QST

devoted entirely to Amateur Radio

Victor C. Clark, W4KFC
1917-1983

HENRY RADIO

...after 56 years, still a leader in the world of amateur radio

THERE ARE A LOT OF GOOD REASONS. WE KNOW THAT WE HAVE PROVIDED THE KIND OF EQUIPMENT AND SERVICE THAT THOUSANDS OF AMATEURS HAVE COME TO EXPECT. THEY KEEP COMING BACK, AND WE'LL DO OUR BEST TO SEE TO IT THAT THEY, AND YOU, WILL HAVE EVERY REASON FOR COMING BACK.

- ✱A large inventory of fine equipment from the world's leading manufacturers.
- ✱A knowledgeable staff dedicated to amateur radio.
- ✱A complete line of accessories.
- ✱A well stocked repair shop staffed by experienced technicians.
- ✱We take trade-ins and sell used equipment.
- ✱Generous discounts on cash purchases.
- ✱We carry our own financing.

Some of the names we stock include:

HENRY • TEMPO • KENWOOD • ICOM • YAESU • HAL • ACE • AEA • AMECO • AMPHENOL • ASTATIC • ANTRONIC • ARCO • ARRL • ASTRON • B&K • B&W • BECKMAN • BENCHER • BIRD • BSR • CES • CETRON • CENTURIAN • COLLINS • COMMUNICATIONS SPECIALISTS • CONNECT SYSTEMS • CURTIS • CUSHCRAFT • DAIWA • DOWKEY • DRAKE • EIMAC • ELECTRA • FANON • GE • HAM KEY • HUSTLER • HY GAIN • INFO-TECH • IRL • KANTRONICS • KENPRO • KLM • LARSON • LUNAR • MFJ • MICROWAVE • MICRO CONTROL SPECIALTIES • J.W. MILLER • MINI PRODUCTS MIRAGE • WM. M. NYE • PALOMAR • PIPO • ROBOT • SANYO • SIMPSON • SOLAREX • SWITCHCRAFT • TRAC • TRANSCOM • TRIPPLITE • TX/RX

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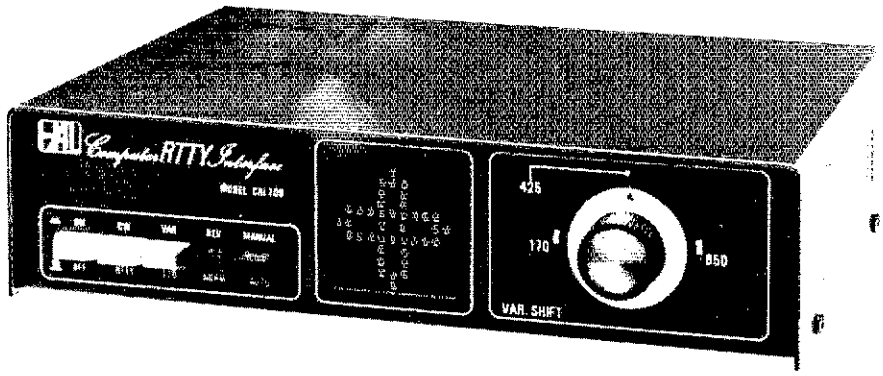
56 YEARS OF SERVICE

WORK ALL THE SIGNALS—NOT JUST THE STRONG ONES

CRI-200
LED Matrix
Tuning Indicator
$299.00*

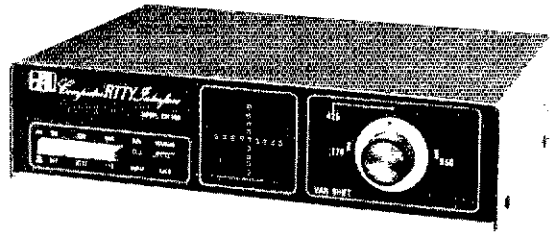


Give your computer a break with the "front-end" performance it needs for good RTTY and CW copy. Why settle for "make-do" RTTY performance of one-tone filters or phase locked loops? Our interfaces give you the solid RTTY and CW performance you need. Want to be sure you are "on-frequency" and not "walking around the band"? We have two different models of tuning indicators to put you on frequency. The deluxe CRI-200 features a matrix of LED's to give a scope-type ellipse tuning display. The CRI-100 has the familiar crossed line display, again using LED's. Best of all, the indicators are built-in—NOT add-ons. Take advantage of our many years of experience in high-tech RTTY and CW—put a HAL ahead of your computer.

- Full two-tone mark and space RTTY demodulation
- 170 or variable 80–975 Hz receive RTTY shift
- Linear-cross LED tuning indicator (CRI-100)
- Matrix LED-scope tuning indicator (CRI-200)
- 800 Hz CW receive input filter (700–1000 Hz int. adj.)
- Plus or minus CW Key output to transmitter
- Computer interface for RS232C or TTL
- Relay isolated PTT switch circuit
- AFSK transmit tones AND FSK output
- Standard 4-pin mike connector
- Standard computer I/O connector
- Spare I/O connectors for customized connections
- Small and attractive cabinet (10"W × 2.4"H × 7"D)
- Includes 120V/60 Hz power supply—no batteries!
- User-friendly controls
- Compatible with HAL ARQ1000 for AMTOR

Best of all, the HAL CRI-100 and CRI-200 are NOT dependent upon special software or a specific computer. Flexibility is the key word—it's your choice for your favorite program and computer. If you are looking for both low cost and high performance, come to HAL, your real RTTY place. See the CRI-100 and CRI-200 at your favorite HAL dealer. Write or call us for our latest RTTY catalog.

CRI-100
Crossed LED
Tuning Indicator
$249.00*



HAL COMMUNICATIONS CORP.
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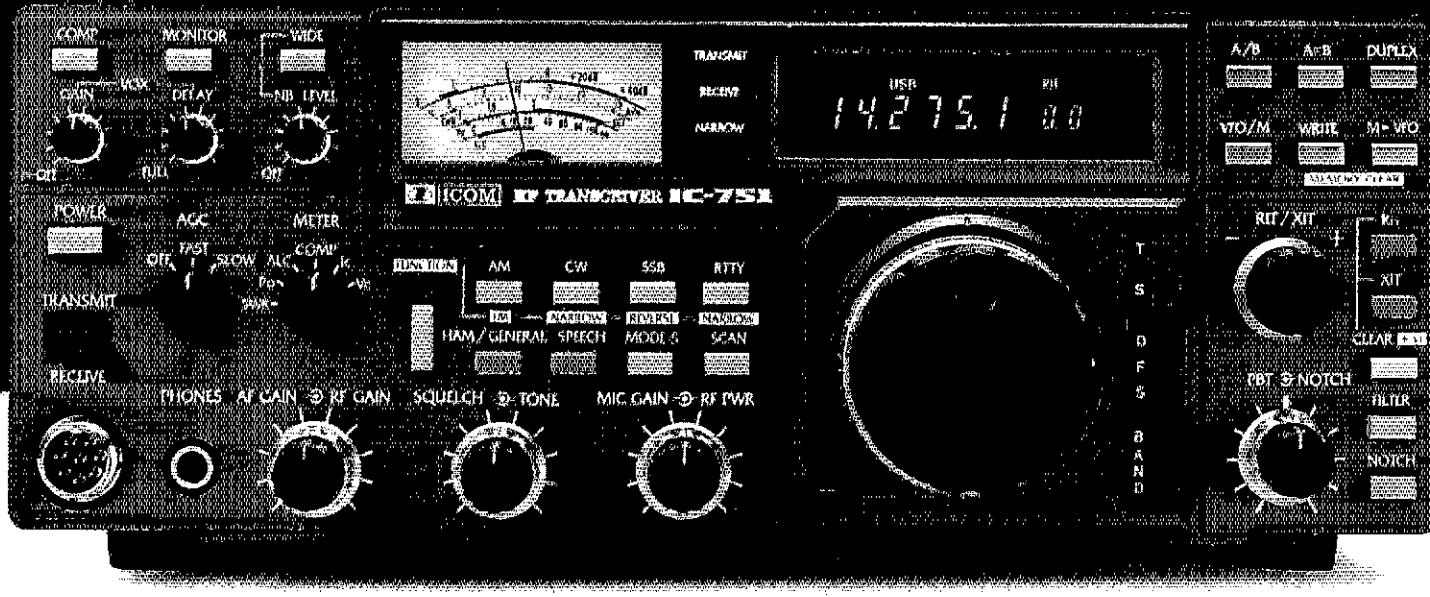
*Suggested list prices. Call your HAL dealer for his price!

ICOM IC-751

The New Standard of Comparison

NEW Competition Grade Transceiver!



ICOM is proud to announce the most advanced amateur transceiver in communications history. Based on ICOM's proven high technology and wide dynamic range HF receiver designs, the IC-751 is a competition grade ham receiver, a 100KHz to 30 MHz continuous tuning general coverage receiver, and a full featured all mode solid state ham band transmitter, that covers all the new WARC bands. And with the optional internal AC power supply, it becomes one compact, portable/field day package.

Receiver. Utilizing an ICOM developed J-FET DBM, the IC-751 has a 105dB dynamic range. The 70.4515MHz first IF virtually eliminates spurious responses, and a high gain 9.0115MHz second IF, with ICOM's PBT system, gives the ultimate in selectivity. A deep IF notch filter, adjustable AGC and noise blanker (can be adjusted to eliminate the woodpecker), audio tone control, plus RIT with separate readout provides easy-to-adjust, clear reception even in the presence of strong QRM or high noise levels. A low noise receiver preamp provides exceptional reception sensitivity as required.

Transmitter. The transmitter features high reliability 2SC2904 transistors in a low IMD (-38dB @ 100W), full 100% duty cycle (internal cooling fan standard), 12 volt DC design. Quiet relay selection of transmitter LPF's, transmit audio tone control, monitor circuit (to monitor your own CW or SSB signal), XIT, and a high performance speech processor enhance the IC-751 transmitter's operation. For the CW operator, semi break-in or full QSK is provided for smooth, fast break-in keying.

Dual VFO. Dual VFO's controlled by a large tuning knob provide easy access to split frequencies used in DX operation. Normal tuning rate is in 10Hz increments and increasing the speed of rotation of the main tuning knob shifts the tuning to 50Hz increments automatically. Pushing the tuning speed button gives 1KHz tuning. Digital outputs are available for computer control of the transceiver frequency and functions, and for a synthesized voice frequency readout.

32 Memories. Thirty two tunable memories are provided to store mode, VFO, and frequency, and the CPU is backed by an internal lithium memory backup battery to maintain the memories for up to seven years. Scanning of frequencies, memories and bands are possible from the unit, or from the HM12 scanning microphone. In the Mode S mode, only those memories with a particular mode are scanned; others are bypassed. Data may be transferred between VFO's, from VFO to memories, or from memories to VFO.

Standard Features. All of the above features plus FM unit high shape factor FL44A, 455 Kh SSB filter, full function metering, SSB and FM squelch, convenien large controls, a large selection of plug-in filters, and a new high visibility multi-color flourescent display that shows frequency in white, and other functions in white or red, make the IC-751 your best choice for a superior grade HF base transceiver.

Options. External frequency controller, external PS15 power supply, voice synthesizer, computer interface, internal power supply, high stability reference crystal (less than ±10Hz after 1 hour). HM12 hand mic, desk mic, filter options:

SSB: FL70
CWN: FL52A, FL53A, FL32, FL63
AM: FL33

ICOM

The World System

ICOM America, Inc., 2112-116th Ave NE, Bellevue, WA 98004 **(206)454-8155** / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234 **(214)620-278**

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CONTENTS

OUR COVER

When Vic Clark, W4KFC, died suddenly on Nov. 25, ARRL lost its President and the Amateur Radio Community lost its most ardent supporter. A tribute to Vic begins on page 9.

TECHNICAL

BEGINNER'S BENCH

NEWS AND FEATURES

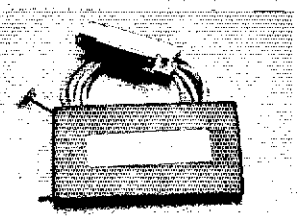
OPERATING

DEPARTMENTS

AEA Brings You The AMTOR Breakthrough

We are pleased to announce three new AMTOR products. Our new software package that will allow you to operate AMTOR with your CP-1 is called AMTORTEXT™. A complete hardware terminal unit and AMTORTEXT software plug-in cartridge for the Commodore 64 computer is called the MICROAMTOR PATCH™. We also have new applications software packages for the AMT-1 and Commodore 64 or VIC-20 computers.

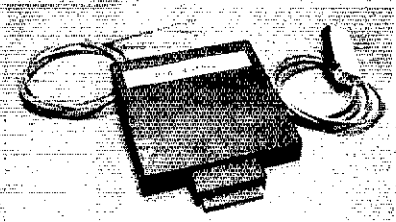
NEW AMTORTEXT™



AMTORTEXT™ is a LOW COST software package that will allow the CP-1 and Commodore 64 computer to be used as a multi-mode AMTOR TERMINAL. Compare the outstanding FEATURES and PRICE of the AT-64 (AMTORTEXT for Commodore 64) to the competition:
• KEYBOARD OVERLAY instructions (eliminates constant referral to manual) • STATUS INDICATORS on screen • Easy to follow MENU • ARQ, MODE A- MASTER OR SLAVE • FEC MODE B • MODE L (LISTEN TO MODE A) •SPLIT SCREEN with 2000 CHARACTER TYPE AHEAD transmit buffer • WORD MODE for error correcting with DEL KEY until space or CR is sent • REMOTE ECHO shows characters transmitted as they are validated by other station • easy entry of your SELCALL for automatic response to ARQ calls • BREAK-IN MODE to interrupt sending station • LTRS/FIGS REVERSE for assistance in MODE L sychronizing • TEN MESSAGE BUFFERS OF 256 CHARACTERS EACH • AMTOR timing synced to host computer internal CRYSTAL OSCILLATOR • PROGRAMMABLE TRANSMIT DELAY can be saved to tape •AUTOMATIC PTT • POWERED BY HOST COMPUTER • includes INTERFACE CABLE for AEA model CP-1 COMPUTER PATCH™.
The AMTOR software TIMING ROUTINES have been written by Peter Martinez, G3PLX (father of AMTOR) which means you can be sure of having NO SYNCHRONIZING problems with other AMTOR stations adhering to the established international AMTOR standard. PROPER SYNCHRONIZATION is an ABSOLUTE must for AMTOR!

$89.95 List $69.95* C-64 AMTORTEXT

NEW MICROAMTOR PATCH™



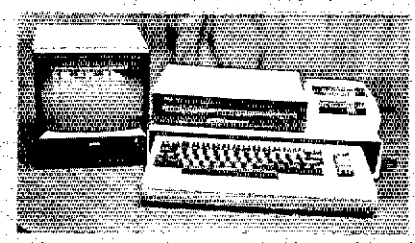
MICROAMTOR PATCH™ is a NEW LOW-COST, HIGH-PERFORMANCE AMTOR SOFTWARE/HARDWARE computer interface package. The MICROAMTOR PATCH (model MAP-64) INCORPORATES AMTORTEXT software (described above) for the Commodore 64 computer. All circuitry and software is incorporated on a single, plug-in cartridge module featuring the following: •TRUE DUAL CHANNEL MARK AND SPACE MULTI-STAGE 4 POLE, CHEBYSHEV ACTIVE FILTERS • AUTOMATIC THRESHOLD CORRECTION for good copy when one tone is obliterated by QRM or SELECTIVE FADING • EASY, POSITIVE TUNING with TRIPLE LED INDICATOR • NOT a low-cost, easily "pullable" phaselocked loop detector!!! • SWITCH SELECTED 170 Hz or WIDE SHIFT on receive • AUTOMATIC PTT • demodulator circuitry powered by your 12 VDC supply to AVOID OVERLOADING HOST COMPUTER and for maximum EMI ISOLATION • EXAR 2206 SINE GENERATOR for AFSK output • SHIELDED TRANSCEIVER AFSK/PTT INTERFACE CABLE PROVIDED • FSK keyed output.

The MicroAmtor Patch is structured for easy upgrading to the AEA CP-1 Computer Patch™ advanced interface unit without having to buy a different software package! Simply unplug the external computer interface cable (supplied with the MicroAmtor Patch) from the MicroAmtor Patch and plug it into the Computer Patch.

$149.95 List $129* MAP64
$239.95 / $199.95* MAP-64/2

The Model MAP-64/2 incorporates the C-64 MBATEXT™ PROM on the same board with AMTORTEXT for low cost RTTY/CW/ASCII/AMTOR operation.

AMT-1



Shown with optional AMT-1 Console Stand, COMM-64 with CRT Monitor and cassette recorder (Not included)

The **AMT-1** is the DEFINITIVE AMTOR TERMINAL UNIT which all future AMTOR units will be measured against. All you need for full AMTOR operation is a dumb ASCII terminal (or personal computer and emulation software) and a normal HF transceiver and antenna. With the AMT-1 you will receive the following features: •SENSITIVE FM DEMODULATOR • FOUR POLE ACTIVE RECEIVE FILTER • TOTAL CONTROL FROM KEYBOARD or by COMPUTER PROGRAM CONTROL • 16 LED PANADAPTOR TYPE TUNING INDICATOR • CRYSTAL CONTROLLED AFSK MODULATOR • RECEIVE/TRANSMIT standard RTTY • TRANSMIT MORSE CW • MORSE RECEIVE field installable option • AUTOMATIC PTT • 13 front panel LED STATUS INDICATORS • all METAL ENCLOSURE for maximum RFI immunity • operates from your 800 ma 12 VDC power source.

$589.95 List $499.95* AMT-1

Applications software for C-64 or VIC-20

AEA also offers an applications software package for the Commodore VIC-20 (model AMT-1/VIC20-1) or 64 computer that is resident on a plug-in PROM CARTRIDGE and includes the INTERFACE CABLE to go between the computer and the AMT-1. KEYBOARD OVERLAY instructions are also included for easy operation without the instruction manual. The COMM-64 program (model AMT-1/C64-1) offers SPLIT SCREEN OPERATION with ten MESSAGE BUFFERS. It also offers UNATTENDED OPERATION with automatic MESSAGE RECORDING and AUTOMATIC STATION INDENTIFICATION.

$89.95 List $69.95*

*SUGGESTED AMATEUR DISCOUNT PRICE THROUGH PARTICIPATING DEALERS ONLY

PLEASE SEND AEA CATALOG

Name

Address

City

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Advanced Electronic Applications, Inc.
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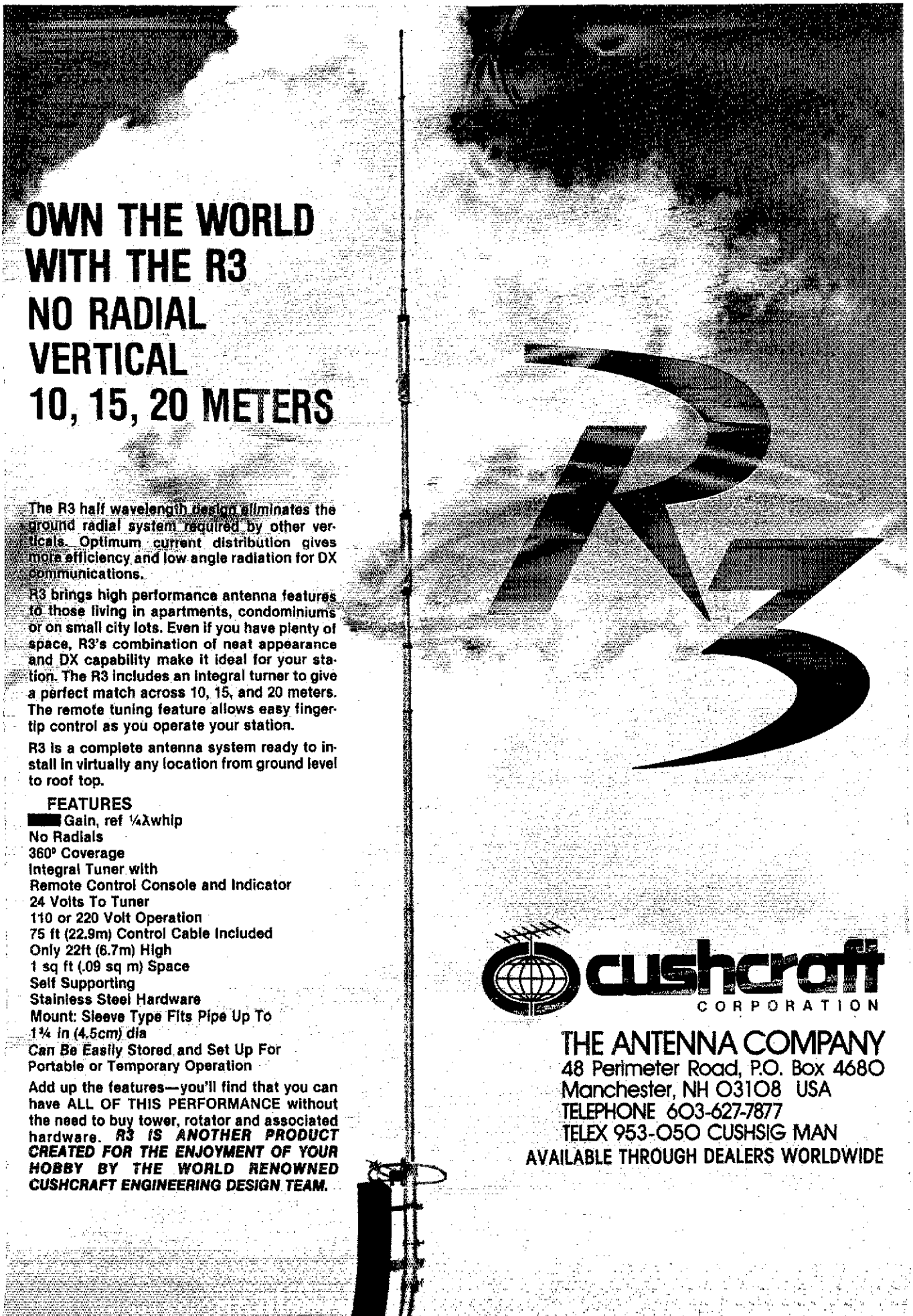

OWN THE WORLD WITH THE R3 NO RADIAL VERTICAL 10, 15, 20 METERS

The R3 half wavelength design eliminates the ground radial system required by other verticals. Optimum current distribution gives more efficiency and low angle radiation for DX communications.

R3 brings high performance antenna features to those living in apartments, condominiums or on small city lots. Even if you have plenty of space, R3's combination of neat appearance and DX capability make it ideal for your station. The R3 includes an integral turner to give a perfect match across 10, 15, and 20 meters. The remote tuning feature allows easy fingertip control as you operate your station.

R3 is a complete antenna system ready to install in virtually any location from ground level to roof top.

FEATURES

- [redacted] Gain, ref ¼λwhip
- No Radials
- 360° Coverage
- Integral Tuner with
- Remote Control Console and Indicator
- 24 Volts To Tuner
- 110 or 220 Volt Operation
- 75 ft (22.9m) Control Cable Included
- Only 22ft (6.7m) High
- 1 sq ft (.09 sq m) Space
- Self Supporting
- Stainless Steel Hardware
- Mount: Sleeve Type Fits Pipe Up To 1¼ in (4.5cm) dia
- Can Be Easily Stored and Set Up For Portable or Temporary Operation

Add up the features—you'll find that you can have ALL OF THIS PERFORMANCE without the need to buy tower, rotator and associated hardware. ***R3 IS ANOTHER PRODUCT CREATED FOR THE ENJOYMENT OF YOUR HOBBY BY THE WORLD RENOWNED CUSHCRAFT ENGINEERING DESIGN TEAM.***

cushcraft
CORPORATION

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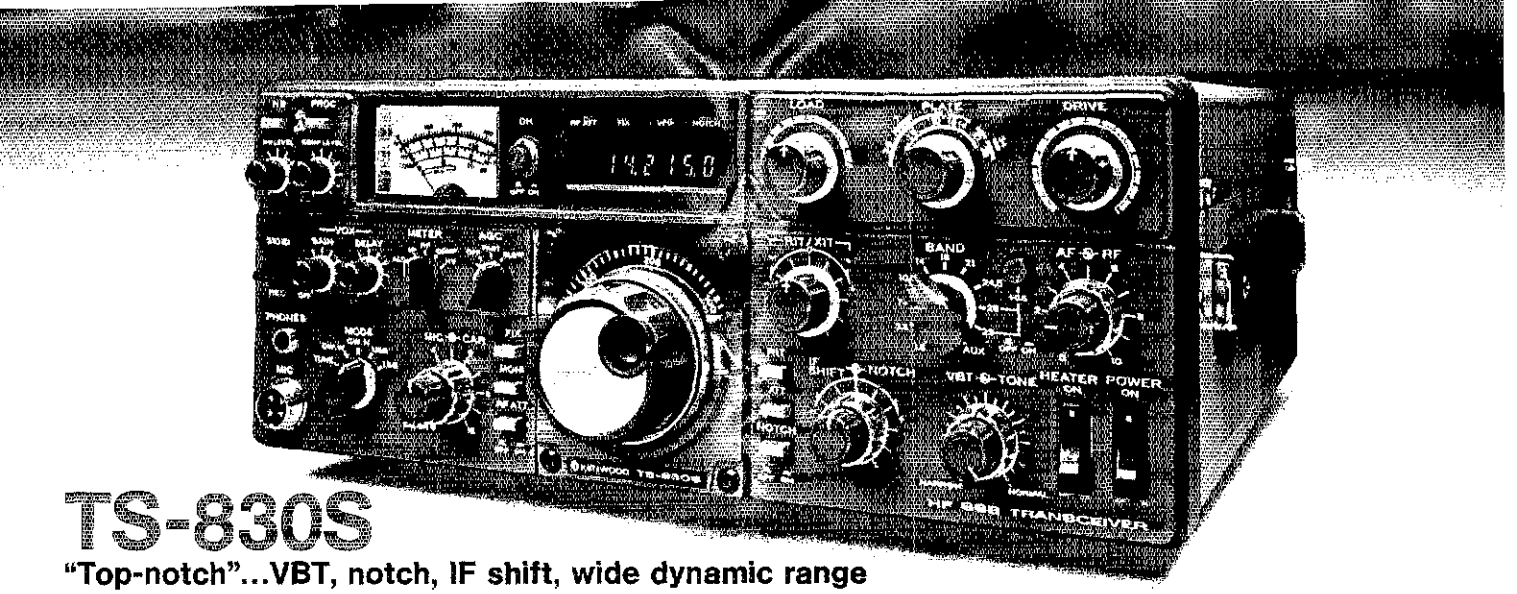


TS-830S

"Top-notch"...VBT, notch, IF shift, wide dynamic range

The TS-830S has every conceivable operating feature built-in for 160-10 meters (including the three new bands). It combines a high dynamic range with variable bandwidth tuning (VBT), IF shift, and an IF notch filter, as well as very sharp filters in the 455-kHz second IF.

TS-830S FEATURES:

- LSB, USB, and CW on 160-10 meters, including the new 10, 18, and 24-MHz bands. Receives WWV on 10 MHz.
- Wide receiver dynamic range. Junction FETs in the balanced mixer, MOSFET RF amplifier at low level, and dual resonator for each band.
- Variable bandwidth tuning (VBT). Varies IF filter passband width.
- Notch filter high-Q active circuit in 455-kHz second IF.
- IF shift (passband tuning).
- Noise-blanker threshold level control.
- Built-in digital display, (fluorescent tube), with analog dial.
- 6146B final with RF negative feedback. Runs 220 W PEP (SSB)/180 W DC (CW) input on all bands.
- Built-in RF speech processor.
- Narrow/wide filter selection on CW.
- SSB monitor circuit.
- RIT and XIT (transmitter incremental tuning).

Optional accessories:

- SP-230 external speaker.
- VFO-230 external digital VFO with five memories, digital display.
- VFO-240 external analog VFO.
- AT-230 antenna tuner.
- YG-455C (500 Hz) or YG-455CN (250 Hz) CW filter for 455 kHz IF.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter for 8.83 MHz IF.
- KB-1 deluxe heavyweight knob.

NEW

TS-530SP

"Cents-ational"...notch, IF shift, digital display, narrow-wide filter switch

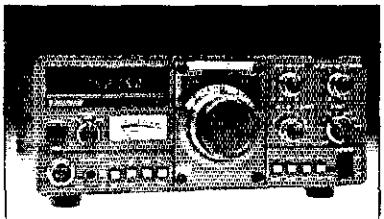
The TS-530SP SSB/CW transceiver covers 160-10 meters using the latest, most advanced circuit technology, yet at an affordable price.

TS-530SP FEATURES:

- 160-10 meters, LSB, USB, CW, all amateur frequencies, including new 10, 18, and 24 MHz bands. Receives WWV on 10 MHz.
- IF shift tunes out interfering signals.
- Audio notch filter, tunable, for minimum QRM.
- Built-in digital display (six digits, fluorescent tubes), with analog dial.
- Narrow/wide filter selector switch for CW and/or SSB.
- Built-in speech processor, for increased talk power.
- Wide receiver dynamic range.
- Two 6146B's in final, allows 220W PEP/180 W DC input on all bands.
- Advanced single-conversion PLL, for better stability, improved spurious characteristics.
- Adjustable noise-blanker, with front panel threshold control.
- RIT/XIT front panel control allows independent fine-tuning of receive or transmit frequencies.

Optional accessories:

- SP-230 external speaker with selectable audio filters.
- VFO-240 remote analog VFO.
- VFO-230 remote digital VFO.
- AT-230 antenna tuner/SWR/power meter.
- MC-50 desk microphone
- KB-1 deluxe VFO knob.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter.
- YK-88SN (1.8 kHz) narrow SSB filter.



TS-130SE

Compact, solid-state HF, 80-10 m, incl. WARC.

- 200 W PEP, 160 W DC.
- Digital display.
- IF shift, narrow/wide filter, switch. (Filters opt.)
- Speech processor, VOX.
- RF attenuator, noise blanker.
- CW semi break-in w/sidetone.
- Final amp. protection circuit.
- Size: 3-3/4 H x 9-1/2 W x 11-9/16 D.

Optional accessories:

- PS-30, KPS-21 Power supplies.
- SP-120 External speaker.
- VFO-120 remote VFO.
- AT-130 antenna tuner.
- YK-88C (500Hz), YK-88CN (270Hz) CW filters.
- YK-88SN (1.8 kHz) SSB filter.
- MB-100 mobile mtg. bracket.

KENWOOD

TRIO-KENWOOD COMMUNICATIONS

1111 West Walnut, Compton, California 90220

Optional FC-10 frequency controller
May be easily connected to the TM-201A or TM-401A. Convenient control keys for frequency UP/DOWN, MHz shift, VFO A/B, and MR (memory recall or change memory channel). A green, easy-to-read, back-lighted LCD display indicates transmit/receive frequencies, memory channel number, ALERT, and SCAN (with blinking MHz decimal). Size: 4.4 (112)W x 1.4 (35)H x 0.9 (22)D, inch(mm). Weight: 3.5 oz. (100 g).

TM-201A/TM-401A

Ultra-compact and lightweight, priority, memory and band scan, 25 watts/TM-201A & 12 watts/TM-401A.

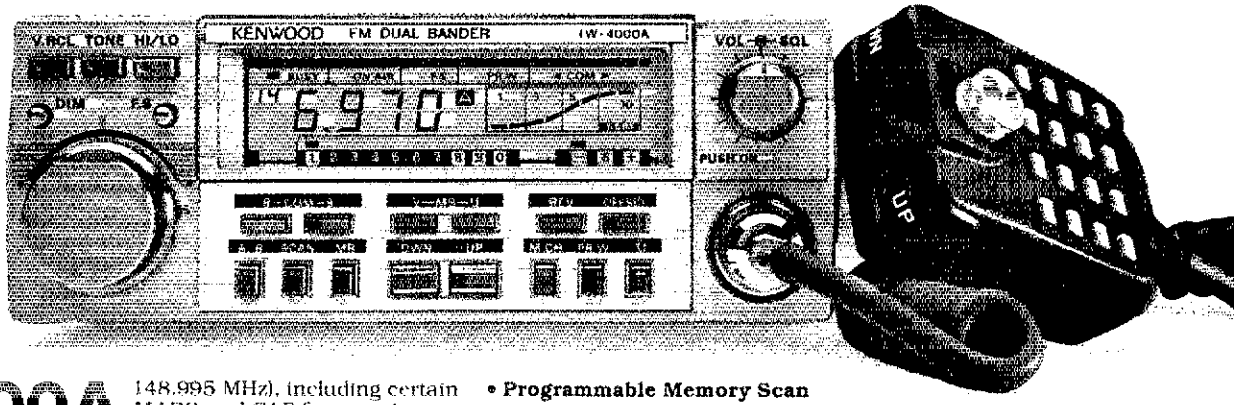
The KENWOOD TM-201A 2- meter and TM-401A 70-cm FM mobile transceivers are the smallest and lightest units available, allowing maximum flexibility in automotive installation.

TM-201A/TM-401A FEATURES:

- **Ultra compact and lightweight**
  Measures 5.6 (141)W x 1.6 (39.5)H x 7.2 (183)D, inch(mm), weighs 2.8 lbs., (1.25 kg.).
- **25-watt output, with HI/LO power switch**
  Produces a powerful 25 watts RF output from a surprisingly compact design (TM-201A).
- **Dual digital VFO's built-in**
- **5 memories plus "COM" channel, with lithium battery back-up (est. 5 yr. life)**
- **Memory scan/programmable band scan**
- **Priority alert scan**
- **Highly visible yellow LED frequency display**
- **High performance receive/transmit**
  GaAs FET RF amplifier for high sensitivity with wide dynamic range. Transmit modulation characteristics selected for best sound and minimum distortion.
- **External high quality speaker supplied** (No internal speaker)
- **16-key autopatch UP/DOWN microphone**
- **Repeater offset switch (±600-kHz/TM-201A; ±5 MHz/TM-401A; and simplex) and reverse switch**
- **Audible "BEEPER" confirms operation**
- **Easy-to-install mobile mount**

TM-201A/TM-401A accessories:

- **TU-3** programmable two-frequency CTCSS encoder
- **KPS-7A** fixed station power supply



TW-4000A

FM "Dual-Bander"... 2-m & 70-cm in single compact package, LCD, 25 W, optional voice synthesizer.

KENWOOD's TW-4000A FM "Dual-Bander" provides new versatility in VHF and UHF operations, uniquely combining 2-m and 70-cm FM functions in a single compact package.

TW-4000A FEATURES:

- **2-m and 70-cm FM in a Compact Package**
  Covers the 2-m band (142.000-148.995 MHz), including certain MARS and CAP frequencies, plus the 70-cm FM band (440.000-449.995 MHz), all in a single compact package. Only 6-3/8 (161)W x 2-3/8 (60)H x 8-9/16 (217)D inches (mm), and 4.4 lbs. (2.0 kg.).
- **Large, Easy-to-Read LCD Display**
- **25 Watts RF Power on 2-m/70-cm.**
- **Opt. "Voice Synthesizer Unit"**
  Installs inside the TW-4000A. Voice announces frequency, band, VFO A or B, repeater offset, and memory channel number.
- **Front Panel Illumination**
- **10 Memories with Offset Recall and Lithium Battery Backup**
- **Programmable Memory Scan**
- **Band Scan in Selected 1-MHz Segments**
- **Priority Watch Function**
- **Common Channel Scan**
- **Dual Digital VFO's**
- **16-Key Autopatch UP/DOWN Microphone**
- **Repeater Reverse Switch**
- **High Performance Receiver/Transmitter**
  GaAs FET RF amplifiers on both 2-m and 70-cm, high performance MCF's in the 1st IF section, provide high receive sensitivity and excellent dynamic range. The high reliability RF power modules assure clean and dependable transmissions on either band.
- **Rugged Die-cast Chassis**
- **"BEEPER" sounds through speaker.**
- **Easy-to-Install mobile mount**

TW-4000A accessories:

- **VS-1** voice synthesizer
- **TU-4C** programmable two-frequency CTCSS encoder
- **KPS-7A** fixed station power supply
- **SP-40** compact mobile speaker
- **SP-50** high quality mobile speaker
- **MA-4000** dual-band mobile antenna with duplexor

KENWOOD

TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut, Compton, California 90220

Directors

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THE AMERICAN
RADIO RELAY
LEAGUE, INC.

"It Seems to Us..."

Victor C. Clark, W4KFC — 1917-1983

Vic Clark is dead. The key of W4KFC is silent; the friendly voice and clear, distinctive fist of its operator will not again be heard on the airwaves in this world. The American Radio Relay League has lost a President, the Amateur Radio community has lost a leader of rare stature, and hundreds — if not thousands — of us have lost a dear friend.

Vic's final week on this earth was characteristically busy as he pursued his responsibilities as League President — a voluntary position for which he received no compensation. On Friday, November 18, he journeyed to New York from his home in Clifton, Virginia, for the 75th anniversary banquet of the Radio Club of America. His report of the event read, "Feature attraction was appearance of KA2ORK and N2DRA of Grenada fame. They made an excellent and well-received presentation to the group. I was honored to be able to present them with Special Citations from the RCA." In typical fashion, Vic downplayed the honor bestowed upon him: he was made a "Fellow" of the RCA, joining a distinguished list of radio pioneers.

Sunday, November 20, found him participating as an observer in a telephone conference call meeting of the Canadian Radio Relay League Board of Directors, followed by a flight to Hartford for the following day's counting of ballots in the Director and Vice Director elections. Developments in the Volunteer Examination Program, in which Vic had a keen interest, occupied much of his attention that evening and Monday. He was thrilled with the news that Congress had enacted Senator Goldwater's legislation to permit the recoupment of expenses by Volunteer Examiner Coordinators, for it cleared the way for ARRL participation as a VEC — something which Vic believed was essential to the future of the Amateur Radio Service.

Following the ballot-counting on Monday and his telephoned congratulations to the winners, Vic headed home. To us, he looked as healthy as we could remember seeing him since a May 1979 heart attack had forced him to reduce his schedule and to limit his in-person participation at the 1979 World Administrative Radio Conference in Geneva — a disappointment to Vic, who had devoted much time during the previous several years to WARC-79 preparations. He left ARRL Headquarters for the last time in high spirits, convinced that the potholes were behind us and the road ahead was smooth. We spoke by telephone several times on the following two days; again, he struck an optimistic chord.

The morning after Thanksgiving, on November 25, Vic complained to his wife Hester, WA4PAE, of chest pains. Because of his medical history, he was taken to the Commonwealth Doctors Hospital for observation. Even as the paramedics were readying him for the trip to the hospital in nearby Fairfax, his main concern was for others: he had been scheduled to attend the ARRL Florida State Convention in Clearwater that weekend, and wanted to be sure that a film he had planned to take down arrived on time and was sent on to its next destination.

That night, at 10:30 P.M., Vic Clark was stricken with a massive heart attack while under observation in the cardiac intensive care unit. One minute he was joking with the doctors; the next, he was gone.

The tragic news spread quickly through the worldwide Amateur Radio community. By noon Monday, ARRL Headquarters had received telegrams of condolence from

MEMORIAL CONTRIBUTIONS

The family of Victor C. Clark, W4KFC, has requested that memorial contributions be made to the ARRL Foundation, 225 Main Street, Newington, CT 06111. The purpose of the memorial fund will be designated later, in accordance with the wishes of the family.

At age 19, Vic Clark was already a renowned radio amateur as W6KFC in Phoenix. He won the Hiram Percy Maxim Memorial Award for 1936, the first year it was issued.

"You Never Forgot Anyone . . ."

30 November, 1983

Dear Vic,

In 1958 you had already been licensed for 26 years when at 12 years of age I discovered radio. It wasn't long before out of the 150,000 American hams, I knew who you were . . . You were the BEST. You were that melodious bug fist, W4KFC, your contest technique a generation ahead of anyone else.

When I was 17, life brought me to a Potomac Valley Radio Club meeting. Standing head and shoulders above (6'4") all, there you were. When you spotted me, you hurried over to introduce yourself and welcome a visitor. When I told you my call, you asserted that you had heard of me even though I didn't see how you could have. A year later I asked you to visit our teenage Field Day set up. You not only did, you let us use your call, W4KFC/4. I still have the photo of me with a sign showing that call.

So maybe three times we met, before I moved to New Mexico to become WA5YTX, and then KT5X. Once every few years we would encounter each other on the air, and you always remembered me. Once while on vacation in Wyoming, both of us QRP, we QSO'ed. You asked me to look up an old friend of yours in Laramie. This man's wife was dying of cancer and he needed a friend. It turned out that you hadn't seen this gentleman since 1942! You never forgot anyone, and had only kind words for everyone.

Last summer the phone rang, and Bill, K5MAT told me that a friend of mine was looking for me on two meters, would I like to know who it was? I said, "sure!" "It's the President of the ARRL!" Yes, you had finally been given the responsibility you most of all deserved. And taking time out from your vacation to visit someone you hardly knew was absolutely typical. You gave me a Canadian Penny, the only coin ever minted with Morse code on it. I just wonder how many folks realize that we have the frequencies that we do largely thanks to your world-wide WARC preparations.

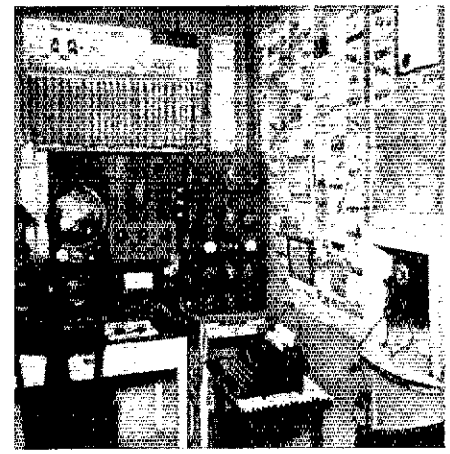
When I was 12 I made a boyhood idol out of a fist and a call. At 38 I just want to say, "Vic, when I grow up, I want to be just like you!"

73, OT es BB
Fred "FD" Maas
KT5X

all six continents. A memorial service in Washington on Wednesday, November 30, drew more than 400 mourners, the vast majority of them radio amateurs and government officials. The Rev. David Reeder, WAØURJ, officiated. Six amateurs were honored by being asked to deliver brief eulogies: WØBWJ, W4NH, W2GHK, HK3DEU, W4YE and myself. Before the service, the six of us compared notes and found that we had treated six different facets of the man, with essentially no overlap. Vic was that big.

The saga of Victor C. Clark, W4KFC, begins on August 23, 1917, in Falmouth, Massachusetts, on Cape Cod. Vic believed that he was the last surviving member of his generation off the *Mayflower* — a claim that was put forward more out of curiosity than pride. His family moved to Phoenix in the early 1920s, and it was here that Vic grew up and became interested in radio. First licensed in September 1933, his first appearance on the air was as W6KFC (Arizona was part of the sixth call area in those days) in January 1934. Those early years were not easy ones — Vic's father died when he was nine years old, and his school years were marked by lengthy illnesses — but they taught him how to overcome adversity by hard work and good humor.

By 1936, W6KFC had become a familiar call sign in traffic handling, contest and DX circles. That year, the founding President of the ARRL, Hiram Percy Maxim, passed away, and his children decided to offer a memorial award to the League member under the age of 21 who made the greatest contribution to Amateur Radio, or had the best all-around record, in a given year. Nineteen-year-old Vic Clark was chosen as the first recipient. Writing in August 1937 *QST*, Clinton B. DeSoto, W1CBD, said



Here is the layout at W6KFC as it appeared in 1937. For the modern version of W4KFC, see May 1983 *QST*, p. 44.

about Vic: "His is a fitting first name to engrave on the scroll of those who typify the everlasting heritage of honor and achievement left by our founder-president." As true as those words were then, they were to be even more fitting in later years. Vic served ARRL as Section Communications Manager for Arizona from 1937 to 1939, and again as SCM of Virginia from 1950 to 1952; as an assistant director for the Roanoke Division from 1952 to 1966; as Director, 1967-74; as First Vice President, 1974-80; as Honorary Vice President, 1980-82; and as President from March 1982 until his death. Vic was probably the most successful salesman of ARRL Life Memberships ever to hand out an application. He was Vice President of the International Amateur Radio Union

Vic devoted considerable energy and talent to WARC-79 preparations, but could not attend full time because of earlier heart trouble. He made the most of his time in Geneva, though, renewing old acquaintances and making new ones among the delegates. In this 1979 photo, Vic is shown with Hassan, J28AA (Djibouti), and Amour, 7X2AJ (Algeria). Vic was especially interested in telephilately — postage stamps with telecommunications themes, particularly Amateur Radio; his discussion with Hassan led to the issuance in 1981 of a postage stamp honoring the Club des Radio-Amateurs de Djibouti.

The American Radio Relay League with its members have suddenly found themselves without the leadership, advice and wise counsel of Victor Clark. As a former Director and more recently its president, he gave to the League the same sensitive and dynamic leadership that he had applied throughout his lifetime — be it his family, his job or the countless other areas of involvement. When the world-wide Amateur Radio community heard the sad news, the common reaction was that a great service had lost a true friend who was in every way a real gentleman.

He was the author of the lead editorial entitled "Team Spirit" in the current issue of *QST*. He believed that Team Spirit was the powerful force that would enable the participating radio amateurs to cope with the challenges of the future. Vic was a Team Player who looked to the future; in the same issue is his picture with Astronaut Owen Garriott planning for the first Amateur Radio operation from space.

ARRL presidents who preceded Vic knew he was no fair-weather supporter: he was at his best when the going was rough. Vic had the unique ability to guide any meeting through the pitfalls of disagreement and dissension by wise counsel, consideration of differing opinion and the use of his special type of wit and humor. The growth and progress of the League are among his most successful accomplishments.

Above all he was one of the friendliest and most approachable of men. He knew no classes, he recognized no distinctions. He walked humbly with his friends, his co-workers and fellow men. Perhaps this is the greatest of all the legacies he gave to those who knew him. — *Eulogy delivered by Carl Smith, WØBWJ, November 30, 1983*

W4KFC's service to Amateur Radio included four years as President, and three years as Vice President, of IARU Region 2. He stepped aside at the Cali Conference in June 1983 to be able to devote more time to his ARRL duties. Here, he takes advantage of a quiet moment to compare notes with the Editor on how the Conference is progressing.

during the critical years before and during the 1979 World Administrative Radio Conference, and traveled to more than 40 countries to generate support for the IARU position. Through it all he remained active in his local Amateur Radio organizations, particularly the Potomac Valley Radio Club, and contributed articles to *QST* and *CQ*.

One of Vic's first encounters with the FCC in Washington came after World War II, when he intervened on behalf of the many amateurs who, like himself, had relocated during or after the war years and wished to have "counterpart" call signs — that is, call signs in their new call area with the same suffix they had had in the old. Through gentle persuasion, he was able to gain this privilege not only for himself but for countless others as well. Unfortunately, FCC was later to abandon the practice.

As active as he was organizationally, he is probably better known for his on-the-air operating. At the 1983 ARRL National Convention in Houston, Vic asked those attending the ARRL Forum how many of them had worked him. About three-fourths of the audience raised their hands! It was an impressive display, but not altogether surprising: For decades, if you hadn't worked W4KFC in the Sweepstakes, you hadn't been on. He was equally active and successful in DX contests, particularly after moving to his hilltop location in Clifton in the mid-50s. The Clifton site was such a classic example of a good radio location that it was featured in W3AFM's "Station Design for DX" *QST* series in 1966. But it was operating ability, and not location or antenna hardware, that was the key to Vic's success. In the three months just before he took office as ARRL President, Vic worked 111 countries with a 2-watt rig — just to see if he could do it. His operating energies were not devoted entirely to competitive activities. He remained active in traffic handling and became a regular participant in Straight Key Night and the Novice Roundup — the former because of the value he placed on fraternalism, and the latter because he thought it important to give beginners a word of encouragement and a helping hand. In his last Novice Roundup, in 1983, he worked more than 200 stations and sent each a QSL card and a letter of welcome. The conscientious way he discharged his Presidential duties cut into his operating time, but he continued to meet schedules as frequently as possible with friends throughout the world.

Just a week before his death, Vic presented a Special Citation to Mark Barettella, KA2ORK, on behalf of the Radio Club of America. *(N2ATT photo)*

Dear Friends, it's good to see so many of you here today, to join in paying tribute to the man who most of us regard as the leading radio amateur of the postwar era. Vic Clark was a champion of Amateur Radio in both senses of the word: a world-class operator as well as one of its greatest protectors and supporters. At ARRL Headquarters the messages of condolence are pouring in — from all six continents and more than a dozen countries by yesterday afternoon. Thousands of radio amateurs feel that they have suffered a personal loss — for, as his many friends in Latin America would say, Vic Clark was *simpatico*.

Vic served his fellow radio amateurs, both present and future, in a variety of roles — from Section Communications Manager of the ARRL Arizona and Virginia Sections to ARRL President. He played a key role in our success at the 1979 World Administrative Radio Conference, although his earlier heart trouble forced him to limit his time in Geneva. As Chairman of the ARRL Long Range Planning Committee, Vic laid the groundwork for the League of the 1980's and beyond — a revitalized organization with greater opportunities for grassroots involvement which was just taking shape when he was taken from us. He felt that his winning of the 1936 Hiram Percy Maxim Memorial Award had given him an important boost early in life, so as a personal project he set out to re-establish this prestigious award for a new generation of young radio amateurs. Several of you who are here today were key contributors to the endowment fund for the Maxim Award, and I know Vic was gratified that you shared his vision.

As great as the loss of Vic Clark is to our organization, it is eclipsed by the personal loss felt by those who were privileged to work with him. Vic was already famous when I first read about him as a 12-year-old, aspiring ham in 1962. I recall, as do many of you, the thrill of my first contact with W4KFC, 20 years ago this month, and the rush to send my QSL card so as to receive his in return — a request which he honored promptly, as he always did. The honor that I felt in taking office as General Manager at the same time Vic assumed the Presidency is difficult to express. He took great pleasure in introducing me as one who was young to be General Manager, but who was aging rapidly.

While his 20 months as ARRL President was much too short, his accomplishments have left an indelible impression on our organization. Vic was modest in triumph, and always anxious to shift the credit, but never the blame, to others. How aggrieved we are to have lost Vic Clark — and how fortunate we are to have known him! — ***Eulogy delivered by David Sumner, K1ZZ, November 30, 1983***

W4KFC with Dr. Ernest Ambler, Director of the National Bureau of Standards, at the November 3, 1983, dedication of the Bureau Radio Amateur Signal Society (BRASS) club station.

Vic Clark was more than an exemplary radio amateur: he was also successful in his career, and was intensely devoted to his family. Vic served with the Federal Aviation Administration and its predecessor agencies from 1941 to 1962, directing the establishment of the instrument landing system (ILS) at airports throughout the U.S. and assisting with the implementation of the system in other countries. He then became director of the U.S. Coast Guard Electronics Engineering Laboratory in Alexandria, serving in that post until his retirement in 1973. Vic and Hester raised six children, including three hams: Andrew (WA4PRF, now living in Japan), Kenneth (K4OKZ), Roger, Jennifer, Beth (KA4YTN) and Miriam. He had seven grandchildren. As supportive as Hester was of Vic's activities, he was equally supportive of hers, particularly in the 4-H.

How do you sum up such a man in few words? Perhaps Hal Steinman, K1ET, has said it best: "Vic Clark was a big man who never made anyone else feel small." — *David Sumner, K1ZZ*

League Lines...

As a final on-the-air tribute, this year's Straight Key Night on New Year's Eve will be dedicated to the memory of Vic Clark, W4KFC. All amateurs are encouraged to make at least one SKN QSO. Instead of the traditional prosign SK to indicate the end of contact, participants may send a final farewell with the letters "VIC" at the end of each contact.

Effective January 3, 1984, antenna data collected on FCC forms 714 and 610 (question 9) will be eliminated. Amateurs proposing antennas exceeding FCC's standards must submit Form 854 to the FCC Field Operations Bureau's Antenna Survey Branch, Washington, DC 20554. The new forms are available from the FCC Consumer Assistance Branch, Gettysburg, PA 17325, any District Office, or ARRL Hq. See Happenings, this issue, for details.

Attention Texas amateurs! On behalf of Bob Winn, W5KNE, and West Gulf Division Director Ray Wangler, W5EDZ, ARRL General Manager Dave Sumner, K1ZZ, approached the Texas 1986 Sesquicentennial Commission for permission for radio amateurs in Texas to use the official Texas Sesquicentennial Logo on their QSL cards. That permission was granted by Randy M. Lee, Executive Director of the Commission, on November 9, 1983.

The ARRL Foundation has established a Scholarship Endowment Fund to honor Senator Barry Goldwater, K7UGA. Don't miss this opportunity to be a Charter Contributor and let Barry know of your appreciation for his support of Amateur Radio. See the article on page 50.

FCC's Office of Science and Technology has issued a technical memorandum describing tests conducted by the FCC relating to the feasibility of integrating Amplitude Compandored Sideband (ACSB) into existing fm two-way radio services. This information may be of interest to hams. Copies can be purchased from International Transcription Systems, Inc., FCC, 1919 M St., NW, Washington, DC 20554 for $5.88. Ask for Technical Memorandum FCC/OST TM 83-7.

At an informal luncheon attended by prominent Washington-area amateurs in November, an "MVB Award" was presented to James C. McKinney, present Chief, Mass Media Bureau, FCC, in recognition of his work on behalf of the Amateur Service while he was Chief, first of the Field Operations Bureau and then of the Private Radio Bureau. A walnut plaque, on which a Morse code key was mounted, explained that MVB meant "Most Valuable Bureaucrat"!

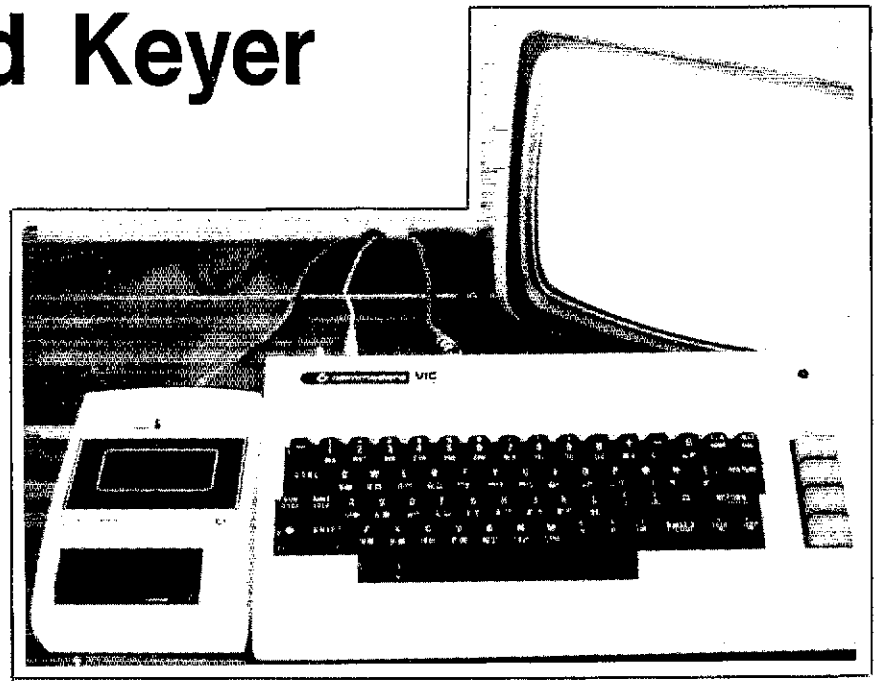
In return Mr. McKinney gave us an important reassurance re the Grenada mission. In reply to a question on whether the Amateur Service had perhaps incurred the displeasure of the U.S. military establishment by handling communications between Grenada and the U.S. in October, he replied, "Not in the least. At no time during the Grenada mission did the Pentagon call the Federal Communications Commission. I have not heard an ounce of criticism from anyone about the way the amateurs conducted these operations. In fact, Grenada constituted one more shining hour of Amateur Radio public service for the benefit of all Americans. The Commission is extremely proud of the service rendered by U.S. amateurs during the Grenada mission!"

"The operation is an unqualified success!", said ARRL General Manager Dave Sumner, K1ZZ, of W5LFL's amateur radio operation from the orbiting Space Shuttle Columbia. "We are proud that Amateur Radio has played a role in bringing active participation in the space program to the average citizens of the world." W5LFL's first opportunity for Amateur Radio communication came 2 days, 10 hours, and 40 minutes into the mission, and the first station contacted was WA1JXN in Frenchtown, Montana. Later in the mission W5LFL QSOed King Hussein of Jordan, JY1, Senator Barry Goldwater, K7UGA, and the ARRL Hq. station, W1AW. Many, many other contacts were made, also. Even when located hundreds of miles from the STS-9 ground track, earthbound amateurs reported that Owen's signals were loud and clear, indicating that the experimental "indoor" antenna was working efficiently. Owen said that ambient noise levels in the aft flight deck made it difficult for him to copy the signals of those calling him. He recorded everything, however, and should be able to recognize many more call signs when playing back the recordings later. February QST will contain a "wrap-up" article on the W5LFL "Amateur Radio in Space" mission.

W1AW operator job opening. If you are General class or higher and are interested in Hq. employment as a W1AW operator, please contact John Lindholm, W1XX, Communications Manager, at ARRL Hq.

The ARRL Technical Department has a job opening. Broad Amateur Radio and digital electronics background required. Contact Paul Rinaldo, W4RI, at ARRL Hq.

A Keyboard Keyer and Code-Practice System



Would you like an assistant in your shack that can serve as a keyboard keyer, provide code practice, has a time-of-day clock and displays a frequency-allocation table on demand? Your VIC 20 computer can do all this and more!

By Dan Whipkey,* N3DN

The popular and versatile Commodore VIC 20® microcomputer is a perfect basis for a keyboard keyer and code-practice system. There are many keyboard keyers on the market, but the features, performance and cost of this system make it worth consideration — especially if you own or are planning to purchase a VIC 20.

The program will fit into an unexpanded (5 kbyte) VIC 20 with cassette tape and TV receiver. It should be adaptable for use with any system that uses the 6502 microprocessor. Output is through a relay, allowing it to be independent of the keying polarity or voltage requirements of your rig. The VIC 20 seems to operate well in RF fields and does not produce objectionable interference in the receiver of my Kenwood TS-830.

Code speed is variable from 1 to more than 70 words per minute. Although the primary program is written in BASIC, the actual Morse code generation routines are written in 6502 machine language to achieve the speed necessary for fast CW operation. A complete program listing is given in the Appendix.

The machine-language program is located in DATA statements within the BASIC program and fits neatly into the cassette-buffer section of the computer memory, thus conserving main memory. This routine is transferred automatically after the program is LOADed from cassette. Since tape is not used again during the keyboard or code practice session, no conflict arises over this dual use of the cassette-buffer area.

*3193 Sandy Ridge Dr., Clearwater, FL 33519

Keyboard Mode

In the keyboard mode, the keyed characters are displayed on the screen and the Morse code is monitored through the TV receiver audio. The common punctuation marks are translated into their Morse code equivalents. These include period, comma, fraction bar and question mark. Four keyboard punctuation marks are translated to commonly used concatinated characters:

: translates to $\overline{AR}$
; translates to $\overline{SK}$
= translates to $\overline{KN}$
- translates to $\overline{BT}$

These are displayed on the monitor in parentheses; for example, a semicolon is displayed as (SK). Seven preprogrammed messages are available by using the F2 through F8 function keys on the VIC 20. These messages are inserted at the beginning of the session and are used for static information, such as call, name, QTH and rig. In addition, provision is made to dynamically enter and access the call of the station being worked. You could use this for variable information other than the call if you wish.

The time-of-day clock uses the internal clock on the VIC 20. When the program is initialized after loading it from tape, the clock is set manually from the keyboard. During the session, the clock display is called up by depressing the left-arrow key. It displays the current time as a four digit number (hours/minutes). Seeing the current time on the screen is an extremely convenient feature, particularly during contest operation.

A Fahrenheit-to-Celsius or Celsius-to-Fahrenheit conversion routine is called by depressing the * key. The user is prompted by screen messages, and return to the main program is automatic.

A table of amateur frequency allocations (for one amateur class) is provided by depressing the + key. The screen can be cleared simply by pressing the £ (English pound sign) key.

Code Practice Mode

In the code-practice mode, characters are generated randomly and displayed on the screen, and the corresponding Morse code is sounded through the TV receiver speaker. Relay output is available, if desired. The character mix is selectable for (1) letters only, (2) letters and numbers, or (3) letters, numbers and common punctuation marks.

Two choices of spacing between characters are available: random (1 to 10) characters per space, or five-character groups with one space between. After 200 characters are generated, the system stops to allow you to check your copy. You are then given the option of starting another session or returning to the main program.

Operation

Keyboard operation is simple and logical. The VIC 20 keyboard has a 10-character buffer, which enables the operator to type ahead of the system. You must be careful not to get more than 10 characters ahead, however, or data will be lost. This is not as restrictive as it might seem. The function keys count as only one key stroke, but they cause multiple Morse characters to be generated.

In the keyboard mode on an unexpanded VIC 20, operational steps are:

1) Turn on the power.

2) A message is displayed on the screen: 3583 BYTES FREE
READY

3) Press the SHIFT and RUN/STOP keys simultaneously.

4) A screen message, PRESS PLAY ON TAPE, is displayed.

5) Press the PLAY button on your tape unit (assuming the Morse code cassette is in the unit).

6) The following screen messages are displayed:
SEARCHING
FOUND MORSE
LOADING
READY
RUN (The program runs for about 20 seconds to initialize the machine-language program.)
MORSE CODE PROGRAM BY N3DN
KEYBOARD = 1
CODE PRACTICE = 2
YOUR SELECTION?

7) Press 1 and the RETURN key.

8) The screen message, TIME SET? will appear.

9) Type in the current time as a six-digit number (format: hhmmss) and hit the RETURN key.

10) CODE SPEED? will be displayed on the screen.

11) Type in a two-digit number, code speed in words per minute, and then press the RETURN key.

12) The keyboard is now ready to go. Each valid key that you type is displayed on the screen and will produce a Morse code character through the TV speaker and the relay output.

To exit from the keyboard mode, press the RUN/STOP key. If you happen to be in an input loop, you must press the RUN/STOP and RESTORE keys at the same time.

To reinitialize the program after stopping, type RUN and then press the RETURN key. To change code speed, type RUN 180 and then press the RETURN key. To reset the clock, type RUN 170 and press RETURN.

Use of Function Keys

To input the call letters of the station being worked, depress the SHIFT and RETURN keys simultaneously. The screen will display INPUT HIS CALL? Type in the other station's call and press the RETURN key. His call will now be sent whenever the F1 key is depressed. F2 through F8 will send preprogrammed messages. These messages are contained in lines 660 through 720 of the program listing found in the Appendix. When you change these statements, make sure you adhere to the exact format shown and keep the entire line length to less than 88 characters.

The function keys can be typed one after another to send long messages. For example, let's assume the other station's call is N5DHJ. Typing the following keys F1, F3, F2, 5, 9, 9, SPACE, 5, 9, 9, SPACE, F4, F6, F1, F3, = will produce the following typical QSO response: N5DHJ DE N3DN R TKS UR RST IS 599 599 QTH IS CLEARWATER, FL. CLEARWATER, FL. NAME IS DAN DAN DAN HW? N5DHJ DE N3DN KN. Repeats can be sent simply by hitting the appropriate function key more than once.

When you become familiar with the use of the function keys, you will want to personalize the messages in lines 660 through 720. Remember, stick to the format shown and keep the *entire line* less than 88 characters. The VIC 20 screen editor makes it easy to change lines.

Table 1
Equivalent Values in Three Number Systems

	Binary (Base 2)	*Decimal (Base 10)*	*Hexadecimal (Base 16)*
BIT Values	8 4 2 1		
	0 0 0 0	0	0
	0 0 0 1	1	1
	0 0 1 0	2	2
	0 0 1 1	3	3
	0 1 0 0	4	4
	0 1 0 1	5	5
	0 1 1 0	6	6
	0 1 1 1	7	7
	1 0 0 0	8	8
	1 0 0 1	9	9
	1 0 1 0	10	A
	1 0 1 1	11	B
	1 1 0 0	12	C
	1 1 0 1	13	D
	1 1 1 0	14	E
	1 1 1 1	15	F

Code Practice

When operating in the code-practice mode, the user is again prompted by screen messages. After going through the normal start-up procedure, select code practice by typing 2 and pressing the RETURN key. The program supplies screen prompts to lead you through the process of initializing the system to suit your requirements.

Machine-Language Program

The machine-language program generates code with the standard 3:1 dash:dot ratio. If you prefer nonstandard weighting, you can shorten or lengthen the dash. Weightings of 2:1 or 4:1 are achieved easily by changing a data statement. To shorten the dash, change the 03 in line 400 to 02. To lengthen the dash, change the 03 to 04.

The audio frequency is specified by the EE characters in line 400. Modifying this value will change the frequency of the audio tone from the TV speaker.

After you make this (or any) modification to data statements you must SAVE the program to tape and then RUN the BASIC program to place the modified machine-language routine into its executable location.

Morse-Code Generation

The Morse code characters are expressed

Table 2
Hexadecimal Equivalent of Programmed Morse Code Characters

Character	Hex Value	Character	Hex Value
,	73	D	0C
-	31	E	02
.	55	F	12
/	32	G	0E
0	3F	H	10
1	2F	I	04
2	27	J	17
3	23	K	0D
4	21	L	14
5	20	M	07
6	30	N	06
7	38	O	0F
8	3C	P	16
9	3E	Q	1D
:	2A	R	0A
;	45	S	08
<	80	T	03
=	36	U	09
>	80	V	11
?	4C	W	0B
@	80	X	19
A	05	Y	1B
B	18	Z	1C
C	1A		

in the series of hexadecimal numbers beginning with the 73 in line 430 and ending with the 1C in line 450. Morse code characters up to seven elements long can be "custom built" by changing these numbers.

A brief discussion of hexadecimal notation may be helpful. A hexadecimal number is a convenient way of expressing a four-bit binary number. Table 1 shows a comparison of numbers in the binary, decimal and hexadecimal number systems.

In this system, a Morse character is expressed as a two-digit hexadecimal number. For example, the Z Morse character is the 1C in line 450. How is it translated? Convert the hex number to binary:

Hex 1 = binary 0 0 0 1
Hex C = binary 1 1 0 0
Combining these binary numbers we get 0 0 0 1 1 1 0 0

The Morse-code-conversion routine reads the combined binary number from left to right until it finds the first "1." This is the start bit. *Thereafter*, still reading from left to right, each "1" is a dash and each "0" is a dot. Our binary number would represent: start, dash, dash, dot, dot. Result: da-da-di-dit, or a Morse z! The table of characters is found sequentially in DATA statements starting with the 73 in line 430 and continuing through lines 440 and 450. Table 2 lists each character and its hex Morse code equivalent.

You can see that the characters < > and @ all translate to hex 80 (seven dots). These keyboard characters can be changed to provide custom-made Morse code elements. Let's take the < and make it into a new character, —...— for example. Write out this character in binary form:

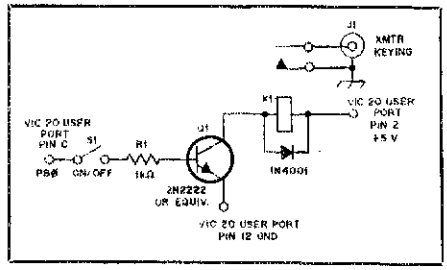


Fig. 1 — Schematic diagram of a transmitter interface that N3DN built into his VIC 20 computer.
J1 — 1/8-in miniature jack. Radio Shack part no. 274-251 or equiv.
K1 — Miniature SPDT 5-V relay, 55-Ω coil, Radio Shack part no. 275-240 or equiv.

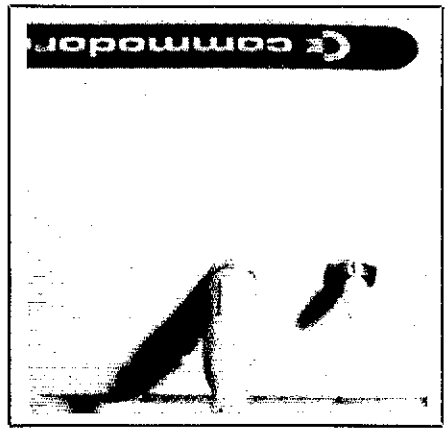


Fig. 2 — The switch and jack added on the back panel of a VIC 20 computer for connecting it to a transmitter.

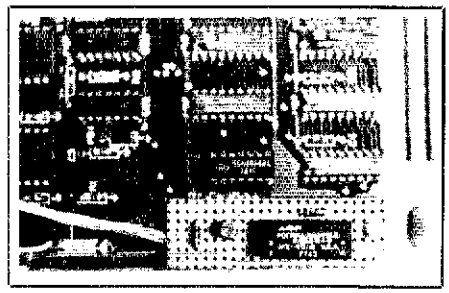


Fig. 3 — Mounting details of the transmitter interface circuit. The perf board containing the components is mounted with an existing screw in the back left corner of the computer case.

0 0 1 0 0 0 0 1. Adding a start bit we have: 0 1 1 0 0 0 0 1. Translate this into a hexadecimal number:

0 1 1 0 0 0 0 1
6 1

Find the first 80 in DATA statement line 440 and change it to a 61. Run the program. Now hitting the < key produces your new Morse character. In this way, you can change any of the available characters to whatever Morse equivalent you choose.

You must be very careful in changing the machine-language code. Errors can cause the program to go off into the "wild blue yonder." Changed programs should be SAVEd to tape often. If your program goes into a loop, sometimes the only way to get out of it is to turn the system off. This wipes out the program and can be a very frustrating experience after an hour's work making changes.

When you type the program into your VIC 20 from the keyboard, be very careful and have someone check your work as you go along. Most "errors" in computer programs turn out to be typing mistakes! Remember: The DATA statements contain hex numbers, so the characters you type in will be numbers 0 through 9 and letters A, B, C, D, E and F.

Hardware Modifications

The keyer signal is brought out on pin C of the VIC 20 user port. Also available on this connector are +5 V (pin 2) and ground (pin 12). I use the circuit shown in Fig. 1.

I drilled two ¼-inch holes in the left rear of the VIC cabinet top (see Fig. 2) for the switch and jack.[1] The other components are mounted on a small piece of perfboard that is mounted inside the computer, as shown in Fig. 3. The signal, +5 V and ground wires are soldered directly to the rear of the user-port connector pins. This allows other devices such as the VIC Modem, to plug into the port without having to disturb the keyer connections.

For those purists who cannot bear to make modifications to equipment, a two-sided connector with 12 pins on a side at 0.156-inch spacing will plug into the user port. The signal, +5 V and ground wires can be brought out to a small Minibox containing the circuitry, switch and output jack. A manual or electronic key can, of course, be connected in parallel with the relay points.

Conclusions

This system and program have proven to be a useful addition to my ham shack. The keyboard keyer is quick and versatile in both CW contests and casual operation. For contest work, I keep several copies of the program on tapes with different messages stored in the function keys, depending on the contest exchange, etc.

I have also found that the program and display are quite useful during phone operation. The clock display, coupled with the CLR/HOME key and screen monitor, makes a convenient "electronic scratch pad." Start time, station being worked, name, QTH and other information can be kept on the screen during the QSO. At the

[1]mm = in × 25.4

```
100 GOTO340
110 PRINT"■":PRINT"  MORSE CODE PROGRAM ":PRINT
120 PRINT"        BY N3DN":PRINT:PRINT:PRINT
130 PRINT" KEYBOARD=1":PRINT:PRINT" CODE PRACTICE=2":PRINT
140 INPUT" YOUR SELECTION";B
150 ON B GOTO 160,1090
160 PRINT"■"
170 INPUT" TIME SET";TI$:PRINT
180 INPUT" CODE SPEED";S:T=225/S:PRINT
190 POKE 0,T:TC=0
200 GETB$:IFB$=""THEN200
210 IF ASC(B$)=95THENGOTO590
220 IF ASC(B$)=42THENGOTO830
230 IF ASC(B$)=43THENGOID920
240 IF ASC(B$)=92THENGOTO1080
250 IFASC(B$)>132 ANDASC(B$)<142THEN630
260 IF ASC(B$)=58THENPRINT"(AR)";:GOTO310
270 IF ASC(B$)=59THENPRINT"(SK)";:GOTO310
280 IF ASC(B$)=61THENPRINT"(KN)";:GOTO310
290 IF ASC(B$)=45THENPRINT"(BT)";:GOTO310
300 PRINTB$;
310 POKE1019,ASC(B$):POKE37138,255
320 SYS1009
330 GOTO200
340 M=849
350 READX$
360 IFX$="ZZ"THEN110
370 GOSUB490
380 POKEM,X
390 DATA C9,20,F0,67,C9,2C,90,4E,C9,5B,B0,4A,AA,BD,96,03,A0,08,84,01,0A,C6,01,90
400 DATA FB,85,02,A8,02,0A,B5,02,A0,01,90,02,A0,03,A9,0F,8D,0E,90,A9,EE,8D,0B,90
410 DATA EA,EA,EA,EA,EA,EA,EA,EA,A9,01,8D,10,91,20,A8,03,A9,00,8D,0B,90,8D,10,91
420 DATA A0,01,20,A8,03,CA,01,D0,CA,A0,02,20,A8,03,60,98,0A,0A,A8,A5,00,A2,FA
430 DATA CA,D0,FD,38,E9,01,D0,F6,88,D0,F1,60,A0,04,20,A8,03,60,73,31,35,32,3F,2F
440 DATA 27,23,21,20,30,38,3C,3E,2A,45,B0,36,B0,4C,B0,05,18,1A,0C,02,12,0E
450 DATA 10,04,17,0D,14,07,06,0F,16,1D,0A,08,03,09,11,0B,19,18,1C
460 DATA AD,FB,03,4C,51,03,ZZ
470 M=M+1
480 GOTO350
490 X=0
500 IF LEN(X$)=0THEN580
510 A1$=LEFT$(X$,1)
520 X1=ASC(A1$)
530 X1=X1-48
540 IF X1>9THENX1=(X1)-7
550 X=X*16+X1
560 X$=RIGHT$(X$,LEN(X$)-1)
570 GOTO500
580 RETURN
590 TH$=LEFT$(TI$,4)
600 PRINT
610 PRINT"-------TIME=";TH$;"--------"
620 GOTO200
630 N=ASC(B$)-132
640 ON N GOTO 650,660,670,680,690,700,710,720,730
650 AD$=HC$ :GOTO750
660 AD$=" DE N3DN ":GOTO750
670 AD$="N3DN ":GOTO750
680 AD$="CQ CQ CQ DE N3DN N3DN N3DN K ":GOTO750
690 AD$="R TKS UR RST IS ":GOTO750
700 AD$="QTH IS CLEARWATER, FL, CLEARWATER, FL. ":GOTO750
710 AD$="NAME IS DAN DAN DAN HW? ":GOTO750
720 AD$="RIG HERE IS KENWOOD TS830S-ANT IS DIPOLE ":GOTO750
730 PRINT:PRINT:INPUT"HIS CALL";HC$:GOTO200
740 PRINT"■"
750 X=1
760 B$=MID$(AD$,X,1)
770 X=X+1
780 IFX=LEN(AD$)+2THENGOTO200
790 POKE1019,ASC(B$):POKE37138,255
800 SYS1009
810 PRINTB$;
820 GOTO760
830 PRINT"■":INPUT" FAR-1,CEL-2";H:PRINT
840 ON HGOTO850,880
850 INPUT" DEG. FAR";FA:PRINT
860 CE=INT((FA-32)*5/9)
870 PRINT" FAR";FA,"= CEL";CE:PRINT:GOTO200
880 INPUT" DEG. CEL";CE:PRINT
890 FA=INT(CE*9/5+32)
900 PRINT" CEL";CE,"= FAR";FA:GOTO200
910 GOTO200
920 PRINT"■"
930 PRINT"FREQ.  ALLOC-EXTRA"
940 PRINT
950 PRINT"10 PH.","28500-29700"
960 PRINT"10 CW.","28000-29700"
970 PRINT"15 PH.","21250-21450"
980 PRINT"15 CW.","21000-21450"
990 PRINT"20 PH.","14200-14350"
1000 PRINT"20 CW.","14000-14350"
1010 PRINT"40 PH.","7150-7300"
1020 PRINT
1030 PRINT"40 CW.","7000-7300"
1040 PRINT
1050 PRINT"30 CW. 10100-10109":PRINT
1060 PRINT"    AND 10115-10150"
1070 GOTO200
1080 PRINT"■":GOTO200
1090 PRINT"■"
1100 INPUT" CODE SPEED":CC:PRINT:PRINT
1110 CS=225/CC:POKE0,CS
1120 PRINT" 1=LTRS,NUMS,PUNCT":PRINT
1130 PRINT" 2=LTRS,NUMS":PRINT
1140 PRINT" 3=LTRS ONLY":PRINT
1150 INPUT" YOUR SELECTION";PS
1160 CT=1:PRINT:PRINT:PRINT
1170 PRINT" 1=RANDOM SPACING":PRINT
1180 PRINT" 2=5 CHAR. GROUPS":PRINT
1190 INPUT" YOUR SELECTION";SS
1200 PRINT"■"
1210 IFSS=1THENZR=INT(RND(0)*10)
1220 IF SS=2THENZR=5
1230 FORT=1TOZR
1240 ON PS GOTO 1250,1280,1310
1250 RN=INT((RND(0)*47)+44)
1260 IF RN>57AND RN<63 OR RN=64 THEN 1250
1270 GOTO1320
1280 RN=INT((RND(0)*43)+48)
1290 IF RN>57ANDRN<65THEN1280
1300 GOTO1320
1310 RN=INT((RND(0)*26)+65)
1320 PRINT CHR$(RN);:CT=CT+1
1330 POKE 1019, RN
1340 POKE 37138,255
1350 SYS 1009
1360 NEXT T
1370 PRINT" ";:RN=32
1380 POKE1019,RN
1390 SYS1009
1400 IFCT>200THEN1420
1410 GOTO 1210
1420 PRINT:PRINT:PRINT" 200 CHARACTERS SENT."
1430 PRINT" CHECK YOUR COPY."PRINT
1440 PRINT" 1=ANOTHER SESSION":PRINT
1450 PRINT" 2=QUIT":PRINT
1460 INPUT" YOUR SELECTION";YQ
1470 ONYQ GOTO1090,110

READY.
```

end of the QSO, stop time can be displayed and the screen information can be transcribed to the station log before I clear the screen for the next QSO. Of course, the TV audio and the relay switch are both turned off in this mode of operation.

The keyboard/code-practice system should be just what is needed for those learning the code and for those who wish to increase their code speed.

APPENDIX — BASIC PROGRAM LISTING

The print "." statements in lines 110, 160, 740, 830, 920, 1080, 1090 and 1200 are "clear screen" instructions. They are typed in as: the quote key; SHIFT CLR/HOME keys; and another quote. They appear as "." in the listing because my printer will not print the VIC 20's "reversed heart" symbol.

References

Finkel, A., et al. *VIC 20 Programmer's Reference Guide.* Commodore Business Machines, Inc. (Wayne, PA) and Howard W. Sams & Co. (Indianapolis, IN), 1982.

Hampshire. *VIC Revealed.* Hayden, 1982.

Zaks, R., *6502 Applications Book* (Berkeley, CA: SYBEX, Inc., 1979).

New Products

PACKET-RADIO CONTROLLER

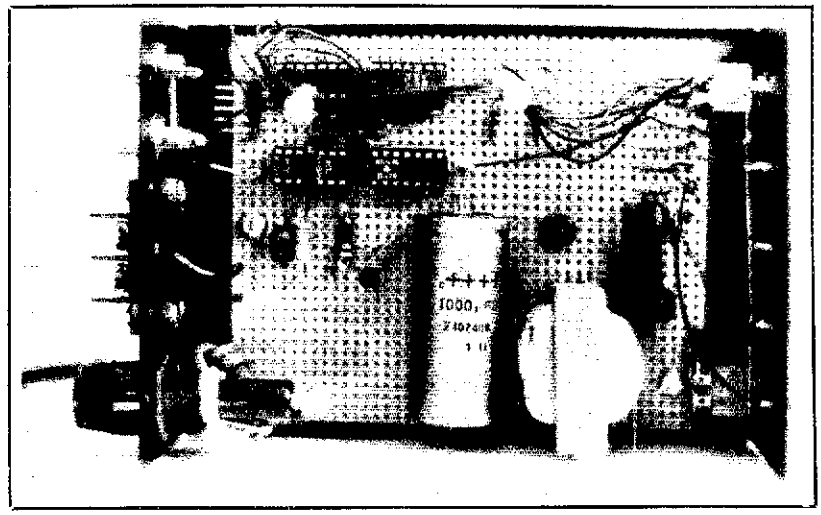
☐ GLB Electronics has announced their Model PK1 packet-radio controller. The terminal side is RS-232-C compatible and self-adapts to Baudot or ASCII codes from 45 to 9600 bauds. The radio side presently runs Vancouver Amateur Digital Communications Group (VADCG) protocol, and AX.25 protocol ROMs are expected to be released by the end of 1983. It has a built-in Bell 202 compatible modem operating at 1200 bauds.

Using a Zilog Z80A microprocessor, the PK1 has 8 kbytes of ROM and 4 kbytes of RAM as standard equipment. RAM can be expanded to either 14 or 56 kbytes at extra cost.

The PK1 PC-board assembly measures 4½ × 9.4 in. Its base price is $149.95 wired and tested, with documentation. Requires a single 12-V dc ¼-A power supply. Documentation is available for $5, refundable on purchase. Additional memory, an RTTY adapter, cabinet and connecting cables are sold separately. Contact GLB at 1952 Clinton St., Buffalo, NY 14206, tel. 716-824-7936. — *Paul L. Rinaldo, W4RI*

A Universal RTTY Current-Loop Interface

Still attached to that high-voltage, 60-mA loop and teleprinter? Build this interface and safely marry your TTL-level RTTY gear to that loop and enjoy the best of both worlds!



By Stan Nafziger,* KF4BY

Like many hams, I enjoyed RTTY for years using a Model 19 teleprinter and its associated 60-mA current loop. When Kantronics introduced the Hamsoft™ program boards for several popular computers, purchasing one seemed like an alternative worth considering since I own a TRS-80C® microcomputer. I did not want to buy the Kantronics modem (TU), as my homemade unit performs well. Because I was reluctant to dispose entirely of the Model 19 or modify any of the existing equipment, I sought a way to safely interface the high-voltage current loop with the TTL signals of the rest of my gear.

A Universal Current-Loop Interface

The circuit of Fig. 1 accomplishes the necessary interfacing and is universal in application. If you intend to use a Hamsoft board, Table 1 and Fig. 2 provide the cable color coding, signal identification and pin-out information you need.

Table 1
Hamsoft-Board Pin-Out Information

Pin No.	*Wire Color*	*Function*	*Signal*
1	Green	Demodulator In	Active low on SPACE
2	Black	Ground	Ground
3	White	CW Key Out	Active low on key down
4	Red	RTTY Out	MARK high/SPACE low
5	Brown	RX/TX	Active low for TX

The required isolation between the 150-V dc loop and the TTL circuits is provided by two optoisolators, U1 and U2. U1 handles the received information from the loop for transfer to the demodulator. Transmitted data keys the loop through U2. U3 provides the required polarity switching for the Hamsoft board. S1, the NORMAL/REVERSE switch, is not a necessity, but it certainly enhances RTTY operation if you do a lot of listening outside the amateur bands and your TU is not equipped with a similar switch. Because of S1, U4C and U4D are required to hold U2 and Q1 in conduction. Otherwise, when operating in REVERSE, the output of U3C would be low and U2/Q1 would be off, resulting in an open loop condition. In the transmit mode, the clamp (U4C/U4D) is released and U2 can follow the input.

U4A/Q3 and U4B/Q2 interface the KEY and PTT lines to the Hamsoft board. You may choose to use relays at these points, but the transistors handle the switching for my TS-430S quite well.

U5 and its associated LEDs provide a visual indication of the status of the RCV/XMT, CW KEY/PTT, SPACE and MARK lines. The SPACE and MARK LEDs are helpful when tuning in RTTY and CW

*406 Holly La., Mauldin, SC 29662

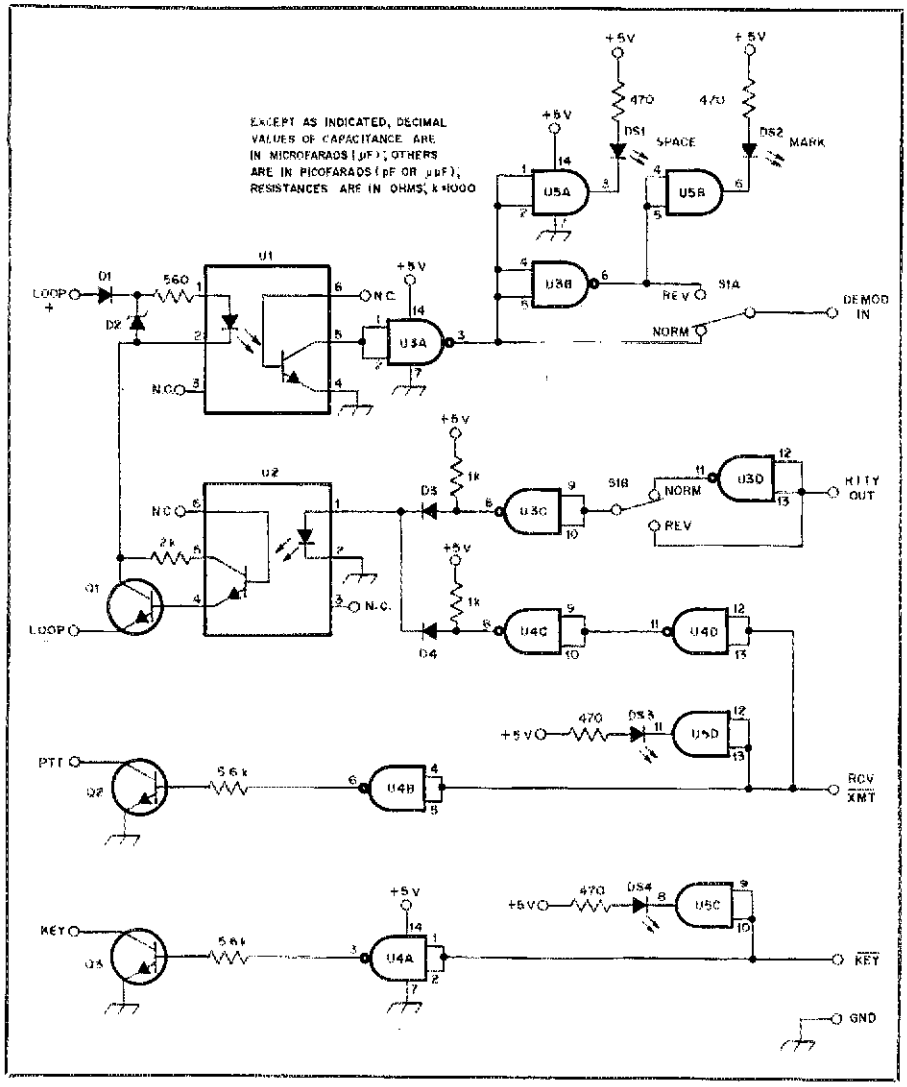


Fig. 1 — Schematic diagram of the interface circuit. All resistors are ¼-W, 5% types.
D1 — 1N4820 or equiv.
D2 — 5-V, 500-mW Zener diode.
D3, D4 — 1N4148 or equiv.
DS1-DS4, incl. — LED
Q1 — High-voltage NPN (Radio Shack MPS-A42 or equiv.)
Q2, Q3 — 2N2222.
S1 — DPDT toggle switch.
U1, U2 — Optoisolator, MCT-2 or equiv.
U3, U4 — 7400 quad two-input NAND gate.
U5 — 7408 quad two-input AND gate.

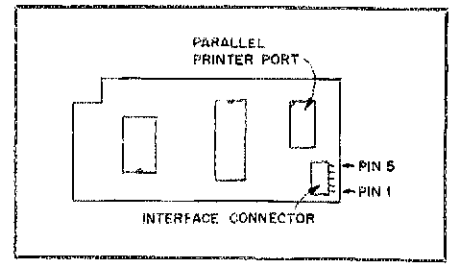


Fig. 2 — Hamsoft-board connector pin-out identification.

signals and should be incorporated if your TU does not have a similar feature.

Construction

Although the parts layout is not critical, I recommend physical separation of Q1, U1, U2 and the remainder of the circuit for obvious reasons: TTL ICs do not appreciate 150-V potentials! The interface power supply can be any regulated +5-V source capable of delivering about 250 mA or more. I built my interface and power supply on a small piece of perf board and housed it in a suitable enclosure.

Some Final Words

A note of caution: Do not connect or disconnect any cabling between the interface and the Hamsoft board with power applied. Also, do not remove the Hamsoft board from the computer without first removing power from both units; the Hamsoft board or the computer could be damaged.

The current-loop interface has been operating perfectly for some time now. This approach allows my TRS-80C microcomputer to be integrated easily into my present RTTY system without any modifications. You may find this simple approach to be of value as well. I welcome any questions or comments you may have; an s.a.s.e. would be appreciated.

Strays

***QST* congratulates...**

☐ the following radio amateurs on 60 years as ARRL members:

- Robert York Chapman, W1QV, of Groton, Connecticut
- Frederick H. Gildemeyer, W4CW, of North Palm Beach, Florida
- Harold H. Robinson, W4QR, of Hampton, Virginia
- Wayland M. Groves, W5NW, of Odessa, Texas

***QST* congratulates...**

☐ the following radio amateurs on 50 years as members of the ARRL:

- Samuel E. Johnson, W6BS, of La Jolla, California
- Edward P. Tilton, W1HDQ, of Canton, Connecticut
- David B. Mitchell (ex-W6OUU), of Vallejo, California
- Orin C. Levis, W6DZ, of Sacramento, California
- William G. Hall, K4RT, of Venice, Florida
- John Montgomery, KB2IE, of McLean, Virginia

QEX: THE ARRL EXPERIMENTERS' EXCHANGE

☐ Wonder what you've been missing by not subscribing to *QEX*, the ARRL newsletter for experimenters? Among the features in the December issue were:

- An introduction to "Packet Meteor Scatter Communications," by Jeffrey W. Moore, KQ1E
- Four BASIC programs for the Pi and Pi-L Network, by Elmer Wingfield, W5FD, in "A Note on Pi-L Networks"
- Info on a new Amplitude Compandored Sideband report offered by the Office of Science and Technology

QEX is edited by Paul Rinaldo, W4RI, and is published monthly. The special subscription rate for ARRL members is $6 for 12 issues; for nonmembers, $12. There are additional postage surcharges for mailing outside the U.S.; write to Headquarters for details.

Build That Kit, Painlessly!

Instruction manuals for kit projects don't always contain sufficient information to make the task easy. KB2LG offers some helpful advice, based on his "learn-by-doing" experiences.

By Irv Seideman,* KB2LG

Building electronics gear from a kit can be a money-saving, satisfying experience — assuming the finished product functions correctly! If it doesn't, your choices are (1) do your own troubleshooting or (2) pay to have the equipment made operational. Logical assembly procedures and reasonable care during construction should help you avoid these choices.

Perhaps you have noticed that manufacturers' instructions for kit assembly range from sketchy to very detailed, depending on the manufacturer. I have found, after successfully completing a number of kits of increasing complexity, that some tools, procedures and precautions (not mentioned in the instructions) speeded the assembly and helped ensure that the finished unit operated as it was designed to.

Despite the temptation to install parts on the PC boards and chassis when we first remove them from their packages, we should avoid doing this. An organized approach will help us to avoid delays and confusion because of a lost or misplaced component. We should also avoid assembly with "make-do" tools, ensure that the circuit connections are solid ones, and avoid a host of gremlin-infested shortcuts that we might be tempted to adopt in our anxiety.

Useful Kit-Building Tools and Supplies

In addition to the basic tools (e.g., screwdrivers, pliers, cutters and soldering iron), some other tools and supplies will help us speed assembly and perhaps even negate Murphy's law until we are finished with the job. You can determine from Table 1 which items listed are desirable after looking at the kit assembly plan and reading the remainder of this article.

Inventory, Verification and Subdivision

We should make sure up front that no parts are missing or defective. Also, we will want to store the components where they are easy to retrieve. Step 1 is to prepare a parts inventory: Make sure you have all of the parts, that they are the right value, and that none are defective.

Open all of the packages and envelopes. Separate components that are similar. Put all parts of the same value (or within a narrow range of values) in a separate storage tray. (For complex kits, you may be instructed to complete one section or module at a time, and the parts may be packaged accordingly.) For example, you may store all of the ¼-W 1-kΩ resistors in one tray. When there are a few resistors of each value (e.g., 1.2 or 10 kΩ), you may store them all in one container. Similarly, you may place a group of small potentiometers in a single tray. I have found that 10 resistors of *different* values in a single tray is the maximum for quick and easy retrieval. A self-adhesive label can be affixed to each compartment or container used. This should be marked with the value or value range for the parts in the container.

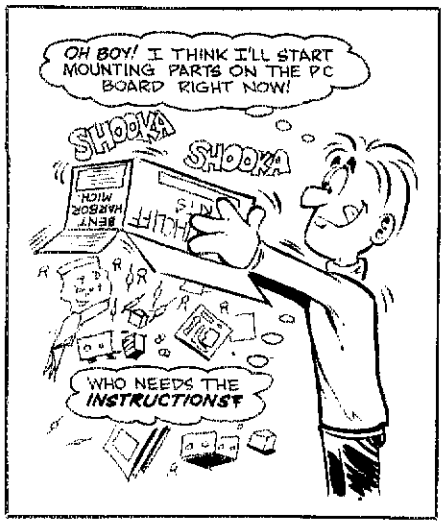
In order to keep track of what you have done, or what remains to be done, prepare a list of the parts, using two columns with the headings Inventoried and Installed. Place a check mark in each column, as applicable. When following this plan, you will be able to verify whether a missing part was

Table 1
Kit-Building Tools and Supplies†

1) Open-end wrenches: for large nuts on controls, pilot lamps, etc.
2) Socket wrenches: (nut drivers): for nos. 4, 6 and 8 nuts.
3) Tweezers (3 in): for handling small parts.
4) Magnifying glass: a 4X or 5X jeweler's loupe and a 4-in-diameter glass.
5) Sponge or steel wool: for cleaning the soldering-iron tip.
6) Solder: 60/40 resin core. Use 0.035-in-dia. for PC boards; 0.50 or 0.62-in-diameter for heavier connections.
7) Light household abrasive (e.g., Bon Ami): for polishing PC-board foils.
8) Electricians' putty: for holding nuts and screws (see text).
9) Volt-ohmmeter: for verifying parts values.
10) Hookup wire: with high-temperature insulation.
11) Storage trays: for separating parts. Use egg crates, muffin trays, tackle boxes or small individual bins.
12) Resistor fixture: If there are several resistors of the same physical size to be installed, say, ¼ W, use two brads (no. 18 × 1 in) hammered into a small block of wood. This will make a suitable lead-bending fixture.

†These are useful items for kit building. How many of these things are needed will depend on the type of kit being assembled. See text.

*25 Lumar Rd., Lawrenceville, NJ 08648



Read the instructions before you start to mount the parts on a PC board or chassis.

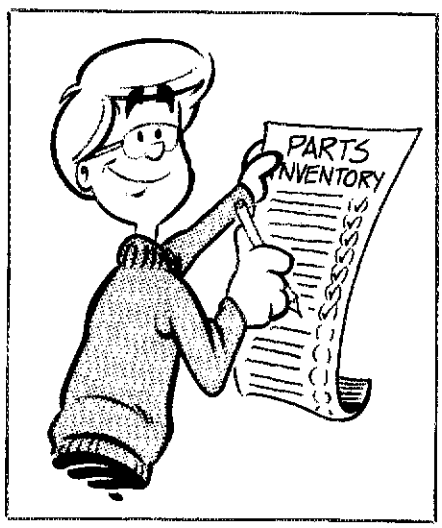
present at the beginning, but was misfiled or dropped on the floor.

As you transfer each part from the original packet to the chosen storage bin, measure the value or give it a visual inspection. For example, select a ¼-W resistor, read the color code (use a magnifying glass to be certain of the colors), and measure the resistance. This will verify that the color code is correct for the resistance value; sometimes a manufacturer will code a run of resistors incorrectly. Be careful in checking the color coding, for some colors look alike. For instance, blue and gray can be confused; likewise with purple, brown and red. Check the values with care to be aware of this possibility.

Checking Other Parts

Electrolytic, tubular paper and high-value ceramic capacitors can be tested for charge capability by means of an ohmmeter. The meter is set for the high-ohms range, after which you touch the ohmmeter test leads to the capacitor terminals, then reverse the connections immediately. At this time, the meter needle should indicate anything from a small to a large deflection, then return to zero. This meter action will verify that the capacitor is not shorted or leaky (abnormal internal resistance). Following the tests, you may store the capacitors according to their types (e.g., electrolytics, tubular or ceramic). They can be filed in accordance with their capacitance values, as well.

The switches can be tested next. An ohmmeter (set for the low-ohms range) can be used to ensure that continuity exists between the switch poles and the related contacts. Check also for cracks in the switch wafers. This is also a good time to segregate any components with special characteristics, such as 1% resistors and temperature-compensating capacitors. These parts can be placed in a separate tray, or trays.



Make sure you have all of the components before you start the assembly procedure. Organize the parts for easy identification.

Transistors and ICs

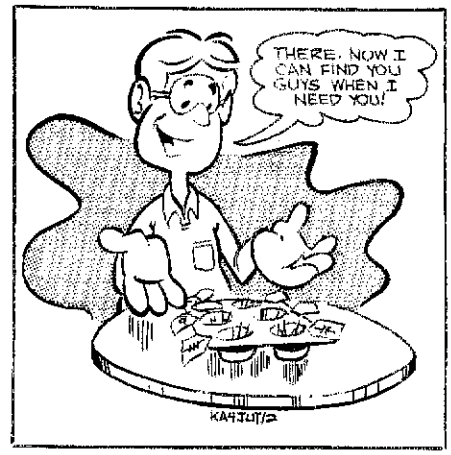
You may want to line up your transistors and ICs in accordance with the type numbers. If they are not static-sensitive, you can stick them in a block of Styrofoam insulation. If they are sensitive to static charges, they should be mounted on conductive black foam material. Generally, this is supplied with the kit, as necessary. The sensitive semiconductors may require special handling (watch for warnings), and should not be disturbed until it is time to install them.

If you have access to one of the simple transistor checkers (see the ARRL *Handbook,* Chapter 16), it will be worth your while to test the transistors; likewise with any diodes in the kit. An ohmmeter can also be used for diode checking. Such tests don't reveal much about the dynamic operation of the devices, however. It is not practical to check ICs unless you have access to dedicated equipment. The indication for a satisfactory diode is a low forward resistance (on the order of 5 to 15 ohms) and a high back resistance (usually greater than 100 kΩ).

Printed-Circuit Boards

Before I mount any parts on a PC board, I like to polish the metal foils with a light-abrasive household cleaner, using a damp cloth or sponge. This will remove oxidation and residue that may have accumulated, and will improve the adhesion of solder.

Unless the instructions say otherwise, mount the flattest components, such as low-wattage resistors, on the PC board first. Gradually progress to the tallest parts (for example, electrolytic capacitors and vertical heat sinks). Try to position the parts so any values printed on them are visible from the same viewing direction. Also, mount the smaller resistors so their color codes "read" in the same direction. This will help eliminate a lot of board turning



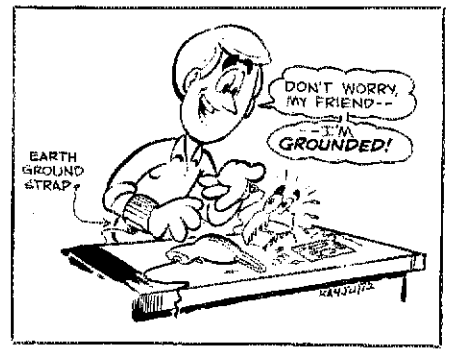
Use trays to contain similar parts. This will simplify the job.

and neck straining later on when values need to be checked.

Components should be soldered to their corresponding foil pads by means of a clean, fully heated soldering iron. A conically-shaped tip in a 25-W pencil iron is recommended. Use a damp sponge or steel wool at intervals to keep the tip of the iron clean. To form a good joint, the solder should adhere well to the PC-board pad. You should be able to pull the solder up the component lead with the iron, thereby forming a "chocolate-kiss" shape. After the joints have cooled, examine them with a magnifying glass to verify the adhesion and shape. Clip off the excess lead lengths close to the circuit board. Keep track of the clippings and place them in a storage tray for later use as possible jumpers. *Warning:* A lost clipping may be the cause of an unwanted solder bridge on a PC board!

Dealing with ICs

ICs with parallel rows of pins (DIP) and IC sockets can be difficult to install on PC boards if you don't align the pins first. Initially, verify that each pin is in line with the one adjacent to it. In most cases, the rows of pins angle outward and are farther apart than the socket contacts or PC-board holes. Use a small block of wood to bend all of the pins in one row slightly inward. Do the



Static charges can destroy some transistors and ICs quickly. Follow instructions when handling sensitive devices.

same with the opposite side of the IC. Adjust the pins until they align with the mating receptacle. Some ICs are hard to insert in their sockets, even though the pins are aligned correctly. Once alignment is verified, press firmly and evenly on the IC until it is fully seated.

When you install ICs or any other multilead component, first solder only the end leads that are diagonally opposite one another. Then check to ensure that the component is lying flat against the PC board. If it is not, you'll find it a simple matter to reheat one or the other end connection, then press the component into a flat position. The remaining pins can then be soldered.

Transistor and Electrolytic-Capacitor Installation

Transistors with truncated circular plastic bodies come with three in-line leads of equal length. It is easier to mount the transistor on a PC board if each lead is of slightly different length. Cut across the ends of the leads at an angle of approximately 20°. The PC-board holes are usually laid out to form a triangle. Use tweezers to bend the center transistor lead toward the apex of the triangle. Be sure to bend the lead toward or away from the flat side of the transistor so the installation conforms to the stencil outline on the PC board (or as specified in the instructions). Next, insert the longest lead in the appropriate hole. Follow this with the other two leads, until the transistor is about ¼ inch above the PC board.[1] Solder only two of the leads; then, observe if the transistor body is straight or at an angle. If the transistor isn't straight, unsolder one lead and align the device. Now, solder the third lead.

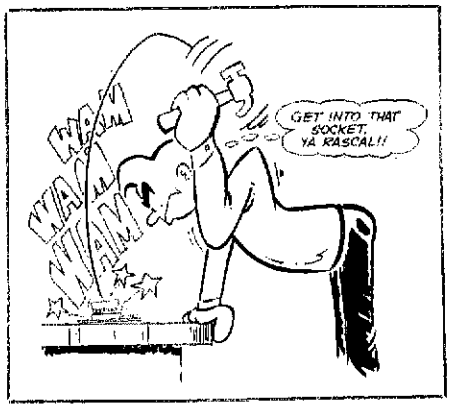
Electrolytic capacitors may be marked with plus and minus connections, or they may show only one polarity sign (heavy black arrow). Unfortunately, the marked polarity is *minus* in some instances and *positive* in others, even in the same kit. Be certain that the leads are positioned properly before you solder the component in place. Solder the center lead of end-mounted electrolytic capacitors first. Press down gently as you solder to ensure a firm fit between the capacitor body and the PC board, then solder the remaining lead.

Interconnections

It is easier to verify correct routing of interconnecting wiring if the wire insulation color is related to a unique circuit. It may not be practical to have a different color for each circuit. Major distinctions can be made by the following possibilities:

1) Blue: low-voltage ac power
2) Red: higher-voltage dc power (positive)
3) Orange: low-voltage dc power (positive)

[1]mm = in. × 25.4.



Install the ICs gently, and apply steady, even pressure on the IC when seating it in a socket.

4) Black: ground/dc voltage (negative)
5) White: dc voltage negative with reference to ground
6) Green: signal circuits (input)
7) Yellow: signal circuits (output)

Wire insulation that melts as you make a solder connection is not only annoying, it can contribute to a short circuit. Test for this possibility by holding (in a vise or pair of locking pliers) a 2-inch length of wire that has been stripped back about ½ inch.[2] Form the end of the wire into a small loop and melt a drop of solder on it. Hold the iron tip on the solder until the insulation smokes or melts. If it melts, use different wire. *Caution:* The insulation is probably not flammable, but handle it as if it were.

Mechanical Assembly

If self-tapping screws have to be threaded into parts such as heat sinks or partitions, do this before the part is positioned in place. If possible, hold the part in a vise and guide the screw with care to avoid misthreading.

Parts such as fuse holders, pilot lights and banana plugs that require the tightening of a nut from the back should be mounted early. This will provide ample room to swing an open-end wrench around them. If there isn't enough room, try fitting a socket (from a socket-wrench set) over the nut and rotate it in small increments with vise-grip pliers. If a lock washer is not supplied, apply some thread-locking gel to prevent eventual loosening.

When a small nut has to be held in position for threading on a screw in a crowded area of the chassis, and the only approach is at right angles to the screw axis, attempts to hold the nut with pliers or a loop of solder are seldom successful. Try forming a thin ring of electrician's putty around the nut, then press it into the opening of a box wrench of the appropriate size. This will affix the nut within the wrench until it is started on the screw, but will allow easy disengagement. If the box wrench is too short, try clamping the nut in a surgeon's hemostat. Use care to not exceed the allowable spread of the jaws in the locked position.

If wiring is to go through a hole in the chassis or a partition, install a rubber or plastic grommet in the hole. This will prevent chafing of the wire insulation. If a grommet is not available, use a countersink or deburring tool to remove the sharp edges of the hole, top and bottom. [*Large-diameter spaghetti tubing can sometimes be placed over a wire bundle in the area where it passes through the hole.* — Ed.]

[2]See note 1.

Conclusion

Kit assembly can be fun, and you have an excellent chance of completing your project successfully if you use adequate tools, follow an organized plan and constantly verify the accuracy of your operations. The pride of accomplishment will add to your pleasure when you use your new equipment. It will be more than make up for the time you invested in putting the kit together!

Strays

I would like to get in touch with...

☐ any amateurs who are Providence College alumni. Paul B. Boivin, Jr., W1ZXA, 242 Old River Rd., RR 4, Lincoln, RI 02865.

☐ any TRS-80® microcomputer users in northcentral Ohio who are interested in joining a net. M. L. Braun, K8IQB, 202 Howard St., Bellevue, OH 44811.

Next Month in QST

When Owen Garriott, W5LFL, made his first historic contact with earthbound stations from the Space Shuttle, he became part of an unprecedented media event and an outstanding achievement for Amateur Radio. You'll find all the details in a February *QST* wrapup.

Also in the February issue:

- the first of a series that will provide computer-generated radiation patterns showing the effect of ground conditions and height for various types of antennas. This installment covers dipoles.
- a construction article describing an AMTOR code converter — just what you've been waiting for if you're into high-tech Amateur Radio.
- packet radio and the personal computer
- two articles aimed at those less experienced: A Beginner's Look at Basic Oscillators, and How to Read a Schematic Diagram.

• *First Steps in Radio*

Getting into Amateur Radio Electronics

Part 1: Ever wonder what you need to know to pass your first amateur exam? This new series will provide the answers — not to the FCC questions themselves, but to the questions most newcomers have about electronics.

By Doug DeMaw,* W1FB

Let's face it: Many potential amateurs feel a bit wary of tackling the electronics involved with earning that first ticket. Whether you're a housewife, a janitor, a factory worker, an English teacher or an advertising executive you may feel inadequate when the time comes to study for an amateur exam. That feeling seems to be shared by most people without a formal background in electronics, no matter where in the world they may live.

After reading the articles in this series, you'll find out for yourself that anyone with the motivation to learn the electronic theory needed for an Amateur Radio license can do so — regardless of their background. I've known children under 10 years of age who passed the Novice exam on the first try, and I've been acquainted with amateurs who were over 80 when they obtained their first license. And then there are persons with disabilities — those without sight or hearing (or both) who have progressed from the first license to the highest class of license (see sidebar on the different types of amateur licenses). Certainly, they have traveled a route that was far more rocky than those of us with no physical impairments.

A great many aspirants seem to give up before they give it a fighting chance. Others attempt to memorize the answers to exam questions. This practice has worked for some people, but it is not to their long-term advantage. Understanding the fundamentals — and that's what it amounts to — of Amateur Radio electronics is very important if you are to feel confident at exam time. This basic knowledge will prove invaluable later in your ham career, too: You'll be able to service your own equipment, you won't be afraid to discuss circuits at club meetings and on the air, and you can enjoy one of the special thrills of ham radio by experimenting and building some of your own equipment.

We shouldn't ignore still another benefit of knowing Amateur Radio theory: It's been the stepping stone to a career in electronics for countless young people. Furthermore, possession of a license puts you in a position to be of service to the federal, state and community governments in time of emergency or disaster. You can be a valuable resource in time of need.

The Fundamentals of Electricity

You may have studied basic electrical theory in high school, but you may have forgotten it because it didn't pertain to your present way of life. That happens to a great many people. So, let's discuss some very fundamental concepts. We'll get into a more detailed treatment in future installments of this series. But for the present, let's talk about ac and dc voltages and currents. These are the basis of all electronics theory, so they are mighty important to us.

Voltage means potential difference. It is called *potential* because the electrical charge is capable of doing some work but

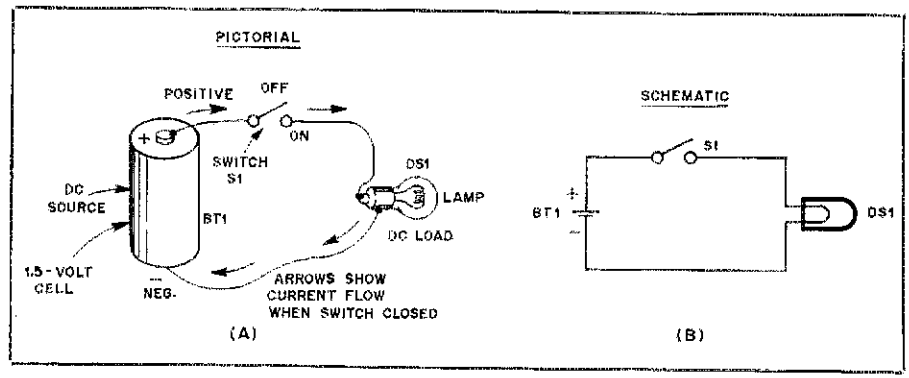


Fig. 1 — The illustration at A shows a simple dc circuit in pictorial form. The arrows indicate the direction of current flow. The drawing at B is the same circuit, but presented in schematic form.

[1]Notes appear on page 25.

