be only a few dB, giving rise to possible TVI and other forms of harmonic interference if a low-pass filter is not used between the transmitter and the Transmatch. As C1 and C2 become more fully meshed, for a particular load impedance, the network exhibits a bandpass response, owing to the greater effective C in shunt with L1.

I developed the circuit of Fig. 1B in an effort to maintain a bandpass type of response under all load conditions. Since C2A and C2B are in tandem, there is always a substantial amount of capacitance in parallel with L1. This circuit was named the "SPC (series/parallel capacitance) Transmatch" because of the C1/C2 configuration.

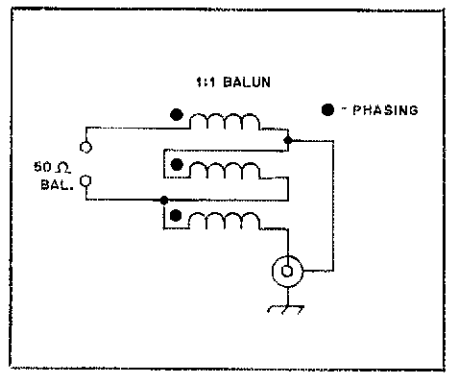


Fig. 3 — Details of a trifilar air-wound 1:1 balun for use from 3.5 to 30 MHz.

The matching range with the improved circuit is the same as with the circuit of Fig. 1A, but the harmonic attenuation is significantly better than that obtained with the "Ultimate." Furthermore, the low-frequency limits of the original network are extended to include the 160-meter band without need for additional components of L and C, using the same coil and capacitor values in the two circuits. In fact, only 3/4 of the available L1 inductance is needed to provide matching at 1.8 MHz when the SPC circuit is employed.

Fig. 2 shows spectographs of the response of a commercial version of the Ultimate Transmatch (A) and the SPC unit (B). The operating frequency is 15 MHz, and the horizontal divisions are 5 MHz each. The vertical scale is 10 dB/div. The load at Z_T is 1000 ohms, yielding a 20:1 transformation ratio. It can be seen that the response at the frequency of the second harmonic (illustration A) is down only 11 dB, with the third harmonic response down 4 dB from the carrier frequency. The SPC response at B shows the second harmonic down 22 dB and the third is down 28 dB. Both circuits were adjusted for a best-case condition. A practical version of the SPC Transmatch will appear in the 1981 ARRL *Handbook*.

It is possible that the harmonic attenuation of the new circuit could be improved by careful isolation of the input/output leads and components, along with a shield plate between C1 and L1/C2. This was not tried.

A word about baluns in Transmatches may be in order. Broadband transformers of the type found in many of the so-called Ultimate Transmatches are not suitable for use at high impedances. Disastrous results can be had when using these transformers with loads higher than, say, 300 ohms during high-power operation. The effectiveness of the transformer is questionable as well. At high peak rf voltages (high-Z load condition such as 600-ohm feeders or an end-fed Hertz antenna) the core can saturate and the rf voltage can cause arcs between turns or between the winding and the core material. If a balanced-to-unbalanced transformation must be effected, try to keep the load impedance at 300 ohms or less. An air-wound 1:1 balun with a trifilar winding is recommended over a transformer with ferrite or powdered-iron core material. Fig. 3 shows such a balun. It contains 12 trifilar turns (close-wound) of no. 12 Formvar-insulated magnet wire on a 1-inch (25-mm) tubular form. — *Doug DeMaw, W1FB*

HAND-POWERED RADIO

☐ I enjoyed the "Stray" in February 1980 *QST* on WBNO, the solar-powered radio station in Bryan, Ohio. I am sure many hams using solid-state rigs in the 50- to 100-watt class could use solar cells with small storage batteries to power their transmitters.

I have used solar cells with my handie-talkie to extend NiCad life when I was away from the charger for extended periods. However, lack of sunshine at times limited the usefulness of the solar cells.

Recently I acquired a squeeze-generator type of flashlight, and I tried using it as an emergency source of charging current. I removed the lens and lamp, and attached leads to the empty lamp socket. When squeezed, the output was a little over 6 V ac. I connected this pair of leads to my NiCad pack in a voltage-doubler configuration, as shown in Fig. 4. A charging current of 50 to 60 mA was obtained. This extended the "on air" NiCad life by one minute when the flashlight was squeezed for 15 minutes! This is enough time to get an emergency message through.

Squeezing the generator develops the muscles in the fingers and forearm. It also reminds one of how much work old Sol does when his rays strike the silicon discs. — *Russell V. Robinson, W4UD, 1548 Valley Dr., Bristol, TN 37620.*

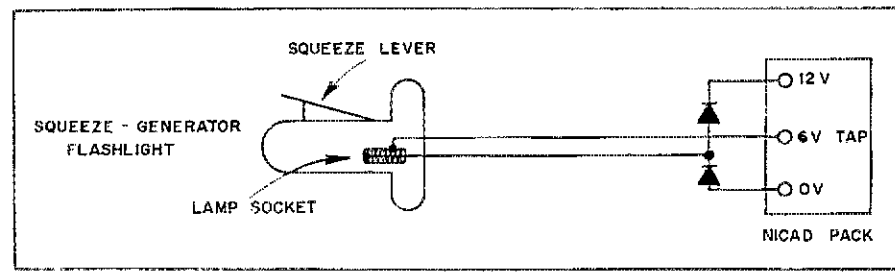


Fig. 4 — W4UD uses this voltage-doubler circuit to charge a handie-talkie NiCad pack with a squeeze-generator flashlight. The two diodes can be any small general-purpose silicon diodes. The wires between the flashlight and the battery pack should be long to allow freedom of movement while squeezing.

WALKING YOUR TOWER UP REVISITED

☐ Reference is made to the article appearing in March 1980 *QST* entitled, "Walking Your Tower Up? Can You Do It Safely?" by P. B. Mathewson, W9IR. The information contained in that article will yield reasonable results if no additional weight is concentrated at the top of the tower (from the presence of a mounted antenna system). The author states that the additional weight from an antenna system must be accounted for in the calculations if this weight is present.

The unfamiliar user might be tempted to add this additional weight to the total tower weight in the equations listed in the article. This can lead to substantial error since the tower weight is assumed to act at a distance of L/2. The concentrated antenna weight will act at the total tower length, however. The differing moment arms should be accounted for in the derivation of these equations.

Applying the same type of analysis used by the author, an equivalent weight (W = W1 + 2W2) should be used in all of the equations given in the article if an antenna system is present. W1 is the total tower weight and W2 is the total antenna system weight (both in pounds).

It should also be noted that if trigonometric reduction is used, Eq. 2 in the article can be written as

$$F = \frac{LW}{2X\,[1 + (H/X)^2]}$$

for those using a four-function calculator. — *Leigh Sedgwick, WA7BPI, 1704 June N.E., Albuquerque, NM 87112*

FREQUENCY-BLOCK PROGRAMMING OF CES 800 SCANNERS

☐ The Communications Electronics Specialties 800 series scanners are used with Clegg and other 2-meter synthesized transceivers. They are extremely versatile and convenient accessories. When programmed for repeater or simplex frequencies in your area, these scanners leave nothing to be desired in operating convenience. When they are used in areas where active repeater frequencies are unknown, however, scanning the entire 2-meter band is very time consuming.

The following program allows you to scan one or more continuous frequency blocks. No wiring changes are required. First, set all push buttons on the scanner to the outer, or released, position. Set the transceiver frequency to 144.00 MHz. Then:

1) Erase memory by pressing SCAN and DELT. Wait until the display "races" before releasing DELT. (It may be necessary to press RSME if the scanner was previously in the HOLD mode.) If you wish to retain the channels already in memory, you may skip this step.

2) Release SCAN. Set the lower limit of the desired block with the transceiver frequency controls, and press ENTR (for example, 146.00). Now set the upper limit of the block (for example, 147.00) and press ENTR.

3) Reset frequency controls to 144.00 MHz, then press SLOW and SCAN. The display will alternate between the upper and lower limits you have chosen. When the display shows the lower limit, press HOLD. Press ALL. Now hold down ENTR while pressing RSME. Continue holding ENTR while the frequency scans up from the lower limit; when it reaches the upper limit, press HOLD.

4) Release ALL and SLOW.

The unit will now scan only from the lower to the upper limits. It still may be programmed to add or delete additional frequencies in the usual manner. Additional blocks may be entered by repeating steps 2 through 4, with new upper and lower limits. — *Samuel Bases, K2IUV, 19 Standish Ave., Yonkers, NY 10710*

TEMPERATURE EFFECTS ON BYPASS CAPACITORS

☐ I'd like to share an experience I had recently with a Heathkit HW-2036 2-meter transceiver. What I found is probably not unique to this unit and may help others in similar situations.

During a recent cold spell a severe drop in receiver sensitivity occurred. The "troublemaker" was a 0.01-μF disc ceramic capacitor for a supply-decoupling resistor in a 455-kHz i-f amplifier (C227). When it was sprayed with commercial freeze spray, receiver sensitivity dropped. I replaced the capacitor, thinking it was defective. The replacement failed to correct the problem. My calculator showed why. At 455 kHz a 0.01-μF capacitor has 35 ohms of reactance. The power supply decoupling resistor is 100 ohms. The bypass capacitor would normally have a value of reactance less than or equal to 10% of the power supply decoupling resistor.

Using the calculator, I determined that the minimum value of capacitance for the bypass capacitor should be 0.035 μF. I used a 0.05-μF capacitor in the circuit. Spraying it with the cold spray resulted in little change in receiver sensitivity.

It is apparent from this exercise that disc ceramic capacitors certainly haven't the best temperature characteristics. The original bypass capacitors apparently were not temperature compensated, allowing changes in capacitance with temperature. Had compensated capacitors been used, no problems would have occurred. — *Eric Lifsey, AC7K, 5733 South 2050 West, Roy, UT 84067*

Feedback

☐ In Fig. 1 of "Increasing Receiver Dynamic Range," May 1980 *QST*, page 17, L5 is a ferrite bead, not a 10-μH inductor as shown. In the lower right corner of Fig. 6, a wire connects the right side of a 1000-pF capacitor and a 1-kΩ resistor to the +5-V bus. This wire should be replaced with a 1-kΩ resistor. In the text above Fig. 6, the references to a BF246 and a BF246C should refer to a U311 transistor. The reference to a BC177 should refer to a 2N2907.

☐ A mail delay prevented the author's script changes from being inserted in the article, "Simple, Accurate Resistance Measurements," appearing in January 1980 *QST*. The following corrections are to be made in the text.

On page 30, col. 3, line 11, change to "The ratio $R2_A/R2_B$ then is X/(1000 − X) . . ." and in the same paragraph change 1.286 to 0.7778, and 12,860 to 7778.

On page 31 in the middle of column 2, the words, "maximum" and "minimum" should be interchanged. In the same paragraph, 10,100/9286.2 should be 9473.8/9990. Also change 1.0876 to 0.95695. The sentence that follows should show 9286.2/10,100 or 0.91943 instead of 1.0450. And add "(R_U in Fig. 3)" to the words " . . . that the comparison resistors . . ." in the next-to-last paragraph.

Product Review

Conducted By Paul K. Pagel,* N1FB

The Swan Astro-150 Transceiver

The Swan Astro-150 Transceiver

Claimed Specifications

Frequency coverage: 3.0-4.5, 6.0-8.3, 13.8-16.0, 20.8-23.0 and 28.0-30.0 MHz.
Power requirement: 12-14 V dc at 20 A peak.
Dimensions (HWD): 3.75 × 9.75 × 11.75 inches (953 × 248 × 299 mm).
Receiver sensitivity: 0.35 μV for 10 dB S + N/N typical.
Transmitter power output: 100 W PEP.
Price class: Astro-150, $925. PSU-5, $180.

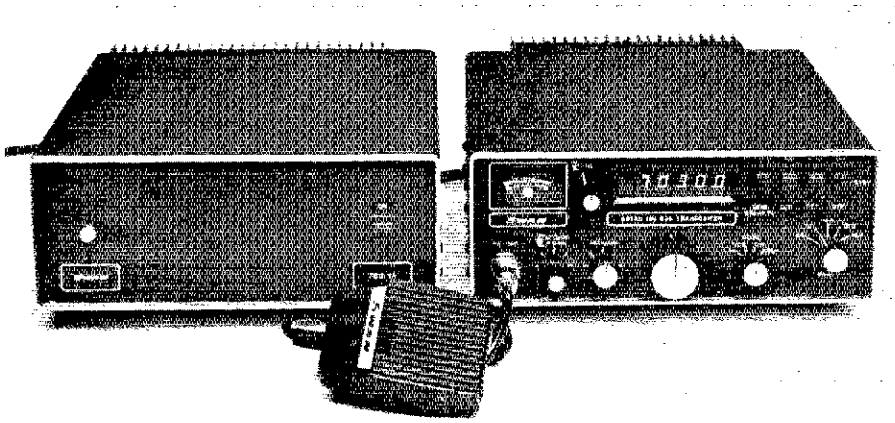


Fig. 1 — The Swan Astro-150 and matching power supply/speaker unit. The "Variable Rate Scanning" knob is the large one in the center of the panel. The microphone shown is included in the price of the Astro-150. Frequency tuning can also be accomplished by using two buttons (not visible) on the top surface of the microphone.

Mention of the name "Swan" calls to mind radios such as the well-known Swan 350 or Swan 500C, along with a particular period in the evolution of Amateur Radio equipment. But the Swan brand name hasn't been heard from much since those days of a decade ago, so it was with particular interest that this offering from Swan was unpacked.

The Swan Astro-150 is an extremely compact, solid-state, 80- through 10-meter ssb and cw transceiver. A matching power supply/speaker combination of equal size is also available. The PEP input of this little Goliath is 235 watts, with a 100-watt output. No receiver peaking or transmitter tuning is necessary. Band-pass filter techniques are used throughout. Also included in the small package are a noise blanker, VOX, RIT (receiver incremental tuning), full break-in cw operation and an easy-to-read digital frequency display (no analog readout is provided).

The quality of construction found upon examining the innards of this unit is second to none. In fact, the reviewer was reminded of a well-executed piece of expensive commercial or industrial test gear. Nine double-sided, glass-epoxy boards are used, and while they don't all plug into a neat row of sockets, the boards can be freed for component replacement relatively easily. Each board is held in place by screws and standoffs (they're captive, so don't worry about them falling into the rig), and all the connections to the board unplug without desoldering. Point-to-point wiring is minimized inside the unit; instead of a mass of wires leading to the front panel controls, a single large circuit board is used. The terminals on the back of all the controls are soldered directly to this board! All in all, looking inside gives the impression of extreme reliability and ruggedness.

The Circuit

Single-conversion, as is usual for Swan, is used. The receive signal is filtered first by the transmit low-pass filters, then a three-section band-pass filter before being amplified by a dual-gate MOSFET. The amplified signal is fed to a doubly balanced, diode-ring passive mixer. It is this design choice that is probably responsible for the excellent dynamic range of the receiver. The reviewer's location (1/2 mile from W1AW) is a good dynamic-range test bed. At no time on any band was any "buckshot" or IMD product heard when W1AW was transmitting. No receiver desensing was ever evident either, even 3 kHz away from W1AW's transmitting frequency. Receiver dynamic-range measurements were made on 80 and 20 meters. On 80 meters, the receiver noise floor measured −127 dBm, blocking occurred at greater than 114 dB and the IMD dynamic range measured 84 dB. This data equates to an input intercept figure of −1 dBm. On 20 meters, the noise floor was −131 dBm, blocking occurred at greater than 118 dB, IMD dynamic range was 86 dB and the input intercept was calculated to be −2 dBm.

Six "birdies" were found in the receiver tuning range. Three of these (at 21.280, 28.010 and 29.010 MHz) were quite strong, reading S5 on the S meter. They were bothersome when operating in their vicinities.

Audio-derived fast-attack, slow-decay age is used, and in my opinion the attack isn't fast enough. Also, some age "pumping" on strong signals is evident. Plenty of audio output power is available from the single integrated-circuit audio amplifier, a good feature for mobile use.

The only relay used in the transceiver is an spst reed relay which disconnects the receiver from the transmitter low-pass filters during transmit periods. All other T-R switching is solid-state. This facilitates the incorporation of true cw break-in, with the reed relay following each transmitted dit and dah. The reed relay is extremely quiet, and QSK operation is a joy! If band conditions are such that QSK is not desired, the operator may revert to semi-break-in with a front-panel switch.

A frequency synthesizer in the Astro-150 generates both the variable LO frequency and the usb/lsb carrier oscillator frequencies. The heart of the synthesizer is a Signetics microprocessor LSI chip, nestled deep in the center of the transceiver. It takes input data from the bandswitch, mode-switch and tuning knob and determines the required number for a programmable divider in the phase-locked loop. When this number varies, the LO output frequency varies, tuning the transceiver. Each frequency thus generated is as stable and as accurate as the crystal oscillator used for a reference. Digital outputs are also provided to drive the LED readout. This micro-computer chip also has a memory. As long as power is continuously applied, it will remember the last frequency tuned on each band and return to that frequency when the band is selected again. A third position is provided on the power switch that removes power from all the circuitry except the memory. Thus, the unit can be turned "off" without losing the stored frequencies.

The synthesizer covers a significant range of frequencies outside of each amateur band, which should be a delight to MARS operators. Reception of 15-MHz shortwave broadcasting (and 15-MHz WWV) is provided, perhaps inadvertently, because on 20 meters the synthesizer will tune all the way up to 16 MHz! (Note to hf-ers: Tuning below 28.0 MHz is *not* possible!) When the bandswitch position is

*Asst. Technical Editor, *QST*

changed, the synthesizer is unlocked for a few seconds until all of the new frequency information is sorted out. This is indicated by the muting of the receiver audio and the illumination of all the decimal points in the frequency display. However, when the synthesizer is unlocked, keying the transmitter still produces rf output! The rf output sweeps up and down the band as the synthesizer hunts for a locked condition. These sweeps can be as much as several hundred kHz in width, so an out-of-band emission is a possibility, especially if the frequency is set near a band edge. Don't transmit while the synthesizer is unlocked! It's too bad Swan didn't see fit to mute the transmitter as well as the receiver.

Operating Characteristics

Perhaps the most notable operating feature of the Astro-150 is what Swan calls "variable rate scanning." The scanning rate is determined by the position of the large knob in the center of the front panel. This "tuning knob" is not really a tuning knob at all; it is a potentiometer with a center detent. With the knob in the detent, no scanning occurs. A slight clockwise rotation of the knob starts a scan upward in frequency, and counterclockwise rotation initiates downward scan. The scan rate depends on how far the knob is rotated from the center detent: The rate is variable from approximately 200 Hz to 100 kHz per second.

It is also possible to change frequency with the hand-held microphone supplied with the unit. Two buttons are located on the top surface of the mic, one to scan up in frequency, the other, down. A single push on a button will jog the frequency by one 100-Hz increment. If the button is held, the synthesizer will scan at about 1 kHz per second. It is worth noting that when the synthesizer is scanning, the frequency does not change in discrete 100-Hz steps (as in the ICOM IC-701). Instead, it sweeps smoothly across the band, coming gently to rest on the selected 100-Hz increment. In case these fixed 100-Hz steps do not allow ssb tuning as precise as the operator would desire, a fine-tuning control is provided which can vary the transmit *and* receive frequencies ±75 Hz from the synthesizer-determined frequency. RIT is also provided, but its range is a paltry ±300 Hz. A much wider range (say ±5 kHz) would be desirable for limited split-frequency cw or DX work. Also, the RIT is always active with no defeat switch included. Not even a center detent has been provided. Thus the operator is always unsure that he is transmitting and receiving on *exactly* the same frequency. In all fairness, it must be mentioned that the circuit was perfectly calibrated: True transceive occurred with the knob precisely at 12 o'clock.

Even after several weeks of use, I never quite got used to the variable-rate scanning. I felt constrained and frustrated. Its somewhat like telling another person to do your tuning for you, following your verbal commands: "Tune higher. There's a signal — stop! Now tune a little lower. Oops, you overshot, tune a little higher." Since the frequency and many other functions are microprocessor controlled, it's a pity that a few user-programmable memories weren't included. This couldn't have been too difficult to do, and would have ameliorated the disadvantages of the tuning system somewhat.

As received from the factory, the built-in, peak-reading wattmeter was slightly generous when compared to an accurate in-line wattmeter. An internal wattmeter reading of 100 watts corresponded to 80 watts of actual rf output. A quick adjustment of the internal calibration control dispatched this problem!

An alc circuit in the '150 works in combination with the forward- and reverse-power outputs of the wattmeter. It acts on a low-level transmitter stage and reduces the drive if either forward or reverse power exceeds preset levels. This circuit was initially responsible for a rather poorly shaped cw keying envelope and moderate on-air key clicks. After a slight adjustment of R103 (FWD alc sensitivity), the cw envelope became near perfect. And as an added bonus, the maximum power output level increased slightly to about 110 watts.

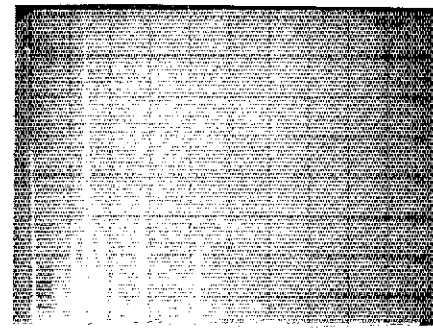


Fig. 2 — Spectral display of the Astro-150 rf output on 40 meters (worst case). Vertical divisions are each 10 dB. Horizontal divisions are each 5 MHz. The response at the far left is the zero-frequency reference of the analyzer. The full scale pip is the 7-MHz carrier. Note the spurious signals (probably synthesizer byproducts) clustered about the carrier. The second harmonic is down 44 dB from the fundamental, and the third harmonic is suppressed 57 dB. The '150 is in compliance with current FCC regulations regarding spectral purity. All measurements were made in the ARRL lab.

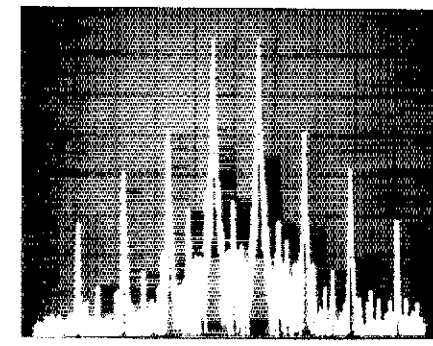


Fig. 3 — Spectral display of the transmitter IMD characteristics at rated power. Vertical divisions are each 10 dB; horizontal divisions are each 1 kHz. Third-order IMD products are down 29 dB from the PEP level while fifth-order products are down 39 dB.

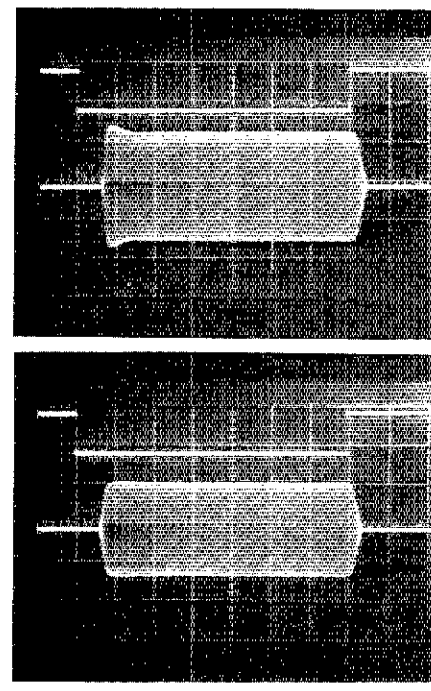


Fig. 4 — Two pairs of keying waveforms are shown. The upper waveform in each pair is the actual key-down time, while the lower is the resultant rf output. The upper rf output waveform is typical of that obtained when the carrier level is advanced just to the clipping point. This waveform did not sound bad on the air. When the drive was reduced slightly, the more ideal lower-output waveform resulted.

An omission on the part of the manufacturer is the absence of a front-panel headphone jack. An audio output jack *is* provided on the rear panel which mutes the built-in speaker, but it is usually stuffed with the external speaker plug if the matching power supply/speaker is used. No headphone jack is provided on the power supply either, although it would be very easy for the owner to add one.

The Astro-150 appears to have been designed with cw operation as a primary concern, not an afterthought. In addition to the full break-in mentioned earlier, two VOX delay potentiometers are provided — one for cw when using semi break-in and the other for 'phone. Also, two degrees of selectivity, 2.7 kHz normal and "narrow," are selectable from the front panel while in the cw mode. The characteristics of the narrow cw filter are not specified in the owner's manual, but appear to be approximately a 500-Hz bandwidth with reasonably sharp skirts; suitable for all but the most demanding cw operating. These are nice touches — other manufacturers please take note! The sidetone used for cw monitoring has very heavy weighting. This is not evident in the transmitted signal, but is annoying at first and takes some getting used to.

The features of the Astro-150 add up to make it a nifty little mobile rig as well. Its diminutive size will allow it to squeeze into spots where no ordinary hf rig would fit. Its hefty audio output and microphone tuning buttons are also well suited to mobile use.

On ssb, the performance of this transceiver left little to be desired. Both receive and transmit audio quality were good. The action of the alc circuit on ssb was excellent. The Astro-150 was very difficult to overdrive. A clean-sounding signal was maintained even when the mic gain control was advanced far beyond the correct setting.

The owner's manual supplied with the unit is very well written and informative, especially the theory of operation section. It includes a brief alignment routine consisting of only those adjustments which Swan feels are within the owner's capabilities. These include VOX, S-meter sensitivity and carrier-oscillator frequency. Not included are the more complex synthesizer, reference generator, alc circuit or bandpass filter adjustments. Further information on the Swan Astro-150 is available from Swan Electronics, 305 Airport Rd., Oceanside, CA 92054. — *John C. Pelham, W1JA*

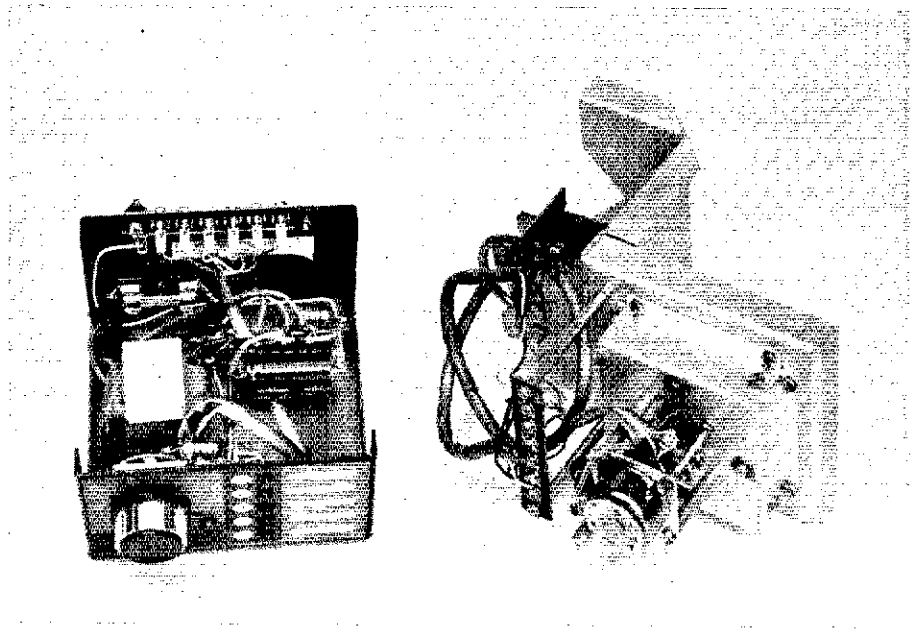


Fig. 5 — The Heath SA-1480 Remote Coax Switch. The actual coaxial switch is within the shielded portion of the right-hand assembly. LED indicators and an erasable front panel are featured on the station control unit.

HEATHKIT SA-1480 REMOTE ANTENNA SWITCH

After replacing my tribander with monobanders last summer and noting the high price of separate runs of coaxial cable, I decided a remote antenna switch was the best way to go. A look at the commercial antenna switches available told me that none of them satisfied my requirements for price and number of positions, so I built my own. During a storm, my homebuilt remote antenna switch filled up with water. As I was lamenting its loss, the announcement of the new Heathkit SA-1480 remote antenna switch caught my eye. The advertisement indicated that the remote switch required an eight-conductor control cable and that it would switch up to five different antennas. It couldn't have fit my needs more closely.[1]

Construction of the remote antenna switch required approximately five hours and was relatively straightforward: Just make sure the polarities of the diodes and LEDs are observed. The complete unit consists of two basic pieces, the remote switch that mounts on your tower or mast, and the control box which is placed at the operating position. The control box is a compact unit using LEDs to indicate which antenna is in use. The switch can be set so that all antennas are grounded and the feed line left open.

The remote switch box is solidly built, with silver-plated switch contacts on a ceramic switch wafer, and good shielding of the rf compartment. A one-piece cover protects the entire unit from the weather. An ample supply of sealant is provided to assure a watertight seal. When assembling the remote unit, be certain to wire the switch and switch motor carefully. Though the instructions are adequate, the wiring is tricky and a mistake can be made. Two little capsules of locking compound are provided to ensure that all hardware remains tight. This compound is particularly nasty stuff when it gets onto your workbench, so read the warnings carefully.

After everything was soldered and assembled, a short piece of cable was used to test the operation of both units. The first attempt resulted in the loss of the 3/16-A slow-blow fuse in the control box. Thorough checking found no errors in wiring, and after an afternoon of searching for a replacement fuse, the second test went perfectly. Possibly the remote unit switch motor (pulse switching) required an extra amount of current to start the first time. In any case, no further difficulties have occurred.

Mounting the remote unit on the tower proved to be very easy. Clamps were provided which accept a mast or tower leg of up to 1-1/2 inches in diameter. It took only about 15 minutes to mount the remote unit and attach the cables from the three antennas. Only three of the five positions available were originally used. Caps are provided to weatherproof the unused connections (all are type SO-239). A multidirectional sloper array for 40 or 80 meters could be switched from this remote antenna switch quite easily. The switch has been in use for several months now with no problems encountered. Less than a second is required to go between any of the switch positions, and the pulse switching generates no noise in the local receiver.

Heath has again come out with the right product at the right time. I would have spent more money for coax than for the remote antenna switch. See if your calculations tell you the same thing! — *Tom Frenaye, K1KI*

[1]One comment: The description Heathkit gives of the remote antenna switch in their general catalog wasn't exactly clear. According to the manufacturer's specifications, the use of the SA-1480 will introduce no more than a 1.05:1 VSWR under 30 MHz and less than 1.2:1 under 150 MHz. The catalog description could be read by inexperienced amateurs to mean that the *switch* would reduce VSWR, which isn't correct.

THE BIRD 4381 RF POWER ANALYST

Microwave ovens, keyers, sewing machines and rf power meters — what do they have in common? A few years ago, that would have been a most puzzling question, but today the answer is easy — microcomputers! By utilizing a single-chip microcomputer, A/D converter and a dual-element THRULINE, Bird Electronic Corp. has produced a convenient and versatile rf power-measuring instrument, the model 4381 RF Power Analyst.

The 4381 will measure forward and reflected power in watts; it will also display power in dBm, measure PEP in watts or dBm, and calculate SWR, percent of modulation and return loss. It records the minimum and maximum value of any of the above quantities and has a peaking-aid mode.

The THRULINE used in the 4381 is similar to that used in the Bird model 43 wattmeter, using the same plug-in elements, but the 4381 has two elements in the THRULINE. This allows the microcomputer to completely control measurement of both the forward and reflected wave. Two "range" slide switches, located just above the display, are used to tell the microcomputer which plug-ins are being used, thus enabling it to correctly interpret the voltage levels received from the THRULINE. The range switches must be set to correspond to the full-scale power rating of the forward plug-in. When both the forward and reflected elements are used for a measurement, as in the case of SWR or return loss, it is assumed that their power ratings are in a 10 to 1 ratio. Readout is by means of a four-digit LED display, and the power for the unit is provided by self-contained, rechargeable NiCad batteries. The NiCads will power the 4381 for about eight hours of continuous operation without recharging.

While most of the functions of the 4381 are straightforward, certain features deserve mention, namely the minimum and maximum reading memories and the peaking-aid mode. By pressing the maximum key, the highest reading obtained since the last clearing of the memories can be displayed. I found this very useful while measuring PEP output of an ssb transmitter when using voice-waveform inputs. Under such conditions, it is difficult to follow the rapidly changing digital display and it is easy to miss the highest value measured. By using the memory, the maximum PEP obtained is easily read.

Bird 4381 RF Power Analyst

Manufacturer's Claimed Specifications

Power range[1]: 100 mW to 10 kW full scale using Bird plug-in elements. Accuracy not guaranteed with components not supplied by Bird.
Usable over-range: To 120% of scale on cw, PEP, SWR and return loss functions. To 400% of scale (PEP) on dBm and % modulation.
Frequency range[1]: 450 kHz to 2.3 GHz.
Sampling rate: 2-3 readings per second.
Accuracy
- Power readings: ±5% of full scale.
- SWR: ±10% of reading.
- % modulation: ±5%[1]
- Return loss: ±0.3 dB to corresponding SWR value.

Modulation frequency: 50-10,000 Hz.
Impedance: 50 ohms.
Insertion SWR: 1.05 max. to 1000 MHz.
Weight: 4.0 lb (1.8 kg).
Battery life: (Rechargeable) 8 hours approx.
Ac power: (Using adaptor) 115 V, 50-60 Hz 6 W 230 V, 50-60 Hz 6 W.

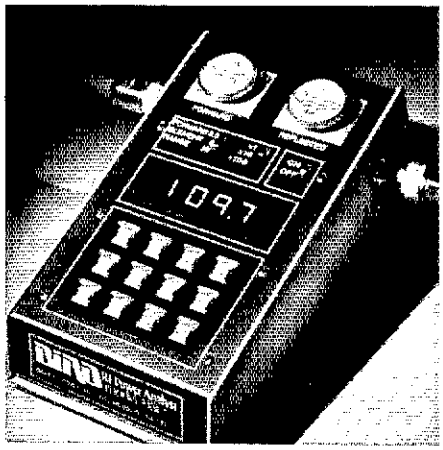


Fig. 6 — The Bird Model 4381 RF Power Analyst. A collapsible bail permits positioning the unit for easy readability.

When using a constant two-tone input, the 4381 reads PEP directly. The minimum memory can be used in this same manner to adjust matching networks for minimum SWR. For those familiar with making such adjustments using an analog meter, the transition to digital readout may be difficult. To help in this respect, the 4381 has a peaking mode. In this mode, the selected quantity is monitored. If successive readings show increasing values, a right-facing arrow is displayed, decreasing values produce a left-facing arrow, and a blank digit is displayed if the values are constant. This reviewer, being accustomed to analog meters, found it very difficult to peak a transmitter output rapidly, but had little trouble quickly adjusting a matching network. The difficulty no doubt arises from differences in smoothness and rate of tuning. In any event, I found myself opting for the analog meter to make such adjustments and then going to the 4381 for precise measurement of the resulting value. While measurement of forward and reflected power (using a conventional meter) and some calculations will produce parameters such as SWR and return loss, I found the 4381's direct readout a nice convenience.

The 4381 is normally supplied with two female N-type connectors; these are easily interchanged with a variety of connector types. The construction of the unit is excellent, and the instruction manual is complete and well written. While the 4381 is without doubt a "professional" instrument and perhaps somewhat expensive for many amateurs, it definitely represents an outstanding measurement instrument. The 4381 is available from the Bird Electronic Corp., 30303 Aurora Rd., Solon, OH 44139. The unit measures 3-21/32 × 6-7/32 × 8-29/32 in. (93 × 158 × 226 mm), HWD. Price class: $590, including connectors and either 117- or 235-V ac adapter. Element prices are $47 each for the 2- to 30-MHz range and $39 each for the 25- to 1000-MHz range. — *George Collins, AD0W*

[1]Frequency band and power range is determined by plug-in element selected. See Bird catalog for availability. Some modes require two elements in a 10:1 power ratio.

[2]For cw power levels greater than one-third of full scale, accuracy of the % modulation mode is ±5% from 0 to 90% and ±10% from 90 to 100%.

[3]For pulse modulation the minimum parameters are: 50 µs pulse width, 100 pps repetition rate and 1% duty cycle.

AUTEK QF-1A ACTIVE AUDIO FILTER

We gave a hefty rundown of the Autek QF-1 audio filter in March 1977 *QST*. Since there are many similarities between that model and the QF-1A, we will ignore the "sameness" and dwell on updates of the original circuit. Outwardly, the QF-1A resides in a new low-profile cabinet of rectangular format. A new control has appeared on the front panel — the AUXILIARY NOTCH FREQUENCY. The color scheme has been changed from black to gray, with noticeably better quality in the cabinetry and the silk screening on the panel.

We were pleased to note that the power on-off switch has been changed to include bypassing the filter when the switch is in the OFF position. The earlier model was awkward to use, because the operator had to disconnect it from the receiver (PL-55 plug) when filtering was not desired.

Autek Research has made another improvement: The previous model used a pair of small-signal bipolar transistors in the audio-output section. Distortion was apt to occur at medium-to-high audio output levels from the receiver, but the QF-1A has an audio IC at the output, and its output is substantially cleaner than that of the QF-1 amplifier. It is worth saying, however, that the new unit can still be saturated at high receiver-output levels.

Auxiliary Notch Frequency

This feature needs to be described in some detail, as it represents the most important change in the circuit. What it gives the operator is the ability to null out annoying heterodynes during cw or ssb reception, irrespective of the filter operating mode (BANDPASS, HIGH PASS, LOW PASS or NOTCH). The null depth is not as great (approximately 40 dB) as is the depth in the NOTCH position of the filter (up to −70 dB), but it is entirely adequate for most forms of steady-tone and cw QRM from 80 to 11,000 Hz. The null frequency is adjustable from the front panel. To disable the circuit, one simply turns the control to one or the other extreme of its range. Although this circuit is not specified as a "notcher" for some forms of ssb splatter, chatter or whatever, the writer has found that it does help in reducing the annoyance of adjacent-frequency ssb QRM.

Other Features

The innards of the QF-1A are more organized and professional than those of the QF-1. Susceptance to RFI has been greatly reduced through the shortening and bypassing of critical leads. No RFI effects could be detected at W1FB when running 1 kW from 3.5 to 29 MHz. The antennas used during this test were 50-ohm types, fed with coaxial cable, and well removed from the station equipment. Different results might be had while using an end-fed horizontal type of antenna, or if there is a high VSWR on the coaxial transmission line.

The new model of filter has SELECTIVITY and FREQUENCY controls which operate more smoothly than those of the old model. Furthermore, the selectivity is reduced automatically when the filter is switched to the LOW-PASS and HIGH-PASS modes. This prevents "blasting" at high settings of the SELECTIVITY control — a definite improvement!

Autek Research QF-1A Active Audio Filter

Claimed Specifications

Size (HWD): 2-1/2 × 6-1/2 × 5 inches (63 × 165 × 127 mm).
Color: Two-tone gray.
Audio output: 1 watt.
Center-frequency range: 250 to 2500 Hz, all modes.
Power requirements: 117 V ac, 50/60 Hz or external +12 V.
Installation: Connects externally to receiver output. Requires external speaker or phones.
Bandwidth: Variable from 20 Hz to flat response.
Price class: $65.
Manufacturer: Autek Research, Box 5127E, Sherman Oaks, CA 91403. Tel. 800-854-2003, ext. 842.

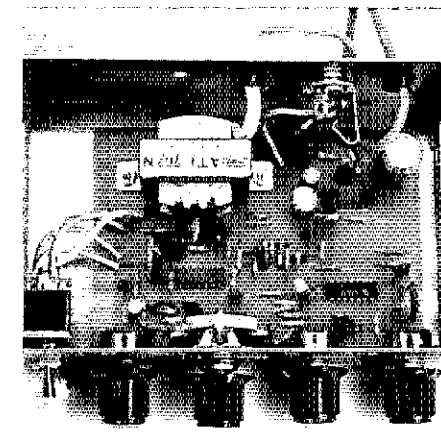


Fig. 7 — A neat, uncluttered layout greets the eye inside the Autek QF-1A audio filter.

Summary Remarks

If there really is such a person as a "serious DXer" (an oft-heard expression), then that person probably knows what can be gained from using a good R-C active audio filter. The uninitiated can learn more on this subject by reading the QF-1 product review, referenced earlier. A good example of how the QF-1 filter "saved the day" (actually, two weeks) for the reviewer was seen during a DXpedition to Montserrat late in 1979, where W1FB/VP2MFW was unable to pull signals out of the noise on 160-meter cw without the audio filter. Signals that were unreadable without the QF-1 became "solid copy" when it was used in the high-selectivity mode. The same filter was used early in 1980 by K1ZZ during his operations on 160 meters from Montserrat.

A good R-C active audio filter can provide the same benefits as a second i-f filter (tail-end filter) in a receiver: It greatly diminishes receiver wide-band noise, thereby improving the overall signal-to-noise ratio. The owner of this type of unit may find himself addicted to its use, even when copying strong signals! — *Doug DeMaw, W1FB*

Phase III Suffers Watery Fate

"T minus 20 seconds . . ."

"9 . . . 8 . . . 7 . . . 6 . . . 5 4 . . . 3 . . . 2 . . . 1 . . ."

"Ignition confirmed."

"Liftoff confirmed."

"We're getting the latest telemetry frame."

"Flight is nominal."

"We had a report that everything was correct."

"We are burning; we are flying."

"The Phase III spacecraft is off the pad; it is gone."

"Official liftoff time is 14 hours, 29 minutes, 42.34 seconds . . ."

". . . Everything is on track; report from Kourou everything is on track."

"We have a report that both transponders are off."

"We have a report there is a problem on one engine."

"The flight is not nominal . . . there is a problem on one engine."

"We have just had the report the launcher is going down, the launcher is going down."

"It appears that the launch was a failure."

"The communication circuits are very quiet now and we're trying to find out what's happening. This is the AMSAT Launch Information Network."

"We just had the report that the launcher is about . . .

". . . splashdown."[1]

From the pre-launch strained anticipation, the thinly disguised excitement at liftoff, the cautious, step-by-step evaluation of reports through the first few moments of flight, to the sudden alarm at the first hints of a malfunction and the utter dejection, frustration and bitter disappointment when the end was confirmed, the whole spectrum of emotions was reflected in the voices on the AMSAT Launch Information Network as the culmination of five exhausting years of international cooperation and volunteer effort fell into the Atlantic.

What happened? Where does the launch failure leave the amateur satellite program? What is the status of AMSAT? The details that follow were gleaned from several sources including telephone conversations with both AMSAT and ESA. Direct quotes are those of Dr. Tom Clark, W3IWI, president of AMSAT.

[1]Voice of W3IWI from Goddard Space Flight Center Control.

The Questions

Why did the launch vehicle go down?

Shortly after launch, chamber pressure in one of the four first-stage Viking 5 rocket engines fluctuated wildly, leading to engine failure at 64 seconds. As the guidance system (gyros and computers) fought to correct the imbalance, the spacecraft experienced a powerful, stressing roll torque. At 104 seconds, two other engines failed, followed shortly by the fourth. At that time, structural failure was sensed, and an automatic self-destruct mechanism activated, "peeling" the spacecraft skin back. The launch vehicle was esentially torn apart and fell into the murky waters of the Atlantic 27 km downrange.

Had Phase III operated properly?

Yes. From the time it had been sealed within the cowling many days earlier until the time when all telemetry was lost just before splashdown, Phase III had performed flawlessly.

Was the spacecraft insured?

Thiokol, the people who supplied Phase III's onboard kick motor, had insisted that AMSAT insure the spacecraft for liability — the kick motor contains volatile fuel. It was not, however, insured for loss. The ESA Ariane launcher is officially an unproven vehicle; these are experimental flights and no underwriter would insure a satellite under these conditions.

Why was this launch chosen?

No other available launches would have carried the spacecraft to a reasonable orbit, given its objectives. Selection of a launch vehicle involves detailed negotiations in the professional arena. Identifying a possible launch vehicle and "making it happen" takes several years — it does not happen overnight. AMSAT looked very carefully at various opportunities and found the ESA Ariane launch to be the most viable. They knew the risk. "Even with the failure, we made the correct decision."

Why was the vehicle launched from Kourou, French Guiana?

It is the site of the ESA launch facility.

What is the status of Phase III-B?

For some time now, AMSAT has set aside the critical hardware items that could constitute a follow up. These include the mainframe, solar panels, flight-qualified critical components, designs and circuit-board masters.

The two most critical problems, however, are finding a suitable launch (AMSAT has been looking for years and continues to do so) and securing adequate financial support. "The final detailed satellite design cannot go on until we know the specifics of the launch. . . . I would be surprised if we could have a launch before 2 or 3 years. I could be fooled; serendipity could strike, but my experience says it's 2 to 3 years."

Why not another OSCAR 6, 7 or 8 if it will take so long?

The number of launch opportunities are relatively small; the amount of work is as much or more than now copying Phase III-A. AMSAT does not favor "throwing together a 'quickie' OSCAR 6 when their limited resources and efforts are best directed toward a Phase III project.

Where does this leave the satellite program and AMSAT?

OSCAR 7 continues to support communication when it's in sunlight, and OSCAR 8, now a little over 2 years old, continues to perform flawlessly. The University of Surrey's UOSAT is scheduled for launch in September of 1981; Soviet RS-3 and RS-4 are expected later this year; AMSAT Canada's SYNCART transponder is looking for a host vehicle; JAMSAT is developing a 23-cm transponder and a French education group has announced its intention to develop an Amateur Radio satellite.

AMSAT continues despite this devastating setback. "What was lost was hardware, and though that obviously hurt deeply, the design and development skills and knowledge, the system software and the many hardworking volunteers remain as resources for the future."

What AMSAT needs now is the support of the amateur community over the long haul ahead. Later this summer an international AMSAT group will meet in Great Britain to better define the amateur space program's long-term goals and improve working relations among AMSAT member-societies. On September 13 of this year AMSAT will hold its annual meeting at the Goddard SFC in Greenbelt, Maryland. Some members have already expressed their ongoing support by "renewing" their life memberships and pledging their energies to resurrect AMSAT's long-lived dream of reliable, high-altitude, long-distance satellite communication over extended periods of time.

We know that the AMSAT crew in Washington would like to hear from all who intend to support the program. You can communicate your support by writing to AMSAT, P. O. Box 27, Washington, DC 20044. The satellite program will continue — with your support. — *Steve Place, WB1EYI*

VHF Mountaintopping in America: A Travel Guide

Few aspects of Amateur Radio offer more fun per watt than mountaintopping. If you've ever dreamed of mounting a vhf expedition to some of the continent's most scenic peaks, this article is for you.

By Wayne Overbeck,* N6NB

As their vacation plans take shape, many amateurs begin planning some sort of mobile or portable operation. Thanks to the solid-state revolution in amateur equipment and the vhf fm repeater explosion, more and more amateurs are taking a compact vhf transceiver along with their clothes and cameras.

As long as you'll be taking a vacation anyway, why not include a couple of the country's most popular radio mountaintops in your itinerary. If you haven't experienced it before, an exciting new thrill awaits you when you get on the air from a high mountaintop. You'll find that a few watts and a modest antenna — perhaps nothing more elaborate than the mobile whip on your car — will yield amazing signals when you park in the right spot.

Perhaps Ed Tilton, W1HDQ, who was vhf editor of *QST* for three decades, said it best long ago:

"From the earliest times one of the great joys of vhf hamming has been 'working portable.' Every enthusiast dreams of someday having a station on a mountaintop, with an unobstructed view for miles in every direction. Few of us ever see this dream become a permanent reality, but with the mobility we enjoy today nearly everyone can bring it off for a few hours now and then."[1]

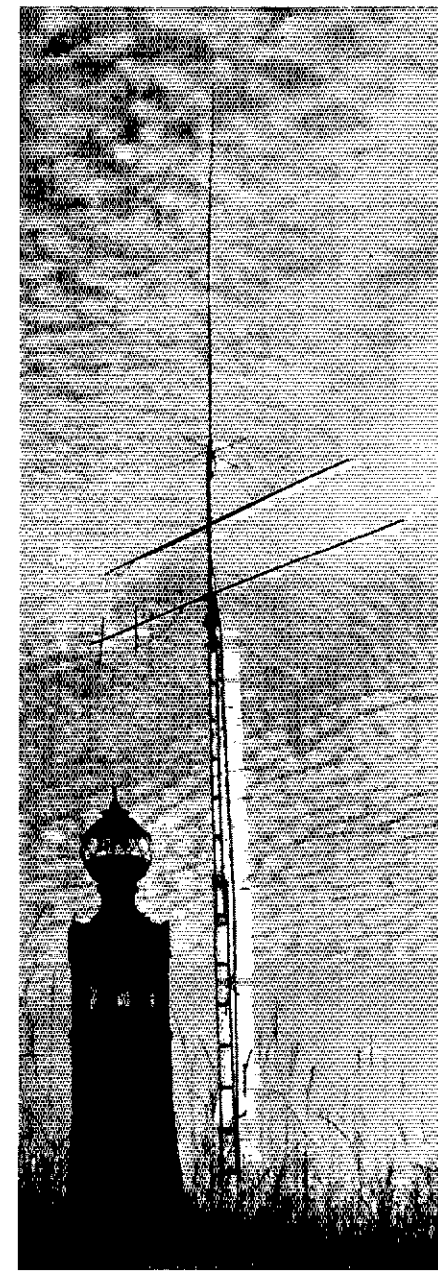
Vhf mountaintopping attracts all sorts of people, from the casual operator with a 10-watt fm transceiver and a whip antenna who stops off on a hilltop for a few QSOs, to the vhf contest purist who hauls crankup towers, gasoline generators and kilowatt rigs up his favorite mountain. But with nothing more than a solid-state fm or ssb rig, perhaps a small solid-state amplifier and a portable beam, you can work almost everything the "big guns" will ever work — if you're in the right place.

To encourage more amateurs to join in the fun, here's a rundown of some of the most famous U.S. radio locations for vhf hilltopping. All of the places mentioned are normally open to the public, although a few have a nominal admission charge. And all are accessible in a passenger car, often on less than half a tank of gasoline from a major city, making many of them ideal for one-day outings. This writer has operated from almost all of the mountaintops described here and highly recommends them for your next trip to a mountainous area, east or west.

Eastern Mountains

Few of the mountains in the East offer the breathtaking elevations of their Western counterparts, but many spots, from Maine to North Carolina, offer vhf excitement that is rarely matched anywhere further west. The high population density and relatively small size of the states mean that a vhf mountaintopper can work huge numbers of people in many states or provinces in as little as a single evening — something virtually impossible to do from mountaintops twice as high in the American west.

Mount Greylock, Massachusetts — If vhf contest scores over the years prove anything, Mount Greylock, in western Massachusetts, is the finest vhf radio location in North America, bar none. At 3491 feet above sea level, it's the highest point in Massachusetts, and the site of a monument memorializing the nation's war dead. During the June and September ARRL vhf contests, the W2SZ/1 group and its predecessors have reeled off a succession of amazing scores from this site. Stations all over New York and New England sound like locals on the vhf



Against the backdrop of a cloudy sky, the War Memorial (along with some temporary additions to the landscape) stands out atop Mount Greylock, Masachusetts, the highest point in the state and one of the very best vhf radio locations in the U.S.

*5818 Woodlake Ave., Woodland Hills, CA 91367

[1]Tilton, *The Radio Amateur's VHF Manual*, 1st edition, 1965, chapter 9, "Portable Antennas." Also in later editions.

bands, and signals as far away as Canada's Maritime provinces, Ontario, Ohio and Virginia are readable on a typical day without any unusual band conditions.

This fabulous mountaintop will probably be spoken for during every ARRL vhf contest until the 21st century, but you can drop in almost any other time and help yourself to some exciting vhf DXing. In fact, you can even stay and dine at the lodge on the summit. The mountaintop is in a state reservation; there is no admission charge.

To reach Greylock, take U.S. Highway 7 for about five miles north of Pittsfield, Massachusetts, and turn right, following the Mount Greylock and "state reservation" signs to the top on an excellent paved road. There are two things visiting hams should bear in mind: (1) the weather can be cold and windy at the summit, even on summer days when it's unbearably hot and humid below, and (2) there's a 31/91 2-meter repeater there, so the summit is "desense city," even with a good rig.

Pack Monadnock, New Hampshire — If Greylock is America's number one vhf location, Pack Monadnock is a very close second. Its elevation is only 2310 feet, but its excellence has been proven repeatedly in vhf contests, most recently in the June 1979 contests when the W1FC/1 group atop "The Pack" beat out the group on Mount Greylock (and everybody else) for top honors.

Pack Monadnock offers just about the same radio coverage as Mount Greylock, with two exceptions. First, it's virtually line of sight into the Boston area, offering an edge over Greylock for local coverage of that densely populated area. Coverage to the west may be a bit inferior to Greylock's, partly because Grand Monadnock mountain, nearly 1000 feet higher, is only about 15 miles away. So why not just go up Grand Monadnock, you ask? Well, backpackers have made the hike up the mountain one of the most popular in New England, but there's no road for vehicle travel to the top. If you're a hiker with a radio in your backpack, by all means don't bypass Grand Monadnock, but if you're more inclined to drive when you go hilltopping, Pack Monadnock will be more to your liking.

Located within a state park, Pack Monadnock boasts a paved road to the top (admission is still 50 cents at this writing). Take Route 101 east about three miles from Peterborough, New Hampshire, and follow the signs up the hill to the summit. It's so easy to reach that local hams often go up during their lunch hours! There's one catch: The summit parking area, which isn't very big, is something of a goldfish bowl — be prepared to explain what you're doing to crowds of curious onlookers.

If Pack Monadnock at only 2310 feet elevation is so good, someone may ask, why not go right up to Mount Washington, New Hampshire, which is an astonishing 6288-feet high? The answer: It is actually too high for most vhf hamming. Not only is the weather unfavorable, even in summer, but much of the time the summit is *above* the tropospheric inversion, rendering vhf communication marginal!

Mount Equinox, Vermont — The third of New England's triumverate of great vhf mountaintops, Equinox is the highest of the three, at 3810-feet elevation. But it is sometimes regarded as too far north to match Mount Greylock or Pack Monadnock. Nevertheless, the highest vhf contest score ever amassed by a single-operator station anywhere was achieved on Mount Equinox, so it can't be that bad a spot! Its overall coverage is very similar to Greylock's, and the mountain suffers only slightly for being some 30 miles further north — and hence further away from the population centers of New York, Philadelphia, Baltimore and Washington.

A radio van and tower trailer at the foot of Mount Equinox, Vermont, one of the best-known sites for hamming in New England. It costs $3.95 to drive up the toll road to the summit, but it's worth the trip.

Mount Equinox is owned by a Catholic religious order which derives much of its sustenance from the inn at the summit and the toll road ($3.95 per car) up the mountain. The road is paved and well maintained but steep; a famous sports car race to the summit occurs each June (usually the same weekend as the June vhf contest).

To reach Mount Equinox, take U.S. Highway 7 to about three miles north of Arlington, Vermont, and turn left at the Mount Equinox toll booth.

[Editor's Note: A lesser-known vhf site should not be overlooked. Anyone who has been to Cadillac Mountain, in Maine's Acadia National Park, can tell you that it belongs on this list. Though relatively far from major population centers and thus not always a thriller, Cadillac is incomparable when conditions are right. Its summit, 1560 feet above sea level, is the highest spot on the Atlantic Coast of North America. It was the northern end of an early 2-meter DX record, and during the September VHF Party of 1955 every ARRL Section from Nova Scotia to Virginia was worked on 144 MHz from there — using 2 watts a-m and a small portable beam. Best DX — 720 miles!

The large circular parking area at the summit is fine for casual mobile operation on any band. A smaller area, Sunset View, just below the summit, is almost as good, and less crowded. But there's a better spot, away from the thousands of tourists who come up the spectacular mountain road every pleasant day. Look for a road (of sorts!) that turns off the mountain loop near the summit gift shop. It leads to a rocky eminence from which the island-dotted Atlantic is almost straight down, on three sides. It is more than worth the trouble for a real vhf DX enthusiast.

Plan to stay in the area a few days, in order to sample the propagation wonders of Atlantic Seaboard ducting. June and September, especially the latter, are recommended. It's best to write the Superintendent, Acadia National Park, Bar Harbor, ME 06409, for permission to use this or any off-road site — *Ed Tilton, W1HDQ]*

High Point, New Jersey — At 1800-feet, High Point is New Jersey's highest spot. It offers an excellent radio shot toward New York City, some 55 miles to the east, coupled with an unobstructed view to the west across the Delaware Water Gap to Pennsylvania. It's in a state park, and no overnight camping (or hamming) is permitted at the summit. But for an interesting afternoon of hamming at a place not too far from metropolitan New York, it's hard to beat.

From the New York area, take Interstate 80 west through Paterson, New Jersey, and go north on State Route 23. Or from Interstate 84 at the New York-New Jersey-Pennsylvania border, take Route 23 south a few miles and follow the signs into the state park and up to the summit. There's a small admission fee.

Spruce Knob, West Virginia — The highest point in "the Mountain State" offers a whole new world of excitement for vhf DX enthusiasts. Don't expect to work multitudes of mobiles on fm, since this mountain is quite far from all large metropolitan centers, but with a horizontal beam and perhaps 70 watts of ssb on the 2-meter band, you can do incredible things from Spruce Knob on any given day.

For instance, if you point your beam toward the northeast, you can, with a little luck, work all the way to New York City and even into New England. Beam southeast, and North Carolina stations by the dozens will say hello. Beam northwest, and 2 meters comes alive with signals from Ohio, Michigan, Indiana and perhaps even the Chicago area. If you beam north, people in Pittsburgh and even Toronto, Ontario, will show up. Without any unusual propagation, an evening's hamming on Spruce Knob may yield 20 states worked on 2 meters. Westerners,

eat your hearts out over this one!

Spruce Knob is in the Monongahela National Forest and is accessible by several well-maintained dirt roads. It's best to inquire about road conditions in Elkins, the town at the foot of the mountain, before proceeding from there. Elkins may be reached via U.S. 33 from either Interstate 79 or 81. For a trip combining a visit to Appalachia with some hamming, Spruce Knob is highly recommended. Bickel Knob, nearer Elkins, is almost as good, and it has a good paved road.

Mount Mitchell, North Carolina — Like Spruce Knob, Mount Mitchell is not especially close to any metropolitan center. And like Spruce Knob, it offers spectacular DX possibilities in many directions, especially to stations equipped for ssb work. At 6684-feet elevation, it's the highest point in the eastern USA, and it's far enough south that the typical summertime inversion is usually above its summit, avoiding the "above the tropo" problem so often encountered on Mount Washington, New Hampshire.

From Asheville, North Carolina, take the Blue Ridge Parkway north and follow the signs to Mount Mitchell. Clingman's Dome, reached from the main road through the Great Smokies National Park, is also good.

And in the West . . .

The vast distances, usually sparse populations, and lofty mountains combine to make vhf DXing a special challenge in Western America. Perhaps because range after range of mountains juts up into the troposphere to cause atmospheric turbulence and break up any ducts that might form, long-haul tropo DX, spanning distances beyond about 500 miles, is much more rare in the West than in the East or Midwest. Nevertheless, the activity level on vhf fm can be incredibly high in the major cities. Thus, mountaintopping in the West is a different sort of experience than it is in the East, but it offers exciting challenges for both ssb DXers and those who prefer fm work.

Mount Pinos, California — Again using vhf contest scores as a criterion, 8800-foot-high Mount Pinos ranks as the best vhf mountaintop in the West. At this writing, Mount Pinos was still the only place in Western America from which a vhf contest high had ever been achieved. But in eight of these contests, a station atop Mount Pinos has turned in the highest single-operator score overall.

Although far from the highest mountain in California, Mount Pinos is ideally situated for vhf coverage of California's major population centers. Located about 100 miles north of Los Angeles, it is directly in the "line of fire" from San Diego and L.A. to the San Francisco Bay Area and the Central Valley. Ssb stations on Mount Pinos routinely work everywhere from far north of San Francisco to points below the Mexican border. And Mount Pinos provides fm coverage good enough to work mobiles on the freeways of L.A. and the streets of Fresno at once, producing astonished reactions at both ends of the path!

A peak that is just about equal for vhf work is near Mount Pinos: Frazier Mountain, elevation 8000 feet. In all important directions, the two mountains have equally clear views, although Mount Pinos tends to be more popular both because it is higher and because one need not drive as far on a dirt road to reach its summit.

To reach either mountain, exit Interstate 5 at Frazier Park and proceed west on Mount Pinos Way past the community of Frazier Park. To reach Mount Pinos, continue about 15 miles to the large parking area three miles from the summit, and then proceed up the dirt road to the "Condor Observation Point." To reach Frazier Mountain, stop by the Frazier Park Ranger Station (west of town) and ask for directions up the dirt road from the station to the summit.

Mount Pacifico, California — Los Angeles is surrounded by mountains as much as 10,000 feet above sea level, where there are many excellent radio locations. Judging again by vhf contest results over the years, the best mountaintop in Los Angeles section would probably be Mount Pacifico (elevation 7500 feet), the site of the highest multioperator vhf contest score ever amassed in Western America (the station: W6AMT). It offers commanding local coverage plus a good shot to Nevada and a fair view to the north (perhaps 6 dB below Pinos or Frazier into the San Francisco Bay area).

Mount Pacifico is in Angeles National Forest and has a public campground at the summit. Hams are welcome, but all-night generator operating may take some negotiations! The mountain may be reached by taking State Route 2 (the Glendale Freeway) north until it becomes Angeles Crest Highway. Continue up Route 2 to Angeles Forest Highway and go left (north) about 10 miles to the Mount Pacifico signs. An eight-mile dirt road leads to the summit.

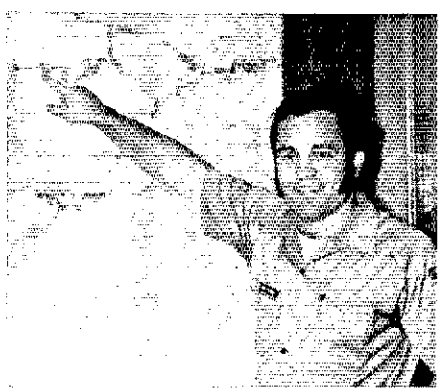
For those wishing to sample southern California mountaintopping without dirt roads, the easy drive up Route 2 to Mount Wilson might be a good choice. At 5710 feet, Mount Wilson towers over Pasadena and much of the southland, and its observatory is a tourist attraction. Most of L.A.'s television and fm broadcast transmitters are there, however, creating severe desense problems. But for a close-in and lofty mountain, it's hard to beat.

Mount Palomar, California — In the San Diego area, the best-known mountaintop is Mount Palomar, elevation 6100 feet. It's no match for the mountains further north for coverage into northern California, but it offers amazing vhf coverage to Arizona and points east (or west to the Pacific). Some of the most impressive vhf DXing ever done in California has occurred here, largely at W6XJ's mountaintop station.

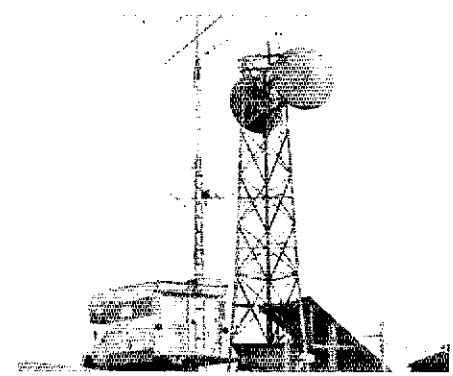
Much of the mountain is within Cleveland National Forest. Like Mount Wilson, it is the site of a major astronomical observatory. To reach Mount Palomar, exit Interstate 5 at State Route 76 in Oceanside, proceed inland to Route S-6, which goes up the mountain to the observatory.

Mount Diablo, California — Probably the most famous vhf location in the San Francisco Bay area, Mount Diablo is only 3849 feet high. But it offers a commanding view around the Bay area and Central Valley. As a result, many top-notch vhf contest scores have been achieved here. Located in a state park, Mount Diablo may be reached by taking Interstate 680 to Walnut Creek, exiting at Yolo Valley Road. Go east 2.5 miles to the Mount Diablo sign, turn right, and go up the mountain. The fee: $2 per day or $5 for an overnight stay.

Another excellent Bay Area mountain is Mount Hamilton, site of Lick Observatory. At 4200-feet elevation, it is, some



Bill Mazingo, a U.S. Forest Service officer in California whose responsibilities include granting permits for Amateur Radio operation in Los Padres National Forest, points out Mount Pinos, one of the most popular vhf locations in the Western U.S.

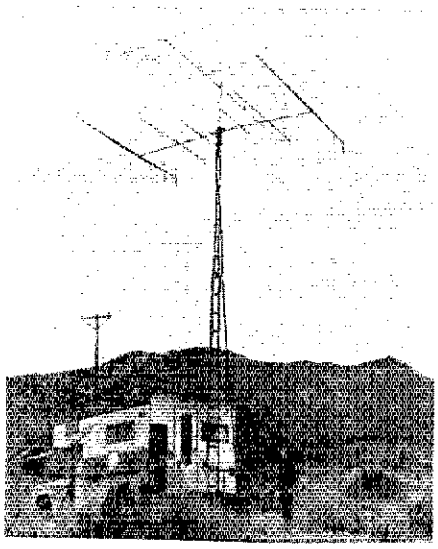


There's not much to see atop Mount Pinos, California, except for an Air Force microwave relay facility (at right) — and a visiting ham's portable vhf station mounted in a camper truck! Eight national championship vhf contest scores have been achieved from this site over the years.

say, a better mountain than Diablo, but permission for overnight ham operations has sometimes been difficult to secure. It may be reached by taking State Route 130 from San Jose to the summit.

Mount Ashland, Oregon — For long-haul DXing on the West Coast, Mount Ashland is the nearest thing to a Spruce Knob there is. At 7500 feet, it isn't especially high by Western standards, but it is readily accessible from Interstate 5 in extreme southern Oregon (take the Mount Ashland exit and proceed west to the summit via a paved road). It's ideally situated for ssb DX work.

If you beam north from Mount Ashland, stations in Portland and Seattle (and sometimes a few VE7s) will hear you. Beam east, and you can work into Idaho and Nevada (if anyone is on the air there). To the south, stations in the Bay Area and California's Central Valley will think you're a terribly choice bit of DX! And if anyone is there, you can work the length of the Valley to Mount Pinos, covering perhaps the longest vhf DX path consistently workable in the West, almost 600 miles. There's a television transmitter at the summit, so be prepared for receiver desense problems.



WB6IDK admires the portable antenna installation at K6YNB/7, Utah Pass, Utah. At this site, visiting hams have repeatedly spanned 400 miles of desert and mountains to work vhf stations in southern California.

Brian Head, Utah — Another mountain that offers regional coverage is Brian Head, near Cedar City, Utah. Its elevation of 11,315 feet makes it a cold place that is sometimes above the tropospheric ducting, but it offers better all-around vhf coverage than any other accessible mountain in its region. Almost everyone you work from Brian Head will be weak, but they'll all be excited to hear a Utah station. To the south, you beam over the high mountains surrounding the Grand Canyon to work stations in Phoenix and Tucson, Arizona. To the southeast, the best-equipped stations in the Albuquerque, New Mexico, area will be in there at S2. And to the north, southern Idaho stations will hear you. To the southwest, an occasional southern Californian can be worked with luck.

To reach Brian Head, take State Route 14 east from Interstate 15 at Cedar City and follow the signs through Cedar Breaks National Monument to the Brian Head ski area. A short dirt road leads to the summit. The peak is in Dixie National Forest.

Utah Pass, Utah — For an exciting evening of tropo DX — albeit all in one direction — Utah Pass is highly recommended. Whereas Brian Head is a cold and austere mountain at a dizzying elevation, Utah Pass is a mere 4800 feet above sea level and only 1000 feet above the Nevada desert floor. But it offers Utah's best vhf radio shot into California — except for a few spots accessible only to mountain goats!

The elevation at Utah Pass is perfect for tropospheric ducting, and you'll work many stations in greater Los Angeles during the peak periods that occur several hours after local sunrise and local sunset. This ducting seems to develop daily over the desert, sometimes producing amazingly good signals. This writer has been there eight different times, never failing to make numerous contacts in southern California, despite the seemingly forbidding obstacles in the way. Unfortunately, Utah Pass is blocked by higher mountains in the immediate area, preventing DX work in other directions.

To reach Utah Pass, go west from St. George through Santa Clara, Utah, on old Highway 91, proceeding about 20 miles to the summit. If you park near the telephone company facility at the pass, you'll be looking "right down the pipeline" toward Los Angeles, nearly 400 miles away.

Mount Rose, Nevada — To work into northern California from Nevada, the acknowledged ideal location is Mount Rose, a 10,000-foot mountain overlooking Lake Tahoe on the Nevada side. Unfortunately, the summit is closed to the public, but there are several turnouts along the "Mount Rose Highway" (Nevada State Route 27) between Lake Tahoe and Reno. From some of these turnouts, you'll find yourself 2000 feet above the surface of Lake Tahoe (which is itself more than 6000 feet above sea level) with an excellent radio shot toward the San Francisco Bay area 200 miles away. Try it on your next trip to Tahoe/Reno.

Mount Potosi, Nevada — Perhaps the best location in Nevada for vhf DXing into southern and central California is 6000-foot-high "Low Potosi," 30 miles south of Las Vegas. An amazing place, it consistently produces signals from California that are 30 db louder than they are in Las Vegas. Low-power stations in L.A. and San Diego will express disbelief when they work you there. And with luck, you can work across the desert and the High Sierras into the Bay Area as well from this location.

To reach Mount Potosi, exit Interstate 15 at Jean, Nevada, and drive west through the old mining town of Goodsprings. There's only one road out of town to the right (and a dirt road at that), but it goes to "Low Potosi." If uncertain about directions, inquire at Goodsprings. There is a telephone company microwave facility at the top of "Low Potosi." There's also a road to the much-higher "High Potosi," but it's not recommended for passenger cars. And "Low Potosi" seems to be just as good for vhf DX work.

About Permissions

Local authorities are generally very cooperative about granting permission to operate on these mountaintops. For an afternoon or evening of casual hamming, of course, no permission is usually necessary. But for a more elaborate operation such as a weekend contest, permission is required in most cases.

For those sites within national forests, a district ranger or his "resource forester" will often grant a permit for a ham radio operation on the spot, usually requiring only that the normal local regulations on such matters as sanitation be observed. One additional requirement often imposed is that a spark-arrestor muffler be provided if a gasoline generator is used.

"Really, we have two goals," explains Bill Mazingo, recreational lands officer in the Los Padres National Forest of California. "First, of course, we want to protect the national forest environment. And second, we view our permit system for hams as an opportunity to let them know what we expect of them."

In general, a courteous explanation of what the amateur wants to do is sufficient to secure permission to operate in any of these places, all of which are popular enough that most local officials will have encountered other hams before, but not necessarily under the best conditions. Writing ahead, to the individual or agency listed in most travel guides, is a safe approach.

One other caution should be issued — vhf mountaintopping can be contagious. This writer started driving to hilltops with a mobile rig and a whip antenna about 15 years ago and got thoroughly "hooked." Now I haul crankup towers, generators and hundreds of pounds of equipment on my vhf mountaintop expeditions. Lots of hams have gone mountaintopping without getting bitten by the bug this badly, but there's no guarantee that you won't become an avid mountaintopper once you've experienced the thrill of working the vhf bands from places like Greylock, Ashland, Spruce Knob, or Pinos. QST

Happenings

Conducted By W. Dale Clift,* WA3NLO

League Members Will Decide on Board of Directors

Did you know that every full member of ARRL has a voice in how the organization and Headquarters is run? How?

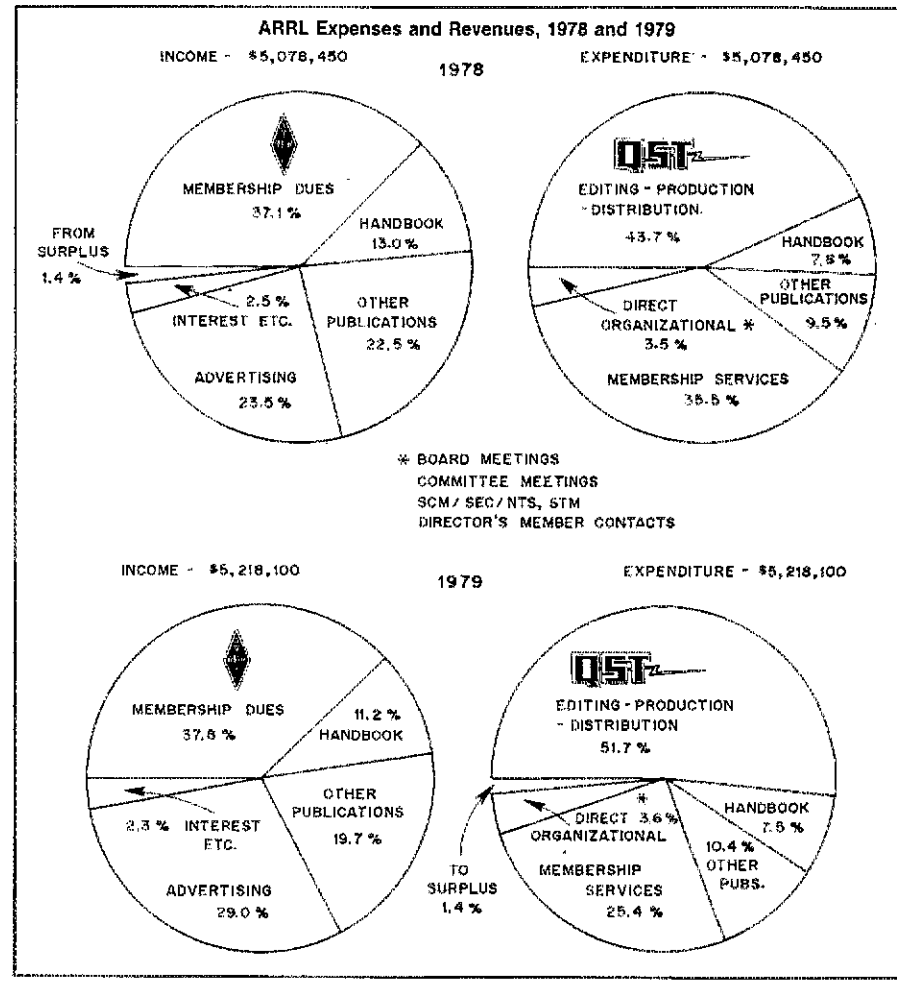
First, let's set the record straight. "Those guys at Hq." are not the ones setting League policy. Oh, sure, we have to make decisions involving day-to-day details. But the ARRL Board of Directors decide matters such as whether the League is going to petition the FCC for more privileges, raise membership dues or make additional services available to members. And *you*, the members, decide who's going to be the director representing your division.

What's a Division?

The ARRL is controlled by 16 directors who are elected by the members on a geographical basis. (See page 8 of *QST* for a list of the present directors and vice directors.) These directors serve for two-year terms, with half standing for election in even-numbered years, half in the odd. Just as in national, provincial or state politics, the voters/members have the privilege and the responsibility either to decide they like the actions of their incumbent representatives and support them actively for reelection, or to decide that other representatives could do a better job, and work for the election of those persons. At the same time directors are elected, vice directors, who can fill in when the director is unable to serve, are also chosen.

Call for Nominations

Nominations are now open for director and vice director in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions for the two-year term beginning January 1, 1981. From now until September 10, at noon, League headquarters will accept nominations bearing the signatures of 10 (or more) full members of a division naming a full member of the division as a candidate for director or vice director. The nominee must hold at least a General class amateur license, or a Canadian Amateur Advanced Certificate, must be at least 21 years of age, and must have been licensed and a full member of the League for a continuous term of at least four years at the time of the election. No person is eligible who is commercially engaged in the manufacture, sale or rental of radio apparatus capable of being used in radio communication. Neither is a person eligible who is engaged in frequency-allocation planning or implementation. Finally, no one can run who is commercially engaged in the publication of radio literature intended in whole or in part for radio amateurs. The idea behind these rules is to ensure that candidates (1) possess a lasting interest in Amateur Radio and the League, (2) have the legal capacity to make decisions for ARRL, and (3) are free of conflicts of interest.



Balloting Will Follow

Whenever there is more than one candidate for either office, ballots will be sent to all full members of the League in that division who were in good standing on September 10. (You must be a licensed radio operator to be a full member.) The ballots will be mailed not later than October 1 and, to be valid, must be returned to Headquarters by noon, November 20. A group of nominators can name a candidate for director, for vice director, or both, but there are no "slates" as such — each candidate appears on the ballot in alphabetical order. If a person is nominated for both director and vice director, the nomination for director will stand and that for vice director will be void. A person nominated for both offices does have the option, however, of declining the higher nomination and running for vice director if he or she wishes. Since all the powers of the director are transferred to the vice director in the event of the director's death, resignation, removal outside the division or inability to serve, careful selection of candidates for vice director is just as important as for director.

Nominating Form

The following form for nomination is suggested; it may be copied onto any paper, or a blank following this form may be obtained from Headquarters on request:

Executive Committee
The American Radio Relay League
Newington, CT 06111

We the undersigned, full members of ARRL

*Deputy Manager, Membership Services, ARRL

residing in the . . . Division, hereby nominate . . . of . . . as a candidate for director; and we also nominate . . . of . . . as a candidate for vice director from this division for the 1981-1982 term.
(Signature . . . Call . . . City . . . ZIP . . . Date . . .)

Nominees or, indeed, any member, may obtain a copy of the Articles of Association and Bylaws, along with a pamphlet outlining the duties and responsibilities of elected League officials.

Absentee Ballots

All ARRL members who are licensed by FCC or DOC but are temporarily residing outside the U.S. or Canada are now eligible for full membership. These members overseas who arrange to be listed as full members in an appropriate division prior to September 10 will be able to vote this year where elections are being held.

Even within the U.S., full members temporarily residing outside the ARRL division they consider home may not notify the secretary prior to September 10, giving the current *QST* address and the reason that another division is considered home (as for instance, holding an amateur call appropriate to the division). So if your home division is the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern or West Gulf Division, but your *QST* goes elsewhere, please let the ARRL secretary know, as soon as possible but no later than September 10, so you can receive a ballot for your home division.

The Incumbents

These persons presently hold the offices of director and vice director, respectively, in the divisions conducting elections this year: *Central* — Don C. Miller, W9NTP, and Kenneth A. Ebneter, K9EN; *Hudson* — Stan Zak, K2SJO, and George A. Diehl, W2IHA; *New England* — John C. Sullivan, W1HHR, and Fred E. Evans, W1JFF; *Northwestern* — Robert B. Thurston, W7PGY, and Ronald D. Mayer, K7BT; *Roanoke* — L. Phil Wicker, W4ACY, and Gay E. Milius, Jr., W4UG; *Rocky Mountain* — Maurice O. Carpenter, KØHRZ, and Lys J. Carey, KØPGM; *Southwestern* — Jay A. Holladay, W6EJJ, and Peter F. Matthews, WB6UIA; and *West Gulf* — Raymond B. Wangler, W5EDZ, and Thomas W. Comstock, N5TC.

In Summary

Petitions need 10 or more signatures of full members and are due at Headquarters by noon, September 10. If there is only one candidate for an office, he or she will be declared elected by the Executive Committee; otherwise, ballots will be mailed not later than October 1 to full members of record September 10. To be valid, ballots must reach Headquarters before noon, November 20. The new term will begin at noon, January 1, 1981.

For the Board of Directors:
June 1, 1980
Richard L. Baldwin, W1RU
Secretary

LAUNCH VEHICLE FAILS, AMSAT PHASE III-A CRASHES

On Friday, May 23, 1980, the Amateur Radio community learned the sad news that the launch vehicle carrying the first AMSAT-Phase III satellite malfunctioned and crashed into the Atlantic Ocean. The first details of the malfunction were transmitted from W1AW, which had a telephone link to the launch site in Kourou, French Guiana. Also, FY7KRU, the club station in Kourou, was in contact with the Goddard Space Flight Center club station, WA3NAN, and the AMSAT-DL station at the University of Marburg, ÐJ4ZC. Ulrich Mueller, DK4VW, fed landline reports directly to FY7KRU from inside the European Space Agency's blockhouse.

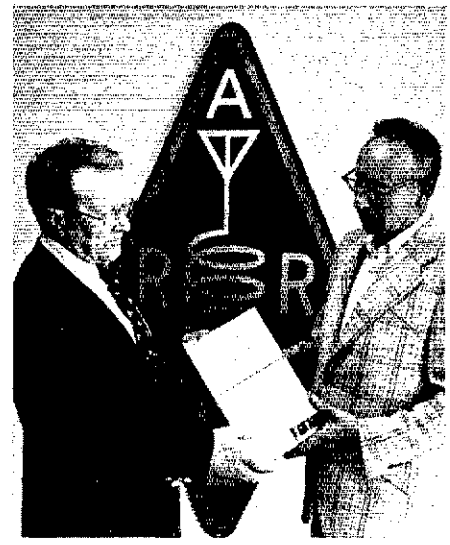
Throughout the morning, radio amateurs received status reports. At T minus 58 seconds, the first of several "holds" began when a computer indicated that a valve had not closed properly. However, this problem turned out to be a computer "glitch" and the count resumed to a recycled T minus six minutes. AMSAT's own computers, linked to Phase III's onboard computer, showed the satellite to be running on internal power with its computer 100% functional.

For the next two to three hours, there were several holds on the launch — one caused by a sudden cloudburst and the other caused by a voltage problem in the guidance system. Finally, the rocket lifted off at 14:29:42.34 UTC, seconds before the launch window closed.

Shortly thereafter, the entire launch vehicle fell into the Atlantic Ocean with Phase III on board. For further details and a glimpse into AMSAT's future, see the article on page 45.

WAØUZO DONATES EMERGENCY REPEATER TO ARRL

Bob Shriner, WAØUZO, of Circuit Board Specialists, donated an emergency repeater to ARRL on May 1, 1980. This repeater is set up on 146.34/146.94 and will be available for loan during an emergency that warrants its use. Completely self contained, except for a 12-V power supply, this unit features extremely low current consumption, built-in duplexer, excellent sensitivity and 7 watts of output power from the duplexer. A complete technical description of the repeater will appear in a future issue of *QST*.



Bob Shriner, WAØUZO (right), presents ARRL General Manager Baldwin with a new, totally portable emergency repeater. The incredibly small package contains everything including the duplexer and control circuitry. It is only necessary to connect 12 V dc and an antenna. The repeater will be set up on 146.34/94 and will be available for loan in emergency situations. *(photo by W1JA)*

During an emergency any responsible group interested in borrowing the repeater should contact John Lindholm, W1XX, ARRL communications manager, for details of availability. Between emergency uses in the field, the unit will be operated at ARRL hq. as a local repeater to insure that it is kept in "ready-to-go" condition. It will not operate at headquarters on 34/94, but will be on another frequency to be determined by the area frequency coordinator. — *Pete O'Dell, AE8Q*

GOOD NEWS FOR CONNECTICUT HAMS

Governor Grasso has signed into law a bill extending the availability of amateur call-letter plates to motorcycles, campers, commercial motor vehicles, and passenger and commercial motor vehicles. Previously, call-letter plates were available only to private, passenger motor vehicles. The new law becomes effective October 1, 1980. — *Warren Thurnauer, K1PJQ*

CONTINUING 420- TO 450-MHz RADIOLOCATION PROPOSED

The FCC has proposed that nongovernment radiolocation be continued in the 420- to 450-MHz band subject to the following conditions: (1) Operation is on a secondary basis to the Government Radiolocation Service and the Amateur Radio Service; (2) operation is limited to use along the shorelines of Alaska and the 48 contiguous states; and (3) authorization is granted on a case-by-case basis, with particular attention given to the proposed power and antenna system requirements. The present rules will cut off all nongovernment radiolocation at 420 to 450 MHz January 1, 1981. Nongovernment radiolocation is used for mapping offshore areas for oil exploration and for making measurements involving studies of the sea and atmosphere.

The Commission's Notice of Proposed Rulemaking in Docket 80-135 is in response to a two-part request by Del Norte Technology, Inc., to delete the January 1, 1981 cutoff date and to permit expansion of 420- to 450-MHz nongovernment radiolocation to inland areas. Because the Commission forsees a need for a complex evaluation of the second part of Del Norte's proposal, requiring an in-depth analysis of operating and technical standards should such operations be extended inland, the scope of the present proceeding deals with the cutoff deadline only. The remaining issues will be handled later, in another rulemaking action.

FCC noted that in almost four years of operation, no known interference complaint has been filed regarding nongovernment radiolocation users in the 420- to 450-MHz band. This lack of known interference is believed attributable to the transient nature of the operations, which are mainly in offshore areas. However, ARRL requested and received a two-week extension for comments. The League asked for more time to permit it to check its membership for reports of interference to amateur operations. At press time, ARRL hq. was still preparing a response.

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

The Contester's Rule Book

In a contest, the pace is always fast and furious (ideally), with operation consisting of making as many contacts as possible in a given time period. Unfortunately, FCC rules are not always conducive to high QSO rates. This month we'll attempt to unravel some of the mysteries of the "rules universe" as they pertain to that curious creature of the forest — the contester.

Q. During the contest last weekend, I heard a number of stateside stations exchanging reports with a Caribbean station but giving only their own call signs. Is this legal?

A. No. You, as a Commission licensee, must give the other station's call in addition to yours at the end-of-exchange. The FCC has set forth some guidelines as to which forms of identification of an amateur station will be acceptable for short QSOs such as DX and contest exchanges.

Examples of acceptable end-of-exchange transmissions of less than 30 seconds are:

DX1DX DE W6XYZ 589 CAL BK
DX1DX W6XYZ 589 CAL K
DX1DX 589 CAL DE W6XYZ K
DX1DX 589 CAL W6XYZ K
589 CAL DX1DX W6XYZ K

For telephony, the voice equivalent of the foregoing examples may be used, substituting "this is" or "from" for DE, and so forth. Incidentally, this requirement for signing the other station's call will be dropped, except in cases where international third-party traffic is involved, if §97.84(a) is amended as proposed in Docket 80-136. (See "Happenings," June 1980 *QST*).

Q. But what about the African station who didn't give his call for 10 or 15 minutes while making 20 contacts?

A. Regulations vary from country to country, and this station may have been operating in accordance with his own rules. But this doesn't change anything for the U.S. amateur — he or she still must identify the other station's call in addition to his own. Of course, from a contest standpoint, it's certainly to the advantage of the foreign station to identify often to avoid duplicate contacts.

Q. How close to the band edge can I put my transceiver VFO, assuming it is accurately calibrated?

A. That depends on your mode of operation. For A1 emissions, your bandwidth is approximately four times the sending speed (i.e. 100 Hz at 25 wpm) — so you should keep your VFO at least half of the bandwidth away from the band's edge. For A3 operation, the necessary bandwidth (as defined in FCC Part 2.202) for a single-sideband, suppressed-carrier emission is 3000 Hz. This means that when transmitting on the upper sideband, your VFO may be set on the lower band edge, provided your carrier and unwanted sideband are suppressed at least 40 dB. If you are operating lower sideband, however, you must maintain a distance of at least 3000 Hz from the bottom edge of the band. The same goes for the upper edge of the band — when operating upper sideband, you must maintain a distance of at least 3000 Hz. And lower sideband operation: you may set your VFO on the band's edge as long as your carrier and unwanted sideband are suppressed at least 40 dB. Remember that, in these cases, the assumption is made that your VFO is perfectly calibrated and stable. You should always leave a little room for a margin of safety when setting your operating frequency near a band edge. All of your sidebands must be within the band (97.63[b]).

Q. I recently heard one Middle East station say he was running 5 kW. Isn't that illegal?

A. Here again, rules vary from country to country, and this station may have been operating within his own country's rules. International regulations don't specify power limits. The maximum limit in some cases is 1-kW input, but the norm is 200 to 400 watts. In the power category, U.S. amateurs are most fortunate to have the privilege of running a kilowatt!

Q. Can my friend, a General, operate with my call sign at my station in a DX contest?

A. Yes, under certain circumstances. You may designate another amateur to be a control operator who, together with you, is responsible for the proper operation of the station. Remember that the control operator may operate your station only to the extent of his own license class privileges (if he operates beyond his limitations, he is a *third party*, just like your grandmother speaking over the mic) (97.79). If, however, his privileges exceed those of your license class, he may use these privileges but must add his own call sign to the station identification: KA4XYZ/W4XX, for example (97.84).

Getting back to the third-party aspect, you may permit any third party to participate in Amateur Radio communication from your station provided a control operator is present to *continuously* monitor and supervise the operation. All third-party traffic must be logged (97.103[b]). Remember that as a third party, he is permitted to communicate only with stations in the U.S. and countries that have third-party agreements with the U.S. This means that if you're planning on having an unlicensed friend operate the next Q-land contest from your station, you're going to have a very low score! (97.79, 97.84).

Q. I overheard an Antarctic station operator say he didn't need a license. Why not?

A. Antarctica is not under the jurisdiction of the FCC, as it is not a U.S. territory or possession. In the special case of U.S. bases in Antarctica, the National Science Foundation and the U.S. Navy have responsibility for amateur communications (the FCC issues blocks of call signs to NSF and the Navy). The NSF and the Navy regulate the use of Amateur Radio and instruct operators to follow general FCC regulations (especially with respect to phone-patch traffic). Most U.S. Antarctic bases do have at least one FCC licensee to oversee Amateur Radio activities. Licensing in certain other military areas is handled by local military officials. These areas include U.S. military personnel in Japan and Guantanamo Bay, Cuba. In the special case of the Pacific Island Trust Territories, licensing is administered under the High Commissioner.

Q. Who handles licensing for all U.S. possessions and territories?

A. The FCC issues all Amateur Radio licenses for the United States, its territories and possessions. Prior FCC permission to operate from these areas is not required. You need only identify your station operation by your own call sign — but you may wish to add an identifying suffix for informational purposes: KA1EBV/KP4, for example. (Important note: Although FCC permission is not required, be sure to check with authorities concerning landing permission in many locations.)

Q. In the excitement of last week's DX contest, I inadvertently operated outside of my sub-band. Will I get a pink slip from the FCC?

A. It's possible. If you receive an official notice of violation, you must reply within 10 days to the originating FCC office in writing. "The answer to each notice shall be complete in itself and shall not be abbreviated by reference to other communications or answers to other notices. If the notice relates to some violation that may be due to the physical or electrical characteristics of transmitting apparatus the answer shall state fully what steps, if any, are taken to prevent future violations, and if any new apparatus is to be installed, the date such apparatus was ordered, the name of the manufacturer, and promised date of delivery. If the notice of violation relates to some lack of attention to or improper operation of the transmitter, the name of the operator in charge shall be given" (97.137).

Q. I would like to operate the next contest from a rare country. Is it possible to obtain operating permission?

A. A lot depends on what particular country you wish to operate in. Permission must be obtained from the government of the foreign country. Not all countries grant operating permission, but many do. For a discussion of foreign operating, see "Washington Mailbox," April 1980 *QST*.

Q. In a recent Novice contest, I heard Novice stations making contacts with higher-class stations. Don't these other stations have an unfair advantage because of their higher power capability?

A. No. All stations, regardless of license class, are restricted to 250 watts input when operating in the Novice sub-bands (97.67[d]).

[Note: Questions appearing in this column are typical of those frequently asked of the FCC and other agencies. Answers, prepared at ARRL have been reviewed by FCC staff. Interpretations contained herein concur with those of the FCC's Personal Radio Branch. Numbers in parentheses refer to specific sections of the FCC rules.]

*Membership Services Assistant, ARRL

Correspondence

Conducted By Bruce R. Kampe,* WA1POI

DOWN TO ROOTS

☐ It seems I keep reading more and more articles and letters about malicious interference, foul language, and just plain sorry operating practices. It's happening on DX contacts, nets, and plain old ragchews. I've heard it blamed on ex-CBers, old operators that don't want to admit new operators into their fold, and others referred to as just plain idiots.

I would like to express my humble opinion as to what is causing all the problems listed above and also many other areas of difficulties. I think it can be summed up in one word, which is *EGO.*

We, as average American citizens, have steadily been on a downhill trend toward satisfying ourselves to the point of not caring if we have to tromp over everyone else. We just don't have the pull-together attitude that has helped us to become one of the greatest countries in the world.

Let each and every person reading this take just a minute to reflect on the last time they were willing to sacrifice their wants for another. Were you able to remember, or did it take some time and lots of searching? How quick we are to become indignant and hostile over a minor incident, but when viewing it as an independent party we would surely classify it as childish.

Every operator should come up with what we all have inside, which is *PRIDE.* Pride in operating, pride in being an Amateur Radio operator, and proud of all the studying and work we put in learning the code.

How about you old timers telling and explaining to the new comers what they are doing wrong? How about the new comers admitting you've just scratched the surface and can learn from the old timers? It's time to admit Amateur Radio is changing, and for the worse.

We can turn it around so that everyone will enjoy it. We have it in our power to assume Amateur Radio will be around 50 years from now. But only if we can first get rid of that *I MUST* feeling we all have. I know we can regulate ourselves if we first conquer our *EGOS. — Bob Cregar, WD8NKT, Bay City, Michigan*

THE QUESTION OF COMPETITION

☐ Your April Editorial decried the fact that "legitimate amateurs can't buy legitimate amplifiers." Funny — I always thought "legitimate" amateurs built and modified their own gear! Taking this in conjunction with the "CMP Plan for 20 Meter DXing," and the letters of correspondence included in the same issue, it is apparent that the only reason anyone really needs a linear is to outshout his neighbors! Is this any different than the CB operators we spend so much time maligning?

Your article "Post WARC — Now What?" asks for suggestions to optimize usage of the new 10-MHz band. Isn't this the perfect time to define a band in which the maximum power is limited to under 100 watts? This would still provide the necessary impetus to manufacturers to include coverage of this band in their receiver and transmitter designs, while removing the competition to see who can shout loudest. Who knows — we might start a whole new trend! *— Steven W. Banbury, WB6DHP, Cupertino, California*

☐ Re "CMP Plan" (April 1980 *QST*) — Let's take it a step further: I propose allocation of all newly acquired amateur frequencies exclusively to General-class-and-below licensees. I also propose a 20-watt power limitation, an 18-foot antenna height restriction, and a 7-wpm code speed *maximum* for all stations operating within the new bands. Hopefully, these regulations will provide those wishing to wallow in mediocrity and avoid competition ample opportunity to do so. Anything to get *them* off *our* backs. *— Scott Davis, K5TA, Corrales, New Mexico*

CLIPPING IS FOR GRASS

☐ I found the "How's DX?" column very interesting in the May issue. It might help if all contesters read it and paid it some heed.

The only thing I disagree with in the writer's comments concerns his restatement of the old adage "You can't work 'em if you can't hear 'em." I think that with the widespread misuse of speech processors in the DX contest, the adage might well be changed to "You can't work 'em if you can't understand 'em." *— Dick Smith, W1FTX/4, Hempstead, North Carolina*

LUCKY LINDY KNEW

☐ I was interested in your article, "Jargon," in the March issue of *QST.* I was taught by many pre-World War II amateurs that the "we" in Amateur Radio was used in the Charles Lindbergh sense, giving credit to the equipment/operator combination.

In this age of appliance operators, it seems more appropriate to me to change the statement to "it worked a new country." *— Joseph A. Weite, KH6GDR, Makakilo, Hawaii*

WOODPECKERS AND HUMMINGBIRDS

☐ Upon beginning to read W6QYT's excellent article, "Over-the-Horizon or Ionospheric Radar," I thought (hoped) it was the "April Fool special." However, it became apparent rather quickly that the article was serious in its description of the Air Force's plans to build and operate such a device. According to my understanding, the radar, even when operating "normally" may cause interference within our amateur bands.

We all know how the infamous "Russian Woodpecker" is still affecting our communications, and even though the article describes the Air Force's machine as being less disruptive, it is my belief that any kind of nonamateur disruption of the amateur bands should be opposed as vigorously as possible. The opposition should be directed toward both existing interference (foreign broadcasting, Teletype services and the "Woodpecker") as well as new threats such as the Air Force radar system.

It is my hope that the ARRL will be as vigorous in its opposition to interference, whatever the cause, as it was successful in promoting Amateur Radio at WARC 79. *— Robert M. May, II, K4SE, Jonesboro, Tennessee*

WORTH GETTING UP IN THE MORNING FOR

☐ Thanks for your letter, "Amateur Radio News." I am really impressed with the WARC '79 results. I didn't realize all that was at stake at the conference. Also, I didn't know we, as amateurs, were in danger of losing frequencies. I see through the dedication and support of the League and its members, we not only didn't lose, but gained in frequencies. That was an outstanding job on the League's part. I have been a ham for almost three years and have enjoyed every minute of it. Not until now do I realize the importance of joining and backing the League. Thanks for all your support and help, even though I haven't supported you. Now that I think about it, it was through your help that I was able to obtain my General class ticket (via W1AW code practice and the *License Manual*).

I have the membership application form and you will have my support and backing. I hope that, from your eye-opening letter, all other non-member operators will come to life and realize the need to support the League. *— Aaron Joseph Varn, Jr., WD4IPX, Ruskin, Florida*

EMBLEM ART

☐ Definitely not. Leave the ARRL emblem ("Correspondence," April 1980 *QST*) as is.

One of the things about Amateur Radio which has perturbed me is the constant changing of things for no other reason than to change.

While a lot of firms change their logo because they feel it will change their image, imagine the loss of instant recognition Crayola Crayons, Hershey chocolate or Morton Salt would suffer if they cast many years of consumer familiarity away for some ridiculous Madison Avenue face lifting?

Again, no. *— Vern A. Weiss, WA9VLK, Kankakee, Illinois*

☐ I can understand the ARRL emblem having been designed as it is since so many early ham receiver shortwave circuits had an antenna coil, but I am intrigued by N5CE's suggestion. Pretty clever. But that inductance should be terminated. *— Jonathan S. Lee, W9MWR, Downers Grove, Illinois*

[Editor's Note: These letters were two of many that commented on the clever modification of the ARRL symbol proposed by Gene Lewis, N5CE.]

*Membership Services Assistant, ARRL

Moved and Seconded...

MINUTES OF EXECUTIVE COMMITTEE MEETING, No. 380, May 18, 1980

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 0900 on Sunday, May 18, 1980, at the Marriott Inn, Rochester, New York. Present were President Harry J. Dannals, W2HD, in the Chair; First Vice President Carl L. Smith, WØBWJ; Directors Gar Anderson, K0GA, William J. Stevens, W6ZM, L. Phil Wicker, W4ACY, and Stan Zak, K2SJO; and General Manager Richard L. Baldwin, W1RU. Also present as observers were Vice President for International Affairs Noel B. Eaton, VE3CJ; Directors Jesse Beiberman, W3KT, and Mitch Powell, VE3OT; Vice Director Peter F. Matthews, WB6UFA; Washington Coordinator Perry F. Williams, W1UED; and General Counsel Robert M. Booth, Jr., W3PS.

The General Manager reported on compliance with actions taken at the January meeting. Action on Minutes 9, 15, 16, 59, and 73 has been completed. Action on Minutes 47, 70, and 72 is on-going (with the effect of Standing Orders.) Action on Minutes 42, 43, 44, 66 and 89 is in progress.

On motion of Mr. Anderson, the Committee recognized the names of 251 members who had recently been elected to Life Membership, and directed the General Manager to list their names in *QST*.

On motion of Mr. Zak, the affiliation of the following clubs was approved: Amateur Radio Club of Central Wisconsin, Camp Douglas, Wisconsin; Barrmec High School ARC, Newark, New Jersey; Clements Amateur Radio Club, Lakewood, Colorado; Clinton Amateur Radio Club, Clinton, Kansas; Essenden Amateur Radio Club, Manteo, North Carolina; Franklin Middle School Radio Club, Shawano, Wisconsin; Gabilan Amateur Radio Club, Gilroy, California; Laughery Valley ARC, Lawrenceburg, Indiana; Laurel Amateur Radio Club, Annapolis Junction, Maryland; London Amateur Radio Club Inc., Ontario, Canada; Manatsota Repeater Association, Bradenton, Florida; Preble Amateur Radio Association, W. Manchester, Ohio; Radnor Middle School ARC, Wayne, Pennsylvania; Redwood Empire Radio Amateurs, Ukiah, California; Reservoir Amateur Radio Association, Coldwater, Ohio; Shawnee Radio Amateur Communications Team, Inc., Shawnee, Kansas; Simi Settlers Amateur Radio Club, Simi Valley, California; University of Texas Medical Branch-Emergency Communication Group, Galveston, Texas; Virgin Islands Amateur Radio Club, U.S. & British, Virgin Islands; Whitewater Hills ARC, Connersville, Indiana; Wild Rivers Amateur Radio Club, Hayward, Wisconsin. (With this action there are now 1877 Category I clubs, 8 Category II clubs, and 346 Category III clubs.)

On motion of Mr. Anderson, approval was granted for the holding of the following ARRL conventions: *1980* May 24-25, Tennessee Section, Knoxville; July 13, Indiana State, Indianapolis; September 27-28, Kentucky State, Louisville; November 1-2, South Florida Section, St. Petersburg. *1981* October 9-11, Southwestern Division, Scottsdale, Arizona. *1982* May 29-30, Delta Division, Knoxville, Tennessee.

After discussion, on motion of Mr. Stevens, and based on the recommendation of the Management & Finance Committee, the Committee VOTED that approved ARRL travel be imbursed at the rate of 22 cents per mile effective June 1, 1980.

On motion of Mr. Zak, the committee VOTED to increase the allocation of the Management & Finance Committee by an additional $2500 for the year 1980.

The Committee was in receipt of a letter from Fred M. McCarthy, W5UE, which commented on the League's proposals in connection with the rewrite of the Communications Act. After review and discussion, the Committe instructed the General Counsel to contact Mr. McCarthy and explain that it was their view that his premise concerning Article 17 of the International Radio Regulations was incorrect and that the Committee believed that the League's position concerning the secrecy provisions of Article 17 and Section 605 is correct and proper.

After discussion, on motion of Mr. Wicker, the General Counsel was instructed to contact Mr. Robert Entwhistle, N1XX, who had applied for financial assistance, and explain that Mr. Entwhistle has not yet exhausted half of his administrative remedies in the pursuit of a solution to his antenna zoning problem.

After discussion, on motion of Mr. Anderson, the Committee VOTED that the staff should file in support of docket 80-136 (on-the-air identification).

On motion of Mr. Anderson, the Committee VOTED to extend the date for receiving ballots in the North Florida SCM election by an additional seven days, in order to solve a zip-code problem that had resulted in a delay in the delivery of some ballots.

President Dannals reported that, in response to Minute 89 of the January meeting (with reference to restrictions at 160 meters) after contacts with both NTIA and FCC, the staff would be petitioning FCC for a reduction of the amateur operation restrictions at 1800-2000 kHz. The Executive Committee recommended that the Canadian Division Director take similar action with DOC.

After discussion, the Committee VOTED that the staff file in support of those recent petitions which would place the responsibility for repeater operation on the user.

After discussion, on motion of Mr. Stevens, the Committee VOTED that the League file in opposition to any extension of radio location operations in the 420-450 MHz band.

During the course of the meeting the Committee discussed, without formal action, the status of a manual to assist members in antenna problems, the possibility of changes in locale and date of future Board meetings, the National Convention program, the "visibility" of ARRL at National and Divisional conventions, the possibility of a standard critique form to be filed by directors and staff after attendance at each ARRL convention, the "national convention" cover for the July issue of *QST*, AMSAT organizational plans, recent organizational changes in Canada, several matters of antenna litigation involving amateurs, a possible *QST* article in September relating to our successes in some West Coast antenna litigation, the West Link (and others "broadcasts," and a July *QST* article on tracking down those stations causing deliberate or harmful interference.

The next meeting of the Executive Committee will be held at 3 P.M. on Tuesday, July 22, in Seattle, and the meeting following that will be held on September 17, at a place and time yet to be determined.

There being no further business, the meeting was adjourned at 1232 P.M.

Respectfully submitted,
Richard L. Baldwin, W1RU, Secretary

LIFE MEMBER APPLICANTS, May 18, 1980

Gary Lee Adams, WB4EBC; Paul E. Adams, Jr., WD8KOI; Thomas Aiello, WA2MHQ; Ray S. Allen, WB8UUX; Donald E. Anderson, W7HI; George C. Anderson, WA2WFK; Thomas J. Ankrom, WA9CEW; Wendy L. Aplin, WD4HDS; Thomas D. Annan, W9ITE; James S. Austin, WD4KCM; H. Christopher Ayers, WB7IXY; Landean H. Bailey, W1OO; Lynn D. Baker, K7LUH; Adolphus R. Barnes, WA2PDK; Dennis H. Barthel, W6HRH; Boyd C. Batchelor, WA4OOM; Roy E. Bearden, WD4IGB; Janice E. Beaupre, K4IJK; Alan R. Beckwith, WA1LJF; William W. Beers, WBØCHE; Robert H. Bell, N6YX; Robert M. Benjamin, WDØEZA; John William Bennington, WD8KBP; Robert A. Bergquist, N7AQF; James Bonner, WD5BRN; Gary F. Bossardet, KA3BJD; Allan L. Bowen, N4OO; Brian R. Bowman, WBØHBG; Edward J. Boysun, WB7QDL; Tim W. Bradshaw; Robert H. Brinkley, WD4HNH; Tommy R. Burks, WD4JHV; Thomas William Cage, K5GJ; Robert B. Camp, Jr., WB4VQF; Larry R. Card, W9CC; J. Robert Casian, K1AX; James M. Chatfield, WD4HJT; Thomas B. Christie, WB5CSR; William E. Close, WB6DNG; William E. Coleson, WA4QBC; David Reeves Comstock, WB5ODI; James S. Congdon, KA6CPJ; Roger M. Cooper, N3RC; Fernando R. Corbacho, WD4LGP; Chris C. Cottrell; Wayne Covington, WDØIEF; H. Allan Crowther, Jr., AI8I; Dan Cram, WD8KOS; George K. Cryder, W8IGI; Charles R. D'Amico, K1QBP; Sylvia L. Danewood, N8BAN; Louis DeFelippi, Jr., K1FEE; Thomas B. DeMeis, K2TD; Peter E. Dehman, WA1JSA; Franz A. Delahan, K3RML; John D. Dessel, WA6JML; Joseph Paul Determan, WB7TGZ; Nelson S. DiGennaro, WB8VUU; Robert E. Dixon, WA8HQI; Robert A. Donaldson; Robert B. Donaldson, WØGOR; Henry F. Dove, KB6VE; Gerald R. Druyor, KB8AI; Frances George du Pont, WA1SVY; Edward D. Dudley, WA4ISI; Michael M. Duggan, WA6UHQ; Daniel M. Duncan, WA6NZZ; Charles C. Early, Jr., K8RSH; Thomas H. Eisenhauer, WB3CQG; Roy A. Estep, W8RVR; Robert K. Evans, KA4DKH; Kevin M. Ewald, WB6KMV; David K. Fansel, Jr., WB3KUX; Del Fansey, WB6WLT; John R. Fellows, WB8OBV; Guy P. Felton, K7WLY; Jerald E. Felts, WA5TLU; Frank H. Finney, W9PXP; Frank E. Fisher, WA4UXO; Eddie W. Flanagan, WB4YRI; Timothy P. Fogarty, WD0ENG; John Bart Foster, K1BF; Alan J. Frame, WB3FTD; Stephen C. Fried, WA2QCV; Marcus Frisch, WA9IXP; John K. Fritze, Jr., KB2CR; D. O. Fysh, VE4JP; Curtis R. Gamble, K8IBQ; Luis Gonzalez, WD4DHE; Stephen D. Green, WB7WQZ; David Gyer, W5RUC; Harold R. Hall, W5MGP; Frances N. Ham, Jr.; Terry W. Harper, KA4Y; James M. Harter, N7ARS; James C. Hartmann, WB9WTQ; Carl L. Hartshorn, III, WA6AUY; David P. Hebert, WA7YKV; Henry Hedden, K4TJK; Charles M. Herring, WD4JJR; John G. Hetzler, WBØUVD; Jay Ward Hill, Jr., WA6EUH; Melvin E. Hixson, WA7VTJ; Glenn W. Hobbs, WB9LXV; Eugene M. Hoenig, WB3FTI; Eric Hoeppner, WB4YKQ; Lloyd B. Howe, WB4YTH; David F. Huberty, WA3FRK; D. H. Janney, WD5CNA; James G. Jeleski, WD5JCR; Victor C. Johnson, WDØBBF; Wayne G. Johnson, K9MII; Jay Jones, III, K1EQA; Peter Kanvenczyk, WB2EAS; Gary J. Keeney, KA2DJI; James W. Kessel, WØPWK; Fred J. Kienzle, K4ZS; James A. Kane, K9EHD; Douglas P. Kingston, III, N3AUC; Frank Knasinski, Jr., WD9IPZ; Herbert K. Kommritz, WB1EPO; Robert S. Kraft, WB4YKY; Charles L. Lancaster, WD6AIG; Roger Lange, WB3CPI; Quinten C. Laster, W4WHY; Leroy M. Lewis, Jr., WBB3BEC; Norman R. Leveille, KA1BTU; Gary A. Ethergren, WØSH; Bo G. Lindfors, N2APH; David K. Lipham, WA4DDC; Sidney Lipkowitz, VE4ZS; David N. Litteral, WB7PRF; Robert B. Loverman, FD4JBC; Wallace W. Lake, WA2NVG; Orville J. Magoon, K6DZN; Darwin G. Manwaring, WA7ZXL; Peter J. Malvasi, WB2BYQ; Joseph H. Marcy, K3DKD; Charles H. Margelli, K7JA; Alan M. Mashn, W2DZI; Ronald C. Marshall, WD4FVC; John J. Martinez, K6SVO; Dennis D. McDonald, WDØCEV; Howard D. McVay, WA6LIL; Jerold L. Mertz, WØGXO; Tom Metty, AI8X; Jeffrey R. Meyer, AA9E; Robert N. Meyer, KBØGT; Gary L. Meyers, WB6TYF; Gordon J. Milldrum, Jr., WB6JAD; Leonard L. Miller, K7MHM; Robert D. Miller, WA6MLY; Thomas L. Miller, K8PNW; Wardel T. Mitchell, W8RJ; Robert F. Mocana, WA6PLY; Carlos E. Montoya, HC1AHR/W2; Mark E. Montrose, K6WJ; William C. Moore, K7IOO; William L. Morris, VE3IM; William S. Morse, WA4OBY; Granville Murphy, W5OVD; James H. Murren, WA6QOZ; Roy B. Neely, WB6IVD; Jim Nelson, WB7VHY; Robert D. Nielsen, W6SWE; Dennis E. Noonan, WB9RIN; Philip C. Nonser, WBØLRO; Robert L. Nunnerick, WB8ZPN; Sean T. O'Callaghan, K8BVY; Michael J. O'Rourke, AA8W; Stan Obuchski, Jr., WB2ETY; Kenneth D. Oelke, VE6AFO; Bruce W. Olin, WB4FBB; Myron R. Olmer, WØGIO; Joe D. Olson, K6ECZ/W5QXR; Ronald E. Osmio, K1CRR; Richard J. Osman, WBØHUQ; Boyd L. Parsons, WØVW; Ricky Joe Parsons, WA4BLB; Charles D. Patterson, W6SUJ; Patrick D. Pellor, WD4JSW; D. Jean Peacor, K1LIV; Dennis Robert Pekrul, VE7CXN; M. Louis Pengue, WA4VSN; Susan A. Peters, KA9GNR; D. Howard Phillips, WØFOO; Dionisio B. Pils, Jr., K9MD; Garth E. Pillsbury, WD6BYM; Terry A. Platt, WD5ADI; Daniel C. Pond, NØTK; Ruben D. Porter, K9RI; James E. Price, Jr., AA3O; Gary N. Quinn, WB3BXU; William Radder, AI7P; Dan Ransom K7MM; George M. Reazer, III, W8MDG; Ward S. Rehkopf, K8ID; Ernest C. Reich, III, WSHQA; Jerry L. Remhof, WØCI; William J. Roberts, Jr., AA4NC; Howard W. Robin, WB2IZS; Robert L. Roesner, WB7WOW; R. Rutledge, WØYZ; Alexis V. Rutter, KA5CYH; David T. Rypma, VE4HTC; Joseph E. Ryus; Edward S. Savela, K8EA; Robert D. Scales, WB5CDL; Paul C. Schaich, KØII; Rod Schreiner, WSGZT; Robert F. Schrueder; Kenneth M. Sciuca, N9KS; Lonnie Sedwick, WB4RZN; Guy E. Shermell, WA8ZSO; John Shupe, K7DJO; Albert T. Skornicka, K8WXQ; Richard L. Smith WA5DXI; Steve A. Smith, KC5I; Robert A. Spoor, WB2PGU; Greg Spychn, WA6MBW; H. Michael Squires, WA4ZNY; Jack A. Stinson, Jr., WB4AQU; James R. Stuebe, KA4NSJ; Oliver Sweningsen, W6NV; Elmer B. Taber, KA7CCT; Hollis E. Thigpen, KA3CGM; Erik J. Thoresen, K1OGF; Greg Toivonen, WB7RCN; John S. Trowbridge, WA2RRO; Willard L. Tucker, WB8VYF; William E. Uell, WD4BNQ; David W. Utter, K2VXO; Andrew J. Wall, WDØCNX; Ted J. Wallace, N6AAY; Thomas C. Warren, KA8IUE; Charles R. Watts, WA6GVC; Clifton R. Welch, WB8ZMG; James C. Weiner, K9LAC; Kendall R. Wheeler, KC2O; Douglas C. Wilkins, WD4KWK; John W. Williams, WA8WDU; George F. Willis, WB6OKR; Terry T. Witkus, WB9GPI; Ronald Wong, WB6DIQ; Keith Woods, WB3ITR; James Roy Woolen, K4UH; Albert Wu, N8AK; John W. Wustenberg, KE5N; Bradley W. Wyatt, Jr., K6WR; Carl J. Zeamer, WB7SZZ; Philip A. Zimmermann, WA2JTH.

Coming Conventions

July 5-6
West Virginia State, Jackson's Mill

July 13
Indiana State, Indianapolis

July 25-27,
Oklahoma State, Oklahoma City

August 1-3,
Florida State, Jacksonville

August 2-3
Louisiana State, Shreveport

August 30-September 1
Pacific Division, San Jose, CA

August 31
Illinois State, Rockford

September 5-7
Southwestern Division, Los Angeles, CA

September 26-28,
Dakota Division, Fargo-Moorhead, ND

September 27-28
Kentucky State, Louisville

October 3-5
New England Division, Boxborough, MA

October 3-5
Virginia State, Virginia Beach

October 10-12
Midwest Division, Lincoln, NE

November 1-2
South Florida Section, St. Petersburg

November 7-9
Hudson Division, South Fallsburg, NY

ARRL NATIONAL CONVENTIONS

July 25-27, 1980
Seattle, Washington

March 13-15, 1981
Orlando, Florida

July 23-25, 1982
Cedar Rapids, Iowa

INDIANA STATE CONVENTION

July 13, 1980, Indianapolis

The Indianapolis Amateur Radio Association will sponsor the 1980 Indiana ARRL State Convention (9th Annual Indianapolis Hamfest) on July 13 at the Marion County Fair Grounds. There will be a complete program of forums: ARRL with Central Division Director Don Miller, W9NTP; Emergency Communications conducted by state emergency coordinator Bruce Woodward, W9UMH; ARRL-WARC '79 narrated by former ARRL vice president and member of IARU WARC '79 team Vic Clark, W4KFC; ATV Projects, and Microwave and Earth Satellite Receivers. Over 25 commercial exhibitors are on display again this year, plus 50,000 square feet of area under roof for your flea market enjoyment. Flea market and commercial set up may begin after 2 P.M. on Saturday. Gates open Sunday at 6 A.M. The hamfest is proud to sponsor (now in our fifth year) and challenge other hamfests to promote a "Homebrew Contest." For information, contact IARA-Indy Hamfest, P. O. Box 11086, Indianapolis, IN 46201, tel. 317-894-8522.

OKLAHOMA STATE CONVENTION

July 25-27, 1980, Oklahoma City

The ARRL Oklahoma Convention and famed "Ham Holiday" will be held July 25 through 27 at Lincoln Plaza, 4445 Lincoln Blvd., Oklahoma City, OK. Sponsored by the Central Oklahoma Radio Amateurs (CORA), its program will include an ARRL forum and technical talks presented by highly qualified speakers. In addition, a full program is scheduled for the ladies.

Adequate rooms are available for commercial exhibitors. Over 10,000 square feet of floor space — all under cover, convenient to loading and unloading, and with unlimited table space — is available at no cost to flea market swappers. (No commercial exhibits in the flea market area.)

The Lincoln Plaza is near the Oklahoma Cowboy Hall of Fame, the State Capitol, the Oklahoma City Zoo and many other attractions. The hotel has a disco, a private club and full recreational facilities for all the family. So, bring your family for a real "Ham Holiday"! There is unlimited parking space.

Preregistration, $5 if received before July 19; after that date, $6. A special award is being given to encourage preregistration. There will also be many other awards, a long-standing tradition of the "Ham Holiday." Mail your registration to CORA, P. O. Box 15013, Oklahoma City, OK 73155.

FLORIDA STATE CONVENTION

August 2-3, 1980, Jacksonville

The Jacksonville Hamfest Association is pleased to present the 1980 Jacksonville Hamfest and ARRL Florida State Convention on August 2 and 3 at a new spacious location, the Orange Park Kennel Club. Located at the intersection of I-295 and U.S. Highway 17, the new facility offers unlimited free parking, a large indoor area and plenty of meeting space.

Many interesting programs and forums are scheduled, and a large variety of manufacturer and dealer exhibits will be presented. Nets and organizations from Florida will be holding meetings. A special DXer's forum and banquet will be sponsored by the North Florida DX Association. It will feature presentations by Stu Woodward, K4SMX, and Bill Barr, N4NX. Reservations for the banquet can be obtained for $11.50 each from N4KF, 258 Wesley Rd., Green Cove Spring, FL 32043.

Headquarters hotel is the Best Western located just across the street from the hamfest. Special rates of $23 single and $28 double are available. Reservations should be made through the local number, 904-264-1211, to get the low rates.

Advance hamfest registrations can be made at $3 per person by writing Jacksonville Hamfest, 1249 Cape Charles Ave., Atlantic Beach, FL 32233. Swap tables are available for $5 per day per table. These can be ordered from Andy Burton, WA4TUB, 5101 Younis Rd., Jacksonville, FL 32218.

For more general information write JHA, 911 Rio St. Johns Dr., Jacksonville, FL 32211.

LOUISIANA STATE CONVENTION

August 2-3, 1980, Shreveport

The Shreveport Amateur Radio Association will host the Louisiana State Convention in the Shreveport Convention Center. This downtown facility is spacious, air-conditioned, just across the street from the Barnwell Art and Garden Center and right on the Red River.

This year we will have the flea market and ladies activities on both days. We will have more displays, more prizes and more fun than ever — and best of all, the admission is "free." From ARRL headquarters we will have Steve Place, WB1EYI, manager, Club & Training Department, to present an in-depth forum on the Phase III and other OSCAR satellites.

Banquet tickets and hotel reservations are available in advance by mail. For more information, contact John B. Veillon, WD5BEB, Box 7033, Shreveport, LA 71107.

Hamfest Calendar

Alabama: The annual Clanton ARC, Inc., swapfest will be held on July 20 at the Alabama National Guard Armory, Airport Rd., Clanton. Gates open 8 A.M. until 4 P.M. No charge for admission. Tables for swappers will be available. Tables for picnic lunches (bring your own main meal). Drinks and snacks at the snack bar. Prizes. Talk-in on 146.19/79, 52, 146.28/88. For more info write Clanton ARC, P. O. Box 29, Clanton, AL 35045.

Arkansas: The 1980 Army MARS convention will be held in Blytheville on July 19-20 at the National Guard Armory, Highway 61 south. Registration is $7.50 and includes a catfish supper and pancake breakfast. Talk-in on 148.01 and 07/67. For more info contact Richard Duncan, WB5CNV/AAR6SH, 209 Wilson St., Dell, AR 72426.

Colorado: The Rocky Mountain Radio League will hold its annual Field Day Demonstration and Swap Fest on July 20, at Karl Ramstetter's Ranch, located on top of Guy Hill in Golden, Highway 93. Doors open at 10 A.M. Prizes, refreshments, pot luck lunch. Bring your own chairs, blankets and trading items. For more info write: Charles Kaufman, WA0GUN, 3734 South Poplar St., Denver, CO 80237.

Illinois: The Annual Big Thunder ARC Hamfest will be held at the Boone County Fairgrounds on July 20. Large indoor facility and plenty of outdoor space available. Camping available; park in lot before 6 P.M. Talk-in on 146.52 and 147.375/147.975. Send s.a.s.e. to Mike George, 6159 Broadview, Belvidere, IL 61008.

Illinois: The 23rd annual Breakfast Club Hamfest and Picnic will be held July 19-20 at Terry Park, Palmyra. Tickets on the grounds are $2. Flea market, movies, games, food, music, prizes. Camping on the grounds for self-contained units. Activities start noon on Saturday and close about 4 P.M. Sunday. Talk-in on 3973 kHz. Info available from Quad-Co Radio Club members WA9ARY, K9UCC or W9KIC.

***Indiana:** The Cass County ARC 3rd annual hamfest will be held on July 20 from 7 A.M. to 4 P.M. at the 4-H Fairgrounds. North from Logansport on Highway 25, right at Road 100, follow QSY signs. Advanced tickets $1.50, $2 at the gate. Outside set-up free, under cover $1. Bring your own tables. Free overnight camping, refreshments and prizes. Talk-in on 146.52 and Logansport repeater, 147.78/18. For more info write: Roy E. Mannikko, WB9PKN, 530 North Cicott St., Logansport, IN 46947.

Indiana: The Steuben County Radio Amateurs present the 22nd annual F. M. Picnic and Hamfest on August 3, at Crooked Lake, Angola. Prizes, picnic-style barbecued chicken, inside tables for vendors and exhibitors. Overnight camping (fee charged by County Park). Talk-in on 146.52 and 147.81/21. Admission $2.

Indiana: The Indianapolis Amateur Radio Convention and Hamfest will be held on July 13 at the Marion County Fairgrounds, Indianapolis. Further info from Indianapolis Amateur Radio Assn., Box 11086, Indianapolis, IN 46201.

***Kansas:** The Pittsburg Repeater Club Organization will hold its hamfest on July 13 at Lincoln Park, Pittsburg. For more information, call Jack R. Dock,

WDØCFH, Box 143, Pittsburg, KS 66762, Tel. 316-231-8137.

Maryland: The Baltimore Radio Amateur Television Society will hold the annual Maryland Hamfest on July 27 at the Howard County Fairgrounds, just off I-70 and Route 144, in West Friendship. Activities will be held rain or shine, beginning at 8 A.M. Talk-in on 63/03, 16/76 and 52. For more info or table reservations, write BRATS, Box 5915, Baltimore, MD 21208.

***Michigan:** The Delta County ARS (DCARS) will sponsor the 32nd annual Upper Peninsula Hamfest on August 2-3, at Bay de Noc Community College, Escanaba. Registration will be $2. DX Forum, ARES and traffic-handling seminars, satellite-TV seminar, slow-scan, Teletype and facsimile demonstrations and a Swap and Shop will be included in this super two-day hamfest. There will also be prizes, a hidden 2-meter transceiver hunt and a model aircraft demo. For more info contact Aileen Gagnon, WA8DHB, Kipling Loc., Mtd. Rte., Gladstone, MI 49837.

***Michigan:** The Shiawassee ARA, Inc., will hold its hamfest on July 20 at the Women's 4-H Exhibition Bldg., McCurdy Park. For more info contact Joseph F. Pontek, Sr., K8IP, 603 S. Main St., Ovid, MI 48866, or Tel. 517-834-2422 or 517-834-5041 (home).

Minnesota: The Iron Range Hamfest sponsored jointly by Northern Lakes ARC, Mid-Range ARC, Mesabi Wireless Association, Wilderness Ham-Radio Operations and Vermilion ARC will be held July 13 from 9:00 A.M. to 5:00 P.M. at the St. Louis County Fairgrounds, Hibbing. Talk-in on 10/79. Free tables for flea market, lunch available at hamfest. Hotels and motels nearby. Prizes. Camper hookups with water and electricity for $3.50 per night.

Minnesota: The Detroit Lakes ARC will hold its 4th Annual picnic and swapfest July 20 from 10 A.M. to 4 P.M. at Long Lake Park, 1-1/2 miles west of Detroit Lakes on Highway 10. Picnic and swap tables available. Talk-in 146.22/82 and 146.52. Contact Russ Berger, NØARZ, 1406 Long Ave., Detroit Lakes, MN 56501.

Missouri: The Indian Foothills ARC will hold its 5th annual hamfest on July 20 at the Saline County Fairgrounds, Marshall. Camping available (no connections for utilities). Flea market (no charge for tables, but reservations requested). Displays of old and new equipment, 10-X booth, prizes. Tickets are $2 each, 3 for $5 at door or 4 for $5 in advance. For more info and tickets write John Roe, WDØFZF, Route 1, Miami, MO 65344, Tel. 816-852-3244 after 6 P.M., or 816-886-2837. Talk-in on 52, 28/88 and 84/24.

***Missouri:** The 2nd annual North Central Missouri Hamfest, sponsored by the Tri-County ARC, NEMO ARC, and Macon County ARC will be held on August 2 from 9 A.M. to 5 P.M. at the Macon Fairgrounds Park, Highway 63 south, in Macon. Free parking, enclosed area for commercial displays, food available on grounds, YL activities, tailgaters welcome. Tickets available at the door. Talk-in on 52, 69/09 and 07/67. For info contact Charles Coy, WBØENV, 601 McKinley, Moberly, MO 65270.

***Missouri:** The Zero-Beaters ARC will sponsor the Washington Hamfest at the Washington Fairgrounds on July 20. Prizes, good buys and games for family members. Commercial dealer exhibit and a large traders row. Talk-in on 52. Refreshments available. For more info on tickets, prizes or camping write ZBARC, Box 24, Durzow, MO 63342.

***Montana:** The Yellowstone National Convention/Hamfest will be held on August 1-3 at the Convention Center in West Yellowstone. It is sponsored by WIMU (the Wyoming, Idaho, Montana, Utah Amateur Radio Council). Activities include forums, contests, crafts, movies, swap tables, dealers, banquets. Motel, hotel accommodations adjoining the convention center are available, with recreational vehicle parks and campgrounds close by. For more info contact WIMU, P. O. Box 20116, Salt Lake City, UT 84120.

***New Jersey:** The West Jersey Radio Amateurs, Inc., hamfest will be held on July 20 at McGuire AFB, Wrightstown, from 9 A.M. to 4 P.M. Admission $2.50; spouses and children admitted free. Tailgate or table space $2.50 per space; please bring your own table. Refreshments and activities available. Prizes, talk-in on 52 and 146.925. Advance tickets available from club members or s.a.s.e. to Mary Lou Shontz, WB2QIU, 107 Spruce Ln., Rte. 16, Mount Holly, NJ 08060. Additional info from Mark Millman, N2ME, 609-871-6691.

New York: The Mount Beacon ARC will hold its hamfest on July 26 at the Dutchess County Fairgrounds, Rhinebeck, from 6 A.M. to 5 P.M. Admission $2 per person; tailgating $3 (one admission); table $4 (one admission). Catered food, free parking. Talk-in on 146.37/97, 147.645/045 and 52. Prizes. Forums on microcomputers and satellites. Indoor and outdoor flea/market. Auction. For info and reservations contact Pat Parker, WA2OYC, Rte. 2, Elbern Dr., Poughkeepsie, NY 12603, Tel. 914-462-7048.

North Carolina: The Cary ARC will hold its 8th annual Mid-Summer Swapfest on July 19 at the Cary Lions Club Shelter (next to the Cary Senior H.S.). Registration is $3. Tables rented or bring your own tables, chairs, etc. Talk-in on 28/88 and 52. Dealers welcome. Prizes, auction, lunch, buy, sell or trade, rain or shine. Info from CARC, Box 53, Cary, NC 27511.

North Dakota: The International Peace Garden Hamfest will be held on July 12 and 13. The hamfest is located on the North Dakota/Manitoba border. Flea market and various activities for hams and their families are planned. Prizes. Free breakfast for those registered on Sunday. Committee chairmen are VE4LB and WAØLPV.

***Ohio:** The Northern Ohio ARS will hold the 3rd annual Noarsfest 80 on July 26 in Wellington, at the Lorain County Fairgrounds. Flea Market set up 6-8 A.M. Gates open 8 A.M. to 5 P.M.; children under 12 admitted free. Advance tickets $2.50, $3 at the door. Huge blacktop flea market area, parking for flea market — $1 per car space. Prizes. Table space — dealers indoor exhibit space, eight-foot tables, $5 each. For advance registration, tickets and info write: NOARSFEST, P. O. Box 354, Lorain, OH 44052. For dealer space contact W8ANM.

***Ohio:** The Tusco ARC, Inc., and Canton ARC, Inc., will hold their hamfest on July 20 at Nimishillen Grange, Canton. Tickets are $2.50 in advance and $3 at the gate. For more info contact Max Lebold, WA8SHP, 10877 Hazelview, Alliance, OH, 44601 or Tel. 216-821-8794.

Oregon: The Lane County Hamfair will be held July 19-20 at the National Guard Armory, 2515 Centennial Blvd., Eugene. Registration $3.50. Displays, lectures, swapship, transmitter hunt and entertainment. Snack bar, plenty of free parking for motorhomes and trailers. Phone or write Sidney A. Strong, KA7C, 1560 Scandia St., Eugene, OR 97402, Tel. 503-688-7448.

Pennsylvania: The Two Rivers ARC, Inc., will hold their 16th annual Hamfest on July 20 at Penn State University, McKeesport. Flea market outside on hard surface. Vendors $5 per car space. Prizes, food and drink available. Admission free. Talk-in on 146.22/82 MHz. For additional info, Tel. 412-464-0550.

Pennsylvania: The 43rd annual South Hills Brass Pounders and Modulators hamfest will be held on August 3 on South Campus of Allegheny Community College, located just off Route 885 in West Mifflin Boro, south of Pittsburgh. Large indoor air conditioned facilities as well as plenty of outdoor flea market area. Dealers, flea market, forums, demonstrations. Refreshments available, prizes. Talk-in on 13/73 and 52. Doors open 11 A.M. For more info contact Doug Wilson, WA3ZNP, 185 Orchard Ave., Emsworth, PA 15202.

Pennsylvania: The Broadcasters' Amateur Radio Club will conduct its 3rd annual hamfest on July 13 from 9 A.M. to 4 P.M. at the Pocono Downs Race Track, Rte. 315, 1-1/2 miles north of Wilkes-Barre. Unlimited outdoor and indoor space, refreshments, prizes, free fm clinic and ac power available. Admission $2.50, spouses and children admitted free; no additional charge for sellers. Gates open at 8 A.M. for set up. Talk-in on 66/06 and 52. For more info contact Charles Baltimore, WA3NUT, Tel. 717-823-3101 or BARC 62 S. Franklin St., Wilkes-Barre, PA 18773.

Pennsylvania: The 3rd Annual BVARA Hamfest will be held July 20 at the Community College of Beaver County. Indoor space for vendors, plenty of free parking and paved outdoor flea market. Registration $2, or three for $5. Great prizes. Food and refreshments available. Talk-in on 25/85, 223.26/86 and 52. For more info contact Adam Horniak, WB3IZN, 182 Edgewood St., Aliquippa, PA. Tel. 412-378-9667 or Gary Mohrbacher, WB3FKE, 3417 — 47th St., New Brighton, PA, Tel. 412-843-9546.

Pennsylvania: The Delaware-Lehigh ARC and the Lehigh Valley ARC will hold their hamfest on Sunday, July 20 at Franko's Egg Farm, Bethlehem. Activities at this hamfest-computerfest-electronicsfest will run from 8 A.M. until 3 P.M. Talk-in on 34/94 and 52. For further info contact Diana Smith, KA3FCE, 603 Third Ave., Bethlehem, PA 18018.

South Carolina: The Charleston ARS will sponsor the Charleston Hamfest on July 12-13 at Omar Shrine Temple, Charleston. Completely airconditioned, overnight security guards. Snack bar. General admission $3.50. Children 12 and under free. Commercial booths $35, includes two admission tickets. Hospitality room (Omar Shrine Temple). Ladies activities. Talk-in on 34/94, 16/76 and 19/79 for general use. For more info contact Charleston Hamfest Committee, P. O. Box 30643, Charleston, SC 29407, Tel. 803-747-2324 or 803-563-2523.

South Dakota: The 1980 annual South Dakota Black Hills ARC hamfest and picnic will be held at the Surbeck Center, South Dakota School of Mines Campus, Rapid City, on July 27. Prizes, forums, tours, exhibits, auto hunt, flea market, contests, prizes and YL activities. Flea market tables are free. Registration will be $6.50 before July 1, $7 after July 1 and at the door. Talk-in on 34/94, contact WØBLK. Sunday noon meal will be catered — tickets available at the door. Assistance will be provided in obtaining lodging or trailer parking facilities. To preregister or obtain further info, contact Black Hills ARC, P. O. Box 1014, Rapid City, SD 57709.

***Tennessee:** The Oak Ridge ARC will hold the second annual Oak Ridge Hamfest on July 19-20 in the Oak Ridge Civic Center (Highway 95). Times will be Saturday 9 to 5 and Sunday 9 to 4. Admission is $2 advance and $3 at the door. Activities include FCC exams, forums including Tennessee Council of ARC meeting. Outside flea market, commercial vendors inside. Talk-in on 88 and 52, 72/12 and 3.980 MHz. For more info and reservations contact Bill Williams, KB2DI, Rte. 2 — Box 359, Powell, TN 37849.

Tennessee: The Radio Amateur Transmitting Society (RATS) will hold the Nashville Hamfest on July 27 at the National Guard Armory, Sidco Drive, Nashville. Doors open at 8 A.M. Admission $1, tables $3. Refreshments available. Talk-in on 90/40. For more info contact RATS, P. O. Box 2892, Nashville, TN 37219.

Texas: The 15th annual Northwest Texas Emergency Net picnic and swapfest will be held on August 3, at 8 A.M. at the city park in Levelland. Co-sponsored by the Hockley County ARC and Northwest Texas Emergency Net. Talk-in on 28/88. This event is for the entire family. Bring your own picnic basket. Lunch begins at 12:30. Swapping all day with tables provided. A $3 registration is requested. For more info contact John R. Bell, W5NGX, 208 Pat St., Levelland, TX 79336.

Texas: The Bridge City ARC will hold the TEX-LA Hamfest and Texas VHF-FM Society Convention on August 2 and 3 from 8 A.M. to 10 P.M. on Saturday and 8 to 12 on Sunday. Hospitality room open Friday evening. Hamfest location is The Red Carpet Inn, Beaumont. Admission is $5 for hams and $1 for non-hams. Activities include seminars, flea market, prizes, ladies activities, commercial displays, QCWA breakfast. Full motel services available. Talk-in on 16/76 and 3925. For additional info contact Carl Sheffield, WD5CVX, P. O. Box 9278, Beaumont, TX 77701.

***Virginia:** The Shenandoah Valley ARC will hold its SVARC hamfest on August 3rd at the Clarke County Fairgrounds, Berryville, from 6 to 5. Admission is $3. Activities include free bingo, banquet, displays of new equipment, tailgating. Food and drinks on grounds. Talk-in on 22/82 and 52. For more info and reservations contact Joanne Aaron, WB2CMV/4, Mount Falls Rte., Box 119AZ, Winchester, VA 22601, Tel. 703-877-1425.

Wisconsin: The Kettle Moraine Radio Amateur Club (KMRA) will hold its annual hamfest on July 19 beginning at 7 A.M. at Badger Raceway — west of Dousman on U.S. 18 and 3-1/2 miles from the intersection of I-94 and State Highway 67. Refreshment tent will feature a happy hour. Friday overnight camping available on the grounds. Talk-in on 146.52, 52.525 and 28.650 MHz. Tickets $1.50 advance and $2 at the door. For further info contact KMRA Hamfest, 108 Shepard Ct., Mukwonago, WI 53149.

Wisconsin: The South Milwaukee ARC will hold its annual Swapfest 80 on July 12 at American Legion Post 434, 9327 S. Shepard Ave., Oak Creek. Activities begin at 7 A.M. and will run until about 5. Parking, picnic area, hot and cold sandwiches as well as liquid refreshments will be available on the grounds. Overnight camping is available. Admission is $2 and includes a happy hour with free beverages. Prizes. Talk-in on 146.94. Directions to the grounds or a flyer are available by writing to SMARC, P. O. Box 102, South Milwaukee, WI 53172. [QST]

Strays

QST congratulates . . .

Lt. Joe Oliveira, WB6BJM, who was recognized by a Resolution from the City of Los Angeles for his volunteer efforts and outstanding citizenship. Joe was the spark plug in organizational efforts and provided the use of his repeater during the recent rains and mudslides in California (see June *QST*, page 11).

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

CRRL Officers and Directors

President: A. Mitch Powell, VE3OT
Honorary Vice President: Noel B. Eaton, VE3CJ
Secretary: Frederick H. Towner, VE6XX
Directors: Thomas B. J. Atkins, VE3CDM
Albert J. Daemen, VE2IJ
A. George Spencer, VE6XN

"If I Join CRRL, Do I Get *QST*?"

A smiling face saunters over to us at a hamfest. "Hi, guys! Tell me. If I join CRRL, do I get *QST*?" The answer, of course, is *yes*. You see, CRRL and the Canadian Division of the League are one and the same.

Let's try to clear up some of the confusion. In a "normal" ARRL Division, the membership elect only two officials, a director and a vice director. These officials handle routine League business, visit clubs and hamfests, take the pulse of the membership and represent that membership on the ARRL Board, which in turn makes decisions concerning recommendations to the FCC, *QST* journal, the operation of departments at League headquarters, etc.

In the past, the ARRL Canadian Division Director and Vice Director did this, too, but they also did more. They had to represent Canadian League members to the Canadian government, and its licensing authority, the Department of Communications. They also represented Canadian amateurs at meetings of the IARU. Duties normal to these two officials had to be carried on in a division 3000 miles wide. It was a lot of work.

Things are easier now. To ensure greater contact and representation for amateurs across Canada, there is the new CRRL Board. Right now, two of its members, Secretary Towner and Vice President Powell, have been elected by you. The three members who are regional directors, Atkins, Daemen and Spencer, are holdovers from an earlier organizational structure, but in autumn 1981, their offices become elective as well.

These five elected members of the board choose the CRRL president. He will normally be someone with considerable experience in amateur affairs, some free time, and an understanding wife. President Hesler met all requirements, but recently resigned. For the present, Vice President Powell is adding the president's duties to his own.

The CRRL Board makes decisions based on your input. What happens to these decisions? Some are implemented by various appointed officials. Concerns about the operation of the League as a whole are taken to Newington by the vice president, who sits on the ARRL Board as Canadian director. Concerns involving contact with the Canadian government and its Department of Communications, or the IARU, are handled by the president.

In a sense, we're having our cake and eating it too. CRRL has all the advantages of a "strictly Canadian" amateur organization, and all the advantages of being part of ARRL. And it is a *democratic* organization. If you don't like what's happening, you can elect a new board within two years.

People sometimes ask: "The people in Newington collect our dues and then meter out the budget. Isn't this a form of control? Don't the Americans try to control our amateur affairs?" The answer is *no*. The CRRL budget is more than adequate for all normal expenses and if special circumstances arise, more money can be made available. We find that the people in Newington are very sensitive about the possibility that they might be interfering in Canadian amateur affairs. Recently there was a meeting of the CRRL Board to straighten out some organizational difficulties. ARRL President Dannals had a legitimate interest in the outcome of this meeting. Under CRRL bylaws, he had every right to attend as an observer and share his expertise. He stayed home. Canadian affairs are Canadian affairs.

Other people ask, "Why the new name?" Actually, the name Canadian Radio Relay League is over 50 years old. It first appeared in *QST* in the 1920s. Adoption of this name for our ARRL Canadian Division reflects the pride we have in the new organizational structure which will give Canadian amateurs the fine representation they deserve. It also reflects the pride we have in our independence within the League, an independence which, of course, has been a fact for years.

Another smiling face stops us, this time at a club meeting. "I want to continue to be a member of ARRL, but I'm not so sure about this CRRL." We want to be helpful, but there's just no choice to offer. The League is the League — and CRRL and the Canadian Division of the League are one and the same.

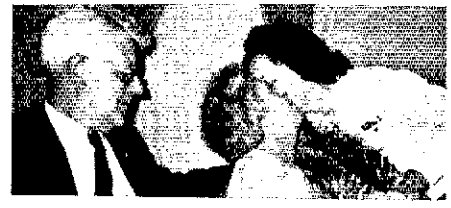
PRESIDENT HESLER RESIGNS

At a meeting in Toronto, Ontario, on Friday, May 9, the CRRL Board accepted with regret the resignation of Ron Hesler, VE1SH, as CRRL president. Mitch Powell, VE3OT, who is currently CRRL vice president and ARRL Canadian director, was chosen to become the new CRRL president.

In accepting the resignation, board members expressed the hope that Ron's advice and counsel would continue to be available to them. Ron has a long and impressive record of service to Canadian Amateur Radio. He was ARRL Canadian Division vice director and, later, director, from 1975 to 1980. He was a founding member of CRRL, the driving force behind its incorporation and its first president.

NOEL EATON APPRECIATION NIGHT

On Saturday, May 10, over 100 radio amateurs, their spouses and other friends gathered at the Mark Twain Showboat in Port Credit, Ontario, to honor Noel Eaton, VE3CJ. Noel's accomplishments are well known. Throughout his long and distinguished career, he has made outstanding and permanent contributions to the betterment of Amateur Radio everywhere. Prior to the globetrotting for IARU and the preparatory work for WARC '79, Noel was an ARRL Canadian director. He was a founding member and the first president of the Ontario Amateur Radio Federation, which later merged with the Ontario Radio Operator's Association to become the Radio Society of Ontario. In 1971 he was named that society's Amateur of the Year. Noel is currently IARU president, ARRL vice president for International Affairs and CRRL honorary vice president.



Julie Eaton, wife of Noel Eaton, VE3CJ, receives a bouquet of roses from Noreen Nimmons, VE3GOL, at Noel Eaton Appreciation Night, held recently in Port Credit, Ontario. *(VE3AND photo)*

Ted Harmer, VE3LI, was master of ceremonies for Noel's evening. Among those on hand to pay tribute to Noel were Harry Dannals, W2HD; John Huntoon, W1RW; Robert Booth, W3PS; Mitch Powell, VE3OT; Bob Benson, VE2VW; Colin Dumbrille, VP9BK; Tom Carpenter, GW3GDZ, and representatives from CARF, RSO, QCWA, CANAD-X, CLARA and the Ontario Trilliums.

Tom Atkins, VE3CDM, read messages of congratulations received from many parts of the world. Ross Purse, managing director of CNIB, made a special presentation on behalf of blind radio amateurs. Art Meen, VE3RX, ARRL Canadian counsel during Noel's term as ARRL Canadian director, thoroughly "roasted" Noel, as he related amusing episodes from Noel's career. At the end of the evening, Noel's assembled friends presented him with a gift, in appreciation of his untiring efforts on behalf of the Amateur Radio fraternity.

*163 Meridene Crescent West, London, ON N5X 1G3

In Training

KEYING ON ASCII

Have you read anything about ASCII (pronounced as-kee) recently? The FCC has decided to allow the use of the common computer language, ASCII, on specific U.S. frequency allocations (see "FM/RPT," page 70, April *QST*). The stage is set for some potentially rapid and innovative trends in the future. Every instructor worth his salt should try a little tuning in of the world of the computer hobbyist, as he will likely be among your next class of students.

Surely you've noticed the growing number of personal computer advertisements, magazines and individuals participating in the hobby. As the hobby grows, so does its population. Computer clubs are cropping up everywhere with their customary swapping of software and operational hints and kinks about hardware. Hamfests are now often linked with computerfests to assure maximal attendance and better dealer representation.

Hams, especially we instructors, have always had the uncontrollable urge to involve other people in our maddening hobby. A perfect marriage could be in the offing between Amateur Radio and the hobby computer field.

While not everyone in this comparatively new hobby possesses all the following traits, judge for yourself if the potential for new amateurs is present. First, these people are no strangers to math and science. Familiarity with these areas has never been a hindrance to becoming licensed. Second, logical thinking, ingenuity and perseverance are needed to create a computer program or debug it. Experimentation is a third characteristic both hobbies have in common. A fourth point might be the seriousness and extensiveness of such an individual's financial investment in his hobby. An additional monetary outlay for a complementary Amateur Radio station is usually realistic.

Consider further a major gripe of the computer hobbyist. He is sincerely searching for a more instantaneous form of communication to convey his needs, problems and knowledge. Now, new FCC regulations make possible a huge flexible pipeline for data exchange he has been looking for. Computer input/output no longer has to wait for the monthly club meeting, publication in a slow-moving newsletter or journal, or inefficient multiple landline networks.

As a result, we have a new population of potential amateurs on our doorstep. Though I wouldn't expect an increase in the radio amateur population equivalent to the CB boom of recent times, it could be substantial. Just how extensive this influx will be depends upon you — the Amateur Radio instructor.

Let's be clear about one point. Owning a home computer or having expertise in the field of computer science is *not* a requirement for teaching Amateur Radio to computer hobbyists. But as an instructor, your casual acquaintance with computers will allow you to understand and communicate more freely with these students. Knowing students' needs and interests is always of value when teaching.

The best way to prepare for this coming trend is, first of all, to get acquainted with hobby computers. At present, a common use for computers and associated hardware in Amateur Radio is RTTY. Visiting such an RTTY setup might be a quick and easy way to get your feet wet. Don't pass up an opportunity to cross paths with a non-amateur's computer installation. Such a demo might result in more insight, free thinking and feedback about computer and Amateur Radio applications. While observing, pick up some vocabulary, learn a few rudiments of operation and ask some questions. Names like Apple, A-Tronix, DGM, HAL, Microlog and Microtronics should begin to have more meaning to you.

No computer-oriented friends? Local computer hobbyist stores, including such national chains as Radio Shack, are more than happy to give demonstrations. The sheer numbers of the latter outlet ensure an informational source within most everyone's proximity. Meeting dates for nearby computer clubs and announcements of future computerfests are to be found at most any computer store. Don't forget to check the book racks for introductory texts besides the usual free sales literature.

By all means, don't neglect the computer hobbyist when organizing your next classes. With the new FCC regulations permitting generous use of ASCII for those having Technician or higher class privileges, increased interest in the Technician class license appears likely. Besides Novice inquiries, the number of requests for Technician/General class instruction may soon show a noticeable spurt.

Use your information on local computer clubs to establish some lines of communication and rapport. Determine if any radio amateurs belong to the local computer organization. Since clubs are always looking for presentations at meetings, why not swap general informational presentations between local groups? Mutual cooperation and goodwill will benefit both organizations in the future. After any promotion of Amateur Radio, be sure to follow up with recruiting information about your next license classes. Also, be prepared to answer some ASCII-oriented questions. Meet with officers in the computer club beforehand, and anticipate likely questions and adequate answers before you field them from the floor.

A little effort in this area could go a long way in helping some highly motivated people enter Amateur Radio. As an instructor, you should take pride in being part of that process.

While on the topic of computers, if you have had any experiences using computers in Amateur Radio instruction, the Club and Training Department would like to know the details. We may use such info in this column or in the "Instructor's Newsletter." — *Bill Grim, WØMHK*

50 Years Ago

July 1930

☐ Clyde Da Vinna, W6OJ, in "Hamming With a Portable in Africa," tells of his experiences as chief cinematographer and radio operator during the filming of MGM's classic "Trader Horn" in several countries in central Africa. This milestone outdoor jungle movie wasn't planned as an early DXpedition — the portable ham gear was primarily utilitarian and more than paid its way — but how could any good ham pass up such an opportunity? A charming account.

☐ George Grammer, W1DF, describes a two-tube converter (mixer and oscillator) to be used ahead of a broadcast receiver for short-wave reception. Plug-in coils extend the range of the converter. Tuning the converter *or* tuning the b.c. receiver to bring in the same signal must have been a new concept to most, since superheterodynes were not too well known at the time.

☐ In "A Compact and Inexpensive Chemical Rectifier" George Parsons writes a definitive article on chemical rectifier design, pointing out a common design error of the past (*insufficient* current density). However, with the trend toward thermionic and mercury-vapor rectifiers, it is unlikely that the well-stated principles were ever widely used.

☐ A description of VE2CA, the station of Mr. and Mrs. Earle Turner of St. Lambert, P. Q., is subtitled "A Medium Power Station of Modern Design." Separate 852 Hartley oscillators are used for 7 and 14 Mc., with a switchable power supply and antenna system. The antenna is a 7-Mc. half wave, Zepp-fed (end-fed with open-wire line). Two receivers are available: a four-tube untuned r.f. and peaked-audio copy of Ross Hull's 1928 classic, and a three 'OIA detector and two audio.

25 Years Ago

July 1955

☐ The popular Central Electronics s.s.b. exciters provide a 9-Mc. signal that can be heterodyned to 75 or 20 meters by using a 5-Mc. VFO. In "A Four-Band S.S.B. VFO" Gordon Lauder, W9PVD, shows how using harmonics of a 5.0- to 5.5-Mc. oscillator provide injection at 10.8 and 16.2 Mc. for 160- and 40-meter operation. Two 6AK6s and a OB2 are used.

☐ In "Versatilize Your Oscilloscope," Lyle Sharpe, W6FSC, describes a pair of useful modifications to a Heathkit O-7 oscilloscope. By adding two subassemblies carrying two twin triodes on one and a triode and twin triode on the other, plus assorted components and a heater transformer, a wide-range voltage calibrator and Z-axis (intensity) modulation are provided.

☐ "Modifying 75A-2 and 75A-3 Receivers," by Collins Co. engineers Andrade and Pappenfus, WØDAN and WØSYF, gives step-by-step procedures for using newer type tubes to improve signal-handling capabilities and mixer operation. It also shows how to install a mechanical filter in the i.f. chain, and how to add a simple input attenuator in the antenna lead.

☐ Further on receivers, a spirited discussion of a March article on "Low-Noise Receiver Design" is found in the "Technical Correspondence" section. The "panel" of four experts from three continents offers many suggestions for simpler or better methods for achieving the objective. Over three pages of interesting reading.

☐ For the u.h.f. man, Russell Robertson, W6DQJ, describes a "Tripler for the 1215-Mc. Band," based on a modified war-surplus radial cavity and a 2C39A "lighthouse" tube. The tripler is driven by output from a 420-Mc. rig.

☐ Moving back nearer the "d.c. bands," Ed Tilton, W1HDQ, continues his series on "Six Meters for the Beginner" with a simple 10-watt transmitter and a discussion on coupling to the transmission line.

☐ Although used on the 10-, 15- and 20-meter bands, "Band-Scanning — The Easy Way" by K. R. Jones, W7OSL, could be applied to portions of the v.h.f. bands. The author uses a 1-r.p.m. clock motor to turn a variable capacitor clipped across the receiver tuning capacitor. A second variable in series determines the band excursion.

☐ And, as might have been predicted, "Correspondence from Members" has nothing good or nice to say about the new circuit diagram symbols. — *By Goodman, W1DX*

Strays

CONTEST NOTES

☐ Upon recommendation of the Contest Advisory Committee and the ARRL Awards Committee, the following contest rules changes have been approved by the Communications Manager:

1) Starting with the 1980 November Sweepstakes, the minimum time-out period will be increased to 30 minutes.

2) Single-operator entries in the 10-meter contest may be made in phone-only, cw-only and mixed (phone and cw) categories.

3) After the 1980 Field Day, it will no longer be a requirement to sign "portable" in any ARRL operating event when you move to another call area, as long as your DXCC country is indicated.

4) The ARRL will continue with a series of mini-contests, generally of short duration and during off-peak hours.

West Gulf Vice Director Tom Comstock, N5TC (left), presents a certificate of appointment as assistant director to Dave Cree, W5SPD. *(WA5KRI photo)*

How's DX?

Conducted By Clarke Greene,* K1JX

Hamming in Charlie-Five

This month we continue our look at DXpeditions. This installment is by Edmund Richmond, W4MGN/C5ACC.

"You never can tell where a radio contact will lead! In January 1979, I made my first QSO with Keith Bone, C5ABK, in The Gambia. The incredible journey and friendships that followed are a direct result of this contact.

"Keith had just finished talking with Jerry, W4KPQ, when I called in on the frequency. Keith came back, and after the preliminaries, described his work and that of his wife, Janie, at a medical research compound in Fajara. Keith is the engineer who keeps the compound together, the electricity flowing, the plumbing working and the grass mowed, while Janie, licensed as C5ABJ, is a nurse in the compound's hospital.

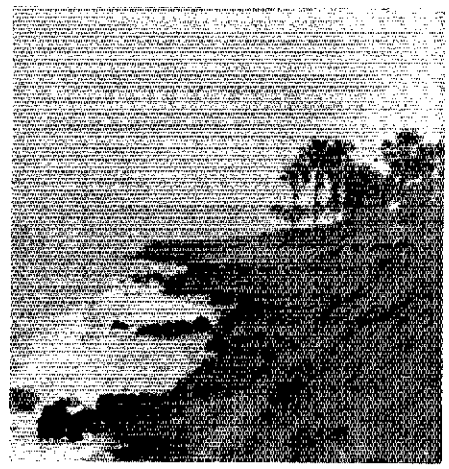
"As a professor of languages and linguistics at Georgia Tech, I had more than a passing interest in the area, the indigenous languages and peoples. I asked Keith several questions about these subjects, which he answered and explained in great detail. This first QSO lasted over two hours! Other QSOs followed which equalled or surpassed the length of the first. He informed me in one of these QSOs that he would be spending six weeks in the States, and would be flying into Atlanta, from London. I invited him to stay with me and use my home as his base of operations for his tour across the States.

"While he was with me at W4MGN, we maintained daily schedules with Janie, Basil, G3MMN, Andrew, C5AAP, and the rest of the Charlie-Five gang. A very close-knit group started to develop, and we began talking about the possibilities of me visiting Keith and Janie in The Gambia during the Christmas break.

"I also met Chuck, KB4GQ, at first by telephone, and later at Keith's farewell party in Atlanta, in late April. Keith spent a week at Chuck's in Montgomery, Alabama, and visited Jerry, W4KPQ, on his way back to Lawrenceville. Unfortunately, the episodes at Jerry's cannot be told. Writing about them doesn't do them justice. You'll have to QSO Jerry or Keith to find out how they managed to get into trouble at the local American Legion Saturday night dance, and with Jerry's XYL!

"By the time Keith flew back home, we had made some pretty definite plans for my trip to The Gambia. Keith, Andrew, Chuck and I became such good friends, we maintained a schedule three days a week. In the meantime, Keith had received permission to operate in Guinea-Bissau. He wanted to time this operation while I was in West Africa, so we could go together.

"Meanwhile, I proceeded with plans from this side of the Atlantic. Seeing an opportunity to conduct some pedagogical research in The Gambia (my field is foreign-language teaching methodology), I wrote a letter to Sir Dawda K. Jawara, President of The Gambia, and volunteered my services as a language pedagogy specialist while I was visiting the country. An invitation was received from him in short order. With this invitation, I made application for, and received, a travel grant from the Georgia Tech Foundation. This paid for my roundtrip airfare from Atlanta to Dakar.



The Atlantic Ocean, just 200 yards from the QTH of C5ABK.

"Owing to many unforeseen problems with the electrical systems in The Gambia, Keith was forced to give up his plans to go to Guinea-Bissau. He had to remain on the compound grounds to ensure electrical power 24 hours a day. He even had to make special arrangements to leave the compound and pick me up at the Dakar airport, when I arrived on December 8. (I must qualify this; I arrived in fine shape, but my baggage somehow did not make the flight! It really didn't matter for the time being, for at least I was in Africa, and was able to fit into Keith's extra pair of shorts. We later learned that my bag was still in New York, because the claim check and routing label were accidentally ripped off the bag. We arranged to have it flown out on the next flight to Dakar, and forwarded to the airport in The Gambia.)

"I spent the next day with Keith at his QTH on the grounds of the Medical Research Council, some 200 yards from the Atlantic Ocean. No wonder he has such a tremendous signal. We toured the compound, where Keith introduced me to his two generators, one of which was going all the time. The next morning, I was in a Land Rover on my way 175 miles up the Gambia River to visit Andrew, C5AAP, in the Bush. I still had jet-lag from the flight over.

"Andy works on an agricultural station in the middle of nowhere, where he helps the Gambians develop strains of rice, corn, millet and sorghum. The trip up the river was an experience in itself. Without warning the pavement ends and the road becomes a dirt washboard with a large number of potholes. The roads at Andy's location are even worse. They are narrow trails and are deadly on tires and suspension systems (both automotive and human).

"Andy really wasn't expecting me for another four days when I was to have arrived with Keith. Since Keith could not leave the compound, however, I took this first opportunity to ride up with one of the medical scientists. When I arrived at Andy's QTH, he was gone. His radio was blaring the news from the BBC, so I knew he couldn't be too far. I had the men leave me on Andy's doorstep, and I waited . . . luckily not too long. He drove in 10 minutes later, and knew me immediately, since not very many new faces are seen this far away from civilization.

"Andy's shack looks like the retail counter at the local radio supply house. He is active on cw and ssb, all bands from 160 to OSCAR. We sat down with a Jul Brew and got acquainted face to face, after so many voice-to-voice encounters. Every night, we talked back to the States at 2300Z with Keith at Fajara, Chuck in Montgomery, and two other good friends Barry, WA2NHE and Lionel, N1ACW. Other friends from the Southeastern DX Club would join in and say hello. Everyone was following my exploits (and those of my baggage) with keen interest. The QSOs sounded like a combination prime-time soap opera and comedy show.

"I spent four fantastic days with Andy in the Bush, visiting some of the native villages, photographing everything that moved and filling up on Jul Brew. On the fifth day we drove down to Fajara in Andy's car, with no spare tire. We had blown it two days before on one of those great roads, and were unable to replace it. There are no automotive stores in the Bush! We bounced our way gingerly back to Fajara, making the 175-mile trip in about five hours. In Fajara, Andy replaced the spare and another tire that had poor tread with two new radials. After taking the old tires off the rims, we discovered to our horror that one of them had picked up a two-inch nail on the way down from the Bush.

"That night, there was a meeting of the Radio Society of The Gambia at Keith's. I met many of the Gambian hams and received my own Gambian license with the call C5ACC. After the meeting, we made our nightly contacts back Stateside to report the next episode of my trip. I conned Chuck into being my QSL manager for my contacts as C5ACC. I also found out that my bag had indeed made the flight to Dakar, so it was somewhere between there and Fajara. At least it was getting closer. The next morning I got on 40 meters and contacted Jean Pierre, 6W8HL, and asked him to check the airport in Dakar for the bag. He told me that it was put on the next flight to The Gambia, and should be in late that afternoon. When Keith and I reached the airport, we found it waiting intact in the Gambian customs office. Boy, to be in my own clothing after a week of Keith's shorts and socks!

"That Sunday, we went to the beach — not

*187 Stafford Ave., Forestville, CT 06010

the tourist variety, but a secluded stretch of pure white sand about 15 miles down the coast, which we had to reach by Land Rover. A day of surf, sun and suds did wonders for my complexion. This was the last day before my research project was to begin with meetings with the educational ministries during the following week. Before they began, I was able to get a group photo of some of the local indigenous operators.