*ARRL Contributing Editor, P.O. Box 250, Luther, MI 49656

Glossary of Terms

ac — alternating current, or electrical current that flows in one direction, then in another.
ampere — the unit of electrical current, abbreviated A.
ARRL — The American Radio Relay League, Inc., headquarters for U.S. and Canadian ham radio operators and the society of the International Amateur Radio Union.
current — the flow of electrons.
CW — continuous wave, or Morse code.
dc — direct current, or electrical current that flows in only one direction.
Hz — the abbreviation for hertz, one cycle per second.
IEEE — The Institute of Electrical and Electronics Engineers, a professional society.
kHz — the abbreviation for kilohertz, 1000 hertz.
MHz — the abbreviation for megahertz — 1 million hertz.
oscilloscope — a device for giving a visual trace of voltage with respect to time; often called a scope, for short.
QSO — contact with another radio amateur.
QST — the official journal of The American Radio Relay League; also a general call preceding a message addressed to all amateurs and ARRL members.
RF — radio frequency.
transformer — a device for converting voltage levels.
voltage — electrical pressure causing electron flow.
volt — the unit of voltage, abbreviated V.
watt — the unit of power, abbreviated W.

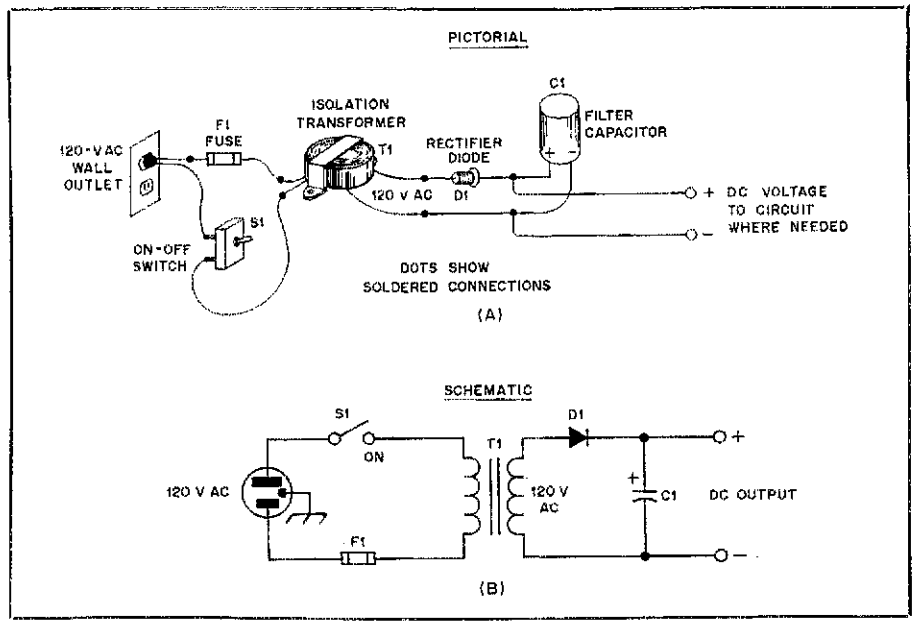


Fig. 2 — A pictorial diagram (A) of a dc power supply that is operated from the standard wall outlet (120 volts ac). D1 changes the ac voltage to pulsating dc voltage, and capacitor C1 removes the small amount of ripple that remains after rectification. The same circuit is shown at B in schematic form.

may or may not be doing work. Voltage is also called "electromagnetic force." That may be a mouthful, but the idea is that voltage is an electrical pressure or force ready to be put to work.

Current is flow of electrons. Electron flow can take place only when there is a voltage (potential difference) and a conductor through which to move. As an analogy, picture two adjacent lakes that we'll call High and Low. Lake High has a water level that is several feet higher than Lake Low. If we cut a small channel between them but put a lock in the channel, no water will flow. But there will be a pressure difference. When we open the lock, water will flow from Lake High to Lake Low until the difference is gone and both lakes are the same level. In electricity, water level in this analogy is similar to voltage, and current is similar to water flow. Electrical current will flow until the potential difference is eliminated or the path is blocked.

DC (direct current) is defined as "A unidirectional current in which the changes in value are either zero or so small that they may be neglected.[2]

What this means is that if we could see dc with our eyes, it would flow in only one direction (like a river) and would appear as a straight line with no humps or bumps. We can see this if we hook up an oscilloscope to the dc-voltage line. The dc will show up on the face of the scope tube as a straight line. Fig. 1 provides a simple illustration of direct current and how it flows. Common sources of dc voltage are flashlight and car batteries. Only dc can be stored in batteries.

We can change alternating currents, the kind of electricity used in homes and business, to dc voltage by *rectifying* and *filtering* it. For example, we can take the voltage from a standard wall outlet (120-V ac), connect it to a transformer (a safety measure to protect us from the high-current voltage source), then pass the ac through a tube or semiconductor rectifier diode. This will give us *pulsating dc* voltage because some of the ac will still be present. These remaining small pulses can then be removed almost entirely by adding a filter capacitor after the rectifier. A simple example of this is given in Fig. 2. A transformer can also be used to increase (step up) the ac-line voltage or lower it (step down).

AC (alternating current) is defined in the IEEE dictionary (note 2) as, "A periodic current the average value of which over a period is zero. *Note:* Unless distinctly specified otherwise, the term *alternating current* refers to a current that reverses at regularly recurring intervals of time and that has alternately positive and negative values."

What does all of this jargon mean? Simply, that ac voltage has a starting point (zero reference) of no value (zero voltage). Then it rises to a particular peak (high) value, falls back to zero and then drops to a negative value that is equal to the peak value. This rise and fall occurs at precise periods. For example, the voltage from our ac wall outlets is rated at 50 or 60 Hz

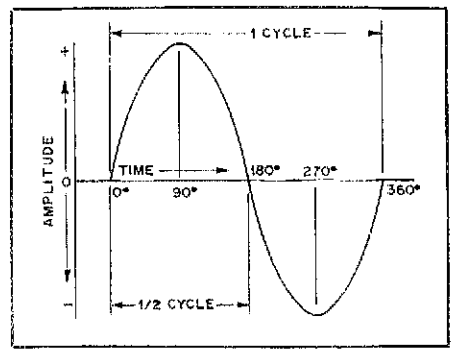
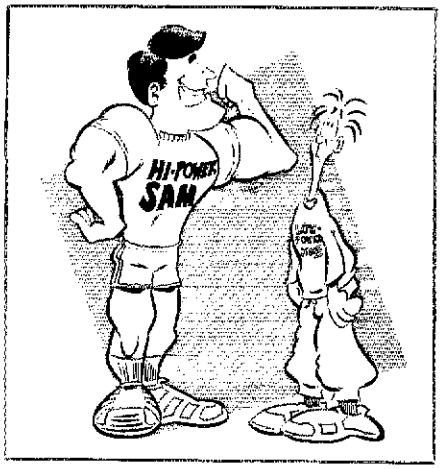


Fig. 3 — Representation of ac voltage, showing how it commences at zero, swings positive, returns to zero, swings negative and returns again to zero. This represents one complete ac cycle.

(hertz), also called "cycles per second." This means the current will travel through one complete cycle — zero to plus, plus to zero, zero to negative and negative back to zero — in a given length of time. This happens 60 times per second with the current from our wall outlet, and may occur several million times per second with the radio-frequency energy that amateurs use to communicate. An ac cycle is illustrated in Fig. 3.

Ac is used mainly to power our homes, to illuminate the bulbs in our lamp, and to operate motors, stoves and the like. On the other hand, most electronic equipment requires a dc-voltage source. So, we feed the ac to a *power supply* (Fig. 2), which changes it to direct current.

The power lines that feed our homes, and that we see crossing the highways and countrysides, carry ac voltage. Some of them convey thousands of volts from the



generating plants to communities many miles distant. This high ac voltage is lowered before it enters our homes. A step-down transformer (located on a nearby power pole) is used for this purpose. The principle of operation for the "pole transformer" is identical to that of the transformer in a dc power supply. The notable difference is in the high amount of power the pole transformer can accommodate. Also, we do not rectify the output from the pole transformer to turn it into dc.

As we mentioned earlier, the RF (radio frequency) energy that amateurs feed to their antennas when transmitting is also ac, but the cyclic rate is very high. For example, a 3500-kHz radio signal goes through its ac cycle 3.5 million times a second. Audio energy (sound waves) is also ac, and the cyclic rate varies constantly when the human voice (or music) is reproduced. The frequency depends on the particular tone at a given instant.

The Matter of Power

Thus far we have discussed voltage and current. But, what about power? In broad terms we tend to think about "power" as a reserve of strength we may call on to perform a task. Car engines are rated in terms of power, or horsepower. Or, someone might say, "He is a powerful man." In the electrical world, power is "the rate of doing work." It is equal to the voltage multiplied by the current. This relationship can be expressed as a simple equation: $P = E \times I$, where P is the power in watts, E is the voltage in volts and I is the current in amperes. Thus, if we had a light bulb that operated from 120 volts, and it required a current of 0.83 ampere to illuminate fully, the bulb would consume 100 watts of power when lit.

We can see from this that the higher the power consumption of a circuit or appliance, the greater the available current requirement. Power, current and voltage are, therefore, the basis of all electrical circuits. The notable exception is when we use what is called a *passive* circuit, one that requires no operating voltage (and therefore does not consume power). Such circuits do have a maximum voltage, current or power rating, though. This means that we dare apply only a certain amount of signal energy to them, lest they be destroyed by excessive power dissipation, caused by current flowing through them. A circuit or device that requires an operating voltage (and draws current) is called an *active* circuit. (See Fig. 4.)

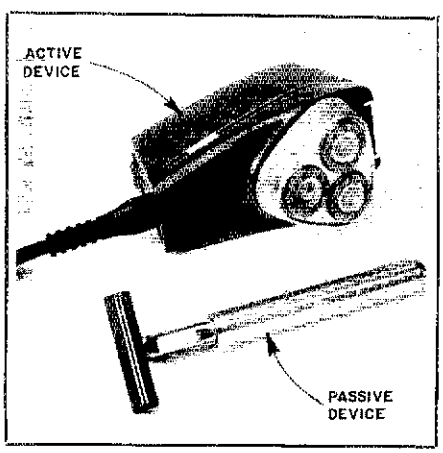


Fig. 4 — Simple pictorial illustration of an active and a passive device (see text).

Getting it Together

If you stayed with me through this discussion, you should have a better understanding of the basics of electricity.

At this juncture you may be saying to yourself, "Sure, it's easy for him to say how easy it is. After all, he's been in this game for a long time!" Well, let me tell you how *I* got started. I was an 8th-grade student when two other fellows and I happened across a book in the school library that described early-day transmitters. We built homemade spark-gap transmitters and antennas from that book, then went blithely on the air, not realizing that a license was required!

Later in life, after getting over the trauma caused by my experience as a

Classes of U.S. Amateur License

Let's examine, briefly, the structure of the various classes of amateur license available to you if you live in the U.S. Most beginners will start with the lowest grade, the Novice, although some start with the Technician or General license.

Novice: This ticket requires the applicant to pass a Morse code test of 5 words per minute, including numbers and punctuation marks. There are 20 multiple-choice questions, 15 of which must be answered correctly. Novices are not permitted to use voice operation; they are restricted to CW, or the Morse code, in portions of four different frequency bands. These bands are suitable for both worldwide and local communications. The license term is five years, but Novice licenses are renewable.

Technician: This license grade represents stepping stone no. 2. You must have a better understanding of electronic theory (there is a 50-question exam), but the code requirement is the same as for Novices. A Technician has all Novice privileges, plus full (including voice) privileges at VHF (very high frequencies) and UHF (ultra high frequencies).

General: The highest percentage of U.S. hams hold a General class license. The requirements are that you pass a 13-WPM code test, including numbers and punctuation marks. The written examination consists of 50 multiple-choice questions, and is the same test given to Technician applicants. With a General license, you will be able to operate on portions of all amateur bands (1.8 MHz up through the microwave spectrum).

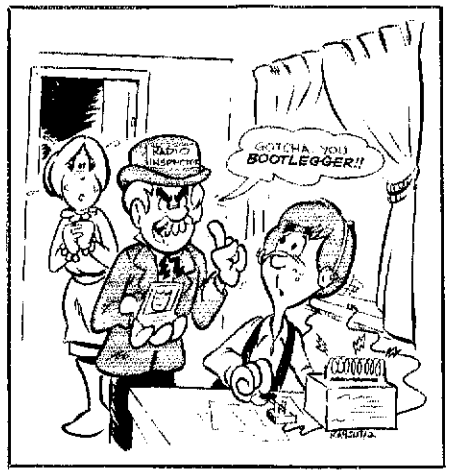
Advanced: This is the last stepping stone to tread upon before going for the big prize — the Extra Class ticket. To qualify for this license, you must take a 50-question theory and rules exam, but the code requirement is 13 WPM, the same as for the General. This license allows you all of the General class privileges, plus some extra voice subbands that Generals must avoid.

Extra: When you're ready to take the Extra test, you've arrived! This license gives you all of the many operating privileges available to hams. Special CW and voice subbands are reserved for Extra Class licensees only. There is a 40-question technical examination, and the code requirement is 20 WPM.

If you have any questions about preparing for or taking an amateur exam, help is available from ARRL Hq. Write to the Club and Training Department, ARRL, 225 Main St., Newington, CT 06111, for the name of a local ARRL instructor or club that sponsors classes. The only book you should need to pass the Novice exam is the ARRL's *Tune In the World with Ham Radio*. It contains an explanation of the basic theory and rules and regulations you'll need to know to pass the written exam, and includes a tape cassette that teaches the Morse code letter by letter.

We do not recommend that you buy "take books" that contain only what are advertised as the correct answers to FCC exams. Similarly, you should avoid "crash courses" in Amateur Radio. These will not only cost you a fair amount of money, but you'll have no real understanding of the theory. For these reasons, memorizing answers to FCC exams is definitely not recommended. Instead, enroll in a class sponsored by a local radio club. The cost, if any, will be nominal. Again, check with ARRL Hq. to find out where classes are being held.

"bootlegger" illegal operator, my interest in radio was rekindled after watching the shipboard operators during WW II. I knew no hams and had no background in electronics. I obtained a copy of *QST*, then borrowed an old *ARRL Radio Amateur's Handbook*. I was off and running! A friend let me borrow her Webcor disk recorder, which I used to transcribe my own CW sending (after I learned the code with a hand key). I recorded some pages from *QST*, but put the text on the disks backwards, starting at the bottom of the page and working toward the top. This prevented me from memorizing the text. Meanwhile, I sent for an ARRL *License Manual*, and between that and the *Handbook* I prepared for the amateur exam. A month later, I went to the Detroit FCC office and passed my test to become



WN8HHS. I met my first ham on the air! So, I know from experience that if one really wants to be a ham, it can be done — whether or not that person has a knowledge of electrical circuits and FCC regulations.

I hope you've been inspired toward taking that first step into the world of Amateur Radio. Let's get together next month in the pages of *QST* for more basic theory and its practical application to Amateur Radio.

Notes

[1]Direct your request to the ARRL Club and Training Department, 225 Main St., Newington, CT 06111. Ask for the information packet on how to obtain an amateur license.

[2]*IEEE Standard Dictionary of Electrical and Electronic Terms*, published by Wiley-Interscience, a division of John Wiley and Sons, Inc., New York, NY.

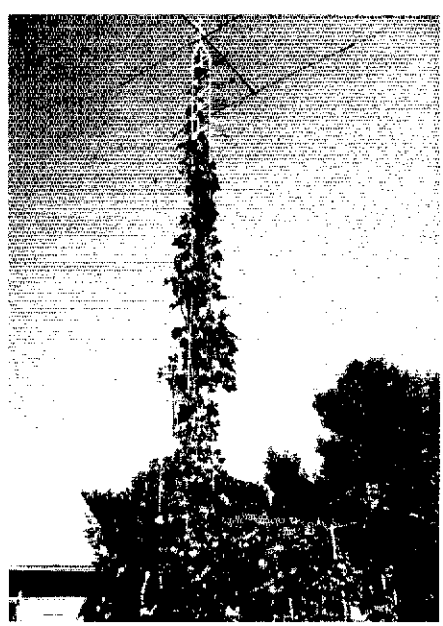
Strays

THE NAVY KNOB — FROM WHENCE IT CAME

☐ A lot of us began ham operating with a key made from a discarded hacksaw blade with a knob taken from an old B battery terminal. We broke the blade to a suitable length and heated that end over the kitchen stove until it was red hot, to take the temper out. We could then drill it with a hand drill. We mounted this on a wood base with RH wood screws and made corrections to the blade by the mounting screw and another used as the stop under the knob. Some of us didn't like the laborious up 'n' down wrist action, so we devised a sideswiper, which worked like a modern keyer only we rattled it back and forth instead of having the dashes and dots on separate sides.

The military used keys adaptable to their needs. Tank operators required a key strapped to their legs, and sometimes the air corps did the same. The Navy had different problems because of the pitch and roll of a ship. Most Navy ops were trained principally as receiving ops and were taught the code and the typewriter simultaneously. The U.S. Navy required proficiency in sending on a hand key, and it was rare to find an op with a "bug" endorsement. Operating tables were usually below deck and often amidships to get a better or more stable position. The "mill" table was set at an angle to the line of the ship's keel to obviate rocking. The telegraph key had to have a base on the knob so the op had something to hold onto. All sailors were issued pea coats and these had large buttons that often came off and could be replaced from the ship's company store. The sailors would drill a hole in these buttons and, by unscrewing the regular knob, they could insert these black buttons underneath the knob — and presto, a navy knob. We can do the same thing today, as large buttons are available either from dry goods stores or from the home knitting box.

Sailors were taught how to grasp a key properly and to use their wrist instead of just their fingers. They would do the pushing with their index finger; the thumb would hang loose on the left side, and the middle finger did the same thing on the right side. They felt more secure with the large knob to hold onto. — *Joe Rice, W4RHZ, Covington, Kentucky*



Bill Hathaway, W2MJK, of Cedar Grove, New Jersey, has found another use for his 50-foot tower besides radiating signals: It supports a giant South American squash plant! That's Bill, about half way up the tower, lowering a squash by rope to his XYL.

I would like to get in touch with...

☐ anyone with modifications for the Wilson Model SY-40A antenna. Andre Lamarre, VE2AHT, 1370 Montpellier, St-Laurent, PQ H4L 4R4, Canada.

☐ anyone who has successfully interfaced a Commodore VIC 1525 printer with a HAL Communications CT-2100 terminal for RTTY and CW hardcopy. Karl Thurber, W8FX, 317 Poplar Dr., Millbrook, AL 36054.

☐ any U.S. radio amateurs who have first-hand information about the sinking of the *Titanic* or are descendants of the survivors. Ralph Barrett, G2FQS, 82 Lilliput Ave., Northolt, Middlesex UB5 5PZ, England.

☐ anyone who can tell me where to obtain a new switch for my VHF Engineering 2-meter hand-held rig, Model HT-144. Naomi Koshel, N2BPR, 13 Cambridge Rd., Turnersville, NJ 08012.

☐ anyone with a schematic diagram for a DSI Instruments, Inc., frequency counter, Model 5500. Olaf Passburg, AK1C, 37 Knollwood Dr., East Longmeadow, MA 01028.

Intermodulation Distortion: A Mystery Solved

By Kenneth H. Kerwin II,* K6UXO

Ever wonder where statements like "only the third-order products are significant" or "even-order products can be ignored" come from when technically oriented people discuss SSB intermodulation distortion? A bit fuzzy on how those distortion products arise, what the terminology used to describe them means, and just why it is so important to avoid overdriving linear amplifiers? If you can tolerate a little bit of math — nothing beyond simple algebra (honest!) — you and I can dispel the confusion.

All modulation processes, including the generation of SSB signals, are, fundamentally, mixing operations.[1] Two signals, typically one at RF (the carrier) and one at AF (the modulation), are fed to a nonlinear circuit (the modulator, which is actually a mixer). The output of this circuit is comprised of both original input signals, two new first-order frequency components, which are the sum of and difference between the two input signals (our desired sidebands), and a bunch of other higher-order, unwanted frequency components called *intermodulation distortion products.*[2] With any luck, all of the IMD products are much weaker than the others. In the case of SSB, we intentionally remove the original RF carrier and audio components, and also one of the sidebands (the sum or difference product), and use only the remaining sideband for our communications.

Unfortunately, a few of the inevitable distortion products produced by nonlinearities in the modulation process (or in subsequent amplifiers) will fall in or near the frequency range of our desired sideband, and thus will not be removed. Those unwanted products within the sideband distort our audio; those near the sideband cause what is termed splatter, or sporadic interference to signals adjacent to ours. We want to minimize these unwanted products, so it's useful to know something about them. Let's examine in detail the generation and amplification of an USB signal. LSB generation works exactly the same way, except for the selection of the opposite sideband.

SSB Generation

Suppose we have an RF carrier at frequency f_c. If we modulate this carrier by mixing it with a single AF tone, we obtain one discrete frequency product in each sideband. Since *inter*modulation distortion products arise from the *inter*mixing of multiple sideband frequency components (and their harmonics), we need at least two AF modulating tones to produce them. This is why you don't hear about intermodulation distortion in connection with CW. To examine the results of intermodulation concisely, with a minimum number of frequency components to keep track of, we simultaneously apply two discrete AF tones to the modulator at frequencies f_{m1} and f_{m2}. This is the *two-tone test* so commonly used. The modulator output is then a collection of discrete frequencies:

A) The RF carrier, f_c (usually partly nulled out by a balanced modulator for SSB);

B) Both AF tones, f_{m1} and f_{m2};

C) Two upper-sideband frequencies produced by the summing of the carrier frequency and each of the modulating tones

$$f_1 = f_c + f_{m1} \text{ and } f_2 = f_c + f_{m2};$$

D) Two lower-sideband frequencies produced by the difference between the carrier frequency and each of the modulating tones

$$f'_1 = f_c - f_{m1} \text{ and } f'_2 = f_c - f_{m2};$$

E) An assortment of higher-order distortion signals arising from the mixing or intermodulation of combinations of the frequencies mentioned and their harmonics.

An amplitude-versus-frequency plot of some typical components, A through D, is shown in Fig. 1. Those spurious com-

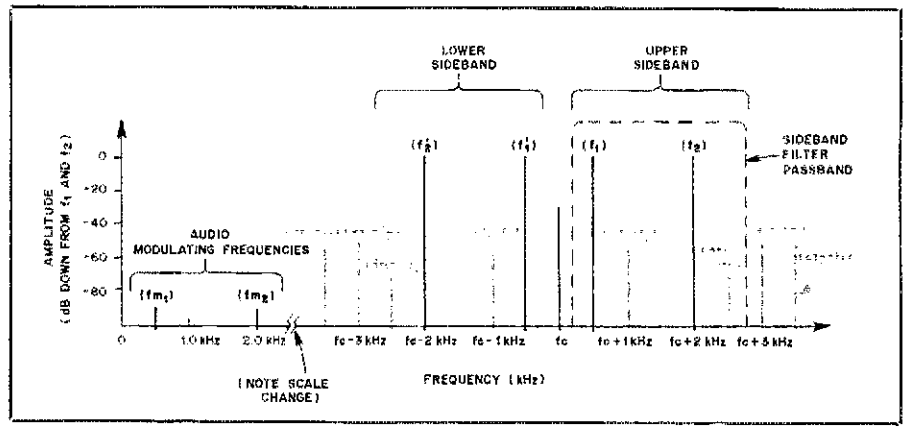


Fig. 1 — An amplitude-versus-frequency plot of a two-tone test. In this example, f_{m1} = 500 Hz and f_{m2} = 2000 Hz. Input signals and desired output signals appear as heavy lines; balanced modulator intermodulation products are shown as shaded lines. Notice that f_c has been partially suppressed by the balanced modulator, and the AF components have been nearly eliminated by the RF circuits. (The log scale used visually exaggerates the low-level component amplitudes.)

[1]Notes appear on page 29.

*5 Oak Dr., Londonderry, NH 03053

ponents of E that fall within the scale of this plot are shown in heavy lines. Notice that a couple of these fall inside our desired sideband.

Since we want a suppressed-carrier USB output, we suppress the carrier, the lower sideband and all other frequency components outside the filter passband represented by the dashed lines in Fig. 1. All audio components are rejected inherently by the filter and any RF tuned circuits that follow it since these have essentially no response to AF. The resultant USB signal is shown in Fig. 2. At this stage, the remaining distortion products are all contained within the USB output of the sideband filter. These may distort our audio a bit, but do not splatter into adjacent signals. In a properly designed system, they are of such low magnitude that the audio distortion they cause is negligible.

For the sake of efficiency and low distortion in the modulator, SSB generation is typically done at low power levels. Therefore, our USB signal of Fig. 2 is amplified in one or more "linear" amplifier stages. Since no amplifier is perfectly linear, and since harmonic generation, mixing and the formation of distortion products always takes place to some degree in any nonlinear circuit, additional low-level, spurious frequency products will be introduced by the amplifier(s).[3]

The SSB filter cannot remove these unwanted products, so some of them can fall within or near our desired USB signal, where RF tank circuit selectivity is not sufficient to attenuate them significantly. Let's examine what sorts of spurious frequency products could now be present.

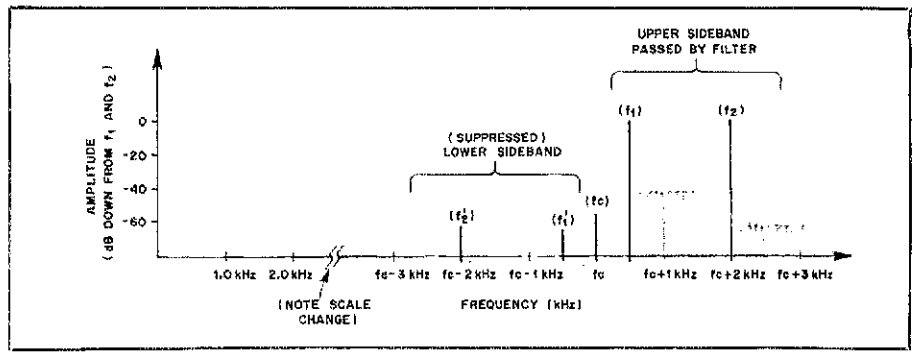


Fig. 2 — An amplitude-versus-frequency plot of the suppressed-carrier USB signal derived from Fig. 1 after filtering. The remaining intermodulation distortion products appear as shaded lines; all other post-filtering signals are heavy lines. All signals not shown have been reduced to insignificance by the sideband filters, and f_c has been suppressed further. Notice that a couple of distortion products remain in the USB signal.

Sum Terms

Modulation theory tells us that the frequency components produced by a modulation or mixing process can only be combinations of the input signals and their various harmonics.[4] The harmonics themselves are generated as a consequence of mixer nonlinearities, and thus will always be present to be mixed in a multitude of possible combinations by those same nonlinearities.

In a well-designed system, the only frequency components of significant magnitude present in the two-tone USB signal of Fig. 2 will be the two desired sideband products f_1 and f_2. In the not-quite-linear amplifier(s), these signals will generate harmonics of the form mf_1 and nf_2, where m and n are integer multipliers applied to f_1 and f_2 to define their particular harmonics; mf_1 and nf_2 will mix (intermodulate) with each other to various degrees, producing spurious output frequency components of the general form $f_x = mf_1 \pm nf_2$. (For the purposes of our simplified discussion, we consider only positive integers or zero for m and n; negative harmonics are undefined.)

First consider the sum terms of the general form

$$f_s = mf_1 + nf_2 = m(f_c + f_{m1}) + n(f_c + f_{m2}) = (m + n)f_c + mf_{m1} + nf_{m2}$$

Notice that, for $m \geq 1$ and $n \geq 1$, each of these terms is a frequency near some multiple, two or greater, of f_c, separated in frequency from that harmonic only by the relatively small spacing of some combination of multiples of the audio modulating frequencies. In other words, all of these sum terms should be removed easily by the selectivity of subsequent RF tank circuits that greatly attenuate harmonics of f_c. Therefore, we can justify neglecting *all* such sum terms, regardless of the values of m and n, so long as our RF circuits provide good rejection of the second and higher harmonics of the carrier.

You may have noticed that there can also exist what mathematicians call "trivial cases," for which m and/or $n = 0$. Let's examine them also. For both m and $n = 0$, the sum term is simply

$$f_s = (0)f_1 + (0)f_2 = 0$$

or dc. This one could occur if there were a dc component present in the USB signal, but in any practical RF circuit this does not exist. For $m = 0$ and $n \neq 0$, the sum term is just

$$f_s = (0)f_1 + nf_2 = nf_2;$$

for $n = 0$ and $m \neq 0$, it is

$$f_s = mf_1 + (0)f_2 = mf_1$$

These are simple harmonics of f_2 and f_1, respectively. One pair of these trivial terms is, in fact, very important to us, though all the rest can be neglected. Our desired sideband frequencies are the first harmonics, for which $m = 1$, $n = 0$ and $f_s = (1)f_1 + (0)f_2 = f1$, and where $m = 0$, $n = 1$ and $f_s = (0)f_1 + (1)f_2 = f_2$. These frequencies are passed by the selective RF circuits and become the desired sideband. All of the other simple harmonic terms of the forms mf_1 and nf_2, for which $m > 1$ and $n > 1$, are rejected as before. Thus, for any system with good harmonic rejection, we can safely ignore *all* of the sum-term frequency components produced by modulation and amplification nonlinearities except, of course, our desired sideband products.

Difference Terms

These are frequency components of the general form

$$f_d = mf_1 - nf_2, = m(f_c + f_{m1}) - n(f_c + f_{m2}) = (m - n)f_c + mf_{m1} - nf_{m2}$$

where the definitions are as before. Here, we encounter a difficulty with our mathematical simplification: If $m < n$, we can obtain a negative number for f_d. Earlier, we said negative frequencies are not defined; frequency is ordinarily considered to be only a positive value, with a negative sign usually indicating phase reversal. Since we are interested here only in the frequencies of the various components, without regard to their relative phases, we shall hereafter use the absolute value of the mathematical results to eliminate having to consider negative frequencies. This is shown as $|f|$, which means we take only the *numerical* value for f, disregarding any minus sign, always as a positive number. The expression for the general difference term then becomes

$$|f_d| = |mf_1 - nf_2| = |m(f_c + f_{m1}) - n(f_c + f_{m2}| = |(m - n)f_c + mf_{m1} - nf_{m2}|$$

As for the sum terms, several trivial cases are most conveniently handled first. For both m and $n = 0$, the difference term reduces to $|f_d| = |(0)f_1 - (0)f_2| = 0$, or dc. This is the same result as for the corresponding sum term, and for the same reason can be neglected. For $m = 0$ and $n \neq 0$, the difference term is

$|f_d| = |(0)f_1 - nf_2| = |nf_2|$; for $n = 0$ and $m \neq 0$, it is $|f_d| = |mf_1 - (0)f_2| = |mf_1|$

As for the sum terms of the same kind, these are simple harmonics of f_2 and f_1, respectively; so all difference terms for which $m > 1$ and $n > 1$ can be ignored, while f_1 and f_2 result when m and n = 1.

An interesting result occurs if $m = n \neq 0$: The difference term is

$$|f_d| = |nf_1 - nf_2| = |n(f_c + f_{m1}) - n(f_c + f_{m2})| = |nf_{m1} - nf_{m2}| = |n(f_{m1} - f_{m2})|$$

This component is the n^{th} harmonic of the difference between the two AF modulating frequencies. For any reasonable value of n, it is in the audio-frequency range, and will be removed by RF circuits having no significant AF response. So far, then, the only spurious frequency components remaining that might cause splatter are those difference terms for which $m \geq 1$, $n \geq 1$ and $m \neq n$. As it turns out, we can eliminate most of these, too.

Notice that the general difference term

$$|f_d| = |(m - n)f_c + mf_{m1} - nf_{m2}|$$

must always be a frequency near some multiple $|(m - n)|$ of f_c, separated in frequency from that harmonic by only some combination of multiples of the audio modulating frequencies, just as is the case for the sum terms. Now, for $|(m - n)| \geq 2$ (i.e., m and n differ by two or more), the difference term will always fall near the second or a higher harmonic of f_c. Thus, for the same reasons given earlier for similar sum terms, *all* difference terms for which $|(m - n)| \geq 2$ can be neglected.

Of all the possible mixer products of modulation and intermodulation, *only* those difference terms for which $|(m - n)| = 1$ (i.e., for which m and n differ only by 1) remain as potential troublemakers. *All* the others are dc, AF or second and higher carrier harmonics, and are rejected thoroughly by properly designed RF circuits following the modulator.

Odd-Order Products

As just demonstrated, the only products left to consider are difference terms of the form

$$|f_d| = |(m - n)f_c + mf_{m1} - nf_{m2}|$$

for which $m \geq 1$, $n \geq 1$ and $|(m - n)| = 1$. The "order" of each possible product for various values of m and n is defined as the sum $(m + n)$. For $|(m - n)| = 1$, $(m + n)$ will always be an odd number; hence, these are called "odd-order" products. For example, for $m = 2$ and $n = 1$, $|f_d| = |f_c + 2f_{m1} - f_{m2}|$; for $m = 1$ and $n = 2$, $|f_d| = |-f_c + f_{m1} - 2f_{m2}|$. Both of these are called third-order products, since $(m + n) = 3$. Similarly, for $m = 3$ and $n = 2$, $|f_d| = |f_c + 3f_{m1} - 2f_{m2}|$; for $m = 2$ and $n = 3$, $|f_d| = |-f_c + 2f_{m1} - 3f_{m2}|$. Both of these are called fifth-order products, since for both, $(m + n) = 5$. Since these odd-order products for which $|(m - n)| = 1$ all result in frequencies that fall near f_c, differing only by various combinations of multiples of the AF modulating tones, they will fall near our desired signal. Thus, they will *not* be significantly filtered out by RF circuit selectivity, and their production must be minimized by careful circuit design and operation.

Distortion products of this sort are theoretically generated indefinitely into ever-higher orders, following the same pattern. Since the amplitude of each product diminishes rapidly as the value of the order increases, only the third- and fifth-order products are ordinarily of sufficient magnitude to be significant.[5] Because the third-order components are the largest (being typically some 20 dB greater in amplitude than the fifth-order products), often all products higher in order than the third can be neglected for practical purposes.

An important exception to this rule of thumb exists for "linear" amplifiers that are overdriven significantly (e.g., noticeable "flat-topping" of the RF envelope as seen on an oscilloscope). In this case, not only the third, but also the fifth, seventh and perhaps even higher-order products generated in the now highly nonlinear amplifier can reach sufficient magnitudes to cause serious interference to adjacent signals. This is because the amplitudes of the normally insignificant intermodulation products grow *much* more rapidly than does the desired modulation as an amplifier is driven further into nonlinear operation.[6] The result is stronger splatter from the lower-order products close to the signal, and a spreading of this interference as our higher-order products (displaced farther from our signal) achieve significant amplitudes.

In other words, the more we overdrive an amplifier, the louder *and broader* becomes the interference we cause to others. Since the incremental decibel increase in the desired signal and the spurious products so heavily favors the latter with increasing overdrive, we gain virtually nothing for all the interference we create. Increasing the drive to the final amplifier for the satisfaction of seeing a meter kick higher than normal just isn't worth it!

We have observed that there is always a *pair* of frequency components associated with each order: one for $m > n$, and one on the opposite side of the carrier for the corresponding $m < n$ that gives the same $(m + n)$ (see Fig. 1). Each of these components is displaced from f_c by a frequency difference that, in general, will not be the same for the two components of each ordered pair. Once the first spurious pair (the third-order products) has been located, it is a simple matter to find each successive higher-order pair by just adding and subtracting a constant frequency difference, $\Delta f = |f_{m1} - f_{m2}|$, which is simply the numerical difference between the two AF modulating tones: Since the k^{th}-order product

$$|f_k| = |(m - n)f_c + mf_{m1} - nf_{m2}|,$$
$$|f_{k+1}| = |[(m + 1) - (n + 1)]f_c + (m + 1)f_{m1} - (n + 1)f_{m2}|, =$$
$$|[(m - n)f_c + mf_{m1} - nf_{m2}] + [f_{m1} - f_{m2}]|, = |f_k + \Delta f|$$

Fig. 3 shows an example of this, a plot of a set of intermodulation products for which $f_{m1} = 500$ Hz and $f_{m2} = 2000$ Hz, and $\Delta f = |f_{m1} - f_{m2}| = |500 - 2000| = 1500$ Hz. It is obvious where to add and where to subtract Δf. The frequency components shown all arise from our simple case of but two discrete AF tones for modulation. For a complex modulation input, such as the human voice, this simple picture becomes immensely more complicated.

Conclusions

Using nothing more than some high school algebra and the assumption that a well-designed RF system adequately rejects dc, AF and all RF harmonics of the carrier from the second on up, we have demonstrated that the only distortion fre-

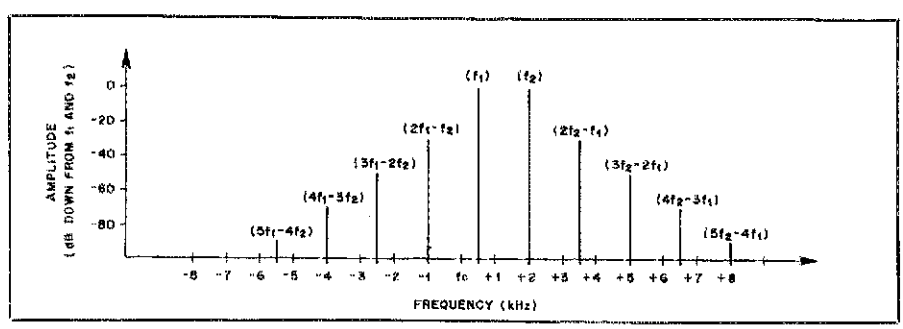


Fig. 3 — Plot of intermodulation products for which $f_{m1} = 500$ Hz and $f_{m2} = 2000$ Hz. The components shown all arise from only two discrete AF modulating tones. The carrier, lower-sideband components, and the intermodulation components they contribute, have been omitted for clarity. The inter-modulation products contributed by f_c, f'_1, and f'_2 would be of such low amplitude as not to show at this scale anyway.

quency products arising from a nonlinear modulation or amplification process we need usually be concerned with are those odd-order products of the form $|f_d| = |mf_1 - nf_2|$ for which $|(m - n)| = 1$ and both m and $n \geq 1$. These travel in pairs, and only the first few such product pairs are ordinarily of sufficient magnitude to raise the likelihood of interference to nearby frequency users.

In a well-designed and well-operated system, these undesirable products can be made negligibly small. Once an amplifier is made sufficiently nonlinear by overdriving it, however, the distortion products in-crease so much faster than the desired signal that splatter and signal broadening result, with no significant gain in "talk power."

It is wise to adhere closely to the equipment manufacturers' recommendations concerning amplifier drive levels, and ensure that these do not exceed proper values. If in doubt, it is better to limit amplifier drive safely below the point where visible "flat-topping" starts to appear on loud voice peaks than to succumb to the temptation to increase drive. Operating the final amplifier a decibel or so below this point will produce no observable difference in our own communications, but will keep us from thoughtlessly destroying those of others.

Notes

[1] *The Radio Amateur's Handbook*, 61st ed. (Newington: ARRL, 1983), p. 12-1.
[2] W. Hayward and D. DeMaw, *Solid State Design for the Radio Amateur* (Newington: ARRL, 1977), p. 242.
[3] W. Orr, *The Radio Handbook*, 20th ed. (Indianapolis: Editors and Engineers, 1975), pp. 7.26 and 10.17.
[4] Hayward and DeMaw, p. 242.
[5] Hayward and DeMaw, p. 243.
[6] Hayward and DeMaw, p. 243; also, *The Radio Amateur's Handbook*, p. 12-19.

New Products

BELDEN LOW-ATTENUATION COAX CABLES

☐ Belden Electronic Wire and Cable has available three 50-ohm, low-attenuation, flexible coax cables (Belden 9913, 9914, 9915) for Amateur Radio, cellular radio, satellite communications, microwave and other two-way communications. The cables are designed as flexible alternatives to semi-rigid cable to allow for ease of installation while maintaining similar electrical parameters. Construction techniques allow these cables to have lower attenuation than other flexible coax cables of the same size. The cables will fit standard connectors.

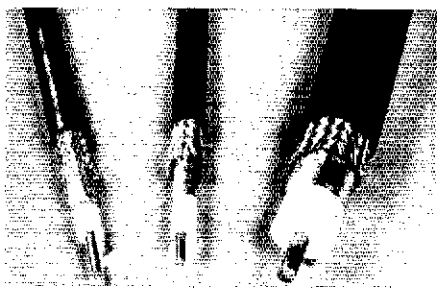
Belden 9913, an RG-8/U type, air-dielectric coax, has an attenuation of 4.5 dB at 1 GHz, 11 dB at 4 GHz and 21 dB at 10 GHz. Nominal capacitance is 24 pF/ft. Overall diameter is 0.405 in. Standard put-ups are 100, 250, 500 and 1000 ft.[1] Representative price is $417.75 for 1000 ft.

Belden 9914, an RG-8/U type, foam-dielectric coax, has an attenuation of 1.6 dB at 100 MHz, 3.1 dB at 300 MHz, 4.1 dB at 500 MHz, 5 dB at 700 MHz, 6 dB at 1 GHz, 13 dB at 4 GHz, and 25 dB at 10 GHz. Nominal capacitance is 26 pF/ft. Overall diameter is 0.405 in. Standard put-ups are 100, 250, 500 and 1000 ft. Representative price is $414.15 for 1000 ft. See Table 1 for typical characteristics.

Belden 9915, an RG-218/U type, solid polyethylene-insulated coax, has an attenuation of 0.83 dB at 100 MHz, 1.6 dB at 300 MHz, 2.4 dB at 500 MHz, 2.7 dB at 700 MHz, 3.5 dB at 1 GHz, and 10 dB at 4 GHz. Nominal capacitance is 30.8 pF/ft. Overall diameter is 0.870 in. Standard put-ups are 250 and 500 ft. Representative price is $1186.50 for 500 ft.

For additional information, write: Manager, Marketing Communications, Belden, 2000 S. Batavia Ave., Geneva, IL 60134. — *Paul K. Pagel, N1FB*

[1] mm = ft × 0.3048; mm = in × 25.4.



Belden Low-Loss RG-8 Type Coax Cable (PRO 9914)

Electrical Characteristics:
Nom. impedance: 50 ohms.
Nom. capacitance conductor to shield: 26.0 pF/ft.
Nom. velocity of propagation: 78%.
Nom. delay: 1.3 ns/ft.
Nominal attenuation:

MHz	*dB/100 ft*
50	1.1
100	1.6
200	2.4
400	3.5
700	5.0
900	5.7
1000	6.0
4000	13.0

Shield coverage: 100% Duobond II, 97% braid.
Nom. shield dc resistance: 1.1 ohms/1000 ft.
Nom. conductor dc resistance: 1.19 ohms/1000 ft.
Max. operating voltage: 600 V ac RMS.
U.L./C.S.A. Listing AWM 1354.
Physical Characteristics:
Nom. weight: 104.2 lb./1000 ft.[2]
Min. bending radius: 4½ inches.
Temperature rating: 40° C to +80° C.
Shield type: Duobond II + tinned copper braid.
Tensile strength (40% of breaking strength): 157 lbs.
Insulation material: Foam polyethylene.
Outside dimensions: 0.405 in.
Jacket material: Black PVC.

[2] kg = lb × 0.454.

Strays

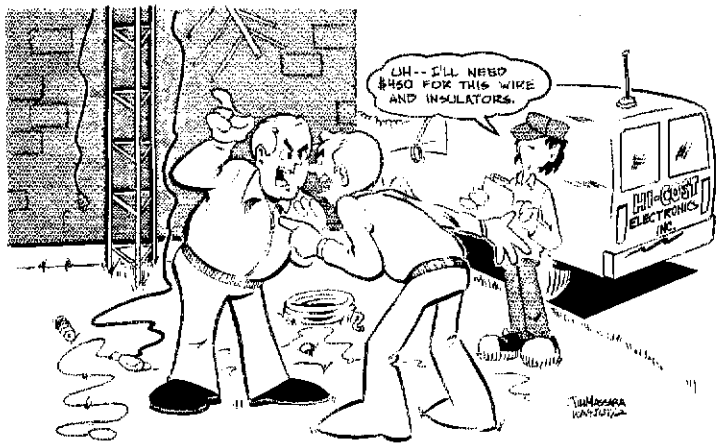
FIRST TRANSATLANTIC TWO-WAY REVISITED

☐ During a 15-meter SSB contact in August 1983, F8DR told W1SE that he was 88 years old and had been present during the first transatlantic two-way contact nearly 60 years before.

This led to an exchange of correspondence between W1SE and F8DR, and eventually to a scheduled contact to commemorate the date, November 27, 1923. Family pressures at F8DR required that the contact be advanced one day to the 26th, but the contact was held then with excellent signals both ways. The following message was recorded and transcribed at W1SE on November 26, 1983.

F8DR, GUY DU BOURG, 88 YEARS OLD, VETERAN OF FRENCH RADIO AMATEURS, SENDS HIS GREETINGS TO ALL AMERICAN RADIO AMATEURS IN MEMORY OF THE 60TH ANNIVERSARY OF THE FIRST CROSSING OF THE OCEAN BY FRENCH STATION 8AB, LEON DELOY, CORRESPONDING WITH REINARTZ AND SCHNELL ON YOUR SIDE.

The story of that dramatic contact and the events leading to it is told in great detail by Clinton B. DeSoto in *200 Meters and Down*, a history of Amateur Radio up through the mid-'30s. Deloy, a doctor, came to this country to attend the First ARRL National Convention in Chicago, expressly for the purpose of consulting with Reinartz and Schnell. He returned to France with a Reinartz design for a transmitter and a Grebe CR-13 receiver. A few nights of one-way transmissions, and then DeLoy was sent a cable to listen for 1XAM and 1MO. The rest is history. Both U.S. stations called simultaneously. 1XAM was told to QRX (which some claim makes him the first U.S. station worked), while 8AB worked 1MO (which others claim makes him the first station worked). Within the next few weeks, dozens of contacts were made. The transatlantic barrier had been broken. — *Lee Aurick, W1SE*



BEGINNER'S BENCH

Some Practical Antenna Considerations

City lot or "rancho grande," DX or stateside communication, we need certain types of antennas to match available space and operating preferences.

By Doug DeMaw,* W1FB

I remember the mess I made of things back when I erected my first ham antenna. Nobody told me it wasn't just a matter of erecting a wire of a specific length (130 feet was the magic number I'd picked up for 80 through 10 meters back then). Somehow, I had failed to learn that the end-fed wire had to be matched to the transmitter, and that the height above ground had a lot to do with how far away my signal could be heard. Perhaps some fundamental knowledge can save you the agonies that many of us had to endure at the start of our ham radio careers.

As I look back on that first installation at WN8HHS (Novice), I recollect the nail biting, finger drumming and the staring into space that came as a result of being unable to make my homemade CW transmitter develop output power with that end-fed wire attached to it. My first week on the air netted a handful of contacts on 80 meters — none of which were over paths greater than a few city blocks!

Then, quite by accident, the transmitter showed high PA (power amplifier) plate current at the dip (resonance), and I began to work stations all over the USA. What had changed? Earlier that day, I had added an improved manual TR (transmit-receive) switching arrangement to go from transmit back to receive (actually, it was a knife switch and some added wire in the shack). Could this have helped me? I changed things back to their original state, and sure enough — the transmitter wouldn't load up!

I learned later on that the extra feet of wire (plus the switch) I placed in the antenna line had changed the feed-point impedance of the wire, making it just right for a suitable match between the antenna and the transmitter output amplifier. Had I known about antenna tuners then, the problem would never have existed: I could have matched the wire to the transmitter and receiver for use in any of the high-frequency bands. The purpose of this article is to round off some of the sharp edges on antenna problems that could confound the beginner. The topics are based on oft-repeated questions we've answered at ARRL Hq. over the years.[1]

What Kind of Wire Is Best?

You'd be surprised to know that a great number of hams — new and experienced — are uncertain about which type of wire is best for antenna work. "Will insulated wire be okay?" Another query has been, "Will aluminum or steel wire radiate satisfactorily?" as well as "What wire diameter (gauge) must I use?" Well, the straight dope is that none of these are especially critical when you are dealing with wire types of antennas below VHF. If I were to offer a rule of thumb for these questions, I'd say something like, "Use whatever you can round up quickly and inexpensively." Of course, the strength of the wire should be sufficient to provide longevity and safety.

The Matter of Insulation

I'll always remember the amateurs who asked me if they could use antenna wire covered with plastic insulation. Perhaps it is a reasonable thing to wonder about; after all, insulation is an electrical barrier at dc (direct current) and can be a barrier in some ac (alternating current) circuits. Despite this, I have used all manner of insulated wire in my antenna systems, and most of them have worked quite well. Among the wire types employed were nos. 12 and 14 solid and stranded house wiring with plastic jacketing, ordinary electrical hookup wire, cotton-covered bell wire, pieces of ac line cord and, of course, enameled or Formvar® -insulated copper wire.

The insulation does not impair the radiation properties of the antenna. In fact, I prefer insulated wire, because it virtually prevents unwanted oxidation of the copper or aluminum conductor. In some cases it adds strength to the wire — another benefit.

The classic antenna wire among beginners seems to be the stranded bare copper that can be obtained at many parts stores. This is acceptable wire, but it will turn black or green rather quickly in polluted air, such as we find in industrial areas. It can become brittle and break in only two or three years if the air contains con-

*ARRL Contributing Editor, P.O. Box 250, Luther, MI 49656

[1]Notes appear on page 34.

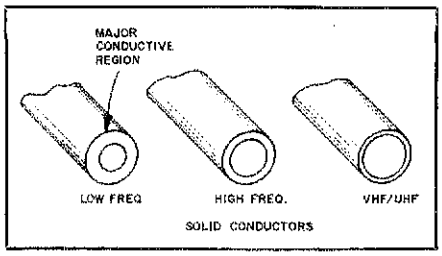


Fig. 1 — Illustration of the skin effect of a conductor for various frequency ranges. The election flow is more effective (greater penetration) as the frequency becomes lower.

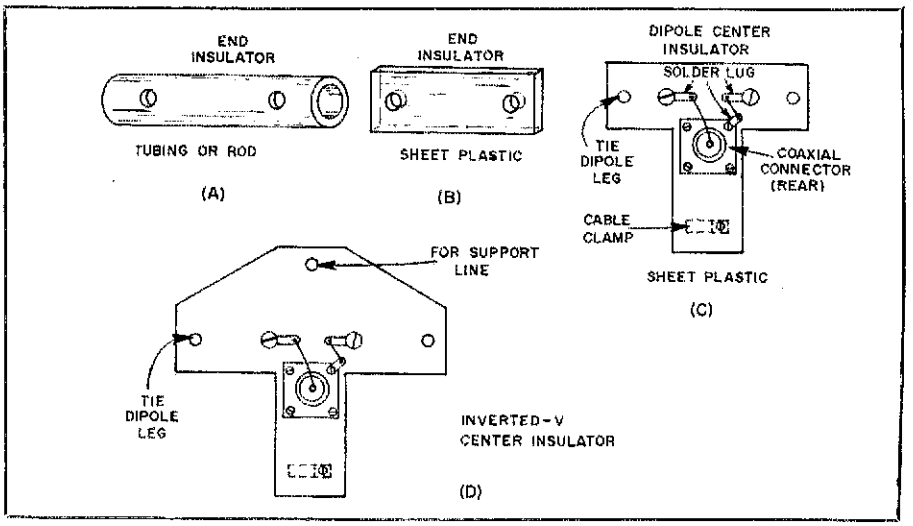


Fig. 2 — Various end insulators and center blocks made from plastic material. Fabricate your own antenna hardware to save money.

siderable salt and/or acids. Frequent replacement can be costly!

If insulated wire other than the enameled type is used to prevent corrosion, be sure to seal the open ends with epoxy cement to prevent migration of pollutants and moisture into the space between the wire and the jacketing material. A marvelous new antenna wire with plastic insulation and rugged conductors was recently made available to amateurs.[2] If you are thinking of a new antenna for many years of use, this product may be of interest to you.

There may be an exception to the statement that insulation does not affect antenna performance. I was told by two experienced amateurs that they had difficulty when fashioning cubical-quad elements from vinyl-insulated house wire. The length formulas for the loop elements were of no use when using that style of wire. I haven't investigated the phenomenon yet, but the cause of the difficulty may be related to a change in the propagation factor of the wire, caused by the insulation, with the one-wavelength dimensions. At VHF and higher, there is a definite difference between the propagation factor (wave velocity) of bare wire and a conductor with thick insulation when dealing with conductors that are long in terms of wavelength.[3] I have never observed velocity problems when using insulated wire in ordinary antennas for frequencies lower than 30 MHz.

Conductor Material

Can we use steel wire in our antennas? What about aluminum? Isn't copper best? Here we have to ask ourselves what is meant by the word best? That word can apply to such matters as *strength, weight, conductivity* and *cost.* If I were to ignore cost and handling convenience, and had to give but one answer, I would specify Copperweld® wire. This is a steel-center wire with an outer layer of copper. The combination provides good conductivity and strength. Most amateurs choose no. 16 gauge as a suitable "happy medium" size. But, no. 18 wire is also quite strong, and it is a trifle easier to work with. (Anyone who has struggled with a coil of spring-like Copperweld will understand what I mean by "easier to work with"! A loose coil can be as cooperative as a snake waiting to strike!)

Although iron and steel are not as effective a conductor at radio frequencies as are aluminum or copper, it isn't so poor that we should ignore it. I have erected a number of fine antennas with steel guy wire as the radiator elements. I have also used the inexpensive electric-fence wire that can be purchased from Sears. A quarter-mile roll costs less than $15! Similar wire, at slightly higher cost, is available in aluminum.

The reason we may prefer good conductors to less effective ones is to reduce losses in the system. The greater the resistivity of the conductor, the greater the power loss in heating (I^2R losses). Conductivity is also based in part on the operating frequency. We have a condition that is known as "skin effect" — the ability of the RF current to penetrate the conductor. The effective conducting area of a solid conductor is governed by frequency and skin effect (see Fig. 1). Therefore, the larger the conductor, generally speaking, the better the conductivity as the operating frequency is raised. Also, the smaller the wire diameter for a given frequency, the more restricted the antenna bandwidth, owing to increased Q (quality factor) of the system. In other words, the higher the Q of any resonant circuit, the narrower its bandwidth will be. This applies to tuned circuits, filters and the like.

I have been asked such questions as, "What is the smallest wire diameter I can use with my kilowatt rig?" If we don't consider the fragility of very small wire, we might say that even no. 28 wire can be used. I've used no. 24 and no. 26 enameled wire a number of times in so-called "invisible antennas" that were configured as end-fed random-length wires. I have yet to burn up a small-diameter wire used in that manner. The CW or SSB duty cycle, plus the air cooling of the wire, prevents current from burning up the conductor. Small-diameter wire also works nicely in radial systems (buried or above-ground systems of wires that serve as a ground screen for antennas).

Aluminum wire, such as clothesline or electric fencing, is also satisfactory for antennas. The two problems we may encounter are (1) difficulty making a good electrical joint and (2) crystalization of the wire with stress and time, which causes breakage. The use of aluminum wire generally requires the mating of copper to aluminum somewhere along the way, and this invites the rapid oxidation that is so common when dissimilar metals are joined.

Some hams have been fooled by fate when they erected antennas made from soft-drawn copper. Magnet wire, such as we wind coils from, is a form of soft-drawn copper. Although it is easy to work with, since it is not prone to kinking easily, it does stretch under stress.

The longer the antenna, the more pronounced the effect. If the low SWR point in your system has changed mysteriously, chances are your dipole or other wire antenna has become longer as a result of wire stretch. If this happens, you will have to readjust the system by trimming off the excess wire. Soft-drawn copper wire with vinyl jacketing is less likely to change dimension from weight, wind and icing stress.

Insulators

If you've priced commercial antenna insulators recently, you may have concluded (as I have) that the dies from which they are cast must be made of gold or platinum! I object to paying $2 or $3 for an item that is mass-produced from 25 cents worth of material. So, I make my own insulators when possible. Generally, we should strive to use insulators that are of high dielectric quality, such as ceramic, steatite, Teflon, polyethylene and Plexiglas. Other good materials are fiberglass, glass-epoxy circuit-

board material (copper removed), phenolic and other low-loss modern plastics. Many of these materials can be purchased as scrap at industrial-plastic outlets, or at a flea market. Fig. 2 shows some of the insulators we can fashion from insulating stock.

In the early days of Amateur Radio, it was not uncommon to find operators who were using antenna insulators made from pieces of hardwood or dowel rod. The wooden sections were cut to size, drilled, then boiled in canning wax or beeswax until they were thoroughly treated against moisture. Spreaders for open-wire feed line were also made from impregnated wood.

Nylon cord is suitable for use as end insulators for wire antennas. Two or more feet of line should be used to ensure that losses are minimized when the line is wet from rain or dew. At this time, I am using a trap-style inverted-V that has 10 feet of strong nylon cord at each end.[4] The cord serves as a support and insulates the ends of the wire from the ground stakes.

Other items that enterprising hams have used as insulators are plastic clothespins, the bodies of plastic pens, plastic pill bottles, nylon center hubs from photocopy-machine paper rolls, plastic hair curlers, nylon six-pack headers and the solid polystyrene center insulation from RG-8/U coaxial cable. I once saw an antenna that had 8-inch strips of inner tube (discarded after a tire blowout) as end insulators! Since most rubber today contains a lot of impurities (such as lamp-black soot), I doubt that I'd use the material in my antenna system. But, this does point out that a little ingenuity can save us time and money.

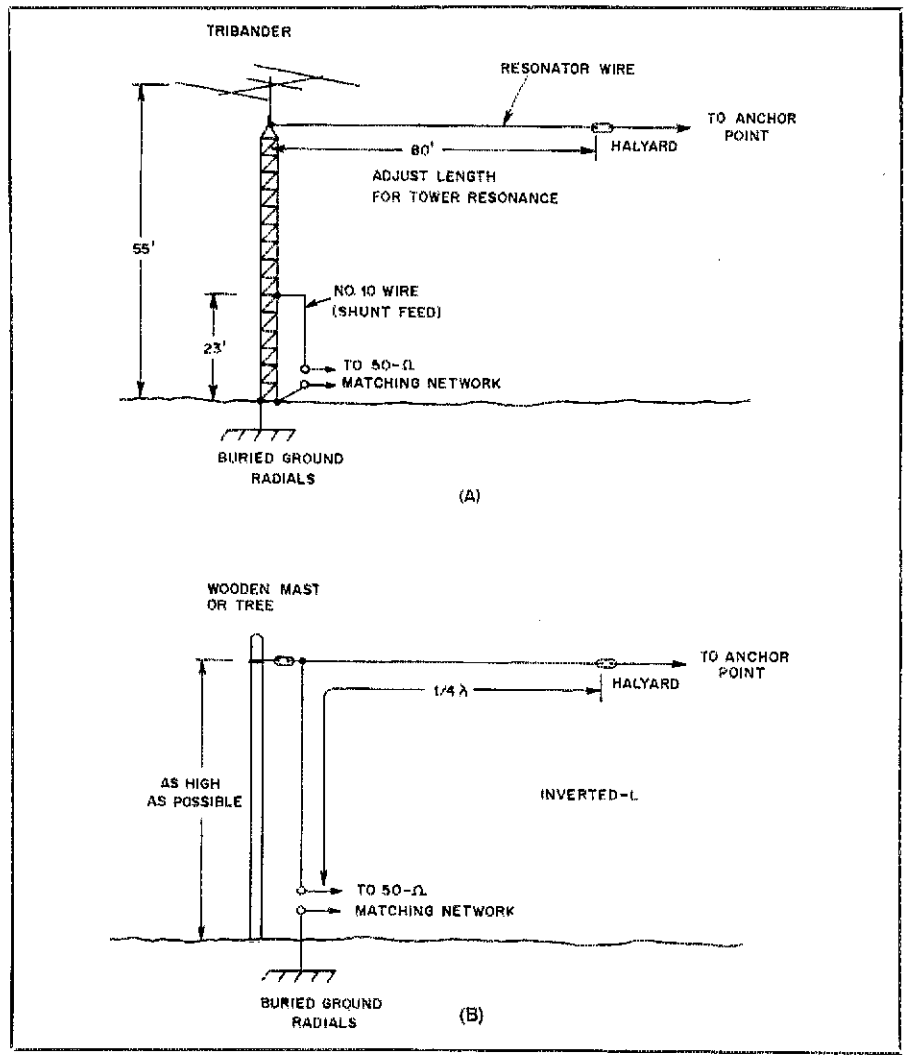


Fig. 3 — An example of how a tower and triband Yagi might be used as a top-loaded vertical. The beam antenna provides some of the top loading, and the extender wire completes the job. The shunt arm can be spaced 2 to 3 feet from the tower. An L network or other matching system can be housed in a box and located at the feed point. This method is applicable to any unguyed tower under 120 feet in height. The shorter the tower, the longer the extender wire. If the tower is guyed, insulators should be installed at the tower connection points. Fig. 3B shows the details of a similar antenna — the inverted L.

DX or Local QSOs — Which Antenna?

The first section of this article can be considered a lengthy Hint and Kink. I hope the column editor, Larry, WA3VIL, will forgive me for my transgressions! But now that we have talked about some hardware fundamentals, what about the antenna as a whole?

All amateurs are interested in antennas, even though they may never build a piece of ham gear. There is a mystique about antennas that lures all of us. Fortunately, that is one part of radio that most amateurs will try their hands at, and the experiments can usually be carried out in a short period at a minimum outlay of cash.

But, what do we desire in terms of signal coverage? A good antenna must be designed for the distance we want to cover reliably from day to day. Some DX antennas are of little value for close-in work, and many antennas for local work are poor DX performers. Increased antenna height will enhance our DX capability, whereas the lower antennas are much better for working out to a few hundred miles in the lower portion of the hf (high frequency) spectrum. Then there's the matter of limited space for the city dweller. Many urban hams can't erect a tower, and conclude, therefore, that DX is out of reach. In this discussion, our principal concern is for high- or low-angle radiation from the antenna.

Some Easy Antennas

There is a saying among DX chasers who haunt the 160- and 80-meter bands: "A short vertical antenna and ground system is much better than a full-size horizontal antenna that is less than a half wavelength above ground." I tend to agree with that philosophy, having had the good fortune of confirming 72 countries over a three-year span on 160-meter CW. The antenna was a 50-foot, shunt-fed tower with a mediocre ground-radial system. A triband Yagi sat atop the tower. With the same setup (and 100 W of dc input power to the last stage of my transmitter), I obtained my Worked All States Award on 160 meters. Earlier, I tried inverted Vs and low horizontal end-fed half-wave wires, but they failed miserably in DX work. They were super, however, for contacts out to a few hundred miles. The same vertical antenna was used on 80 meters with outstanding results. I had only 16 buried radials in the city-lot lawn, the longest of which was only 100 feet in length. Some were only 40 feet long. Fig. 3 shows the details of the antenna. For those who don't have a tower, a metal mast can be used in place of the tower. If only a tree is available for a support, you might try the inverted L antenna of Fig. 3B. It should provide similar results to those of the antenna at Fig. 3A.

A ground-mounted 40-meter vertical is easy to erect and is fairly "low key" with regard to being seen by neighbors. We need not use tubing if a tree support is available. A vertical wire can serve as the driven element of the antenna. Even a wire that is sloped less than 45 degrees will have

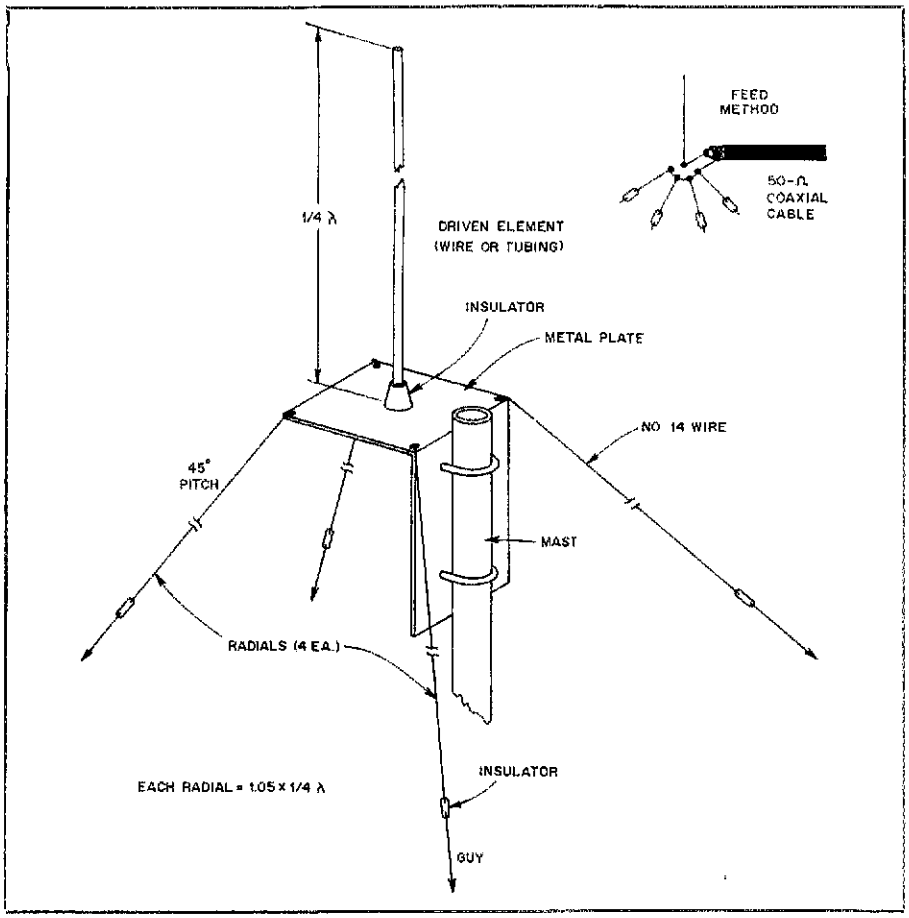


Fig. 4 — Example of a ground-plane vertical. The radial wires are connected to the metal base plate and drooped at a 45-degree angle to provide an impedance match to 50-ohm line. The vertical element can be made of tubing, or a wooden support can be added above the base plate to accommodate a wire element in place of the tubing. If this is done, the wire must be insulated from the wooden mast by means of standoff posts. The radial wires serve as guys for the overall system. Each wire is 5 percent longer than the driven element. This is a good DX antenna for 20, 15 or 10 meters, owing to its low radiation angle.

predominantly vertical, low-angle radiation.

For operation at 20, 15 or 10 meters, it is more practical to erect a ground-plane vertical on a pipe mast or chimney mount. Four above-ground radials are sufficient for good operation. They can be made of wire and used as guy wires (see Fig. 4).

The practical limitation of low-angle vertical antennas is the inherent "dead zone" in signal coverage. Signal levels will be high within the ground-wave contour (usually under 100 miles), then there will be a skip zone where the signal is very weak (a couple of hundred miles or more) until refraction bends it down to earth beyond the dead zone. That is why many hams with vertical antennas have communications difficulties on 160, 80 and 40 meters when trying to work someone relatively close to them. A simple horizontal antenna, close to the ground, is frequently used for close-in QSOs.

A very good high-angle antenna for use on 75 or 40 meters is shown in Fig. 5. I dubbed this antenna the "Lazy Quad" when I wrote it up for *CQ* Magazine in the early 1950s. It is excellent out to, say, 500 miles — especially at those times of the day when the band is changing (near sunset and just after daylight). The ground below the antenna acts as a reflector, and the signal is directed skyward. Generally speaking, a dipole that is low to the ground has the same characteristics, and that is why it is so effective for short-haul contacts. A dipole antenna has little or no directivity

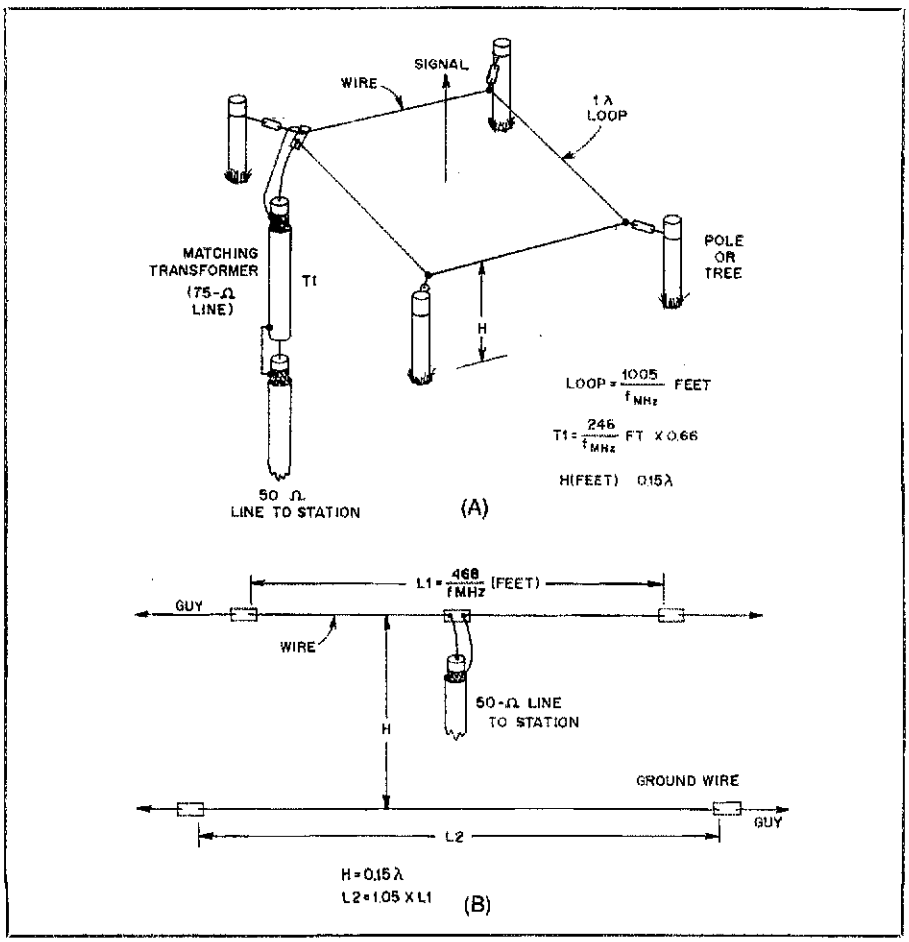


Fig. 5 — The antenna at A is designed for high-angle (short-range) communications on 75, 80 or 40 meters. The ground below it acts as a reflector; the better the ground conductivity, the better the performance. A coaxial transformer matches the 50-ohm feed line to the antenna. The free-space feed impedance is on the order of 115 ohms. It will be somewhat lower when so close to ground. The actual impedance will depend on the quality of the ground below and near the loop. A counterpoise loop made 5 percent longer than the driven element can be placed 0.15 wavelength below the quad loop if there is doubt about the ground conductivity in the area. A similar system is shown at B. It uses a simple dipole above a counterpoise ground or reflector. It can be used without the counterpoise ground if the earth conductivity is acceptable for skyward directivity.

unless it is a half wavelength or greater above ground. Now, that is pretty high at 160 meters (259 feet) or 80 meters (133 feet at 3.7 MHz). We hams tend to think of antenna height in terms of physical dimensions rather than electrical ones. That's a mistake, for even though 70 or 80 feet seems high, it's very low in terms of wavelength at the lower frequencies. To have an 80-meter dipole 50 feet above ground is about as poor as mounting a 10-meter beam 3 feet above ground. None of us would want to do that! It is for this reason that a short vertical antenna usually outperforms a low horizontal antenna for DXing.

We must recognize in this discussion that an electrically short antenna, vertical or horizontal, is not as efficient as a full-size antenna. There is always a trade-off to accept. Also, vertically polarized antennas are noisier during receive than are horizontal antennas. This is because most man-made noise is vertically polarized.

It would be impractical to attempt to describe the many wire antennas suitable for DX and local operation from a city lot. *The ARRL Antenna Book,* recently revised considerably, contains a wealth of practical information for those who want to build antennas. If you don't have a copy, you should invest in one.

Ground Systems in Brief

Countless amateurs have said, "I can't put up a ground-mounted vertical because I don't have room for buried radials." "Balderdash," I am prone to reply. An imperfect ground system is far better than none at all! It is surprising to observe the loud signals that some stations propagate with inferior ground screens. I remember vividly the whopping signal from W7DOL/6 when I worked 160 meters from Connecticut. He was usually the loudest station on the West Coast, and he told me he was using an 80-foot vertical with no ground radials! I dread to think about the kind of signal he would have sent my way if he had had 120 quarter-wavelength radials deployed!

Those fatalists who won't even experiment may be affected by a case of lethargy. I think experimenting is the better part of Amateur Radio. Try a vertical antenna, even if you can lay down only one or two radials. You could be rewarded with better results than theory dictates. I have always made an effort to tie as many ground wires as possible to my antenna systems. If there is a chain-link fence on your property, tie it into the ground system. Do likewise with the cold-water lines in your home, rods driven into the soil near the base of your vertical and utility-company grounds on your property.

Radial wires need not be buried in the ground. They can be laid on the lawn and staked down with homemade large staples to permit mowing the grass without hardship. If they can't be laid out linearly from the base of the antenna, wrap them around the house, garage and trees. The main idea is to get them in or on the ground — some place.

For those of you who are afraid of disfiguring your lawn by putting radial wires in it, take heart. A lawn-edging tool makes a narrow slit, and the wires need be only a couple of inches below the surface to be out of the way. The slits can be closed by stepping on them. The grass will soon grow over the incisions and no one will ever know that an "operation" took place.

What Have We Learned?

In essence, the intent of this article was to kindle your courage toward building and experimenting with antennas. Numerous cost-saving shortcuts have been presented with the hope that you will have some new tricks in your bag when you tackle that next antenna job. If you're wealthy and want to be top dog in the DX pileups, buy your antenna system. The antennas described here will make no one a "big frog in a little pond," but they'll enable you to enjoy good communications most of the time.

Notes

[1]ARRL members may take advantage of the free TIS (Technical Information Service) at Hq. by writing to the Technical Department. Limit the number of questions with each request, and be sure to include a business-size s.a.s.e. for the reply to your inquiry.

[2]Snyder Antenna Corp., 250 East 17th St., Costa Mesa, CA 92627, Att: Wes Olson. Wire is coated with ultraviolet and weather-resistive plastic. The conductor consists of seven steel strands and 12 copper strands woven together for an equivalent wire size of no. 14.

[3]J. Hall, ed., *The ARRL Antenna Book* (Newington: ARRL, 1982).

[4]m = ft × 0.3048; mm = in × 25.4. QST

Strays

ERROR-FREE HF TRANSMISSION ACCOMPLISHED

☐ On April 2, 1983, Jerome Dijak, W9JD/2 (Ithaca, New York) and Wallace Lamb, WØPHD (Warren, Minnesota) completed the error-free HF transmission and verification of several types of information. The text was sent in ASCII characters, followed by Reed-Solomon forward-error-correction (FEC) information and block verification. The data and times included: (1) a 4-kbyte computer program, 7 minutes and 25 seconds; and (2) 15 third-party messages (25-word texts in standard ARRL format with full preambles and addresses), 7 minutes and 40 seconds.

W9JD developed this particular computer communications software system over the past two years. The FEC system can withstand a 20% channel byte error rate without requiring block repeats. The system uses a block acknowledge/repeat request scheme for those periods when the channel error rate is severe.

Transmitter output power at both ends of the link was 80 W. The transmissions were made on 14.08 MHz using RTTY modems, FSK, 425-Hz shift and a data rate of 300 bit/s. — *Jerome T. Dijak, W9JD*

In the wake of the Grenada crisis, in which Amateur Radio was the sole link to the outside for several hours, Massachusetts Gov. Michael Dukakis (seated) proclaimed November 6-12 as Amateur Radio Week. Watching the signing are Middlesex Radio Club members (l-r) KA1SA, KO1N, WA1HXQ, W1LJO, K1CEI and K1NDF. *(photo courtesy WA1HXQ)*

I would like to get in touch with...

☐ any hams who have contacted or passed any message for *Glomar Java Sea.* The ship went down near Hainan island in the South China Sea on October 29. Lt. Commander Al Melis, U.S. Coast Guard, Marine Inspection Office, 7300 Wingate St., Houston, TX 77011, tel. 713-229-3558.

☐ anyone with modifications for an HW-8, a Century 21 or a Kenwood T-599 and R-599. Frank Lev, WA2LPX, 327 Adirondack Dr., Farmingville, NY 11738.

☐ anyone with a schematic drawing for a Edgecom System 3000A 2-meter transceiver. John W. Hays, WØOMV, RR 1, Box 769, Waukee, IA 50263.

☐ any radiomen who served aboard the *USS Arizona,* 1938-39, or the *USS Augusta,* 1939-41. Rene Delagnes, WØPA, 4258 N. Colorado, Kansas City, MO 64117.

Technical Writing for League Publications

You can share your technical ideas and achievements with your fellow amateurs by writing for *QST* and other ARRL publications.

By Paul Rinaldo,* W4RI

QST enjoys the widest readership of any Amateur Radio periodical in the world. That's an important reason why many experienced authors think of *QST* as the best vehicle for their technical articles. Of course, the main object is to pass along what you've learned to others. But there are additional rewards.

First, there is a sense of accomplishment in completing the article and knowing you gave it your best effort. It's also a good feeling when your manuscript is accepted for publication. Undoubtedly the biggest "high" is when you finally see your article in print. That has to rank with the boost you experienced after your first Amateur Radio contact. But that's not the end of it. People take the time to write you a letter or post card saying "thanks" or "good job." Stimulating articles can draw lots of mail — you see only a fraction of it in *QST* Technical Correspondence.

Getting Ready

Perhaps half of the battle is choosing a subject and making up your mind that you're going to write the article. Ask yourself a few questions. What technical subject do you know well enough to help others understand? Have you recently completed a construction project with unique features? Do you have experimental results to pass along to others? Is there something new about your subject or your presentation? Will your article interest other amateurs?

Ah, but you think you can't write? Wrong! The important thing is that you must be able to convey your message in a written form. Impeccable English, correct spelling, polished style and letter-perfect manuscripts are the exception. The *QST* technical editors are accustomed to working with a wide variety of manuscripts. The important thing is that the author provide the editor with a manuscript containing technically valid substance.

If you're wondering what kind of articles are needed, the short answer is *any* technical article relating to Amateur Radio. But there are three particular types of articles that *QST* readers devour. The favorites are construction articles (with PC-board etching patterns) that can be completed in a few evenings or weekends. The second category is articles for beginners. Articles involving new technology comprise the third group. Reader interest in these kinds of articles seems to be insatiable.

The Writing Process

Now that you've picked your topic and decided to write a *QST* technical article, give some thought to organization. Some writers can just type the manuscript without using a written outline. They're the exception. Most authors need one to maintain an orderly progression of ideas, and to avoid forgetting things.

With outline in hand, it's time to sit down to the typewriter or word processor and start writing. If you have a computer with word-processing software, we'd prefer to receive your text electrically to save us the work of retyping the text. However, the lack of computer standards makes it impractical to handle every computer format.

We use WordStar® word processing in the Technical Department and would prefer that authors planning to transmit their manuscript electrically use it if possible. For those who don't have WordStar, other word-processing programs can be used. If your computer uses an 8-inch single-sided, single-density (SSSD) CP/M® disk format or a 5¼-inch IBM PC format, we can accept the manuscript on disk. If not, we can receive it on the telephone line at 300 or 1200 bauds. At 300 bauds we use the Bell 103 modem standard, which virtually all personal computers use. At 1200 bauds, we can receive either Bell 212A or Vadic 3400 modem signals. To send text via modem, please telephone 203-666-1541 and ask for the Technical Department. Whether you use a typewriter or a computer, it will be helpful if you type the text no more than 50 characters per line and double space between lines.

Don't be discouraged if you seem to have a bad day writing. If you put it off until you really get in the mood, that day may never come. It's probably best to work on your manuscript anyway. At least you can put some thoughts on paper and have something to edit later.

Illustrations

Schematics or other types of illustrations should be used wherever possible to supplement the text and to give the article visual appeal. The important things are the thought that goes into the illustration and a complete written description of it. If you're not an artist, don't worry — a sketch that gets the idea across is all we need. Our artist will redraw everything and make it consistent with *QST* style.

Your article will have a much better chance of being selected as the "lead article" (the first one appearing in the issue) if you supply good sharp, crisp photographs. Black-and-white photographs printed on glossy paper can be used in any article. Color photos are normally limited

*ARRL Senior Technical Editor

to lead articles and the *QST* cover. (If you wish to submit a photo for cover consideration, it should be in vertical format.)

Printed Circuits

When submitting a construction article, you should include PC-board artwork and a sample PC board. If you are not able to do so, the Technical Department can arrange for one to be designed by a commercial PC house that will then offer the board for sale. Commercial layout with no cost to the author is possible only for smaller projects that do not use plated-through holes and do not involve difficult layout. Also, the construction project must appeal to a large enough number of readers to make it feasible for the PC-board house to absorb the layout costs.

Unfortunately, we cannot offer much help to authors needing complex PC layouts and double-sided boards with plated-through holes. We hope to have some solutions in the future and would welcome recommendations on how designs could get such support at low or no cost.

Prototype Submission

In some cases, authors should send a working model of the construction project to Hq. for lab testing. This must be done for transmitters so the lab can verify compliance with FCC rules concerning spurious outputs. Also, the lab is equipped to conduct many measurements that the individual cannot afford to do.

We also like to validate computer software in the lab whenever feasible. We can check operation of software on a number of popular personal computers, but not all.

One caution, however, is that the lab is *not* staffed to troubleshoot or repair equipment and software. Lab work is usually limited to support of *QST* or ARRL book projects, or research and development activities of benefit to the general membership. Before you send hardware or software for lab testing, please check with us to see if it is feasible and, if so, the best way to handle it.

Manuscript Submission

Write your name on every sheet of the manuscript, including all illustrations. We take care to not lose things, but it's helpful to have each sheet identified in case of a mishap.

When your manuscript is received at Hq., it will be read within a few days of receipt. Each manuscript is read by the assistant technical editors and the senior technical editor. They meet once each week to discuss all pending manuscripts and their acceptance for *QST*.

Some manuscripts are returned to the author as being unusable for *QST*. Reasons for doing so vary but include: Construction projects that would be difficult to duplicate, articles in areas where we receive many submissions (such as keyers and antennas), an article similar to another already accepted for publication. This is a matter of editorial judgment, and is necessary to ensure that *QST* technical articles are technically sound and of interest to the readership. Rejecting articles is an unpleasant task for editors, so they know it is for authors. You can be assured that the editors are biased toward *accepting* articles. When many manuscripts are received in the same period, some may be returned simply because of the overflow. In that case, the editors must select the better articles and try to achieve a balance among different interests.

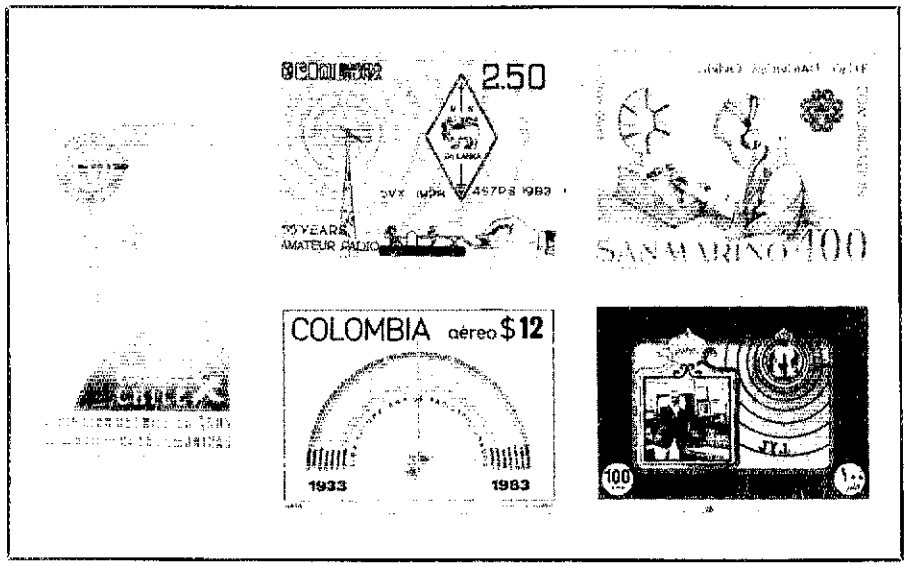
There are also times when a manuscript is not immediately accepted because it needs a bit more work. In those cases, an editor will write or phone the author and work out the details. In some cases, elaboration is needed. In others, a new photograph may do the trick.

The best outcome, of course, is acceptance of your manuscript. In this event, you will be advised by letter and told the name of your handling editor. Also, you will receive a release form giving the League the right to use your article in *QST* and possibly later in a book. The editor will edit or rewrite the text as necessary and will check all illustrations for accuracy. All drawings must be in the hands of the artist at least four months before the cover date in which the article is to appear. Edited text is sent to the phototypesetter two months before the cover date. A proof copy of your article, as typeset, will be sent to you about one week before the camera-ready originals leave Hq. for the printer (on the ninth of the month before the cover date).

Soon after the issue is mailed, you will receive three extra copies of that issue. One is to send to your parents or children to let them know of your achievement! We'll let you decide where to send the others. A little later, you will also receive an attractive certificate attesting to the publication of your article in *QST*.

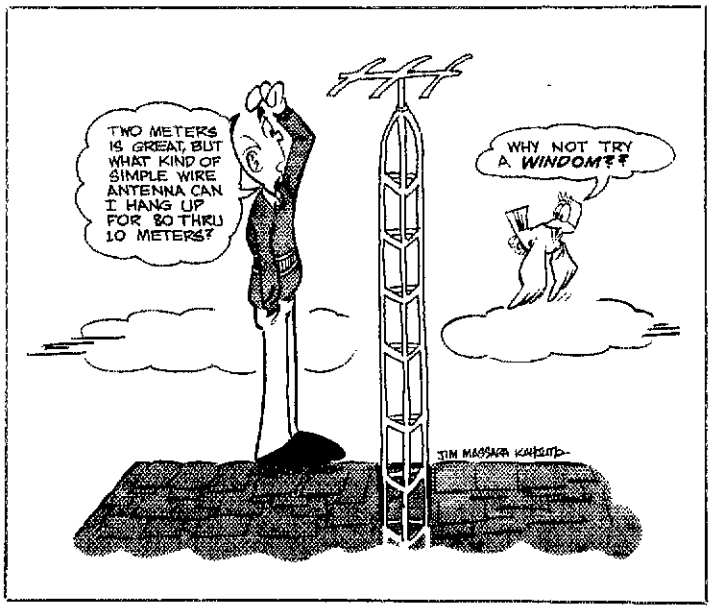
This article should have alleviated most of your fears about writing for *QST*. Still a bit confused, you say? We have one final aid for you. Prospective authors are invited to write the Technical Department for a free copy of "A *QST* Author's Guide." This nifty little booklet provides even more detailed information. See you in print! QST

Strays



Five more Amateur Radio stamps were issued last year, bringing the total to 27. The Chilean stamp, with a dove of peace flying above the globe, honors the Radio Club de Chile for "its 60 years of service to the community," while the Sri Lanka stamp, showing a hand working a key, recognizes the 55th anniversary of the Radio Society of Sri Lanka. The Colombian stamp celebrates the golden anniversary of the Liga Colombiana de Radioaficianados. Ceremonial cancellation of first-day covers carrying the Colombian stamp took place on June 9, 1983, during the annual conference of the Liga in Cali, with IARU President W1RU, LCRA President HK5ASF and ARRL President W4KFC (SK) taking part in the occasion. The San Marino stamp, showing a young man operating what appears to be DF equipment, has the words "Radio Amatori" along the upper left-hand side. The Jordanian stamp, issued in five multi-colored denominations, pictures King Hussein, JY1, at his amateur station. For a current list of Amateur Radio stamps, send a business-size s.a.s.e. to Taizo Arakawa, N2ATT, 444 Westminster Pl., Lodi, NJ 07644.

A New Antenna Twist — The "Windom J-L"



Many HF-band enthusiasts seek simplicity, performance and multiband capability. The author shows how to structure the famous Windom off-center-fed wire antenna for better performance.

By R. R. Schellenbach,* W1JF

Are you looking for an antenna that radiates effectively, is easy to erect and use with a minimum of adjustment difficulties? The Windom antenna fits the description quite nicely.[1] It is true, however, that the single-wire feed line of this antenna produces some uncontrolled radiation because it is not balanced: It relies on the earth ground for the circuit return, but this characteristic may be exploited to our advantage. (More on this later.)

After I searched for methods to develop an efficient multiband antenna, I chose the Windom over previously published designs that contained traps, coils and parallel conductors in various combinations. The Windom seemed to be the ideal model for additional features and versatility.

Simplicity was my foremost consideration in the initial selection. Later in the design process, compromises such as polarization, directivity, bandwidth and impedance matching would take hold, offering a practical and economical solution to the quest for a multiband antenna.

The letters "J-L" in the article title provide a tip-off for the versatility added to the capability of a standard Windom antenna. In our new system we find the added features of an inverted "J" and "L" combination, which provides a five-band, single antenna system that covers 80 through 15 meters.

Six-band operation is possible. The "Windom JL" can be resonated on the 160-M band by the simple inclusion of a base loading coil. A 3-inch dia coil of no. 14 wire, spaced one wire diameter on each turn, does the trick. Operation is satisfactory, although the coil does complicate matters: It must be switched in or out. Also the "JL" design called for ultimate simplicity (no coils, traps, etc.) The polarization changes brought about by the differences in antenna configuration, band to band, were an attempt to optimize the system performance. The objective was to provide maximum *signal-radiating characteristics* for each operating band.

The evolution of the simple Windom into the Windom J-L followed to some extent the principles I developed and described in *QST*.[2] There is one exception: Eliminate the traps and loading coils. The objective with this antenna is to use only wires and insulators, while providing reliability, with reduced weight as a bonus.

Compromise Multiband Antennas

Regular doublet antennas fed with low-impedance transmission lines are practically worthless on harmonic frequencies. An example of one exception is the trap dipole. Another is the use of a single-band dipole at the third harmonic (40 and 15 meters is one such case). The limitation is not so much the fault of the antenna response to harmonics, but of the feed system incompatibility. Whether it is deliberate or not, the Windom will radiate on odd *and* even harmonics, either from the flat top or single-wire feeder. It is mainly for this reason the Windom lost favor in preference to other less susceptible harmonic-radiation types of antennas with low-impedance feeders.

A doublet antenna for use in the new 30-meter band, with low-Z feed line, can't operate effectively on the second harmonic — the 15-meter band. Although we might use a center-fed doublet with open-wire feeders (tuned), and would find that it performed well on both bands, it would require a balanced matching scheme, such as a balun or Transmatch at the radio-room end of the line. This would enable us to convert the balanced line to unbalanced low-Z coaxial cable.

Our single-wire feed line for the Windom offers greater simplicity (no spreaders or baluns) and the added advantage of harmonic operation, for which an inverted-J configuration may be adapted easily. In using an antenna for harmonic operation, the basic half-wavelength antenna is not resonant at the exact harmonics. Therefore, we should adjust it in length for the band in which it will have the most frequent use. Keep in mind that it is better to err on the higher-frequency band than the lower one, because there will be a smaller-percentage error on the highest band. For this reason I chose to compromise the 15-meter band dimensions. This was accomplished with the Windom J-L by setting the flat-top length on 30 meters so it is resonant at the higher end of the band. I used the well-known equation:

$$L(\text{feet}) = \frac{468}{10.150\ \text{MHz}} = 46.1 \quad \text{(Eq. 1)}$$

where 0.3048 × feet = meters.

[1]Notes appear on page 39.

*12 Whitehall Lane, Reading, MA 01867

The operational length for the second harmonic closely follows the applicable equation:

$$L(\text{feet}) = \frac{492\ (N-0.05)}{f(\text{MHz})} = 45.68 \qquad \text{(Eq. 2)}$$

where f(MHz) is 21 and N = 2 (for second-harmonic operation). The result comes very close to the calculated length of 46.1 feet for 30 meters, making it feasible for us to use the 46-foot dimension for the flat-top length on both bands.

Feeder Tap Point

We can learn the feeder tap point on the antenna by simple calculation. Further adjustments will not be necessary unless you are a perfectionist. Improper location of the feeder tap point will not alter the resonant frequency of the antenna, but it will affect the standing waves on the feeder.

A single-wire feed line can be operated over a fairly wide frequency range without serious losses, and with a suitable matching network at the station end, little difference will be noted. I configured the tap point as a "Y" that is 6 inches (mm = in × 25.4) on a side. This technique (Fig. 1) broadens the impedance-matching point. This not only produces a less sensitive position electrically, but offers a mechanical advantage: The connection will be less prone to breakage under the stress of wind and excessive feed-line movement.

The proper tap point would be determined normally for fundamental operation, as with the old standard — 14% off center for the 46-foot 30-meter length specified earlier. Our result would be 16.56 feet off one end of the antenna for the tap. However, for harmonic operation we can obtain a better match if the tap point is 33% of the antenna length, from one end. Although this disagrees with the accepted 14% specification, I have found it much better for fundamental and harmonic operation.

Owing to these considerations, our Windom J-L has the tap point 15.33 feet from one end. This results in somewhat more inverted-L format than found with the "T" for the T-J of note 2. Because of this dissymmetry around the tap point, the currents in the two sides of the flat top do not balance completely. Unlike the balanced "T" top-loaded antenna of my previous design, there is some minor radiation from the horizontal portion when it is operated as a vertical antenna on 40 and 80 meters. Being that there is very little RF current on the horizontal portion, the radiation from this short length is similarly low.

Adding the Inverted J

We can provide enhanced operation on 20 meters by adding the inverted-J configuration. The twin stub, as shown in Fig. 1, is only resonant at 20 meters. It adds so little to the feed line used during Windom operation that it permits an easy 20-meter addition to the system.

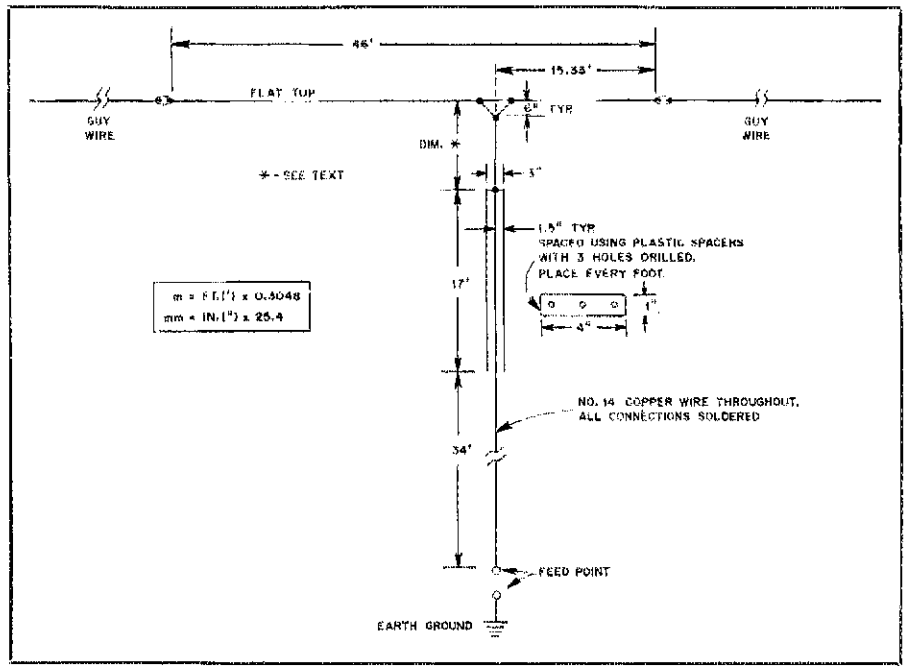


Fig. 1 — Dimensional details for the Windom J-L antenna. The single-wire feeder, including the 20-meter stub, should be kept perpendicular to the flat top as closely as possible. If this can't be done, at least the 20-meter stub section should be maintained vertical respective to the flat top.

By virtue of the resonant quarter-wave decoupling technique, the ¼-wave stub disassociates the influence of the upper-wire portion beyond the stub and the flat-top portion that functions as the active section on 20 meters. In effect, we now have an inverted-J antenna that is vertical, mounted at ground level and base tuned. This results in an ideal situation for low-angle DX-antenna operation in the 20-meter band.

The length of the 20-meter stub and active vertical section (Fig. 1) is for the lower part of the 20-meter CW band. Other operating-frequency ranges may, however, be implemented by using the following equations.

$$\text{stub length (ft)} = \frac{240}{f(\text{MHz})} \qquad \text{(Eq. 3)}$$

and

$$\text{vertical length (ft)} = \frac{480}{f(\text{MHz})} \qquad \text{(Eq. 4)}$$

This results in a stub for 14,050 kHz that is 17.08 feet long. The vertical section is twice that length, or 34.16 feet. These dimensions may be rounded off to 17 and 34 feet, respectively, without any significant detuning effects. These dimensions also provide low SWR and no detuning effects across the 150-kHz lower part of 20 meters when matched by means of a Transmatch between the feed line and the transmitter.

We should recognize that the vertical section must be measured from the point where the quarter-wave stub ends (downward). This must include the lead length that goes to the base-mounted tuner. Therefore, the 35-foot dimension illustrated in Fig. 1 can be physically shorter by inclusion of the tuner lead length.

The final dimensions were checked by means of a dip meter while I was aloft on a guyed extension ladder. I do not recommend this risky procedure unless your medical insurance is paid up, or if you are a daredevil! I was pleased to learn, however, that the theory held up in practice: The desired resonances were verified.

Provisions for 40 and 80 Meters

Now that we have exploited the system to cover the 30-, 20- and 15-meter bands we can adjust the remaining portion of the antenna to function as a 3/4- or 5/8-wavelength top-loaded vertical on 40 meters. The remaining variable dimension of Fig. 1 (marked with an asterisk) may be altered without affecting our calculations for the higher bands. Irrespective of the physical dimensions of this antenna section, the system will operate successfully at half frequency as an "inverted L" on 80 meters. The polarization on 80 meters will be vertical, with the system worked against ground.

The section marked with the * has a 6-inch minimum dimension. The operational characteristics on 40 meters will be similar to those for a 5/8-wave vertical. In-

creasing this dimension to 16 feet will alter the antenna to function as a 3/4-wavelength radiator.

In operation, the differences between the two 40-meter conditions influence not only the overall system height, but allow you to select the radiation characteristics you desire. The 5/8-wave format is best for DX work, as shown by the vertical-angle lobe profiles in Fig. 2A: The angle of radiation is predominantly low. If the dimension with the * is increased to 16 feet, the high-angle responses shown in Fig. 2B will prevail. This is useful for short-haul work on 40 meters. Table 1 provides dimensional data for both antenna configurations.

My Windom J-L has a nominal height above ground of 67 feet. I chose the 3/4-wave format for maintaining strong signals up and down the East Coast. If DX is your bag try the 5/8-wave setup. I received signal reports of RST 579 from Europe at approximately 0000Z on 20, 30, 40 and 80 meters. The dc power input to my transmitter was 200 watts. These reports were received in August 1983.

Matching Networks

A matching network is essential for the proper operation of this antenna. This is because the system is highly responsive to harmonics and the selectivity of the network is helpful in minimizing unwanted harmonic radiation. Also, the network provides an impedance match between the station equipment and the feed line of the Windom J-L. This antenna is fully compatible with most single-wire Transmatches. Approximate feed-point impedances for the antenna are listed in Table 2. The Transmatch may be one of the commercial units that are rated to handle the power of your transmitter. Homemade units of the type described by DeMaw for remote control will prove very useful for multiband operation.[3] I prefer remote tuning for the sake of convenience. It reduces RF power loss. A remote network permits you to locate the antenna farther from the house, which reduces the pickup of man-made noise. Also you can keep the antenna farther from trees and power lines when using a remote-controlled matching network.

Orientation for Azimuthal Effectiveness

The directional properties of the Windom J-L, however modest, can be used to advantage at 15 and 30 meters. For example, from my QTH in eastern Massachusetts, the antenna flat top is oriented broadside to 30° east of north. This provides a fairly wide (60°) azimuthal-coverage angle of Europe and Oceania. On 15 meters the clover-leaf pattern (less than 50° angle lobes) covers north and central Africa, the Mediterranean, Oceania, most of Asia and the Far East. The vertical-polarization mode for 80, 40 and 20 meters provides omnidirectional coverage.

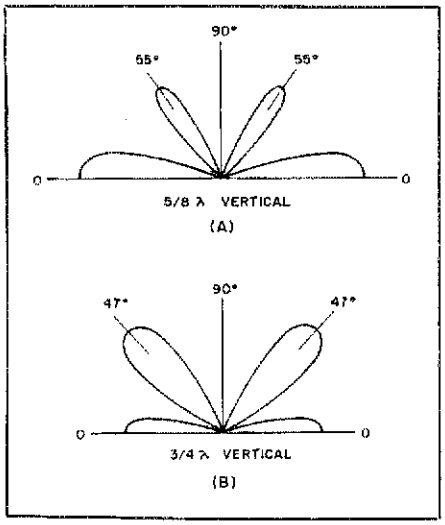


Fig. 2 — Vertical-lobe profiles for 40-meter operation, 3/4 versus 5/8-wave mode. It can be seen that the 5/8-wave pattern is the most favorable for low-angle DX work.

Table 1
Windom J-L Dimensions (40 meters)

Desired Configuration	*Dimension (*Fig. 1)*	*Height Above Ground*
5/8 wave	6"	51' 11"
3/4 wave	16"	67' 5"

Table 2
Feed-Point Impedances for Five-Band Operation

Band (meters)	*Impedance (ohms) Approx.*
80	100 to 170
40	30 to 100
30	600
20	>1000
15	600

Ground System

While the antenna appears to be relatively simple and easy to adjust, it is an effective radiating system. But, as with any of the single-wire systems, especially those used in the lower-frequency bands, a major problem is obtaining a low-resistance ground. An effective ground is needed for the efficient operation of this antenna.[4]

Again, with the implementation of a remote antenna-matching network and coaxial-cable feed, we will help to avoid having unwanted RF energy on the station equipment. An effective ground system under the antenna and matching network will aid performance and reduce the chance for migration of stray RF voltage.

In Conclusion

This antenna has proven itself to be highly effective and seems to provide equal performance to much more complicated antenna systems. You should be pleased with this multiband antenna I have reconstructed and modernized from the old favorite of the 1930s — the Windom. Long may it live!

Notes

[1] L. Windom, "Notes on Ethereal Adornments," *QST*, Sept. 1929.
[2] R. R. Schellenbach, "Try the T-J," *QST*, June 1982, pp. 18-19.
[3] D. DeMaw, "Antenna Matching, Remotely — Some Thoughts," *QST*, July 1982, pp. 14-16.
[4] J. Stanley, "Optimum Ground Systems for Vertical Antennas," *QST*, Dec. 1976, p. 13.

Dick Schellenbach was first licensed as W6TKX in the 1930s. He is a veteran of the U.S. Army and Navy, and has served as a communications specialist for nearly 40 years. Dick is a consulting scientist with Support Systems Associates in Burlington, Massachusetts. His work involves electronics and communications programs for the U.S. Air Force. He was recently awarded his doctorate in electrical engineering, with concentration in telecommunications.

Strays

I would like to get in touch with...

☐ anyone with information on converting a Sonar FM 40 Business Radio for amateur use. Clyde LanPhear, KB9KL, 3201 W. Calle Fresa, Tucson, AZ 85741.

☐ any Mississippi hams who are active on 6- and 2-meter SSB. Bill Jones, KA5LVP, 106 N. 38th Ave., Hattiesburg, MS 39401.

☐ anyone with information on modifying the Hal DS-3000KSR (Version III). Harry Palmer, W4VDC, 4009 Peach Dr., Jacksonville, FL 32216.

☐ any Ø-land hams interested in Christian fellowship. Franklin Brodale, AGØM, 1602 Susan Ave., Cherokee, IA 51012.

☐ anyone having a schematic drawing of the Mini Scan Monitor, Model 5050, manufactured by Toshiba for Sears. Thomas W. Darga, KA8GBB, 35775 Schmid Dr., New Baltimore, MI 48047.

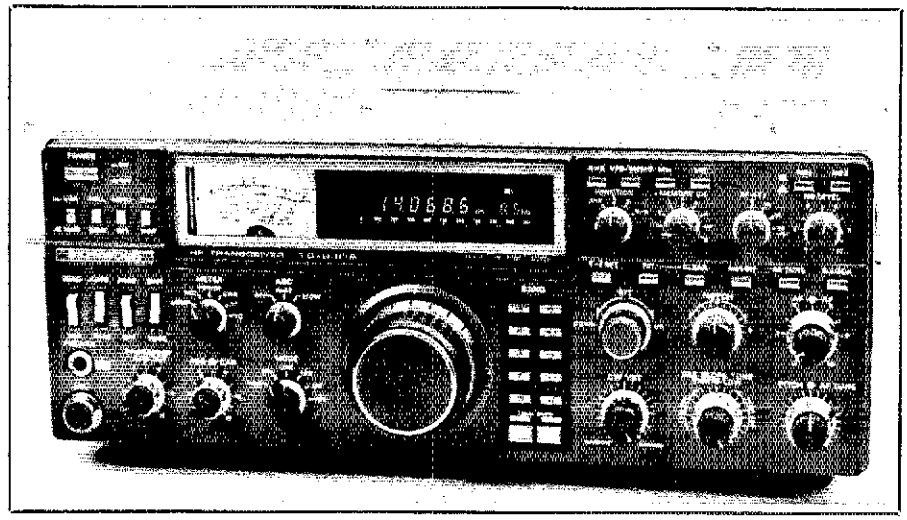
Product Review

Conducted By Paul K. Pagel,* N1FB

Trio-Kenwood Communications TS-930S HF Transceiver

Every major manufacturer of HF equipment has a feature-packed, state-of-the-art transceiver these days. Kenwood is no exception. The TS-930S is their show piece. This electronic marvel contains a 250-W-input, solid-state, broadband transmitter, a high-performance receiver (including general coverage), synthesized frequency control, a hefty power supply, a bevy of bells and whistles, and even an optional automatic antenna-matching network all in one box.

Describing each and every feature of the '930 would fill considerably more space than available here. Table 1 lists the front- and rear-panel controls and connectors. This review will highlight some of the unique features of the radio.



Frequency Control

The TS-930S employs a push-button bandswitch instead of the conventional rotary-type selector. There is a button for each band from 160 to 10 meters, including the WARC bands. Two push buttons located at the bottom of the bandswitch panel allow tuning up or down in 1-MHz steps to access the nonham frequencies covered by the general-coverage receiver.

Two VFOs are built into the '930. Both share a common synthesizer and are controlled by the main tuning knob. The VFO function switch has settings for transceive on VFO A or VFO B. Using one VFO for transmit and the other for receive is easily possible for split operation. The A=B switch brings the unused VFO to the frequency in use. The VFOs tune in 10-Hz steps, providing frequency transition almost as smooth as in radios with a crystal-controlled LO. The main tuning knob is weighted to give a smooth, high-quality feel.

One feature not standard on most HF rigs (not yet, anyway) is a memory. Up to eight frequencies on any combination of bands may be stored in the '930 memory. Storing a frequency in memory is as easy as tuning to the desired spot and pressing the MIN switch. The MR switch may be used to recall a frequency. The VFO/MEMO switch transfers frequency control from the VFO to the memory switch for selection among the preset channels. Three AA-size batteries in a compartment under the top cover back up the memory when power is disconnected. These memories may be used in a variety of ways. A traffic handler might store chosen net frequencies, while a DXer could program in several pileup frequencies and switch among them.

Contest operators may plug in their favorite frequency for each band before the fray begins so they can bandswitch directly to the active part of the band with a minimum of dial twirling.

Another unusual feature of the '930 is the digital display. Years ago, any digital display attracted attention. Now, they come in all shapes and sizes, and the '930's is white! A red pointer dial underneath the display digits tracks the progress up and down the band in 20-kHz increments. This display is wonderful to look at.

The two digits to the right of the main frequency display show the RIT offset in 100-Hz increments. The RIT range is an amazing ±9.9 kHz, and there is no conventional center off position. Instead, the RIT-CLEAR switch returns the offset to zero.

Receiver

The '930 uses a quadruple-conversion receiver

*Assistant Technical Editor

Table 1
TS-930S Controls and Connections

Front Panel
General
METER switch
POWER switch
DIMMer switch
SEND/REC switch
MODE switch
VOX switch

Frequency Control
BAND switch
1 MHz STEP switch
D.IAL LOCK switch
VFO FUNCTION switch
VFO A=B switch
RF-SET switch
VFO/MEMO switch
MEMORY CH switch
MIN memory write switch
MR memory recall switch

Transmitter
MICrophone gain control
CARRier level control
FULL/SEMI CW break-in switch
PROCessor switch
PROCESSOR IN-OUT control
MONItor switch
AUTO/THRU antenna tuner switch
MIC jack (8 pin)

Receiver
NB1 noise blanker 1 switch
NB LEVEL control
NB2 noise blanker 2 switch
RIT switch and control
RIT-CLEAR switch
NOTCH switch and control
AF TUNE switch and control
NAR/WIDE CW filter switch
AGC switch
PHONES jack (1/4-in phone)†
RF ATTenuator switch
AF gain control
RF gain control
CW VBT control
SSB SLOPE TUNE control
PITCH control

Top Panel
VOX GAIN control
ANTI VOX control
VOX DELAY control
CALibrator switch

Rear Panel
ANTenna connector (SO)-239)
GND ground terminal
RX. ANT output switch
TX. ANT jack (phono)
RX. VERTER connector (8-pin DIN)
REMOTE connector (7-pin DIN)
IF OUT jack (phono)
PHONE PATCH jacks (phono)
RTTY KEY jack (phono)
Power connector
EXT. SPEAKER jack (1/8-in phone)
CW. KEY jack (1/4-in phone)
FUSE 6A holder

†mm = in × 25.4.