"My two-week trip ended too quickly. I felt as if I had been in paradise. The scenery and the weather, but mostly the people, had been spectacular. Unfortunately, Keith was not able to leave the compound to drive me up to Dakar to catch the flight back home, so I hitched a ride with the Gambian police commander. I had a 14-hour layover in Dakar until my flight left at 2:30 in the morning, so I arranged with Jean Pierre to meet me and show me around the city. We had a delightful time, visiting with Jacques, 6W8DY, at his shack on top of the secondary school where he is headmaster. We spent the evening hours with several of the 6W8 hams until flight time.

"The flight back to New York was very sad. I had an incredible adventure with some dear friends whom I would never forget. It was difficult to leave, but I knew that I would be returning next summer. The Gambian government extended to me an invitation to assist them in their language and literacy programs, so that's where I'll be — hamming in Charlie-Five with my friends!"

Keith, C5ABK, with his power supply.

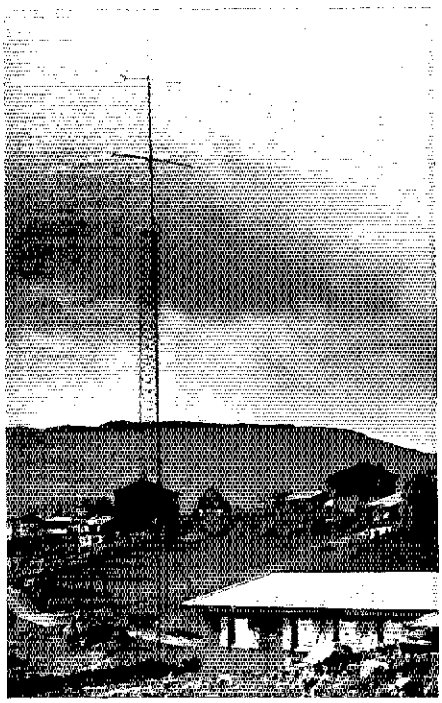
NCDXA CONVENTION

That biennial DX Convention sponsored by the National Capitol DX Association will be held on September 27 and 28. The Ramada Inn at Tysons Corner, Virginia, will host DXPO '80. If you registered at any of the past DXPOs, you will receive information automatically by mail. If not, contact K3AO for a detailed program and registration application.

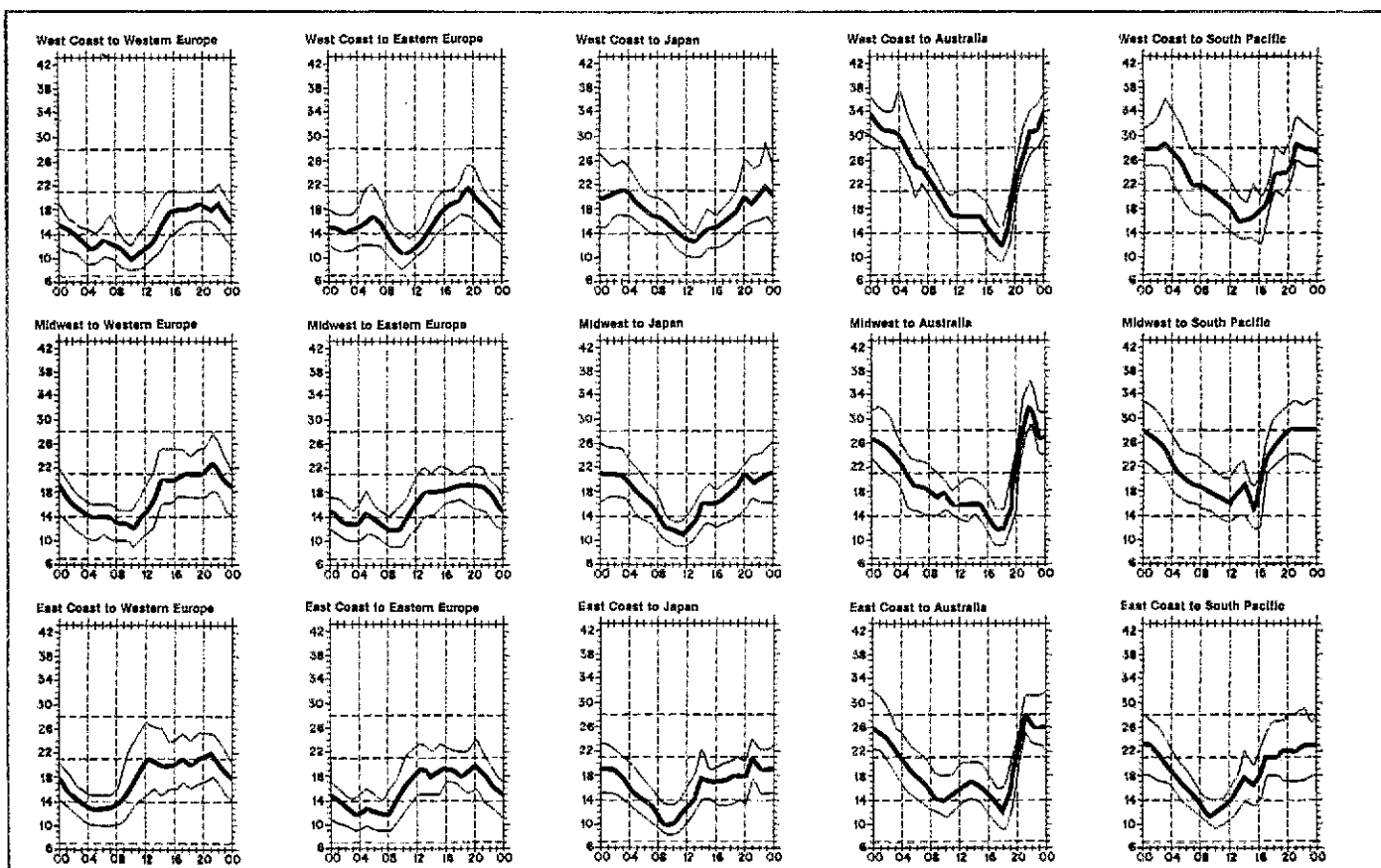
DON'T CALL BLINDLY

OY7ML sent along that photo of club station OY6FRA. Martin points out that in the Faroe Islands, like in many other countries, it is illegal for an amateur to blindly call a station. This causes real problems when a DX station doesn't identify for a half hour or more.

Many stations are *legally bound* not to call that rare one without knowing whom they are calling. That brings up a good point: Nobody should be calling a station without knowing who it is. The sword cuts both ways though; many DXpeditions rarely identify in their desire to keep the QSO rate up. But, even at rates over 300 per hour, identifying once a minute shouldn't be a problem. Not identifying is what causes problems. QST



Club station OY6FRA in the Faroe Islands is located near the shore, so they should have a potent signal in the contests this year. The tower is 18 meters high. *(OY7ML photo)*



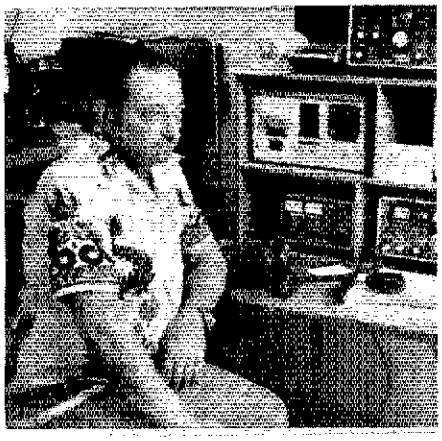
When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be 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

QSL Corner

Administered By Joan Becker

The ARRL DX QSL Bureau System (Incoming)

Within the U.S. and Canada, the ARRL DX QSL Bureau System is made up of 22 call area bureaus that act as central clearing houses for QSLs arriving from foreign countries. These "incoming" bureaus are staffed by volunteer workers. The service is free and ARRL membership is not required.



This is Romano, 5T5ZR, from Nouakchott. *(W4MGN photo)*

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* — Leon Lapkiewicz, K3GM, P. O. Box 6238, Philadelphia, PA 19136.

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 QSO 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* — W@ 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 3061, San Juan, PR 00902.

U.S. Virgin Islands: all calls — Graciano Belardo, KV4CF, P. O. Box 572, Christiansted, St. Croix, VI 00820.

Canal Zone: all calls — LPRA, P. O. Box 9A-175 Panama 9A, Republic of Panama.

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. Daenen, VE2IJ, 2960 Douglas Ave., Montreal, PQ H3R 2E3.

VE3 — The Ontario Trilliums, P. O. Box 157, Downsview, ON M3M 3A3.

VE4* — W. A. Stunden, VE4BJ, 578 Oxford St., Winnipeg, MB R3M 3J9.

VE5 — A. Lloyd Jones, VE5IL, 2328 Grant Rd., Regina, SK S4S 5E3.

VE6* — G. D. Holeton, VE6AGV, 4003 1st St., N.W., Calgary, AB T2K 0X2.

VE7* — Howard Martin, VE7AFY, No. 45-9960 Wilson Rd., Ruskin, BC V0M 1R0.

VE8* — Al Sturko, VE8NS, P. O. Box 72, Fort Smith, NWT X0E 0P0.

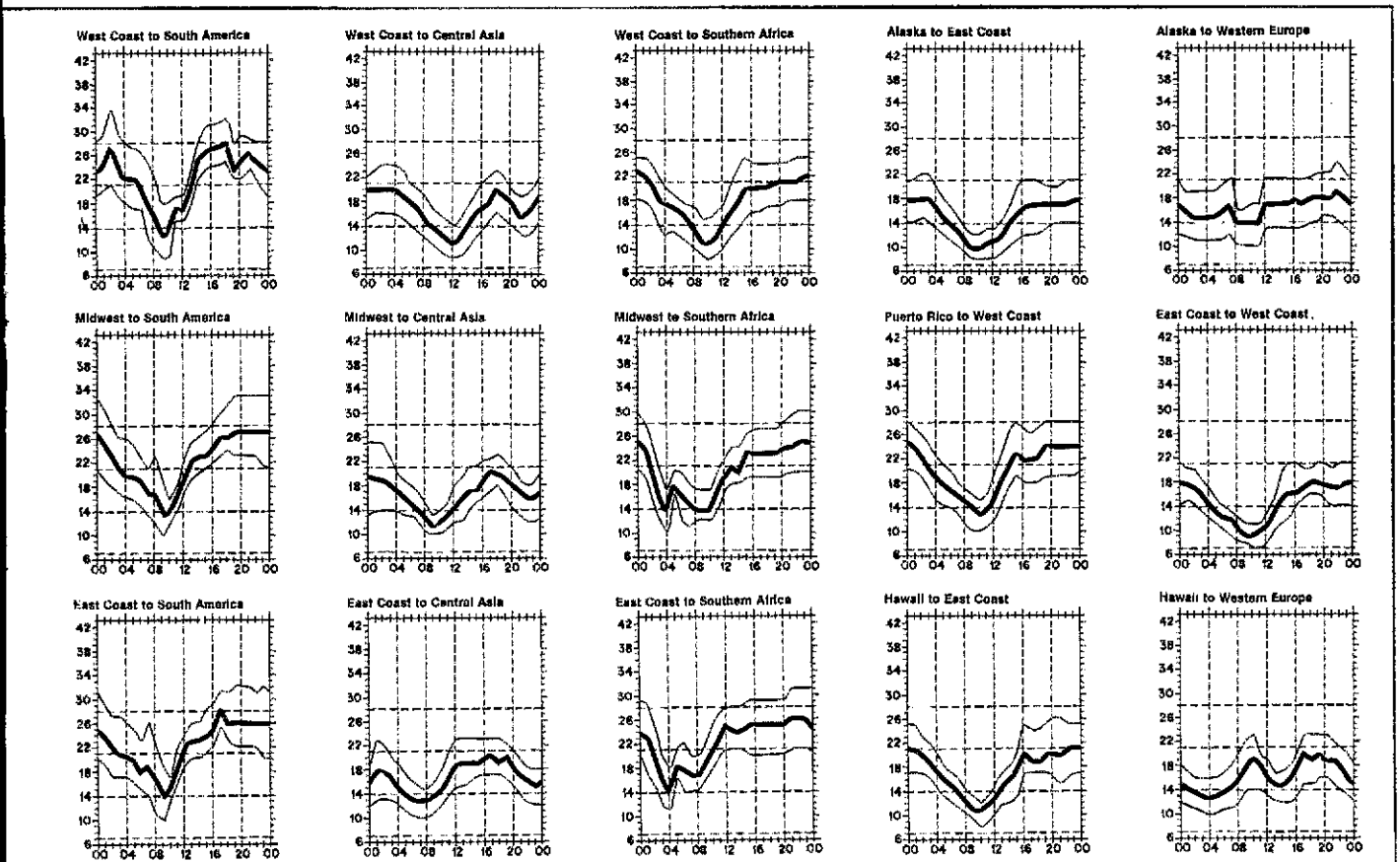
VO1, VO2 — CRRL VO QSL Bureau, P. O. Box 6, St. John's, NF A1C 5H5.

*These bureaus sell envelopes or postage credits. Send an s.a.s.e. to the bureau for further information.

QSL Manager Volunteers

K4DOT
K4AMC
WA4KOP
WB4MTE

All cards for SV1C/A-SV11W/A-SV1J/A, the last Mt. Athos DXpedition, should be directed to: P. O. Box 3751, Athens, Greece. WA1GXF/C6A — Direct — G. C. Mitchell, P. O. Box 509, Marsh Harbor, Bahamas. QST



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11, for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, CO. These predictions, for July 15 to August 15, 1980, assume a sunspot number of 142, which corresponds to a 2800-MHz solar flux of 187.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 20-country increments through 240, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from March 1 through March 29, 1980. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

DF2HL/201
DJ5KB/131
DK7SB/103
DK8AX/163
DL7NB/247
F6CGS/100
G3OLU/102
HA1SO/104
HA5LV/106
HA5MO/108
HB9BAH/135
HC1HV/199
I8SCV/119
IT9AF/287
IT9LMK/185
JA1KNZ/119
JA1VDJ/176
JJ1IHS/106
JA6EOR/144
JH6UBT/109
JA8GZV/233
LA9EF/111
OH2BLD/204
OZ6ZZ/133
PA2VDZ/102
PAØEFI/105
SP8ECV/204
VE3BGX/200
VE3FEA/118
AD1V/100
AI1E/110
K1AH/102
K1GRB/115
N1AFC/120
W1EO/100
WA1TIV/110
WA1VTW/108
WB1FGK/101
K2TY/117
KA2CEK/152
KA2CWJ/103
KB2HZ/105
N2AIF/110
W2BKH/120
W2HGT/106
W2IY/181
W2NHV/224
WA2VCM/101
WA2VOS/104
WB2ODN/110
WB2ODO/108
WB2PFO/143
WB2POG/100
WB2THN/160
K3LYK/100
K3RL/209
KA3BOD/101
KB3HB/108
N3BJ/254
N3MW/104
W3UHP/164
WB3AVN/108
WB3FIY/235
WB3HTK/104
WB3LGO/128
K4ITV/111
KF4N/102
KG4F/164
KM4C/102
N4BCN/103
N4IQ/102
W4PFG/101
W4ZBA/176
WA4PSF/100
WA4SNI/169
WB4ZIH/102
WD4FWE/106
WD4LOZ/108
AK5D/100
K5FZM/104
KA5W/187
N5BV/108
W5RKK/173
W5SGT/103
W5YH/224
WB5NBY/148
WB5QWI/100
WB5SRK/105
WN5EAT/115
K6AXC/287
K6GXO/122
K6KCM/112
KB6KF/187
KD6F/158
N6VV/152
W6KXV/163
W6NCR/105
WD6EEQ/105
WN6CND/102
AE7W/100
AI7P/107
K7ZOT/104
KA7AUH/232
N7ASZ/170
W7KQH/143
W7KT/198
AD8V/206
K8YVT/102
KB8LL/109
KB8LT/136
N8ASU/102
WA8SJX/120
WA8YWR/109
WB8CSH/112
WB8UEL/102
WD8KKW/102
KB9BR/214
KB9IG/108
N9AIB/117
N9AKW/105
N9AMF/139
W9NYG/103
WB9UKE/103
WD9CYR/102
KØKTP/227
KAØALX/104
KBØBL/106
WAØTVV/100
WBØNSA/110
WBØRHC/103
WDØAWP/109

Radiotelephone

A9XBS/101
DA1PN/103
DF2HL/196
DF4PL/109
DJ4LN/103
DJ8SO/110
DK8AX/142
DL7NB/234
EI8DE/109
HC1EE/131
I2PQW/130
IØRIZ/237
JA1VDJ/164
JJ1IHS/106
JA4BKE/224
JH6UBT/109
JA7PL/279
KL7P/105
KP4AAQ/157
LA7EU/116
PA2VDZ/102
PP5AZ/104
PY5EG/199
SP8ECV/120
VE3FEA/101
VE7ARB/100
ZP5ZR/110
AG1C/116
K1FPJ/100
K1GRB/114
K1MZN/101
KA1AWH/117
N1AFC/108
WA1VTW/107
WB1ECL/112
K2TY/102
KB2BC/104
KB2HZ/105
KB2LB/102
W2RFU/101
WA2GEA/103
WA2HKS/128
WB2HIQ/126
WB2JFH/101
WB2PFO/141
WB2RRB/102
WB2THN/114
WB2VIN/107
K3GBZ/274
K3RL/162
KB3HB/100
W3UHP/137
WA3URO/108
WB3FNZ/105
WB3HTK/102
WB3IGR/142
WB3JVD/115
WB3LGO/122
KB4JA/131
W4DQQ/204
WA4BRM/102
WA4YKJ/103
WB4LED/102
WD4ARZ/100
KA5W/136
W5PLN/121
W5RKK/169
W5YH/214
WB5USA/104
WD5DII/104
WD5DRM/101
K6SMH/135
K6UJV/103
KB6KF/146
N6IM/109
W6KXV/120
W6NCR/105
K7OH/110
N7ASL/129
N7ASZ/109
W7GQM/110
W7KNT/110
W7KQH/140
WA7WLT/101
WB7BYB/108
AD8V/194
AK8S/108
WB8CSH/107
WD8KVR/101
KB9BR/214
KB9IG/108
N9AKW/103
N9AMF/133
W9ISF/124
W9RVM/102
WA9JNM/107
WB9VJN/101
WB9WUT/154
KØKTP/225
KBØHJ/106
NØABR/105
WØFHA/104
WØRAO/109
WBØPPR/108
WBØYUC/103
WBØZHH/122

CW

DL7IJ/104
EA7OH/162
IV3NCB/101
JH2IIH/105
JA7PL/199
LA9EF/101
OX3OA/101
OZ1EOE/101
OZ1FRR/104
SP8ECV/167
W2IY/155
WB2THN/100
AJ3H/134
K3DZ/103
K3RL/105
N3BJ/133
WB3FIY/105
WB3JYD/102
AA4KY/101
AE4X/179
N4ITV/105
K4KUZ/111
N4ZG/103
W4PCJ/100
WB4ANA/100
KA5W/106
W5SJ/219
W5VGF/101
AD6D/116
W6VKQ/100
WA6PNY/100
WA6VJP/101
WB6TIJ/103
AF7M/104
W7QMU/111
K8DL/104
K8TL/112
NØGU/107
NØZA/107
WØSA/145
WØYBV/102

160 Meters

G3SZA
PAØHIP

5BDXCC

OE1ZJ
JA6CLJ
ON6OS
SP5EWY
EA8OZ
W1JZ
WB3AVN
WAØFBQ
DL8AN
DLØWU

Endorsements

Mixed

DJ1BV/300
DJ3BE/156
DK2BI/321
DK9FB/317
DK9WB/310
DL1LD/309
DL1OT/290
DL6KG/324
EA1BC/324
EA1SQ/200
EA7OH/231
G3KAA/300
HA1SB/226
HC5EE/279
HKØBKX/301
I8KDB/351
JA1CRR/322
JA1IOA/254
JA1OCA/328
JR1FYS/266
JA2AAQ/332
JA3GM/307
JA7AD/343
JA7PL/294
JA8AYN/310
KP4V/200
KV4FZ/332
LA1K/335
OE1BFW/260
OH3XZ/277
OK1DH/263
OK1MP/335
OZ1CTK/242
PY1HX/349
PT2VE/224
PY2DFR/329
PY5EG/205
SM4EMO/260
SM5BBC/311
SM6AOU/336
SM6BXV/228
SM6CMU/302
SP9AI/310
TI2BEV/125
VE2DPJ/120
VE2FEX/148
VE3BZ/301
VE3GCE/140
VE3XK/280
VE5RU/352
XE1FR/292
YU1DZ/289
YU2AAU/248
YU3TUX/175
ZF2BP/119
AB1U/260
AD1S/198
AG1C/125
AG1J/259
K1RB/183
K1RH/227
K1ZSI/315
W1BWS/156
W1DQH/270
W1FTX/335
W1GUW/245
W1YY/310
WB1CCH/251
K2AGZ/331
K2IJ/261
N2DL/290
N2KA/292
N2JA/224
W2CC/302
W2FHY/260
W2JU/122
W2SY/323
W2YD/320
WA2ECA/181
WA2GEZ/256
WA2PID/151
WB2AMO/306
WB2LUD/134
AI3N/199
AF3B/126
AJ3H/183
K3MD/151
K3OIH/201
K3AV/328
K3CT/125
K3DCP/323
K3IE/252
K3JGJ/180
K3LHD/147
K3LVO/121
N3GW/180
W3AC/334
W3IHT/199
W3KA/339
W3NQC/152
W3YX/301
WB3DIP/134
WB3DJF/202
WB3FIZ/229
WB3HAZ/269
WB3IGR/145
WB3JBF/201
WB3KAM/203
AA4KY/157
AA4MI/174
AA4MW/192
K4BVQ/330
K4CXY/247
K4IKR/338
K4KPH/242
K4KUZ/210
K4RZ/300
K4TFI/225
K4TO/320
K4XP/305
KB4BH/250
KF4H/149
W4CZU/301
W4FLA/318
W4NG/224
W4OHZ/290
W4OO/345
W4OYI/158
W4QO/214
W4PZV/320
W4SNR/275
W4XR/327
W4YKH/270
W4ZR/300
WA4GHO/202
WA4GIQ/249
WA4HDD/280
WA4LBX/179
WA4LOF/282
WA4OUF/275
WB4EDD/300
WB4PRU/253
WB4PUE/120
WB4RFZ/260
WD4RCO/200
AI5B/262
K5EOA/253
K5FC/240
K5KX/315
K5MA/282
K5RSG/177
K5XE/153
KA5ACC/210
N5AB/280
N5DX/331
N5HB/225
W5LZZ/335
W5QOT/157
W5SJ/333
WA5BYG/124
WA5IEV/330
WB5TZZ/200
WB5ZKR/180
WD5HRX/182
K6ASI/225
K6CBL/291
K6RQ/345
K6SMH/149
K6UFT/320
N6DX/338
N6IM/202
N6ST/202
W6ANB/333
W6ETR/201
W6HYG/350
W6KH/345
W6KUT/356
W6OMR/299
W6OU/210
W6QNA/345
W6RDS/157
W6YMV/340
W6YO/335
WA6OFC/249
WA6OIU/280
WA6RVR/201
WB6GFM/173
WB6TIJ/182
WB6WIW/281
WD6ATC/180
AF7M/180
K7AII/211
K7EQM/221
K7KD/286
K7LAY/285
K7NHV/205
K7NTW/200
K7ZM/181
N7AEM/153
N7RO/322
W7BGH/340
W7EEJ/202
W7IIT/174
W7NCO/321
W7QMU/227
W7QS/301
W7TS/201
W7YKN/211
W7ZHZ/292
WB7OUL/261
K8CSG/305
K8GG/253
K8IP/325
K8KAE/280
K8MPF/220
K8NA/300
K8TL/318
K8ZR/310
KA8T/270
N8BM/280
W8INV/140
W8MR/248
W8NJC/260
W8PCS/251
W8QWI/298
W8ZCK/326
WD8KWT/150
AJ9D/260
K9BG/299
K9BWQ/292
K9HLW/262
K9IW/269
K9KK/132
N9ZN/340
W9GU/348
W9KBV/253
W9KQD/330
W9ON/226
W9VA/301
W9VCQ/306
W9ZR/330
W9ZWH/300
WA9TVM/300
WA9USE/249
WA9WWT/220
WB9JOV/142
WB9NOV/204
WB9ZQA/157
WD9CUP/201
WD9EPG/157
WD9IIX/240
ABØX/280
KØCS/273
KØJFV/225
KØJN/310
NØAT/251
NØJW/160
NØSS/266
NØZA/200
WØJS/273
WØOGJ/147
WØTT/200
WAØECB/150
WBØNAA/240
WBØYMR/199

Radiotelephone

CX6AM/250
CX9CO/293
DJ1BV/288
DJ9ZB/322
DK2BI/319
DK4YA/262
DK9WB/309
DL6KG/320
EA8OZ/281
G3ZBA/323
HC5EA/260
HB9AAA/331
I1YG/314
I5LZJ/219
I6ZAJ/159
I8KDB/351
JA1OCA/324
JA2AAQ/329
JA3GM/281
JA8GZV/230
JH8GWW/183
KH6JEB/250
KV4FZ/326
LA4HH/152
OE1BFW/257
OK1MP/315
OZ5EV/300
OZ7OP/302
PY2DSQ/276
PT2VE/200
PY5EX/172
PT7TP/155
PP8DD/179
SM6CMU/273
TU2EP/158
VE3EGS/240
VE5RU/351
VE7AFY/200
XE1MDX/124
XE1NI/241
AB1U/176
AD1S/198
AG1J/259
K1CPJ/200
K1RB/183
K1ZFI/302
W1BFB/278
W1DOH/126
W1GUW/244
W1JJ/301
N2KA/256
N2KW/275
W2CC/301
W2CKR/211
W2IOO/299
W2NHV/224
W2OKM/356
W2SSC/270
W2SY/306
K3IE/162
K3LHD/140
KB3HE/175
W3AC/327
W3FJY/165
W3KA/271
W3OJW/200
W3YX/270
WB3FIY/225
WB3FOB/254
AA4KY/128
AA4MW/181
K4BVQ/318
K4CXY/243
K4IKR/325
K4KUZ/177
K4TO/296
KA4ABA/125
KB4CL/151
KB4PX/150
KG4F/159
KT4G/270
W4EBO/273
W4PZV/319
W4ZBA/175
W4ZR/300
WA4HDD/279
WA4LOF/273
WA4OPW/306
WA4QOV/150
K5GO/290
K5RSG/176
N5DX/295
W5JME/239
W5LDH/270
W5LZZ/335
W5OOT/156
W5SJ/324
W5URN/154
W5VVD/181
WA5CST/199
WA5IEV/329
WB5RQM/134
K6ASI/223
K6AXC/286
K6BKU/133
K6CBL/201
K6DO/166
K6EDA/257
K6SMF/282
N6DX/311
N6ST/169
W6CFG/201
W6HYG/340
W6KUT/334
W6OJW/140
W6OMR/259
W6ORD/280
W6OU/162
W6YMV/339
W6ZC/313
WA6OEC/205
WA6OIU/272
WB6WIW/281
AE7V/180
AE7M/127
K7KD/286
K7LAY/265
K7ZM/167
N7RO/315
W7EEF/197
W7FDJ/270
W7GLU/205
W7KT/190
W7YKN/210
WA7OIJ/225
WA7ZWG/250
WB7OUL/254
K8AQA/204
K8CSG/305
K8GG/249
K8IP/220
K8NA/296
K8TU/155
K8ZR/307
W8CY/281
W8MH/241
WB8RFN/179
WD8BSX/221
WD8LJX/223
WD8NQE/220
K9BWQ/292
K9HLW/223
K9IW/252
K9KK/131
K9QVB/232
W9ABA/296
W9GU/316
W9HPS/339
W9IGK/181
W9VA/181
W9VCQ/285
W9ZWH/290
WA9FZQ/279
WB9FUM/138
WB9NOV/203
WB9ZBG/124
WB9ZQA/156
WD9CUP/200
KØARY/151
KØHSC/201
KØJFV/201
KØJN/281
NØAT/246
NØSS/245
WØPSH/204
WØTT/195
WBØTNY/221
WBØWAY/199

CW

DL1HH/252
I1SRU/138
JA1BN/243
JA1GLT/160
JA2AAQ/255
JA3GM/225
OK1MP/179
OZ1CTK/182
PY2DFR/162
SM6CMU/200
SM6INC/131
K1RH/217
K1UO/214
K1XA/125
N1AC/253
W1BWS/147
K2IJ/228
N2JA/210
N2KW/231
W2NC/260
K3IE/213
W3KA/144
K4FJ/220
K4HRG/164
KF4H/127
W4WJ/240
WA4LOF/135
K5EOA/152
K5GO/176
K5XE/149
N5DX/198
N5RF/162
N6IM/186
W6TOR/142
WA6OEC/153
N7CW/200
N7RO/150
W7EEJ/177
W7IIT/155
K8DYZ/272
K8FU/175
K8IP/156
K8ZH/226
K9IW/152
K9QVB/203
N9KW/175
W9IT/160
WØBW/260

FM/RPT

Conducted By Stan Horzepa,* WA1LOU

FM Without Repeaters

Once upon a time, there were no Amateur Radio repeaters. At that same time, however, hams were using frequency modulation for radio communications. Today, hams are still communicating with fm without repeaters. This mode is known as simplex or direct operation in the vhf-uhf world. As the unimpeded growth of fm repeaters continues, the growth of simplex activity also grows.

A lot of hams crisscrossing the country on our highways and interstates operate simplex on 146.52 Mhz during their sojourns. Traffic on .52 is especially heavy on weekends. These traveling hams stick to simplex for a number of reasons. Some are rockbound; they have crystal-controlled transceivers and do not have the correct crystals for the local repeater. Others have full-coverage, frequency-synthesized equipment, but do not want to continually change channels looking for a useable repeater while speeding along at 55 mi/h. In heavy traffic, it is not healthy to drive holding a microphone in one hand and twisting the radio dials with the other; manipulating the steering wheel with your knees is not recommended. Instead, sit on the simplex channel to promote highway safety.

When disaster strikes, the availability of commercial power may be erratic and the operation of repeaters powered by the commercial mains may not be dependable. Most ARES and other emergency groups have a contingent plan for communications in such a situation. They use a designated simplex frequency for communications. Lifesaving communications can be accomlished without a repeater, and for intercommunications at the site of an emergency direct communications is often preferable to repeater work. If you want to contact another crew at the other end of a train wreck, it is easier to get hold of that group via a simplex channel than by trying to go through a repeater that is probably jammed with emergency communications.

When emergency plans are formulated, 146.52 MHz may seem to be advantageous to the emergency group because "everybody has .52." But a quieter, specially designated channel may be preferable because there would be far less activity (interference) than on .52 and there would be fewer "do-gooders" on the designated channel — "do-gooders" who can foul up the works. The all-encompassing emergency plan could include both 146.52 and another designated simplex frequency for emergency communications.

If you live within a 50-mile radius of ARRL headquarters in Newington, Connecticut, under normal propagation you should be able to receive the League's bulletins from WIAW's 2-meter station. Most of the ARRL bulletins (in cw, phone and RTTY) and the code-practice sessions transmitted on hf are simultaneously transmitted on 147.555 MHz (check the WIAW schedule for the exact times of transmissions). If you are in the WIAW 2-meter listening area, you will probably find these vhf-fm transmissions preferable to the fading, noise and interference on the low bands. Try it.

Fm simplex gets a real workout whenever there is a hamfest or ham convention at hand. When the Waterbury locals pile into two or three vehicles to make the trek to the Rochester ham-bash each spring, vehicular intercommunications is accomplished via fm simplex. All of the pit stops along the route are precisely coordinated. ("Get off at this exit. . . . I think there's a gas station there, maybe.") And the continual chit-chat between vehicles is assurance that the trip will not be boring. ("Why did the rhinoceros cross the road?" [1]) Similar caravans to Dayton, San Diego, Atlanta and Podunk are often accompanied by fm-simplex intercommunications. This is clearly evident by the thickening of simplex activity as you get closer to the event.

Once you get there, make sure that the NiCads in your hand-held are fully charged because all weekend long there will be a lot of activity on the simplex frequencies. You will hear folks trying to locate their friends who are lost in the fleamarket, and you'll hear other folks trying to locate a hospitality lounge in order to get lost. At times, chaos will reign on simplex, but it's a lot of fun.

Every once in a while, the bands go bonkers and hams are able to communicate through repeaters hundreds of miles away. When this occurs, the place to be is a simplex frequency; the DX will be rolling in there, too. Working DX on a simplex frequency is preferable to doing the same on a repeater because when you hear DX coming over the repeater it is very likely that the DX station is keying up (and interfering with) other repeaters on the same frequency. This can be avoided by moving to a simplex frequency. And if one simplex frequency is too crowded with DX, the proliferation of frequency-synthesized equipment permits easy movement to another frequency.

Simplex operation provides an alternative to repeater communications. Some hams prefer simplex. There, conversations can go on uninterrupted by the continuing series of breakers found on repeaters. Others move from a repeater to a simplex frequency whenever direct communication is possible (for instance, between two local base stations). There is no need to tie up the repeater. Someone who needs the repeater's capabilities for communications may be standing by. So, give 'em a break.

If you have a full-coverage, frequency-synthesized transceiver, tune around and you can eavesdrop on some interesting conversations being conducted on the non-standard simplex channels. You may be surprised at what you will hear — hot DX tips or the latest ham gossip — keep your ears open. The world of fm simplex awaits you.

[1] The punchline to this joke — "He was tied to the chicken."

OBEWAN/RPT

For nearly two years, Skip Hansen's repeater has been sitting patiently atop a 1400-foot hill in Palos Verdes, California, waiting for the day that the FCC would say that ASCII was okay. Well, that day finally came and WB6YMH/RPT became an ASCII repeater. Normally, the repeater hums along, quietly repeating any voice communications coming its way from the L.A. area. As soon as someone types OBEWAN (the "Star Wars" character immortalized on the silver screen by Alec Guinness), however, the repeater is transformed into an ASCII machine, and communications with the onboard Z-80 computer is possible. Say BYE to the computer and the repeater is back in its voice mode.

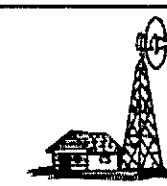
WB6YMH welcomes all to use his repeater. It's on 144.76/145.36 and every Tuesday at 7 P.M., you will find the Southern California Amateur Radio Computer Club's net in session. Join the gang.

*72 Stiles St., Waterbury, CT 06706

OP GUIDE

Do you want to learn more about operating in the world of FM/RPT? A brand new League publication, "The ARRL Operating Manual," includes a chapter on the subject (written by the conductor of this column) detailing all the ins and outs of operating in the fm and repeater mode. The book also contains chapters covering all of the other aspects of ham radio operating written by authorities in the field. This book belongs in every ham shack and is available for $5 from your local ham radio dealer or directly from ARRL headquarters. I highly recommend it. QST

The World Above 50 MHz



Conducted By
William A. Tynan,* W3XO

The Sun, From Whence Our DX Comes

For this month's lead, I have chosen to present a piece written by Jim Stewart, WA4MVI. Jim, who is a holder of WAS on 2 meters, is well known in the vhf fraternity. I am sure you will find his ideas interesting and thought-provoking.

Worldwide DX on 6 meters again became a reality during the fall of 1979 as the long-awaited sunspot maximum provided amateurs with rare ionospheric conditions not substantially present for 20 years! The "old timers" who were around during the last such glorious time, 1957-58, still remember those years as truly remarkable. Many comments are heard these days that "Yes, 6 meters is good now, but you should have been on in 1957 . . ."!

Those were good years for Amateur Radio and vhf activities. Talk filled the air of tracking the first space satellites, the International Geophysical Year (IGY) project, the first QSO via EME on 144 MHz, 6-meter DX, and the relatively new technique of meteor DXing. Many vhfers operated "Benton Harbor Lunch Boxes" and "Goonie Boxes." A good 6- or 2-meter beam could be had for just over 10 bucks! As solar activity exceeded 200-year records, more and more amateurs discovered vhf DX. Contest scores soared, as did the ham population itself. Many achieved WAS and WAC on 6. Europe was worked from the western U.S. for the first time and the eastern U.S.-to-Europe QSOs became routine. The more-skilled participants knew that if these DX conditions repeated themselves, it would probably be many years in the future.

Ionospheric propagation via the F2 layer seldom takes place at 50 MHz, except during very high solar maximums which occur about every 11 years. There is evidence now, however, indicating that some events show more correlation with a 22-year cycle and the best DX may very well reoccur with this interval. Vhf band conditions were remarkably similar during 1957 and 1979, and less spectacular during 1947 and 1968.

Modern studies of the sun began around 1610 AD when the invention of the telescope led to the discovery of sunspots. However, talk of these imperfections on the solar disk was quite unpopular in those days because of religious beliefs. Thus, we are uncertain of the accuracy of sunspot records until approximately 200 years ago, when the existence of 11-year cycles was observed. In recent times, interest in these cycles grew more intense when it was realized that the quality of radio transmission over long distances was related to solar activity. It soon became apparent also that DX conditions seemed to recur with the 27-day cycle, corresponding to the rotation of the sun. At some future time we may be able to say beyond any doubt that the best vhf DX conditions appear on alternate cycle peaks.

This writer has observed the sun since the beginning of the present cycle by both optical and radio means. Careful analysis of daily records, along with WWV information, enable one to predict the recurrence of monthly events and gain some insight into this mysterious relationship between solar events and DX.

It appears that our present cycle may have peaked on November 10, 1979. On this date WWV reported a 10.3-cm flux level of 383, and 144-MHz solar noise here at WA4MVI was the highest ever observed. Photographs made on this date show an extremely rare white light prominence associated with intense solar storm activity. Peak monthly 10.3-cm flux values for late 1979 were 232 for August, 233 for September, 242 for October, 383 for November and 247 for December.

Careful study of band conditions during 1979 shows remarkably similar characteristics to those of 1957, and if the declining portion of the cycle is similar, we may be able to predict with some degree of certainty what may be in store on the bands in the months to come. During both 1957 and 1979, DX got underway by mid-October and peaked in November, with a slight decline in December. Both cycles saw early-fall paths very good between the northeastern U.S. and Europe. As November arrived, the Europeans worked farther west and JA contacts spread from the West Coast to the Midwest and parts of the East. The winter of 1958 saw openings shifting to more southerly paths between Africa and the southeastern U.S. and from the western states to Australia and New Zealand. As winter turned to spring, north-south paths became more frequent. Summer days were somewhat quiet with little F2 or Es. During mid-October F2 again reappeared much as in 1957 although not quite as frequent and widespread. North-south paths remained good for several years and auroral became intense, frequent and widespread.

The spring of 1980 produced good north-south openings for the southern tier of states, along with some good opportunities toward ZL and VK. Again, the similarity with corresponding months in 1958 is striking. Very good tropospheric conditions could again appear during the summer and fall of 1980 as solar activity may indirectly cause weather patterns to move lazily across the country, allowing stagnant air masses and temperature-inverted layers to form.

The summer and fall of 1979 and 1957 saw remarkable tropo openings on 144 MHz and 432 MHz. The tremendous opening last September will long be remembered. A "new" mode of propagation on 144 MHz appeared during 1979 between Texas and Florida, with characteristics sounding much like aurora. A similar mode was described back in 1957! Sporadic E "short skip" was said to be off during 1957 and 1979. While it is still too early to characterize the 1980 Es season, we may be able to show in future years that this mode is poorer during years of high solar activity than in low sunspot years.

These have indeed been unforgettable times for the vhf world, and they may not be equalled again for many years. If this writer's suspicions are correct, namely that the 22-year cycle is key to the reappearance of F2 sufficiently intense to cause widespread 50-MHz openings, then the fall and winter of 2001-2002 may be the time to watch!

A special thanks is in order to W4AFM and W4YLU for their assistance in obtaining past records of DX and solar activity.

I hope that most of us will be around by the year 2000 to partake of whatever Old Sol has in store for us, Jim!

MOUNT TOM VHF PICNIC

K1FO sends along word of the 11th annual Northeast VHF Association Picnic to be held Sunday, August 24, at the Mount Tom State Park, Holyoke, Massachusetts. Steve says that the affair usually draws a fine crowd of 144 MHz-and-up ssb/cw DXers. He urges those with like interests to bring the family, tapes and pictures. For further information, contact him at 53 Oak St., East Hartford, CT 06118. An s.a.s.e. would be appreciated.

ON THE BANDS

6 Meters — The date on which this is being written, May 11, is in a sort of transition period for 6 meters. F2, which most of us have not seen much of lately anyway, is yielding to Sporadic E, from which we can all hope for better things. A few Es openings have already occurred, indicating, at least, that we will have a few this season. Naturally, it's too early to get an inkling as to how good this year will be. That should be a lot clearer by the time you read these lines. One by-product of the recent F2 that should enhance Es excitement this year is the great increase in activity at DX locations. As many of these spots are within Es range of the U.S., this upsurge in the number of active stations should provide some interesting sessions. An example of this came on one of the first openings from the mid-Atlantic states to the south. In addition to the Florida stations normally heard under such conditions, C6ACY was in there handing out a country new to many and adding a lot of spice to an otherwise routine opening. Let's hope that many more of these follows who got on the band because of the attraction of F2 DX don't desert it during these upcoming Es months. Remember that Es contacts with the Caribbean, Central America, northern South America and Hawaii do take place during many years. Even the path from the West Coast to Japan has been bridged via Es the past few years. The ZB2VHF beacon has been heard on the East Coast, apparently via the same mode. With ZB2BL, EI2W, EI6AS, EI9D and TF3SG on the band, we could be in for some fascinating openings in that direction.

Also, we should not overlook the possibility of crossband 6- to 4-meter contacts with the UK. Although attempts to accomplish that feat via F2 have not been successful so far, many, including WA5IYX, believe that chances may be better on the multihop Es mode. It certainly seems worth the effort anyway.

2 Meters — K9EFX, Valparaiso, Indiana has been busy. John completed an aurora contact on April 11 with WA3WUL, Delaware, and n.s. exchanges with K5UGM, Texas, on the 12th; W4WD, Florida on the 20th; K1WHS, Maine on May 3 and K1MNS, New Hampshire, May 4. This brings his state total to 25, and he is looking for skeds, particularly with western stations. By the time this appears, the single Yagi will have been replaced with stacked Boomers. K9EFX also passes along information about a nightly sked which includes himself, AIØL, Missouri, WØKRX, Minnesota and a number of other northern Midwest stations. The group gets together on 144.140 beginning at 0000Z.

K1GSR/3, near Baltimore, passes along additional information on those Maryland to Ohio schedules mentioned in last month's column. A1 reports that the nightly schedules began February 13. Signals at first were invariably very marginal until 2200 EST. Then they seemed to build up until about 2230. Conditions in general were not a factor. Rain, snow or whatever could not prevent the group from making contact. It appeared that the propagation was troposcatter over the path length of about 400 miles (645 km). For the initial month signals would shift from one location to another. This effect became very obvious as more stations became involved. Often, for stations within 8 miles (13 km) of each other, one would hear the 8s but the other would not, only to see the situation reverse just moments later. This seemed indicative of a constantly shifting and turbulent reflecting medium in the troposhere. As April arrived, this effect began to disappear, and stations started hearing each other simultaneously over a broad area. In addition, signals grew stronger and became more consistent.

K1FO notes that, since putting up his new array of four 3 2-wavelength Boomers, his moonbounce results have really picked up. Steve has now QSOed 26 different stations in 16 states and five countries. The next project is to add an antenna mounted 3SK-48 preamp and RG-8317U coax. WA1JXN/7 complains that, since he set up at his Montana QTH, there doesn't seem to be as much random EME activity as there was. Lance pleads for more people to get on when the moon is in a favorable location.

1-1/4 Meters — The radar is QRT! That's the good news passed along by W6PO and printed in the first issue of K5FF's 220 news bulletin. Bob indicates that he did have some difficulty with interference from the Bay Area noise generator during his first skeds with W4WD, but that now that it is off he had little problem in working Russ. It is speculated that the demise of this bothersome source of QRM may now permit West Coasters to join the rest of the country on 220. Heretofore, 222 has been used for weak-signal work in California, Oregon and Washington. The remaining

*Send reports to Bill Tynan, P. O. Box 117, Burtonsville, MD 20730, or call 301-384-6736 and record your message.

stumbling block which may still prevent universal adoption of the low end for weak signal work is channel 13 interference. Some of this may be a result of overload problems in our receivers. An appropriate filter can help this. K5FF says that she uses a Fair Radio F-197/U following her preamp. Of course, some of the birdies may actually be in our band. In this case, the only recourse is to complain to the TV station. K5FF's news sheet goes on to say that K7HSJ reports that the Seattle gang are already using 220.2 in order to work the nearby VE7s, who have limited spectrum space available on the band. K5FF notes that her tropo Yagi is cut for the low end and she understands that the EME systems at both W6PO and WØPW are, also. Of course the dish that K5FF and W5FF use for moonbounce is not frequency critical.

Those wishing to receive K5FF's very informative 220 publication are asked to send a stack of s.a.s.e.'s to Lee Fish, P. O. Box 73 Edgewood, NM 87015.

70 Cm — Make no mistake. It *is* possible to contact stations halfway around the globe via moonbounce. ZL3AAD's exploits are certainly living proof of this. Any of the European stations he can work are, for all intents and purposes, on the other side of the earth. The result of this is that common moon times are quite limited, about 30 minutes to one hour. Graham has, nevertheless, been successful in working a number of

The 70-cm EME array at ZL3AAD, consisting of 16 WØEYE Yagis.

Europeans, including DL9KR and G4EZN. He has also been holding skeds with F9FT and others. ZL3AAD says that he is indebted to K5JL for assistance as well as moral support, in the completion of his EME station. The job, incidentally, took two years. His antenna consists of 16 WØEYEs, while a homebrew K2RIW amplifier provides the power. The receive preamp uses an MGF-1400 and a Microwave Modules transverter and a KWM-2 round out the rest of the station.

G3CWI writes that the gang at G4EZN, the Bannuingham EME Group, are very proud of their QSO with ZL3AAD, feeling that it represents the world's EME DX record. If not, it sure is close. They went to special effort to complete the contact, selecting a time when the moon was at perigee. Available window time was just 20 minutes, so everything had to go like clockwork. The station at G4EZN is 150 watts input (no kW permit yet) and a 30-foot dish. Receiving is aided by an Alpha 1000 GaAs FET yielding a noise figure of less than 0.5 dB.

ATV grabs the spotlight in the terrestrial realm. WB5UUA's first QSO via that mode was notable to say the least. With only 300 milliwatts output from a 2N3866, AI used a good tropo opening to bridge the gap between his McKinney, Texas, QTH, near Dallas, to W5DFU Tulsa, Oklahoma. That's a distance of 215 miles (346 km) and may constitute a miles-per-watt record for ATV. W5DFU runs about 260 watts output, which provides excellent picture quality. AI sends along screen photographs to prove it. The one from W5DFU's end wasn't bad either, considering the power involved. AI estimates that the signal from Tulsa was about 40 to 50 dB above noise. That would be equivalent to 70 to 80 dB in a 2-kHz bandwidth.

STORY BEHIND THE RECORD BREAKING WORK DOWN UNDER

As everyone knows, the seasons below the equator are reversed from those we are accustomed to. Thus January, a month hardly known hereabouts for its superior tropo conditions, is a prime time of the year for that mode in VK-land. As reported previously in this column, that month saw the 23-cm record extended. Taking advantage of the fine tropo conditions prevailing across the Australian Bight, that body of water occupying the large chunk that appears to have been bitten out of the southern portion of the continent, VK6KZ and VK5MC made the grade over a 1422-mile (2290-km) path. This is 112 miles (180 km) farther than the record set a little over a year earlier by the same pair. Because the description of this work, as well as the preparations for it and the contacts that took place on lower bands during the same time period, is presented so well by Eric Jamieson, VK5LP, in his monthly column in *Amateur Radio*, "VHF-UHF: AN EXPANDING WORLD," I will quote directly from the April issue of that Wireless Institute of Australia publication.

"For the fourth successive year Dr. Walter J. Howse, VK6KZ, has continued his exploration of the vhf/uhf propagation between southeastern Australia and the southwest of Western Australia. Commencing in December 1976, in Albany, on 144 and 432 MHz, his tests have taken him, in December 1977, to Torbay Hill, 20 km west of Albany; in January 1979 to Walpole — a farther 65 km west, and now in January 1980 to Cape Leeuwin — the most southwestern point of WA [Western Australia].

"During this time a world record was established by him on 432 MHz from Torbay Hill — but this in turn was broken six weeks later by Aub Keightley, VK6XY, in Albany, and that in turn was exceeded more recently by contacts between Hawaii and California; the world record on 1296 MHz was extended from Walpole and now further contacts from Cape Leeuwin are the basis of claims for a new world record. The latest expedition also resulted in contacts on 144 and 432 MHz to be submitted for new Western Australian and Australian records, respectively.

"Following a close study of synoptic weather patterns and liaison with the Perth Meteorological Bureau, Dr. Howse set forth from Perth on Tuesday afternoon, 22nd January, 1980. At that time, the long-wave pattern in the Southern Hemisphere comprised four waves with features of importance in the Australian region, being troughs located near 85 degrees east and 170 degrees east and a ridge near 130 degrees east. The Melbourne Bureau stated that these features, along with other elements of the long-wave pattern, appeared to be oscillating about these positions and that continued anti-cyclonic activity at central to eastern longitudes was expected.

"On arrival at Cape Leeuwin at 1230Z, the Adelaide 144.8-MHz beacon was audible at good strength but no contacts were made (apart from successful QSOs with Don Graham, VK6HK, in Perth over a 271-km [168-mi] path on 144 and 432 MHz) until 1428Z when VK5NX and VK5ZB — both mobile — were worked via the VK5RHO repeater in Adelaide on 146.85 MHz.

"At 2032Z two-way ssb communication was established with Reg Gialle, VK5QR, on 144 MHz. Thirteen minutes later, VK5QR was heard on 1296 MHz ssb but a two-way contact did not eventuate until 0057Z when signal reports of 53/53 were exchanged. This contact over a 2146-km [1333 mi] path with two-way ssb exceeded the previous world record distance of 2107 km [1308 mi]. In the interim, contacts were made by VK6KZ with VK6WG and VK6KJ in Albany (260 km — 161 mi — east), VK6QA and VK6XQ in Geraldton (616 km — 383 mi — north), VK6HK in Perth, and with Ken Yates, VK5RP, in Adelaide. Ken's 1296-MHz ssb signal was also copied at Cape Leeuwin but no reports exchanged.

"Also at about 0000Z Wednesday, 23-1 [January 23], VK6KZ became aware of the opening between Perth and Adelaide on 144 MHz, which was the first to result in contacts since February 1952. The circumstances of these contacts are themselves very interesting and gave evidence of the advantages and disadvantages of the calling frequency of 144.100 MHz. In summary, at 2300Z on 22-1 (0700 Wed.), VK6KZ told VK6HK of the strong 2-metre signals from Adelaide. VK6HK looked carefully for the Adelaide 2-metre beacon and heard it. Don alerted a number of other Perth amateurs by telephone and together they frantically sought activity from Adelaide. Several phone calls to Adelaide went unanswered. Aub, VK6XY, in Albany was contacted by Wayne, VK6WD, and Aub triggered the Adelaide fm repeater. The net result was the emergence of a new licensee, Les Wood, VK5ALW. The honour of the first Adelaide-Perth contact for nearly 30 years went to VK6WD, who worked Les at 0003Z. Contacts were also made by Jack VK6ZEL, Ron VK6FM, and Phil VK6ZKO. Ironically, Don VK6HK did not copy his report from VK5ALW due primarily to QRM on 144.1 from stations in Albany and Denmark. Here was an occasion where stations with a favourable path would have helped by shifting away from the calling frequency to leave that free for stations trying the more-difficult path.

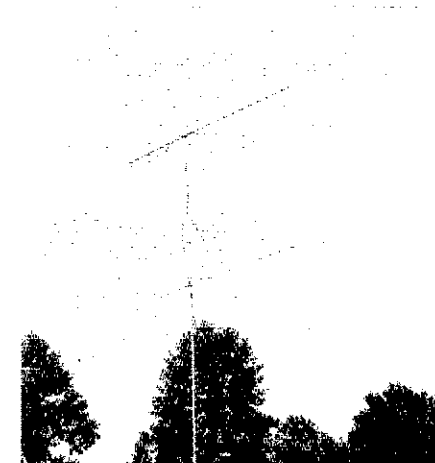
"The opening to Perth appeared to close at 0110Z, and to VK6FM 45 km south of Perth at 0230Z. The Perth-Adelaide distance is 2129 km [1322 mi]. Ken VK6ZFQ, at Katanning, 250 km [155 mi] southeast of Perth, worked into Adelaide also. At 0025Z on 23-1 he worked VK5ALN on ssb over a 1933-km [1200-mi] path. (Ken had two further contacts during the opening, viz., at 1255Z with VK5RO and 2305Z with VK5LP). He reported hearing VK6KZ/P working VK5s without hearing the other end of the QSOs.

"In the meantime VK6KZ/P at Cape Leeuwin ceased operating at about 0230Z in order to have breakfast — anyway the Adelaide beacon was fading! Activity was resumed at 0800Z with VK5VF at good strength. A number of 144-MHz contacts were made with stations in locations as diverse as VK5MC in Mt. Gambier (actually Hatherleigh, near Millicent), Adelaide, Albany, Perth, Geraldton, and at 1035Z with Andy VK6OX, 1056 km [656 mi] north at Carnarvon. At 1000Z Chris VK5MC was heard on 1296 MHz and VK6KZ/P was heard by VK5MC. An exchange of reports, however, was not achieved until 1200Z with reports of 519 to VK5MC at 43/42 received from Chris. This distance of 2290 km [1422 mi] is being claimed as the world record for the 1296-MHz amateur band.

"At 1036Z the first VK3 station was heard on 144 MHz and worked were VK3OT, VK3BPM, VK3AXV, VK3YLR/P, VK3YII and VK3ZBJ. The contact with Andrew VK3YLR/P at Ross Hill, 80 km [50 mi] east of Melbourne, is the basis of claims for new Western Australian and Victorian records for 144 MHz. Distance 2785 km [1729 mi]. Although Andrew heard VK5KZ/P on 432 MHz no contact resulted. However, at 1337Z VK3ZBJ was worked on 432 MHz over 2717 km [1687 mi] for a new claimed Australian record.

"The following morning saw band conditions deteriorate with the last DX contact by VK6KZ/P being one with Eric VK5LP on 221Z on 23-1, i.e. 0621 hours local time on Thursday, 24-1-80.

"Equipment used by VK6KZ included a modified Kenwood TS-120V transceiver at 28 MHz with Microwave Modules transverter for 144 and 432 MHz and 10-watt power levels on these bands. The 1296-MHz ssb was obtained by processing a 21-MHz ssb source as described by Reg VK5QR in *AR* for October 1979. Power output on 1296 MHz was about 4 watts fed to a 1-metre parabolic dish mounted above the car. The receive converter comprised two BFR91 rf amplifiers ahead of a Microwave Modules converter. Antennae for 144 and 432 MHz were 5- and 7-element Yagis, respectively." [QST]



Live in an apartment and can't put up antennas? QTH down in a hole and you can't get out? Here's how W3EP/9 solved similar problems. Emil can assemble these stacked Quagis and set up his FT-221 and KLM 160 amplifier in a few minutes. From this hill near his Bloomington, Indiana, QTH, he has worked 31 stations on 2 meters.

YL News and Views

Conducted By Jean Peacor,* K1IJV

YL/OM Contest Results

Let's think spring in July! YLRL's YL/OM Contest has been one of the first signs of spring for 31 years. If you participated this year, you know what fun it is. If not, bear in mind that it happens every spring.

Contests provide multiple opportunities for all contestants. If certificate hunting is your forte, YL contacts help toward many awards — YL/DXCC, YLCC, YL/WAS and YL/WAC, to name a few. There is joy in hearing the old-timer contesters you have QSO'd year after year; there is joy in meeting all the new contestants. As your contest operating skills improve, you sense the personal rewards of contest operating.

This year's Gold Cup winners are Carole Ann Buckler, GD4HIT, and Jim Fodor, W4MOY, for the cw portion. The ssb portion's Gold Cup scorers are Suzanne Malesic, HI8XDJ, and Bruce Siff, W2GBX/4. Congratulations all.

"I can't tell you when I've had more fun on the radio." These are the words of Georgia's Peggy Malto, KA4FVU. Peggy joined the contesters quite by accident. She forgot that there was a contest. As she signed with a station, following a short contact, two OMs called her asking for contest contacts. Suddenly, Peggy was in her first YL/OM Contest. What's more, she placed second worldwide for ssb. Her calendar is marked for next year's contest. Her enthusiasm typifies that of all contestants.

If your call isn't among those in the results that follow, think spring in March next year and join in the fun. It happens every spring.

*Country Club Dr., Monson, MA 01057

Carole Ann Buckler, GD4HIT, from the Isle of Man, highest scoring DX YL last year, is this year's winner of the Gold Cup for cw. Carole operates mostly cw. Listen for her on 20, 15 and 10 meters.

Jim Fodor, W4MOY, cw Gold Cup winner from Georgia, expresses thanks to all YLs for a fine contest, his first in 15 years. Jim is serving in the USAF where, over a period of years, he has been K8JAD, DL4RZ, KG1AA (op.), KZ5JF and HL9VU.

YL/OM Contest Results — Cw

YL		*OM*
GD4HIT	Gold Cup	W4MOY
VP2VFV	Second Place	VE3EMA
WA2WHE	Third Place	AE7P

YL CW

W1YPH, 10,850; K1NEI 8970; WA2WHE,* 19,713*; W2HFR, 640; WA2NFY, 1363; *W3CDQ,* 323; *WB4PRM,* 15,130*; KA4FVU, 3526; KI4W, 150*; KT4E, 13,035*; WA4BQY, 60*; WA4EPM, 938*; WA4SRD, 5929*; *WA8FSX/7,* 3795*; *W8YL,* 13,624*; K8ONV, 12,075*; WA8YPY, 1170; WD8QAD, 12,021*; *N9YL,* 6758*; N9AIB, 6683*; *WBØNIE,* 8680; *DK8LE,* 13,930; DJØYL, 1519; DIØYL/P, 1400; *F2SQ,* 374*; *GD4HIT,* 21,553*; *I5UNA,* 4200*; *JA1AEQ,* 11*; *LA4YW,* 113*; *OK5YLS,* 17,424; OK1ARI, 1344*; OK3YCW, 110*; *OZ7YL,* 1550; *SP5YL,* 286; SP2FF, 200*; *VK3KS,* 7395*; VK3BIR, 4; *VP2VFV,* 20,664; *YC1BZ,* 5775*; OK3KEU, 1110.* Special Recognition — Clubs: LZ1KDP, 12,090; YU7JDE, 1925.

OM CW

W1PEG, 660; W1BNS, 651; W1GKJ, 350*; W1POJ, 193*; *W2AAU,* 594; K2LEG, 154; N2CM, 280*; W2UAP, 280*; W2WSS, 315; *W3EE,* 168; *W4MOY,* 1,330*; W4JUJ, 99; *W5NR,* 156; *W6ZT,* 494; AA6EE, 9; WB6OYJ, 225*; *AE7P,* 813*; W7RD, 165*; W7ULC, 735*; *K8LWP,* 125*; *W9LNQ,* 570*; K9GDF, 425*; *WAØCTX,* 193*; KAØCLS, 168; VOIAW, 88; *VE3EMA,* 891*; VE3IKF, 574*; *VE4MG,* 532; *DL7SU,* 4; *EA4BV,* 50*; *IT9AGA,* 193*; *OK1MAA,* 41*; OK2LN, 12; *OZ8E,* 19*; *SM5RH,* 61*; *VK3XB,* 31*; *YU7SF,* 594*; YU1NEO, 374.

YL/OM Contest Results — Phone

YL		*OM*
HI8XDJ	Gold Cup	W2GBX/4
KA4FVU	Second Place	AA4FF
OK5YLS	Third Place	G3VUH

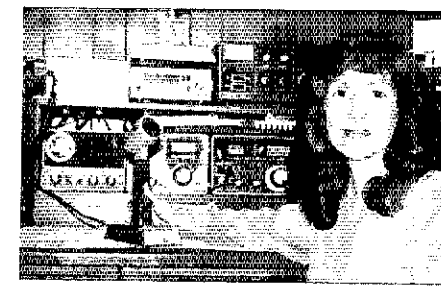
YL Phone

WB1CZC, 3526*; AG1IU, 787*; *WA2NFY,* 984; *WB3EFQ,* 3126*; *KA4FVU,* 74,745*; KT4E, 39,330*; W2EEO/4, 1196; W4LYC, 1666*; WA4BQY, 9913*; WA4KOP, 31,413*; WA4SRD, 5875*; WA4UYZ, 2440*; WD4NGD, 13,268; *WB7QOM,* 27,831*; WB7FDE, 27,246*; *WD8QAD,* 11,270*; N8ALJ, 50*; *WB9VXQ,* 15,183; *WDØAKS,* 14,963*; WAØKVP, 195*; *KL7L,* 1938; *VE5FK,* 30; *DF3TE,* 6930; DF3BN, 1500; DJØYL, 6432; DK6FM, 3613*; DK9ZL, 1610*; *GD4GWQ,* 12,870*; *HI8XDJ,* 235,313*; *HK3AXT,* 39,116; *HP1XIE,* 9045*; *JH1ACA,* 1250; *LA4YL,* 20; *OK5YLS,* 41,650*; OK1ARI, 4050*; OK1OZ, 6673*; OK3TMF, 3630; *ON8IC,* 25,313*; *OZ1AVV,* 225*; *PS8YL,* 14,570; *VK3BIR,* 5796; VK3KS, 30; *VP9IX,* 23,790*; *YC1BZ,* 2138*; *YU1OYL,* 5032. Special Recognition — Clubs: LZ1KDP, 77,406; YU7JDE, 12,754*.

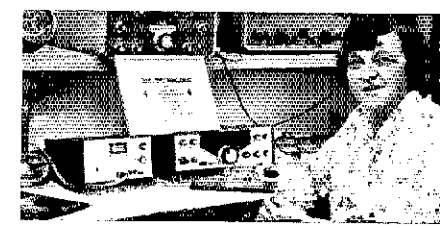
OM Phone

W1BNS, 709*; *W1GKJ,* 709*; N1ADX, 113*; W1HOZ, 641*; W1PEG, 238; WA1CJR, 495*; *W3IEZ,* 1388*; *W2GBX/4,* 2806; AA4FF, 2475*; AA4WA, 1350*; N4CD, 125; W2LH/4, 25; W4JUJ, 80*; W4WWQ, 1063; *W6OU,* 660*; KA6FUI, 1; *W7ULC,* 340*; W7AHZ, 306; *KB8GH,* 495*; KA8AOT, 320; *W9LNQ,* 1318*; K9GDF, 11*; K9JJG, 319*; W9CA, 446*; *WØGNX,* 1120; *VE3BR,* 293*; *VE4MG,* 656*; *DL7SU,* 735; DJ2SL, 138*; *EA3LA,* 260; EA6EW, 253; *F3IJ,* 158*; *G3VUH,* 1821*; G3NFV, 672; *GM4ELV,* 406*; *IIYPT,* 595*; *LA2DR,* 640*; *OK3YK,* 390*; OK1AGN, 325*; OK1DHJ, 38*; OK1DJG, 123*; OK1DMS, 191*; OK1OFK, 140*; OK1ONI, 56*; OK1PFM, 15*; OK2JK, 264; OK2QX, 175*; OK2SAR, 140*; *OZ5EV,* 1215; OZ6XR, 340*; *SM7FSV,* 60; *SP6DVP,* 88*; *VK3XB,* 9; *YU1NEO,* 150; OK1DKS, 248*.

*Low-power multiplier
Italicized calls are certificate winners



A Novice in December '78, General in May '79, Georgia's Peggy Malto, KA4FVU, earned second place in YL/OM for ssb. Peggy operates 10- and 15-meter ssb Tuesdays and Thursdays at 1900 UTC or cw on 15 and 20 meters many afternoons.



Gretna Longware, WA2WHE, from Elizabethtown, New York, scored third in the cw portion. Her fine score was highest for U.S. YLs. Her activities in a family business, the Coast Guard Auxiliary on Lake Champlain, and as an NOAA Weather Observer, leave her limited operating time, but look for her on 3.5 MHz, evenings.

Results, Seventh Annual ARRL 10-Meter Contest

QRO or QRP, 28 megs was the place to be!

By Bill Jennings,* K1WJ and Tom Frenaye,** K1KI

For the next several years at least, we're going to look back at 1979 as the "good old days" of the 10-Meter Contest. We don't mean to say that 10 is going to dry up and go away, but we have reached the peak of solar cycle 21 and what goes up does have to come down. Of course, the band isn't just going to fold up like a pole-axed water buffalo, as we should have fairly decent conditions for the next 10-Meter Contest or two.

It will be readily apparent to anyone who follows the ups and downs of solar activity/band conditions vs. number of stations on to be worked/submitting entries in a contest that with the "record" fine conditions will come a record of number of entries. The 1979 10-Meter Contest, held December 9 and 10, 1979, was indeed number one at least in terms of total number of entries — 1565 (1013 W/VE and 552 DX) and average score. Quite a contrast to the Third 10-Meter Contest (1975) when the conditions were the poorest in the history of the contest and the entries were at a record low of 628. Stands to reason that if there are more people on playing in the contest, there are more stations for the big guns to work, and some higher-than-average scores should appear in the results. Absolutely. N7DD at 945 k points and VE6KW with almost 940 k points, about 3400 QSOs and 140 multipliers apiece, make the point quite nicely. In fact the 1979 W/VE 10-Meter Top Ten averaged over 104,000 points, at an average score of 674,938 points, better than the Top Ten of the 1978 contest.

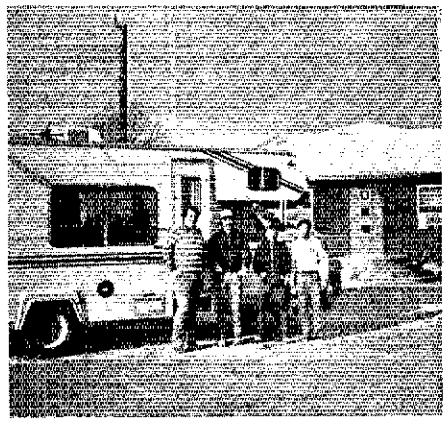
Excellent band conditions are only about half the battle in trying to make the top ten in this contest. You've also got to have the experience in contest operating and a station capable of putting out that *big* signal. Hard to tell just exactly what the "ideal antenna array" is from the diverse configurations used by this year's top W/VE participants. For example: N7DD 5-element wide-spaced Yagi at 65 feet; VE6KW 5-element Yagi at 75 feet; K7LR 10-15 duoband Yagi at 40 feet; N7DF 5-element Yagi; K5RC 5 elements at 70 feet, 7 elements at 85 feet, and 5 elements at 150 feet; WØYK 7 elements at 37 feet and 7 elements at 128 feet; N7XX 4-element Yagi and 6-element Yagi (height not specified); WØSD 3-element Yagi at 70 feet and a Hy-Gain DB10-15 at 150 feet; WØUA TH3 tribander at 85 feet and 4 elements (fixed east) at 48 feet; and W7EJ 3-element Yagi at 45 feet and 6-element Yagi at 102 feet.

If you believe that old adage "when 10 meters is hopping you can work the world with 5 watts to a wet noodle," you're going to want to plan to enlarge that 10-meter array and start adding height as the propagation begins to get a little worse. Better yet, raise one 10-meter antenna to improve your groundwave signal and keep a lower antenna for the higher angle of radiation to utilize those less-frequent openings.

A big amplifier and a "killer" antenna array may help an op to carve out his own portion of the band, but were definitely not necessary components to be able to turn in a decent score. Take the top QRP entry, which was turned in by N2AA. From home, Gene runs a Yaesu FT-301S at 5-watts output to a 3-element Yagi at 20 feet. Gene had a couple of nice JA runs, a few 40-QSO-plus hours into Europe and a few times did 50 to 60 QSOs per hour with stateside stations. Interesting to note that in the N2AA log were 714 QSOs (16 Novice and Technician types) and 110 multipliers (49 States, 7 VE multipliers and 54 DXCC countries).

*Communications Assistant, ARRL
**Assistant Communications Manager, ARRL

Ivan, F3AT, finishing up the paperwork prior to submitting his contest log.



DXpedition to Wyoming. WD8LLD/7 and KA8D/7. Operators from the left are WB8BZX, WD8LLD, KA8FXU, KA8D. The guys said that there were so many antennas on the motor home that it looked like a big rolling porcupine.

Seventy-years young and 50 years in Amateur Radio. Ted, W3GPR, still likes to take a little time for contesting from Eastern Pennsylvania.

Division Leaders

Single Operator Division		*Multioperator*
K3ZJ	Atlantic	K3WW
W9RE	Central	K9HV
WØSD	Dakota	KØSR
W5WMU	Delta	WD5BOL
K8LX	Great Lakes	AA8U
WB2WIK	Hudson	W2YV
WØXK	Midwest	WØGM
K1VTM	New England	K1GQ
K7LR	Northwestern	KL7Y
N6BT	Pacific	K7SFN
N8II	Roanoke	N4RV
WØYK	Rocky Mountain	KØRF
N4BP	Southeastern	KB4KJ
N7DD	Southwestern	K6AA
K5RC	West Gulf	N5FF
VE6KW	Canadian	VE4XK

Members of the Baden ARC living in the Canadian military community in West Germany. Left to right: DA1YT, DA1MH and DA1FN.

Top-Five DX — Single Operator

Call	*Score*	*QSOs*	*Mult.*
TG9GI	635,296	2466	128
G5CMX (N8ET)	547,162	2055	133
PJ2FR	529,584	1947	136
SM5GMG	523,164	1938	134
YU7BCD (YU7OQI)	490,320	1805	135

Top-Five DX — Multioperator

Call	*Score*	*QSOs*	*Mult.*
G3FJE	572,994	2187	131
UK2GKW	544,368	2062	132
LU5E	525,720	2021	130
HK3TF	511,048	2012	127
SMØAQD/OHØ	492,378	1797	137

Top-Ten W/VE — Single Operator

Call	*Score*	*QSOs*	*Mult.*
N7DD	945,000	3375	140
VE6KW	939,760	3455	136
K7LR	758,910	3079	123
N7DF	700,348	2894	121
K5RC	696,500	2786	125
WØYK	693,248	2707	128
N7XX (AH6Z)	683,060	2870	119
WØSD	681,250	2725	125
WØUA	679,276	2772	122
W7EJ	672,384	2472	136

Top-Ten W/VE — Multioperator

Call	*Score*	*QSOs*	*Mult.*
KØRF	867,620	3055	142
W2YV	730,002	2483	147
N4RV	700,282	2507	139
VE4XK	676,000	2704	125
AA8U	623,052	1923	162
WØCP	622,440	2660	117
K1GQ	600,356	2326	129
K3WW	599,256	2378	126
WB1HIX	557,056	2048	136
K8AZ	540,994	1970	134

SOAPBOX

Thanks for another great 10-meter contest. . . . I would like to see a point scheme such as two points per phone QSO, four points per cw QSO and six points per Novice QSO as the QSO rate on phone makes cw (and especially Novice cw) somewhat undesirable . . . this was the most action I've ever seen on 10 meters at one time and I loved every minute of it (N5HD). [Next year's 10-Meter contest will allow single-operator stations to enter a mixed phone and code, cw-only or phone-only category. — Ed.] There was never a shortage of stations to work; sometimes it seemed like the entire contest was taking place in the Novice band. Great! (KA5FAS/N). Time spent on the 10-Meter Contest: Put up and test antenna — 5 hours, prepare logs and other forms — 1 hour, get psyched up — 24 hours, contest — 30 hours, sleep during the contest — 16 hours, fix broken rotor during the contest — 2 hours, post-contest QSOs — 2 hours, dupe logs/count multipliers — 100 hours, projected time to answer the huge stack of QSL cards needing Vermont — 30 hours. Total time spent — 210 hours! *And they call this a hobby??* (WB1GQR). I have a gnawing feeling that many of the "KAs" that I worked were forgetting to put /N or /T after their calls (WA2HEB/T). After the contest, I discovered that my 7-element beam direction-indicator had slipped 30 degrees. Conditions sure must have been good — for others! (W9LT). Heard many ops missing a good bet by not even trying to work the meteor scatter that rolls through late at night. There are easy contacts to be made via m.s. on 28 MHz, to fill in those 500- to 1000-mile paths which are nearly impossible to work via other modes (WB2WIK). Should be able to operate the full 48-hour period of the contest (WD5ABF). It is interesting to note that section 96.67(b) of the FCC regs states "Amateur Stations shall use the minimum amount of transmitter power necessary to carry out the desired communication" (KA1CZF/N). . . . as MacArthur once said, "I shall return." (WA2NHA). It is my belief that if this contest was held next month, with the education that I have received from this one, my score would increase by 50% to 75% (KAØELX). What happened to Africa and South America? Am I the only one who didn't hear them? Not one signal from S.A. or Africa either day, but Europe and JA were super (WB9WXC). Didn't know anything about contesting and it dawned on me too late in the game that I should be calling CQ instead of digging out multipliers (WD4LTD). Murphy paid me a visit during the contest and brought some TVI with him. He also did a job on my VOX circuit, my antenna traps and my receiver preamp. If he thinks he has found a home here, he'd better think again, 'cause if I find him, I'm gonna waste the chump once and for all (N9AQT). Being able to switch from cw to ssb made it a lot more interesting and fun (WDØFGY). This really needs to be scheduled at a different time. The weeks immediately before the long holidays are needed for more family oriented activities. In North America, January would be a good time because no one has any money left to go anywhere after the holidays (VE3FIU/K8HI). Also, the non-contesters on the band seem to think that an op changes into a monster when working a contest by forgetting common courtesy. Not so. Try telling that to the AC5 station who broke up by best run by calling someone on SSTV, which he said was "more important." Horse Hockey! I'm for a published "Lid List." (KA1FJ). It took me six hours to enter my contest log into my computer, three minutes for the computer to print the log, then 12 hours for the computer to alphabetize all the calls and one minute to print the dupe sheet (WA4CYR). Really bananas! High rates, Rare multipliers, phone, cw, Novices, just everything — an incredible brawl! (WØUA).

FEEDBACK

Kindly note the following additions and corrections to the 1978 10-Meter Contest (see page 81, June 1979 *QST*).

At 7452 points in the South Carolina Section, the call listed should read WD4PMU, *not* WD4DPU.

N9AHY is really located in the Illinois Section, *not* in Wisconsin as printed.

The top Novice score from Missouri belongs to KAØCMK/N, not KAØCHK.

In Colorado, WBØGXR/N is really WDØGXR/N

F6EBA should have a line score of 64,130 - 583 - 55

Late mail delivery from overseas brought us a check log from UKØAAC; a fine score from UB5MCS (212,454 - 1221 - 87), making Victor the certificate winner from the USSR; and YUINGO, who scored 10,260 points by making 171 QSOs with 30 multipliers.

Almost left out:

Michigan

AA8U(+ AI8D, K8s DMG LF MJZ SXA YHH, KA8s AEE BXD FAK, N8AW, WB8QZL, WD8s BDK BDW BWN MBB RRC SBJ) 623,052-1923-162-36

Disqualifications:

N6CCN

Scores

Scores are listed by section within each U.S. call area, by Canadian call area, and by continent/country, according to prefix. The highest single-operator station in each ARRL section and country receives a certificate. The highest multiple-operator station in each section and country and the highest Novice score in each ARRL section receive certificates, if there are three or more entries listed in that classification or if, in the opinion of the Awards Committee, the entrant displayed exceptional effort. Read the listings (left to right): call, score, QSOs, multiplier, hours of operation.

DX

Africa

Canary Islands

EA8TY	240,552-1025-117-21	

Liberia

5L2AV	263,736- 989-132-	

Asia

Korea

HM1QD	58,140- 306- 95-16	

Thailand

HS1ABD	69,520- 439- 79-11	

Japan

JA7OWD	380,952-1628-117-35	
JR1WHW	361,100-1570-115-32	
JK1YVM	341,504-1472-116-36	
JA9SQO	173,864- 844-103-22	
JH1AGU	172,640- 830-104-27	
JH1VRQ	165,996- 783-106-12	
JH7JGG	156,558- 663- 97-	
JA3EQC	117,504- 612- 96-25	
JF1SEK	72,864- 414- 88-	
JA1PUK	71,378- 401- 89-13	
JA2WB	69,120- 369- 85-24	
JR3XEX	56,832- 380- 64-	
JA1EM	54,868- 313- 86-25	
JA7NVF	53,120- 380- 62-10	
JR3COZ	51,958- 307- 80-	
JA7JND	50,076- 321- 76-	
JH1WIX	47,212- 290- 74-14	
JJ1SOE	38,016- 248- 66-	
JH8GEU	37,668- 251- 73-	
JA2DHL	30,774- 225- 69-13	
JH1UUT	28,120- 185- 76-24	
JH4HLN	23,182- 164- 67- 9	
JK1VXH	21,838- 179- 61- 9	
JA1OP	19,920- 159- 60- 9	
JH2ORJ	18,612- 141- 66-21	
JJ1OSP	17,052- 135- 58-16	
JH4UVU	16,616- 124- 67-	
JE3FUN	16,500- 150- 55-14	
KA8NA(K2NA,opr)	15,120- 124- 56- 6	
JA6AKV	13,700- 143- 50-	
JA6PL	11,616- 130- 44-	
JE6FME	11,200- 105- 50-22	
JH7BRG	11,128- 107- 52-	
JK1BBO	10,912- 124- 44-	
JH1MTR	9964- 102- 47-	
JA4YPE	9730- 120- 35-	
JF3CEC	8954- 123- 37-	
JA9CWJ	8208- 108- 38-	
JG1JMH	8084- 91- 43-10	
JR3CVQ	7928- 76- 34-	
JA5QDU	5600- 70- 40-	
JA1AAT	5402- 73- 37-	
JH2XTV	5396- 71- 38-	
JA1AEW	4284- 63- 34-	
JM1FSR	2822- 45- 17-	
JK1KUW	2560- 48- 20-	
JL1VHB	2058- 49- 21- 5	
JA1JGP	1020- 30- 17-	
JL1KPP	400- 20- 10-	
JR3QCT	252- 14- 9-13	
JA9BV	224- 14- 8-	
JH1FJK	70- 7- 5-	
JA3BCT	50- 5- 5-	
JA2YKA/JH2QXG,JR2GMC, JR3URO,JA4UDP,JH4VRQ, JA9NFO,oprs)	353,510-1537-115-	
JA7YAA(JH7s AEF WTC,JR7OMB, JA9PPC,oprs)	235,108-1109-106-33	
JH1YDT(JF1SDH,JG1EAL, JH1GNU,oprs)	166,320- 936- 88-32	
JA3ZRT(JA3REU,JH3s AIU FOD FVR KWQ,oprs)	138,556- 729- 94-	
JA2YAC(JA2GEJ,JE2QIZ,oprs)	102,830- 451-113-32	
JA7YCQ(Multiop)	69,454- 445- 77-	

Mongolia

JT1BG	4968, 92- 27-	

Lebanon

OD5LX	2322- 43- 27-	

Asiatic R.S.F.S.R.

UA9CBW	143,070- 753- 95-	
UA9YDX	94,776- 718- 66-	
UA9SAX	74,740- 505- 74-	
UA9CBM	64,294- 411- 77-	
UA9CED	62,514- 453- 69-	
UA9OO	57,400- 410- 70-	
RA9CEU	57,024- 528- 54-	
UA9QBT	48,800- 405- 60-	
UA9LFK	43,164- 218- 99-	
UA9AG	41,160- 294- 70-	
UA9ACM	37,448- 302- 62-	
UA9FCK	32,982- 239- 69-	
UA9SDL	29,568- 224- 64-	

UA9QBS 22,390- 265- 63-
UA9CCD 3840- 57- 32-
UA9NP 3816- 66- 28-
UW9WI 1292- 38- 17-
UK9WBR(Multiop) 129,872- 724- 89-
UK9UAC(Multiop) 117,600- 784- 75-
UK9WA(UA9s WAY WAZ WBA WBB,oprs) 71,898- 521- 69-
UK9UCH(RA9UIF,UA9s UDL USD,oprs) 55,056- 444- 62-
UK9SAW(Multiop) 40,810- 371- 55-
UK9SAV(Multiop) 11,808- 164- 36-
UK9KAF(Multiop) 3480- 57- 29-
UK9MCN(Multiop) 1324- 47- 16-

Turkoman

UH8EAD 45,508- 376- 62-

Kazakh

UL7LAW 191,672- 988- 97-
UL7PBY 70,290- 495- 70-
UL7TA 37,088- 301- 61-
UL7AAS 27,642- 271- 51-
UL7PA 21,240- 236- 45-
UL7JCA 20,304- 216- 47-
UL7DBD 13,962- 179- 39-
UL7ECJ 8382- 127- 33-
UK7PAL(Multiop) 23,900- 239- 50-
UK7LAF(Multiop) 7476- 89- 44-

India

VU2GO 28,288- 272- 52-

Cyprus

5B4HF 377,568-1656-114-20

Europe

Andorra

C3IMK(EA3s NE WZ,oprs) 299,000-1300-115-19

Portugal

CT4NH 76,800- 384-100-
CT1AIU 65,532- 381- 86-

Federal Republic of Germany

DL8PC 465,608-1628-143-
DJ3HJ 358,118-1307-137-25
DK2MN 170,856- 791-108-28
DF8XL 65,764- 406- 82-
DK7ZT 40,716- 292- 72- 7
DL1RB 31,464- 228- 69-
DA2AL(WB3BIS,op) 30,660- 210- 73-22
DJ2YE 27,588- 200- 66-13
DF3LZ 20,100- 201- 50-
DK8JB 19,800- 117- 75-
DL7CF 17,952- 165- 48-
DJ5GG 9792- 102- 48-
DJ6XB 9396- 87- 54- 7
DL1YA 8742- 90- 47-
DF3QN 6084- 78- 39-
DF8NO 2450- 43- 25-
DL1AM 1334- 27- 23-
DK9KC 1089- 54- 40-
DL6WW(DF1ZE,DH5ZF,DF7ZP, DK8WD,DL3ZA,oprs) 426,360-1615-132-
DK9TU(DK1PD,DK5GB,DK9NX, DL7s XB ZN,oprs) 333,450-1401-117-
DA2BS(DA1s FN MH QR XU YT, DA2WC,oprs) 180,992- 829-112-29
DL8VK(DK4ZK,DK5s AA BZ, DK8WF,DL2FAG,DL6MK,oprs) 147,960- 651-108-28
DA1XL(DA1s UY VM VN,DA2LB, DA4EM,oprs) 92,020- 535- 86-26

German Democratic Republic

DM2BTO 240,352-1035-116-
DM2FDL 60,610- 551- 55-
DM3XX1 47,158- 323- 73-
DM3NKF 31,356- 234- 67-
DM3SBM 27,900- 186- 75-
DM4WCE 21,328- 179- 62-
DM3TH 13,780- 130- 53-
DM4WFF 7722- 99- 39-
DM2DIF 7400- 100- 37-
DM3UE 6336- 72- 44-
DM4QWL 5624- 76- 37-
DM4XCE 4600- 57- 46-
DM3ZL 4130- 69- 35-
DM5VNH 3924- 77- 36-
DM2EVH/P 2496- 52- 24-
DM2CEE 1920- 40- 24-
DM4YEL 1100- 25- 22-
DM3OG/DM4WGG 750- 25- 15-
DM3WI 704- 22- 16-
DM2CRJ 588- 20- 14-
DM3VGO 168- 12- 7-
DM5IG(DM5s AIG XIG,oprs) 6006- 75- 39-

Spain

ED3AIN 225,170- 979-115-19
EA2OP 112,860- 588- 95-19
EA2OJ 8736- 78- 56-

Ireland

EI2BB 320,640-1336-120-21

France

F5WA 167,356- 937- 86-23
F6DCQ 125,568- 657- 96-
F6EGV 29,988- 223- 63-17
F3AT 19,588- 150- 59- 7
F6BVB 17,952- 219- 41-
F8WE 14,112- 147- 58-
F8RU 13,500- 125- 54-
F8TQ 13,300- 125- 50-
F8TM 3264- 51- 32-
F6CZO 2804- 48- 24-
F9SE(OH2LU,opr) 616- 20- 14-

England

G5CMX(N8ET,opr) 547,162-2055-133-28
G4GXL 121,952- 592-105-
G3ESF 78,949- 448- 88-34
G4BUO 40,200- 300- 67- 8
G4BUE 11,648- 104- 56-
G3FJE(G4s BWP DRS GIR,oprs) 572,994-2187-131-28

Isle of Man

GD4GWQ 2484- 46- 27-

Scotland

GM3YOR 185,250- 970- 95-
GM3RAO 167,642- 769-109-
GM4CHX 22,144- 173- 64-

Guernsey

GU3YIZ 67,200- 400- 84-
GU3MBS/M 39,566- 269- 73-

Wales

GW4BLE 248,706-1011-123-

Hungary

HA5KBM 59,856- 349- 86-
HA9HW 41,344- 263- 68-
HG8KQ×(HA8BY,opr) 30,072- 177- 84-
HG6EA 1588- 41- 17-
HA9IG 1296- 36- 18-
HG9KOB(HA9s PV RB RU SB,oprs) 386,474-1597-121-
HA6KNV/P(Multiop) 5270- 85- 31-

Switzerland

HB7G(HB7AW,opr) 68,220- 405- 71-
HB9LP 17,056- 208- 41- 6
HB7ROW 8132- 105- 38- 7
HB7BRQ(K3KWJ,opr) 928- 27- 16-

Italy

I4JCC/5(W3US,opr) 402,960-1460-138-30
I3XCE 102,432- 558- 88-24
I3IET(+I3MAU) 273,828-1201-114-24

Norway

LA1NG 217,532- 914-119-18
LA5SH 94,160- 424-110-
LA1H(LA9OI,opr) 40,920- 330- 62-
LA6ZW 28,152- 204- 69-
LA9HW 18,810- 164- 57-
LA2GN 8550- 195- 45-
LA3UG 7488- 96- 39-
LA2IJ 4762- 63- 37- 7
LA7SI 2438- 53- 23-
LA1KQ 2300- 46- 25-
LA5YV 1656- 36- 23-
LA1VL 1480- 32- 20-
LA4LG 816- 24- 17-
LA2AD 456- 19- 12-
LA2YT 264- 12- 11- 1

Bulgaria

LZ2DB 252,668-1117-113-
LZ2VE 20,256- 211- 48-
LZ2GS 15,228- 142- 54-
LZ2KKZ(Multiop) 136,000- 666-100-

Austria

OE2VEL/1 34,952- 256- 68-
OE1TKW 2300- 46- 25- 3

Finland

OH1EH 83,100- 554- 75-
OH6RC 64,512- 336- 96-
OH6BG 36,140- 277- 65-
OH7QU 34,960- 259- 65-
OH1QB 26,520- 204- 60-
OH7NW 23,660- 169- 70-
OH9SS 18,924- 166- 57-
OH5AD(OH5LK,opr) 15,950- 140- 55-
OH4PW 9360- 90- 52-
OH2BKY 8772- 100- 43-
OH2BSA 8208- 72- 54-
OH3NM 8024- 93- 34-
OH2FS 3450- 70- 25-
OH3FW 2030- 35- 29-
OH9TD 1750- 35- 25-
OH5MQ 1116- 34- 17-
OH5TZ 810- 27- 15-

Aland Islands

OH3JR/0 17,591- 171- 51-
SM0AQD/OH0(+SM0GMZ) 492,378-1797-137-

Czechoslovakia

OK1ALW 260,148-1134-114-
OK2BTI 159,576- 654-122-
OK3WW 84,096- 437- 96-
OK1FCA 77,896- 417- 91-
OK3CJK 55,242- 341- 81-
OK3IF 43,362- 285- 73-
OK2PFQ 26,796- 231- 58-
OK1KZ 23,200- 200- 58-
OK1DKR 22,528- 176- 64-
OK3BA 22,000- 202- 50-
OK2QX 20,862- 171- 51-
OK1KCI 18,574- 251- 37-
OK1JHR 16,016- 153- 52-
OK1QH 14,280- 135- 51-
OK3CAR 14,080- 128- 55-
OK3CON 10,710- 117- 45-
OK1TW 9990- 135- 37-
OK1JBL 9912- 118- 42-
OK1DKS 9476- 103- 46-
OK3TOA 8034- 101- 39-
OK3CO 7216- 88- 41-
OK2KWI 6696- 108- 31-
OK1JXG 5832- 81- 36-
OK3CEE 3500- 44- 25-
OK2LN 2484- 54- 23-
OK1AYX 2112- 48- 22-
OK1KIR(OK1DAI,opr) 1550- 31- 25-
OK2KVI 1190- 35- 17-
OK1AVD 840- 30- 14-
OK3V5Z(Multiop) 25,560- 213- 60-
OK1KOK(Multiop) 11,776- 128- 46-
OK1KTW(Multiop) 4712- 76- 31-
OK1KCF(Multiop) 840- 28- 15-

Belgium

OS6AH 172,356- 813-106-
ON5AZ 166,192- 799-104-
OS7EJ 109,056- 568- 96-26
ON4XG 98,800- 488- 95-
ON5WL 46,350- 309- 75-12
ON6NL 43,860- 255- 86-
ON5TZ 28,200- 188- 75-22
ON8UW(W9KP,opr) 19,580- 178- 55-16
ON4FD 6464- 99- 32-
ON7VP(+ON6NW) 75,200- 487- 75- 15

Faroe Islands

OY1AT 16,432- 158- 52-

Denmark

OZ5EV 389,988-1413-138-
OZ7BW 44,252- 299- 74-
OZ6XR 41,720- 301- 70-
OZ1BUR 38,676- 295- 66-
OZ7YL 24,960- 240- 52-
OZ2UA 20,584- 166- 62-
OZ1CGW 16,912- 151- 56-
OZ9OL 6570- 73- 45-
OZ1CCB 3492- 61- 36-
OZ2BM 1680- 28- 28-
OZ4HW 1596- 38- 21-

Netherlands

PA2TMS 245,920-1060-116-
PA0AWI 78,988- 398- 98-20
PA3ABA 72,036- 414- 87-
PA0INA 61,812- 606- 51-
PA0DUO 47,268- 234-101-
PA0GT 29,638- 203- 73-
PA3AEB 29,200- 200- 73-
PA0QAM 21,780- 165- 66-
PA0KSB 12,654- 111- 57-
PA0UV 12,540- 110- 57-
PA0JM 9840- 120- 41-
PA3AJA 9292- 101- 46-
PA0TUK 7896- 84- 47-
PA0COR 7566- 97- 39-
PA0LIE 7020- 90- 39-
PA0MTJ 3240- 60- 27-
PA0YN 2350- 47- 25-
PA2DXY 1520- 40- 19-
PA0GN(PA0s BRO ERA GIN OOM OOS VAJ,PA2EWU,PE1s BBI BOW,PE0s ETR MOT,oprs) 297,750-1191-129-30

Sweden

SM5GMG 523,164-1938-134-
SM5CAK 100,608- 831- 64-
SM3DXV 33,902- 253- 67-
SM5IMO 28,752- 197- 73-
SM6BDS 26,536- 198- 62- 8
SM5DAC 21,944- 211- 52-
SM5ARL 16,226- 133- 61-
SM7AIO 15,104- 128- 59-
SM6BBX 11,920- 149- 40-
SM5BDV 6762- 138- 49-

Poland

SP9CAV 98,766- 531- 93-
SP5BR 92,862- 452- 99-
SP9PDF 70,680- 404- 85-
SP6GF 69,420- 345- 89-
SP5XM 69,342- 381- 91-
SP5IVC 52,316- 319- 82-
SP9AKD 20,838- 151- 69-
SP2AVE 16,758- 147- 57-
SP9HWN 16,016- 143- 56-
SP6DMJ 12,444- 121- 51-
SP7FTP 12,342- 121- 51-
SP9DFH 8280- 89- 45-
SP6KZW 6370- 91- 35-
SP5GLQ 5016- 66- 38-
SP9BDQ 510- 17- 15-
SP7KTE 162- 7- 7-

Greece

SV0AR 54,600- 417- 65-18

European S.F.S.R.

UA1AWO 198,396-1000- 99-
UW1AE 107,926- 593- 91-
UA6LIG 92,738- 526- 89-
UA3ECF 90,464- 514- 88-
UA4HFQ 88,408- 514- 86-
UA3RQO 82,800- 480- 86-
UW3ER 73,568- 418- 88-
UA3TN 73,260- 412- 90-
UW3UO 66,424- 428- 76-
UA4WBJ 57,086- 391- 73-
UA3LCU 46,170- 285- 81-
RA3DPD 46,116- 366- 63-
UA8AZA 44,544- 348- 64-
UA3LBP 40,192- 314- 62-
UA3DNK 37,884- 286- 66-
UA4CH 35,464- 280- 62-
UA3ST 34,406- 281- 63-
UA6AKB 33,768- 252- 67-
UA4CK 31,590- 242- 65-
UV3MM 31,122- 247- 63-
UA3AGQ 24,336- 234- 52-
UA4HBP 20,532- 174- 59-
UA3AFQ 20,280- 169- 60-
UA6AYR 17,102- 177- 46-
UA3IDT 14,602- 148- 49-
UA6AJF 13,536- 142- 48-
UA3QAQ 12,250- 175- 35-
UA1ZCG 11,100- 111- 50-
RA3PGQ 9916- 134- 37-
UA4CM 8268- 101- 39-
UA6ANS 7846- 128- 31-
UA3AEX 7800- 130- 30-
UV3AP 6080- 74- 40-
UA4ACP 4416- 69- 32-
UA3GO 2592- 54- 24-
UK3QAE(Multiop) 228,330-1062-107-
UK6LTG(Multiop) 110,520- 614- 90-
UK3DAH(Multiop) 39,192- 276- 71-
UK6LBM(UA6LFX,UW6LI,oprs) 30,690- 278- 55-

Ukraine

UB5IJK 418,176-1452-144-
UB5MCS 358,020-1530-117-
UB5BZ 66,160- 451- 80-
UB5AAL 60,922- 367- 83-
UB5QES 41,860- 322- 65-
UB5GCX 39,712- 272- 73-
UB5HBT 30,000- 200- 75-
UB5MNM 22,990- 121- 95-
UY5EM 21,708- 197- 54-
UB5ICS 13,824- 142- 48-
UB5QFJ 10,620- 118- 45-
UY5TE 9944- 77- 36-
UB5QES 4712- 76- 31-
UB5JKW 2772- 41- 33-
UB5QCK 2150- 40- 25-
UK5AAP 546- 21- 13-
RB5IOV 18- 3- 3-
UK5QBE(Multiop) 72,988- 514- 71-
UK5QAC(Multiop) 60,600- 404- 75-
UK5IAZ(Multiop) 22,644- 222- 51-
UK5QCI(Multiop) 10,854- 201- 54-
UK5UDX(UA4LAR,UB5UAL, oprs) 6016- 94- 32-

White R.S.S.R.

UC2AFE 104,152- 553- 94-
UC2ACD 77,854- 469- 83-
UC2OBZ 55,390- 352- 79-
UC2WAZ 18,368- 159- 66-
UC2AW 10,960- 134- 40-
UC2SE 10,004- 122- 41-
UC2OAI 7344- 102- 36-
UC2OBA 5810- 82- 35-
UC2ACL 1672- 44- 19-

Azerbaijan

UD6CN 62,764- 442- 71-
UD6DLJ 18,228- 186- 49-
UD6DER 182- 14- 13-

Georgia

UF6FER 69,138- 501- 69-
UF6OAC 32,800- 200- 57-

Moldavia

UO5OGX 107,262- 531-101-
UO5OBE 56,376- 370- 73-
UO5OWC 49,274- 339- 71-

Lithuania

UP2BAR 222,384- 984-113-
UP2BDO 81,096- 425- 93-
UP2BAE 72,540- 378- 93-
UP2BCG 69,900- 463- 75-
UP2BCD 34,648- 244- 71-

Latvia

UQ2GDM 181,596- 805-111-
UQ2GBW 125,840- 572-110-
UQ2OP 69,844- 425- 76-
UQ2HO 57,288- 341- 84-
UQ2GCP 7462- 91- 41-
UK2GKW(Multiop) 544,368-2062-132-
UK2GDZ(Multiop) 190,082- 941-101-

Estonia

UR2RQJ 102,800- 514-100-
UR2QD 56,238- 309- 91-
UR2RCU 33,108- 186- 89-
RR2TAG 19,796- 200- 49-
UR2JL 16,872- 148- 57-
UR2AW 180- 10- 9-
UK2RDX(Multiop) 200,200-1001-100-
UK2RAQ(Multiop) 51,528- 339- 76-

Rumania

YO6KEI 23,058- 189- 61-
YO7APA 10,040- 120- 46-
YO8RL 1080- 30- 18-

Yugoslavia

YU7BCD(YU7QQM,opr) 490,320-1805-135-
YU1NZW 32,376- 219- 71-
YU7SF 17,280- 125- 69-
YU2CCB(Multiop) 164,000- 725-120-

I.T.U. Geneva

4U1ITU(K3KWJ,opr) 15,050- 175- 43-

North America

Bahamas

C6ACY(WA7UWE,opr) 468,208-2251-104-

Dominican Republic

HI8LC 23,600- 200- 59-

Virgin Islands

KP2B 169,680- 707-120-

Greenland

OX3ZM 40,256- 272- 74-

Guatemala

TG9GI 635,296-2466-128-26

Costa Rica

TI2NA 282,240-1260-112-24

British Virgin Islands

VP2VCA(W0YR,opr) 18,338- 173- 53- 8

Mexico

6G1J 173,316- 858-101-16
XE1LLS 89,319- 784- 57-14

Cayman Island

ZF2AG(N8AG,opr) 41,674- 300- 67-20

Barbados

8P6ML 25,172- 203- 62- 9

Oceania

Philippines

W7LPF/DU2 13,300- 175- 38-

Guam

AH2E 385,890-2029- 95-35

American Samoa

AH8A 141,960- 910- 78-19

Australia

VK5MF 39,804- 321- 62-16

Indonesia

YB0ACL(W4LCI,opr) 8820- 126- 35-18

South America

Chile

CE3AEZ 2028- 39- 26- 2

Ecuador

HC5EA 99,176- 506- 98-12
HC2BW(W1VEH,opr) 46,200- 275- 84-24

Dominican Republic

K9EF/HI8 158,064- 888- 89-

Colombia

HK4UT 1496- 34- 22-
HK3TF(+HK3AXT) 511,048-2012-127-32

Argentina

LU5FGG 32,768- 256- 64-23
LU5E(LU1BR,LU2s AFH DSL, LU3s AJW DK,oprs) 525,720-2021-130-36

Netherlands Antilles

PJ2FR 529,584-1947-136-33

Brazil

PT2BW 45,892- 298- 77-

Trinidad

9Y4VU 10,738- 91- 59- 5

W/VE

1

Connecticut

K1VTM 641,832-2276-141-33
W1WEF 320,124-1440-111-26
K1TO 214,756-1001-106-20
K1KI 180,624- 834-106-12
W1CC 73,800- 410- 90-12
K1EB 71,200- 400- 89-30
WA1FCN 57,768- 332- 87-
AB1U 37,440- 288- 66- 7
W1CH 27,724- 239- 58-14
W1CNU 25,916- 206- 62-10
WB1CRH 20,064- 176- 57- 5
W1IVB 19,266- 169- 57- 9
WB1EAZ 18,792- 162- 58- 9
K1TN 18,240- 190- 48- 3
K1TG 17,864- 154- 58-11
WB1CRI 10,920- 85- 60- 6
WB1HLU 9438- 143- 33-12
WB1ACS 8470- 98- 35-10
KA1C2F/N 8288- 89- 37-16
K1DII 6930- 99- 35-10
WB1FVJ 6656- 92- 32- 3
W9KDR 4608- 48- 48- 9
K1RT 1952- 60- 16- 2
W1QV 1170- 45- 13- 2
W1CUH 416- 15- 13- 7
K1NYK(+KA1s BMB GD, WA1YEC,WB1GIF) 232,680-1108-105-34
K1MUJ(WA1s GBA HYN,oprs) 134,640- 612-110-11
WB1GOO(+WB1DBR) 132,512- 609-101-30

Eastern Massachusetts

WB1ANT 383,724-1683-114-27
W1HHN 140,976- 711- 99-20
K1VUT 102,856- 551- 84-19
W1FM 95,368- 512- 91-16
K1FWF 78,822- 453- 87-16
W1GXT 77,800- 389-100-19
AD1Z 60,320- 369- 80-24
W1AQE 50,020- 305- 82-
K1GRB 44,718- 257- 87-15
K1EXJ 35,568- 228- 78-15
W1PL 35,092- 283- 62- 7
K1RB 28,392- 182- 78-26
WB1DFV 19,468- 157- 62- 6
KA1CLV/N 12,384- 102- 43-22
W1PLJ 11,782- 137- 43-11
K1UR 6510- 93- 35- 3
AD1C 6480- 89- 36- 7
WA1YVT 3286- 53- 31- 8
WA1UZH(+WA1ZXB) 442,134-1827-121-33
AE1P(+WB1FLA) 210,944-1021-103-32
AB1F(+AB1X,N1ASF) 17,040- 582- 95-31
N1AEQ(+K1s ANS NTS ZZJ,KA1s AAD BVN DAS,N1AOW) 116,982- 601- 97-35
WB1FWS(+KA1BCV) 91,532- 467- 98-30

Maine

WA1YOC 238,194-1203- 99-16
WA1PDG 78,776- 444- 86-26
KA1CVM 74,496- 384- 97-22
N1AFC 53,632- 419- 64-10
K1BZ 14,444- 157- 46-10
W1GX 7400- 100- 35- 3
WB1CXJ 3200- 40- 40-21
W1CTR 2070- 45- 23- 2
KM6FC/W1(+KA1CKL,KM6FD, WB6BON) 243,040-1085-112-33

New Hampshire

W1HCS 414,480-1727-120-36
WA1YIV 69,056- 416- 83-21
WA1NIE 58,860- 317- 90-13
AC1J 41,160- 293- 70- 9
K2DWR/1 31,590- 236- 65-11
KA1DJR/N 27,380- 180- 57-31
KA1CAU/N 20,400- 150- 57-25
W1VBX 20,240- 184- 55-27
W1ICU 18,600- 150- 62-12
WB1EIH/T 10,664- 86- 43-19
KA1BUL 5494- 56- 41- 8
KA1BBI/N 1584- 27- 18- 6
N1ACH 1500- 30- 25- 2
K1GQ(+K1s AR DG,N1EJ) 600,356-2326-129-33
W1RR(+AF1O,K1IU) 531,440-1816-146-36

Rhode Island

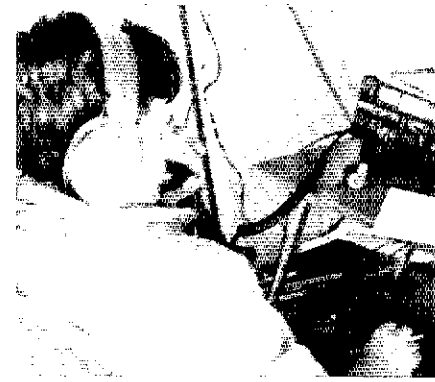
N1ARP 53,088- 316- 84-30
WA1GND 17,974- 197- 43-14
WB1HIX(+N1ACU) 557,056-2048-136-36

Vermont

WB1GQR 380,152-1557-122-30
WA1KPJ 353,718-1371-129-29
WA1ZLD 283,360-1287-110-31
KA1EJ 119,884- 725- 82-16
W1CTM 101,268- 522- 97-21
KA1BEE/N 9100- 93- 39-12

Western Massachusetts

N1YY 462,972-1882-123-35
N1TZ 263,280-1097-120-20
WA1ZAM 165,816- 846- 98-26
N1ATD 46,294- 275- 79-25
WB1HIH 31,388- 267- 59-21



EA3WZ and EA3NE spent considerable time, money and effort to go to Andorra and put C31MK on the air. Looks like Field Day, but at – 12° C it sure didn't feel like it. Right: John, EA3WZ, runs some U.S. stations.

JH2ORJ likes to contest in style. Note the neat station layout.

KIUU 8640- 91- 45- 4
W1JP 8160- 80- 51- 6

2

Eastern New York

W2AZO 136,300- 724- 94-12
WB2THN 65,760- 405- 80-14
WA2KCL 59,332- 326- 77-18
WA2MRW/N 46,340- 223- 70- 8
N2AZS 35,960- 300- 58-26
K2MN 34,310- 228- 73-12
WB2OFV 29,280- 240- 61-17
N2BJG 28,686- 245- 57-28
N2ES 28,080- 216- 65-16
WB2KHE 26,860- 207- 64-20
WB2KMY 25,254- 202- 61- 7
KA4DHY/2 24,800- 200- 62-10
N2BIN 24,400- 200- 56-20
KA2AOP 21,672- 218- 52- 8
AA2Y 16,016- 139- 56- 7
WA2RNX 10,656- 110- 48- 4
W2UW 8624- 98- 44- 3
KA2DLX/N 8312- 58- 28- 9
WB2QUH 3960- 65- 80- 8
AK2H 3300- 48- 33- 7
W2YV(+K1PR,N2NT) 730,002-2483-147-36
AG2X/(+AJ2O,KA2s AKS APN DGG JBY ICA JCD,KB2J,
WA2OUSI 266,400-1200-111-35

New York City - L.I.

K2PE 221,328-1036-106-20
W2DKM 174,930- 832-105-25
WB2AMU 125,256- 594-102-32
K2SX 109,890- 529- 99-12
W2KZE 84,490- 497- 85-36
WA2SUH 78,958- 407- 97-17
WA2SFL 49,202- 337- 73-11
WB2DLA 30,160- 215- 65-22
N2GC 22,848- 208- 56-10
AC2P 20,060- 170- 59-12
WA2SVT 19,592- 158- 62-13
KB2DY 15,846- 139- 57-11
W2KDI 14,112- 84- 84-20
KA2PTG 13,524- 120- 27- 6
WB2PXA 11,040- 120- 46- 5
K2HTO 5544- 77- 36- 5
KA2DIV 3168- 50- 24- 8
WB2PLT 2048- 64- 16- 2
WB2QEU(Multiop) 140,220- 613-114-21
KA2ELW(+WB2PWV) 123,740- 538-119-36
N2ALD(+WA2KQY) 97,006- 533- 91-15

Northern New Jersey

WB2WIK 255,794-1032-121-35
WB2QYI 231,752- 982-118-26
WB2YOF 205,184- 903-112-24
N2AA 164,120- 730-110-26
AF2L 149,040- 803- 92-18
WA2NHA 142,800- 680-105-21
N2OL 133,848- 676- 99-24
W2RQ 110,352- 627- 88- 9
WB2LDN 100,608- 523- 96-30
K2UFM 94,000- 500- 94-15
K2JT 74,948- 453- 82-12
WA2OVE 52,668- 356- 74- 6
WA3DFC 45,738- 294- 77-11
WB2RNZ 43,766- 270- 79-11
K2PF 43,664- 260- 82-12
WA2JHN/N 32,240- 206- 62-21
KA2CSI/N 30,120- 209- 60-15
WB2SXT 21,518- 203- 53-14
WB2TOM 18,920- 172- 55-14
WD2AJJ 16,632- 154- 54- 8
W2CHA 16,380- 105- 78-17
WB2NGT 15,840- 136- 48- 6
WA2LTS 15,364- 136- 46-22
WB2GJO 12,480- 115- 52-12
WA2PQU 11,750- 125- 47-
W2CC 10,100- 101- 50- 5
WA2UDT 8814- 104- 39-24
WB2NHT 7644- 106- 36- 5
WB2NCF/T 4374- 63- 27- 6
WB2EGI(+WA2PID,WB2S RTF TSY) 262,406-1042-121-34
K2XR(+K2UWR,N2ADH) 256,586-1177-109-34
WB2JGP(+WB3LBM) 116,800- 581-100-32
WB2RLB(+N2BQ,WA2KYG) 87,356- 469- 86-26
WB2FOU(+AD2K) 13,104- 156- 42- 7

Southern New Jersey

W2BHK 214,926- 951-113-22
WA2AUV 59,752- 388- 77-30
W2GTN 18,422- 151- 61-13
K2HPV 15,904- 135- 56- 8
W2QKJ 13,350- 135- 49-26
WA2HEB/T 12,710- 118- 41-22
W2EHN 8924- 97- 46- 6
WA2CUW 4416- 55- 32- 5
N2AWC 4320- 60- 30-24
N2CQ 4148- 61- 34- 2
KB2LQ(Multiop) 2296- 41- 28- 4

Western New York

WA2MNM 110,210- 515-107-22
KB2HF 95,232- 512- 93-19
KA2HDY 95,178- 528- 87-26
W2RTY 92,644- 437-106-23
KB2DE 56,144- 319- 88-18
WA2EYA 48,516- 311- 78-16
N2AOW 44,660- 319- 70-24
N2ALK 43,120- 278- 77- 8
WB2OZS 38,640- 276- 70-19
WB2LOF 38,372- 180-105-10
WB2MWB 36,840- 307- 60-25
K2XU 36,310- 251- 71-13
WB2TKD 32,400- 225- 72-36
KA2CZO 31,812- 241- 66-20
W2IE 31,744- 256- 62- 9
WB2ZEL/T 30,696- 149- 52-
KB2KN 13,570- 115- 59- 6
WB2NLR 12,672- 144- 44- 5
WB2GLD 11,782- 136- 43-15
W2FUI 11,424- 113- 48-26
W2EZ 11,388- 136- 39-
WA2YRL 9108- 138- 33- 8
KA2CQV 8908- 108- 34-13
WA2HXB 7128- 99- 36- 6
WA2YVG 5152- 89- 28-14
WA2IMG 3000- 50- 30- 4
N2ARG 2828- 54- 26- 7
AK2O 630- 17- 15- 3
WB2PSI(K2s RJ SPO,WA2s EWU YRL ZKD,WB2s AQQ KAO,oprs) 232,560-1019-114-29
WA2IKO(+WB2PGU) 205,794- 917-111-32
K2QIE(KA2DDJ,WA2PHA, WB2WSV,oprs) 203,148- 891-114-30
WA2ZFW(+KA2ABA) 40,000- 280- 80-20

3

Delaware

KA3BCP 270,816-1092-124-23
K3HBP 158,508- 777-102-16
K3CNH 15,694- 133- 59-10
WA3BZT/T 2584- 50- 17- 8
AC3T 160- 25- 13- 1

Eastern Pennsylvania

N3AOT 168,054- 738-111-25
KA3ARQ 143,460- 797- 90-30
KA3ART 66,582- 411- 81-34
KB3BW 63,902- 359- 89-19
W3ARK 62,856- 387- 81-12
WB3EFI 53,676- 364- 77-27
WB3JYY 48,034- 317- 73-22
W3GPR 41,328- 287- 72-17
W3ADE 36,294- 240- 69-21
W3ETB 35,250- 235- 75-20
WB3JZE 34,572- 239- 67-30
KA3BOG 32,900- 235- 70-13
WA3BNO 21,808- 182- 56- 5
W3PC 18,460- 130- 71-10
KA3AFY 13,824- 126- 48-13
W3IXQ 13,038- 123- 53-12
WA3TQJ 11,544- 143- 39-34
KA3BLP 11,248- 152- 37- 2
W3CEI 8568- 119- 36-12
K3PQC 6000- 100- 30- 9
WB3KOA 5940- 55- 40- 5
KA3AKZ/N 4640- 42- 42-27
W3HMR 2200- 39- 25- 2
K3WW(K3WJV,KB3GJ,oprs) 599,256-2378-126-
KB6R/3(+WA2BFW) 290,556-1153-126-36
WB3KHF(+WB3KHE) 69,530- 409- 85-28
WB3HJC(+WB3FLK) 65,188- 379- 86-31
N3AOG(+KA3EOQ,WB3EPU) 61,824- 315- 92-34

Maryland - D.C.

K3ZJ 445,952-1660-134-35
W3LPL(N3TR,opr) 335,708-1723-126-36
WB3DNL 335,520-1397-120-34
K3EW 329,364-1300-126-35
K2II/G/3 178,044- 802-111-27
WA3VUQ 168,674- 697-121-19
WA3UPH 131,036- 694- 94-12
W3GN 107,380- 576- 91-31
W3HVM 74,124- 423- 87-18
WB3LNV/N 58,108- 342- 73-14
W3JDT 43,928- 289- 76-11
W3AGH 43,344- 301- 72-32
W3MZG 28,274- 211- 67-11
WA3TGB 25,600- 200- 64-17
N3RL 20,608- 161- 64- 6
WJPYZ 15,708- 117- 66-20
WB3FWD 14,400- 143- 45-11
W3FQE 13,158- 153- 43-17
W3WOT 10,332- 123- 42- 6
KA3BWT 8712- 121- 36-
WA3YKR 7704- 107- 36-11
AG3S 5808- 66- 44-14
KA3CZL/N 1126- 27- 19-20
N3AQH(+N3AVA) 119,790- 605- 99-15
KA3DBN/N(+KA3CGM) 74,408- 368- 71-30

Western Pennsylvania

K3UA 138,904- 716- 97-14
WA3FUV 120,324- 813- 74-23
K3DE 101,436- 477-107-30
W3KBZ 73,416- 399- 92-19
KA3AJZ 61,236- 378- 81-21
W3HDH 32,000- 200- 80- 6
W3IW 27,186- 192- 69- 7
AD8J/3 25,992- 236- 57- 6
KB3CK 25,636- 221- 58-12
W3GVI 23,310- 185- 63-13
KB3BV 19,344- 186- 52- 9
WB3KAF 16,968- 202- 42- 6
WA3UNX 14,406- 139- 49- 7
WA3ESH 13,144- 124- 53-16
WA3ZAH 11,704- 133- 44-13
W3DKL 11,524- 134- 43- 6
KA3DBO/N 6596- 75- 34-17
N3BAW 4104- 57- 36-
WA3PCX 24- 4- 3- 5

4

Alabama

K4ZGB 163,590- 779-105-22
N4KG 119,340- 510-117-11
K4IQJ 48,250- 313- 75-15
K4GSK 20,680- 179- 56-12
N4AID 5508- 81- 34- 9
KA4BZY 2640- 60- 22- 8
WA4MGJ 806- 31- 13- 2

Georgia

K4BAI 116,594- 599- 97-14
WD4HER 79,113- 438- 82-20
K4HAV 54,796- 284-103-14
WA4EMA 51,408- 304- 84-14
K4LDI 43,624- 266- 76-20
K4KG 38,106- 261- 73-30
N4BWS 31,098- 219- 71-20
WB4NMA(+WA4OVH) 207,872- 891-116-35
WA4QVM(+WD4EBB) 19,300- 193- 50-15

Kentucky

WA4QQV 287,212-1217-118-27
WA4QMQ 205,428- 901-114-28
WD4LTD 85,800- 429-100-21
KB4YI 62,568- 395- 79-30
KA4FBZ 27,502- 203- 67-25
WA4NOH 24,050- 185- 65-24
W4YGK 23,684- 171- 62- 7
WB4ASZ 18,216- 198- 46-20
WB4TKJ 18,124- 195- 46-13
WD4IAG/N 11,550- 103- 33-14

North Carolina

WD4NAO 213,196- 986-108-23
WB4MSG 194,526- 899-107-32
WA4ZXA 181,216- 809-112-20
K4JYS 155,624- 747- 98-26
N4FD 153,260- 788- 97-22
WD4AAM 127,260- 606-105-28
N4QY 56,960- 320- 89-19
WA4FXJ 46,200- 308- 75-19
WD4JFR 18,096- 104- 87-22
WB5YMS 17,064- 150- 54-10
WD4NLX 10,332- 107- 41-15
N6DR/4 7260- 110- 33- 3
W4XC(+WD4MKQ) 104,004- 482-107-25

Northern Florida

N4SA 313,728-1376-114-23
N4UF 164,934- 833- 99-27
KA4FYC 50,358- 327- 77-28
AG4S 23,184- 168- 69-15
N4KF 1176- 25- 21- 2
KB4HF(+KF4W) 136,640- 610-112-29
K4GSO(W4s UEA WWW,WA4s EQ2 HHC,WB4RZH,WD4s CND PQN RJI,oprs) 110,016- 572- 96-33
WD4IIO(WA3YMV,WB3FUU, W4ILE,WD4s EGR FNX,N8AWM, oprs) 31,680- 255- 60-16
K4HML(+W4BLQ,WB4YPS) 10,682- 143- 37-14

South Carolina

WB4TLX 156,368- 674-116-34
K4RV 48,960- 340- 72-24
WB4IUX 19,604- 169- 58- 5
WD4NNP 15,220- 141- 54- 9
KB4IU(+WA4WYT,WB8TCT) 47,460- 339- 70-29

Southern Florida

N4BP 324,786-1463-111-23
WA4NPO 200,182- 991-101-28
W4OO 140,576- 753- 92-22
WA4RRB 121,506- 789- 77-11
WA3UBA/4 113,602- 719- 32-36
K4KUZ 100,646- 553- 91-17
WD4AHZ/N 65,550- 372- 75-17
K4XB 56,980- 407- 70-18
K4QHH 47,916- 363- 66-28
K1FJM/4 34,310- 231- 55- 8
WD4HRY 20,640- 172- 60-13
WB4WDK 14,852- 158- 47- 6
WA4FYZ 13,056- 132- 48- 9
G5CP/W4 5642- 89- 31-
KA4CSS/N 3600- 56- 25-13
KB4KJ(+WA4QKX,WB4DWD) 377,576-1732-109-31
WD4MWJ(+KA4DKI) 171,832- 914- 94-36

Tennessee

AG4V 231,312- 948-122-25
K4AMC 119,382- 584-101-25
WB4WHE 62,988- 355- 87-15
W4ZWZ 41,496- 273- 76-16
WD4HUT 35,990- 305- 58-30
WD4PEQ 24,708- 213- 58-19
WD4FKS 16,652- 181- 46-
W4OGG 14,134- 199- 33- 6
KA4FDJ 13,938- 101- 69-10
WB4MXC 10,108- 116- 38-20
WD4LFD 7688- 62- 62-24
WD4CFN 7072- 104- 34- 7
K4MZE 1080- 27- 20- 2
KB4SL(+WA1RCE) 37,836- 276- 68-21

Virginia

WA4YCR 171,288- 732-117-29
KA4BFT 100,748- 557- 89-24
WA4NTP 92,048- 523- 88-12
W4OEL 88,944- 386-109-21
K4TSU 74,800- 440- 85-25
W4ZEI 67,512- 385- 87-24
W4WWQ 53,680- 305- 88-17
W4YE 42,480- 290- 72- 7
W4XDD 26,520- 199- 68-10
WB4DNL 23,546- 173- 61-23
N4CD 22,016- 177- 64- 7
W4KMS 19,344- 156- 62-15
WD4GCE 15,810- 155- 51-10
WB4PVT 13,132- 134- 49-11
K4GEL 12,604- 132- 46- 7
KA4HRD 9880- 126- 38-13
WB9WZY/4 598- 14- 13-
N4AXA 396- 18- 11- 2
W4ZRJ 160- 10- 8- 1
N4RV(+K3EST) 700,282-2507-139-
KB4LX(+N4ABZ,WA4s QVP YOB ZNY,WB4s ARA CTF WWS, WD4FTK) 337,250-1349-125-35
WA4YBV(+WD4GXN,WB4QGX, W4THU,W4TSJ) 333,060-1281-130-28
KB4OB(+WD4NES) 65,404- 494- 83-23

5

Arkansas

N5DY 31,784- 274- 58-20
AD5F 18,300- 181- 50-12
WD5CND 10,080- 120- 42-
W5EIJ 1476- 41- 18- 3
WD0FDN/5(+WD5BKA) 34,080- 284- 60-22
K5VR(+WD5HQT) 24,700- 245- 50-10

Louisiana

W5WMU 648,900-2571-126-36
WB5SKQ 324,400- 935-120-29
W5WS 72,226- 450- 77-26
W5OB 63,480- 331- 92-24
K3IT/5 58,608- 363- 74-
WD5DJX 30,800- 277- 55-19
WD5JTZ 20,856- 229- 51-13
KB5M 484- 22- 11- 2
WD5BUC/N(+WD5EAE) 9248- 135- 34-11

Mississippi

WB5HQH 116,844- 749- 78-19
W5AQ 47,424- 304- 78-22
W5NCB 15,984- 148- 54-24
KA5DTD 10,668- 127- 42-14
WD5BOL(+WB0HOZ) 61,650- 411- 75-23

New Mexico

K5TA 928,000-2400-110-25
N2JB/5 70,638- 579- 61-22
DK5WV/W5 62,186- 527- 59-15
WD5GNW 41,088- 428- 48-17
W6OOH/5 17,888- 177- 43-
KA5DIU/N 12,240- 140- 34-11
WD5JMA/N 5322- 73- 29- 4
K5TE/5(+W5VBO,WD8CBU) 446,896-2108-106-26
W5GB(KA5BOD,KR5E,N5BKR, WB5QLR,WB8RTK,WB0JEK, WD5FVN,oprs) 244,240-1420- 86-27

Northern Texas

AF5K 425,256-1833-116-29
K5NW 189,624-1724-113-28
N5BLT 142,038-1066- 76-21
WB5DUQ 144,640- 904- 80-18
WA5UBK 114,800- 820- 70-24
WD5ABF 99,360- 542- 90-36
N5HO 98,384- 558- 88-25
WB5OFB 61,000- 378- 68-10
KA5Q 48,168- 446- 54- 7
KA5EFF 47,820- 405- 51-19
KA5FAS/N 39,168- 310- 51-22
WB5KIA 37,504- 293- 64- 8
W5QF 37,204- 244- 71-16
N5AYV 31,850- 242- 65-15
KA5DWI/N 23,016- 210- 42-27
WA5GYX 16,030- 167- 45- 6
N5IS 4460- 110- 43-
W5SOD 3672- 84- 34- 4
KA5GDJ/N 2686- 79- 17-10
WA5RSC 672- 21- 16- 2
K8TD/5(+K5LC) 258,766-1157-109-27
WB5VZL(+KE5C,WD5BIK) 217,800-1209- 90-30

Oklahoma

AD1S 132,096- 765- 86-17
K5CKQ 118,064- 628- 94-25
WD5CSK 81,528- 513- 79-16
K5DEC 35,148- 303- 58-15
WD5IRR/5 20,640- 215- 48-20
N5AFV 18,400- 200- 46-18
WB5VUD 12,996- 171- 38-15
N5SFE(+K5s QEA WE,N5NW, W5ZWX,WD5DKT) 460,428-1887-122-29
WA5MLT(+WB5s QNK TZZ) 297,792-1504- 99-28
WD5HTT(+W5EIU) 55,142- 283- 79-20

Southern Texas

K5RC 696,500-2786-125-33
K5KG 349,068-1507-114-26
W5RRR(W5LSZ,opr) 68,844- 408- 84-23
WD5CWN 38,610- 297- 65-12
AF5F 33,588- 311- 54-11
WD5BCK 26,448- 225- 57-14
AK5G 24,480- 240- 51- 8
WA5IYX 19,008- 216- 44- 9
KA5N 14,344- 163- 44-18
KA5DKW 13,328- 98- 68-26
WD8DKJ/5 11,934- 147- 39-20
KA5DXH 8920- 119- 40- 8
AC5R 5158- 91- 34- 7
WB5QYL 5250- 70- 35- 4
K5TM(K5ZD,WB5QQG,oprs) 288,792-1318-108-36
WB5ZCK(+KA5AJP) 85,880- 565- 76-25

6

East Bay

K6XQ 133,232- 749- 88-36
WB6ZEP 122,958- 841- 69-19
WA6KXN 41,610- 365- 57-14
K6ARF 19,690- 162- 55-12
K6OYE(+KA6BPN,W6s AVS EEN, WA6NTG) 405,316-1894-107-27

Los Angeles

W6TPJ 270,396-1218-111-24
A16Z 128,484- 741- 86-20
W6GNS(WB6RXW,opr) 70,148- 492- 71-26
WA6POZ 68,250- 455- 75-17
WA6KYU 42,966- 408- 54-18
WB6OWD 21,112- 188- 58-12
W6CN 18,240- 160- 57- 8
K4JSI/6 16,144- 180- 48-11
W6NXB 11,868- 138- 43-20
KA6CPL 8652- 103- 42-10
K6EA 6634- 95- 34-
WA6CL 4896- 68- 36-16
KA6CTI 4482- 66- 37-11
WA6HQS 900- 30- 15- 4
K6AA(KB6FT,KE6B,N6IB,oprs) 440,142-2019-109-28
K6YWJ(+WB6KOU) 390,276-1758-111-32
K6OKW(+K6YRA,K7AMQ) 296,652-1257-118-29
K6ELX(Multiop) 200,796-1130- 87-26

Orange

W6HK 126,672- 751- 84-27
WA6BHR 94,462- 647- 73-10
K6PVS 77,780- 481- 80-22
KB6MT 69,632- 510- 68-36
N6AXL 63,440- 488- 65-24
N6PE 50,688- 378- 66- 6
K6VDP 38,760- 310- 60-25
KB6LJ 24,192- 216- 54-20
KA6BWL/N 13,580- 137- 35-18
WB6IHZ 6840- 90- 38- 6
W6LEN 6324- 101- 31- 5

W6VLD(K6TXA,N3AYL, WA2HSK,WA6s DPQ EUM HJK, oprs) 372,816-1726-108-28
N6AED(+KA6DSD,WA6MRH, WB6RWZ) 169,624- 930- 91-36

Santa Barbara

N6TR 589,680-2519-117-31
K6ELQ 185,468-1019- 91-
WA6NHB 55,132- 358- 77-18
WA6VNN 54,810- 412- 63-18
WA6DJS 46,920- 340- 67-10
WA6IGU 27,328- 189- 56-15
KA6GKU/N 13,098- 117- 37-23
W6OUL 1204- 38- 14- 2
N6MA(+WA6IJZ) 266,640-1320-101-26

Santa Clara Valley

N6BT(WA6VEF,opr) 633,556-2618-121-34
N6RZ(WB6SHD,opr) 592,134-2667-111-27
K6HNZ 394,716-1778-111-30
N6NF 368,000-1840-100-29
AC6V 214,176-1164- 92-23
N6ZB 135,456- 809- 83-25
W6OKK 122,836- 764- 82-17
N6OI 78,384- 552- 71-18
WA6TKT 62,648- 378- 82-12
N6UW 56,388- 381- 74-22
WB6HGH 48,618- 333- 73-15
W6YVK 16,644- 146- 57-12
W6MTJ 7104- 96- 37-10
KA6HTC/N 6696- 76- 27-23
K6RU(+N6NE,W1ARR) 408,312-1956-107-28

San Diego

N6ND 354,594-1569-113-26
W7KHN/6 339,404-1561-107-26
KF6C 188,936-1243- 76-24
WD6FHS 60,200- 418- 70-21
WA6VNR 56,016- 338- 72-21
WA6MHZ 29,240- 215- 68-14
AA6EE 8880- 111- 40- 4
W6XJ(+WB5CTS,K6JYO, WA6DBC,WB6OKK) 357,344-1691-104-32

San Francisco

WB6NBR 147,076- 886- 83-21
K6JFY 7396- 86- 43-14
WA8LLY/6 336- 21- 16- 3
W6BIP(+WA6DJI) 171,000- 855-100-24
WD6EEQ(Multiop) 109,896- 719- 76-20

San Joaquin Valley

W6YKM(AI6V,opr) 438,020-1991-110-29
N6LK(N6EE,opr) 237,228-1119-106-30
WB6ITM 19,032- 156- 61- 8
WA6JDB 18,468- 171- 54- 7
N6BVP 18,144- 189- 48-13
K6TG 16,500- 165- 50-15
W6RLG 9718- 113- 43- 9
WD6BJK/T 3312- 59- 23- 8
WB6LBR(WA6ALA,WD6CPO, oprs) 216,544-1072-101-32

Sacramento Valley

AA6DX 487,812-2301-106-25
K6RLY 358,662-1534-113-24
WB6RDA 116,928- 672- 87-19
W6AMW 80,840- 430- 94-30
W6YMH 44,352- 352- 63-35
WA6BRV 16,920- 170- 47- 8
N6JM 12,780- 123- 45- 5
KB6JM 9100- 91- 50- 5
WD6CQH 2256- 38- 24- 9
W6SX 2150- 43- 25-

Pacific

NH6A 19,200- 200- 48-17

7

Arizona

N7DD 945,000-3375-140-36
N7US 629,276-2579-122-28
K6LL/7 593,334-2493-119-27
WB7PST 256,122-1377- 93-26
W7ZMD 123,532- 694- 89-18
W7YS 116,362- 778- 73-19
WA7EXB 71,100- 450- 79-23
WA7YUL 36,400- 350- 52-12
KA7FRS/N 27,324- 188- 54-20
WA7NXL 23,484- 206- 57-10
WB7UDJ 23,128- 196- 59-14
WB7BRB 8346- 107- 39- 5
WB7RSE/N 5760- 64- 30-14
KA7DWR(+N7ADA) 128,340- 930- 69-26

Idaho

K7LR 758,910-3079-123-25
K7TAK 30,498- 273- 51-13
WB7TJI 15,190- 208- 35- 8
W7KXA 2950- 59- 25- 3

Montana

K7PGL 202,926-1091- 93-15
WA7WLT 79,344- 684- 58-19
KL7FDQ/7 73,322- 563- 61-23
K7CPC 29,302- 299- 49- 8
KA1EA/7 12,160- 146- 40- 7
N7AMZ(+W7TYN) 356,174-1729-103-25

Nevada

AE7K 44,840- 352- 59-13
W7ABX 28,980- 322- 45- 8
WB7VVH 22,220- 202- 55-14
W7LHE 19,074- 187- 51- 8
N7ALX 15,386- 157- 49-16
W7YKN 3312- 69- 24- 1
K7SFN(+WA7KNK) 465,088-2236-104-24
WB7TZW(+N7BCQ) 142,058- 973- 73-27

Oregon

W7EJ 672,384-2472-136-32
AG7M 561,836-2486-113-30
W7ZR 393,924-1931-102-36
AE7W 386,892-1954- 99-30
WB7QYI 271,714-1319-103-26
WB7VVU 201,600- 960-105-27
W7TC 127,512- 759- 84-25
W7GUR 83,904- 505- 76-16
W7MLJ 72,072- 462- 78-25
WB7SRU 55,760- 410- 68-20
AD7L 50,370- 345- 73-14
WB7QGH 48,734- 401- 59-17
K7EAU 44,330- 403- 55-25
W7YAQ 33,930- 259- 65- 7
KA7BSJ 30,160- 288- 40-12
W7RRJ 27,232- 184- 74-15
WB7SQM 26,936- 255- 52-13
WB7VPM/N 24,380- 213- 46-16
W7NES 19,035- 146- 45-14
WB7WOE 11,136- 97- 48-10
KA7EXM/N 9240- 100- 35- 4
K7TDX 4680- 56- 30- 7
KA7DHU 4240- 53- 40- 2
WA7OEM 600- 20- 15- 2
WB7PQU(+K7WPC) 352,880-2005- 88-28
W7VW(W6HSW,K7s TDX,ZFG, W7IEO,WA7VNS,WB7s CXW DDH, oprs) 117,792- 801- 72-23

Utah

N7DF 700,348-2894-121-27
WA7HQD 211,464-1188- 89-20
N7SM 145,520-1036- 68-16
W7LGG 12,744- 100- 59- 5
KB7JE 10,008- 139- 36-11
W7OHR/T 2014- 39- 19-11

Washington

N7XX(AH6Z,opr) 683,060-2870-119-28
W6RR/7 614,998-2584-119-28
K7LXC 138,348- 820- 81-24
N7DX 54,432- 432- 63-12
KA7FXS 36,088- 336- 52-16
WB7UUM 31,808- 284- 56-12
WB7PZT 26,216- 226- 58-11
WA7STA 22,272- 192- 58-12
W7GB 21,420- 210- 51- 4
N7AME 12,672- 144- 44- 7
W7BYK 10,706- 101- 53- 8
AB7M 6370- 81- 35- 6
WA5ZKQ/7 3600- 60- 30- 3
K7RS 3264- 51- 32- 2
W7ERH 2912- 49- 28- 3
W7UMX(K5WTA,KB7FX,N7AAC, WA7LZE,WB1DAL,oprs) 236,118-1357- 87-34
N7BES(+KA7AXD,N7AFQ, WB7VNY) 227,304-1476- 77-26

Wyoming

N7CG 166,144-1298- 64-36
WA0LJN/7 34,476- 338- 51-21
WB7PLU 13,572- 164- 39-25
WD8LLD/7(+WB8BZX) 148,764- 940- 77-27
KA8D/7(+KA8FXU) 61,600- 550- 56-22

Alaska

AL7Z 334,620-1690- 99-31
KL7BV 324,048-1884- 86-24
KL7ITG 258,152-1403- 92-28
AL7O 118,560- 912- 65-31
KL7CQ 36,816- 354- 52- 8
WL7AHU/N 35,796- 229- 57-13
KL7JCF 33,708- 318- 53-15
KL7FAP 29,232- 261- 56-16
WL7AAN 25,024- 184- 68-13
KL7IWE 24,910- 235- 53- 5
WB4WXE/KL7 112- 8- 7- 2
KL7Y(+AL7H,KL7JHD) 399,076-2242- 89-26

8

Michigan

K8LX(WB8ALP,opr) 580,212-2043-142-
WD8CRY 275,274-1119-123-33
KB8EC 238,350-1135-105-27
N8ACD 115,056- 564-102-16
WD8PDA 110,400- 575- 96-36
N8BCD 100,940- 505- 98-21
K8SS 81,792- 424- 96-11
WB8FEZ 54,740- 380- 70-22
WD8KXN 50,964- 267- 93-19
W8JJO 42,016- 404- 52-26
KA8EHM 34,272- 261- 63-12
K8SIA 32,550- 216- 75-11
W8VSK 29,862- 180- 79- 8
WD8PRM 29,786- 281- 53-29
K8LIX 25,326- 208- 60-14
WB8MDG 23,608- 227- 52-21
KB8IO 14,518- 119- 61-11
K8LJG 12,584- 116- 52- 5
WB8AAX 11,084- 149- 34- 7
W8WVU 10,120- 110- 44- 4
K8NG 10,010- 107- 46-12
KA8GBC/N 9632- 129- 28-17
WD8AFX 7564- 122- 31- 4
K8QWG 4260- 68- 30- 7
K8KIR 3782- 53- 31-11
W8YL 1440- 40- 18- 3
WD8NKA 234- 13- 9- 4
K8ZE(+K8s NWD ZZU,W8MNL, WA8s NHG TCI,WB8QPD) 436,020-1668-130-36
N8ACA(+K8s EX XR,KB8DT, N8IJ,WA8ICK) 234,136-1032-113-27
WB8BUQ(+K8CV,KB8BPY, WA8RUF,WB8s DUX NBS, WD8CIN,WN8PEE) 210,516- 993-106-31
W8KGG(K8s CN QKY,KB8BZ, W8XN,oprs) 104,226- 585- 87-28
WD8DNW(+AC8W,K8DD,KB8NI) 100,768- 536- 94-25
W8BB(+WD8PKC) 37,350- 249- 75-20
W8YY(AB8C,KA8s CYI FBB,WD8s DON DQR EDJ JPX,oprs) 33,292- 287- 58-17

Ohio

W8WPC(N9AG,opr) 469,504-1790-131-35
KB8JF 242,284-1075-119-31
WB8KKI 234,544-1092-107-28
N8AKF 108,388- 553- 98-30
AK8O 93,960- 534- 87-21
AA8S 72,906- 419- 87-14
WB8RTJ 72,080- 419- 85-27
N8ATR 71,200- 400- 89-26
WD8MOV 69,646- 332- 97-21
N8BJQ 59,920- 367- 80-20
K8BL 57,072- 333- 82-11
WA8AGH 51,898- 337- 77-28
AC8C 45,212- 254- 89-30
WD8MVK 32,982- 239- 69-21
WA8WCU 27,816- 211- 61-27
WA8UNP 27,376- 236- 58-13
WD8KGZ/N 25,648- 187- 56-18
AI8M 20,800- 200- 54- 8
WD8MRF 17,730- 197- 45-16
W8LCY 16,576- 148- 56-16
W8FN 13,524- 147- 46- 3
WB8SID 12,600- 175- 36- 5
W8XT 12,024- 163- 36- 8
W8SQ 10,560- 110- 48-10
WB8IUS 8944- 104- 43- 8
K8DL 8250- 75- 55-
KA8BZM 8050- 115- 35- 6
W8LXP 4950- 75- 33- 8
W8IDM 4480- 70- 32- 4
WD8NJM 4464- 59- 31- 9
AI8K 3780- 63- 30- 3
KA8CEK/N 3500- 54- 25-10
K8MR 2310- 48- 21- 1
W8NPF 2184- 42- 26- 7
N8AXA 2176- 34- 32- 8
W8AEI 1520- 40- 19- 6
AG8J 870- 25- 15- 2
KA8CXA/N 414- 17- 9- 7
K8AZ(+K8s MR NZ,N8AA,W8s HSK KIC,WB8PHI,WD8ALG) 540,994-1990-134-35
WA8RCN(+KA4DCZ,K8III, WB8KRY) 423,604-1546-137-33
K8CX(K3s LR VX) 421,344-1652-126-33
WB8JBM(K8US,KA8CSN,N8VT, WB8DQP,WD8OFP,oprs) 416,240-1720-121-30
WB8IFP(+KA8FCP,KB8NH,N8s AJR ALN,WB8ZJY,WD8s CJQ KMX ROD) 350,416-1446-121-32
W8YX(KL7JER,WB8NOJ,oprs) 218,400- 908-120-34
K8OCL(+K8IKD,KB8AC,N6UB, W8s BTW OMY,WB8s MMW YIJ YUO,WD8s JLM OTO QZM) 188,134- 863-109-34
WA3OJX(+K8GN,W8KRR) 182,114- 851-107-33
W8ON(+KA8CQI) 113,792- 508-112-21
N8AFY(+W8IYA) 26,784- 216- 62-18
N8AJN(+WD8NHD) 18,432- 143- 64-12

West Virginia

N8II 455,618-1718-131-32
N8ACQ 24,426- 177- 69-12
K8KVX 19,140- 165- 58-15
KA8AEO 14,532- 173- 42-19
N8APA(+N8ABW) 116,560- 620- 94-28

9

Illinois

K9MK 449,316-1783-126-30
K9MFI(WB9JKI,opr) 233,856-1008-116-30
K9BG 209,346- 911-111-27
K4VUD/9 118,864- 640- 92-27
W9PNE 98,406- 486- 99-27
W9WY 91,520- 430-104-21
WD9EMI 88,704- 448- 99-30
W9QWM 75,294- 402- 89-21
KB9AW 58,740- 330- 89-21
K9JU 55,616- 352- 79-12
K9MS 55,224- 348- 78-19
KB9EW 55,168- 419- 64-35
AD9K 48,180- 330- 73-26
WD9FUJ 46,440- 387- 60-22
W9HPG 43,260- 289- 70-20
WB9ZLN 37,422- 231- 81-14
K9BJM 30,480- 254- 60-13
WD9AEU 30,150- 224- 67-15
K9UQN 27,090- 215- 63- 9
WB9QHV 26,082- 207- 63-12
KA9OLP/N 25,724- 166- 59-12
K9BQL 25,704- 204- 63- 8
N9LE 25,025- 211- 56- 9
K9GH 23,064- 186- 62-21
WA9TZL 20,832- 217- 48- 8
WD9GGY 19,600- 171- 56- 9
K9SM 18,696- 164- 57- 4
W9REC 14,672- 131- 56-30
WB9KPT 11,592- 138- 42-15
W9NXP 10,080- 112- 45-30
WD9CMB 9660- 138- 35- 7
WB9ZED 5616- 108- 26-12
KA9AZY/N 1624- 43- 14-15
K9UJ 1404- 27- 26- 2
N9ALC 950- 25- 19- 2
WD9FDW 672- 24- 12- 4
KA9EWN/N 540- 17- 10- 9
K9HV(+W9NIN,WD9DCL) 381,780-1510-126-35
WD9IIX(+WA9EKA) 293,940-1274-115-32
W9YH(K9s PW VV,WB9LFN, ops) 261,516-1147-114-31
N9AQT(+WB9YDR,WD9s DBA DNL) 223,776- 999-112-30
AG9E(+WD9APJ) 100,352- 510- 98-31
WD9GVY(+WD9GKF) 92,340- 513- 90-28
KA9DXZ/N(+KA9DYA) 75,432- 344- 84-27
W9CA(+N9AIB) 62,264- 346- 86-23
WD9GKG(+KA9BNG) 52,688- 351- 74-25
N9BBE(+N9BCC) 32,612- 263- 62-24
KB9AV(+KA9CAZ) 23,100- 209- 55-19
WB9LDH(KA9s DXC DXD EAP, W9MON,WD9s HNA JCF JFB, oprs) 5304- 102- 26- 5
K9XI(+KA9COZ) 1584- 42- 18- 4

Indiana

W9RE 642,928-2225-144-34
W9LT 297,472-1162-128-33
N9JG 240,720-1020-118-33
K9CLO 234,432- 984-119-32
KB9HG 223,288- 959-113-33
K9WZB 182,286- 741-123-34
WB9FOL 102,828- 451-114-36
KB9CO 69,084- 341-101-22
WD9DVO/N 66,682- 382- 77-24
N9AFU 31,460- 267- 55-30
WB9WXC 28,600- 220- 65-15
N9ACD 26,790- 230- 57-20
W9NNC 26,624- 208- 64-16
WA9MCJ 20,286- 147- 69-15
K9IU(W3EP,opr) 20,246- 191- 53- 8
WB9JKO 18,336- 190- 48- 9
WB9FNR 15,680- 160- 49-
WB9LUG 12,600- 100- 63-15
WB9VVT 4940- 95- 26-
K9UIJ 2304- 48- 24- 3
AF9L 720- 24- 15- 3
N9BW(+K9IHM,N9GK,W9KBY, WB9HTY) 333,408-1208-138-30

Wisconsin

W9OP 229,104-1022-111-24
K9DAF 202,404- 991-101-20
N9ACP 111,090- 529-105-28
WD9DEE 99,704- 484-103-20
WB9SVM 93,258- 471- 99-23
WD9BCG 66,516- 476- 69-18
WA9KLM(AF9T,opr) 64,152- 486- 66- 8
WB9GGD 45,678- 292- 73-15
WA9BZW 23,800- 170- 70-19
W9HE 15,694- 133- 59- 5
WB9HGS 11,316- 137- 41-12
WA9YRL 11,236- 106- 53-19
KA9OSH/N 10,480- 87- 40-18
WB9OBX 9760- 122- 40-18
N1ABY/9 8502- 109- 39-10
N9KS 5600- 100- 28- 3
WB9NRK 5100- 85- 30-11
K9GDF 4964- 73- 34- 2
KB9DZ 2852- 62- 23- 7
W9VZR 2816- 49- 22-23
KB9CT 1560- 30- 26-
WB9EGZ(+W9XT) 306,240-1391-110-28
W9YT(AC9C,KA9CRD,WB9PYE, oprs) 221,200-1106-100-36
WB9UBM(+KA9CHZ) 175,240- 674-130-32
K9EAM(K9VCN,WA9SWX,WD9s BJA EGE,oprs) 148,860- 827- 90-36
KB9GF(+WB9UGX) 19,600- 200- 49-13

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Colorado

WØYK 693,248-2707-128-30
WØUA 679,276-2772-122-32
KØZX 486,352-2153-113-29
KØPVI 268,632-1475- 91-26
ACØS 181,056- 941- 96-20
KAØBJI/N 67,600- 447- 65-23
WDØABI 51,198- 337- 69-22
WØRSR 50,384- 376- 67-12
KAØCCP/N 33,282- 308- 43-24
NØBHQ 14,060- 185- 38-13
AGØL 13,176- 122- 54- 4
KAØAIA/N 6216- 84- 28-30
KA2AXF/ØN 5214- 57- 33- 7
WØDSW 2400- 50- 24- 3
KØRF(+K6RF,KØGU,WDØDSU) 867,620-3055-142-35
WØCP(+NØCP) 622,440-2660-117-32

Iowa

WBØPYD 274,170-1220-111-30
WAØQMU 223,000-1115-100-36
NØADI 94,752- 504- 94-26
WDØFGY 78,402- 528- 73-19
WØPPF 60,640- 379- 80-27
WBØRWM 59,512- 346- 86-16
WBØUCP 42,380- 316- 65-23
AIØZ 28,188- 258- 54- 8
KAØCGM 15,640- 183- 34-10
KAØD 7200- 120- 30-14
WAØDWL 3024- 54- 21- 6
WBØUBL 2700- 50- 27- 3
KØEVC 1960- 49- 20- 7
WØGM(WAØUYW,WBØs SEL YUI, oprs) 352,500-1410-125-30
WØGQ(KAØCNS,NØs AYM BGI, WAØZZG,WDØs EJQ HGI,oprs) 223,816-1108-101-32
WØHJ(+WBØs GNV QMA, WD9HYA) 114,552- 666- 86-24
WDØBKX(+WDØBLD) 71,928- 486- 74-23
NØALX(+NØBHJ) 40,800- 300- 68-18

Kansas

NØXA 489,684-1896-129-29
WD9DSD/Ø 154,682- 869- 89-36
KAØBCW 135,680- 848- 80-13
WDØHAP 124,504- 788- 79-24
NØASH 58,300- 550- 53-20
KØIEW 18,880- 236- 40-16
KAØCRT/N 13,530- 178- 33-16
NØARB 12,480- 160- 39- 6
NØIN 9744- 116- 42- 1
KAØBUT/N 9300- 113- 31- 8
WØXI 2814 66- 21- 7
WBØISW 2200- 50- 22- 2
WBØZTU/T 1040- 23- 13-19
WDØAFO(+WB5WOQ) 131,712- 782- 84-26

Minnesota

KBØBU 432,250-1729-125-28
KØIR 313,548-1479-106-23
KØILI 160,448- 872- 92-20
WDØHMF 119,970- 645- 93-20
WAØPDA 66,810- 393- 85-21
WAØGNO 62,660- 482- 65-30
WBØVAZ 54,720- 380- 72-30
WØRGU 50,880- 318- 80-30
WBØKIN 39,772- 326- 61-19
WAØVHX 38,160- 317- 60- 7
WBØOHS 34,220- 290- 59-10
KBØJX 32,208- 244- 66-21
KAØCXK 27,108- 244- 54-10
WAØWWW 21,600- 216- 48-14
KAØASU 18,240- 172- 48-10
WDØFOF 7298- 89- 41- 4
WAØKRL 1450- 29- 25- 2
KØSR(+WBØHCH) 339,460-1535-110-29
WØRIF(+KAØCRW,NØJP,WDØs ELS HAD) 169,084-1031- 82-27
NØBBS(+AEØM) 130,130- 696- 91-18
WDØCEO(+WAØTVB) 112,294- 617- 91-27
WDØGNK(KØs IN TS,KAØs CRO CSE EDF,WØVB,WAØQWY, WBØMBD,WDØs EOI FCX FFB, oprs) 101,712- 652- 78-27
KNØKCW(+WDØDTU) 100,878- 716- 69-23
ACØW(+WBØLTH) 76,220- 515- 74-26

Missouri

WØXK 521,422-1913-137-35
NØAQK 303,924-1324-114-26
KØRWL 193,568-1019- 92-20
AGØU 105,120- 581- 90-20
WAØZHY 49,560- 347- 70-28
WDØGML 33,320- 196- 85-17
WØERZ 26,838- 213- 63-13
KØUQV 25,164- 233- 54-12
WBØVHH 22,752- 237- 48-19
WDØELL 11,562- 122- 47-13
WBØTPK 9126- 117- 39-10
AKØW 4056- 78- 26- 9
WBØLFY 1276- 29- 22- 1
WØEEE(NØARN,WBØs QLU SND UEX,oprs) 298,080-1296-115-30

Nebraska

KØSCM 413,034-1679-123-29
WAØJCE 77,390- 546- 71- 8
KAØELX 35,856- 332- 54-24
WBØQPA 22,820- 326- 35-12
KØSW 19,228- 209- 46- 8
KØLS 13,818- 147- 47-11
KAØDXR/N 2080- 40- 20-10
KAØEJX/N 768- 22- 12- 4
WDØCKJ(+WBØIUT) 44,880- 340- 66-20
WBØSXM(+WBØSXN) 39,552- 206- 48-

North Dakota

WDØDAM 124,476- 759- 82-20
WBØEHC 88,972- 767- 58-13
KBØJK 52,300- 523- 50-13
WØLHS 6328- 113- 28-
WA2DJM/Ø 1360- 34- 20- 2

South Dakota

WØSD 681,250-2725-125-30
WBØMWJ 172,126- 967- 89-20
WBØEVQ 48,444- 357- 66-15
WDØBWH/N 31,850- 263- 49-19
WDØHWX 27,200- 200- 68-14
KAØCWS 22,176- 184- 48-16
WØWUU 1740- 30- 29- 4

VE

Maritimes

VE1BNN 362,628-1436-126-20
VE1TG 267,008-1043-128-36
VE1ABI 166,530- 915- 91-27
VE1ABD 62,556- 401- 78-16

Newfoundland

VO1AW 1932- 42- 23- 2

Labrador

VO2CW 422,500-1625-130-23

Quebec

VE2HY 73,280- 452- 80-22
VE2WA 68,200- 307-100-13
VE2FSM 59,312- 337- 88-
VE2ADZ 48,253- 322- 73-20
VE2XL 23,010- 195- 59-16
VE2JR 12,200- 121- 50-19

Ontario

VO3GCO 389,928-1477-132-28
VE3DLR 143,980- 626-115-27
VE3IKN 138,968- 599-116-30
VE3DAP 126,480- 602-102-26
VE3FIU 94,116- 506- 93-22
VE3DZV 47,360- 296- 80- 9
VE3BR 40,200- 268- 75-
VE3HWV 34,844- 281- 62-10
VE3SC 22,330- 203- 55-24
VE3FEA 21,168- 167- 56-30
VE3AOD 20,140- 190- 53-30
VE3GSC 12,126- 123- 47-24
VE3HCI 8092- 119- 34- 4
VE3ECP(+VE3BXY) 358,120-1279-140-30
VE3TY/3(+VE3GXZ) 121,600- 608-100-25
VE3BPC/3(VE3s EEH ENF GCZ HZD,oprs) 103,206- 501-103-29

Manitoba

VE4AES 146,452- 893- 82-24
VE4QZ 53,040- 408- 65-15
VE4GN/VE4 42,966- 341- 63-23
VE4RP 31,104- 243- 64-10
VE4XK(VE4s RM VV,oprs) 676,000-2704-125-28

Saskatchewan

VE5AAD 58,500- 565- 50-19
VE5JQ(+K5MH) 132,352- 741- 88-28

Alberta

VE6KW 939,760-3455-136-29
VE6AYI 294,690-1551- 95-22
CZ6MP 220,320-1080-102-36
VE6APN 56,942- 382- 71-10
VE6PD 10,010- 99- 35- 5

British Columbia

VE7BTV 556,320-2280-122-
VE7EL 206,154- 881-117-27
VE7CVM 146,138- 820- 89-29
VE7AZG 65,520- 420- 78-30
VE7AVU 15,168- 158- 48- 7
VE7CMT(+VE7CSD) 288,048-1412-102-29
VE7CFX(+VE7CBR) 131,760- 732- 90-23

Check Logs

K1ZZ,W1PWK,AB2S,W2GJ, W2STM,WA2AFE,WB2MCB, WA3EEC,K4VX,KB4JK,KS4G, W4KOQ,W4MM,WD4CBA (WA4EMF,opr),KL7IBT,W7DMD, DJ6VR,DM2CBA/A,DM2DGE, DM2GDL,DM2YLO,DM3EA, DM3LI,DM3PFF,DM5HDL, DM5TGL,G3DYY,IØYWK,LA7SP, OH2BSS,OH2XA,OK2BJR, OK2SWD,OK3KFF,OX3CS, OZ1DKG,OZ1DQX,OZ8E, PAØLEG,PAØPLM,PAØTVU, PAØWLN,PY7AOR,SM6AYM, SM6JNW,SM7BBV,SP9HG, UA1WCX,UA1ZBP,UA3ACD, UA3AGF,UA3AIT,UA3DAT, UA3DGI,UA3DHH,UA3DID, UA3DJN,UA3DLD,RA3DQP, UA3EAL,UA3TAG,UA3TAM, UA3TCI,UA3TDP,UA4BI,UA3CPP, UA4FCZ,UA4FDJ,UA4HAD, UA4ZA,UA6ACK,UA6APP, UA6ARX,UA6LFQ,UA6LXZ, RA9AKO,UA9FBV,RA9FBZ, UA9HBQ,RA9SRN,UA9UTF, UA9WEX,UAØCDM,UAØIBF, UB5JLS,UB5QAE,UB5VBY, UB5WCB,UB5ZAX,UB5ZDK, UK2BAS,UK3ABB,UK3TAY (Multiop),UL7GAA,UQ2GEI, UQ2PJ,UR2FU,UT5NE,UW6CV, UW9CL,VE3IPR,VK7NFR, YO5AVP,YO8KGZ,AKØI/6Y5

Rules, 1980 ARRL UHF Contest

Propagation during last year's UHF Contest wasn't anything to write home about, yet participation was up 35%. Contesting seems to be catching on among you refugees from the QRM on the lower bands. No promises for extraordinary conditions this year — you'll have to get on and find out for yourself.

Remember that the point values increase dramatically as you go higher in frequency. This will offer you a good chance to prepare those microwave stations for the September contest.

Make a note of your best DX on each band (non-EME) so we can make a special chart in the writeup.

Don't forget to send an s.a.s.e. to ARRL beforehand to make sure you have the appropriate forms on hand for the contest.

Rules

1) The 1980 ARRL UHF Contest begins at 1900 UTC on Saturday, August 2, and ends at 1900 UTC on Sunday, August 3. Entrants may use as much of this period as they wish.

2) Contacts may be made on all authorized amateur bands above 220 MHz, using all authorized modes of emission. (However, use of the 430-MHz band is limited to 430-433 MHz, inclusive.)

3) No station may contact any other station more than once per band for QSO credit, regardless of mode.

4) For a valid contact to occur, each station must send *and* receive an exchange consisting of a signal report plus either a four- or five-digit number, indicating the position of the station in longitude and latitude, rounded *down* to the next whole number.

Example: K8WW in Seven Hills, Ohio, would send 59 and 8141 as his exchange, since his longitude and latitude are 81° west, 41° north. WB6NMT in San Diego, California, might send 599 and 11732 (117° west and 32° north). Even a station at 117°, 59′ west would send 117, not 118!

Stations not competing in the contest may be counted for contact and multiplier credit if they send their location with enough specificity that the competing station may determine the appropriate longitude-latitude designation.

5) Partial QSOs do not count. Both calls, the full exchange, and acknowledgement must be sent and received.

6) Fixed, portable or mobile operation under one call is permitted. Only land-based stations (not aeronautical or maritime mobiles) may be counted for multipliers. A portable or mobile station may not be counted for more than one QSO per band, even if the station is moving. However, a station that changes locations may be contacted for additional multipliers but only once for QSO points.

7) A transmitter, receiver or antenna used to contact one or more stations under one call sign may not subsequently be used during the contest period under any other call sign, even if more than one call is assigned to a given location by the licensing authority (except for family stations). One complete station must exist for each contact an entrant claims.

8) All equipment and antennas used by entrants must be owned and operated by amateurs. Use of nonamateur-owned gear is not prohibited, but use of such equipment places the entrant in a separate category, ineligible for awards.

9) All equipment and antenna adjustments, logging and operating must be performed by one person for a station to qualify for single-operator status. All stations in which more than one person participates in any of these functions during the contest period are classified as multioperator stations.

10) While no minimum distance is specified for contacts, equipment in use must be capable of real communication (i.e., able to communicate over a distance of at least a kilometer).

11) Scoring: a) Each completed contact on the 220-and 430-MHz bands is worth three contact points. QSOs on 1296 MHz are worth six points each, while those on 2304 and higher frequencies are worth 12 points each.

b) The total multiplier is derived by counting the number of different exchanges (i.e., longitude and latitude numbers) received on each band and summing these band totals. Thus, each geographic area one degree in longitude by one degree in latitude is a unit worth one multiplier and may be counted as such on each band on which they are worked.

c) The final score is determined by adding up the contact-points amassed on all bands used and multiplying that total by the sum of longitude-latitude multipliers on each of the bands.

Example: W3HMU works 25 stations in 12 one-degree multipliers on 220 MHz, 34 stations in 17 multipliers on 432, 10 stations on 1215 MHz in six multiplier blocks, and one station in one multiplier on 2304 MHz. He has 249 contact-points (75 + 102 + 60 + 12) and a multiplier total of 36 (12 + 17 + 6 + 1), for a final score of 8964 points (249 × 36).

12) Contacts made by retransmitting either or both stations, whether by satellite or terrestrial means, are prohibited. Frequencies regularly occupied by a repeater in a locality may not be used for contest work in that area, even if the repeater is turned off.

13) A station located precisely on the dividing line between two one degree longitude or latitude units may select either one as his location but may not hand out both multipliers without moving his complete station (including antennas) at least 100 meters.

14) Entries must be postmarked no later than August 22, 1980 and must set forth the call sign, exchange (both sent and received), time/date, frequency/band and mode used for each claimed QSO. An accompanying summary sheet must list the total number of QSOs and multipliers (both broken down on a by-band basis *also*), the final claimed score, a description of the equipment used, calls of *all* operators if multiop, mailing address and station location, and a signed statement that all rules and regulations have been followed. Also note the best DX QSO made on each band.

15) The high-scoring single-operator and multioperator station in each ARRL *Division* will receive a certificate. Additional certificates will be awarded at the discretion of the ARRL Awards Committee.