Trio-Kenwood Communications TS-930S HF Transceiver, Serial No. 3070685

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency Coverage: Receive — 150 kHz to 29.9999 MHz; transmit — 1.8-2.0, 3.5-4.0, 7.0-7.3, 10.1-10.15, 14.0-14.35, 18.068-18.168, 21.0-21.45, 24.89-24.99, 28.0-29.7 MHz.	Receive — as specified; Transmit — 1.5-1.9999; 3.5-4.0; 7.0-7.4999; 10.0-10.4999; 14.0-14.4999; 18.0-18.4999; 21.0-21.4999; 24.5-25.0; 28.0-29.9999 MHz.
Modes of operation: CW, SSB, AM, FSK.	As specified.
kHz/turn of knob: Not specified.	10.
Frequency display: 6-digit fluorescent.	5/16-in high, white digits.
Frequency resolution: 100 Hz.	As specified.
Backlash: Not specified.	Nil.
S-meter sensitivity (μV for S9 reading): Not specified.	160 m, 155; 80 m, 160; 40 m, 160; 20 m, 160; 15 m, 190; 10 m, 165.
Transmitter power input: 250-W SSB/CW/FSK; 80 W AM.	Power output (measurements without AT-930 tuner in line/with AT-930 in line): 160 m, 110 W, 80 m, 115/105; 40 m, 120/105; 30 m, 120/107; 20 m, 120/110; 15 m, 120/105; 10 m, 115/100.
Harmonic suppression: Better than 40 dB.	50 dB (see Fig. 1).
Third-order IMD: Less than −31 dB.	−35 dB (see Fig. 2).
Spurious suppression: Better than 50 dB.	50 dB (see Fig.1).
Receiver sensitivity: (1.8-30 MHz) less than 0.25 μV for 10 dB S+N/N.	Receiver dynamics measured with optional 500-Hz CW filters installed:

	80 m	*20 m*
Noise floor (MDS) dBm:	−139	−139
Blocking DR (dB):	Noise limited.	Noise limited.
Two-tone 3rd-order IMD DR (dB):	87.5† (99.5)††	86.5 † (96.5)††
Third-order intercept (dBm):	−9.25† (5.75)††	−7.75† (10.25)††

Color: Two-tone gray.
Size (HWD): 5.6 × 14.75 × 13.8 in (141 × 374 × 350 mm).
Weight: 40.8 lb (18.5 kg).

†at 20-kHz spacing ††at 50-kHz spacing

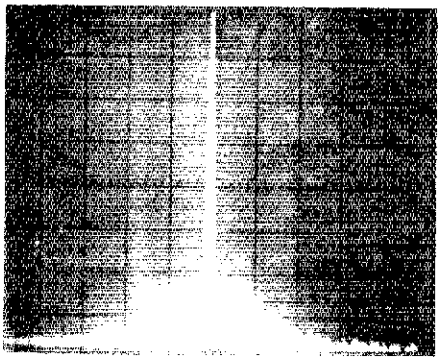


Fig. 3 — Spectral display of synthesizer noise about the carrier. Vertical divisions are each 10 dB; horizontal divisions are each 20 kHz. The TS-930S was being operated at rated input power on the 20-meter band.

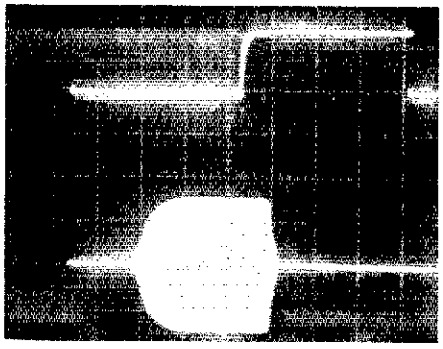


Fig. 4 — CW keying waveform of the TS-930S. Upper trace is the actual key closure; lower trace is the RF envelope. Each horizontal division is 5 ms.

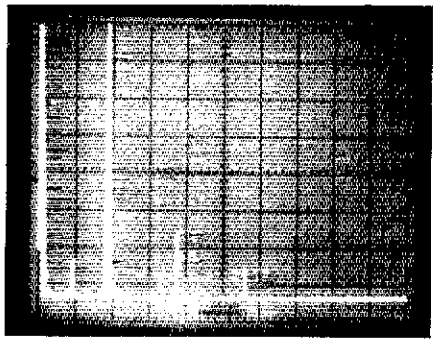


Fig. 1 — Worst-case spectral display of the Kenwood TS-930S. Vertical divisions are each 10 dB; horizontal divisions are each 1 MHz. Output power is approximately 100 W at a frequency of 1.8 MHz. All spurious emissions and harmonics are at least 50 dB below peak fundamental output. The TS-930S complies with current FCC specifications for spectral purity.

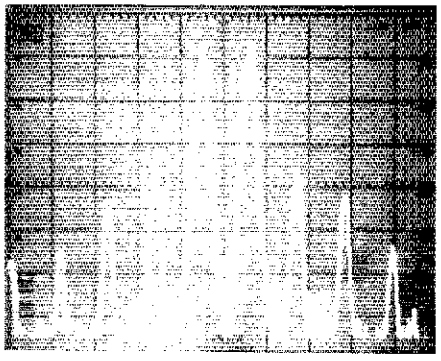


Fig. 2 — Spectral display of the TS-930S output during transmitter two-tone IMD test. Third-order products are 35 dB below PEP, and fifth-order products are 42 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 1 kHz. The transceiver was being operated at rated input power on the 20-meter band.

with the first IF at 44.93 MHz, the second at 8.83 MHz, the third at 455 kHz, and the fourth at 100 kHz. Signals enter the receiver through switched band-pass filters and are sent to paralleled JFET RF amplifiers. The first and second mixers are balanced, employing two more JFETs each. The third and fourth mixers use dual-gate MOSFETs. There are as many different approaches to the state-of-the-art high-dynamic-range receiver as there are rigs, and Kenwood has a winner here.

Not one but two noise blankers are included in the '930. The first, with a threshold control, is effective against pulse-type noise. The second is for pulses of a longer duration, such as those annoying "woodpecker" over-the-horizon radar pulses. The woodpecker blanker really helps. Use of the noise blankers noticeably degrades receiver performance under high-level signal conditions. Judicious use of the NB LEVEL and RF ATTenuator controls will get rid of the noise while keeping overload problems to a minimum.

An entire arsenal of QRM-fighting weaponry is available to the '930 operator. For CW operation, several optional filter combinations are available. The review '930 came with the YK-88C-1 500-Hz second IF filter and the YG-455C-1 500-Hz third IF filter installed. A front-panel NAR/WIDE switch offers selection of the narrow CW filters or the normal 2.7-kHz SSB filters.

The CW VBT control is a continuously variable bandwidth tuning control, which may be used to tighten up CW selectivity. Used with the wide (SSB) filters, the VBT varies the bandwidth from 2.7 kHz down to 600 Hz. With either or both CW filters installed, the VBT range is 500-150 Hz. VBT is especially handy for those times when the narrow filter is too much and the wide filter is not enough. In fact, the VBT works so well that a casual CW operator may never need the selectivity afforded by the optional filters.

In addition to IF filtering, the TS-930S incorporates an effective audio filter. The AF TUNE circuit controls a peak-type audio filter with an 800-Hz center frequency, adjustable ±400 Hz. This filter is useful for reducing unwanted signals and noise.

Yet another feature for the CW op is the PITCH control. The normal CW offset is 800 Hz. For those operators who prefer to listen to a higher (heaven forbid!) or lower note, the PITCH

control simultaneously shifts the IF passband, the received beat frequency *and* the sidetone pitch. This rig is a far cry from the days when CW was added as an afterthought!

Kenwood has not forgotten the SSB operator, either. The SSB SLOPE TUNE controls (HIGH CUT and LOW CUT) allow independent adjustment of the high and/or low frequency slopes of the IF passband. These controls help "cut" interference from stations higher or lower in frequency. In addition, the NOTCH filter (also useful on CW) helps cut SSB QRM.

Even the RF ATTenuator is worth mentioning. Instead of the usual fixed 20 dB or so value, the '930's attenuator is switchable — 10, 20 or 30 dB. This feature allows the operator to choose the right amount for conditions and is especially useful on the low bands.

Transmitter

Kenwood chose a pair of rugged Motorola MRF-422 transistors, each capable of dissipating 290 W, for the final amplifiers. The MRF-422s operate at 28-V dc, and the net result is a clean, cool-running transmitter. Output power is at least 100 W on all bands. The transmitter is broadband, and no tuning is required. SWR-protection circuitry reduces transmitter output if the load SWR is greater than about 2:1. Two quiet cooling fans, one for the final amplifier heat sink and one for the power supply, automatically activate when heat sink temperatures rise and shut off after the temperatures fall below a safe level.

The review TS-930S came with the optional AT-930 automatic antenna-matching network installed. This pi-network uses coils and two motor-driven variable capacitors. According to the manual, it is capable of matching antenna impedances from 20 to 150 ohms. The AT-930 works on all amateur bands except 160 meters. To use the tuner, simply place the AUTO/THRU switch in AUTO, set the mode switch to TUNE, and hit the SEND switch. After some motor whirring and buzzing as the tuner searches for the best match, the transceiver is ready for operation. Tuning ranges are preset for each band, so the automatic operation takes only a few seconds when using a resonant antenna. Just for fun, I tried matching my coax-fed full-size 160-meter inverted V on various bands. The AT-930 matched that antenna for use on each of the 80-10 meter amateur bands!

As mentioned in the receiver portion of this review, CW operation was a primary design consideration rather than an afterthought. The full break-in CW operation is just that — real QSK. The circuit uses CMOS logic to ensure proper sequencing and reed relays for silent operation. The receiver AGC recovers instantly, as it should, making QSK a joy to use.

For the RTTY operator, the '930 has FSK. On transmit, the modem output keying line may be connected directly to the RTTY KEY jack if the voltage on the line is 5-V dc or less. A keying relay must be used with older high-voltage equipment. For receive, the modem input signal may be derived from the PHONE PATCH OUT jack.

Operation

The TS-930S is a quality piece of equipment. All of the controls have a good feel — the variable controls are firm but smooth, and the switches are solid. The front panel is well thought out, making the rig exceptionally easy to use.

There must be active amateurs on Kenwood's design staff because the transceiver has so many subtle useful touches. Most of the receiver bells and whistles really do work in reducing QRM when pulling out weak signals. Rear-panel jacks make connecting an outboard receiver, an external preamp or a different receive antenna (e.g., a Beverage for the low bands) a snap. The speech processor is easy to set up and, properly adjusted, sounds good. Unlike some other solid-state rigs, the transmitter has enough power to drive almost any amplifier to its limit, even on 10 meters. The panel meter even functions as an accurate wattmeter and direct-reading SWR meter. Accessory connectors on the rear panel allow attachment of an array of transverters, phone patches, monitor scopes and other accessory items. This rig has just about everything an active ham could want.

Although receiver dynamics testing in the ARRL lab was somewhat limited by reciprocal mixing noise, at no time during my on-the-air evaluation did I experience phase-noise problems. Even during high-signal-level conditions on the low end of 40 meters, I could not detect any phase noise. I used the transceiver during several contests, on CW and SSB, and the receiver delivered outstanding performance.

I do have two complaints about the '930. Synthesizer switching transients can be heard when tuning the band at a moderate-to-fast rate. These "pops" seem like built-in QRN and are especially annoying when tuning a dying band during a contest looking for very weak signals. The other complaint only comes into play when using the '930 as an IF for VHF and UHF transverters. The advent of transceivers found manufacturers generating CW by injecting a tone into the microphone amplifier circuit, normally in the USB mode. During CW reception, a narrow band-pass filter is usually added to reduce the IF bandwidth. For some reason, Kenwood has chosen LSB for CW generation in the '930S after years of using USB. While this does not affect CW-to-CW QSOs, this presents some problems on the bands above 144 MHz, where CW-to-USB QSOs are common.

All things considered, Kenwood has done an outstanding job with the TS-930S, and anyone considering the purchase of a state-of-the-art rig should audition one. Manufacturer: Trio-Kenwood Communications, 1111 West Walnut St., Compton, CA 90220. Price class: TS-930S with AT-930 antenna tuner, $1800, YK-88C-1 filter, $70; YG-455C-1 filter, $100. — *Mark Wilson, AA2Z*

MIRAGE COMMUNICATIONS D1010 430-450-MHz AMPLIFIER

☐ This solid-state amplifier is designed to operate with as little as 300-mW input to a maximum of 15 W. Such a wide range of input levels provides flexibility so that most any hand-held transceiver, homemade exciter or multimode rig can be used as a driver.

The D1010 operates as a linear amplifier in the CW, SSB, FM and ATV modes. Two front panel switches control all operation: One is the POWER ON/OFF switch, while the FM/SSB switch selects the T-R relay time delay. A hole on the side of the amplifier allows access to a control whose adjustment sets the delay time required when operating SSB. The built-in antenna relay is RF actuated so the amplifier can be used with a transceiver. A rear-panel jack is provided for separate amplifier keying to eliminate relay noise when VOX operation is not used. Grounding this point will key the antenna relay.

The only other front-panel items are two LEDs. One indicates the antenna relay is energized during transmit; the other LED lights when power is applied. If this light should go out during operation, it indicates an overheating condition, and the amplifier will be disabled until

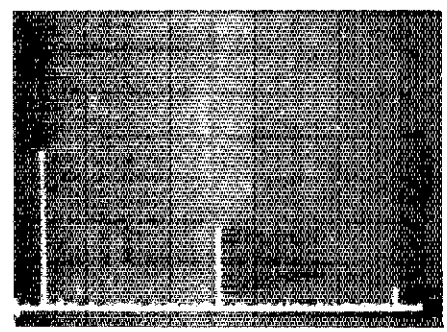
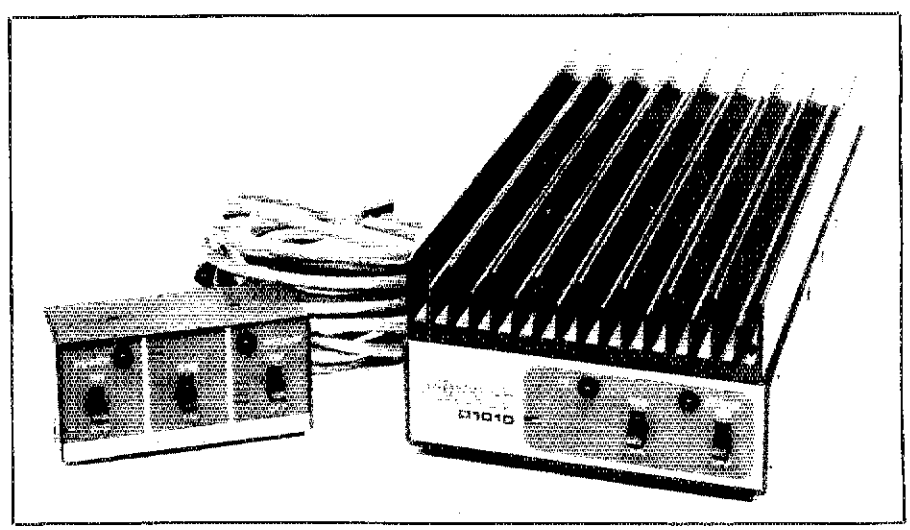


Fig. 5 — Worst-case spectral display of the Mirage D1010 amplifier. Vertical divisions are each 10 dB; horizontal divisions are each 100 MHz. Output power is approximately 100 W at a frequency of 432 MHz. The fundamental (pip at the left of the photo) has been reduced in amplitude approximately 32 dB by means of notch cavities; this prevents analyzer overload. All harmonics and spurious emissions are at least 50 dB below peak fundamental output.



Mirage Communications D1010 430-450 MHz Amplifier, Serial No. 762-1081

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency range: 430-450 MHz.	Confirmed.
Modes of operation: FM, SSB, CW, ATV.	Confirmed (not used on ATV).
Power ratings: Input, 300 mW to 15 W; output, 100 W or more for 10-W input.	10 W output with 300 mW input; 110 W output with 15 W input.
Dc power requirements: 13.6 V at 20 A (nominal).	Confirmed.
Fuse: 35 A (internally mounted).	Confirmed.
Size (HWD): 3 × 5½ × 12 inches.†	
Weight: 5 lbs.	
Price class: D1010 (N connectors), $329; D1010 (UHF connectors), $319; RC-1, $25. Available from Mirage Communications Equipment, Inc., P.O. Box 1393, Gilroy, CA 95020.	

†mm = in × 25.4; m = ft × 0.3048; kg = lb × 0.454.

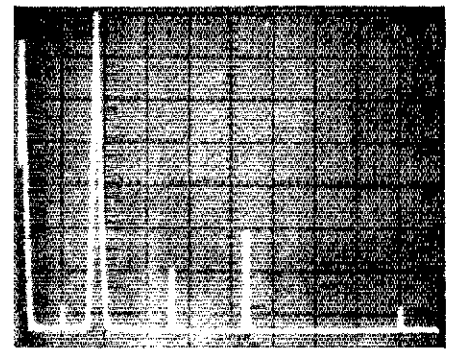


Fig. 6 — Worst-case spectral display of the Viewstar PT-2000A amplifier. Vertical divisions are each 10 dB; horizontal divisions are each 1 MHz. Output power is approximately 600 W at 160 meters. All harmonics and spurious emissions are at least 55 dB below peak fundamental output. The PT-2000A complies with current FCC specifications for spectral purity.

the temperature reaches 140° F. A built-in thermostat turns off all power when the heat sink temperature reaches 170° F. The amplifier must be located where air can circulate over the heat sink.

Rear panel RF input and output connectors are type N or UHF (your choice). The remote keying jack is a phono connector, and a six-pin Molex connector is provided for use of the RC-1 Remote Control Head. Amplifier power is applied through a two-conductor pigtail of no. 6 stranded wire.

This amplifier performed without any problems over a long period of contest and satellite operation. Operating through the new OSCAR 10 satellite proved that the 100-W output was more than adequate when used with a 10-dB-gain circularly polarized antenna with switchable sense (LHCP and RHCP). This seemed to be just the right amount of power because of line losses in a 50-foot run of 10-year-old coax. I measured 50 W at the antenna feedpoint which netted the AMSAT maximum recommended of 500-W ERP.

The amplifier was used for terrestrial operation from the home station and while mobile. When operating mobile, the amplifier was installed in the engine compartment, near the battery, at a point where there is adequate ventilation (mounting brackets are supplied with the amplifier). The RC-1 Remote Control Head made this kind of installation convenient for mobile as well as fixed operation. At home, I placed the amplifier in an attic location, along with the power supply, so the feed line losses could be held to a minimum while using a roof-mounted tower/antenna combination. In this installation, an attic fan was used during summer operation and the amplifier was located near the eave intake vent for maximum cooling. Though I did not attempt it, this amplifier could conceivably be installed in a weatherproof box near the antenna. A receiving converter, a preamplifier and a switching relay could also be installed in the weatherproof box. This would help eliminate any line losses.

Mirage has a five-year limited warranty on materials or workmanship (except power transistors) from date of purchase, for the original owner. The RF power transistors are warranted for one year. — *Bernie Glassmeyer, W9KDR*

VIEWSTAR PT-2000A HF LINEAR AMPLIFIER

☐ The PT2000A is a deluxe HF amplifier featuring 1.8- to 30-MHz coverage, a 2.3-kW SSB power-input rating, a CCS (CW, SSTV, RTTY) 1.3-kW power-input rating and a pi-L output network for good harmonic suppression.

On the Inside

What separates one amplifier from another? Many would agree that the power supply and the cooling system are two important factors. The '2000A uses a heavy-duty (30 lb) plate transformer and voltage-doubler circuit to produce 2900 V in the SSB mode and 2300 V in the CW (or CCS) mode.[1] A pair of Eimac 3-500Z zero-bias triodes provide amplification, and they are cooled by a plenum cooling system consisting of a squirrel-cage blower, air-system sockets and Viewstar-designed chimneys.[2]

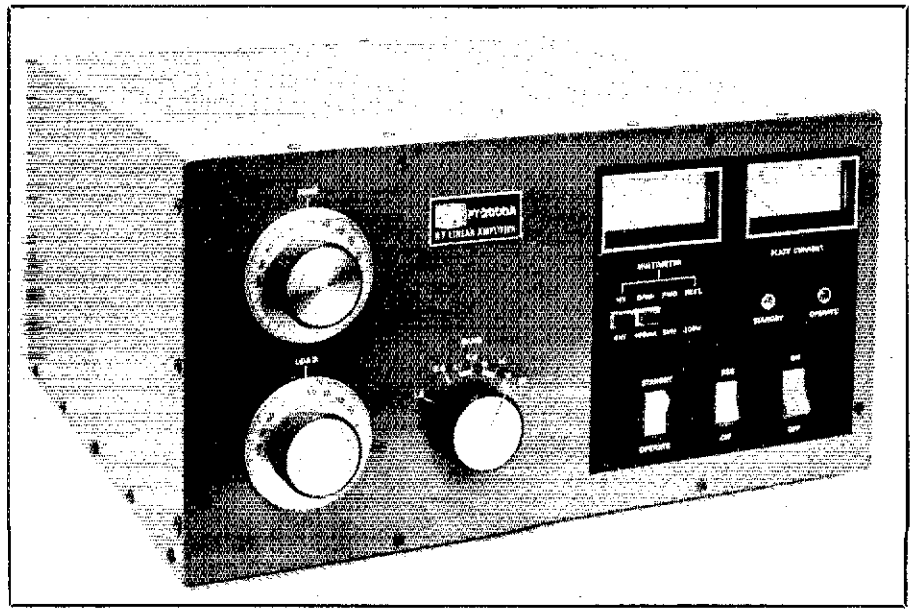
With a large number of transceivers today using solid-state final amplifiers, the input SWR of an external power amplifier has become increasingly important. The Viewstar unit uses pi input networks on each band, and has a worst-case input SWR of 1.7:1 (see data table) — most transceivers should drive the amplifier with no difficulty. A toroid core is used in the output matching network to provide the required inductance for 1.8-MHz operation; this reduces the overall size of the output tank.

External Controls and Connectors

The front-panel layout is simple yet functional; the TUNE and LOAD controls drive their respective capacitors through smooth vernier mechanisms with two large knob skirts indicating relative position on a 0-100 scale. WARC-band markings are included on the BAND switch, which has five positions (U.S. model). Other front-panel controls and indicators include a STANDBY/OPERATE switch, which allows bypassing the amplifier, metering of high voltage (1-4 kV), grid current (0-400 mA), plate current (0-1 A), forward power (0-2 kW) and reflected power (0-200 W); and two panel lamps that indicate OPERATE or STANDBY conditions.

An uncluttered rear panel has jacks for RF IN and RF OUT (SO-239), ANT RELAY and ALC (phono), AC INPUT (CEE-22) and a standard

[1]kg = lb × 0.454.
[2]Plenum: a condition in which the pressure of the air in an enclosed space is greater than that of the outside air pressure.



Viewstar Model PT-2000A HF Linear Amplifier, Serial No. 2000-8249-5048

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Modes of operation: SSB, CW, AM, RTTY, ATV	As specified.
Total frequency coverage (MHz): 1.8-2, 3.5-4, 7-7.3, 10.1-10.15, 14-14.35, 18, 21-21.45, (24 and 28-29.7 on non-U.S. models).	As specified (not tested at 10.1, 18, 24 or 28 MHz).
Drive power: 75-100 W nominal.	For 1-kW input: 160 m, 54 W; 80 m, 73 W; 40 m, 68 W; 20 m, 69 W; 15 m, 58 W;
Output power: Not specified.	At 1-kW input: 160 m, 600 W; 80 m, 660 W; 40 m, 680 W; 20 m, 680 W; 15 m, 640 W;
Efficiency: 60% nominal.	At 1-kW input: 160 m, 54.6%; 80 m, 58.7%; 40 m, 61.2%; 20 m, 61.0%; 15 m, 58.2%;
Input SWR: Less than 1.5:1.	160 m, 1.70:1; 80 m, 1.38:1; 40 m, 1.00:1; 20 m, 1.45:1; 15 m, 1.70:1.
Harmonic and spurious suppression: 50 dB.	Worst case: −55 dB (see photo).
Third-order IMD suppression: −33 dB.	
Maximum ac line input power: 115 V/15 A or 230 V/8 A.	Confirmed.
Weight: 70 lbs.†	
Dimensions: 8½ × 17 × 18 in.	
Color: Two-tone gray.	

†mm = in × 25.4; kg = lb × 0.454.

two-pin ac jack for an optional Muffin® fan.[3] Also on the rear panel are holders for the AC MAIN and ZENER (for cathode overcurrent protection) fuses.

Mechanical Details

Total PT-2000A weight is 70 pounds! The chassis and cabinet are constructed of heavy-gauge aluminum. Picking up the end of the cabinet opposite the power transformer does not bend the cabinet at all. (Try that test with other amplifiers.) The sides and top are a single shell that is bolted to the main chassis by no less than *33* screws, but the tight cabinet should help prevent TVI. Removal of the cabinet shell activates a safety interlock switch that disconnects primary power from the amplifier.

On-the-Air Tests

During the review period, I used the amplifier in conjunction with an ICOM IC-740 HF transceiver.[4] Apartment living dictates 117-V ac power, so the '2000A was rewired for low-voltage operation (it comes factory wired for 234 V). (Luckily, my apartment has 30-A circuit breakers and heavy-gauge wiring — the line-voltage drop at 1-kW input is less than 2 V.) You will appreciate the power-transformer terminal block and wire-lug terminations; they really simplify the rewiring.

Viewstar suggests adding an optional Muffin fan if continuous-duty operation is anticipated; the review unit included this fan. After many hours of CW contest operation, the unit remained cool, except for a small area on the top of the cabinet, directly above the tube chimneys.

My apartment building has a CATV system that employs 300-ohm ribbon cable for distribution. Braced for a large dose of TVI when the amplifier was activated, I was pleasantly surprised! Not one complaint of interference, except from my roommate, who noticed a little crosshatching on Channel 3 while I ran a "gallon" on 15-meter SSB.

"Final" Thoughts

The PT-2000A is certainly a "deluxe-class" amplifier. Some readers may not like the choice of the older 3-500Z triodes as the active devices; they would prefer a single ceramic-metal tube, such as the Eimac 8877. I agree with Viewstar — the 3-500Z is a low-cost, rugged tube that simplifies mechanical construction. What else can I say about the amplifier? Anyone who is looking for heavy-duty kilowatt "shoes" should take a close look at the '2000A. (During the preparation of this review, Viewstar announced the availability of the PT-2500A. According to the manufacturer, this improved model is capable of providing the 1500-W output level now permitted by FCC regulations).

Price class of the PT-2000A is $1495. For more information, contact Viewstar, Inc., 1690 Walden Ave., Buffalo, NY 14225, or 705 Progress Ave., Scarborough, ON M1H 2X1, Canada. — *Gerry Hull, VE1CER/W1*

[3]This specification outlines the use of a three-wire (grounded) ac connector with rectangular pins. It's the type you see on new electronic test equipment, computer hardware, and so on. (P. Rinaldo, "Microphone and Power Connector Standards," *QEX*, Sept. 1982).

[4]The ICOM IC-740 HF Transceiver, "Product Review, *QST*, Sept. 1983, p. 39.

HUSTLER 6-BTV VERTICAL ANTENNA

☐ One week after the 6-BTV was ordered from Hustler, a 6-foot-long box of aluminum and small parts arrived. A check of the package contents and a review of the instructions assured me this would be an easy job. The assembly instructions are clear, and there are no difficult procedures involved. Following the manufacturer's suggested measurements exactly, I had the antenna ready for mounting one hour later.

The antenna-raising weather was perfect — cold and rainy. I drove a 5-foot mast 42 inches into the earth and installed a 10-foot ground rod next to the mast. Placement and removal of the 23-foot antenna is not difficult. The radiating element slips over, and is clamped to, a heavy-walled stub that projects from the mount.

Hustler suggests connecting the coaxial cable to the antenna mount directly. It is better to make a short lead with one end fastened to the antenna mount and a connector at the other. This allows convenient removal of the antenna mount even when the cable is buried. Hustler also recommends a shield choke (10 turns, 6-inch-diameter) at each end of the transmission line. This choke prevents RF currents on the outside of the shield from affecting the SWR and radiation pattern. Each choke requires 15 feet of cable.

I adjusted the antenna for minimum SWR on each band from 10 through 80 meters. After spending several hours adjusting the antenna, I found it still wasn't resonant on the 30-meter band. A 20-inch tube below the 20-meter trap was too short, and the 24-inch tube above the trap too long, for proper adjustment. When the tube positions were reversed, the situation

Table 2
Hustler 6-BTV SWR Measurements

Frequency	*SWR*	*Frequency*	*SWR*
3.500	3.74	21.000	1.71
3.525	2.34	21.050	1.71
3.550	1.34	21.100	1.72
3.575	1.53	21.150	1.72
3.600	2.59	21.200	1.71
3.625	4.75	21.250	1.73
3.650	6.72	21.300	1.84
		21.350	1.97
Frequency	*SWR*	21.400	2.11
7.000	1.77	21.450	2.11
7.050	1.48		
7.100	1.22	*Frequency*	*SWR*
7.150	1.51	28.000	2.18
7.200	1.68	28.100	2.14
7.250	2.40	28.200	1.96
7.300	3.04	28.300	1.96
		28.400	1.94
Frequency	*SWR*	28.500	1.92
10.100	1.40	28.600	1.92
10.150	1.69	28.700	1.94
		28.800	1.91
Frequency	*SWR*	28.900	1.91
14.000	1.43	29.000	2.04
14.050	1.43	29.100	2.02
14.100	1.42	29.200	1.98
14.150	1.53	29.300	2.01
14.200	1.83	29.400	2.05
14.250	2.01	29.500	2.05
14.300	2.37	29.600	2.08
14.350	2.72	29.700	2.20

improved. Measurements with a calibrated wattmeter still yielded an SWR of 3.5:1 at 10.15 MHz and 2.5:1 at 10.1 MHz. This poor SWR performance merited a call to the manufacturer. I was informed that their test unit works fine, but the 20-inch tube is required between the 20- and 30-meter traps; this confirmed my experience and that there is an error in the assembly instructions.

Conditions at my site require a tube even shorter than 20 inches above the 20-meter trap. A 4-inch piece was cut from the 20-inch tube to obtain the 30-meter SWR curve shown in Table 2. Further shortening of the 20/30-meter and 30/40-meter tubes would result in better SWR readings, but those shown suit my needs as a CW operator. All antenna sections, except the 15/20-meter tube, were shortened to their minimum length as a result of tuning.

Bad experience in my youth with a vertical antenna made me curious about this one. I decided to experiment without radials to see if they were necessary at my location. Hustler states that the efficiency of the ground system can be judged by comparing the resonant antenna length to the nominal lengths given for assembly. If the antenna is shorter after adjustment, ground conductivity is better than average. The adjusted length of my antenna is short, so radials are not required. Radials will be installed only if the SWR increases as the soil dries. As spring and summer passed, the SWR was still low, and no radials needed.

Operation

My misgivings about vertical antennas were soon dispelled. The first contact with the new antenna was 4Z4QE (on 20-meter SSB with 100-W output). For Field Day, I transported the 6-BTV, in three pieces, to a lake in New Hampshire. Installation and disassembly each required 15 minutes. At the Field Day site, the 6-BTV was above 12 inches of water on the east shore of the lake. The ground plane was excellent for a minimum of 10 wavelengths to the north, west and south; reports of strong signals were received from California, Texas and Colorado.

Conclusion

I have two minor complaints about the 6-BTV. First, assembly of a purchased antenna should not require cutting of aluminum tubes. Second, the nuts and bolts should be stainless steel; after only four months, there is visible corrosion on these parts. Performance of the 6-BTV is satisfactory and compares well with my inverted V. The V was slightly directional, but a lower angle of radiation seems to give the vertical antenna a small advantage for DX work. The 6-BTV requires no band switching and little tuning. Bandwidth is adequate to cover all bands except 80 meters, where only 90 kHz is usable without a Transmatch. The 6-BTV is available from Hustler, Inc., 3275 N. B Ave., Kissimee, FL 32741. Price class: $140. — *Bob Schetgen, KU7G*

Strays

BORN-AGAIN HAM

☐ A chance encounter a while ago with a magazine article about Amateur Radio carried me back in memory to Chicago where, as a boy, I sat mesmerized in front of a "cat's whisker" and a piece of galena listening to dots and dashes from ships on Lake Michigan and a few hams nearby. Back to mind also came that day in 1920 when, as a freshman in high school, I passed the "government exam" and was issued the call letters 9APH.

Then I remembered the various rigs I had built, from a Ford coil to a 1-kW "rock crusher." The crashing noise of its rotary spark gap could be heard all over the neighborhood! And I thought about the advent of CW and about my very first phone contact in 1923, when the carbon grains in my microphone overheated and stuck together. For me, it was the greatest of hobbies, but things like getting married and raising a family took precedence. Then came 20 years producing motion pictures, 25 more years as a cattle rancher and, ultimately, retirement.

After all these years, I met a ham through the ARRL who helped me get a Novice ticket and then, a few months later, my General class license. Back "pounding the brass" in 1982, I felt like Rip Van Winkle. If Rip found changes when he awoke, you can imagine what I found after being off the air for almost 60 years! — *Burt Depue, N7EJY, Wickenburg, Arizona*

NAVY HONORS THREE RADIO AMATEURS POSTHUMOUSLY

☐ On the occasion of the 60th anniversary of the Naval Research Laboratory in Washington, DC, ceremonies were held on October 19, 1983. Among the guests was Secretary of the Navy John F. Lehman, Jr., who addressed the more than 400 people who attended. Of particular interest was the recognition of three pioneer members of the NRL staff who made many contributions as scientists to Naval electronics, radar and communications systems. Significantly, all were radio amateurs, and this point was recognized by the speakers.

Dr. Louis A. Gebhard, ex-8AG (1896-1981), was employed by the Laboratory from 1923 until his death. Dr. A. Hoyt Taylor, ex-9YN (1879-1961), and Leo C. Young, W3WV (1891-1981), are credited as discoverers of the radar effect, which set the stage for developments that changed the course of history during World War II. The three first met as young men communicating with one another from their homes via Amateur Radio in different parts of the country. It was their mutual interest in propagation effects, developed in the course of their Amateur Radio activities, that led to their friendship and, later, to their joining the group that founded the NRL in 1923. Each of the three later received the Presidential Certificate of Merit from President Truman.

Other speakers at the ceremony included Rear Admiral Leland S. Kollmorgan, USN, Chief of Naval Research; Dr. Timothy Coffey, Director of Research at NRL; and Dr. Robert A. Frosch, Vice President of General Motors Corporation. Also speaking was Captain John A. McMorris II, USN, Commanding Officer of the Laboratory, who added a special welcome to the radio amateurs and representatives of ARRL. Three streets in the Naval Research Laboratory compound were renamed, one for each of the three honored scientists. — *Vic Clark, W4KFC*

SKIERS HAVE NET

☐ A worldwide net for advanced and would-be advanced powdered-snow skiers has been established. Net control is David Arnold, KA1CPL, a trustee of the U.S. Ski Team. New participants are welcome. Contact KA1CPL, 309 Musterfield Rd., Concord, MA 01742, tel. 617-369-4548.

QST congratulates...

☐ Technical Advisor Richard K. Olsen, N6NR, on being appointed as an Adjunct Professor of Business by the Board of Directors at La Jolla University of California for his outstanding experience and performance in the business community.

☐ Tennessee Section Emergency Coordinator Melvin L. Chandler, K4TKQ, on receiving the 1983 Union Carbide Corporation Nuclear Division Community Service Award.

New Products

MOTOROLA MOC8100 OPTOCOUPLER

☐ An optocoupler (optoisolator) capable of operating with an input current of only 1 mA (most optoisolators require a 10-mA level) is being produced by Motorola. The MOC8100 consists of a gallium-arsenide LED coupled to a sensitive silicon phototransistor contained in the standard six-pin DIP. It has a guaranteed minimum current transfer ratio of 50%, and is capable of being driven directly from low-level logic and telecommunications circuits. The device has an isolation rating of 7500 V. These units are available from authorized Motorola distributors, and are priced at $1.20 each in quantities of 100-999. — *Paul K. Pagel, N1FB*

Hints and Kinks

Conducted By Larry D. Wolfgang,* WA3VIL

A DRILL PRESS FOR PRINTED-CIRCUIT BOARDS

☐ I have used my electric hand drill to make the holes in many printed-circuit boards. Each time I would make a board, the task seemed a bit more difficult than the last! Finally, I decided that I had to have a drill press before making any more circuit boards.

After a trip to a local hardware store, I had all the necessary ingredients for a simple homemade device. I bought the following 1/8-in pipe fittings: two close nipples, one elbow, one street elbow, a tee, an 8-in nipple and a 3-in nipple.[1] I found a piece of 1-in-thick pine, approximately 8 inches square, and had a small 12-V dc windshield-washer-pump motor from a 1970s Chrysler auto in my junk box. Any small dc motor with a 1/8- or 1/16-in-diameter shaft will do, and they can be found in auto junk yards, hobby shops and other stores.

For drill bits, I use old dental burrs. Most dentists are glad to give you a few old bits, but you may have to ask them to save a few for you, since they are normally discarded when the dentist can no longer use them. My favorites are called friction-grip carbide burrs. [Editor's Note: My dentist gave me a handful of bits after I explained what I wanted them for. He says he sometimes goes through six or more bits per day. They are so inexpensive that it is easier to throw them away as soon as the cutting edge dulls a little. He even gave me a conically shaped bit that is covered with tiny diamond chips. This bit is perfect for enlarging a smaller hole. It pays to visit your dentist!]

Fig. 1 shows most of the construction details. Drill a 7/16-in diameter hole near one edge of the board, then counter bore or carve the top of this hole so the elbow flange will fit into it. One close nipple is tightened into the elbow, and this assembly is placed into the hole in the base. A hinge joint is formed by turning a street elbow into the plain elbow. Grease the threads first to help it turn easier. The final orientation should be with the close nipple down and the open end of the street elbow pointing up. This joint should not be too tight, or you won't be able to pivot your drill-press arm.

The next step is to put a 90° bend about 1½ in from one end of the 8-in nipple. Be careful not to kink this piece of pipe. It is best to make several bends of 20 to 30° each instead of one sharp bend. Tighten this piece into the street elbow, then add the tee and the 3-in nipple to complete the handle. The other close nipple goes into the tee, and should be oriented horizontally.

Using a hacksaw, split the close nipple, spread the two sides open and flatten them out to fit around the motor housing. Clean the side of the motor and roughen it with a file, then epoxy it to the flattened tee. The entire assembly should be epoxied to the base, as shown in the photo.

You will need an adapter shaft coupling to go between the motor shaft and the drill bit. Fig. 2 illustrates how one can be made. The exact dimensions may have to be changed to suit your particular motor. Allen-head set screws will make a neater job than the screw shown in Fig. 1. I will make a shaft coupler for anyone who is building one of these drill presses, if they are unable to fabricate one themselves.[2]

Purists will point out that the drill tip is moving in an arc with this device, rather than straight up and down. When you are only drilling 1/8-in-thick material, the difference between an arc and a chord is negligible.

As one final note, be sure that the motor turns clockwise when viewed from above. You are ready to start drilling circuit boards, without having to hold your drill and trying to keep it vertical. — *Tom Desaulniers, Jr., K4VIZ, Leeds, Alabama*

[1]mm = in. × 25.4.

*Assistant Technical Editor

[2]Send the diameter of the motor shaft you are using, along with $3 and an s.a.s.e. to Tom Desaulniers, Jr., K4VIZ, P.O. Box 755, Leeds, AL 35094. The ARRL and *QST* in no way warrant this offer.

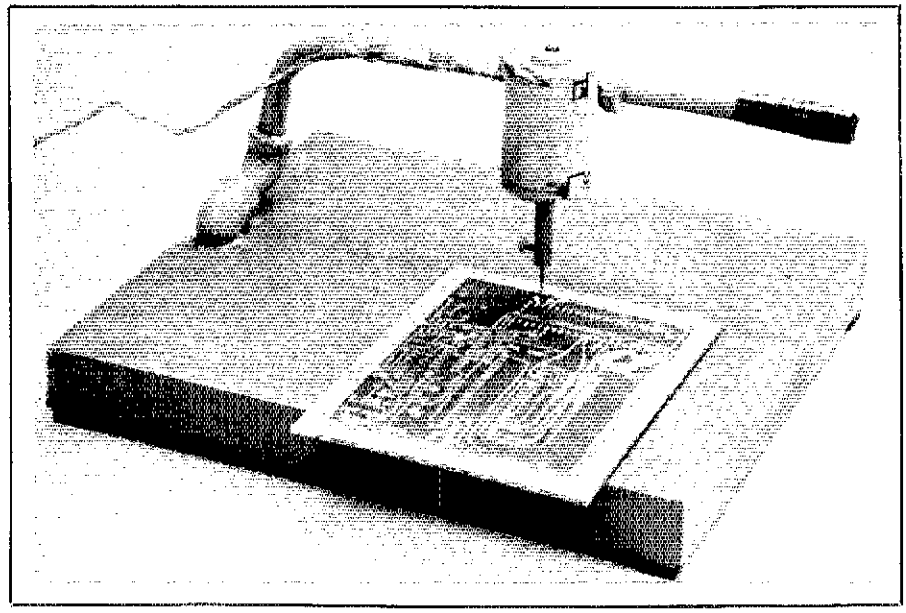


Fig. 1 — Photo of the pc-board drill press built by K4VIZ.

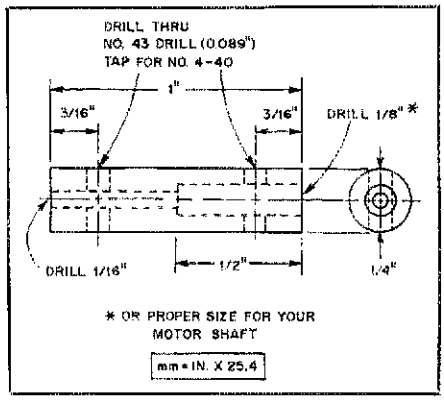


Fig. 2 — Construction details of a shaft coupler for use with the drill press. The diameter of the motor shaft hole may have to be adjusted to suit the motor you are using.

CW WAVE-SHAPING CIRCUIT FOR THE TS-820S

☐ After receiving an Official Observer report of key clicks on my signal, I checked the output from my TS-820S with an oscilloscope. My rig had a rather sharp on/off keying waveform which, when coupled with a Class-C kilowatt amplifier, could be causing key clicks.

My solution is shown at Fig. 3. I mounted this circuit right on the terminals of my Vibroplex "bug," with no modifications to the Kenwood rig. The TS-820S supplies bias to operate Q1. Turn-on time is determined by the time constant of C1 charging through R1, and the decay time is set by the rate of discharge of C1 through Q1. A jumper, placed in the circuit as shown, bypasses the wave shaper if I want to use my "bug" with other rigs. — *Patrick Buller, W7RQT, Kennewick, Washington*

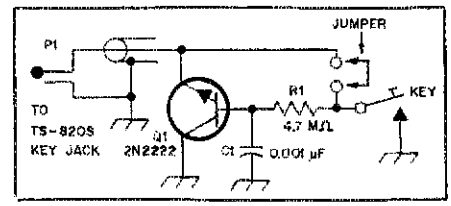


Fig. 3 — Schematic diagram of a CW wave-shaping circuit built by W7RQT to cure a problem of key clicks with his Kenwood TS-820S.

NOISE AND THE CUSHCRAFT FOUR-POLE VHF ANTENNA

☐ The W3IE repeater, which serves Elk County, Pennsylvania, uses a Cushcraft four-pole antenna. This antenna is mounted at the 250-ft level of a 500-ft CATV tower, and is exposed to severe weather conditions.[3]

After this antenna provided us with satisfactory performance for quite some time, we began to notice static noise on the machine during periods of high winds. Inspection of the array showed that the SO-239 connectors had become loose where they fasten to the dipole frames. They thread into a piece of 3/32-in-thick aluminum, and oxidation between the connector body and the support on all four dipoles resulted in poor electrical connections.

Our solution was to install star washers and thin 9/16-in nuts on the SO-239 connectors to ground them firmly to the support brackets. The problem has not recurred since this addition was made.

This type of mounting is common to most Cushcraft VHF antennas with gamma-matching arrangements. Ringo vertical antennas also use this type of connector mounting, so others should find our solution to this problem helpful. — *Peter Carr, WB3BQO, Ridgway, Pennsylvania, and John Guthrie, W3GJ, St. Marys, Pennsylvania*

THE HALF-FOLDED-DIPOLE MATCH FOR YAGI ANTENNAS

☐ While trying to install a gamma-matched four-element Gotham beam, we became frustrated with the up-and-down, cut-and-try technique. We would adjust the beam from a position about five feet above the roof, but when we raised our telescoping TV-mast tower to the operating level, the antenna was no longer matched to the feed line. It is difficult to know how to compensate for this change.

We rebuilt the antenna as a three-element, wide-spaced beam, using the half-folded-dipole matching system. Fig. 4 gives the dimensions we used for our 10-meter beam. Except for a slight

^{a}m = ft × 0.3048.

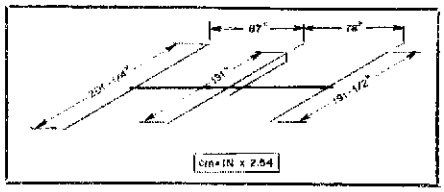


Fig. 4 — Dimensions for a wide-spaced three-element 10-meter beam that uses a half-folded-dipole matching scheme.

upward shift of the resonant frequency, a matched condition was maintained when going from the adjusting position to full height.

The half-folded-dipole match is a simplified version of the coax fed gamma match, and can be used if the radiation resistance of the antenna is known or can be estimated. Adjustments of the gamma-arm length and the capacitance are eliminated with this system. The only tuning required is to set the driven-element length for resonance at the desired center frequency.

The radiation resistance of a wide-spaced three-element Yagi antenna is about 25 ohms. If an equal-diameter folded-dipole element is used, the feed impedance is about 100 ohms balanced, or 50 ohms unbalanced from either side to the center ground point. The center conductor of a piece of 50-ohm coaxial cable is connected to one end of the folded element, and the braid is grounded at the center of the driven element. Fig. 5 illustrates this technique. As long as the radiation resistance is between 21 and 30 ohms, the SWR at resonance will be less than 1.2:1. Radiation resistances of other than 25 ohms can be matched by determining unequal tubing sizes and spaces from *The ARRL Antenna Book*.

Fig. 6 gives the tubing diameters and lengths that we used. By employing smaller-diameter tubing for the folded half-element side, weight balance and near-equal wind resistance can be maintained. Sections of 7/8- and 3/4-in tubing are placed inside of the 1-in tubing at the center to step down the inside diameter. A 1-in PVC pipe coupling supports the floating end of the folded element at the center. Plexiglas® spreaders and nylon cable ties can be used to space the tubing on the folded element. The mechanical balance point on our driven element is within an inch of the physical center, and that makes mounting the beam easier.

This type of driven element is easy to design, fabricate and adjust. The impedance match is nearly perfect at resonance, and we are quite happy with the results from our new antenna. — *Dan Levin, N6BZA, and Martin Levin, W6BDN, Menlo Park, California*

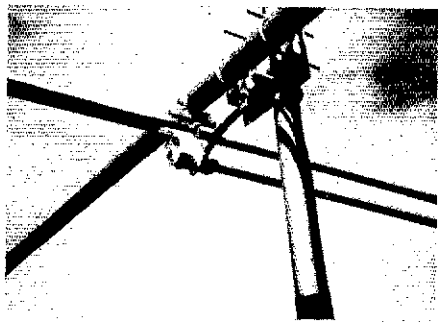


Fig. 5 — The boom-to-mast mounting details and the method of connecting the coaxial feed line to a half-folded-dipole driven element. Notice that a screw goes through the PVC pipe coupling and into the folded-element tubing to connect the center conductor.

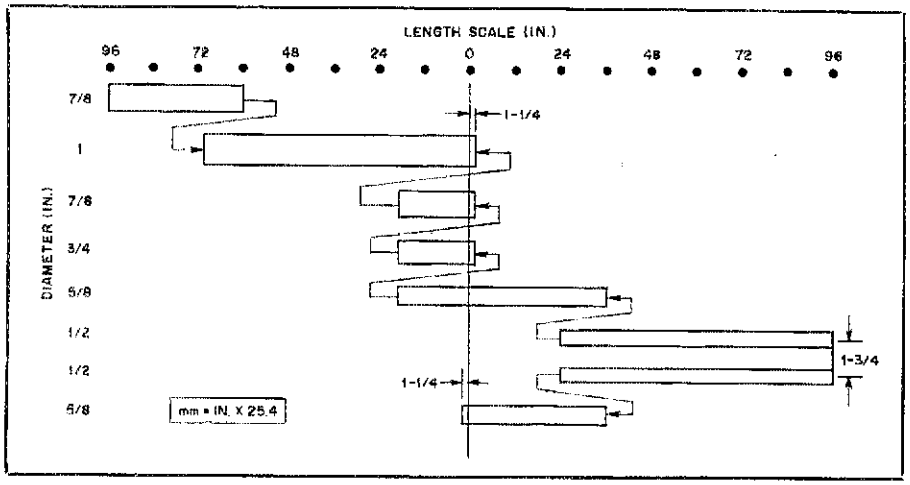


Fig. 6 — Exploded view of the driven-element tubing, showing diameters and lengths for the various tubing sections.

ELIMINATING KEY CLICKS IN THE YAESU FT-901DM

☐ My Yaesu FT-901DM had a very hard CW keying waveform, which can result in severe key clicks. I checked with Yaesu about this problem, and they suggested the following modifications: Add a 0.0047-μF capacitor between the collectors of Q1804 and Q1805 on the Rectifier C Unit, PB-1717, and add a 0.01-μF capacitor from the junction of C1703 (0.001 μF) and R1703 (100 Ω), on PB-1715, to ground. This junction is on the grid-bias lead to the final amplifier.

I was still not satisfied with the keying waveform, so I did a bit of experimenting with circuit changes. In the end, I changed the 0.0047-μF unit mentioned above to a 0.01-μF disc capacitor. I also added a 0.05-μF capacitor between terminal 13 and ground on PB-1717. This is the plug-in terminal that connects to the emitter of Q1806 and R1816 (22 kΩ). This circuit board is easy to remove. Both capacitors are soldered to the appropriate points on the solder side of the board.

In addition, locate the junction of R14 (12 kΩ), R13 (22 kΩ) and C84 (0.047 μF) in the grid-bias lead to the driver stage. This can be found on the bottom of the '901, between the plug-in terminal strips for the Rectifier A Unit (PB-1708) and the NB/RF Processor Unit (PB-1703) on a small terminal strip near pins 1 and 2 of PB-1708. Install a 0.25-μF capacitor from this junction to ground. The capacitor will fit alongside the keyer board, and can be connected to ground on an open terminal just behind the keyer board. Finally, add a 0.1-μF capacitor between terminal 5 and ground on the Rectifier A Unit.

You will still have to be careful to keep the CW drive control below the point at which the final amplifier is over driven, producing a harder leading edge on the keyed waveform. Properly adjusted, the keyed waveform is near perfect, with no trace of key clicks. This same modification has been used with good results on several FT-101ZD transceivers.

Another change that I made to my FT-901 involves the adjustment of the VOX delay control. The potentiometer to change the delay time is inconveniently located under a small cover on the cabinet top. I removed VR602 (a 500-kΩ variable resistor) from the VOX/Marker Unit on PB-1846. Then I mounted a new 500-kΩ control on a small aluminum bracket attached to the small removable cover. I routed two wires from where the old control was soldered on the circuit board, through a hole drilled in the cover, to the new potentiometer. Small pin jacks and plugs in these wires allow easy disconnection if the top cover must be removed. This VOX delay control could be mounted in another location to provide a better appearance, but that was not my primary concern when I made the modification. — *Joe Hertzberg, N3EA, Bryn Mawr, Pennsylvania*

Technical Correspondence

Conducted By
Bob Schetgen,* KU7G

J ANTENNA IMPROVEMENTS

☐ A friend of mine recently built the 2-meter J antenna described by Aurick in "The Timeless J" (Nov. 1982 *QST* and the 1982 edition of *The ARRL Antenna Book).* After taking special care to duplicate the antenna shown in the article, he found it difficult to obtain an SWR of less than 2.5:1. The antenna also exhibited considerable sensitivity to nearby objects. Since my friend intends to use the antenna while mobile, this sensitivity is a serious problem.

After considerable work, I could not get an SWR of less than 2.1:1, which occurred at 146.52 MHz. This SWR could be achieved only by putting the connector clips at the top of the insulator block shown in the article. Next, I removed the insulator block and read the SWR with the tap points at various distances from the shorting bar. (Fig. 1 is a graph of the results.) Minimum SWR would occur with the tap points *inside* the specified insulator block. Relocation of the tap points did not cure the problem encountered during proximity to other objects. A person walking within 30 in of the antenna increases the reflected power by 50%.[1]

At this point it was apparent that the antenna had another basic problem. Going back to the books, I found three articles that are helpful. First, I read the section about the J in the 13th edition of *The ARRL Antenna Book* (pp. 226-227). Two versions of the J are shown: one is fed with a balanced high-Z line (otherwise identical to Aurick's design), the other with coax connected to the base of the J, but with no shorting bar. A similar article about a coax fed J, "The Sneaky 'J'," by K. Thurber, W8FX/4, was published in the Aug. 1978 *73* magazine. W8FX uses the same type of direct feed without the shorting bar. Also, the 1942 edition of *The Radio Amateur's Handbook* shows the J with an open-wire feed line; and also its close cousin, the 1/2-λ Zepp antenna. This information led me to conclude that it is preferable to feed the antenna with a high-Z line, about 200 to 600 ohms. The solution is to use a 4:1 balun made from a half-wave length of coax.[2] A 4:1 balun provides a better impedance match (with the tap points above the insulator block) and reduces SWR to 1.5:1, or less, across the 2-meter band. In addition, the sensitivity to nearby objects is reduced; a 5- × 2-ft metal plate 7 in away from the antenna only increases the reflected power by 10%.

Reducing the height of the insulated mounting block by 1/2 in might provide an even better match. This feed method offers a significant improvement; repeaters are consistently accessed using a hand-held transceiver from a distance of 35 miles. — *Domenic M. Mallozzi, N1DM, Watertown, Massachusetts*

[1]mm = in × 25.4; km = mi × 1.6093.
[2]Baluns with a 4:1 impedance ratio are shown in Chapter 9 of *The ARRL Antenna Book* and Chapter 19 of *The Radio Amateur's Handbook.*

*TIS Specialist, ARRL

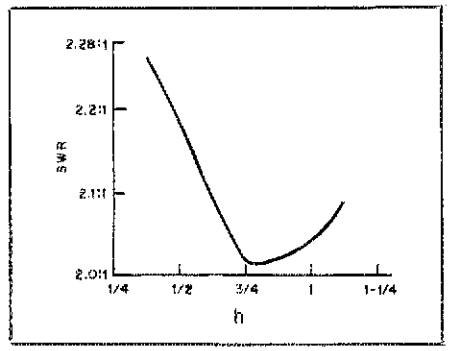


Fig. 1 — SWR curve for the J antenna with a shorting bar at the base and fed directly with 50-Ω coaxial cable. The variable, "h," is the distance, in inches, from the shorting bar to the tap points.

BALANCED ANTENNA MATCHING

☐ [The following is excerpted from a letter by John Belrose, VE2CV. Mr. Belrose was responding to an inquiry from Paul Hogg, W8UGT, about the T-network that appears in "A Kite Supported 160- (or 80-) Meter Antenna" (March 1981 *QST* and Technical Correspondence, May 1981 *QST) — Ed.]*

Since I have pen in hand, or typewriter in front of me, let me comment on impedance-matching networks. The T network is, in my opinion, a very versatile circuit that can provide proper matching for a wide variety of reactive loads. It has a series arm to tune the reactance of the load, and another to match the resulting resistive impedance to the 200-Ω balanced impedance of the balun.

Other networks have been employed:

1) The simplest is the L network (a neat arrangement that provides a means of reversing the series and shunt arms of the network is available from Unique Products Company). It requires few components, but is a bit tricky to adjust (compare with Fig. 2 of my March article).

2) A modified pi network is used by the R. L. Drake Co. in their tuners.

3) A series-parallel capacitance combination, which was developed by W1FB, has been in ARRL publications for a number of years.

4) A T network with a single, center-tapped coil appears in an article by W6EBY in the September 1978 *Ham Radio Magazine.*

All of these unbalanced circuits can be rearranged for a balanced configuration, but this may require twice as many components. There is an advantage to be gained, however, in that all of the power is delivered to the antenna and not wasted as heat in a balun. Also, a balun only performs well as a balanced-to-unbalanced transformer for *matched, purely resistive* loads.

In regards to component values for the T network, any load can be matched at any frequency. However, when one considers practicality, the range of reactive loads that can be tuned is restricted, particularly at the lower frequencies. For 160-m operation, capacitor values of 400 to 600 pF should be used, and an inductor value of 28 μH. If the components are inadequate for matching on a particular band, fixed capacitors can be plugged or switched into the circuit. Incidentally, my circuit can match a one-terminal antenna, such as a random wire, by grounding one of the output terminals and feeding with the other. — *John S. Belrose, VE2CV, Aylmer, Quebec, Canada*

PI-NETWORK EQUATION

☐ I was just reviewing Wingfield's "New and Improved Formulas for the Design of Pi and Pi-L Networks" (Aug. 1983 *QST).* Inductance was the unknown when I built my own transmitter with a pi-network. I thought it would be helpful to have an equation that would tell me the load seen by the tube when only the capacitances and the output load, at resonance, are known.

Rearranging the old pi-network equations, I arrived at the following quadratic solution:

$$R_{in} = \frac{-(b) \pm \sqrt{b^2 - 4ac}}{2a} \qquad \text{(Eq. 1)}$$

where

$a = (X_{C2})^2 (R_{out})$
$b = -(X_{C1})^2 ([R_{out}]^2 + [X_{C2}]^2)$
$c = (X_{C1})^2(a)$

Values from Table 2 of Wingfield's article can be used to check the validity of this formula. As an example, let R2 = 50 ohms, X_{C1} = 188 ohms and X_{C2} = 37 ohms. This gives us: a = 68450, b = -1.3674×10^8 and c = 2.41929×10^9, which yields R1 = 1979.8 ohms. This represents an error of −1% from the tabulated value of 2000 ohms. The formula is consistent with Wingfield's table. Finally, using the established pi-network equations, a circuit Q and value for X_L may be calculated. — *Martin Sample, WA6JTD, Tuolumne, California*

REFLECTED POWER

☐ I am responding to Maxwell's article, "The Reality of Reflected Power" (Technical Correspondence, Feb. 1983 *QST).* I regret that Maxwell considers my article, "What Your Wattmeter Really Reads" (Feb. 1981 *QST),* to be " . . . promoting the erroneous notion that reflected power is fictitious." My article says, "Under key-down conditions, the source (transmitter) does not recognize the existence of such a quantity as reflected power." As Maxwell states, "Line voltage measured across the line is the phasor sum of the forward and reflected voltages; line current measured in series with the line is the phasor sum of the forward and

reflected currents."[3] Thus, under key-down conditions, the source (transmitter) supplies only *a* line voltage and *a* line current, just as it would to any lumped-constant circuit having the same impedance as the load. The constituent parts of the voltage and current are known only to the analyst and are of no concern to the transmitter. My article simply explained how reflectometer wattmeters derive their readings from *a* voltage and *a* current and told how to convert the readings to true or actual power (since these meters are not true wattmeters). Since August 29, 1983 [The date the FCC's new output power measurement rule went into effect — Ed.] has passed, I'm changing my terminology from true or actual power to:

FCC power = forward power — reflected power (the latter two are obtained from reflectometer wattmeters)!

No one doubts that reflections are real. Radar, laser range finders, and so on, provide ample proof. These techniques employ direct measurement of reflected power by turning the transmitter off before the reflection arrives back at the transmitter. It is very simple to measure reflected power when only the reflection is present. I don't think the flashlight analogy is appropriate. — *J. T. Kroenert, KA1PL, Barrington, Rhode Island*

MORE ON THE TS-820(S) WARC CONVERSION

☐ One reader who made the WARC-band modifications to his TS-820(S), as shown in my article in the Feb. 1983 *QST*, has pointed out that he was unable to obtain full power output on 18 MHz. (One section of the loading capacitor is not quite adequate to match a 50-Ω load.) His solution is to install a toggle switch in the PA compartment to add another section of the loading capacitor to the circuit for 18-MHz operation.

A more convenient way to solve the problem, without further changes to the amplifier compartment, is to use the relay that was added for 10-MHz operation to perform the same functions on 18 MHz. Use two small-signal diodes to feed 9 V to the relay AND circuit (Fig. 4 of the Feb. article) from both the WWV and AUX positions of the band switch. (A schematic of the addition is shown in Fig. 3.) On 18 MHz as well as on 10 MHz, the relay switches both unused sections of the loading capacitor into the circuit. It also shorts the tuning coil at the 7-MHz tap on both bands. (These turns, and more, are also shorted by the band-selector switch when it is in the AUX position for 18-MHz operation.)

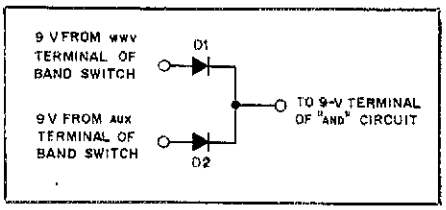


Fig. 3 — Schematic diagram of diode connections for TS-820(S) WARC modification.

As with the 10-MHz modification, the 18-MHz terminal of the band switch is easy to reach without disturbing the lead dress. The diodes I used were small-signal germanium diodes (type number unknown) acquired at a flea market. Almost any diode should work well. — *Robert C. Cheek, W3VT, Myrtle Beach, South Carolina*

MOTOROLA TMOS AVAILABLE

☐ I wish to provide additional information about Motorola TMOS RF Power FETs mentioned in "Go Class B or C with Power MOS FETs," by DeMaw (March 1983 *QST*; Feedback p. 43, May 1983 *QST*). The MRF138 is rated at only 30 W (output) because the specification includes a linearity test. In this test the third-order IMD products must be 30 dB below each tone (not below PEP output, as amateur transmitters are commonly rated).

The MRF171 is a "drop-in" replacement for the MRF138 and is conservatively rated at 45 W of CW output at 150 MHz. (A graph of power output versus power input for the MRF171 is shown in Fig. 2.) The point is that one must consider the entire specification when output power ratings of solid-state devices are compared. Do not look at power-output numbers alone.

The MRF138 and MRF171 MOS FETs are available now. They were not delayed by "manufacturing problems" as stated in the feedback item. — *Roy Hejhall, K7QWR, Phoenix, Arizona.*

[3]Feedback, April 1983, *QST*, p. 40.

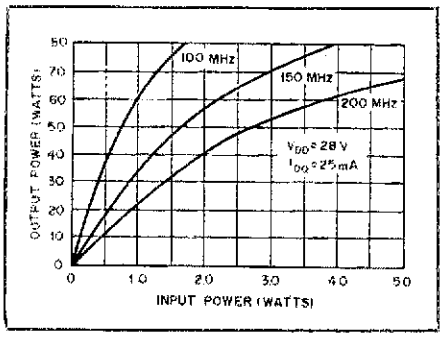


Fig. 2 — Output power versus input power curves for the MRF171.

Feedback

☐ Author Wingfield has found several printing errors in his "New and Improved Formulas for the Design of Pi and Pi-L Networks" (Aug. 1983 *QST*). In the program listing, the last term of line 180 should read: (Q1*Q1 + 1): GOTO 280. Also, line 220 should begin with: IF R1/R2 > ...

On page 24, the first full sentence should begin, "The error is greater for R1 < R2, ..." There is a reference to Motorola *AN-267* in the last paragraph under the "Unsatisfactory Q Results" subheading; the data mentioned actually appears on page 6 of *AN-267*, not at the beginning.

Eq. 13, on page 25, should read:

$$Q1 = \sqrt{\frac{Qo \bullet R1}{X_L} - 1}$$

and the term "1" in Eq. 14 should be included under the radical sign. Eq. 67, at the upper-right corner of p. 28, should read:

$$Q2 = Qo - Q1$$

☐ Bob Shriner, WAØUZO, points out an error in Fig. 2 of Rand's article, "The 'Beeper': An Audible Frequency Readout for the Blind Amateur," on p. 21 of Sept. 1983 *QST*. Timer U35 will not work as shown. Pin 2 should be connected to pin 6, not to +5 V as shown. Make the connection to the top of the 1-MΩ tone-adjust control, instead of the bottom.

☐ Author Gannaway, G3YGF ("Tropospheric Scatter Propagation," Nov. 1983 *QST*), informs us that his address has changed to 31 High View, Pinner, Middlesex, HA5 3PE, England.

☐ More errors have been found in, "The Pizza Clock: An Exercise in Wire Wrapping" (June 1983 *QST*; Feedback p. 50, Dec. 1983 *QST*). The 1-kΩ resistor at pin 6 of U1 has not, as stated in the Dec. 1983 Feedback, been eliminated; rather pins 5 and 6 are reversed in Fig. 7, on p. 30, of the article. U5 and U9 are 4069 CMOS hex inverting buffers, not 4049s.

☐ WA1RGP tells us that the statements about safe gate swing in "A VXO CW Rig for 30 Meters," by DeMaw (Nov. 1983 *QST*), are in error. Siliconix no longer includes a gate-protection diode in the VN67AF. Caution is suggested; some of the older devices are still sold through retail outlets.

☐ Vinton Brown, W6TDA, points out an error in "The Manufacture and Use of Resistors" (Nov. 1983 *QST*). The top line of the second column on page 24 should read, " ... so the resistance will not increase with increasing frequency." Actually, other construction factors are involved, and the resistance may increase or decrease with increasing frequency. This will depend on the actual resistance, and probably even the manufacturer. The general trend is for the resistance to decrease slightly as the frequency increases above some threshold, typically 10 MHz.

☐ The correct address for Austin Custom Antenna (Product Review, *QST*, Dec. 1983) is: P.O. Box 357, Sandown, NH 03873.

☐ The review of the A.E.A. AMT-1 AMTOR Terminal Unit (Product Review, Nov. 1983 *QST*) requires a bit of clarification. In the review, mention is made of using the low tones of 1275/1445 Hz and operating the transceiver in the USB mode. The review unit is one of the first distributed in the U.S. and, as such, uses the low tones. Later units sold in the U.S. use the high tones of 2125/2295 Hz and require use of the LSB mode.

☐ A line was inadvertently dropped from the article on the Volunteer Examining Program in Dec. 1983 *QST* (bottom of first column, page 51). The missing line reads: [condi]tions are met: "BE IT RESOLVED that the ...

New Scholarship Honors Senator Goldwater

Here's your chance to thank Senator Goldwater, K7UGA, for all he's done for Amateur Radio!

By Chris Imlay,* N3AKD

On November 9, 1983, Amateur Radio honored the man who has for many years served as its governmental protector and advocate, Senator Barry Goldwater, K7UGA, by establishing a scholarship in his name. The $5000 scholarship will be awarded annually to a deserving radio amateur to encourage in that individual what Senator Goldwater represents to Amateur Radio — the spirit of achievement and dedication in the field of communications. It will be administered by the ARRL Foundation.

In the Senator's Washington chambers, flanked by League officials, Quarter Century Wireless Association officials, the Chairman and Private Radio Bureau Chief of the FCC, and friends of the Senator from the Capitol Hill Amateur Radio Society, the ARRL Scholarship Endowment Fund Honoring Senator Barry Goldwater was announced by Perry Williams, W1UED, the League's Washington Area Coordinator. Perry noted that through the Senator's Amateur Radio involvement, he has "brought joy to thousands of members of the armed services stationed overseas, and through his professional career, he has exemplified the principles of commitment and service to one's country and fellow citizens."

After the announcement, Barry's modest but honest response was that he felt he didn't deserve it, but "I would be a liar if I said I didn't like it!" Turning to the K7UGA station behind his desk, the Senator "told the world" of the scholarship announcement in successive QSOs with WØFIR, WØBWJ, NN3SI and others. As with every other amateur, that part of the ceremony could have gone on for hours.

FCC Chairman Mark Fowler summarized the feelings of all present, noting how lucky the Amateur Radio community was to have K7UGA as its "elder statesman" in government, and how closely the Commission "tests the waters" with Senator Goldwater before taking actions affecting Amateur Radio. Although the ceremony was brief, the amateur community established a permanent method of expressing its appreciation to its most staunch advocate in government. QST

Be a Charter Contributor to the Goldwater Scholarship Fund

Here's your opportunity to thank Barry, K7UGA, for his long-term staunch support of the Amateur Radio Service and to let him know of your appreciation. Send in your contribution *now* and be a *Charter Contributor*. All Charter Contributors will have their name and call listed in a commemorative book to be presented to Senator Goldwater prior to the awarding of the first scholarship in his honor. The deadline for donations by Charter Contributors is August 1, 1984.

If your contribution is $25 or more, we will list your name and call in *QST*. If your contribution is $100 or more, in addition to your name and call appearing in *QST*, you will receive a signed photograph of the Senator, suitable for display in your hamshack. And for contributions of $1000 or more, in addition to the above, we'll put your photo in *QST* and you'll receive a personal thank you call from Robert York Chapman, W1QV, President of the ARRL Foundation, which is administering the Goldwater Scholarship Fund.

We welcome *all* contributions, regardless of size. Please help us achieve our goal of building an endowment sufficient to fund the Goldwater Scholarship in perpetuity. What better way to honor a great amateur, a great statesman and a great human being?

Larry Kettlewell, W3HHG (right), staff member of the Senate Select Committee on Intelligence, makes one of the first contributions to the Goldwater Scholarship fund. Left to right are Senator Goldwater, K7UGA, ARRL Foundation President Robert York Chapman, W1QV, ARRL President Vic Clark, W4KFC (SK) and W3HHG.

*ARRL Counsel

License Renewal Information

1) Attach a photocopy, or the original, of your license to the FCC Form 610 (available from ARRL Hq.; s.a.s.e. please).

2) Mail to FCC, Gettysburg, PA 17325.

3) Retain copies of everything, if possible, as proof of filing before expiration. If you file before the license expiration date, you may continue to operate beyond the expiration date and until the new license arrives. After expiration, there is a two-year grace period under which you may still renew and keep your call sign without retesting, but you must wait until the new license arrives to operate. After this two-year grace period expires, you must be reexamined for a new license. Normally, application should be made approximately 90 days before expiration; however, renewal can be applied for at any time during the term of the license.

4) If you are simply modifying your license (change of address, for example), you must fill out the Form 610; a letter is no longer sufficient. Incidentally, your license will also be automatically renewed for 10 years at this time.

5) If you have any questions or problems, drop a note to the Membership Services Department, ARRL Hq.

The "Considerate Operator's Frequency Guide"

Some frequencies that are generally recognized for certain modes or certain activities:

1800-1825 kHz	CW only	14.08-14.10 MHz	RTTY
1825-1830 kHz	"DX window" (no W/VEs)	14.23 MHz	SSTV
1850-1855 kHz	"DX window" (no W/VEs)	21.09-21.10 MHz	RTTY
3590 kHz	RTTY DX	21.34 MHz	SSTV
3610-3630 kHz	RTTY	28.09-28.10 MHz	RTTY
3845 kHz	SSTV	28.68 MHz	SSTV
7040 kHz	RTTY DX	29.30-29.50 MHz	Satellite downlinks
7090-7100 kHz	RTTY	29.52-29.58 MHz	Repeater inputs
7171 kHz	SSTV	29.60 MHz	FM simplex
		29.62-29.68 MHz	Repeater outputs

(In addition, on 20 meters in particular, the low end of the U.S. phone segment is reserved for DX, the high end for traffic, and ragchewing in between. The dividing lines are not definite, however.) Radio Control R/C Channels: 50.80, 50.82, 50.84, 50.86, 50.88, 50.90, 50.92, 50.94, 50.96, and 50.98 MHz. See also August 1983 *QST*, p. 72.

U.S. Amateur Frequency and Mode Allocations

Power Limits: All U.S. amateurs are limited to 200-W PEP output in the Novice segments. On all other segments, with certain exceptions in the 160-meter, 10-MHz and 420-MHz bands, 1500-W PEP output is permitted. (A-m operations will use old power limits and standards until June 1, 1990.) Also, there are erp limitations for stations in repeater operation. (See 97.67, FCC rules.) At all times the power level should be kept down to that necessary to maintain communications. (Revised as of December 1983)

Bandwidth Limitations

FREQUENCY (OR PHASE) MODULATION: On frequencies below 29.0 MHz, the bandwidth of F3 emission shall not exceed that of an A3 emission having the same audio characteristics.

TELEVISION and FACSIMILE: On frequencies below 50 MHz, the bandwidth of A4, A5, F4 and F5 emissions shall not exceed that of an A3 single-sideband emission.

On frequencies between 50 MHz and 225 MHz:

(1) The bandwidth of A4 and A5 single sideband emission shall not exceed the bandwidth of an A3 single-sideband emission.

(2) The bandwidth of A4 and A5 double-sideband emissions shall not exceed the bandwidth of an A3 double-emission.

(3) F4 and F5 emissions shall utilize a peak carrier deviation no greater than 5 kHz and a maximum modulating frequency no greater than 3 kHz or, alternatively, shall occupy a bandwidth no greater than 20 kHz. (For this purpose the bandwidth is defined as the width of the frequency band, outside of which the mean power of any emission is attenuated by at least 26 decibels below the mean power level of the total emission. A 3-kHz sampling bandwidth is used by the FCC in making this determination.)

Below 225 MHz, an A3 emission may be used simultaneously with an A4 and A5 emission on the same carrier frequency, provided that the total bandwidth does not exceed that of an A3 double-sideband emission.

Digital Transmission:

The use of Baudot, ASCII and AMTOR is permitted on any amateur frequency where F1 emission is permitted, subject to the following requirements:

(1) The *sending speed* shall not exceed the following:

(i) 300 bauds on frequencies below 28 MHz;

(ii) 1200 bauds on frequencies between 28 and 50 MHz;

(iii) 19.6 kilobauds on frequencies between 50 and 220 MHz;

(iv) 56 kilobauds on frequencies above 220 MHz.

(2) When type A2, F1 or F2 emissions are used, the *radio or audio frequency shift* (the difference between the frequency for the "mark" signal and that for the "space" signal), as appropriate, shall be less than 1000 Hz.

(3) When type A2 or F2 emissions are used, the highest fundamental modulating frequency shall be less than 3000 Hz.

The International Telegraph Alphabet Number 2 (commonly known as Baudot) transmission shall consist of a single channel, five-unit (start-stop) teleprinter code conforming to the International Telegraph Alphabet Number 2 with respect to all letters and numerals (including the slant sign or fraction bar); however, in the "figures" positions not utilized for numerals, special signs may be employed for the remote control of receiving printers, or for other purposes indicated in this section.

The American Standard Code for Information Interchange (commonly known as ASCII) shall conform to the American Standard Code for Information Interchange as defined in American National Standards Institute (ANSI) Standard X3.4-1968.

The International Radio Consultative Committee (CCIR) Recommendation 476-2 (commonly known as AMTOR) shall conform to the specifications of CCIR 476-2 (1978) Mode A or Mode B.

The *use of any digital code* is permitted on amateur frequencies above 50 MHz, except those on which only A1 emission is permitted, subject to the following requirements:

(1) Communications using such digital codes are authorized for domestic operation only (communications between points within areas where radio services are regulated by the U.S. Federal Communications Commission), except when special arrangements have been made between the United States and the administration of any other country concerned.

(2) The bandwidth of an emission from a station using such digital codes shall not exceed the following (where for this purpose the bandwidth is defined as the width of the frequency band, outside of which the mean power of any emission is attenuated by at least 26 decibels below the mean power of the total emission; a 3-kHz sampling bandwidth being used by the FCC in making this determination):

(i) 20 kHz on frequencies between 50 and 220 MHz;

(ii) 100 kHz on frequencies between 220 and 1215 MHz;

(iii) On frequencies above 1215 MHz any bandwidth may be used provided that the emission is in accordance with §97.63(b) and §97.73(c).

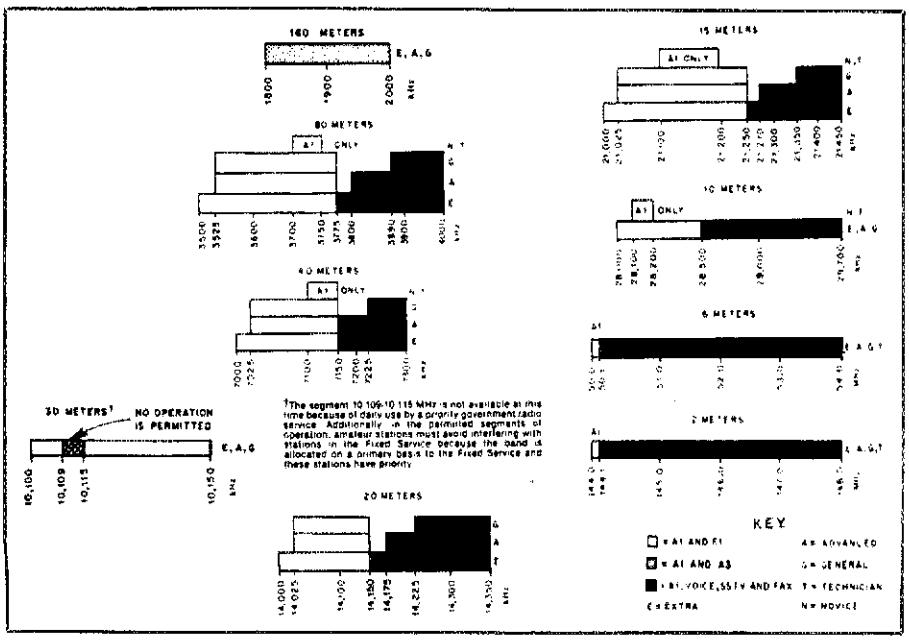
(3) A description of the digital code and the modulation technique shall be included in the station log during all periods of use and shall be provided to the Commission on request.

ALL MODES: The carrier frequency plus modulating frequencies must be contained within amateur allocations and within appropriate subbands.

NOTE: Some amateur bands are shared with other services. Some geographical limitations exist for the 420-MHz band. For details, and for information on specialized modes, see *The FCC Rule Book (ARRL)*. For information on repeaters, see the *The FCC Rule Book* and *Repeater Directory*.

160 METERS: Extra, Advanced and General may use some segments at 1.9-2.0 MHz. Limitations are on a geographical basis; see *The FCC Rule Book (ARRL)* for limitations on this segment. There are *no* geographical limitations on the 1.8-1.9 MHz segment. (Note: A1 and A3 only are permitted on the 160-meter band.)

Other — All modes, except as noted.



MAJOR ARRL OPERATING EVENTS AND CONVENTIONS — 1984*
(Check *QST* monthly for updates)

JANUARY

1	Straight Key Night
5	West Coast Qualifying Run
7-8	ARRL QSO Party, CW
8	*ARRL Hamfest (Oak Park, MI)*
10	W1AW Qualifying Run
12-15	*SAROC (Las Vegas, NV)†*
14-15	*ARRL Hamfest (Sarasota, FL)*
14-15	*VHF Sweepstakes*
21-22	ARRL QSO Party, phone
24	W1AW Qualifying Run
28-Feb. 5	Novice Roundup

FEBRUARY

1	West Coast Qualifying Run
4-5	*ARRL Hamfest (Miami, FL)*
8	W1AW Qualifying Run
12	*ARRL Hamfest (Mansfield, OH)*
18-19	International DX Contest, CW
19	*ARRL Hamfest (Melville, NY)*
19	*ARRL Hamfest (Elkin, NC)*
22	W1AW Qualifying Run
25	*ARRL Hamfest (Robbinsdale, MN)*
25-26	*Ohio State Convention (Cincinnati)*
26	*ARRL Hamfest (Davenport, IA)*
26	*ARRL Hamfest (Vienna, VA)*

MARCH

1	West Coast Qualifying Run
3-4	International DX Contest, phone
4	*ARRL Hamfest (Livonia, MI)*
8	W1AW Qualifying Run
10-11	*Florida State Convention (Orlando)*
10-11	*ARRL Hamfest (Lafayette, LA)*
11	*ARRL Hamfest (Winchester, IN)*
17-18	*ARRL Hamfest (Fort Walton Beach, FL)*
17-18	*North Carolina State Convention (Charlotte)*
22	W1AW Qualifying Run
24	*ARRL Hamfest (Elizabethtown, KY)*
25	*ARRL Hamfest (Madison, OH)*
25	*ARRL Hamfest (Grayslake, IL)*
30-April 1	*Midwest Division Convention (Kearney, NE)*

APRIL

4	West Coast Qualifying Run
7-8	*Missouri State Convention (Kansas City)*
13	W1AW Qualifying Run
14	*ARRL Hamfest (Muskegon, MI)*
14-15	*Mississippi State Convention (Jackson)*
27-29	DAYTON HAMVENTION (Dayton, OH)†
29	W1AW Qualifying Run

MAY

3	West Coast Qualifying Run
5	*ARRL Hamfest (Albany, GA)*
5-6	*ARRL Hamfest (Columbia, MO)*
5-6	*ARRL Hamfest (Greenville, SC)*
6	*ARRL Hamfest (Centralia, IL)*
6	*ARRL Hamfest (Paramus, NJ)*
12	W1AW Qualifying Run
18-19	*Atlantic Division/New York State Convention (Rochester, NY)*
18-20	*ARRL Hamfest (Fresno, CA)*
20	*ARRL Hamfest (Knoxville, IL)*
20	*ARRL Hamfest (Marshall, MO)*
23	W1AW Qualifying Run
25-27	*Rocky Mountain Division Convention (Aurora, CO)*

JUNE

1-3	*West Gulf Division Convention (Dallas, TX)*
3	*ARRL Hamfest (Chelsea, MI)*
3	*ARRL Hamfest (Princeton, IL)*
6	West Coast Qualifying Run
9-10	VHF QSO Party
10	W1AW Qualifying Run
10	*ARRL Hamfest (Willow Springs, IL)*
16-17	*Georgia State Convention (Atlanta)*
23-24	Field Day
26	W1AW Qualifying Run
29-30	*Michigan State Convention (Livonia)*

JULY

5	West Coast Qualifying Run
7-8	*Indiana State Convention (Indianapolis)*
8	*ARRL Hamfest (Alexander, NY)*
14-15	*ARRL Hamfest (Rossville, GA)*
14-15	IARU Activities
16	W1AW Qualifying Run
19-21	*ARRL NATIONAL (New York, NY)*
25	W1AW Qualifying Run

AUGUST

1	West Coast Qualifying Run
4-5	UHF Contest
7	W1AW Qualifying Run
11-12	*ARRL Hamfest (Charlotte, VT)*
12	*ARRL Hamfest (Willow Springs, IL)*
18-19	*Southeastern Division Convention (Huntsville, AL)*
25	W1AW Qualifying Run
26	*Illinois State Convention (St. Charles)*

SEPTEMBER

1-3	*Pacific Division Convention (Santa Clara, CA)*
6	West Coast Qualifying Run
8-9	VHF QSO Party
12	W1AW Qualifying Run
21	W1AW Qualifying Run
22-23	*Roanoke Division Convention (Virginia Beach, VA)*
29-30	*New England Division Convention (Boxboro, MA)*

OCTOBER

3	West Coast Qualifying Run
6-7	ARRL QSO Party, CW
11	W1AW Qualifying Run
12-14	*Southwestern Division Convention (Santa Maria, CA)*
13-14	ARRL QSO Party, phone
20-21	Simulated Emergency Test
28	W1AW Qualifying Run

NOVEMBER

1	West Coast Qualifying Run
3-4	Sweepstakes, CW
9	W1AW Qualifying Run
17-18	Sweepstakes, phone
19	W1AW Qualifying Run

DECEMBER

1-2	160 Meter Contest
5	West Coast Qualifying Run
8	W1AW Qualifying Run
8-9	10 Meter Contest
27	W1AW Qualifying Run

*Hamfests/Conventions of record as of November 1, 1983

†Not an ARRL event

QST Abbreviations List

These abbreviations, revised to conform with contemporary electronics and communications standards, appear in QST and other League publications. Keep them handy for easy reference.

a — atto (prefix for 10^{-18})
A — ampere (unit of electrical current)
ac — alternating current
ACC — Affiliated Club Coordinator
ACSB® — Amplitude Compandored Single Sideband
A/D — analog-to-digital
AF — audio frequency
AFC — automatic frequency control
AFSK — audio frequency-shift keying
AGC — automatic gain control
Ah — ampere hour
AIRS — ARRL Interference Reporting System
ALC — automatic level control
AM — amplitude modulation
AMTOR — Amateur Teleprinting Over Radio
ANT — antenna
ARA — Amateur Radio Association
ARC — Amateur Radio Club
ARES — Amateur Radio Emergency Service
ARQ — automatic repeat request
ARS — Amateur Radio Society (Station)
ASCII — American National Standard Code for Information Interchange
ASSC — Amateur Satellite Service Council
ATV — amateur television
AVC — automatic volume control
AWG — American wire gauge
az-el — azimuth-elevation

B — bel
balun — balanced to unbalanced (transformer)
BC — broadcast
BCD — binary-coded decimal
BCI — broadcast interference
Bd — baud (bit/s in single-channel binary data transmission)
BER — bit error rate
BFO — beat-frequency oscillator
bit — binary digit
bit/s — bits per second
BM — Bulletin Manager
BPF — band-pass filter
BPL — Brass Pounders League
BT — battery
BW — bandwidth

c — centi (prefix for 10^{-2})
C — coulomb (quantity of electric charge); capacitor
CAC — Contest Advisory Committee
CATVI — cable-television interference
CB — Citizens Band (radio)
CBMS — computer-based message system
CCTV — closed-circuit television
CCW — coherent CW
ccw — counterclockwise
CD — Communications Department (ARRL Hq.); civil defense
cm — centimeter
CMOS — complementary-symmetry metal-oxide semiconductor
coax — coaxial cable
COR — carrier-operated relay
CP — code proficiency (award)
CPU — central processing unit
CRT — cathode-ray tube
CT — center tap
CTCSS — continuous tone-coded squelch system
cw — clockwise
CW — continuous wave

d — deci (prefix for 10^{-1})
D — diode
da — deka (prefix for 10)
D/A — digital-to-analog
DAC — digital-to-analog converter
dB — decibel (0.1 bel)
dBi — decibels above (or below) isotropic antenna
dBm — decibels above (or below) 1 milliwatt
DBM — doubly balanced mixer
dBV — decibels above/below 1 V (in video, relative to 1 V P-P)
dBW — decibels above/below watt
dc — direct current
D-C — direct conversion
DEC — District Emergency Coordinator
deg — degree
DET — detector
DF — direction finding; direction finder
DIP — dual in-line package
DPDT — double-pole double-throw (switch)
DPSK — differential phase-shift keying
DPST — double-pole single-throw (switch)
DS — direct sequence (spread spectrum)
DSB — double sideband
DTMF — dual-tone, multifrequency
DVM — digital voltmeter
DX — long distance; duplex
DXAC — DX Advisory Committee
DXCC — DX Century Club

E — voltage
EC — Emergency Coordinator
ECAC — Emergency Communications Advisory Committee
ECL — emitter-coupled logic
EHF — extremely high frequency (30-300 GHz)
EIRP — effective isotropic radiated power
ELF — extremely low frequency
EMC — electromagnetic compatibility
EME — earth-moon-earth (moonbounce)
EMF — electromotive force
EMI — electromagnetic interference
EMP — electromagnetic pulse
EPROM — erasable programmable read-only memory

f — femto (prefix for 10^{-15}); frequency
F — farad (capacitance unit); fuse
FAX — facsimile
FD — Field Day
FET — field-effect transistor
FL — filter
FM — frequency modulation
FSK — frequency-shift keying
ft — foot (unit of length)

g — gram (unit of mass)
G — giga (prefix for 10^{9})
GaAs — gallium arsenide
GDO — grid- or gate-dip oscillator
GHz — gigahertz
GND — ground

h — hecto (prefix for 10^{2})
H — henry (unit of inductance)
HF — high frequency (3-30 MHz)
HFO — high-frequency oscillator
HPF — highest probable frequency; high-pass filter
Hz — hertz (unit of frequency)

I — current, indicating lamp
IC — integrated circuit
ID — identification; inside diameter
IF — intermediate frequency
IMD — intermodulation distortion
in — inch (unit of length)
in/s — inch per second (unit of velocity)
I/O — input/output
IRC — international reply coupon
ITF — Interference Task Force

j — operator for complex notation, as for reactive component of an impedance (+j inductive; −j capacitive)
J — joule (kg m^2/s^2) (energy or work unit); jack
JFET — junction field-effect transistor

k — kilo (prefix for 10^{3}); Boltzmann's constant (1.38×10^{-23} J/K)
K — Kelvin (used without degree symbol) (absolute temperature scale)
kBd — 1000 bauds
kbit — 1024 bits
kbit/s — 1000 bits per second
kbyte — 1024 bytes
kg — kilogram
kHz — kilohertz
km — kilometer
kV — kilovolt
kW — kilowatt
kΩ — kilohm

l — liter (liquid volume)
L — lambert; inductance
lb — pound (force unit)
LC — inductance-capacitance
LCD — liquid crystal display
LED — light-emitting diode
LF — low frequency (30-300 kHz)
LHC — left-hand circular (polarization)
LO — local oscillator; League Official
LP — log periodic
LS — loudspeaker
LSB — lower sideband
LSI — large-scale integration

m — meter; milli (prefix for 10^{-3})
M — mega (prefix for 10^{6})
mA — milliampere
mAh — milliamperehour
MDS — Multipoint Distribution Service; minimum discernible (or detectable) signal
MF — medium frequency (300-3000 kHz)
mH — millihenry
mho — mho (use siemens)
MHz — megahertz
mi — mile, statute (unit of length)
mi/h — mile per hour
mi/s — mile per second
mic — microphone
min — minute (time)
MIX — mixer
mm — millimeter
MOD — modulator
modem — modulator/demodulator
MOS — metal-oxide semiconductor
MOSFET — metal-oxide-semiconductor field-effect transistor

ms — millisecond
m/s — meters per second
MSI — medium-scale integration
MUF — maximum usable frequency
mV — millivolt
mW — milliwatt
MΩ — megohm

n — nano (prefix for 10^{-9})
NBFM — narrow-band frequency modulation
NC — no connection; normally closed
NCS — net-control station; National Communications System
nF — nanofarad
NF — noise figure
nH — nanohenry
NiCd — nickel cadmium
NM — Net Manager
NMOS — N-channel metal-oxide silicon
NO — normally open
NPN — negative-positive-negative (transistor)
NR — Novice Roundup (contest)
ns — nanosecond
NTS — National Traffic System

OBS — Official Bulletin Station
OD — outside diameter
OES — Official Emergency Station
OO — Official Observer
op amp — operational amplifier
ORS — Official Relay Station
OSC — oscillator (schematic diagram abbrev.)
OTC — Old Timer's Club
OTS — Official Traffic Station
oz — ounce (force unit, 1/16 pound)

p — pico (prefix for 10^{-12})
P — power; plug
PA — power amplifier
PAM — pulse-amplitude modulation
PC — printed circuit
PEP — peak envelope power
PEV — peak envelope voltage
pF — picofarad
pH — picohenry
PIA — Public Information Assistant
PIN — positive-intrinsic-negative (transistor)
PIO — Public Information Officer
PIV — peak inverse voltage
PLL — phase-locked loop
PM — phase modulation
PMOS — P-channel (type) metal-oxide semiconductor
PNP — positive-negative-positive (transistor)
pot — potentiometer
P-P — peak to peak
ppd — postpaid
PRAC — Public Relations Advisory Committee
PROM — programmable read-only memory
PSHR — Public Service Honor Roll
PTO — permeability-tuned oscillator
PTT — push to talk

Q — figure of merit (tuned circuit); transistor
QRP — low power (less than 5-W output)

R — resistor (schematic diagram abbrev.)
RACES — Radio Amateur Civil Emergency Service
RAM — random-access memory
RC — resistance-capacitance
R/C — radio control
RCC — Rag Chewers' Club
RF — radio frequency
RFC — radio-frequency choke
RFI — radio-frequency interference
RHC — right-hand circular (polarization)
RIT — receiver incremental tuning
RLC — resistance-inductance-capacitance
RM — rule making (number assigned to petition)
r/min — revolution per minute
RMS — root mean square
ROM — read-only memory
r/s — revolution per second
RST — readability-strength-tone
RTTY — radioteletype
RX — receiver, receiving

s — second (time)
S — siemens (unit of conductance); switch
s.a.s.e. — self-addressed stamped envelope
SEC — Section Emergency Coordinator
SET — Simulated Emergency Test
SGL — State Government Liaison
SHF — super-high frequency (3-30 GHz)
SM — Section Manager; silver mica (capacitor)
S/N — signal-to-noise (ratio)
SPDT — single-pole double-throw (switch)
SPST — single-pole single-throw (switch)
SS — Sweepstakes; spread spectrum
SSB — single sideband
SSC — Special Service Club
SSI — small-scale integration
SSTV — slow-scan television
STM — Section Traffic Manager
SX — simplex
sync — synchronous, synchronizing
SWL — shortwave listener
SWR — standing-wave ratio

T — tera (prefix for 10^{12}); transformer (schematic diagram abbrev.)
TA — Technical Advisor
TC — Technical Coordinator
TCC — Transcontinental Corps
TD — Technical Department (ARRL Hq.)
tfc — traffic
TR — transmit-receive
TTL — transistor-transistor logic
TTY — teletypewriter
TV — television
TVI — television interference
TX — transmitter, transmitting

U — integrated circuit
UHF — ultra-high frequency (300 MHz to 3 GHz)
USB — upper sideband
UTC — Coordinated Universal Time
UV — ultraviolet

V — volt; vacuum tube (schematic diagram abbrev.)
VCO — voltage-controlled oscillator
VCR — video cassette recorder
VDT — video-display terminal
VFO — variable-frequency oscillator
VHF — very-high frequency (30-300 MHz)
VLF — very-low frequency (3-30 kHz)
VLSI — very-large-scale integration
VMOS — vertical metal-oxide semiconductor
VOM — volt-ohm meter
VOX — voice-operated switch
VR — voltage regulator
VRAC — VHF Repeater Advisory Committee
VSWR — voltage standing-wave ratio
VTVM — vacuum-tube voltmeter
VUAC — VHF/UHF Advisory Committee
VUCC — VHF/UHF Century Club
VXO — variable crystal oscillator

W — watt (kg m^2/s^3, unit of power)
WAC — Worked All Continents
WARC — World Administrative Radio Conference
WAS — Worked All States
WBFM — wide-band frequency modulation
Wh — watthour
WPM — words per minute
WVDC — working voltage, direct current

X — reactance
XCVR — transceiver
XFMR — transformer
XO — crystal oscillator
XTAL — crystal
XVTR — transverter

Y — crystal (schematic diagram abbrev.)
YIG — yttrium iron garnet

Z — impedance; see UTC

5BDXCC — Five-Band DXCC
5BWAC — Five-Band WAC
5BWAS — Five-Band WAS
6BWAC — Six-Band WAC

° — degree (plane angle)
°C — degree Celsius (temperature)
°F — degree Fahrenheit (temperature)
α — (alpha) angles; coefficients, attenuation constant, absorption factor, area, common-base forward current-transfer ration of a bipolar transistor
β — (beta) angles, coefficients, phase constant current gain of common-emitter transistor amplifiers
γ — (gamma) specific gravity, angles, electrical conductivity, propagation constant
Γ — (gamma) complex propagation constant
δ — (delta) increment or decrement, density angles
Δ — (delta) increment or decrement determinant, permittivity
ϵ — (epsilon) dielectric constant, permittivity, base of natural logarithms (2.71828), electric intensity
ζ — (zeta) coordinates, coefficients
η — (eta) intrinsic impedance, efficiency, surface charge density, hysteresis, coordinate
θ — (theta) angular phase displacement, time constant, reluctance, angles
ι — (iota) unit vector
$\varkappa$ — (kappa) susceptibility, coupling coefficient
λ — (lambda) wavelength, attenuation constant
Λ — (lambda) permeance
μ — (mu) permeability, amplification factor, micro (prefix for 10^{-6})
μC — microcomputer
μF — microfarad
μH — microhenry
μP — microprocessor
ζ — (xi) coordinates
π — (pi) 3.14159
ρ — (rho) resistivity, volume charge density, coordinates
σ — (sigma) surface charge density, complex propagation constant, electrical conductivity, leakage coefficient, deviation
Σ — (sigma) summation
τ — (tau) time constant, volume resistivity, time-phase displacement, transmission factor, density
ϕ — (phi) magnetic flux, angles
Φ — (phi) summation
χ — (chi) electric susceptibility, angles
ψ (psi) dielectric flux, phase difference, coordinates, angles
ω — (omega) angular velocity $2\pi f$
Ω — (omega) resistance in ohms, solid angle

Reflections of a Real Zero

By William P. Wilson,* KØCDJ

Having recently passed another birthday, I took time out to reflect a bit on my life. Since hamming is indeed an important part of all this, I also reflected a bit on that.

I was first licensed, as KNØCDJ, way back in 1955. I was 11 years old then. In 1962, while a college freshman, I began a 14-year separation from radio. Upon getting relicensed in 1976, I noted quite a few changes had occurred since my exit. These changes were not limited merely to unparalleled advances in the technical field, but even included new operating procedures.

Back in the good old AM days, I don't really remember any of the DX stations resorting to such (now commonplace) devices as lists, or to listening for calls by district. In those days, it seems to me, we just all jumped in on top of each other in the "American band," while the DX station remained relatively untouched by the QRM, hiding himself discreetly below 14.2 MHz.

As soon as I got my ticket and my old call back, I acquired one of the newfangled transceivers and a beam, and headed off for 20-meter SSB to work some rare DX. What I encountered was astounding. The rarer DX stations could now be heard right within the American band. Because of the unruly pileups that resulted right on the DX station's frequency, the DX op would attempt to bring order out of chaos through the use of lists, or by listening for American calls from only one of our call districts at a time.

Although these procedures seemed fair and made sense to me at first, one thing soon struck me: When going by districts, the DX station would always start with the first call area, or the "Ones." The DX would then proceed to the "Twos," and so forth, always getting to us "Zeros" last!

Although I had many times been called a "real zero," I did not at first entirely comprehend the full impact being a Zero was to have for me in the gentlemanly art of DXing. It was not long before I realized what it meant to be a Zero in a DX pileup. Again and again, that rare country would be 10 over 9 when he started with the Ones, but he would drop out altogether by the time we Zeros were given our chance at him.

Nonetheless, these long, frequently futile waits in pileups had their educational side. I came to recognize that within that unruly mob of individuals constituting the pileup there existed certain, clearly defined subgroups.

The first of these subgroups I noticed is the What-abouts. Like many of the other subgroups, they have no call signs . . . well, almost no call signs. What-abouts always appear immediately after the DX station finishes taking calls from their district. They scream over the air things like, "What about the Twos?" and "What about the Fours?" The contribution of What-abouts to order within a pileup is immeasurable.

Next come the Roses. These are hardy individualists, independent thinkers and avid fans of Shakespeare, firmly clutching to the principle that ". . . a rose by any other name would smell as sweet." They are always thoughtful and sweet enough to call the elusive DX prey when he is requesting calls from other call districts. Roses never call DX stations requesting calls from stations in the Rose's own zone.

One of the most fascinating subgroups I encounter is the Enlighteners — that select, self-appointed band of intellectual beacons who, without regard to personal safety or convenience, carry the light of knowledge to the poor ignorant DX stations of the earth. It is at once clear to Enlighteners that, despite the fact that literally thousands of American stations are calling while hundreds of others are successfully working any given DX station, the DX station cannot possibly even guess that the propagation between him and the U.S. is favorable.

He breaks through the thunderous cacophony of the other callers and, in the most nonchalant of tones, makes some truly clever statement like, "Thanks for the comeback, Hassid. Just wanted to say 'Hi' and let you know you were getting into Cleveland okay!"

And then there are the Deputies. This crack band of electronic patrolmen, entirely on their own, saddle themselves with the unpleasant burden of issuing warning tickets to the rest of us poor fish in the pileups. You will hear the Deputies hurling all sorts of admonitions into the ether, like, "You're out of the band!" (They are always out of the band when they tell us this) and "You're 50 kHz wide, 'CDJ!" (Deputies always call us by our call sign suffix.) Deputies are extremely careful to time their transmissions to coincide exactly with those of the DX station on whom they are always zero-beated! One day without Deputies and the entire band would be consumed by lids.

With the severe deterioration of manners and chivalry amongst the Amateur Radio community, another subgroup of hams has emerged. These are the Advisers. Fights seem to almost always break out between some of the contenders in any pileup. These verbal altercations always begin and remain right where they can do the rest of us the most "good" — exactly on the frequency of the sought-after DX station.

It is usually at about this point that the Advisers arrive. Often appearing in groups, the Advisers will begin ceaselessly broadcasting the same advice concerning the original insulter: "Just ignore him, Jim . . . . All guys like that want is attention . . . Just ignore him!" By repeating this over and over, the Advisers prove to the insulters that they are getting no attention.

Well, let's return to the plight of us poor Zeros. By the time the Zeros have their chance at the DX prey, two things invariably happen: First, the propagation has entirely disappeared . . . but then it should have, since it has been at least two hours since this orderly process of proceeding by call areas began. Second, now the Brickers are on frequency. These are those selfless individuals who, armed only with bricks, keys and indestructible finals (they never have rigs that use TV sweep tubes), fight a never ending battle to prevent us Zeros (and others) from even hearing the DX station whose signal has now almost disappeared. Frequently, two or three Brickers will join together at the same time on the frequency, providing the rest of us with beautiful chords and joyful harmonies.

I have never been able to understand what motivates these indefatigable soldiers with their eternal carriers. I can only admire their devotion and stick-to-it-iveness. I once was told of an extra-courageous Bricker who stayed at his brick until the smoke and flames of his burning home engulfed him, transforming him into a Silent Key. Let that Bricker's example and bravery inspire Brickers everywhere!

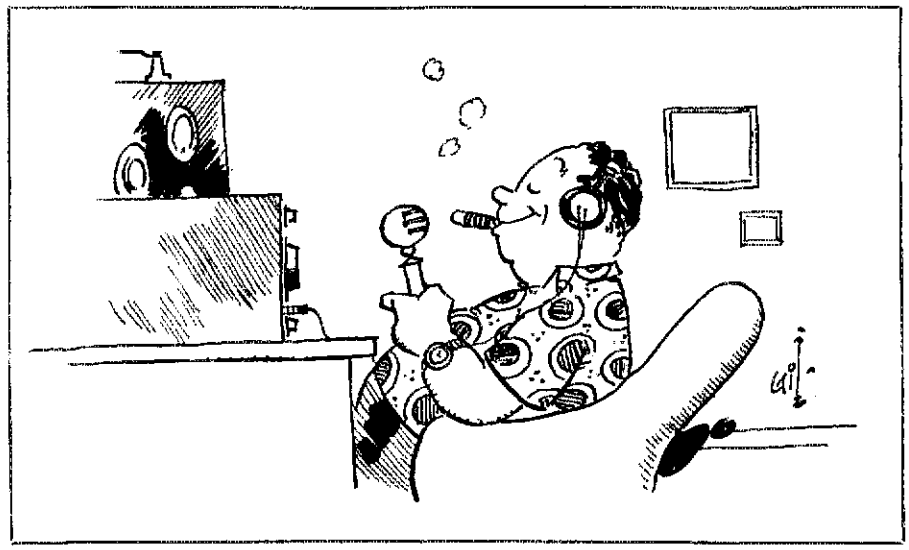
It is said that adversity builds character. That probably explains why so many of us Zeros are real characters. It is with that in mind that we make our plea to the rest of our amateur brethren. The next time you hear a DX station in a pileup taking calls by districts, and he begins with the Ones, if you can, please slip in between the What-abouts, the Roses, the Enlighteners, the Deputies, the Advisers and the Brickers and tell that "rare one" not to forget us — the real Zeros!

*Star Rte., Box 246, Detroit Lakes, MN 56501

Real Rag Chewers

"Hey, you monitoring the CATS Net? Anything going on at your place today?"

By John G. Troster,* W6ISQ



"Well, Charlie, they say it's going to rain. But, I was just sitting here thinking how miserable it is to be a full-time practicing Ragchewer. Everybody looks down at us like we don't amount to nothing. There just ain't no dignity for us at all."

"Hmmmm ... you're right. DXers is always saying, 'QSY, you're on top of a DX station,' and Traffic fellas are always saying, 'QSY, you're on top of a net.'

"And did ya ever notice that at all them big conventions that there's absolutely no special activities for us old-time-dedicated-friendly-philosopher-ragchewers? We sure ain't much, huh? How do we get deserving recognition anyhow?"

"Yeah, why can't they treat us like everybody else? They reserve lecture rooms and have big forum speakers for the DXers and VHFers and RTTYers and traffic fellas ... even the QRPers."

"And they all have their own breakfast meetings. But nothing, absolutely nothing for us silver-tongued ragchewers ... the big backbone of Amateur Radio. It's humiliating."

"QRX one, old-timer. We do have our Rag Chewers Club, ya know. Got my certificate right here on the wall that says I'm entitled to all the 'privileges, prerogatives, rights, favors, glory, rank, fame, popularity and honor, etc.' "

"Yeah, but where are all them 'rights' and 'glory' and 'honor'? You just said the DXers is always pushing us around. And where are our convention lecture rooms and breakfasts? Nobody pays no attention to us."

"Hmmmm ... and I see here that my Rag Chewers certificate don't even have a number on it. Got to have a number to make it official. So suppose all us practicing golden-throated real ragchewers organize and start giving out memberships and numbers and certificates and ..."

"Hey, yeah. And fellas could work each other and swap numbers ... and we could have a Real Rag Chewers WAS and DXCC and Five-Band DXCC for working other Real Rag Chewers with numbers ... and have contests. If we do all that, then everybody has got to recognize us as the only group dedicated to preserving the oratorical and philosophical traditions of Amateur Radio."

"Yeeeaaahhh ... and we could sell pins and stamps and patches and hats ... oh boy. And we could give out an annual award for the best Real Rag Chewer ... call it the 'Silver Throat Award' ... or maybe the 'Big Mouth Award' ... haw! Maybe even get us a regular column in *QST* every month."

"And we could start our own publication. Maybe call it *Big Mouth Speaks*. Sure, and print in-depth, investigative reporting articles like ... ahh ... 'Getting Started in Ragchewing' ... ahhh ... 'Dangers in Ragchewing' ... ahhh ... 'Computerized Ragchewing' ..."

"Neato ... with all them things, they'd have to give us a special forum room at the convention for sure. And special breakfasts too."

"Say, I bet Old Director Bill would maybe ... maybe even get us a RRC booth at the N-a-t-i-o-n-a-l Convention so's we could recruit RRC members and sell pins and ..."

"QRX ... QRX ... maybe we got us a problem. I mean, how could anybody get serious about a group that has a name like Real *Rag* Chewers? DXer means something. So does RTTYer or QRPer. But *Rag* Chewer ... hmmmm ... that *word* ... ahhh ... Rag ... it don't paint any picture about our contribution to the time-honored art of conversation! And my Rag Chewers certificate is even signed by the Old Sock ... ugh."

"You mean, Charlie, you're thinking about the terrible image of all them people setting in front of a mike chewing on a ... ahhh ... how about Real Fat Chewers?"

"Naw ... chewing fat is worst than chewing rags. I dunno, maybe we're stuck with *Rag* Chewers. There really ain't no substitute, is there? But still, it just ain't so dignified for a big organization like RRC, that's all."

"Oh well ... what's in a name? A ragchewer by any other name is still a genius at the art of conversation. Let's bite the mike and accept them words and go ... ahhh ... forward. Let me tell you, when all of us RRCs get organized and everybody has a number and certificate and the RRC WASs is rolling in, then we'll be the biggest and most popular group there is in all of Amateur Radio. And nobody is gonna care what name we got. 'Cause they'll be tripping over their mike cords to join up."

"Yeah, I hope so. And we'll get a lecture room at the N-a-t-i-o-n-a-l Convention and ..."

"And have big signs out in front of the room that announces the speakers just like the other groups has got."

"And what great programs. They're gonna hear the best international authorities on ragchewing and the conversational arts to lecture us ... 'Rag Chewing in Troubled Times' ... 'International Standards for Ragchewers' ... ahhh ..."

"Oh my, what programs. We'll be the

*82 Belbrook Way, Atherton, CA 94025

biggest attraction at all them conventions. People is gonna give up DXing and Satteyliteing and RTTYing and all turn to us RRCs. Now they're all gonna have to pay some attention to us old-time-backbone-of-Amateur-Radio-silver-tongued-golden-throated-real-ragchewers. Real Rag Chewers is a group whose time has come! Right?"

"You betcha! Us RRCs is gonna be sooo biiiiggggg that . . . tha . . . you . . . you . . . realize that us RRCs is gonna ruin all them other groups . . . hmmmm . . . oh me. Do you suppose Amateur Radio is ready for us RRCs to take over just yet?"

"Hmmm . . . you mean maybe our time has not come yet? That we're creating a rag-chewing monster that would eat up all them VHFers and Technicals and RTTYers and them other groups?"

"Yup. Us RRCs and all our exciting numbers and awards and contests . . . and Big Mouth publications and convention forums . . . we got it so good we could destroy everybody's interest in everything else. There would be nothing left of Amateur Radio except just us RRCs. That's all. Good bye, DXers . . . trafficers . . ."

"Oh my gosh. Kinda scary. Terrible burden on us."

"Yeeeeaaahhh. I know a traffic fella and a QRPer who's kinda nice. And a coupla DXers I know is nice fellas. We don't really want to hurt 'em or put 'em out a business . . ."

"Perhaps you and me . . . we should . . . ahhh . . . swallow our pride and not start up Real Rag Chewers just yet. Maybe go back to a little basic ragchewing and talk some more and figure this all out . . . and . . ."

"Just think! We went from nothing to dominating Amateur Radio . . . but now we gotta sacrifice it all to save the others . . . whew! Kinda gives me the shivers. Yeah, back to a little philosophical reorganizing and get calmed down a bit. Ahhh . . . like I was saying before . . . anything new going on at your place today?"

"Gee, we almost stole Amateur Radio. Ahhh . . . well now . . . ahhh . . . back to basics . . . they say it's supposed to rain over here today. Maybe . . . ahhh . . . I'd better QRT and go out and cut the lawn."

Strays

TIS DO'S AND DON'TS

☐ The ARRL Technical Information Service is offered free to members. Although we are eager to help newly licensed amateurs and others with technical problems, in fairness to members we cannot respond to continuing requests for assistance from those who choose not to join the League.

For us to respond promptly to your inquiries we must have:

1) your name

2) your amateur call and license class (tell us if you're not licensed)

3) your membership expiration date

4) a stamped, *business-size* envelope bearing your mailing address for our reply (IRCs acceptable from outside the U.S.).

When writing, please observe the following guidelines so we may provide the best possible service to the greatest number.

1) Before writing for technical assistance, search your files of *QST* and other ARRL publications. The answer you need may be there, available immediately. Consult the annual index of articles in each December issue.

2) Please do not ask for comparisons among commercial products. Choice of equipment is largely a matter of personal preference. Consult Product Review information in *QST;* compare manufacturers' specifications in their brochures.

Do not ask for information on articles published in other magazines. Write to the editor or author of that article.