16) Disqualifications: see January 1980 *QST*, page 90. QST

Silent Keys

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

W1DMS, Arthur H. Downer, Abington, MA
ex-W1DPR, Norman E. Leighton, Portland, ME
K1EMD, Edward E. Hemphill, Miramar, FL
W1FTJ, Dorothy W. Evans, Concord, NH
W1HHG, Albert E. Mosher, Ipswich, WA
K1ITU, Donald J. King, Amherst, MA
K1MQD, William A. Halliwell, Fall River, MA
K1OYM, Faith A. "Fay" Wedge, Bristol, CT
W1RO, Richard E. Harrison, Longboat Key, FL
W1VAY, Walter H. Butterfield, Cranston, RI
WA2BVJ, Lawrence Puccio, Sound Beach, NY
W2CGH, Mulford R. Bawden, Neptune, NJ
W2DUS, Daniel W. Chamberlain, Dix Hills, NY
W2JHO, George S. Hannell, Latham, NY
KB2KV, Andrew M. Merison, Corning, NY
WA2UNU, Mildred Parfitt, Elmira, NY
W3BEJ, Watson M. Corson, Lafayette Hills, PA
W3MSD, Edward J. Reed, Wyoming, PA
W3SFH, Wallace A. Radcliffe, Mifflin, PA
W3SMK, James G. B. Perkins, Abington, PA
*K4AI, Joseph A. Benesh, Morganton, NC
W4AQK, Glenn C. Smith, Englewood, FL
W4BDM, Charles H. Whitaker, West Palm Beach, FL
N4CAY, Clare W. Davis, Rockledge, FL
K4DMW, Sam G. Koerner, Hopkinsville, KY
WA4EPS, Merritt C. Duncan, Decatur, GA
WD4FEB, Don Soeder, Hollywood, FL
K4FHG, Matthew Bell, Anniston, AL
WD4GOI/K1RGQ, John T. Meehan, Punta Gorda, FL
K4GRG, William E. Carnes, Bishopville, SC
WB4HVL, James T. Adams, Columbia, SC
WA4MTL, Dr. William L. Heeve, Ormond Beach, FL
WA4NJG, Jack C. Henderson, Mineral, VA
WA4OEO, George Nolin, Montgomery, AL
W4RJO, John H. Tinney, Dallas, GA
W4SJR, William G. Chapman, Stuart, VA
W4WF, Cleveland B. Marshall, Abingdon, VA
N4YY, James K. Ramsey, Graniteville, SC
N5AEL, Peter G. Bilman, San Antonio, TX
W5ANO, Charles L. Wright, Lubbock, TX
WD5BRY, Richard J. O'Donnell, New Braunfels, TX
W5FMQ, Ralph F. Lee, Lubbock, TX
W5KOU, Charles C. Centorbi, Arabi, LA
W5RJ, Roy L. Taylor, Fort Worth, TX
WB5UAJ, Howard C. Browning, Dennis, MS
W5UIO, Thomas J. Perryman, Weslaco, TX
*W5VQY, Theodore C. Summers, Santa Fe, NM
WB5YVX, Roy L. Ellis, Crosbyton, TX
W6AQK, George E. Teel, Baldwin Park, CA
WD6BTF, Robert H. Little, Salinas, CA
W6EBJ, Emil "Sid" Sedlacek, Glendora, CA
WD6FVC, Frank Grebel, Magalia, CA
N6GJ, Robert O. Brooke, Glendale, CA
K6IAQ, Claud C. James, Sunnyvale, CA
W6NBT, Ernest G. Rudolph, Bishop, CA
W6NGC, Ralph A. Melanson, El Centro, CA
WB6PIG, Harold W. Secor, San Diego, CA
W6RVA, Vincent F. Filizola, North Hollywood, CA
K6SJN, Warren J. Flint, Placerville, CA
W6SRJ, George C. Biggar, Fremont, CA
W6ULO, Pete J. Rosano, Sacramento, CA
W6VDJ, John C. Bailey, Encinitas, CA
W6YD, Raymond B. Walling, Vista, CA
N7AJS, June L. Owen, Phoenix, AZ
KA7AMF, Reid T. Blackburn, Vancouver, WA
W7GX, Gene Traber, Phoenix, AZ
W7KDX, Gene D. Byers, Bellevue, WA
WA7RBW, Ralph E. Halterman, Casper, WY
W7UFL, Raymond R. Stone, Nahcotta, WA
WB7USS, Robert R. Rasmussen, Scottsdale, AZ
W7VT, Edward S. Hill, Tucson, AZ
WB7WCW, Hayden L. "Bill" Cross, Clinton, MT
W8BKI, George C. Whiteman, Charleston, WV
WD8COZ, Oliver H. Rhodes, Charleston, WV
K8ET, Charles L. Shaw, Kettering, OH
WA8IJD, Herald C. Eagon, Delaware, OH
W8IME, Stephen D. Cook, Toledo, OH
W8IQC, Fred Mahaney, Northwood, OH
K8JDT, Carl Schwartz, Versailles, OH
WD8LCB, David R. Mort, Hudson, MI
W8MVL, Carl E. Hawthorn, Ft. Myers, FL
WB8NAC, Loren F. Dillon, Plymouth, MI
W8NGI, Burton J. Downs, Canfield, OH
W8NOH, Louis A. Gerbert, Grand Rapids, MI
W8RZQ, Edwin W. Laas, Toledo, OH
W8UCE, Sam S. Hostetler, Kalamazoo, MI
K8UIP, James H. Douthett, Toledo, OH
W8ZOK, Edmond F. Miller, Saginaw, MI
W9ELG, Charles A. Sodergren, Wonder Lake, IL
W9KQB, George P. "Bud" Woida, Manitowoc, WI
WB9NAQ, Frank H. Salter, Shelbyville, IN
K9YMZ, Paul E. "Deke" Graden, Nokomis, IL
WB9YXX, William Walker, Portage, WI
WØAPJ, Dr. Fredric W. Wilson, Sioux City, IA
WAØBMN, Paul A. Mitchell, Reinbeck, IA
WØJXT, William D. Ussery, Lebanon, MO
KØKAQ, Marian B. West, State Center, IA
KØOLY, Robert W. Laughlin, Charles City, IA
KØOSF, Richard L. Ronan, Florissant, MO
KØQBI, Lionel O. Hibma, Worthington, MN
KØTOO, Smith E. Bennett, Panora, IA
KH6IQN, Robert L. Foutts, Honolulu, HI
VE1AMM, Gifford W. Lewis, Weymouth, NS
VE1VK, Roderick Grant, Rockingham, NS
VO1GP, Edwin L. Samms, Deer Lake, NF
VK3BAK, Violet Niedeck, Melbourne, Australia
XE1WU, Francisco Davo Lozano, Mexico City, Mexico

*Life Member, ARRL

Note: All Silent Key reports sent to Hq. must include the name, address and call sign of the *reporter* as well as the name, address and call of the Silent Key in order to be listed in the column.

Correction

The Silent Key column in June did not include the fact that James R. Fisk, W1HR, was an ARRL Life Member.

Operating News

Conducted By John F. Lindholm,* W1XX

Will the RS(T) System Last Until Judgement Day?

During the early days of Amateur Radio, the RS(T) system as a means of giving information to a contact — referring to readibility, signal strength and, as far as the cw mode is concerned, tone quality — turned out to be both a valuable and reasonable system. All the equipment in use was homebrew of course, as were a lot of the components. The performance and reliability of components, and the achievable gain of valves, were limited to rather low levels; measuring techniques were at a more-or-less primitive technical level, and, moreover, the whole business was quite an expensive one. Indeed, it was necessary and valuable to know — because it could not otherwise be easily ascertained — whether one's signal produced a "rather strongly audible, i.e. S7" audio output; whether one's oscillator performed in such a way that "very good readability — R5" could be attested, and that the ripple-smoothing components of the power supply allowed a report like "tone with absolutely pure dc quality — T9." Such information really meant an "enrichment of knowing," using the communication theorist's definition of "information."

Is this true any longer? The author definitely does not believe it is because:

(a) What commercially-produced equipment nowadays will produce other than T9 quality in general?

(b) What is the use of a signal strength report at all, provided that one can really copy the operator at the other end 100 percent — regardless of what an S-meter reading from 0 to 9 and some psychologically pleasing decibels may say?

There remains R-Readability to characterise the only parameter that really counts: information loss. But what is the use of a scale of 1 to 5? Does one know the difference between "good readability — R4" and "very good readability — R5"? Who has never heard highly embarrassing reports like "You are five and nine, old man, but please just repeat your name and QTH; I lost this in some QRM by a local around the corner."

The author puts forward and idea, therefore, which he thinks might be worthwhile throughout the entire cw world — and the phone world as well; that is, the final deletion of the archaic, redundant and — in this day and age, absolutely senseless RS(T) system, and substituting a very simple system which — neglecting aesthetic aspects because we are not allowed to broadcast music anyway — takes account of the one and only parameter relevant to the transmission of information, i.e. information loss.

For "To copy or not to copy, that is the question!" is it not?

The author's idea is for a "Q-System," in which "Q" stands for transmission quality in a more general sense, which implies tone quality, skill of fist (or voice), QRM/QRN situations, QSB, frequency stability and so on. The scale which he thinks would be absolutely sufficient for a relevant information exchange between QSO partners is:

Q1 = At no time sufficient transmission quality: no copy.

Q2 = Some of the time sufficient transmission quality: partial copy.

Q3 = At all times sufficient transmission quality: full copy.

Intermediate report stages such as Q1/2 or Q2/3 could of course be used, and for those interested in the "why" of given reports there is always the opportunity to ask a contact to explain his report in a more detailed way — e.g. "Q2 = QSB es sum QRM" and so on.

The author feels that this system would result not only in a considerable reduction in contest and logging duties, but also in avoidance of exchanging mostly dishonest and/or nearly 100 percent redundant information. In this sense the suggested system as a contribution in the fight against "air-pollution in Amateur Radio" is worth discussion.

By common consent, arguments such as "But we never did this before!," "Why change a system we've used for so many years?" and "Good Lord, my QSL cards — there are still 5000 in stock — all showing RST!" etc., are no arguments at all! — *R. Hertzer, DL7DO*

[This article reprinted from the Radio Society of Great Britain publication *Radio Communication*, August 1979. — Ed.]

SCM ELECTION NOTICE

To all ARRL members in the Missouri, Southern New Jersey, Quebec, South Carolina, Western Pennsylvania, Eastern Massachusetts, Saskatchewan, Nebraska and New York City-Long Island sections: You are hereby solicited for nominating petitions pursuant to an election for Section Communications Manager. A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition*. No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

Petition forms (CD-129) are available on request from ARRL headquarters but are not required. The following form is suggested:

(Place and date)
Communications Manager, ARRL
225 Main Street, Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Communications Manager for this Section for the next two-year term of office. (Signature . . . Call . . . City . . . Zip . . .).

An SCM candidate must have been a member of the League for a continuous term of at least two years and a licensed amateur of General Class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must be received at headquarters on or before 5:30 P.M. Eastern Local Time, September 5, 1980.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on October 1, 1980, returns counted November 18, 1980, and SCMs elected as a result of the above procedures will take office January 1, 1981.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition, for a two-year term beginning January 1, 1981.

If no petitions are received for a section by the specified closing date, such section will be resolicited in January *QST*, and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager.

You are urged to take the initiative and file a nominating petition immediately.
John F. Lindholm, W1XX
Communications Manager

REPEAT SCM NOMINATING SOLICITATION

Since no petitions were received for the Manitoba and Oregon sections as a result of notices in the January and February *QST*, nominating petitions for these sections are herewith resolicited. See the above notice for details on how to nominate.

SCM APPOINTMENT

In the Connecticut Section, Stanley Horzepa, WA1LOU, has been appointed to complete the term (until September 30, 1980) of William J. Pace, W1ID (resigned). Solicitations for Connecticut are now being made in April and May *QST*.

ARRL APRIL MORNING SPECIAL

High noise levels and a long exchange made the April Morning Special a bit more difficult than the last one. Short hours and lack of traditional 5 9-type contest exchanges make these contests popular among newcomers and oldtimers alike. QSO leaders in each call area are listed below, while complete results were sent to all participants. — *Tom Frenaye, K1KI*

ARRL April Morning Special Call-Area Leaders

KL7P	6		
WØUA	127	W5JW	100
K9VV/K9RS	122	AC4X	75
WB8JBM	126	K3UA	134
N7US	82	K2NF	97
N6RO	106	K1KI	118

APRIL OPEN CD PARTY

Activity was quite good in the Open CD Party, especially on cw. Splitting the contest into two weekends seemed to gain everyone's favor. Complete results appear in the summer edition of *QCD* sent to all League appointees and officials and to everyone who sent in a log in the Open CD Party. Those of you who are not already involved in the OTS, OO, OBS and similar programs should contact your SCM (page 8) or send an s.a.s.e. to ARRL hq. asking for form CD-187 for information on the various volunteer appointments. Listings below indicate final score, QSOs, multipliers and ARRL section. — *Tom Frenaye, K1KI*

*Communications Manager, ARRL

April Open CD Party High Scores

CW

N6RO	56,934-777-72-10-EB
K1KI	52,966-746-71-10-CT
K6LL/7	50,960-728-70-10-AZ
N6TR	49,404-716-69-10-LA
K3UA	49,335-715-69-10-WPA
W2RQ	49,203-693-71-10-NNJ
N2IC	45,493-679-67-10-NNJ
AG7M	43,081-643-67-10-OR
N4ZZ	42,296-622-68-10-TN
K9RS	42,092-619-68-10-IL
K1XA	41,748-588-71-10-CT
N2NT	41,138-614-67-10-NLI
W1WEF	40,664-598-68-10-CT
N4SA	40,194-638-63-10-NF
K8CC	40,089-581-69-10-MI
W9TG	39,996-606-66-10-IN
N1EE	39,664-592-67-10-EM
KØTK(+ KØFVF)	35,970-545-66-10-MN
K1BU (WB1ANT, opr)	35,310-535-66-10-EM
N6NF	34,136-502-68-10-SCV
W6UQF	33,924-514-66-10-SD
K6WI	33,088-517-64-10-ORG
AA3B	31,558-509-62-10-EPA
W9OP	31,500-500-63-10-WI
VE4VV	30,875-475-67- 8-MB
K3YL	30,177-479-63-10-EPA
N6PE	29,340-489-60- 9-ORG
W7GHT	29,238-443-66- 9-ID
WBØLFY	29,238-443-66-10-MO
KØII	28,365-465-61-10-MN
WA3OVC/5	27,776-434-64- 9-ST
K9EYA	26,586-422-63-10-WI
KØET	26,304-411-64-10-MN
W6BIP	23,852-356-67-10-SF
AF4T	23,607-387-61-10-TN
AC5K	23,119-379-61-10-ST
KØBR	21,840-390-56-10-MN
W1TM	20,940-349-60-10-WM
KA3BOD	20,691-363-57-10-EPA
K1ZZ	20,646-333-62- 4-CT
W9MO	20,292-356-57-10-WI
WB1HIH	20,040-334-60-10-WM

Phone

K6LL/7	90,936-1263-72-10-AZ
N7US	57,960- 828-70-10-AZ
N6NF	54,812- 772-71-10-SCV
WB4QBB	49,842- 702-71-10-NF
W1XX	44,781- 649-69-10-CT
N4KG	41,406- 618-67-10-AL
N7YL	38,940- 590-66-10-NV
K5WA	38,847- 563-69- 7-ST
W1WEF	37,740- 555-68-10-CT
N3TR	37,713- 563-67-10-MD
WB3DNL	36,270- 558-65-10-MD
AG7M	33,001- 541-61- 8-OR
W2RQ	32,340- 490-66- 7-NNJ
N1EE	30,624- 464-66-10-EM
KØTK (+ KØFVF)	29,458- 466-63-10-MN
K3PA	29,120- 455-64-10-EPA
WØEJ	27,654- 419-66- 9-IA
K3NB	24,066- 382-62- 9-EPA
WB1HIH	19,544- 349-56-10-WMA
N4BP	19,234- 326-59- 4-SF
K1KI	18,300- 305-60- 4-CT
KØGND	18,282- 277-66- 6-NE
KB6FR/3	17,930- 326-55-10-EPA
NP2AE	15,960- 290-55- 4-WI
WA2STM	13,988- 269-52-10-ENY
WB8JBM (WB8DQP, opr)	13,035- 237-55- 3-OH
K8SIA	11,800- 200-59- 7-MI

W1AW NOTE

The complete W1AW summer operating schedule appears in April *QST*, page 97. A W1AW schedule also is available on request from ARRL headquarters. Please enclose an s.a.s.e. See the "Contest Corral" section of *QST* for times and dates of W1AW Code Proficiency Runs. QST

OSCAR Operating Schedule

	OSCAR 7			OSCAR 8			
DATE (UTC)	*Orbit No.*	*Time UTC HR MN*	*Eqx W. Long. Degrees*	*Orbit No.*	*Mode*	*Time UTC HR MN*	*Eqx W. Long. Degrees*
1 July	25,737	01:50	98.9	11,834	AJ	00:00	52.5
2 July	25,749	00:49	83.7	11,848	X	00:05	53.7
3 July	25,762	01:44	97.3	11,862	A	00:10	55.0
4 July	25,774	00:43	82.2	11,876	AJ	00:15	56.2
5 July	25,787	01:37	95.8	11,890	J	00:20	57.4
6 July	25,799	00:36	80.6	11,904	J	00:24	58.7
7 July	25,812	01:31	94.2	11,918	A	00:29	59.9
8 July	25,824	00:30	79.1	11,932	AJ	00:34	61.2
9 July	25,837	01:24	92.6	11,946	X	00:39	62.4
10 July	25,849	00:24	77.5	11,960	A	00:44	63.6
11 July	25,862	01:18	91.1	11,974	AJ	00:49	64.9
12 July	25,874	00:17	75.9	11,988	J	00:54	66.1
13 July	25,887	01:11	89.5	12,002	J	00:58	67.3
14 July	25,899	00:11	74.4	12,016	A	01:03	68.6
15 July	25,912	01:05	87.9	12,030	AJ	01:08	69.8
16 July	25,924	00:04	72.8	12,044	X	01:13	71.1
17 July	25,937	00:58	86.4	12,058	A	01:18	72.3
18 July	25,950	01:53	100.0	12,072	AJ	01:23	73.5
19 July	25,962	00:52	84.8	12,086	J	01:28	74.8
20 July	25,975	01:46	98.4	12,100	J	01:32	76.0
21 July	25,987	00:46	83.3	12,114	A	01:37	77.2
22 July	26,000	01:40	96.8	12,128	AJ	01:42	78.5
23 July	26,012	00:39	81.7	12,141	X	00:04	53.9
24 July	26,025	01:33	95.3	12,155	A	00:09	55.2
25 July	26,037	00:33	80.1	12,169	AJ	00:13	56.4
26 July	26,050	01:27	93.7	12,183	J	00:18	57.6
27 July	26,062	00:26	78.6	12,197	J	00:23	58.9
28 July	26,075	01:20	92.1	12,211	A	00:28	60.1
29 July	26,087	00:20	77.0	12,225	AJ	00:33	61.3
30 July	26,100	01:14	90.6	12,239	X	00:38	62.6
31 July	26,112	00:13	75.4	12,253	A	00:43	63.8
1 Aug.	26,125	01:08	89.0	12,267	AJ	00:47	65.1
2 Aug.	26,137	00:07	73.9	12,281	J	00:52	66.3
3 Aug.	26,150	01:01	87.4	12,295	J	00:57	67.5
4 Aug.	26,162	00:00	72.3	12,309	A	01:02	68.8
5 Aug.	26,175	00:55	85.9	12,323	AJ	01:07	70.0
6 Aug.	26,188	01:49	99.5	12,337	X	01:12	71.2
7 Aug.	26,200	00:48	84.3	12,351	A	01:17	72.5

Orbit predictions by Project OSCAR, P. O. Box 1136, Los Altos, CA 94022. To keep abreast of the latest developments, tune in to the regular phone and cw bulletins over W1AW, AMSAT bulletins transmitted around 29.490 MHz on Mode A, 145.960 MHz on Mode B, and 435.160 Mode J, during O 7 and O 8 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).

Soviet RS data have been discontinued.

O 7 progresses an average of 28.7374° W. per orbit in a period of 114.9423 minutes.
O 8 progresses an average of 25.8026° W. in a period of 103.2039 minutes.

O 8 modes of operation are Mondays and Thursdays — Mode A. Tuesday and Friday — Mode AJ. Saturdays and Sundays — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D.
Mode AJ is simultaneous operation of both transponders

Note: A minus sign in front of the downlink frequency indicates that the passband of the satellite is inverted in that mode. This means that signals transmitted up to the satellite at the low end of the uplink passband will appear at the high end of the downlink passband.

Additionally, upper-sideband signals transmitted on the uplink will appear as lower-sideband signals on the downlink.

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

Formulas for calculating approximate downlink frequencies. x = downlink frequency.

OSCAR 7

Mode A: x = uplink frequency − 116.450 MHz ± Doppler shift
Mode B: x = uplink frequency − 578.100 MHz ± Doppler shift

OSCAR 8

Mode A: x = uplink frequency − 116.458 MHz ± Doppler shift
Mode J: x = uplink frequency − 581.106 MHz ± Doppler shift

Further information on the radio amateur satellite program can be obtained free of charge from ARRL hq.

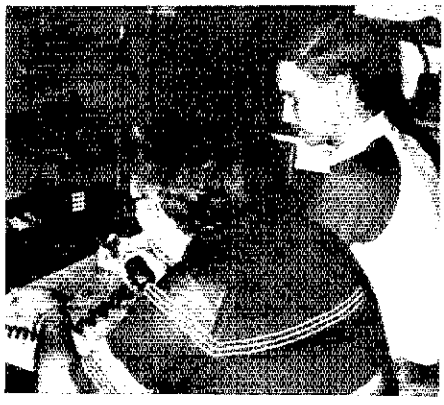
Public Service

Conducted By Robert J. Halprin,* K1XA

The Oklahoma Story

Will Rogers once said about Oklahomans, "I never met a man I didn't like." This is easy to understand when you visit Oklahoma. This 70,000-square-mile state is abundant with friendly people, from Comanche, in the south, to Quapaw, in the northeast. Oklahoma contains some of the country's most beautiful lakes and streams, including the Cimarron River, Wildhorse Creek and the Great Salt Plains Reservoir, near Alva. With natural resources like this, Oklahoma is a home for the Eastern Gray Tree Frog and the Great Horned Owl. Couple this with a winning football team, an industrial boom and a general modernization, most people who visit want to stay.

Despite this, Oklahoma does not always exhibit characteristics of "Fantasy Island." In Oklahoma, we don't have the snowstorms of the North, earthquakes of the West, or flooding of the South. We have tornadoes. And when we have them, every crawling, creeping, breathing, living thing sits up and takes notice.



From the Will Rogers Airport, WB5PWS (left) and Assistant Emergency Coordinator AE5N, track the course of a tornado at the amateur station in the National Weather Service forecast office. Oklahoma County ARES activities are conducted under the direction of Emergency Coordinator KB5BS. *(WA5MLT photo)*

On April 10, 1979, not just Oklahomans, but the entire nation, took notice. In less than an hour and a half, over 1700 were dead or injured, nearly 7000 homes were destroyed and damage ranged into the hundreds of millions of dollars. This, of course, was the tornado disaster that struck the Wichita Falls/Vernon, Texas, and Lawton, Oklahoma, areas.

The Oklahoma Traffic and Weather Net immediately activated on 3900 kHz, the state emergency frequency. With the exception of a few glitches, emergency information was passed efficiently. The local and section emergency plans were working. Before it was all over, weeks later, it seemed as though just about everyone had served as net control and most everyone had seen duty from fixed, portable and mobile locations.

I suppose one of the most hair-raising events during the first few hours occurred when I received word that Altus hams were the first to reach Vernon, Texas, with men and equipment. Only four months prior, Phil Clements, K5PC, the then-SEC of Northern Texas, and I had discussed the need to conduct a more realistic SET. This added realism was to be manifested in the form of moving men and equipment across the Red River in simulation at two points: (1) Hugo, Oklahoma, moving to Paris, Texas, and (2) Vernon, Texas, moving to Altus, Oklahoma. When we agreed to spring this on the ECs and ARES members, we never knew . . . After this series of real-life events, emergency drills, practice exercises and assisting various agencies, like the Red Cross, took on a totally different meaning.

Two months later, a unique cooperative agreement was reached between Oklahoma ARES members and the National Weather Service — Oklahoma City/Tulsa. The purpose of the agreement is to support both organizations with their long-range severe weather spotting and warning activities. With the letter of agreement, section emergency plan and League-sponsored national agreements (with Red Cross and Salvation Army), ARES members have a great opportunity to provide a wide range of quality communications services to the residents of Oklahoma. The text of the NWS agreement, signed in July 1979, appears above. — *H. O. Townsend, WA5MLT, ARRL Oklahoma section emergency coordinator*

ARES-NWS Agreement

I) Purpose

This agreement states the terms for an understanding between the Oklahoma Section of the ARES and the NWS, that will serve as a broad framework within which volunteer personnel of the ARES (and other Amateur Radio organizations) may offer their assistance to the NWS for communications in connection with the identification and reporting of severe weather events and other disaster activities.

II) Recognition

A) The NWS recognizes that the Amateur Radio Service, because of its broad geographical station coverage and its excellent communications capabilities, can render valuable aid in identifying and reporting severe weather events which are hazardous to public safety.

B) The ARES recognizes the NWS as the federal agency, charged by Congress, to issue warnings of hazardous weather to the public.

III) Amateur Radio Emergency Service (ARES)

The ARES is an operational unit of the Amateur Radio Public Service Corps of the American Radio Relay League. The Section Communications Manager (SCM) is responsible for the management of ARES activities within the State of Oklahoma. The Section Emergency Coordinator (SEC) is appointed by the SCM. With the approval of the SCM, the SEC develops and manages the section emergency communications plan and appoints local Emergency Coordinators (EC) to implement the plan at the local or county level.

IV) NWS Skywarn Program

Project Skywarn is a broad scope program intended to increase public awareness of natural disasters, such as tornadoes and flash floods, and to mobilize community resources for disaster preparedness. Included within this effort is the Skywarn Spotter Program. The goal of the spotter program is to identify and report severe weather events in order to reduce the loss of life and property by the public. This is accomplished by insuring that such reports are available to:

1) Local government and Civil Defense officials who must make the decision to sound sirens and activate other community warning systems.

2) News media outlets who disseminate the information via television and radio.

3) National Weather Service Offices which disseminate the information via:

a) NOAA Weather Wire Teletype to the media, law enforcement and Civil Defense agencies, and to other groups served by the system.

b) NOAA Weather Radio

c) The National Warning System (NAWAS) to Civil Defense and law enforcement agencies.

d) Internal communications systems to other NWS offices such as the National Severe Storms Forecast Center at Kansas City.

VI Intent of the Program

It is not the desire of the NWS or the ARES to interfere with the operation of any existing spotter groups; rather to encourage and support such networks in any manner possible.

Where operational spotter groups do not exist, both the ARES and the NWS will cooperate in the development of such networks. When possible, this will involve the support and participation of local Civil Defense and local government officials.

VI) Methods of Cooperation

A) Subject to manpower and other operational demands, the NWS will:

1) Provide spotter training to any recognized Amateur Radio group requesting such training. Training will be coordinated with the SEC and the local EC as well as with the local Civil Defense Director.

2) With the approval of the appropriate Meteorologist-in-Charge, the NWS will make space available in the NWS office for the operation of Amateur Radio equipment by licensed amateurs from the local area.

3) Publicly support and acknowledge the important role Amateur Radio is contributing to the warning program and public safety.

B) The ARES (or any other organized amateur group which wishes to participate) will assist the NWS in development and organization of spotter networks; providing personnel and equipment as resources allow.

A CHANGE IN VENUE

The Hit and Bounce Net meets daily at 1330Z UTC on 7040 kHz. They had been in continuous operation on 7070 kHz since 1937, but were forced to change their net frequency because of ssb QRM. This information via K2OWN, net manager.

MASTER PSYCHOLOGISTS?

From K4ZN's traffic column in *Worldradio News:* "Either the gang at ARRL headquarters who produced the new ARL list is composed of master psychologists, or [they] did something quite stupid. The change certainly generated a lot of fuss among traffic handlers . . . There were predictions of possible massive confusion, including this writer's. But with my January traffic total already past 200 as I write these lines, I've encountered only one instance where

*Assistant Communications Manager, ARRL

Some of the notables at the 7290-net picnic in April were (left to right) kneeling: W5BGE, AA5J, W5VMP. Standing: WA5RVT, K5HZR (net manager), W5HMR, N5BT, W5KLV. *(photo courtesy W5EDZ)*

WD8BIL was the control station for a hospital patient transfer coordinated by the Lake Erie Amateur Radio Association in Cleveland. *(WD8PYV photo)*

the old meanings were intended and it was obvious. Nor have I yet heard of any real mixup, and given the popular feeling, any such mixup would receive instant publicity. Hence, it seems all the gripes of the traffic handlers only served to insure everybody knew about the new list by 1 January when it went into effect. If that was the intention of the ARRL staffers, it was a stroke of genius."

ARES REPORTS

☐ Ventura County, California — September 18-22. A tractor pulling a chain ran across a pipe in a field and sparked a brush fire which burned over 36,000 acres. ARES was activated immediately and provided communications for Red Cross shelters, the Salvation Army and field first aid teams. ARES was also active in two other brush fires in the area. (W6RIC, EC Ventura Co., CA)

☐ Irene Creek, Washington — October 28-29. The county sheriff requested ham assistance to provide communications for a hunter lost in rugged terrain. All operations were conducted via 75 meters and the hunter was located. (KL7IEB, EC Skagit Co., WA)

☐ Togwotee Pass, Wyoming — November 6. Several Cheyenne hams assisted in the search for a lost woman missing in the wilderness by providing communications for the National Guard and Civil Defense. (WB7UFI', EC Laramie Co., WY)

☐ Lexington, Virginia — November 8. K4AOV was returning home from a meeting and noticed a pair of vertical headlights that turned out to be a car in a ditch. The car contained an elderly man in obvious physical distress. WA4WBD was contacted on 146.52 MHz and rescue arrived in five minutes. (K4BKX, SCM VA)

☐ Ponca City, Oklahoma — November 20. Approximately 12 inches of rain fell, causing extensive flooding. Local hams assisted the Ponca City Civil Defense in locating high-water locations and other areas where assistance was needed. (W5ZWM, EC Kay Co., OK)

☐ Madisonville, Kentucky — December 15. Kentucky District II ARES coordinated communications for the transfer of 129 patients from one hospital to another. Amateurs set up control stations in each facility and each of the 10 ambulance crews included an amateur with a portable radio to use for communications through the local repeater. (WA4ZVL, EC District II, KY)

☐ Blue Ridge Mountains, Virginia — December 22. Amateur communications assistance was requested to aid in the search for a lost hunter. A command post was established, and hams with portable radio gear accompanied the search groups. The hunter was the victim of a hunting accident and was discovered only four hours into the operation. (WA4EGW, EC Augusta Co., VA)

☐ Shepherdsville, Kentucky — January 3. Information received over the Kentucky Traffic Net indicated that it was imperative that an individual traveling through the area contact his home. The police would not cooperate because there was no positive identification of the vehicle, but since the individual was monitoring CB, a local CB group was contacted and the message was successfully delivered. (WA4YPQ, EC Fifth District, KY)

☐ Minot, North Dakota — January 5. During a severe winter storm that dumped 13 inches of snow across the area, the Minot Amateur Radio Association provided base, phonepatch and four-wheel-drive assistance to stranded motorists in the area. (WB8BZH, EC Ward Co., ND)

☐ Richmond, Virginia — January 5. A heavy, freak snowstorm struck the area, dumping 14 inches of snow. Local amateurs provided radio-coordinated transportation of medical personnel to and from area hospitals. (AB4U, Asst. EC Richmond, VA)

☐ Sacramento Valley, California — January 11-15. A series of warm tropical-like rainstorms caused snow to melt and extensive flooding ensued. The Tahoe Amateur Radio Association offered assistance while the Yuba-Sutter ARES Net was alerted to handle emergency traffic. Amateurs also provided communications for Red Cross shelters set up during the flooding. (WB6QFJ, SEC Sacramento Valley, CA)

☐ Salt Lake County, Utah — January 12-13. A fire engulfed a secluded road-maintenance facility and local ARES members moved in to provide communications through WR7AFT for the relief operation. (WA7ZBO, EC Salt Lake Co., UT)

☐ Summit County, Utah — January 17-18. Several amateurs searched for a transmitting *ELT* in the rugged hills near Salt Lake City, only to discover a helicopter with its ELT transmitting accidentally. (WA7ZBO, EC Salt Lake Co., UT)

☐ Halifax County, Nova Scotia — January 22-23. Three youths were missing in bushland during bad winter-weather conditions. Eighteen local ARES members assisted the Waverly Search and Rescue Team during the ensuing search. Local repeaters were used extensively and the youths were located. (VE1ASW, SEC Maritime)

☐ ARRL Section Emergency Coordinator Reports. For April, 35 SEC reports were received denoting a total ARES membership of 17,898. This represents a 16.7% increase in reports received one year ago (30) and a 16.5% increase in membership (15,365). Sections reporting were Ala, Alta, Ariz, Ark, Colo, EBay, EMass, Ind, Iowa, Kans, La, Me, Mar/NFld, Mich, Minn, Nebr, Nev, NFla, Ohio, Okla, Ont, Org, SDuo, SJV, SBar, SCV, SFla, SNJ, Utah, Va, Wa, WVa, WMass, WPa, Wis.

REPEATER LOG

According to reports received between April 20 and May 20, the following repeaters and simplex frequencies were involved in the delineated public service events.

	Weather Emergency	Criminal Activity	Medical Emergency	Vehicular Emergency	Search and Rescue	Fire	Public Safety Events	Drills/Alerts	Miscellaneous	Total
N1ADE								1		1
WR1AFK								3		3
KA1CJA									1	1
WR2ABZ								1		1
WR2ACN						5				5
N2MD								1		1
WB2NHO			1	1	15	1				18
W2VL				2	16	1				19
WA3EVT								1		1
VE3IL								1		1
K3IML									1	1
WA3JDX								1		1
K3JSZ								1		1
VE3MHZ								1		1
VE3MOT								1		1
VE3RPT								1		1
VE3TOR								1		1
VE3TTY								1		1
WR3UER				3	2	2				7
WA3UNG						1				1
WR4ASY								1	2	3
WR4AUE	1									1
W4CUE								1	1	2
W4HFH									1	1
WR5ABA			1		4					5
WR5ABE					3					3
WR5ABI					2					2
WR5ABY			1		6					7
WR5AJG			1							1
WR5AKZ								2	1	3
WR5ANY								1		1
WR5APK					2					2
WR5APN					1					1
WR5ASC	1									1
K5HCJ					1					1
WB5LJQ								1		1
W5PFC									1	1
WA5VKY					1		2			3
K5VRL								1		1
K5XY					1		1			2
WR6ACB						1		1		2
WR6ACD							1			1
WR6ADX									1	1
WR6AES								1		1
WR6AII								1		1
WB6BJM			1		5	3			4	13
WD6CTX							1			1
K6EO								1		1
WB6OQS									1	1
WA6WTT								1		1
WC7AAT								2		2
WR7AGY								3		3
WR7AGY									1	1
WR7AIU								1		1
K7CC			2	4	20	1				27
WH8AES								2		2
WR8AJL	1									1
W8GZF						1				1
W8UPV						1			1	2
WRØAEV								1		1
WRØAFT								2		2
WRØREX								1		1
Simplex						2		15	3	20
Total	3	1	10	10	79	19	5	54	15	4 196

NATIONAL TRAFFIC SYSTEM

W5MI now assistant RN5-E manager, W7LYA now TWN-E manager, succeeding ADØA, who has been transferred to the East Coast. WA2KOU has been doing a lion's share of the NYS liaison on 2RN-D. CAN-E certificates to K4QCQ W9CXY W9NXG W9QLW WØHI (10th annual); WØAM KØCW (ninth annual); K5MC (seventh annual); W5RB (fourth annual); W4ZJY WBØOBH WØYLS (third annual); WA9QCF W9JUJ N5IC (second annual); WN4KKN (first annual). EAN-D certificates to WA4LJI WB4WII KB4N KC8C. RN5-E certificates to N6AEN W4CKS KA4IVO WA4JDH WA4ZPZ WA4RAJ N5RB W5MI K5TI. W5VMY WA5PRI WB5IHA K5OAF KB5W W5WZ W5EDT WB5TRZ W5RB W5UYH WA5JGU WB5NKD WB5NXO WB5NKC K5JGZ WA5AIO W4ZJY AF4I W4WOP WD4NJR K4JGW W4OOG K4VM WA4CNY N5BB N5BT N5CY K5PE K5MC K5PC N5TC AA5J W5SBE K5GM W5KLV.

April Reports

Area Nets

	2	3	4	5	6	7
EAN	90	3653	40.1	1,307	95.0	
CAN	90	1688	18.8	.583	99.2	
PAN	60	2152	35.9	1,026	99.6	
Region Nets						
1RN	90	915	10.2	.555	97.0	87.8
2RN	138	1216	8.8	.583	86.8	96.7
3RN*	30	245	8.2	.584	100.0	98.9
4RN	120	1695	14.1	488	85.7	100.0
RN5	90	1123	12.5	418	88.4	100.0
RN6	120	1228	10.2	411	78.8	98.9
RN7	120	1302	10.9	870	100.0	100.0
8RN	118	755	6.4	383	85.0	98.9
9RN	150	854	5.7	345	94.0	100.0
TRN	90	567	6.3	321	75.6	97.5
ECN	91	404	4.4	411	71.4	87.8
TWN	88	675	7.7	.357	83.1	100.0
TCC						
TCC Eastern	186[1]	1033				
TCC Central	202[1]	886				
TCC Pacific	111[1]	810				
Sections[2]	5734	25,490	4.4			
Summary	7219	46,691	6.5			
Record	7420	51,475	19.1			

*incomplete report

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (188): ABN APN ASN SEASAW (AK), AENB AEND AENJ AENM AENS (AL), ARN OZK SCARC (AR), ATEN HARC SWN (AZ), BCEN (BC), NCN NCTN (CA), CN CWN HNN (CO/WY), CN CPN NVTN WESCON (CT), DEPN DTN (DE), AFPN DEN FAST FPON FPTN GN MEN PBTN PEN QFN QFNS SBEN SPARC SWFTN TPTN (FL), CGVN CVEN GERN GSN GSSBN GTFCN GTN (GA), I75MN TLCN (IA), IMN MTN (ID/MT), ILN (IL), ICN ITN QIN (IN), KPN KSBN OKS (KS), 4DARES 5DARES 5DARES KNTN KRN KTN KYN MKPN SEKEN (KY), LAN LRN LSN LTN (LA), EM2MN EMRI EMRIPN HHTN NEEPN WMN WMPN WMTN (MA/RI), MEPN MMN MTN (MB), MEPN (MDC), AEN CMEN MSN PTN SGN SPSN (ME), MACS MITN MNN QMN UPN (MI), MNAMWXN MSN MSPN MSSN (MN), MON NEMOE TNT (MO), APN (MR/NF), MTN (MS), CMN CNCTN JFK M2MEN NCSSBN PCTN THEN (NC), CN (NC/SC), WNN (NE), GSFM (NH), JSARS MCN NJN NJPN NJSN NJVN OBTTN UCETN (NJ), NMRR SWN (NM), NSN (NV), BAVTN CNYTN NLI NLIPN NLIVHFN NYPON OCTEN STAR WDN (NY), BN ONN OSN OSSBN (OH), OAN OFON OLZ ONON OPEN OTWN (OK), CMN LN OLN OPN OSN (ON), BSN JCARES MPARES OARES PDXAARES PTTN SOFMN (OR), EPA EPAEPTN PTTN WPA WPA2MTN WPAPTN (PA), SCSSBN (SC), NJQ SDEN SDMN SDN (SD), SATN (SK), MCRN MTPSN RCARESN TEPN TN TSN WTVHFN (TN), TEX TSN TTN (TX), BUN UCN (UT), VLN VN VNTN VSBN VSN (VA), WARTSN WSN (WA).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

W4SQQ has been appointed TCC Director — Eastern Area (evening), replacing K3KW, who was forced by work commitments to relinquish his post

	2	3	4	5
TCC Eastern	196	94.9	2693	1033
TCC Central	210	96.2	1627	886
TCC Pacific	120	92.5	1620	810
Summary	526	94.5	5940	2729

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (April): Eastern Area (N2YL/K3KW, Directors) — W1s KX NJM, WA1ZAZ, K1s BA EIR GN SSH XA, W2s GS COB EFU FR GKZ MTA RQ ZOJ, K2NY, N2YL, WA2s ICB SPL SYR, W3s FAF PQ, WA3WQP, K3s KW NGN, N3SJ, W4s JK MEE SQQ UQ, WA4CCK, WB4PNY, K4s BKX KNP, N4s KB NK, KB4N, KB6FR/3, W8s PMJ VPW, WB8WTS, K8s AAZ KMQ, KC8C, VE3s CWA GOL JIR SB. Central Area (W5GHP/W9JUJ, Directors) — W4ZJY, WD4HIF, K4YZU, WN4KKN, N4MD, W5s KLV RB SBE, WA5s BHF INJ RKU, WB5s OXE YDD, WD5HHK, K5s AJM GM MC PE TL, N5s RB TC, W9s CXY DND HOT JIJ JUJ NXG, N9TN, WB9WGD, WØs AM HI, WAØTNM, KØs CW EZ. Pacific Area (W5KH, Director) — N5NG, W5KH, N6s GW PZ, K6OE. W6s EOT INH OA SX VZT YBV, WB6PVH. W7s DZX EP GHT LYA VSE, K7s HLR KSA MG, WA7GYQ, ADØA, KØs BN DJ, WØFG, VE7ZK.

Independent Nets (April 1980)

	2	3	4
Amateur Radio Telegraph Society	30	1565	461
Central Gulf Coast Hurricane	30	157	2437
Clearing House	30	130	296
Early Bird	30	709	421
Empire Slow Speed	27	54	401
Hit and Bounce	30	275	460
IMRA	26	408	967
Mission Trail	31	114	1406
New England Novice	30	86	140
North American SSB Traffic	24	162	219
North American Traffic and Awards	30	27	904
Piconet All Day Watch	164	240	2987
West Coast Slow Speed	29	153	389
20-Meter ISSB	26	288	440
75-Meter ISSB	30	816	1142
7290 Traffic	50	705	2784

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll April 1980

This listing is available to amateurs whose public service performance during the month indicated qualifies for 60 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. 30; (2) Checking into phone/RTTY nets, 1 point each, max. 30; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned NTS liaison, 3 points each, max. 12; (6) Delivering a formal message to a third party, 1 point each, no max.; (7) Handling an emergency message, 5 points each, no max.; (8) Serving as emergency coordinator or net manager for the entire month, 5 points, max. 5; (9) Participating in a public service event, 5 points, max. 5. This listing is available to Novices and Technicians who achieve a total of 40 or more points.

334
KA9CPA
238
K4TH
217
N4CCT
182
WA4CNY
175
WA4PFK
159
WD8LRT
157
WB7WOW
153
WD8KZX
148
KB6FR
140
VE3JIR
133
W7VSE
WD4HIF
128
WA2SPL
121
WB7TQF
WA3WQP
W2ZOJ
119
K2GCE
118
K2VX
117
AA2H
115
KB5TC
W4MEE
WA3PXA
WB4FVV
114
W2RQ
W2UEZ
W2YJR
WA5RVT
113
N6AWH
WB8YRY
WD8NYN
112
K4SCL
W4WXA
WA2MFV
WB2EAG
WB3GZU
111
WA2PIP
WB5YDD
110
AF2L
KA1BJY
VE3GOL
WB2KIH
WB8YDZ
109
W9JUJ
108
K7JV
W4OGG
107
KB2HM
KG5L
WA4JDH
106
W5DTR
WA2UWA
WA4CCK
WB2PJU
WB2RMI
105
W5KLV
WA1TBY
104
K7GXZ
N5AUG
VE5AE
WA3NAZ
103
AJ3R
K1BA
N3JL
WB2IOJ
102
W2MTA
101
K9PNG
KB4N
WØOYH
W5VMY
100
N7AKX
W1TN
WA2MVQ
WB1GWE
WB8MTD
99
WA4SRD
WB4TZR
98
AF8V
WA4STO
97
KA4BQK
N5EK
96
N5TC
WB4VVL
WD9IUX
95
AA5J
N9ASX
W4NWM
WB2IDP
WD5EUE
94
AA3S
N4NK
WA8HGH
WB3FEH
93
KB4OZ
KB5EK
N8ABA
W1RWG
WA2CUW
WA2KOJ
WB5NKD
92
W2AHV
91
N1AWX
W8VPW
WA7MEL
90
VE3DPO
VE3GT
VE5WM
W4CKS
W4ZJY
W8GGX
WB4ZOJ
WD9BCM
89
K5TL
N4ET
WØFT
WAØTNM
WB5NKC
88
K4DZM
K4ZN
N4LE
W7GHT
WB2TQC
86
KB5UL
N4AZI
VE3FGU
W9NXG
WB1CPF
85
KA2CTU
KA2DOA
KB8MX
W4ANK
WA2AFE
WA4EIC
WB2BNY
84
K4EV
KA1EO
KA4IVO
W5VMP
W6INH
WA2EQW
83
KØEZ
K1BSO
N5BT
VE1WF
VE3KK
W7FJZ
WB5CIT
82
K1JHC
K9BVE
WB1BYR
81
N8CW
VE5HG
VE5KS
W7LNE
WA2HEB
WB1ANT
80
K4BKX
N2CR
N5RB
WB3CAI
79
N2APB
WB3KYL
WD4AWN
78
K8OZ
WØOTF
W2XD
W9DM
WD5DQR
77
N2BKK
VE3HTL
76
KB4OW
W3GQJ
WA1IOG
75
K4JGW
WØVJD
W9XD
WB1DXR
WD5IDB
WD5JYI
74
AF1L
N3AKC
VE3CWA
WB4NCH
WB5TAY
73
K7NTG
KBAAZ
W5HMR
WD4CNR
72
KA8CPS
W1EOF
W4FMN
WA4ZHC
WA7IHS
WB2LZN
WD8QMP
71
AG2R
N4WA
W6OA
70
AK5N
K8PXM
KA4LNA
N6GW
W2AET
WA6LVO
WB5LAT
69
N3AIU
WB9JSR
68
KA2CYZ
VE3JRT
WA4EYU
WA8GMT
WB8SYZ
67
N3BEJ
W9HOT
W9JIJ
WA5QFD
WB1FZX
66
K6INK
N2BC
N3EE
W7GB
WB3GZV
WB3KDQ
WD5GKH
WD8PEI
65
AG9G
K4VHT
W4WYR
64
W4NQL
W5TI
WB2TOM
63
K5QEW
KA2GOO
WØOUD
WB2PKG
WB8UBR
62
KB6OT
N7APC
VE3JLL
W1TM
W4IBU
W5SBE
W6JXK
W6RNL
W9IEM
WA1LOU
WA1MJE
WD9DVA
61
K6YD
KA1CC
WB3JYZ
WD4PDK
WD8KBW
60
AJ5F
VE3DUK
WB5JZP
WB8SIQ
WDØBMR
WD4CFZ/T
WD4CNQ
WD5IVD
58
WD4SIH/T
57
N2BDW/T
56
WB7CFH/T
51
KA4NNG/N
WD8BHE/N
50
KA1CGP/T
49
WB2AIU/T
WB2RMJ/T
48
WD4JTO/N
47
WD8ILX/T
45
WD4JJK/N
41
KA4BBA/T
40
KA4IKH/N
WA2WUL/T

Brass Pounders League April 1980

BPL Medallions (see April 1979 *QST*, page 77) have been awarded to the following amateurs since last month's listing: N4PL, W5SHN, W6NL, W7EP, KC8C and WBØZOY.

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.

	2	3	4	5	6
W3CUL	890	826	1431	72	3219
WBØZOY	0	985	457	985	2427
WØWYX	55	779	294	485	1613
WA4JDH	0	684	595	1	1280
WA2SPL	105	508	588	32	1233
KA9CPA	16	815	122	280	1233
W4MEE	5	586	528	26	1145
WA3WQP	6	472	427	27	932
WD4HIF	6	393	431	33	863
W4LX	382	25	387	6	800
N4CCT	33	366	334	66	799
WA4CNY	120	358	276	32	786
WA6AMK	4	383	342	23	752
W7VSE	11	381	325	32	749
K4TH	19	339	238	149	745
W9JUJ	3	346	348	3	700
W3VR	246	149	281	10	686
W7DZX	34	320	328	3	685
WA4EIC	2	321	316	13	652
K4SCL	1	331	294	6	632
AA4FG	174	150	282	15	621
WA4PFK	85	227	231	74	617
KB6FR/3	62	258	220	62	602
W5KLV	2	327	258	13	600
WB4PNY	0	243	342	4	589
WB7WOW	70	207	253	56	586
K5JGZ	14	260	267	10	551
AJ3R	2	213	307	2	544
WB3GZU	53	198	256	30	537
WA4CRI	160	163	104	105	532
W4JK	0	250	276	0	526
W9JIJ	36	241	234	7	518
VE3JIR	17	253	190	56	516
WB7TQF	63	195	184	74	516
KB4N	2	250	250	5	507
W6INH	119	138	240	8	505
Multioperator station:					
WB1CPF	347	178	483	11	1019

BPL for 100 or more originations plus deliveries:

WA3ATQ	274	VE3CWA	119
WØBMA	162	K7NTS	116
WD4COL	136	WA2PIP	114
W3BBN	133	N4BBY	110
WØHZU	130	WB5UYV	109
N4PL	126		
Multioperator station:			
WD4IIO	205		

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Tom Frenaye,* K1KI

JULY

4

West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0400Z July 5 (9 P.M. PDT July 4). 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 enclose your full name, call (if any) and complete mailing address. A large self-addressed envelope will help expedite your award/endorsements.

9

W1AW Qualifying Run, 10-35 wpm at 0200Z July 10 (10 P.M. EDT July 9). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. The complete W1AW schedule appeared on page 97 of April *QST*. Other details are the same as for the July 4 listing.

12-13

IARU Radiosport Championship, May *QST*, page 73.

19-20

SEANET Contest, sponsored by the Philippine Amateur Radio Association. Work southeast Asia stations, 48-hour period UTC. 160-10 meters, single operator all band and single band, multioperator single transmitter categories. Send signal report and serial number beginning with 001 on each band. SEANET countries: A4 A5 A6 A7 A9 AP BV BY CR9 C2 DU EP HL HS H4 JA JD JY KC6 KG6 KH2 KH6 KX6 P2 S2 S7VK VQ9 VS5 VS6 VS9K VU VU-A VU-I XU XV XW YB YJ ZL 3B6 3B8 3D2 4S7 4W1 5Z4 9K2 9M2 9M6 9M8 9N1 9V1. Contacts with SEANET countries count two points on 20-15-10 meters, five points on 80-40 meters and 10 points on 160 meters (double those numbers when working DU HS YB 9M2 9M6 9M8 9V1 stations). Multiply QSO points by the number of SEANET countries worked and then by three to get the final score. Send one IRC for results. Results will be announced at the 10th SEANET convention in Manila November 29, 1980. Send your entry so that it arrives before October 31 to Eshee, 9M2FK, P. O. Box 13, Penang, Malaysia.

Colombian Independence Day Contest, sponsored by Liga Colombiana de Radioaficionados. 48-hour period, phone and cw, 160-10 meters. Exchange signal report and serial number (HK stations will send signal report and 170 — for 170 years of independence). Count 10 points for HK contacts, three points for DX contacts and one point for those with your own country. Multiply by sum of DXCC countries per band. Only one QSO per band. Plaques. Mail entry by August 30 to L.C.R.A., Contests and Awards Manager, Apartdao 584, Bogota, Colombia.

QRP Summer Contest, sponsored by AGCW-DL. from 1500Z July 19 until 1500Z July 20. Categories for less than 3.5 watts, below 10 watts, multioperators and non-QRPers. Complete rules were published in January *QST*, page 95, or send an s.a.e./IRCs to DJ5QK, Otto A. Weisner, Feudenheimer Str. 12, D-6900 Heidelburg 1, Fed. Rep. of Germany.

Maine QSO Party, sponsored by the Portland Amateur Wireless Association, from 1600Z July 19 until 2000Z July 20. Exchange signal report, serial number and QTH (County for ME stations; state, province or country for others). Count three points per QSO and multiply by number of ME counties worked for final score (ME stations multiply by ME counties plus states, provinces and countries). Suggested frequencies: cw — 1805 and 60 kHz from low end; phone — 1815 3930 7280 14,280 21,380 28,580 kHz; Novice — 3725 7125 21,125 28,125. Mail by September 1 to Joe Blinick, K1JB, PAWA, Box 1605, Portland, ME 04104.

23

W1AW Qualifying Run, 10-35 wpm at 2300Z (7 P.M. EDT). See July 9 listing for more details.

26-27

CW County Hunters Contest, sponsored by the CW County Hunters Net, from 0000Z July 26 until 0200Z July 28. Mobile, portable and fixed categories (M,P, + P). Exchange serial number, category, signal report, state and county (province or country for DX). Stations may be worked again if they change county. Those changing counties may repeat QSOs for points. County-line stations send only one number but each county is valid for a multiplier. Count one point for QSOs with fixed stations, three points for portables and mobiles. Multiply by total counties worked for final score. M and P stations calculate score on basis of QSOs with one state. Suggested frequencies: 3575 7055 14,070 21,070 28,070 kHz. M and P stations only call CQ below 7055 and 14,070, others spread out above. Check (dupe) sheets required if more than 100 QSOs. Large s.a.s.e. for results. Send by September 1 to CW County Hunters Net, Jeffrey Bechnet, W9MSE, 673 Bruce St., Fond du Lac, WI 54935.

AUGUST

1-7

SWOT QSO Party, sponsored by Side Winders on Two. Seven-day contest, operate as much as you wish, cw and ssb only. No repeater or satellite QSOs. Exchange geographical indicator — latitude and longitude. Example: W7CKL located at 32°7'N 110°55'W would send 32110. SWOT members add "X" to geographical indicator. Non-competing stations may be counted if they give their location accurate enough so that the geographic indicator can be determined. Stations may be worked once per mode. Multiply total SWOT QSOs ("X" after number) by SWOT geographic units. Do the same for non-SWOT QSOs. Add the two for total score. Send s.a.s.e. for results. Logs not required unless requested. Send summary sheet (including SWOT number if any) by September 1 to Val Taylor, W7CKL, 3849 N. Houghton Rd., Tucson, AZ 85715.

2-3

ARRL UHF Contest, this issue, page 72.

YO DX Contest, sponsored by Romanian Amateur Radio Federation, from 1800Z August 2 until 1800Z August 3. Cw and ssb, 80-10 meters. Avoid lower 10 kHz of each band. Single and multioperator, single and multiband. Exchange signal report and serial number. YO stations will send two letters indicating their county (YO2: AR CS HD TM. YO3: BU. YO4: BR CT GL TL VN. YO5: AB BH BN CJ MM SJ SM. YO6: BV CV HR MS SB. YO7: AG DJ GJ MH OT VL. YO8: BC BT IS NT SV VS. YO9: BZ DB IF IL TR PH). Count 10 points for YO QSOs, two points for other European QSOs. Multiply QSO points by sum of YO counties and European countries per band for final score. Separate logs per band. Mail entry by September 1 to Romanian ARF, Box 05-50, R-76100 Bucharest, ROMANIA.

Illinois QSO Party, sponsored by the Radio Amateur Megacycle Society, from 1800Z August 2 until 2300Z August 3 with a rest period from 0500Z to 1200Z. Phone and cw. Exchange signal report and QTH (county for IL stations; state, province or country for others). Suggested frequencies: cw — 60 kHz from low end; phone — 3975 7275 14,275 21,375 28,675; Novice — 25 kHz from low end. Count one point per QSO (two for Novices and Technicians). IL stations multiply QSO points by sum of states, provinces (10 maximum) and countries (5 maximum). IL portable or mobiles add 200 points for each county where 10 QSOs were made. Non-IL stations multiply QSO points by IL counties for final score (one bonus multiplier for each group of eight QSOs in the same IL county). Club participation awards. S.a.s.e. for results. Mail by September 15 to RAMS/K9CJU, 3620 N. Oleander Ave., Chicago, IL 60634.

9-10

European DX Contest (WAEDC), sponsored by the Deutscher ARC, full 48-hour UTC period, 80-10 meters. (Note: Phone Sept. 13-14 RTTY Nov. 8-9.) Single op all band; multiop single transmitter. Multi-single only: only one band change allowed within 15-minute period, except for new multipliers. Only 36 hours of operation out of the 48 are permitted for single ops. The 12 hours of nonoperation may be taken in one, but not more than three periods any time during the contest. Non-EUs work EU stations only. Exchange RS(T) plus serial number starting with 001. Each QSO worth 1 point. Stations may be worked only once per band. Each confirmed QTC (given or received) counts 1 point. The mult. for non-EUs is determined by the no. of EU countries worked on each band. The multiplier on 80 may be multiplied by 4, the mult. on 40 by 3, the mult. on 20-15-10 by 2. Score is the total QSO points plus QTC points multiplied by the sum total of multipliers from all bands. A QTC is a report of a confirmed QSO that has taken place earlier in the contest and later sent back to an EU station. It can only be sent by a non-EU to an EU. A QTC contains the time, call and QSO no. of the station being reported. A QSO can be reported only once and not back to the originating station. A maximum of 10 QTCs to the same station on all bands is permitted. You may work the same station several times to complete this quota. Only the original contact, however, has QSO point value. Keep a uniform list of QTCs sent. QTC 3/7 indicates that this is the 3rd series of QTCs sent and that 7 QSOs are reported. Certificates. Usual disqualification criteria. Contest Committee decisions final. Log 40 QTCs or QSOs per sheet (sheets are available from W3OG — official forms are recommended). Separate logs per band. Deadline for cw logs September 15; for phone entries October 15, RTTY December 1. WAEDC committee address is Box 1328, D-895 Kaufbeuren, Fed. Rep. of Germany, or Hartwin E. Weiss, W3OG, Box 440, Halifax, PA 17032.

15

W1AW Qualifying Run

16-17

Rhode Island QSO Party
New Jersey QSO Party

23-24

All Asia Contest, phone

24

W1AW Qualifying Run

30-31

Four-Land QSO Party

SEPTEMBER

13-14

ARRL VHF Contest

Standard Contest Guidelines

1) Make sure your log details the date, time, band, call sign and complete exchange sent and received, for each QSO claimed for the contest credit.

2) Your summary sheet should indicate your score, including how you figured it, and a declaration that you followed FCC/DOC regulations and the contest rules. Your name, call sign and complete address should be typed or printed in block letters.

3) Crossband, crossmode and repeater contacts are usually not permitted. Contacts with the same station on different bands are usually permitted.

4) Your log should be checked carefully for duplicate QSOs and, if more than 200 QSOs are made, dupe sheets should be included with your entry.

5) Your log may be considered a checklog or disqualified if it is incomplete or if too many errors are detected by the contest committee.

6) Avoid standard net frequencies.

7) International contests generally offer awards to top scorers from each state/province.

8) Your summary sheet should include the following statement: "I have observed all competition rules as well as all regulations established for Amateur Radio in my country." The declaration should be signed and dated. QST

*Assistant Communications Manager, ARRL

Section Activities

A-1 OPR ✗ EC ✗ DXCC ✗ RCC ✗ WAS ✗ STM ✗ OES ✗ OTS ✗ NM

SCM ✗ ARES ✗ OVS ✗ SEC ✗ OBS ✗ TCC ✗ OO ✗ NTS ✗ WAC ✗ CP ✗

CANADIAN DIVISION

ALBERTA: SCM, S.T. Jones, VE6MJ — Sec & Actg SCM: E. Roy Ellis, VE6XC. Net Manager (APSN), VE6AFO Net Mgr (ATN), VE6BBL. SCM VE6MJ is moving to Victoria BC and VE6XC (SEC) is to take over SCM duties for duration of term. We wish you luck Sid and say thanks for a job well done. Consideration being given Alberta hams for their accomplishments in a recent provincial government communications exercise to be formally established as an auxiliary in government communications plans. Traffic: VE6HO 89, VE6CHK 88, VE6QN 28, VE6AFO 14, VE6XC 10, VE6ABC 9, VE6WV 8, VE6CE 4, VE6VS 4, VE6ARN 3, VE6WN 2, VE6YW 2.

BRITISH COLUMBIA: SCM, H.E. Savage, VE7FB — White Cane Net 3765 Mondays 0303Z. All B.C. nets have remained on same time of GMT during daylight saving time. Nice to hear VE7CN and VE7DGB after months in hospitals are now improving. QCWA Dogwood Chapter GAM June 21 in Surrey, will be a luncheon. Shuswap ARC officers: VE7BHJ, pres., VE7OI, secy. How about a note to your SCM of your activities or the club's. Traffic: VE7ZK 154, VE7COA 50, VE7CGJ 30, VE7FB 25, VE7BLO 15, VE7DFY 9.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst. SCM: VE4JP. Sec: VE4TR. STM: VE4RO. Net Mgrs: VE4s VJ TE AFJ NM. All certificates are now in from all government agencies. All have been mailed out. One year ago we were under water, now we have the opposite. Plans are already being made for FD, and looks like another busy weekend. The Smileathon again was handled amply by amateurs in many parts of Manitoba, nice going guys. MEPN QNI 923, QTC 35, sess 30; MTN QNI 153, QTC 81, sess 30; MMN QNI 394, QTC 32, Sess 30. No WRIN report for April available. Traffic: VE4PG 62, VE4AFJ 61, VE4NE 41, VE4DP 36, VE4TE 34, VE4OJ 28, VE4NM 20, VE4AAD 19, VE4FK 16, VE4AED 14, VE4OE 13, VE4JA 11, VE4LB 10, VE4AAU 7, VE4ADS 7, VE4AEE 3, VE4GB 2, VE4ABU 1, VE4AG 1, VE4XN 1.

MARITIME — NFLD: SCM, Donald R. Welling, VE1WF — ASCM: VO1-G. STM/NM: APN Open. NM: VO1JN. SEC: VE1ASW. Silent Keys: VE1UG VE1CP. Hospital: VE1WG. AREC Group formed St. Andrews, NB. MAARC has large class, interesting article on VE1OC in NSARA Bulletin. Canadian Newsfronts Editor (GST), now VE3GRO, looking for club bulletins. SCM attended EAS meeting at Syracuse, NY. ECNd will operate at 1745Z and 1930Z on 7160 kHz. Need ops from section to check into ECNd, any volunteers, see VE1WF. IRG: W1QOK pres., VE1BGO & K1HHC, vice pres.; VE1LW, secy., VE1DQ, treas. Yarmouth ARC: VE1UT, pres.; VE1LN, vice pres.; VE1GM, secy treas. APN 31 sessions, QNI 184, QTC 93, QTR 474. Traffic: VE1WF 229, VE1LCR 75, VE1BMN 52, VE1BXA 33, VE1XF 18, VE1OC 12, VE1KR 10, VE1AUL 7, VE1YO 6, VE1HJ 4.

ONTARIO: SCM, Larry Thivierge, VE3GT—A/SCM: VE3BMG. SEC: VE3APK. STM: VE3GOL. The 1980 RSO Convention returns to Toronto on October 3, 4 and 5 at the Prince Hotel. Advance publicity material available from Box 997, Willowdale M2K 2T6. Nipissing FM Inc. has installed autopatch facilities on VE3NFM. The fourth annual IARU Radiosport Championship is on the 12 and 13th of this month. The new womens' QCWA Chapter 120 has over 100 members. VE3FGU recently piled up over 1300 cw contacts as 8P6MI. VE3BIA enjoying his new key board on the low end of 40 cw. Upgrades to Advanced include VE3s IWY KHQ KSH and IWR. During a regional scout conference in the Pickering High School, the South Pickering ARC operated club station VE3SPC/3 in order to promote Amateur Radio. Traffic was sent to friends across North America. Taking part were VE3s JPP DAX IRB KXT WZ LLT HFX LEQ HAA and ANJ. The following have become Silent Keys. VE3s HCW CW and CUO. Former KWARC member VE3FUH now on the air from Equador as HC1XL on 21.250 kHz from the back yard of HCJB. London repeater VE3LAC has moved to atop Regina Mundi College, in order to avoid any embarrassment I will no longer report Silent Keys unless I am given full details by the reporting station. VE3IPN received his Worked all Northern (WAN) while VE3JPX earned his 50 contact sticker. Field appointments: OTS: VE3CWA; NM Laurentian Net: VE3FPI; EC London: VE3GV. VE3FQV is the new manager of ONTARS. VE3IFP stepping down as NM of the Laurentian Net - thanks to him and his assistant, VE3FKJ, for a job well down. VE3DUK will be the new assistant. Westside ARC enjoyed a very good tour, arranged by VE3FEA, of Bell Tel's Communications Centre in Don Mills. Tour guide was VE3CEX. New calls on the air across the section include VE3s MMC MMF MBF LFG LFI and LFK. Traffic: (Apr) VE3JIR 516, VE3GOL 354, VE3CWA 283, VE3DPO 197, VE3JLL 178, VE3KK 164, VE3GT 163, VE3CYR 154, VE3HTL 131, VE3ISW 129, VE3FGU 102, VE3JRT 77, VE3EWD 75, VE3GFN 72, VE3IFP 55, VE3BVG 50, VE3JPP 50, VE3ANJ 43, VE3DVE 40, VE3GYD 40, VE3HCS 39, VE3WG 32, VE3SB 31, VE3AWE 29, VE3DUK 29, VE3GNW 23, VE3KXB 21, VE3APK 19, VE3BZR 14, VE3AYZ 13, VE3FPI 12, VE3CBR 9, VE3IXB 6. (Mar) VE3FPI 10.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA. STM: VE2FFE. New appointee: VE2FWE as OTS. Please mail your monthly reports so they will get here no later than the 4th of the month, if later, they will not go in until the following month. Next CD Party is listed for October. Lets have more participants than in April. Le reseau VE2TA a maintenant quelques nouveaux animateurs, afin de venir en aide a VE2BIN. Avec regret, j'ai a vous annoncer le deces de VE2ZL. Edouard a ete un des pionniers de RAQI. Traffic: (Apr) VE2FFE 49, VE2EC VE2EKC 21, VE2FEX 18. (Mar) VE2FFE 55, VE2EC 45.

SASKATCHEWAN: SCM, Norm Waltho, VE5AE — STM: VE5XC. NMs: VE5WM VE5DC VE5HG VE5SF. SPN 1175 QNI, 25 QTC; SATN 334 QNI 22 QTC; SKTN 2-m 318 QNI, 5 QTC; RARA 437 QNI; PWXN 497 QNI. Congrats go to VE5ADS VE5ATI VE5WV and all of the other new hams in the province that I haven't heard of yet. Looks like a bad year for fires up north. Welcome back to VE5EO VE5DR VE5AX and all the others that spent a warmer winter in other parts of the country. Congrats also go to the new club in Yorkton, The Parkland ARC, sounds like there will be competition from there for Field Day. Things are shaping up in the Battlefords for the hamfest this year — looks like a three day affair. Traffic: VE5AE 49, VE5HG 38, VE5ACN 10, VE5NJ 5, VE5AAT 4, VE5UX 2.

ATLANTIC DIVISION

Delaware: SCM, Roger E. Cole, W3DKX — SEC: W3PQ. STM: WA3WIY. PSHR: K3JL 103, N3AKC 74, W3DKX 54. New appointment: WA3WIY as STM and Manager of DTN. Delaware is most fortunate to have traffic handlers with the skill and reliability of WA3WIY and XYL WB3DUG. I am confident that he will do an excellent job. Heartfelt thanks to W3WD retiring STM and Net Manager for his years of service to DE amateurs. We look forward to his continued net participation. Clubs competing for Field Day trophies, please mail reports to W3DKX by August 1st. DTN QNI 330, TFC 57; DEPN QNI 46, TFC 7. Traffic: W3QQ 56, K3JL 45, N3AKC 35, W3DKX 30, WB3DUG 25, WA3WIY 24, W3WD 20, WB3ANC 8, KA3DPR 4.

EASTERN PENNSYLVANIA: SCM, Karl W. Pteil, W3VA — SEC: WA3PZO, STM: WB3JYZ. NMs: AA3B AG3R AJ3R WA3WQP. Net Reports: EPA QNI 644, QTC 309; EPAFPTN QNI 477, QTC 174; PFN QNI 354, QTC 301; PTTN QNI 340, QTC 119; ATN (2) QNI 85, QTC 18; LVN(2) QNI 32, QTC 3; LVN QNI 9, QTC 0. OBS reports: WB3JYZ AJ3R W3ID WB3CAI W3AVJ K3EBZ W3CL and N3AIU. OO reports: K3TXG and W3GOZ. OVS reports: W3GOA WA3BJQ W3HK WB3GUS. BPL: WA3WQP KB6FR/3 AJ3R WA3ATQ. PSHR reports KB6FR/3 WA3WQP AJ3R WB3FEH WB3CAI N3AIU WB3GZV WB3JYZ N3BEJ W3GOA K3RHI W3BUR. WB3JYZ is new STM. AA3B new NM. New appointments: W3TB to OFS; WB3FFH K3JSZ and N3BEJ to OTS, congrats. ARA provided communications for the Hazelton Area Walk-a-thon. W3BUR reports RF Hill ARC 12th Annual Banquet a great success. W3HK doing antenna work before grass cutting takes no. 1 priority. N3AVV has new tri-band beam. WA3ATQ reports conditions so bad on 75 lately she has to do a lot of relaying. AA3B AG3R and N3WS had a fantastic time at Dayton. CW nets welcome AF3Z. KB6FR/3 will move to VE3 after graduation. Good luck and best wishes from EPA. New upgrades: KA3EPU to Advanced. WB3JIA KA3CIP KA3GRP KA3DJE KA3ECE to General. KA3AHX now KB3JK. The EPA Section Basket Picnic will be held Sat. Aug 30, at Tuscorora State Park 5 miles north of Tamaqua. Open to all hams and their families in the section. K3JSZ back in nets after rig and tuner problems. Anthracite Breaker Ten Ten Net meets Sun and Tues evenings at 9 P.M. on 28.660 MHz. Traffic: (Apr) WA3WQP 932, KB6FR/3 602, AJ3R 524, WA3ATQ 433, W3IPX 170, K3NGN 143, WB3FEH 128, KA3BOD 108, W3VA 100, W3BI 91, WB3CAI 75, AG3R 71, N3CD 66, WB3JYZ 57, N3BEJ 53, AA3B 52, WB3GZV 50, N3AIU 36, WB3CUF 31, W3ID 25, WA3YOE 25, WA3VIL 23, W3ADE 14, W3AVJ 8, W3CL 8, K3NB 8, WA3OFD 7, W3BUR 6, W3HK 6, K3RHI 4, AF3Z 4, K3EBZ 3, K3JSZ 3, WB3BJQ 2, WB3BNR 2, WB3GUS 2, K3AKN 1. (Mar) W3BI 98, AA3B 65, W3DP 39, W3RUR 8, W3RJ 2.

MARYLAND—DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — Congrats to WB3GZU April traffic leader and to WØVJD/3 runner up, W8GIO Dad, WA3KCY Son and KA3DGS Wife make it a ham family clan. W3WBY retired and moved to Floral City, FL. K3HPG is getting ready for the fall contests! KB3AP is a regular on the MARCO Net. WB3JRW would be on 2 and 6 meters, but work won't let him erect those antennas. W3CDQ tripped to the Antique Wireless Assn in SC plus doing the DX/NA YLRL contest. Congrats to WB3KYL with upgrade to Extra, and finishing Electrician Apprentice School. N3AMA is now AK3W, a result of his upgrading. WB3AIQ and K3RXK enjoyed Dayton and the trip back with WB3DUJ and WA3SXH in the convoy. AA3S was there, too. W3ZNW had a few reties from AF MARS. WB3EPN spent 4 months internship in San Francisco, got law degree May 25, and back to CF for the law degree in July. WA3CBC passes the 80 year milepost, very active. WA3WPY is disguised as KA3FSP Seattle. WA3YNW has his 813's tamed and purring. W3UT reports a slim month. W3FZV has a regular 3RN spot from MDD. WB3KDO is covering the Balto/Annapolis corridor. WB3GZU is the MEPN NCM. N3QA covers Kent County. WØVJD/3 has a busy active family. N3SJ's busy season is upon him. WB3CES gets K3ORW to send in his report, and K3ORW finds the evening news interferes with his nets. K4FJ says don't forget DXPO 80 Sept. 27/28. The So. Md. ARC elected WA3SKK, pres.; WA3UPH, vice pres.; WB3EBA, secy., W1ZX, treas.; KA3AHI, activities; W3OQBI WB3RBK WA3IAI, directors. N3AFM predicts sporadic E is coming! With the nets: Net/Manager Sessions/Traffic/Qni average. MDC PON/W3OYY 4/10/22.5. WR PON/W3DFW 22/27/20.6. The PON's meet on 3905 at 5:15 P.M. local time daily except Sundays. MEPN/WB3GZU 31/128/25.8. Meets daily on 3920 at 6 P.M. local time. 100 percenters KA3ARH and WB3BFK. Others W3ADQ N3AGM WA3IHW K3OMN K3ONU AA3S AE3W and WA2YFM. Point winners AA3S/68, W3DKX 59, KA3ARH 57, W3FA 53, WB3GZU 42, and WB3CES 41. Traffic: WB3GZU 537, WØVJD/3 158, W3FA 119, WB3KDO 102, WB3KYL 102, N3SJ 82, AA3S 48, WA3YNW 34, WB3EPN 30, W3FZV 25, KB3AP 15, N3QA 10, W3ZNW 9, WB3CES 8, K3RXK 8, W3UT 4, K3ORW 1.

SOUTHERN NEW JERSEY: SCM, Bill Luebkemann, WB2LCC — SEC: W2HOB. STM: WB2GTW. Hamfest season is again approaching and promises to be bigger and better than ever, if we can all afford the gas! The Delaware Valley Radio Assn, working jointly with the Lawrenceville Repeater Group, kicked off the season on April 20 with their annual hamfest. All reports indicate that it was tremendously successful, with lots of sellers and buyers. The next hamfest in our section will be held at McGuire Air Force Base on July 20, sponsored by the West Jersey Radio Amateurs. The fest runs from 9 A.M. till 4 P.M., with tickets costing $2.50 and selling spots (indoors or outdoors) also selling for $2.50. The indoor area is air-conditioned, so you better get there early or get an advance reservation if you wish to be assured of a selling space indoors. And practice your cw also, for the annual WJRA QLF contest. Spouses and children are free, with kiddie movies planned for all day to keep the little ones occupied. More info from N2ME and advance tickets from WB2QIU. Next months column will focus on details of GCARC and SJRA hamfests. Traffic: AA2H 227, WA2CUW 180, WB2LCC 175, WB2IQJ 171, WB2HUV 81, WA2ONW 67, W2ZQ 67, KC2A 57, WA2HEB 52, WD2AHO 51, K2UL 46, K2YBN 42, W4NLC 36, N2AEP 32, WB2GTW 27, WB2PKG 26, KA2GTE 25, WA2WUL 24, WA2GXU 16, KB2OE 9, WA2PTQ 7, KD2Q 5.

WESTERN NEW YORK: SCM, Lonnie J. Keller, WA2AOG — STM: W2MTA. SEC: W2BCH. No BPL. PSHR to W2ZOJ WA2MFV W2MTA WA2ZJP WA2KOJ WA2AFE KA2CTU N2APB W2AET. Lots of Public Service activities this month. RAWNY operated Armed Forces Day on the USS Little Rock (in the Buffalo Naval Park), with WA2FKV W2ICZ WB2OKB WB2OWO & WB2LKO manning the rigs. The St. Lawrence Valley ARES ran communications for the Canton, NY Cancer Run for Hope. RAGS did the same for the Syracuse Fun-to-Run race; the Lockport ARA for the March of Dimes Superwalk; GRAM for the Batavia March of Dimes Marathon; Chemung Co. AREC for the 50th Anniversary of Soaring meet; last but not least, the Tompkins Co. ARC for the Etna White Water Canoe Races, where WA2EOW made all of us proud to be amateurs as he made an ice-water rescue of a floundering canoer. W2ZOJ succeeds W2OS as NM of NYS, and WA2PUU replaces W2ZOJ as NM of CNY. New RAWNY officers are WA2FKV, pres.; WB2OKB, vice pres.; WB2OWO, secy.; WA2OJV, treas. Named "Ham of the Year" at the April RAWNY meeting were WA2OJV and WB2OWO, co-winners. ROOKIES "Ham of the Year" is WB2FXK. Congrats to K2IXE who is now Extra Class. KD2Y. Traffic: (Apr) WA2ELD 301, WA2MFV 242, W2MTA 236, W2ZOJ 232, WA2KOJ 125, N2APB 109, KA2CTU 109, WA2HSB 109, WA2AFE 78, WB2FHE 77, WA2ZJP 75, W2PZL 59, WB2OWO 53, WB2OIX 48, W2AET 45, WA2AOG 27, AF2K 26, KB2GT 17, WB2PID 13, W2PPS 10, K2VR 5, WB2NAO 4, KA2HCB 1. (Mar) WB2FHE 61, K2GWN 60, N2ALB 14.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB — ASCM: N3FM. SEC: WA3VUP. Asst SEC: WA3JBQ. STM: N3EE. NMs W3NEM W3MML WA3PXA WB3JDI.

Net	Sess.	QNI	QTC	kHz	Time/Day
WPA	30	295	126	3585	8:00 P/Dy
WPAPTN	30	520	138	3983	6:15 P/Dy
WPA2MTN	30	235	102	146.28/88	8:00 P/Dy
NWPA2MTM	26	256	20	146.04/64	9:30 P/Dy

WPA RACES 3990.5K 9:00A/S PTTN 3610K 6:30 P/Dy. W3YQ has resigned as STM and Net Manager of the WPA (CW) Net. N3EE has been appointed to take the STM post. I wish to thank W3YQ for the fine job he has done while doing this important work, the nets have improved during his tenure. N3FM will assume the work of gathering the reports for the net and AC3N will copy and mail out the results. W3LRS is a Silent Key, our sympathies are extended to his family. KB3IQ and K3WT are new OOs. WA3ZOC now Advanced, congrats. Crawford ARS new officers: WA3PRJ, pres.; K3YAK, vice pres.; WA3ABY, secy/treas.; K3GGS WB3JDI, dir. Armstrong City new officers: K3MHT, pres.; K3FOW, vice pres.; W3SFA, secy/treas. Allegheny Cty Pub. Serv. members (39) provided comm. for the local walkathon. Washington Cty amateurs did the same there. Enjoyed meeting so many at the Dayton Hamfest. Also at Meadville. Appointees are requested to report regularly or have their appointments cancelled. WA3PXA PSHR 115, N3EE had 66. All amateurs should belong to ARES and RACES it might save your family some day. Traffic: WA3PXA 319, W3EGJ 198, W3SMV 136, N3EE 114, W3YQ 109, N3FM 85, K3SMB 67, KB3DT 57, WA3UNX 51, N3WS 50, W3KUN 41, WB3JGD 35, W3KMZ 35, W3UHL 35, WB3JDI 34, W3MML 30, WB3GWJ 27, K3HCT 27, AC3N 20, WB8PAV 20, WB3HUJ 17, W3IDW 17, WA3VRE 15, KA3DXP 14, W3EXC 14, WA3JBQ 14, W3RUL 13, K3VQV 12, W3SN 9, WB3BOB 6, N3KB 5, AF3B 4, K3UA 2, W3LOD 1.

CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst. SCM: W9RYU. SEC: W9AES. NMs: WA9KFK and WB9JSR. Cook County EC: W9HPG.

Net	Freq.	Times/Days	QTC	Sess.
ILN	3690	0030/0400	323	60
ILL Phone	3915	2130 Dy	157	30
NCPN	3915	1200/1700	132	56
IEN	3940	1400 Su	—	—
W9VEY Mem Stn 2-meter			14	4

The 18th annual Illinois QSO Party will be held on August 2nd and 3rd. Contact RAMS/K9CJU, 3620 N. Oleander Ave., Chicago, IL 60634 for further details. KA9BZY has upgraded to Technician. KA9HHT, 9 year old, has received his Novice ticket. The Southern Illinois Amateur Radio Society is operating their new repeater from Carbondale with autopatch and 220 control link. N9ALC, XYL of W9LNQ, received her DXCC certificate. Our sympathy to the family and friends of W9MUL of Urbana who recently passed away. New appointment this month is N9BJQ as an OTS. W9HOT reports that the 9RN had 454 messages during 90 sess and that Illinois participation was 100% with W9JIJ W9YCE W9NXG WB9WGB WD9FDB and WB9HYH checking in. WA9VLK will coordinate a local two-meter net in the Kankakee area. W1RW will be a guest of the Sangamon Valley Radio Club (Springfield) on May 30th. Many eyeball QSOs were held at the Dayton Hamfest with the Illinois contingent present in great numbers. It is a great shock to learn of the death of W1HR, founder of Ham Radio. He suffered a massive heart attack on April 18. W1HR, age 45, was a life member of ARRL and a personal friend. He will be missed by many in this Division. New calls in the Clinton and Decatur area are: KA9CBV KA9EIN KA9GRA KA9GST KA9GSS KA9GWU KA9HFS KA9HCU KA9HCV. KA9EMX is now a General Class licensee. WB9RJZ, was killed this month in Europe while attending school. Our heartfelt condolences go to WB9QLF and his family. WA9HOO and K9ICC underwent major surgery and are on the road to recovery. Net control K9QLS is sponsoring a slow speed cw net on Sun nites at 9:00 P.M. CST on 21.110 MHz. *The fifth annual hamfest sponsored by the* Sangamon Valley Radio Club, Inc. (Springfield) will be held September 28, at the Sangamon County Fairgrounds in New Berlin, 16 miles west of Springfield. NØTG spoke on the Navasa DXpedition at their last

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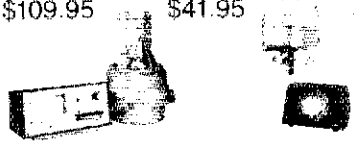

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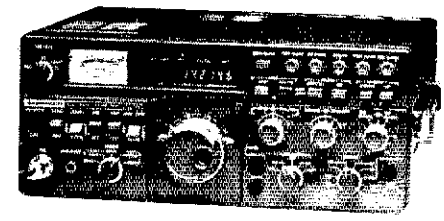
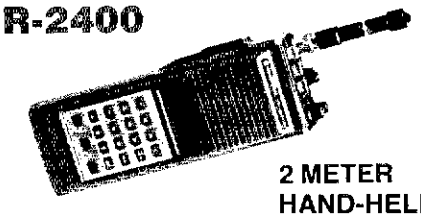


TS-120S

TR-2400



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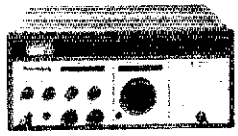

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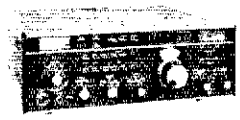

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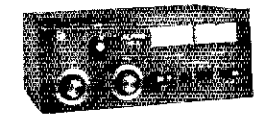

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meeting. The Chicago chapter of QCWA held their spring April meeting with a travelogue of Russia narrated by Vern Rutter. If you are active on 10 GHz or are contemplating such activity write to WB9CYY, 707 Hawthorne, S., Milwaukee, WI 53172. K9AQJ was guest speaker at the 10-10 International Net Inc. at Los Angeles on April 20th. The CAND. during 60 sess. passed 683 messages and Illinois had 100% participation with WD9FDB W9YCE W9HOT W9IIJ W9NXG and WB9WGB checking in. W9IIJ is the only RPI for the month. Traffic: W9JIJ 518, W9HOT 308, W9NXG 289, K9RVE 161, WB9JSR 144, W89PUK 144, K9PNG 140, N9TN 112, KA9ALR 100, WD9FDB 95, WB9WGB 95, KN9BAM 78, W9YCE 78, W9TLU 61, K9EEA 61, W9OK 59, W9KH 38, W9OYL 48, W4IZI 38, W9LNQ 35, K9SW 29, W9PRN 26, K9UN 19, WD9EBQ 12, WB9SGK 7, WD9HZF 4

INDIANA: SCM, Bruce Woodward, W9UMH — SEC: W9UMH. STM: W9IJJ. Net Managers; ITN W9QYY OIN WD9GXW IGN N9AEI. VHF W9PMT April net reports. All nets meet Daily except IPON

Net	Freq.	Time	QNI	QTC	Sess.
ITN	3910	1330/2300	2121	207	60
OIN	3656	1430/0100 /0400	835	420	88
IGN	3708	0015	116	058	30
IPN	3910	2130	1190	119	30
IPON	3910	1300	109	010	4

Indiana 100 percent on D9RN for April. VHF Net report for April: QNI 2603, TFC 110 from 15 nets. Total state vhf nets 48. As your new SCM, I promise that any changes in our method of operation will come only after long and careful deliberation. The system we now have is backed by years of practice. New EC appointments for April: WD9JLT Switzerland County, KA9FDF Floyd County, KB9JK Scott County. Continuing for another two years are: W9RTH Jackson County, WB9FHP Orange County, K9JKRK Shelby County, W9DO Howard County, K9VMG Putnam County, WA9OHX Tipton County. OTS appointment, W9RTH. It is hoped that in the future we can increase the number of OTS appointments. If you are interested in an appointment see me at the IRCC booth or Emergency Communications Forum at the Indy Hamfest and State ARRL Convention July 13th. We have 48 Two-Meter fm nets operating in the state. Many of these nets are AREs or radio club nets. Some are successful traffic nets. I have seen tremendous growth in operating practices and procedures on these nets. Our repeaters are a tremendous help in getting traffic passed. Many thanks to the 15 nets that are reporting their activity to W9PMT. If you are a two-meter net manager, keep track of your checkins, traffic and time and report them. Our ARRL affiliated Amateur Radio clubs in the state are strong and active. We have many new clubs. If you have information for this report get it to me. Remember there is a two month lag time. Our strength lies in working together. Congratulations to K9WWT for the Ham of the Year Award given at the Herbert S. Brier Memorial Banquet by the Lake County Amateur Radio Club. Traffic: W9JJJ 700, W9FC 161, W9EI 113, WD9CIS 109, N9AEI 71, W9PMT 52, WA9QCF 52, W9ULW 52, N9PS 50, W9XD 49, W9HUF 48, WD9DVA 44, W9WEI 43, K9WWJ 40, W9DLF 38, AG9J 34, WA9TJS 25, W9IOH 24, WA9OKK 21, W9UEM 21, K9DIY 20, W9RTH 18, K9IU 17, K9KTB 16, KA9UVZ 14, KA9EJT 13, K9ET 13, WD9JAB 11, W9VAY 10, K9CGS 8, K9FG 8, W9URQ 7, W9BDP 4

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9OAK. STM: K9UTQ. NMs: W9AYK W9IEM WB9IGH N9AUG W9DM K9LGU. New Novices La Crosse area KA9HJN KA9HOP KA9HOQ, all students Faith Christian School radio class for the second year have at least acquired Novice license. New Novice Watertown area KA9HPF, daughter of KB9FM. WB9MSM is home after 4 years in Navy. K9NC WB9TOC have 1st Class commercial license. MARA Swapfest was well attended. KB9KN has Extra, as well as N9AUI N9AUG. Hope everyone had a chance to attend the severe weather meetings in your area. These are very helpful to you as amateurs as well as the public. N9JW and WB9WWS are proud parents of a son. WB9PAW and 6 others helped in a bike-a-thon in Dodge County, weekend of April 26-27, all went well. KA9CPA made BPL. N9AOZ KA9DBC KA9DLH have Advanced. N9BEY KA9FYU have General. W9NA placed first in Wisconsin in the 46th annual ARRL November Sweepstakes in cw. Congrats. Green Bay area 2-meter Net had 67 QNI, 3 QTC. NWTN had 426 QNI, 57 QTC. Governor Dreyfus has proclaimed May 17, 1980 as "Amateur Radio Day in the State of Wisconsin." How about some news items, tidbits from your area via radiogram or card? PLEASE. Traffic: KA9CPA 1233, WD9FSZ 182, W9YCV 164, WD9IUX 164, N9AZI 137, WB9YPY 136, WD9BCM 128, W9IEM 127, N9AUG 123, K9FHI 110, W9DND 100, WB9IGH 97, W9DM 64, WD9DHF 63, W9AYK 60, N9CP 54, WB9YPZ 52, W9FDY 51, WB9JSW 48, WB9NRK 50, K9KSA 49, AG9G 42, W9GKO 42, W9UCL 42, K9AO 38, K9AKG 37, KA9CRN 33, W9IDO 33, K9JPS 29, WB9WHQ 29, K9HDF 26, W9IHW 25, W9SFI 20, WB9ESM 18, WB9PAW 17, W9CJE 14, KB9FM 14, K9UU 13, WA9WYS 12, WD9AJA 11, WB9WNA 11, K9ANV 10, W9UW 10, K9UTO 5, K9ASC 2.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX — SEC: WAØQIT. STM: AFØO.

Net	Time	MHz	QNI	QTC	Sess.
MSPN N	1800Z	3.945	409	35	30
MSSN	2315Z	3.710	98	17	29
MSPN/E	2345Z	3.929	799	148	30
WX	0015Z	3.929	501	324	30
MSN 1	0030Z	3.685	176	110	30
MSN 2	0400Z	3.685	151	67	29
EC Meeker					
Co Rares	0130Z	22/82	124	5	4

PSHR: WBØZBJ AFPO KØPIZ WØHZU KØJCF KCØT WAØTFC. The Duluth Ham Swap was really enjoyed by a great many, as well as yours truly. Seeing so many friends from that section of Minnesota, meeting many others; discussing DX with some of the Thunder Bay hams; having the director, vice-director, SCM, STM, all three branches of MARS, the civil air patrol and representatives of all field appointments, except OO how did we miss that one? Top this off with the friendship and hospitality of the XYL of WAØQIT, as well as the rest of the family. Congrats to WAØQIT for the second place recipient of the Herb S. Brier, W9AD Memorial Instructor of the Year Award. Please accept my apology for any reports, news, comments, etc. that may be left out of this column for I have been, and am still very ill. Some call changes are: KCØA/WDØFCX KCØP/WAØQMY KCØT/KAØAIT KBØS/WBØVAZ KBØLU/WDØHXL. New upgrades: WBØYMI Gen to Adv;

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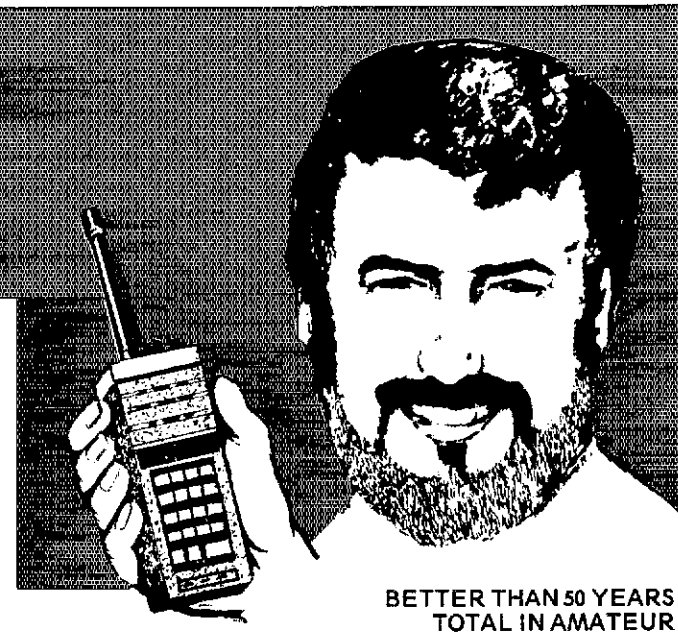

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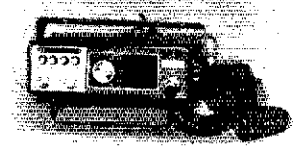

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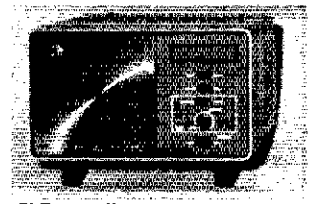

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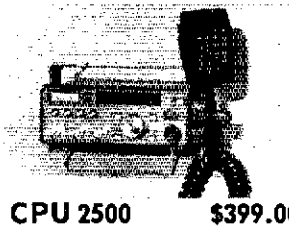

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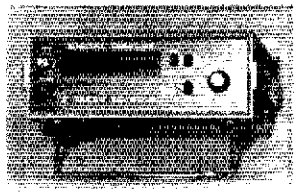

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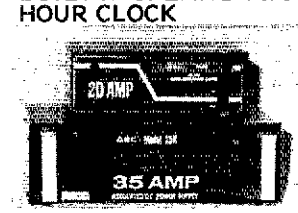

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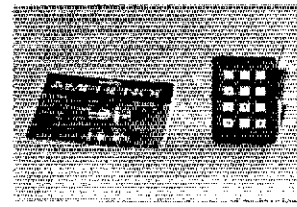

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WBØZBJ; Adv to Extra: NØBJR, Tech to Adv. Why not check with WAØQIT, the SEC, to ascertain if your county has an EC. If not, why not volunteer? We need you and can use you! Start making plans now to attend the Dakota Division meeting Sept. 26 and 27 at Fargo. July 25, 26 & 27 is the National ARRL Convention in Seattle, WA. Hope to see some of you there. Traffic: WØHZU 339, WAØTFC 248, AFØO 235, KØPIZ 110, WAØONE 109, WØDFX 101, WBØZBJ 83, WDØCGM 68, KCØT 61, WBØUK! 61, WBØNZB 60, WAØAIN 51, KØJCF 46, KØCSE 38, WØDUW 38, AIØY 17, WAØYVT 17, WØYIQ 14, NØJP 10, KØTS 10, WAØEZQ 8, WBØSCN 5.

NORTH DAKOTA: SCM, Lois A. Jorgensen, WAØRWM. SEC: WBØTEE. OBS: WØDM. NM: WAØCRH. OO: WDØCLD. Congrats to Novices KAØGYU, KAØGYR, KAØGYT, KAØGYS, KAØHHJ, KAØHDN, KAØHJT, KAØHHH, KAØHF! KAØHHO and KAØGMU. KØRJL and WDØCPZ upgraded to Advanced. We express sympathy to the family of WØEFJ as Silent Key. Freq of 2-M at Minot and Turtle Mts. area are: WØAUH 146.40/147.00; KØCLD 146.19/146.79; WØNVK 145.16/146.76. Fargo Club wishes to invite anyone in the area 3rd Tues. to their meeting at WDAY Studio at 7 P.M. Theodore Roosevelt Club had election: WDØAL, pres.; AEØE, vice pres.; WAØFEU, secy-treas. They have their ham picnic on August 9-10 at Peterson Lake. International Peace Garden Hamfest is July 12-13. KØPYZ Memorial Contest is August 3rd. Don't forget the ARRL Division Convention Sept. 26-28 in Fargo. Traffic: WAØRWM 100, NØAFP 22, WDØGMD 5.

SOUTH DAKOTA: SCM, Lydia S. Johnson, WØKJZ — ASCM: WØDVB. SEC: WAØTNM. NM: WØHOJ. WAØTNM, WØWE. Annual SD Hamfest and picnic sponsored by Black Hills Amateur Radio Clubs at Surbeck Center, School of Mines, Rapid City, July 25, 26, 27, with forums, tours, exhibits, xmtr hunts, flea markets, contests, prizes, YL activities, and much more! Congrats to PSHR winners WAØTNM with 89 points and WDØBMR 60. EC WBØPZO reports that Pennington County ARES Net meets Sun at 7 P.M. local time on 146.34/.94. Congrats to license upgraders: KAØEMQ to Technician; NØBAD, KAØLMT, WDØETF to General; WØCSM, Advanced. Traffic: WDØBMR 261, WØDVB 103, WAØTNM 101, WØMZI 96, KØFRE 84, WAØUEN 69, WAØVRE 68, WØKJZ 54, WØHOJ 43, WBØOMF 28, WØIG 8.

DELTA DIVISION

ARKANSAS: SCM, S.M. Pokorny, W5UAU — SEC: K5TML. NMs: KC5E, W5MYZ, W5POH, WA5ZW7. Nets freq hmefday. QNI QTC Mgr. ARN 3.995 2330Zdly 1150 69 KC5E, OZK 3.760 0000/dly 154 35 W5MYZ. SCARC 28 765 U130/M-T 163 10 WA5VSV. APN 3.937 1100Z/M-S 782 36 W5POH, M-Bird 3.928 2130Z/M-F 805 38 WA5ZWZ. N5ANI now KB5UI. Congrats to KA5GZD, KA5GZK, Novice to Tech. KA5BMK, KA5HEB Novice to Gen. WD5COS Gen to Adv. New Hams KA5IFS, KA5ICI, KA5HYF. NWAARC picnic attended by abt 100 registered hams plus XYLs and jr ops. WA5EJH, WB5VDO, WB5WPF certified in CPR, April 3, '80. Sorry to report KC5E gave up as ARN mgr and WA5LGN will take over as of May 1. Cancel EC app't of WB5MQH. Issue OTS app't to W5LL; NM app't to WA5LGN; EC app t to N5AHH, WD5BJF, WD5GHD. OBs: by WB5KUI 6, K5DW 3, W5UAU 3. Traffic: K5AJM 201, KC5E 25, W5UAU 24, W5POH 20, WB5GOH 19, W5BLP 4, W5KL 4, WB5LWJ 2, W5EJI 1.

LOUISIANA: SCM, Jim Giammanco, N5IB — RN5 certificates were awarded to N5RB, W5MI, K5TL, W5VMY, WA5PRI. LA was 93.3 percent represented on DRN5 during April. Rumor has it that KB5AQ had a bellyful of fun heading up a very successful Baton Rouge Hamfest. Good food and good friends were much in evidence. The BR Award went to WA5TXA, and the Stan Preston Award to WB5RYC. Hearty congrats to both. Don't forget the LA State Convention in Shreveport, Aug. 2 and 3. AE5V reports that 11 Monroe stations were active providing communications for the March of Dimes "Super Walk." A base station and several mobiles covered the 20 km course. WB5SOT is new DEC for the State Police Troop F area, and Troop A area is handled by WB5FMD. AB5G is new EC for LaSalle Par. The slow speed net, LSN, especially needs your support during the summer months. LSN is the perfect way to break into cw traffic work and improve your ear and fist painlessly. During BR Hamfest, SEC WB5TPG had very productive talks with state c.d. officials. Help him all you can.

NET	Freq	Time	QNI	QTC	Mgr.
LAN	3615 kHz	7&10 P.M. Dy	244	122	N5RB
LTN	3910 kHz	6:30 P.M. Dy	455	66	N5EK
LSN	3703 kHz	7:30 P.M. M-F			WB5YRT
LBN	3587.5 kHz	6:30 P.M. Su	12	11	N5RB
LEN	3910 kHz	8:00 P.M. Su			WB5TPG

Traffic: W5GHP 176, N5RB 168, K5TL 134, WB5JZP 110, N5EK 85, WB5LBR 43, N5BFV 40, W5VMY 38, N5IB 28, WD5FLM 16, WB5IKT 7, WD5GJB 4.

MISSISSIPPI: SCM, E. Ed Robinson, W5XT — SEC: WB5FXA. Good news for you beginning or rusty cw types. Miss. Slo Net is revived thanks to KA5GGG and several supporters including WA5IDF and WA5JWD. MSN meets at 3733 kHz at 7:00 P.M. Mon Wed Fri CDST. Everyone is urged to checkin. Both MSN and MTN need our support. Excellent hamfest in Jackson April 19-20. Good crowd, good prizes, good eyeball QSOs. Many tnx to WB5SNB and his crew. Congrats to upgrades: N5BXG to Gen, WB5VCE, KA5FGY, WA5DVV, WD6EOP to Adv, KA5HIU, KA5HIT, KA5CYR to Tech. CAND (W5KLV) sess 60, QTC 683, with DRN5 Rep. 100 percent by Miss. station N5AMK. CGCHN (AG5X) sess 30, QNI 2437, QTC 157, MSBN (K5MK) sess 30, QNI 2258, QTC 50, MTN (K5OAF) sess 30, QNI 127, QTC 60, MN (WA5OPT) sess 30, QNI 619, QTC 12, MSN (KA5GGG) sess 5, QNI 26, RACES (N5AMK) sess 4, QNI 152, Capital AEN (KA5AGD) sess 3, QNI 86, QTC 1, Gulf States Emer. N. (JCARCEN-KB5W) sess 21, QNI 742, QTC 26 with 1 emer. 4 hour sess on 13 Apr for tornados Gulfport-Biloxi area. Traffic: N5AMK 109, K5OAF 35, W5EDT 49, WB5SNB 32, WB5TRZ 24, W5XT 21, KA5AFT 10, N5XA 2.

TENNESSEE: SCM, Earl Leonard, KB4G — SEC: W4NZW. STM: W4ZJY. This is the season when net participation and traffic drops off. Try to take one evening out from the garden and check into your favorite net. I notice some operators service messages back to the station they got them from. They should be serviced to the originating station. It would be good for all if each club would have a session on traffic once in a while. It would be a start for the newcomer and a refresher for the OT. Pay particular attention to the ARRL message format. Net certificate awarded to WD4KCW, CW Net Honor Roll: WA4CMS, WA4CNY, W4DDK, WB4LEH, WB4YXN, W4ZJY, AF4T, and WB4ZSZ. Congrats. Phone nets: 228 sess, 7808 QNI, 897 QTC. CW nets: 83 sess, 604 QNI, 207 QTC. OTS appointments: W4DDK, WD4NJR and

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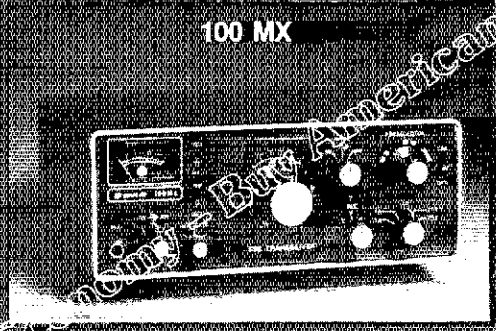

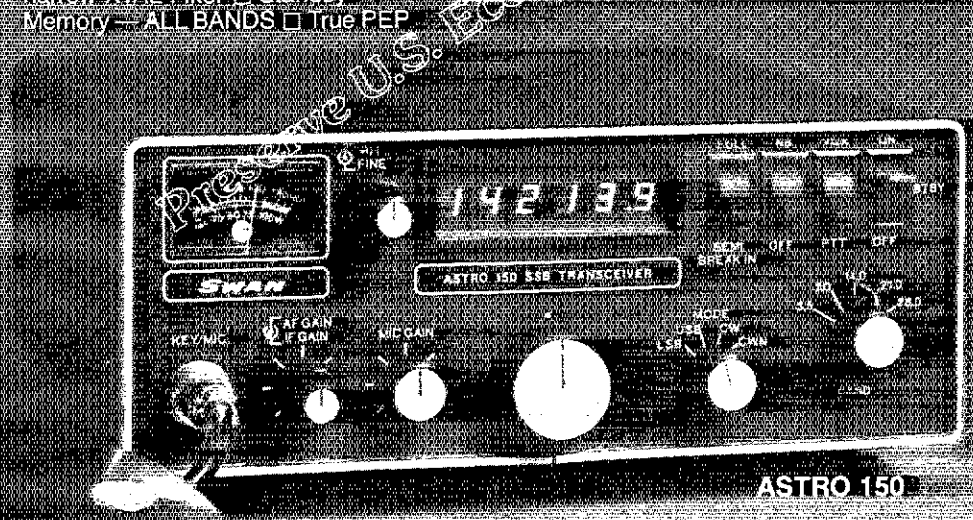

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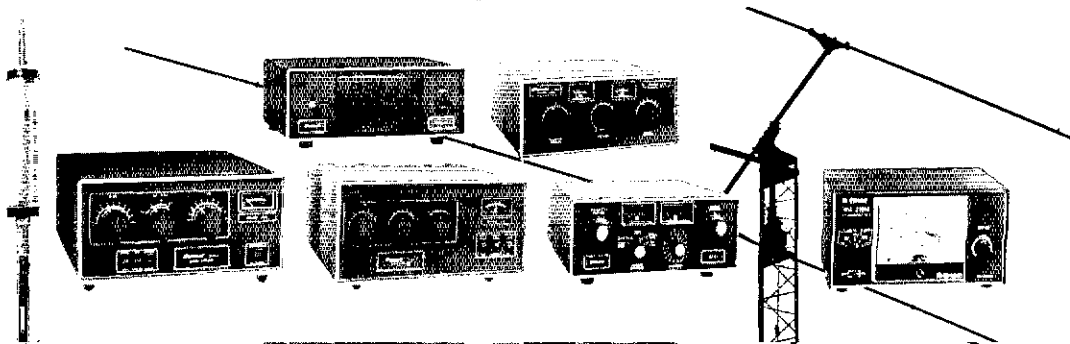


K4WOP. My thanks to all, nice going. Traffic: WA4CNY 785, W4OGG 369, W4ZJY 193, AF4T 178, WB4PRF 160, WB4BKF 158, K4JGW 105, WD4NJR 75, WA4FMR 64, WD4SIG 54, WB4LEH 49, KA4GSS 37, W4MRD 28, WB4ZSZ 28, WB4GZF 26, W4PFP 26, W4EBT 24, N4BGA 22, K4WOP 18, W4EWR 17, W4LBD 17, WB4YPO 12, W4RUW 10, W4TYV 9, WA4CGK 8, W4VJW 8, WA4WVW 6, W4UIO 3.

GREAT LAKES DIVISION

KENTUCKY: SCM, Joe Miller, K4DZM — STM: K4HRF. SEC: WB4ZML. Nets reporting: (Section Nets*)

Net	QNI	QTC	Net	QNI	QTC
KYN*	312	169	BARES	63	8
KSN*	180	52	4ARES	11	2
KNTN*	383	107	5ARES	59	3
KTN*	1285	115	6ARES	178	9
KRN*	531	36	AATN	41	3
MKPN*	986	76	TS2M	303	27
9RN-D	37%	454	SPKEN	27	0
CAN-D	100%	683	CARN	176	26
KPON	47	3	PAWN	510	28

WA4KKV, 13th District DEC, reports lots of activities through June. Congrats to all the ECs in that district. DEC for District 6 reports that activities up and just finished Derby Week Festivities. KY RTTY Net needs help; see K4YZU. KYN top QTC net. Traffic: (Apr) K4DZM 133, KB4OZ 109, WA4SWF 108, K4JLX 96, KS4V 71, KA4AZT 61, WD4LXX 55, WA4EBN 51, WD4ONV 50, WA4GNP 47, WD4JTO 35, K4HRF 34, WA4JTE 33, WD4CQF 30, W4PKX 29, N4AOF 27, WB4APC 26, KA4GFU 24, KA4IKH 23, WA4AVV 22, K4HOE 19, WA4AGH 18, KC4AV 18, WA4YPO 15, WB4AUN 14, WD4CJQ 14, K4MHL 9, K4AVX 8, WA4JAV 7, KA4MBF 7, WD4BSC 6, WD4KDG 6, WA4GAL 3, WA4NOG 2. (Mar) KB4OZ 124, KS4V 122, WB4ZDU 113, WA4WSM 111, WD4RNI 109, K4DZM 94, N4AOF 85, K4JLX 76, WA4AVV 74, K4HOE 66, WA4OMH 62, WA4SWF 54, WA4EBN 49, WB4AUN 48, WB4APC 44, WD4ONV 38, KA4AZT 35, K4HRF 34, W4PKX 32, WA4AGH 31, WA4JTE 30, W4CDA 29, WD4JTO 29, KA4GFU 26, WD4LXX 23, WD4CQF 21, K4MHL 16, WA4GNP 15, KA4IKH 15, WD4BSC 11, WA4JAC 11, WD4KDG 11, WA4NOG 11, WD4CJQ 10, WA4GAL 10, WA4YPO 8, K4AVX 6, WA4IGD 3, WD4LTD 1.

MICHIGAN: SCM, James R. Seeley, WB8MTD — Asst SCM: WA8DHB. SEC: WA8EFK. STM: WB8YRY. NMs N8ABA WD8BHE WA8DHB K8LNE K8KMQ WD8LRT WA8PIM AF8V WB8YDZ W8YIQ.

Net	Freq.	Time/Day	QNI	QTC	Sess
QMN*	3663	1800/2000 Dy	1361	511	90
MITN*	3953	1900 Dy	591	230	30
GLETN	3932	2100 Dy	1079	160	30
MNN*	3722	1730/2000 Dy	575	142	58
MACS*	3953	1100 Dy	683	104	30
UPN*	3922	1700 Dy	720	79	34
BR	3930	1730 M/S	394	33	25
WSSBN	3935	1900 Dy	659	28	30
ARES	3932	1730 Su	68	5	4
MEN	3930	0900 Su	139	0	4
MATW**	3953	1600 Su	43	0	4

VHF Activity 14 reports 1132 49 81 AF8V =NTS Section Nets. **Mich Amateur Traffic Workshop. Times EDT. Field appointments: OO W8EMD: OTS: KC8B. Silent Keys: K8JLH W8ZUL. OO reports: K8AIT W3GQJ K8JH AG8U. OBS report: K8NKB. Nice work by CMARC and Black River ARC on completion of their communication trailers. An item I overlooked that needs reporting: DARA celebrated its 50th anniversary last December, and had as honored guests W8DYH and W8CAT, the club's founding president and secretary. It was, as W8AP reported, "a great celebration." Three public service workshops are scheduled for this summer, one for the UP in connection with the UP Hamfest in Escanaba Aug. 3,4; a new one for "upper lower" Michigan on Sept. 13 in Gaylord; and the old standby in Lansing on Sept. 27. Separate sessions for ARES and NTS. Meet your fellow ECs and traffic handlers, your SEC, STM and SCM, exchange ideas and information. Everyone welcome. Pick the one closest to you, share the ride and save fuel. Full details on the ARES Net at 5:30 P.M. Sun. A note for repeater owners and trustees: granted, 3rd party logging requirements for repeaters are a pain, but the suffering could be worth it in terms of having trained, practiced traffic handlers on tap when needed for a real emergency. Think about it, please. I'd like to publish periodically a list of ht local nets. Know of one that meets weekly or ottener on ten and down? Send me the details. Traffic: (Apr) WB8MTD 438, WD8KZX 398, AF8V 309, WD8LRT 258, WB8YDZ 240, W8VPW 231, WB8YRY 178, N8ABA 139, WA8PIM 133, KB8MX 125, WA8TAQ 96, N8BIK 92, W3GQJ 89, WD8BHE 84, KA8CPS 81, K8RV 81, W8YIQ 81, W8CUP 72, WB8ZIY 66, W8IHX 63, K8DTG 61, WA8DHB 58, WB2LZN 57, WD8NKA 50, K8GXV 48, K8LNE 47, WB8SYA 47, KA8EPK 45, WD8NKT 37, W8VIZ 35, WR8HIN 34, W8SCW 33, WA8WZF 32, W8WOJ 31, WD8OSE 27, WB8WYO 24, WD8EIB 22, WB8HPZ 22, WD8IBY 22, WD8KCM 21, K8UPE 21, WD8MJB 20, WD8IXZ 17, WD8OEP 17, WD8DJS 15, WD8JRT 15, WA8JXJ 14, W9NXD 14, WA8QAF 14, W8TBP 12, WB8TTA 12, K8OCP 11, KC8B 8, KB8FK 7, W8LDS 7, W8QFQ 7, WB8NCD 5, W8WVL 5, K8ZJU 5, WB8BNN 4, WB8HSN 3, W8JUP 3, WD8ECT 2, KA8GMJ 2, WB8IFK 2, W8IIJ 2, K8JED 2, WD5JKQ 2, W8MPD 2, W8LOU 1. (Mar) W8TBP 25.

OHIO: SCM, Harold C. Chapman WB7JGW — Asst. SCMs: W8MOK AF80. SEC: K8AN. NMs: KR4AZ WD8KBW WB8KWD K8OZ WD8PUH WB8YGW. Net reports:

Net	QNI	QTC	Sess.	Time (Local)	Freq.
BN	564	347	59	6:45/10 P.M.	3.577
BNR				6 P.M.	3.605
ONN	146	35	29	6:30 P.M.	3.708
OSN	250	158	30	6:10 P.M.	3.577
OSSBN	2598	662	90	10:30 A.M./4:15 & 6:45 P.M.	3.9725
06mN	371	38	30	9 P.M.	50.160

Congrats to K8OZ and WA8GMT recently elected by OSSBN members for one year terms beginning May 1 as net manager and advisory board member respectively. I'm sure you'll both do the tob which the membership elected you to perform. Thanks to WB8OMQ for his stint as net manager. WB8SIO was selected by K8OZ as assistant manager. The Talawanda High RC officers for this school year are WD8OMP pres; KA8EHA, vice pres.; WB8NYC, secy/treas. Congrats to WB8MZZ his recent SS efforts. No sermons this month. Appointments: NM/K8OZ EC/N8BOY/Ashtabula 00/K8DT

Local Nets	QNI	QTC	Sess
BRTN	360	133	30
FRCN	106	0	6

Does Your Shiny New Rig Really Have:

"STATE-OF-THE-ART" SELECTIVITY

EXCITING NEW RADIO ACCESSORIES

Add an Autek.

QF-1A Active Filter

For SSB & CW

PATENT PENDING

Only $65 ppd. U.S.A.

115 VAC supply built-in. Filter by-passed when off.

SUPER-RANGE Auxiliary Notch rejects 80 to 11,000 Hz! Covers signals other notches can't touch.

Four main filter modes for any QRM situation.

Continuously variable main selectivity (to an incredible 20 Hz!)

Continuously variable main frequency. (250 to 2500 Hz, all modes.)

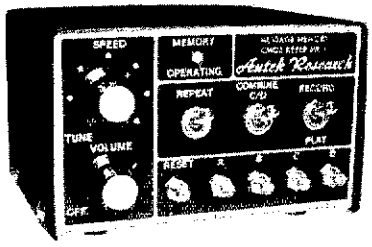
AUTEK pioneered the **ACTIVE AUDIO FILTER** way back in 1972. Today, we're still maintaining that engineering leadership. Our **QF-1A** evolved from suggestions from thousands of owners, and years of dedication to making the "ultimate" filter. No gimmicks — just something that really "works" like the ad says. You're in for a treat!

Autek filters gained their reputation by using a costly **INFINITELY VARIABLE** design. Yet, mass-production (we sell only **ONE MODEL** — the best) makes it a tremendous bargain. You're not limited by a few fixed positions. You vary selectivity 100:1, and vary frequency over the entire usable audio range. **PEAK CW** (or voice) with an incredible **20 HZ BANDWIDTH**, but also variable all the way to "flat." Imagine what the **NARROWEST CW FILTER MADE** will do to **QRM**! Reject whistles with the most flexible **NOTCH** you've heard. Wide or narrow. Depth to 70 dB. **LOWPASS** helps you cope with **SSB** hiss and splatter. Skirts exceed 80 dB. Most above features were in the popular QF-1 (See excellent review in March, 1977 **QST**.) The new "A" model is more selective, adds a **HIGHPASS** mode for **SSB**, and a great **AUXILIARY NOTCH** (35 to 60 dB) to give **TWO NOTCHES, NOTCH/PEAK, NOTCH/LOWPASS,** or **NOTCH/HIGHPASS!** If this doesn't convince you, please **ASK ON THE AIR.** Owners are our best salesmen!

Due to cost and panel-space limitations, even the latest rigs only include a fraction of the **QF-1A** features. We recommend you buy the best rig you can afford, spend $3,000 or more, then add a **QF-1A** and listen to the improvement! **WORKS WITH** Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Collins, Heath, S/T, etc., **ANY RIG!**

Hooks up in minutes. Plug into your rigs phone jack, or attach to speaker wires. Plug speaker or phones into **QF-1A** rear-panel jack. That's it! Filter supplies 1 watt to fill a room. No batteries rqd. (+12 VDC hookup possible.) 6½x5x2½". Handsome light/dark grey styling. Get yours today.!

CMOS PROGRAMMABLE KEYER MAKES CW FUN!



Calls CQ while you relax.

Also remembers name, QTH, contest exchanges.

Record anything you want in seconds!

Model MK-1 $99.50 ppd. U.S.A.

Our classic **MK-1** should make you wonder why anyone would buy an ordinary keyer, when memory costs so little! Records 4 messages. Just select "record," tap the A, B, C, or D message, and start sending at any speed! Record over old messages as easily. Playback by tapping the same button. Each message holds about 25 characters (letters, numbers). Total 100 characters. Handy repeat switch repeats message forever until reset. Very useful for **CQ's. YOU SIT BACK AND WAIT FOR A CALL!** Another switch combines two messages for 50 characters. "Memory-saver" feature standard.

This "state-of-the-art" keyer pleases beginners and CW "pros" alike. **DOT AND DASH MEMORIES. TRIGGERED CLOCK. IAMBIC. SELF COMPLETING. JAM PROOF. 5 to 50+ WPM. LATEST CMOS FOR LOW CURRENT.** Built-in monitor, speaker. Widely adjustable tone, volume. Perfect weighting at all times. No fiddling with an adjustment that varies with speed. **NEW: DUAL TRANSMITTER OUTPUTS** key **ANY** modern (post 1963) ham rig directly without a battery or relay, including difficult-to-key solid-state rigs. **115VAC** supply built in, or connect **9-14 VDC** to rear panel. Use with **ANY** paddle. 6x3½x5". Burned-in and tested. Sockets for **IC's.** Full instructions.

NOW AVAILABLE. 4096 BIT MEMORY EXPANDER (ME-1) allows 16 messages, 400 chars. & "combine" for longer messages. Plugs into memory socket of **ANY MK-1** ever made. Installs in 10 to 30 mins. Full instructions. Buy your **MK-1** now and easily add memory later if you wish!

FLASH! MK-1 used to set new world's CW record. A single operator worked 3992 DXQSO's & 275 band-countries in only 48 hours! Get the choice of champions — AUTEK.

ORDER WITH CONFIDENCE. NO LONG DELAYS HERE. We ship 95% of orders from stock. 1 year limited parts & labor warranty. Try our great service! VISA & MC Welcome.

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ORDER BLANK (Or Use Separate Sheet of Paper)

Please Rush ppd. via Speedy UPS.

- ☐ QF-1A Filter at $65.00
- ☐ MK-1 Keyer at $99.50
- ☐ ME-1 Expander for MK-1 at $40 (factory installed)
- ☐ ME-1 Owner installed at $30 (save $10)

Add 6% tax in Calif. Add $3 each to Canada, Hawaii and Alaska. $2 for UPS air. Add $15 each elsewhere (shipped air).

Enclosed is $_____

VISA or MC# _____ Exp. date _____

NAME _____

ADDRESS _____

CITY STATE ZIP

Send to Autek Research, Box 5127E, Sherman Oaks, Ca. 91403.

WILSON SYSTEMS, INC. MULTIBAND ANTENNAS

WV-1A $59.95

FACTORY DIRECT

4 BAND TRAP VERTICAL (10 - 40 METERS)

No bandswitching necessary with this vertical. An excellent low cost DX antenna with an electrical quarter wavelength on each band and low angle radiation. Advanced design provides low SWR and exceptionally flat response across the full width of each band.

Featured is the Wilson large diameter High-Q traps which will maintain resonant points with varying temperatures and humidity.

Easily assembled, the WV-1A is supplied with a hot dipped galvanized base mount bracket to attach to vent pipe or to a mast driven in the ground.

NOTE: Radials are required for peak operation. (See GR-1 below)

SPECIFICATIONS

- 19′ total height
- Self supporting—no guys required
- Weight — 14 lbs.
- Input impedance: 50 Ω
- Powerhandling capability: Legal Limit
- Two High-Q traps with large diameter coils
- Low angle radiation
- Omnidirectional performance
- Taper swaged aluminum tubing
- Automatic bandswitching
- Mast bracket furnished
- SWR: 1.1:1 or less on all bands

GR-1 $14.95

The GR-1 is the complete ground radial kit for the WV-1A. It consists of 150′ of 7/14 stranded aluminum wire and heavy duty egg insulators, instructions. The GR-1 will increase the efficiency of the WV-1A by providing the correct counterpoise.

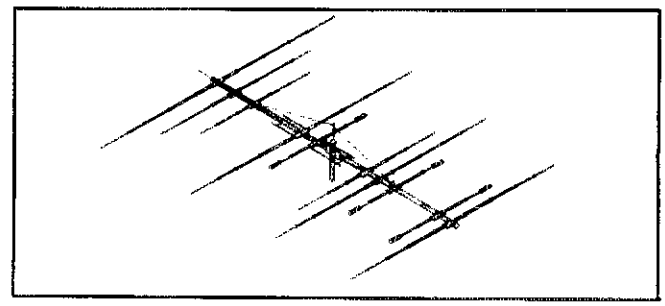
33-6 MK $59.95

Now you can have the capabilities of 40-meter operation on the SYSTEM 36 and SYSTEM 33. Using the same type high quality traps, the 40-meter addition will offer 150 KHZ of bandwidth at less than 2:1 SWR. The new 33-6 MK will fit your present SY36, SY33, or SY3 and use the same single feed line. The 33-6 MK adds approximately 15′ to the driven element of your tri-bander, increasing the tuning radius by 5 to 6 feet. This addition will offer an effective rotatable dipole at the same height of your beam.

SY-40A $349.95

★ 3 MONOBANDERS on 1 Boom

- 4 elements on 20 mtrs FULL SIZE
- 4 elements on 15 mtrs
- 5 elements on 10 mtrs

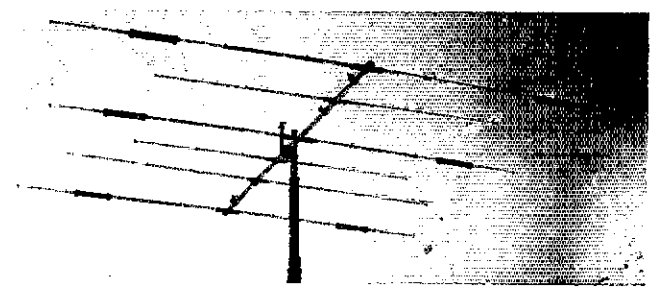


The System 40A is the answer to the DXer who does not have space to stack monobanders yet wants the advantages they offer. Through the use of a switchable matching unit, only one feed line is required and complete coverage of both the phone and cw bands are available with only one setting.

SPECIFICATIONS

Max. Pwr. Input ..... Legal Limit	Matching Method ..... Split Beta	Surface Area ..... 12.1 sq.ft.
VSWR @ Res. 1.2:1	F/B Ratio	Wind Loading @ 80 mph ..... 309 lbs.
Impedance ..... 50 ohm	Boom ..... 2" x 26'	Assem. Weight ..... 75 lbs.
Feed Method ..... Balun Supplied	Longest Element ..... 36'	Shipping Weight ..... 84 lbs.
	Turning Radius ..... 22'6"	

SY-36 $214.95

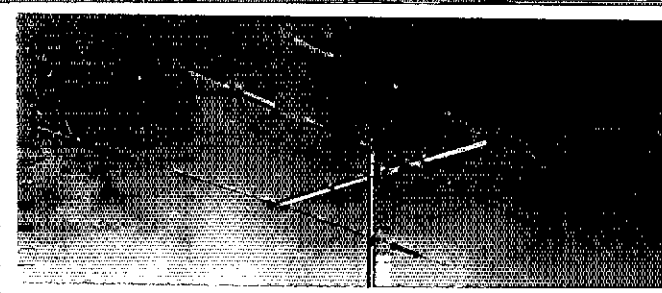


A trap loaded antenna that performs like a mono-bander! That's the characteristic of this six element three band beam. Through the use of wide spacing and interlacing of elements, the following is possible: three active elements on 20, three active elements on 15, and four active elements on 10 meters. No need to run separate coax feed lines for each band, as the bandswitching is automatically made via the High-Q Wilson traps. Designed to handle the maximum legal power, the traps are capped at each end to provide a weatherproof seal against rain and dust. The special High-Q traps are the strongest available in the industry today.

SPECIFICATIONS

Band MHz 14-21-28	Boom (O.D. x Length) .. 2" x 24' 2¾"	Wind Loading @ 80 mph ... 215 lbs.
Maximum power input . Legal Limit	No. of Elements 6	Maximum wind survival ... 100 mph
Gain (dBd)	Longest Element ..... 29'6¾"	Feed method ..... Coaxial Balun (supplied)
VSWR @ resonance ... 1.3:1	Turning Radius ..... 18'6"	
Impedance ..... 50 ohm	Maximum mast diameter 2"	Assembled weight (approx) . 53 lbs.
F/B Ratio	Surface area ..... 8.6 sq. ft.	Shipping weight (approx) . 62 lbs.

SY-33 $159.95



Capable of handling the Legal Limit, the SYSTEM 33 is the finest compact tribander available to the amateur. Designed and produced by one of the world's largest antenna manufacturers, the traditional quality of workmanship and materials excels with the SYSTEM 33. New boom-to-element mount consists of two 1/8" thick formed aluminum plates that will provide more clamping and holding strength to prevent element misalignment. Superior clamping power is obtained with the use of a rugged 1/4" thick aluminum plate for boom to mast mounting. The use of large diameter High-Q Traps in the SYSTEM 33 makes it a high performance tri-bander and at a very economical price. A complete step-by-step illustrated instruction manual guides you to easy assembly and the lightweight antenna makes installation of the SYSTEM 33 quick and simple.

SPECIFICATIONS

Band MHz 14-21-28	Boom (O.D. x length) .. 2" x 14'4"	Wind loading at 80 mph .... 114 lbs.
Maximum power input Legal Limit	No. of elements 3	Assembled weight (approx) .. 37 lbs.
Gain (dBd)	Longest element ..... 27'4"	Shipping weight (approx) ... 42 lbs.
VSWR at resonance ... 1.3:1	Turning radius ..... 15'9"	Direct 52 ohm feed — no balun required
Impedance ..... 50 ohms	Maximum mast diameter 2" O.D.	Maximum wind survival .... 100 mph
F/B Ratio	Surface area ..... 5.7 sq. ft.	

ORDER FACTORY DIRECT 1-800-634-6898

Prices Effective 7-1-80 to 7-30-80

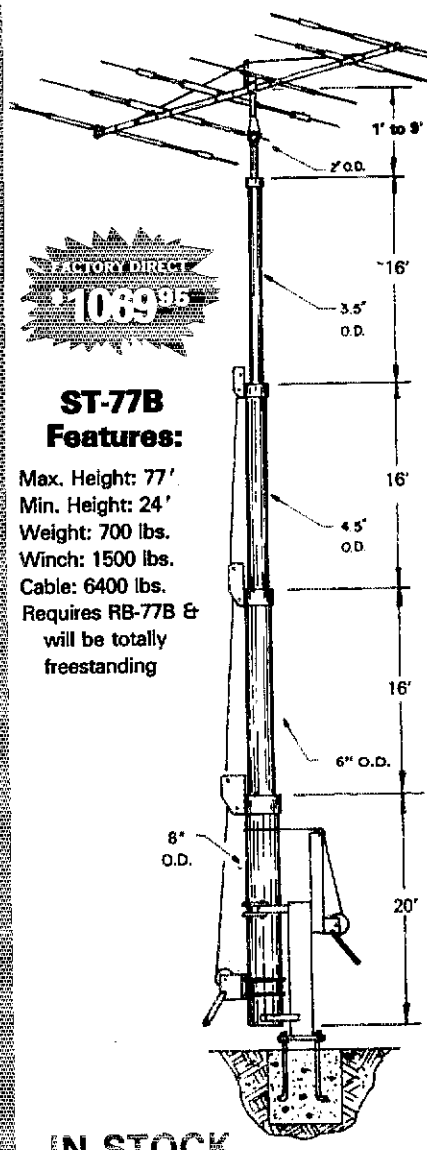
WSI WILSON SYSTEMS, INC.

4286 S. Polaris Ave., Las Vegas, Nevada 89103

Prices and specifications subject to change without notice.

WILSON SYSTEMS TOWERS

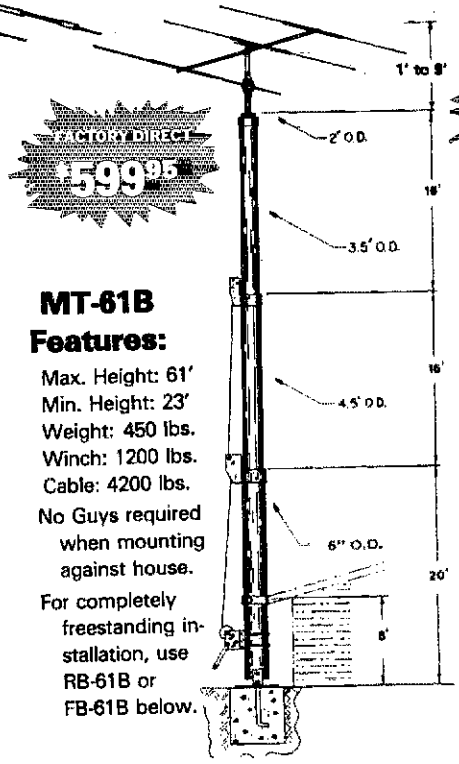
— IN STOCK —



FACTORY DIRECT $1069.95

ST-77B Features:

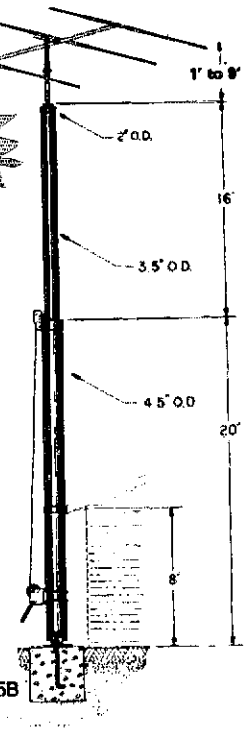
Max. Height: 77'
Min. Height: 24'
Weight: 700 lbs.
Winch: 1500 lbs.
Cable: 6400 lbs.
Requires RB-77B & will be totally freestanding



FACTORY DIRECT $599.95

MT-61B Features:

Max. Height: 61'
Min. Height: 23'
Weight: 450 lbs.
Winch: 1200 lbs.
Cable: 4200 lbs.
No Guys required when mounting against house.
For completely freestanding installation, use RB-61B or FB-61B below.



FACTORY DIRECT $389.95

TT-45B Features:

Max Height: 45'
Min. Height: 22'
Weight: 250 lbs.
Winch: 1200 lbs.
Cable: 4200 lbs.
No Guys required when mounting against eve of house.
For completely freestanding installation, use RB-45B or FB-45B below.

IN STOCK

WIND LOADING			
Tower	Height	Sq. Ft.	
ST-77B	69	18	Square Footage Based on 50 MPH Wind
	77	12	
MT-61B	53	18	
	61	12	
TT-45B	37	18	
	45	12	

BASE CHART		
TOWER	WIDTH	DEPTH
TT-45B	12" x 12"	30"
FB-45B	30" x 30"	4½'
RB-45B	30" x 30"	4½'
MT-61B	18" x 18"	4'
FB-61B	3' x 3'	5½'
RB-61B	3' x 3'	5½'
ST-77B	See Below	Bases
RB-77B	3½' x 3½'	6'

Wilson Systems uses a new high strength carbon steel tube manufactured especially for Wilson Systems. It is 25% stronger than conventional pipe or tubing. The tubing size used is: 2" & 3½"-.095; 4½" & 6"-.125; 8" -.134. All tubing is hot dip galvanized. Top section is 2" O.D. for proper rotor and antenna mounting.

The TT-45B and MT-61B come complete with house bracket and hinged base plate for against-house mounting. For totally freestanding installation, use either of the tilt-over bases shown below.

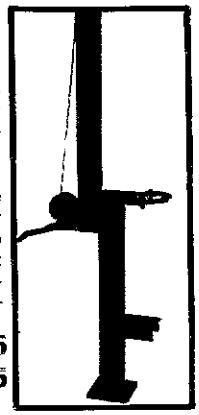
The ST-77B cannot be mounted against the house and must be used with the rotating tilt-over base RB-77B shown below.

TILT-OVER BASES FOR TOWERS

FIXED BASE

The FB Series was designed to provide an economical method of moving the tower away from the house. It will support the tower in a completely free-standing vertical position, while also having the capabilities of tilting the tower over to provide an easy access to the antenna. The rotor mounts at the top of the tower in the conventional manner, and will not rotate the complete tower.

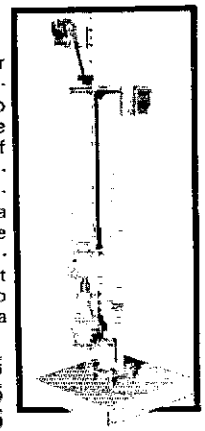
FB-45B . . 112 lbs. . . $179.95
FB-61B . . 169 lbs. . . $259.95



ROTATING BASE

The RB Series was designed for the Amateur who wants the added convenience of being able to work on the rotor from the ground position. This series of bases will give that ease plus rotate the complete tower and antenna system by the use of a heavy duty thrust bearing at the base of the tower mounting position, while still being able to tilt the tower over when desiring to make changes on the antenna system.

RB-45B . 144 lbs. . $249.95
RB-61B . 229 lbs. . $334.95
RB-77B . 300 lbs. . $469.95



Tilting the tower over is a one-man task with the Wilson bases. (Shown above is the RB-61B. Rotor is not included.)

ORDER FACTORY DIRECT 1-800-634-6898

Prices Effective 7-1-80 to 7-30-80

WILSON SYSTEMS, INC.

4286 S. Polaris Ave. Las Vegas, Nevada 89103

LC/NWOARES	333	72	21
MASER	81	9	4
RARA	56	0	4
TSRAC	721	98	29
VWCEN	25	1	4

Traffic: K8AAZ 291, W8PMJ 287, K8OZ 256, W8UPD 177, WA8HGH 171, WB8WTS 146, W8MOK 140, WB8SRC 139, WA8GMT 136, WB8JGW 134, N8CW 130, W8GGX 121, WD8KBW 121, WB8MEK 96, W8ENI 92, W8OZK 84, WB8UBR 83, W8OEM 79, W8MGA 72, K8AN 69, WD8KFN 69, W8TP 65, WB8SIO 51, WD8DYW 50, WA8SSI 48, W8TH 48, N8AKS 45, WB8QHV 45, WD8QMP 41, WD8PUH 38, WD8ILX 32, KB8LQ 32, W8RG 30, WB8ICL 27, N2MA 27, W8WEG 27, W8LZE 26, WD8OYO 25, KB8KV 24, WD8PID 24, WB8YGW 24, KA8DJZ 22, K3RC 22, WB8CJU 21, W8WAV 20, WB8TRK 19, WB8PIY 18, WB8UWD 18, W8UQY 17, WD8QAC 16, WB8YTD 16, WB8AWM 15, WD8OYK 15, W8IM 14, AB8P 14, WB8MZZ 13, WB8NHV 12, WB8MRL 11, WD8PEI 11, WB8TPX 11, KA8CTC 10, K8DL 10, W8BHL 9, K8CKY 9, W8HVA 9, WB8TKU 9, WB8WNH 9, WD8PMW 8, WB8VZX 8, W9NJP 5, WA8TSX 5, WA8BOV 4, W8UPH 3, K8JA 2, WB8TPN 2, N8VT 2, WB8WHF 2, WB8QHU 1.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Guy L. Olinger, K2AV — SEC: WB2VUK. STM: WA2SPL. ASCM: WB2VUK W2IT. NM: W2WSS KB2JG WB2OOH WB2ZCM WB2EAG. Nets: NYPON 5 P.M. 3913; ESS (slow) 6 P.M. 3590; NYSPTEN 6 P.M. 3925; NYS 7 P.M. 10 P.M. 3677; CDN (Troy) 6:30 P.M. 34/94; HVN (Beacon) 7:30 P.M. M-F 37/97; SDN (White Plains) 9:30 P.M. S/T/T 66/06 M/W/F 615/015. The mail bag has been very slim this month. Goes from slim to more good stuff than I can print. It may be that a bit more will come in this next week. However, folks, I can no longer wait till the 15th or 18th just to geta column full. Stuff not IN MY HANDS on the 10th of the month may not make it in any more. A few times I have driven to Newington to deliver the column before the deadline. The juice just costs too much to do that anymore. The above INCLUDES BPL and PSHR listing in QST. As an assist to get the stuff in, WB2EAG KB2KW & N2BDW are on a lot and will take traffic for me. Traffic reports (only) may be given to WA2SPL and will get here. Also I will ON! NYSPTEN & 7 P.M. NYS Mondays. (NYPON is over before I get home.) The AARA bulletin had a marvelous list of things NOT to do when chasing DX. First thing is, it makes me feel guilty. Second thing is, I wonder what would happen if all that terrible stuff was tried in the same pile-up. ARRGHH . . . Traffic: WA2SPL 1233, W2YJR 270, WB2EAG 200, W2SZ 180, W2BIW 79, WA2EQW 55, KA2DVK 40, N2BDW 37, WA2CYJ 36, W2IQK 27, AA2Y 22, N2EF 18, WB2SON 18.

NEW YORK CITY — LONG ISLAND: SCM, Paul A. Lindgren, WA2UWA — Asst. SCM: Stephen H. Bloom WB2IDP Asst. SCM/NYC: Dwight Ernest KA2CNN. STM: WB2BNY. The following are traffic nets in and around the NLI Section

Net	Time/Day	Freq.	NM
NLI*	1900/2200 Dy	3630	WB2BNY
NSPN*	1815 Dy	3928	WA2SEL
BAVTN*	2030 M-F	147.315	KA2DBW
ESS	1800 Dy	3590	W2WSS

Nets denoted with an asterisk are NTS Section Nets. High QNI: NLI: K2LIE W2AHV WB2TQC WB2IDP K2GCE NSPN: WA2UWA WA2SEL K2LIE WB2IDP WB2TQC. PSHR this month to K2GCE WA2UWA WB2KIH WB2IDP WB2BNY WB2TQC and W2AHV. WB2HIQ was forced to resign as NSPN manager due to rig and personal problems. Please give WA2SEL the new manager your cooperation. K2HD putting out super section traffic bulletin called the Parrot. If you are not getting a copy check into one of the nets and you will be put on the mailing list. WB2DCJ reports having a great time working VP as WB2DCJ/VP9 during vacation. Well known vhf operator WA2PMW, reports he is now working QRP on the low bands and has 40 states and 30 countries. The Grumman ARC was awarded the Navy Certificate of Merit for their help during the Iranian crisis. The Great South Bay ARC held their annual picnic May 17 at Heckscher State Park. A good time was had by all. Congrats to WB2KCT who is now a great grandmother. MAARC continues to grow with 9 new members in March. KA2CNN has been giving prsentations on the Olympic torch run to a few of the local clubs. WA2SEL having a ball with new 40 and 80-meter dipole. Says its nice to be heard for a change. WB2IOK will be attending MIT starting in September. At the time this was written, WB2NNW was in the hospital. It is hoped by the time you read this that he will be fully recovered. 00 report received this month from WA2PMW. WB2IDP rejoined Army MARS and has new callsign AAR2MR. Hope everyone had a good Field Day and don't forget to send your station activity reports either to the SCM or the assistant SCM. Traffic: K2GCE 188, WA2UWA 187, WB2KIH 123, W2AHV 105, KA2CNN 91, W2GKZ 88, WB2IDP 77, N2BKK 67, WB2BNY 66, WB2TQC 60, WA2SEL 34, N2BGR 27, W2DBQ 24, WB2DCJ 12, WA2PMW 2

NORTHERN NEW JERSEY: SCM, Robert Neukomm, WA2MVQ — SEC: WB2VUF. STM: W2XD. NMs: K2VX KB2HM W2PSU WB2RMI W2TCA W2UEZ & WA2CUW.

Net	Freq.	Time/Days	Sess.	QNI	QSP
NJN/e	3695	7 P.M.Dy	30	255	215
NJN/l	3695	10 P.M. Dy	30	257	195
NJSN	3735	6:30 P.M. Dy	30	263	52
NJVN	49/49	10:30 P.M. Dy	30	272	142
NJPN	3950	5 P.M. Dy 9 A.M. Su	34	658	394
UCEN	085/685	7:30 P.M. Dy	30	255	74
OBTTN	72/12	Dy	30	464	131
NJRTTY	147.51	Dy	30		

At this reading FD is on. Don't forget your traffic reports and radiograms to me! Ramapo Mountain ARC together with the Fairlawn ARC repeater covered the Passaic County Community College with the following stations active: N2AAC WB2ARS KA2AVA N2BGS KB2DN WA2EKM KA2ERI KA2FXA WA2HLE KA2HNQ K2IDH WA2JUO WB2JUO WB2LAH WB2LNL K3LPG WA2MVQ WA2OFI W2TCA WB2UZA WB2WAB WB2WLW WB2YGT WB2YMW WA2ZNT (RMARC) N2AYJ KA2BLF WB2CAM KA2CMB KA2DKC KA2DPM KA2HCG WB2HUS WA2JUZ WB2LXS WB2PKV N2RN WB2RSR WA2TWH WB2UYU WA1WEI and N2WT (FLARC). Ramapo Mountain ARC had an excellent microcomputer demonstration at their last meeting. State CONFAB to be held June 21 to discuss state net — contact WA2MVQ or W2XD for info. Sussex County ARC ran a successful emergency drill April 23. Holmdel ARC reports that in March it had WA2SFF as speaker on "AMPS" techniques in mobile use. The April talk was on antennas vhf/uhf by W2VHP.

W2QW the Raritan Valley Radio Club is having a flea market June 21 at Columbia Park in Dunellen. Advancements: to Technician, KA2HWP; to General KA2HOC who is now N2BQZ KA2HOA KA2BBH N2BQL and to Advanced, N2ATT. 21st Annual New Jersey QSO Party back to original date of August 16-18 with following freq: 1810, 3535, 3900, 7035, 7135, 7235, 14035, 14280, 21000, 21355, 28100, 28610, 50-50.5 and 144-146. Send logs to Englewood ARA, Inc., P. O. Box 528, Englewood, NJ 07631. WA2PIP attained 30 wpm proficiency. AF2L received 180 endorsements for DXCC. Old Bridge DX Group announcing rare DX on AF2L/R as it's heard. WB2MFP has a new Henry S-1 HT. Union County March of Dimes Walkathon was held April 20th with the following participating: WB2CMN N2EQ KA2GQQ WB2KLF WB2MFP WA2MIF N2NS WB2RMI WB2RMJ WA2RTZ through WA2ZDN/R. I saw quite a sizable gang from NJ Traffic at Dayton. Guess traffic was pretty dead that weekend! Try to get reports to the SCM by the 5th of the month! Traffic: (Apr) W2RQ 383, WA2PIP 334, W2CQB 283, W2UEZ 265, WA2MVQ 240, K2VX 221, AF2L 195, N2BC 149, KB2HM 133, N2CR 129, AG2R 106, W2XD 95, N2IC 88, WB2TOM 79, WB2RMI 77, KA2DOH 61, KA2CYZ 54, WB2RMJ/T 51, WB2FZY 45, WB2KLF 44, WA2UPH 39, W2ZEP 34, KA2GTY 32, KA2GQQ 30, W5DTR 28, WA2MIF 27, W2SQ 24, K2WM 22, WA2QWR 21, N2XJ 18, W2UH 16, WB2AIU/T 14, WB2WDW 13, KA2EEQ 12, N2BNB 11, N2AYJ 8, WB7UQO/T 5, W2NKD 4, W2CC 1. (Mar) K2WM 23. (Jan) W2XD 83.

MIDWEST DIVISION

IOWA: SCM, Max R. Otto, WØLFF — SEC: WØIYW. DEC: WBØAVW KØCY WBØVYG. WBØKAM, operated by WAØAUX, received reports from WØASM WBØAVW KØEVC WBØEJA WØFQ WØGLI KØGP KØHCN NØHR WAØIOA W9KCW WAØKVB WØLFF WAIØMIZ KØRFO WAØUVH WAØWHZ WAØWNT WBØWOE. WAØYGV & KØZQ of progress of the Pony Express. WDØAWN now NØBPJ to go with her new General ticket. WDØAWH is NØBPK and KAØFXY is NØBPM. Mt. Pleasant has 7-99/39. AIØQ well licensed, has Radio Telephone 1st, Radio Telegraph 2nd, Amateur Extra and Radar endorsement soon. 75-M Net election results: directors KØDVO KØJVO KØKQJ WØSRR WAØYGV with ACØZ chmn. Noon NCS — WBØAVW WDØEOD WBØJFF KØJGI WØWC and WØWDC. Eve NCS — NØAEF WBØAVW KØFXM WØLFF WBØTWW and WAØVYU. WBØJFF is secy/treas. and WBØAVW manager of both sessions. Congrats for upgrades to: KAØEPA Tech.; WDØBLA and WBØTEY General. WDØEGR WDØBKR and WDØBKT Adv. Novice classes in Vet's Home at Marshalltown by KAØCLQ and WDØEIF. WDØEJQ graduated 18 Novices. WBØZLA has WAS/WAC. New gear: WBØSEL MLA-2500, WBØTEY Wilson S-36. KAØBXI TR-7625, WDØBLA GLA-1000, KAØEXF TS-700A, KAØBBY TS-120/IC-225A, WAØDMM SB-104A. Mason City ARC had great mail PR.

NET	Freq.	Time/Days	QNI	QTC	Sess.
Iowa 75M	3970	1730 M-S	1221	39	26
Iowa 75M	3970	2300 M-S	995	63	26
Tall Corn	3560	2330/0300 Dy	365	124	60

Traffic: (Apr) WAØAUX 212, WØYLS 115, WØSS 103, WIØQ 102, KAØX 80, AEØR 53, WBØUPF 48, KØGP 38, WBØPYD 37, WØLFF 22, WØBW 18, WBØAVW 14, KAØEVW 3. (Mar) KAØEVW 7.

KANSAS: SCM, Robert M. Summers, KØBXF — SEC: WØKL. Section net reports for April: KWN QNI 821, QTC 483; QKS QNI 316, QTC 116; KSBN QNI 1160, QTC 124; KPN QNI 304, QTC 16; CSTN QNI 1358, QTC 92. We will hope for a quarterly report from QKS-SS for next month. Congrats to WØRT on receiving his WAZ award. KSBN was able to handle "P" traffic Apr. 7 for CD and have it delivered within 15 minutes thx to the efforts of an ex Kansas WØONF, a regular QNI to the net. WØKL gave a good review of the Kansas ARES to the Conference of Emergency Preparedness officials in Topeka recently. WØPB among others were in attendance. Kaw Valley ARC officers for 1980 are: WAØVRS, pres.; KAØBBP, vice pres & act treas.; KAØBNL, vice pres., also act secy. Wichita ARC reports a successful auction recently and the addition of a new rig to the emergency van, WØSOE. Congrats to NØBMJ on receiving the Eagle Rank in the Boy Scout program. Good luck to all participating in the1980 Field Day event. Traffic: WØOYH 136, WDØACG 102, WØAM 92, WØHI 92, WØFT 78, WAØLBB 65, KØEZ 57, WBØYLP 49, WDØBRZ 48, WØCHJ 41, WØFIR 39, WØASY 25, WØFDJ 23, NØABA 22, WØRBO 20, WBØLKA 16, KØBXF 15, WØKL 15, NØIN 11, WØPB 10, WØRT 3.

MISSOURI: SCM, L. G. Wilson, KØRWL — Asst SCM: Joe Flowers, WØOTF. SEC: WBØFKY. Officers for the newly formed Northland Amateur Radio Assn are: WDØHTC, pres.; WDØAVW, vice pres., KAØGBK, secy.; NØAJI, act mgr. All those who attended the recent PHD Hamfest know that it was again, a big success. There was a real good attendance and a good time was had by all. Antenna work has begun in a big way at WBØUXI and ABØI in preparation for the upcoming contest season. Finally, our deepest sympathies to the families and friends of the following Silent Keys: WØFXW WAØSHD WAØETA and ex-WØMRB.

Net	QNI	QTC	Net	QNI	QTC
NEMOE	115	1	MON	178	122
HBN	406	50	MON2	128	70
TNT	26	34	MOSSBN	679	32

Traffic: WØBMA 498, KØSI 117, WØBV 95, WØOTF 94, KAØP 81, KØONK 53, WBØNIE 20, KAØE 19, KØRWL 10.

NEBRASKA: SCM, Rex P. Greenwell, KØKP — SEC: WAØASM. CONGRATULATIONS HAMS OF NEBRASKA! In a banquet meeting of the Professional Insurance Agents of NE, Lt. Governor Luedtke presented you with an Outstanding Public Service Award for your past work in providing communications services in the public interest! The governor cited you for, among other things, operating your amateur stations in times of need with emergency situations, cooperating with the weather services in tracking storms, operating message "traffic" networks, and always pitching in your part in an outstanding manner. A special plaque was presented engraved "For distinguished service to the Nebraska Section American Radio Relay League." This award goes to all the hams of Nebraska across the state! Each and every one of you have officially been commended and thanked by the governor's office!! The award was made in Omaha and attended by 500 professional insurance agents, the press, the mayor of Omaha, for the governor, Lt. Gov Luedtke, Ak Sar Ben ARC Pres, KØDG and your SCM. WOW!!! I'm proud of each of YOU!! Keep up the GREAT WORK!! The plaque will travel across the section to present at your local club meetings. Congrats to upgrades: Advanced KØUTH; Tech WDØBQN. We scored 93 percent check ins on TEN Tic Net! New alltime high! TNX WØEUT WDØBQG and WDØCID NB

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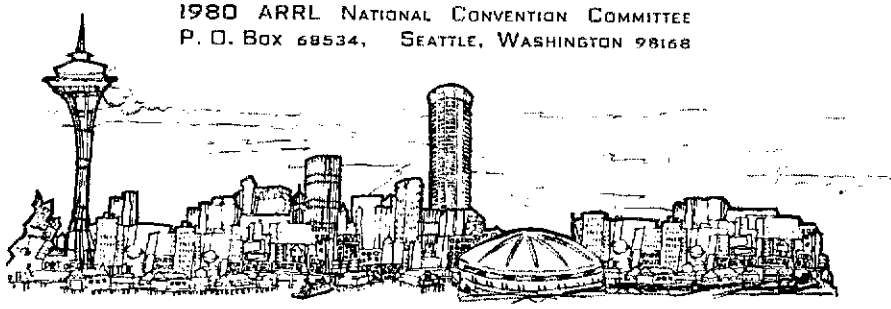

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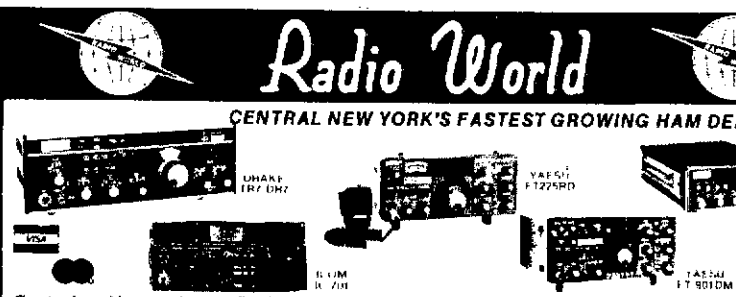

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reps. WØAP, congrats as new Ch Op Society Wireless Pioneers and Hon Chief Radio Intelligence Division. He is retired Engineer in Charge FCC Grand Island monitoring station. FB! Nets: AM Phone QNI 1417, QTC 26; Cornhusker QNI 871, QTC 14; OCWA QNI 56; Platte Valley 2-Mtr QNI 54, QTC 2; Western Net QNI 628, QTC 25; Nebr. Sun AM AREC QNI 117; Nebr Storm QNI 1302, QTC 57. Traffic: (Apr) WØEUT 79, KØBRS 38, WAØBOK 36, WØHOP 31, WØSGA 30, WØZNI 25, WØVYX 13, WBØGWR 11, WAØOQX 8, WAØQEX 8, WBØGMQ 7, WAØPCC 7, WDØBQG 4, WAØLOY 3, WAØAPY 2, KØSFA 2, KØKP 1, WØNIK 1, WØRHU 1. (Jan) WØRHU 3. (Mar) WAØBOK 22.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, Stan Horzepa, WA1LOU — SEC: W1SY. STM: WB1AIU.

Net-NM	Freq.	EDST	Sess.	QTC	QNI
CN-K1EIR	3640	1900 + 2200	57	384	349
CPN-K1EIC	3965	1800/ 1000 S	30	144	317
NENN-WB1CPF	3720	1815	30	86	140
Nutmeg-WA1ELA	28/88	2130	33	83	332
RASON-WA1FSM	13/73	2100 MWFS	17	83	332
WESCON-WA1LOU	78/18	2030	30	121	393

Hi QNI CN: WB2PJU W1WP; CPN: K1AQE WB2PJU WB1FZX. Hi QTC Nutmeg: W1DFT W1EFW. 50 hams from the Tri-City ARC, SCRAMS and RASON participated in EXPO 80, handling 345 radiograms, making 95 special event contacts and providing communications for two emergencies. The New Milford board of selectmen accepted Asst EC WA1ZXT's offer to establish an official liaison between ARES and the office of Civil Preparedness. Nearly 50 traffickers feasted at the annual CN/CPN dinner. WA1DQL W1HAB W1LUH WA1OFP and K1UL encouraging other SARA members to join them in microcomputerized RTTY. Veteran traffic handler W1HMJ is moving to 4-Land. W1NG held the CARA audience captive with his presentation entitled "10 Steps to DXCC." KA1DEU and WB1FZX upgraded their tickets. New appointees: WA1FSM NM (RASON), WB2PJU/1 NM (WESCON), WA1ZXT OTS, K1WJ OES. WB2OSY/1 subbing as CPN NM. CT appointee files are being transferred to the SCM's TRS-80, which is quickly running out of memory. ... Traffic: (Apr) WB1CPF 1019, WB2PJU 376, K1GF 252, W1EFW 146, WB1DGR 118, K1AQE 95, K1DM 93, K1XA 79, WB1ACZ 62, WB1ESJ 50, W1GVT 45, W1CUH 44, WB1FZX 43, WA1ZXT 39, WA1LOU 30, WA1WQG 30, W1KV 17, K1EUW 16, W1QV 4. (Mar) K1DM 97. (Feb) K1DM 23 (Jan) K1DM 48. (Dec) K1DM 138.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD — STM: WA1TBY. SEC: WA1BLG. ASCM: WA9NEW

Net	Mgr.	Freq.	Time(loc)/Dy	QNI	QTC
EMRI	WA1VAB	3.658	19/2200/Dy	567	337
EMRIPN	W1FJI	3.898	1730/Dy	349	198
EM2MN	WA1IFE	90/30	2000/MWF	56	33
EM2MN	WA1IFE	145.8	2000/TTh		
NEEPN	K1BZD	3.945	0830/Su	73	9
HHTN	K1BSO	04/64	2330/Dy	516	192
RAIN/3	N1AMF	01/61	1800/Dy	287	300

Who says that you can't put up a new 2-meter repeater in the Boston area. With the cooperation of a nonused channel holder and a group of public service minded amateurs, a new repeater now resides on 145.23/144.63 and is located in the old Hancock Building in downtown Boston. The main purpose for this machine will be public service, specifically with the Red Cross in mind. W1VSV, who also runs communications for Boston Red Cross, is the trustee. A lot of people worked on this and you know who you are, so thanks!! Quannapowill Club had K1MM talk on some of his many DXpeditions — he's held 21 callsigns. Massasoit Club had a successful mini-auction. Southeastern Mass ARA meeting was highlighted by a visit from Boy Scout Troop 74 from N. Dartmouth. The hf rig was demonstrated to them with a solid contact with a JA! Capeway Club had a ladies night. Framingham Club had an open house at their new association station at the Dantorth Museum. The Southern New England DX Assn. contributed to the WA6YQW gift fund. She was seriously injured during the Palmyra-Kingman expedition recently. North Shore Ham Services is a new group formed from members of the North Shore Repeater Assn whose function is education of new hams with emphasis on the handicapped. The 19-79 Repeater Assn had a banquet. Minuteman Repeater Assn had W1IS talk on speech processors. The Norwood Club has renewed publication of their monthly newsletter, the Newscarrier. The Southeastern Mass ARA helped in the March of Dimes Walkathon. A group from the Sturdy Memorial Hospital ARC took their wives out to dinner in Providence. The Whitman Club had a slide presentation by K1BZD on their excellent banquet. The Sellesley Club had WA9NEW talk on Over the Horizon Radar. Middlesex Club member K1QBP got his Extra. Mitre Bedford Club had G3BVU talk on USAF radar systems. Billerica Club has been running mini-auctions at the end of their meetings and the treasury is bulging. W1XA WA1UMA WB1FJO W1EGE N1ADY WB1DJM provided communications for Red Cross during RI disaster drill. KA1CGP WB1EZT and Wellesley Club active in BAA Marathon (communications not running). Traffic: K1BA 378, WA1TBY 325, WA1VAB 281, N1GQ 279, KA1BJY 218, K1GN 207, K1BSO 144, KA1CC 142, N1CW 132, WB1GWE 125, N1AWX 120, WB1DXR 116, W1ATX 106, K4YX 91, W1DMH 63, WA1FNM 59, K1BZD 52, WB1ANT 47, AF1Z 46, W1FJI 38, KA1CGP 31, KH6JNQ 30, WB7TPY 27, KA1HG 25, WB1EZT 24, W1PEX 24, WA2ORV 22, WA9NEW 21, W1XA 16, W1LE 13, W1PJ 9, N1EE 7, KA1BMJ 7, WA1ZQT 6, W1FJ 4.

MAINE: SCM, Ed Bristow, WA1MUX — New EC Kennebec City W1WCI. AARA officers: WA1OYC, pres.; K1TFK, vice pres.; KA1CSP, secy.; KA1CNB, treas. AARC members supplied communications for local foot race; AEARU members same for JC March of Dimes walkathon. SARA officers: KA1HC, pres.; KA1BHF, vice pres.; KA1AYC, secy.; WB1CXV, treas. Club sponsoring both Novice and Gen-Tech classes. PSHR: W1RWG KA1EO WB1BYR AF1L. Sess/QNI/QTC: PTN 33/311/149; SGN 26/1023/161; MSN 13/85/9; SPSN 12/135/18; CMEN 4/66/10; AEN 4/43/0. Traffic: WB1BYR 133, N5YX/1 121, W1RWG 117, W1HDC 70, AF1L 70, W1BJ 51, WA1MUX 37, W1ISO 21, KA1AYC 19, WA1JZP 16, KA1EO 15, WA1YNZ 12, KA1EKT 11, WA4UJJ/1 9, W1BMX 8, W1AHM 6, WA1ZJL 6.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH — Sec: K1RSC. STM: W1TN. NMs: W1NH WB1HFI. It is sad to report W1HR a Silent Key. The 2-meter fox hunts are increasing. Clubs are Nashua, Amherst & Great Bay. N1AHN W1JY WB1ASY K1KA N1AIX AF1T W1VAU

W1NH WB1DKX & WB1GXM worked all 10 counties in the NH QSO Party. Out of state, W5WG was tops with 6. New Navy MARS EC for NH is WB1EWE. The GSFM net had 492 check-ins & 131 traffic. Saddleback Repeater Net meets Thurs at 7 P.M. W1FYR on ASCII with mod 35ASR. W1BYS visiting DL4-Land. Seen on Hyways & Byways: WA1HYU W1RMT W1HSC WB1ADD W1LIM & W3OO. GSPN had 365 check-ins & 44 traffic. New QCWA member is W1FYR. WB1HFI worked 50 New England counties. WB1GXN now KA1ID. WB1HGO working on her Extra. KA1DQA now General. W7UN has new 10-meter beam. K1OSM is into microprocessors. The Nashua provided communications for the Easter Seals Bike-A-Thon. For details on the New Hampshire Fox Hunt Award, contact K1KA. The Rochester club GBHAR news letter edited by KA1BXA. Everyone enjoy the summer. Traffic: (Apr.) W1TN 230, WB1HFI 143, WB1HJO 101, K1OSM 99, W1MHX 95, KA1BJ 46, KA1DQA 35, WB1HGO 28, W1FYR 26, WB1DSW 25, K1ACL 19, KA1BBI 15, WA1PEL 13, N1ALM 12, W1GLJ 11, K1NH 11, W1NH 7, W1BYS 2. (Feb.) K1YMH 63, K1ACL 57, W1BYS 3.