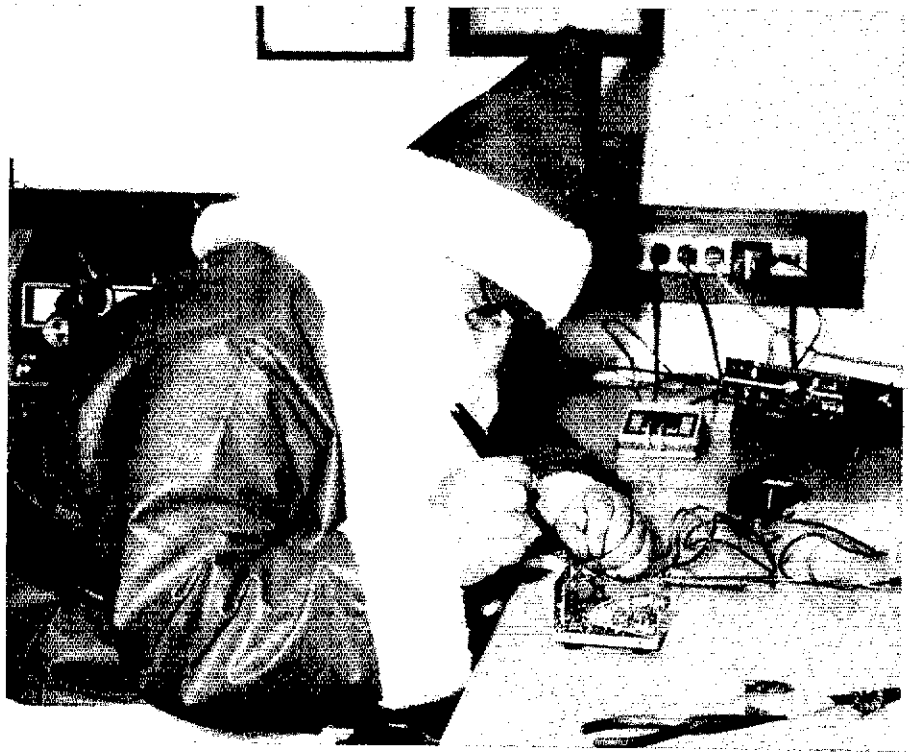
Do not request custom designs for amateur gear.

Do not ask advice on nonamateur matters. We cannot respond to questions about CB, marine radio, hi-fi, etc. (unless they concern interference caused by amateur gear).

3) Use a typewriter when possible; otherwise, write or print *clearly.* Please be reasonable in the number of questions you ask; try to limit your questions to three per letter.

4) When writing, please come right to the point, and be sure to share with us whatever experience you have had with the problem in question. This will avoid our reply covering a ground you've already been over.

5) Address all technical questions to Technical Information Service, American Radio Relay League, 225 Main St., Newington, CT 06111. — *Bob Schetgen, KU7G, Technical Information Specialist*



What's this? Santa caught in his North Pole workshop building a "stocking stuffer" for some lucky ham! Actually, it's Glenn Bilger, W4OCC, of Alexandria, Virginia, who dresses up as Santa each year for the kids in his community. *(K4BAV photo)*

Happenings

Conducted By Carol L. Smith,* AJ2I

- *Election Results*
- *New Exam Schedule*
- *Progress on Volunteer Examining*

ARRL Election Results

Counting of votes for ARRL Division Directors and Vice Directors took place at Headquarters on November 21, 1983. The process went smoothly. Newly elected representatives and those who were unopposed will take office on January 1, 1984, and will serve two-year terms.

Here are your newly elected representatives:

Canadian Division

For Director: Thomas B. J. Atkins, VE3CDM (unopposed)

Tom, President of the Canadian Radio Relay League, Inc./Director, Canadian Division, ARRL, was reelected to the position he has held since September 1982. Tom was formerly a founding director and secretary of CRRL, and vice director, ARRL. Born and educated in the United Kingdom, he has made his home in Toronto since 1952, and was licensed as VE3CDM in 1968. Tom holds the Canadian Advanced Amateur Certificate, and also the call G4ABN, having passed the exam for a British license in 1950. He is a former CARF director, member of the ARRL public relations advisory committee and ARRL assistant director. Tom represented Canadian amateurs at the IARU Region 2 conferences in Lima, Peru in 1980 and Cali, Colombia in June 1983. At the Cali meeting he was elected treasurer of IARU Region 2. Other Amateur Radio affiliations include life membership in the ARRL/CRRL, RSO Royal Signals ARS, and memberships in CARF, Toronto West Side ARC and several FM repeater groups. Active on 1.8 MHz through 450 MHz, Tom's diverse background includes 26 years of active and reserve military duty and longtime membership in the Canadian Power Squadrons. A member of the Quarter Century Club of the Canadian Association of Broadcasters, Tom is Vice President, Standard Broadcast Sales Co., Ltd., Television.

For Vice Director: Harry MacLean, VE3GRO (unopposed)

Harry holds a Canadian Advanced Amateur Certificate, with lifetime privileges. Harry, who conducts the Canadian NewsFronts column in *QST*, is an elementary school teacher in London, Ontario. He is also the Vice President and Secretary of the Canadian Radio Relay League, Inc. Harry has now been elected to the post he was appointed to in September 1982 to fill a vacancy.

Atlantic Division

For Director: Hugh Turnbull, W3ABC (unopposed)

Hugh lives in College Park, Maryland, and has been licensed since 1932. A holder of the Extra Class license, Hugh is a member of the Goddard ARC, the Foundation for Amateur Radio (currently he is chairman of its scholarship committee), the Potomac Valley Radio Club, Green Mountain Repeater Association, QCWA and AMSAT, and is a life member of the ARRL. Hugh is a registered Professional Engineer holding degrees from Lafayette College and West Virginia University. Hugh's 37-year engineering career prior to retirement in 1979 included employment with the FCC, VOA and NASA. His ARRL positions include National Convention Committee 1975; Assistant Director 1974-80; Vice Director 1980-82; Director, Atlantic Division since the death in office of Jesse Bieberman, W3KT; Board Liaison to the RFI Task Group; Member ad hoc Committee to improve the League's Washington presence; and Representative to ANSI ad hoc Group for RF immunity.

For Vice Director: George W. Hippisley, K2KIR — 2193; E. Merle Glunt, W3OKN — 1399; Edward J. Kuebert, K3KA — 794; Vincent H. Bardsley, KB3OM — 618.

"Bud" lives in the Buffalo, New York, area, and has served as Atlantic Division Vice Director for the past year. He is General Manager, Electronics & Systems Division of Moog Inc., in East Aurora, New York (manufacturer of industrial control systems). Bud has a BSEE from MIT and is responsible for the design, manufacture, and sale of electronic equipment for various consumer, industrial and military products. Licensed in 1954 at age 13, he is a life member of the ARRL and a member of QCWA. Active on 160 through 2 meters, Bud enjoys DX, contests, traffic handling, emergency communications, repeaters and OSCAR. Currently Chairman, Eastern Area Staff, and Manager, Eastern Area Net of National Traffic System, he is a former President of Radio Amateurs of Greater Syracuse, SCM of Western New York and a member of the Contest Advisory Committee.

Dakota Division

For Director: Tod Olson, KØTO (unopposed)

Tod became Dakota Division Director after service as Vice Director upon the ascension to a vice presidency of Gar Anderson, WØGA, in 1982. He holds an amateur Extra Class license and lives in Long Lake, Minnesota. Tod is employed at Control Data Corporation.

For Vice Director: Howard Mark, WØOZC (unopposed)

Howard holds an Advanced class license and lives in Burnsville, Minnesota. He has served as Dakota Division Vice Director since being appointed to the post in April 1982, and is manager of a computer-aided instruction system for Control Data Corporation.

Delta Division

For Director: Clyde O. Hurlbert, W5CH — 1301; O. D. Keaton, WA4GLS, 834. Clyde is a self-employed attorney who holds an Extra Class amateur license. First licensed in 1946, he resides in Biloxi, Mississippi, and is beginning his second term as Director.

For Vice Director: Robert P. Schmidt, W5GHP (unopposed)

Robert was first licensed in 1938, and he

New ARRL President Carl L. Smith, WØBWJ

Under the ARRL Articles of Association and By-Laws, a vacancy in the office of President is filled automatically by the First Vice President. Thus, Carl L. Smith, WØBWJ, fills the unexpired term as ARRL President created by the untimely death of Victor C. Clark, W4KFC. An ARRL Vice President since 1970, President Smith was a member of the IARU Observer team at the 1979 WARC and at other worldwide conferences.

President Smith served as ARRL Rocky Mountain Division Director from 1961 to 1970. Prior to that, he was division Vice Director in 1957-58, assistant director in 1955-56 and Colorado SCM in 1955-56.

President Smith lives in Denver and is a retired airline pilot with over 42 years of experience. He has been actively involved with ARES, weather nets, RACES and the Denver Radio Club.

Carl L. Smith, WØBWJ, ARRL President

*Membership Services Assistant

presently holds an Advanced class license. He has served as SCM for Louisiana and as chairman of the ARRL Emergency Communications Advisory Committee. Also the TCC director for the central area of the National Traffic System, he holds an A-1 Operator certificate, a 40-WPM code proficiency certificate and two public service awards for emergency communications work.

Great Lakes Division

For Director: Leonard Nathanson, W8RC (unopposed)

Leonard was first licensed in 1948 and is a life member of the ARRL and the QCWA. He has served as ARRL Great Lakes Division Director since 1980. A self-employed attorney who also holds a degree in electrical engineering, Len's interests include traffic handling, DXing, contesting and RTTY.

For Vice Director: George Wilson, W4OYI (unopposed)

George has been continuously active in Amateur Radio since the age of 16. He is beginning his second term as Great Lakes Division Vice Director. He is active in the National Traffic System and was Kentucky's SEC, then SCM. A self-employed lawyer, George holds the DXCC award and the A-1 Operator certificate. His ham radio interests are mostly CW and 2-meter FM.

Midwest Division

For Director: Paul Grauer, WØFIR — 1601; Robert S. McCaffrey, KØCY — 954; Wellington B. Stewart, KØSI — 347.

Paul has held the office of Midwest Division Director for the past 10 years, and he was Vice Director for the preceding two years. Paul has been a member of many Board Committees and at present is a member of the Executive Committee. He owns and is president of the Wilson Telephone Co. Paul is also a Director of the State Bank of Wilson and a Director of the State Bank of Lucas. A Life Member of the ARRL, he was first licensed in 1928 and holds an Extra Class license. He owns and maintains a repeater and reports in regularly to several nets, including the Kansas Weather Net and the Kansas Traffic Net. Paul has made BPL several times, is a member of MARS and has made over 19,000 phone patches for service personnel throughout the world, particularly in Southeast Asia. He was awarded the Raymond E. Baker Ham of the Year Award and has a Golden Anniversary Award from the QCWA.

For Vice Director: Claire Richard Dyas, WØJCP (unopposed)

Dick was first licensed in 1957 as K5JJD. He has been involved in the Army MARS program, holding a variety of positions. A retired Lieutenant Colonel in the U.S. Army, Dick has been active in the Lincoln Amateur Radio Club, serving as Director. He served as SCM for Nebraska from 1974-1978, and was Assistant Director from 1973-1975. Dick has served as Vice Director for the Midwest Division since 1976.

Pacific Division

For Director: William J. Stevens, W6ZM — 1467; Robert B. Vallio, W6RGG — 1089; Jettie B. Hill, W6RFF — 760.

Bill has served as Pacific Division Director since 1978. He is a life member of the ARRL and the QCWA, and is active on 80 meters through 220 MHz. Bill holds DXCC Honor Roll, and the WAC and WAZ awards. He has served on the ARRL Executive Committee, and is presently chairman of the Management and Finance Committee, which reviews all aspects of League management performance and effectiveness, and makes recommendations to the full Board.

For Vice Director: Gary Kip Edwards, W6SZN — 1537; Frederic N. Barry, K6RTU — 631; James O. Knochenhauer, K6ITL — 573; James A. Maxwell, W6CF — 565.

Kip holds an Extra Class license, and was first licensed in 1958. A life member of the ARRL, he is an active DXer. He is currently director of the Northern California Contest Club, holds 5BWAS and 5BDXCC, and has participated in several DXpeditions. Kip lives in Belmont, California, and practices law in the San Jose area.

Southeastern Division

For Director: Frank M. Butler, Jr., W4RH — 3235; Stewart H. Woodward, K4SMX — 1680.

Frank is a life member of the ARRL and has been licensed since 1950. He has been the Director since 1980. Now living in Fort Walton Beach, Florida, Frank graduated from the University of Alabama, with a BSEE degree. He has also done graduate work at Ohio State and Florida State Universities. Presently, Frank is responsible for planning, conducting and reporting on field tests of various military radio and radar systems at Eglin Air Force Base. Frank is a member of numerous ham and professional organizations, including the Eglin ARS, Playground ARC, AF MARS, CD, QCWA, AFCEA and IEEE. He is a member and former NCS of the 75-m NFPN and NCS for local VHF nets. He has received ARRL Public Service awards for work in hurricanes, tornadoes and other emergencies. While on the ARRL Board, Frank has served on all Standing Committees, as a member of Ad-Hoc Committees on the 10 MHz Band and Volunteer Examiner Program, and as liaison to the VHF-Repeater Advisory Committee. He also served as Florida SCM from 1957-1980 and as SE Division Vice Director 1979-1980.

For Vice Director: Evelyn D. Gauzens, W4WYR — 3361; James A. Gundry, W4JM — 1512.

Evelyn returns as Southeastern Division Vice Director, a post she has held since 1980. She was first licensed in 1952 and holds an Advanced class license. Evelyn has served as Assistant Director for 16 years and as TVI Chairman of Dade County for 21 years, and she has assisted with IARU Region 2 meetings held in the Miami area. Presently Evelyn is Assistant SEC and functions as a public relations contact for the FCC and local news media. A great part of her on-the-air activity is spent in public service and emergency communications, but Evelyn continues to enjoy DX, rag chewing and experimenting. She is a life member of the ARRL, and belongs to the QCWA, QCWW, YLRL and Florida Phone Traffic Net.

The ARRL Board of Directors

Every two years League members have the opportunity to determine who will represent them on the ARRL Board of Directors. Members also choose Vice Directors. In the event that a Director is incapacitated or is in some other way prevented from continuing in office, the Vice Director succeeds to the office. A list of all Directors and Vice Directors appears on page 8 of every issue of *QST*.

Later this year, nominations for Director and Vice Director will be open in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions. The American Radio Relay League is a nonprofit membership organization incorporated under the laws of the State of Connecticut. ARRL members wanting more details about the organization are invited to request a copy of the ARRL Articles of Association and Bylaws. Please send a business-size, self-addressed, stamped envelope to AA&BL, ARRL Special Requests, 225 Main St., Newington, CT 06111. A new edition, reflecting changes made at the Board meeting in Houston last October, is now available.

LAMAR HILL, W4BOL

We regret to report the death of Lamar Hill, W4BOL, of Cochran, Georgia. Elected in 1949, Lamar served as Director of the ARRL Southeastern Division from 1950 to 1951 and again from 1952 to 1953. Lamar was employed as manager of the G. B. Hill Lumber Company. The Amateur Radio fraternity will miss him.

HAROLD M. McKEAN, W1CEG

Harold (Mac) McKean, W1CEG, former Managing Editor of *QST*, became a Silent Key on November 8, 1983. Mac first joined the Headquarters editorial staff in 1946 as a proofreader. He came to us from a local newspaper following service with the U.S. Coast Guard during World War II. It wasn't long before his editorial talents led to his appointments as Assistant to the Editor in June of 1946, Assistant Editor in August of 1947 and Managing Editor in 1950. He held this position until December 1955 when he left the Headquarters staff to work elsewhere in the electronics publications field. In addition to his management and editorial handiwork with *QST*, as Production Manager Mac also had the responsibility of producing all League publications.

FCC EXAM SCHEDULE

This schedule tells when 1984 amateur exams will be given at FCC Field Offices. The schedule represents a drastic reduction in examination opportunities. Caution: Call the Field Office to confirm this schedule. With volunteer licensing pending, changes could take place rapidly. FCC Field Offices are holding exams *by appointment only* on the following dates, with cut-off dates for accepting applications given in parentheses:

February 6 through February 10	(January 15)
May 7 through May 11	(April 15)
August 6 through August 19	(July 15)
Nov. 5 through Nov. 9	(October 15)

Addresses of FCC Field Offices:

ALASKA, Anchorage — 1011 East Tudor Rd., Rm. 240, Anchorage 99510, tel. 907-563-3899.

CALIFORNIA, La Mesa — 7840 El Cajon Blvd., Rm. 405, La Mesa 92041, tel. 619-293-5478.

CALIFORNIA, Long Beach — 3711 Long Beach Blvd., Rm 501, Long Beach 90807, tel. 213-426-4451.

CALIFORNIA, San Francisco — 423 Customhouse, 555 Battery St., San Francisco 94111, tel. 451-556-7701.

COLORADO, Denver — 12477 West Cedar Dr., Denver 80228, tel. 303-234-6977.

FLORIDA, Miami — 8675 NW 53 St., Suite 203, Miami 33166, tel. 305-350-5542.

FLORIDA, Tampa — Interstate Bldg., Rm. 601, 1211 N. Westshore Blvd., Tampa 33607, tel. 813-228-2872.

GEORGIA, Atlanta — Rm. 440, Massell Bldg., 1365 Peachtree St., N.E., Atlanta 30309, tel. 404-881-3084.

ARRL Foundation President Robert York Chapman presents John Champa, AMSAT Senior Vice President, with the Foundation's most recent grant of $10,000. Looking on are (l-r) W0FIR, W6EJJ, NK6K, K8OCL, W4KFC (SK), W1QV, K1WLX and W6GC *(K1ET photo)*

HAWAII, Honolulu — Prince Kuhio Fed. Bldg., 300 Ala Moana Blvd., Rm. 7304, P.O. Box 50023, Honolulu 96850, tel. 808-546-5640.

ILLINOIS, Chicago — 230 S. Dearborn St., Rm. 3940, Chicago 60604, tel. 312-353-0195.

LOUISIANA, New Orleans — 1009 F. Edward Hebert Fed. Bldg., 600 South St., New Orleans 70130, tel. 504-589-2095.

MARYLAND, Baltimore — George M. Fallon Fed. Bldg., Rm 1017, 31 Hopkins Plaza, Baltimore 21201, tel. 301-962-2728.

MASSACHUSETTS, Boston — 1600 Customhouse, 165 State St., Boston 02109, tel. 617-223-6609.

MICHIGAN, Detroit — 1054 Fed. Bldg. and U.S. Courthouse, 231 W. LaFayette St., Detroit 48226, tel. 313-226-6078.

MINNESOTA, St. Paul — 691 Fed. Bldg., 316 N. Robert St., St. Paul 55101, tel. 612-725-7810.

MISSOURI, Kansas City — Brywood Office Tower, Rm. 320, 8800 East 63rd St., Kansas City 64133, tel. 816-926-5111.

NEW YORK, Buffalo — 1307 Federal Bldg., 111 W. Huron St., Buffalo 14202, tel. 716-846-4511.

NEW YORK, New York — 201 Varick St., New York 10014, tel. 212-620-3437.

OREGON, Portland — 1782 Fed. Office Bldg., 1220 S.W. 3rd Ave., Portland 97204, tel. 503-221-4114.

PENNSYLVANIA, Philadelphia — One Oxford Valley Office Bldg., 2300 E. Lincoln Hwy., Rm. 404, Langhorne 19047, tel. 215-752-1324.

PUERTO RICO, San Juan — Fed. Bldg. and Courthouse, Rm. 747, Avenida Carlos Chardon, Hato Rey 00918, tel. 809-753-4567.

TEXAS, Dallas — Earle Cabell Fed. Bldg., Rm. 13E7, 1100 Commerce St., Dallas 75242, tel. 214-767-0761.

TEXAS, Houston — 5636 Fed. Bldg., 515 Rusk Ave., Houston, 77002, tel. 713-229-2748.

VIRGINIA, Norfolk — Military Circle, 870 N. Military Hwy., Norfolk 23502, tel. 804-441-6472.

WASHINGTON, Seattle — 3256 Fed. Bldg., 915 Second Ave., Seattle 98174, tel. 206-442-7653.

EXAMINATIONS AT OTHER LOCATIONS

The FCC also travels to designated examination points in cities that do not have a conveniently located FCC office. The following schedule lists the cities by state. The month(s) in which the exam will be given is in parentheses, and the FCC Field Office administering the test is in brackets. An appointment must be made with the office giving the examination. Do so at least 30 days before the beginning of the month in which the examination will be given. The FCC Field Office will notify you when and where to appear for the examination.

ALABAMA:		
Northern	(Sep.)	[Atlanta]
Southern	(Mar.)	[Atlanta]
ALASKA:		
Fairbanks	(Apr.)	[Anchorage]
Juneau	(May)	[Anchorage]
Ketchikan	(May)	[Anchorage]
ARIZONA:		
Phoenix	(Jun.)	[Long Beach]
ARKANSAS:		
Little Rock	(Apr., Oct.)	[New Orleans]
CONNECTICUT:		
Hartford	(Oct.)	[Boston]
GUAM:		
Agana	(Will advise)	[Honolulu]
IDAHO:		
Boise	(Jun.)	[Portland]
INDIANA:		
Indianapolis	(Jan., Jul.)	[Chicago]
KENTUCKY:		
Louisville	(May, Nov.)	[Chicago]
MAINE:		
Augusta	(May)	[Boston]
MISSOURI:		
St. Louis	(Apr., Aug.)	[Kan. City]
MONTANA:		
Helena	(Apr.)	[Seattle]
NEW MEXICO:		
Albuquerque	(Oct.)	[Denver]
NEW YORK:		
Albany	(Jun.)	[New York]
NORTH CAROLINA:		
Charlotte	(Apr.)	[Norfolk]
Greensboro	(Oct.)	[Norfolk]

Mark Barettella, KA2ORK, is greeted by President and Mrs. Reagan at a reception held recently at the White House. Mark was commended for his outstanding efforts during the recent Grenada crisis. See December 1983 *QST* for Mark's story. *(photo by Mary Anne Fackelman, the White House)*

Pending Dockets Affecting Amateur Radio (as of December 7, 1983)

Docket	*Subject*
21006*	FCC proposal to relax leakage standards for cable television systems. (See League Lines, Feb. 1982 *QST*, and Happenings, March 1982 *QST*, p. 58.
78-369*	RFI Docket; Further NOI released. (See Happenings, Feb. 1979 *QST*; also see March 1979 *QST*, pp. 9 and 48, Sept. 1981 *QST*, pp. 9 and 58, and Dec. 1981 *QST*, pp. 70-71.)
79-144*	NPRM to solicit comments on effects of rf exposure standards on radio services and equipment; and FCC proposal to adopt regulations to protect health of employees and the public exposed to radiation in excess of national standards. (See Happenings, March and Aug. 1980 and April 1982 *QST*.)
80-739*	NPRM into implementation of 1979 WARC Final Acts. (See April, July, Aug., Sept., Oct., Nov. 1981 *QST*, and Jan. and July 1982 *QST*. See also March and May 1983 *QST*.)
81-414*	NOI-NPRM to allow use of spread spectrum in amateur bands. (See Happenings, Sept. and Dec. 1981, May 1982 *QST*.)
82-83*	Twenty-meter phone band expanded. Further NPRM for phone subband expansion on other hf bands released. (See June 1983 *QST*.)
82-625*	Proposal to amend the Commission's rules regarding use of hf radio spectrum below 25 MHz by stations in the Fixed and Land Mobile Services. (See Happenings, Feb. 1982 *QST*.)
83-28*	Proposal for codeless amateur license. (See March, June and Sept. 1983 *QST*.)
83-524*	NPRM for RACES frequencies revision. (See Aug. and Oct. 1983 *QST*.)

Petition for Rule Making Affecting Amateur Radio

File No.	*Petitioner*	*QST Reference*	*Nature of Petition*
4040*	ARRL	3/82 6/82 & 10/83	CATV non-use of amateur frequencies.

*Comment deadline passed. Awaiting Commission action.

President Expected to Sign VEC Bill

On November 3, 1983, Senator Barry Goldwater (R-AZ), K7UGA, introduced a bill into both houses of the Congress to amend the Communications Act to allow a Volunteer Examiner Coordinator (VEC) to recoup necessary expenses for administering the Volunteer Examiner Program. The bill was passed by the Senate and House of Representatives on Friday, November 18. President Reagan was expected to sign the bill into law in early December. The ARRL and FCC are now working on necessary changes to Part 97 of the Rules to incorporate VEC cost recoupment into the Volunteer Examiner Program. Once the rules have been changed, the path will be clear for the ARRL to begin contract negotiations with the FCC, establishing the League as a Volunteer Examiner Coordinator. Before that contract can go into effect, however, both the ARRL Board of Directors and the FCC's General Counsel's Office must ratify the agreement.

OHIO:
- Cincinnati (Apr., Oct.) [Detroit]
- Cleveland (Mar., Sep.) [Detroit]

OKLAHOMA:
- Oklahoma City (Sep.) [Dallas]

PENNSYLVANIA:
- Pittsburgh (Jan., Jul.) [Philadelphia]

SOUTH CAROLINA:
- Columbia (Feb.) [Atlanta]

SOUTH DAKOTA:
- Rapid City (Apr.) [Denver]

TEXAS:
- El Paso (Apr.) [Dallas]
- San Antonio (Mar., Sep.) [Houston]

TENNESSEE:
- Knoxville (Aug.) [Atlanta]
- Nashville (May) [Atlanta]

UTAH:
- Salt Lake City (Jul.) [San Fran.]

WASHINGTON:
- Spokane (Jun., Dec.) [Seattle]

WEST VIRGINIA:
- Charleston (Nov. & May) [Baltimore]

PENDING DOCKETS AND PETITIONS FOR RULE MAKING IN THE AMATEUR RADIO SERVICE

This listing of pending dockets and petitions for rule making in the Amateur Radio Service is current as of December 7, 1983 (see chart on page 60). Any party may file a petition for rulemaking if he or she feels a change in the Amateur Radio regulations is desirable. An original and five copies of the petition should be sent to the Secretary, Federal Communications Commission, Washington, DC 20554. (For further information, please refer to Washington Mailbox, June 1983 *QST*.

At some point, the Commission will either dismiss a petition for rule making (if it appears to have no merit, or deals with an issue already decided), or, if it appears to have merit, assign it a docket number and release it to the public in the form of a Notice of Inquiry or Notice of Proposed Rule Making. A Notice of Inquiry simply shows that the Commission wishes to explore the subject matter of the petition further, but does not propose any specific changes to the rules. The latter is the purpose of a Notice of Proposed Rulemaking. On rare occasions, if a petition for rule making requests a minor editorial change to the rules, a lifting of restrictions or a procedural change of no substantive import, the Commission may proceed directly to a Report and Order and bypass the intermediate stage of Notice of Inquiry or Notice of Proposed Rule Making.

A Notice of Proposed Rule Making eventually leads to a Report and Order in which the proposed rules may be adopted as proposed, adopted in part or rejected. Upon publication of the Report and Order in the Federal Register, an individual has 30 days in which to file a petition for reconsideration should he or she be dissatisfied with any of the new rules. Copies of Commission NOIs, NPRMs and RMs are available from ARRL Hq. (s.a.s.e. please).

NEW FCC AMATEUR ANTENNA HEIGHT APPROVAL FORM

Effective January 3, 1984, antenna height data on FCC Form 610 and Form 714 will be obsolete. From then on, amateurs will request and receive on the new FCC Form 854 approval of antennas whose proposed heights exceed maximum allowable standards of §97.45 of the Rules. Complete Form 854 *only* if the height of your antenna will exceed (1) 60.96 meters, or 200 feet, or (2) 1/100 of the minimum distance between the antenna site and any aircraft landing area. See Section 97.45 of the Rules for details. Submit the form to the Field Operations Bureau's Antenna Survey Branch, Washington, DC 20554. Requests for quantities not exceeding three may be addressed to the FCC Consumer Assistance Branch, Gettysburg, PA 17325, or to any district office. Requests for larger quantities must be sent to the FCC Supply Section, Room B-10, 1919 M St., N.W., Washington, DC 20554. League members may ask for a copy of the form from Headquarters (please include an s.a.s.e.).

ADDITIONAL 10-METER REPEATER FREQUENCIES NIXED

The Commission has terminated its proceeding in PR Docket 83-485, the proposal to allow additional frequencies for repeater operations in the 10-meter band. (See October *QST*, p. 60, for details.) The Commission said it "was persuaded

Federal Communications Commission

Approved by OMB 3060-0139 Expires 4/30/86

Request for Approval of Proposed Amateur Radio Antenna and Notification of Action

Instructions:
- Complete this form only if the height of the antenna will exceed - 60.96 meters (200 feet) or - 1/100 of the minimum distance between the antenna site and any aircraft landing area.
- Mail this application to the FCC, Antenna Survey Branch, Washington, D.C. 20554.
- See Statements on back.

FCC USE ONLY
Approved by:
Date:
☐ No obstruction marking required.
☐ Obstruction marking required.
☐ Form 715 par. _____
☐ Form 715A par. _____

1. First Name | M.I. | Last Name
2. Mailing Address: Number & Street
City | State | ZIP Code
3. Amateur Call Sign
4. Antenna Location

NOTE. To find the north latitude, west longitude, and site elevation of the antenna location, use a 7.5 minute topographic quadrangle map. This may be purchased from the U.S. Geological Survey, Washington, D.C. 20242 or U.S. Geological Survey, Denver, Colorado 80225. You must determine your north latitude and west longitude and west longitude to the nearest second.

	Degrees	Minutes	Seconds
North Latitude			
West Longitude			

5. Check the type of support structure proposed for the antenna. ☐ Tower ☐ Pole ☐ Bldg. ☐ Other (specify) _____
6. (a) Give the elevation of the ground above mean sea level at antenna site . . . _____ feet
(b) Give the overall height of the antenna structure above ground level . . . _____ feet
(c) The overall height above mean sea level is (add 6(a) and 6(b)) . . . _____ feet
7. Will this antenna require notification of proposed construction to the FAA? ☐ Yes ☐ No (See FCC Rules & Regulations Section 17.7 & 17.14) If "Yes" give the following information:
Location of FAA Office Notified | Date of Notification | FAA Study Number
8. Will the antenna share an existing structure? ☐ Yes ☐ No If "Yes" give the following information:
Name of Licensee | FCC Call Sign | Radio Service

I certify that I am the above-named applicant and that all statements made on this application and any attachments hereto are true and complete to the best of my knowledge.

Signature | Date | A willfully false statement is a criminal offense; U.S. Code, Title 18, Section 1001

FCC USE ONLY

When validated by the FCC Seal, this form and any attachment(s) become part of your amateur radio station license. Keep it with your station files.
NOTE: THIS IS NOT AN AUTHORIZATION TO TRANSMIT.

Licensee's Name | Amateur Call Sign | Location of Antenna: City | State

Antenna Coordinates

North Latitude	West Longitude
Degrees - Minutes - Seconds	Degrees - Minutes - Seconds

☐ Antenna height approved at _____ feet (AGL)
☐ No obstruction marking
☐ Marked & Lighted per FCC Form(s):
☐ 715 Part _____
☐ 715A Part _____

Remarks:

NOT VALID WITHOUT FCC SEAL

FCC 854
June 1983

New FCC Form 854, Request for Approval of Proposed Amateur Radio Antenna and Notification of Action.

to terminate the proceeding without adopting the proposed rules for two reasons:

1) providing additional repeater frequencies in the 10-meter band would have an adverse effect on amateur satellite communications, including beacon transmissions, robot operations, telemetry signals and transponder downlinks;

2) there is no compelling need for repeater subband expansion in the 10-meter band at this time — congestion on repeater frequencies appears to represent local conditions. This is consistent with the League's position. Interference to amateur satellite communications outweighs any frequency congestion that local repeaters may experience."

CREDIT NG6O FOR OLYMPIC CALLS

Richard Jay Ward, NG6O, of Hollywood, California, reminds amateurs that California stations whose call sign contains the digit "6" may use either "23" or "84" in place of the "6" from July 1 to August 31, 1984. This provision was enacted to honor the 1984 Summer Olympics, and the special calls will be used to "spread friendship, goodwill and excitment from the location of this international event." Ward petitioned the Commission for this special call-sign action, which he describes as "one of the fastest actions known by the FCC." (See also November 1983 *QST*, p. 70.)

SM ELECTION NOTICE

To all ARRL members in the Wisconsin, Illinois, Northern Florida, Santa Clara Valley, Indiana, Vermont, Maine, Oregon and East Bay sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page eight of this issue. [Editor's Note: Solicitations for petitions in Canadian Sections henceforth will appear in Canadian NewsFronts.]

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)

General Manager, ARRL
225 Main St., Newington, CT 06111

We, the undersigned full members of the ... ARRL Section of the ... Division, hereby nominate ... as candidate for Section Manager for this Section for the next two-year term of office. (Signature ... Call ... City ... ZIP ...).

An SM candidate must have been a member of the League for a continuous term of at least two years and a licensed amateur of Technician class or higher immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, March 9, 1984.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on or before April 2, 1984. Returns will be counted May 22, 1984. SMs elected as a result of the above procedure will take office July 1, 1984.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition for a two-year term beginning July 1, 1984.

If no petitions are received for a section by the specified closing date, such section will be resolicited in July *QST*. An SM elected through the resolicitation will serve a term of 18 months.

Vacancies in any SM office between elections are filled by appointment by the General Manager.

You are urged to take the initiative and file a nominating petition immediately.

David Sumner, K1ZZ
General Manager

SM APPOINTMENT

In the Santa Clara Valley Section, Rodney J. Stafford, KB6ZV, has been appointed to complete the term (June 30, 1984) of Ross Forbes, WB6GFJ (resigned).

SECTION MANAGER ELECTION RESULTS

Balloting Results: In the New Mexico Section, Joe T. Knight, W5PDY, received 278 votes and Robert A. Scupp, WB5YYX, received 114 votes. Mr. Knight was declared elected. His term begins January 1, 1984.

Moved and Seconded...

MINUTES OF EXECUTIVE COMMITTEE
No. 410
November 16, 1983

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met by telephone conference call at 3:30 P.M. EST on Wednesday, November 16, 1983. Present on the line were President Victor C. Clark, W4KFC, in the Chair; First Vice President Carl L. Smith, WØBWJ; Directors Paul Grauer, WØFIR, Jay A. Holladay, W6EJJ, Gay E. Milius, Jr., W4UG, and Leonard M. Nathanson, W8RC; and General Manager David Sumner, K1ZZ.

Mr. Clark reviewed the contents of his letter of November 11, addressed to all members of the Board, which outlined the present situation regarding the volunteer examination program. Since the meeting of the Board in Houston, the following had transpired:

1. Senator Goldwater introduced Senate Bill 2045, to amend the Communications Act to permit the recoupment of expenses by Volunteer Examiner Coordinators (VECs).
2. The schedule of FCC-conducted amateur examinations for 1984 was released, and reflects a drastic reduction in examination opportunities throughout the country.
3. Discussions with FCC personnel have indicated that the Commission intends to leave the format of the volunteer-administered examinations to the discretion of the VEC. If more than one organization coordinates examinations, this is likely to result in non-uniform examinations, and in uneven standards being applied to applicants.
4. On November 10, FCC formally solicited applications from organizations interested in serving as VEC for any or all of the thirteen call areas, for a program to begin as early as December 1 of this year.

It was moved by Mr. Milius, seconded by Mr. Holladay, that the following resolution be circulated to the members of the Board of Directors for mail vote in accordance with Article 6 of the Articles of Association:

RESOLVED, that the President, with the assistance of the General Manager and Counsel, is instructed to initiate negotiations with FCC immediately, with the objective of developing a draft agreement, for Board approval, under which the League would begin serving as Volunteer Examiner Coordinator at the earliest possible date.

On motion of Mr. Grauer, seconded by Mr. Nathanson, it was unanimously voted to amend the motion by striking the phrase "mail vote" and substituting therefor "vote by telephone conference call." The question then being on the motion as amended, the same was unanimously ADOPTED.

On motion of Mr. Nathanson, seconded by Mr. Milius, approval was given for the holding of the following ARRL convention:

Mississippi State April 14-15, 1984, Jackson, MS

There being no further business, the meeting was adjourned, at 3:50 P.M.

Respectfully submitted,
David Sumner, K1ZZ — General Manager
Victor C. Clark, W4KFC — President

MINUTES OF EXECUTIVE COMMITTEE
No. 411
November 21, 1983

The Executive Committee of the American Radio Relay League, Inc., met at 10:30 A.M. EST on Monday, November 21, 1983. Present at the Headquarters offices in Newington, Connecticut, were President Victor C. Clark, W4KFC, in the Chair; Directors Gay E. Milius, Jr., W4UG, and Leonard M. Nathanson, W8RC; and General Manager David Sumner, K1ZZ. Present by telephone conference call were First Vice President Carl L. Smith, WØBWJ, and Directors Paul Grauer, WØFIR, and Jay A. Holladay, W6EJJ. Also present as observers at the Headquarters offices were Directors Edmond A. Metzger, W9PRN, William J. Stevens, W6ZM, and Hugh A. Turnbull, W3ABC.

Mr. Clark reviewed the developments related to the volunteer examination program since the telephone conference call meeting of November 16. Before its holiday recess, Congress took favorable action on the legislation needed to permit volunteer examiner coordinators to recoup expenses. The legislation, H.R. 2755 (the FCC authorization bill), is on its way to the President for his signature. In view of this development, on motion of Mr. Nathanson, seconded by Mr. Milius, it was unanimously voted to postpone indefinitely the telephone conference call of the members of the Board which had previously been authorized, on the understanding that in the meantime efforts would be made to secure FCC rulemaking to implement expense recoupment for volunteer examiner coordinators, and that language for the agreement between ARRL and FCC would continue to be developed. It was the sense of the Committee that a Special Meeting of the Board should be called at such time as the agreement is ready for Board consideration, should this be accomplished in advance of the date of the 1984 Annual Meeting of the Board.

Mr. Holladay reported that the Convention Committee organizing the 1986 ARRL National Convention in San Diego, California, had requested that the date be changed so as not to coincide with the Labor Day holiday weekend. On motion of Mr. Holladay, seconded by Mr. Nathanson, it was unanimously voted that the dates of the 1986 ARRL National Convention are changed to September 5-7, 1986.

There being no further business, the meeting was adjourned, at 10:49 A.M.

Respectfully submitted,
David Sumner, K1ZZ — General Manager
Victor C. Clark, W4KFC — President

How's DX?

Conducted By Ellen White,* W1YL/4

When Will That DX QSL Arrive?

Several months ago, John W. McBeath, W3IQS, furnished ARRL with an extensive manuscript detailing his computer analysis of a five-year DX card return. We'd like to present the highlights for you at this particular time when we're all prone to "sum up" the year before (and list good intentions for the year ahead!).

During the period of 1977 through 1981, a period fortuitously coinciding with the sunspot cycle peak, 286 countries were worked and 284 confirmed. Almost 2000 QSL cards were sent out, 1400 received. Detailed records of all DX QSL activity were kept, records subsequently analyzed in a variety of ways with a Heathkit H-89 computer.

Via	*No. QSLs Sent*	*% Response*	*Weeks to Reply*	*Countries Confirmed*
Bureau	893	50	58.0	122
QSL Mgrs.	248	88	10.5	136
$ & IRC	159	82	13.3	27
Postcard	40	53	6.6	17
Totals	1340	61	36.7	284

QSL Practices

Nearly all contacts with a country on a band were QSL'd until the country/band was confirmed. Cards were always directed to a QSL manager if the DX station used one. Otherwise, the initial contact with a "rare" DX country was done on a direct basis, supplying the wherewithal for return postage. A "stock" QSL card, identical to that used by hundreds of U.S. amateurs, was employed throughout the period. (Subsequent unsolicited QSL cards sent by the DX station were replied to 100% via the ARRL Outgoing QSL Bureau. Information on the Incoming and Outgoing Bureaus is available from ARRL Hq. for an s.a.s.e.)

Overall Results

W3IQS initiated 1340 QSL cards and sent another 599 cards in response to those initiated by DX stations. While the analyzed data represents cards initiated in the period 1977-1981, the data on cards received spans 1977 to 1983. Nearly two years has past, and there should be few, if any, replies still in the pipeline.

The 50%-response rate on cards via the Bureau was disappointingly low. Clearly, one should not assume that a reply will be received for cards sent via the Bureau. The results also support the conventional wisdom that QSLing via the Bureau is a rather slow process taking about a year. Cards initiated via managers or sent directly with return means of postage showed a much better response rate and a quicker turn around.

Clearly, QSL managers are the best possible route. Even so, there will be disappointments. Twenty-eight stations kept my return postage without bothering to reply. Twenty-nine ignored the s.a.s.e. sent to their manager. There was some statistical indication that the station most likely to ignore the return postage, IRC or s.a.s.e. was one manned by a U.S. amateur not engaged in serious DX operating.

Regional Differences

From the data, some simple conclusions are apparent. For example, the Bureau is not the way to go to get cards from the Americas, the Caribbean and the Indian Ocean (and quite a few were sent via the Bureau to Indian Ocean stations. Moscow's Box 88 is slow, but has a relatively good response rate. Virtually all cards received that were initiated by the DX station came from the USSR, Japan and Europe. If you want a card from the other regions of the world, you had better take the initiative!

Band Differences

Some slight differences were also noted in the results on different bands. The Bureau response for 75-meter contacts was especially disappointing (33% response). A 56% response occurred for 10-meter cards via the Bureau. All of the cards originated by the DX station were for contacts on 20, 15 and 10 meters. None in this entire study were *originated* by the DX for 40- and 75-meter contacts. Take the initiative if you want cards for contacts on 75 and 40!

Conclusions

The ARRL QSL Bureau is inexpensive and slow, and has a relatively low response rate. Nevertheless, all 70 "common countries" were ultimately confirmed via the Bureau, along with 63 "rare countries." This gives a total of 133, many more than the 100 needed for DXCC. If your funds are limited and a basic DXCC is your goal, use the Bureau and be patient. If you crave the Honor Roll, or if you are impatient, then use the more expensive but faster routes such as s.a.s.e.'s, return-postage equivalents and IRCs.

A Word of Warning

Never, never send a DX station United States currency without permission! In some parts of the world, possession of foreign currency is a felony and may carry a prison sentence.

*19620 SW 234 St., Homestead, FL 33031

SUCCESSFUL QSLING TIPS

Some months back the popular *W6GO/K6HHD List* reviewed the basic elements for a successful DX card return. If *your* percentages haven't been quite what *you* hoped for, you might want to review Jan and Jay's tips.

Basics. Use 24-hour UTC. Write out the name of the month. Write or print clearly. Always send an s.a.s.e. or s.a.e. and return postage. Send separate return envelopes for each card desired. If you fold anything, place it in the envelope with the fold on the bottom. Be patient!

Explanations: If you keep your log in Univeral Coordinated Time (UTC), then the time on your card will agree with the time in the DX station's log and save the manager countless hours. We will continue to harp on this point until we convince you that you must have a clock (preferably a 24-hour clock) in your hamshack that tells time in the International Standard, (formerly referred to as GMT, also referred to as Zulu time by members of the military and MARS. Keep your log in UTC! Remember, too, that the date changes at 0000. This is early evening in the U.S. (4 P.M. PST and 7 P.M. EST).

If you work a station on February 1, 1984, and you put 2/1/84 on the card and then send it to an overseas country there will be a problem. Most everyone *but* the United States abbreviates dates in the sequence of day, month, year; and someone outside of the United States will read your 2/1/84 as January 2, 1984. An easy way to avoid this problem is to write out the name of the month. The biggest headache that QSL managers have is trying to figure out the time and date that you worked their station!

Be sure all entries on your card are readable. If your handwriting is poor, please print. If the manager or DX station cannot decipher your writing you may get your card back or it may be filed in the "round file" — and you get no return card. Don't correct mistakes; make out a new card. Correcting errors on a card that is later used to apply for awards could cause that card to be disqualified on an "altered" basis.

S.a.s.e. stands for "self-addressed stamped envelope," while s.a.e. means "self-addressed envelope." Always send at least one s.a.s.e. or s.a.e. If your request is for several cards, and especially if it is for more than one station that is handled by the manager, send more than one envelope, or be prepared to wait much longer for those cards. Postage expenses come out of the manager's pocket. If you don't send some means for returning your card, it may come back via the bureau or perhaps not at all. When you send a request to an overseas manager or direct to the station you want the card from, include IRCs (International Reply Coupons) for return postage plus an s.a.e. Some folks send "green stamps" (U.S. dollar bills) for return postage. This can present a real problem and may well get the person on the other end in serious trouble.

If you fold your s.a.s.e., put the fold in the bottom of the envelope in which you enclose it. Many of these s.a.s.e. enclosures have been cut in half by the letter opener because the fold was at the top!

Be patient. Managers have various ways of receiving log information, but the most common way is via the mail. Sometimes it may take six months because of the lack of mail service to some remote islands.

QSLing is expensive. There is no way around it. But remember that it is also costly for the person on the other end. And the more in demand he or she is, the more expense it is for him or her. Consider the stations most in demand in remote areas of the world. They must buy thousands of cards to answer that demand. If they are then expected to QSL via the bureau, their bureau may be a very long way from them. Just the postage to transmit several hundred cards to the bureau for distribution may be a prohibitive expense. So, the rarer the station, the less likely it is you can expect a card "via the bureau," and you must help to share the expense by making it very easy for the DX station to return his card to you.

BURMA NOTES

Recently WB9TTN had the pleasure of going to Singapore with his family to visit with his wife's parents — affording Gurbux an opportunity to have an eyeball with his father-in-law, Charan, 9V1NR. He spent over three weeks abroad, traveling from Singapore to Malaysia and Penang. While in Singapore he ran across an old friend from Rangoon, Burma, XZ2DW. WB9TTN knew Toe from his old days in Rangoon when he was second operator for his father Tara,

Left to right are Charan, 9V1NR, Toe, XZ2DW, and Gurbux, WB9TTN.

XZ2KN (a well-known Rangoon call). Toe has settled in Singapore and hopes to have his own 9V1 call soon. From the accompanying photograph it is easy to see where Gurbux got the phonetics WB9 Tall Turbaned Neighbor!

NEW ZEALAND CALL SIGNS

At the start of this new year, New Zealand will be adopting some new calls: ZL1-ZL4 as before, ZL5 for the Antarctic bases, ZL6 for Intruder Watch and Emergency stations, ZL7 Chatham Islands, ZL8 for the Kermadecs, ZL9 for the Auckland and Campbell Islands, ZL0 for visitors to New Zealand and ZK3 for the Tokelau Islands.

W9DXCC

Last September's 31st annual W9DXCC bash was an excellent success, with DXers from 11 states and 4 countries attending. Sponsored by the Northern Illinois DX Association, the event featured a day-long program ranging on topics from sound equilization to DXpeditions and the eternal enigmas of DX. Speakers included K8CW, Heard Island; WB4ZNH, TT8BC/BD Chad; K9EID, sound equalization; and featured as dinner speaker WA6AUD, former editor of the *West Coast DX Bulletin* and current DX editor of *CQ*. Enter September 15-16 on your 1984 calendar to participate in the Northern Illinois DX Association's next DXtravaganza!

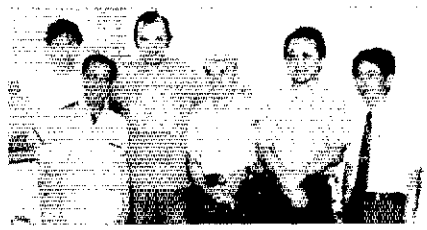
CAMBODIA (KAMPUCHEA)

That August activity by XU1s SS, PV and KC has been approved by ARRL, clearing the way for Kampuchea credits. Special thanks to the JAs for their handling of the matter.

THE CIRCUIT

☐ L2X: Through January 15 look for LU2DX using this special contest call. Joe will be back in the U.S. in mid-January.

☐ USA-CA: After a superlative performance for 18 years, W2GT steps down and notes that the new custodian for the award is Dorothy H. Johnson, WB9RCY, 333 South Lincoln Ave., Mundelein, IL 60060. FB, Ed!



For WCY, three ARI members received permission to operate from Taiwan, Sept. 18-23, enhancing world understanding through communications. (Left to right I2NYN/BV, BV2A-BV2B, I2MQP/BV, I2BVS/BV, KA6LGX and JA6CRP.)

☐ Yasme: The Colvins are in the midst of a half-year South America jaunt, with possible excursions to some of the rarer countries and islands. Present plans call for operation in HK, HC, CP, CE, LU, CX, ZP, and Peru under 4T4WTY for World Telecommunications Year. Operation will take place on the low ends of all phone/cw bands, with special efforts on the lower frequencies. Please, one QSO per band per mode per country. As usual, cards go to The Yasme Foundation, Box 2025, Castro Valley, CA 94546.

☐ HH2A: Art writes that anyone who has had a QSO with him and has not received confirmation should resend his card to Art's new QSL manager, WB2NEF, with s.a.s.e. or appropriate IRCs.

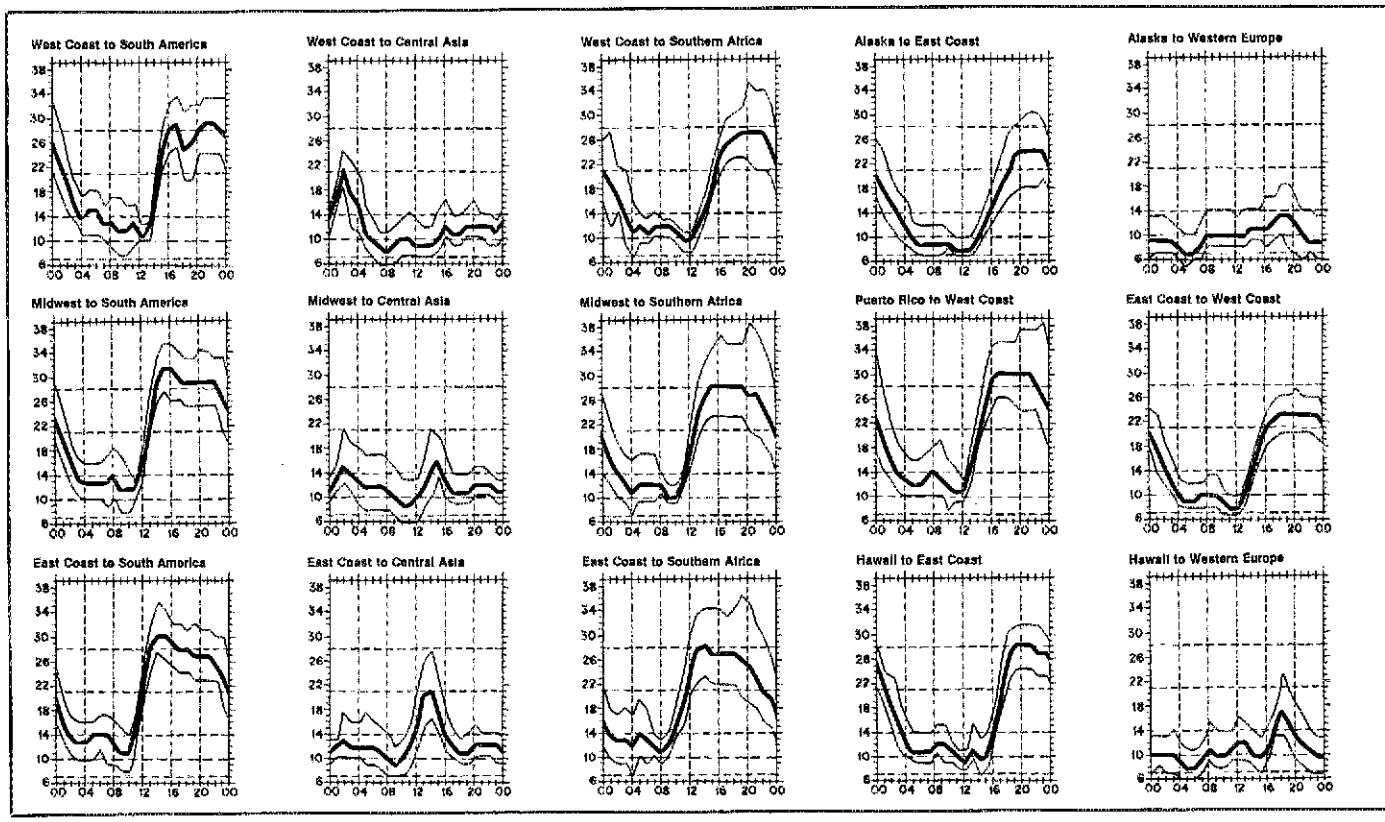
☐ VS6CT: Phil notes that he has a new QSL manager for stateside contacts: Alec Allan, G5VS, P.O. Box 126, Harrow, London, UK. (Alec also manages cards for A71BH, A71NJ, A71AS and C31YF.) During Phil's seven-week stint on Madeira (plus a couple of weeks in the Canary Islands), he sandwiched in 3250 contacts and WAS, working about 160 countries.

☐ Belize: That Kansas City DX Club CQWW CW operation under V3A gets confirmed via KBØG.

☐ C6A: Plans are underway for Dallas-area hams to operate a two-station/multioperator setup in the Bahamas during the ARRL CW DX Contest. The call used will be N5RM/C6A, operated by NS4M/5, K5IU, K5MM and N5RM. This should be a big one.

☐ Lord Howe: VK2BQQ has postponed his operation to November 1984. That VK2WU/LH1 late October stint gets confirmed via the VK2 Bureau.

☐ Netherlands: K8GG planned to open up on Christmas Eve with K8GG/PA (Netherlands, not Pennsylvania!). George notes that he will have inverted Vs about 40 feet up and run about 90-W output. His speciality is giving Novices a shot at DX when 15 is open. During the day he'll try 21,150 kHz about 1500Z, and in the evenings 7099, listening up 2-3 kHz, at about 2200Z. Some tips for Novices: To maximize contacts,



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

W9DXCC speakers (left to right), WD9IIC program chairman, K9EID, K8CW, WB4ZNH, WA6AUD, W9WU master of ceremonies.

he will work fairly quickly — report and name/state only — nothing else unless he requests. Those wanting a card should send an s.a.s.e. to K8GG with their card. Cards without an s.a.s.e. may be answered much later. Don't ask for his QTH over the air; call another ham who has a *Callbook* (he's had the same address over six years).

☐ Geneva: Per above, George also hoped to contact Novices from 4U1ITU on 15 meters December 20-21.

☐ China: VE3BX operated BY1PK on September 23 from 0100-0200Z. He has the cards at his home QTH (please forward s.a.e. with one IRC). Cam notes he had a nice visit with Tong and Yang. N4IA's recent China trip netted a visit to BY8AA and a brief operation of BY1PK. Bob notes a fine time and that he met ex-XU8EC in Shanghai. He comments that BY4AA began operating October 12 from Shanghai.

☐ Indonesia: YB5ASO is active daily throughout the winter season as follows: 160: 1100-1230Z (QRN permitting) and 2100-2200Z; 80: 1200-1300Z and 2230-2330Z (again, QRN permitting); 40: 1030-1130Z and 2200-2300Z. John notes he has had some good long path with the states on 40 and 80 at the 2200-2300Z times.

☐ Bermuda: The Radio Society of Bermuda is concerned about the growing numbers of cards addressed to VP9AM. This call has never been issued and RSB is looking for some tips which might help locate the pirate. Your aid via RSB, Box 275, Hamilton, Bermuda is requested. W1BPM reports that he now handles cards for both VP9KA and VP9KM. QSL via CBA with s.a.s.e.

☐ 160: Word has it that SV0AA operates around 1832 kHz about an hour before his sunrise. North Florida to HZ1AB on "top band" is W4ZR's latest coup.

☐ Colombia: The Colvins note that many of the persons in the HK licensing field are women: the woman in charge of license applications from the club to the government, the chief of the government licensing section, the Vice Minister of Communications, etc.

☐ KH8: VE7BBC has made the trek from 5N1 to KH8 for about two years. Steve still uses the FB QSL services of Dennis Pekrul, VE7CXN, 2131 Duthie Ave., Burnaby, BC, Canada V5A 2S1.

☐ What with DX Competition about upon us it might be well worth quoting from *The Totem Tabloid*, Western Washington DX Club, Inc., on that perfect tie-in between contests and DX operation: "If DXers are the Cadillac drivers of our hobby, contesters are the sports car drivers, emphasizing speed, flexibility and high-performance operating!" QST

QSL Corner

Administered By Joan Becker, KA1IFO

Here is some information for those of you who would like to QSL direct to the station location. It is passed along as we receive it and, therefore, may not be accurate. The call sign in parentheses is the QSL manager.

CE0EVG/OZ (WB6WOD)
EL2BA (WA2DHF)
EL7C (DK5VI)
HH2VP (W1FJ)
J73M (W2OB)
OX3SG (LA5NM)
PJ7A (K1AR)
PZ5JR (K3BYV)
P47N (W5AT)
TJ1AF (N4IAM)
TL8CK (F6EWM)
TL8ER (F6GQK)
TN8EE (F6ECX)
TU2NW (AK3F)
T32WI (T12J)
VQ9JD (N6AFD)
V2AN (WB2SSR)
ZS3HL (KE1A)
3D2ZM (K6ZM)
3V8PS (IN3RZY)
4U38UN (W2MZV)
4V2C (NQ4I)
5H3DM (G3NXR)
5R8AL (WA4VDE)
7P8CL (SM5DGA)
9H1CV (W2KF)
T2ADE P.O.B. 5, Funafuti, Tuvalu
T30DB P.O.B. 457, Betio Tarawa, Rep. of Kiribati

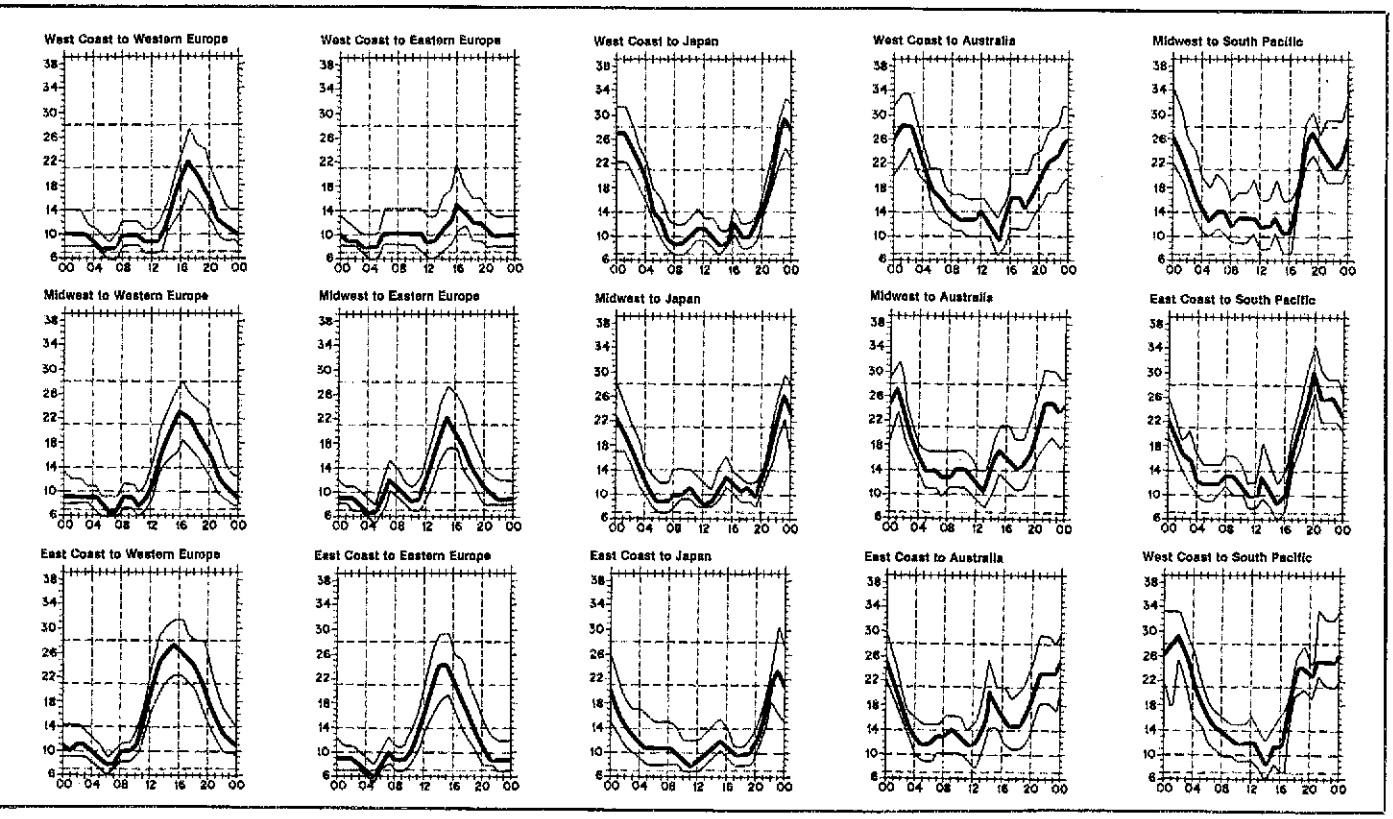
Special Notes

☐ VS6AY has left Hong Kong. There was a delay in the printing of his QSL cards, but he will QSL 100%.

☐ December 1983 QSL Corner, page 74, contains information and addresses for the Incoming Bureaus. Sept. 1983 QSL Corner, page 65, contains information on the operation of the ARRL-Membership Overseas QSL Service. For information on the bureau operations (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St., Newington, CT 06111.

QSL Manager Volunteers

K8YAH K7OVM QST



lowest curve (optimum traffic frequency, or fot). See April 1983 *QST*, page 63, 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, Colorado. These predictions, for January 15, to February 15, 1984, assume a sunspot number of 69, which corresponds to a 2800-MHz solar flux of 120.

DX Century Club Awards

Administered By Don Search, W3AZD

The DX Century Club certificate is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL Countries List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from October 1 through October 31, 1983. 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

CT1YH/123 IT9GSF/104 JI3AOD/107 OK3TMF/114 YU7AJD/128 W1FDR/148 KB5DN/219 AD6Z/102 W8SEY/319
G4OSY/102 J73RM/107 JR3WXA/141 PY1EGB/104 YU7JDE/102 N4DNJ/136 N5DMP/182 KE6WL/101 AJ9G/105
HA5KBC/101 JA1GO/319 JA6CLO/110 PT2GG/144 ZS6XD/107 N4ERM/127 W5TCX/109 W7PEW/100 KØRW/104
HA5KFV/101 JA1SJC/155 JH6MWO/108 VE3HVJ/168 KA1WV/105 WA4YLD/107 W5TXK/105 K8IU/101 KØYMQ/103
HB9FBQ/273 JF1ERP/108 JAØED/167 YU3THM/166 KA1YP/101 WB4WRK/100 WA5OKI/163 KU8B/102 KØZQD/285
HB9CMZ/133 JA3PG/106 OE6MKG/312 YU4ZA/164 W1KDD/100 WC4B/134 WB5DBT/186 NE8V/102 WBØRMT/101
HL4XM/103 JF3PLF/154

Radiotelephone

CE3BTY/101 DL8ZP/105 I1XOI/152 JF3PLF/136 PY3CM/148 KA1OA/100 W3WFM/108 WD5JDT/121 W8SEY/180
CX6BBY/145 EA1UO/131 JA1GO/280 JI3AOD/107 SP8DYY/101 KA1WV/103 KB4CWO/100 KA6JDH/101 WB8VPQ/112
DF8GQ/119 EA3DHR/107 JI1FJV/110 LU3MCJ/113 VE3HVJ/106 KM1R/120 WK4R/108 WB6VOV/102 WD8KZS/226
DH2EAJ/117 EA5NQ/107 JL1CHX/115 OE1MKW/101 VQ9RS/103 WA1WXI/100 N5DMP/181 K8DVW/106 W9GMV/106
DK6UM/103 EL2AD/110 JM1XSA/114 OK3KEX/120 YS9JY/114 K2MFY/260 WA5PTV/100 K8QFH/102 WB9MSV/262
DL6NT/114 F3CY/109 JA3PG/106 OK3TMF/103 AK1E/182 N2DNY/101 WB5DBT/184 K8ZPY/125 KØZQD/284

CW

CT1YH/102 JA1GO/225 JA3KWJ/134 VE3HVJ/137 K2MFY/191 WC4B/113 N8AXY/155 KR9J/100 KAØAYN/104
G4IJW/106 JA1SJC/109 OK3TMF/102 VE4ADG/111 WA2HZR/266 AC5K/114 W8SEY/150 KW9N/107 WBØZSS/101
HB9BFQ/154 JF1ERP/108 ON8HF/135 KA1EMQ/101 N4ERM/111 W6SC/231 WD8KZS/106 N9BKT/100 WDØARX/102
HB9CMZ/126 JA3DAY/225 OZ7KV/110

160 Meters RTTY

GI3OQR DK5PR

5BDXCC

NI4H K9BG H44SH N4ZG JA1FNA I4USC K6FO KM6B OK3TMF
K5FUV WA4MAI VE6WQ DK5JX ON6HX UQ2GDW I2LPA K6OJ HB9RG
NF4A K1XM UA3TDX A71AD CT4NH JA1KYE PY2TM AA2Z N4FKZ
SM6AYM LA7QI F6BWJ

Endorsements

Mixed

A71AD/282 G4CP/361 ON6IT/237 YU3TUX/230 W2HTI/357 W4FCC/183 W5CTM/249 W6VBI/325 WD8KZS/234
DF2PW/243 G4EDG/201 ON6RR/202 YU7DX/280 W2LOG/300 W4FDA/330 W5YM/148 WB6RIU/309 WD8QBP/175
DF6PK/141 G4GIR/264 ON8HF/240 ZS6AZQ/154 W2NY/293 W4GPA/167 WA5IPS/178 WB6ZHD/293 AK9Z/188
DJ5DA/341 G4IJW/254 PY2DBU/278 AK1E/189 WB2DZZ/236 W4IMB/199 WD5CPR/181 K7WA/225 K9GPN/154
DJ5VQ/337 G4LDS/200 PY3EM/247 K1AR/307 WB2VEG/325 W4KN/342 K6EXO/336 KA7KIS/158 K9IUF/328
DK1FW/310 G8GG/204 PY4ALC/274 K1VR/313 KA3CTY/205 W4MWT/312 K6AXC/316 KC7E/275 K9QXY/305
DK4DC/177 HA5KKB/222 PY7VKZ/321 K1ZZ/315 KE3R/150 W4WG/329 K6GWN/310 N7RT/315 KJ9N/198
DK6OR/223 HB9AUT/204 SM5CAH/158 KA1DOS/234 N3TO/272 W4WKB/137 K6GXO/292 W7AOL/130 KM9L/287
DL1FBO/210 HB9T/270 SM6CKS/336 KM1R/150 W3ARK/289 W4WKQ/200 K6OJ/363 W7DH/313 KQ9W/279
DL1FBQ/188 I1SBU/311 SM6JAO/234 W1GY/272 W3EYF/341 WA4WZO/165 KB6Q/288 W7EDA/318 N9BOK/179
DL6QW/327 I4EAT/299 SM6JHO/235 WA1YTW/284 W3GOH/308 WB4KRH/287 KB6WI/161 W7FPT/202 W9DDX/297
DL6YH/136 IT9QDS/261 SM6KQK/201 K2CP/187 W3SOH/305 WB4OSS/322 KD6NR/141 W7FY/271 W9AQ/340
DL7CW/326 JA1AFF/206 SM7AZL/310 K2GAT/290 W3YQ/260 WD4RCO/293 KG6I/180 W7GXC/306 WA9EKA/297
DL7NS/316 JA1IBX/338 SM7BBV/321 K2MFY/313 AA4M/307 WJ4T/206 KM6B/307 W7LGG/305 WB9OJE/152
DL7SY/309 JE3NWN/207 SM7GCP/218 K2OWE/280 AB4D/330 WM4M/152 KT6S/127 W7NP/284 AEØK/307
DL7XS/269 JA2ADH/330 SM7KIU/125 KQ2Q/200 K4ELK/305 AF5M/306 N6BOI/249 WA7MOK/267 KØJSY/289
DL8AK/282 JA3DAY/262 VE3FEA/284 KR2J/177 K4KUZ/300 K5AS/295 N6HR/325 AB8Y/303 KØSW/267
EA4AXW/159 JA3PXH/290 VE3JCV/220 KS2M/130 KA4JMZ/200 K5BDX/266 N6MB/298 KBDJC/288 KØUR/280
EA5AR/208 JR3GWZ/275 VE3LAJ/226 KU2X/225 KC4HN/149 K5GOE/270 N6MM/318 KB8BS/299 KC0Q/290
EA8RL/254 JA7AD/347 VE5BBQ/149 N2AIF/241 KN4F/238 K5OTI/285 N8VO/270 KB8LT/292 KZØE/259
EA9AM/175 JA7HMZ/293 VE7AAQ/347 N2IT/197 N4BLX/290 K5PR/260 W6KYJ/335 KR8W/288 NØCUB/119
EA9IE/291 JA7JH/322 VE7BD/326 NA2J/260 N4BQD/249 K5RJ/324 W6NLG/292 N8BKF/283 NØJW/250
EL2AM/159 KH6IJ/354 XE2ADY/130 NA2Q/125 N4FAC/248 K5VNJ/313 W6NPY/311 W8FN/185 W0ANZ/288
F6HKD/128 LU8BA/291 YU2CBM/317 W2GND/256 N4GFI/176 KC5CP/243 W6RDL/302 W8GOC/270 W0MHK/250
G3VKW/300 OK1MG/335 YU3DKS/273 W2GQF/312 ND4Y/174 KD5RO/250 W6TEX/280 W8GS/315 W0QLX/321
G3XTT/289 OK1ZL/305 YU3TKL/286 W2GW/352 NU4N/255 W5CKT/336 W6UE/160 W8NGO/357 WDØGML/276
G4BUE/299 OK2DB/307

Radiotelephone

A71AD/282 HB9AUT/203 PY2DDM/173 YBØACL/200 W2LOG/300 W4MWT/311 KD5GB/192 W6PKB/150 N8BKF/282
CE3DQR/135 I2LPA/325 PY3DX/225 YU6ZA/176 W2MOY/220 W4TFB/320 W5BPT/261 W6RDL/273 NB8C/175
DF4PL/263 I5HOR/281 PY3EM/238 ZP5JCY/201 WB2DZZ/183 W4WKB/129 WB5LZG/269 WA6HYI/127 W8GS/266
DJ5JH/289 I6ZAJ/284 PY7VKZ/312 ZP5MJV/255 K3UA/303 WA4HII/253 WB5RCS/250 WB6RIU/309 W8NGO/342
DJ5VQ/319 I7SCA/333 SM6CKS/335 ZS6FU/280 N3TO/226 WA4WZO/127 WB5TED/292 WB6VSK/294 W8VSA/260
DK1FW/310 IT9GCQ/287 SM6JAO/225 4Z4VG/157 W3ARK/179 WB4OSS/321 WD5ABG/250 KC7E/238 KC9XY/125
DL6QW/300 IT9LYF/181 SM6JHO/140 AF1U/250 W3AX/200 WB4TIN/305 K6AXC/314 KD7EC/205 KJ9N/176
DL7SY/300 JA1IBX/335 SM6KQK/158 KA1PU/151 AA4M/285 WI4R/237 K6EID/290 KT7V/272 KM9L/282
DL9CQ/278 JF1PHJ/178 SM7AZL/293 W1GY/202 K4JDJ/150 WJ4T/182 KB6OK/250 KU7F/152 KQ9W/273
EA7BLO/245 JA2ADH/329 SM7GCP/216 WA1DPX/175 K4KUZ/282 AF5M/266 KC6H/260 N7RT/286 KU9I/305
EA9IE/292 JA3PXH/272 SV8CS/250 WA1YTW/280 KC4LQ/230 K5GH/320 KE6AL/176 W7EDA/230 N9BA/299
EA9AM/175 JR6RVG/125 VE1BWP/177 K2GAT/290 KD4NZ/215 K5GOE/264 KM6B/307 W7GXC/305 W9DDX/297
EL2AM/157 JA7HMZ/269 VE3DOU/275 K2YIY/313 KD4OM/150 K5PR/202 KQ6H/273 AB8Y/281 W9LA/328
G3VKW/300 LA2TO/250 VE3FEA/277 KC2KU/228 N4BLX/289 K5RJ/317 N6MB/298 K8AQ/326 W9XM/310
G3XTT/267 ON5HU/291 VE3KGK/280 N2AIF/184 N4FAC/246 KB5DN/288 N6VO/230 K8DJC/288 WA9EKA/291
G4BUE/281 ON6IT/233 VE3LAJ/202 N2BAT/232 NO4N/179 KB5RA/178 W6AED/320 K8IQB/260 K0JSY/289
G4GIR/236 ON8HF/204 VE7AAQ/325 W2GQF/310 W4EBO/309 KC5KL/200 W6KYJ/317 K8MID/149 N0AMI/279
G4IJW/253 OZ2TH/225 XE1MEX/175 W2HTI/356 W4KN/280 KC5ZA/127 W6NLG/287

CW

DF2PW/226 EA5AR/190 JR3GWZ/229 SM6KQK/138 N2IT/192 NU4N/176 K5VNJ/158 K7WA/205 KQ9W/184
DJ5DA/251 EA8RL/225 JA5SIX/186 SM7EL/135 N2KW/300 W4KN/280 KB6EP/201 N7RT/280 KR9O/160
DJ5JH/260 F6HKD/127 JA7HMZ/260 VE3FEA/177 WA2CBB/260 W4MLA/206 KD6NR/126 AB8Y/252 WA9EKA/282
DJ5VQ/262 G3XTT/228 JA8MHG/188 VE3JCV/182 K3UA/286 W4WJ/295 KM6N/231 KF8N/175 WB9PXR/201
DL1TU/251 G4BUE/227 OK1MG/284 VE3LAJ/156 W3ARK/231 AK5Q/151 N6VO/151 W8FN/162 AEØK/263
DL7SY/263 I4EAT/157 ON5KD/280 KA1DOS/212 W3EYF/260 K5AS/285 W6BJH/280 W8LNO/151 KCØQ/270
DL7XS/185 JA3PXH/268 ON6RR/156 K2LFL/149 AA4M/274 K5BDX/228 W6TEX/227 AK9Z/181 KJØU/261
G4GIR/184 JA2ADY/245 SM4CQW/176 KU2X/178 K4KUZ/282 K5OTI/197 WA6VJP/173 KM9L/214 WØANZ/166
EA4AXW/129 JE3NWN/207 SM6JHO/175 N2AIF/207

DXCC NOTES

Honor Roll Change for 1984: Commencing with the 1983 Annual List in December *QST*, Honor Roll members will be indicated in bold face print. The traditional 1983 December submissions for Honor Roll will be published in the March 1984 issue of *QST*.

Beginning with 1984 submissions, Honor Roll standings will be published in the June issue of each year with March 31 the cutoff date for submissions. The members of the Honor Roll will again be indicated in the December Annual List in bold face.

Reminder: Those wanting to update their Honor Roll standing or make the Honor Roll (to appear in March 1984 *QST*) must have their cards into Hq. no later than December 31, 1983.

Those wanting to update for the Honor Roll listing (to appear in June 1984 *QST*) must have their cards into Hq. no later than March 31, 1984. QST

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

Maritime Mobile Mythology

Despite amateurs' steadfast tradition of rules compliance, pockets of problems do crop up from time to time. They usually stem from misinterpretations and myths surrounding so-called "gray areas" in the rules. Nowhere is this more true than in the case of maritime mobile operation in and around foreign ports. Well-intentioned U.S. hams often have trouble in determining just whose rules they're supposed to follow when sailing the seven seas.

There is a darker side, too. Unscrupulous yachters who do not hold ham tickets use our amateur frequencies for such purposes as ordering parts and supplies for their vessels, and conducting stateside business affairs. They harbor the ill-conceived notion that, because they're on the high seas, somehow the rules don't apply to them. Still others forgo the standard marine mobile emergency communications gear, relying instead solely on an unlicensed ham transceiver — a dangerous proposition in a maritime emergency.

Administrations unfriendly to international Amateur Radio are the first to cite these instances as reasons for removing privileges and frequencies at worldwide allocation conferences such as WARC-79. With another general WARC possible in just a few short years, now is the time for all amateurs to come to grips with these problems so that international Amateur Radio will remain the shining star it is. This month, we'll examine important rules governing international and maritime mobile operation.

Q. Soon my wife and I will set sail on a luxury liner for a cruise among the Caribbean islands. I'd like to bring a rig with me. When operating, whose rules do I follow?

A. The first determinant is the country of registry for the vessel. When operating on the high seas (in international waters) on a U.S.-registered vessel, you will follow Part 97 of the FCC Rules. This means that if you are an alien (other than a Canadian citizen) licensee, you must obtain either a U.S. Amateur Radio license by passing the required examination, or a reciprocal operating permit from the FCC prior to your operation aboard the U.S. ship. U.S. licensees and Canadian DOC licensees need no special permit or authorization other than their own licenses. Canadian and U.S. hams enjoy automatic reciprocal operating privileges.

Q. Whose rules do I follow when my U.S. ship sails into the waters of another country?

A. When sailing or anchored in the territorial waters of another country, you must check the rules of that country prior to your operation of an amateur station. You must comply with those rules and obtain any required license or permit from that country's government. It is recommended that you study the country's requirements well in advance of your departure date, as some administrations can take as long as six months to issue the necessary operating paperwork. Plan ahead!

Q. What if the vessel is of non-U.S. origin?

A. If you are sailing in international waters aboard a non-U.S. vessel, check the rules of the country of the ship's registry. You must obey those rules, and obtain any necessary license or permit from that country's government prior to your operation. If you are sailing in the waters of a foreign government's territory, then you must observe the rules of that government. You must obtain any necessary license or permit from that government prior to your operation in its territory.

Q. What do foreign Amateur Radio rules encompass?

A. When your operation is governed by the rules of a foreign country, be sure you obey *all* of them. This means you should review those rules carefully, as there may be requirements that differ widely from your home country's rules. Make sure you observe the frequency bands permitted, station ID requirements, third-party traffic restrictions, and so forth.

Part 97 on the High Seas

Q. When U.S. rules apply, what provisions pertain specifically to international and maritime mobile operation?

A. Concerning your equipment aboard a ship, (1) the installation and operation must be approved by the master of the ship; (2) it must be separate from and independent of all other radio equipment, if any, installed aboard the ship; (3) its electrical installation must be in accord with the rules applicable to ships as put forth by the appropriate government agency; (4) no interference must result to the efficient operation of any radio equipment installed onboard the same ship; and (5) your equipment and any associated gear must not cause a hazard to the safety of life or property (97.101).

For stations in ITU Region 2 frequencies used must be consistent with U.S. frequency bands and, if a U.S. station, the privileges of the control operator's license class. Outside Region 2 and subject to the limitations of the control operator's license class, the frequency segments listed in 97.75 may be employed.

Q. What ITU Region do I reside in?

A. If your station is in Europe or Africa, it's in Region 1. North and South America comprise Region 2. And the rest of the world makes up Region 3.

Q. Can I pass third-party traffic?

A. In cases where U.S. rules apply, you may pass third-party traffic, including phone patches with the U.S. mainland. You may *not* handle or pass such traffic with other countries, *except* those with whom the U.S. holds third-party-traffic agreements. There are never any exceptions to these rules, and even thoughtless violations can cost the good reputation hams have earned over the years.

There has been a great amount of abuse of third-party-traffic privileges. These privileges are tenuous, at best, and subject to swift revocation. Do *not* use phone patches and traffic nets for ordering parts and supplies, delivering business messages or making arrangements for accommodations at ports of call. Third-party messages and remarks must be limited to those of a personal nature — general greetings, for example. Of course, if an emergency presents a threat to the safety of life or property, then use whatever means you can to get help. See October 1983 *QST*, page 91, for a list of third-party-traffic countries.

Make a special effort to inform other hams of the gravity of the third-party-traffic situation. Let's put our self-policing powers to work to curb abuses.

Q. I am an alien licensee and want to operate in U.S. waters. What kind of authorization do I need? What rules do I follow?

A. In order to operate when you are in U.S. jurisdiction including aboard a U.S. vessel in international waters and on any vessel or land in U.S. territory, you must obtain either an FCC Amateur Radio license by passing the required exams or a reciprocal operating permit. The only exception applies to Canadian citizens with DOC licenses because of U.S.-Canadian automatic reciprocity. (97.303)(97.41)

Any alien may apply for a U.S. ham license, and is encouraged to do so by the FCC if he/she will be spending a considerable length of time in the U.S. Applications for U.S. licenses are made on the Form 610.

Application for a reciprocal operating permit is made on the FCC Form 610-A, and sent to FCC, Gettysburg, PA 17325. The application should be filed at least 60 days in advance of the planned operation. Normally, a permit will expire one year after issuance, but in no event after the expiration of the license issued to the alien amateur by his or her government. (97.307)

Alien operation under the FCC permit will be governed by Part 97, the terms of the reciprocal-operating agreement between the U.S. and the alien's home country, and the provisions of the alien's home license. FCC may also impose additional conditions on the alien's operation. (97.311) An alien operating from a U.S. vessel on the high seas indentifies the station by signing his or her call followed by the prefix of the U.S. area he or she is closest to: for example, G3CE operating in waters off the Hawaiian coast would sign G3CE/KH6. At least once during each contact, the alien must indicate, in English, the geographical location of his station as nearly as possible by city and state, commonwealth or possession — G3CE/KH6, 250 miles south of Honolulu, for example. (97.313)

[Note: Questions appearing in this column are typical of those frequently asked of the FCC and other agencies. Answers, prepared at ARRL Hq., have been reviewed by the FCC's Personal Radio Branch for agreement with current FCC interpretations and policy. Numbers in parentheses refer to specific sections of the FCC rules.]

*Deputy Manager, Membership Services, ARRL

The World Above 50 MHz

Conducted By
Bill Tynan,* W3XO

1983 — An Important Year for VHF

The year just passing into history has been one of considerable importance to the world above 50 MHz. January saw two events that are destined to be felt in the years to come. After a number of years of struggle by those convinced of the ultimate benefit from regularly operating beacons, FCC finally authorized automatic unattended beacon operation by U.S. amateurs. In addition, the so-called Maidenhead grid system, proposed by G4ANB and SM5AGM, was launched here in North America along with a brand new League-sponsored series of awards for the bands above 50 MHz — the VUCC. Both the grid system and the awards based upon them have proven to be more popular than anyone could have predicted only a year ago. (See the list of VUCC holders accompanying this column.)

In February, 40 U.K. VHFers received special limited permission to use the 6-meter band. It is hoped this will be a precursor to general authorization for all British amateurs as soon as the currently operating Band 1 television transmitters are closed down, as they are scheduled to be. The third month of 1983 brought a new world record for the 1¼-meter band and the first two-way on the band via Transequatorial Propagation, or TE. This historic first was accomplished after months of hard work and preparation on the part of both participants. KP4EOR and LU7DJZ. These two are now gearing up to make the attempt on 70 cm.

Beginning in April, a new series of VHF contests was initiated: the Spring Sprints. They met with such an enthusiastic reception that a series of Fall Sprints has been instituted. The Sprints were the first contests to employ the new grids as multipliers, and served as a fine introduction of them to U.S. and Canadian VHFers. Also in April, NASA gave the nod to a proposal filed jointly by ARRL and AMSAT for amateur operation from space by W5LFL during some of his off-duty hours as a crew member on the ninth *Shuttle* mission. The fourth month also saw a bang-up VHF program at the huge Dayton Hamvention, put together by WA8ONQ and an able group of helpers, and the ARRL Board of Directors adopted a band plan for 6 meters submitted by the VUAC and the VRAC.

May brought another one of those special moonbounce operations that do so much to popularize the mode by giving those who have setups not normally capable of spanning the round trip between earth and moon a chance to actually make an EME contact. This 70-cm operation, spearheaded by W3IWI, was from the 140-foot-diameter radiotelescope at Green Bank, West Virginia, in commemoration of the 50th anniversary of the discovery by Carl Jansky of radio signals from outer space. This event is generally credited as being the birth of the science of radio astronomy. The Green Bank operation resulted in some 150 QSOs in 20 countries on all continents.

The lead *QST* article that month was of special interest to VHFers. Written by W3EP, it explained in understandable terms how weather patterns produce the tropo DX, a major propagation staple on our VHF bands. Two first-rate VHF conferences were held — one in New England, and the other in northern California.

Who needs to be reminded how important June was to VHF, and Amateur Radio in general. The 16th day of that delightful month witnessed the launching of AMSAT's long-heralded Phase III satellite. This "bird" and those like it to follow are destined to have a far-reaching impact on all of Amateur Radio; it has already proven useful to VHFers for setting up schedules and comparing notes. That month also saw the first crossing of the Atlantic on 6 meters via Sporadic E when VE1YX and VE1BNN contacted a number of the U.K. permit holders. A few days later, WA1OUB became the first U.S. amateur to accomplish the feat by working GJ3YHU, with KA1PE coming in a close second when he hooked up with GI3ZSC only a few minutes later. Britain had been worked on 6 meters via F_2 in years past, but this was the first time it was done via the E layer.

In July, a new 3-cm record of some 1000 miles was established between IØSNY/EA9 Spanish Morocco and IWØBCU/IT9 western Sicily. The month also brought some good news from Down Under. Word was flashed that VKs received permission for limited use of the band segment 50.0 to 50.150 MHz. Previously, they were prohibited from operating below 52 MHz. After months of trying, W4HHK and W8YIO made contact on 2304 MHz over a path of 583 miles. Kansas City was the site for a fine VHF conference sponsored by the Central States VHF Society. The saddest event of the year for the VHF fraternity also occurred in July when one of the all-time great inhabitants of the world above 50 MHz, Carl Scheideler, W2AZL, was taken from us.

September witnessed the first use of grid squares as multipliers in one of the three major ARRL-sponsored VHF contests. In October, a system for increasing the probability of working stations at extended distances, suggested by K2RIW, was featured as the lead for this column. The month also saw two great VHF get-togethers. One was the annual conference and Hamarama sponsored by the Pack Rats of the Philadelphia area; the other was the splendid show organized by SMIRK for the ARRL National Convention, held this year in Houston, Texas. November *QST* carried a fine article by G3YGF on tropo scatter, with an emphasis on the microwave bands. In addition to providing an understanding of this propagation mode, the article should also serve to stimulate interest in these bands and show that they are good for something besides line of sight.

In mid-November, word was flashed that the first 1¼-meter WAS had been claimed. Many had thought this goal would never be accomplished on the band considered an orphan by a large number of hams, but it was. See further details elsewhere in this column. As the final month of the year arrived, we were treated to the first operation from space by a radio amateur as W5LFL worked the world while orbiting in the *Shuttle*. Working W5LFL proved to be a challenge for some, but Owen handled it well and made as many as possible happy with historic contacts. Even those who were unsuccessful in working him got a thrill out of just listening to this historic first for Amateur Radio.

The year 1983 has seen the ever increasing interest in EME, with it becoming increasingly clear that, especially on 23 cm, the mode can provide useful communication with amateur power. Speaking of amateur power, 1983 saw FCC action on a change that many had long sought. No longer will our maximum authorized power be 1000-W input. Now, we can legally run as much as 1500-W output. This should represent a real boon to moonbouncers bent on staying within the letter of the law. Unfortunately, the year also marked the decline of solar activity and, with it, a significant drop in the number and length of long-haul 6-meter F_2 openings which, over the past few years, have provided more 50-MHz DX opportunities than even the most optimistic of us would have dared hope for when Cycle 21 was getting underway.

Yes, 1983 has been quite a year for VHF, and for Amateur Radio in general. We all look forward to 1984 with eager anticipation to see what good fortune it will bring to our special niche in the wonderful hobby we share.

ON THE BANDS

6 Meters — As if to compensate for an almost complete absence of F_2 propagation, the old band put on a pretty good E_s show for us beginning just before mid-November. KA5LVP Hattiesburg, Mississippi, reports an opening to Connecticut, Pennsylvania, Maryland, Michigan and Illinois between 0255 and 0400Z on the 10th. A few scattered openings were also reported on the 12th, but it was the following day that the E clouds really began to produce. Throughout much of the eastern portion of the country, the band was alive for some eight hours. At this location near Washington, the stations heard were mostly from Florida and west along the Gulf Coast, although a few Midwest stations were in as well and C6ADV was worked. The next evening, VE1YX had a field day for the time of year. Bob completed 55 QSOs in the 1st, 2nd, 3rd, 4th, 8th and 9th call areas between 0140 and 0320Z on the 15th. One thing that particularly impressed him was the large number of new 6-meter operators, many of them running very low power. He said that he worked one station in Philadelphia using just 1 W to an indoor dipole.

As proof that F_2 is not quite dead, W3IWU reports

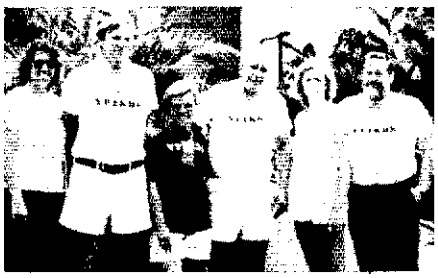
*Send reports to Bill Tynan, W3XO, P.O. Box 117, Burtonsville, MD 20866, or call 301-384-6736 to record late-breaking information.

that on the 12th he heard signals up to 49.987; unfortunately, no amateurs were heard. On the same day, W5DZF/4 near Miami worked OA4PQ and heard the HC2FG beacon and PY2DW. The previous day, it was reported that ZSs were hearing the 5B4 beacon. Moral: Don't retire those 6-meter rigs yet. Another example that the band isn't dead yet is the success of the W6JKV/K6MYC DXpedition to Easter Island. In a letter from Mike summarizing their results it is learned that W6JKV/CEØ managed contacts with 11 PYs and five KH6s, as well as one LU and one CE. On three days during their stay in late October, the band was open to KH6 and a like number of days to South America. It boggles the mind to think what excitement would have been caused by a DXpedition like this a few years ago.

Last month, I announced that, from now on, updates of the 6-meter DX box would appear only once per year. However, many people seemed to have been taken by surprise at its appearance in November and have submitted revised totals since then. Therefore, I will make an exception in 1984 (as I did during the years of peak solar activity) and publish two updates again this year. The next one should appear in May. To meet the deadline for that column, I must have the completed forms by March 10. If you need blank forms, drop me an s.a.s.e. as soon as possible.

2 and 1¼ Meters — The big story this month, of course, is the news that WØVB has put in a claim for the first 1¼-meter WAS — a feat many said would never take place on this band because of the low activity level. But Terry helped his own cause to get the final state Hawaii. He had previously made similar contributions with DXpeditions to several other states. In this case, he, in company with WØRGU, journeyed to KH6 with moonbounce equipment for both 1¼ meters and 2 meters. Meanwhile, back in Minnesota, his station was manned by WØOHU. The contact was completed with KH6IJ, the call used for the operation, at 0540Z November 15. The two went on to work more 1¼-meter stations, as well as he on 2 meters for the EME contest. I expect to have details next month.

There should be quite a few more WASs by the time this one is over. Incidentally, those who don't have the good fortune to work KH6IJ on 2 meters this trip may have another chance. K6MYC says that he is planning a similar jaunt for February. K6MYC reports that his trip to Easter Island was quite successful in terms of 2-meter EME QSOs. Mike succeeded in providing this rare country to 18 EME operators in various parts of the world. Much of the coordination was accomplished via OSCAR 10.



Summer 1983 was enlivened by a host of DXpeditions, swelling the country totals of many 6-meter operators. Here is the crew that put St. Kitts on the air (l-r): Geri (XYL of WB8BKC), WB8BKC/VP2KBH, KA8LDO/VP8KBJ, N8AKY/VP2KBI, Sharon (XYL of K8EFS) and K8EFS/VP2KBK. In two weeks, the group racked up 244 contacts in 10 countries and 18 states on 6 meters. Three countries were worked on 2-meter FM simplex, and their QSO total on the HF bands was 3170.

N3AHI/4 writes that he believes the AM-6155 power amplifier, which is available from Fair Radio for about $150, to be the buy of the year. The unit, which includes a built-in power supply, uses an 8930 to produce about 500 W in the 200-400 MHz frequency range. A few simple modifications, worked out by WB4NMA and WD4JQV, are necessary to get the AM-6155 on 220 MHz. Jim will send a copy of these to anyone dropping him an s.a.s.e. with 37 cents postage. Address is James R. Holt, 5096 Oak Grove Dr., Sugar Hill, GA 30518. N3AHI/4 says that he is now on all bands, from 6 meters to 23 cm, with particular emphasis on 220, especially on Tuesday evenings. He adds that he is joined on that band by area stations WB4NMA and WA4NJP.

VUCC Awards Issued†

6 Meters (100 grids for basic award)

K8WKZ	225	K1TOL	
KB4CRT	150	WA1OUB	150
W1QXX	150	W3EP/9	
N4MM	150	N5DDB	125
WB8WXZ	125	W1WHL	
WB7OHF	150	WB4LSM	
WB1FVS		N2CEI	
WD4FAB	125	W8MVE	
WA3DMF	125	NØLL	
WA6BYA		KI3L	
W4OO	150	WB4NMA	
KA1DHO		KØTLM	
W3WFM	125	K8TGC	
N3COG		W1JR	
N2DXP		KC8OS	

2 Meters (100 grids for basic award)

K9MRI	125
WB9MSV	
WA8ZHE	
N9KC	

70 CM (50 grids for basic award)

W1JR	80
K8WW	
WB3ESS	

23 CM (25 grids for basic award)

WB8BKC	30
K8WW	

†as of November 15, 1983. Numbers refer to endorsements.

2-Meter Standings

For WAS holders, listing is WAS number, call, state, call areas worked and grids worked. For others, call, state, U.S. states worked, call areas worked and grids worked. Call areas are the 10 U.S. call areas plus KH6 and KL7, each VE and XE call area, and DXCC countries not located within the continental limits of the U.S., Canada or Mexico. In order to make the Standings a true reflection of stations currently active on 2 meters, those not reporting activity within the past two years have been dropped. They will be reinstated upon written presentation of continuing activity. WAS holders are listed in any case. Compiled November 15, 1983.

*Indicates that one or more contacts were made via EME
†Indicates WAC

1	KØMQS*	IA	12	WB1FVS	CT	34	11	WA3DMF	MD	32	10	K5VVV	TX	25	8	W9WZB	IN	41	13
2	K5CM*	OK	12	W1JSM	NH	33	8	K3MWV	PA	32	10	W5NZS	OK	25	7	W3EP/9	IN	41	13
3	NØJA*	MO	12	K1VMI	CT	31	12	K3HCE	MD	29	11	K5QNM	OK	24	9	W9IP	IL	40	9
4	K9HMB*	IL	12	W1GXT	MA	30	11	W3OTC	MD	28	9	WA5IYX	TX	24	9	K9SM	IL	36	9
5	K1WHS*	ME	12	K1FWF	MA	29	11	WA4LYS*†	FL	49	47	W6XJ*		29	12	AA9D	IL	31	10
6	WA4MVI*	NC	12	KA1DHO	MA	28	10	WA4CQG*	AL	49	—	WB6NMT*		26	13	WB9MSV	IL	30	11
7	K5JL*	OK	12	W1AIM	VT	28	9	WD4IIS*	GA	42	12	K6PVS*		24	—	WBØTEM*	IA	49	22
8	WA9DOT*	WI	12	K1SF	MA	27	11	WD4DGF	TN	41	—	K6JYO		19	5	WØRWG*	MO	49	15
9	WBØZXU*	IA	12	W1FJH	MA	26	8	WA4PCS	KY	40	10	WA6LHD		14	6	KXØO	CO	48	20
10	K9CA*	IA	12	WA1LOU	CT	25	11	W4GJO	GA	39	11	K6HMS		11	5	KØALL*	ND	48	16
11	WØSD*	SD	23	KA1DHO	MA	24	9	K4CAW	NC	38	12	K6GAO		9	6	WBØVYV*	IA	48	11
12	K5BMG*	LA	12	W1HDQ	CT	24	7	WA4DKH	KY	38	11	K6QXY		9	4	WØEMS	NE	48	11
13	K5GW*	TX	12	W2CNS*	NY	48	24	N4CD	VA	38	12	WA8LLY/6		8	4	NØLL	KS	46	10
14	WB5LUA*	TX	23	W2PGC*	NY	47	15	W4HHK	TN	38	9	N6CA		8	3	WØOHU	MN	45	12
15	K4GL*	SC	23	WA2GSX*	NY	46	22	K4KAE	SC	36	13	WA1JXN/7*	MT	49	40	KØDAS*	IA	45	12
16	WØVB*	MN	14	K2QR*	NY	45	27	W4IIS	GA	36	8	W7HAH*	MT	46	23	KØSE*	MN	45	10
17	WB5LBT*	LA	20	K2OS*	NY	44	14	W4LNG	GA	36	8	W7CI*	AZ	48	17	WBØDGF	NE	42	10
18	K4PKV*	NC	12	WA2PVV*	NY	40	13	WD4CXU	VA	35	8	WA7JUO*	NV	45	16	WAØSJR	MO	41	9
19	WØRWH*	MO	23	W2CRS	NY	37	8	KØRI/4	VA	34	11	WA7JTM	AZ	21	6	WØPN	MN	40	11
20	W8IDU*	MI	23	W2RS	NJ	36	13	W4FJ	VA	34	8	WA7ADK	UT	24	6	KCØQR	NE	39	11
21	K1MNS*†	NH	48	K2OVS	NY	36	12	WA4OWC	FL	33	10	N7BHC*	UT	21	6	WØRAP	IA	39	10
22	WB9VEN*	IL	12	WA2TIF	NY	36	11	W3IY/4	VA	32	8	K7ICW	NV	21	9	KØAOD	MO	38	11
23	K5FF*	NM	16	WB2WIK	NJ	35	12	WA4SBC	VA	31	12	WB7EPA*	AZ	16	6	WØPW	CO	38	9
24	W5FF*	NM	16	NB2T	NJ	35	12	KC4P	AL	30	9	N7ART	WA	15	5	WBØDGF	NE	38	9
25	W7FN*	WA	12	WB2CUT	NJ	35	—	K1FJM/4	FL	29	9	N7EIJ	ID	13	6	WBØIUT	NE	37	10
26	W1JR*†	MA	20	WA2FGK	NJ	34	8	K4CKS	GA	29	—	N7AKB	NV	12	4	WØRAP	IA	37	10
27	WBØQMN*	CO	12	W2MPK	NY	27	8	WB4NXY	KY	27	8	WB7QBC	WY	12	3	WBØSIL	MO	36	13
28	WB4EXW*	NC	18	W2DWJ	NJ	27	11	NA4I	GA	24	10	WA7EPU	AZ	9	6	KØTLM	MO	36	10
29	K9KFR*	IN	12	KA2BTD	NJ	26	10	N4QH	GA	23	8	WB8PAT*	OH	48	33	WØPW	CO	35	9
30	K3VGX*	PA	12	WA2ABN	NY	25	10	W5JTL*	MS	49	13	W8WN*	MI	48	14	KØUDZ	SD	33	10
31	SM7BAE*		21	K2YCO	NY	25	10	WD5CRK*	OK	49	12	K8EUR	OH	41	11	KCØQR	NE	31	10
32	WA7BJU*	OR	12	N2BJ	NY	25	10	N5KW*	OK	49	12	WA8MIL	MI	39	9	NØAJU	NE	30	9
33	VE7BQH*		35	KE2N	NY	23	11	WØRRY/5*	OK	47	13	K8RZB	OH	39	10	KAØAYN	MN	28	10
34	W6PO*	CA	12	WA2DKB	NJ	23	11	K5SW	OK	47	12	K8WKZ	MI	38	12	WBØZAH	MN	24	9
35	WA3VSJ*	PA	27	N2BMN	NJ	22	10	W5RCI	MS	46	10	W7EKI/8	OH	38	8	VE1UT	NS	38	17
36	WAØLPK/KL7	AK	20	AB3D*	DE	48	22	KR5F*	TX	44	36	KJ8S	MI	34	10	VE2DFO*		48	30
37	WBØYSG	NE	12	WA3USC*	MD	47	18	K5WE	OK	44	13	WD8BRE	MI	33	10	VE3EMS		38	11
38	N7NW	WA	12	WB3JHP	MD	45	19	W5HN	TX	42	12	W8LCY	OH	32	8	VE3FN		37	11
39	W5LUU	TX	12	K3WHC	PA	37	9	W5HFV	OK	38	10	KB8SG	MI	27	8	VE3DSS		37	10
K1FO*	CT	49	18	K3QCQ*	PA	37	8	KB5MR	OK	38	9	W8CAP	MI	26	11	VE3ASO*		35	12
K1GVM*	MA	44	15	W3XO	MD	37	10	WA5DBY	TX	36	11	N8AXA	OH	26	9	VE3FKX		35	10
K1BKK*	VT	43	14	K3MD*	PA	36	16	WA5HNK	TX	35	12	W8TN*	WV	24	11	VE3DTQ		31	12
WA1JOF*	MA	40	19	W3IWI	MD	36	12	WB5JAR	AR	34	10	K9XY*	WI	49	26	VE3EQQ		20	12
WA1OUB	NH	37	13	W3RUE	PA	36	11	W5UWB*	TX	33	11	K9EFX*	IN	44	13	VE4MA		14	9
W1YTW	ME	36	12	W3ZZ	MD	35	11	N4JS/5	MS	31	8	KB9NM	WI	43	14	VE4UX		8	5
K1PXE	CT	35	13	WB3LJK	MD	35	11	K5DHU	TX	27	10	W9AAG	IL	42	9				
N1AIS	MA	34	12	W3CLQ	PA	33	10	WA5YOU	LA	26	8								

Conducted By Bob Atkins,* KA1GT

Periscope Antenna Systems

One problem common to all who use microwaves is that of mounting an antenna at the maximum possible height while trying to minimize feed line losses. The higher the frequency, the more severe this problem becomes, since feed losses increase with frequency. Since dishes are most often used on the higher bands, there is also the difficulty of waterproofing feeds (particularly waveguide feeds). Inaccessibility of the dish is also a problem when changing bands: Unless the tower is climbed every time and the feed changed, there must be a feed for each band mounted on the dish. One way around these problems is to use a "periscope" antenna system (sometimes called a "flyswatter antenna").

Fig. 1 shows a schematic representation of such an antenna system. A plane reflector is mounted at the top of a rotating tower at an angle of 45 degrees. This reflector can be elliptical (with a major:minor axis ratio of 1.41) or rectangular. At the base of the tower is mounted a dish (or other type of antenna such as a Yagi) pointing vertically upwards. The advantage of such a system is that the feed antenna can be changed and worked on easily. Additionally, with a correct choice of reflector size, dish size and dish-reflector spacing "feed" losses (system gain-feed antenna gain) can be made small. In fact, for some particular system configurations, the gain of the overall system can be greater than that of the feed antenna alone.

Fig. 2 shows the relationship between the effective gain of the antenna system and the distance between the reflector and feed antenna for an elliptical reflector. At first sight, it is not at all obvious how the antenna system can have a higher gain than the feed alone. The reason lies in the fact that, depending on the feed-reflector spacing, the reflector may be in the near field (Fresnel) region of the antenna, the far field (Fraunhoffer) region of the antenna or the transition region between the two. In the far field region, the gain is proportional to the reflector area and inversely proportional to the distance between the feed and reflector. In the near field region, seemingly strange things can happen, such as decreasing gain with decreasing feed-reflector separation. The reason for this gain decrease is that, although the reflector is intercepting more of the energy radiated by the feed, it does not all contribute in-phase at a distant point and so the gain decreases. For those wishing a rigorous mathematical analysis of this type of antenna system, several references are given at the end of this article.

There are some problems with the physical construction of a periscope antenna system. Since the antenna gain of a microwave system is high and, hence, its beamwidth narrow, the reflector must be accurately aligned. If the reflector does not produce a beam that is horizontal, gain will be lost. From the geometry of the system, an angular misalignment of the reflector of X degrees in the vertical plane will result in an angular misalignment of 2X degrees in the vertical alignment of the antenna system pattern. Thus, for a dish pointing straight up (the usual case), the reflector must be at an angle of 45 degrees to the vertical and should not fluctuate due to factors such as wind loading. The reflector itself should be flat to better than 1/10 of the wavelength in use. It may be made of mesh, provided that the holes in the mesh are also less than 1/10 wavelength in diameter. A second problem is getting the support mast to rotate about a truly vertical axis. If the mast is not vertical, the beam will swing up and down as it rotates and the gain will fluctuate. Despite these problems, amateurs have used periscope antennas successfully on the bands through 10 GHz. Periscope antennas are used frequently in commercial service, though usually for point-to-point transmission. Such a commercial system is shown in Fig. 3.

It should also be mentioned that it is possible (though more difficult for amateurs) to construct a periscope antenna system using a parabolically curved reflector. The antenna system can then be regarded as an offset fed parabola. More gain is available from such a system at the added complexity of constructing a parabolically curved reflector, accurate to 1/10 wavelength.

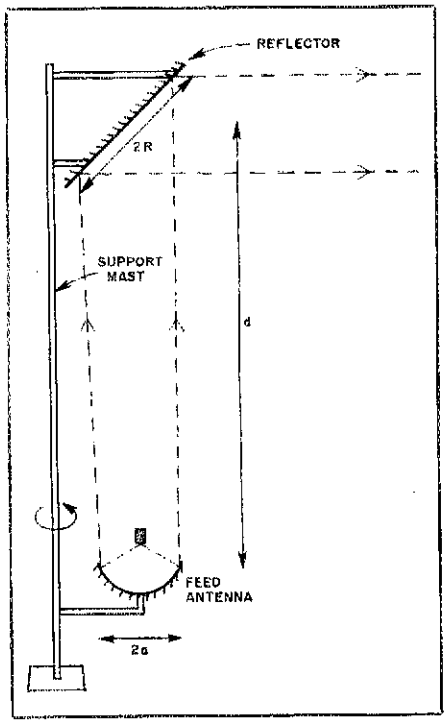


Fig. 1 — The basic periscope antenna, whose design makes it easy to adjust the feed antenna.

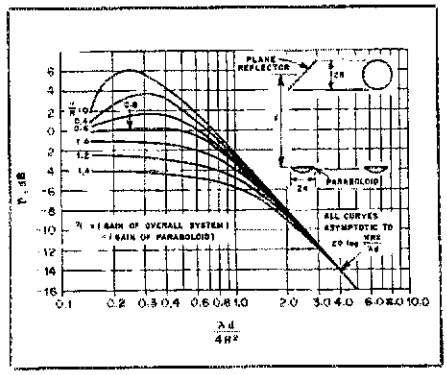


Fig. 2 — Gain of a periscope antenna using a plane reflector (after Jasik, *Antenna Engineering Handbook*, and RSGB *VHF/UHF Manual*).

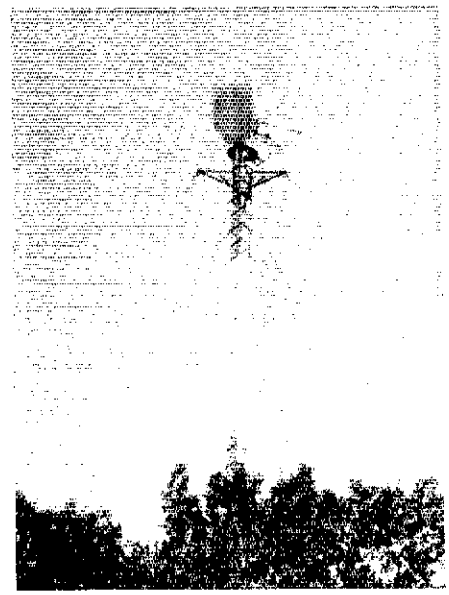


Fig. 3 — Commercial periscope antennas, such as this one, are used often for point-to-point communication.

*103 Division Ave., Millington, NJ 07946

References

Drexler, J. "An experimental study of a microwave periscope." Proc. IRE 42, 1954, p. 1022.

"Greenquist, R. E. and Orlando, A.J. "An Analysis of Passive Reflector Antenna Systems." Proc. IRE 42, 1954, pp. 1173-1178.

Jakes, W. C., Jr. "A Theoretical Study of an Antenna-Reflector Problem." Proc. IRE 41, 1953, pp. 272-274.

IARU News

Conducted By Richard L. Baldwin,* W1RU

What About 10 MHz?

It was over four years ago that we won a slice of the 10-MHz band at WARC-79, and perhaps the passage of time has dulled our recollections of how fragile that victory was.

In 1972 a small committee participating in the U.S. preparations for WARC-79 came to believe that a case could be made for new amateur bands at 10, 18 and 24 MHz. Those goals, among others, were shared with and adopted by the member-societies of IARU, and by the time WARC-79 commenced in Geneva a number of countries had included those bands in their pre-conference position papers. Not an overwhelming number of countries, by any means, but enough to bring the subject up for serious discussion at the conference.

We finally got a 10-MHz allocation from the conference, but only by the skin of our teeth. The chairman of the working group tackling that portion of the spectrum had to test the water with several proposals — for a 100-kHz allocation, for 50 kHz, for amateur primary, for amateur secondary — until he found a combination that was voted on favorably by the conference.

It was a 50-kHz segment, shared with the fixed service, with amateur use to be secondary, that was finally adopted by the conference, and then only by the narrowest of margins. Those of us who were at Geneva in 1979 held our breath as 10.1-10.15 MHz made its way from the allocations working group to the full allocations committee to the final plenary session. We were all very much aware of how close defeat was on a number of occasions.

After WARC-79, prior to actual implementation of the conference decision, there was considerable IARU debate about the projected use of that new band at 10 MHz. It was indeed a special case. It was only 50 kHz wide. It was shared with the fixed service, which includes both civilian and military users of many countries. Amateur use was to be secondary, and on the basis that no interference was to be caused to the primary users. For these reasons, should there be any voluntary restrictions by the amateur service?

Yes, the members of IARU decided. Because of the limited width of the band, only narrowband modes should be used — i.e., CW and RTTY. No phone. Similarly, because the amateur service was secondary and not to cause harmful interference to the primary user, the members of IARU agreed that they ought not to encourage any type of operation that was competitive in nature. Thus, it was agreed not to sponsor contests on 10 MHz or to encourage the crediting of contacts on that band for any form of awards. It was hoped that this restriction would discourage the wild pile-ups that often occur when a rare DXpedition makes its on-the-air appearance.

Do these voluntary, mutually agreed on restrictions please everyone? No, of course not. There has been some pressure for SSB operation on the band, and for the crediting of DX contacts on 10 MHz for DXCC. But IARU's position is still that the practical realities of our allocation at 10 MHz are such that to permit phone operation and/or to permit competitive activities on that band would eventually either jeopardize our existing allocation or make it more difficult to get expanded allocations at a future conference. It is encouraging to note that so far the 120 members of IARU have maintained the integrity of their 10-MHz agreements.

Well, what of the future? Sometime in the next couple of years or so, more amateurs will gain access to the exclusive bands at 18 and 24 MHz, and these will provide new opportunities for contests and awards. Sometime in the next decade or so, there's going to be another General World Administrative Radio Conference, and the members of the ITU will take another look at the allocations table. Surely, one of the IARU goals for that conference will be for expanded privileges at 10 MHz. Maybe a wider slice, maybe an exclusive allocation, maybe both. We think we'll be in a better position to achieve these expanded privileges if in the meantime we have done nothing to violate the terms under which we now occupy the band, terms that clearly specify that we occupy it on a secondary basis and that we are not to cause interference to the primary service.