RHODE ISLAND: SCM, J. Titterington, W1EOF — SEC: K1DT. STM: N1RI. WA1SZC now has Extra and awaits new call. 1980 officers at Hope Valley Repeater are: WA1ZOZ, pres.; KA1FE, vice pres.; WA1VIH, treas.; WA1VIL, secy.; WA1TMZ, comm. officer; N1AGG WA1YZD & WA1ZTL, bd member. From CT we welcome WB1DAS to RI. New Novices: KA1EQR KA1EUW KA1EVA KA1EVB & KA1EZK. N1RI turns job of AMSAT Area Coordinator over to N1DM. W1JFF reports Red Cross disaster drill went very well. EMRI Slow Speed NEt is back in business on 3715 kHz at 8:30 P.M. local time, seven days a week. This is an ideal way to learn traffic procedure, check in. WA1OSL, Acting Mgr, reports RIEM 2-mtr Tfc Net has sess 22, QNI 212, TFC 65. Field Day was great with all groups — it will be better next year. ARES Net doing better each week — FB! Traffic: W1EOF 102, KA1BTU 63, KA1FE 58, AE1S 16, N1RI 4.

VERMONT: SCM, Bob Scott, W1RNA — SEC: W1VSA. The old Tri-County ARC in the Brattleboro area is in the throes of reorganizing. We hope it is not too long before they have a going club. N1AOZ has upgraded to Advanced as has N1APA, both in Vernon, VT. GMN 26/494/54; VT SSB 29/485/117; Carrier 25/415/36; VT RFD 4/65/11; VTF 4/62/4. W1KOO repeater has been operating on a makeshift antenna with much reduced coverage — winter had its way with the old one. Expected to be back in full operation in early May. It has been missed! Traffic: K1BOB 101, N1ARI 45, W1RNA 14.

WESTERN MASSACHUSETTS: SCM, Art Zavarella, W1KK — STM: W1TM, SEC: W1JP, ASCMs: W1BVR K1BE. NMs: WMN/W1UD daily 7 P.M. on 3562, WMPN/WA1MJE weekdays 4:30 P.M. on 3935, WMEN/W1UPH Sun. 8:30 A.M. on 3937. This ARES net serves as a section weekly meeting. The six designated liaison stations then convey the formal and gist of the informal "words of wisdom" to their respective 2-m repeater nets at 9 A.M. This 75-m/2-m combo on Sun mornings is working out so well as a section-wide communications exercise that serious thought is being given to an NTS counterpart for a weekday evening at 8:30, same frequencies and modis operandi. Laudable is the close working arrangement between SEC W1JP, and the EC of the Mt. Tom Repeater Assoc. Plans are to extend similar relations to the other repeater groups in WMA for a unified amateur response in the event of public need. PSHR: K1JHC 82, WA1MJE 62, W1TM 62. Traffic: WA1MJE 199, W1TM 180, K1SSH 168, K1JHC 89, K1IJV 70, W1KK 64, WB1HIH 46, WA1OPN 37, W1BVR 31, W1EFC 28, W1JP 25, W1ZPB 19, WA1DNB 13, W1UPH 7.

NORTHWESTERN DIVISION

ALASKA: SCM, Fred Wegmer, KL7HFM — ASCM: KL7AG. ASCM: KL7IBG. SEC: KL7EWQ. STM: KL7P. New Anchorage EC, AL7AW; Juneau EC KL7JFT. Fairbanks hams busy with preperations for annual Yukon 800 race. Don't miss the big Fairbanks Flea Market/Hamfest June 7. Many Alaska hams plan to attend SEANARC 80, see you there. Southeastern hams getting started with Coast Guard Support Net, Good luck. KL7GL reports TRS-80 RTTY activity. Look for him on 20-m; others getting ready for computer ASCII RTTY are KL7ILA KL7IRT KL7IWM KL7HFM. NL7A up & running with HAL system. Look for KL7HAB & KL7HFM on SSTV. I need some input on the Alaska QSO party idea. Reminder: Alaska calling freq. 14,292 anytime. Traffic: KL7BZ 220, KL7P 119, KL7IYX 65, KL7RF 37, KL7Q 34, KL7IUI 27, AL7O 14, KL7JFT 13.

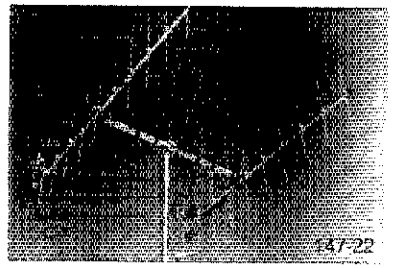
IDAHO: SCM, Jem Allen, W7JMH — Kootenai Club reports their 8th anniversary — congrats! K7ID has worked 500 different prefix on 20 and 15 in the past 6 months! AD7N planning trip to Far East. WB7WIA has new job, moved to Pullman. KA7AGR visited for a few days. Congrats to KA7DIS — he got his General! AD7N and K7ID going to ARRL Nat'l Conv. in Seattle. Pocatello Club had a presentation on civil defense by W7QNL and voted to support the Bannock County Civil Emergency Services to the tullest. Mt. Harrison 146.40/147.00 repeater needs financial help. Send contributions to Harold Short, WA7VHW, 923 Tenth St., Rupert, ID 83350. Elmore County ARC busy on 2 meters helping with March of Dimes at Mt. Home on April 19. Congrats to WA6IOC WB7QYU WB7RUL KA7CKU N7AYL KA7EKR for a job well done! Net Reports:

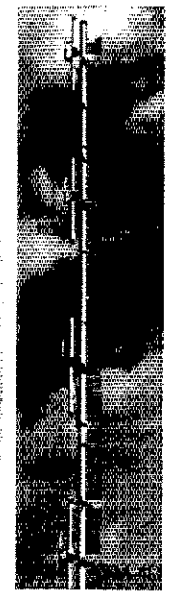
Net	Freq.	Sess.	QNI	QTC
FARM	3935 8 P.M. Dy	30	1511	40
CD	3990 8:10 A.M. M-F	22	644	8
IMN	3635 9 P.M. M-F	22	262	85
MINI-CASSIA	146.52 FM	4	13	1
MT. KIMPORT	147.66/06 FM	4	90	1

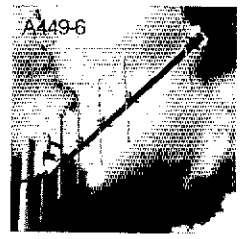
WA7VJL has new Triton IV — sure sounds FB! Traffic: W7GHT 175, N7APC 76, AC7P 70, K7JV 60, W7JMH 19.

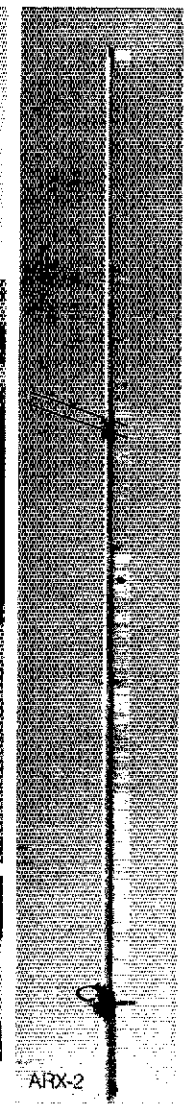
MONTANA: SCM, Robert Leo, W7LR — Montana 2-meter repeater list continued from last month: 28/88 WR7ADN Bozeman; N7AD Gt. Falls; WR7APG Missoula; K7CML Miles City; 31/91 WR7AEW Havre; WR7ALU Libby; WA7JNA Hardin; 34/94 WR7ABY Butte; K7EFA Red Lodge.* WB7VTS Hinsdale; 37/97 WR7ALX Missoula; 147.60/00 WA7ZSO Helena*; 63/03 WR7AKD Lookout Pass; 81/21 K7WNE Missoula; 93/33 WB7USV Bozeman. * is Autopatch. Add to previous list: 01/61 WB7CXR Havre*; 16/76 WB7FFW Billings*. WA7OBH has 234 countries worked, 202 confirmed. Will report RACOM Helena VHF mtg results later. KA1EA, Bozeman, reports 6-mtr Aurora contacts 12 & 13 April. N7ATT KA1EA send microprocessor cw on 2 mtrs. Bozeman club holds 2-mtr bunny hunts often. KA7DLC 13 countries via satellite. New Extra class: KA1EA KA7M (ex KA7CBV); N7ANR

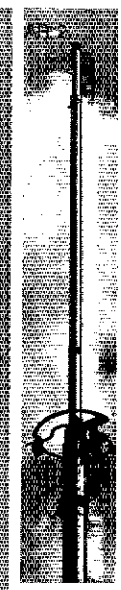
How to enjoy FM











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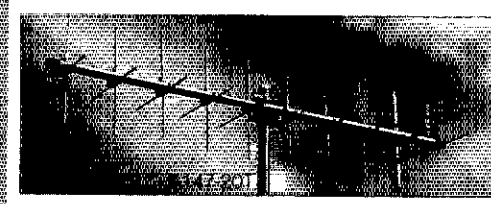

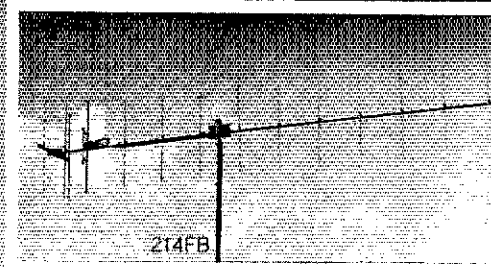

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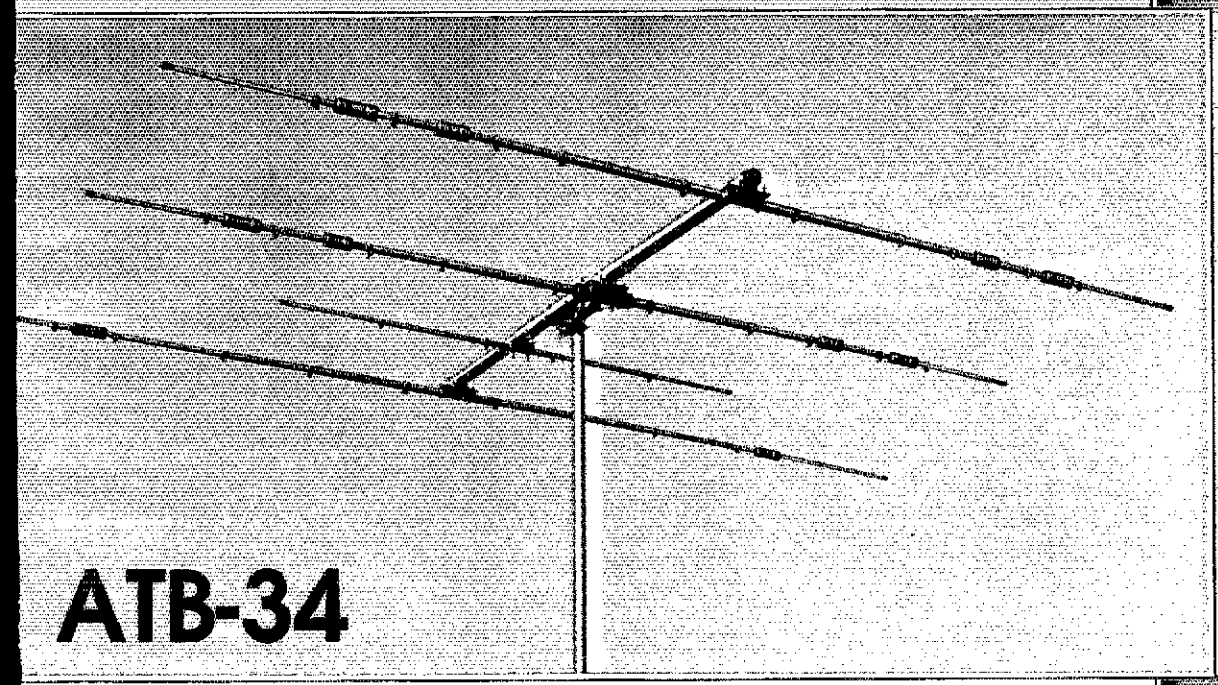

ATB-34

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

SPECIFICATIONS

Gain	*
F/B Ratio Avg.	*
3dB Beam Width	62°
Nominal Impedance	50 ohms
Power Handling	2000 Watts PEP
Boom Length	18'
Longest Element	32'8"
Turning Radius	18'9"
Wind Area	5.4 Ft.^{2}
Weight	42 lbs.
Maximum Mast O.D.	2.25"

*Antenna gain specifications cannot be published in QST. For complete information on all Cushcraft antennas, see your dealer or write for a free A-9 catalog.

ATV-5

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

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

ATV-3	ATV-4	ATV-5
10-15-20 Meters	10-15-20-40 Meters	10-15-20-40-80 Meters
Height 13'7" (4.2m.)*	Height 19'2" (5.9m.)*	Height 24'9" (7.4m.)*

ALL MODELS
Power Handling 2000 Watts, Nominal Impedance 50 ohms, Maximum Mast Size 1¾" O.D. Termination: accepts PL-259

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new Advanced. Traffic: W7DEO 70, W7IXD 25, W7LBK 4, W7NEG 4, W7LR 2.

OREGON: SCM, Dale T. Justice, K7WWR — SEC: K7OLN. Section and Local Nets.

Net	Time/Days	Freq.	QNI	QTC	Mgr.
BSN	0045Z Dy	3908	569	28	WB7POU
OSN	0130Z Dy	3587			WB7OFI
Pdx AARES	0230Z Dy	147.32	637	43	K7WWR
WCN	0200Z Dy	3702	389	153	K7ZIG
PTTN	0200Z Dy	146.76	632	137	W7LRB
OARES	0130Z Dy	3993.5	440	109	W7HLF
JCARES	0215Z W/F	147.06	186	16	W7VSE
SoOrFM	0230Z Mon	146.64	101	0	W7FDU
MPARES	0200Z M/Th	146.85	83	1	WA7ZAF

The 1676 Net is now the Prime Time Traffic Net. MPARES is the Marion/Polk Co. Net, and has skeds on RTTY and cw on Wed nights. WA7HJV is now on from Pendleton with antenna in the trees. Mt. Hebo's power went away during the winter requiring installation of a generator to charge the batteries to keep 147.22 on the air. UVARC took part in the March of Dimes Walkathon. W7HKE rec'd WAS. New UVARC officers: AD7K, pres.; AE7Q, vice pres.; KA7AID, secy.; WB7VSP, treas. TERAC has supported Mt. St. Helens watchers with a remotely controlled camera system built from scratch. OTVARC program was W7GUR on the QSL Bureau and DXing, followed by a film previewing the Trask Mtn. Enduro, for which Washington Co. ARES is communicating. Lots of amateur groups were involved in making the 8th Keg Roll a success for the Kidney Assn of Oregon. Traffic: (Apr.) W7VSE 749, K7NTS 248, W7HKE 137, WA7HS 115, W7LNE 53, K7QPW 40, K7WWR 28, W7LT 18, K7SGU 17, WB7DSK 1. (Mar.) WB7DSK 7. (Feb.) W7HKE 185.

WASHINGTON: SCM, Bob Klepper, W7IEU — STM: W7DZX. SEC: WA7RWK. Nets reporting for April.

Net	Time	Freq.	QNI	QTC	Mgr.
NTN	1930Z	3970	1101	76	W7PFD
WARTS	0200	3970	3023	218	W7EQY
NWSSBN	0230	3945	678	69	K7AJT
WSN	0245/0545	3590	545	152	K7GX7
PSTS	0130/0615	146.92	130	24	W7IEU
SCARES	0230	147.18	32	11	W7ERH

Don't forget that with Daylight Saving Time, nets are operating 1 hour early UTC. Enjoyed the trip to the Spokane Swapfest and the chance to talk to many of you. K7DDU and her crew are to be congratulated for the efforts put forth to make the event a success. You still have time to make arrangements to attend SEANARC '80 on the 25, 26 and 27 of July. Many thanks to all of you who played a successful role in the completion of the many Walkathons and the Diabetes Bikeathon. WB7WOW and N7RV are Life Members now. N7CY presented a very interesting program on how to conduct communications on the air for the West Seattle ARC. K7FR is now on 450 MHz. For those not going to SEANARC, there is the Okanogan Valley Hamfest on July 26-27. Lower Columbia ARA provided communications for a Boy Scout Camporee, and handled some emergency communications during the event. W7AIB has antennas up and participating in cw traffic nets again. K7SH and his ARES group provided communications for a successful search for a 13 year old boy. Board members of Mt. Baker ARC Repeater Group are: WB7AUP, chmn.; W7FCH, secy., WA7ZWG, treas.; WB7CAO WB7PMV, board; W7ISX W7EKM W7UMH, maintenance, K7VNI, custodian. WWDX Club's Totem Tabloid reminds all interested in the upcoming 10,1-10,15 MHz (30 Meters) band, to send your thoughts to ARRL. Most opinions, according to the Tabloid, is cw mode and some suggest power limits such as in the Novice segments now. WB7QWC attended critique of Island City ARC SET. N7AGG and many others have been involved in many hours of watching to see what Mt. St. Helens is going to do, if something does happen, information can probably be heard on the Baw Faw Rptr on 3987 kHz. Conditions are different with nets meeting an hour early so all of us should keep our equipment up to par. We also have been experiencing quite a bit of interference from some stations working 2 meters and leaving the vox on their low band rigs on. How about checking things out? Hope you all have a nice 4th of July weekend. Traffic: W7DZX 685, WB7WOW 586, WB7TOF 516, K7GXZ 176, KL7JEB 129, W7FJZ 127, W7IEU 101, K7GTP 100, N7AJ 92, N7AFZ 81, W7GB 63, WA7BDD 59, WB7EBP 57, WB7CFH 54, W7BUN 26, W7APS 20, N7AFY 13, WB7QWC 9, W7ERH 4.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — Asst. SCMs: K6UWR W6ZF VE2AOV. SEC WB6KQU busy reorganizing. New ECs N6KL WA6SDA KB6LL with more changes planned. N6RO still building towers at Radio Oakley. W6JXK involved in organizing CA RTTY NET, 3637.5 at 8 P.M. KA6ERF new OTS. WR6ADM, NCCC-sponsored Alameda County RACES machine on 147.84/24, is now all solid state and boasts a 208 AH battery backup system. The new machine was designed & built by WB6ODL and the battery-floating power supply was designed & built by AA6G with chassis work by N6AMG. WB6KQU & I attended the April meeting of the UCARC at Berkeley and presented our individual perceptions of emergency communications. UCARC has established BEARS (Berkeley Emergency Amateur Radio System), and recently received a tribander and rotator from W6PVE. SBARA (Fremont, Milpitas, Newark, Union City) has launched a membership drive. Info from Jane Bell, 37882 Andrews Ct., Fremont 94536. LARK member, N6AXH, first winner of their "Klutz of the Month" award. Something about a coaxial nail! MDARC held their auction and survived an IRS audit all in the same month! Traffic: W6JXK 454, W6OA 126, WB6UZX 42, KA6ERF 41, K6UGS 27.

NEVADA: SCM, Ralph E. Covington, W7SK — ASCM: N7RH. SEC: WA7KCD. Mount Lewis machine on 34/94 courtesy of WB7PKV. New officers TARA; WB6VLK, pres.; W6ITR, vice pres.; KA6FNX, secy.; WA6VKL, treas.; WD6GHG W7KJU W6CSP WA6SUW, dir. WA6EWV disabled at home. LVRAC Net on 34/94 Tues at 8 P.M. April meeting of SNARS had program by OSCAR expert W7BYR. NARA Hamfest August 16, Idlewild Park, Reno. Nevada Sagebrush Net meets nightly 7:30 P.M. on a frequency of 3906 kHz. Traffic: N7AKX 221, W7BS 88, KB7BP 3.

PACIFIC: SCM, Pat Corrigan, KH6DD — STM: WØKON. SEC: KH6CKJ. EC-Honolulu: KH6ILR. ARRL First V-Pres. KH6IPY/WØBWJ visited KH6 at end of Apr. Probably the last stint for the KH6IPY call. He had nice visit with former SCM KH6BZF. KH6ILR has promulgated Oahu emerg. plan and it is very good. If you can offer your emerg. preparedness services, please contact KH6ILR

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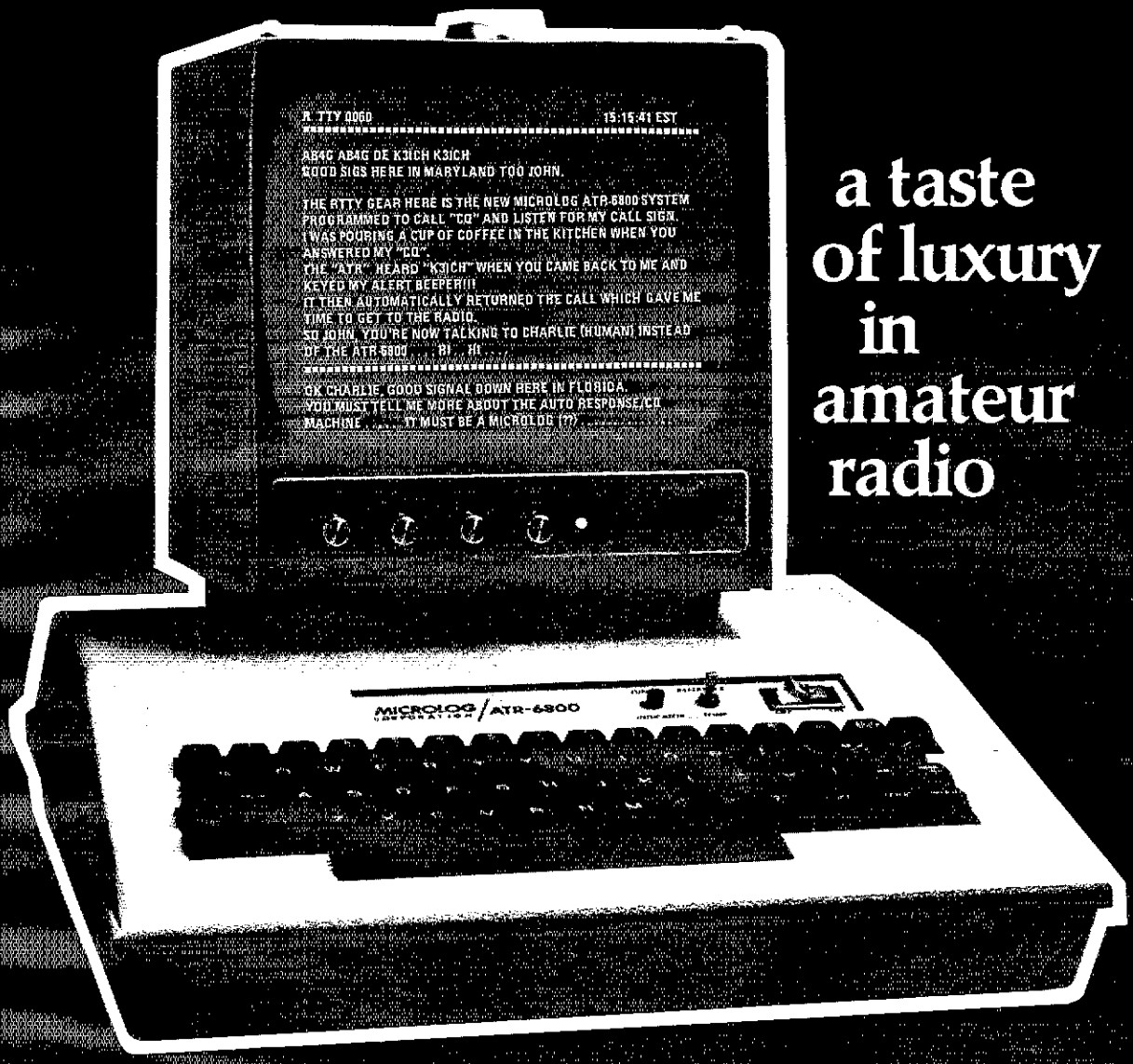

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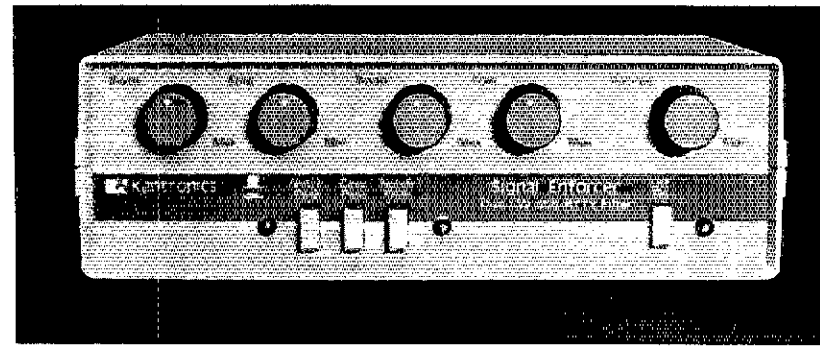

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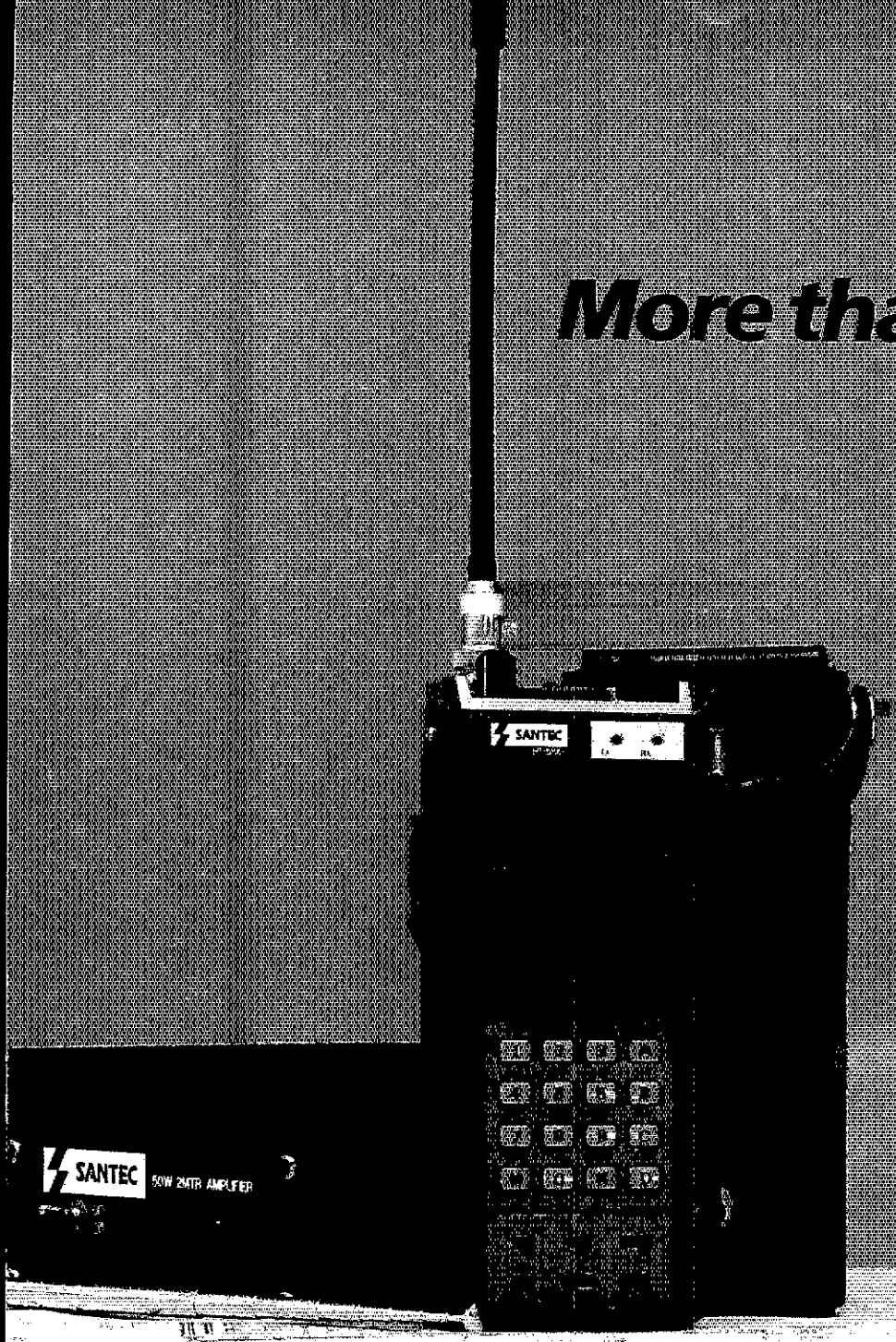

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SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: WB6GFJ. ASCM: AI6T. Over 700 attended the annual Sacramento Valley Ham Swap sponsored by the North Hills RC. Big prize winners were WA6HLQ a S-2 and KA6DHN a TR 7400. New officers for the Yuba/Sutter ARC are: WD6EEC, pres.; WB6ZZY, vice pres.; KA6COH, secy.; W6GCM, treas. K6DEO N6CCS KB6MD WD6BFR KA6AWX, dir. The new slate for the Tahoe ARA are: WB6VLK, pres., W6ITR, vice pres.; KA6FNX, secy.; WA6VKL, treas.; W6CSP W7KJU WA6SUV WD6GHG, dir. KB6JM has been making good progress with the State Legislature in getting ham license plates for motorcycles. Our friend WB6YRO has become a Silent Key. WB6CQF and the Butte/Glenn Co. ARES provided communications for the March of Dimes Walkathon held in Paradise. Recent upgrades include KA6FTY (Adv) and KA6GBW (Gen.) Traffic: W6SX 40, W6DEF 16, W6RSP 9.

SAN FRANCISCO: SCM, Art Samuelson, W6VV — SEC: WB6ZRK. STM: K6TP. K6GWE/R sporting new club logo thanks to KA6BQF. SFRC has new newsletter name (Nuts and Volts) courtesy of W6VV and new mast head courtesy of K4DRD. Humboldt ARC provided communications for Kinetic Sculpture Race from Arcata to Ferndale. San Francisco RC furnished communications during CAL MEDEX-80 simulated earthquake exercise. Congrats to W6RNL on PSHR. WA6PYN is planning to combine hamming and water sports this summer. Santa Rosa Fairgrounds was site of an Amateur Radio display during annual Scout-O-Rama. Welcome to new Novices KA6KJI and KA6KJJ. Traffic: (Apr.) W6RNL 225, K6TP 83, K6JFY 52, W6IPL 38, W6GGR 8. (Mar.) W6GGR 14.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — Asst. SCMs: WA6YAK W6TRP WA6HIN SEC: WA6YAB. The Central Valley DXers meet the 1st Sat. of the month in Fresno. New officers of the San Joaquin Net are: W6DPD, mgr.; WB6THY, secy.; WB6DAZ, asst. secy. The Fresno International DX Convention had the largest attendance ever. K6XJ and K6OPE won prizes. W6EOM N6IJ and W6FXV are Silent Keys. WA6YYY WD6BDE and K6ZLU have Advanced. FØHN/W6 is KA6KFY. W6YK and W6YO are on the DXCC Honor Roll. W6FZM has a TR 7600. WD6ACY has a 102 BX and 2KD5. WD6BDE has a L-7. There are only 10 months till the 39th Fresno Hamfest and ARRL Pacific Division Convention on May 16-18, 1981 in Fresno. See you at the ARRL Pacific Division Convention at Marriot's Great America on Labor Day weekend 1980. Traffic: WB6TTP 33, W6DPD 29, WA6YAB 16, K9YBM 15, WA6JDB 5, WD6FRS 2.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. New OO is W6SZN in Belmont. KB6ML hand delivered, by bicycle, a large activity rpt including info that he gives to friends and neighbors on messages by Amateur Radio. He also visited W6YBV and got some good pointers on tfc handling. WB6IZF reports the Silicon Valley Emergency Communications Service is really mushrooming. W6MMG holds sked with son WA6NDN who is at college and his other son WB6HBL reports QRL with girl friend — little time for DX. W6MXO operating mobile on 40-mtr cw. N6XI reports little time for radio as he is swamped at work. W6YBV and W6KZJ busy with cw traffic and W6AUC with phone tfc. New members of NPSARC are WA6ZDB WA4CLW and WA7NEO, and upgrades are WB6PMG to Advanced and KA6HVO to General. Remember Pacific Division Convention in Santa Clara Aug. 29-31 with fun for the family. With Field Day over, the plans are being made for next years event. Ex-W6WC is now KK6N. SLVRC and SCCARC had another successful joint breakfast meeting. WB6IZF reports 1460 ARES members in SCV and 19 ECs. Graduates of SMRC's Novice class are KA6JJC KA6JJB KA6JQG KA6JIZ KA6JIY KA6JIX KA6JXA KA6JUT and KA6JWR-welcome to ham radio! New members of LERA ARC are WD6FEL and K6HBR, and upgrades KJ6Z and KK6A to Extra. SPECS members W6ASH W6AIN W6TVO WB6OML and WB6GYT participated in KRON-Red Cross Health Fair. SCCARC had a successful flea market as well as EMARK and SCCARA. N6TX spoke to SCCARA on Amateur Reception of 4 GHz Geostationary Communications Satellite Signals. New member SCCARC is K3NNV. Traffic: W6YBV 200, W6KZJ 128, WB6ML 67, W6AUC 64, W6RFF 38, W6ASH 10.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Bill Parris, AA4R — Asst SCM: N4UE. STM: K4VHT. Carolina Morning Net (CMN) now meeting at 8 A.M. EST on 7294 kHz and the Carolinas Novice Net (CNN) is now at 7115 kHz at 6 P.M. . . . both nets meet daily and are members of NTS. Brightleaf ARC (Greenville) planning on a big turnout for their annual Family Day which will feature a "pig picking." Azalea Coast ARC recently had very interesting program by Captain Garrett of the Wilmington based Coast Guard Cutter Northwind featuring a slide presentation of a trip to the South Pole. Countryside ARS is a new club in Williamston, officers are KA4KNU, pres.; WD4IOC, vice pres.; KA4BQD, secy.; WA4TKJ, treas.; KA4NSG, sgt @ arms; KA4DIW, reporter. KA4NSF, photographer. The club meets the fourth Thursday of each month. W4EAT, EC for Stanly Co., reports the ARES group participated in Disaster Awareness Week in April and the Stanly Co ARC provided communications for a Diabetes Bike-a-thon with KB4OR as coordinator. The communications were handled on 220 MHz which is a switch from the normal 2 meters usually used for this type of event. Congrats to WA4OOS, a National Merit Scholarship winner this year. You may remember him as a former Net Manager of the CNN. The Coastal Carolinas Chapter of QCWA met at the Raleigh Hamfest and elected W4EHF, pres.; AA4L, vice pres.; W4LPL, secy/treas. The Chapter will install officers at the Fayetteville Hamfest August 16-17. Traffic: WD8NYN 292, WD4CNQ 217, AB4S 164, AB4V 135, WB4WII 134, WB4VVL 126, K4VHT 122, KF4R 105, WA4BFT 100, K4FTB 91, KU4W 71, WA4OBR 68, N4AET 64, WD4CNR 57, KQ4M 56, K4VHQ 56, N4ZH 55, W4FMN 51, WA4SRD 50, WD4CFZ 49, K4DHX 48, WB4MXG 48, WD4AIE 46, W4EAT 46, W4VTP 40, WA4OJU 39, AA4R 39, KA4DNL 32, K4NLK 32, N4UE 31, WD4JJK 30, WB4CES 27, WA4CUD 25, KB4OV 25, WD4ABZ 24, KC4AM 22, WB4CYN 22, WB4VQZ 16, WA4IHG 11, WA4UTC 11, WD4NAO 9, K4TPK 8, W4EHF 6, WB6OTS 6, WD4ENB 3.

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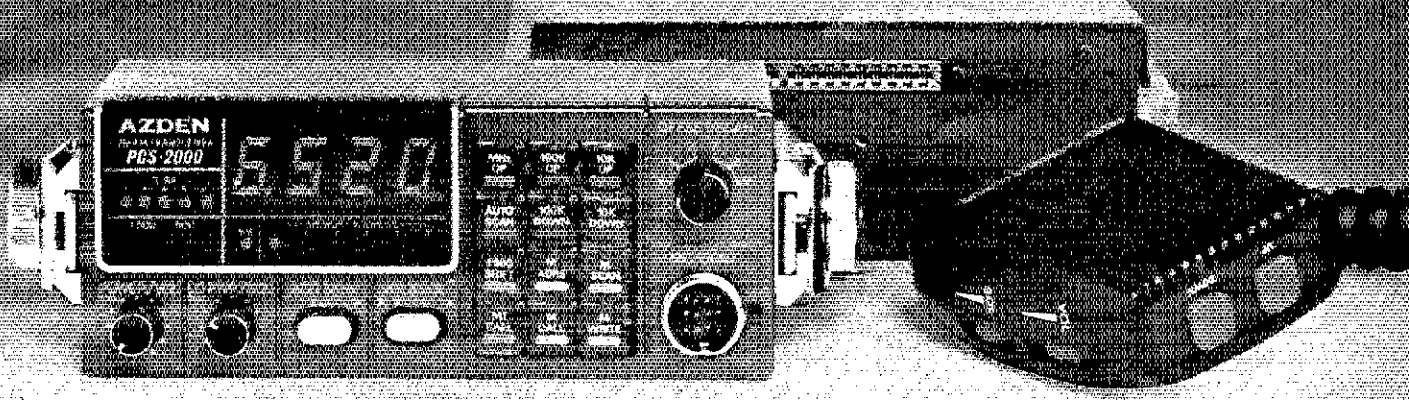

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LED indicates 5 kHz position.

The 1 kHz/5 kHz Switch gives you an effective choice of 800 2-meter channels in 5 kHz steps.

Dim/Bright Switch for bright illumination of frequency read-out and meter for daytime, and lower intensity for safe mobile operation at night.

The Manual/Scan Switch lets you choose your frequency manually, or have the VF-7401 find an active channel for you.

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Optional Micoder II Microphone/Auto Patch Encoder lets you phone through repeaters with auto patch input. Draws power from the 7401, so no mike battery is necessary.

The Squelch Control also functions as the receiver's sensitivity control to stop scanning only upon reception of "full-quieting" signals, skipping the weak ones.

The 100 kHz Selector button controls the VF-7401's tuning in 100 kHz increments. **The 7401's 1 MHz Selector** button lets you choose any 1 MHz segment of the 2-meter band.

The 10 kHz Selector advances in 10 kHz steps. In Scan, as it recycles from "9" to "0," it also causes the 100 kHz readout to advance by one digit. Depress once to resume scan function.

More features that make the VF-7401 the 2-meter rig that belongs in your shack and vehicle

No more searching through repeater guides while mobiling in unfamiliar territory – your new Heathkit VF-7401 will find the active channels for you. It will even alert you to band openings. You're going to enjoy building your VF-7401... and you're going to love using it. The VF-7401, the ultimate 2-meter rig...from the more than 200 Hams at Heath.

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- Convenient detachable mike using 4-pin connector.
- Power to the Micoder II Microphone (if used) eliminates need for a battery.
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AM-405

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — Asst SCM: WB4UDK. SEC: WD4HBX. STM: W4ANK. DECs: Zone 1 & 2 WB4TNS, Zone 3 KC4AD, Zone 4 K4VIA, Zone 5 WD4EDM, Zone 6 N4ATO, Zone 7 WA4JYR, Zone 8 N4BCD. Support your ARES program. Tnx to all who attended the ARES meet in Charleston. A good turnout. Congrats to new ECs KB4KT WA2PZK/4. Check-ins/traffic: SC SSBN 1597/167; Blue Ridge 2-Meter Net 1038/34; Anderson 2-M Net 517/24; CN 634/299; Lancaster County 2-M Net 182/12; Western SC Emergency Net 203/46; Newberry County ARES Net 54/11; Carolina State Line Net Mar 67/4, 48/5, District 5 ARES Net 27/0. CNN 276/56. Trident ARC ARES Net 70/0. Traffic: K4ZN 358, W4ANK 264, W4NTO 78, W4FMZ 74, KA4AUR 62, K4VIA 53, W4MTK 49, K4FRX 41, WB4MXW 40, W4FVV 34, WB4UDK 25, W4NQL 24, K4LYU 17, N4BCD 12, AF4E 11, WB4JNE 10, KB4CO 9, WA4VYS 9, WA4JWS 8, WD4EDM 7, N4EE 5, WD4BUM 4, WD4FJP 2, K4KEP 1.

VIRGINIA: SCM, Rick Genter, K4BKX — ASCMs: Buddy Smith, W4YE & Bill Farone, N4NK. SEC: N4AZI. STM: WA4STO. Chief OO: W4HU. Chief OVS: N4CD.

Net	kHz	Time-P.M.	Sess.	QTC	QNI	Mgr.
VNTN	3907	Noon	30	143	321	N4LE
VSBN	3947	6:00	29	291	583	N9ASX
VSN	3680	6:30	30	118	397	WB4KSG
VN-E	3680	7:00	30	219	446	WB4FLT
VN-L	3680	10:00	30	173	277	WB4FLT
VLN	3947	10:15	29	186	545	WA4YIU

Hot weather and QRN are here for sure now! W4SQQ has passed the STM job to WA4STO. Many thanks to W4SQQ for a job well done and congrats to WA4STO for the move up. N9ASX has replaced him as VSBN manager. W4SQQ has joined the rest of the many Virginians on the Eastern Area Staff as the new Director for the Transcontinental Corps (TCC). Eastern, evening. Many congrats. We are all proud of you. DXPO-80 will be held at Tysons Corner on Sept. 27th and 28th. To get on the mailing list, write K3AO, Rte. 1, Box 230 Bryantown, MD 20617. WA4FDV and I are in the process of ;moving. Please note the new address on page 8. Starting NOW, WA4STO, our new STM, will get all station reports with traffic or PSHR. His address is Box 167, Steven Fountains, 22653. ARES drills were held in W4WWQ's and WB4UHC's districts and all went exceptionally well. Club bulletins received from: AMRAD, Central Va. Contest Club, Hampton Roads RC, Lynchburg ARC, Portsmouth ARC, Roanoke Valley ARC, Richmond ARC, Sterling Park ARC, Virginia ARA, Va. Teletype Society, Williamsburg Area ARC. Its good to hear from all of you. Traffic: WB4PNY 689, W4JK 526, KB4N 507, WA4STO 451, WA4CCK 324, W3BBN 319, WA4LJI 288, K4KNP 267, W4SQQ 267, WB4FLT 209, K4BKX 174, K8LGA 174, N9ASX 134, WB4KSG 129, KA4BQK 115, N4AZI 114, W4UQ 98, N4LE 95, N4NK 95, WA4YIU 88, K4JM 85, W3BBO 78, N4YO 72, K4AXF 55, N4IF 54, N4RF 54, AA4CK 49, KA4ETG 49,N4BJX 48, WB4ZTJ 47, K4EJ 46, W4NWM 44, W4OKN 41, WB4RWY 39, WA4QWC 37, K4JDM 32, K4VWK 32, WD4NEI 30, W4YVG 28, WB4KIT 25, N4CIR 22, KA4GBL 22, W4JAZ 22, K0JH 21, W4SUS 21, W4CEU 20, WA1VRL 17, KB4OF 16, W4SVG 16, W4CFV 15, WD4FTK 15, W4GTH 15, WB4MAE 15, WB4UHC 15, W4JUJ 14, WA4RTS 14, KA4GIO 13, W4LXB 13, K4MLC 12, W3ATO 10, WB4DOZ 10, WB4ODZ 8, N4DCL 7, W4KXE 7, WA4ISA 6, KB4OB 5, N3RC 5, WA4EGW 4, WA4FDV 4, N4GHI 3, WD4DUU 3, W4YE 3, N4ATT 2, WD4EUV 2, WA4JUO 2, W4KX 2, W4PVA 2, WA4WQG 2, W4DM 1, WB4LAB 1, N4OT 1.

WEST VIRGINIA: SCM, Karl Thompson, K8KT — STM: KC8C. SEC: K8QEW. Net Mgrs: K9MHR W8FZP KD8G WD8LDY. WD8EAV is now KD8X. Plateau ARA is now a League affiliate. W8JM has been active on Hillbilly Net. Jackson County Hamfest will be at Cedar Lakes, Ripley on Aug. 10. Bluefield Hamfest Aug. 24 at Brushfork Armory. Chas. area hams provided communications for 2nd annual Coal River Marathon. K8QEW was guest speaker at Dayton Hamvention.

Net	Freq.	Time-Z	QNI	QTC	Sess.
Hillbilly	14290	1700 Su	170	76	4
WV Phone	3990	220 Dy	569	91	29
MD Phone	3990	1600 Dy	234	34	30
WVN	3567	2300 Dy	166	49	29
Bk. Diam	25/85	0200 Tu	40	5	5

2-Mtr.

Traffic: KD8O 104, W8HZA 64, KC8C 62, WD8LDY 28, W8FZP 25, WBJWX 25, K8MHR 25, N8AJC 23, K8KT 21, WD8EAV 18, AJ8J 17, W8CAL 14, WD8AXY 12, WD8DHC 10, WB8BMX 9, K8JQ 7, WB8UDY 7, K8ZDY 7, W8YP 6, K8QEW 5.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Robert W. Poirier, K0DJ — SEC: W0ACD. STM: WB0MCL. NM: K0CNV W0HXB W0HE WD0AIT KB0Z. Welcome to Grand Junction's newest traffic handler, WA7VLA. W0EJD has been nominated as TCC Director for the daytime Pacific Area. The amateur effort in the Channel 9 sponsored Health Fair has been termed a huge success. Many thanks to all who participated. The Buckhorn and Loveland repeater groups took part in the March of Dimes Walkathon in Loveland. W0HXB and W0ETT operated the April CD Party in Cheyenne. 270 contacts were had using the latter callsign. Comedian W0GO attributes his meager traffic count to being out of town for several weeks. Excuses, excuses, hi. Unusual weather keeping the Weather Net busy. ARES groups on the Eastern Slope are urged to prepare for the tornado season. Net reports: Columbine 30 sess, QNI 1438, QTC 63, Informals 207, QNF 1088; CWN 28 sess, QNI 197, QTC 125, QNF 738; HI-Noon 30 sess, QNI 1487, QTC 169, Informals 245, QNF 1457. Traffic: (Apr) WB0ZQY 1941, W0WYX 1613, W0EJD 181, W0LAE 125, WD0AIT 118, W0HXB 95, K0DJ 92, AD0A 86, WD0DNM 75, KB0Z 72, WB0YKH 48, W0NFW 43, WA7VLA 27, W0GO 10. (Mar) N0BLU 67.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5AIR. NMs WD5AHH & KG5L. Southwest Net (SWN) meets daily on 3583 kHz, at 1930 local and handled 219 msgs with 215 stations in. New Mexico Roadrunner Net (NMRRN) meets daily on 3939 kHz at 1800 local and handled 107 msg with 1028 stations in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 70 msgs with 764 checkins. Yucca 2-Mtr Net handled 7 msgs with 353 checkins. Over 400 happy hams attended the Mesilla Valley ARC Chili/Bean Feed Apr 26-27, with the RM Div Dir and V. Dir present. A good ole' time had by all. Congrats to all who received awards from the VA for their FB operation with WB5MII, the VA traffic station. Traffic: KG5L 261, N5NG 177, W5UH 168, W5ENI 129, W5JOV 37, WA5MIY 18.

UTAH: SCM, Royce Henningson, K7QEQ. SEC: WB7FCB STM: W7OCX. There has been a great deal of activity in the Salt Lake County area from EC WB7ZBO. He has a

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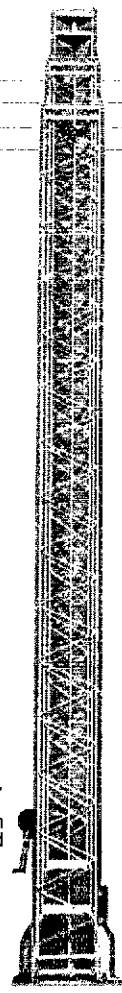

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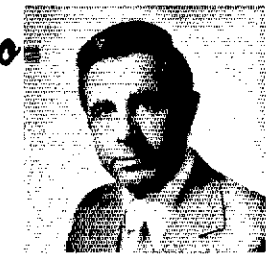

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MW 50**	20' 10"	50'	8.6 Sq. Ft.‡	668.00
MW 65**	21' 3"	65'	5.0 Sq. Ft.‡	913.00
W 36**	20' 6"	36'	9.0 Sq. Ft.	546.00
W 51**	21' 0"	51'	9.0 Sq. Ft.	844.00
WT 51**	21' 0"	51'	9.0 Sq. Ft.	923.00
W 67**	22' 0"	67'	9.0 Sq. Ft.	1,816.00
LM 237**	20' 6"	37'	16.0 Sq. Ft.	1,064.00
LM 354**	21' 0"	54'	16.0 Sq. Ft.	1,537.00
LM 470**	23' 6"	70'	16.0 Sq. Ft.	2,826.00
LM 470D** Motorized	23' 6"	70'	16.0 Sq. Ft.	3,221.00
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large number of activities to involve local amateurs in 26 mile foot races, television telethon, March of Dimes Superwalk "80," Motorcycle hill climbs and many other things. They have used the local repeaters and auto patches to coordinate activities and their emergency van to coordinate communication with the sheriff, police, fire, ambulance and helicopters. WB7ZBO said that if anyone told him there was nothing to do in his county, he would probably die laughing. Great job! Traffic: K7HLR 209, WA7MEL 67, NØAHA 52, WA7JRC 43, W7RO 17, W7OCX 7.

WYOMING: SCM, Chester C. Stanwaity, W7SDA — The Wyoming YL Club is sponsoring the Wyoming Hamfest this year. The hamfest will be held July 19th at the Casper Community College and July 20th on Casper mountain. The Sweetwater County ARC is now incorporated and newly elected officers for the following year are WB7AMP, pres.; WB7QMO, vice pres.; KA7FIT, secy/treas. WB7QGH now KB7KP. Congrats to KA7GPE and KA7GUU new Novices, N7AYT new General, KA7GUU and KA7HAI Advanced. KA7HAI passed Novice Feb 20th and General and Advanced March 12. WB7NHR reports Wyo. Cowboy Net held 22 sess with 710 QNI and 6 QTC. WAØPFJ reports Jackalope Net held 26 sess with 625 QNI and 0 QTC. Traffic: WA7GYQ 211, K7KSA 110, WA7SGG 8, KA7FKT 6.

SOUTHEASTERN DIVISION

ALABAMA: SCM, James M. Bonner, K4UMD — SEC: W4IBU. The Mobile Hamfest had some most unusual entertainment this year. The committee came up with a civil defense activation on 34/94. The ten point five inches of rain was completely unplanned. In spite of the flood, there was an excellent turn out and all there had a great time. On the other end of the state, the AENU has been assigned to the 2-meter net in Florence. N4CCT can tell you which repeater. The big event for all Alabama was the proclamation of Amateur Radio Week, May 11 — 17, by Gov. Fob James. K4UMD WB4DGI WA4WYA KC4P N4AWW W4ZEC were on hand in Montgomery for the impressive session. New M Net members this month are N4MJ K4RY N4CHJ .3138 QNI in 33 sess for this net. Public Service for April: March of Dimes Walkathon, Montgomery, WB4UAY WD8NXF KA4AOK W4ZEC N4BKF WD4NKO WB4TWG WA4YCM KA4IHC N4BJJ. For Birmingham, K4DSO W4ELV KA4ANM N4AHJ WA4RNP WB4MED WD4ARZ W4EVD WA4AWS. For George Lindsey Golf Tournament, Montgomery, W4ZEC WD4NDQ W4MF W4PLI WD4BTX WD4BSX WB4UAY WB4ZSI N4ANM N4BKF N4AWW KA4AOK WA4UAW N4BJJ WA4YCM WB4OZN N4MJ. Good job, ladies and gentlemen. Public Service is ham radio. Traffic: WA4JDH 1280, N4CCT 799, WYCKS 137, K4UMD 32, KA4EWD 24, W4IBU 23, AA4J 21, WD4DHI 20, KA4IVO 20, WB4EKJ 15, WA4JPK 12, KA4JOE 11, KA4BUI 8, WB4TVY 6, WA4RMP 4.

GEORGIA: SCM, Eddy Kosobucki, K4JNL — ASCM: K4VHC. SEC: K4SWJ. ASEC: WB4HXE. STM: WA3NAZ/4.

Net	Freq.	Time (All EDST)	Mgr.
GCN	3995	0700 Dy 0800 Su	K4DMK
GSN	3595	1900 & 2200 Dy	W4WXA
GTN	7118	1815 Dy	WB4ZOJ
GSSBN	3975	1930 Dy	WB4ZVX
ARES	3975	1700 Su	WD4ADV
GA TFC "A"	7243	1200 Dy	W4GH
GA TFC "B"	3957	1830 Dy	W4GH
GERN (RTTY)	3620	2000 Fr	WA4ZHC

Tnx to all Atlanta RC members for the FB hospitality shown me during my visit. WB4KEZ now KC4EK, WD4FJR now KC4DC. Kennehoochee Hamfest a real success according to the committee members. The ARES program in the section is growing. Repeater nets throughout are showing an increase. Many local events can use amateur communications for their Public Service festivities. This is an excellent way to show the public what our capabilities are. GERN (RTTY) Net still looking for new members. WA4ZHC has many programs in mind for RTTY ops. Check in at 2000 local, Fri on 3620. Condolences to the family of K4SUD who became a Silent Key recently. He was the first elected secretary of the Georgia Single Sideband Association. A reminder and invitation to all from WB4ZVX, president of the GSSB Association. The annual picnic will be held at Madison on Sat, August 2nd. I am available to speak at your local club. Please contact me as I am now getting my schedule together. Thanking all of you again for all of your efforts and hope to see you someplace this summer. Traffic: W4WXA 238, WA3NAZ/4 155, WB4ZOJ 119, N4CMF 78, W4GH 76, WA4CBT 55, WD4ADV 52, K4EV 51, WA4ZHC 45, W4ELO 33, K4JNL 27, N4UZ 26, W4HON 18, K4BAI 17, W4BIA AK4T 14, N4BGN 12, AA4GA 2.

NORTHERN FLORIDA: SCM, Fred Marchman, AA4FG —

Net	Freq.	Time/Days	QNI	QTC	Mgr.
NFPN	3950 kHz	2230Z Dy	1474	247	WD4PDK
QFN	3651 kHz	2300/Dy 0200Z	838	680	NM4WA N4WA
AFPN	7272 kHz	1630Z Dy	384	427	W4IRA
TPTN	3940 kHz	2100Z Dy	674	379	WD4HXS
QFNS	3715 kHz	0000Z Dy	392	187	WA4PFK

Volusia County amateurs have inaugurated Operation SKYWARN. Halifax Chapter QCWA now chartered, with N4BCU chairman protem, and meeting set for Daytona Funfest May 31st or June 1st. The message origination at New Port Richey Home Show was good, with approx 325 messages sent. West Pasco amateurs did fine job in furnishing communications for Chasco Fiesta Parade. Hernando County ARA plans c.d. drill May 7th with County Commissioners invited to observe. WA4NKA instructing new Jax Beach Novice class. East Pasco hams provided communications for Fund Run with KB4DF WA4JYD AA4FG WA4QID WB4YQP using WR4APL. 33 amateurs participated in a c.d. simulated emergency drill in Duval County on March 24. Orlando ARC updating phone numbers in Auto-Dial system. Sorry to report W4UJL resigning as EC of Orange County on Dr's advice to curtail activities. He has served for over 8 years, has been an outstanding EC, and a major factor in N. Florida's high ranking in SET. Leon County amateurs handled communications for March of Dimes on March 15, with 21 hams participating. TARS presented local Red Cross Chapter with a portable blackboard. Sky High ARC reports 16 in Novice class after 4 weeks. Their FD site is 235 ft. above sea level and has a 200 ft. tower. Congrats to new Gen KA4DCD, new Adv. KA4FDF W4MQZ K4IPL and and new Extras WA4NKA and KW4F (ex-WB4NGF). Traffic: (Apr) WD4HIF 863, AA4FG 621, WA4CRI 532, N4PL 432, WD4IIO 412, N4WA 279, W4FZX 259, N4BBY 242, W4MGO 214, WB4TZR 206, WD4HXS 166, KF4U 136, K4RNS 110, W4KIX 100, WD4DNC 95, N4BZH 80, WD4NYY 79, WD4PDK 78, K8PXM 60, W4LDM 50, KB4T 40, WB4DTS 38, WB4RIS 34, WA4EYU 30,

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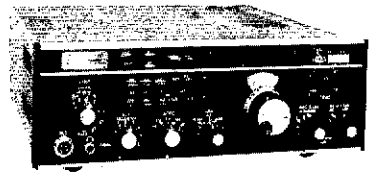

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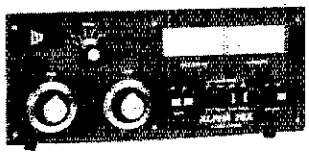

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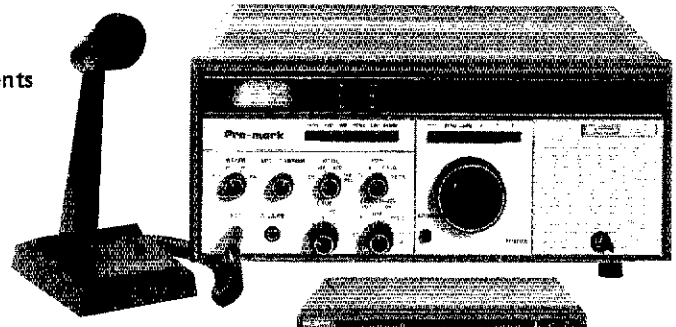

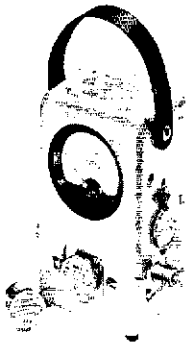

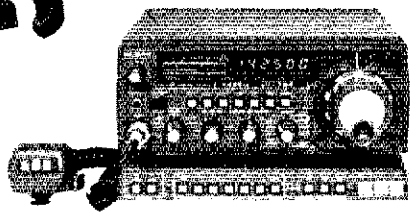

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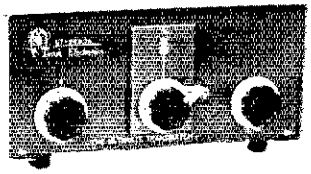

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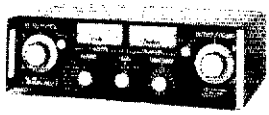

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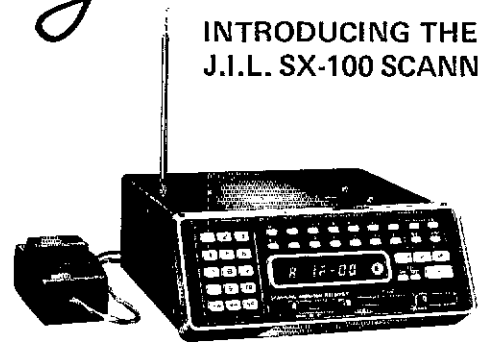

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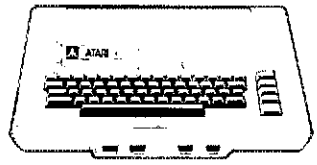

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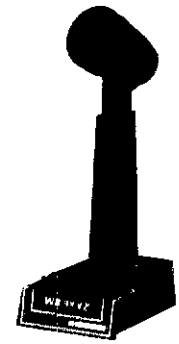

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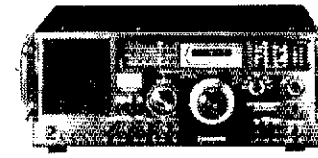

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SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst SCM: W4KGJ. SEC: AA4WJ. STM: K4TH. I bet you didn't notice the change in title of this column from "Station Activities" to "Section Activities." I suppose this is to imply a broadened scope of material to be included. We never seem to get enough material from station reports to make a good column. And, conversely, sometimes a station will send us several pages of information on a Public Service event they pulled off, then complain we didn't put it all in. We have a limitation on how much we can submit for publication, and have to keep some sort of balance. Our limit now being raised to 70 lines — about 700 words. This is an increase of about 16% from our former 60 lines and now represents about 3% of the national total. Since total space available remained the same, this indicates that our section is growing faster than the national average. We don't know how our space allocation compares to other sections, with the new allocations, but with the old allocations our 60 line limit was not exceeded by any section and was equalled only by Eastern Pa., Illinois, Los Angeles, Michigan, NY-Llm and Ohio. Not yet publicized much, but an important change is scheduled to take place in afternoon sessions of NTS with the adoption, June 1st, of the EAS/NTS restructuring proposal. This proposal provides that Region Nets will meet at 1:30 P.M., 3:30 P.M., 7:45 P.M. and 9:30 P.M. (Eastern, Central or Pacific time, depending on which area the net is in). Area Nets will meet at 2:30 and 8:30 P.M. WD4COL is real proud of his newest Novice KA4NNG, who made PSHR her first month licensed and is now doing 20 wpm plus. KM4G reports real QRL finishing his senior year in engineering at FAU. W4IYT reports Dade County ARPSC has set up emergency nets for 13 Cuban shelters on 24-hour basis. WA1IOG/4 reports Key West club heavily involved helping with Cuban refugees. N4KB reports he now has a hi-Q mini beam up 20 feet. W4KMN has a new address Rte 3, Box 70B, Lake Placid. W4JM is new asst director, president, Central Fla. Chapter QCWA and NCS on their net 7240 kHz 10 A.M. Sat as well as president, Citrus Center ARC, Lakeland. He invites comments to be passed on to Director Frank Butler, W4RH. W1NJM advises "will be back in the fall" and will put on a code copying contest at Orlando looking for someone to break Ted McElroy's world record of copying 75.2 wpm. W3CUL advises still no tower after waiting many months, so she is trying a different source. Hurricane season starts June 1st. Better check out your emergency equipment, review emergency preparedness with your Emergency Coordinator, and be ready to operate on you local emergency nets as well as section emergency nets on 3940 and 7272 kHz. Traffic: W3CUL 3219, W4MEE 1145, W4LX 800, K4TH 745, W3VR 686, WA4EIC 652, K4SCL 632, WA4PFK 617, WD4COI 384, W4NFK 373, K4ZK 348, WB4FVV 315, KA4FZI 312, WB4WYG 243, WD4AWN 228, WB4PIB 187, W4WYR 172, W4GPL 146, W4IRA 145, N4ET 126, WA4HXU 111, W4DVO 110, K4EUK 110, WB4NCH 99, N4KB 65, AA4WJ 59, KB4OW 55, WA1IOG 46, KA4LNA 43, WB4KYE 38, WB4SNX 35, W4KMN 32, W4SMK 25, WA4HDH 22, KA4BBA 15, N4APE 10, WB4NJU 9, KA4GDV 7, WD4IWT 2.

WEST INDIES SCM, Julio Negroni, KP4CV — PRARC held its annual convention at Hotel Montemar, Aquadilla on April 27. New board of PRARC is KP4ABN, pres.; KP4AM, vice pres.; KP4EFD, secy.; KP4AK, treas. KP4U very active as section liaison with 4RN. KP4FEY, our STM, is very active preparing WINS, the new slow speed cw net on 3710 kHz due to start May 1st at 6:30 PM daily. KP4FEY also sends the following bits: KP4EEH studying for Extra Class and FCC First Class Phone test this summer. NP4AT KP4AH KP4AE and KP4FKC teamed to start up KP4FEY's car after PRARC hamfest. KP4EHP pushed his worked total to 211. NP4AT trying out new ICOM 255A. KP4FEY passed his Extra and has a new Clipperton. Traffic: KP4FEY 38, KP4U 40, KP4DGT 8.

SOUTHWESTERN DIVISION

ARIZONA: SCM, W. L. Haskell, AC7D — SEC: N7EH. The HARC had a booth at the Parkways '80 located at the fairgrounds in Kingman. Over 50 pieces of Tfc were handled; lots of good will was generated for Amateur Radio. Opr's were W7KAX W6TAZ WB7RSV WB7RYR & WB7RYO. The WARC furnished comm. for the Colo. River "10,000 Mtr. Run." Both runs were sponsored by the Bullhead Cty C/C. Gov. B. Babbitt attended; started the runs and awarded the event prizes. 52 simp. used with solid cpy. Participating: WA7UDV W6TRF WA7TPW KA7AVO WB5MUS WB6APL WA6MGR W7KSY WB7BTQ WB7UKI W7GAA KA7CQQ KA7BFD. Globe, AZ has another "Extra"-congrat's WB7AWO. ATTN ALL: You are probably aware of the NEW CD-3 form. Chngs have been brought to your attn via OSO/OBS. If you have further constructive suggestions drop a line to ARRL for their consideration. OR's some time "lag" a little but every effort is being made to expedite the more important ones! Thx to N7EH Tucson, for the many hours expended in cpyg W1AW several times a week. He disseminates them on several nets in AZ. This method speeds up the system rather then waiting for the Postman to deliver the bulletin — that's the way it should be done — at least part of the time. At a recent AARC mtg, Phnx, WA7KQE gave a fine presentation on Traffic Nets. He is mgr. of the AZ Tfc & Emer. Net, 3992 kHz, daily, 0230Z. Also listen to and ck into the Cactus Net 3915 kHz, 0100Z, M-F, & 2230Z S/S. If you haven't tried this phase of ham opr — u r missing the fun! If u r pret. is cw, ck into the SWN, 3585 kHz, 0300Z, daily. (KG5L, Mgr.) ARCA rpts: Tuthill Hamfest 1st weekend of Aug. WA7NXL walked off with first place in the CA QSO Party-agn. Apr How many of you could have qualified for PHSR? Net Tfc, etc: A-10 QNI1067; QTC, 156 SWN QNI 215; QTC 219. Traffic: N6ANL 520, W7LVB 229, K7MC 160, W7EP 112, WA7KQE 45, K7NTG 42, K7UXB 18, K7JKM 15, AC7D 9, WA7NXL 7, K7NMQ 7, W7LBW es N7FH 5, KA5DDW 3, KB7DV 2, W7YS 2, WA7WEB 1, W7DOS 1.

LOS ANGELES: SCM, Perry Masterson, KD6C — This will most likely be my last monthly report to the Los Angeles Section. Due to my heavy work load now at work, I tendered my resignation as SCM. It has been an exciting two and one half years that I have served in this capacity. I have enjoyed very much meeting all the radio amateurs that I did during this time. I don't know who will replace me at this time, however, I trust you will give him the fine support that you have given me. During the month of April, W6INH made BPL by earning a traffic count of 504. W6INH is the STM for the section and his

traffic handling abilities show. As I believe this column is a forum for the section, all amateurs should be heard from. KB6OT has indicated to me that he is opposed to the revised time schedule for the daytime PAN and RN6 nets. I trust the net managers take into consideration all factors known to them before making changes. N6VI is well on his way to being fully equiped for Field Day this year. The Morse Telegraph Club had their annual meeting during April. It was well attended and the entertainment was outstanding. W6RIQ reports well over 1000 AM QSOs on 10 meters so far this cycle. I guess he is going for a record of some sort. Traffic: W6INH 505, K5INK 131, WB6YID 94, N6PZ 85, KB6OT 79, WA6LVO 73, W6RRO 27.

ORANGE: SCM, Fred Hayn, WA6WZO — Because of health and employment circumstances, AC6H has resigned as SCM. Effective June 1, WA6WZO has been appointed to complete the unexpired term through March 1981. All present section appointments will remain in force. Please send or resubmit all back activity reports and requests to WA6WZO or contact me at 714-549-8516 between 1 and 4 PM weekdays. Your SCM has the "World of Amateur Radio" film for club use.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — STM: N6GW. SEC: W6INT. Asst SEC: N6RD. An important purpose of this column is to report activities of amateurs in San Diego and Imperial Counties. To do this I need your input. Drop me a postal card, by fifth of each month, with info on your activities. (See page 8 for address). Form CD-210 is also available from me for reporting. WA6AMK hosted an SCN meeting on May 3. He has a most impressive ham shack. Northern Dist ARES participated in multi-agency emergency drill on Apr 17. Problems in handling casualties contaminated with radioactive material (simulated) were encountered. Palomar ARC's 13/73 repeater was the key to good communications. North County Tfc Net met 29 times and handled 103 messages in April. New meeting place for ARC of El Cajon is Parkway Jr. Hi. Still on 2nd Thur. Communications and exhibit for Boy Scout Fair was provided by 24 ARES members. WD6EGR has upgraded to Extra. Poway ARS officers for 1980 are: N6OQ, pres.; K2UVG, vice pres.; WA6VSA, secy.; WB6MFI, treas. Traffic: (Apr) N6GW 135, W6HUJ 132, WB6MLB 103, N6AT 98, W7IWN 77, WA6SKU 45, K6HAP 41, WA6UFY 13, WA6COE 8. (Mar) WA6AMK 217, K6HAP 32 (Dec) WA6AMK 752.

SANTA BARBARA: SCM, D. Paul Gagnon, N6MA — NM K6DZT is now running the Section ARES Net three nights per week at 1930 on 3985 MWF. More net controls are needed. W6ZRR averages 90 bulletins per month on fm and RTTY in SLO area. He has a new FT225RD for RTTY bulletins. Field Day planning done by WB6RGA for Conejo Valley ARC and WD6EVT for Simi Settlers. KA6EXN WD6EZY and WA6OHX passed Advanced exams. W6TSH presented radio astronomy to Simi Settlers ARC. WB6YAU is teaching ham class in Simi on Wed. WB6QNX is NCS for Simi Net 247.48 8PM Thurs. AJ6Y is a newly wed. WA6ZYG won Santa Barbara Interclub Contest for ARRL DX Test. W6LB is recovering from surgery in Santa Maria. The Simi March of Dimes Walkathon was assisted by N6AYV W6AFF WA6s OHX TMS GUT WB6s QKF QNY ONX TMF ODZ WD6s EVT EZY and KB6UI. ARES in Oxnard assisted in Job's Daughters Walkathon with W6s POE WB HWK WA6GIG WB6RVA KA6s BPG BPH WB6RVA and N6BSB helping. PSHR: K6YD 61, N6MA 28, W6POE 10, K6DZT 10. Traffic: K6YD 110, WB6TRP 66, N6YH 30, N6MA 18, N6TR 10, W6POE 6.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC — Asst SCM: AE5C. STM: W5VMP. SEC: N5WB, NMs: AE5I AA5J and N5BT. Our feature club of the month is the North Texas High Frequency Assn up Denton County way. The club meets on the fourth Mon of the month @ 1930 local time at the Denton City Hall. The club interest centers on DXing and awards, spiced up by a well rounded amount of "mini-DXpeditions, contesting, and public service work. The fine newsletter covers all the latest gossip on choice DX, achievments of members, DX news, info on awards, and a little editorializing here and there. The membership is open to all amateurs interested in the DX area of our hobby, and the membership roster includes folks from Germany, Japan, and Bulgaria! At the helm for 1980 is WD5ICY chmn. Some of the past planned activities were mini-DXpeditions to Telephone, TX and Telegraph, TX and from the deck of the battleship Texas. For furthur info on this FB organization contact WA5HKW 3305 Heather Lane, Denton, TX 76201. The Texas CW Tfc Net/7290 Tfc Net annual picknick was held at Kerrville State Park as usual, with good turnout. N5BT was elected NM of TEX at the meeting. Congrats: KA5FAS now KB5UL. WA5ODH now KB5SN. Texas Slow Net (TSN) had QNI 387, QTC 52 in 30 sess. PSHR: WD5JYI AA5J WD4SIH WD5IVD WA5QFD W5TI KB5UL N5BT WB5LAT WD5EUE W5HMR AJ5F. Traffic: W5TI 390, N5BT 207, AA5J 195, KB5UL 174, WD5EUE 142, WB5OXE 117, W5HMR 69, W5VMP 67, WA5INJ 65, K5OKM 63, K5MC 56, WD4SIR 50, WD5IVD 43, AE5I 40, WB5BKM 38, W5CTZ 35, WA5EZT 34, WB5LAT 34, WA5QFD 34, W5IAR 31, W5ERT 27, K5PC 27, WA5KGZ 24, W5TAH 18, WB5YYK 17, WB5UHO 16, AJ5F 15, K5SOR 6, K9MX 2.

OKLAHOMA: SCM, Leonard Hollar, WA5ESN — WB5NKC and WB5TFX out of hospital and back on air, FB. New repeaters on at Alva, 147.90-30; Clayton 146.40-.47.00 should fill 2 more gaps in coverage real well. FB reports from the local nets with an increase in activity. Many new calls in traffic reports. Work progressing towards repeater linking with the first step being from Altus to Okla City, with relay point at Cement. More links in mill. Lawton Hamfest usual FB operation, ARRL Forum and ARES meetings well attended. Next big meeting for OK is Ham Holiday in July. Broken Arrow Swapfest growing. Have many FB reports from clubs helping with charity walkathons etc. This is good publicity for Amateur Radio. 34 station activity reports for April, with 7 PSHR's, up from last month. Traffic total 2860, an increase over March. Hear many new calls on the bands. Also, to the many recent upgrades, out congrats. Hope we hear you on the traffic nets soon. WB0PGD & WB0QGW new at Mooreland. KB5OH moving to VA. 1 report each from OO, OBS & OVS. Where are the others? Does your local Red Cross, c.d. or other public official know who you are and what you can do for them? Traffic: K5JGZ 551, WB5NKC 377, W5REC 277, K5CXP 191, W5RB 153, WB5NKD 144, KB5EK 128, KF5A 112, K5OWK 101, WB5ELG 83, WA5OUV 76, W5IOL 68, W5VXU 66, WD5IDB 61, W5UYH 61, WB5EAY 53, W5SUG

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Let you use inexpensive recycled 10M or 2M SSB exciters on UHF & VHF!

- Linear Converters for SSB, CW, FM, etc.
- A fraction of the price of other units; no need to spend $300 – $400!
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28-30 MHz in, 436-437 MHz out; 1W p.e.p. on ssb, up to 1½W on CW or FM. Has second oscillator for other ranges. Atten. supplied for 1 to 500 mW input, use external attenuator for higher levels.

Extra crystal for 432-434 MHz range..... $5.95
XV4 Wired and tested $149.95

XV2 VHF KIT - ONLY $69.95

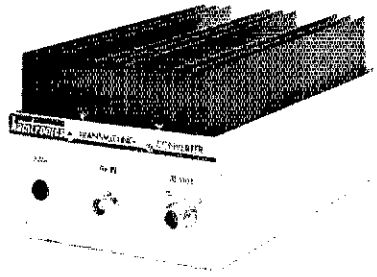
2W p.e.p. output with as little as 1 mW input. Use simple external attenuator. Many freq. ranges available.

MODEL	INPUT (MHz)	OUTPUT (MHz)
XV2-1	28-30	50-52
XV2-2	28-30	220-222
XV2-4	28-30	144-146
XV2-5	28-29 (27-27.4 CB)	145-146 (144-144.4)
XV2-7	144-146	50-52

XV2 Wired and tested $109.95

XV28 2M ADAPTER KIT - $24.95

Converts any 2M exciter to provide the 10M signal required to drive above 220 or 435 MHz units.



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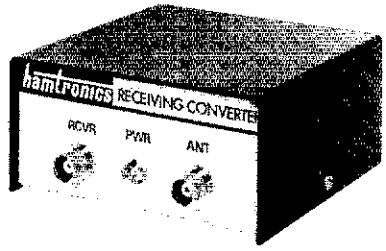

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MODEL	RF RANGE	OUTPUT RANGE
CA28	28-32 MHz	144-148 MHz
CA50	50-52	28-30
CA50-2	50-54	144-148
CA144	144-146	28-30
CA145	145-147-or-144-144.4	28-30 27-27.4 (CB)
CA146	146-148	28-30
CA220	220-222	28-30
CA220-2	220-224	144-148
CA110	Any 2MHz of Aircraft Band	26-28 or 28-30
CA432-2	432-434	28-30
CA432-5	435-437	28-30
CA432-4	432-436	144-148

Easily modified for other rf and if ranges.

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Kit less case	$34.95	$49.95
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Professional Quality VHF/UHF FM/CW EXCITERS

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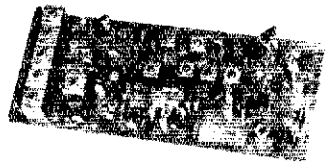

T50-50	6-chan. 6M, 2W Kit	$44.95
T50-150	6-chan, 2M, 2W Kit	$44.95
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LPA2-40	220 MHz; 30 to 40W	$119.95
LPA2-45	6M, 2M; 40 to 45W	$119.95
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LPA4-30	430MHz; 30-40W	$119.95

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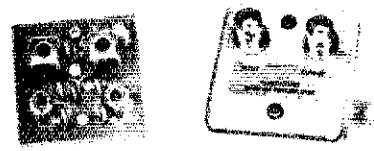

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- Specify operating frequency when ordering

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MODEL P432 UHF PREAMP, available in versions to cover bands 300-650 MHz.

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Kit with case	$18.95	$26.95
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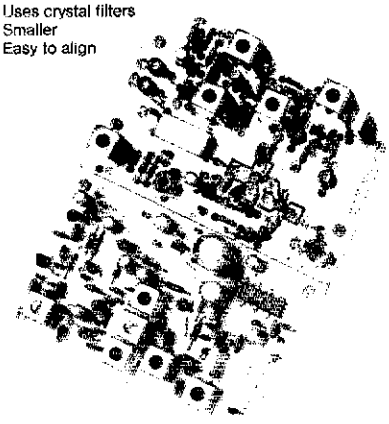

R75A* VHF Kit for monitor or weather sattelite service. Uses wide L-C filter. -60dB at ± 30 kHz..... $69.95

R75B* VHF Kit for normal nbfm service. Equivalent to most transceivers. -60dB at ± 17 kHz, -80dB at ± 25 kHz... $74.95

R75C* VHF Kit for repeater service or high rf density area. -60dB at ±14kHz, -80dB ±22kHz, -100dB ±30kHz.... $84.95

R75D* VHF Kit for split channel operation or repeater in high density area. Uses 8-pole crystal filter. -60dB at ±9 kHz, -100dB at ± 15 kHz. The ultimate receiver!... $99.95

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NEW R110 VHF AM RCVR

AM monitor receiver kit similar to R75A, but AM. Available for 10-11M, 6M, 2M, 220 MHz, and 110-130 MHz aircraft band $74.95. (Also available in UHF version.)

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43, WA5FSN 39, K5CAY 33, WA5HSU 32, W5VLW 27, W4VOR 25, WD5GLO 24, WA5RKU 24, W5AS 22, WA5SEC 20, W5FKL 18, WD5IFB 15, WD5IRR 13, WA5UTO 9, WB5ITU 6, W5HGH 4, W5JJ 3, KA5DRD 1.

SOUTHERN TEXAS: SCM, Roger Coday, N5FN — Asst SCM/STM: N5TC. SEC: AK5N. K5HZR reports 7290/TTN/TEX Net picnic was great success. The horseshoe pitching tournament was won by WA5CTJ and WB5ZDP. ACa5K thrilled by making contact with Denver, CO on 7 MHz using 900 mW homebrew rig. AK5N addressed several groups lately on emergency communications. WB5EFJ says KA5HXF is recent Novice from TCARS classes. WB5CIT is still very active with TIRS. He says half the relay system at Blanco has been changed over to solid state. KD5O is busy of late preparing to go back to school for a MBA and expecting the arrival of a harmonic in July. Sam Houston Amateur Radio Klub (SHARK) of Cleveland holding license classes in April/May. KA5GBP upgraded to General and is N5BXU. KA5EII and KA5ENG upgraded to General and KA5BUW to Advanced. AC5R has moved to GA. WB5ASA wrote a nice report covering ARES activities in Galveston Cty. Much credit there also goes to WD5KBK AG5P WN5EAT WD5HPG and others. W5OVH is active with new organization for women Amateur Radio ops. It was organized by women members of QCWA and is called Quarter Century Wireless Women. W5CKC and others organizing Emergency Response Teams for DPS Region 2A. Each team consists of three amateurs with complete self-contained equipment and living conditions. Looks great! Traffic: (Apr) W5KLV 500, WB5UYV 320, WB5YDD 261, W5SBE 222, K5HZR 174, K5GM 158, W5SHN 146, N5TC 124, KB5TC 120, K5PE 93, AK5M 79, WB5YRV 75, WB5CIT 74, KC5M 72, K5QEW 72, WB5MMI 69, WA5RVT 64, KB5NX 47, K5RG 48, WB5TAY 43, W5BGE 42, WD5FGY 32, KA0CSM 26, AK5N 25, WD5GKH 24, WB5EFJ 23, N5FN 18, WD5DQR 17, WD5JJS 5, KA5DHL 2, KD5O 2 (Mar) W5SBE 262, AC5K 14.