ADMINISTRATIVE COUNCIL MEETING

The IARU Administrative Council met in Newington, Connecticut over the weekend of November 4 to draft a set of by-laws to accompany the draft constitution that had been prepared during an earlier meeting in Tokyo. The draft constitution and by-laws complete the restructuring of IARU commenced in 1979, and are currently being submitted to the membership of IARU for their consideration.

In very broad terms, the new documents more clearly spell out the goals and objectives of IARU, they establish the role of the Administrative Council in carrying out the policies of the IARU, and they clearly define the responsibility and the authority of the regional organizations. Finally, of course, the new constitution and by-laws recognize that the basic source of inspiration and authority should and does come from the individual member-societies of IARU.

Taking part in the November meeting were G5CO and PA0LOU from Region 1, HK3DEU and YV5BPG from Region 2, JM1UXU and VK3KI from Region 3, along with K1ZZ, W1RU and WØBWJ.

HIGH-FREQUENCY BROADCASTING WARC

Beginning in early January, a team of observers from IARU will be participating in the work of the HF BC WARC taking place in Geneva. Spread over two sessions in 1984 and 1986, the WARC will attempt to develop a plan for the use of the spectrum allocated to the HF broadcasting service. Hopefully, the success of such a plan would reduce the amount of "out-of-band" operation that now takes place. Therefore, it is to the advantage of the Amateur Radio Service for such a plan to succeed. Unfortunately, 11 previous attempts to develop such a plan have met with failure, and even today the number of requirements for channels submitted by the various members of ITU somewhat exceed the number of channel-hours provided by 24-hour days and the increased HF BC allocations of WARC-79.

Participating on behalf of IARU will be G5CO and W1RU. HK3DEU will be available to provide back-up if necessary.

*President, IARU

Mini Directory

As a convenience to our readers, here is a list of items of particular interest and when they most recently appeared in QST.

Advisory Committee Members	Oct. 1982, p. 46	Pending Dockets	Nov. 1983, p. 72
Board Standing Committees (Minute 42)	June 1983, p. 55	QSL Bureaus Incoming	Dec. 1983, p. 74
Call Sign Assignment System	June 1983, p. 61	Outgoing	Sept. 1983, p. 71
International DX Contest Rules	Dec. 1983, p. 95	QSO Party Rules	Dec. 1983, p. 100
January VHF Sweepstakes Rules	Dec. 1983, p. 96	*QST* Abbreviations List	This issue, p. 53
License Renewal Information	This issue, p. 51	Reciprocal-Operating Countries	Nov. 1983, p. 71
Major ARRL Operating Events and Conventions — 1983	This issue, p. 52	Section Emergency Coordinators	Oct. 1983, p. 95
		Third-Party-Traffic Countries	Oct. 1983, p. 91
		U.S. Amateur Frequency and Mode Allocations	This issue, p. 51

YL News and Views

Conducted By Jean Peacor,* K1IJV

Flexibility

The Young Ladies Radio League (YLRL) enters its 45th year on January 1, 1984. Flexibility is the motto for the year, chosen by newly elected president Rose Ellen Bills, N2RE, of Pennsville, New Jersey.

Rose Ellen was first licensed, as WA2FGS, in 1957. In 1971, she upgraded to Extra Class. She has been a most active member of YLRL for 16 years, having served as receiving treasurer, disbursing treasurer, new-member editor for *YL Harmonics* for three years, secretary, and as vice president last year. She is secretary/treasurer of the Second Area Young Ladies Amateur Radio Club (SAYLARC), and serves Pennsylvania-Jersey Young Ladies (PJYL) as secretary and editor of their newsletter. She is an associate member of Buckeye Belles, TASYL, TOTS and CLARA, and is active in several local radio clubs.

Amateur Radio is not Rose Ellen's sole activity. She is a full-time secretary in the Wilmington, Delaware, offices of E. I. DuPont de Nemours & Company. When time permits, she can be found square dancing, bike riding, swimming, walking or playing the piano or organ. She enjoys craft work, and recently finished a quilt. In other words, Rose Ellen is a busy person. YLRL's 45th year will be exciting under her direction.

Rose Ellen Bills, N2RE

Officers who will serve with Rose Ellen are: Vice President Marilyn Backys, WB9TDR; Secretary Jeanette Ellis, WO4U; Disbursing Treasurer Karla Holmes, WA1UVJ; Receiving Treasurers (Districts 1, 2, 3, 4) Barbara Robinson, WB1ACA, (Districts 5, 6, 7) Mary Lou Brown, N7DHA, (Districts 8, 9, 10, KH6, KL7, VE) Becky Skinner, KA9GWE; District Chairmen — (1) no candidate; (2) Minerva Fronhofer, WB2JNL; (3) Betsy Robinson, WB3FQH; (4) Carol Shrader, WI4K; (5) Billie Hill, WB5YLI; (6) Jo Anne Dow, WA6ZGM; (7) Beulah Barrick, W6NLM/7; (8) Eila Russell, WA8EBS; (9) Adah Elliott, W9RTH; (10) Marjorie Tiritilli, KBØZC; (KH6) no candidate; (KL7) Betty Marsh, KL7FJW; (VE) Thelma Woodhouse, VE3CLT.

All licensed YLs are welcome to join YLRL. Further information may be obtained by writing to N2RE, 17 Craig Pl., Pennsville, NJ 08070.

MICHIGAN AMATEUR RADIO LADY OF THE YEAR

The Michigan Amateur Radio Lady of the Year Award is presented each year at the ARRL state convention in Muskegon, Michigan, by the Section Manager. The recipient for 1982 is Aileen Gagnon, WA8DHB, of Gladstone, Michigan.

Aileen has been a very active member of the Amateur Radio community since she was first licensed in 1962. Her particular area of interest is public-service communications, and she is highly involved in various aspects of the National Traffic System. Aileen is an Assistant Section Manager for Michigan's Upper Peninsula, an Official Relay Station, Net Manager of the Upper Peninsula Net, and a member of TASYL, UPYL and MACS nets. She is also a member and Net Control for MITN, and is active on the Michigan Amateur Traffic Workshop. Active in Emergency Communications, she serves as Net Control for the Upper Peninsula ARES Net, and is a prime organizer for net activities during the SET.

Aileen has received two certificates of merit from ARRL, is a past-president of the Delta County Amateur Radio Society, and is a member of the local repeater association. During her very rare spare moments, she keeps a constantly updated card file of all Upper Peninsula hams, used in printing an annual *Upper Peninsula Ham Directory*.

Aileen is a busy housewife, and she and her OM Mel have one of the outstanding vegetable gardens in Delta County. Congratulations to Michigan's Radio Lady of 1982.

Aileen Gagnon, WA8DHB

AVIATION HONOR AWARD — 99s

Mildred Doremus, 1983

Millie Doremus, W1SVN, of Lynnfield, Massachusetts, was recently named Woman of the Year by the New England Division of the International Women Pilots Association in recognition of her many contributions over the years to the field of aviation. This association was founded by Amelia Earhart and is known as the "99," as there were 99 women pilots present at its inception.

Millie's name is now inscribed on their traveling plaque, which will be in her possession for a year. She was presented an Amelia Earhart Bronze Medal that bears a picture of Earhart and her plane on the front and has the honor award inscription to Millie on the reverse side.

Millie learned to fly in 1958 and has been a member since 1962 of 99s, in which she has served on most committees and in many offices. She has flown in many All Woman New England Air Races (AWNEARs). Through her many Amateur Radio contacts, Millie has arranged for ham radio coverage for many rally flyovers.

A licensed radio amateur since 1950, Millie is a charter member of Women Radio Operators of New England (WRONE), and is an active member of the North Shore Repeater Association. Congratulations to another of Amateur Radio's exciting YLs.

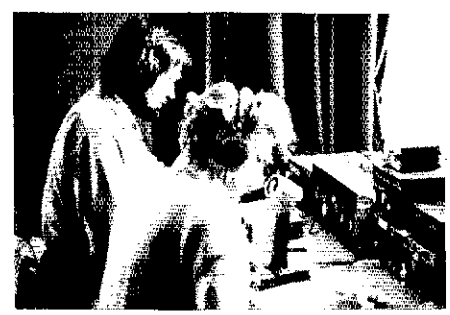
The Texas YL Round-Up Net (TYLRUN) celebrated its 29th birthday in Dallas, Texas, in September 1983. The net meets on 3.942 MHz, Thursdays at 1300 UTC. Back row (l-r): WB5FGM, WB5ELG, W5MWK, N5FFB, W6QGX, W5ZPD, KJ5C and a guest. Front row (l-r): K5MPI, K5DLI, W5YKE, K5BNQ and N5DXD.

ELLA GRINDELL, DK9ZL

Ella Grindell, DK9ZL, and her OM, Vasek, DL4FF, of Frankfurt, Germany, are enjoying having more time for Amateur Radio in retirement. All of their operating hasn't been from Frankfurt.

Ella and Vasek operated the last two weeks of October 1982 from the Isle of Man as GD5EOO and GD5BLG, with Stefan (DF7FH) as GD5CGV. In March 1983, they operated from Guernsey as GU5EOO and GU5BLG. To get there, they journeyed through beautiful Jersey, where they operated as GJ5EOO and GJ5BLG. During this time, they participated in the WPX contest, logging 8000 QSOs. Ella shared in 2800 of these. A return trip to the Isle of Man was scheduled for November 1983.

Ella is a member of YLRL and the South African Women's Radio Club. She looks forward to many more QSOs while DXpeditioning. Look for her Wednesdays at 1400 or 1500 UTC on 28.805 or 21.388 MHz when German YLs listen for U.S. YLs.



Vasek and Ella Grindell, DL4FF and DK9ZL.

*Country Club Dr., Monson, MA 01057

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

DOC Examinations, Eh?

No, no one took off. In fact they came together, in Ottawa on October 29, to meet with DOC and review some 350 questions in the DOC questions bank.

There was a real need for this meeting. For over two years, amateurs have complained about DOC examinations. Many of the complaints were justified. Some examinations had questions about phase-locked loops or three-terminal voltage regulators or the characteristics of an ideal op amp: material not even hinted at in TRC-24. Some had questions so difficult you almost needed a degree in higher mathematics to get the answer. Others had questions so poorly worded you could only guess at the intent.

Tom Atkins, VE3CDM, Harry MacLean, VE3GRO, and Ray Perrin, VE3FN, represented CRRL. CARF sent Art Blick, VE3AHU, and Ron Walsh, VE3IDW. Gerry Wintermeyer and four others from DOC rounded out the group.

Back in September, at CRRL request, DOC released copies of the questions bank to CRRL and CARF. CRRL sent its copies to workers in Vancouver, London, Toronto and Ottawa. These workers included experienced Amateur Radio instructors, electrical and electronic engineers, technical writers and professional educators — all active, concerned amateurs. Their comments were complied into a single document that formed the basis for much of the discussion at the Ottawa meeting.

Here's the group that reviewed the DOC questions bank (l-r): VE3AHU and VE3IDW from CARF, Gerry Wintermeyer from DOC, CRRL President VE3CDM, Glen Pilley and Fern Rachaine from DOC, and CRRL Ontario Director VE3FN. Not shown: VE3GRO, who took the picture.

What happened at that meeting? It was a marathon session running from 9 A.M. to 7 P.M., with only a short break for lunch. Somehow, the group managed to do justice to all 350 questions. About 20% of the questions were retained without change. Questions not related to material in the new TRC-24 and unduly difficult questions were simply deleted. Many questions were improved. In some cases, suggested answers were improved. As a result, Canadian amateurs can expect some very fair examinations in the future.

Any hot tips for those about to write? Not really. We can tell you that AM double sideband is not specifically mentioned in the new TRC-24. There won't be too many questions of this once-popular mode. You won't have to come to examinations armed with a scientific calculator or a set of log tables. Questions that needed that kind of math are gone. If you can substitute into formulae, do operations with decimals and solve square roots, you'll be just fine. And finally, you won't be asked to draw diagrams. Instead you'll be given diagrams, usually the ones in TRC-24, and asked to explain what's going on.

At this meeting, DOC accepted an unprecedented amount of input from the amateurs. So now if you have a complaint about examinations, you really complain to CRRL or CARF, right? Hey, take off, eh. The amateur organizations just helped with the questions! The ultimate responsibility for Amateur Radio examinations still rests with DOC.

CRRL NEWS

☐ CRRL is looking for new questions for DOC examinations. Have some ideas? Pass them along. All questions received will be reviewed by a panel of amateurs and, if approved, forwarded to DOC for inclusion in their questions bank. Speaking of exams, they will be held across Canada February 8 (date was listed incorrectly in the December column). Apply to DOC before January 11.

☐ Several amateurs and Amateur Radio groups have asked CRRL to ask DOC to reinstate RTTY operation in at least part of the 7.05-7.1 MHz portion of the 40-metre band. CRRL did ask for this about two years ago, but there was no follow-through. A new request is being prepared. The idea is that almost all non-Canadian RTTY operation is centred on 7.09 MHz, and Canadians ought to be able to work the stations that are there. CRRL is also asking DOC to eliminate the need for cw identification after RTTY transmissions, particularly those using ASCII or the Baudot code.

☐ CRRL discussions with CCTA, the Canadian Cable Television Association, seem to be paying off. Two of that association's recent publications warned of interference through leakage and specifically mentioned Amateur Radio. Cable companies were told: "The message is clear. We either comply with the rules or face the possibility of losing spectrum." At presstime, representatives of CRRL, CCTA and DOC were planning to meet to discuss solutions. CRRL did invite CARF to take part in this meeting.

☐ New versions of the CRRL *Canadian Amateur Radio Licensing Manual* and the CRRL *Questions and Answers Book*, to conform with the revised new TRC-24, are in the works. There is a good possibility that CRRL will be producing French versions as well.

*163 Meridene Crescent West, London, ON N5X 1G3, Tel. 519-433-1198

SECTION MANAGER ELECTION NOTICE

To all CRRL members in the Manitoba Section: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. The name of the incumbent is listed on page 8 of this *QST*. A petition, to be valid, must contain the signatures of five or more full League members residing in the Manitoba Section. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on the petition*. It is advisable to have more than five signatures.

Petition forms (CD-129-C) are available from the CRRL Headquarters office, but are not required. The following form is suggested:

(place and date)

The Secretary, CRRL
Box 7009, Station E
London, ON N5Y 4J9

We, the undersigned full members of the League residing in the Manitoba Section hereby nominate ... as Section Manager for this section for the next two-year term of office. (Signatures ... Calls ... Addresses, including postal codes.)

The Section Manager candidate must have been a member of the League for a continuous term of at least two years and a licensed amateur holding a Canadian Amateur certificate immediately prior to the receipt of petition at the CRRL Headquarters office.

Petitions must be received at the CRRL Headquarters office on or before 5:30 P.M., Eastern Local Time, March 9, 1984. If more than one valid petition is received, a balloted election will take place. Ballots will be mailed from the CRRL Headquarters office on or before April 2, 1984. Returns will be counted on May 22, 1984. A Section Manager elected as a result of this procedure will take office on July 1, 1984, and serve for two years.

If only one valid petition is received, the person nominated will be declared elected without opposition.

If no petitions are received by the specified closing date, the Manitoba Section will be resolicited in July 1984 *QST*. A Section Manager elected after resolicitation will serve for 18 months.

Vacancies in any Section Manager office between elections will be filled by the CRRL Secretary acting on the advice of the CRRL Board.

You are urged to take the initiative and file a nominating petition immediately.

Harry MacLean, VE3GRO
CRRL Secretary

BANNED COUNTRIES, THIRD-PARTY AND RECIPROCAL-OPERATING AGREEMENTS

The following countries forbid radio communications with amateur stations under their jurisdiction: Burma, Iraq, Libya, Pakistan, Somalia and Zaire.

Canada has third-party-traffic agreements with the following: Australia, Bolivia, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, El Salvador, Guatemala, Guyana, Haiti, Honduras, Israel, Jamaica, Mexico, Nicaragua, Paraguay, Peru, Trinidad and Tobago, United States, Uruguay and Venezuela.

Canada has reciprocal-operating agreements with the following: Australia, Austria, Barbados, Belgium, Bermuda, Botswana, Brazil, Chile, Colombia, Costa Rica, Denmark, Dominica, Dominican Republic, Ecuador, Finland, France, Germany (Fed. Rep. of), Greece, Guatemala, Haiti, Honduras, Iceland, India, Indonesia, Ireland, Israel, Italy, Jamaica, Luxembourg, Malta, Netherlands, New Zealand, Nicaragua, Norway, Panama, Papua New Guinea, Peru, Philippines, Poland, Portugal, Saint Lucia, Senegal, Sweden, Switzerland, United Kingdom, United States, Uruguay, Venezuela and Yugoslavia.

Club Corner

Conducted By Sally O'Dell,* KB1O

THE ELECTRONIC CLUB

I recently saw a cartoon that showed a fellow sitting on a park bench, obviously down on his luck. Two passersby were commenting on this poor chap; it seems he was brilliant in high tech, but took a long vacation and fell too far behind in his field.

After reading it, I couldn't help but think how close to the truth this really was. Judging from complaints I hear about the amount of reading people in the industry have, just to keep pace with new ideas and innovations, my suspicions seem well-founded. How can the average individual who is not employed in the electronics industry hope to keep up with technology?

Consider Radio Clubs

For the moment, let's consider what radio clubs can do for us. Notice I used the plural, indicating more than one club. Few clubs, if any, have memberships large enough to be versed in all areas of technology. To overcome this problem, we could conceivably create a "pipeline" to carry information among clubs. Lately, we've heard a lot of talk about the various methods of electronic communication. Experts predict that within the next 20 years, over half the country will be able to send and receive mail electronically. Some consider that a conservative estimate, but one thing is for certain: We are on the threshold of a new and exciting era of interactive communications.

If we take this "electronic mail" concept and apply it to the club-pipeline theory mentioned earlier, we could create a new vehicle for communicating information to radio clubs. Ideally, this pipeline of information would funnel data to a computer, from which it could then be retrieved by many clubs at some future date. Of course, computer enthusiasts have been doing this for some time, and the results are encouraging.

Historically, Amateur Radio operators have used all the methods of communicating available to them to enhance the art of communications. If this trend is to continue, we should consider all avenues open to us. Literally hundreds of bulletin boards are being used across the country, yet only a handful are dedicated to Amateur Radio. We are lacking in this area and need to establish a similar service for our hobby. The advantages are tremendous! With a bulletin board, if a sked with a friend is missed, the band is poor or the neighbors are complaining of TVI, a message can be left to be picked up later. Of course, this implies some type of bulletin board for national use.

Fortunately, one such service does exist. The HamNet Special Interest Group, which is accessed through the CompuServe Information Service (a local phone number in most areas), is dedicated to Amateur Radio. HamNet is probably one of the better known bulletin boards devoted to our hobby. In addition to its ability to store messages, it also allows for on-line interactive conferences. Now that the winter months are upon us, think how nice this facility would be, especially for those located in the snow belt. No more canceled or missed meetings because of bad weather. A club could hold a meeting via a similar local system. If several other clubs or club councils wished to hold a joint meeting, a system such as HamNet would be ideal.

This past November, ARRL Hq. staff presented a discussion on the Volunteer Exam program. Amateurs and nonamateurs from coast to coast participated in this hour-long session on the HamNet system. This is but one example of how we can use new methods of communicating. What are the other possibilities? Perhaps representatives of several different clubs across the country could meet and exchange ideas and information. How about a meeting of all clubs in a Section, or Division! And not a single club would have to leave its local area.

Of course we *are* hams, and the ability to transmit information on radio frequencies is what sets us apart. Packet radio repeaters now permit hams in several areas of the country to access local computer-based message systems (CBMS) and do much, much more — over the air! The surprisingly not-so-distant future will bring a proliferation of such systems as the cost of equipment drops. For now, however, the landline networks let you get involved immediately.

Which club will be the first to sponsor such a historic event? If your organization is thinking along similar lines or has other ideas on the subject, drop a note to the Club Branch at ARRL Hq. We'd like to hear from you. — *Ed Raso, WA2FTC, Assistant Club Program Manager, ARRL*

*Club Program Manager, ARRL

SSC Kudos and Contacts

Congratulations to the League's newest Special Service Clubs. These clubs are recognized for extended efforts on behalf of Amateur Radio and service to their communities. For further information on these clubs, contact them at these addresses.

Bergen Amateur Radio Association, Inc.
c/o P.O. Box 402
Glen Rock, NJ 07452
Club membership — 168

Central Georgia Amateur Radio Club
c/o P.O. Box 2242
Warner Robins, GA 31093
Club membership — 108

Egyptian Radio Club, Inc.
c/o P.O. Box 562
Granite City, IL 62040
Club membership — 131

Hoodview Amateur Radio Club
c/o P.O. Box 20824
Portland, OR 97220
Club membership — 137

Jacksonville Range Association, Inc.
c/o P.O. Box 10623
Jacksonville, FL 32207
Club membership — 205

Newport County Radio Club
c/o 18 Market Sq.
Newport, RI 02840
Club membership — 66

Oregon Tualatin Valley ARC
c/o P.O. Box 5132
Beaverton, OR 97006
Club membership — 190

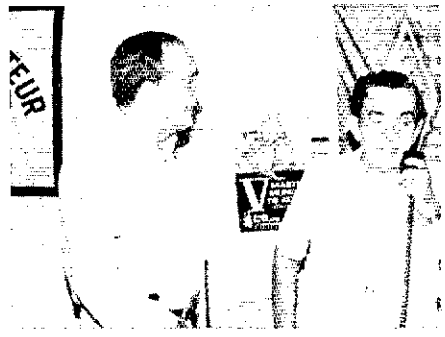
Ozone Amateur Radio Club
c/o P.O. Box 553
Slidell, LA 70459
Club membership — 38

Pike County Amateur Radio Club
c/o 207 Mariah St.
Winslow, IN 47598
Club membership — 40

Poughkeepsie Amateur Radio Club
c/o 11 Phyllis Dr.
Wappingers Falls, NY 12590
Club membership — 85

Story County Amateur Radio Club
c/o RR 1
Ames, IA 50010
Club membership — 55

Theodore Roosevelt ARC
c/o 271 Allen St.
Dickinson, ND 58601
Club membership — 23



Secretary Fredie Alvarez, NP4CF (left), and President Manuel Reyna-Fernandez, KP4ABN, of the Puerto Rico ARC (San Juan) assisted with communications during the fifth world veterans championships in September. The club also passed messages for the more than 5000 athletes and their families. *(photo courtesy WP4CFX)*

Special Events

Conducted By Edith Holsopple,* KA1KRQ

Issaquah, Washington: Issaquah ARC will sponsor the Rats Nest and Crooked Stick contest from 2100Z *Jan. 8* until 0100Z *Jan. 9*. Frequencies: 21.060 21.200 for CW, and 21.350 21.450 for phone. A 100-foot wire at 20 feet in the air is required for participation. A Rat Catcher certificate is available to stations contacting three IARC members during the contest. Certificate via KB7NV, 6822-131st Ave., S.E., Bellevue, WA 98006.

Sunrise, Florida: The Radio America Group will celebrate its fourth annual picnic at Markham Park from 1200Z *Jan. 14* until 0400Z *Jan. 15*. Frequencies: 7.293 14.228 21.375 28.655 29.28 (FM). Certificate for working the field station. Certificate via Radio America, P.O. Box 25405, Tamarac, FL 33320.

Jamaica, New York: The Hall of Science ARC will operate two stations to celebrate their 11th anniversary on *Jan. 15* from 1400 to 2300Z. WB2JSM will be on CW in the first 25 kHz of the Novice bands, and WB2ZZO will operate SSB in the first 25 kHz of the General phone bands. Certificate for working either station via HOSARC, P.O. Box 131, Jamaica, NY 11415.

Apache Junction, Arizona: Superstition ARC will operate WB7TJD 10 kHz up from the low end of the Novice and General band edges (40-10 meters) 1500-2300Z *January 27-28* to commemorate Lost Dutchman Days. Certificate via SARC, P.O. Box 1551, Apache Junction, AZ 85220.

Punxsutawney, Pennsylvania: Punxsutawney ARC will commemorate Groundhog Day, *Jan. 29*, on 7.230 and 14.290 MHz, 1500-2200Z. Certificate via WB3GAD, RD 6, Box 211, Punxsutawney, PA 15767.

Marshall Islands: The Kwajalein ARC, KX6BU, will operate from Jan. 28 to Feb. 5 to commemorate the 40th anniversary of the Battle of Kwajalein and Roi-Namur. Frequencies will be the General CW and SSB portions of 80-10 meters. Certificate and QSL via KARC, P.O. Box 444, APO San Francisco, CA 96555.

Note: The deadline for *receipt* of items for this column is the 15th of the second month preceding publication date. For example, your information would have to reach Hq. by February 15 to make the April issue.

*Communications Assistant, ARRL

Hamfest Calendar

By Marjorie C. Tenney,* WB1FSN

†**Florida: (Sarasota) — Jan. 14-15:** The 5th Annual Sarasota Hamfest, sponsored by the Sarasota ARA, will be held at the Exhibition Hall, 801 N. Tamiami Trail (U.S. 41), 8:30 A.M. to 4:30 P.M. Sat. and 8:30 A.M. to 3 P.M. Sun. Donation covers two days; $3 in advance, $4 at the door. Cost for tables for two days, $12, includes door donation; no one-day tables. Advance reservations requested. Talk-in on 31/91 primary, 13/73 secondary. For advance tickets, booths and tables, contact Dave Johnson, Jr., W4CCR, 2619 Forest La., Sarasota, FL 33581, tel. 813-924-2525, or Sarasota Hamfest, P.O. Box 3182, Sarasota, FL 33578.

†**Florida: (Miami) — Feb. 4-5:** The Tropical Hamboree/ARRL Hamfest of the Americas, sponsored by the Dade RC, Inc., will be held at the Flagler Dog Track, 9 A.M. to 5 P.M. Sat. and 9 A.M. to 4 P.M. Sunday. Swap tables $14 in advance, $16 at door. Advance admission $4; at the door $5. Advance ticket and table deadline is Jan. 31. Technical forums, DX forum and dinner, ARRL programs, RTTY forum, FCC exams, organizational meetings, new product exhibits, Hamboree dealer specials, personal computer forum, mammoth swap shop, QCWA Hospitality Corner, International displays and programs. Special Hamboree hotel rates: $47 single, $49 double. Hotel reservation card available upon request. Free overnight parking for self-contained RVs at Hamboree site. Talk-in on 16/76 and 81/21. For information and reservations, write to or call Evelyn Gauzens, W4WYR, Chairman, 2780 N.W. 3 St., Miami, FL 33125, tel. 305-642-4139. For brochure, write to Dade Radio Club, Inc., P.O. Box 350045, Miami, FL 33135-0045.

†**Illinois (Arlington Heights) — Jan. 29:** The Wheaton Community Radio Amateurs annual Wheaton Hamfest will be held at Arlington Park EXPO Center on Jan 29, from 8 A.M. to 4 P.M. Admission is $3 in advance, $4 at the door. Technical forums, dealers, swap and shop. For advance reservations and further information, call 312-231-7497. Talk-in on 01/61.

†**Louisiana (Hammond) — Jan. 21:** The Southeastern LA University ARC will sponsor the Hammond Hamfest on Sat., Jan. 21, from 9 A.M. to 3 P.M., in the Men's Gym and East Side Cafeteria at the University. No admission charge. Women's activities, forums, swap and shop, dealers. Tables supplied at no charge, limit of one table per seller. Refreshments, noon meal. Talk-in on 146.40/147.00. For further information, write to SLUARC, Box 1324, Hammond, LA 70402.

Michigan (Traverse City) — Feb. 11: The Cherryland ARC announces its 11th Annual Swap-N-Shop, at the Immaculate Conception Elementary School gymnasium, 218 Vine St., from 8 A.M. to 2:30 P.M. Table set-up at 6:30 A.M. Tables $3 each; admission $2.50. Talk-in on 25/85. For details, send s.a.s.e. to Jerry Cermak, K8YVU, 3905 Slusher Rd., Traverse City, MI 49684, tel. 616-947-4848.

Nevada (Las Vegas) — Jan. 12-15: SAROC, annual prestige convention hosted by the Southern Nevada ARC, Inc., will be held at the Hacienda Resort Hotel. SAROC room rate $35 (plus 50¢ for telephone), single or double occupancy, per night, plus tax; call 1-800-634-6713. Included with advance registration ($17 per person): technical sessions and exhibits on Friday and Saturday, coupon for cocktail party (for adults only) on Friday hosted by *Ham Radio*, awards and women's program on Saturday, one each breakfast or brunch on Saturday and Sunday, one *free swap table* for noncommercial guest on Friday and Saturday. QSL with check to SAROC, POB 945, Boulder City, NV 89005-0945.

New York (Yonkers) — Jan. 22: Come to the Yonkers Electronics Auction, sponsored by the Yonkers ARC, at Lempko Hall, 556 Yonkers Ave., from 9 A.M. to 3 P.M. Inspection from 9 to 10 A.M.; auction starts 10 A.M. sharp. Hams and computer enthusiasts: new and used equipment "put on the block." Plenty of seats and parking. Unlimited free coffee all day. Admission: $3 each — buyer and seller. Children under 8 free. Club commission on successful sales only: 10% on first $100, 5% on remainder. Talk-in on 146.265/146.865 and on 52. For information: YARC, 53 Hayward St., Yonkers, NY 10704, tel. 914-969-1053.

Virginia (Richmond) — Jan. 15: FROSTFEST '84, Amateur Radio and Computer Festival, will be held from 8 A.M. to 4 P.M. at the Virginia State Fairgrounds. Booths for exhibitors reduced from last year. Flea market spaces $3 (tables may be rented for $3.50). General admission $4. Everything indoors in heated building. Available Saturday at 1 P.M. Security guard all night. Trucks may be unloaded inside building until 11 P.M. Doors open again for exhibitors at 6 A.M. Call Bill Scruggs, N4DDM, tel. 804-272-8206, or write to Richmond Frostfest, P.O. Box 1070, Richmond, VA 23208. Novice exams will be given by KX4Y. Talk-in on 28/88, 34/94 and 144.83/145.43.

[Attention those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in *QST* of prizes of any kind and games of chance such as bingo.]

Note: Sponsors of large gatherings should check with League Hq. for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance. QST

†ARRL Hamfest

*Convention/Travel Coordinator, ARRL

Coming Conventions

February 25-26, 1984
Ohio State, Sharonville (Cincinnati)

March 10-11, 1984
Florida State, Orlando

March 17-18, 1984
North Carolina State, Charlotte

March 30-April 1
Midwest Division, Kearney, Nebraska

ARRL NATIONAL CONVENTIONS

July 20-22, 1984
New York, New York

October 4-6, 1985
Louisville, Kentucky

September 5-7, 1986
San Diego, California

In Training

Conducted By Jonathan Towle,* WB1DNL

R_x: TRAFFIC HANDLING

Tired of listening to random code groups? Given up chasing across the Novice bands for signal and weather reports? Traffic handling may be just what the doctor ordered!

Traffic nets are a great way to increase your code speed, while learning net procedures. In fact, handling traffic was the basis for the formation of the ARRL, and remains a principal operating activity of many amateurs.

The main focus of a traffic net is to convey accurate information. It is perhaps not as much fun as working your 50th state or 100th country, but certainly is more realistic and enjoyable than listening to your code practice tape over and over again.

Instructors

Our task as good instructors is to teach more than the answers to a few select questions. We want skilled amateurs who are courteous to their fellow operators and who can be effective communicators when necessary. Remember: Today's students will be tomorrow's QRM if we don't take the time to teach the proper techniques.

Amateur Radio is a unique hobby. But sometimes it's hard to know where to start with so many different ways to participate. We want to teach students how to get the most out of their ham tickets. Traffic handling will not fulfill all of the operating needs of all your students, but it may provide the incentive to explore new techniques.

We are sure that not everybody will want to spend all their operating time handling traffic. But if we can demystify this particular part of our hobby and get people to try it, then we will have succeeded in helping to sustain a valuable part of the Amateur Radio Service. And even if few go on to daily participation in the National Traffic System, each will have learned a valuable skill that all hams should master.

Instead of sending code practice at your next class meeting, try setting up a student traffic net in your classroom. Have your students bring their code-practice oscillators to class. Then, assign each a call sign and have them relay formal messages around the room. Students will find that practicing their newly learned Morse code skill through handling traffic — where the objective is getting accurate information and not simply repetition — is a lot of fun. In this case, you'll find that more fun equals better performance.

Students, et al.

If you are tired of exchanging signal reports, why not check into a slow-speed traffic net? Spend your operating time improving your code speed, meeting new friends and learning new skills. You can learn more about net frequencies and procedures from the ARRL Communications Department by requesting these informative operating aids: *Operating an Amateur Radio Station*, *Public Service Communications Manual* and *The ARRL Net Directory*. *OARS* and *PSCM* are available to ARRL members for a large (9 × 12 in) s.a.s.e. with 54 cents postage each or 88 cents postage for the *Net Directory*. For your general operating needs, we recommend *The ARRL Operating Manual* ($5). Your Section Manager (see page 8 in any *QST*) can also provide you with net frequencies in your area.

Every licensed ham should know the proper way to pass traffic. A valuable skill that may not be part of your normal activities on the amateur bands — correct, efficient, effective traffic handling — may be the only means of communicating with the outside world if conventional lines of communication are down. The Training Branch hopes you will explore this aspect of Amateur Radio. One good place to get started is on your local traffic net. QSL? QST

*ARRL Training Program Manager

Correspondence

Conducted By Peter R. O'Dell,* KB1N

GRENADA

☐ News reporters are not permitted to use amateur radio to conduct interviews. That is construed by the FCC as "business." I would suggest that the time has come for a change in the rules when amateur radio is the only way to get information on a situation that is in the public interest . . . That *news dissemination* is a *public service* and amateur radio is a *service-oriented* licensing of frequencies. As an amateur for 50 years and a professional news broadcaster for more than 40, I tried to get in on Mark's frequency to request simple reports from time to time. Networks and stations are permitted *to listen and to broadcast* such material. I was waved off, told the frequency was closed to newsmen. The net controllers refused to shift frequency to discuss the matter.

After several frustrating hours of waiting, while no information was being passed and the Grenada frequency was unused but protected, for the most part, a coordinating frequency was established, with ARRL sanction we were told. It worked. Net control W4PPC acknowledged my call and described the net, and a request was passed on to KA2ORK for a day's end report.

Mark complied with a brilliant roundup. Things were quiet, he said, and the military commander had told him that there had been no civilian casualties.

That was the news that made the networks, wire services and local stations that night, and it was the news that anxious relatives and friends had been waiting for.

It was public service of the finest kind, delivered by the *Amateur Radio Service.* — *Roy Neal, K6DUE, Burbank, California*

IT SEEMS TO THEM

☐ I just finished reading your It Seems To Us column in the November '83 *QST*. After being a ham almost 18 years and an ARRL member a majority of that time, I have finally been moved to the point of writing a brief letter. I wholeheartedly agree with the entire content of your article, and sincerely hope that this reflects the attitude of the bulk of our ham population. So Dave, keep me inspired and keep writing those "moving" articles, Hi. — *Harold D. Dale, WB4AEG, Adairsville, Georgia*

☐ Amen! I started about the same time you did and had a tenth-hand DX-20 and an old WW II receiver with a dipole! I am amazed at the gear required by new Novices today . . . — *Glenn R. Kurzenknabe, K3SWZ, New Cumberland, Pennsylvania*

☐ I read with interest David Sumner's comments in It Seems to Us . . . Dave has some valid points. However, he failed to point out that many in our ranks need to be reeducated in ethics and niceties of communicating with each other.

You think it doesn't turn a youngster off when a California Kilowatt with gain so high a monitor scope does flip-flops comes on 1 kc below a QSO or net already in operation and, asked to move, hears the snide remark ". . . you must be using a Cracker Box for a receiver . . ."? This is generally followed by a lecture on how *he* can operate on sideband with 1 kc separation ad infinitum, ad nauseum. Not a few of these remarks come from a class of calls generally associated with a 50-year ham who should know better.

Is it any wonder so many new hams are dropping out? Be proud of your station. But like politics and religion, don't put the other guy's gear down. — *Harry Brundridge, KBØTD, Hermitage, Missouri*

SOME LIKE US, SOME DON'T

☐ "The Personal Computer," November 1983 *QST*, pg. 11, to me was worth the entire cost of one year's subscription to *QST*. You took the mystery out of computers: Too many people think by buying a cheap computer it can do *everything*. I hope you follow up on this story. You saved me a lot of money. Otherwise, I would be playing those stupid games like you see on TV. Thank you. — *Fred A. Ettari, W8BYG, Oakwood Village, Ohio*

☐ Please restructure *QST*. Nobody really cares how much traffic was passed or who upgraded beyond the locals, and they knew two months before *QST* anyway. — *Brett J. Halpin, WA2VZW, Riverdale, New Jersey*

IT MAKES YOU WONDER

☐ The comment (Oct. '83) by K9SB about his encounter with a "code butcher" reminds me of a similar QSO I had about 30 years ago. I was talking to another ham who had the worst fist that I had ever heard, and I suggested that he do some off-the-air practice. He wasn't too pleased with my comments. He told me that his paralysis was 95% and that he could just manage to work his key.

I sometimes remember that QSO when I hear K9SB's "butchers." — *Jim Roux, W4YA, Clearwater, Florida*

AMATEURS OR HAMS? WHICH IS BETTER?

☐ Oh, how I winced when I heard you describe today on National Public Radio how "hams" were relaying messages to and from Grenada. I always think of our brethren as "radio amateurs" as in ". . . Of, by, and for the . . ."

For me, "ham operator," "ham radio," "radio ham," "shortwave ham" and phrases of that ilk conjure up an image of some unkempt, uncouth, socially backward dullard who interferes with all the television sets in the neighborhood. It may have been an adequate name for our hobby way back when, but given our current sophistication, I would hope we could shed the "ham" image and move up to something a little more positive; "radio amateur" sounds a lot better to me. — *James Hebert, K8SS, Livonia, Michigan*

AMTOR

☐ I would like to thank the ARRL staff for instituting transmission of ARRL bulletins by W1AW using the AMTOR teleprinter code. I am tremendously pleased with the improvement of print quality of the transmissions received at my station during the past month or so. Removing the errors sure makes a difference!

I and many of the other amateurs who make use of AMTOR are pleased to see the ARRL quickly respond to the members' request to add these transmissions. I hope that necessary schedule changes have not adversely affected other users of your services. Thanks again. — *Paul Newland, AD7I, Holmdel, New Jersey*

A HOME FOR HAMS

☐ Here at Moorings Park, in beautiful Naples, Florida, we have the answer to Marilyn Agnew's problem posed in her letter captioned "Ham Retirement Home" in the November issue.

Her father is typical of many thousands of hams, either retired or approaching retirement, who wish to continue to pursue our hobby in a retirement community. I had the same problem before we discovered Moorings Park, where we have four licensed hams with a radio shack on the seventh floor of a tower building, an antenna on the roof — I should say antennas, for there are several — four high-frequency rigs and two VHF.

We have just completed an Open House to acquaint the other residents of Moorings Park with amateur radio, both as an emergency public service and as a hobby. As a result, five more potential hams who are residents of Moorings Park have indicated their intention to work toward their license.

Do you know of any other retirement communities where amateur radio is not only permitted but actually encouraged? This is the only one of which I am aware. — *Robert F. Weinig, K4FZ, Naples, Florida*

OUR BEST SERVICE?

☐ I am writing this to show my appreciation for the ham radio operator. I have a son in Beirut, Lebanon, and word got out he was okay. A ham operator in West Virginia got the message and called me on Tuesday, October 25.

In all the excitement I forgot his name. Later that evening, I got another call from a ham in Wyandotte, Michigan. He also was relaying the message.

I work with a ham operator, and was telling him of this good news and good work. This is how I got your name and address.

I hope the two fellows will somehow see or hear from this letter and know of my thanks and appreciation. And to all the hams: They're doing a fine job. — *Robert J. Young, Dearborn, Michigan*

*Public Information Coordinator, ARRL

Silent Keys

It is with deep regret that we record the passing of these amateurs:

KA1AQW, John Scanlan, Manchester, NH
W1BCP, John Casey, Sr., Dover, NH
WB1CCR, Raymond P. Ely, Willimantic, CT
W1CEG, Harold M. McKean, New Britain, CT
K1DXX, Ridgeley B. Underwood, North Andover, MA
WB1FLZ, Ursula C. Dickman, Beverly, MA
K1JDA, Herbert S. Merrill, Falmouth, ME
KA1TU, John J. Wood, Jr., Leicester, MA
W1VGL, Frederic C. Warner, Bethel, CT
W1VIS, Perry J. Hodgkins, Winthrop, MA
W1WB, Edward B. Halton, Providence, RI
*W2AOS, Charles E. Biele, Myrtle Beach, SC
W2BBS, William Peuser, College Point, NY
K2CFU, Carl Clunn, Kenvil, NJ
W2CHI, William Fairclough, Blairstown, NJ
W2EDR, James J. Dillon, Staten Island, NY
W2GUJ, Jack L. Berliant, Freeport, NY
K2INS, William J. Sullivan, Ithaca, NY
WA2JMH, William J. Ehlers, Holcomb, NY
W2KDI, John W. Banzer, Rockville Centre, NY
W2QAB, E. Gilbert Forsberg, Fort Myers, FL
W2VKF, Robert J. Link, Smallwood, NY
W2WZ, T. Sheridan Irwin, Jr., Glen Cove, NY
W3CGS, Harry W. Stark, Upper Darby, PA
WB3EQF, Joseph W. Koelbler, West Mifflin, PA
W3GVG, Malcolm L. Wiseman, Washington, DC
KA3HSL, Elston Hillman, Berwyn, PA
WA3JQQ, Kenneth S. Kinney, Jr., East Petersburg, PA
KA3JSE, Emory H. Wilt, Altoona, PA
*K3JVU, Thomas J. Coyne, Baden, PA
W3WJK, James E. Wood, Mars, PA
K4AAQ, William J. B. Owings, Brent, AL
W4CAT, Clayton E. Wilson, Oak Ridge, TN
WA4EGB, Dawson C. Brinkley, Moultrie, GA
N4EGY, Robert Burch, Brooksville, FL
W4EO, Robert M. Cook, Franklin, TN
*WB4FOD, William M. Glenn, Sr., Louisville, KY
WA4HLS, Milton F. Smith, Cleveland, TN
K4HMT, John Altmayer, Cape Coral, FL
W4IOH, Jesse N. Thacker, Sr., Greensboro, NC
K4JJ, James E. Moffatt, Baltimore, MD
*W4KFC, Victor C. Clark, Clifton, VA
KA4MDP, Julius F. Fuchs, Henderson, KY
W4MQU, Arthur G. DeCamp, Jacksonville, FL
W4NGZ, Hansford D. Scott, Auburn, KY
KA4PFZ, Robert A. Taylor, Miami, FL
K4VL, Charles W. Thibedeau, Largo, FL
W4WLX, Chalmers S. Stromberg, Orlando, FL
WA4YBU, William W. Green, Columbus, GA
WA4YLC, Harry L. Jones, Orlando, FL
KA5AEQ, Malcom E. Snyder, Sapulpa, OK
W5AHT, Frank E. Fisher, Gustine, TX
N5DGD, Louis A. Korzekwa, San Antonio, TX
K5GS, Gerald C. Summers, Dallas, TX
W5HKK, Frank O. Dillon, San Antonio, TX
W5LQR, Jack P. Morgan, Dallas, TX
KD5NA, Harris S. Krum, Fort Worth, TX
WB5RKE, Myles W. "Bill" Graves, Paris, TX
W5RTH, Emile Goguen, San Antonio, TX
W5VAQ, Alton E. Broussard, Lafayette, LA
K5ZRO, Laimon L. Lamb, Vicksburg, MS
W6ANU, B. E. "Gene" Harris, Melbourne, FL
N6CCP, Jerry K. Jasperson, Big Bear Lake, CA
W6CJF, George S. Shoemaker, Mt. Dora, FL
K6DQA, Hillis R. Hauck, Upland, CA
W6ERE, Clifford L. Price, Modesto, CA
N6GOU, Orlen W. Knutson, Chula Vista, CA
W6HNM, George C. Bielski, Brisbane, CA
W6OHQ, Wayne K. Murphy, Oakland, CA
WA6OXI, Paul Hayes, Palm Desert, CA
W6PDY, William H. MacFarland, Whittier, CA
WA6RHZ, George M. Swain, Santa Barbara, CA
K6VRB, Robert C. Gunton, Newark, CA
W6YSP, Wesley J. Navotny, La Mesa, CA
K6ZBD, Edward L. Mundrick, Grants Pass, OR
WA6ZXZ, Charles A. Hood, Ramona, CA
K7DG, Kenneth W. Zahn, Las Vegas, NV
W7HUB, Everett L. Hanna, Sun City, AZ
W7IIR, Roy S. Massey, Burton, WA
W7KAC, Lester B. Conaway, Indian Springs, NV
KA7QNQ, Malcolm E. Strong, Boulder City, NV
WB7WLC, Leslie B. Hathaway, Eugene, OR
W8ACG, Maurice L. Myers, Portsmouth, OH
N8BQK, Al C. Wymer, Swanton, OH
K8DQB, Charles E. Farley, Mayfield Heights, OH
N8EBP, James H. Clark, Rochester, MI
WB8GVI, John W. Feazell, Columbus, OH
*K8HXW, Louis C. Winters, Lansing, MI
W8PWI, William L. Siverling, Hubbard, OH
KA9BZL, Robert D. Eads, Kokomo, IN
W9COY, Roger J. Leaf, Hoffman Estates, IL
WA9EQV, Roger A. Den Tandt, Rockford, IL
K9GAB, Willard R. Brown, Vincennes, IN
W9GI, George P. Honold, Manitowoc, WI
W9LYZ, Richard D. Flynn, Decatur, IL
W9MQ, Paul F. Moore, Fort Wayne, IN
K9OUR, John A. Kolmodin, New Carlisle, IN
WØCCD, Louisianna R. Pickert, Omaha, NE
WØCKK, Evelyn D. "Ed" Muhleman, Marionville, MO
WBØFAV, Donald M. Stuart, Edina, MN
KAØKDJ, Fred C. Genovesi, Omaha, NE
KØLRO, James N. Bean, Flandreau, SD
WBØPCF, LeRoy S. Brown, Wichita, KS
WØVHQ, George Elbers, Steen, MN
WØVZL, Everett M. Norman, Anthony, KS
KH6DUM, Hattie S. Bloomer, Walanae, HI
KH6IOG, Lincoln F. Dixon, Saranac Lake, NY
VE3XR, Thomas Frazer "Doc" Cummings, Brampton, ON
VE7PY, Henry G. B. Hardham, Penticton, BC
DL1YA, Hans Schleifenbaum, Bruennsteinstrasse, West Germany
DL9PF, Walter Vedder, Moerfelden Walldorf, West Germany
EI3B, Sean Merry, Co. Clare, Ireland
OH6PI, Birger Hoglund, Nykarleby, Finland

*Life Member

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys will henceforth be confirmed through acknowledgment only to the family of the deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from Hq.

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. Please allow several months for the listing to appear in *QST*. QST

50 Years Ago

January 1934

☐ E. F. Johnson (of that company) and Ralph Glover (a Chicago engineer) find that open wire lines are more practicable for ham work than concentric cables, but they recommend frequent transposition of the open wires for better balance to ground.

☐ W9PLM, former 1MK operator, built a push-pull Colpitts oscillator for standby transmitter use; his antenna pickup coil is in the center of a split tank, which he says is an improvement over the pickup coils at each end.

☐ *QST* takes due note of the tenth anniversary of the first successful transoceanic amateur communication — 1MO and 1XAM working French 8AB on the "very low" wavelength of 100 meters. (Any spot below 200 meters was okay for amateurs in those days — *Ed.)*

☐ After extensive experimentation with neutralized amplifiers, Geo. Grammer concludes that link coupling outpoints capacitive feed, especially in eliminating stray capacitances, and that taking neutralizing voltage off a split tuning capacitor provides greatly increased stability over the usual coil tap.

☐ Newsman W9BNC gives some tips on what ham activities constitute interesting stories for hard-to-crack daily papers. Romance by radio tops the list, outclassing even rare DX.

☐ The Detroit police radio system is far ahead of any other law enforcement communications system, and R. S. Kruse says that both the technical design and the operating procedures have deep amateur roots.

☐ Secretary Warner describes the procedure in getting a Class C (mail) ticket. You're eligible if you live more than 125 miles from a city where the Federal Radio Commission gives exams at least quarterly.

☐ There is increasing interest in "TBTOC," awarded for working across either ocean on three different bands.

☐ The Editor requests cooperation in keeping clear the channels used by W1XP, W6XK and W9XAN during standard frequency transmissions to help us calibrate our gear.

☐ W5BDB finds that an untuned coil has enough distributed capacity to work well in the new "tri-tet" circuit (with coil and tube shielding), thus eliminating one tuning control.

☐ Eight pages of ads from the National Company help the old exchequer in this depressed economy.

☐ W5LS reminisces about some commercial operating high-jinks with his buddy "Soupy" Groves, W5NW.

25 Years Ago

January 1959

☐ W4AO and W4LTU elaborate on last month's treatise dealing with v.h.f. use of reactance devices, in particular parametric amplifiers.

☐ WØUPH presents a series of curves from which we can, by simple arithmetic, derive values for shunt and series reactances for L networks — to match the available resistance.

☐ For a decent 'phone signal, you don't need a scope, says K1CLD; his simple diode monitor, adapted from a field-strength indicator circuit, works just fine.

☐ W1TS rigged up a "temporary" ground-plane antenna for 20, 15 and 10 meters (three separate elements tied together at the base), but it performed so well he left it up; it also works on 80 and 40 with the feed line acting as part of the radiating system.

☐ V.H.F. Editor W1HDQ went whole hog with his new 220-Mc. beam — a total of 66 elements stacked in Yagi configuration, with a quarter-wave matching section.

☐ WØRQF's "electronic eyeball" is a complete panoramic adaptor; an oscillator at the intermediate frequency sweeps across 20 kc., and incoming signals are displayed as vertical pips on a 2-inch scope tube.

☐ One more way to start simply in ham radio — W1HCP adapts the surplus BC-454 to produce an 80-meter receiver.

☐ Because store-bought crystals are priced so high, W3TLN undertook considerable experimentation with half-lattice filters using surplus xtals in the 4 to 7 Mc. range, with successful results.

☐ K6QHZ has a system of obtaining specific standing-wave ratios (for calibration purposes) by inserting an appropriate reactance in series or parallel with a resistor equal to the line impedance.

☐ Rapid switching on RTTY is feasible with W1OUG's technique of mounting a microswitch so that the bell striker activates a relay to reverse the transmit-receive direction, a kind of break-in.

☐ W1JLN enjoyed his compact 25-watt, one-band portable rig so much he built an expanded version — a bit more power, and four-band coverage.

☐ Recounting highlights of the year past, the Editor rates Governmental and public recognition of the importance of the Amateur Radio Service as the outstanding accomplishment.

☐ Get yourself and your gear ready for the 25th running of the League's International DX Competition in February and March. — *W1RW* QST

FM/RPT

Conducted By Stan Horzepa,* WA1LOU

Freedom of Speech, on the Air

Occasionally, situations arise that cannot be avoided, and someone has to grab the bull by the proverbial horns. The situation today is the so-called "free speech movement" that is permeating some of our repeaters and has resulted in the loss of license by some of its proponents.

Ear of the Beholder

When the Supreme Court tried to define pornography, one Justice commented that he knew it when he saw it. His comment illustrates the difficulty of formulating a definition for something that is very subjective. Simply, the Justice was saying that pornography is in the eye of the beholder: What is pornographic to one person may not be pornographic to another.

Obscenity is similar to pornography in its subjectivity. A certain four-letter word way offend one person, yet the same word may not offend another. This is the crux of the problem when "obscenity" is used in the Amateur Radio world (as well as in the real world).

Real World Vs. Radio World

A roomful of people may agree that certain words are not obscene. They can use the words freely without offending anyone in that room. However, if the door to the room is opened and a passerby happens to hear someone in the room using those words, the passerby may or may not be offended. To be sure that the roomful of people do not offend those outside, they either have to shut the door or not use the words.

The users of a particular repeater may also agree that certain words are not offensive to those users and that those words can be spoken over the air freely. A repeater does not have a door that can be closed, however. What is said on a repeater is not limited to shouting distance, as in our imaginary room. Rather, what is said on the repeater is transmitted over many miles and may be heard by many hams and nonhams alike, including some who do not prescribe to that repeater's style of "free speech." Since you cannot shut out this audience, the repeater users either must stifle their speech or shut off their repeater.

Some may argue that if people are offended by what they hear on their radio, they should shut it off. The weakness of this argument is that the damage has already been done. No one can anticipate what will be heard on the radio; thus, listeners must actually hear the obscenity before they can attempt to counteract it. But it is too late; they have already been offended.

Decency, the Common Variety

My argument against the use of obscenities in Amateur Radio is not based on a legal premise. The courts, the *Constitution* or statutes offer no stable ground from which to formulate an argument. Rather, my argument is based on something that is common to all civilized people in all lands — common decency.

In general, our hobby is populated by ladies and gentlemen. Most of them do not use certain words on the air and, in return, do not wish to hear certain words on the air, either. So, if one is prone to use certain words over the air, there is a high probability that he or she will offend someone. If you feel you cannot express yourself without using certain potentially offensive words, you are in the wrong hobby. End of sermon.

TWO-METER BBS

A radioteleprinter bulletin-board system is now operational in Norwalk, Connecticut, on 146.580 MHz. Assembled by Mark, WA1GOO, and Art, K1VKO, the system is on the air under Mark's call sign. It is accessible throughout the greater New York City metropolitan area. An Apple computer using Super Ratt software runs the show, which idles at 60 WPM Baudot but may be user-controlled up to 110-baud ASCII.

To access the system, send "WA1GOO" and a carriage return, and the system will welcome you aboard. (For a hard copy of all of the system commands, send a business-size s.a.s.e. to Art Santella, K1VKO, 43 Seaview Ave., East Norwalk, CT 06855. Once you have logged onto the system, you will have access to a wealth of information related to Amateur Radio, including ARRL bulletins, DX information, computer programs and messages from system users. If you are within a 50-mile radius of Norwalk, give the system a shot.

*75 Kreger Dr., Wolcott, CT 06716

REPEATER LOG

According to reports received between September 10 and November 10, repeaters were involved in the following public service events: 19 weather emergencies, 5 crimes, 10 medical emergencies, 447 vehicular emergencies, 15 fires, 1 search and rescue, 56 public safety events, 86 drills/alerts and 6 power failures.

The following repeaters were involved (followed by the number of events): WA1DGW 14, W2ODV 7, WA2PQV 9, K2QIJ 13, WB2RUH 4, W2VL 55, WB2ZII 10, WA2ZWP 1, N3BFL 23, W3CYO 2, W3GV 1, VE3TTT 13, W3UER 10, W3VRZ 3, W4HBB 2, W4LLO 23, WB4QES 15, WA4SWF 5, W5RVT 1, W6AK 25, WD6AWP 16, KH6H 1, KH6HHG 2, W6RHC 11, WA7CGQ 2, WB7DRD 2, W7EX 294, W7HSG 3, K7OMR 7, K8DDG 22, WA8EFK 4, WD8IEL 21, W8MVE 7, WA8ULB 3, WØAFG 1, KØASM 5, WDØBQM 2, KØPGM 1, KØSCM 4, WØZUX 2.

OTHER NEWS

Other is an informative newsletter published by Wes, WB2OIA, that contains news of regional VHF and UHF activities "other than club repeaters on 2-meter FM." The coverage area of *Other* is New York's Hudson Valley and Western Connecticut. For a copy of the newsletter, send a business-size s.a.s.e. with 20 cents postage to Wes Nilson, WB2OIA, Aux. 2, Box 7, Marlboro, NY 12542.

Strays

RECAPTURED MEMORIES

☐ One of my finest experiences in providing service in its truest form occurred while serving recently as a relief net controller on the East Coast Amateur Radio Service network. On June 10, 1983, I had the extreme pleasure of assisting in the reunion of two former servicemen who were buddies during World War II.

Jim Richmond, KE4WN, of Front Royal, Virginia, had checked in just prior to a check-in from Carl Theis, W8BKH, of Palmyra Heights, Ohio, a suburb of Cleveland. As soon as I repeated the phonetic spelling of Carl's QTH, I received an immediate "contact" from the Front Royal station. Since Jim and Carl could not copy one another, the former requested that I relay information to the Ohio station. He wanted to learn if Carl might know of a Dick Boss, whom he knew years ago at that QTH. Carl did not know anyone by that name, but he referenced his local telephone book and reported that there were two listings of Richard Boss.

Jim then reported the following information: When he was a resident of Shaker Heights (also a suburb of Cleveland) prior to WW II, both he and a Dick Boss joined the U.S. Marines on July 18, 1940. Carl made a phone call and, as luck would have it, reached a man who was asked: "Were you in the Marines, and when did you join?" The reply was the 18th of July, 1940! When Dick found out that his wartime buddy had located him, all pandemonium broke out.

Working under the poor band conditions at the time, the relayed service was made more clear with the assistance from Don Bjorklund, K4KCM, of Fairfax, Virginia. A few days later, I was fortunate to have a short QSO with Jim, who said he and his long-lost friend are now in direct touch with each other, with exchanges of old and new photographs and plans for an early eye-ball reunion of the families being firmed after the lapse of 40 years.

This was not only a thrilling experience for both ex-Marines, it is very satisfying for Don and me that a real *service* had been accomplished! — *John Barrows, W1HCR, East Falmouth, Massachusetts*

HAM PUBLICATIONS FOR THE SIGHTLESS

☐ Amateur Radio is a very popular avocation with blind individuals. Hundreds of blind hams operate their stations with special aids, such as audible frequency readouts, tune-up devices and antenna tuners. Many publications are available in Braille and audio form from a number of sources — state and federal agencies for the blind, private companies and nonprofit organizations.

One such group, Recording For The Blind, Inc., has a comprehensive library of ham radio book recordings. RFB will also record books as priorities permit (college textbooks are their main concern). They require two copies of the book or manual; however, once the transcription process is complete, the patron receives one copy back along with reimbursement for the other (kept as the master by RFB). Many state agencies will braille and record publications for roughly 11 cents per page.

Technical manuals for amateur transceivers and other equipment containing complex schematics are more difficult to transcribe into Braille or audio form, but many agencies perform these services. Manufacturers are encouraged to make available their manuals to blind individuals or agencies upon request for brailling or recording at reduced cost.

For more information on sources of special operating aids, publications and organizations, write to ARRL Hq. for the booklet *ARRL Program for the Disabled.* — *Rick Palm, K1CE*

1984 Novice Roundup Announcement

Now that you have your ticket, are you hesitant to get on the air at only 3-5 wpm? Are you spending hours tuning up and down the dial listening for a CQ that's slow enough to copy? Relax. All new hams, from old to young, are in the same boat of new-ham-awkwardness. Novice Roundup is your chance to dive into the airwaves and drown yourself in QSOs. If you're a really shy person, find a ham buddy and jump in together as a multiop station.

Although the Novice Roundup is aimed primarily at Novices and Techs, the more hams participating, the merrier the game will be. All amateurs are encouraged to join the fun. The good news for Novices and Technicians is that you are eligible for the handsome certificate awarded to each single-operator station who submits a valid entry of 200 or more QSOs. If the rules seem complicated at first glance, try reading them two or three times. They need to be followed with precision if your entry is to qualify. Feel free to contact us here at ARRL Hq. if you have any questions. When you're ready to put your contest entry form and logs in the mail, double check to make sure all the information is included and your handwriting is legible.

FUN-damentals of the Novice Roundup

The 1984 Novice Roundup lasts an entire week, including two weekends: 0001 UTC Saturday, January 28 (Friday local time), to 2359 UTC Sunday, February 5. To keep contesters from killing themselves, participants are limited to 30 hours at the most. Write to ARRL for your entry forms, and put a bookmark in your *QST* so the rules will be easily accessible when the forms arrive. Entry forms include three or more (specify quantity) log sheets with room for 100 contacts on each, a summary sheet (one needed) and a CD-77 form dupe sheet to keep track of the stations you've worked. Run your self-addressed, stamped envelope to the mailbox now, and you'll have the forms in time to start the Roundup. The address is ARRL, 225 Main St., Newington, CT 06111.

Your goal in the contest is to work as many stations as possible, in as many different ARRL Sections and DXCC countries as possible. ARRL Sections are listed on the Novice Roundup entry form and on page 8 of every *QST*. (If you're not sure which Section you're in, write to ARRL for a free copy of *Operating an Amateur Radio Station,* which breaks down each Section by county.)

Each station you work may be counted only once. Short QSOs work best, so don't discuss grandma's rhubarb pie with another contester or repeat anything unless asked. Here's a typical Novice Roundup QSO:

CQ NR CQ NR DE KA1KHR/N KA1KHR/N K
KA1KHR/N DE KA9PUB/T A̅R̅
KA9PUB/T DE KA1KHR/N 579 CT KN
KA1KHR DE KA9PUB R 569 IN KN
KA9PUB R 73 DE KA1KHR/N K

To streamline the QSO, the license class can be dropped after the contact has been established.

Happy Contesting!

Rules

1) **Object:** For Novice and Technician operators in the United States (and possessions and territories) to exchange QSO information with as many stations as possible on the 3.5, 7, 21 and 28-MHz Novice/Tech bands. Others work Novices and Technicians only.

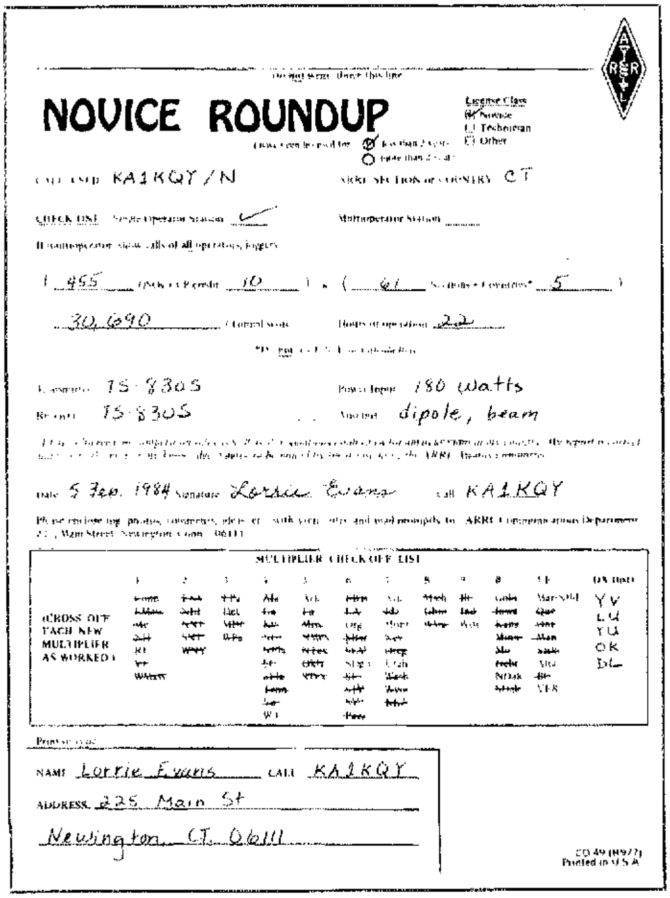
2) **Contest Period:** The week that spans the end of January and the beginning of February, including both weekends. Begins 0001 UTC Saturday, January 28, 1984, and ends 2359 UTC Sunday, February 5. Operate no more than 30 hours. Off periods must be at least 15 minutes; listening time counts as operating time. Times on and off must be indicated in your log.

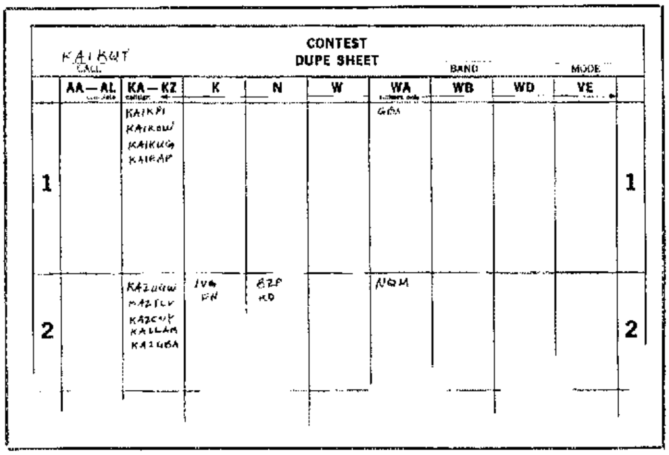
3) **Categories:**

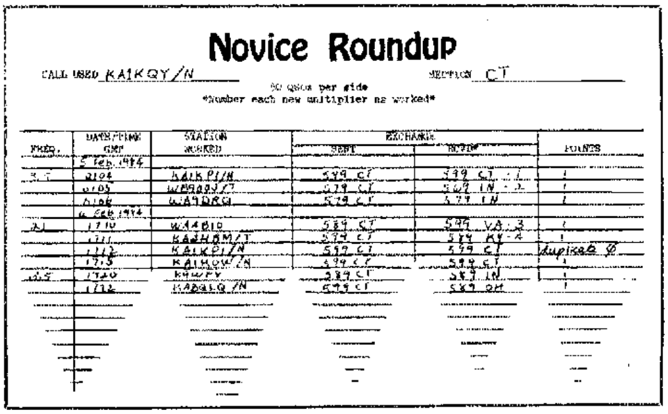
(A) Single Operator: One person performs all transmitting, receiving and logging functions.

(B) Multioperator: Single transmitters only. Those obtaining any form of assistance, such as relief operators or logging.

4) **Exchange:** Signal report and ARRL Section or country for DX stations. Novices should send /N and Technicians /T after their call sign so







others will know their license class.

5) **Scoring:**

(A) QSO Points: Count one point for each complete two-way QSO. Work each station once, regardless of the frequency band.

(B) Multiplier: Each ARRL Section (listed on page 8), plus VE8/VY1, plus each foreign country.

(C) Code Proficiency: Additional points can be earned if you have qualified for an ARRL (not FCC) Code Proficiency certificate. CP credit equals the speed in words per minute indicated on the latest certificate or sticker held by the entrant. For more details on the Code Proficiency program, see Contest Corral, page 87, this issue.

(D) Final Score: Add your Code Proficiency credit to your total number of QSO points. Multiply that by your ARRL Section/country total for your final score. For example, if you work 100 stations in 31 Sections + 3 foreign countries and have an ARRL Code Proficiency credit of 10 wpm from W1AW or W6OWP, then your score is 100-plus-10 × total multipliers (31 + 3) or 34, for a total of 3740 points.

6) **Miscellaneous:** Crossband contacts are not permitted. Novices and Technicians work any amateur stations; others work Novices and Technicians only.

7) **Reporting:** Contest forms (log sheets, summary sheet, dupe sheet) are available from ARRL Hq. for an s.a.s.e. Official forms are recommended. Any entry making more than 200 QSOs must submit duplicate checking sheets (alphabetical listing of stations worked). Incomplete or late entries will be classified as check logs. Logs should include dates, QSO times, on and off times, complete exchange sent and received, and band. Postmark your entry within 30 days after the contest (March 6, 1984).

8) **Awards:** Certificates to the top Novice and Technician in each ARRL Section and each single-operator Novice or Technician who submits a valid entry with 200 or more QSOs. Multioperator or General class licensees and above are not eligible for awards.

9) **Conditions of Entry:**

(A) Each entrant agrees to be bound by the provisions as well as the intent of this announcement, the regulations of his/her licensing authority and the decisions of the ARRL Awards Committee.

(B) Disqualifications: See below. QST

Club Competition Rules and Contest Disqualification Criteria

The 1984 contest season is upon us. Three of the ARRL-sponsored contests during 1984 include an ARRL-affiliated club competition — January VHF Sweepstakes, February/March International DX Contest and November Sweepstakes. There are a few ground rules to follow to ensure that your club's scores are properly credited (and to ease the log checker's burden). These are detailed below.

From time to time it becomes necessary to consider disqualifying an entry to an ARRL contest. The particulars are listed below. Most of the time the reason is simply that the person submitting the entry was not accurate in copying call signs or contest exchanges. As long as you are careful only to log QSOs when you are sure of the information, you should have nothing to worry about. [The use of standard ARRL contest forms will help to ensure that your score is figured properly and speed up the publication of contest results in *QST*.

Don't hesitate to call or write if you have a question about the rules listed here or the rules for any particular contest. The time to ask is before the contest, not afterward.]

Club Competition

Only ARRL-affiliated clubs may participate in the club competition. A member must be listed in the regular score listings to be counted for a club.

For a club to be listed, two conditions must be met:

1) At least three different entries from members of the club must be submitted.

2) All members wishing to be included in the club scores must indicate the club name on their summary sheet, *and* the club secretary must send a list of all club members eligible to compete for the club and which level (unlimited, medium, local) they wish to enter for *each* competition. Remember to meet the mailing deadline!

There are three levels of club competition:

1) *Unlimited.* Any club submitting 51 or more *entries* is in this class. (One station can submit two entries, one on phone and one on cw in the November Sweepstakes and the DX Contest.) All stations and all operators must reside within 175 miles of the club's center. All members more than 50 miles from the club's center must attend at least 50 percent of the club's meetings to be eligible to submit an entry. If, however, they have not been a member for a year's time, they must have attended at least 50 percent of the meetings since becoming a member. There is no attendance requirement for those members within 50 miles. However, to be considered bona fide, a member must be active in club affairs. Members living outside of 175 miles and/or members operating stations outside of 175 miles may not compete in the club competition. The club must be ARRL-affiliated.

2) *Medium.* Any club submitting fewer than 50 entries falls in this class, except as noted in local club criteria, below. The same mileage and attendance requirements apply as the unlimited class club. The club must be ARRL-affiliated.

3) *Local.* Any club submitting 10 entries or less is in this classification. All members must reside within 20 miles of the club's center. There is no attendance requirement. Again, the club must be an ARRL affiliate.

Single and multioperator station scores may be counted. At a guest-operated single- operator station, both the guest operator and the station licensee must be members of the same club in order to count the score for that club. At multioperator stations, at least 66 percent of the operators must be members of the same club in order for the score to count for that club.

In conjunction with the 50-percent attendance rule, the club must hold *at least* four in-person meetings per year. A club's entry classification may be changed if, in the opinion of the ARRL Awards Committee, the club has manipulated its number of entries to fall into a lower classification (e.g., if a club with 100 members submits only the 50 highest scores, even if more than 50 of its members wish to compete.)

It is not within the intent of these rules that a club should vote out a member or a member resign and then be voted back into the club later so that the 50-percent attendance rule can be met.

The highest affiliated-club entry will be awarded a gavel in each category (unlimited, medium, local).

The highest single-operator CW score and the highest single-operator phone score in any club entry will be awarded with a club certificate when at least three single-operator CW and/or three single-operator phone scores are submitted.

Disqualification

If the claimed score of a participant is reduced by two percent or more, the entry may be disqualified. Score reduction does not include correction of arithmetic errors.

Score reductions may be made for taking credit for unconfirmed QSOs and/or multipliers, duplicate contacts, and/or other scoring discrepancies.

An entry with more than two-percent duplicate contacts left in the log or an entry in which more than two-percent "rubber clocking" (altering the actual time to increase the operating time so that it is greater than the allowable limit) is detected *will be automatically disqualified.*

If a participant is disqualified, he or she will be barred from submitting an entry in the next annual running of that specific contest, e.g., disqualification from the 1983 phone SS prohibits submission of an entry for the 1984 phone SS, but 1984 CW SS participation is okay.

The calls of all disqualified participants will be listed in the *QST* contest report.

Any participant on the borderline of disqualification, but not actually disqualified, may receive a warning letter.

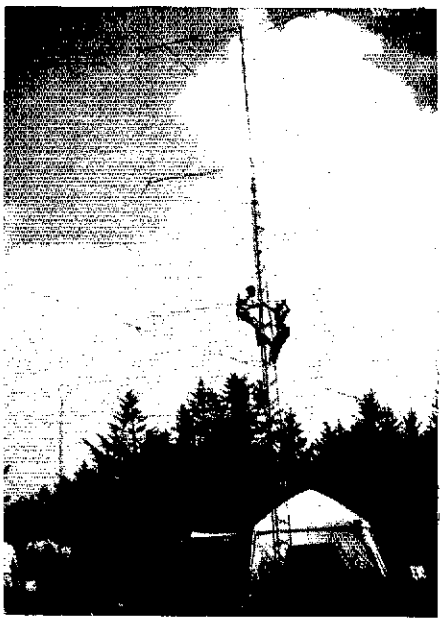
For each duplicate contact or miscopied call sign that is removed from the log by Hq., three additional contacts will be deleted as a penalty. The penalty will not be considered part of the two-percent disqualification criteria.

In all cases of question, the decisions of the ARRL Awards Committee are final. QST

Results, 1983 ARRL September VHF QSO Party

By Edith Holsopple,* KA1KRQ

Target: 1340 feet. Obstacles: Wrong road; no road; this is a road? Where is the top? Climb hills, climb trees, search for the top. VE2DUB finds top. Where is the car? Where is VE2DUB? VE2DUB finds car. Down mountain, up road other side. This is a road? All out. Car clears rocks. Find trail. Test generator — good motor, no juice. Dissect generator — fan disintegrated, wires broken. Hold wires, start generator, solder wires using power from generator. Gets dark. Carry generator up, up, up. Stop. Base camp. Set up 144 MHz. Make eight contacts. Go to sleep 2 A.M. Rain, lightning, thunder, falling branches. Get up. Carry up 50, 220, 432, 10-GHz stations. Start generator. Listen, many signals. Call AF1T. Generator complains, generator balks, spits, seizes, stops forever ... Take down station. Carry all down, down, down. Pack it up. Go home. Lesson learned: You must have light, reliable generator and a drive-up site. — VE2DUB (VE2CUA/2)



Members of Mecklenburg (Charlotte, North Carolina) Amateur Radio Society set up their station on Roan Mountain in Tennessee using W4BFB as their call. *(K4TP photo)*

VHFers charged on toward improvements and innovations in spite of varying circumstances that might have discouraged hams who are less inclined toward hard work and experimentation. This is the first time that grid squares replaced ARRL Sections in a September VHF QSO Party. Most reactions to the grid squares were enthusiastic. Turnout was excellent, with 436 entries received for this September 10-12 edition of the party. If satisfaction is the reward of hard work, Steve Harrison, KØØU, should be very happy. Here are some of the trials he went through just getting started.

I'd been pushing all the members of the Olathe, Kansas Amateur Radio Club for some time to get involved with VHF SSB/CW, but nobody really wanted to jump into something they didn't really know much about. Only one or two members had ever operated above 6 meters on SSB/CW. It just so happened, however, that AE5W/Ø needed to remove his HF beam and mentioned he would like to try the September QSO Party. So, we got together the 6-meter gear from a local estate and my own 2-meter stuff, and put up the antennas. Simple, right? Uh-uh.

Getting that Classic 36 tribander down wasn't too hard. The broken rotator was easy to fix, too. But by Saturday morning, Darryl had a meeting elsewhere and we still didn't have any antennas back up. So, it was just myself all day Saturday, putting up the Boomer on one half of the Classic 36 boom (12-ft aluminum and exactly the right diameter for the top tower bearing) at the top, then the Ringo Ranger on top of that, then the 7-element vertical FM Yagi, then trying to get the rotator back in place. I finally had to tie the other half of the Classic 36 boom onto the tower for use as a gin pole while reinstalling the rotor, and then, finally, came the 4-element 6-meter beam.

Each antenna, the gin pole, the feed lines and the mixed-up rotor cable took an hour apiece. And I hadn't even gotten the 7/8-in Hardline unrolled from the 1½-foot coil that it came in. That took another 1½ hours and required cutting the coax from the boomer to length and inserting the type N connector on the coax. It was already dark, and lightning was flashing all over the horizon, but not in Olathe yet, and I couldn't see to solder the center pin on the coax. We had begun operating at about 5:30 P.M. or so, but didn't get it all together until around 9 P.M., when I finally slid down the tower for the last time — just when it began raining again.

Other VHFers had equally rocky times getting going. Rain, wind and even snow interfered with more than one station's activity. A weather front ran from the northeastern corner of New Mexico through western Kansas, into eastern Nebraska and through the middle of Wisconsin. Fifteen minutes of solid scatter was reported from Minnesota on 6 meters Sunday morning. Low propagation, as well as a heat inversion, conspired against West Coast operators. Some found 1296 to be sporadically wild, however. East Coast conditions were similarly mediocre. Those who gave up early were disappointed to discover that they had missed an exciting east-west tropo in the last two hours. Persistence was a hallmark of success in this round.

Leading the single-operator list this year is AA2Z with a very respectable score of 77,319. The outstanding multiop group W2SZ/1 scored an incredible 462,348. Good show!

Overall, the VHF outing was an enjoyable bash, and now we're looking forward to the January VHF Sweepstakes, to be held later this month. Complete rules appear in December 1983 *QST*. As usual, September certificates will be in the mail around January 15.

SOAPBOX

I think guys should spread out more instead of crowding the top 10 kHz of the CW band. We have lots of room, so let's use it (W1CNU). The band was really worked out on Sunday, although conditions were good. My apologies to everyone I couldn't hear on Sunday night, as I lost two different tuner-mounted GaAsFETs and was left with a 6-dB noise figure (K1FO). Grid-square multiplier system was a unique incentive to turn antennas more frequently. Pleasantly surprised at the level of VE station activity on all bands ... Thank goodness it didn't rain more than a half hour ... no fun operating from leaky tents on a mountaintop in the heavy rain (W1QI). Super contest! Great to be able to work so many 4-land stations (WA1YKN). Think grid squares was a great activity maker and definitely improved the test. However, it hurt to hear W2SZ working W8/9/Ø, and I could only hear W2s (W1JR). The contest was very good but closed in for the Philadelphia area in general. Other areas to the north enjoyed some good ducting to the west ... The grid-square system, generated by Europeans possibly because of the political setup, does not seem to apply to this country. The contests have always been set up on the basis of ARRL Sections (as it should be with an ARRL-sponsored event) ... there are many who still are trying to work states, and one likes to know what state he is working, instead of finding out after the contest is over (W2EIF). Good fun, but overdriven linears on mountains are unfair to others. I'm not talking about receiver overload here (W1IUN). I never thought we would ever make more contacts on 2 meters during the last two hours of a contest than during the first two, but we did (W1TKZ). The big guns made it difficult for me to work the water pistols ... I couldn't even hear most of the stations others were working (WB1FSV). Band conditions were horrible, hard to make any contacts. Rig broke down, so had to borrow an IC551D. XYL and I really like using the grid-locator exchange (WA5YOU). The grid-square system is the way to go ... Propagation never really opened up here. ... I forecast a tremendous opening "tomorrow" night (WD5IKD). No stations heard from Colorado, Oklahoma, the Pacific Northwest or California ... I had to listen to the Sunday evening news to reassure myself that California really hadn't finally slid into the ocean (W5FF). I operated the entire contest off my solar-charged battery, except for the antenna rotators. I have a 30-W ARCO solar panel and two surplus 7-W panels feeding a 105-AH deep discharge battery (N5ACP). Sure enjoyed the earlier quitting time on Sunday P.M., since I had to get up early Monday to start my week (WB5KTC). I'm sure getting tired of multi-oping with "Murphy." He "fixed" three rigs this time (WA5VJB). A lot of people did not know their grid square, and I could not use them (KA5OCN). The front-end overload, poor selectivity and signal-mixing problems of today's generation of 2-meter all-mode rigs is just not acceptable, and we hams should demonstrate this by being smarter shoppers (N5TM). I was able to cut 80 ft of coax by running the station from my attic. It was hot, hot and hot. The best thing about this contest was when my wife, KA5QEQ, decided to get on and make a few SSB contacts (WD5FEH). Conditions — terrible! Activity — low! But still fun (WA4CQG)! I was told by some of our local 6-meter enthusiasts of long standing that I would be considered a serious 6-meter "freak" when I confirmed at least 40 states (N4DLE). This was my first contest, and I found it very interesting (N4ECZ). Our first effort from Putnam Mt. ... and probably our last. We had to quit operating numerous times to kill hornets and spiders, and to chase rats and lizards (WA4LIT) ... after 30 hours of static and radio noise, a direct hit of lightning may have been a break from the monotony ... Special tnx to those who did give me a contact (WB4SLM). During first minute on air, XYL informed me that I had TVI. ...

*Communications Assistant, ARRL

Division Leaders

Single Operator Division			Multioperator Division	
Call	*Score*	*Division*	*Call*	*Score*
VE3BFM	21,995	Canadian	VE3LNX	48,645
AA2Z	77,319	Atlantic	K3YTL	182,252
W9OEH	45,720	Central	W9CFS	9499
WØXG	7040	Dakota	KCØP	112
W5RCI	7076	Delta	W4BFB	80,372
WD8ISK	33,488	Great Lakes	W8VP	109,769
WB2QOQ	29,880	Hudson	WA2SNA	79,976
KØTLM	16,400	Midwest	NØLL	26,196
K1PXE	39,468	New England	W2SZ/1	462,384
K7HSJ	1995	Northwestern	N7NW	5720
W6YKM	12,880	Pacific	WB6KBZ	28,026
WD4GXN	15,677	Roanoke	N4DT	19,516
KAØMQA	1872	Rocky Mountain		
WD4JQV	4500	Southeastern	WD4IIS	50,094
K6LMN	3477	Southwestern	W6OAL	38,678
K5SW	13,248	West Gulf	KJ5Q	2904

Top Ten

Single Operator		Multioperator	
Call	*Score*	*Call*	*Score*
AA2Z	77,319	W2SZ/1	462,384
W9OEH	45,720	K3YTL	182,252
K1PXE	39,468	W1TKZ	143,040
K3HP	37,512	K1TR	118,701
W3IP	37,051	W8VP	109,769
WD8ISK	33,488	W4BFB	80,372
WB2QOQ	29,880	WA2SNA	79,976
WA2TEO	28,542	WB2RVX	72,653
W2EIF	26,268	W8DGY	59,640
K1EM	24,882	W1QI	52,290

turned out to be my 11-year-old TV "going south." Solved TVI problem, bought new TV (KE4WT). Score is low due to stinko condx and also military reserves both days, so I missed morning scatter and tropo (K1FJM/4). Tnx fer the grid-square concept, or our multiplier count would have been pitiful (W4BFB). What really blew my mind was WB6NMT working up and down the West Coast on 2-meter sideband mobile!! I guess my elevation of 5000 ft was bouncing signals off the inversion (K6LMN). I was surprised to hear that most of those participating knew all about the grid-square concept. I was expecting to have to explain it a lot more (WB9LOZ). With highs in the 100s, it was difficult to stay cool . . . I kept waiting for the inversion over central California, but it never materialized. Still had a good time (WAØJRB/6). Really liked using grid squares. Why not recognition for the highest score in each grid square? (WA6SLF). I believe we had better DX on two than any other band. For some reason, 1296 DX record was exciting (W6OAL). Quite different from ARRL Section contest. Also "fake" contacts are not easily gotten via so-called scatter modes. The grid square two-way requirement makes the contact more believable. It is interesting that grid-square distribution benefits those inland from the coast . . . where activity is considerably less, station QSO total-wise (K7ICW). Best contact was 60 miles on 1296 with 2 W (K7HSJ). Had to move Saturday morning because of snow Friday night . . . only moved a few miles, but it put me in CN87, which I didn't find out till a few days later (WA7UQV). My little station is surrounded by big guns . . . each with a kilowatt and four or eight long Yagis. I felt like a VW between two big 18-wheelers on the freeway (N7DRR). Went all the way up to EN67 to give out a rare one and had no propagation (WB8TGY). Contests such as this show the real potential of low-powered stations. When but in a contest will a very distant station struggle so hard to hear you? But this shows one the actual range that is possible (K8CQA). I discovered the quickest way to stall a 5-hp gasoline engine is to attach a 70-A automotive alternator to it through a 4:1 pulley, and then key your xmtr with the linear on (WB8DRR). If this is not the friendliest competition known to mankind, I don't know what is! Supplies here included 148 grams of peppermint starlights, four packs of Hubba Bubba gum, three 2-liter bottles of Pepsi and four aspirin (for extremely patient XYL). After XYL saw her second contest in 13 years of living with a ham, she enrolled in a Novice class. If you can't beat them . . . (WA3DNM).

SCORES

Scores are listed by ARRL Section. Within each Section, single-operator, multiband scores are listed first, then single-operator, single-band scores starting with the lowest frequency, and then multioperator scores. From left to right, each line lists: call, score, QSOs, multipliers and bands operated (A — 50 MHz; B — 144 MHz; C — 220 MHz; D — 432 MHz; E — 1296 MHz; F — 2.3 GHz; G — 3.14 GHz; H — 5.7 GHz; I — 10 GHz; J — 24 GHz; K — 48 GHz; L — light).

Among the single-operator stations, the overall Section winners and single-band winners are indicated by bold-faced type for the call sign of the Section winner and for the one letter(s) denoting the bands won. For example, in New Hampshire, WA1OUB is the overall Section winner as well as the single-band leader on 50 and 144. AC1J is the 220-MHz and 432-MHz leader.

Canadians VE2DWG, VE2HAK, VE2DUB, Joe Alonso and VE1BCZ began operations dry and on the rocks. *(VE2XL photo)*

N4HY is "radioactive" from station K1DS/1 in Rhode Island.

N2DXP finds operating to be a breeze at 6-meter multiop station K2DEL in Northern New Jersey. *(KT2K photo)*

W/VE

1

Connecticut

K1PXE 39,468- 342- 73-ABCDE
K1EM 24,882- 323- 66-ABCD
WA1BQC 14,971- 225- 63-ABCDE
N1FAJ 5552- 86- 32-ABCD
KA1HYN 3393- 100- 29-BD
KA1GIP 608- 38- 16-AB
N1CLW 308- 25- 11-AB
W1WRL 1104- 69- 16-A
K1RZ 10,016- 313- 32-B
K1GX 3725- 149- 25-B
WB1BXS 2142- 119- 18-B
W1CCH 2016- 112- 18-B
W1CNF 624- 52- 12-B
K1FO 5940- 110- 27-D
K1ZZ 48- 6- 4-B
W1QI (+KA1ELG, N1ABY, WA1WXV, WB1CVW)
52,290- 484- 90-ABCDE

Eastern Massachusetts

W1GXT 10,672- 185- 46-ABCDE
WA1IDF 9125- 179- 24-BDE
WB1FKF 6400- 107- 50-BCDE
WA1YKN 2478- 137- 33-BD
W1JR 4032- 58- 32-ABCDE
W4SP 3172- 97- 26-ABCD
W1FM 2400- 85- 24-ABD
K1TQ 1102- 59- 19-ABD
W1JOI 840- 47- 12-BCDE
N1BC 477- 36- 9-BD
WØRLJ 5712- 198- 29-B
W1AX 315- 35- 9-B
KA1DHD 16- 8- 2-B
W1XM (+N2ME, WB5RWY)
33,832- 188- 52-ABCDE
N1BGJ (+N1BCG)
3761- 197- 43-ABD
KA1GAR (+WA1YFZ)
8140- 187- 37-ABD

Maine

W1PLX 1188- 66- 18-B
AF1T/1 (+K1WHS, KA1KE, WA1SKY)
35,520- 385- 80-ABCDEI

New Hampshire

WA1OUB 18,876- 284- 66-ABCD
AC1J 6225- 148- 36-ABCD
W1JSM 2616- 109- 24-B
W1IIN 928- 58- 16-B
W1BNZ 910- 70- 13-B

Rhode Island

W1AJR 3744- 90- 32-BD
AK1E (+K1HD, N1BNL, WA1AYS, WA2JRH, WB4RVA)
30,196- 338- 66-ABCDF
K1DS (+N4HY)
15,068- 256- 52-ABCDE

Vermont

W1AIM 2597- 67- 37-ABCD
WA1IGK 867- 51- 17-AB
K1IK 376- 27- 14-AB
W1TKZ (+K1s TK, PR, N1s ADX, CPE, N2AWG, W1s GGI, OOP, WA1PQY, WA2TTF)
143,040- 816-149-ABCDEI

Western Massachusetts

KA1APR 21,045- 244- 69-ABCD
AC1T 4356- 107- 36-ABCD
K1WCN 1136- 53- 16-ACD
WA1UOL 480- 32- 15-AB
WB1FSV 240- 30- 5-A
WA1VTA 3336- 139- 24-B
K1LR 140- 20- 7-B
WA1CRX 33- 11- 3-B
W2SZ/1 (+AG1M, AK4L, K1DH, K1FOL, K3MM, K2UF, KA1s DZV, ZE, KD2S, NK4FM, W2ARQ, WA2s AAU, SPL, WA8USA, WB1s CBH, HIH, WB2JSJ)
462,384-1414-247-ABCD
EFGHIJ
K1TR (+K1EIV, K1BA, K1EA, K3WM, N1s BEM, BZU, W1MJ, WA1PBU, WA1VEJ)
118,701- 789-131-ABC
DEI

2

Eastern New York

WA2TEO 28,542- 342- 71-ABC
DEF
N2BI 8578- 187- 41-ABD
WB2KMY 4002- 151- 23-BC
WA2ZPX 3554- 129- 26-B
WA2RPW 1368- 72- 19-B
WB9RNJ/W2 14- 7- 2-B
W2DMC (+K2s MME, SK, N2s BJ, DCL, DVX, N6BOD, WA2MEE, WA8MAZ, WB2s IEE, KSP, NFC, ZME, WD2ADD)
53,344- 442- 64-ABCD

New York City - L.I.

N2BFJ 17,010- 261- 55-ABD
WA2SLY 6500- 200- 34-AB
K2DVS 5547- 100- 31-ABD
WA2EUS 1140- 35- 15-BD
WB2ICO 3515- 185- 19-B
KA2BPP 2016- 112- 18-B
K2RIW 3458- 114- 26-D
WB2PWR (+WA2YNP)
11,288- 268- 42-ABCD

Northern New Jersey

WB2QOQ 29,880- 344- 72-ABC
DF
WA2WIH 15,476- 226- 53-ABCD
WA2SWA 12,526- 281- 66-AB
N2CFI 12,048- 159- 48-ABCD
K2BOW 10,678- 281- 38-AB
K2BMP 4512- 154- 28-AB
WA2UDI 3397- 81- 27-ABCD

K4BNC 1628- 24- 22-AB
W2VC 9287- 110- 37-DE
WA2ALM 1692- 94- 18-B
WA2SNA (+K2BJG,KA2IVS,N2s AA7, CJJ,LEY,W2s NPT,RS, WB2s DIN, KEN)
79,976- 592-104-ABCDE

WA2FXB (+K2OWG,KA2BAS, WA2s GEZ, PJZ,WB2QBI)
29,965- 192- 67-ABCD
K2NI (+KA2KLW,KU2C,N2s,BBA,DQE, EIZ,ELN,ENO,WB2NQV)
27,365- 356- 65-ABCD
K2DEL (K3JNZ,KA2TGY,KC2KU,KT2K, N2AAM,N2DKP,WA1PDK,WA2s,CRF, DNO,KBI,RYC,VKH,WB2s,KSP,NTP, oprs.)
23,484- 379- 57-ABCD
KC2FX (+KA2KBD,WA2s,ASM,MOI,NBD, WB2CLU)
9589- 215- 43-ABCD

Southern New Jersey

W2BIF 46,268- 292- 66-ABCDE
WB2YEH 21,638- 239- 62-ABCDE
W2HRW 14,820- 255- 52-ABD
K2ZT 12,800- 210- 48 ABD
N2BYE 2174- 205- 34-ABC
KA2JKI 5420- 89- 40-ABDE
WA2ONK 6183- 229- 27-B
KB2CW 1974- 96- 21-B
KA2INY 1,332- 37- 12-B
WB2RVX (+KA2NYF,WB2NPE)
72,653- 511-107-ABCDE

K2BWR (+K2ERJ)
30,780- 251- 81-ABCDE

Western New York

K2GK 22,533- 194- 87-ABCDE
W1XX/2 14,941- 197- 67-ABCD
WA2SZY 3154- 73- 38-BD
KA2OQY 2934- 86- 34-AB
W2VO 2520- 68- 40-AB
KA2ENE 2325- 75- 31-ABC
KA2LLK 1155- 55- 21-AB
KC2AW 576- 36- 16-AB
K2LWR 18,480- 280- 66-B
K2OS 4428- 123- 36-B
W2UAD 4329- 117- 37-B
K2HTQ 2697- 93- 29-B
W2AWF 195- 15- 13-B
WB2QCJ 800- 25- 16-C
N2WK (+KX2I,WA2IAQ)
25,198- 246- 86-ABCD
WB2NKR (+KA2QID)
2970- 90- 33-AB
WA2ZXS (+K2GVI, KA2s EIU,NDP, NLL,PBH,TAX,KB2YU,KB3RG, KC2RN,KD2H,N5BGY, WA2s FLX, NKG)
2769- 70- 39-ABD

3

Delaware

K4CHE/3 14,204- 206- 53 ABCD
K3SXA 1846- 53- 26-BCD
KA3FHZ 2091- 123- 17-B

Eastern Pennsylvania

AA2Z 27,319- 493- 121-ABCDE
K3HP 37,512- 391- 72-ABCDE
KB3NO 12,555- 230- 45-ABCD
N3ADC 9120- 194- 60-ABD
K3IWK 8385- 183- 53-ABD
WA2OMY 7410- 150- 38-ABCDE
WB3INZ 7310- 215- 34-AB
KB3ZS 6322- 184- 29-BD
KB3HE 5950- 139- 34-ABCD
WB3JYO 4410- 105- 30-ACD
N3BHS 3250- 104- 26-ABCD
WA3KEY 3754- 102- 27-AB
W3IIT 2673- 95- 27-ABC
AA3W 595- 25- 17-BC
WA3KFI 119- 17- 7-AB
WA3ONM 8943- 271- 33-B
K3ONW 7308- 203- 36-B
N3ET 5248- 164- 32-B
W3FEY 4050- 150- 27-B
WB2MBM/3 840- 60- 14-B
N3DMT 273- 39- 7-B
KA3EHL 256- 64- 4-B
W3MSI 245- 35- 7-B
KB3XB 15- 5- 3-B
K3YD (+K3MKZ,KA3s EWR,EKO, ILE,KB3QI,KF3Y,KQ3R,N3s CYB,DAP,W3DZH, WA3s JWP, IWV, NVS,TON, WB3s LAI,KAA,KKQ, IWZ)
182,232- 880-161-ABCDE
W3AD (+K3HEC, N3s BCD, BNA, W3s DYI,IPX, WA3s HMK, PRG, PPH, WB3BNB)
32,622- 358- 86-ABD
W3EP (+W3s GKN, DZ,DH,WA3CHQ,)
21,550- 270- 66-ABCD

Maryland D.C.

W3IP 37,051- 374- 79-ABCDE
W3WEM 16,120- 201- 65-ABDE
N2SB/3 12,364- 191- 44-BDE
W3ZZ 10,492- 201- 43-ABCD
K3AKR 6840- 133- 38-ABCD
K13I 704- 44- 16-A
K4NXB 6730- 225- 30-B
WA3DJE 6045- 195- 31-B
WA3FAL 5430- 181- 30-B
KB3GX 3703- 161- 23-B
N3CLZ 216- 24- 9-B
W3XO 210- 35- 7-C

Western Pennsylvania

WA3FYJ 9688- 173- 56-AB
K3MO 4692- 82- 51-ABD
W3KB 198- 17- 11-BD
W3HDH 352- 22- 16-A
WB3GOH 2376- 72- 13-B
WB3EUM 420- 28- 15-B
W3GNR/3 (+KA3s,AWL,DWR,WA3s, BUX,GQU,JK9)
18,286- 190- 82-ABC
K3HKK (+K3CM,KC3s,CU,HO,N3s,OLA, DLL,N4BIX,WB3s AEJ,CXR,WB8LIY)
12,784- 172- 68-ABCDE
K3EAS (+K3FOW,N3ALP,W3FC,WB3CLH)
5593- 114- 47-ABD

4

Alabama

WA4CQG 4214- 77- 43-ABCD
N4DLE 66- 11- 6-A
N4ECZ 12- 4- 3-A
WA4VOG 104- 13- 8-B
WA4LIT (+K4EHT,WB4NJG)
8448- 106- 66-ABD

Georgia

WD4JQV 4500- 80- 45-ABCDE
WB4SLM 1769- 61- 29-AB
KA4KKF 405- 26- 15-ABC
AF4T 50- 10- 5-AB
KE4WT 4- 2- 2-A
WD4IIS (+N3AHI,N4HSM,WB4s ACG, NMA,WD4MBK)
30,094- 308-138-ABCDE

Kentucky

KC4KG 21,240- 190- 90-ABCD
WB4NXY 4416- 79- 46-ABD
WA4PCS 272- 16- 11-C

North Carolina

K4CAW 2884- 107- 54-BD
N2CJP/4 3045- 94- 29-ABD
N4DI (+N4AH,K4PXE,WD4V)
19,516- 219- 82-ABCD
WA4WZQ/4 (+K4ABC KA4HKK, WA4WZP,WD4GHU)
11,098- 160- 74-ABD

Northern Florida

WA4GS 546- 35- 14-ABD

South Carolina

NB4S 1376- 53- 33-B
N4IBU 840- 42- 20-B
WB4NNY (+WA4IDU)
882- 36- 21-BD

Southern Florida

WB8ICY 840- 35- 24-AB
KI4JM/4 319- 24- 11-ABD

Tennessee

WD4DUF 5760- 104- 48-ABC
KL4BX 1092- 52- 21-AB
WB4KNF 1782- 54- 33-AB
WA4OYK 902- 28- 22-ABCDE
W4BFB (+AA4SC,AK2C,K4s CKB, CVV,MQG,PDY,RVW,TP,KA4WYC, KC4s,KH4V,N4s EJF,FYF,W4IKI, WA4YCG,WB4s FCS,TLX,UFD, WD4ABZ)
80,372- 527-142-ABCD
WD4IHD/5 (+KA4P,KU4K,WA4NVM, WB4s, LHD,OVT,WB5RBS)
16,296- 163- 84-ABCD

Virginia

WD4GXN 15,677- 207- 61-ABD
K4IHB 4370- 144- 30-AB
K4FTO 3700- 100- 32-AB
W4DO 2610- 87- 30-AB
WA4MMP 1550- 62- 25-AB
N4MM 1196- 52- 23-AB
WA4UAF 861- 41- 21-AB
KA4SI 744- 31- 12-CD
KC4YN 374- 41- 14-AB
KL7GLL/W4 456- 38- 12-A
K3RZR/4 4995- 185- 27-B
KF4GL 451- 41- 11-B
WA4KMS 105- 15- 7-B
N4IY/4 (+KK5YH,KD4IG,KO4A, WA7EFP,WB4RDV)
11,835- 230- 45-ABC
K4HEX (+KA4s MVO,YNO,KB4BNW, N4s GIM,IMD,WB4ONI,WD4GIW)
6840- 116- 53-ABD

5

Arkansas

WD5CAN 5456- 60- 48-ABCD
WD5AGO 2088- 72- 29-B
N5DL 1320- 55- 24-B
N15A (+WA5s TRV,DDF WD5GAP)
6138- 102- 38-ABC

Louisiana

N5BHD 2139- 69- 31-AB
W5EYZ 1426- 62- 23-B
WA5YOU (+WB5NIE)
2236- 61- 38-ABCD

Mississippi

W5RCI 2076- 93- 58-BCD
N4VC/5 6076- 98- 62-AB
WD5IKD 1722- 39- 26-ABD

New Mexico

W5FF 1131- 39- 29-AB
N5ACP 576- 36- 9-ABC
KA5EBL 100- 10- 10-B

Northern Texas

KC5WX 12,336- 204- 68-ABCD
WB5KTC 3410- 172- 39-ABD
WA5VJB 3550- 101- 23-ABCDE
K5DHB 2001- 56- 29-ABDE
K5IS 1769- 39- 31-AB
KD5RQ 476- 34- 14-A
KY5N 948- 79- 12-B
KA5DCN 536- 67- 8-B

Oklahoma

K5SW 13,248- 145- 69-BCD
KD5QY/5 4452- 88- 42-BD
N5TM 1536- 51- 24-BD
WD5EEH 1482- 57- 26-B
K5WF 1344- 40- 29-ABD
WB5DSH 963- 41- 23-A
AA5V 903- 43- 21-B
KA5QFQ 135- 15- 9-B
K15Q (+W5NZS)
7904- 69- 33-ABCDE

Southern Texas

WB5RUB 920- 40- 23-AB
W5UWB 286- 22- 13-AB

6

East Bay

NR6K 150- 15- 10-AB

Los Angeles

N3EG/6 1106- 66- 14-ABCD
W6PFI 768- 29- 16-ABCD
WB6DTA 112- 13- 7-ABCD
KB6BVO 60- 15- 4-A
WA6LKR 70- 14- 5-B
W6NXB 56- 7- 4-B

Orange

K6PVB 2150- 65- 25 BDE
KA6ART (+KA6JDI,KE6JS, N6ME,WA6s,OQC,PMX,WB6KAJ, WD6GSH)
9600- 304- 24-ABCD

Pacific

AH6EK 12- 6- 2-B

Sacramento Valley

NR6A 3146- 116- 32-ABCD
W6SIH (+WA6KOD)
446- 19- 14-ABCDE
K6RFI/6 (+W6/ABP)
216- 19- 8-BCDE
K7MM/M6 (+KA7QOE)
50- 7- 5-BD

San Diego

K6LMN 3477- 146- 19-ABCDE

San Francisco

WB9LOZ 1095- 63- 15-ABCD
W6MSN 578- 30- 16-ABD
WA6LLY 548- 27- 14-ABD
WA6JRB/6 252- 16- 7-B

San Joaquin Valley

W6YKM 12,880- 206- 56-ABCDE
K6JKO 533- 38- 13-ABCD
WA6SLF 286- 22- 11-BC
KE6GY 198- 46- 13-A
KE6NS 1096- 84- 19-B
NR6Q (+KG6AR)
10,533- 230- 53-ABCD

Santa Barbara

WA6IJZ 280- 40- 7-B
KA6VVB 216- 36- 6-B
AA6Q/6 3- 3- 1-B
W6OAL (+K6HXW,KA6JOE,WA6DYS, WB6YON)
38,678- 335- 83-ABCD EFGHIJ
K6MEP (+K6VMN,KH6N,N6HBL, NS6X,WA6FPX)
2849- 130- 27-ABCDE

Santa Clara Valley

KA6ING 720- 60- 12-AB
WB6KBZ (+KH6SS)
28,026- 385- 34-ABCDE
WA6WJN (+N6IMY)
702- 54- 13-AB
N6KL (+KJ6K,N6HDN,WA7NKI)
189- 27- 7-B

7

Arizona

K2DNR/7 3146- 79- 36-ABCDE
WB7SAE 1- 1- 1-B
WA7JIM (+KA7EHE)
1008- 42- 24 AB

Idaho

KB7N 209- 19- 11-B
WB7NFZ 77- 11- 7-B

Nevada

K7ICW 680- 34- 20-AB
WB9AJZ/7 516- 40- 12-BD
KB7AP/7 (+K8RQO,KA7NKX,W0YPH)
480- 25- 16-ABD

Oregon

K7RSJ 1995- 34- 19-ABCDE
W7TYR 1900- 70- 19-ABCDE
W7HDM 1760- 83- 16-ABCD
KB7CW 144- 24- 6-B
N7BLS (+K7RWT,N7DB,WA1GEM, WA7BAC,WB7BMP)
6437- 131- 29-ABCD

Utah

N7BHC 215- 24- 9-ABD

Washington

K7KOT 5070- 135- 30-ABCD
W7EHB 715- 47- 13-ABCD
WA7UQV 1695- 97- 15-BD
N7DRR 765- 85- 9-B
KR7I 553- 79- 7-B
WB7ATP 80- 16- 5-B
N7NW (+K7ND,N7AMX,WA6NBB, WA7DFI)
8720- 180- 40-ABCDE
WB7PCK (+KA7ICT)
2507- 93- 13-ABCD

Wyoming

WB7RBM 286- 26- 11-B
WA7OKF 45- 9- 5-B

8

Michigan

WB8KAY 15,300- 176- 75-ABCD
N8AKY 7261- 137- 53-AB
KA8OCL 4387- 107- 41-AB
NE8I 3712- 62- 32-BCDE
WB8AAX 3128- 92- 34-B
N8DEI 2975- 94- 31-B
KA8DHQ 2356- 76- 31-B
W8CAP 1943- 67- 29-B
AC8W 1620- 60- 27-B
N8CKH 1600- 64- 25-B
WB8TGY/8 8- 4- 2-B

Ohio

WD8ISK 31,488- 264-104-ABCDE
WB8PAI 18,920- 162- 86-ABCD
K8DTO 14,328- 156- 72-BCD
K8WW 10,878- 100- 49-DE
AA8Q 10,282- 182- 53-ABCD
WD8CFX 6670- 133- 58 ABD
K8TL 2640- 60- 33-BD
N8CCC 1060- 59- 20-ABCD
K8DW 324- 13- 12-CDE
K8AN 322- 21- 14-AB
KB8ZR 85- 17- 5-ABC
WA8ZHE 15,333- 269- 57 B
KA8IEC 6507- 181- 41-B
W8RBC 1534- 59- 26-B
K8MR 680- 34- 20-B
WB8LCY 450- 25- 18-B
K8NI/AERO 168- 14- 12-B
W8VP (+K8AL,KA8BDZ,N8CQX, W5UA,W8PR,WA8s FHE,HTO, WB8EKB,WB9YCZ)
109,764- 669-187-ABCDE
WB8JY (+KA8PIL,W8ULC,WB8EEX)
59,640- 556-140-ABCDE
K8COA (+WB8TEI)
6042- 85- 47-ABD

West Virginia

N8TN 2160- 56- 36-ABD
N8EDL 322- 23- 14-A
WB8DRR 5216- 122- 43-B
N8II 4089- 141- 29-B

9

Illinois

W9IVI 2788- 77- 34-ABD
KC9OA 1126- 49- 24-AB
KA9MGR 144- 18- 8-A
WB9MSV 15,180- 230- 66-B
K9AKS 10,904- 188- 58-B
KA9LDS 5217- 141- 37-B
N9AEL/9 4757- 117- 46-B
KA9HDZ 4905- 109- 45-B
WD9FSA 4826- 127- 38-B
KC9YU 4332- 114- 38-B
N9AO 3168- 96- 33-B
WB9UWA 2418- 78- 31-B
K9BQL 1625- 65- 25-B
W9IMJ 1392- 58- 24-B
WB9NEY 594- 33- 18-B
WA9BXB 360- 30- 12-B
KB0V/0 231- 21- 11-B
W9ABA 1- 1- 1-B
KA9HVY (+KA9HBR,KC9XM, K590,N9BZR)
4329- 111- 39-ABD

Indiana

W9OEH 43,720- 320-127-ABCD
K9EW 2094- 79- 26-AB
WB9UTJ/9 3116- 61- 38-BD
K9WZB 11,165- 203- 55-B
A39BT/9 5934- 129- 46-B
K9CFX 1050- 42- 25-B
WB9NTL 140- 13- 5-B
W9CSF (AG9S,K9s,DXE,ET,

KA9BWH,KC9CP,KN9H,N9VEY, W9LVW,WB9SKC,WD9EIX,oprs.)
2499- 160- 39-ABC
WB8HUC/9 (WA8WXT,WB8s GEU, [illegible], oprs)
7380- 130- 56-AB

Wisconsin

WA1IED 6164- 122- 46-BCD
K9XY 1008- 39- 21-BD
WA9LZM 612- 36- 17-AB
KA9HKL 2668- 92- 29-B
N9IO 1944- 72- 27-B
WB0C/9 231- 21- 11-B
W9YCV 228- 19- 12-B
K9CDF 18- 6- 3-B
N9DII 8- 4- 2-B
AD9W (+KB9NH)
4270- 122- 35-B

Ø

Colorado

KA0MQA 1872- 66- 24 ABCD
K0KFA 1155- 77- 15-B
WB0LHB 18- 16- 3-B

Iowa

WB0SWD 12,627- 186- 61-BD
WB0DSU 4800- 97- 40-ABD
AK0M 1827- 63- 29-AB
N0CIH 1631- 67- 23-BC
W0RAP 1449- 34- 21-DE
KD0BT 1168- 52- 24 AK
K0JJA 876- 31- 23-ABD
WB0YWW 2552- 88- 29-B
WN0DRC 1584- 66- 24-B
N0EKT 1550- 62- 25-B
KB0V 294- 21- 14-B
KB0V/M 9- 3- 3-B
KB0V/M 4- 2- 2-B
WB0ZKG (+AK0P)
17,987- 196- 81-ABD

Kansas

WB0ISW 3605- 111- 43-ABCD
K0VDA 512- 26- 16-BD
WA0TKJ 1716- 66- 26-B
AK0G 760- 40- 19-B
KA0PHT 160- 16- 10-B
N0LL (+KA0U,WA2VMS)
26,196- 201-118-ABD
KE0M (+KD0DW,WA0VIF,WB0UXP)
7772- 116- 58-ABCD
K0UU (+AE5W/0)
4554- 99- 46-AB

Minnesota

W0XG 7060- 115- 55-ABD
W0RGD 4950- 73- 45-ABCDE
KB0CQ 338- 26- 13-B
K0BYY 264- 23- 11-B
K0JP (+KA0URO)
112- 14- 8-B

Missouri

K0TLM 16,400- 173- 82-ABCD
W0RWB 16,046- 205- 71-BD
WA0NOK 7240- 105- 60-ABCD
N0FY 4312- 82- 48-ABD
KM0A 1211- 51- 23-AB
W0JRP 814- 36- 22-ABD

Nebraska

W0EMS 4740- 76- 60-BD
N0AJU 2310- 70- 33-AB
KC0OQ 1150- 50- 27-AB
WB0UGF 180- 44- 24-B
WD0BQM (+KA0CRI,W0RAV, WB0GPM)
448- 28- 14-ABD

VE

Maritimes-Newfoundland

VE1UT 496- 26- 16-BCD
VE1ARM 320- 20- 11-B

Quebec

VE2FWT 1728- 53- 27-ABCD
VE2ADE 98- 14- 7-B
VE2CUA/2 (VE1BGZ,VE2s, AQU, HOR,DWG,BAR,XI,oprs.)
54- 9- 6-B

Ontario

VE3BFM 21,995- 201- 83-ABCDE
VE3ASO 16,577- 192- 25 ABD
VE3FCD 8208- 152- 54-AB
VE3EGN 3885- 78- 37-ABCD
VE3AAY 722- 38- 19-A
VE3AQG 1675- 67- 25-B
VE3EML 1320- 60- 22-B
VE3LNX (+VE3s AOI,MLW,NSQ)
48,645- 330-115-ABCDEF
VE3FHR (+VE3s FBO,OAF,NPB,)
2964- 74- 18-ABD

British Columbia

VE7ASI 1218- 47- 21-ABCD
VE7PRC (+VE7DMF)
854- 61- 14-AB

DX

XE1SW (W5XW,K5HVG,N15X oprs)
24- 6- 4-A

Check Logs

W1EXS,K1KI,KB1XG,K7KI/M [illegible]

Public Service

Conducted By Robert J. Halprin,* K1XA

Lost in the Wilderness

Field Day for the Capital City Amateur Radio Club every year is defined as two fun days in the mountains. Club members rarely score enough points to make the effort appear worthwhile. But to the many of us who have waited nine months for summer to come to Montana, a few days in the mountains mean warmth and relaxation.