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HY-GAIN ANTENNAS

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TH6DXX	6-Element Triband Beam	$225
TH3MK3	3-Element Triband Beam	$165
TH3JR	3-Element Triband Beam	$119
TH2MK3	2-Element Triband Beam	$109
HY-QUAD	2 Element Triband Quad	$199
402BA	2-Element 40-mtr Beam	$175
205BA	5-Element 20-mtr "Long John"	$225
155BA	5-Element 15-mtr "Long John"	$145
105BA	5-Element 10-mtr "Long John"	$ 94
204BA	4-Element 20-mtr Beam	$175
153BA	3-Element 15-mtr Beam	$ 64
103BA	3-Element 10-mtr Beam	$ 54
DB1015A	3-Element 10/15-mtr Beam	$115
64B	4-Element 6-mtr Beam	$ 47
66B	6-Element 6-mtr Beam	$ 89
18HT	Hy-Tower 80 10 mtr, Vertical	$249
18AVT/WB	80-10 mtr Trap Vertical	$ 75
14AVQ/WB	40-10 mtr Trap Vertical	$ 55
208	8-Element 2-mtr. Beam	$ 24
214	14-Element 2-mtr Beam	$ 29
2BDQ	80/40 mtr. Trap Dipole	$ 49
5BQ	80-10 mtr. Trap Dipole	$ 85
6N86	80-10 mtr KW Balun	$ 14

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HF Mobile Resonators Standard (400W) — Super (2KW)

10 & 15 mtrs	$10	$15
20 mtrs	$12	$18
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Bumper mounts, springs, folding masts, etc. in stock — Call!
Supergain 2 mtr Mobile Colinear-CG1-144 . $39 CG-144 . $25

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CDE CD-45-2 (9 sq. ft)	$ 99
CDE HAM 4 (15 sq. ft)	$149
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ATV5	80-10 mtr Vertical	$ 90
20-3CD	3-Element 20 mtr "Skywalker"	$165
20-4CD	4-Element 20 mtr "Skywalker"	$239
15-3CD	3-Element 15 mtr "Skywalker"	$ 82
15-4CD	4-Element 15 mtr "Skywalker"	$ 98
10-3CD	3-Element 10 mtr "Skywalker"	$ 59
10-4CD	4-Element 10 mtr "Skywalker"	$ 75
A50-5	5-Element 6 mtr Beam	$ 59
617-6B	6-Element 6-mtr "Boomer"	$169
32-19	19-Element 2 mtr "Boomer"	$ 75
214B	14-Element 2 mtr "Boomer"	$ 59
214FB	14-Element 2 mtr FM "Boomer"	$ 59
228FB	28-Element 2 mtr FM "Power Pack"	$188
220B	17-Element 220 MHz "Boomer"	$ 69
A147-11	11-Element 2 mtr Beam	$ 34
A147-22	22-Element 2 mtr "Power Pack"	$ 98
ARX 2	2 mtr "Ringo Ranger"	$ 34
ARX 450	450 MHz "Ringo Ranger"	$ 30
A147-20T	2 mtr Vertical & Horizontal Beam	$ 59
A144-10T	10-Element 2 mtr "Oscar" Ant	$ 37
A144-20T	20-Element 2 mtr "Oscar" Ant.	$ 53
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AT-4B	New 145/435 MHz "Oscar" Ant.	$ 99
A14T-MB	Dual "Oscar" Ant mounting boom	$ 20

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(Freight paid on all foldover towers. Prices 10% higher west of Rocky Mountain states.)

50 ft. 25G Tower	$199
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3/16" EHS Guywire	$11/100 ft. $99/1000 ft.
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3/16 CCM cable clamps (3/16" or 5/32" cable)	$0.30
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1/4 TH Thimble (fits all sizes)	$0.25
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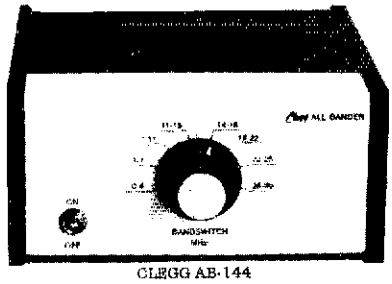

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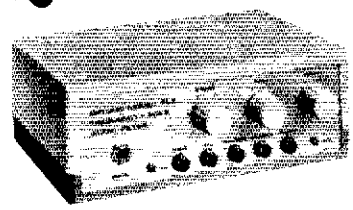

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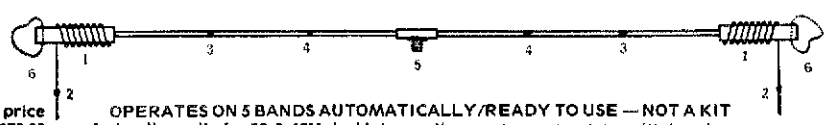

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MT-1 Transformer 19
PS-110H 12v ps 69
110L Xcvr (RX+TX) 249
CIR
BPS-200 AC supply $ 89
CLEGG/SQUIRES-SANDERS
22'er FM series 25 $119
FM-21 220 FM Xcvr 99
FM-27B 2m FM Xcvr 149
Desk cgr for HT-146 19
031 AC ps 49
CLIFFORD INDUSTRIES
XR 12v power supply $ 39
COLLINS
75S-3 Ham Rcvr $399
75S-3/CW filter 450
75S-3B Ham Rcvr 499
75S-3B Rcvr (round) 549
75S-3B conv to C 549
51S-1 Rcvr (round) 1295
32S-1 Transmitter 275
32S-3 Transmitter 450
30L-1 Linear 495
30L-1 Amp (round) 599
312B-2 Speaker 19
312B-4 Console 199
KWM-2 Xcvr 575
KWM-2A Xcvr (round) 899
351D-2 Mobile mt 49
516F-2 AC supply 199
516E-1 KWM-1 DC ps 69
MP-1 DC supply 49
CC-1 Carrying case 69
CTG Magnum 6 (KWM-2) 99
COMDEL
CSP-11 Speech proc $ 49
DENTRON
80-10AT Tuner $ 39
160-10AT Tuner 99
160-10AT-3kw Tuner 119
MT-2000A Tuner 119
MT-3000A Tuner 289
GLA-1000 Linear 239
AF-1A Audio proc 99
DRAKE
2B Ham Rcvr $179
2BQ Spkr/Q-mult 29
2AC Calibrator 12
R-4 Ham Rcvr 259
R-4A Ham Rcvr 279
R-4B Ham Rcvr 329
R-4C Ham Rcvr 399
4NB Blanker 49
FL-250 Filter 35
FL-500 Filter 35
FL-1500 Filter 35
FL-4000 Filter 35
FL-6000 Filter 35
MS-4 Speaker 19
CPS-1 Conv ps 19
CC-1 Console 39
TR-4 Xcvr 359
TR-4/NB Xcvr 399
TR-4C Xcvr 425
TR-4C/NB Xcvr 469
TR-4CW/RIT Xcvr 499
FF-1 Xtal adapt 49
TR-7/CW filter 1099
TR-6 6m Xcvr 529
TR-6/NB 6m Xcvr 579
T-4X Transmitter 299
T-4XB Transmitter 349
T-4XC Transmitter 399
AC-3 AC supply 65
AC-4 AC supply 89
MN-7 Matcher 129
W-4 Wattmeter 39
UV-3 3-band Xcvr 695
ML-2 2m FM Xcvr 99
TR-22 2m FM Xcvr 99
TR-22C 2m FM Xcvr 125
TR-33C 2m FM Xcvr 139
AC-10 AC ps 29
AA-22 2m amp/preamp 69
GONSET
911A AC supply $ 39
HALLICRAFTERS
HT-44 Transmitter $159
PS-150-120 PS 69
SR-400 Cyclone II 349
SR-400A Cyclone III 399
P-500AC AC ps 99
FPM-300 Xcvr 299
HA-1 Keyer 49
HEATHKIT
HR-1680 Ham Rcvr $199
SB-301 Rcvr/CW filt 249
IB-1100 Counter 79
IM-4100 Counter 79
HY-GAIN
3750 Xcvr $799
ICOM
IC-502 6m SSB Xcvr 159
IC-701 Xcvr/ps $949
IC-21 2m FM Xcvr 149
IC-22A 2m FM Xcvr 149
IC-22S 2m FM Xcvr 189
IC-202 2m SSB Xcvr 199
IC-211 2m Xcvr 475
IC-230 2m FM Xcvr 179
IC-245/SSB 2m Xcvr 349
IC-255A 2m FM Xcvr 279
IC-280 2m FM/cable 299
IC-30A 450 FM Xcvr 299
IC-3PA AC supply 49
IC-3PS/IC-20L 99
ITH-230 IT handset 29
TT-1215 TT mic 19
JOHNSON
Kw matchbox/SWR $149
KLM
Force 5 Xcvr/ps $795
2-140B 2m FM amp 149
4-80BI 2m amp 159
10-40BL 2m amp 99
15-80BL 2m amp 149
KENWOOD
R-599 Ham Rcvr $249
R-599D Ham Rcvr 349
S-599D Speaker 19
T-599 Transmitter 249
T-599D Transmitter 375
TS-520S Xcvr 549
SP-520 Spkr 24
TS-820 Xcvr 649
TS-820/dig 725
TS-820S Xcvr 799
R-820 Ham Rcvr 788
R 300 SW Rcvr 199
TV-502 2m Xvtr 189
TV-502S 2m Xvtr 199
TS-600 6m Xcvr 499
TS-700A 2m Xcvr 450
TR-2200A 2m FM Xcvr 139
TR-7200 2m FM Xcvr 129
TR-7400A 2m FM Xcvr 289
TR-7625 2m FM Xcvr 249
RM-76 Programmer 89
PS-5 Supply/clock 49
PS-6 Power supply 49
LUNAR
2m 10-80w amp $149
PACE
Comm II 2m FM Xcvr $239
PANASONIC
RF-8000 SW Rcvr 1199
RF-2200 SW Rcvr 139
RFE
RFE-100 Dig disp $ 99
REGENCY
HR-2MS 2m FM Xcvr $ 99
HR-212 2m FM Xcvr 99
HR-2B 2m FM Xcvr 129
FC-175 Counter 149
ROBOT
70 Monitor $199
SBE
SB-34 Xcvr $199
SPECTRONICS
SC-30 Counter $ 88
SC-250 Counter 89
STANDARD
14U 2m FM Xcvr $199
C-118 2m FM HI 129
C-6500 SW Rcvr 199
SWAN
P-1215 AC supply $ 49
SS-200 Xcvr 299
PS-20 AC supply 95
260 Xcvr 289
350 Xcvr 229
350D Dig Xcvr 379
500 Xcvr 289
500C Xcvr 319
500CX Xcvr 359
700CX Xcvr 399
750CW Xcvr 399
HF-700S Xcvr 379
HF-700S/SS-16 429
PSU-3A AC ps 119
100MX Xcvr 399
PSU-5 AC ps 129
102BX Xcvr 799
PSU-6 AC ps 139
117XC AC supply/spkr 99
230XC 110/220 ps 95
508 Ext VFO 149
600T Transmitter 325
600R Custom Rcvr 299
600R/SS-16 Rcvr 349
MkII Linear 575
1500Z Linear 429
250 6m Xcvr 199
250C 6m Xcvr 275
210 6m VFO 75
FP-1 Patch 39
FP-4 Patch 49
WM-2000 Meter 39
SI-2A Tuner 175
TEMPO
2020 Xcvr (Clev) $499
Tempo One Xcvr (Fla) 288
AC One AC ps (Fla) 89
DC-1A DC supply 75
VHF-One Plus 2m Xcvr 199
TEN-TEC
Omni-D Ser B Xcvr (E) $669
Omni-D Ser B/NB 699
252M/D AC ps 99
243 Remote VFO 99
509 Argonaut 279
Triton II Xcvr (Fla) 349
252 AC supply (Fla) 75
262 AC supply (Fla) 89
Century 21 Xcvr 249
Century 21 dig (Fla) 299
276 Calibrator 19
KR-50 Keyer (Ohio) 69
WILSON
1402 w/ITP $129
WE-800 2m FM Xcvr 299
YAESU
FTDX-560 Xcvr (Ohio) $399
FTDX-570 Xcvr 449
FR-101S Ham Rcvr (Fla) 349
FR-101 DIG Rcvr 375
FL-101 Transmitter (Fla) 349
FT-101B Xcvr 499
FT-101E Xcvr (Ohio) 599
SP-101 Speaker 19
FTV-250 2m Xvtr 189
FT-301S Xcvr (Ohio) 399
FT-301S DIG (Ohio) 449
FT-301 DIG (F/O) 599
FP-301 AC ps (F/O) 99
SP-120 Speaker (Ohio) 19
FC-301 Ant tuner (Ohio) 99
FT-7 Xcvr 369
FT-901DM Xcvr 899
FT-901D Xcvr (Fla) 699
FL-2100B Linear (E) 299
200R 2m FM Xcvr (Fla) 129
FT-221R 2m Xcvr (Ohio) 399
FT-227R 2m FM Xcvr 229
FT-670B 6m Xcvr 299
FT-625RD 6m Xcvr 549
FT-627RA 6m FM Xcvr 289
FRG-7 SW Rcvr 239
YC-355D Counter 169

5-23-80

(1) This list was prepared from an inventory taken on the date shown. The quantities vary. In some cases there are several of one item, others, only one. Due to the lead and distribution time of this publication some of the items may have already been sold by the time you see this ad. But, due to the number of trades we are involved in each day, some items are in stock that are not listed. When ordering state more than one choice, if possible. (2) AES reserves the right to sell power supplies and accessories only with matching transmitters or transceivers, depending on our stock situation. (3) To insure quality, our used gear is serviced and made ready for shipment after we receive your order. Please allow 5 to 10 working days delay in shipping your order. (4) No trades on used gear. (5) Used gear policies do not apply to New Equipment specials, closeouts, etc. shown on this page.

The following are NEW Close-outs, Overstock merchandise, New displays, Demos, etc. Most are factory-sealed, all carry New warranties. Limited quantity. First come, first served. Most Close-outs available at Milwaukee only. Terms of sale: Payment in full with order, Mastercharge, or Visa (Bankamericard); no trades.

	reg.	NOW
ALDA		
103 80-20m Xcvr/nb/cal/mic	$573	349
103A 80/40/15m Xcvr/cal	514	299
ALLIANCE	reg.	NOW
HD-73 Rotor	$154	109
AMECO	reg.	NOW
BIU Bridge indicator unit	$ 21	9
PV-144 2m preamp	19	9
ATLAS	reg.	NOW
DMK/XL Mobile mt	$ 65	39
215X/NB Xcvr w/blanker	810	599
215XS (LE) Xcvr	765	569
215XS/NB (LE) Xcvr/blanker	810	599
DMK Mobile mt	55	39
RX-110S Receiver	299	199
RX-110 Rcvr+TX-110L Xmtr	438	299
RX-110+TX-110H/PS-110H	636	449
CDI	reg.	NOW
AM filter for FT-101	$ 39	29
CES	reg.	NOW
800-YS Scanner, FT-227R	$99	49
251T/B Program dialer	99	69
CIR	reg.	NOW
Astro 200 Xcvr	$995	549
Astro 200/CW filter	1045	549
Astro 200A Xcvr	1095	599
BPS-200 AC supply	135	125
SPR-200 Speaker	30	24
SPS-200 AC ps/speaker	165	149
SOC-200 Stn console	295	195
MIC-STA Desk mic	38	23
COLLINS	reg.	NOW
MM-2 Boom mic/headset	$240	120
312B-2 Speaker		29
KWM-2A Xcvr	3992	3393
PM-2 Portable supply	768	599
32S-3A Transmitter	3673	3122
516F-2 Power supply	467	396
312B-3 Speaker	107	88
312B-4 Station console	732	499
302C-3 Wattmeter	557	399
DL-1 Dummy load	305	199
CC-2 Carrying case	297	252
CC-3 Carrying case	297	199
CUSHCRAFT	reg.	NOW
A14-2 2 el 20m beam Truck	$119	69
A14-3 3 el 20m beam Truck	169	99
A21-3 3 el 15m beam Truck	99	59
A28-4 4 el 10m beam	89	49
A220-22 22 el 220 beam	82	49
DENTRON	reg.	NOW
HF-200A Xcvr	$699	450
HF-ACS 12v 10A supply	129	49
160-AT 160m ant tuner	59	29
80-10AT 80-10m tuner	59	39
PS-10 VOM/wattmeter	49	29
PS-20 VOM/wattmeter	69	39
F-1 FS meter	19	15
W-2 Wattmeter	129	99
W-2 PEP Wattmeter	159	99
WP-1A PEP wattmeter	149	99
AF-1A Speech processor	199	129
GLA-1000 Linear	379	279
GLA-1000B Linear	399	329
Clipperton L before 6/29/80	699	499
Clipperton L after 6/29/80	699	549
MLA-2500B Linear	1299	749
DTR-2000L Amp Air Freight	1429	999
Ir. Monitor Tuner	79	49
Super Tuner Plus Tuner	149	129
MT-2000A Tuner	199	159
MT-3000A Tuner	399	339
RT-3000 Tuner	299	259
AT-1K Tuner	149	129
AT-3K Tuner	259	229
BL-1 Balun for AT-1K/3K	49	45
Big Dummy Dummy load	39	35
DRAKE	reg.	NOW
DSR-2 SW Rcvr	3400	2400
RP-500 Receiver protector	90	69
AN-5 Shortwave ant	8	5
MN-7 Tuner	175	149
MMK-3 Mt for TR-4	10	8
7077 Hand mic	19	9
1525EM Encoder mic	49	35
CC-1 Converter console	49	45
UV-3 2m only DEMO	595	499
EDGECOM	reg.	NOW
3000A 2m Xcvr	$549	349
ELECTROVOICE	reg.	NOW
641 Microphone		49
400 Stand	14	9
600E Mobile microphone	28	19
HY-GAIN	reg.	NOW
TH6DXX 6 el Truck	$329	249
TH5DX 5 el tri-band Truck	269	199
TH3Mk3 3 el tri-band Truck	229	169
TH3JR 3 el tri-band, 600w	169	129
TH2Mk3 2 el tri-band	149	119
Hy-Quad 2 el quad	274	209
402BA 40m 2 el beam Truck	239	189
205BA 20m 5 el beam Truck	329	249
204BA 20m 4 el beam Truck	249	189
203BA 20m 3 el beam Truck	139	99
155BA 15m 5 el beam	199	149
153BA 15m 3 el beam	89	79
105BA 10m 5 el beam	129	99
103BA 10m 3 el beam	74	59
Hy-Tower 80-10m vert Truck	359	279
18AVT/WB 80-10m vertical	105	84
14AVQ/WB 40-10m vertical	69	57
12AVQ 20-10m vertical	42	34
2BDQ 80-40m trap doublet	59	49
5BDQ 80-10m trap doublet	109	89
3807 Nicad for 3806	34	19
1106 Wall cgr for 3806	9	5
ICOM	reg.	NOW
IC-245 2m FM Xcvr	$579	299
IC-245/SSB 2m Xcvr	699	399
IC-3PA Power supply/spkr	99	59
IC-211 2m Xcvr	899	599
IC-202 2m SSB Xcvr DEMO	289	199
IC-30A 450 FM Xcvr	449	399
KLM	reg.	NOW
Force 5 Xcvr w/ps	1344	699
661 6m Xcvr	695	499
Multi-2700 2m Xcvr	756	599
FDM-148 Desk microphone	29	19
1500HD Hvy duty rotor Truck	795	495
2-140B 2m FM amplifier	229	159
KENWOOD	reg.	NOW
R-599 Receiver	$349	299
CC-69A 6m conv for R-599		29
T-599D Transmitter	499	399
PS-5 5A 12v ps w/clock	79	59
MB-1A Mt for TR-2200A	13	5
TR-7600 10w 2m FM Xcvr	375	289
TR-7625 25w 2m FM Xcvr	425	329

continued - next page

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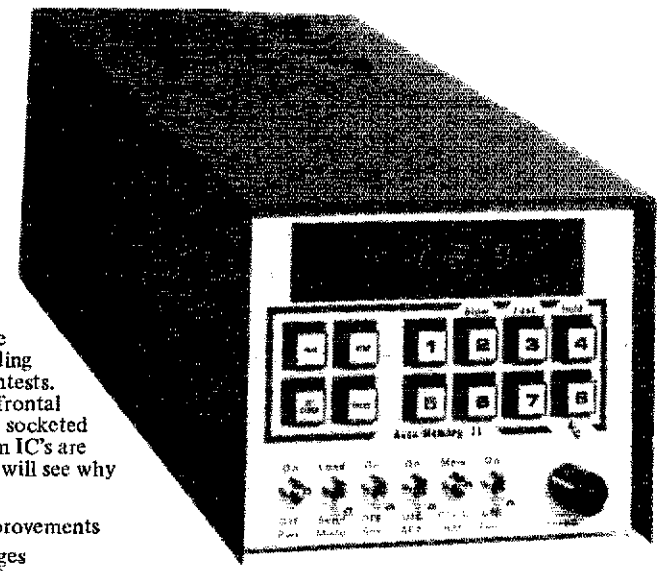
Accu-Memory II

- Eight Message Memory Keyer
- 6 Digit — 24 Hour Clock
- Digital Speed Readout
- One Year Limited Warranty (Parts and Labor)

$229 Assembled and Tested



The Accu-Memory II is an improved version of the original Accu-Memory as described in the ARRL Handbook and now in use by thousands of amateurs. These improvements were made by the designer, WB4VVF, based on requests from DX'ers and contest users for additional capabilities and for an assembled version. Features such as large computer grade pushbuttons, not small round ones, and easy memory loading allow the memory to be used and not fought with during contests. An all metal case, 4x5x13 inches, was designed for minimum frontal area and maximum EMI protection. Plug-in main boards with socketed IC's and LED's assure easy maintenance. No expensive custom IC's are used. Compare these features and those listed below and you will see why your friends are using Accu-Memories!

Retained Accu-Memory Features

- Iambic Operation
- Dot and Dash Memories
- Automatic Character Space
- Self Completing Characters
- Dot and Dash Insertion
- Messages May Be Combined (up to full 8 message length)
- Keyed Clock (messages may be loaded one word at a time)
- Message Number and Bit Display
- Tune Switch

Accu-Memory II Improvements

- 8-512 Bit Messages (4096 bit total)
- 24 Hour Clock With Crystal Backup
- Digital Speed Readout
- Improved Tone Oscillator (no clicks or thumps)
- Positive and Negative Keying
- One Hour Battery Back-up For Memories and Clock
- Provisions Provided for Remote (remote available soon)
- Memory Stop with Paddle

Accu-Circuits, Inc.
P. O. Box 13287
Orlando, Fla. 32859

Terms: Money order or bank check. Personal checks require three weeks clearance. Florida residents add 4% sales tax. U. S. funds only. Shipping prepaid in the U. S.

Specials, Closeouts & Overstock equipment, etc. continued from opposite page.

	reg.	NOW
MIDLAND		
13-510A 2m FM synth Xcvr	$399	329
13-505 2m FM Xcvr DEMO	229	179
18-940 2m tnk/roof ant	31	15
18-941 2m magnet ant	37	25
18-950 220 tnk/roof ant	31	15
18-951 220 magnet ant	37	19
MIRAGE	reg.	NOW
B-108 5-15/80w 2m amp	$169	149
B-1016 5-15/160w 2m amp	279	249
B-3016 15-45/160w 2m amp	239	209
NYE	reg.	NOW
250-25-3 500w tuner/relay	$212	88
250-25-4 500w tuner	202	88
PALOMAR	reg.	NOW
Kachina 6 & 10m Xcvr	$689	389
REGENCY	reg.	NOW
DFS-5K Selector for Whamo	$199	49
EC-175 175 MHz counter	449	199
AR-2 2m amplifier	119	89
HR-440 440 FM Xcvr	349	269
MT-25 25w VHF marine Xcvr	299	169
MT-15S 15w VHF marine Xcvr	349	199
MA-8 Small speaker	16	9
ROBOT	reg.	NOW
400 SSTV scan converter	$795	599
SEI	reg.	NOW
SPS-8 12v 8A power supply	$ 59	39
SPS-10 12v 10A power supply	79	59
SPS-10M 10A ps w/meter	99	79
SPS-20 12v 20A power supply	109	89
SMA-100 2m 5-15/70-80w	149	119
SMA-101 2m 1-5/70-80w amp	179	139
SPA-101 1-5/70-80 amp, ps	329	229
SPECTRONICS	reg.	NOW
DD-1K Dig disp for Kenwood	$169	89
SC-30 30 MHz counter	169	59
SC-250 250 MHz counter	219	89
SILTRONIX	reg.	NOW
FC-1 5 KHz-40 MHz counter	$169	89
STANDARD	reg.	NOW
C-118 2m FM HT/batt/cgr	$313	149
C-118/TTP 2m FM HT/TTP	373	189
146A 2m FM HT/batt/cgr	350	149
C-6500 SW receiver DEMO	379	229
SWAN	reg.	NOW
100MX Xcvr	$699	569
HF-700S Xcvr/PSU-3A ps	878	599
HF-700S/SS-16 w/PSU-3A ps	978	699
WM-6200 6 & 2m wattmeter	87	59
WM-1500 Wattmeter	74	59
PS-20 12v 20A supply	179	119
FC-76 40 MHz counter	169	79
SI-1 Antenna tuner	189	129
LP-3400 Low pass filter	49	25
14C DC module	119	69
117XC Spkr, cabinet only	30	19
742 75-20m mobile ant	109	89
TPL	reg.	NOW
1202B 2m FM 1-4/80-100w	$269	169
401 220 FM 5-15/30-45w	139	99
350 450 FM 5-15/25-40w	179	129
TEMPO	reg.	NOW
DM-20 Desk microphone	$ 39	29
VHF/One 2m FM Xcvr	495	269
TEN-TEC	reg.	NOW
545 Omni-A Series B Xcvr	$949	649
546 Omni-D Series B Dig Xcvr	1119	799
252MO 12v 18A supply	139	119
252MO/E 115/230v ps	146	129
Triton IV Xcvr DEMO	699	499
Triton IV/digital DEMO	869	599
540 Xcvr	699	549
544 Digital Xcvr	869	659
252M 12v 18A supply	139	125
262M 12v 18A ps w/VOX	159	139
262M/E 115/230v ps w/VOX	166	149
240 160m converter	110	99
241 Xtal oscillator	35	29
242 Remote VFO	179	149
509 Argonaut Xcvr	389	339
251M 10A 12v ps w/ammeter	95	89
KR-1A Keyer paddle only	35	25
KR-2A Keyer paddle only	17	9
KR-5A Keyer	39	29
KR-50 AC/DC keyer	110	99
TRI-EX	reg.	NOW
W-51 Tower/base/winch	1023	767
RCB-51 Extra base for W-51	160	120
CO-3 Coax standoff kit for W-51	38	28
LM-354 Tower/base/winch	1863	1397
RCB-54LT Extra base, LM-354	210	157
TA-54L Tilt-over base, LM-354	437	327
MC-50 Motor kit, LM-354	442	331
CO-3 Coax standoff, LM-354	38	28
AD-100 2" x 10' mast	56	42
AD-150 2" x 15' mast	78	58
TB-2 Thrust bearing	52	39

Note: Milwaukee has the above limited stock of Tri-Ex products, which are all shipped via truck, freight collect. If you live closer to Milwaukee than to the factory in California you will SAVE FREIGHT!

	reg.	NOW
VHF ENGINEERING		
SYN II 2m synth DEMO	$239	99
PS-15C Kit 12v 10A supply	99	79
PS-25C Kit 12v 20A supply	139	119
WILSON	reg.	NOW
M-320 3 el 20m beam	149	99
WV-1 40-10m vert, radials	79	59
WM-62 6/2m mobile ant	29	14
1402 2m FM HT	$254	149
1402/TTP HT w/touch tone	316	179
1405 2m FM HT	329	199

The following model 2m HT's are without the high/low pwr. switch & batt. LED.

Mk II HT/batt/wall cgr/TTP	332	189

Note: High/low switch may be installed on Mk II/IV by AES for $20.00.

	reg.	NOW
YAESU		
FT-901D Xcvr DEMO	1259	899
FT-901DE Xcvr	1259	899
FT-301S 20w PEP Xcvr	559	459
FT-301S DIG 20w PEP Xcvr	750	499
FT-301AD Xcvr	935	799
FP-301 Power supply	157	149
FT-101Z Xcvr	749	649
FT-7B Xcvr	675	575
FT-7 20w PEP Xcvr DEMO	499	399
SP-120 Speaker	25	19
SP-101B Speaker	25	22
YO-301 Monitor scope	263	229
YO-101 Monitor scope	320	199
FTV-650B 6m transverter	239	199
FTV-250 2m transverter	275	225
FR-101S Receiver	599	349
FL-101 Transmitter	649	399
LL-301 Phone patch	49	45
YP-150 Dummy/wattmeter	86	79
SP-401PB Speaker/patch	59	49
XF-31C CW filter for FT-401	45	35
QTR-24 World clock	35	29
FT-625RD 6m Xcvr	895	649
FT-227RA 2m FM Xcvr	399	299
FT-227RB 2m FM Xcvr	380	329
CPU-2500R 2m FM Xcvr	559	359
CPU-2500RK 2m FM Xcvr	467	399
FT-202R 2m FM HT	199	139
NC-1 cgr, 8 4A nicads	57	49
HICKOCK Test Gear	reg.	NOW
38 Counter/wattmeter	$279	99
244 3A 10.5-14.5v ps	125	59

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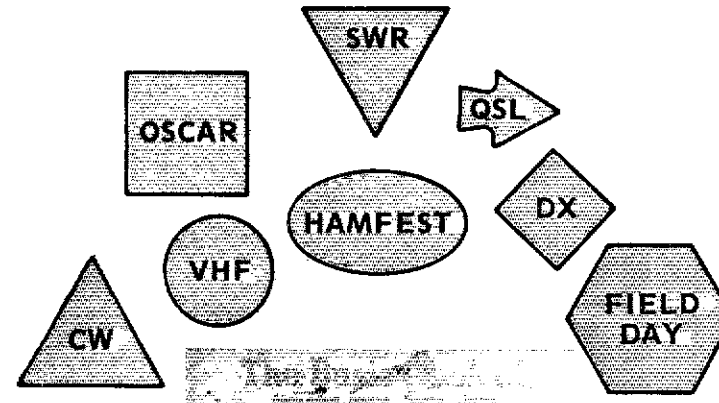
STOP



if these topics interest you

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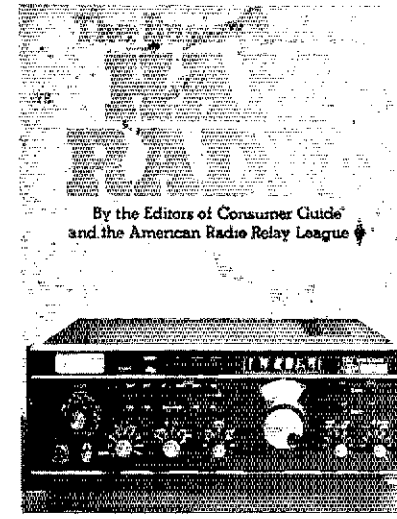
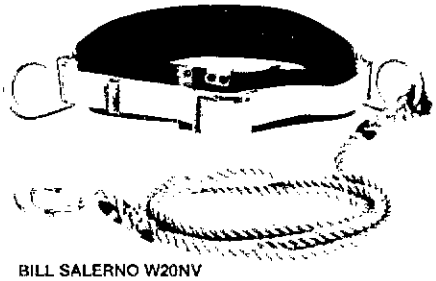


ARRL Newington, CT 06111

"ONV SAFETY BELT" A "MUST" FOR EVERY HAM



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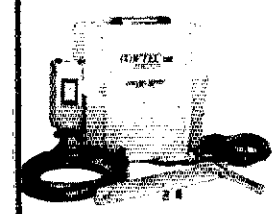

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Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 85 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 August 21 through September 20 will appear in November *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 in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed the entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA, 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 — W7GAO/6 Box 530, Santa Rosa CA 95402.

CERTIFICATE for proven two-way radio contacts with amateurs in all ten USA areas. Award suitable to frame and proven achievements added on request. S.a.s.e. brings TAD data sheet from W6KS, 2814 Empire, Burbank, CA 91504.

RADIO EXPO '80 Sept. 6 & 7 Lake County Fairgrounds, Rt. 45 & 120 between Chicago and Milwaukee. Commercial exhibits, huge flea market, seminars, ladies programs. Advanced tickets $2, $3 at gate. Send $2. for each and s.a.s.e. to P. O. Box 1532, Evanston, IL 60204. Call for information 312-B-S-T-E-X-P-O.

VACATION in the beautiful Pacific Northwest and enjoy the 26th National ARRL Convention, SEANARC'80, in Seattle, Wa., July 25-27, 1980. The theme 'World Friendship Through Amateur Radio' headlines a featured program of seminars, tours, ladies programs, displays, forums and major equipment exhibits. Roy Neal, K6DUE, is the featured banquet speaker. Not enough room to list everything so get program and registration details from — 1980 ARRL National Convention, P.O. Box 68534, Seattle, WA. 98168.

BLUEFIELD Hamfest '80, Sunday, August 24th, Bluefield Armory. $2 in advance $3 at gate. Children under 12 free. East River Radio Club, 2113 Hemlock Hill, Bluefield, WV 24701.

CONNECTICUT: The Southcentral Connecticut Amateur Radio Association (SCARA) will hold its first annual edition of Super Scaratest '80 on August 16 and 17 at the North Haven Ramada Inn. The two-day show will feature exhibits, a giant outdoor flea market, and on Sunday, an all-day auction as well. Awards throughout the two-day show including a solid-state low-band transceiver, a synthesized two-meter HT, a microcomputer system and a 600 MHz frequency counter. Want to know more? Look further down this column!!

ILLINOIS: Fox River Radio League hamfest, Sunday August 24, Kane County Fairgrounds, St. Charles, IL. Free flea market-inside display area, tables $10 and $3. Discounts available. Contact Gary Senesac KA9ADP, 926 Britta lane, Batavia, IL. 60510. Tickets: $1.50 advance — $2. gate. Contact Jerry Frieders W9ZGP, 1501 Molitor Rd., Aurora, IL 60505.

CANTON, Ohio — 6th Annual Hall of Fame Hamfest, July 20. Bigger and better facilities at the Nimishillen Grange near Louisville, Ohio just east of Canton on Route 62. Mobile check-in on 52/62, 19/79, 72/12. Call W8AL/8. $2.50 advanced $3. at gate. Contact WA8SHP, 10877 Hazelview Ave., Alliance OH 44601.

SUPER Scaratest '80: A giant Amateur Radio and computer festival can be found at exit 12 off I-91. All hams in New England will be receiving direct mail info in May. Pre-registration (before July 1) will be $4 and $5 at the door. Send inquiries to P. O. Box 5265 Hamden, CT 06518 or call Jeff Wayne, K1YLV at 203-281-6038. Talk-in on 146.01/61. Watch the August issue of QST for our half-page ad with more details of this major ham and computer meet!

GOOD times at the Pines. 1980 Hudson Division Conven-

tion. The Pines Hotel, South Fallsburg, NY, November 7, 8 & 9. Full program, exhibits, flea market, free entertainment and dancing at night. Advance registration $5, with s.a.s.e. to Mike Troy, WA2TYV, 70 Ridge Street, Rye, NY 10580. $6.50 at the door. Ask for hotel registration info. Room rates including all meals, banquets, per person double occupancy per night from $38.50 to $49.50.

HAMBURG, NY — HAM-O-RAMA '80 — 9th annual hamfest. Exhibits, tech programs, awards, flea markets. Plenty of free parking, free RV hookups. Erie County Fairgrounds, Sept. 12 and 13. Advance tickets $3.00. Contact Ron Brodowski KC2P, 260 Hilltop Drive, Elma, NY 14059 716-652-6754.

PENNSAUKEN NJ: The Greater Delaware Valley Hamfest by MSWW A.R.C. on October 19, 1980 at Nashville East Cotillion Ballroom, Rt. 73 about 5 miles from Tacony Bridge. 8 A.M. to 5 P.M. set-up begins at 2 A.M. Reserved indoor tables $5/table. Commercial displays, seminars, YL activities and outdoor flea market. Admission $2.50 at gate and $2 in advance (s.a.s.e.) Talk in 22/82 and 52/52. RV parking. Write or call GDV-80 Hamfest, 16 East Camden Avenue, Moorestown, NJ 08057 Ph.: 609-234-3926.

KENTUCKY: The Bluegrass Amateur Radio Society will host its annual ARRL Central Kentucky Bluegrass Hamfest August 10, 1980 starting 8:00 A.M. at the Fasig-Tipton Sales Paddock, Newton Pike, Lexington, Kentucky. Grand award. Hourly awards given. Forums. Indoor exhibits & distributors, paved outside fleamarket. Admission $3 advance, $3.50 at gate; includes parking. Food service available. Talk in on 146.16/76 MHz. For details write Bluegrass Hamfest, Attn: Edward Bono, WA4ONE, 2077 Dogwood Drive Lexington, KY 40504.

ELMIRA, New York International Hamfest, September 27, 1980. Chemung County Fairgrounds. Numerous programs, awards, and activities; gates open at 8. Contact John Breese, 340 West Avenue, Horseheads, NY 14845.

ELECTRONIC back yard sale — like hamfest, July 4, 5 & 6, 1980. 9-5PM at 5631 W. Irving, Chicago, IL 60634, WA9-JEZ, George, 312-545-3622.

ESTABLISHED Amateur Radio club is looking for an operational 220 repeater. Cash deal. Call evenings: 212-544-8530 N2BAF.

BLOSSOMLAND BLAST! Sunday, October 5. Fleamarket, film tour of Heathkit, XYL program, More! $2. advance, $3. at door. XYLs, kids under 16 free. Tickets/info s.a.s.e. to Box 164, St. Joseph, Michigan 49085.

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TRAVEL-PAK QSL Kit — Converts Post Cards, Photos to QSLs. Stamp brings circular. Samco, Box 203, Wynantskill NY 12198.

DELUXE QSLs, Samples 25c. Petty, W2HAZ, P. O. Box 5237, Trenton NJ 08638.

DON'T buy QSL cards until you see my free samples — or draw your own design. I specialize in custom cards. Send black and white sketch: will give quote. Little Print Shop, Box 9848, Austin TX 78766.

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QSLs — The KØAAB collection plus many new custom designs. Send No. 10, 28c, s.a.s.e. for free samples and prices. Marv WØMGI, 2095 Prosperity Ave., St. Paul, MN 55109.

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QSL samples. Large color catalog 75c. Ham logbook incorporates 5BWAS and 5BDXCC record with standard logbook $3.50. Budget Print Center, 130 Lincoln Highway, New Haven, IN 46774.

General

WANTED: DRAKE RV-4C VFO. Ken Pisichko, Gillam, Manitoba, Canada.

WANTED: HW-101, HP23B, crystal filter in good condition and with manuals. Jim Holden, 853 Westdale St., Oshawa, Ontario, Canada, L1J 5C2.

WANT mint condition Johnson Courier amplifier State price. VE3OU, 790 Regent St., Cambridge Ont., N3H 2V3.

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WANTED: Radios, parts, books, magazines before 1928. W6ME 4178 Chasin Street, Oceanside, CA 92054.

VERY interesting! Next 6 issues $2. Ham Trader Yellow Sheets, Wheaton, IL 60187.

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RALPH Hicks, W5BCO, Dealer: Motorola, Atlas and Magnus ssb. P. O. Box 15633, Tulsa, OK 74112. 918-582-1333.

MANUALS for most ham-gear made 1937/1970. Send 25c coin for 16 page "Manual Catalog" postpaid. H. I. Inc., Box Q864, Council Bluffs, IA 51502.

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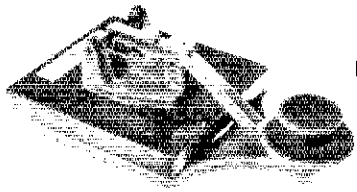

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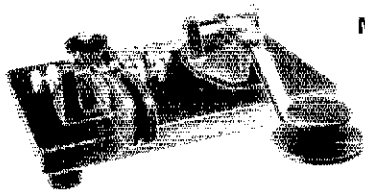

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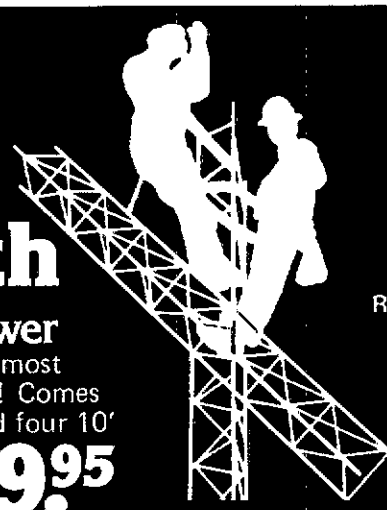

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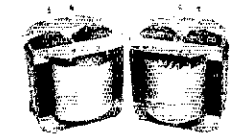

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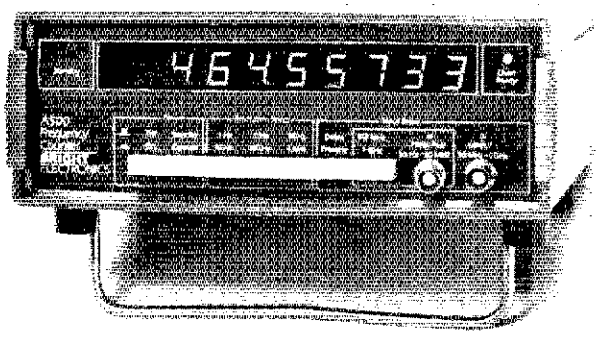
NEW



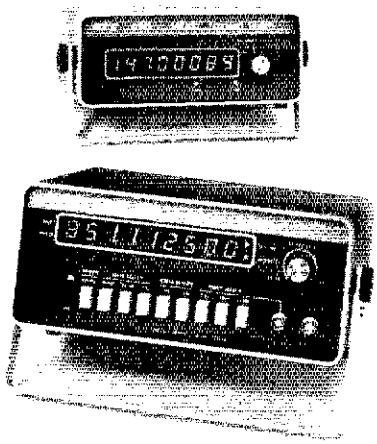
BRIGHT'S new frequency counters feature RFI shielding, easy-to-read green LED's and professional styling that make the A500 and A500E compatible with the equipment in your shack. The A500 is not just another "pretty face." It is a highly, reliable accurate counter that will put you precisely on frequency every time. It will even show you the input that is selected!

PARAMETER	A500	A500E (Extended Range)
Frequency Range Dynamic Range (Typical)	50Hz-500MHz 35Dbm@50Ω	50Hz-1100 MHz 35Dbm@50Ω
Resolution 50Hz-50MHz (best available gatetimes vary) 50MHz-500MHz 500MHz-1100MHz	.1Hz 10Hz NA	.1Hz 10Hz 100Hz
Accuracy over Temperature	1 PPM 17°C.-30°C.	1 PPM 17°C.-30°C.
Sensitivity 50Hz-50MHz 50MHz-500MHz 500MHz-1100MHz	1-10MV 10-50MV NA	1-10MV 10-50MV 50-100MV
Time Base Description	10MHz Proportional Oven	10MHz Proportional Oven
Size and Number of Digits	9@.5"	9@.5"
Price incl. antenna & AC supply	$185.95	$215.95

Available options: Nicad Battery Pack ($29.95)

FULL 1-YEAR LIMITED WARRANTY

COMMUNICATIONS MODELS



BRIGHT's C1000 and C600 frequency counters are known throughout the communications industry for their ruggedness and reliability. These units are housed in tough .125" metal cabinets. Built to exacting commercial standards, many companies rely on the C1000 as their local frequency standard. Whether you are an old timer, a large company or just starting in communications, you'll count more accurately and for less money with BRIGHT.

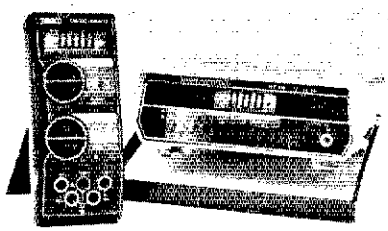
PARAMETER	C600	C1000
Frequency Range Dynamic Range (Typical)	50Hz-600MHz 38Dbm@50Ω	50Hz-1000MHz 55Dbm@50Ω
Resolution 50Hz-60MHz (best available gatetimes vary) 60MHz-600MHz to 20KHz to 75MHz 75MHz-1000MHz	1Hz 10Hz — — —	— — 01Hz .1Hz 1Hz
Accuracy over Temperature	.1 PPM 17°C.-30°C.	.1 PPM 0°C.-40°C.
Sensitivity 50Hz-60MHz 60MHz-600MHz 50Hz-75MHz 75MHz-500MHz 500MHz-1000MHz	20-50MV 10-50MV — — —	— — 20-50MV 10-50MV 50-100MV
Time Base Description Size and Number of Digits	10MHz Proportional Oven 8@.5"	10MHz Proportional Oven 9@.5"
Price incl. antenna & AC supply	$295.00	$595.00

Available options: C1000-1.25 Extended Range, Full 9 Digit Resolution, Nicad Battery Pack
C600-Nicad Battery Pack
C1000 shown with full 9 digit resolution option

FULL 1-YEAR LIMITED WARRANTY

Need to measure volts, ohms or amps?

LCD DIGITAL MULTIMETERS



No doubt you own a trusted analog meter that has been your friend for years. You probably have wondered, though, about it's accuracy and resolution since starting to work on your new rigs. The book says the emitter should be 3.2 volts but you can't tell whether its 2V or 3V. What you need is a BRIGHT DMM. We have two models to choose from; a convenient hand-held, and a bench/portable.

DM150	DM210
A hand-held DMM with 2 convenient rotary switches. It has 10A AC & DC ranges. Large bench-size .6" LCD display. Full five functions—AC & DC volts, AC & DC amps and ohms. The DM150's size, weight and .5% DC accuracy make it handy for your shack. $119.95 (includes leads and battery).	A bench/portable DMM that is as happy in the field as on the bench. Large .6" LCD display with range and function annunciators. Full five functions—AC & DC volts, AC & DC amps and ohms. The DM210 with its .25% DC accuracy is a must for the serious ham. $169.95 (includes leads and batteries).

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High-speed on-the-air contacts at 20, 23 and 26 WPM for Extra-class with simulated exam. ☐ QXX
Another hour QXX, high-speed, contacts at 20, 23 and 26 WPM. ☐ QXX 2
This super tape instructs "enhanced" code with wider spaces designed for beginnners. ☐ Super 5
On-the-air-style copy generated to "enhanced" specifications with spacing for 7½ to 15 WPM. ☐ Super QSO
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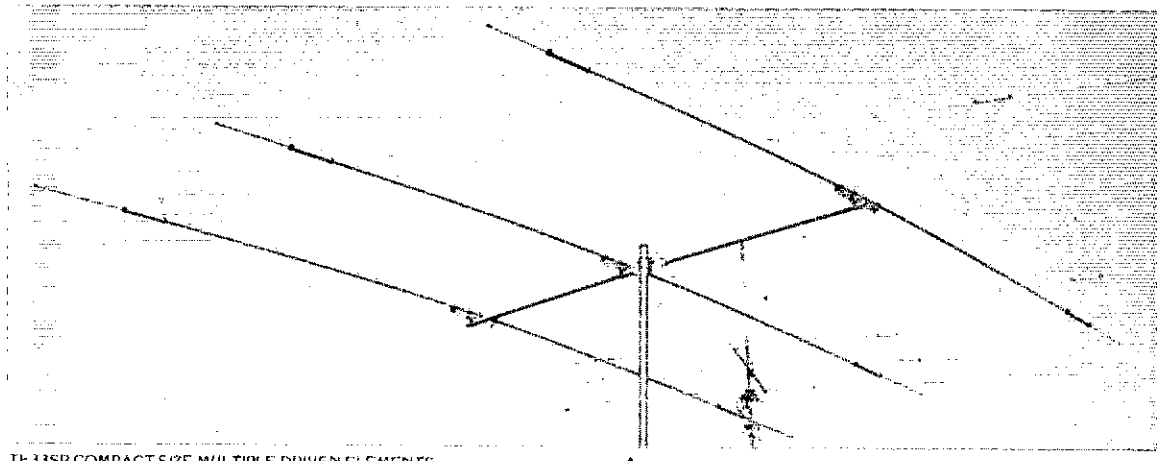

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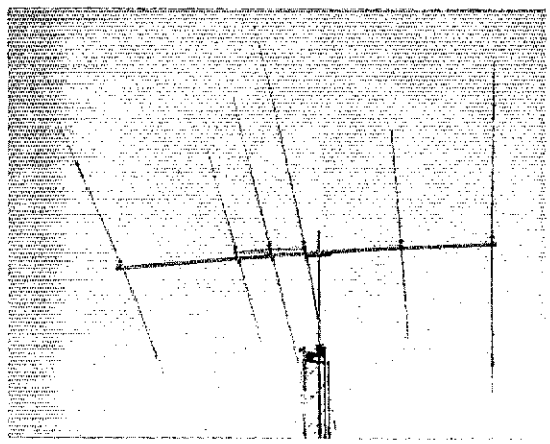

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◁ The TET 3F36DX and 3F37DX triband beams provide excellent performance across the complete spectrum of the 10, 15 and 20 meter amateur bands. High performance is accomplished through the use of a full sized driven element for each band combined with efficient Hi Q traps for the parasitic elements. No Phone and CW settings with the 3F36DX and 3F37DX. Full band coverage is possible even with the new all solid state tranceivers. You can expect VSWR below 1.5:1. The 3F36DX and 3F37DX are fed directly with a single 50 ohm coaxial line. No baluns or difficult to adjust matching networks are used.

TET invites you to compare our performance data against that of other antenna manufacturers. TET, the leader in wideband antenna design, offers superior performance at an affordable price. Join the crowd and switch to TET.

BAND	ELE-MENTS	ELE-MENTS PER BAND	MAX PWR	VSWR	IMPEDANCE	MAX ELEMENT LGTH	BOOM LGTH	TURN-ING RADIUS	WIND SURFACE AREA	WIND LOAD @80 mph	MAST SIZE	WT
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3F36DX	14/21/28	6	3/4/4	2KW	BELOW 1.5	50 Ohm	34'5"	16'5"	17'3"	9.58 sq. ft.	191 lb	2"	46.3 lb.
3F37DX	14/21/28	7	3/5/5	2KW	BELOW 1.5	50 Ohm	34'11"	24'8"	17'5"	11.3 sq. ft.	226 lb.	2"	55 lb.

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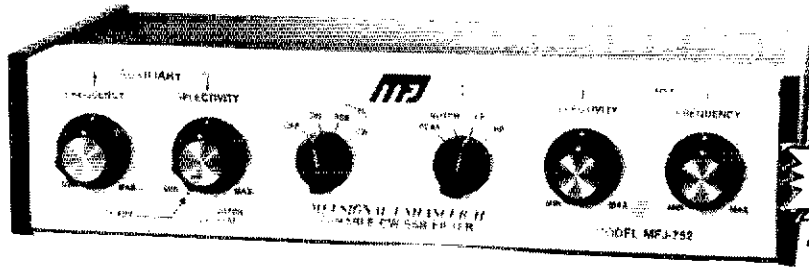

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$79.95

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The Primary Filter lets you peak, notch, low-pass, or highpass signals with double tuned filter for extra steep skirts. The **Auxiliary Filter** lets you notch a signal to 70 db. Or peak one with a bandwidth down to 40 Hz.

Tune both Primary and Auxiliary Filters from 300 to 3000 Hz. Vary the bandwidth from 40 Hz to almost flat. Notch depth to 70 db.

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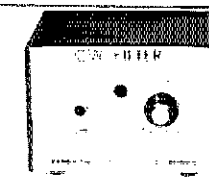

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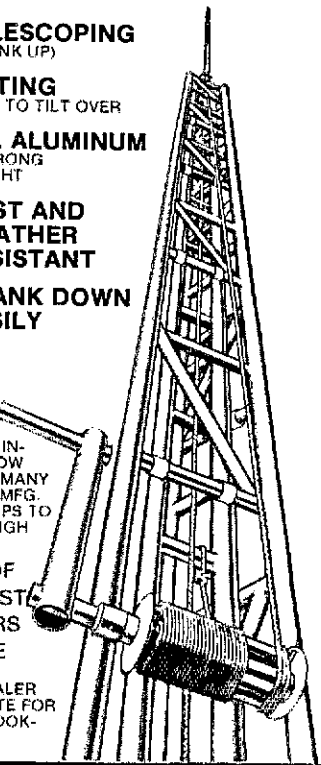

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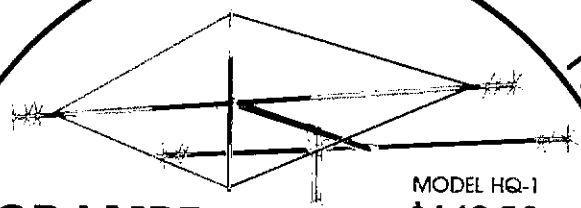

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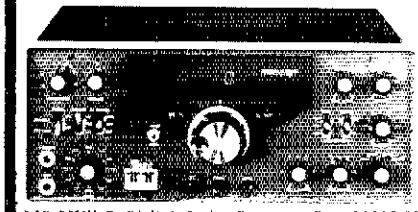

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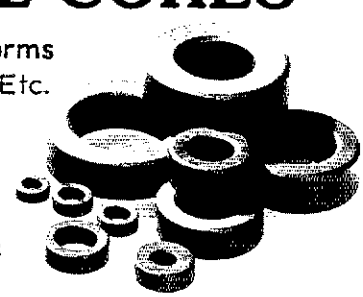

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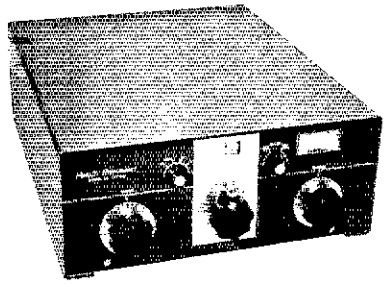

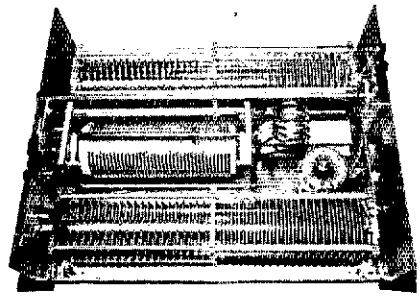

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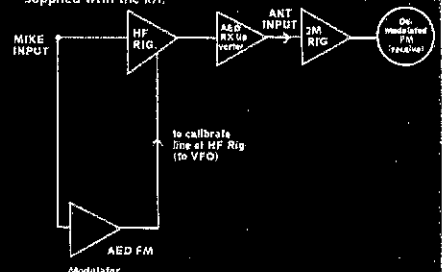

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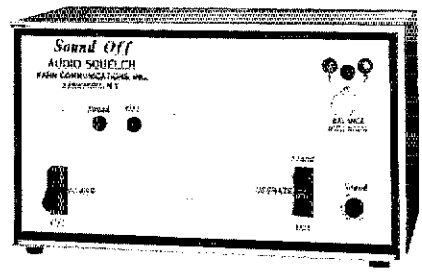

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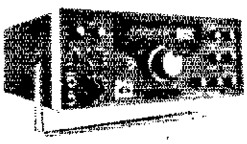

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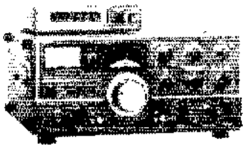

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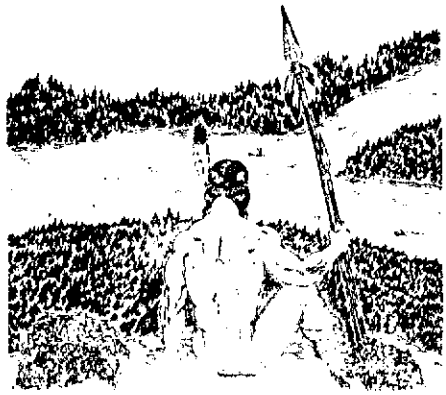

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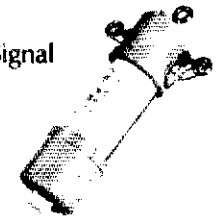

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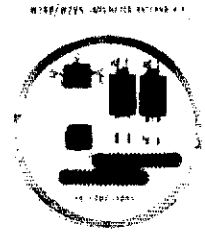

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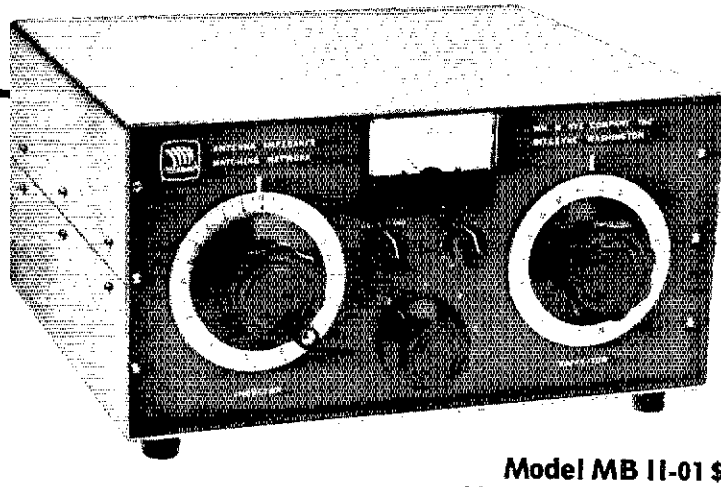

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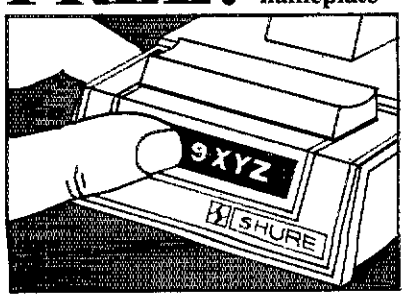

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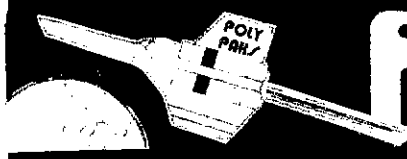

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FOR SALE: Wilson 500 rotator with indicator and aprox 100 ft heavy 10 cond cable & UPS $110. Mr. D. R. Heineken, WA5OHI, 2823 Solano Dr. N.E. Albuquerque NM 87110.

OMNI A/B series, 217, 218 filters, VFO, N.B., 252 MO, 4 months old, mint, $899, no calls, N1JM, 7202 Rt. 31, Clay, NY 13041.

WANTED: IcomIC20 2 meter xcvr with manual. Any condition. Dick, WA7SFY, P. O. Box 73, Connell, WA 99326 509-234-5406.

SELL: W3NID is moving. Heathkit SB-300, SB-400 HW-202 with GLB-400B; Hallicrafters SX-43; Hygain 18 AVT/WB; Moseley tri-band Quad, OST 1934 through 1964; 4-400A, 4E27, 813; homebrew 3000 volt-500 mA. Pick up only. Prices negotiable. 215-822-2845.

DRAKE "C" Line, T4XC, R4C, AC4, MS4, FL1500, NB. Excellent condition. $995. Ieon, K1LS, 617-877-2273.

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ANTIQUE collectors Zenith floor model oak highboy cabinet radio 1926 earliest ac model, excellent condition. Has some octal tubes as originals. Became extinct. Also Hallicrafters SX71A, will include spare tubes for both. Will negotiate any reasonable offers for each. George Roberts 2020 Himrod St., Ridgewood, NY 11385 Tel. 212 366-4845.

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KENWOOD TS-520SE, cw filter, MC50 mic, used a few hours in 4 months, like new — $550/BO Presentation chrome bug, excellent $30. W8KHR, Ron, 615-889-2010.

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SELL: Tower 40 foot aluminum free standing 9 square foot load, TH3MK3, Ham II all cables $500. HQ180C excellent condition with IF noise limiter $250. WA3LEU 3269 Oak Ave Scranton PA 18505.

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SALE Viking II transmitter with VFO, $125, Knight KG2000 dc-5mc laboratory oscilloscope $90, both excellent. W3HWT, 329 Evergreen, North Wales, PA 19454.

SELLING station: Heath SB-230, $350. Yaesu FT-301 with cw filter, $500. Heathkit HP-1144 12-V supply for FT-301, $60. MFJ-8043 keyer, $30, and Vibroplex single-lever paddle $15. "RF Power Components" brand Maxi-Tuner 3-kW transmatch with built-in SWR meter, $75. Swan WM-1500 wattmeter, $25. All equipment in excellent condition with manuals; most with original cartons and packing. John Pelham, W1JA, 128 Dowd St., Newington, CT 06111. 203-667-1622.

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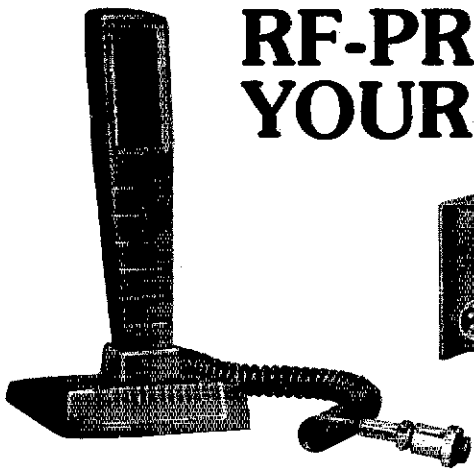

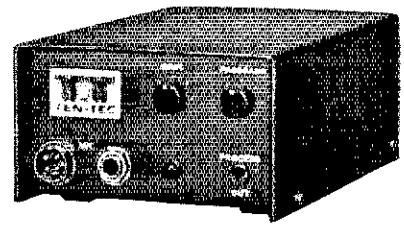

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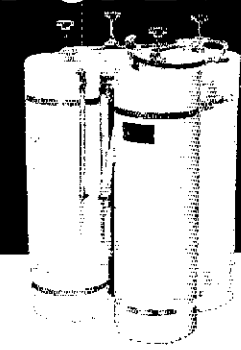

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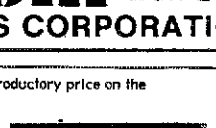

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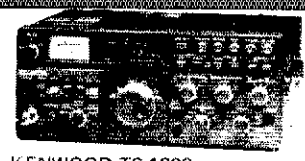

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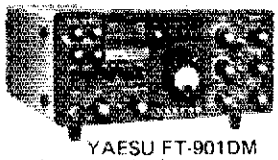

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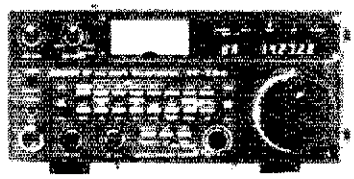

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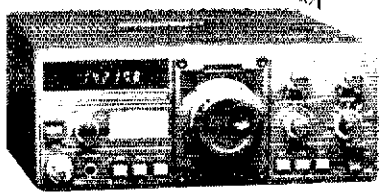

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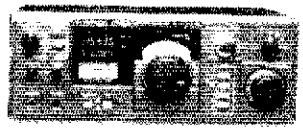

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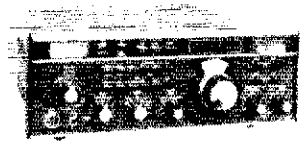

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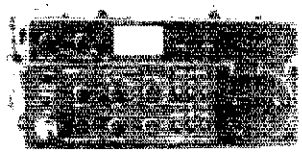

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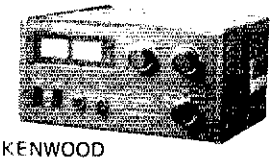

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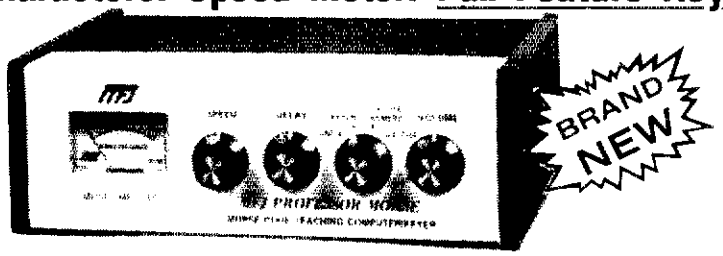

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The new MFJ-410 "Professor Morse" is a computer-like random code generator and keyer that sends an unlimited supply of precision Morse Code in random groups.

It **never repeats the same sequence** so you can't memorize it like code tapes.

Vary speed 5-50 WPM and read on speed meter.

Vary spacing between characters and character groups (for example, copy 5 WPM with 13 WPM characters) to give proper character sound at low speed.

Select alphabetic only or alphanumeric plus punctuation (period, comma, question, slash, double dash.)

Tone control. Room filling volume. Built-in speaker. **Ideal for classroom teaching.** Earphone jack (2.5 mm) for private listening.

Uses 110 VAC, or 9-18 VDC, or 4-C cells (for portable use). Optional cable for car cigarette lighter ($3.00). 6x2x6 inches.

Built-in full feature keyer. Volume, speed, internal tone and weight controls. **Weight control** adjusts dot-dash space ratio; makes your signal distinctive to penetrate QRM. Speed meter works for keyer, too. Tune switch keys transmitter for tuning. Reliable solid-state keying: grid block, cathode, solid state rigs. **OPTIONAL BENCHER IAMBIC PADDLE.**

Dot and dash paddles have fully adjustable tension and spacing. Heavy base with non-slip rubber feet eliminates "walking". $39.95.

Order from MFJ and try it — no obligation. If not delighted, return it within 30 days for refund (less shipping). One year unconditional guarantee.

Order today. Call toll free 800-647-1800. Charge VISA, MC or mail check, money order for $149.95 plus $3.00 shipping for MFJ-410 and/or $39.95 plus $3.00 shipping for Bencher paddle.

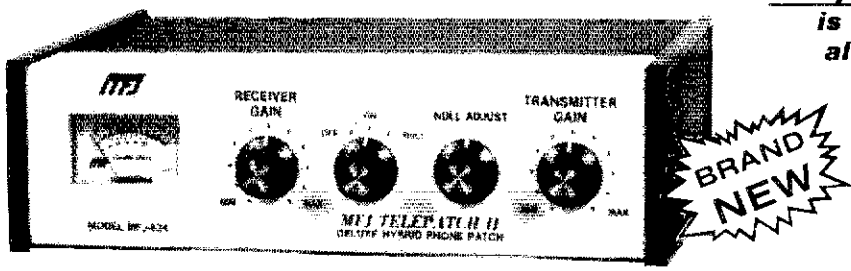
CALL TOLL FREE . . . 800-647-1800

Call 601-323-5869 for technical information, order/repair status. Also call 601-323-5869 outside continental USA and in Mississippi.

MFJ ENTERPRISES, INC.
BOX 494, MISSISSIPPI STATE, MS 39762

NEW MFJ-624 Deluxe Hybrid Phone Patch

Feature Packed: VU meter for line level and null. Has receiver gain, transmitter gain, null controls, bypass switch. Beautiful hum-free audio. RF filtered. VOX or push-to-talk. Works with any rig. Simple patch-in-patch-out installation.



Crisp, clear hum-free audio
is what phone patching is all about and MFJ has it.

$59.95

This new MFJ-624 Telepatch II hybrid phone patch gives you a combination of performance, features, and quality that you won't find in other phone patches.

PERFORMANCE: Gives you crisp clear, hum-free audio which is what phone patching is all about. Use automatic VOX or push-to-talk. RF pi-filters and PC board construction eliminates RF feedback. Works with any rig.

FEATURES: VU meter monitors telephone line level to prevent crosstalk between telephone channels. Also lets you adjust null depth for maximum isolation between receiver and transmitter.

Separate transmitter and receiver gain controls eliminate readjusting rig's controls after patching.

Null control for maximum isolation.

Function switch: OFF for normal operation. **ON** connects your rig to phone line for patching. **NULL** switches VU meter to let you adjust for maximum null.

Simple 2 cable installation (plus phone line) when rig has patch-in-patch-out jacks. Connects easily to **any** rig.

Phono jacks for patch-in-patch-out, speaker, microphone. Screw terminals for phone lines.

Eggshell white, walnut sides. 8x2x6 inches.

QUALITY: Every single unit is tested for performance and inspected for quality. Solid American construction, quality components.

MFJ-620 TELEPATCH HYBRID PHONE PATCH. Same as MFJ-624 but less VU meter. 6x2x6 inches. $49.95 plus $3.00 shipping and handling.

One year unconditional guarantee.

Order from MFJ and try it — no obligation. If not delighted, return it within 30 days for refund (less shipping).

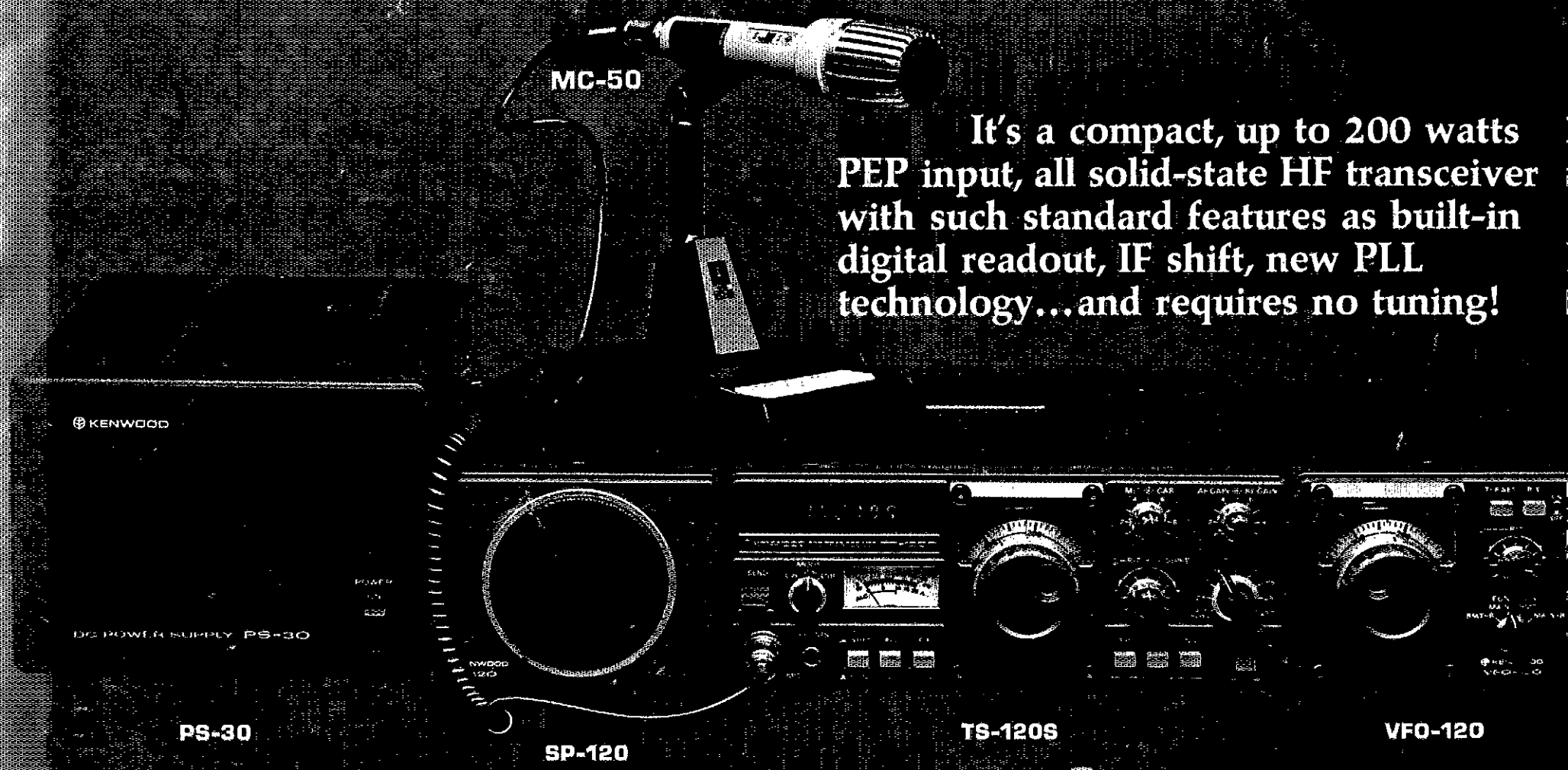
Order today. Call toll free 800-647-1800. Charge VISA, MC or mail check, money order for $59.95 plus $3.00 shipping for MFJ 624 and $49.95 plus $3.00 shipping for MFJ 620.

CALL TOLL FREE . . . 800-647-1800

For technical information, order/repair status, in Miss., outside continental USA, call 601 323-5869.

MFJ ENTERPRISES, INC.
BOX 494, MISSISSIPPI STATE, MS 39762

TS-120S...A big little rig.



It's a compact, up to 200 watts PEP input, all solid-state HF transceiver with such standard features as built-in digital readout, IF shift, new PLL technology...and requires no tuning!

Exciting and perfect for car or ham shack use! But, there's more to say about the TS-120S! This unique all solid-state HF, SSB/CW transceiver produces a hefty signal and also offers a lot of other features in a very attractive, compact package. See this new model at your Authorized Kenwood Dealer!

KENWOOD

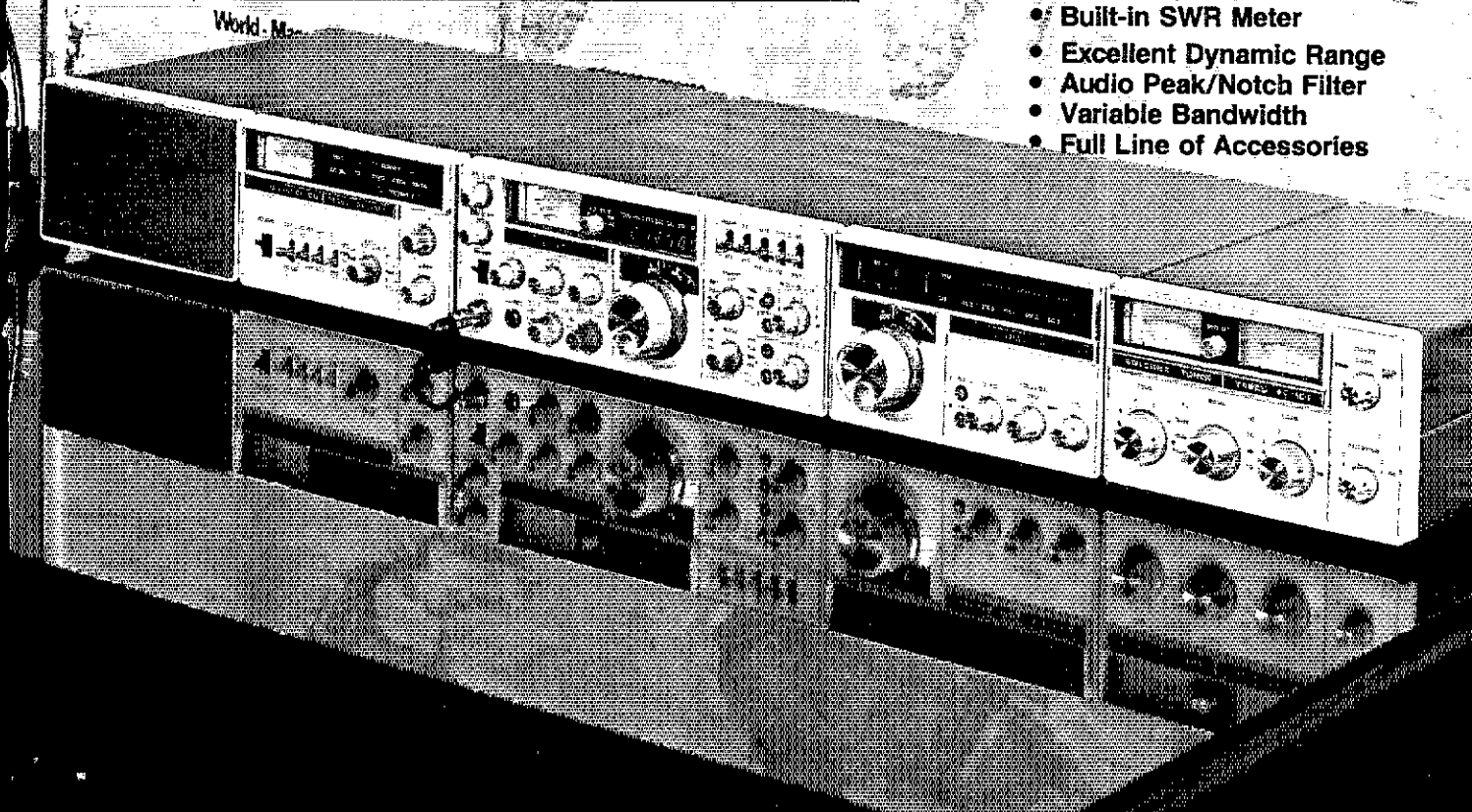
...pacesetter in amateur radio

TRIO-KENWOOD COMMUNICATIONS INC.
1111 WEST WALNUT/COMPTON, CA 90220

SOMETHING DIFFERENT
The FT-107 Series with "DMS"*
"It's A Cut Above The Rest"

- **Solid State**
- **240 watts DC SSB/CW**
- **160-10 meters, WWV** (2 auxiliary band positions are available for future expansion)
- **RF Speech Processor**
- **SSB, CW, AM, FSK**
- **Built-in SWR Meter**
- **Excellent Dynamic Range**
- **Audio Peak/Notch Filter**
- **Variable Bandwidth**
- **Full Line of Accessories**

*** OPTIONAL DIGITAL MEMORY SHIFT ("DMS")**
12 discrete memories. Stores individual frequencies or use as 12 full coverage VFOs (500 kHz each)



The FT-107 has been created as a result of a blending of technologies — computer, solid state and RF design. By careful utilization of these disciplines and the experience gained from our FT-301 series, YAESU has achieved an HF transceiver which offers unique features (e. g. "Digital Memory Shift"), efficient operation and a level of performance that has been previously unattainable.

(Receiver Section) FT-107 TRANSCEIVER SPECIFICATIONS (Transmitter Section)

Sensitivity: 0.25 uV for 10dB S/N, CW/SSB, FSK
1.0 uV for 10dB S/N, AM
Image Rejection: 60dB except 10 meters (50dB)
IF Rejection: 70dB
Selectivity: SSB 2.4 kHz at −6dB, 4.0 kHz at −60dB.
*CW 0.6 kHz at −6dB, 1.2 kHz at −60dB.
*AM 6 kHz at −6dB, 12 kHz at −60dB
Variable IF Bandwidth
20dB RF Attenuator
Peak/Notch Audio Filter
Audio Output: 3 watts (4-16 ohms)
Accessories: FV-107 VFO (standard not synthesized)
FTV-107 VHF (UHF Transverter)
FC-107 Antenna Tuner
SP-107 Matching Speaker
FP-107 AC Power Supply
*CW/AM Filters Optional

Power Input: 240W DC (SSB/CW) 80W DC (AM/FSK)
Opposite Sideband Suppression: Better than 50dB
Spurious Radiation: −50dB.
Transmitter Bandwidth 350-2700 hz (−6dB)
Transmitter: 3rd IMD −31dB neg feedback 6dB
Transmitter Stability: 300 hz after 10 min. warmup
less than 100 hz after 30 min.
Antenna Input Impedance: 50 ohms
Microphone Impedance: 500 ohms
Power Required: 13.5V DC at 20 amps
**100/110/117/200/220/234V AC at 650 VA
**FP-107 or FP-107E Optional

YAESU
The radio.

1179RR

Price And Specifications Subject To Change Without Notice Or Obligation

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