Planning for the activity had gone well. N7DKL, Chuck, had picked up the antennas and radios and had deposited them at K7CCZ's (Jim's) cabin. On Saturday, June 25, members began arriving with their families. The day was warm and the kids wanted to look for frogs. A teenager, who was an experienced babysitter, volunteered to watch the kids. With buckets in hand, they wandered down to the creek.

Up the hill by the cabin, some of the adults made lunch, while others worked their rigs. Over the next hour and a half, peace and tranquility came to the mountain. Unfortunately, it was to end abruptly.

At 3:30 P.M., there was a call for help. Nyleen, the four-year-old daughter of Kim and Nancy Marshall (KA7PUI and KA7PUJ), had disappeared. She had been sitting in the middle of the dirt road, waiting for her friend to come back. Less than three minutes later, she simply was not there. Immediately, adults and children began calling her and searching the nearby area. After a fruitless canvas of the area, the Jefferson County Sheriff's Office was notified. Upon receipt of the call, the Sheriff's Office notified Lewis & Clark County Search and Rescue. Our local RACES repeater, 25/85, temporarily out of service, was quickly repaired by KC7LM (John). A command post was established by the Sheriff's Office at the site. N7DKL and his wife Betty, KA7MAH, began manning a ham radio communication post from their camper for what would be 10 long days. Les, W7CT, our oldest and most experienced operator (80 years young) put through the first of hundreds of phone patches.

From 3:30 P.M. Saturday, June 25, through Monday, July 4 (a total of 10 days), more than 2000 volunteers searched the Elkhorn Mountains of Montana for a lost four-year-old. Volunteers, including personnel from the Civil Air Patrol, Malmstrom Air Force Base, National Guard, Helena and Deer Lodge National Forest Interagency Crew, Montana Department of Lands Fire Fighting Crew, Scott Air Force Base, Clancy Volunteer Fire Department, Clancy Quick Response Unit, Jefferson County Sheriff's Office, members of the Latter Days Saints Church, psychics, and hundreds of citizens who simply cared enough to come, participated in the search. Dog handlers and their dogs from numerous Montana counties and the Salt Lake City-based Rocky Mountain Rescue Dogs searched for days. Local churches, supermarkets and a soft drink distributor supplied enough food for all the searchers for the entire 10 days. Repeatedly the volunteer searchers asked "How far could a four-year-old walk without shoes?"

Jam Haslip, K7CCZ, was one of the hundreds of volunteers searching the Elkhorn Mountains of Montana for a lost four-year-old child. *(Gene Fischer, Helena Independent Record, photo)*

After two and a half days, Lewis & Clark Search and Rescue left the scene. Under the strong coordination of Tim Campbell, Jefferson County Deputy Sheriff, a well-coordinated search effort was manned. Each search team required a ham. Search teams with ham communication were dispatched by Deputy Campbell to an area marked on a map. Teams reached their search locations by helicopter, horseback and National Guard truck, and on foot. Field locations were reported by ham radio, as were sightings of interest. Large search parties used two and three hams to keep the group together. A second ham monitoring station was established in a vehicle parked next to a sheriff's truck and the Sheriff's scanner was programmed for the ham frequencies. Upon receiving a message that a group had found something of interest — a possible footprint, a handful of picked flowers, another deep mine shaft — a searcher with special training (tracker, diver, etc.) would be dispatched immediately by radio to the exact location. Together, searchers and hams logged hundreds of miles, crawling through deadfall, slogging through swamp, and climbing in and out of every drainage within the radius of the search.

It was obvious early on that reinforcements were needed to supplement the number of hams in the Helena area. Calls went out to Butte, Anaconda, Great Falls and Bozeman. Within hours, extra 2-meter rigs were sent with those hams who could leave their work responsibilities and come in person. Gene, KB7Q (a top 6-meter contester from Bozeman), accompanied by his fellow club members, Fred, KE7X, and Bill, KA7AAK, set up a portable emergency repeater on a nearby mountain to provide more efficient coverage on 22/82. Hams with and without talking privileges were pressed into service. The ARRL Section Manager for Montana, Les, N7ATK, quickly established procedures by which ARRL and FCC policies could be followed. When procedural questions were raised, Les immediately responded with the necessary answers.

For 10 days, hundreds of men and women who hardly knew one another were united by a single concern: the search for a lost child. People who had never heard of ham radio became aware of its capabilities. Emergency personnel were impressed by the professionalism of the amateurs and the efficient running of the communication network. Jefferson County Sheriff Tom Dawson stated, "I don't know what we would have done without the hams. From my point of view, they were the backbone of the communications."

Yet, even with the hundreds of searchers and the well-coordinated communication system, we never did find Nyleen. The best people in the country were unable to find any sign of her presence.

Ham radio and the rest of the community provided its best. While we know we did everything possible to find Nyleen, however, we know we face the winter months remembering that our best was not enough. — *Allen S. Lefohn, KA7M, Clancy, Montana*

MEDICAL CENTER BAILED OUT BY AMATEUR RADIO

Amateur Radio came to the rescue and proved its worth once again on Sunday, June 19. Possibly due to a lightning strike, the internal telephone systems at both Kettering Memorial Hospital and Sycamore Hospital were rendered inoperative. Both hospitals are on the same telephone system via a microwave link. Members of the Kettering Medical Center Amateur Radio Club moved into position at both hospitals and were assisted by members of the Miami Valley FM Association and the Dayton Amateur Radio Association. Some 25 amateur operators took part in setting up and operating stations in key areas such as the emergency room, surgery, central supply, public relations, several of the nursing units and the main telephone switchboard room.

Many of the medical personnel soon realized the value of Amateur Radio communications that day as only a selected few telephone lines were operative to the outside Bell system. In addition to the point-to-point communications within the two hospitals, other hams at their home base stations were running traffic to relay over their telephones, such traffic as vital life-saving information from doctor's orders to medical supply needs.

The radio communications kept the 147.675 and the 145.11 repeaters busy for almost 14 hours until nor-

*Deputy Communications Manager, ARRL

mal telephone communications could be restored. The administration of Kettering Medical Center expresses their gratitude to all the amateur operations who volunteered their time and radio skills to keeping an efficient flow of communication during the temporary communication blackout. The Kettering Medical Center ARC also wishes to thank the members of MVFMA and DARA who participated. — *Gary Eldridge, KC8UD, Vice President, KMC ARC, c/o Media Dept., Kettering Medical Center, 3535 Southern Blvd., Kettering, OH 45429*

JOINING HANDS IN PUBLIC SERVICE

On November 6, 1983, the Mid-Rivers REACT Team no. 4455 received an opportunity to supply emergency communications along the route of the St. Charles County Striders first half-marathon road race in St. Charles City. The request was made by both St. Charles County Striders and Athlete's Foot, based upon REACT performance at the previous Lake St. Louis Triathlon and other athletic events.

Advance planning was accomplished between the St. Charles County Striders' coordinator and three members of Mid-Rivers REACT team. The race route which was 13.1 miles was thoroughly reviewed with Mid-Rivers REACT, St. Charles City and County Police, and other interfacing agencies by the St. Charles County Striders to insure runner safety. The start line was established at Jefferson Avenue and Riverside Drive with the finish line located at the train depot on Riverside Drive in St. Charles City. Aid stations were fixed at the finish line and approximately every 2.5 mile increment along the route. Some 15 other radio emergency spotter locations were defined. It was determined that 19 volunteer radio operator positions had to be covered. The REACT team was requested to supply not only safety spotters, but also communications between finish line officials and aid stations while reporting locations of the 1st through 5th place and last place runners. Some 300 contestants were anticipated to run through busy city streets and along the north 94 highway area. Many participants would be using the half-marathon to get ready for the upcoming 26 mile St. Louis full marathon to occur later this year.

The entire event required support of both citizens band and amateur 2-meter radio communication volunteers to successfully allow net control to maintain contact with start, finish, the Mobile Sidewag Unit, and some 17 other requested spotter positions. Citizens band and Amateur Radio operators from the Mid-Rivers REACT/ARES team and Citizens Band radio operators from the Lincoln Pike REACT team were called into action. Permission was graciously given by KØFWL to allow REACT licensed ham radio operators to use his St. Charles City based repeater and from WBØYDQ to use the Northwest Amateur Radio Club Repeater as backup. Several Amateur Radio operators from various local Amateur Radio clubs pooled their efforts to assist in a combined REACT (Radio Emergency Associated Citizens Team) and ARES (Amateur Radio Emergency Service) effort.

The half marathon which started promptly at 8 A.M. on Sunday morning turned out to be a great success thanks to the various emergency radio operators participating. The race was over and awards presented to the runner participants by 11 A.M. Runners completed the race safely without any problem. The 1st through 5th place and last place contestant positions were communicated to finish line officials during the race on a timely basis. All traffic safety concerns were handled promptly. After the race, many compliments were given to the REACT/ARES overall radio communication support by the St. Charles County Striders and runners on an individual and public basis. Both the REACT Citizens Band radio operators and ARES ham radio operators recognized the potential benefits in working together.

"It was an outstanding joint effort among REACT teams and Amateur Radio operator volunteers helping make the race safe, eventful and fun for the contestants. It was accomplished in a very professional teamwork atmosphere. Each and every volunteer was extremely important and deserves a special thanks for a job well done!" said NØEZH, the new St. Charles County ARRL Emergency Coordinator and Co-founder of Mid-Rivers REACT. "We hope that other REACT teams and Amateur (ham) Radio emergency service groups throughout the world will try just as hard to build working relationships between the two volunteer radio systems in a public service spirit. It does work!" — *Gary O. Schuchardt, NØEZH*

PUBLIC SERVICE DIARY

☐ Williamstown, Massachusetts — August 9. At the conclusion of a day of camping, one member of a group of boy scouts (allergic to bee stings) was stung twice by yellow jackets. Scoutmaster KA1CFE called for help on the Mt. Greylock repeater (K1FFK/R) and was answered by KA1HFN. The scout was hospitalized promptly, and was in good health the following day. (KA1CFE)

☐ West Middletown, Pennsylvania — October 9. While driving in town, N3BKW witnessed a three-car accident. He used the K3PSP/R autopatch to call the local 911 emergency center to report the accident, which included two injuries, one very serious. Local police, a fire company and an ambulance arrived at the scene minutes later. (N3BKW)

☐ Turks and Caicos Islands — November 4. W8EH was in QSO with two other amateurs on 40 meters at approximately 0700 UTC when VP5EE on Caicos Island broke in to request help in a medical emergency. An ill woman needed to be hospitalized on Grand Turk Island, and he needed someone to notify the Grand Turk Airport to turn on the lights on at the airfield so that the plane carrying the woman could land safely. W8EH called the overseas telephone operator, the airport was contacted, and the woman was transported successfully. (W8EH)

AMATEUR RADIO EMERGENCY SERVICE REPORTS

☐ Mocksville, North Carolina — June 8. Immediately after a mid-air collision of two small planes over Twin Lakes Airport, the Forsyth County ARES responded to the scene to provide communications. The function of the communications effort included controlling the traffic flow into the airport, controlling the information flow to ensure accuracy, and coordinating clean-up, surveillance and data/information-gathering crews. Ham radio simplified and speeded up the flow of information tremendously. (WA4TCR, EC Forsyth Co.)

☐ Northwestern Ontario — September 4-11. An Indian reservation was evacuated when an out-of-control forest fire spread through the area. Several district-level ARES groups were activated to help out with the coordination of transporting the 400 evacuees to Gimli, Manitoba, some 200 air miles away. VE3LWR/R in Kenora was used as a communications link with hf operations as the evacuation proceeded. Fourteen hams remained on alert during the crisis until the 160,000-acre fire was finally contained seven days later. (VE3JJA, DEC Northern Ontario)

☐ Columbus, Ohio — October 16. During the 1983 Columbus Marathon, the Central Ohio ARES provided communications for local police, fire, sheriff and Red Cross officials. Seventy-four operators used nets on simplex and on four different repeaters to relay information among the 24 checkpoints. In addition, use of ATV helped race officials and Amateur Radio net controls to better coordinate the 4000-runner marathon. (W8BKO, DEC Central Ohio)

☐ North Adams, Massachusetts — October 22-23. The Berkshire County ARES was invited to participate in a Civil Air Patrol air/ground search training exercise. ARES members provided the various search teams with communications among the search aircraft, ground teams and the mission base. The participating groups were given an actual mission with an Emergency Locator Transmitter (ELT) hidden within 10 nautical miles of a local airport. The ELT signal was only 100 milliwatts and was partially buried (as it might be in a real downed aircraft). ARES and Civil Air patrol personnel worked side by side and exchanged many ideas for future cooperative efforts. (WB1HIH, SEC Western Massachusetts)

☐ Tullahoma, Tennesee — October 29. Twelve members of a local ARES group worked with the City of Tullahoma in a comprehensive disaster exercise involving several city and state agencies. The exercise was based on a staged multiple vehicle collision among a tractor-trailer truck carrying toxic materials, a loaded school bus and a freight train. ARES members established three communications circuits on 2-meter simplex frequencies for officials of local civil defense, Red Cross the local hospital and the Coffee County Communications Center.

Operations from the hospital presented a particular challenge, as there would not possibly be *any* interference to the hospital's electronic monitoring equipment. This problem was overcome by installing a battery-powered remote controlled transceiver and antenna on the roof of the building, and placing the control head in the emergency room about 250 feet from the radio (WB4FUR, EC Coffee County)

COMMUNICATIONS SERVICE OF THE MONTH

The night of September 25 brought on a great deal more than a quiet evening at home watching TV. At approximately 9:30 P.M., the Shelby County Amateur Radio Emergency Service (SCARES) was informed of three lost hikers at Oak Mountain State Park. This was no drill! All of our training was now to be put to the test. Immediately the Alabama Emergency Net "N" was activated on the N4DMA repeater.

Thanks to our drills with the Vulcan Trail Association (VTA) over the past year and a half, the assembly of amateurs at park headquarters was smooth. Jerry, N4IVI, was assigned to be NCS for AENN using a rig that I brought. We were all told of the situation as it stood at that time (10:30 P.M.). The number of persons reported missing had been increased to six, two of whom were a three-year-old child and a seven-month-pregnant woman. Hearing these details, we decided that some amateurs should be advised to be on stand by for a second response, should it be required. Also assisting from base stations were Sue, N4FCO, Ted, KA4WMM, and Dale, WB4ATX. The Pelham, Alabama police and fire departments were notified to stand by. Four teams of amateurs were assigned and dispatched. Carl, N4DMA, Bill, KF4DM, James, KA4ZQA, Paul (non-ham) and I drove to the trailheads and headed into the woods.

The almost full moon was not as much help as I had hoped it would be, owing to the late summer leaves on all the trees. After about thirty minutes of search, another team accompanied by James, N4AHV, was assembled and dispatched from park headquarters.

Check-ins from the teams were made every ten or fifteen minutes. Radio contact with one team was lost early in the search, but as is preplanned, all teams continued with their assignments. Later, at 11:50 P.M., my team made visual contact with the VTA leader of the team that radio contact was lost with.

Good news was heard from the trail ahead of us. The VTA member of that team advised that he had found the six missing people and that all were in good shape other than bruises, scrapes, thirst and fear. This information was relayed over N4DMA/R to the waiting ears of the family that had assembled at park headquarters.

All in the party were able to hike back under their own power with the guidance of our flashlights. These people had burned some of their clothing in an attempt to make hand torches to find their way out.

After a three-mile hike back to our transportation followed by a four-mile drive to park headquarters, there was a touching reunion at 12:45 A.M. A person who sees first-hand the emotion at this point cannot help but feel good about all the effort that was put forth.

Vulcan Trail Association, Oak Mountain State Park and the Shelby County ARES can be proud of their accomplishments. Lessons were learned, public relations for Amateur Radio were improved, and six people will never forget the help from volunteer organizations that they received. (Paul S. Creed, Jr., N4HTG, EC Shelby County)

ARRL SECTION EMERGENCY COORDINATOR REPORTS

☐ For October, 38 SEC reports were received, denoting a total ARES membership of 20,860. Sections reporting were: AB, AZ, CT, EMA, ENY, IN, KS, KY, ME, MI, MN, MS, MO, NE, NH, NLI, NC, NFL, NTX, OH, OK, ON, ORG, PAC, SV, SDG, SJV, SC, SD, SFL, TN, UT, VA, WV, WMA, WNY, WPA and WI.

NATIONAL TRAFFIC SYSTEM

K5GM took over as TCC-C/c4 director, while N5AMK assumed the #1 slot for TCC-C/c2. Congratulations to ND5T who is now net manager for TWN/c2. W5GHP didn't stay out of the picture too long; he is now the assistant manager for RN5/c4. Certificates from 2RN/c4 were awarded to KA2OIW, KC2TF and VE2FMQ.

October Reports

1	2	3	4	5	6	7
Cycle Two						
Area Nets						
EAN	33	1322	40.1	.893	91.9	
CAN	33	1032	31.3	.635	100.0	
PAN*	62	925	14.9	.493	98.9	
Region Nets						
1RN	64	653	10.2	.472	92.2	100.0
2RN	61	371	6.1	.349	85.9	100.0
3RN	37	339	9.2	.568	98.0	97.0
4RN	66	728	11.0	.433	77.7	100.0
RN5	62	771	95.4	.404	100.0	100.0
RN6	64	498	7.8	.318	93.0	100.0
RN7						100.0
8RN	66	458	6.9	.372	99.0	100.0
9RN	64	463	7.2	.316	100.0	100.0
TEN	65	858	13.2	.559	83.1	100.0
ECN						54.6
TWN	60	288	4.8	.321		96.8

TCC

TCC Eastern	142[1]	806				
TCC Central	82[1]	389				
TCC Pacific						
Cycle Four						
Area Nets						
EAN	33	2000	60.1	1.566	94.4	
CAN	33	1160	35.2	1.061	100.0	
PAN	33	1185	35.9	.940	98.5	
Region Nets						
1RN	66	904	13.7	.570	96.9	93.9
2RN	94	716	7.6	.615	93.6	81.8
3RN						100.0
4RN						97.0
RN5	66	852	12.9	.680	96.5	100.0
RN6	66	751	11.4	.581	100.0	100.0
RN7	64	564	8.8	.761	98.5	98.5
8RN	54	382	7.1	.438	85.0	97.0
9RN	66	447	6.8	.377	97.3	100.0
TEN	66	493	7.5	.445	81.4	100.0
ECN						93.9
TWN	63	506	8.0	.374	83.3	97.0

TCC

TCC Eastern	137[1]	899	
TCC Central	67[1]	463	
TCC Pacific			
Sections[2]	7376	33,709	4.6
Summary	8718	52,485	6.0
Record	9039	59,630	16.4

*PAN operates both cycles one and two.
[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (264): APSN ATN (AB), MG SDN SSN (AK), AENB AEND AENK AENR AENX AENY AENZ ATNM ECAARES WAEN (AL), ACN ATEN HARC (AZ), BCEN (BC), SCN/1 SCN/2 SCN/N RTTY/V (CA), DEPN DTN SEN (DE), BEN DEN ENMC FAST FMSN FMTN FPON FPTN GN LCEN NFPN PEN PRVAN QFN QFNS SEFTN SPARC SVTM SWFTN TPTN (FL), CGVN GCN GSBN GSN GTFCN NWGN (GA), ILN ISN ITN (IL), ICN ITN QIN (IN), IA75MN ICN ITEN TLCN (IA), CSTN KMWN KPN KSBN KWN QKS QKS-SS (KS), 3ARES 5ARES 7ARES 11ARES BARES CARN KYPON KEN KNTN KSN KTN KYN MKPN NKARC PAEWTN TSTMN WTEN (KY), LAN (LA), AEN CMEN MPSN PTN RACES SGN (ME), MEPN MMN MTN WRIN (MB), CITN EM2MN EMRI EMRIPN EMRISS HHTN NEEPN RIEM2MTN (MA/RI), MACS MITN MNN OMN UPN (MI), MNAMWXNT MSN MSPN MSSN PICONET (MN), MTN RAN (MS), CMEN HBN IFN JCARN LOCWN LOFMN MEOW MON MOSSN PHD RRARN SARN STAN (MO), MTN (MT), BVARES CC2MN CCTMN EN2MN MARES NCHN NCN NE40 NE75 NEQCWA NMPN NSN PARC PV2MN PVTN SBARES TCARES WNN (NE), GSFM GSPN NHN (NH), NJM NJN NJPN NJSN NJVN OBTTN SJVN TCETN (NJ), NSN (NV), BAVTN CNYTN HCAT&E NCVHFTN NLI NLIPN NYPON NYS NYS/M OCTEN SCVHFTN STAR WDN (NY), CNCTN PCTN (NC), CN CSN (NC/SC), BN BNR BRTN BSSBN COARES HCARES LCNWOARES LCTN NCTW NEON O6MN OSN OSSN TATN (OH), NON NWOSN OLZ ONON OPEN OTN OTWN STN QCWA-63 (OK), KTN OLN OPN OSN OSN2 OSND TIN (ON), BSN MPARES ORARES OSN PDXARES PTTN WCN (OR), PTN (PAC), NWPATMTN WPA WPAPTN WPA2MTN (PA), QSN (PQ), GPD2MN SCNTN SCSSBN (SC), SDEEN SDN SDPN SDTIN WCEN (SD), TNCW TNPN TNVN TSRN (TN), NET TEX TSN TTN (TX), BUN UCN (UT), VTN (FT), SVEN STARES VLN VN VSBN VSN VTN (VA), EWTN NTN NWSSBN PSTS SCARES WARTS WSN (WA), WVARN WVFN WVN WVNN (WV), WINC WINS (WIN).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

1	2	3	4	5
Cycle Two				
TCC Eastern	144	98.6	1623	806
TCC Central	93	88.2	839	440
TCC Pacific				
Summary	237	93.4	2462	1246
Cycle Four				
TCC Eastern	152	90.1	1803	899
TCC Central	70	95.7	916	463
TCC Pacific				
Summary	222	92.9	2719	1362

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (October) *Cycle Two* — Eastern Area (AF8V, Director) — N3ADU AA4AT N1BHH WA4CCK KA8CPS K1EIC VE3GOL WB3GZU KO2H WA2HEB WB1HIH KB2HM VE3HTL WD8LRT W1NJM K8OZ W8PMJ W8QHB W1QYY KB3UD AF8V AK1W N2XJ W1XX WB8YDZ. Central Area (N5AMK, Director) — N5AMH N5AMK N5BT W5CTZ N5DFO WB5EAY WØFRC NG5G KW9J W4JL WA4JTE W9JUJ K5KJN W5KLV WB9NVN W9NXG KD5OE WB5OXE K5UPN WF4X WB5YDD. Pacific Area (WØHXB, Director) — KT6A NØACW VE6CHK N7CSP NØCXI KU6D WØEJD WD5ESV KB7FE N7FKA W7GHT N6GIW N6GW K6HAD WØHXB KM6I W5JOV KBØMB KA7MJI K7OVK K6OWA WA7OYI KØPCK ND5T W7TGU K6UYK W6YVY KM7Z. *Cycle Four* — Eastern Area (W2CS, Director) — VE3AWE W3BBN KI3C WA4CCK W2CS W1EFW W2FR KB3FW W2GKZ VE3GOL WB3GZU KB2HM W1ISO KN1K AH2M W1NJM W8PMJ W1QYY WB4PNY W3PQ W2RQ K3RZR WA2SPL KB3UD W4UQ AF8V VE1WF W2XD N8XX K4ZK. Central Area (K5GM, Director) — WØAM W9CXY KØEZ K5GM WØHI K5OAF W5RB N5TC W5TFB K5TL WB9UYU KB9X KV5X W4ZJY. Pacific Area (KN7B, Director) — ADØA KN7B KØBN KA7CPT KCØD KØDJ W7DZX NØEBM W6EOT W7EP W7GHT WA7GYQ WØHXB N2IC W7LG W7LYA KAØNLI ND5T WA7TEH W5UH W7VSE W6VZT VE6ZK.

Public Service Honor Roll October 1983

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 SM). 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, no max. This listing is available to Novices and Technicians who achieve a total of 40 or more points. Stations that are listed in the Public Service Honor Roll for 12 consecutive months, or 18 months out of a 24-month period, will be awarded a special PSHR certificate from Hq.

392
WA4CCK
249
KV7W
194
WB7WOW
185
VE3GOL
177
WD4COL
175
WD8MIO
149
KA1GBS
KBØZ
148
WØOYM
147
WF4X
144
W1EOF
143
WB7OGA
141
KA3DLY
133
KAØARP
132
K4JST
130
WB6QBZ
129
KAØEPY
127
WA1YNZ
126
WA4EIC
124
WB2EAG
123
WB2KLF
KA1EXJ
WBØTED
119
K4ZK
WA4QXT
118
KK3F
WB3GZU
WF4Y
117
W2MTA
116
W3YVQ
WD8LRT
KF7R
115
WA4PFK
WB1GXZ
W9YCV
114
N2EBA
WB2MCO
113
AF8V
KB5W
112
KC2QQ
WB1HIH
KC9CJ
W6VOM
111
KA1BBU
WA2FJJ
W1PUO
WB4AID
110
KI1M
VE3BDM
KW9J
WD4ALY
109
KC2TF
N4FQD
N5AMK
NI6A
108
K8KQJ
107
WØKJZ
AL7W
KK1E
KA4GUS
WB4WYG
KS7I
N2XJ
106
K3JL
WD8RHU
KVØG
WB2OMZ
105
KF8J
KA8CPS
W6RNL
104
WA2HEB
WAØTFC
AG2R
WB2VUK
WA4JDH
103
W7VSE
KA1T
KA4AMC
KB3UD
KA3EJG
WB4GHU
KD7ME
102
W3VA
KA8NGR
KT9I
W4CKS
KZ8Q
100
VE3HGJ
W4ANK
99
KQ3T
KA4GFU
98
WB2OWO
W1TN
WA3WIY
N8DSU
WD4CNQ
WB4WII
97
KA2BHR
KT6A
K7GXZ
KA4SAA
KR4V
96
AK1W
N2AKZ
WB2ZCM
KA5HDT
95
KC2SW
W7GHT
WB5CIC
W2VY
K2VX
KB4OZ
94
KA1AVU
VE3HTL
KBØMB
KB4WT
93
VE3WM
KY4U
92
KA1EPO
WB2RBA
N3COY
N5DKW
91
KX7W
WB1GLH
KA3GJT
AG9G
K2ZM
K4KDJ
90
W5CTZ
K6UYK
N1ER
W1KX
VE3GT
KJ3E
N4GDT
KA9OBP
KA9IKR
WB2UVB
WD8OUO
N2ELW
KA4MTX
AA4AT
89
KAØBWM
N1BGW
W1RWG
VE3FGU
VE3DPO
N4PL
KB5UL
NI5V
WB8MTD
KA2OIW
WA4LXP
88
N5TC
W2AET
AI6E
87
WD9FRI
N1ARI
W2BIW
86
KB7FE
K3ZJJ
KB9X
KA9HPQ
KD4TY
WA4YPQ
KA4BCM
K5OAF
K8AGD
85
WA2KOJ
KF4U
AK2E
84
VE3KK
KA7GQP
WB1ABQ
K4VWK
NN4I
83
W6INH
KL7IJG
N1BJW
W2ZOJ
NW4R
82
W5KLV
N1AJJ
KJ3T
N9BDL
KD5FR
WB6DOB
81
WB2IDS
KC3DW
KB4LB
W7LG
K2ZVI
80
KA4BBA
KA6HJK
K3NTD
KD2BE
WØFRC
W2YJR
79
KR7L
KS5V
KU4W
78
KY2P
KB2WI
WB5YDD
N4GHI
77
NØEEH
KA7AID
KN3B
WB5GKH
K1CB
WA9BXB
WD4OCW
K4ZN
76
WD8KBW
KC6NN
WA1TBY
KA1TJ
KA2DQA
WB4YQP
75
WB2GHN
WA3UNX
KA4IUM
WB6RTE
74
W8EK
WA6ZUD
KA5AZK
NG4J
N2DZZ
W1AF
W3DKX
WA6QCA
W9QBH
WA4EYU
WB4TZR
73
KAØKWM
N7BGW
KP4DJ
KC3DW
W9NXG
72
K7LCA
WD4HBP
71
N8CW
W5DTR
KA6BNW
K6TP
K6TWJ
70
AE1T
WA8DHB
W7LNE
WB9IHH
N3BFL
WB2OHR
69
K3CR
WA1DXT
KO7V
VE2CU
VE2EDO
KG9B
WA2YBM
68
K1JHC
K6SI
AIØQ
NT4S
67
WB2PID
WB3KJT
W4WXH
K8JDI
WØLAE
K4WJR
W4FMZ
66
NØGFS
KU2N
W2XD
W2KB
W4LXB
65
KA1ML
K6GND
VE2FMQ
W9DM
N8AWH
KØBM
KT5Y
KA4SKV
KB4OG
64
KCØOO
KØPCK
W6IPL
63
KX7T
KAØBCB
K2GXT
KD7MW
KA8MEB
K5DDV
62
K1WGO
KB3FW
WA4JTE
N5EZQ
61
WB3FKP
WØOUD
WD4PBF
WD4BSC
WA4RNP
60
N3ADU
NW4A
55
N5FDL/T
49
KA8GGZ/T
WB2ANK/T

Brass Pounders League October 1983

BPL Medallions (see April 1979 *QST*, page 77) have been awarded to the following amateurs since last month's listing: N2BOP KB2HM WB2IDS.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

1	2	3	4	5	6
W3CUL	818	956	1355	101	3241
KA9CPA	22	1378	186	870	2456
W9JUJ	1	506	493	0	1000
W1EOF	2	357	540	48	947
W3VR	297	196	312	26	831
N3ADU	0	412	387	1	800
WD8MIO	42	386	182	26	736
KA1GBS	6	350	345	53	754
K6UYK	86	308	297	6	697
W4FX	9	314	330	21	674
AF8V	3	362	265	7	637
WA4JDH	1	313	276	3	593
W7DZX	18	284	272	2	576
WD4COL	52	228	213	71	564
WØFRC	6	227	335	0	562
WB7WOW	16	367	102	63	548
WB1GXZ	12	232	284	9	537
W3ATQ	1	262	268	6	537
AA4AT	15	267	250	4	536
W7VSE	4	271	244	14	533
WB7OGA	34	210	260	29	533
WF4Y	105	249	174	1	529
K8NCV	15	237	248	4	504
KBØMB	151	113	221	17	502
WA4PFK	13	298	175	14	500
Multioperator Station:					
K3NSN	1248	3000	1200	150	5598
BPL for 100 or more originations plus deliveries:					
N5EZM	148				
KH6H	143				
KAØCIR	136				
N5FDL	129				
K8YUW	119				
WØFIR	117				
K2MT	108				

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DLVD.
6 — TOTAL

Independent Nets (October 1983)

1	2	3	4
Amateur Radio Telegraph Society	30	440	285
Central Gulf Coast Hurricane	31	172	2239
Clearing House	31	63	258
Early Bird	31	1000	435
Empire Slow Speed	31	70	409
Golden Bear	31	87	1783
International Amateur Traffic	35	256	—
IMRA	26	690	1357
Mission Trail	31	219	1095
West Coast Slow Speed	31	113	416
20-Meter ISSB	26	805	579
75-Meter ISSB	31	294	1113
7290 Traffic	52	568	3820

1 — NET NAME
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Bill Jennings,* K1WJ

JANUARY

Dec. 31-Jan. 1

ARRL Straight Key Night, Dec. *QST,* page 100. See League Lines, page 12, for details about the dedication of SKN to the memory of Vic Clark, W4KFC.

4

West Coast Qualifying Run, 10-35 wpm, at 0500Z Jan. 5 (9 P.M. PST Jan. 4). W6OWP prime, W6ZRJ alternate. Frequencies are approximately 3590/7090 kHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL for grading. Please include your full name, call sign (if any) and complete mailing address. A large s.a.s.e. will help expedite your award/endorsement.

7-8

ARRL QSO Party, CW, Dec. *QST,* page 100.

40-Meter World SSB Championship, Dec. *QST,* page 100.

75-Meter World SSB Championship, Dec. *QST,* page 100.

9

W1AW Qualifying Run, 35-10 w/min, at 0300Z Jan. 10 (10 P.M. EST Jan. 9). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See Jan. 4 listing for more details.

14-15

ARRL January VHF Sweepstakes, Dec. *QST,* page 96.

Hunting Lions in the Air Contest, Dec. *QST,* page 100.

160-Meter World SSB Championship, Dec. *QST,* page 100.

21-22

ARRL QSO Party, phone, Dec. *QST,* page 100.

Worked All States SSTV Contest, sponsored by *A5ATV,* from 2300Z Jan. 20 until 2300Z Jan. 22. Work as many different states (U.S.) as possible on the video mode. All QSOs must be in video form, with a minimum of call sign and RSV signal reports sent and received. Score 10 points per SSTV QSO, 100 points for "new" states and 500 points for SSTV QSOs with Alaska or Hawaii. Send logs to Contest Manager, c/o *A5 ATV,* P.O. Box H, Lowden, IA 52255.

HA DX Contest, Dec. *QST,* page 100. Note date change. Contest period is 2200Z Jan. 21 until 2200Z Jan. 22.

Michigan QRP Club CW Contest, sponsored by the Michigan QRP Club, from 1500Z Jan. 21 until 1500 Jan. 22. Three entry categories: 1 W or less output power; 5 W or less output power; more than 5 W. Exchange signal report, QTH (state, province or country) and power output. Count one point per QSO and multiply by the number of states, provinces and countries worked per band. Multiply total by 1.5 if using battery or natural power. Mail logs (include s.a.s.e. for results) by March 3 to Contest Manager, Michigan QRP Club, 281 Crescent Dr., Portland, MI 48875.

North Dakota QSO Party, sponsored by the Red River Radio Amateurs, 0000-0800Z and 1600-2400Z Jan. 21 and 0800-1600Z Jan. 22. Work stations once per band and mode. Exchange signal report and QTH (county for ND stations; state, province or country for others). Suggested frequencies: phone — 1.835 3.905 7.280 14.295 21.380 28.580; cw — 1.810 3.540, 35 kHz up from band edge; Novice — 25 kHz up from band edge. Count 10 points per phone contact, 20 points per CW contact and 50 points per RTTY contact. ND stations add 100 points for working five Novices. ND stations multiply points by number of states/provinces/countries worked; others multiply by total ND countries worked (max. 53). Mail logs by Feb. 28 (include a large s.a.s.e. for results) to Mike Beaton, KDØA, 2267 Flickertail Dr., Fargo, ND 58103.

Texas QSO Party, sponsored by the West Texas ARC, from 0000Z Jan. 21 until 1800Z Jan. 22. 80-10 meters only. Work stations once per band or as they change county. Single operator only. CW QSOs only in CW sub-band. Exchange serial number and QTH (county for TX stations; state, province or country for others). Suggested frequencies: phone — 3.940 7.260 14.280 21.370 28.600; CW — 65 kHz up from band edge; Novice — 10 kHz up from band edge. TX stations count one point per phone QSO and two points per CW QSO; multiply by the number of TX countries, states, provinces and countries worked. Others count one point per phone QSO and two points per CW QSO with TX fixed stations; and 5 points per phone QSO and 7 points per CW QSO with TX mobile stations. Multiply by total number of TX counties worked (max. 254). Logs must be received by March 15. Mail to Tom Horton, K5IID, 2708 Halifax Ave., Odessa, TX 79762.

AGCW-DL QRP Winter Contest, CW only, sponsored by Activity Group Telegraphie, from 1500Z Jan. 21 until 1500Z Jan. 22, 160-10 meters. Single ops may operate 15 hours only; multiop stations may use the entire 24-hour period. Single ops enter 3.5-W input or less class, 10-W input or less, or QRO (more than 10-W input class); multiops 10-W input or less, or QRO. Work each station only once per band. Exchange RST, serial number and power input (add "X" to exchange if you are crystal-controlled). Count 1 point for QSOs with own country, 2 points for QSOs within own continent and 3 points for DX QSOs (outside own continent). Count one multiplier for each country worked and one multiplier for each DX QSO. Log by band. Multiply points by multipliers per band; add band scores for multiband entries. Crystal-controlled stations double points. Mail logs to reach sponsor by March 3. Send entries to Siegfried Hari, DK9FN, Spessartstrabe 80, D-6453 Seligenstadt, Fed. Rep. of Germany.

VE1 Contest, CW, for VE1 Amateurs only, sponsored by the New Brunswick ARA, from 1100Z until 2300Z Jan. 22, 75 meters only; CW-to-CW QSOs only. Exchange call, name, county, province and signal report. Score 1 point for exchange sent and 1 point for exchange received. Multiply points by the number of counties worked in the three Maritime Provinces. Sable and St. Paul count as separate counties. Maritime mobile stations count as their home county. Logs postmarked by Feb. 25 to Herb Shaw, VE1YC, 920 Broadview St., Bathurst, NB E2A 3S9.

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W1AW Qualifying Run, 10-35 w/min at 2400Z (7 P.M. EST) Jan. 24. See Jan. 9 listing for more details.

28-29

CQWW 160-Meter Contest, CW sponsored by *CQ,* from 2200Z Jan. 28 until 1600Z Jan. 30. CW only (phone Feb. 25-27). W/VW stations count 2 points per W/VE QSO and 10 points per DX QSO. DX stations count 2 points per QSO with own country, 5 points other country and 10 points per W/VE. Multiply by sum of states, provinces and DXCC countries (incl. KH6 and KL7). Exchange signal report and serial number; W/VE stations also send state/province. Avoid the 1825-1830 DX window. Mail entry by Feb. 26 (March 29 for phone) to Don McClenon, N4IN, 3075 Florida Ave., Melbourne, FL 32901.

Michigan YL QSO Party, sponsored by The Auto State Young Ladies, from 1800Z Jan. 28 until 1800Z Jan. 29. Work each station only once. No crossband, net or repeater QSOs. Exchange call, signal report, QTH (ARRL Section or country) and TASYL Number (if applicable). Score 1 point for phone QSOs, 2 points for CW QSOs (double points for working a TASYL member). Multiply QSO points by the number of different ARRL Sections and DXCC countries worked. Entries must be received by Feb. 25. Mail to Carol Hall, WD8DQG, 4651 Cardinal Dr., Mt. Pleasant, MI 48858.

French Contest, CW, sponsored by the Reseau Des Emetteurs Francais, from 0000Z Jan. 28 until 2400Z Jan. 29 (phone, 0000Z Feb. 25 until 2400Z Feb. 26). Single ops operate only 36 hours. Work French stations, including overseas territories and DA1/2 French Military stations. Exchange signal report and serial number. Count 3 points per QSO. Multiply by total of French Departments (max. 96), DA1 DA2 and FC, all countries of the DUF (Diplome De L'Francaise) and the other "Francophone" countries: HB, ON, HH, LX, OD, VE2, 3B, 4U, 9U, 9Q and 9X. Each of these multipliers count once per band. Mail within 30 days to REF, Contest Committee, Square Trudaine 2, 75009 Paris, France.

UBA Trophy Contest, CW, sponsored by the Union of Belgian Amateurs, from 0600Z Jan. 28 until 1800Z Jan. 29 (phone 0600Z Feb. 25 until 1800 Feb. 26); 80-10 meters. Entry classes: single operator-all bands may operate only 26 hours; single operator, 80 and 40 meters only, may operate only 16 hours; multioperator-single transmitter may operate 36 hours. Exchange serial number and signal report. Log by band. Count 10 points per QSO with ON station and Belgian Military station in Germany, 1 point for QSO with stations in one of the French countries (see French Contest rules above). Multipliers are Belgian Provinces plus BFG (BSD) or (FBA) for a maximum of 10 per band. Final score equals total number of QSO points times total number of multipliers. Entries must be postmarked by March 1 (April 1 for phone). Mail to UBA HF Contest Committee, Galicia Jan, ON6JG, Oude Gendarmeriestraat, 62, B-3100 Heist Op Den Berg, Belgium.

Classic Radio Exchange, sponsored by the Southeast ARC, from 2100Z Jan. 29 until 0400Z Jan. 30. Object is to restore, operate and enjoy old equipment built since 1945 but at least 10 years old. Exchange name, signal report, state/province/country, receiver and transmitter type. The same station may be worked again with different equipment combinations on each band/mode. Suggested frequencies: phone — 3.910 7.280 14.280 21.380 28.580; CW — 60 kHz up from lower band edge; Novice/Technician — 20 kHz up from lower band edge. Add the number of all the different transmitters and receivers worked plus the different states/provinces/countries worked per band. Multiply that number by the total number of QSOs. Multiply that total by the total years old of all your transmitters and receivers used (minimum three QSOs per unit). For transceivers, multiply years old by 2. Mail logs (include s.a.s.e. for results) to Stu Stephens, K8SJ, 1407 Hollyrood Rd., Sandusky, OH 44870.

28-Feb. 6

ARRL Novice Roundup, this issue, page 79.

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West Coast Qualifying Run, 10-35 w/min at 0500Z Feb. 1 (9 P.M. PST Jan. 31). See Jan. 4 listing for more details.

FEBRUARY

4-5

Arizona QSO Party, sponsored by the Southern Arizona DX Assn., from 1800Z Feb. 4 until 0600Z Feb. 5. Work each station once per band per mode. Exchange signal report and QTH (county for AZ stations; state, province or country for others). Suggested frequencies: phone 3.895 7.230 14.280 21.365 28.560; CW — 60 kHz up from lower band edge; Novice — 25 kHz up from lower band edge. Count 1 point per phone QSO, 2 points per CW or other mode QSOs, 4 points per QSO with Novice/Technician in the Novice bands. AZ stations multiply by number of states, provinces and DXCC countries. Others multiply by the number of AZ counties (max. 15), and double multiplier for working all AZ counties *and* club station W7NQ. Club competition, also. List your club name on your entry, and have your club secretary send list of eligibles to sponsor. It takes five individual entries to make the club listings. Logs must be received by March 4; mail to SADXA, Philip Stickney, N7BUP, 1890 West Paseo Cuenca, Tucson, AZ 85704.

New Hampshire QSO Party, sponsored by the New Hampshire ARA, from 1900Z Feb. 4 until 0700Z Feb. 5 and 1400Z Feb. 5 until 0200Z Feb. 6. Work stations once per band and mode. Exchange signal report and QTH (county for NH Stations; ARRL Section or country for others). Suggested frequencies; phone — 3.935 3.975 7.235 14.280 21.380 28.575 50.115 145.015; CW — 1.810 3.555 3.730 7.055 7.130 14.055 21.055 21.130 28.055 28.130; RTTY — 3.625 7.085 14.085 21.085 28.085. NH stations count 1 point per QSO and multiply by total NH counties/ARRL Sections/countries worked. Others count 5 points per QSO and multiply by total NH counties worked. Logs must be postmarked by March 15 (incl. s.a.s.e. for results).

*Assistant Communications Manager, ARRL

Send to Pete Cantara, K1IM, 19 Haverhill St., Hudson, NH 03051.

Vermont QSO Party, sponsored by the Central Vermont ARC, from 2100Z Feb. 4 until 0700Z Feb. 5 and 1100Z until 2400Z Feb. 5. Stations may be worked three times per band (once each on CW, phone and RTTY). CW and RTTY QSOs must take place in the appropriate subbands. Exchange serial number and QTH (county for VT stations; state or province for others). Suggested frequencies: phone — 3.910 7.230 14.260 14.320 21.360 28.570 50.110 144.2; CW — 3.503 3.730 7.030 7.130 14.060 21.060 21.160 28.060; RTTY — 3.620 and up 90 kHz from lower band edge on other bands. Count 1 point per phone QSO, 2 points per CW or RTTY QSO. Multiply by number of states plus provinces plus DXCC countries for VT stations; others multiply by number of VT counties worked (max. 14). Official log sheets available for s.a.s.e. to sponsor. Mail entry by March 1 to D. Nevin, KK1U, W. Hill, Northfield, VT 05663.

Zero District QSO Party, sponsored by the Davenport RAC, from 1900Z Feb. 4 until 0100Z Feb. 5 and 1500Z until 2400Z Feb. 5. Zero district stations may work anyone; those outside of the zero district may only work Ø-district stations. 80-10 meters only. Each station may be worked only once per band and mode (CW and phone). Mobile stations may be worked again as they change counties. Suggested frequencies: CW — 60 kHz up from lower band edge; Novice — 25 kHz up from lower band edge; phone — 3.900 7.270 14.300 21.370 28.570. Phone QSOs are worth 1 point; CW QSOs are worth 2 points. Zero district stations multiply QSO points by total of ARRL Sections, Ø-district counties and DXCC countries worked. Others multiply QSO points by number of Ø-district counties worked. Mail logs by March 10 to WØBXR, 2131 Myrtle, Davenport, IA 52804.

VE1 Contest, phone, 1100Z until 2300Z Feb. 5. See Jan. 21-22 listing for more details.

North American Sprint, CW, sponsored by the *National Contest Journal,* from 0100 to 0459Z Feb. 5 (phone contest 0100-0459Z Feb. 12). Contests are separate; 80, 40, 20 meters only. Suggested frequencies: CW — 3.530-3.550 7.030-7.050 14.030-14.050; phone — 3.870-3.910 7.210-7.240 14.260-14.290. For a valid QSO, you must send and receive *all* of the following information: other station's call, your call, serial number (consecutive starting with 001), your name and state (or province/country). An operator may use only one call sign during the contest. Multiply valid QSOs by sum of states, provinces and North American countries (not W/VE). KH6 is not counted as a state or as an NA country. VE mults. are Maritimes (VE1, VO1, VO2) and VE2 through VE8 (8 max.) Non-NA countries do not count as multipliers. Special QSY rule: Stations soliciting a call by sending CQ, QRZ, etc., are permitted to work only one station in response to that solicitation. They must thereafter move at least 1 kHz before working any other station, or at least 5 kHz before again soliciting calls. Team competition: Each team has a maximum of 10 members as a single-entry unit. Clubs having more than 10 members may submit more than one team entry. To qualify, the name and call sign of each operator (and station operated if a guest op) must be registered with W6OAT. The team information may be contained either in a letter received by W6OAT before the start of the Sprint or in a Western Union mailgram dated at least 24 hours before the start of the Sprint. There are no distance or meeting requirements for a team entry. CW and phone teams are separate. Entries must be *received* no later than 30 days after the Sprint. Mail CW entries to Rusty Epps, W6OAT, 948-H Kiely Blvd., Santa Clara, CA 95051. Phone entries go to Rick Niswander, K7GM, 1914 W. Cortez Circle, Chandler, AZ 85224.

YU WW DX Contest, sponsored by the Savez Radio-Amateur Jugoslavije, from 2100Z Feb. 4 until 2100Z Feb. 5. CW only, 3.5 and 7 MHz. Suggested frequencies 3.520-3.590 and 7.010-7.040. Exchange signal report and serial number. Count 5 points per YU QSO (10 points on 3.5 MHz), 4 points for other DX QSOs (5 points on 3.5 MHz) and 2 points for QSOs on your own continent (3 points on 3.5 MHz). Multiply by the number of DXCC countries plus YU prefixes worked per band. Single ops must remain on a band for at least 30 minutes; multiops at least 10 minutes. Band changes to work new multipliers may be made at any time. Mail logs by March 15 to Savez Radio-Amatera Jugoslavije, YUDXC, Box 48, 1101 Beograd, Yugoslavia.

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W1AW Qualifying Run, 10-40 WPM at 0300Z Feb. 8 (10 P.M. EST Feb. 7). See Jan. 9 listing for more details.

11-12

North America Sprint, phone, see Feb. 5 listing.
PACC Contest

18-19

ARRL International DX Contest, CW.
Roman Castles International Trophy Contest

Amateur Satellite Program News

Conducted By
Bernie Glassmeyer,* W9KDR

AMSAT ANNUAL MEETING AND SYMPOSIUM

The November 12 AMSAT Annual Meeting was considered the "best ever" by those who attended. Reservations were quickly filled for the 200 lunch and dinner allocations. The AMSAT meeting went like clockwork. AMSAT and its many volunteers can be proud that the meeting was such a success. Ballots were counted at the meeting, and the directors' election results were announced. The winners are W3GEY, W6SP, W6XN and VE2VQ. Incumbents serving one more year on their terms are W3IWI, G3IOR and JA1ANG. W3TMZ was chosen first alternate, and WØRUE second alternate.

Also announced was the new editor of AMSAT's *Orbit* magazine: KB2M. ARRL congratulates WA2LQQ on his editorship through the 15 issues of *Orbit* thus far.

We will have more information on the AMSAT Annual Meeting next month, as details were not available in time for this issue.

AMSAT Officers Elected

Elected at the November 19 meeting of the AMSAT Board of Directors were President, W3IWI; Executive Vice President WA2LQQ; Senior Vice President K8OCL; Vice President of Operations KO5I; Assistant Vice Presidents of Operations WØRPK and WH6AMX; Vice President of Engineering W3GEY; Assistant Vice Presidents of Engineering KA9Q, NK6K and W2FPY; Treasurer W3TMZ; Corporate Secretary Martha Saragovitz. Congratulations to the new team of AMSAT officers.

Letter to All IARU Societies

On November 17, the following letter was sent from ARRL to the 117 IARU Societies:

Dear Sister Societies:

Operation through AMSAT-OSCAR 10 has become an important communications resource for Amateur Radio on a worldwide scale. To keep pace with this exciting new resource, it will be necessary to educate users and potential users on proper satellite operating procedures.

Please assist us by passing this operating information on to your members. Reprinting the information in your journals would be most helpful.

The most important operating procedure, and the one that is abused the most, is regulating users uplink power. AMSAT has now set the guidelines for maximum uplink power levels for both Mode B and Mode L transponder operation.

Preliminary power levels that have been published prior to this notice are now changed to the following:

Mode B

The maximum user uplink power should not exceed 500 W EIRP. This would be approximately 300 W ERP. It is possible to access the satellite with as little as 10 W into a 10-dBi gain antenna when the uplink power levels are not exceeded.

AMSAT requests that UTC Mondays be set aside for QRP operating using no more than 100 W. During these QRP periods, the transponder can accommodate more users and the weaker signals can be heard without degradation of signals. AMSAT and ARRL ask that users make every day a QRP day.

The users who violate the satellite operating procedures only discourage others from communicating with them. Violators can be identified easily because their signals will be stronger than the AMSAT-OSCAR 10 beacon. Excessive uplink power only makes the weaker signals disappear, and weakens the signals of those who are making an effort to communicate properly.

Mode L

The Mode L transponder is not operating as well as expected, possibly because the spacecraft 1269-MHz receiver cannot be switched from the omnidirectional antennas. The exact reasons for the poor performance have not been fully determined. Nonetheless, a high amount of uplink power is required.

Currently, the AMSAT recommended uplink power level for Mode L is 25-kW EIRP. This present condition may eventually be remedied; an engineering investigation is being conducted by AMSAT.

We will try to keep you informed of the latest recommended AMSAT operating procedures. Both ARRL and AMSAT thank you for your assistance.

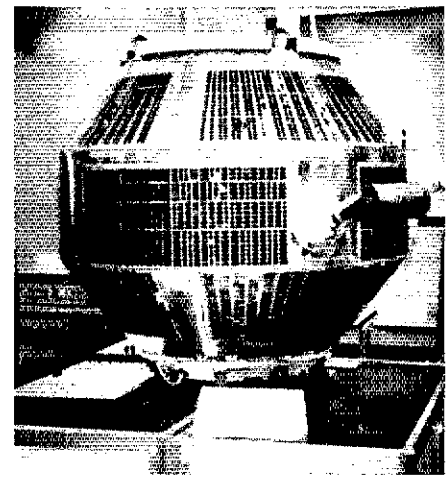
73,
Bernard D. Glassmeyer, W9KDR
Satellite Program Manager

Monthly Listings

☐ *ASR* (Amateur Satellite Report) is available for $22 ($30 overseas) for 26 issues (1 year) from Amateur Satellite Report, 221 Long Swamp Rd., Wolcott, CT 06716.

☐ AMSAT Membership is available for $24 per year; $26 outside North America. Life Membership is $600. Subscription to six issues of *Orbit* magazine each year is inseparable from membership. Write to or call AMSAT Headquarters, P.O. Box 27, Washington, DC 20044, tel. 301-589-6062. VISA/MC cards accepted.

☐ ARRL members only: Send a 4- × 9-in S.A.S.E. with your call sign to the Club and Training Department, ARRL Hq., for a complete, monthly orbit schedule for all operating amateur satellites. A year's supply of s.a.s.e.'s may be sent at one time; be sure to include 2 units of postage for each s.a.s.e. Further information on the Amateur Radio Satellite Program can also be obtained free of charge from ARRL Hq.



Soviet RS 10 Seen at TELCOM '83

The accompanying photo of the Soviet RS 10 satellite was taken by JA1AN at the World Telecommunications Exhibit. The event took place in Geneva, Switzerland, from October 26 to November 1. The last event, four years ago, had a display of the presently orbiting RADIO satellites (RS 3 through RS 8). We have no information on this new satellite yet, but if a picture is worth a thousand words, I'm sure the words will follow a successful launch.

*Satellite Program Manager, ARRL

Section News

The ARRL Field Organization Forum

Coordinated By Jim Clary, WB9IHH

CANADIAN DIVISION

ALBERTA: SM, E. Roy Ellis, VE6XC — SM/SEC: VE6XC. A/SM: VE6AMM. STM/NM (APSN & ATN)/DEC: VE6ABC. VE6ABC is CRRL Amateur of the Year. He wears several hats and the award will be presented soon at NARC. A lot of planning went into a prov SET but sigs did not cooperate. Theme of SET was requesting comments on MOU between hams and govt. Regret to report that VE6CJU became a Silent Key this month. Traffic: VE6CHK 304, VE6ABC 100, VE6BKP 20, VE6AMM 10, VE6AVV 7, VE6CPE 2, VE6EB 2, VE6FS 2, VE6HF 1, VE6YW 1.

BRITISH COLUMBIA: SM, H. Ernie Savage, VE7FB — British Columbia Emergency Net, reports the October QNI's up considerably over past months. Our newest member, VE7FPM, obtained ticket nine months ago and took on NCS with perfect code and control, which only proves that local CW nets that control WPM speed limit of fifteen pays. IMN net also maintains 15 WPM speed. Of course, off net the speed is suited to the operators. We have many appointments open to League members; please ask. B.C. Phone Net has maintained its average check-ins. NM VE7QC has been in hospital for a spell. VE7ZA aboard the S.S. Hope in the South Seas as radar person and his XYL is aboard as trained nurse. They are on 14128 at 0530Z. Traffic: VE7BNI 205, VE7CDF 175, VE7EDN 57, VE7EWI 44, VE7FB 12, VE7BZI 7, VE7ARR 2.

MANITOBA: SM, Peter Guenther, VE4PG — A/SM: AJE. STM: OO. SEC: HK. NMs: IX VJ NM. SET was delayed this year till October 29. Indications are that the turnout was satisfactory. All nets seem to show an increase in QNI as well as traffic. MTN QNI 90, QTC 78, sess 30. WRIN QNI 313, QTC nil, sess 9. MMN QNI 575, QTC 34, sess 31. MEPN QNI 1094, QTC 27, sess 31. Traffic: VE4PG 68, VE4AJE 50, VE4IX 36, VE4TE 35, VE4RO 34, VE4JA 22, VE4AAD 21, VE4BI 17, VE4FK 11, VE4CF 7, VE4DT 6, VE4LB 5, VE4NE 5, VE4ADS 4, VE4DS 4, VE4CR 2, VE4JF 2, VE4MG 1, VE4TK 1, VE4XN 1.

MARITIME/NEWFOUNDLAND: SM, D. R. Welling, VE1WF — Looking for assistance with various appointments. Any volunteers? VE1ASJ and group completed a successful DXpedition to St. Paul Island. They had over 20K QSOs. VE1ZP named as Net Mgr for Mar. Phone Net; congrats. Work on repeater directory listings nearly completed. Two new prefixes issued: CY0 for St. Paul and CY9 for Sable. Congrats to MAARC exec.: VE1BOT, pres.; VE1CDV, v.p.; VE1CKW, secy.; VE1BX, treas. Silent Keys: VE1BHF VE1ANS VE1DD VE1JX VE1ABW. APN: 30 sess. QNI 117, tfc 51, time 299. Traffic: VE1WF 300, VE1BPM 68, VE1ALU 16, VE1BXA 11, VE1BPM 5.

ONTARIO: SM, Larry Thivierge, VE3GT — BM: VE3IBV. PGL: VE3GV. SEC: VE3GV. STM: VE3HTL. TC: VE3EGO. I am pleased to announce the appointment of Syd Horne, VE3EGO, as the section's Technical Coordinator. I'm sure he needs no introduction to Ontario/Canadian amateurs. Cornwall has a new repeater, VE3OJE located at Moose Creek, 144.77 in/145.37 out. VE3KTX has received her YLCC award. Regretfully I report the following Silent Keys: VE3GLD VE3HMJ VE3ZU. Many OTs will remember VE3ZU as VE3BUX, the Section's SCM from 1968 to 1970. This year's SET went quite well with activity from the northwest from Fort Francis, Dryden, Kenora, Sioux Narrows and Sault Ste. Marie. Thanks to all those who helped and participated. Any comments you may have regarding the SET are most welcome. A revision of the section's Traffic Training Manual will soon be under way. Welland Co. ARC, formed in 1967, now has a membership of 82 local amateurs. VE3BBW has moved to the Belleville area. Congrats to VE3FP who recently received an award from the Central Canada Broadcast Engineers for his pioneering efforts in radio. The mayor of Tecumseh is VE3EZJ. VE3LAC will feature code practice sessions operated by VE3WM at 1930 local on Tues/Thurs. Will VE3DZH be able to hear it? DOC Notice No. DGTR-018-83 dated 14th Sept. is the latest update of banned countries, third party and reciprocal operating agreements. VE3SKY and VE3KBR are now "right side up." VE3KQS is on the air from the Toronto area with a bulletin board and mail box operating on 7.0465 MHz + or – 100 Hz. He will try to maintain the system 24 hours a day and solicits your support. To each and every one, may 1984 be your year. Traffic: VE3GOL 324, VE3KK 284, VE3HGJ 270, VE3HTL 229, VE3GT 217, VE3BDM 166, VE3KCZ 123, VE3FGU 98, VE3CYR 93, VE3WM 85, VE3EUI 80, VE3AJN 77, VE3JSM 77, VE3DPO 76, VE3AWE 73, VE3GFN 68, VE3KXB 64, VE3DZH 58, VE3BVG 39, VE3BSY 38, VE3BAJ 36, VE3WV 26, VE3EWD 19, VE3WG 14, VE3KLX 10. (Sept.) VE3KXB 40, VE3BAJ 23.

QUEBEC: SM, Harold Moreau, VE2BP — SEC: VE2DEA. STM: VE2EDO. PIO: VE2YW. BM: VE2ALE. TC: VE2ED. NMs: VE2EDO VE2FSA. Trois-Rivieres ARC (VE2MO) celebrated its 60th anniversary on Oct. 22. About 150 amateurs were present. Congrats to VE2FJR for his DXCC (mixed). VE2WJ was elected president of Sherham ARC (Sherbrooke). Fellicitations a VE2FKD, qui a ete re-elu comme president de l'UMS. VE2DVX, anime une table ronde tres interessante tous les mardi soir sur VE2TA Avec regret j'ai a vous informer du deces de VE2AIZ. Traffic: VE2EDO 75, VE2BP 52, VE2EC 38, VE2FFE 35, VE2EKC 26. (Sept.) VE2CU 52.

SASKATCHEWAN: SM, W. C. Munday, VE5WM — SEC: VE5RP. STM: VE5HG. TC: VE5GF. NMs: SATN-VE5BAF; SPN-VE5NJ; PWXN-VE5EX; RARA2-VE5OI; SKTN2-VE5HG; MJARC2-VE5AFA. Net reports: SATN 30 sess. 116 QNI, 10 QTC; SPN-31 sess., 1076 QNI, 43 QTC; PWXN 31 sess., 503 QNI; RARA2 31 sess., 561 QNI, 5 QTC; SKTN2 15 sess., 44 QNI; MJ2 30 sess., 294 QNI, time in session 276 minutes. With winter approaching, not only birds migrate to warmer climates, but VE5DR VE5JS and VE5LV are three hams that I know of that will be escaping SK winter blasts. A total of 46 amateurs, 8 from Moose Jaw and 38 from Regina provided communications for Regina's United Way "Arms Around Regina" Project. Traffic: VE5BAF 41, VE5HG 35, VE5UX 27, VE5AEJ 19, VE5NJ 10, VE5WM 4.

ATLANTIC DIVISION

DELAWARE: SM, Harold K. Low, WA3WIY — STM: W3DKX. SEC: W3PQ. PSHR: K3JL WA3WIY W3DKX. Congrats to KA3ITN and WA3QLS on the birth of a daughter. DARC new officers; K3HBP, pres.; AE3H, v.p.; WB3GXD, treas.; N3CGH, secy. The Worked All Delaware Counties certificate officer is N3CGH. Send proof and 27 cents postage. Kent ARC had visitors from the National Weather Service in Wilmington and the coordinator of Del. SKYWARN net. Operation of the net was explained. SARA handled communications for a second walk for world hunger. There were 12 members active. DTN: QNI 438, QTC 48 in 21 sess. DEPN: QNI 81, QTC 14 in 5 sessions. SEN: QNI 46, QTC 1 in 4 sessions. Traffic: W3QQ 72, W3DKX 56, WA3WIY 46, WB3DUG 36, K3JL 27, WA3PWT 10, W3WD 6, K3ZXP 5.

EASTERN PENNSYLVANIA: SM, Karl W. Pfeil, W3VA — ACC: KB3NE. SEC: WA3PZO. SGL: N3CJP. STM: KB3LF. DEC: AA3C K3QXC KB3LR KB3UD N3AIA N3BFL W3EEK.

Net	Freq.	Time	QNI	QTC	Sess.
EPAEPTN	3917	6 P.M. Dy	586	232	36
EPA	3610	7/10 P.M. Dy	468	209	63
PTTN	3610	6:30 P.M. Dy	245	143	33
PFN	3958	5 P.M. Dy	211	174	31

Local and VHF nets reporting (QNI/QTC/sess.): D3ARES 167/36/7; D5ESN 140/36/6; D6ARES 36/1/4; Cumb. Co. Cty ARSN 33/9/4; ESV ARSN 33/0/4; PWA ARES 92/1/5; PFN (Sept): QNI 182, QTC 175 in 30 sess. New appointments: K3NTD to ORS; N3DMB to OO; welcome aboard. BPL: K3NSN. OO report W3KEK. OBS reports: KA3EJG KO3M W3AVJ W3VA. PSHR: K3NTD KA3DLY KA3EJG KA3GJT KB3FW KB3UD N3BFL. N3BSK N3COY W3VA WA3JRL WB3FKP. EPAEPTN welcomes KA3BVJ N3CWB N3DMB. PTTN welcomes KN3M. Upgrades: N3CFE to E; N3CWB to A. New call signs: KR3J/KB3HV; N3DQE/KA3GUT; N3DQZ/KA3KGN. New gear: KA3IME IC745; WA3WDX LC271E. K3YD spent 2 weeks at Ft. Bragg, NC and was promoted to Major in U.S. Army Reserves. SET messages were received from K3QXC KA3s CHB DLY EJG KB3UD N3s BFL COY W3s AQN KNE WA3s DFU PZO WB3JYY WB8KPE on commercial power and K3s QXC YD KA3s EAQ GJT KB3JW N3s AIW AOG BAY CFE DCR W3s AQN EEK WB3EPU on emergency power. K3NTD reports for first time; welcome aboard. K3QXC, DEC D2, sporting a new 80-mtr dipole. Penn Wireless Assn. finished first in Class 7A and Tamaqua ARA finished first USA in 2A battery (B) in June's Field Day. KA3DLY QRL in SET with 12 sessions, 3 NCS and 2 liaisons. FB. WA3ADE is on 6 mtrs with all-mode gear and wants to know many remember the old 5-mtr band? WA3CKA enjoying cool fall weather by doing some hunting in the nice woodlands near his QTH. N3AKO has new 80/40-mtr dipoles at his new QTH. WA3JRL, EC Montour Co., reports Central Susquehanna Valley ARS net now active every Tues. at 7 P.M. local time on 147.30/90 rpt. Notice to all NCs; Please get net reports to your NM ASAP so he can get his reports in on time. Traffic: K3NSN 5698, N3COY 326, KB3UD 263, KA3DLY 218, KB3FW 176, W3IPX 173, WB8KPE 120, W3VA 96, KA3GJT 89, K3NTD 86, AA3B 78, N3CD 67, WA3WQP 63, KA3EJG 59, W3AQN 41, K3QXC 32, N3BFL 32, W3CL 23, WA3ZMC 22, W3FAF 21, W3TWV 21, N3AIW 20, W3ADE 20, WB3FKP 17, KO3M 14, N2BSK 13, W3HK 10, WA3CKA 9, N3CMC 5, W3AVJ 5, AF3Z 5, K3YD 2. (Sept.) WA3WQP 94.

MARYLAND — DISTRICT OF COLUMBIA: SM, Karl R. Medrow, W3FA — Get in touch with PIO KA3DBN. He is all cranked up to help your club! Your SEC WA3TAI and the EC's need your inputs, too. Clubs are missing out on SSC; see ACC KA3DRO. STM WB3GZU and W3FA can be found on the MEPN! KC3DW made PSHR in August with points to spare — trouble is I forgot to list him! Sorry. KA3R found a number of poor signals this month. W3CDQ opines there is too much going on in October! You gotta hear W3ZNW's keyboard to believe it! KB3WL is as far north as you can get and stay in MDC. KJ3E has a hand field and is enjoying ham radio again. WB3KJT becomes a grandpa for the second time, and N3BBQ for the first time; congrats. W3YVQ has RACES and Red Cross agreements with 12 counties; good job. W3LDD and KC3DW were 100% on the MEPN. KC3Y has been keeping EAN skeds! WB3BFK nicely balances the PON and MARS nets. W3UT is our Sat nite 3RN man. KA3EWV dedicated the new BRASS clubhouse with KA3DXZ chairperson for the event. W3HVS likes the nets now that he can get there. KB3NL has a new tribander, new 2-mtr beam and is into VTRs. KC3AV is manager of MSN. This gang helped the AARC spread "Chesapeake Appreciation Day" traffic to all! KC3Y & K3NNI made points on this one as did KK3F. W3DQI reports the Laurel ARC officers are: K3IOG, pres.; KA3KID, v.p.; W3HSS, secy.; N3CKD, treas.; KA3HRD, member-at-large. WA3VPL has the Queen Anne's ARC on the air. W3FZV made a few of state QSO parties. N3QA is back from sea and helping MDD/3RN. KJ3T is moving to Fla. N3IT doubled her traffic count this month. WB3GZU missed BPL by a whisker! Bulletins and news letters are appreciated from Goddard ARC, Columbia ARA, FAR, Laurel *Feedback* and Chesapeake Bay ARA. With the nets (sessions/tfc/QNI avg.): WC 2-Mtr/KC3DW 4/2/15.3; MDC PON/W3OYY 4/6/15.5; WR PON/WB3BFK 22/38/11; MSN/KC3AV 37/119/7.8; MEPN/WB3GZU 30/148/30.3 (with WA3IHW and W3YVQ missing 3 or less); MDD/W3PO 63/300/10.2. Brass W3FA W3QQ and KJ3E. Traffic: WB3GZU 497, KC3DW 246, KC3Y 226, KJ3E 205, W3YVQ 190, W3FA 190, KK3F 108, KC3AV 92, WB3KJT 67, KA3EWV 67, KJ3T 66, KB3WL 65, K3NNI 50, W3UT 30, W3DQI 22, W3FZV 21, N3IT 16, WB3BFK 15, W3ZNW 15, N3QA 14, WA3VPL 14, W3LDD 12, W3HVS 6. (Sept.) N3TT 8.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB — SEC: K2NE. STM: WA2HEB. SGL: W2XQ. BM: WB2UVB. TC: W2IJX. PIO: WA2RVE. OO: WB2UBG. Through an oversight, the New Jersey Slow Net (NJSN) was omitted from the 1983-84 *Net Directory*. This net, which meets daily on 3735 kHz at 6:30 P.M. local time, is one of the best, if not THE best, public service training nets in Amateur Radio today. All operators, whether those just wanting to increase their code speed or those who are looking to become public service oriented should seriously consider checking into this net. Many of our A-1 ops and BPLs of today are graduates of NJSN. For details contact WB2IQJ. I am pleased to announce that Bob Spain, WA2RVE of Blackwood, has been appointed to the important position of section Public Information Officer (PIO). He is in the process of contacting each League affiliated club in the section to open up a steady flow of PR type information. Hopefully, each club will be able to share with other groups their favorable press releases and such. For info contact WA2RVE at RD2, Box 564, Blackwood 08012. Traffic: WB2UVB 171, WA2HEB 155, KC2PB 34, WA4JRB 28, KA2ANJ 23, KA2CQX 15, W2IU 11, WA2MGV 5.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA — SEC: W2BCH. STM: W2ZOJ. ACC: N2EH. BM: W2GLH. TC: W2QR. OO/RFI: W2AET. PIO: WA2PUU. SGL: KO2X. Owing to a filing error at ARRL Hg. in November, this report contains both September and October reports. LEAGUE MEMBERS in WNY now at 2833, with 52 active affiliated clubs; other clubs are invited to enroll. NOVICE CLASSES: Cortland — K2ZER; Ticonderoga — KA2KSM; GRAM — K2OS; Syracuse — NA2C; DeWitt — KC2OY; Rochester — N2EH; Rome — WA2NKE; ARATS — N. Tonawanda; Black River Valley — WA2OEP; Tompkins Co. — KO2X; Champlain Valley ARC — N2BN. COMMS: GRAM Great American Balloon Extravaganza — W2FEY; National Girls Softball Tourney at Binghamton — WB2GHH; Rome Triathalon — W2IXR; NIMO Nine-Mile Drill — KA2NHR; Wine Glass Marathon Chemung/Steuben — W2GJ. Plattsburg "Goblin Patrol" and Pyramid Mall Public Booth. WNY staff met Nov. 4-6, concluding that we communicators need to better communicate. Clubs are invited to INVITE any above listed WNY Section leadership to hear more about discussions at Newark Valley. ARES District ECs: WA2AIV Western; KA2BHR Central; WB3CUF Mohawk; KB2KW Southern; WB2ANO Northern. The 1983 Simulated Emergency Test was a "cakewalk." NTS was active, but not overtaxed, as indicated by activity on Eastern Area Net. (W2MTA NCSed 3 of the 4 Sunday sessions.) Only a FEW of the MANY county ARES groups exercised during the two-month SET time period. With the many local communications supported events each year, is SET becoming passe? Really? KA1YE/B is on 28.2665 MHz beacon continuously in the Rochester area. OBS K2KWK SKED Sundays 2045 on 146.88 and 146.79, Mondays 1215 on 145.11, and at 1930 on 145.31. REMEMBER: ARRL National in New York July 19-21 and Rochester May 18-19. Thanks UNYREPCO for the invite to Rome meeting; hope we helped. WA2OEP and Rae had full month in Lewis Co. BPL (Sept.): K2GXT WA2FJJ. PSHR (Sept.): W2AET KA2BHR N2BLX WA2FJJ VE2FMQ W2GJ K2GXT WB2IDS WA2KOJ W2MTA KU2N WB2OWO KC2QQ WB2RBA KC2SW W2ZOJ. PSHR (Oct.): W2AET KA2BHR KA2DQA WA2FJJ VE2FMQ K2GXT WB2IDS WA2KOJ W2MTA KU2N WB2IWI WB2PID KC2QQ

WB2RBA KC2SW W2ZOJ. Net statistics (Sept./Oct.)

NARASEN	75/15	0930/Sn	168-005-08
NYS/1*	3677	1000/Dy	499-209-61
Mike Farad	3925	1300/M-S	282-062-50
THIN	3913	1600/Sn	049-000-04
NYPON*	3913	1700/Dy	1478-714-67
NYSPTEN	3925	1800/Dy	1261-118-61
ESS	3590	1800/Dy	780-129-61
OCTEN*	34/94	1830/Dy	1030-120-61
Q Net	31/91	1830/Dy	389-003-30
STAR/E*	99/39	1830/Dy	029-006-61
WDN/E*	04/64	1830/Dy	1254-314-73
Blue Line	93/33	1900/Dy	855-033-60
Blue Line (Aug)			438-025-28
NYS/4*	3677	1900/Dy	1013-526-61
JCARCN	10/70	2000/Dy	476-025-29
OARC Net	25/85	2000/W	133-000-09
VHF THIN	04/64	2000/T	093-000-08
WNYECN	3955	2000/3Sn	(ARES)
BRVRN	055/655	2100/Dy	364-013-30
BRVRN (Aug.)			337-045-31
CNYTN*	90/30+	2115/Dy	916-164-61
STAR/L*	99/39	2130/Dy	048-020-20
WDN/L*	04/64	2130/Dy	1266-294-65
NYS/5*	3677	2200/Dy	870-703-61

*NTS. + Tuesday and Friday on 40/00. Traffic: W2MTA 479, WA2FJJ 292, KC2QQ 224, WB2IDS 216, WB2OWO 212, W2ZOJ 192, W2AET 189, VE2FMQ 152, K2GXT 151, W2FR 124, KC2SW 123, KU2N 117, KG2D 107, KA2BHR 93, WA2KOJ 92, KA2HAC 85, WA2HSB 82, WB2RBA 68, WB2QIX 65, WA2OEP 59, KA2DQA 43, AF2K 35, N2ABA 27, WB2PID 24, WA2SMZ 24, WA2SDY 22, KA2OVL 20, KA2DBD 13, WB2NAO 12, KA2QIK 9, KA2HRS 7, K2RN 6, K2VR 2, N2ARD 1, K2IUT 1. (Sept.) WA2FJJ 506, K2GXT 420, WB2OWO 281, W2MTA 278, W2AET 208, WB2QIX 204, WB2IDS 198, WA2HSB 173, WA2SDY 164, VE2FMQ 125, W2FR 124, KC2QQ 124, KC2SW 122, KA2BHR 113, KG2D 107, WA2KOJ 106, W2ZOJ 83, WB2RBA 60, W2GJ 54, KU2N 48, N2BLX 42, KB2KW 41, KA2HAC 39, KA2DQA 36, KA2QIK 36, W2PHQ 18, N2ABA 14, WB2NAO 14, WA2OEP 14, K2IUT 10, AF2K 9, WA2RXO 9, N2ARD 8, KC2XD 8, KA2HRS 7, WB2PID 7, K2RN 7, KA2DBD 6, K2VR 6. (Aug.) N2ARD 6, K2RN 6.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB — SEC: AB3Q. STM: AC3N. ACC: N3EE. OO/RFI: KN3B. PIO: WB3IZJ. SGL: W3OKN. TC: W3FE. BM: WN3VAW.

Net	QNI	QTC	Sess.	kHz	T/D
WPACW	433	220	35	3585	7:00 P/D
WPAPTN	766	203	35	3893	6:15 P/D
WPA2MTN	482	71	31	144.28/88	6 P/D
NWPA2MTN	—	—	—	144.53/5.13	1400Z

We have two Silent Keys, W3WJK and K3COQ (who was living in Tulsa, OK after he retired). New upgrades to General-N3APW KA3JWJ; to Advanced-N3DIO N3DMO N3DOL (ex-KA3DEK); Extra-KQ3W (ex-N3CZY). K3TUA was listed in error in the Oct. issue; he has not yet upgraded. Hope to have the results of the PA QSO Party next month. Foothills ARC new repeater on 147.78/18. WPA DX repeater 144.77/145.37. New Novice slow speed net 3.749 MHz Mon. and Wed. 8:30 P.M. Skyview ARS 1984 officers: KC3BB, pres.; KA3IJJ, v.p.; K3VRV, treas.; KA3HBB, secy.; WB3AHI N3DDZ, 5-year directors. Two Rivers ARA 1984 officers: W3OFM, pres. WB3CWR, v.p.; KC3HJ, secy.; KC3GK, treas.; WB3JWJ, act. mgr.; WA3IZJ (3), prop. This is N3ADU's last month as the Net Manager for the WPAPTN, I owe him a debt of gratitude for the fine job he has done. The net will miss him and his help, but he will still be on the net and will help KQ3T, the new net manager. KQ3T is active on both SSB and CW. ECs should get their SET reports to the SEC. Some are still going to have their SET. Traffic: N3ADU 800, AC3N 270, KQ3T 201, K3NPW 146, K3CR 133, KA3COX 120, WA3UNX 107, W3NEM 101. WA3QNT 87, W3OKN 81, N3FM 67, K3SMB 54, KN3B 52, WD8PUH 50, WN3VAW 46, W4RUL 45, W3HDH 43, W3NGO 31, W3KMZ 28, W3MML 28, WB3HWB 21, W3IQD 22, KC3JO 15, W3KUN 13, K3HCT 12, WB3DNF 11, KQ3M 10, K3TUA 9, N3KB 6, K3LTV 6, AB3X 4, K3HR 4, W3LOD 3, WA3DBW.

CENTRAL DIVISION

ILLINOIS: SM, David E. Lattan, WD9EBQ — SEC: W9QBH. STM: KB9X. OO/RFI: K9MX. BM: K9ZDN. PIO: WD9EED. SGL: W9KPT. ACC: WB9SFT. ASM: K9ORP.

Net	Freq	Times (Z Win)	QNI	QTC	Sess.
ILN	3690	0030/0400 Dy	613	173	61
ITN	3705	0100 Dy	230	74	30
ILPN	3915	2230 Dy (X Sn)	—	—	—
NCPN	3915	1300 Dy (X Sn)	477	62	—
NCPN	7270	1815 Dy (X Sn)	210	89	—
IEN	3940	1500 Sn	142	3	5
IARES	3915	2230 1 + 3 Sn	35	2	—
ISN	3905	0000 Dy	433	157	36

Illinois was represented 100% to 9RN by stations N9AJE N9TN K9AZS K9CMO K9GMZ K9PNG K9QEW K9SW W9INZ W9NXG WB9NVN KW9J KW9T KD9K and KB9X. Illinois was represented 100% to D9RN by stations WB9ODN WB9NVN WB9BXB WB9WGD W9HOT W9NXG W9HLX K9EHP K9AZS and KW9J. D9RN was represented 100% to CAND by Illinois stations K9EHP K9AXS W9HOT W9NXG WB9NVN and KW9J. W9CJW, faculty sponsor for the Southern Illinois University ARC, reports that the following SIUARC members have upgraded: WB9VDQ, from Novice to Advanced; KA9OOC, from Novice to Tech; KA9PEY, from Novice to Tech. KA9PEY is also CX1ABH. Congrats to all! WA9AQN reports that he and stations WD9IFF WA9KRL KB9RW and N9DKR were active at a Boy Scout jamboree held this month and were on the air with 550 Scouts from Camp Bunn near Hettic with the Sangamon Valley RC operating W9DUA/9. K9DQU, Executive VP of the Morse Telegraph Club, set up and operated his HF station for the club's Grand Chapter meeting on the 8th floor of the Carson's store in the Chicago loop. He used a hustler mobile whip out a window with a couple of 35 foot radials and reports that he had excellent results. LOOKING AHEAD — Sunday Jan. 29th will be the annual Wheaton Community Radio Amateurs hamfest, and as usual, SEC W9QBH will be conducting an ARES forum. Owing to limitations on time and budget, Bob is only able to do about three major presentations per year, those at Wheaton, Peoria, and the Illinois ARES Seminar. Make plans now to attend the ARES seminar at the hamfest, as the programs are always something new and worthwhile. LOOKING BACK — the 2nd annual Illinois ARES seminar held this month at the Champaign Co. EOC in Urbana IL, courtesy of Champaign County ESDA coordinator WA9YXZ was an even greater success than the year before. Presentations were made by State ESDA Communications Officer Ross Pickett, W9NXJ, National Weather Service Area Manager Ray Waldman and American Red Cross disaster specialist Jeff Dooley. On the ham side, ASM K9ORP made a presentation on the

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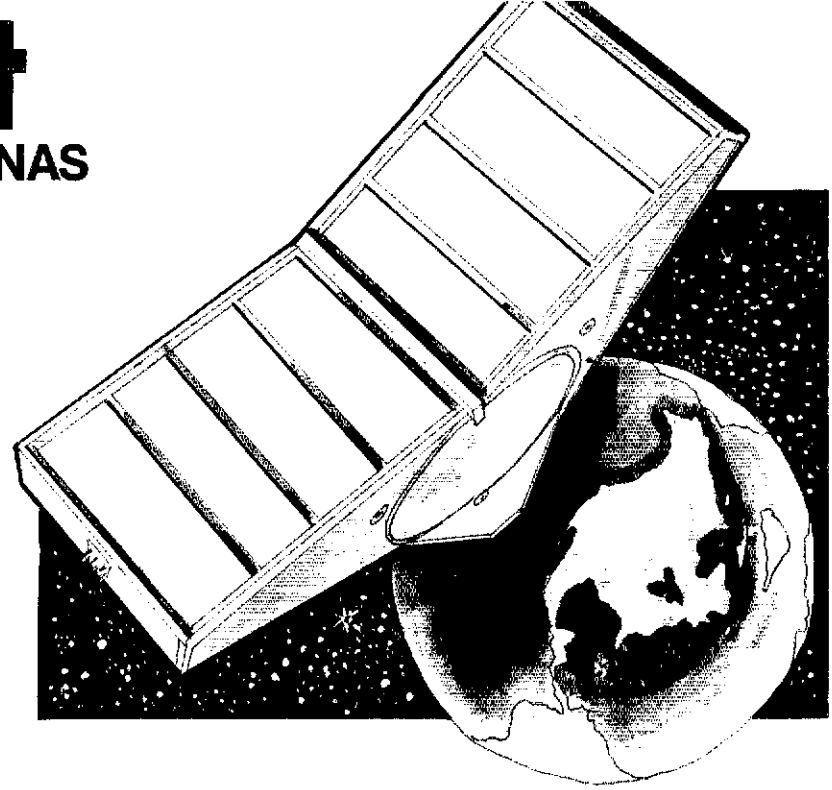
The two meter antennas have been proven in many thousands of ham satellite stations. They feature excellent performance plus ease of assembly and installation.

	10 Element	20 Element	16 Element
MODEL	A144-10T	A144-20T	416TB
Frequency, MHz	145.9	145.9	435
2:1 SWR Bandwidth, MHz	>2	>1.5	>3
Forward Gain, dBd			
3-dB Beamwidth, deg	52	38	34
F/B Ratio, dB			
Boom Length, in (m)	70 (1.8)	130 (3.3)	80 (2.03)
Longest Element, in (m)	40 (1.0)	40 (1.0)	13.3 (.34)
Wind Area, ft² (m²)	.74 (.07)	1.42 (.13)	.5 (.046)
Weight, lb (kg)	3.5 (1.6)	6.6 (3.0)	4.9 (2.2)
Max Mast OD, in (cm)	1.50 (3.8)	1.50 (3.8)	2.0 (5.0)



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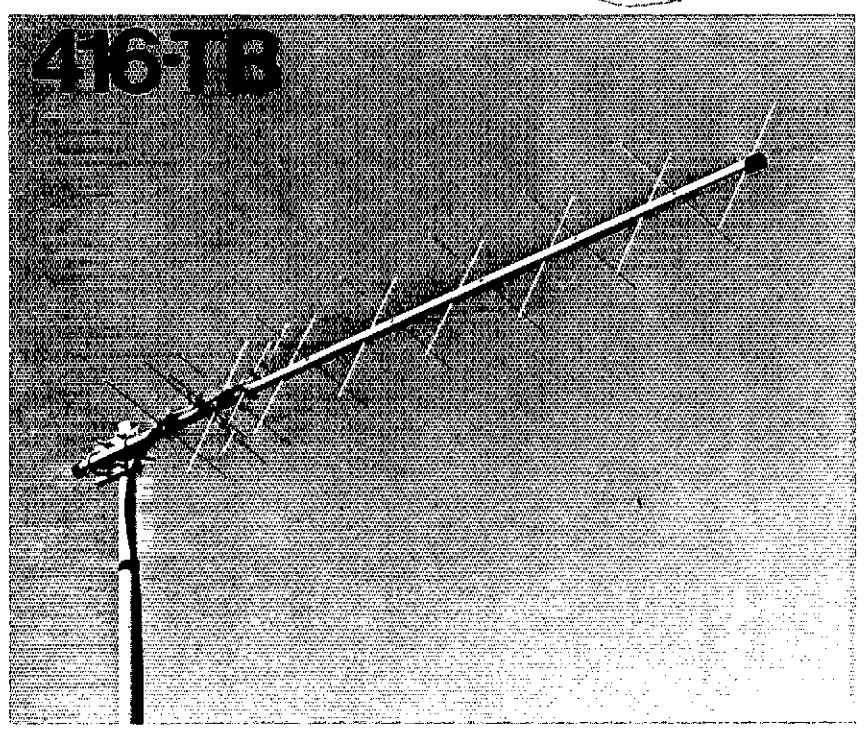

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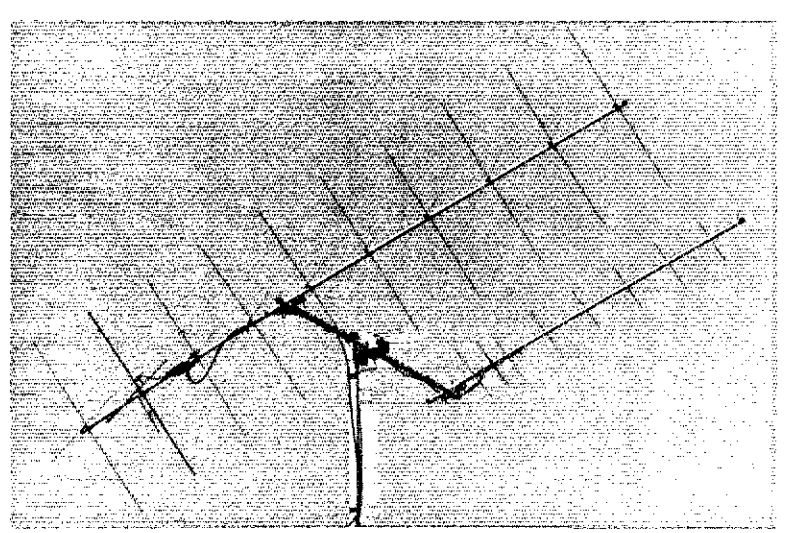

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importance of the first responder circle of wagons technique for initiating a large response to a major disaster scene. SEC W9QBH moderated the event and tied the relationship of each together with our ARES mission. Congrats to all on a job well done. I'm already looking to next year's program! Traffic: KW9J 248, W9NXG 233, KB9X 189, W9JIJ 158, W9HOT 132, K9AZS 120, WA9BXB 108, WB9UEA 107 (WX), K9EHP 91, K9QEW 85, W9HLX 80, W9QBH 50, W9TLU 42, KD9K 41, WA9SHE 35, KA9FEZ 34, KN9BAM 33, K9CMO 30, KD9EH 24, W9KR 14, K9WMP 12, K9SW 11, KA9OZJ 8, WA9RUM 8, WB9WGD, WD9EED 7, KA9NAH 7, W9SSP 6, WD9HQW 4, WD9HZF2.

INDIANA: SM, Bruce Woodward, W9UMH — SEC: WB9ZQE. STM: W9JUJ. OO/RFI: KJ9G. SGL: WA9VQO. PIO: K9DIY. SDXC: N9MM. BM: KC9TA. SRC: N9WB. ACC: K9TUS. SOC: W9OBF. TC: WD9ADB. SHC: WA9FUD. NMs: ITN-W9QYY; QIN-KJ9J; ICN-KA9CZD; VHF-W9PMT; IWN-KA9ERC.

Net	Freq.	Time/UTC/Daily	QNI	QTC	QTR	Sess.
ITN	3910	1330/2130/2300	3075	580	6785	93
QIN	3656	1430/0100/2300	784	395	2209	94
ICN	3708	2315	86	30	544	30
IWN	3910	1310	2059	6	541	31
IWN	VHF	Kokomo	1121	28	322	31
IWN	VHF	Bloomington	1262	—	105	27

Hoosier VHF nets: QNI 6260, QTC 295, QTR 7401, bulletins 69, sessions 145 for 29 nets. Cycle 4 9RN 98% QTC 447, QNI 431, QTR 1185 in 66 sessions. IN stns N9AEI W9CSJ W9EI W9FC KJ9J W9JUJ WA9QCF W9QLW W9TG WB9UYU K9WWJ W9XD, D9RN — 463 messages in 1464 minutes. 100% IN stns K9CGS W9URQ W9JUJ W9PRD KB9NR WB9MIK. CAND 1032 messages in 33 sessions. D9RN 100% in stns KA9AZS W9JUJ W9URQ W9PRD. Silent Keys W9ZRA and WB9ANM, Fort Wayne. We are starting an Indiana RTTY Net. The net manager will be KB9SU, Wolcottville. The time will be 0000Z on 3630 kHz. With all the current activity by computerization and future possibilities the net should be successful. If you have RTTY capability please check into the net. WB9FDF and KA9BSD were among the top ten OOs listen in the *ARRL Letter*. Congrats for the job you both are doing. N9AHP in connection with his civil defence teaching spent two weeks in Las Vegas. I am sure he picked up something. I thought the Simulated Emergency Test this month was very successful. Thanks for a job well done to WB9ZQE W9QYY, all ECs, ORSs, and particularly the NCSs on 3910. The work done with all served agencies was also appreciated. KK9W and KX9G have added some satellite software to the Purdue computer system. N9DRR has some interesting contest-type software. Don't dispair if you want a particular ham program, chances are someone has it. Contact me. Congrats to N9ADS KB9RH and KV4GC who received the National Weather Service award for their help to set up and operate the SKYWARN program in Fort Wayne. Congrats to the following upgrades. KA9PYS to Tech, KA9MDD to Advanced, and K9RXX to Extra. Traffic: W9JUJ 1,000, W9UMH 347, KJ9J 319, W9URQ 153, W9EI 141, WB9UYU 123, W9UEM 109, W9QYY 108, WA9QCF 106, KK9D 87, WB9ZQE 83, KA9LAU 73, N9AEI 72, WD9HII 66, KB9HH 66, KB9HH 59, K9DCX 56, K9WWJ 51, W9PMT 49, N9HZ 44, W9JZV 42, KW9D 41, N9CQS 38, W9QLW 38, WD9DWD 36, KA9EIV 36, WD9EXI 36, KC9TA 35, KK9N 35, N9DHX 33, W9RTH 28, WD9GET 26, WB9AWI 24, K9DIY 24, W9IOH 24, K9CGS 18, WB9TOW 18, WA9OKK 16, WD9CIV 16, K9OUP 15, WB9OZZ 15, AB9A 14, W9DKP 13, W9OZJ 12, K9FW 9, W9ZGC 9, WB9AJY 8, W9BDP 3, KC9ED 2, W9POF 2, K9SBW 2. (Sept.) N9HZ 63, N9DHX 3.

WISCONSIN: SM, Roy A. Pedersen, K9FHI — SEC: W9OAK. STM: K9UTQ. BWN 3984 1100Z QNI 1311, QTC 1395 WD9IID. BEN 3985 1700Z QNI 744, QTC 224, WB9ESM. WSBN 3985 2230Z K9ANV. WNN 3723 2300Z QNI 161, QTC 20 KA9HPQ. WSSN 3645 2230Z QNI 196, QTC 51 KC9CJ. WIN-E 3662 0000Z QNI 381, QTC 155 W9YCV. WIN-L 3662 0300Z QNI 250, QTC 129 K9LGU. XPO 3925 1731Z QNI 236, QTC 13 WA9YVC. NWTN .34/.94 2330Z QNI 425, QTC 43 N9BDL. Gr. Bay .72/.12 (Thur.) 0145Z QNI 32, QTC 0 WB9NRK. WCWTN .31/.91 2330Z QNI 479, QTC 31 N9AUG. KE9C's mom WD9GRH has Tech. KA9OVH has General. WD9BKY & N9EAJ have Advanced. New officers of QCWA, Wisconsin chapter: W9OUT, chrmn, W9BCC, vice chrmn, W9YCV, secy.; K9GDF, treas., W9SO W9TQ W9FAD, directors. K9YGZ's son is Novice. K9YGZ's brother in law is a Novice, KA9QII. KMRA swapfest was well attended. KA9GYD is now KY9P. Sorry to report the following Silent Keys: W9GI WB9YPZ W9GRK W9NPR WA9GYF. New officers Mancorad Club: K9LWI, pres., WB9CYC, v.p., W9NPX, treas.; N9BCX, secy.; W9BZU WB9OBX K9HAG K9DIN directors. KA9QDA is now N9EFY & KA9NCL is now N9EDV; both are from Ripon. KA9LLN is now KD9FC. BPL to KA9CPA. New Novices Eau Claire area KA9QPF, XYL of N9AUG. SET was well participated in; thanks to all. Traffic: KA9CPA 2456, W9CXY 295, W9CBE 167, WD9IID 146, KA9OBP 138, K9FHI 133, WA9WYS 133, W9YCV 133, WB9ESM 128, K9GDF 117, W9LDO 107, KC9CJ 103, KA9BHL 95, W9IEM 89, W9UCL 82, WD9FRI 78, K9SAO 75, WB9YPY 66, K9AKG 60, KA9IKR 59, KC9KQ 57, KA9HPQ 56, K9UTQ 56, N9BDL 55, KG9B 50, W9SO 49, AG9G 48, K9LGU 47, WB9ICH 45, N9AUG 42, WB9JSW 41, N9BCX 37, KY9P 36, K9VSO 36, N9BGE 33, KN9P 33, WB9PKL 33, WA9YVC 31, K9BED 30, KC9MX 30, KB9NG 29, KA9AFB 28, WB9WNA 28, N9CRO 27, W9FDY 24, WA9ZTY 24, W9IHW 21, N9DCF 20, WD9BKT 20, K9JPS 17, WB9NRK 14, K9RTB 9, W9UW 9, KA9BHK 8, WB8RGE 4, W9KHH 3. (Sept.) K9VSO 22, K9JPS 17.

DAKOTA DIVISION

MINNESOTA: SM, Helen Haynes, WBØHOX — SEC: KAØARP. STM: KDØCI. Greetings & happy holidays! In the Nov "Section News," some articles of interest were left out owing to column length. Here is a brief potpourri: The St. Cloud Hamfest was on Aug 14th. KCØT was host for the annual MSN meeting later that same day. It was nice to see many of you at both events. NØBST of the St. Paul ARC obtained ARRL/PSA tapes. KSTP, AM 1500, broadcasts these tapes, mainly on weekends. Perhaps your group would like to obtain these tapes to promote ham radio in your community. Callsign correction: WØECR new KXØS. Special greetings to WAØSUA who has recovered nicely from successful surgery. Oct news: WBØDHS informs me that the Marshall rptr is now permanently assigned to 147.195 in/147.795 out (you read correctly). SET activity was down from last year according to preliminary figures provided by KAØARP. However, I'm pleased by the response by so many Stations to submit SARs this month; tnx a million! Waseca and Park Rapids hamfests both were on Oct 1st. I hope the two clubs will have them on different dates next year so I can go to both. Park Rapids has set their '84 hamfest for Oct. 6th. Once again, ADØS is #1 in the Minn QSO Party with the most contacts. Congrats to KAØCIR who has qualified for the BPL Medallion. Net news: WØOJH is now asst. Net Mgr

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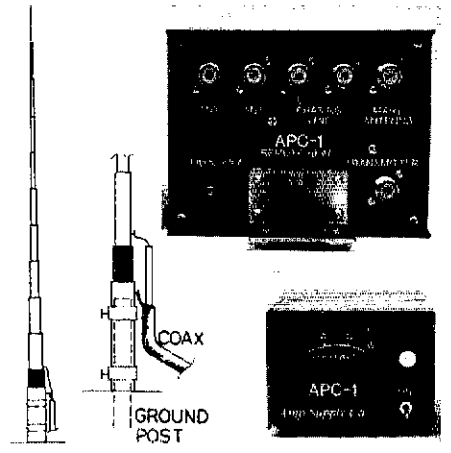
LA-1000A **$399.50***



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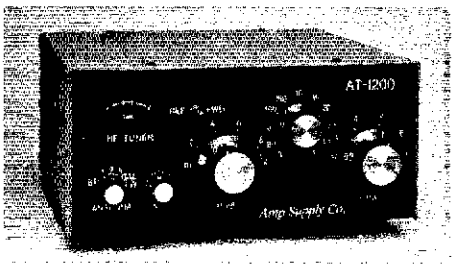

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The AT-1200 antenna tuner is the perfect companion for the LA-1000A or any amplifer running up to 1200 watts input. It covers 1.8 to 30 MHz, has an antenna selector switch for 3 coax positions and 1 long wire or balanced feedline, and a built in SWR bridge and meter.

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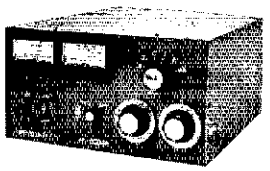

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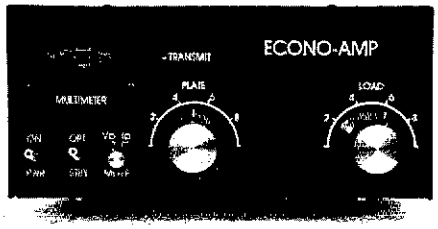

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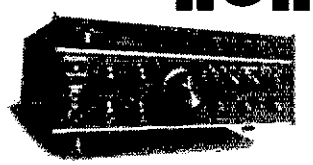

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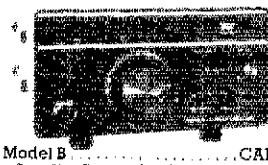

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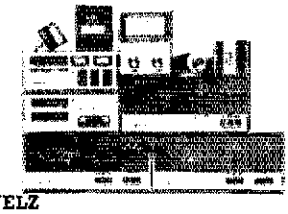

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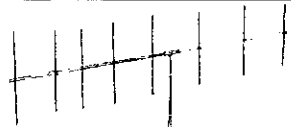

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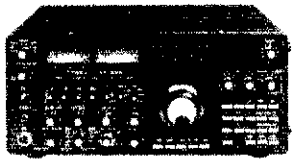

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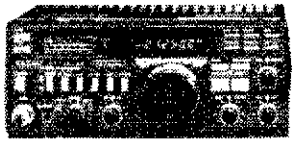

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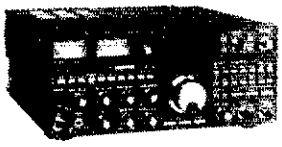

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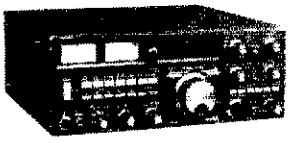

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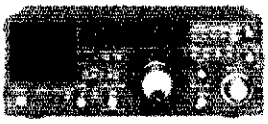

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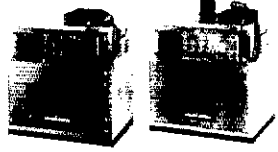

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Net	Freq.	Time	Sess.	QNI	QTC
MSN/1	3685	6:30P	31	337	148
MSN/2	3685	10:00P	31	280	75
MSSN	3710	7:00P	30	136	39
MSPN/N	3945	12:05P	31	622	149
MSPN/E	3929	5:30P	31	1238	328
MNAMWXNT	3929	6:15P	29	701	470
PICONET	3925	Daily	26	3068	320

Traffic: KB0MB 502, WA0TFC 463, KA0ARP 445, KT9I 397, KA0CIR 270, N0CLS 238, KA0EPY 224, W0EHI 214, W0HZU 195, KA0JUX 191, KD0CI 158, WD0BAC 155, W0MFW 117, W0CJH 110, WA0ONE 85, KC0UJ 84, WD0CGM 76, AA0U 60, KT0R 58, K0OGI 56, WB0HOX 48, WD0HDD 44, N0EXP 40, W9DM 30, KD0KK 25, K0CSE 20, W0RYX 17, WB0JUL 16, KZ0H 15, KA0KWM 13, N0EYR 11, KC0NL 10, N0ELB 9, KX0V 9, WD0BGS 8, N0BTR 7, W0KYG 7, KY0X 7, KB0RW 6, KA0AJF 4, K0CVD 4, KA0JQO 4, WB0TND 4, KN9U 4, NB0R 3, KA0LWU 2, WB0TNC 2, W0UKI 2, KB0WV 2, KA0LRL 1, KA0LTJ 1, W0MJD 1, WB0VJI 1. (Aug.) KA0ARP 162.

NORTH DAKOTA: SM, Dean R. Summers, KQ0C — W0CDO was hospitalized and is recovering. New calls: NC0Y NC0X N0FAT N0FBA N0FBB N0FAZ. Congrats to all the upgrades! Club meetings: Three Rivers RC, 3rd Thurs, Wahpeton. Red River Radio Amateurs 3rd Tues, Cass Co. Disaster Serv. Ctr. Fargo North Dakota State University ARS at EEE Bldg. RM. 201. Wed. 7 P.M. NDSU, Fargo. Sioux ARC of University of N.D. Student Mem. Union 3rd Thurs. UND Grand Forks; Bismarck AR Klub, 4th Tues. Town House Motor Inn 7:30 P.M. Bismarck. Theodore Roosevelt ARC 1st Mon. Public Library Dickinson. These are current ARRL affiliated clubs. Data 25 sessions, 304 QNI, 29 QTC GR 78 QNI.

SOUTH DAKOTA: SM, Fredric Stephan, KC0OO — TC: K0AS. SEC: W0YMB. BM: N0CFS. SGL: NB0D. STM: W0KJZ. OO/RFI: KC0OO. ACC: WB0PWA. Compared with the previous 3 years, this last long year's section activities have shown dramatic improvement. Operating pursuits and total amateur involvement increased in all general areas. Great strides have been taken in specific areas also. Total ARRL membership numbers are up, which nowadays is rare in some of the sections. Public service, both quality and quantity, is up. Monitoring of government legislation pending is way up. The public information and public relations area has been boosted. Bulletin management and frequency is up. The number of new nets is up. Contesting and DXing attempts have jumped. Training, Field Day and special events activities are up. We have technical and club coordinators now who are pushing new programs. Public Service Honor Roll members are on a great increase. Emergency coordination and section-level traffic management have both improved more than ever before. Our SEC and STM have brought in more people and expertise. EC work and traffic totals are substantially up. NTS TEN and DTEN representation is much better. I will look forward to bringing you another annual report at this same time next year that is evidence of even more improvement in our small but highly upgraded South Dakota section. Traffic: W0KJZ 124, KC0AF 76, WA0UEN 73, W0DVB 63, W0YMB 63, KC0OO 55, W0RWE 44, K0FRE 44, WB0SUM 32, WB0LTV 28, N0CFS 27, WB0OMF 26, WB0KWX 25, N0EEH 15, NB0D 9, WA0BZD 6.

DELTA DIVISION

ARKANSAS: SM, Joel M. Harrison, WB5IGF — SEC: N5BPU. STM: AE5L. TC: W5FD. SGL: W5LCI. ACC: AD5M. Owing to a slip-up at ARRL Hq. this report contains both September and October columns. Congrats to Morris Middleton, AD5M, Mountain Home, who was appointed Affiliated Club Coordinator. He is off to a good start and has a hard job ahead of him. I personally want all amateurs to get involved in our club program. With your help we can have one of the best club programs anywhere. The Arkansas Field Organization would like to wish all a happy new year. Congrats and hats off to our section traffic handlers W5UAU W4AZJ W5TUM WD5FCE AE5L W5RIT K5BIL and others. They all deserve a big hand for their efforts. The Arkansas hamfest and ARRL state convention are tentatively scheduled for April 7 and 8 pending ARRL Hq. approval. W5BED renewed ORS. W5RIT invites county hunters to join 14336 kHz. W5KL returned home from Europe where he visited several hams, including LX1JW to whom he presented QCWA Hall of Fame award. K5UR reports good DX activity on 80 and 160. The Conway club is very active on 145.21 with RTTY and ASCII. N5BPU reports very excellent SET activity. The Conway group now has W5AUU active at the OES Hq. WD5DUY in Searcy is enjoying DX with a new triband beam. AE5L reports net activity and traffic picking up now that fall is here. Traffic: AE5L 58, W4AZJ 37, WB5IGF 32, KA5DFT 31, WD5FCE 28, W5UAU 25, W5RIT 16, W5KL 8. (Sept.) AE5L 105, W5UAU 16, W4AZJ 12, W5KL 8, W5RIT 8.

LOUISIANA: SM, John Meyer, N5JM — STM: W5GHP. SEC: WA4MUW. PIO: KO5R. ACC: K5DPG. SGL: KD5SL. Happy New Year to all! W5LVX continues to be the most active OO; keep it up. LCARC's directory should be out by now; order a copy if you haven't already done so. CLARC's 1984 team is KB5CX, pres.; KD5YU, v.p.; WD5JBX, treas.; KA5HCJ, secy.; K5KTV, director. Good luck! BRARC will sponsor a commemorative station at the State Capitol for the Worlds Fair; hopefully others will follow. W5XX, chmn of the Delta QSO Party for the past 14 years is looking for a good worker to take over the reins. Well folks? N5JM dined with VS6CT, prexy of the Hong Kong ARC and climbed the Great Wall, but couldn't find the elusive BY1PK. The LSN is looking for some more members; this is an excellent way to learn slow speed tfc work. Also, the STM needs more activity reports, before the 10th please. Novice classes starting at CENLA & at other clubs.

Net	Freq. kHz	Time	NM
LTN	3910	6:30 P.M. Dy	N5ANH
LAN	3615	7 & 10 P.M. Dy	N5BFV
LSN	3703	7:30 P.M. Dy	WA5ANV
LEN	3910	8 P.M. M	KA5PFB
CCTN	146.01/61	6:45 P.M. M-F	GNOARC

Traffic: KA5HDT 155, W5GHP 143, K5GL 92, W5TVW 49, WB5LBR 45, N5ANH 32. (Sept.) W5LQ 27.

MISSISSIPPI: SM, Tom Hammack, W4WLF — STM: KB5W. SEC: N5DDV. PIO: ND5M. Slow net needs your help at

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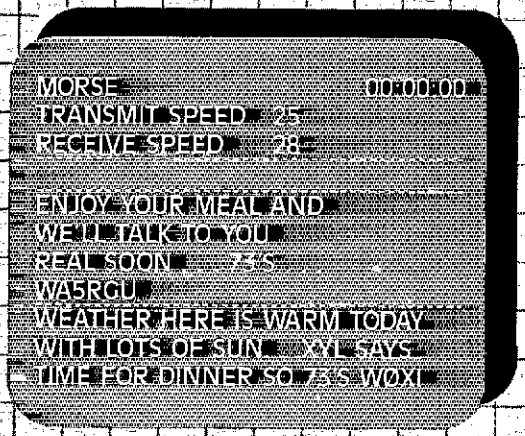

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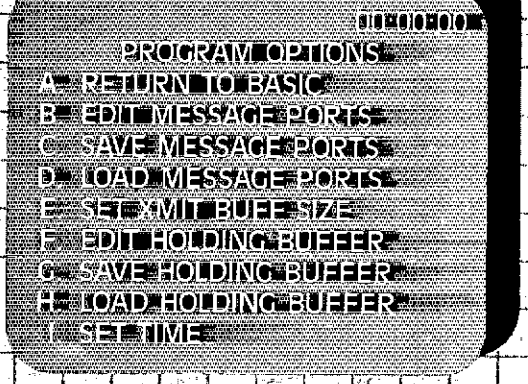

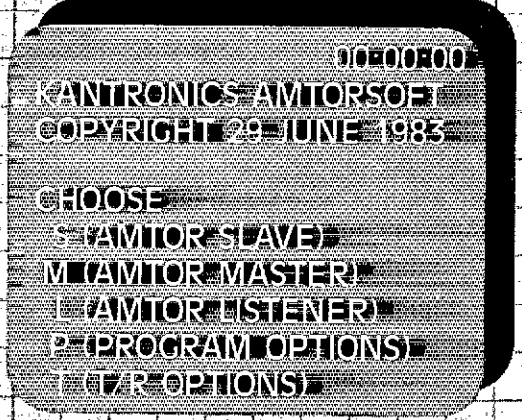

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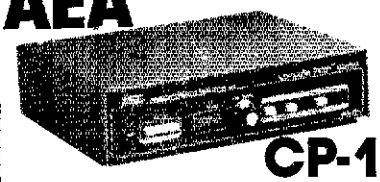

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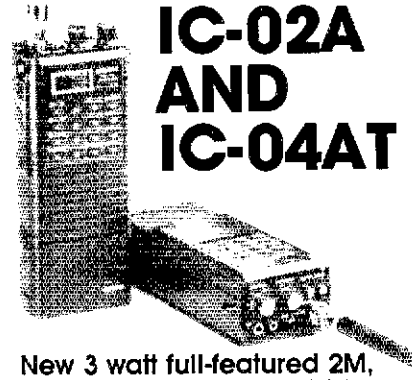

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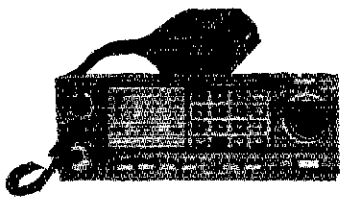

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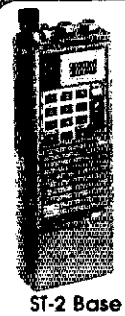

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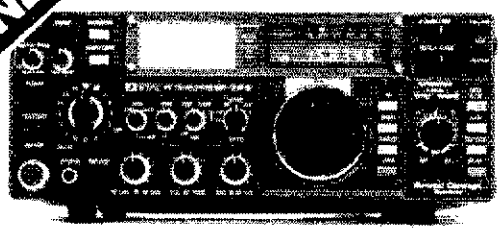

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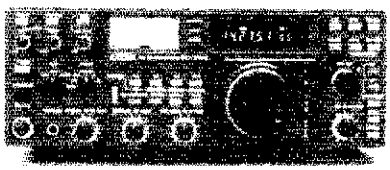

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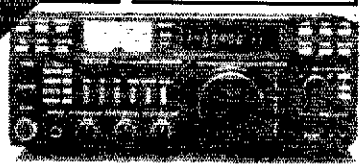

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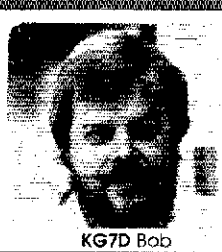

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1900 local Mon - Fri on 3733. KW5T accepted position of Asst. SM at the coast hamfest. Thanks. Fine SET. Several good local SETs as well. AE5H active as OBS with transmissions to Jackson & Vicksburg nets. Congrats to N5DTG who is now NK5W and also to KC8IS, now NK5X. N5XA recently QSOed his "Elmer" from 1934 after years of no contact. You started a good one, W9IQW; thanks! W5VCY has WAC on OSCAR 10. Who else is active in MS on OSCAR?

Net	Sess.	QNI	QTC	NM	Freq.	Time (local)
GCSBN	31	605	6	W5JHS	3925	1830
MMN	31	511	8	WB5RMW	3935	0630
MSBN	31	2360	92	N5DSK	3987.5	1745
MTN	31	156	76	K5OAF	3665	1845

Traffic: N5AMK 517, KB5W 430, K5OAF 254, N5DDV 64, N5EZQ 59, KT5Z 44. W5LSG 31, WD5JXT 17, N5XA 1.

TENNESSEE: SM, John C. Brown, NO4Q — ACC: WA4GLS. OO/RFI: W9FZW. PIO: WK4V. SEC: K4TKQ. SGL: WA4GZZ. STM: NG4J. TC: W4HHK. Beginning January 1 the section will have a new STM. She, note I said she, is one very familiar to all that have been on the various traffic nets of Tennessee. A hearty welcome to a well qualified traffic operator. She will be looking forward to all net managers and the like keeping her busy with big reports and activity. I need also to note that the section also have a new net manager, DRN5-K4WWQ. He will be making some control station appointments to receive traffic for us at 10:30 and 15:30 CST daily. If you are interested, check with K4WWQ; he can use your help. W4VQE has indicated that the section RTTY net is not getting many stations in the section. There are more from outside than inside. How about giving it a try with that new computer. Must congratulate the SEC on the different approach he used in the 1983 SET. Getting a piece of traffic from the nursing home patients, etc. Had two fold purpose there. Aren't you sorry you did not participate? Those that participated in the Grenada communications exercise are to be congratulated for the fine job. There were some honor roll recipients missed in the last month report that need to be mentioned-TSN W4DDK K9IMI/4 NG4J W4ZJY KA4ZNU. Net certificates to KA4BSG and KA4FLV. We had a 100% participation report for DRN5, thanks to K4WWQ and his staff. A total of ten nets did not report this time. We sure would like to hear from the net managers and find out what has been going on to give your net proper credit and to get your traffic count. A lot of good work is not getting counted. How about it? The section activity report for this month is LF - sess. 82, QNI 3491, QTC 112; VHF-sess. 85, QNI 2112, QTC 594; CW sess. 58, QNI 351, QTC 111; RTTY sess. 29, QNI 78, QTC 3. Traffic: W4WXH 433, NG4J 231, K4WWQ 131, W4DDK 73, K4WOP 47, WD4GYT 43, KA4ZNU 41, W4MRD 34, W4PFP 28, KE4LS 27, KA4BSG 25, W4ZJY 25, WB4YPO 25, K4YOL 19, KI4V 9, NM4W 7, W4PSN 7, K4UMW 7, W4TYV 6, NN4S 4, WA4HKU 3 WA4RMP 2.

GREAT LAKES DIVISION

KENTUCKY: SM, Anna Sloan, KA4GFU — SEC: WA4JAV. STM: KA4BCM. OO/RFI: N4GD. BM: WA4AGH. PIO: K4TAJ. ACC: W4OYI.

HF Nets		Time	Mgr	QNI	QTC
KRN	3959	1130Z	WD4IUW	—	—
MKPN	3959	1330Z	KA4SAA	1110	139
KTN	3959	0000Z	KA4SKV	1179	176
KYN	3600	0100Z	WD4IYI	211	68
KSN	3600	0330Z	KZ8Q	189	66
KNTN	3727	0000Z	KB4OZ	331	107

VHF Nets		
Lexington ARES	146.76	1730 EST Mon.
3ARES O'boro	147.21	2130 CST Thurs.
4ARES Bowl Gr	146.85	2100 CST Thurs.
7ARES N. KY	147.975	2000 EST Fri.
NKARC N. KY	147.28	1930 EST Wed.

KS4V retired as DEC DIST 1 after many years of service. New DEC is N4FFO. DIST 4 DEC WA4SAC is joining the Air Force. A replacement has not been found. Please send address of new Novices and items of interest for this column to the STM. Traffic: WA4JTE 273, KA4SAA 121, WD4IYI 95, WD4RWU 95, KA4GFU 90, KB4OZ 88, WD4BSC 79, WA4EBN 76, KA4MZY 72, KA4BCM 69, K4MHL 66, WA4JAV 60, NW4A 57, KA4SKV 53, WA4AVV 38, WK4D 38, WB4ECB 38, WD4IYH 37, KA4MTX 34, WA4YPQ 30, KD4TY 27, WA4SWF 25, WD4CJQ 20, WA4NOG 18, N4GD 17, WA4AGH 16, WB4APC 16, WB4NHO 16, K4HOE 12, WD4PBF 12, KA4YIV 11, N4HZT 10, WB4AUN 9, WD4IXS 9, W4PKX 9, W4WQV 9, WD4CQF 7, KA4GBZ 5.

MICHIGAN: SM, James R. Seeley, WB8MTD — ASM: WA8OHB. SEC: WA8EFK. STM: WD8RHU. SGL: N8CNY. TC: WB8BGY. BM: KZ8V. OO/RFI Coord.: K8JH. ACC: K8SB. PIO: KC8K.

Net	Freq.	Time/Day	QNI	Tfc	Sess.	Mgr.
QMN*	3663	1800 Dy**	1312	419	98	KV8U
MACS*	3953	1100 Dy**	672	376	31	K8LNE
MITN*	3953	1900 Dy	717	367	35	K8KQJ
GLETN	3932	2100 Dy	966	96	31	WD8IBY
MNN*	3722	1730 Dy**	261	95	65	KA8NCR
UPN*	3922	1700 Dy	589	74	39	WA8DHB
WSSBN	3935	1900 Dy	566	35	31	—
TASYL	3922	1900 M	30	5	5	WD8DUG
VHF 11 Reports			1322	142	70	W8CUP

NTS nets, times local. **QMN late net, 2200; MNN late net, 2000; MACS Sn 1300, ARES net Sn, 3932, 1730. Traffic Workshop Sn, 3953, 1600. ARRL Info Net W, 3953, 1745. 3932 is MI HF emer. freq. Silent Key, with deep regret: WA8WZF. New club officers: Black River ARC- WD8MEY, pres.; WB8GCG, v.p.; KI8Z, secy./treas.; KA8QYH, act. mgr. Hiawatha ARA- KO8U, pres.; WD8AKF, v.p.; W8WNT, secy.; W8IOC W8JXJ, treas. I note a slight increase in traffic reports this month, probably owing to SET as much as to my policy reversal on quarterly summaries. At least the plunge seems to have been stopped. As for SET itself, MI activity was at its usual high level, and I sensed more enthusiasm than in some I've seen. Perhaps it was the newcomers, of which there were several in prominent roles, who helped generate a fresh spirit. I count SET '83 overall a very worthwhile effort for MI. KC8K, our new PIO, is on the lookout for PR-oriented hams, especially in the larger communities, to consider for PIA (Public Information Assistant) appointments. While most active clubs are strong on PR, the extra support that comes with the PIA program could make a substantial difference in any club's efforts to present "us" to the public. And this is one of the most vitally important functions of any club today — of any concerned amateur, really. On recent info nets I have been asking for comments on the state of the field organization and on the state of the League generally — an open invitation for criticism, and for the most part all I've gotten are compliments. It's like waiting for the other shoe to drop! Surely there must be folks out there with dissatisfaction in some area or other. Join the net and get your thoughts aired, perhaps get some lively discussion started. At all levels we need the "devil's advocates" and the balloon busters. To grow and to meet the needs of

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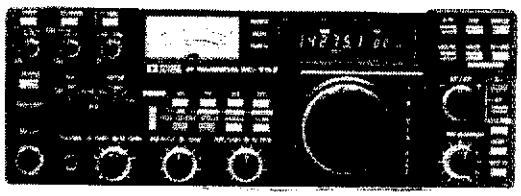
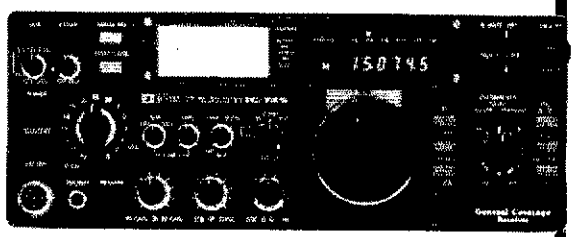


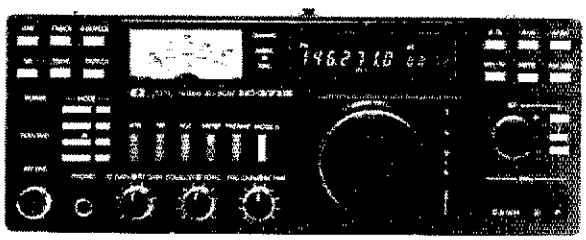
NEW IC-751 ICOM

A whole new generation of technology. A new CPU with a capability of scanning of 32 memories in total or by selected mode! Other features are full break-in QSK keying, both advanced *PBT*, RIT, XIT with separate readout, deep notch filter, and scanning, memory scanning, FM as *standard*, sharp slope FL44 sideband filter *standard*, continuous adjustable noise blanker levels, split VFO operation, squelch operation, and easy-to-read fluorescent readout.

NEW IC-745 ICOM

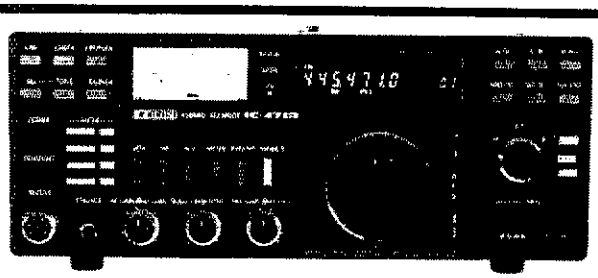
A full feature HF transceiver and general coverage receiver. 16 tunable memory channels; passband tuning; continuously adjustable AGC; and 100% duty cycle transmitter. The 16 tunable memory channels have the capacity to memorize not only the desired frequency, but also the desired mode of operation.





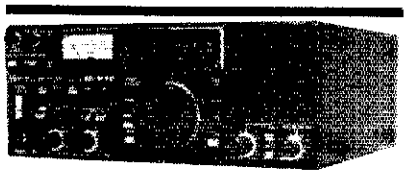
IC-271A ICOM

A 2 Mtr all mode covering the entire 2 Mtr Ham Band. 25 watt output, 32 memories and built-in subaudible tone selectable from the main tuning dial. Frequency, modes, tones and offset may be written into each memory. A new two color display.



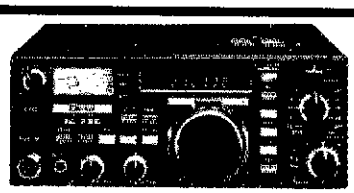
IC-471A ICOM

A 20MHz all mode base station covering 430 to 450MHz. 10 watt output, 32 memories and built-in subaudible tone selectable from the main tuning dial. Frequency, modes, tones and offset may be written into each memory. A new two color display.



IC-R70 ICOM

The best general coverage receiver for the Ham or SWL, 100KHz to 30MHz, 117 VAC standard, 12VDC option. AM/SSB/CW/RTTY/FM (opt.)



IC-730 ICOM

ICOM's portable/affordable 80-10 meter HF ham band transceiver. IF shift/AM, SSB, CW/8 memories/microphones included standard.

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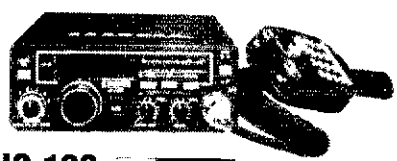
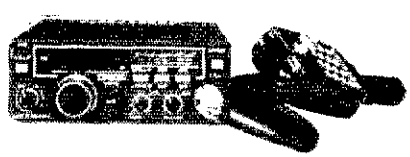
FIRST IN SALES IN SERVICE!!



IC-120 ICOM

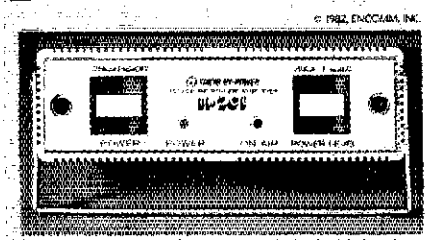
A 1.2GHz FM mobile transceiver covering 1260 to 1300MHz. This unit is fashioned after the IC-25A. Power output is 1 watt.



IC-25H 2 Meter ICOM

ICOM's new 45 watt version of its popular IC-25A transceiver features green LEDS and new HM14 microphone.

2900 N.W. VIVION RD. / KANSAS CITY, MISSOURI 64150 / 816-741-8118



HL-20U UHF AMPLIFIER — This is another super compact from THL, and it's beautiful, with the controls on the brushed metal face panel to make operations as easy as touch and go.

The ultra-compact HL-20U is a basic amplifier for all UHF handheld radios, and it can accept input levels from 200mW to 3W, to provide a big 20W output signal. Fixed antenuator design allows for full output from as low as 200mW drive.

Your UHF handheld operations have never experienced anything like this surprising little amplifier. $119.95 Suggested Retail

TOKYO HY-POWER LABS, INC.

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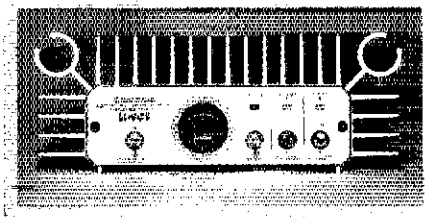
All stated prices and specifications subject to change without notice or obligation.



HL-90U UHF AMPLIFIER — Our new 80W output big-power UHF amp, with GAS-FET preamp and drive requirements as low as 10W, is designed for the 70cm amateur band.

It features stable and powerful amplification along with excellent linearity, which is especially effective on SSB. With its built-in receiver preamp, the HL-90U enables you to enjoy more comfortable DX QSO's. Accurate output power can be read with the built-in precision directional coupler, and power can be reduced by one half by the power level switch.

The HL-90U works FM, SSB, and CW, it provides a remote control terminal, and it comes to you for $389.95 Suggested Retail.

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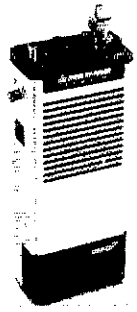
UHF Transceiver



Yes, It's True!

Now there is a truly unsophisticated 3 channel crystal controlled radio to get everyone on UHF NOW. This radio is so affordable everyone should have at least two.

The low cost MICRO-7 (Model HT-7) comes with one channel of two crystals, a transmit and a receive already installed, the four drycells (AA size) needed to power the unit, an antenna and 200 mW of transmitting power.

A rather wide variety of accessories are available to boost your enjoyment and convenience such as: Speaker / mic (HSM7) (24.95) compatible with other audio systems like Kenwood and ICOM units, Subtone generator (HTE7) (19.95) set for 103.5 by a crystal, the VOX module (HVX7) (19.95) use with the boom-mic headset (HBM7) pictured below (39.95) and a rechargeable NI-Cd battery and charger (39.95). For more output use the HL-20U THL amplifier (114.95) for up to 20 watts output.

The HT has been around for a long time but not like this. The MICRO-7 makes it time you got yourself a UHF radio and joined the evolution . . . upward.

THL Highpower Amplifiers Couplers, Transceivers

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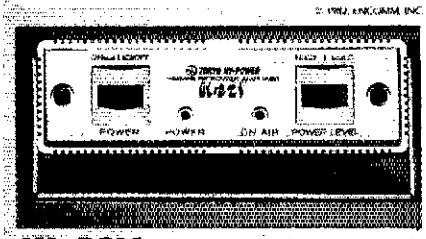

HL-32V VHF AMPLIFIER — The first of our super compact amplifiers for use with handheld radios. For VHF operations, this unit produces up to 25W output with drive from your 0.5W to 3W handheld. Low insertion loss on receive and selectable power level design provide low VSWR to the transceiver.

Excellent for mobile use in snuggly fitted smaller cars, this little beauty can be stowed under the seat, out of sight and out of mind.

The HL-32V operates linear mode for SSB or FM (switch selected), and the best news of all: the price is only $89.95 Suggested Retail!

Meets or exceeds FCC specifications.

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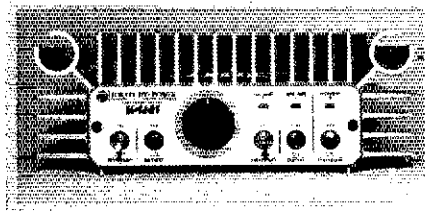

HL-160V VHF AMPLIFIER — This is our big 160W 2 meter linear amplifier which can work with a radio of 10W or even 3W output. This setup is achieved with a pair of rugged VHF R.F. transistors, using highly reliable one-board construction, and with the HL-160V's built-in 12db MOS-FET preamp.

The HL-160V has convenient front panel controls and select switches, LED indicators and a very reliable RF wattmeter. This big amp works SSB, CW, FM and AM modes, and it has a true coaxial relay on the output side.

When you need the power, the HL-160V is the power you need. $349.95 Suggested Retail.

Meets or exceeds FCC specifications.

TOKYO HY-POWER LABS, INC.

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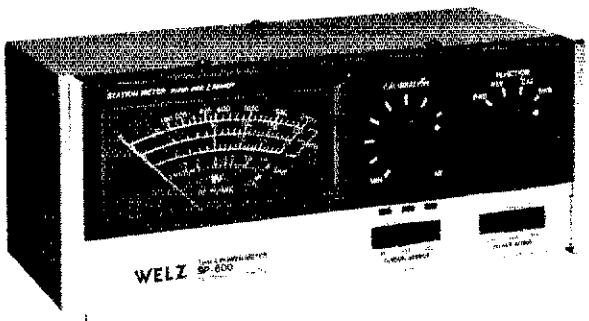
SP-600



SP-600 Select 1 of 3 sensors by soft touch switch. Three wide bandwidth sensors cover 1.6-500MHz.
RS-1: 1.6-60MHz 0-2kW
RS-2: 1.6-150MHz 0-200W
RS-3: 130-500MHz 0-200W

SP-200 Two position antenna switch and indicators. Three power ranges to 1kW, 1.8-160MHz.

SP-400 Three band sensors (2m, 220, 450MHz), 10 percent accuracy, 0-150W CW, LED power range indicators.

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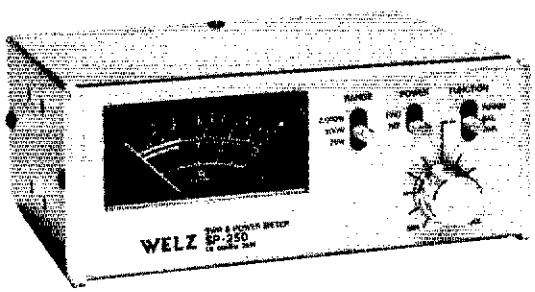
SP-250



SWR & POWER METERS

SP-250 Low-profile, economy 2kW wattmeter. 1.6-60MHz bandwidth. 3W SWR sensitivity. Three ranges. A Best Buy!

SP-15M 1.8-150MHz, 200 watt, low-profile wattmeter. VSWR, FWD PWR, REF PWR, 1.5W SWR sensitivity. Great for mobile HF.

SP-45M VHF-UHF to 100 watts. 3W sensitivity for SWR, 10 percent accuracy. All metal shielded construction.

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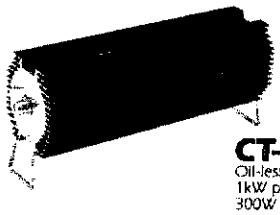
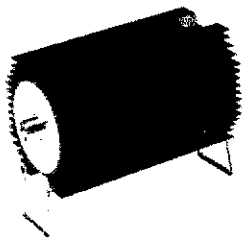
DUMMY LOADS



CT-300
Oil-less aircooled,
1kW peak for 3 min.,
300W avg. DC-250MHz

CT-150
Oil-less aircooled,
400W peak for 3 min.,
150W avg. DC-250MHz



CT-15A
50W peak, 15W avg.
50-239 screw-on dummy
DC-500MHz, VSWR<1:1.2

CT-15N
50W peak, 15W avg.,
Type N Dummy Load
DC-500MHz, VSWR <1.1:1

SURGE SUPPRESSOR

CA-35A
Contains replaceable, chip-type surge voltage protector.
Low loss, low VSWR.
DC-500MHz, 350V breakdown

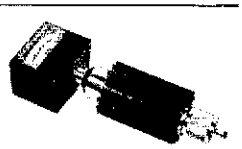
COAXIAL SWITCH

CH-20N
Two-way coaxial switch.
50-239 type connector.
DC-900MHz, 1kW power.

TERMINATION POWER METERS

TP-05X
BNC connector,
5W talkie checker.
Field calibratable.
3W avg. Dummy Load,
1W center. 50-500MHz.

TP-25A
25 watt version of TP-05X for mobile use.
Larger Dummy Load.
50-500MHz



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the membership, we need to know what those needs are. OO reports: W8QG K8JH WB8IKJ. BPL: AF8V. Traffic: AF8V 637, WD8RHU 459, KA8CPS 422, W8QHB 347, K8KQJ 312, KA8OWN 256, KA8NCR 206, WB8MTD 202, WD8LRT 149, KB8GT 111, WD8OUO 105, W8DT 104, WA8DHB 103, WB8YDZ 90, K8GXV 82, KA8EQO 79, WB8WKQ 72, W8PDP 66, K8OCP 64, WB8SIW 62, N8EBG 58, W8YIO 57, WD8MJB 56, K8UPE 51, WD8EIB 48, W8IHX 43, KT8G 41, W8SCW 41, W8CUP 37, KA8PQO 35, KV8U 35, WB8TTA 33, W8VIZ 30, N8CNY 26, K8DD 26, K8ZJU 26, WB8ITT 25, KA8JCL 24, WD8ECM 19, WB8HSN 19, W8YZ 19, KI8Q 17, W8TBP 12, W8TKW 12, WB8SYA 11, WA8ZSE 10, N8COA 7, WB8DJS 7, KP8Q 4, KA8SSU 4, WB8YWA 3. KB8TD 2, N8EBN 1. N8EOI 1. (Sept.) WB8YDZ 81, N8EBN 6.

OHIO: SM, Allan L. Severson, AB8P — SEC: K8AN. STM: K8OZ. ACC: K8US. PIO & SGL: N8CVK. TC: KB8MU.

Net	QNI	QTC	Sess.	Time (local)	Freq.
BN	381	307	62	6:45/10 P.M.	3.577
BNR	397	239	37	6:00 P.M.	3.605
BSSN	458	266	66	9:45 A/7:15 P.	
ONN	72	29	23	6:30 P.M.	3.708
OSN	261	115	31	6:10 P.M.	3.577
OSSBN	2312	976	99	10:30 A.M. 4:15 & 6:45 P.M.	3.9725
OSSN	110	46	28	6:45 A.M.	3.577
O6MN	321	16	31	9:00 P.M.	50.160

Details of 1984's Ohio Convention continue to flood in from K8JE and the Cincy group. Looks like the forums will have something for everyone. Two full days, from 9 to 5, with discussions on baluns, soldering, cellular systems (you can't get more "state of the art" than that), QRP, the upcoming volunteer examining program, tower legality with Judge Voris, W8BCE, etc. etc. Of course, there will be an ARRL Forum with our Director, W8RC, and ARRL VP, W4RA. Two evening receptions capped by what will be another top quality banquet with speaker Bruce Humphrys, K8HR, of HANDI-HAM fame and past Special Achievement Award winner at Dayton. He will also conduct a forum dealing with modifying ham gear for the handicapped. I'm sure each area in this state has someone who could benefit from that discussion, so see you there! Congrats to all for another extremely successful SET weekend! Club elections: Cleveland Wireless — AF8C, pres.; KT8O, v.p.; W8LYD, secy./treas. Greater Toledo ARC — WA8JNT, pres.; WB8HHZ, v.p.; WA8TOA, secy; M. Blair, treas. Canton ARC: KK8D, pres.; WA8ADA, v.p.; W8FEC: secy./treas. LEARA—N8BGK, pres., W8AZO & WD8PYV, v.p.; WD8AYI, secy.; W8GRG, treas. Appts.: W8NLQ, EC Knox Co.; KA8HGU, EC Tuscarawas Co. Upgrades, N8EHY to Extra. Congrats to all new officers, appointees and upgrades!

Local Nets	QNI	QTC	Sess.
ALERT	51	4	4
BRTN	315	208	37
COARES	107	9	3
Lorain Co.	53	9	13
LCNWO	344	88	35
MASER	146	29	4
Medina CO.	297	34	31
NEON	125	32	27
NCTW	30	84	16
RARA	60	2	4
TATN	434	91	31
TSRAC	1034	310	44
VWCEN	33	3	4

Traffic: WD8MIO 736, K8NCV 504, W8PMJ 487, K8YUW 428, WD8KFN 380, W8EK 312, K8AN 290, K8OZ 273, KBJDI 260, W8BO 226, KA8MEB 219, W8OZK 198, AB8P 195, N8DSU 187, WD8RIB 174, WB8DMF 152, KF8J 140, WB8KKI 128, KD8IC 120, N8AUH 111, WD8KBW 109, N8EES 98, W8WEG 90, WD8RGP 81, N8EVC 75, W8SKP 71, K8TVG 69, KA8IAF 67, KA8CGF 66, N8CW 65, KV8Q 64, NE8X 63, K3RC 55, WD8AYH 54, WB8JGW 53, KA8ICB 47, WA8HED 44, WD8IKC 44, WB8UBR 43, WD8ODV 37, W8CXM 36, WA8SSI 36, WB8YTD 32, W8BHL 31, WB8HHZ 31, WD8RGS 30, N8AEH 29, WD8OYK 28, NC8Q 28, N8JR 27, KA8GGZ 25, KA8GJV 22, K8NJQ 22, KW8X 22, N8AJU 20, KA8GMF 19, WA8DYX 16, WA8HGH 16, WB8SRC 16, WD9HDZ 14, WB8NHV 14, W8RG 14, W8OOL 11, W8FUP 10, WB8KWD 10, W8MVE 9, WB8SIQ 9, WD8BMK 8, K8DL 7, WB8VOA 7, K8CKY 6, K8CMR 6, W8WAV 6, WD8EKI 5, WB8NTR 5, K8BXT 4. (Sept.) N8AUH 63, WB8VOA 19.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK — STM: WB2MCO. SEC: AK2E. ACC & SC: N2BFG. SGL: KB2HQ. BM: WB2EAG. Club news: Albany ARA-new members WA3YZM KA2SKG N2EKJ KA2PBB N2DQV KA2SBL. Silent Key — W2LVZ. Auction held Nov. 11. Congrats to Poughkeepsie ARC on becoming Special Service Club! Also reports new members-K2KBL KA2SAB WA2SDD KA2THT. Overlook Mtn ARC and Ulster RACES provided comm. for bike race-those assisting were W2MU N2EK N2EIK KC2IW WA2KPF. Net reports: NYS/M QNI 279, QTC 115; NYS QNI 943, QTC 568; NYPON QNI 831, QTC 352; CDN QNI 650, QTC 101; ESS QNI 409, QTC 70; Ulster RACES QNI 61, QTC 2. I wish everyone the very best of the Holiday Season! All the best in the New Year! This column does now allow very complete reports. If anyone would like to volunteer to be editor for an ENY newsletter, please let me know. Thanks to WA2SPL who has done an outstanding job as STM, and good luck to WB2MCO as the new STM. Congrats also to SEC AK2E and SGL KB2HQ. Will have more next month on appointees. PSHR: WB2EAG WB2MCO KC2TF WB2VUK WB2ZCM K2ZM W2BIW AK2E K2ZVI W2YJR WB2OHR WA2YBM. PSHR (Sept.) WB2ZCM. Traffic: WB2EAG 446, WA2SPL 300, KC2TF 244, WB2MCO 170, K2ZM 133, WB2ZCM 124, W2PKY 115, WB2VUK 101, W2BIW 99, WA8MAZ 92, WA2JBO 86, AK2E 79, W2YJR 43, K2ZVI 39, WB2OHR 30, WA2YBM 27, N2AWI 25, AA2Y 25, WA2JQL 23, WB2SON 14, K2HNW 12. (Sept.) WB2ZCM 96. (Aug.) WB2ZCM 94. (July) WB2ZCM 122.

NEW YORK CITY — LONG ISLAND: SM, John H. Smale, K2IZ — SEC: WA2SUB. STM: K2GCE. ACC: WB2IAP. OO/RFI: NB2T. TC: W2JUP. PIO: W2IYX.

NLI CW*	3630 kHz	1900/2200	W2LWB
NLIPN*	3928 kHz	1815	KS2G
NCVHF	6.145/745	1930 M-F	K2MT
SCVHF	4.77/5.37	2030 M-F	WA2ARC
BAVHF	6.07/67	2000 M-F	N2BQD
ESS	3590 kHz	1800	W2WSS
NYS	3677 kHz	1900/2200	N2APB
NYS/M	3677 kHz	1000	WB2EAG
NYS	7077 kHz	1000 M-S	WB2EAG

*Denotes section net; all times are local; please try and help out by checking in whenever possible. Plan now to attend the ARRL National Convention July 20-22 at the New York Statler. Dr. Owen Garriott, W5LFL, will be the guest speaker at the banquet. After doing an outstanding

MFJ TUNERS

QUALITY TUNERS THAT DELIVER MORE PERFORMANCE, MORE FEATURES, MORE VALUE FOR YOUR MONEY.

MFJ-941D 300 WATT VERSA TUNER II

$99.95 (+$4) **MFJ's fastest selling tuner packs in plenty of new features. New styling!** Brushed aluminum front. All metal cabinet. **New SWR/Wattmeter!** More accurate. Switch selectable 300/30 watt ranges. Read forward/reflected power.

New antenna switch! Front panel mounted. Select 2 coax lines, direct or through tuner, random wire/balanced line or tuner bypass for dummy load.

New airwound inductor! Larger more efficient 12 position airwound inductor gives lower losses and more watts out. Run up to 300 watts RF power output.

Matches everything from 1.8 to 30 MHz: dipoles, inverted vee, random wires, verticals, mobile whips, beams, balanced and coax lines.

Built-in 4:1 balun for balanced lines. 1000 V capacitor spacing. Black. 11 x 3 x 7 inches. Works with all solid state or tube rigs. Easy to use anywhere.

MFJ-940B, $79.95, 300 watts, SWR/Wattmeter, antenna switch on rear. No balun. 8 x 2 x 6 in. eggshell white with walnut grained sides.
MFJ-945, $79.95, like MFJ-940B with balun, less antenna switch.
MDJ-944, $79.95, like MFJ-940B with balun, antenna switch on front panel, less SWR/Wattmeter.
Optional mobile bracket for 940B, 945, 944, $5.00.

MFJ-900 200 WATT VERSA TUNER

Matches coax, random wires 1.8-30 MHz. Handles up to 200 watts output; efficient airwound inductor gives more watts out. **$49.95** (+$4) 5x2x6 in. **Use any transceiver,** solid state or tube. Operate all bands with one antenna.

OTHER 200 WATT MODELS:
MFJ-901, $59.95, like 900 but includes 4:1 balun for use with balanced lines.
MFJ-16010, $39.95, for random wires only. Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

MFJ-949B 300 WATT DELUXE VERSA TUNER II

$139.95 (+4) **MFJs best 300 watt Versa Tuner II. Matches everything** from 1.8 - 30 MHz, coax, randoms, balanced lines, up to 300W output, solid state or tubes.

Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.

Built-in 4:1 balun. 300W, 50-ohm dummy load, SWR meter and 2 range wattmeter (300W and 30W).

6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case. 10 x 3 x 7 in.

MFJ-962 1.5 KW VERSA TUNER III

Run up to 1.5 KW PEP **$229.95** (+$10) and match any feedline continuously from 1.8 to 30 MHz; coax, balanced line or random wire. Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected power, 2% meter movement. **6 position** antenna switch handles 2 coax lines (direct or through tuner), wire and balanced lines. 4:1 balun 250 pf 6 KV variable capacitors. 12 position inductors. Ceramic rotary switch. All metal black cabinet and panel gives RFI protection, rigid construction and sleek styling. Flip stand tilts tuner for easy viewing. 5 x 14 x 14 inches.

MFJ-989 3 KW ROLLER INDUCTOR VERSA TUNER V

$329.95 (+$10) **Meet "Versa Tuner V". It has all the features you asked for,** including the new smaller size to match new smaller rigs - only 10 3/4"W x 4 1/2"H x 14 7/8"D.

Matches coax, balanced lines, random wires — 1.8 to 30 MHz. 3 KW PEP- the power rating you won't outgrow (250 pf-6KV caps).

Roller Inductor with a 3-digit turns counter plus a spinner knob for precise inductance control to get that SWR down to minimum every time.

Built-in 300 watt, 50 ohm dummy load, built-in 4:1 ferrite balun.

Built-in 2% meter reads SWR plus forward and reflected power in 2 ranges (200 and 2000 watts). Meter light requires 12 VDC. Optional AC adapter MFJ-1312 is available for $9.95.

6-position antenna switch (2 coax lines, through tuner or direct, random/balanced line or dummy load). SO-239 connectors, ceramic feed-throughs, binding post grounds.

Deluxe aluminum low-profile cabinet with sub-chassis for RFI protection, black finish, black front panel with raised letters, tilt bail.

MFJ-981, $239.95. 3 KW, 18 position switched dual inductor. SWR/Wattmeter. 4:1 balun.

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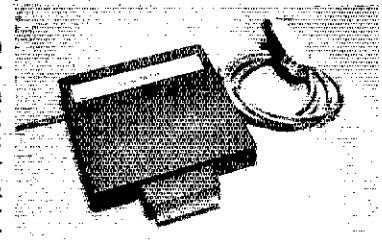
MBATEXT™ is the most advanced MBA (Morse, Baudot, ASCII) software plug-in cartridge available for the VIC-20 or Commodore 64 computer. Compare our outstanding features and price to the competition.

• KEYBOARD OVERLAY instructions to avoid constant referral to the manual • RTTY and ASCII SPEED ESTIMATE MODE • BREAK-IN CW MODE •QSO BUFFER RECORD TOGGLE •WORD PROCESSOR style insertion, deletion, and correction in TEXT EDIT MODE • CW AUTO SPEED TRACKING plus SPEED LOCK • BREAK-IN BUFFER that is easy to use • Low speed FARNSWORTH CW TRANSMISSION (between 5 and 14 WPM) • RE-TRANSMIT RECEIVED TEXT DIRECTLY without need of disk or cassette • DISK, CASSETTE, OR PRINTER storage of message and QSO buffers • RECEIVE AND TRANSMIT 5-99 WPM MORSE • 10 SOFT-PARTITIONED™ MESSAGE (OR TEST) BUFFERS • WORD WRAP • TIME OF DAY CLOCK • PRECOMPOSE SPLIT SCREEN OPERATION • STATUS INDICATORS on screen • EASY START-UP by simply typing SYS 44444 or SYS 33333 • DEDICATED FUNCTION KEYS for quick operation • Ability to IMBED CONTROL FUNCTIONS in type-ahead buffer • WORD OR CHARACTER mode • SELECTABLE BAUDOT UNSHIFT ON SPACE (USOS) •SEND/RECEIVE 60, 67, 75, 100, 132 WPM BAUDOT PLUS 100, 300 BAUD ASCII • RTTY BLANK-FILL and MORSE BT option for idle transmit periods • AUTOMATIC PTT • computer control of TONE REVERSE • MASTER MENU, COMMAND MENU, and OPTIONS MENU makes MBATEXT™ easy to use with no prior experience • INCLUDES CABLE TO INTERFACE WITH AEA model CP-1 COMPUTER PATCH™ • POWERED BY HOST COMPUTER.

NEW MICROPATCH™

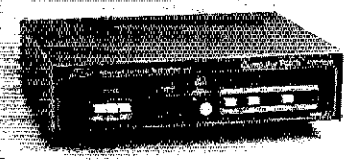


MICROPATCH™ IS A NEW LOW-COST, HIGH-PERFORMANCE Morse, Baudot and ASCII SOFTWARE/HARDWARE computer interface package. The MICROPATCH™ model MP-20 or MP-64 incorporates the complete MBATEXT software ROM (described above) for either the VIC-20 or Commodore 64 computers. All circuitry and software is incorporated on a single, plug-in cartridge module featuring the following: • TRUE DUAL CHANNEL MARK AND SPACE MULTI-STAGE 4 POLE, CHEBYSHEV ACTIVE FILTERS • AUTOMATIC THRESHOLD CORRECTION for good copy when one tone is obliterated by QRM or SELECTIVE FADING • EASY, POSITIVE TUNING with TRIPLE LED INDICATOR • NOT a low-cost, low-performance phase-locked loop detector!!! • SWITCH SELECTED 170 Hz or WIDE SHIFT on receive • 800 Hz multi-stage active CW FILTER • AUTOMATIC PTT • RTTY ANTI-SPACE • demodulator circuitry powered by external 12VDC (not supplied) to AVOID OVERLOADING HOST COMPUTER and for maximum EMI ISOLATION • EXAR 2206 SINE GENERATOR for AFSK output • SHIELDED TRANSCEIVER AFSK/PTT INTERFACE CABLE PROVIDED • PLUS or MINUS CW KEYED OUTPUT • FSK keyed output.

The Micropatch is structured for easy upgrading to the AEA Computer Patch ™ advanced interface unit without having to buy a different software package! Simply unplug the external computer interface cable (supplied with the Micropatch) from the Micropatch and plug it into the Computer Patch.

$149.95 List $129.95*
MP-20 or MP-64

COMPUTER PATCH™



COMPUTER PATCH™ is the name of our most advanced computer interface equipment for Morse, Baudot, ASCII, or AMTOR operation. The CP-1 will allow you to patch most of the popular personal computers to your transceiver when used with the appropriate AEASOFT™ TU software such as AEA MBATEXT, AMTOR TEXT™, or the MBATEXT RESIDENT ON THE MICROPATCH units. AEA also offers a full feature software package for the Apple II, II plus and IIE; TRS-80 Models I, III and IV; and the IBM-PC. The CP-1 will also work with certain other computers using commonly available software packages.

The CP-1 offers the following advanced and high quality features: • HANDSOME ALL METAL ENCLOSURE FOR MAXIMUM RF IMMUNITY • DUAL CHANNEL, MULTI-STAGE ACTIVE MARK AND SPACE FILTERS • AUTOMATIC THRESHOLD CORRECTION • RECEIVE 170 HZ FIXED OR 100-1000 HZ VARIABLE SHIFT • 800 HZ multi-stage CW FILTER • PRE—LIMITER AND POST-LIMITER FILTERS • SERIAL RS-232 FIELD INSTALLABLE OPTION • 117 VAC WALL ADAPTOR SUPPLIED • PLUS (+) and MINUS (-) CW OUTPUT JACKS • MAGIC EYE STYLE BAR GRAPH TUNING INDICATOR • SCOPE OUTPUT JACKS • NORMAL/REVERSE front panel switch • MANUAL (override) PTT switch • VARIABLE THRESHOLD for CW • ANTI-SPACE RTTY • KEY INPUT JACK for narrow shift CW ID on RTTY, CW practice, or keyboard bypass.

The CP-1 is made in the U.S. with high quality components including double-sided glass epoxy through-hole plated boards, complete with solder mask and silk screened parts designators.

$239.95 List $199.95* CP-1

PACKAGE SPECIALS
$239.95*

Combine the VIC-20 or COMM-64 MBATEXT™ software with the CP-1 at time of purchase and you receive a SPECIAL PACKAGE PRICE. NOW the best RTTY COMPUTER INTERFACE SYSTEM is available at prices comparable only to vastly inferior systems.

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MFJ ACCESSORIES

HEAR POLICE/FIRE/WEATHER ON YOUR 2 METER HANDHELD

Scanning Handhelds become Police/Fire Scanners

MFJ-313

$39.95

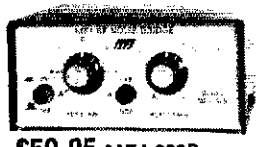
This MFJ VHF converter turns your synthesized scanning 2 meter handheld into a hot Police/Fire/Weather band scanner.
144-148 MHz handhelds receive Police/Fire on 154-158 MHz with direct frequency readout. Hear NOAA weather, maritime coastal plus more on 160-164 MHz. Mounts between handheld and rubber ducky. Feedthru allows simultaneous scanning of both 2 meters and Police/Fire bands. No missed calls. Highpass input filter and 2.5 GHz transistor gives excellent uniform sensitivity over both bands. Crystal controlled. Bypass/Off switch allows transmitting. Won't burn out if you transmit (up to 5 watts) with converter on. Low insertion SWR. Uses AAA battery. 2¼ x 1½ x1½ inches. BNC connectors. Enjoy scanning, memory, digital readout, etc. as provided by your handheld on Police/Fire band.

"GRANDMASTER" MEMORY KEYER

MFJ-484
$139.95

Up to twelve 25 character messages plus 100, 75, 50 or 25 ch. messages (4096 bits). Repeat any message continuously or with pauses of up to 2 minutes. LEDs show message in use. Record, playback, or change messages instantly at touch of a button. Memories are resettable with button or touch of the paddle. Built-in memory saver— 9 V battery takes over when power is lost. Iambic operation with squeeze key. Dot-dash insertion. Dot-dash memories, self-completing, jam-proof spacing, instant start. 12-15 VDC or 110 VAC with optional adapter, $9.95. 8x2x6 in.

RX NOISE BRIDGE



Maximize your antenna performance! $59.95 MFJ-202B
Tells whether to shorten or lengthen antenna for minimum SWR. Measure resonant frequency, radiation resistance and reactance.
New Features: individually calibrated resistance scale, expanded capacitance range (±150 pf). Built-in range extender for measurements beyond scale readings. 1-100 MHz. Comprehensive manual. Use 9 V battery. 2x4x4 in.

INDOOR TUNED ACTIVE ANTENNA

"World Grabber" rivals or exceeds reception of outside long wires! Unique **tuned** Active Antenna minimizes intermod, improves selectivity, reduces noise outside tuned band, even functions as preselector with external antennas. Covers 0.3-30 MHz. Telescoping antenna. Tune, Band, Gain, On-off bypass controls. 6x2x6 in. Uses 9V battery, 9-18 VDC or 110 VAC with adapter, MFJ-1312, $9.95.

$79.95 MFJ-1020

RECEIVER PRESELECTOR

MFJ-1040
$99.95

Improve weak signal reception, reject out-of-band signal, reduce image response from 1.8 to 54 MHz. Up to 20 db gain. Low noise MOSFET. Gain control. Bandswitch. Can use 2 antenna, 2 receivers. ON-OFF/Bypass. 20 db attenuator. LED. Coax, phone jacks. 8x2x6 in. Also for XCVRs to 350 watts input. Auto bypass. Delay control. PTT jack. 9-18 VDC or 110 VAC with optional AC adapter MFJ-1312, $9.95.
MFJ-1045, $69.95. Same as MFJ-1040, less attenuator, XCVR auto bypass, delay control, PTT. Use 1 ant., 1 rcvr. 5x2x6 in. 9 V battery, 9-18 VDC or 110 VAC with optional AC adapter, MFJ-1312 $9.95.

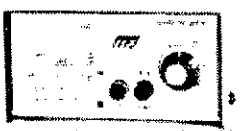
MFJ/BENCHER KEYER COMBO

MFJ-422
$99.95

The best of all CW worlds- a deluxe MFJ Keyer in a compact configuration that fits right on the Bencher iambic paddle! MFJ Keyer - small in size, big in features. Curtis 8044 IC, adjustable weight and tone, front panel volume and speed controls (8-50 WPM). Built-in dot-dash memories. Speaker, sidetone, and push button selection of semi-automatic/tune or automatic modes. Solid state keying. Bencher paddle is fully adjustable; heavy steel base with non-skid feet. Uses 9 V battery or 110 VAC with optional adapter, MFJ-1305, $9.95.

VHF SWR/WATTMETER

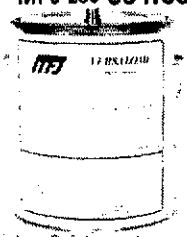
MFJ-812 $29.95



Low cost VHF SWR/ Wattmeter! Read SWR (14 to 170 MHz) and forward/ reflected power at 2 meters. Has 30 and 300 watts scales. Also read relative field strength. 4x2x3 in.

1 KW DUMMY LOAD

MFJ-250 $34.95



Tune up fast, extend life of finals, reduce QRM! Rated 1KW CW or 2KW PEP for 10 minutes. Half rating for 20 minutes, continuous at 200 W CW, 400 W PEP VSWR under 1.2 to 30 MHz, 1.5 to 300 MHz. Oil contains no PCB. 50 ohm non-inductive resistor. Safety vent. Carrying handle. 7½x6¾ in.

24/12 HOUR CLOCK/ID TIMER

MFJ-103
$34.95

Switch to 24 hour GMT or 12 hour format! Battery backup maintains time during power outage. ID timer alerts every 9 minutes after reset. Switchable seconds readout. Elapsed timer. Just start clock from zero and note time of event up to 24 hours. Bright blue .6" digits. Alarm with snooze function. Synchronizable with WWV. Lock function prevents mis-setting. Power out, alarm on indicators. Black. 5x2x3 in. 110 VAC, 60 Hz.

DUAL TUNABLE SSB/CW FILTER

MFJ-752B $89.95

Dual filters give unmatched performance! The primary filter lets you peak, notch, low pass or high pass with extra steep skirts. Auxiliary filter gives 70 db notch, 40 Hz peak. Both filters tune from 300 to 3000 Hz with variable bandwidth from 40 Hz to nearly flat. Constant output as bandwidth is varied; linear frequency control. Switchable noise limiter for impulse noise. Simulated stereo sound for CW lets ears and mind reject QRM. Inputs for 2 rigs. Plugs into phone jack. Two watts for speaker. Off bypasses filter. 9-18 VDC or 110 VAC with optional adapter, MFJ-1312, $9.95.

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job as SEC, WA2KKJ has had to step down. I want to thank him for keeping things going. He will be replaced by WA2SUB, former EC for town of Babylon. Also, please welcome W2IYX as the Public Information Officer for the section. Radio Central ARC ran a special events station, WA2UEC, for the 62nd anniv. at the RCA site at Rocky Point. KF2F is now on the air with a Kenwood 930, and W2SZV has a new Kenwood 430S. Gt. South Bay ARC had K9CH from the ARRL Hq. as their guest speaker at the Oct. meeting. Past pres. of the Wantagh ARC, N2EM is now an asst. professor of computer science at Potsdam. K1VKO and WA1GOO report they have a 2-mtr (RTTY & ASCII) RBBS "mailbox" on 146.580 MHz simplex. The system is on 24 hours a day and they report good coverage into NYC and Long Island. For a copy of the system commands send a business-size SASE to K1VKO, 43 Seaview Ave., E. Norwalk, CT 06855. NYC LI ACC WB2IAP presented the newest affiliated club in the section, Jr. H.S. 180 in Rockaway Beach, with their certificate from the ARRL Hq. If you need a speaker for your meetings, contact WB2IAP or me. Plans are being made for the International Special Olympics being held at Eisenhower Park in June. As the details become available they will be passed along. Traffic: N2AKZ 312, K2MT 155, K2GCE 72, W2DBQ 64, KA2FFC 30, KS2G 25.

NORTHERN NEW JERSEY: SM, Robert Neukomm, KB2WI — SEC: WB2VUF. STM: W2XD. BM: N2BOP. ROC: W2CC. SGL: W2KB. PIO: WB2NQV. TC: AD7I. ACCs: KK2U KY2S. NMs: W2CC AG2R N2BNB WB2RMJ WB2ANK WB2IQJ KY2D N2XJ W2PSU.

Net	Mgr.	Freq.	Time	Sess.	QNI	QSP
NJM	N2XJ	3695	1000 Dy	31	155	56
NJN/E	AG2R	3695	1900 Dy	31	363	200
NJN/L	AG2R	3695	2200 Dy	31	252	116
NJSN	WB2IQJ	3735	1830 Dy	31	---	---
NJPN	W2CC	3950	1800 Dy 0900 Sn	37	420	209
NJVN	WB2ANK	49/49	2230 Dy	31	297	104
TCEN	WB2RMJ	147.255	1930 Dy	31	78	74
OBTTN	KY2D	147.12	2000 Dy	31	---	---
NJRTTY	W2PSU	147.51	Autostart			

TCRA News. Election results: W2DQA pres.; KC2FR, v.p.; WB2RMH, secy.; W2IZC, treas.; KC2FS W2HWW W2IHA WB2RNJ WA2WDJ trustees. Metroplex news: W2JIO gave a talk and demonstration of his design, development and practical application of a wide-range of equipment for sightless operators. His wife K2LY also attended the meeting. Congrats to WA2NVF on his recent wedding; W1IAN was best man. The Perry family are all licensed amateurs: KA2ROF KA2TCC and WB2MGP who recently upgraded to general. WB2JUN and his wife are expecting a new "MetroHarmonic" soon. N2BPO is Advanced. RAVEN reports they were involved in the statewide emergency management drill called "Emex Ethel." A large group of members were involved in three ""thons" in October: on the 9th for "Fitness Day," the 16th for CROP and the 30th for "Hikes for Scouting." WB2PEK has a new daughter. N2DPV has moved back to Pequannock and is working for Bells Labs. Garden State ARC reports on 4th Annual W2GSA Mini-DXpedition to Treasure Island on Oct 1-2 with the following in attendance: KN2B VE3ZB KY2S KC2ZV N2FT WA2NHZ KC2ZC KA2TGC WA2PAC WA2JOC N2DPB N2DPC WA2JKS KE2V WA2ESZ WA2YAB WB2KCV KA2TGF W2NCF N2DR. The following two are Silent Keys: K2NP K2BX. Upgrades: WA2BAS WB2VJF W2RRX NA2H. Extra: N2DPB KD2ZE N2DSZ N2ELW N2EED KA2OZA KD2ZV. Advanced: N2DHT. General: KA2RCS. Tech: KA2SRZ new Novice. JSARS *Ka-Chunker* reports W2IX spoke on "The Basics of Antennas and Antenna Systems" at Ft. Monmouth October 15th. W2TPJ marks his 32nd year as an OO and 53rd year as a "ham." Nutley ARS reports KC2FC gave a talk on basic radio before the membership including 15 potential Novices. Springfield EOC Radio OPS provided communication for NYC Marathon and the Union Twp parade. KB2WI helped in the communications with Grenada with KA2ORK/J3 along with KC2PK and N2DRA. All received Certificates of Merit. Traffic: N2XJ 299, AG2R 240, WA2NPP 196, W2VY 185, K2VX 119, KY2P 115, KA2OIW 113, KB2WI 102, WB2KLF 92, WB2GHN 61, W2XD 53, KD2BE 40, N2EBA 36, WB2ANK 34, N2DZZ 33, W2UH 25, W2RRX 24, W2CC 19, W5DTR 16, W2KB 16, N2ELW 15, WA2FZJ 7, N2BNB 5, W2ODV 3.

MIDWEST DIVISION

IOWA: SM, Bob McCaffrey, KØCY — SEC: WA4VWV. STM: KAØX. PIO: KBØZP. ACC: WBØQAM. SGL: AKØQ. TC: KØDAS. BM: KØIIR. I am now accepting nominations for the 4th "Iowa ARRL Amateur of the Year Award." Please send me a statement of an ARRL member that best typifies the Iowa Ham. ICN is doing FB on a 5-night-a-week schedule and invites your participation. NIARC participated with the Red Cross in an unannounced drill. New officers for the EIDXA are WØMN WØWP KØLUZ. The .22/.88 rptr in Marshalltown is up and running. The .34/.94 in DSM has a super new location on the IHP tower. New officers at Dvnpt are K9AYK WBØFBP WBØHMZ WAØOEW, and in Mt. Pleasant are KAØBTE KAØPZL and WDØENR.

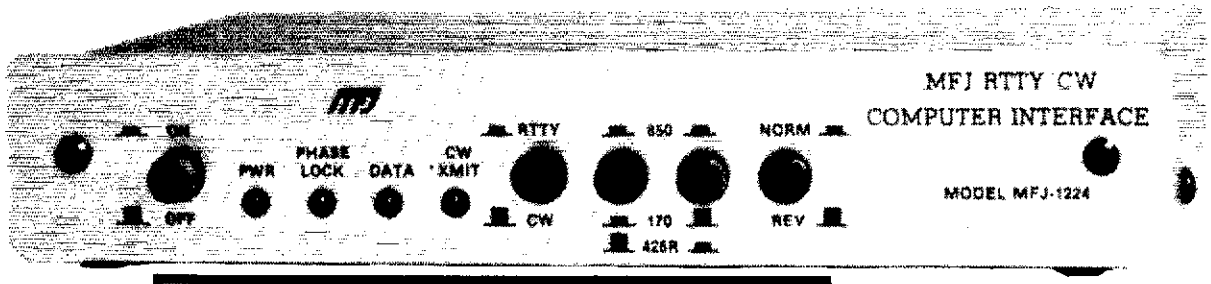
Net	Freq.	Days	Times	QNI	QTC
IA75 Phone	3970	M-S	1830-2330	1778	106
TLCN	3560	Dy	0030-0400	420	188
ICN	3713	M-F	0100	76	34
ITEN	3970	Sn	2230	71	12

This is the time that we will review appts, so if you are delinquent with your reports let us know of your activities. WB9GTD upgraded to Adv. Did you forget to send me your ttc reports; you were doing so well. Hope you had HAM for the holidays and not a bunch of Turkeys. Keep watch for severe winter WX. Traffic: WØSS 247, WAØAUX 241, WDØFWB 241, KØGP 134, WØYLS 100, KØCY 93, WDØGVY 79, W4JL 76, KØOI 58, KAØADF 55, WBØJFF 45, WBØAVW 33, KCØSC 30, KAØJQC 29, WØBW 22, WØFQ 18, WØZTP 18, WBØBHF 7, KAØPZM 6.

KANSAS: SM, Robert M. Summers, KØBXF — SEC: WØKL. STM: WØOYH. SGL: NØBLD. TC: KØEZ. BM: KØJDD. Another SET has come and gone. The results will soon tell us if we have improved or slipped a notch or two in the standings. Only you know if you are really prepared to be of valuable assistance to your community in the event of an emergency communication need. If YOU did not think to participate in 1983, mark your calendar now to do so in 1984. Net activity reports: KSBN QNI 1407, QTC 215; KPN QNI 461, QTC 147; KWN QNI 613, QTC 574 for the morning session, and QNI 835, QTC 573 for the evening session; CSTN QNI 2070, QTC 95; QKs QNI 291, QTC 98; QKS-SS QNI 53, QTC 25. Several KS hams were fortunate enough to be able to attend the national convention in Houston. No comments on the programs, etc., though. WØHI did report a good session of the CAS meeting on Oct. 8 was held in conjunction with the convention though. Received and approved the first SPECIAL

MFJ RTTY / ASCII / CW COMPUTER INTERFACE

Lets you send and receive computerized RTTY/ASCII/CW. Copies all shifts and all speeds. Copies on both mark and space. Sharp 8 Pole active filter for 170 Hz shift and CW. Plugs between your rig and VIC-20, Apple, TRS-80C, Atari, TI-99, Commodore 64 or most other personal computers. Uses MFJ, Kantronics software and most other RTTY/CW software.



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Powerful RTTY/ASCII/CW software for VIC-20, Commodore 64. Developed by MFJ. Cartridge plugs into expansion port. Features split screen display, type ahead buffer, message ports, RTTY/ASCII/CW send and receive plus much more.
Includes cable to interface MFJ-1224 to VIC-20 or Commodore 64.

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MFJ-1224

This new MFJ-1224 RTTY/ASCII/CW Computer Interface lets you use your personal computer as a computerized full featured RTTY/ASCII/CW station for sending and receiving.

It plugs between your rig and your VIC-20, Apple, TRS-80C, Atari, Ti-99, Commodore 64, and most other personal computers.

Powerful MFJ software available for VIC-20 (MFJ-1250, $49.95) and Commodore 64 (MFJ-1251, $49.95). Features split screen display, type ahead buffer, message ports, RTTY/ASCII/CW send and receive plus more.

Uses Kantronics software for Apple, TRS-80C, Atari, TI-99 as well as VIC-20 and Commodore 64.

You can also use most other RTTY/CW software with nearly any personal computer.

A 2 LED tuning indicator system makes tuning fast, easy and positive. You can distinguish between RTTY/CW without even hearing it.

Once tuned in, the interface allows you to copy any shift (170, 425, 850 Hz and all shifts between and beyond) and any speed (5 to 100 WPM on RTTY/CW and up to 300 baud on ASCII).

Copies on both mark and space, not mark only or space only. This greatly improves copy under adverse conditions.

A sharp 8 pole active filter for 170 Hz shift and CW allows good copy under crowded, fading and weak signal conditions.

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A +250 VDC loop output is available to drive your RTTY machine. Has convenient speaker output jack.

Phase continuous AFSK transmitter tones are generated by a clean, stable Exar 2206 function generator. Standard space tones of 2125 Hz and mark tones of 2295 and 2975 Hz are generated. A set of microphone lines is provided for AFSK out, AFSK ground, PTT out and PTT ground.

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High voltage grid block and direct outputs are provided for CW keying of your transmitter. A CW transmit LED provides visual indication of CW transmission. There is also an external hand key or electronic keyer input jack.

In addition to the Kantronics compatible socket, an exclusive general purpose socket allows interfacing to nearly any personal computer with most appropriate software. The following TTL compatible lines are available: RTTY demod out, CW demod out, CW-ID input, +5 VDC, ground. All signal lines are buffered and can be inverted using an internal DIP switch.

For example, you can use Galfo software with Apple computers, RAK software with VIC-20's, or Clay Abrams software with TRS-80C, N4EU software with TRS-80 III, IV. Some computers with some software may require some external components.

DC voltages are IC regulated to provide stable AFSK tones and RTTY/ASCII/CW reception.

Aluminum cabinet. Brushed aluminum front panel. 6x1¼x6 inches. Uses 12-15 VDC or 110 VAC with optional adapter, MFJ-1312, $9.95.

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It plugs between your receiver and VIC-20, Apple, TRS-80C, Atari, TI-99, Commodore 64 and most other personal computers.

Use MFJ-1250 ($49.95) software cartridge for VIC-20 or MFJ-1251 ($49.95) software cartridge for Commodore 64. Use Kantronics software for Apple, TRS-80C, Atari and TI-99.

An automatic noise limiter helps suppress static crashes for better copy, while a simple 2 LED tuning indicator system makes tuning fast, easy and positive.

In addition to the Kantronics compatible socket, a general purpose socket provides RTTY out, RTTY inverted out, CW out, CW inverted out, ground and +5VDC for interfacing to nearly any personal computer with most appropriate software.

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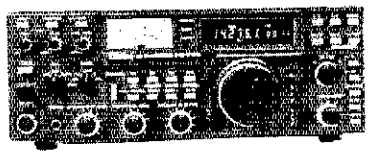

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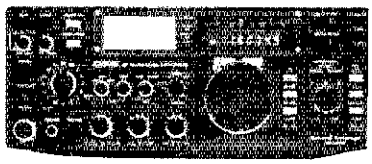

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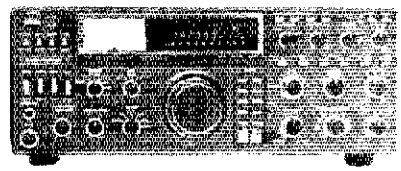

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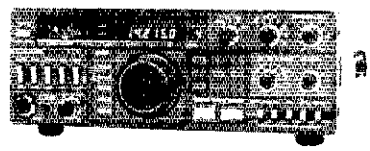

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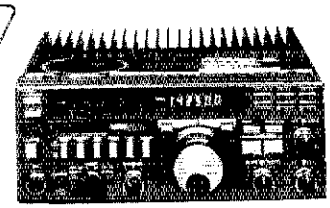

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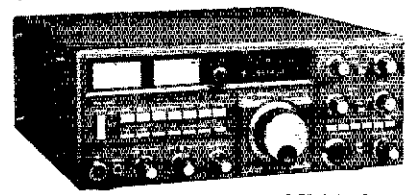

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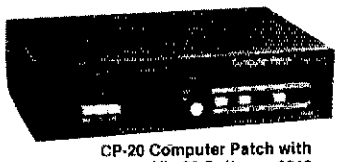

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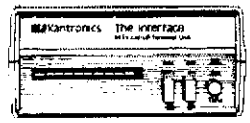

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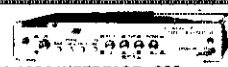

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B108	2M	Yes	10W	80W	10A	$159
B1016	2M	Yes	10W	160W	20A	$249
B3016	2M	Yes	30W	160W	17A	$199
C22	220	No	2W	20W	5A	$ 79
C106	220	Yes	10W	60W	10A	$179
C1012	220	Yes	10W	120W	20A	$259
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RS35M	25	35	149
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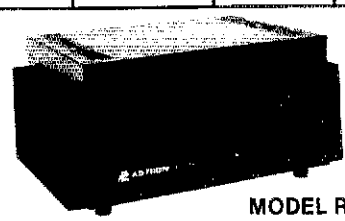

MODEL RS-50A

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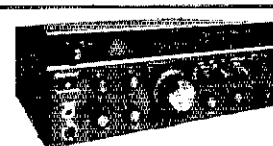

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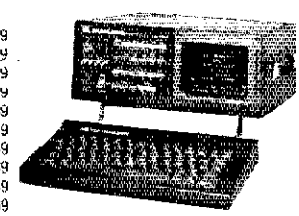

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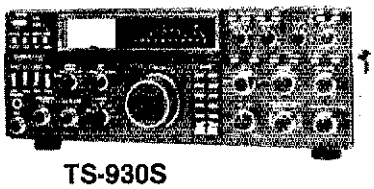

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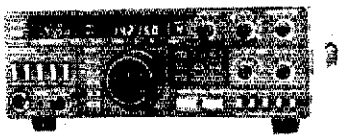

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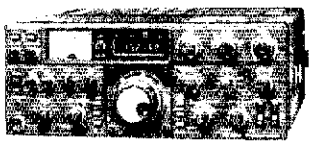

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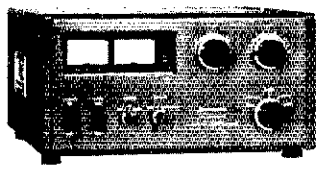

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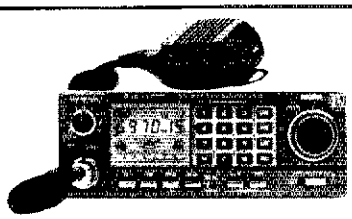

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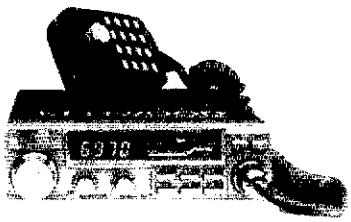

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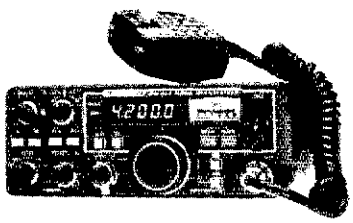

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- Dual VFO
- Hi-Lo Power Switch
- High Performance Noise Blanker

TR-9130 List $529.95
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TR-2500 2.5W/300 mW (Switchable) 2 Meter Handheld Transceiver Small Size— Small Price— Big Performance!

- LCD Readout
- Ten Memories w/Lithium Back-up
- Band and Memory Scan
- Built-In Sub-tone Encoder
- Built-In 16 Key Autopatch Encoder
- Slide Lock Battery Pack

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RA-3 Telescoping Antenna **$14.95**
BH-2A Belt Hook **$4.95**
PB-25H Heavy-Duty Battery Pack **$39.95**
DC-25 13.8VDC Power Adapter **$19.95**

All TR-2500 Accessories in Stock for Immediate Shipment!
TR-3500 Also in Stock at Sale Prices—Call!

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TW-4000A Dual Bander 2m and 70cm FM in One Compact Package!

- Big LCD Readout
- 25W Output—Both Bands
- 10 Memories w/Scan and Back-up
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- GaAs FET Front End
- 16 Key Up/Down Mic

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R-600—R-100S—R-2000 Receivers in Stock!
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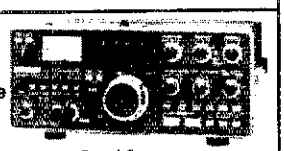

TS-780 2m/70cm Dual Band—All Mode Transceiver

- Dual VFO
- 10W Output
- VOX
- Noise Blanker
- Band Scan
- 10 Memories
- Memory Scan
- AC Power Supply

TS-780 List $999.95
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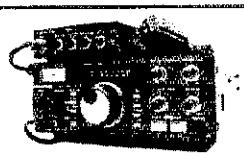

TS-660 Quad Bander—All-Mode Transceiver 6m, 10m, 12m and 15m

- Dual VFO
- IF Shift
- 10W Output
- 5 Memories
- Noise Blanker
- VOX, Narrow Filters, AC Supply and Other Accessories Available

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SERVICE CLUB application for the CENTRAL Kansas ARC, Inc. of Salina, KS. Other clubs should refer to your recent communication from headquarters, pull out the form CT-203 (283) and do your thing. Let us make KANSAS number one in every activity category pretaining to Amateur Radio, a goal that is NOT impossible!!! Traffic: WØFRC 562, WØOYH 222, WBØZEN 182, WØHI 142, KØBXF 124, WØFIR 123, KSØU 99, WØKL 90, WØFDJ 77, WØCHJ 61, WØMYM 53, WØQMT 34, KØGSC 24, WØPB 13, WØOAG 11, KAØE 5, WAØOWH 5, WØNYG 3. (Sept.) WØHI 137, WØFIR 80.

MISSOURI: SM, Ben Smith, KØPCK — Bob Peavler, W9NVY (ex-WØBV) became a Silent Key Oct. 14. He was a former SCM of Missouri and had been Missouri CW Net Manager for several years. Our sympathy to the Peavler family and their friends. The TWA ARC of Kansas City provided communications for the Boy Scout Camporee held near Kansas City the weekend Sept. 30 to Oct. 2. Club members assisting with this project were: WBØPPM NØEQL WAØUUC and Jim Morelock. On the same weekend the Indian Foothills ARC of Marshall also provided communications for the Missouri State Corn Husking Contest held at Marshall. Indian Foothill club operators for this event were: WBØSZH WBØSZI KØBVB WBØZIY KAØCZH KBØYG WØKNF KØGZW. Operations such as these are worth a lot as PR for Amateur Radio and give the clubs a chance to provide a service to their community. The Mother of the West Chapter of the 10-10 International hosted VK4NUE and her OM Phil of Brisbane, Queensland, Aust. at a carry-in dinner Oct. 16 at Mexico, MO. Seventeen chapter members and their families attended. They have been visiting 10-10 chapters in North America and were the guests of KØTCQ and family of Monroe City while in Missouri. WØCKK, 86, passed away Oct. 10. He had been involved in Amateur Radio in many aspects, such as teaching Novices, MARS programs and as a member of ARCs in southwest MO. He was still active on 2 meters via his HT. Our congrats to KAØQAY of Festus, who received her Novice ticket at the age of 11. Hope she enjoys Amateur Radio for many years to come.

Net	Time	Freq.	Sess.	QNI	QTC
MOSSN	1800	3963	34	779	132
MON	1900/1145	3585	32	327	171
MEOW	1745	3963	31	401	38
HBN	1005 M-F	7280	21	425	44
SARES	2000 Th	146.31	5	289	12
RRARN	2000	146.19	26	341	20
IFN	2000 M	147.24	4	28	1
PHD	2100 T	146.43	6	121	0
CMEN	2100 W	146.16	4	52	0
JCARES	2100 W	146.03	4	48	0
SARN	2100 W	146.03	4	45	0
LOACW	2000 T	28.1047	5	27	0
LOAFM	2100 F	146.13	4	89	0

Traffic: AIØO 216, KØPCK 184, KØSI 150, KØBM 97, WØBMA 96, KT5Y 930 WØOUD 75, KØDSQ 57, KGØL 53, KØUAA 48, K2ONP 37, KAØP 31, NØBLB 29, KUØG 26, WAØKUH 19, WBØHOP 13, WØNUB 12.

NEBRASKA: SM, Reynolds, Davis, KØGND — Happy New Year! The Nebraska section moves into 1984 with a lot of momentum! Thank you for your support of the League. And, special thanks to your leadership team: Section Emergency Coordinator — Jim Sanford, NØAIH 402-571-2704; Section Traffic Manager — Shirley Rice, KAØBCK, 308-632-4337; Bulletin Manager — Ken Johnson, WDØEMR 402-466-4916; Affiliated Club Coordinator — Keith Erickson, KØGNW 308-234-9863; State Government Liaison — Bob Mitchel, WBØRJJ, 402-488-3166; Official Observer & RFI Coordinator — Joe Eisenberg, WAØWRI 402-464-8882; Public Information Officer — David Ahrendts, KCØXT, 402-397-6339. My address and phone are found on page 8 of *QST* each month. Let's all work together to the benefit of Amateur Radio. One new appt. — KAØCRI to Scotts Bluff ARES Net Manager. Traffic: KØDKM 143, WAØSCP 130, WBØTED 123, KØGND 74, KAØBCB 69, WØKK 58, WØAFG 33, WØMAO 33, WAØBOK 27, KØIXY 24, KAØBWM 23, WDØBQM 20, WAØOQX 16, WDØEGK 8, KAØELI 7.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Pete Kemp, KA1KD — SEC: K1WGO. STM: K1EIC. OO/RFI: KA1ML. ACC: N1AZF. TC: W1HAD. PIO: K1NGL. SGL: K1AH. BM: KS1F.

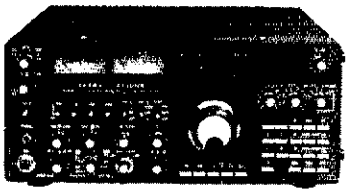
Net	Freq.	Time/Local	QTC	QNI	NM
CN	3640	1900/2200	360	404	K1EIR
CPN	3965	1800/1000 Sn	188	359	KA1BHT
NVTN	28/88	2130	—	—	WA1ELA
WCN	78/18	2030	108	491	WB1GXZ
RTN	13/73	2100	82	307	K1UQE

The rescue of Americans from Grenada made headlines, with Amateur Radio providing the vital link to the world. A BIG TNX go out to all of our fellow amateurs who contributed so unselfishly during this period. W1UVW/KA6CAP provided communications for the NW Ct Bike Race. Happy New Year. KB1CT resides in our section. W1FAI has been elected to the Board of Governors of the SE Ct American Red Cross. K3ZJJ assisted in providing communications for the New York Marathon. The 146.655 machine in Stamford has a new controller. The Southing ARA had a most busy month in Oct. They set up communications for the Apple Harvest Festival, the Festival Road Race, the 13-mile half-marathon race, and the 12-mile Crop Walk. In Nov. they will provide communications for the Eagle Walk. In addition, they have set up emergency communications network headquartered in the Southington PD. KA1ILH is EC for this activity. KA1FWD has a new antenna up, tnx in part to his fellow ops from MARS. Attention all affiliated clubs: The Section Leadership Team is in place to assist you. In order for each club to receive full benefits of such an organization, communication is essential. Each club should have a contact person to facilitate this process. Having up-to-date information for your club's members is a valuable service. One wonders how many amateurs are still sending in Novice exams under the old system, or operating in the "old" sub-band segments. It pays to stay informed. Remember, station appointments are available, so contribute to the cause. Traffic: WB1GXZ 537, K1UQE 234, KA1BHT 148, KA1EGE 144, W1EFW 126, WB9IHH 95, WB1CRH 61, K3ZJJ 50, W1XX 43, WB1ESJ 39, W1FAI 32, K1AQE 31, WA1WQG 29, W1BDN 27, N1CLV 27, WA1HFE 21, W1QV 11, W1CUH 10, W1DPR 8.

EASTERN MASSACHUSETTS: SM, Rick Beebe, K1PAD — STM: KA1GBS. SEC: W1IAY. ASM: K9HI. ACC: K1AZE. OO/RFI & BM: WA4STO. TC: KA1IU. PIO: WA1IDA. SGL: K1BCN.

Net	Mgr	Freq.	Time(loc)/Dy	QNI	QTC
EMRI	WA1LPM	3.658	1900/2200/Dy	445	528
EMRIPN	KA1GBS	3.959	1730/Dy	313	330
EM2MN	N1BNI	23/63	2000/Dy	467	205
NEEPN	K1BZD	3.945	0830/Sn	89	67
HHTN	KA1MI	04/64	2230/Dy	678	384
EMRISS	N1BHH	3.715	2030/Dy	177	112

YAESU SALE!



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800Hz CW Filter..$FREE 6Khz AM Filter...$FREE
Memory Backup..$FREE Installation.....$FREE

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- Full Break-in CW
- RF Speech Processor
- Variable Bandwidth
- IF Shift
- APF/Notch
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- Adjustable Noise Blanker
- 12 Internal Digital VFO's with Memories
- Much, much more—call or write for info

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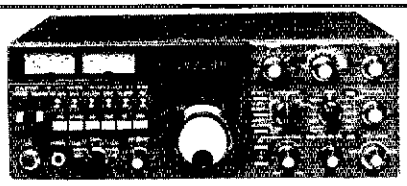

FT-102

160-10MTR WITH WARC BANDS TRANSCEIVER
- Digital Readout
- Built-in AC Supply
- Variable Bandwidth
- IF Shift
- CW/SSB/AM/FM Modes
- RF Speech Processor
- Noise Blanker
- Much, much more—

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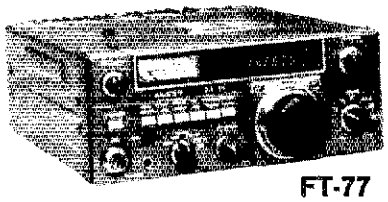

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New 80-10mtr Compact HF Transceiver
- Digital Readout
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- CW/SSB/FM Modes
- CW Wide/Narrow
- Optional AC Supply, CW Filter, FM Unit

External VFO, Antenna Tuner Available

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FT-230R 2mtr FM.....$359
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All Mode Tri-Band Transceiver
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- 144-148 Mhz
- 10 watts output on all bands
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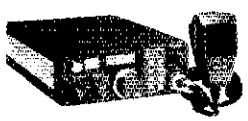
- 21, 24.5 & 28 Mhz option available soon

Please Call For Price & Delivery Information



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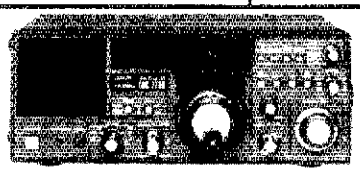

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FNB-2 Nicad.....$29
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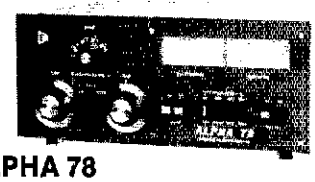
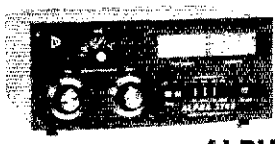


ALPHA 78



ALPHA 374A

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78	$3495	*
374A	$2595	*
76A	$1985	*
76PA	$2395	*
76CA	$2695	*

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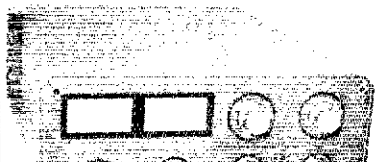

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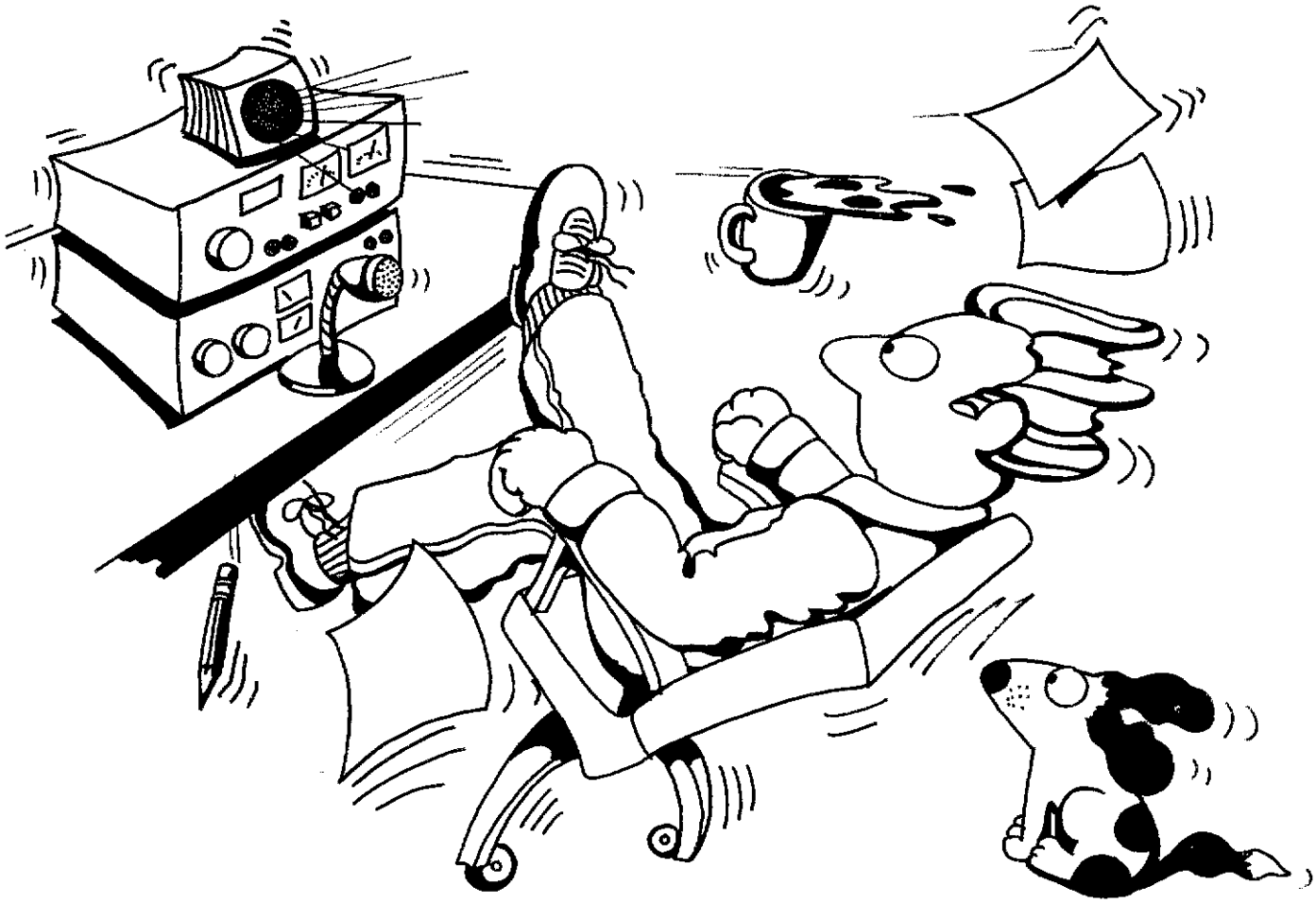
"... (click) ... just turned on the ALPHA ..."



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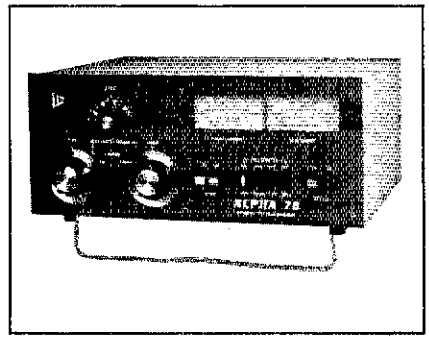

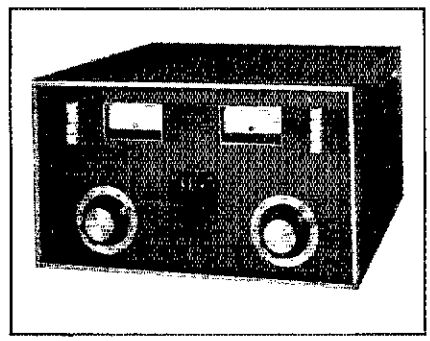

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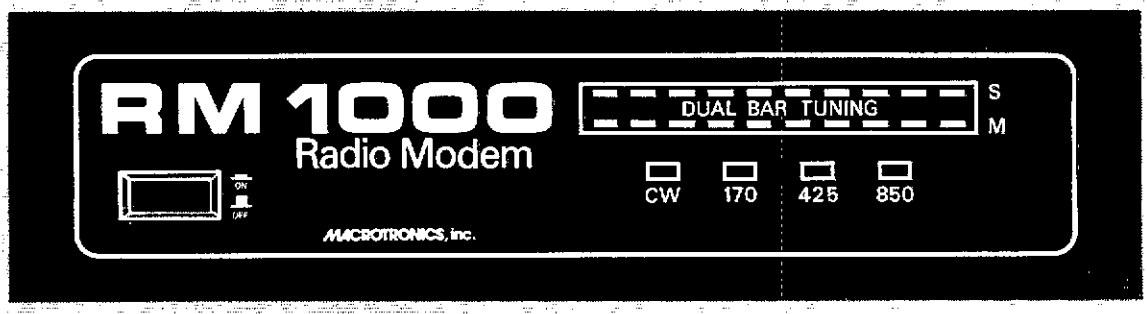

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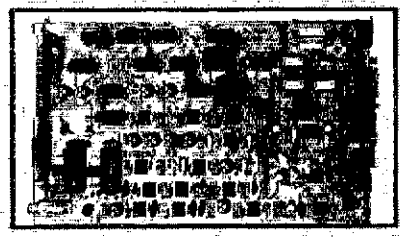

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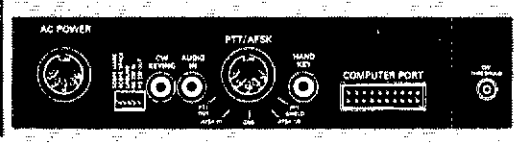

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CI2MN N1BYS 045/645 1930/Dy 215 152
Greater New Bedford Club sponsored a League Planning Meeting, called by Division Director W1HHR. We had the pleasure of having League President W4KFC with us as an added bonus. Many topics of importance to Amateur Radio were discussed and the attendees took advantage of the opportunity to input directly to our Director and President. For the first time I had the pleasure of meeting W1ASI who was SCM some fifty years ago. Quannapowitt club celebrated its 35th year as a club. Sturdy Memorial ARC operated a station in conjunction with the Boy Scouts Jamboree on the Air, and made contact with several other stations in the US and Canada that were doing the same thing. Massasoit club is running a Novice class. Colonial club had a talk on the STS-9 flight. N1BBT is preparing for another monumental traffic effort from the Mass. Maritime training ship. By the time you read this he will be getting underway so all hands pitch in on the nets and help us deliver and originate return messages to the shop. Wellesley club helped with parade coordinations and communications on Veterans Day. Norwood club provided communications for Norwood Hospital and Walpole Road Races. Billerica club made a visit to ARRL Hq. and had an interesting talk on radio astronomy and on the possibility of extraterrestrial life. Framingham club is running a Novice class. North Shore RA is planning a trip to ARRL Hq. Cape Ann ARS meets every Sunday morning for coffee and donuts at their clubhouse. Traffic: KA1GBS 754, N1BGW 379, KA1EXJ 358, KN1K 333, N1AJJ 277, N1ER 247, WA1TBY 179, KA1BBU 176, KA1EPO 170, K1CB 152, WA1DXT 147, KO1O 143, N1BHH 123, N1BYS 110, WA1FNM 84, K9HI 61, KA1AMR 40, WB3FOC 39, K1BZD 37, KA1KF 31, W1QLL 28, KI1I 15, KA1DJV 14, W1MJ 14, W1ZHC 13, WA1FCD 10, K1LCQ 10, KA1EFO 4, K1OGF 2. (Sept.) W1AF 268, KO1O 42, W1MJ 3.

MAINE: SM, Cliff Laverty, W1RWG — SEC: KL7IJG. STM: AK1W. BM: W1JTH. TC: KQ1L. PIO: KA1TJ. SGL: K1NIT. OO/RFI: W1KX. ACC: KB1JF. BM W1JTH reports 68 bulletins, 121 transmissions on cw, SSB, RTTY for Sept. & Oct. Sandy River ARC elected KA1GPQ, pres.; N1BCE, v.p.; WA1LZR, secy.; WA1JCN, treas. Mid-Coast officers W1RJP, pres.; K1JHN, v.p.; KA1FKS, secy/treas. State of Maine YLs recognized 2 youngest YLs, Laurie Mann (9) KA1KXP & Beth Knight (12) KA1KXA at Fall mtg. W1YXC has gone south.

Net	Sess.	Checkins	Traffic	NM
SGN	32	1108	407	K1GUP
PTN	54	522	251	AC1G/KA1AVU
AEN	7	96	31	WA1YNZ
CMEN	9	223	28	W1WCI
MPSN	6	86	17	KL7IJG
RACES	5	43	9	W1RWG

PSHR: WA1YNZ AK1W KA1AVU WB1GLH W1KX W1RWG N1BJW KL7IJG KA1TJ WB1CBP. Traffic: AK1W 372, KA1AVU 231, W1KX 220, N1BLZ 172, WB1BYR 132, KL7IJG 132, W1ISO 131, W1RWG 128, WA1YNZ 123, WB1GLH 116, N1BJW 66, KA1TJ 65, WB1CBP 45, W1JTH 42, W1WCI 30, W1BMX 30, KB1JF 23, KA1FTL 17, K1NIT 16, W1CTR 16, K1PV 12, W1AHM 7, KA1ENM 6, W1VEH 6, N1BME 5, W1OTQ 5.

NEW HAMPSHIRE: SM, Robert C. Mitchell, W1NH — STM: W1TN. Seasons greetings to all. W1JY & W1NH attended Portland ARRL members meeting with Director Sullivan & Pres. Clark. New north country Extras: N1AHN now KT1A; KA1ZO now KS1S; W1HJF. AK1E & KB1A provided emergency communications for Franklin firms test. KA1KPU now N1CWB. KA1JLK now Extra. Tentative date for the Great Bay club's hamfest is April 7. The Port City club's annual banquet will be on Jan. 20. Traffic: N1NH 392, KI1M 240, KK1E 237, W1TN 232, W1GUX 205, AK1E 167, N1CPX 93, N1AKS 92, W1ALE 68, W1MHX 58, WB1CFP 52, W1VTP 46, K1PQV 40, K1OSM 36, W1CUE 25, K1ACL 24, W1FYR 17, N1ALM 17, W1OKU 13, KA1JKL 13, KA1GOZ 12, KA1HPO 11, KA1FKM 9, N1BSM 8, K1OIQ 8, N1CWB 7, WA1FUG 2, W1LQQ 2, KA1IIP 1.

RHODE ISLAND: SM, Gordon F. Fox, W1YNE — SEC: KA1EHR. STM: W1EOF. TD: AB1D. NM: WA1OSL RIEM2MTN. ACC: N1BEE. SGL: K1DA. New appts: KA1FPP. OES endorsements: W1EOF ORS. Newport Co. RC was designated a Special Service Club, first in R.I. ARES RTTY link with US WX Svc in final stages of planning. With the completion of hardware determinations a demo is to be held for Wx Svc officials from Wash and New York. The SET demo at the wx svc was a FB success, thanks to KA1EHR WA1RBT and KB1G. SYSLINK II BBS has a special interest group called "HAM RADIO." Give it a try at 272-1138. WANTED: Public Information Officer, Bulletin Manager and OO/RFI Coord. Traffic: W1EOF 947, KA1KML 227, WA1CRY 97, KA1FPP, WA1CSO 27, N1RI 22, KA1EHR 14, KA1HHM 5.

VERMONT: SM, Reed A. Garfield, WB1ABQ — STM: N1ARI. SEC: W1RNA. BM: AE1T. SGL: W1KRV. ACC: KA1AKI. Seems like most of the section news is sad this month. K1BQB still having troubles; W1MHS in Mass, who handles the GMN/VPN reports for me is in hospital. Our prayers are with you. Hope to have much better news next month. Nets: VTN 31/141/96; VSBN 31/605/123; VFMN 31/456/77; CVFMN 5/54/5. Traffic: N1COB 103, W1KRV 102, N1ARI 88, AE1T 74, WB1ABQ 61, W1OAK 40.

WESTERN MASSACHUSETTS: SM, William J. Hall, W1JP — ACC: W1YI. OO/RFI: N1CM. PIO: WA1MJE. SEC: WB1HIH. SGL: K1BCN. STM: W1UD. TC: KA1JJM. PRA: K1BE K1BOX WA1PLS. NM: W1KK W1PUO KA1T KR1R. K1PAD and I agreed on one SGL for the entire state. Congrats to W1BKG of Pittsfield who was recently recognized for 50 years ARRL membership. Kudos to W1ISO W1ZWZ WA1DNB and K1NWE who participated in the Grenada radio link in October. The Sept. Yankee Vernon nuclear plant evacuation drill went very well, with all towns in the emergency planning zone covered by amateurs. A good thing, too, since the newly installed commercial system failed. I received a copy of a letter from a scoutmaster regarding a scout stung by yellow jackets. The lad required emergency treatment owing to his allergy, and a 2M HT was employed as the only link (via K1FFK/R) to help. The scout was under medical care within 45 minutes. The Montachusett ARA FD effort netted 833 QSOs for 6285 points 2A Battery QRP. This placed them 8th out of 61 entries in their class. PSHR: WB1HIH W1PUO KA1T K1JHC. Traffic: KA1T 337, W1PUO 336, W1UD 206, WB1HIH 140, WA1YYW 84, W1JRA 80, K1JHC 63, W1KK 60, K1IJV 56, W1JP 44, K1PUG 29, W1SJV 23, WA1OPN 18, W1ZPB 17, KA1EKQ 15, WB1HKN 10.

NORTHWESTERN DIVISION

ALASKA: SM, David W. Stevens, KL7EB — STM: KL7T. SEC: KL7QS. SGL: KL7LO. OO/RFI: AL7FL. I want to thank AL7AC for the fine job he did as Section Manager. With the new year comes preparation for the Iditarod Dog Team Race. Amateurs will cover more than 30 checkpoints. Amateurs are essential to coordinating airplanes, dogs,

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And our thanks to all the others whose comments we didn't have room to print.

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people, and are vital to a safe race. For others, winter is a time of studying. I would like to see many involved in the Volunteer Examiner program.

Nets	Freq.	Days	UTC	Manager
APN	14,292	M-F	1800	—
Snipers	3920	Dy	0400	KL7JDR
Seasaw	3900	Dy	0500	WL7APE
Motley	3933	Dy	0700	AL7BR

Traffic: KL7VY 111, AL7FJ 64.

IDAHO: SM, Dennis L. Hall, KK7X — Killer Earthquake Hits Idaho. Read the headlines across the country as two young children were killed by falling debris in Challis. KB7HN headed up operations from the Department of Emergency Services in Boise. The following stations assisted in communications: WA7s ESU DNK ZPT DNK WOW WB7WOW K7s CXG SU N7s EZQ AVY GA DHZ WA7SIG KB7HN W7IWU KA7EWL WB7PFQ KK7U KB7MU KB7ZD KA7CKE K6QN W7FGZ WA7ZPP W7IRE KA7LLV KX7C W7FKZ K6UN KD7JN W7ASA W7HPH KC7TN. Thank you to all for providing a valuable public service. Magic Valley Chapter ISRA provided communications for "Rem to Rim" run in October. Thank you to all of those stations who participated in the SET. Owing to a lack of space all those activities cannot be listed here. New Officers Evergreen Chapter QCWA: W7GHT, pres.; W7CVJ, v.p.; K6LWS, secy/treas. Congrats!

Net	Freq.	Time	Sess.	QNI	QTC
ICD	3990	7:10 a.m. M-F	21	644	25
IMN*	3635	8 p.m. Dy	31	332	213
IMN/SET	3635		10	81	62
Farm**	3935	0200Z Dy	31	1797	78

Including SET

**Farm net participated in Earthquake traffic, K7JB ran net for 2 hour session. Most traffic for Mackie and Challis. Traffic: W7GHT 244, KA7GQP 126, N7DHM 20, K7TM 4.

MONTANA: SM, Les Belyea, N7AIK — Hats off to our TC, KØPP, for making a clean-sweep (worked all ARRL sections plus Yukon/NWT) in November's "Sweepstakes." The 1984 officers for the Yellowstone ARC: WB7VDM, pres.; WA7BKW, v.p.; N7EOR KA7NMA K7TQM, board members. K7CGZ lost his summer cabin to fire. It didn't take long for hams from Great Falls, Helena and Butte to build him a new one in a few short weekends; FB. Thanks to the work of PIA KK7Y, Amateur Radio in Montana got very excellent TV coverage featuring WA7PZO and KB7SE. KS7R is now the EC for Lewis & Clark Co. New Novices from Helena are KA7RDO and KA7RDU. Upgrades include: to Tech-KA7NNY KA7RDU; to Advanced-N7FFM KA7AAK (now KC7PZ); to Extra-WB7CFL N7CTF. WA7GVT reports the Richey Divide repeater is operating on the freq. of 146.40/147.00.

Net	Sess.	QNI	QTC	Mgr.
BSN	13	185	2	WB7UTJ
IMN	21	332	213	K7RX
IMN/SET	—	82	62	—
MTN	31	1317	157	KB7SE

Traffic: KF7R 277, WB7TNH 119, N7AIK 64, W7JMX 17, KB7SE.

OREGON: SM, William Shrader, W7QMU — STM: W7VSE. SEC: N7CPA. PIO: KC7YN. SGL: KA7KSK. ACC: WB7WTD. RFI: AK7T. OO: N7SC. UPGRADES: KX7Z (Extra), and KA7OSB (General). Small number this month reported, but hearty CONGRATS. W7TC was listed in the top ten Official Observer listing. He won a new *Callbook* for his constant efforts. W6OFF is teaching the upgrade class for UVARC in Roseburg. K7AA won a IC2AT at the Salem ARC annual fall dinner. WB7AET was lucky too, and won $250 gift certificate in a major drawing at Hoodview ARC. Both Hoodview ARC and OTVARC are now Special Service Clubs for ARRL. Keep up the good work! Seventy-one hams helped in the Diabetes Assn. Bike-A-Thon in Portland, OTVARC made a pitch for the 1986 National ARRL Convention but lost out. Try again, guys and gals! New officers for CORA in Bend are: WB7PII, pres.; KB6AMX, v.p.; N7CSH, secy/treas. New officers for RVARC Medford are: KC7WO, pres.; WB7SZM, v.p.; KA7OFM, secy/treas. Congrats to KA7MDC for her first DX QSO with Costa Rica. It was a toprate QSO between two YLs, neither of whom could see the fancy equipment they were using, both being blind. What a wonderful hobby this is. OSN net totals were QNI 576, QTC 323. Traffic: W7VSE 533, KN7B 193, KX7W 179, W7ZB 110, KX7T 109, AL7W 88, KA7AID 44, KI7Y 40, N7BGW 39, W7LNE 14, W7DAN 11. (Sept.) KN7B 100.

WASHINGTON: SM, Joe Winter WA7RWK — SEC: W6IIH. STM: K7GXZ. ACC: K7RS. TC: K7UU. BM: KD7G. PIO/SGL: W7CKZ. OO/RFI Coord.: KB7WC.

Net	Freq.	Time(Z)	QNI	QTC
WSN	3590	0245/0545	600	225
WARTS	3970	0200	3093	195
NTN	3970	2000	1164	50
NWSSBN	3945	0230	723	46
EWTN	146.64	0130/0530	85	54
PSTS	145.33	0130/0630	711	133

Tnx to PIO W7CKZ for writing the Sept. column while I was in W1- & VE3-lands. Made a one-day visit to ARRL Hq., meeting many of the staff and working from W1AW. This my 2nd visit was more interesting than the 1st ten yrs ago. When possible stop in for an interesting tour. WWDXC: K7NW & KM7E presented slide show of their two week tour of Finland and four week, 12K miles in 8 USSR call areas. "Super Program." Yakima ARC W7AQ had a complete operating stn (HF, VHF & RTTY) including Novice signup at the Central Wash State Fair. Eight mbrs handled comms for 10K run and 9 mbrs worked 5-mile route for the Grand Sunfair Parade. 1984 installation of officers dinner is Jan. 10. The Kamiak Butte ARA held its 3rd annual banquet Nov. 5th. They report they are surmounting the usual problems of a new organization, but still need your support. LCARA: KA7CRN & KA7CRO had visitors from New Zealand, ZL1CH & XYL. They enjoyed their stay and meeting local hams at breakfast. A Swedish ham, SM6KWA, visited KA7JVW & N7CFA. KB7LQ arranged tour of Norpac mill. Boeing Emp. ARS Wash State QSO Party was again a great success. Top scores were N7AYF with 209,600 pts and KA7DJR 70,070, W7WMO 64,192, KU7F 61,686, WA7RWK 39,104, BEARS stn K7NWS 77,592. Certs went to 38 states, 4 countries & 20 counties. Congrats to chmn K7RS for a fine job, W. Sea. ARC board votes to become Special Service Club (SSC). Club. K7LYT was chmn for QCWA banquet on Nov. 5. WB7ELD gave talk on cassettes. Olympia ARS pres. WB7UEU attended planning meeting for the Woman's Olympic Marathon scheduled for early May. One hundred thousand spectators are expected and 1500 volunteers are needed for success. Radio Club of Tacoma purchased a new Drake TR-7. More operating is expected. They are also applying for SSC status. Pierce Co. EC N7DRT rpts SET was a success with 28 ARES mbrs active. SET exercises throughout the section were generally good. Not all were on SET weekend. I urge those ECs that didn't have a SET this year to plan one for 1984. It's later than you think. Spokane Co. EC WB7VSZ activated ARES net for Challis earthquake.

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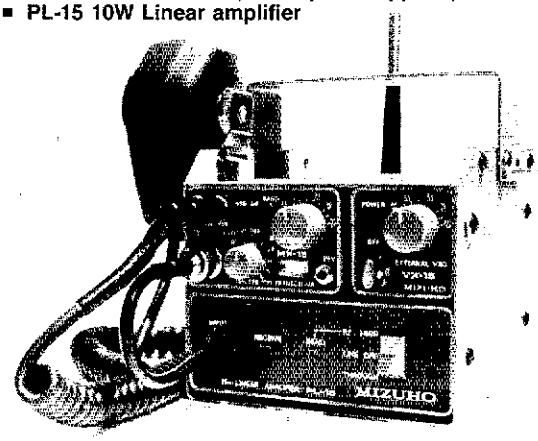

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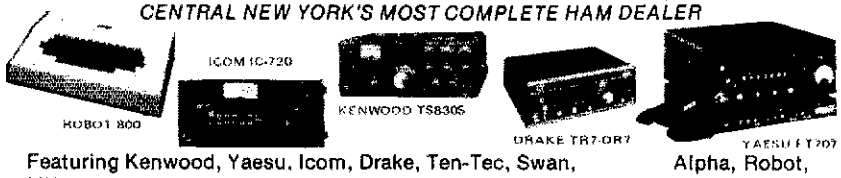

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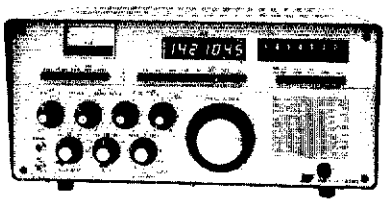

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- OSK CW: Fast break even crossband, vacuum relay
- COMPUTER CONTROLLED: Remotely by optional RS232 interface
- PRICE $5995: Phone Don Payne, K4ID, for brochure . . . if you want the finest.

Personal Phone — (615) 384-2224
P.O. Box 100
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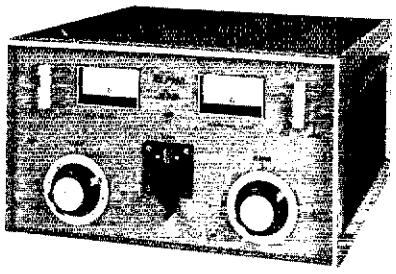
PAYNE RADIO

ETO ALPHA 77DX

If you want the finest



SPECIAL SALE — ALL ALPHAS

Model	List	Sale
77DX	$5450	**$3995**
78	$3495	**$2495**
374A	$2595	**$1875**
76A	$1985	**$1465**
76PA	$2395	**$1695**
76CA	$2695	**$1930**

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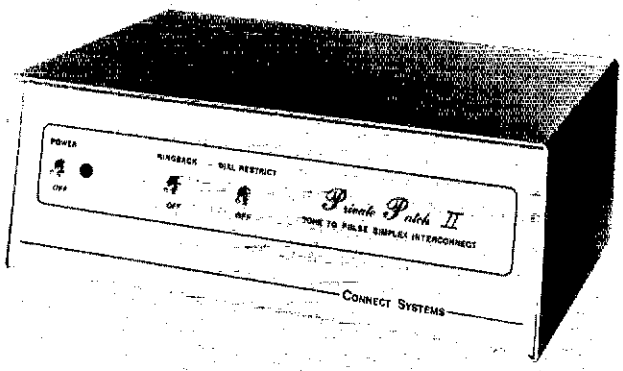
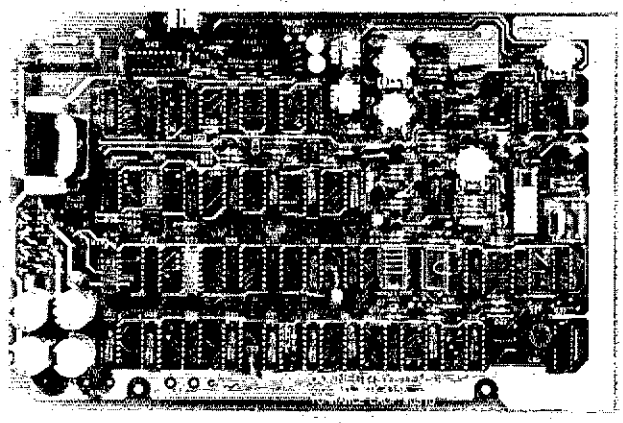
PRIVATE PATCH II

THE ULTIMATE SIMPLEX AUTOPATCH

PRIVATE PATCH II is for the discriminating amateur who demands the finest in simplex autopatch performance, features and quality. Our digitally processed VOX and simplex loop create a level of communications quality which is not even closely rivaled. *Please . . .* do not confuse our technique with sampling!! **PRIVATE PATCH II** has the following major advantages over sampling type autopatches:

- Compatible with every known transceiver—yes, synthesized and relay switched types included.
- No transceiver modifications are ever required!
- Connects only to MIC and external speaker jack—no internal connections to your transceiver required.
- Natural push to talk operation—no need to pause—you may talk the instant the button is pressed.
- Much greater range—noise on your weak mobile signal causes no performance degradation. (Noise sampled autopatches fail to operate when your signal becomes noisy.)
- **Private Patch II** offers natural "take-turns" style of communications in the manner you are used to. There are no annoying sampling kerchunks and missing syllables punched out of every other word.
- In addition to superb simplex operation, **Private Patch II** will operate through *any* repeater from your base location. Yes, *any* repeater! Tone encoding equipment and repeater modifications are not required.





STANDARD FEATURES

- CW identification—ID ROM chip included.
- Single chip XTAL controlled tone decoder.
- Tone to pulse—compatibility with all telephone systems—eliminates critical tone adjustments in the mobile—no wrong numbers, ever! Can be strapped for straight tone dialing.
- Speed dialer compatible—can consume up to 15 digits per second.
- Sophisticated toll restrict logic—user programmable restrict digits.
- Five digit access code—59,049 user programmable code combinations! (Their three digit code beginning with * has less than 196 combinations.)
- Ringback (reverse patch)—alerts you with CW ID.
- Busy channel ringback inhibit—will not send CW ID alert if channel is in use — defeatable.
- Three/six minute "time-out" timer—resettable from the mobile—four CW ID warnings during final minute.
- Control interrupt timer—assures reliable and positive control.
- Self contained 115VAC supply—230V 50/60 Hz available at slight additional cost.
- Modular phone jack—and seven foot cord.
- 14 day return privilege—when ordered factory direct.
- One year factory warranty.

OPTION: FCC registered coupler.
Inquire about commercial and half duplex models.

OUR QUALITY GLASS BOARD, SUPERB ENGINEERING AND EXCELLENT COMPONENTS BLEND TOGETHER TO PRODUCE THE FINEST AMATEUR AUTOPATCH AVAILABLE.

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Twenty-five mbrs. responded. Some handled messages for the Red Cross. K7WF gave slide show of his trip to Wales at the River Rounders meeting. I hope everyone had a nice Christmas and I wish you all a Happy New Year. Traffic: W7DZX 576, WB7WOW 548, WB7OGA 533, KS7I 401, KR7L 332, KD7ME 230, K7GXZ 199, N7ANE 160, W7HNA 157, W7LG 131, WA7BDD 118, KD7ME 107, K7CTP 106, W7LUP 74, N7DPP 63, W7IEU 61, KR7F 60, W7GB 53, W7APS 35, WB7VSZ 20, K7AJT 17, KA7INX 12, K7OXL 11, N7AFZ 4, W7AIB 2.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG — ASMs: W6ZF N6DHN. SEC: W6LKE. STM: NI6A. The September and October reports are being added together. The September report did not appear in December *QST* owing to a filling error at ARRL Hq. My thanks to WB9IHH at Hq. for making this extra space available. Welcome aboard to newly appointed ORS K6APW. NBARA members WA6OUC WA6EFP WB6EUI W4EHR WA3WEP KA6IFA N6IUL & K6UJS had a verrry interesting time at the 3rd Annual Bathtub Regatta on Mare Island Channel! MDARC had a booth at the 46th Annual Walnut Festival, which demonstrated HF, Amateur TV, RTTY and satellite communications. EBARC welcomed new member KA6APL, and congratulated two recent grads of their Novice course, KB6BGD & KB6BGE who both upgraded to General. EBARC's club station pledge fund now totals $600. The new solid state rig is not far off. LARK editor N6FKK featured an excellent article on his recent travels in Ireland. There have been no recent recipients of their coveted "Klutz-of-the-Month" award. LARK's Novice class is under the direction of W6RGH. *QRZ NBARA* is the newsletter of the North Bay ARA and is edited by K6UJS. It is the newest addition to my mailbox. Their officers are: W6IZU, pres.; WD6FVF, v.p.; W6RJY, secy.; WB6EUI, treas.; W6LRT WA6EFP KA6QPW, dirs. They meet the 4th Wed. of each month, 7:30 P.M., 440 Santa Clara St., Vallejo. HARC's *The Ground Plane* is now edited by N6IYQ. MDARC had 25 members active with a booth and large station set up at the Walnut Festival. EBARC Silent Key, W6EJA, willed his complete HF and VHF station to the club. Their Salvation Army station is now fully equipped. It's a sobering thought, to be sure, but we all should have a will, and the disposition of our gear is an important item. Traffic: NI6A 439, W6VOM 162, K6AGD 140, K6APW 76, WB6DOB 73. (Sept.) NI6A 294, K6AGD 239, W6VOM 169, W6CX 155, K6APW 88, WB6DOB 80, WB6UZX 29.

NEVADA: SM, L. M. Norman, W7PBV — SEC: WB5VDV/7. STM: W7BS. Send your station activity report to me on the FIRST of each month. W7MRN returned home after and extended trip to Canada. He was heard almost every night with a FB mobile signal. W7GNG working near Vernal, UT. WA7UTK has a new linear. W7KFI reports MARS CID personnel checking on equipment issued to members. W7BX attended a Pearl Harbor reunion. K7HRW reports an increase in RACES activity. WB5VDV/7 reports ENARS Cave Mt. repeater on 06/61 with a new antenna. KA7AKM and WB5VDV/7 were NCSs for the SET. New appointees: EC WB6MXA/7; TC K7ICW. More check-ins are needed for NV WX net 3993 at 0600 PST Mon thru Sat. KA7EUA is doing FB job as NCS. Traffic: W7BS 50, W7PBV 6.

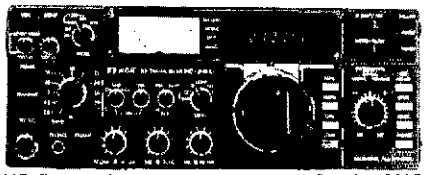
PACIFIC: SM, Army Curtis, AH6P — STM: KH6HIJ. SEC: KH6B. ACC: KH6BZF. BM: KH6W. PIO: KH6IJ. Aloha and hafa adai to all of the Pacific. As we start this new year of 1984, let's take a moment to consider this wonderful hobby we share. It has given you so much pleasure. What have you given it in return? There are many ways in which you can contribute, please contact myself or one of the volunteers listed above to find out how. Pacific Traffic Net now running at 5 P.M. HST MWF on 14.075. KH6RQ is NCS on Mondays. Looking for others to take a day. Can you help? Let's make 1984 the finest year ever for Amateur Radio in the Pacific. Traffic: KH6B 287, KH6HIJ 76, KH6S 65, KH6H 38, KH6RQ 13, AH6P 4.

SACRAMENTO VALLEY: SM, Ron Menet, N6AUB — SEC: KY6Q. SEC: WA6ZUD. SGL: WB6WFG. Please complete and return your club's Annual Report for 1984. This will keep your League affiliation current. A number of clubs in the Section failed to do so last year. Let's have 100% reporting in 1984. Congrats to N6EPG for 13 consecutive PSHRs. Also to: KB6ACR and KA6QEO (to General Class); N6GLL (to Advanced); and KB6MX (to Extra). The Haytork Balley RA has their new repeater up on 146.13/73 on a peak in Trinity Co. at 6800 feet above sea level. Special thanks go to WB6WFG for arranging STS-9 air time on channel 13, Stockton/Sacramento. The 1983 SET was another good one according to the reports we have received. Seems we impressed a number of local public safety officials. Next year will be even better! Traffic: WA6WJZ 81, N6CVF 34, KY6Q 30, WA6ERZ 10, WA6ZUD 7, N6EPG 5, WB6SRQ 5. (Sept.) WA6ZUD 6.

SAN FRANCISCO: SM, Bob Smith, NA6T — STM: K6TP. SEC: N6BLN. The REXDA "Redwood Empire Award" is off and running with the first award going to a local club member, W6DTV. Hewlett-Packard has organized a new club within the plant in Santa Rosa. FWRA-HARC participated in six public service events with communications in Oct. This should be a new club record. SET activities in Humboldt-Del Norte Cos. were a big success under the direction of KE6LF and his able helpers. SFRC has three AR stations under its supervision now: "SS Jeremiah O'Brien," VA Hospital, and now the SF Red Cross Chapter HQ. The club will need a lot of help, so get out and participate in the club activities. Even though W5LFL/STS-9 will be delayed, plans within the section are proceeding ahead with many clubs setting up publicity and working stations to help publicize "hams in space." Check with your local STS-9 club chairman for information. I was glad to see the section active in CQ WW SSB. I talked to many of you from V30AA this year. Traffic: W6RNL 275, W6IPL 254, K6TWJ 102, K6TP 80, WB6RTE 26.

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD. SEC: WA6YAB. STM: N6AWH. TC: WA6EXV. Appts. renewed: ORS W6DPD; SEC WA6YAB; EC W6AJH. New officers of the Central Valley RC are: WB6VIN, pres.; KA6LXM, 1st v.p.; Jim Appleton, 2nd v.p.; W6VMB, sec/treas. Net chief is WB6TGW. The club meets the 2nd Thurs., usually in Delano. W6KXO K6GHT (ex-W6SUP) are SILENT KEYS. Congrats to the recent upgrades: Advanced — KA6IPL N6HWF KA6ATU N6HEW; General — KA6VEC KA6VED N6HWO; Tech — KA6ZBQ. WB6UKB has an IC-3AT. N6HWO has a FT-101E. N6GPA has a TR 7625. K6PKO and AD6V have WAZ. W6QQE has a computer. The 1984 Fresno Hamfest is at the Tropicana Inn on May 18-20. Plan to attend. Enjoy the swap meet and eyeball QSOs. Traffic: N6AWH 45, W6DPD 21, WA6YAB 5, K6PMG 4.

SANTA CLARA VALLEY: SM, Rod Stafford, KB6ZV — SEC: KA6R. STM: W6PHT. PIO: WB6BPU. ACC: W6MKM. I'd like to introduce myself. I'm KB6ZV, your new Section Manager. WB6GFJ resigned as SM, and I was invited to

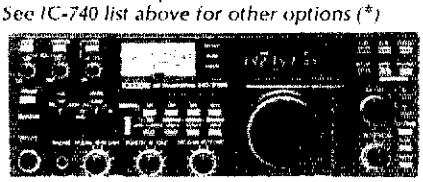


HF Transceivers	Regular	SALE
IC-740 9-band 200w PEP Xcvr w/mic	$1099.00	**949.95**

plus **FREE** PS-740 internal power supply &

$50 Factory Rebate - until gone!

PS-740 Internal power supply	$159.00	**149.95**
***EX-241** Marker unit	20.00	
***EX-242** FM unit	39.00	
***EX-243** Electronic keyer unit	50.00	
***FL-45** 500 Hz CW filter (1st IF)	59.50	
***FL-54** 270 Hz CW filter (1st IF)	47.50	
***FL-52A** 500 Hz CW filter (2nd IF)	96.50	**89.95**
***FL-53A** 250 Hz CW filter (2nd IF)	96.50	**89.95**
***FL-44A** SSB filter (2nd IF)	159.00	**144.95**
SM-5 8-pin electret desk microphone	39.00	
HM-10 Scanning mobile microphone	39.50	
MB-12 Mobile mount	19.50	
**Options also for IC-745 below.*		
IC-730 8-band 200w PEP Xcvr w/mic	$829.00	**599.95**
FL-30 SSB filter (passband tuning)	59.50	
FL-44/A SSB filter (2nd IF)	159.00	**144.95**
FL-45 500 Hz CW filter	59.50	
EX-195 Marker unit	39.00	
EX-202 LDA interface; 730/2KL/AH-1	27.50	
EX-203 150 Hz CW audio filter	39.00	
EX-205 Transverter switching unit	29.00	
SM-5 8-pin electret desk mic	39.00	
HM-10 Scanning mobile microphone	39.50	
MB-5 Mobile mount	19.50	
IC-720A 9-band Xcvr/.1-30 MHz Rcvr	$1349.00	**899.95**
FL-32 500 Hz CW filter	59.50	
FL-34 5.2 KHz AM filter	49.50	
SM-5 Desk microphone	39.00	
MB-5 Mobile mount	19.50	
IC-745 9-band Xcvr/.1-30 MHz Rcvr	$999.00	**899.95**
PS-35 Internal power supply	160.00	**144.95**
CF5-455K5 2.8 KHz wide SSB filter	TBA	
HM-12 Hand microphone	39.50	
SM-6 Desk microphone	39.00	
See IC-740 list above for other options (*)		



IC-751 9-band Xcvr/.1-30 MHz Rcvr	$1399.00	**1229**
PS-35 Internal power supply	160.00	**144.95**
FL-52A 500 Hz CW filter	96.50	**89.95**
FL-53A 250 Hz CW filter	96.50	**89.95**
FL-33 AM filter	31.50	
HM-12 Hand microphone	39.50	
SM-6 Desk microphone	39.00	
RC-10 External frequency controller	35.00	
CR-64 High stability reference xtal	56.00	
Options: 720/730/740/745/751	**Regular**	**SALE**
PS-15 20A power supply	$149.00	**134.95**
EX-144 Adaptor for CF-1/PS-15	6.50	
CF-1 Cooling fan for PS-15	45.00	
PS-20 20A switching ps w/speaker	229.00	**199.95**
CC-1 Adapt. cable; HF radio/PS-20	10.00	

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Options - continued	Regular	SALE
CF-1 Cooling fan for PS-20	45.00	
EX-310 Voice synthesizer for IC-751	39.95	
SP-3 External speaker	49.50	
Speaker/Phone patch - specify radio	139.00	**129.95**
BC-10A Memory back-up	8.50	
EX-2 Relay box with marker	34.00	
AT-100 100w 8-band automatic ant tuner	349.00	**314.95**
AT-500 500w 9-band automatic ant tuner	449.00	**399.95**
MT-100 Manual antenna tuner	249.00	**224.95**
AH-1 5-band mobile ant w/tuner	289.00	**259.95**
PS-30 20A systems power supply	259.95	**233.95**
GC-4 World clock	99.95	**94.95**
HF linear amplifier	**Regular**	**SALE**
IC-2KL 160-15m/WARC solid state linear	1795.00	**1299**
VHF/UHF base multi-modes		
IC-251A* 2m FM/SSB/CW xcvr	$749.00	**549.95**

***$50 Factory Rebate** - until gone!

IC-551D 80w 6m Xcvr	$699.00	**599.95**
PS-20 20A switching ps w/speaker	229.00	**199.95**
EX-106 FM adaptor	125.00	**112.95**
BC-10A Memory back-up	8.50	
SM-2 Electret desk microphone	39.00	
IC-271H 100w 2m FM/SSB/CW Xcvr	TBA	
PS-35 Internal power supply	160.00	**144.95**
IC-271A 25w 2m FM/SSB/CW Xcvr	699.00	**629.95**
IC-451A 430-440 SSB/FM/CW Xcvr/ps	899.00	**769.95**
IC-451A/high 440-450 Xcvr/ps	899.00	**769.95**
AG-1 15 db preamp for IC-451A/45A	89.00	**79.95**
IC-471A 10w 430-450 SSB/CW/FM Xcvr	799.00	**719.95**
PS-25 Internal power supply	99.00	**89.95**
EX-310 Voice synthesizer	39.95	
HM-12 Hand microphone	39.50	
SM-6 Desk microphone	39.00	
VHF/UHF mobile multi-modes		
IC-290H 25w 2m SSB/FM Xcvr, TTP mic	549.00	**489.95**
IC-560 10w 6m SSB/FM/CW Xcvr	489.00	**439.95**
IC-490A 10w 430-440 SSB/FM/CW xcvr	649.00	**579.95**
VHF/UHF/1.2 GHz FM		
IC-22U 10w 2m FM non-digital Xcvr	299.00	**249.95**
EX 199 Remote frequency selector	35.00	
IC-25A 25w, 2m, grn leds, up-dn-TTP mic	359.00	**319.95**
IC-25H as above, but 45 Watts	389.00	**349.95**
IC-27A 25w 2m mobile Xcvr	TBA	
IC-45A 10w 440 FM Xcvr, TTP mic	399.00	**359.95**
EX-270 CTCSS encoder	39.00	
BU-1 Memory back-up	38.50	
RP-3010 10w 440 MHz FM repeater	999.00	**899.95**

Buy (10) IC-45A's at one time at our SALE PRICE & get an RP-3010 at 50% off of LIST.

IC-120 1w 1.2 GHz FM Xcvr	$499.00	**449.95**
RP-1210 10w 1.2 GHz FM repeater	TBA	
Cabinet for RP-1210 or RP-3010	249.00	
VHF/UHF portables	**Regular**	**SALE**
IC-505 3/10w 6m port. SSB/CW Xcvr	$449.00	**399.95**
BP-10 Internal nicad battery pack	79.50	
BC-15 AC charger	12.50	
EX-248 FM unit	49.50	
LC-10 Leather case	34.95	
IC-402 432 MHz portable SSB xcvr	389.00	**299.95**
SP-4 Remote speaker for portables	24.95	
IC-3PS Power supply for portables	95.00	**89.95**
IC-20L 2m 3/10w PEP or FM amp	98.00	**89.95**

Hand-held transceivers:

Deluxe models	**Regular**	**SALE**
IC-02A for 2 meters	$ 319.00	**289.95**
IC-02AT w/DTMF	349.00	**314.95**
IC-04A for 440 MHz	TBA	
IC-04AT w/DTMF	TBA	
Standard models	**Regular**	**SALE**
IC-2A for 2 meters	239.50	**214.95**
IC-2AT with TTP	269.50	**219.95**
IC-3A for 220 MHz	269.95	**234.95**
IC-3AT with TTP	299.95	**239.95**
IC-4A for 440 MHz	269.95	**234.95**
IC-4AT with TTP	299.95	**239.95**

Accessories for hand-helds	Regular
BC-25U Extra wall charger	$ 10.00
BC-30 Drop-in rapid charger	69.00
BP-2* 425ma 7.2v 1w long life battery	39.50
BP-3 Extra 250ma 8.4v 1.5w battery	29.50
BP-4 Alkaline battery case	12.50
BP-5* 425ma 10.8v 2.3w high power batt	49.50
**BC-30 required to charge BP-2/5*	
CA-2 Telescoping 2m antenna	10.00
CA-5 5/8-wave telescoping 2m ant	18.95
CP-1 Cig lighter charger (for BP-3)	9.50
DC-1 DC operation module	17.50
FA-2 Extra 2m flexible antenna	10.00
HM-9 Speaker/microphone	34.50
LC-2A Leather case without TTP cut-out	34.95
LC-2AT Leather case w/TTP cut-out	34.95
ML-1 2m 2.3w/10w amplifier (use BP-5)	**SALE 79.95**
ML-25 2m 20w amplifier	**SALE 179.95**
3A-TTN 16-button TTP front; 2A/3A/4A	39.50
CommSpec SS-32M 32-tone encoder	29.95
CA-3 Extra 220 flexible antenna	9.12
CA-4 Extra 440 flexible antenna	9.12
M-12 12 ch marine hand-held	**SPECIAL 269.95**

Shortwave receiver	Regular	SALE
R-70 100 KHz-30 MHz digital receiver	$749.00	**599.95**
EX-257 FM unit	38.00	
IC-7072 Transceive interface, 720A	112.50	
FL-44/A SSB filter (2nd IF)	159.00	**144.95**
FL-63 250 Hz CW filter (1st IF)	48.50	
SP-3 External speaker	49.50	
EX-299 (CK-70) 12v DC option	9.95	
MB-12 Mobile mount	19.50	

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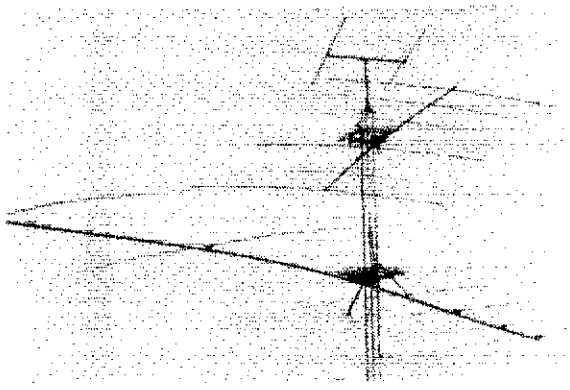
- ★ Grand prize for in-store drawing:

  IC-02AT 2 Meter Digital Readout Handheld

- ★ No purchase necessary to register for grand prize.
- ★ Special in-store pricing.
- ★ ICOM Personnel to demonstrate new equipment.
- ★ Refreshments will be served.
- ★ See the new line of ICOM equipment.
- ★ New equipment available for your inspection and purchase.



— Yes, that's a six element 20m monobander with a 57' boom.

THE M-1-A ROTATING ANTENNA MOUNT . . .

- — Eliminates inaccessable and top heavy arrays while allowing a maximum utilization of the entire tower structure for antenna mounting locations.
- — Allows independent antenna directional control on the same tower.
- — Does not use slip rings; antennas are fed in the normal manner. All electronic end-of-rotation stops permit full 360 degree operation yet prevent coax or control cable wrap-up.

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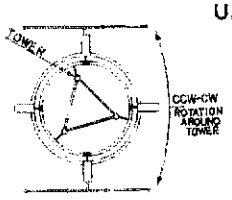

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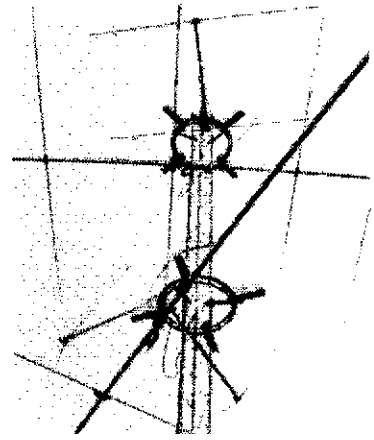

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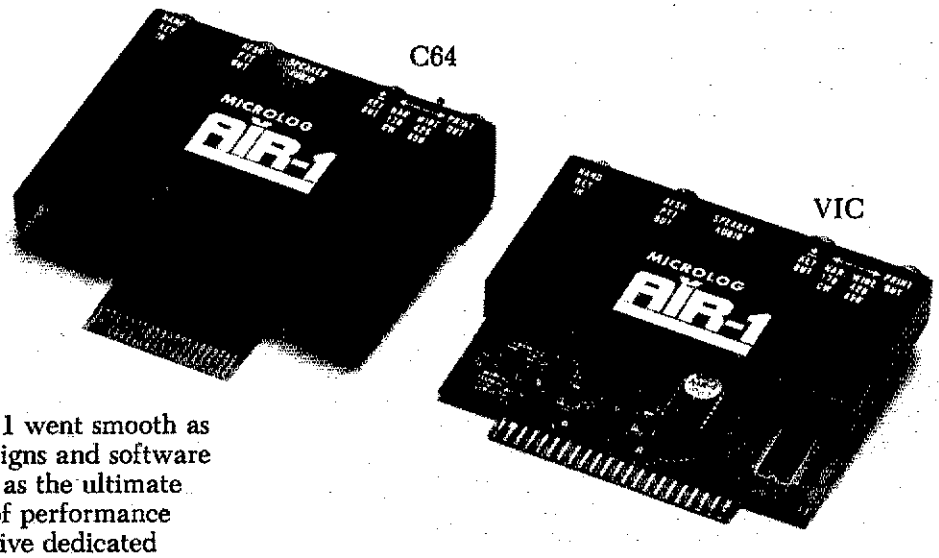

AIR-1 Past

As an R & D project, the AIR-1 went smooth as silk. By using our proven TU designs and software that's been refined on units such as the ultimate ATR-6800, we obtained a level of performance only found in much more expensive dedicated systems. Compare it for yourself or ask an AIR-1 owner. They work great!

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complete his term of office which expires June 1984. The section owes a thank you to WB6GFJ for a job well done. If you have any questions or if I can be of any assistance to you, please feel free to give me call at 408-274-0492. Welcome to new Section Traffic Manager W6PHT. W6ASH was interviewed by KPIX-TV for the station's newscast. The interview took place during the Idaho earthquake while ASH was handling traffic. It was a good interview and good exposure for Amateur Radio in the Bay Area. Santa Cruz hams KD6BD & N6FAC have outfitted their boat and are headed to Mexico and other parts of the world for an extended cruise. They have a daily sked with N6FAD. WA6RXB is the chairman for the Pacific Div. Convention to be held in Sept. at the Marriot Hotel in Santa Clara. If you would like to help with the planning of the convention or if you have any suggestions as to programs or forums, contact WA6RXB KA6R or KB6ZV. KB6ZO will be serving another term as president of Western Public Service. WPS runs their net each night at 0230 UTC at 3952. S.C. Valley Rptr. Soc. once again assisted the Sunnyvale Dept. of Public Safety with its "Halloween Patrol." Participants included KA6s AOV SQD & PZL, WB6s FEL KCJ & RDD, WB5VUL KB6TO WD6BGP N6EJG KE6CT WA2IBM and W4EHR. EMARC recently started a Novice class with 21 people enrolled. KA6VBT's 12 yr. old son, KA6VKX, recently upgraded to Tech. WB6IZF is back home for a while after shuttling back and forth between Calif. and Egypt. Amer. Legion Post 380 is composed entirely of hams who are veterans. They provided communications for the Veteran's Day Parade in San Jose. They think they may be the only all-amateur post in the U.S. If you know of any others, contact me. Traffic: W6PHT 119, W6ASH 14.

ROANOKE DIVISION

NORTH CAROLINA: SM, Ian C. Black, WD4CNR — STM: W4EAT. SEC: KU4W.

Net	Time	Freq.	QNI	Tfc	Mgr
CMN	7:45 A.M.	3.927	521	178	WD4CNQ
CEN	6:30 P.M.	3.902 ±	438	147	K4NLK
CN/E	7:00 P.M.	3.574	—	—	K4WJR
CN/L	10:00 P.M.	totals	546	291	
JFKN	6:30 P.M.	3.923	869	91	WB4WII
THEN	7:30 P.M.	3.923	605	78	WD4LRG

VHF nets liaisoning NTS: CNCTN QNI 1114, tfc 79; PCTN QNI 570, tfc 70; PETN QNI 448, tfc 56. Note format of report- next mo. we'll be reporting liaison record of VHF nets. The service they perform is fantastic and should be recognized. Thanks to their efforts, messages now being delivered which used to be serviced back. Also reports coming in of increased net activity and interest in tfc. hndling. by Tech. class ops who, up 'til now, have been left out of this function of our service. One VHF net joining NTS. The phrases "-run by," "-operated by," and even "-ruled by" have been used and abused relative to the Field Organization and section nets in the NTS. While it's true a NTS net must be responsive to the needs of the system, the FO has no interest in controlling any net. Operation of a net within the guidelines of the NTS is all it takes for affiliation. So if you want it, you got it. Anyone reading last month's column must have laughed at the comment about emergency involvement chances when they heard about Grenada. Seems everyone was involved in that. Nice plug for AR in general, and traffic handlers in particular in *Congressional Record*, thanks to our friend Sen. Goldwater. I guess you never know. Traffic: WD4CNQ 209, WA4OBR 201, WD4LRG 180, WB4N 142, K4NLK 139, WB4WII 137, W4EAT 123, KU4W 85, WA4SRD 84, WD4HRR 78, K4JHF 75, WA4MNR 72, K4IWW 57, W4TWD 42, NE4J 41, KA4KJI 41, K4GI 40, WA4YTQ 38, WD4HTE 27, WB4CYN 27, W4GRO 24, KA4WXK 20, NT4K 18, W4EHF 16, N4GGI 11, N4UE 9, KA4ATK 4.

SOUTH CAROLINA: SM, Jimmy Walker, WD4HLZ — I have heard on numerous occasions that this part of *QST* is wasted space. It has been said that no one reads "Section News." As you already know, this column has been missing for the past two months and I think every ARRL member in SC has asked — "WHAT HAPPENED?" At least for the SC section, I can say that amateurs here read this column. Maybe WB9IHH at ARRL Hq. and I can get our act together for the January *QST*. WB9IHH has assured me that all stations reporting traffic and qualifying for PSHR for August and September were recorded and will receive proper credit. Ham Radio on the Road (HROTR) was presented in October *QST*. As shown in the article, 16% of all amateurs today are under age 30. Why are fewer people becoming hams today? They simply never hear about our hobby. All of us must reach out and grab those would-be hams. HROTR was developed to recruit new amateurs by going to Scout troops, 4-H clubs, schools and computer clubs. You will set up an Amateur Radio station and show them what our hobby is all about. The clubs in our section will be the key to success of the HROTR recruitment program. Most will have members willing to take their equipment to youth groups. Remember, it is essential to follow up these demonstrations with a Novice class. If you are interested contact WD4HLZ WD4NMF or WB4UDK. Nets (Aug.-Oct.) SCSSB 3760/463; SCNT 351/196; Blue Ridge 5248/216; Greater Pee Dee 3093/282; Western Carolina 876/58; Anderson 591/7; Lancaster 424/63; Carolina State Line 148/4; Laurens 80/13. Traffic: (Aug.-Oct.) K4ZN 696, K4WJR 690, W4FMZ 411, W4ANK 366, W4NTO 256, K4FRX 151, WB4UDK 136, W0IKT 92, WD4PLB 84, KA4LRM 67, K4ZB 63, KA4AUR 47, WD4NMF 46, WD4FJP 39, WA4JWS 27, W4QD 26, W4PAB 24, WA4MIY 18, W4DRF 15.

VIRGINIA: SM, Phil Sager, WB4FDT — Please remember to send in your ballots to elect Virginia's next Section Manager. Ballots will be mailed out the first week of January. The first Virginia hamfest of the year, "Frostfest '84," will be held Sunday, Jan. 15 at the Virginia State Fairgrounds. The Virginia Century Club in Virginia Beach has been renamed the Virginia DX Century Club. The Potomac Valley Radio Club (PVRC) is looking for contest oriented amateurs from the Northern Virginia area. If interested contact KC8C at 703-698-7681. The Northern Virginia Chapter of the QCWA is looking for QCWA members. Contact W4YE. W4YE also reports new beam on 40 meters. Welcome new traffic net checkins W4ZYE K4JYL NM4L and NF4T. SVEN reports 31 sessions with 45 QTC, while STARES reports 36 sessions with 75 QTC. Congrats to W3ATQ and AA4AT who made BPL this month. PSHR listings this month to WA4CCK with an amazing 392 points, followed by K4JST WD4ALY WB2OMZ KR4V KB4WT K4KDJ AA4AT NN4I K4VWK N4GHI WD4OCW KA4IUM NT4S W4LXB and KB4OG. Total amateurs reporting to our STM WD4ALY were 47, reporting 4810 message points handled. W4UG has worked 99 countries on RTTY, and hopes to b on the new OSCAR soon. N3RC reports new FT203 for 2 meters, while N4YE reports a new harmonic, Elizabeth, born Nov. 3. W4UG and WB4FDT working on a *Virginia Section Information Digest* which will be published in the early spring. The *Digest* will consist of listings of all section and local

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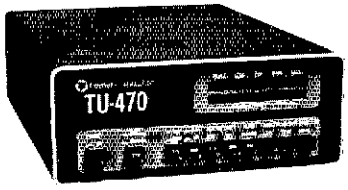

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Rev 11/83

nets, all clubs, all ARRL appointees, repeaters, historical and other information pertaining to the Virginia section. The *Digest* will be published on a one-time basis and will be mailed to all ARRL members in the section. Traffic: W3ATQ 537, AA4AT 536, WA4CCK 418, WD4ALY 268, N4GHI 250, K4JST 228, KR4V 212, K4KDJ 210, WB4PNY 185, WA4LJI 175, KB4OG 163, K4AET 149, WD4OCW 128, W3BBN 127, W4JLS 120, KB4WT 103, KA4IUM 98, WB2OMZ 98, NN4I 80, K4JM 79, N4NK 75, K4VWK 58, KA3DTE 57, K3RZR 56, K4MLC 45, NT4S 41, WB4KIT 38, WB4DQZ 30, KA4IXZ 28, W4UQ 28, W3BBQ 24, WB4ZNB 24, KC4HN 19, W4LXB 18, KA4ZTB 18, N4FNT 17, N4GWJ 16, WB4EDB 14, NF4T 13, N3RC 6, WA4EQW 5, WB4MAE 4, W4PVA 3, WA4TVS 3, W4DM 2, W4KX 2, W4TZC 2.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT — SEC: K8QEW. STM: KD8G. ACC: WA8CTO. TC: K8CG. SGL: K8BS. W8FZP is now DEC for Zone 6. WA3NUI is now EC for Lincoln Co. W8HZA has returned from nice visit with daughter in Ala. W8AH received nice newspaper publicity in connection with Grenada affair. Holiday greetings to all.

Net	Freq.	Time	QNI	QTC	Sess.
WVFN	3900	6:00	656	94	31
WVN	3567	7:00	148	53	30
WVMD	7335	11:45A	635	36	31
WVNN	3730	6:15	90	4	30
Hillbilly	14290	1600Z/Sn	138	17	5
KFC 2M	87/47	8:30/M	96	4	5

Traffic: KZ8Q 264, K8QEW 88, K8TPF 65, N8EMQ 59, W8LYV 56, WA3NUI 48, KD8G 45, WA8KCJ 37, K8KT 37, W8FZP 36, W8JWX 11, N8AJC 10, K8JQ 10.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Bill Sheffield, KQ8J — The total membership in ARRL has increased for the section in 1983. I hope you are as proud as I am. We have a very progressive group of hams in our state. Many plans are on the drawing board for the next two years. The 1984 Rocky Mountain Division Ham-vention will be held in the Denver metro area on May 25-27, at the Holidome I-70 & Chambers. Already we have commitments from mfrs, dealers & speakers. The facility is large, modern & beautiful. More on this later, but plan to attend. Packet radio demos have been made recently by N0BRZ KØZCO & WA8ZIA. Rky Mtn VHF digital repeater will have packet radio & mailbox capabilities. This is a step towards the future. If a demo is set for your area, plan to attend & see what it is all about. Please, if you put out a newsletter for your club or area, put me on the mailing list. We can only pass along what we hear about. ARA will be voted on for affiliated club status this month. Contact WBØDUV for info on affiliation. There are many benefits including club insurance. Hope that all had a good holiday season, good luck in 1984, and thanks to one and all for your support. 73, KQ8J. Nets: CWN-QNI 170, QTC 170R-2TP, time 822, 34 sess. CWXN-QNI 2581, QTC 3192, time 2790, 31 sess. HNN-QNI 1807, QTC 78, int 415, time 1462, 31 sess. CoI-QNI 873, QTC 49, int 195, time 805, 26 sess. Traffic: NØBQP 2177, WAØHJZ 1780, KQJAN 505, WØFPT 412, WØACH 400, NØCXI 289, KAØCZW 248, KBØZ 206, WAØOYI 180, KAØDMR 178, WDØAIT 120, WDØAUN 108, WØLAE 53, WØNFW 36. (Sept.) WØLQ 30.

NEW MEXICO: SM, Joe T. Knight, W5PDY — DEC: KB5XD. STM: KV5U. NMs WA5UNO KB5LI W5VFQ. Southwest Net (SWN) meets daily on 3.583 at 1930 local and handled 221 msgs with 264 stations in. New Mexico Roadrunner Net (NMRRN) meets daily on 3.939 at 0100 UTC and handled 94 msgs with 1156 stations in. New Mexico Breakfast Club meets daily on 3.939 at 0630 local and handled 90 msgs with 1237 checkins. Yucca 2-Mtr Net 78/18 & 93/33 handled 5 msgs with 200 checkins. Caravan Club 2-Mtr Net 66/06 handled 13 msgs with 177 checkins. Vy sorry to report the passing of K5WSH. He will certainly be missed. Good reports from the "Fall Back Campout" at Lake Roberts. Everyone reported a fine time. Traffic: W5DAD 248, W5UH 223, N5SJ 80.

UTAH: SM, Ron Todd K3FR — STM: W7OCX. SEC: NA7G. BM: WA7MEL. OO/RFI: KD7FL. ACC: KB7XO. PIO: N7BHC. TC: K7RJ. OARC and UARC both running Novice classes now. Hope to have a good crop of the new hams this winter. SET was successful in section, tfc ops liked the extra message counts available. WA7MEL had visitor WA7LBQ. W7JL and K4KUU visited friends and relatives. K7MG QSYed to Wyo, good luck. WA7JJL now EC for Davis Co. Traffic: K7HLR 221, WA7WIB 194, WA7KHE 152, WA7TEH 152, WA7MEL 101, WA7JJL 54, W7OCX 32, K7UM 10, W7PBV 5, N7BQE 3, K3FR 2.

WYOMING: SM, Dick Wunder, WA7WFC — SEC: W7TVK. STM: WØOGH. BM: KD7AN. OO/RFI & TC: KC7QY. PIO & ACC: KC7QJ. Two-Meter SSB Net in SE Wyo. 8 P.M. Sun at 144.25 MHz with WB7RSM KC7QJ KD7AN KA7DKH WA7YKM WØOGH and others as regulars. KA7MSM upgraded to Adv. WB7BPO's new call is NE7C; K7ISG's new call is NE7D; KA7FPZ's new call is KD7PV; congrats to all. Gillette has a radio club now, "Campbell Co. ARC," reports W7HNI. Wyoming Cowboy Net has new manager, KC7AR. Congrats to him on new assignment and TNX to WB7NHR for the fine job as mgr during the last six yrs. Wyo. Cowboy Net held 21 sessions with 843 QNI & 35 QTC. Wyo. Jackalope Net held 26 sessions with 553 QNI & 2 QTC. Best to all in the New Year. Traffic: WB7NHR 294, W7HLA 109, WØOGH 30, KC7KC 23.

SOUTHEASTERN DIVISION

ALABAMA: SM, Joseph E. Smith, Jr., WA4RNP — SEC: N4DMA. STM: N4JAW. SGL: KA4WVU. PIO: WO4W. N4DMA has agreed to continue as SEC. N4JAW (ATNM Net Manager) will succeed WA4PIZ as STM. KA4WVU of Montgomery will be our SGL and WO4W will be our PIO. I am still in need of a BM, a TC and an OO/RFI Coordinator to round out my section staff, so drop me a line and we will discuss the qualifications. My address is on page 8. It is sad to note the passing of I Will. This person will be sorely and the next time the call goes out for help you may have to volunteer yourself. Recent upgrades include KB4AQQ to Adv and KE4RA N4FQD and N4FWL to Extra. The ARES consists of hams who register themselves to help during an emergency. The SEC appoints an Emergency Coordinator for each county. Any operator wishing to become involved should contact N4DMA or me for more information. AL rep 100% by N4FQD and W4CKS on CAND. PSHR: WA4LXP W4CKS N4FQD WA4JDH WA4RNP. BPL: WA4JDH. Traffic: WA4JDH 593, W4CKS 150, N4FQD 146, WA4LXP 53, WB4IXA 52, K4AOZ 27, WA4RNP 21, WB4TVY 8, WD4DHI 8, W4DGH 5.

GEORGIA: SM, Eddy Kosobucki, K4JNL — SEC: WB4ABY. STM: K4VHC. ACC: WA4ABY. BM: W4BIA. OO/RFI: K4VHC. PIO: WA4PNY. SGL: W4BTZ. TC: K4UDR. I know that during the Grenada crisis many of u Ga hams were involved in many ways. I asked for reports from u on the nets & got only one response, that one from WA4ZHC who spent many hours handling tfc, etc. Please, from now on if any emergency should arise write up some sort of a report & send it to me so that I can forward it to the ARRL Hq. Many of u don't know that Amateur Radio exists because of the public service we perform. This past crisis was a real shot in the arm for the hobby. Congrats on a vy FB job. The members of the Alford Mem RC have to be congratulated on the fine efforts at the Fam-vention. Wx, crowd & hospitality were all in order. STM K4VHC informs me that the Ga Emerg RTTY net (GERN) will commence operation on 3625 sometime in Jan. All u "green keyers" listen on the nets for further info as to time, etc. I told u OMs that the YLs of MALARC are out to show us up. They are now an ARRL affiliated club & are now looking at new horizons. Congrats girls. MARC (Metro Atlantic Radio Council) has established a phone number for the benefit of hams moving into the area or traveling hams looking for club meetings. The number is 404-233-6747. Alford Mem. RC elected: KE4BI, pres.; WA4PNY, v.p.; W8NF secy.; WD4NFT treas. As of this writing I have only 3 of the dates for 1984 Ga section hamfests: Columbus ARC, Mar 31 & April 1; Albany ARC, May 5 & 6. Atlanta (Ga State) June 16 & 17. I have & try to keep the schedule, so please let me know the dates with any other info. Have a Happy New Year. Traffic: W4PIM 171, K4VHC 107, WB4NTW 65, K4NM 54, KA4ATM 47, WB4RUJ 45, K4BAI 21, W4BIA 20, W4HON 14, W4YWY 14, N4BIM 7.

NORTHERN FLORIDA: SM, Billy Williams, N4UF — As in many other sections, the Grenada story focused a great deal of attention on Amateur Radio in Northern Florida. Camera crews from all 3 network affiliates spotlighted amateur operations in Jax and wide coverage was reported in Orlando. As ham radio was the only news source, reporters and journalists saw firsthand the value of ham radio and remarked about the clarity of the transmissions. Much groundwork for future publicity was developed. Florida Field Day results show the North Fla. ARS (W4IZ) as top scoring station followed by LMARS (AJ4L) and the Silver Springs RC (W4WWW). NOFARS thus takes the *Florida Skip* trophy for the second straight year. The first two ARRL Special Service Clubs in the section are NOFARS and Jax RANGE. The Seminole Co. area has a model arrangement of RACES, ARES and REACT with all working closely together. Great job by WD4NIX and KB4LB. The East Orange Emergency Net headed by W4LUW and KD4QZ was very active in SET and also in reporting traffic totals. Also SVTN and LSTTN. The Gainesville ARS had a station at the Alachua Co. Fair. They also provided comm for the UF homecoming. W1HXK upgraded to General and KF4GY to Advanced. LSTTN now has 54 regular members who meet on a 7-day schedule. Congrats to NQ4P and staff! KB4DYH is now N4IYU. SSRC had public event station at Dunnelon Air Show with over 30 ops. The San Antonio Rattlesnake Festival had a stn with KF4KF KB4DF KA1BK K3IC WD4BRB and WB4YQP pitching in. In Daytona Beach, N7SD and KB4GW graduated 6 new hams. W4MB was interviewed on WNDB concerning ITU activities. The Playground ARC viewed "Amateur Radio's Newest Frontiers," the ARRL video tape and was very impressed. The VHF traffic net meets on the Crestview repeater at 8 P.M. CST each evening except Sat. OARC has a very thorough questionnaire out to all members to gauge interest in potential club activities. It touches on just about every aspect of club participation. WB4TPG is new EC for Hernando Co. and reports the weekly ARES Net there is off to a good start. N4JEL is new ham in Tallahassee. KA4DCF appeared as guest moderator on WFSU-TV. KA4YLC upgraded to Tech. Traffic: WF4X 674, WF4Y 529, N4PL 429, N4GDT 297, WA4QXT 285, WD4HBP 265, WB4GHU 258, WB4ADL 197, WA4EYU 185, WD4RIQ 177, KB9LT 174, AA4FG 170, WD4IIO 170, KB4LB 161, KD4KK 136, W4GUJ 112, NS4C 111, KF4U 111, KA4ETX 105, WD4HUZ 103, WD4MLQ 98, W4DTV 97, WB4TZR 91, NY4E 90, NF4O 84, W4MGO 74, KD4QZ 66, WD4RJI 53, KA4RBY 52, WB4YQP 50, KA4SGC 44, KB4T 38, N4UF 38, NA4F 38, WB4DTS 31, N4JHI 30, N4ADI 25, WA4PUP 23, NQ4P 22, N4BOY 20, WA4STZ 20, KW4V 20, K4PYV 13, N4IIP 12, WD4JXH 12, KX2L 11, KA4RMH 10, WB4AWG 10, W4LUW 8, K3CQR 6, KF4GY 5, WA4PUO 5, KA4ZOL 5, W1HXK 2. (Sept.) W4KIX 29, W4GUJ 20, KX2L 2. (Aug.) W4KIX 49.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK — SEC: W4SS. STM: K4ZK. TC: KI4T. BM: WA4EIC. ACC: AA4WJ. PIO: W4WYR. SGL: KC4N. The only section-level appointment that still needs to be filled is that of OO/RFI Coordinator — please let me know your thoughts and any recommendations. There was much publicity here, as elsewhere with Grenada. WB4ELX and XYL, WA4MJI were on television for several minutes one evening, and I understand there were several others also from Broward Co. W4ESH sent me a clipping from the *Naples Daily News*. He and his station were right on the front page with a very clear color photograph. The SET went very well for Florida and W4SS and W4UEA, the SECs for Southern and Northern Florida respectively, are to be commended. A special thank you to all the stations who participated in the event, both on local and on the section levels. The traffic nets were operating at their usual level of excellence, K4ZK & WF4X and the net mnagers are also to be congratulated. I received 47 messages from active stations and clubs during SET. BM WA4EIC reports that for the month he, NW4R K4IEK W4DL WD4KBW W4ESH AA4BN and N4IMI handled a total of 238 bulletins received and transmitted. NW4R said that Polk Co. hams provided communications for the Leukemia Society Swimathon with WT4F WA4OZA WB4AVA KA4NQK WB4NSQ and NW4R. W4LLA reported 64 phone patches this month in addition to his formal traffic. N4KB said that he worked HA8BJ and HP1XE on 80 meters and that he is also active on 160 meters now. N4KB also said that his brother, W1NJM, will be back in Florida on Dec. 4. N4WX is on 147.54 with store and forward packet switcher in Palm Bay. W4JM has finally acquired a 100% solid state exciter, a IC-730 to back up his TS830S. He also plans to use it mobile. A list of active clubs was received. The list was printed Oct. 22. The list includes the Hollywood ARC, a Special Service Club, as well as the following: Central Florida Cypress Chapter, Cape Kennedy Area ARC, Space Center ARS, Florida Institute of Tech ARS, Platinum Coast ARS, Indian River ARC, Brevard RA, Vero Beach ARC, Key West ARC, Pompano Beach ARA, Fellowship ARC, Dade RC Radio Club De Cuba Exile, North Dade Repeater, Broward ARC, Tamarac ARA, South Florida DX Assn, Palm Beach ARC, West Palm Beach ARC, IBM ARC of Boca Raton, St. Lucie RA, Martin Co. ARA, Fort Pierce RC, Manatee ARC, Clearwater ARS, Winterset RC of FL, Metropolitan RA, Sun City Center ARC, Sarasota Emergency RC, Sarasota ARA, Brandon ARS, Tamiami RC, Tampa ARC, Tampa Bay RA, St. Petersburg ARC, Polk Co. CD ACS, Fort Myers ARC, Collier Co. ARC and the Charlotte ARS. 73 de WA4PFK. Traffic: W3GUL 3241, W3VR 831, WD4COL 564, WA4PFK 500, K4ZK 426, WA4EIC 374, K4IA 248, WB4AID 224, KA4AMC 213, K4EUK 202, KA4GUS 187, W4SS 187, WB2NVJ 184, WB4WYG 183, W4DL 178, KY4U 171, NC4H 167, K4JLL 148, K2RUE 147, WD4KBW 147,

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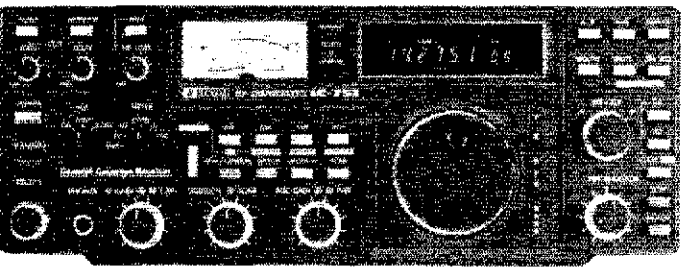
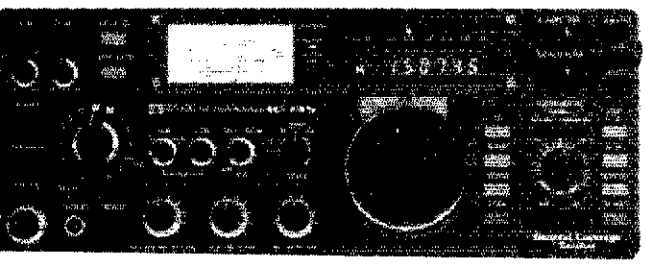


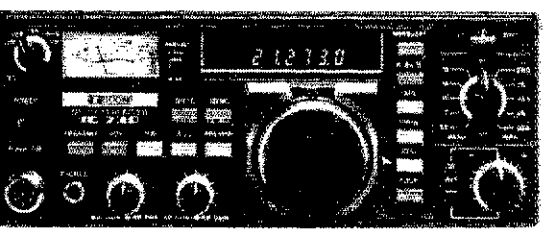
IC-751 **General Coverage Receiver**
9 Band Ham Transceiver

- General Coverage Receiver
- 160 — 10 Meter Ham
- QSK
- FM Standard
- 32 Tunable Memories With Lithium Battery Backup
- 12 Volt Operation
- Hygrade 455KHz XTAL Filter
- M to VFO, VFO to M
- Large Knobs/Spacing
- RIT Readout
- 105dB Dynamic Range
- Mode Memory
- Squelch
- Passband Tuning
- Internal Power Supply Option
- Scanning
- Mode Scan
- Dual VFO
- Multiple Filter Options
- 100% Duty Cycle



IC-745 **General Coverage Receiver**
9 Band Ham Transceiver

- General Coverage Receiver
- 160 — 10 Meter Ham
- 16 Tunable Memories
- IF Shift
- PBT
- AM Recieve
- FM Optional
- 12 Volt Operation
- Scanning
- 100dB Dynamic Range
- Internal Power Supply Option
- Dual VFO
- Multiple Filter Options
- Mode Memory
- Squelch
- CW Keyer Option
- 100% Duty Cycle



IC-730 **8 Band Ham Transceiver**
Compact, Mobile

- 8 — 10 Meter Ham
- 8 Tunable Memories
- Dual VFO
- IF Shift
- PBT Option
- CW Filter Option
- 100dB Dynamic Range
- 12 VDC Operation

Optional Accessories: PS15 Power Supply, PS30 Power Supply, PS35 Internal Power Supply (751, 745), Mobile Mounting Brackets, IC-2KL Linear Amplifier, AT500/100 Antenna Tuner, BC10 Memory Backup (730), & SP3 External Speakers.

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The World System

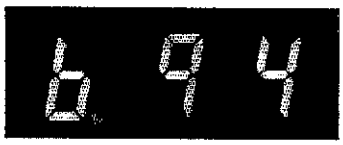
ICOM America, Inc., 2112-116th Ave NE, Bellevue, WA 98004 **(206)454-8155** / 3331 Towerwood Drive, Suite 307, Dallas, TX 75234 **(214)620-2780**

ICOM IC-25H

45 Watts of Compact Power

IC-25H
2 Meter Mobile
45 Watts

45 watts / green LED readout / compact size / touchtone™ scanning microphone / 2"H x 5½"W x 8¾"D / 2 VFO's / 5 memories make the IC-25H the best 2 meter mobile value on the market.



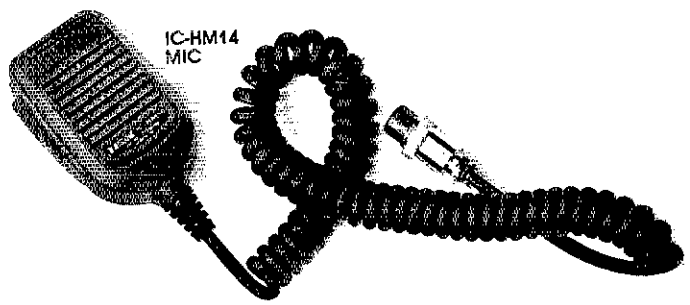
New Green LED. Easier to read in bright sunlight, and not glaring at night, the IC-25A's new readout provides good visibility under all conditions.

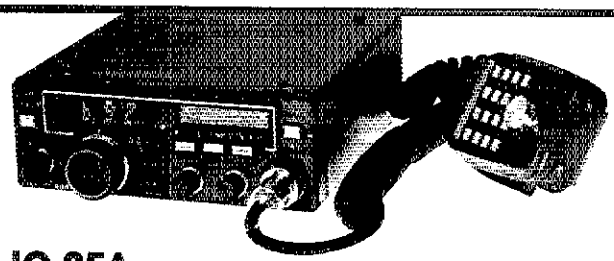
Dual VFO's. Dual VFO's give an extra stored frequency for scanning (memory scan scans 5 memories plus 2 VFO's) and each VFO has a different tuning rate for easy QSY.

5 Memories. Instant access to most frequencies: VFO A information is transferred to the selected memory by pushing the write button.

Priority Channel. Any memory channel may be monitored for activity on a sample basis, every 5 seconds, without disruption of a QSO conducted on a VFO frequency.

HM14 Microphone. Smaller and lighter . . . the HM14 microphone provides a 16 button touchtone™ pad as well as up and down scan buttons, adding easy frequency control of the radio and repeater access tones.





IC-25A
25 Watts / 2 meters

The IC-25A is a very compact 2 meter FM mobile. Only 2"H x 5½"W x 7"D, the IC-25A features a green LED readout which is visible in any lighting condition, a touchtone™ / scanning microphone and 25 watts of output.

These standard features have made the IC-25A the most popular 2 meter mobile on the market.

Scanning. Pushing the S/S button initiates the scan circuitry. With the mode switch in a memory position the unit will scan all 5 memories plus the 2 VFO frequencies. With the mode switch in a VFO position, the unit will scan the entire band or the portion of the band defined by memories 1 and 2.

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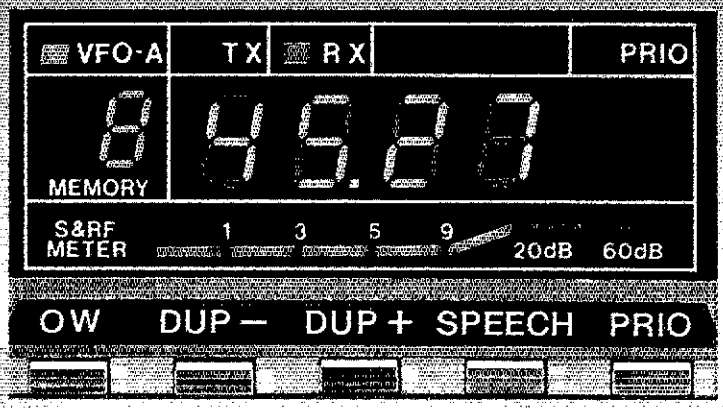
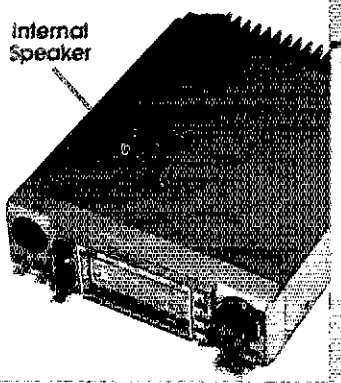
ICOM IC-27A

The Most Compact 2 Meter Mobile!

Now ICOM presents an important breakthrough in two-meter mobile communications, the IC-27A. The smallest two-meter mobile available, the IC-27A measures only 38 millimeters high by 140 millimeters wide. As an added bonus, the IC-27A, through ICOM engineering, is able to contain an internal speaker to provide ease of mounting and make the unit one small compact complete package.





25 Watts. In such an incredibly small package, the IC-27A is able to provide 25 watts of output power. And even though the IC-27A is the smallest available two-meter mobile unit, it has sacrificed none of the features found in fully featured VHF mobiles.

32 PL Frequencies. The IC-27A comes complete with 32 PL frequencies ready to go and controlled from the front panel knob. Each PL frequency may be selected by the main tuning knob and stored into memory for easy access along with frequency.

10 Memories. The IC-27A has 10 tunable memories available to store receive frequency, transmit offset, offset direction, and PL tone. Memories are backed up by a lithium backup battery, which will store memories for up to seven years.

Speech Synthesizer. As an added plus, the IC-27A features an optional speech synthesizer to verbally announce the receiver frequency of the transceiver through the simple push of a button. This allows the operator to hear what frequency he is operating on without looking at the transceiver.

Scanning. Included with the IC-27A is a scanning system which allows scanning of memories or scanning of the band. Each memory may be scanned between programmable limits.

Priority Scan. Priority may be selected to be either a memory channel or a VFO channel. By using sampling techniques, the operator can determine if a frequency he is interested in using is free or busy.

Microphone. Each IC-27A comes complete with a microphone which includes a 16-button touchtone pad for access to your favorite repeater or for dialing through an autopatch.

THE ICOM 27A is a superior piece of ham equipment engineered and built by ICOM to provide superb performance in the mobile radio environment. See the IC-27A at your local ICOM dealer.

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W4LLA 118, W4NFK 95, KF4RL 66, W4ESH 66, NW4R 61, AA4BN 59, KA4NXF 58, KA4RWV 52, NJ4O 48, W4DVO 47, KA4FZI 46, W4YCL 45, K7LCA 42, WD4CHO 42, K5IHH 41, KA4KDD 41, KF4JA 40, WA4HXU 39, KA4BBA 36, WB4GCK 34, W4PKP 34, KB4KB 33, K4JI 32, WB2OUK 30, KY9T 30, KA4YHS 27, K4FQU 26, WD4AWN 25, W3IJR 24, N4FNY 17, W4WYR 15, N4KB 14, WD4MCC 14, W8ARW 12, WA1VOB 12, K4VSN 11, WO4V 10, WK4F 9, WB4LPX 9, KD4VN 9, N2WX 9, WB4GJH 8, W4OUU 8, W4MFD 8, NX4X 8, N4CMW 7, KA4GDU 7, KF4JI 7, WB8SNT 7, KA8AKY 6, W1DLP 6, AF3S 6, WD9AEP 5, N4BXU 5, K4OVC 5, W4JM 4, KA4KSQ 4, KF4AL 3, KA8CXQ 3, WA4LKY 3, WD4PPA 3, KA4SIH 3, KA4ALM 2, KB4AOO 2, AA4WJ 2, WV4F 1, K4IRT 1, WR4J 1. (Sept.) NC4H 75, KM4Y 49, W1DLP 33.

WEST INDIES: SM, Gregorio Nieves, KP4EW — West Indies Net Slow (WINS) daily 7 P.M. (2300 UTC) on 3.710 MHz. West Indies Net Central (WINC) daily 6:30 P.M. (2230 UTC) on 146.94 MHz. The SET exercise was conducted on the weekend of Oct. 15-16. The same was conducted as planned on a meeting held in KP4DJ QTH a week before. In this meeting were present: WP4BCV, STM; WP4BEF, Net Manager WINC; KP4DJ, Net Manager WINS; NP4CF SEC; KP4ABG, EC; KP4EW. Four sessions were conducted each day for WINC and four sessions for WINS for a total of 16 sessions on that weekend. The exercise was excellent and the cooperation of many amateurs throughout the section was received as we expected. Different net controls in the WINC sessions were WP4BCV KP4GB KP4FMM WP4BEF WP4BXO WP4CFX KP4BE NP4D and WP4AOO. SEC NP4CF and KP4ABG were in CD Hq. handling traffic from government agencies. Traffic for WINS were received from KP4CEK WP4BEI NP4FQ and KV4BA and VP2VI from Virgin Islands. Thanks to all of you for the cooperation in the success of this exercise. KV4BA and KV4FZ were reported as traffic handlers during the short FCC waiver in the Grenada situation. Congrats to KP4FI for his third position in the 1A category in the June Field Day exercise. Congrats to KP4GJ and NP4P for their upgrading to Extra class. KP4DJ reports the following for WINS: QND 441, QTC 36, QNI 135, QNI to 4RN 49 times (2 sessions). WP4BEF reports the following: QND 385, QTC 16, QNI 417 — 23 sessions. PSHR: KP4DJ. Traffic: KP4DJ 75.

SOUTHWESTERN DIVISION

ARIZONA: SM, Erich J. Holzer, N7EH — STM: W7EP. NMs: WA7KQE WA7FDN. Well, the floods reported last month have subsided and section amateurs are back to performing their usual fall public service activities. W7KAX reports that he as well as N7BUC WA7YXC KA7AIC and W7SQM help provide back-up comm. when 10 prisoners escaped from the Mohave Co. jail and a manhunt was initiated. Members of the Green Valley ARC provided comm. for the 3rd annual fun run held in their city. Those participating were: KA7KOR W7LTA W7JWR WB7ORC KX7J KB0KP WB7CFX W0ROD KA7HDC N7DBM KA7EVH. In Tucson, the TRA reports that the following participated in one or more of these events: Tucson Crime Fair, Optimist Air Show, or Camp Wildcat Bike-a-thon — KB0IW K5DGZ K7YBF KA7FRY KA7OIZ KA7DAC WB7TWM WB7OWA K7KYW KC7AO WA7RKI WB7UXX WB2AVE N7CVG W7YXE WB7ORB KC7WU KC7HU KA7OOO WB7STA K7OMR WB7VOM WA7WKE KV7D KV7B WB7CGQ K7CO N7EH WB7ONS AF7M. KA7FRY and KA7OOO were local Tucson TV celebrities during the Grenada emergency. PSHR: KO7V KB7FE. Cactus Net QNI 781, QTC 141. ATEN: QNI 1002, QTC 205. Traffic: KB7FE 266, K6LL 204, KO7V 102, WA7KQE 36, W7LVB 28, KA7HEV 24, N7EH 24, N7CQY 17, W7KXE 13, WA7NXL 3.

LOS ANGELES: SM, Stan Broki, N2YQ — SEC: N6UK. STM: W6INH. ACC: NF6D. The So. Cal. DX Club has its new repeater location on the air with a big signal all the way to San Diego. ARES Southern District Sub-area #1 has been active this month with Peninsula Music Fair and on Oct. 16 the South Bay Hunger Walk. ARES Sub-area 4 had a diabetes bikathon Oct. 2 and a crop walkathon on Oct. 16. Also they helped the Elk's Club Oktoberfest in Whittier. The SET in Los Angeles section was a varied event with individual ECs throughout the section performing. Thanks to all that helped. Oct. 20 the Olympic Village Amateur Radio Planning Committee headed by W6GG met. The station managers for the three Olympic Villages were announced: USC Village Marty Wolf N6VI, UCLA Village Dick Mannheimer, K6LAE, UC/Santa Barbara, Tony Tonkin N6AJA. Approx. 48 amateurs per station will be needed. URGENT!! Los Angeles section needs a Public Information Officer. This appointment will be absolutely needed for next year's Olympics. OO reports. K6KA 120+. Congrats the reports are showing up again. The RTTY group and VHF groups are sending reports regularly. Thanks a lot gang. N6DZQ back on air with repaired rig. Thanks. Band conditions are improving slowly. Traffic: K6UYK 697, K6YBV 326, W6INH 234, WA6OCM 104, AD6A 79, KT6D 32, W6NKE 23, N6GZP 22, WA6LVO 19, K6CL 14, N6DZQ 13, WB6FWZ 4.

ORANGE: SM, Sandra Heyn, WA6WZN — SEC: W6UBQ. STM: WA6QCA. ACC: KA6NLY. BM: W6DXL. OO/RFI Coord: N6PE. PIO: NS6W. SGL: N6HIQ. TC: AA6DD. DECs (by counties): WB6JBI (Orange); W6LKN (Riverside); K6GGS (San Bernardino); WB6YZY (Inyo). EC WA6OPS reports that the Intra-Hospital Communications Group of Orange Co. will be given special ID ARES cards with their new logo; the group now supports the following hospitals Brea Community, Brea Neuropsychiatric, Canyon (Kaiser), Fullerton Community, Humana Westminster, La Habra Community, Placentia-Linda Community, St. Jude Hospital & Rehab Center (Fullerton), St. Jude Hospital Yorba Linda, West Anaheim, Mission Community. Orange Co. RACES and IDEC sponsored a program that had a panel discussion on dealing with the media in emergency situations. The panel included Dick Koehler from the *Daily Pilot* and Bob Navarro from KNBC, channel 4. ACC KA6NLY chairman of the Orange Co. Council of Amateur Radio Organizations asks clubs to join by sending $3 to treas WB6ULU; Jan. 10th at Allstate Savings in Tustin. OCCARO will have elections and plan for 1984. Lake Elsinore Valley ARC newly elected officers are: WA6ZNO, pres.; KE6FT, v.p.; KB6BTM, treas.; KE6EG, secy. Congrats to KE6CB on passing his Extra, even though he suffers from muscular dystrophy. Congrats to Buena Park ARC on becoming an ARRL Affiliated Club. Even though United ARC edged out the Western ARA, WARA won the OCCARO FD plaque the 3rd year in a row. The Seal Beach Yacht Club sponsored a marriage with CW vows of KE6RJ and KE6QI conducted by Rev KB6X, the ceremony was held Oct. 23 on 7.133 MHz with WA6HOQ, NO6Y and WA6NAE as control stations. DEC WB6JBI held successful SET critique meeting of OC ARES AECs and ECs. PSHR: WB6QBZ AI6E KA6HJK WA6QCA KA6BNW.

Section Nets

Net	Sess.	Checkins	Tfc.	Mgr.
SCN/1	35	384	323	AI6E
SCN/2	31	192	162	AI6E
SCN/V	37	602	411	WA6QCA
RTTY/V	61	489	109	KA6HJK

Traffic: WB6QBZ 273, KA6HJK 191, AI6E 189, WA6QCA 181, KA6BNW 126, N6GIW 107, K6GGS 85, W6RE 67, N6GOT 60, K6ZCE 40, W6PNS 28, N6FRW 27, W6TKV 26, W6NTN 25, WA6WZO 2.

SAN DIEGO: SM, Arthur R. Smith, W6INI — PIO: WA6CUP. ACC: WA6COE, TC: N6NR. BM: WA6HJJ. STM: N6GW. SEC: W6INI. ECs by District: N6CQW Eastern, WD6CSS Southern, WA6EYX Northern, W6INI Central, WA2NNT Tri-City, WA6LAW Imperial Co. A high-rise apartment fire on Oct 23 in downtown San Diego found ARES members responding to the needs of the Red Cross and the emergency medical system. Communications were established from the Red Cross Hq. to the fire scene and from the fire scene to Mercy Hospital. The latter provided a backup link from the Field Medical Commander to the Base Hospital. Field participants were: WA6BCC K6DBJ WD6FUN W6FUZ W6INI KD6QJ W6QLJ K6UK. Back-ups were: WB6LLO WB6SIP W6TET K6UV. The North County Traffic Net met 32 times, handled 105 msgs. W1LE is editor of *The Call Letter*, published by the Poway ARS. San Diego City Emergency Management Volunteers are updating flood response plans as the rainy season nears. For info and membership contact W6INI (273-1120). K6HAP has moved to Michigan. He will be missed from public service activities. Traffic: KT6A 584, KM6I 280, KB6AI 101, N6AT 77, WA6IIK 22, N6CW 14, W6HUJ 8, W1LE 8. (Sept.) KB6AI 46.

WEST GULF DIVISION

NORTHERN TEXAS: SM, Phil Clements, K5PC — ASM/ACC: NI5V. SEC: W5GPO. STM: W5VMP. PIO: N5FDL. OO/RFI: WB5JBP. TC: WB5IIR. BM: W5QXK. SGL: W5UXP. SET was the best ever, with reports from all over the section. Thanks to all for the hard work! The Lefors ARK of Pampa set up a display at the Chautauqua Celebration, with lots or PR and 50 messages originated. Also, nine new Novices in Pampa, each taught by WB5ORH and WB5BKL. The RATT (Radio Amateurs of Texas Tech) club is active from Lubbock with public service work, and is setting up a club station on campus. I'm sure all our section Leadership officials join me in thanking you all for a most progressive and constructive year in our League activities. A most happy holiday season to all, and all the best in 1984! PSHR: NI5V N5EZM KC5NN WB5CIC KA5AZK KB5UL N5DKW N5FDL KD5FR. Traffic: WB5CIC 449, N5FDL 282, KB5UL 264, N5EZM 214, K5PC 161, KD5FR 157, KA5AZK 135, N5GKF 123, NI5V 115, W9OYL 108, WB5NFS 81, WB5OXE 75, N5DKW 73, WB5YUC 71, K2SCU 65, KC5NN 43, W1AEL 34, N5GLY 28, W5CUE 18, WA5EZT 16, KA5QYV 14.

SOUTHERN TEXAS: SM, Arthur R. Ross, W5KR — SM/TM: N5TC. SEC: WA5HVT. BPL: W5TFB WB5YDD. OO report: K5DL. KS5V has moved to Canyon Lake; will be more active on all bands. GAND mgr W5KLV reprts DRN5 represented 100%. STX stations QNI: K5GM N5CRU N5EFG N5AMH WB5YDD N5DFO W5KLV. San Antonio RC Bulletin reports highly successful Novice class just completed; another starting immediately. Most clubs reporting nominating committees busy. Texas VHF-FM Society reports new officers: N5AHD, pres.; WA5RON, v.p.; K5PFE, secy./treas.; W5XC, tech coordinator; W5QGZ, freq coordinator chmn, WB5BMB W5EBJ WA5MWD, directors. DRN5 mgr WB5YDD reports STX represented 100% by WB5FQU WB5EPA K5WOB W5KLV N5DFO N5AMH W5CTZ N5EFG W5URN KD5CB K5KJN WB5YDD. KE5ER and KE5FT are husband and wife traffic team in Brownsville. About 14 amateurs in the Rio Grande Valley assisted in a "biathlon" (contestants run six miles, then get on bicycles and ride 15 more miles) in Harlingen Oct 30. Traffic: W5TFB 577, WB5YDD 502, N5DFO 394, W5CTZ 362, W5KLV 303, N5TC 175, WB5EPA 65, KS5V 42, WB5GKH 27, KE5ER 26, AK5M 25, W5BGE 24, W5KR 22, K5OWK 20, K5RG 14, WB5FQU 12, KK8L 10, K5HZR 7, KE5FT 4.

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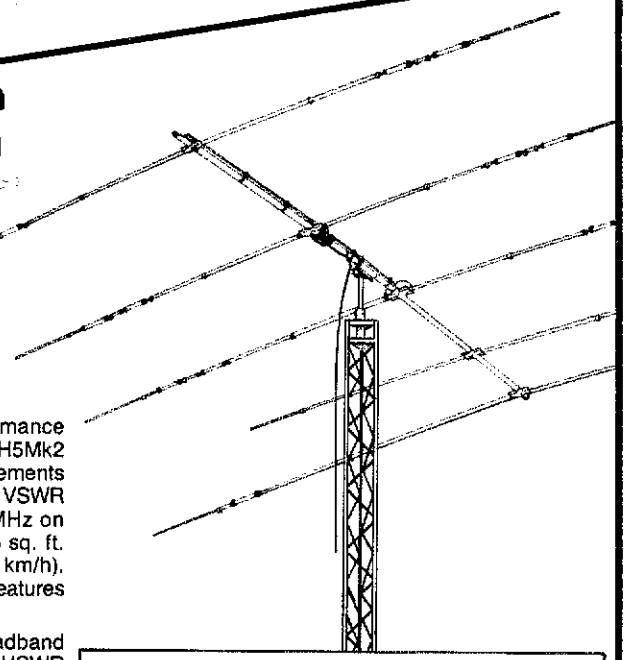

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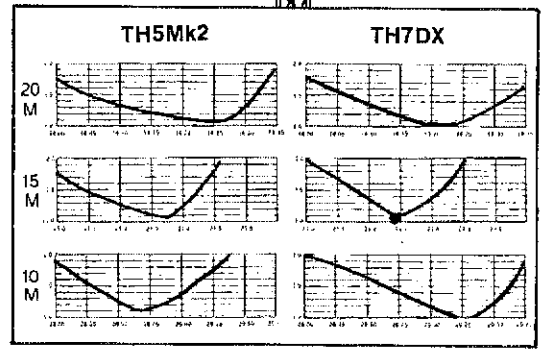

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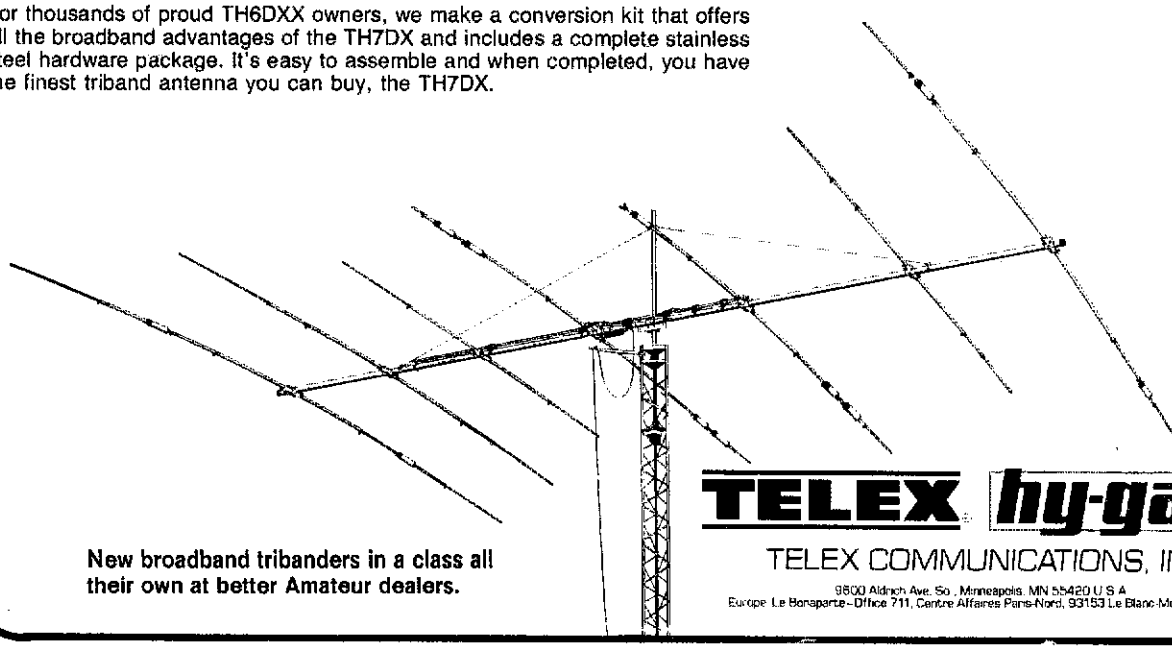

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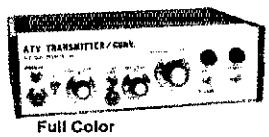

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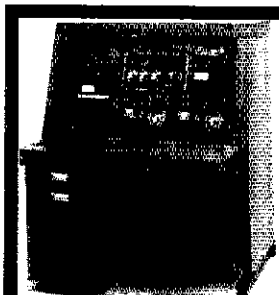

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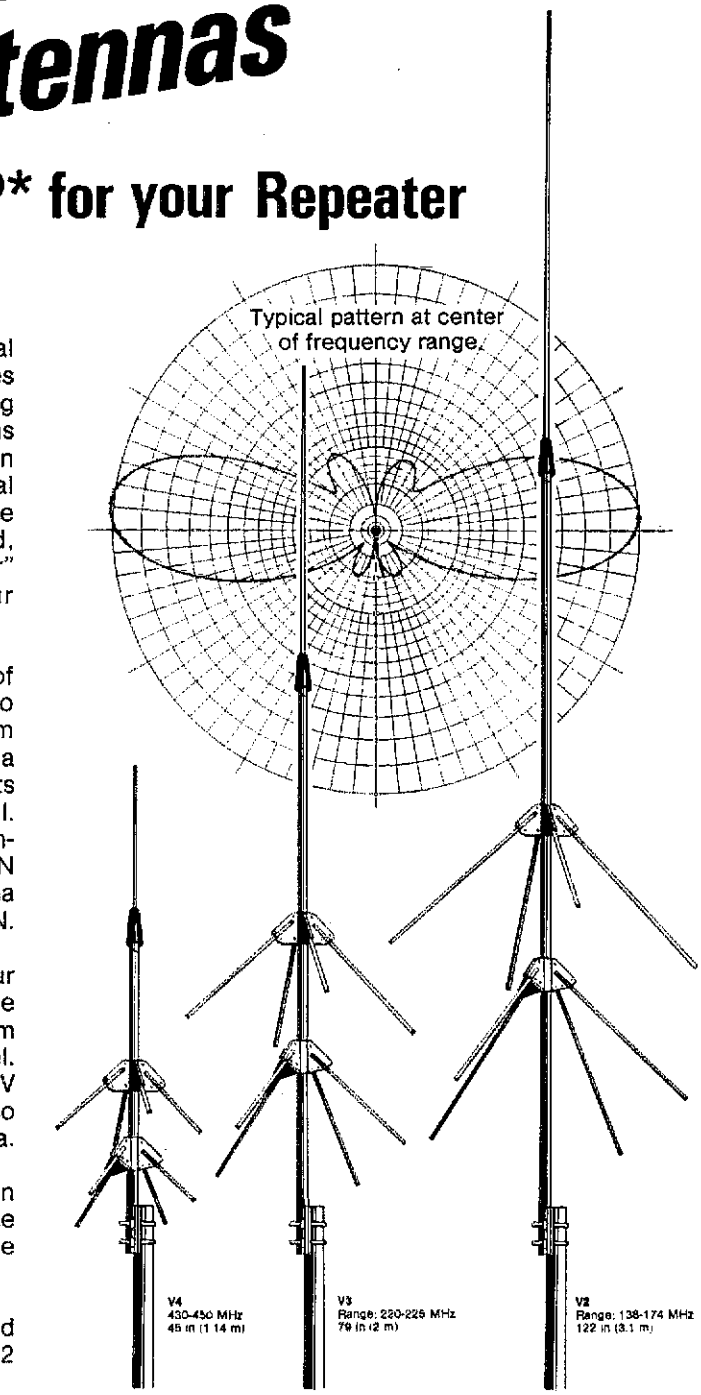

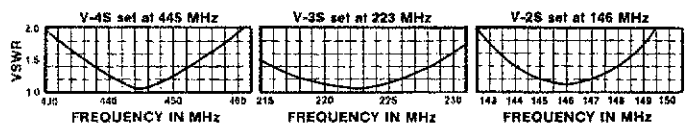

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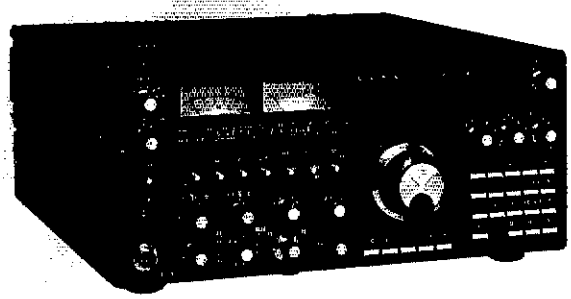

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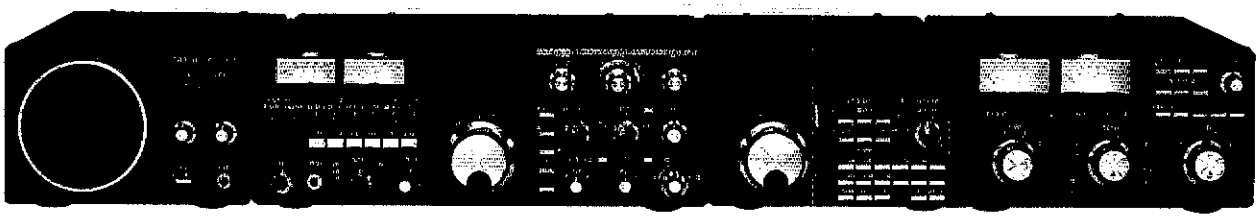
TX: 100W 1.8–29.99 MHz
RX: 150 kHz–29.99 MHz

FT-980 CAT

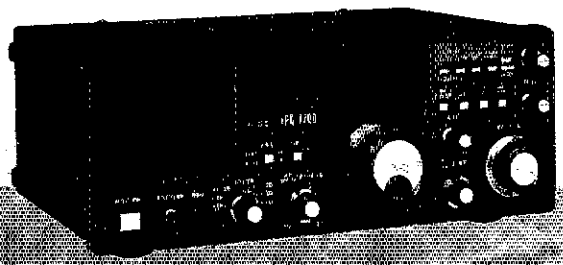
NEW HF ALL MODE TRANSCEIVER WITH GENERAL COVERAGE RECEIVER, 8-BIT MICROPROCESSOR CONTROL, AND INTRODUCING YAESU'S NEW COMPUTER-AIDED TRANSCEIVER SYSTEM FOR COMPLETE EXTERNAL COMPUTER CONTROL.
TX: 100W 9 bands
RX: 150 kHz–29.99 MHz



FT-102 LINE

Designed for wide dynamic range and clean transmitter output—to give you that extra competitive edge. Three 6146B's give power to spare, while the ultra-modern features give you total operating flexibility and control.

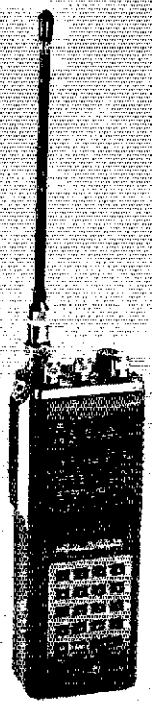
Simple, reliable and thrifty, the all solid-state rig that gives you everything you need for no-frills mobile HF, or base station with the optional FP-700 Power Supply.
100W: 9 bands, SSB and CW, w/FM optional



All mode synthesized general coverage receiver—perfect for serious shortwave listening. Options include 12-channel Memory Unit, VHF Converters, Antenna Tuner and an Active Antenna.

Specifications subject to change without notice or obligation.

V/UHF FAMILIES



FT-208R/708R

Feature-packed FM Handhelds that have proven their superior performance. Microprocessor control assures convenient operation while incorporating every worthwhile feature the serious operator needs.

FT-208R 2.5W/1W RF: 143.5–148.5 MHz

FT-708R 1W/200mW RF: 440–450 MHz

10 memories w/lithium backup
Full scanning features

FT-230R/730R

Compact FM mobiles engineered for reliability and convenience. The perfect balance of current drain and power output for all mobile needs. Built to withstand years of punishing mobile use.

FT-230R 25W RF: 143.5–148.5 MHz
FT-730R 10W RF: 440–450 MHz

FT-290R/690R/790R

All mode portables with full microprocessor control and all of the features needed for serious SSB, CW and FM field operation when powered by eight optional "C" cells. Options also available for mobile and base operation.

FT-690R 2.5/1W RF: 50–54 MHz
FT-290R 2.5W/1W RF: 143.5–148.5 MHz
FT-790R 1W/200 mW RF: 430–440 MHz

FT-480R/680R/780R

All mode base/mobiles with power and performance in all SSB, CW and FM applications. Optional matching FP-80A AC Power Supply makes the perfect base station.

FT-680R 10W RF: 50–54 MHz
FT-480R 10W RF: 143.5–148.5 MHz
FT-780R 10W RF: 430–440 MHz

YAESU

YAESU ELECTRONICS CORP., 6851 Walthall Way, Paramount, CA 90723 • (213) 633-4007
YAESU Cincinnati Service Center, 9070 Gold Park Drive, Hamilton, OH 45011 • (513) 874-3100

Feel an *UltraPro*™

Introducing our new microprocessor-based HD-8999 *UltraPro* CW Keyboard... Better features and technology, for the build-it-yourself operator.

A major advance – the newest generation of "intelligent" CW Keyboards is now here! The *UltraPro* sends letter-perfect code, was 'human engineered' for maximum convenience, style and comfort – with specialized functions to improve your QSO productivity, typing skill and copy speed!

It's the most versatile concept in CW history! Assemble one yourself for real satisfaction – *and savings.*

EXCLUSIVE FEATURES

UltraPro combines the look of professional design with the sound and feel of a Morse computer. It's the only CW Keyboard with conveniences of the finest word/data processing terminals, like component-level diagnostics and 2-key rollover. A custom microprocessor makes setup fast, with all operations programmed by a few keystrokes. Send at 1-99 wpm, with ten weight and space settings, and enjoy automatic serial number generation, too! Up to ten variable-length message memories will hold a total of 495 characters, and can be selectively protected against erasure. CMOS RAM with battery backup and AC/DC power compatibility means you can use it anywhere.

MORE USER-FLEXIBILITY

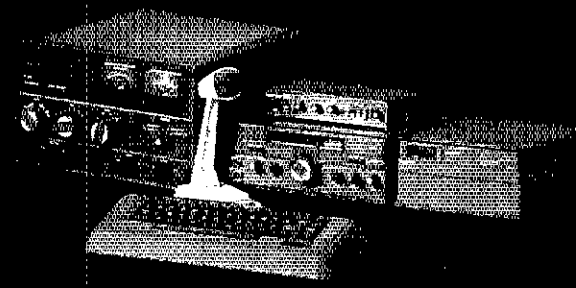
A large four-digit LED display and three-color bargraph panel provide complete status update by indicating parameter values as they are set and change, input error, space remaining in the message memory and fullness of the 64-character type-ahead buffer. The *UltraPro* has twelve different code practice modes to increase your copy speed, including one that can improve your typing skill! Yet it's so easy to use, a 9-year-old Novice can sound like a pro in minutes. *UltraPro* CW. There's no better name for it. Or the feeling you get from using it.

FREE CATALOG!

Get full details and specs in the latest Heathkit catalog. Write today: Heath Company, Dept. 009-134, Benton Harbor, MI 49022. Or visit your nearby Heathkit Electronic Center.*

– .... . .–. .'... / –– ––– .–. . / ..–. ––– .–. /
– .... . / .... .– –– / .– – / .... . .– – ....!

See our complete line including the SS-9000 computer controllable transceiver, QRP transceiver, coax switcher, amplifiers, antenna tuners and station aids.



Order toll-free MasterCard and Visa 800-253-0570.

Heathkit

Heath Company

A subsidiary of Zenith Radio Corporation

*Units of Veritechnology Electronics Corporation in the U.S.

AM-438

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*. If the 20th falls on a weekend or holiday, the Ham-Ad deadline is the previous working day.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last 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 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 characters 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 — W7GAQ/6 Box 530, Santa Rosa CA 95402.

CERTIFICATE for proven two-way radio contacts with amateurs in all ten USA areas. Award suitable for framing and proven achievements added upon request. S.A.S.E. brings TAD data sheet. W6LS, 2814 Empire, Burbank, CA 91504.

IMRA-International Mission Radio Association Helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1900-2000 GMT. Br. Bernard Frey, 1 Pryer Manor Rd., Larchmont, NY 10538.

THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed. F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

JOIN the Old Timers Club, an international non-profit organization. If you operated a radio station, commercial, amateur or Armed Forces 40 or more years ago, and have an Amateur license at present you are eligible. Join the real pioneers of ham radio. Write O.O.T.C. Box AA, Mamaroneck, NY 10543 for details.

HAVE A-M capability? Join S.P.A.M. (Society for Promotion A-M) Membership is free. Write: F.A. Dunlap (S.P.A.M.), 14113 Stoneshire, Houston, TX 77060 (S.A.S.E. please).

FOURTH ANNUAL Ohio State Convention and Flea Market: Join in the even bigger "Cincinnati ARRL '84," February 25 and 26. Activities for Hams and electronics enthusiasts: forums, meetings, vendors, Wouff Hong, women's activities, banquet, hospitality suite, more. Sure cure for "cabin fever." Hospitality suite Friday and Saturday nights. The $5 convention registration includes all convention awards. Flea market is $4/space for two days — Ham and electronics items, only. Write: Cincinnati ARRL '84, P.O.B. 11300, Cincinnati, OH 45211 or telephone 513-825-8234. Vendor and exhibitor inquiries invited.

SAROC Annual Prestige Convention hosted by Southern Nevada ARC., Inc., at Hacienda Resort Hotel, Las Vegas, January 12-13-14-15, 1984. SAROC room rate $35.50 per night, single or double occupancy, call 1-800-634-6713. Included with Advance Registration $17 per person, Technical Sessions and Exhibits (on Friday and Saturday), coupon for cocktail party for adults only (on Friday) hosted by Ham Radio Magazine, Awards and Ladies Program (on Saturday), one each Breakfast or Brunch (on Saturday and Sunday), one Free Swap Table (on Friday and Saturday) for non-commercial guest. QSL with check to SAROC, POB 945, Boulder City, NV 89005-0945.

THE OAK PARK ARC presents its annual Swap, N Shop on Sunday, Jan. 8 from 8:00 A.M. to 3:00 P.M. at Oak Park High School, Oak Park, Michigan. Activities include seminars on Packet Radio, Oscar 10. F.C.C. Novice exams will be given at 11:00 A.M. Plenty of awards, refreshments and free parking. Talk-in on 52. For further information send S.A.S.E. to: Oak Park ARC Swap and Shop, 14300 Oak Park Blvd., Oak Park, MI 48237. Admission is $2.50.

W.A.R.A. Warren Ohio Hamfest Aug. 19, 1984 at Kent State University, Trumbull Campus.

LIMARC INDOOR HAMFAIR '84 — sponsored by the Long Island Mobile Amateur Radio Club will be held on February 19, 1984 at the Electrician's Hall, 41 Pinelawn Road, Melville, New York from 0900 to 1600. Table reservations are $10.00 each payable in advance to Bob Reed, WB2DIN, 2970 Valentine Place, Wantagh, NY 11793. Buyers admission is $3.00 per person, spouses/friends/children included. Food and refreshments will be available. Talk-in will be W2VL/R 146.25/146.85 or on 146.52 simplex. For additional information contact Al Flapan, WA2FBQ, at 516-796-2965 or Hank Wener, WB2ALW, at 516-484-4322.

FOR SALE: Large wall calendar with AMATEUR RADIO printed in top half. Excellent gift at $3.50 each, including USA mailing. Enclose self-addressed mailing label. W6LS, 2814 Empire, Burbank, CA 91504.

FLEMINGTON, N.J. Hamfest by Cherryville Repeater Association will be held Saturday, April 7 at Hunterdon Central Field House. For table reservations or other information write Bill Inkrote, K2NJ RD10 Box 294, Quakertown,-Croton Rd., Flemington, N.J. 08822 or call 201-788-4080.

NJ MICRO SHOW & Computer Fleamarket (Indoors), Saturday, January 14, 10 AM to 5 PM at Meadowlands Hilton Hotel, Rte. 3, Secaucus, NJ. Buyers $5, Sellers $35-$150. For seller reservations and payment (with MC/VISA) call 201-297-2526. No tables or booths available at the door! (W2TGH).

PHILADELPHIA/NJ Micro Show & Computer Fleamarket (Indoors), Saturday, January 21, 10 AM to 5 PM at Halloran Plaza Hotel, Route 130 South, Pennsauken, NJ (5 min. to Philadelphia). Buyers $5, Sellers $25-$125. For seller reservations and payment (with MC/VISA) call 201-297-2526. No tables or booths available at the door! (W2TGH).

QSL Cards/Rubber Stamps/Engraving

TRAVEL-PAK QSL Kit — Converts Post Cars, Photos to QSLs. Stamp brings circular. Samco, Box 203, Wynantskill, NY 12198.

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.

DISTINCTIVE QSL's — Largest selection, lowest prices, top quality photo and completely customized cards. Make your QSL's truly unique at the same cost as a standard card, and get a better return rate! Free samples, catalogue. Stamps appreciated. Stu, K2RPZ, Box 412, Rocky Point, NY 11778 516-744-6260.

FREE samples — stamp appreciated. Conner, 522 Notre Dame Ave., Chattanooga, TN 37412.

QSLs & rubber stamps. Top quality. QSL samples and stamp information 50c. Ebbert Graphics D-3, Box 70, Westerville, OH 43081.

WOODGRAINED QSLs. Beautifully printed. You have to see them. Write for free samples. Ham Graphics, Box 244Q, Camden, NY 13316.

QSL samples — 25¢ Samcards - 48 Monte Carlo Dr., Pittsburgh, PA 15239.

EMBROIDERED emblems, custom designed club pins, medallions, trophies, ribbons. Highest quality, fastest delivery, lowest prices anywhere. Free info: NDI, Box 6665 M, Marietta, GA 30065.

CADILLAC of QSLs — Completely different! Samples $1. (refundable) Mac's Shack, P.O. Box No. 43175, Seven Points, TX 75143.

QSLs — KØAAB collection, railroad employees and railfan's specials, front report styles. State your sample wants. 37¢ self addressed business size envelope required. Marv WØMGI, 2095 Prosperity Ave., St. Paul, MN 55109.

QSLs Samples 30c (stamps OK) Fred Leyden, W1NZJ, 454 Proctor Ave., Revere, MA 02151.

INTRODUCING: Beautiful natural full color photo QSL cards, made from your color negative or slide. From $260. for 3,000 cards minimum. Free samples, stamps appreciated. K2RPZ, Box 412, Dept. NC, Rocky Point, NY 11778 516-744-6260.

QSLS, Quality and fast service for 23 years. Include call for decal. Samples 50¢. Ray, K7HLR, Box 331, Clearfield, UT 84015.

SPACE SHUTTLE cards done in 3-D design. Samples 25¢. 3-D QSL Co. P.O. Box D, Bondsville, MA 01009.

QSLs by W6BA "customized" $19.75 per 1000. Star Route 2, Box 241, 29 Palms, CA 92277.

NEW KID on block — for QSL free samples write Kings Grove Press, Box 9, Ellerslie, MD 21529. Also custom printing and SWL's. Stamp appreciated.

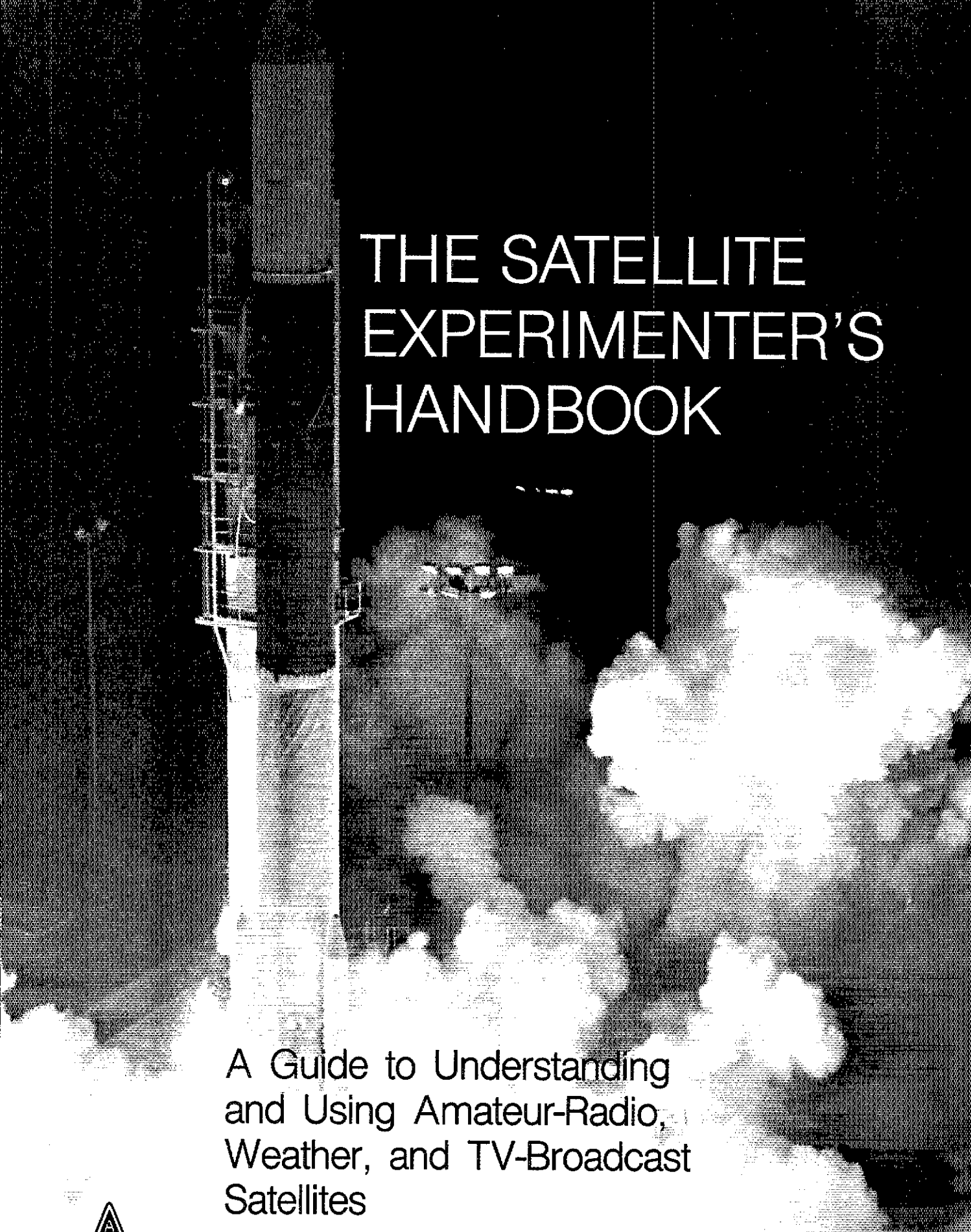
RUBBER Stamps custom made to your satisfaction. Free literature. J. Glass, WB6ZTI, 14316 Cerecita Drive, East Whittier, CA 90604.

CLUB Call pins: 3 lines 1-1/4 × 3-1/4 $1.55 each. Call, first name and club, colors: blue black or red with white letters. Catalog — Arnold Linzner, WA2ZHA, 2041 Linden, Ridgewood, NY 11385.

QSL's by W4TG: Prices from $16 per 1000. Send SASE to PO Box F, Gray, GA 31032.

BE SURPRISED - get a variety of cards - 100 for $8 or 200 for $13. Samples $1 refundable. All three colors, fast service, satisfaction guaranteed. Constantine, 1219 Ellington, Myrtle Beach, SC 29577.

FINEST custom QSLs, large cut catalog and samples $1 refundable on first order. Ritz Print Shop P.O. Box 45018, Westlake, OH 44145.



THE SATELLITE EXPERIMENTER'S HANDBOOK

A Guide to Understanding and Using Amateur-Radio, Weather, and TV-Broadcast Satellites

PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE

"DX-traordinary."

Superior dynamic range, auto. antenna tuner, QSK, dual NB, 2 VFO's, general coverage receiver.

TS-930S

The TS-930S is a superlative, high performance, all-solid state, HF transceiver keyed to the exacting requirements of the DX and contest operator. It covers all Amateur bands from 160 through 10 meters, and incorporates a 150 kHz to 30 MHz general coverage receiver having an excellent dynamic range.

Among its other important features are, SSB slope tuning, CW VBT, IF notch filter, CW pitch control, dual digital VFO's, CW full break-in, automatic antenna tuner, and a higher voltage operated solid state final amplifier. It is available with or without the AT-930 automatic antenna tuner built-in.

TS-930S FEATURES:

160-10 Meters, with 150 kHz-30 MHz general coverage receiver.
Covers all Amateur frequencies from 160-10 meters, including new WARC bands, on SSB, CW, FSK, and AM. Features 150 kHz-30 MHz general coverage receiver. Separate Amateur band access keys allow speedy band selection. UP/DOWN bandswitch in 1-MHz steps. A new, innovative, quadruple "UP" conversion, digital PLL synthesized circuit provides superior frequency accuracy and stability, plus greatly enhanced selectivity.

Excellent receiver dynamic range.
Receiver two-tone dynamic range, 100 dB typical (20 meters, 50-kHz spacing, 500 Hz CW bandwidth, at sensitivity of 0.25 μv, S/N 10 dB), provides the ultimate in rejection of IM distortion.

All solid state, 28 volt operated final amplifier.
The final amplifier operates on 28 VDC for lowest IM distortion. Power input rated at 250 W on SSB, CW, and FSK, and at 80 W on AM. Final amplifier protection circuits with cooling fan, SWR/Power meter built-in.

CW full break-in.
CW full break-in circuit uses CMOS logic IC plus reed relay for smooth, quiet operation. Switchable to semi-break-in.

- **Automatic antenna tuner, built-in.** Covers Amateur bands 80-10 meters, including the new WARC bands. Tuning range automatically pre-selected with band selection to minimize tuning time. "AUTO-THRU" switch on front panel.
- **Dual digital VFO's.** 10-Hz step dual digital VFO's include band information. Each VFO tunes continuously from band to band. A large, heavy, flywheel type knob is used for improved tuning ease. T.F. Set switch allows fast transmit frequency setting for split-frequency operations. A=B switch for equalizing one VFO frequency to the other. VFO "Lock" switch provided. RIT control for ±9.9 kHz.
- **Eight memory channels.** Stores both frequency and band information. VFO-MEMO switch allows use of each memory as an independent VFO, (the original memory frequency can be recalled at will), or as a fixed frequency. Internal Battery memory back-up, estimated 1 year life. (Batteries not Kenwood supplied).
- **Dual mode noise blanker ("pulse" or "woodpecker").** NB-1, with threshold control, for pulse-type noise. NB-2 for longer duration "woodpecker" type noise.
- **SSB IF slope tuning.** Allows independent adjustment of the low and/or high frequency slope of the IF passband, for best interference rejection. HIGH/LOW cut control rotation not affected by selecting USB or LSB modes.
- **CW VBT and pitch controls.** CW Variable Bandwidth Tuning control tunes out interfering signals. CW pitch controls shifts IF passband and simultaneously changes the pitch of the beat frequency. A "Narrow/Wide" filter selector switch is provided.
- **IF notch filter.** 100 kHz IF notch circuit gives deep, sharp, notch, better than -40 dB.
- **Audio filter built-in.** Tuneable, peak-type audio filter for CW.
- **AC power supply built-in.** 120, 220, or 240 VAC, switch selected (operates on AC only).
- **Fluorescent tube digital display.** Six digit readout to 100 Hz (10 Hz modifiable), plus digitalized sub-scale with 20-kHz steps. Separate two digit indication of RIT frequency shift. In CW mode, display indicates the actual carrier frequency of received as well as transmitted signals.
- **RF speech processor.** RF clipper type processor provides higher average "talk-power," improved intelligibility.
- **One year limited warranty on parts and labor.**

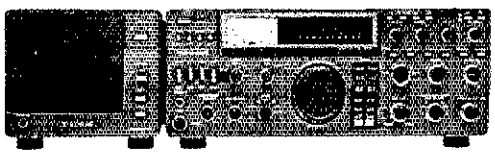
Other features:
- SSB monitor circuit, 3 step RF attenuator, VOX, and 100-kHz marker.

Optional accessories:
- AT-930 automatic antenna tuner.
- SP-930 external speaker with selectable audio filters.
- YG-455C-1 (500 Hz) or YG-455CN-1 (250 Hz) plug-in CW filters for 455-kHz IF.
- YK-88C-1 (500 Hz) CW plug-in filter for 8.83-MHz IF.
- YK-88A-1 (6 kHz) AM plug-in filter for 8.83-MHz IF.
- SO-1 commercial stability TCXO (temperature compensated crystal oscillator). Requires modifications.
- MC-60A deluxe desk microphone with UP/DOWN switch, pre-amplifier, 8-pin plug.
- TL-922A linear amplifier (not for CW QSK).
- SM-220 station monitor (not for pan-adapter).
- HS-6, HS-5, HS-4, headphones.

More information on the TS-930S is available from all authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

KENWOOD

. . .pacesetter in amateur radio



Specifications and prices are subject to change without notice or obligation.

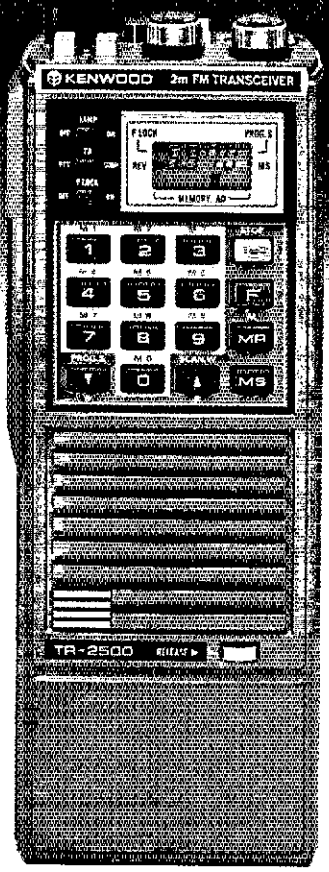
TR-2500

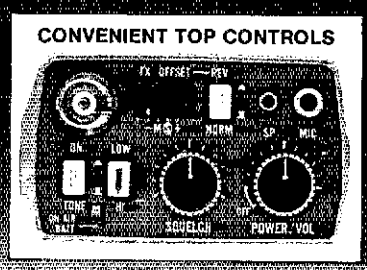
Big performance, small size, smaller price!

The TR-2500 is a compact 2 meter FM handheld transceiver with every conceivable operating feature.

TR-2500 FEATURES:

- Weighs 540 g, (1.2 lbs), 66 (2-5/8) W x 168 (6-5/8) H x 40 (1-5/8) D, mm (inches).
- LCD digital frequency readout.
- Ten memories includes "MO" for non-standard split repeaters.
- Lithium battery memory back-up, built-in, (est. 5 year life).
- Memory scan.
- Programmable automatic band scan, and upper/lower scan limits; 5-kHz steps or larger.
- Repeater reverse operation.
- 2.5 W or 300 mW RF output, (HI/LOW power switch).
- Built-in tunable (with variable resistor) sub-tone encoder.
- Built-in 16-key autopatch encoder.
- Slide-lock battery pack.
- Keyboard frequency selection.
- Covers 143.900 to 148.995 MHz.

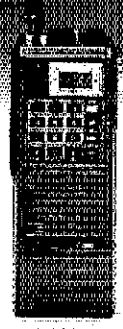




- Optional MS-1 mobile or ST-2 AC charger/supply for operation while charging.
- Battery status indicator.
- Complete with flexible antenna, 400 mAH Ni-Cd battery, and AC charger.

Optional accessories:

- ST-2 Base station power supply/charger (approx. 1 hr.)
- MS-1 13.8 VDC mobile stand/charger/power supply.
- VB-2530 2-M 25 W RF power amps., (TR-2500 only).
- TU-1 Programmable CTCSS encoder (TR-2500 only).
- TU-35B Programmable CTCSS encoder (mounts inside TR-3500 only).
- PB-25H Heavy-duty 490 mAH Ni-Cd battery pack.
- DC-25 13.8 VDC adapter.
- BT-1 Battery case for AA manganese/alkaline cells.
- SMC-25 Speaker microphone.
- LH-2 Deluxe leather case.



TR-3500

70 CM FM Handheld

- Covers 440-449.995 MHz in 5-kHz steps.
- Hi-1.5 W, Low-300 mW.
- TX OFFSET switch, ±5 kHz to ±9.995 MHz programmable.
- Auto/manual squelch control.
- Tone switch for opt. TU-35B
- Other outstanding features similar to TR-2500.

- BH-2A Belt hook.
- RA-3 2 m 3/8 λ telescoping antenna (for TR-2500).
- WS-1 Wrist strap.
- EP-1 Earphone.

TR-7950/7930

Big LCD, Big 45 W, Big 21 memories, Compact.

Outstanding features providing maximum ease of operation include a large, easy-to-read LCD display, 21 multi-function memories, a choice of 45 watts (TR-7950) or 25 watts (TR-7930), and the use of microprocessor technology throughout.

TR-7950/TR-7930 FEATURES:

- New, large, easy-to-read LCD digital display. Easy to read in direct sunlight or dark (back-lighted). Displays TX, RX frequencies, memory channel, repeater offset, sub-tone number, scan, and memory scan lock-out.
- 21 new multi-function memory channels. Stores frequency, repeater offset, and optional sub-tone channels. Memory pairs for non-standard splits, "A" and "B" set band scan limits. Lighted memory selector knob. Audible "beep" indicates channel 1 position.
- Lithium battery memory back-up. (Est. 5 yr. life.)
- 45 watts or 25 watts output. HI/LOW power switch for reduction to 5 watts.
- Automatic offset. Pre-programmed for simplex or ±600 kHz offset, in accordance with the 2 meter band plan. "OS" key for manual change in offset.
- Programmable priority alert. May be programmed in any memory.
- Programmable memory scan lock-out. Skips selected memory channels during scan.
- Programmable band scan width.
- Center stop circuit for band scan, with indicator.
- Scan resume selectable. Selectable automatic time resume-scan, or carrier operated resume-scan.
- Scan start/stop from up/down microphone.
- Programmable three sub-tone channels with optional TU-79 unit (encoder).
- Built-in 16-key autopatch encod with monitor (Audible tones).
- Front panel keyboard control.
- Covers 142.000-148.995 MHz in 5-kHz steps.
- Repeater reverse switch. (Locking)
- "Beeper" amplified through speaker.
- Compact lightweight design.

Optional accessories:

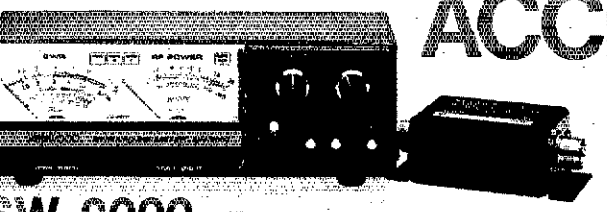
- TU-79 three frequency tone uni
- KPS-12 fixed-station power supply for TR-7950.
- KPS-7A fixed-station power supply for TR-7930.
- SP-40 compact mobile speaker.

KENWOOD

TRIO-KENWOOD COMMUNICATIONS

1111 West Walnut, Compton, California 90220

ACCESSORIES

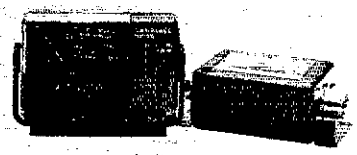


SW-2000

60~6-m 2 KW SWR/PEP-POWER Meter
o to 3 separate directional couplers may be connected. ne SWC-3 is supplied.) Optional couplers: WC-2 (2-m/70-cm, 200 W) & SWC-3 (160~6-m, 2 KW).

MC-55 (8P/6P)

Mobile Microphone (8-pin or 6-pin)
700 Ω Electret Condenser Mic. with flexible boom, and separate STAND-BY box built-in UP/DOWN switch and 5 minute Time-Out-Timer.

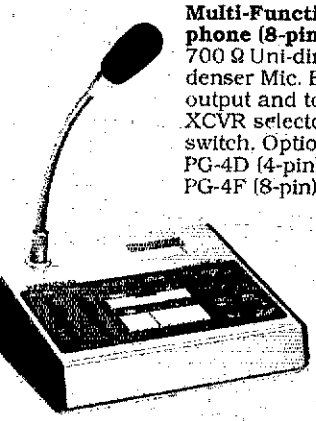


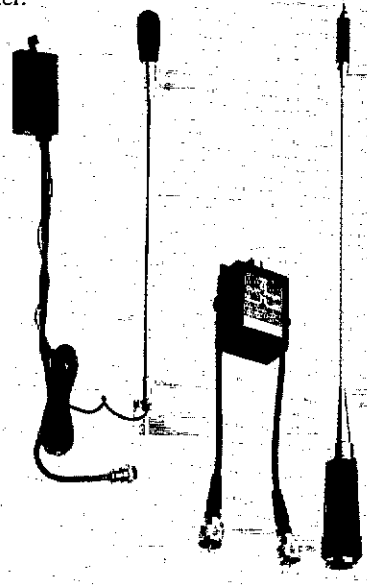
SW-100A/B

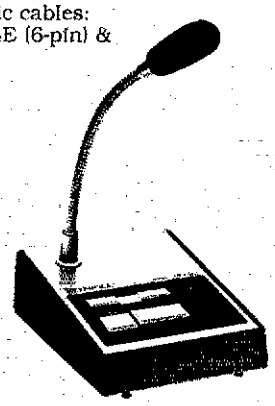
A: 160-m~2-m, B: 2-m~70-cm, 150 W SWR/POWER/VOLT Meter
Compact design with separate coupler, ideal for mobile use. Built-in 0-20 V voltmeter.

MC-85

Multi-Function Desk Top Microphone (8-pin)
700 Ω Uni-directional Electret Condenser Mic. Built-in mic-amp with output and tone control, meter, XCVR selector and UP/DOWN switch. Optional mic cables: PG-4D (4-pin), PG-4E (6-pin) & PG-4F (8-pin).

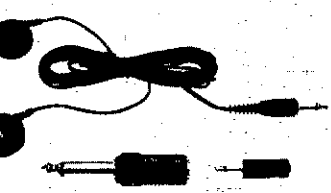






MC-80

Desk Top UP/DOWN Microphone (8-pin)
700 Ω Uni-directional Electret Condenser Mic. with "FLEX" type boom. Built-in mic-amp and UP/DOWN switch. Optional mic plug adaptors: MJ-84 (8p-4p) & MJ-86 (8p-6p).

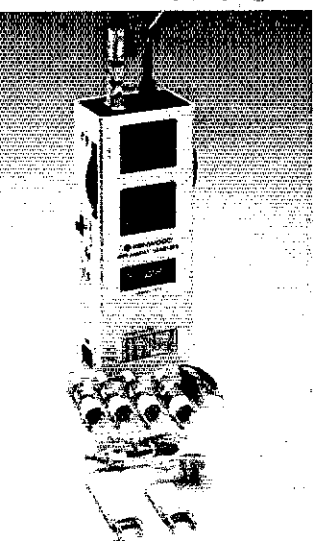


MA-4000

2-m/70-cm Dual Band Mobile Antenna
5/8 λ for 2-m and stacked 5/8 λ for 70-cm. Duplexer is supplied.

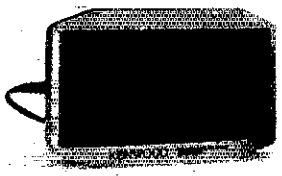
HS-7

icro Headphones (16 Ω)
tra light weight and portable r-fitting headphones supplied th two audio adaptor plugs.



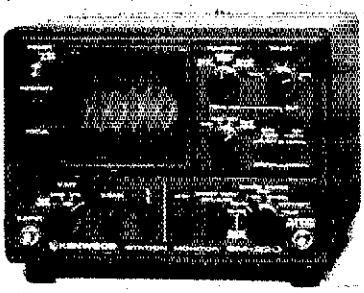
PC-1A

Phone Patch (FCC Part 68 registered)



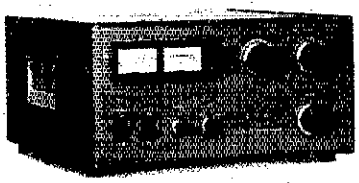
SP-50

High Quality External Mobile Speaker



SM-220

Station Monitor/High-Performance Oscilloscope
Pan-display capability with optional BS-8 (for TS-830S/820S/180S) or BS-5 (for TS-520 series). Transmitted waveforms and/or receiving signal waveform monitor. Built-in 2-tone generator.



TL-922A

160~15-m 2 KW PEP/1 KW DC Input Linear Amplifier
Pair of EIMAC 3-500Z tubes and excellent IMD characteristics. Perfect safety protection with blower turn-off delay circuit.

DM-81

0 kHz-250 MHz Dip Meter
l solid-state and built-in battery.

MICROPHONES:
- **MC-60A** Deluxe desk top microphone with UP/DOWN switch. (8-pin) Pre-amplifier. 500/900 Ω
- **MC-60N4** Deluxe desk top microphone (pre-amp. not included). (4-pin) 50 k/500 Ω
- **MC-50** Desk top microphone. 50 k/500 Ω (4-pin)
- **MC-48** 16-key autopatch UP/DOWN microphone. (8-pin)
- **MC-46** 16-key autopatch UP/DOWN microphone. (6-pin)
- **MC-42S** Hand microphone with UP/DOWN switch. (8-pin)
- **MC-35S** Noise-cancelling hand microphone, 50 k Ω (4-pin)
- **MC-30S** Noise-cancelling hand microphone, 500 Ω (4-pin)

MICROPHONE CABLES:
- **PG-4A/4B/4C** For MC-60A/60N4. PG-4A(4-pin)/4B(6-pin)/4C(8-pin)
- **PG-4D/4E/4F** For MC-85. PG-4D (4-pin)/4E(6-pin)/4F(8-pin)

MICROPHONE PLUG ADAPTORS:
- **MJ-48** (4-pin mic to 8-pin XCVR)
- **MJ-84** (8-pin to 4-pin)
- **MJ-86** (8-pin to 6-pin)

HEADPHONES:
- **HS-6** Lightweight headphones
- **HS-5** Deluxe headphones
- **HS-4** Standard headphones

GENERAL PURPOSE AC POWER SUPPLIES:
- **KPS-7A** 13.8 VDC, 7.5A intermittent
- **KPS-12** 13.8 VDC, 12A intermittent
- **KPS-21** 13.8 VDC, 21A intermittent

ANTENNAS:
- **RA-3** 2-m 3/8 λ Telescoping antenna with BNC connector
- **RA-5** 2-m 1/4 λ /70-cm 5/8 λ Telescoping dual-band antenna with BNC connector

Other accessories:
- **RD-20** Dummy load, 50 Ω, DC-500 MHz, 50 W intermittent
- **SP-40** Compact external mobile speaker
- **AL-2** Lightning & static protector, 50 Ω 1 KW output
- **PG-3A** DC line noise filter for mobile

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Hams communicate with each other using voice, morse code, computers and teletype. The movement of floats during the Rose Parade on New Year's Day is coordinated by hams using amateur television. Hams have even built their own communications satellites to provide reliable communications around the earth.

Your passport to all of this fun and adventure is the Novice Amateur Radio License, and the best study material for passing your FCC Novice exam is contained in *Tune in the World with Ham Radio.*

Over 200,000 persons have used *Tune in the World with Ham Radio* as their steppingstone into Amateur Radio. The package contains the best study material available for passing your Novice FCC exam. The booklet tells all about the FCC rules and regulations and Amateur Radio operating procedures. An easy-to-read section of the booklet provides you with the basic electronic knowledge you need for the exam. The cassette makes learning the code as painless as possible. We have added a separate supplement which provides the FCC question pool for the Novice license and brings the package up-to-date.

The Tune in the World with Ham Radio package consists of 134 pages of easy-to-understand text and an additional 26 pages of equipment and publication advertising. The cassette prepares the prospective Novice for the 5-words-per-minute code exam by teaching the code character by character — a proven method. Code practice at 5 words per minute follows. A supplement provides questions and answers from the FCC question pool. The entire package is available for $8.50 (in U.S. funds) and is available at your favorite dealer or from **The American Radio Relay League, 255 Main Street, Newington, CT 06111.**

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TRANSVERTERS MMT-220/28 $220, MMT 432/28 $260, MMT 1296/144 $320. Hans Peters VE3CRU 416-759-5562.

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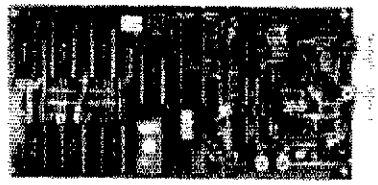

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NATIONAL RADIO Co equipment manuals list S.A.S.E. Maximilian Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

WANTED: Early telegraph instruments for my collection. Keys, sounders, call boxes, registers, meters, and related items including pre-1910 paper. Larry Nutting, WD6DTC, 5957 Yerba Buena, Santa Rosa, CA 95405.

WANTED: Yaesu YO101 - TH6 to TH7 conversion kit, 3-500Z's, 2 M all mode xcvr. W2UGM, 66 Columbus Ave., Closter, NJ 07624, 201-767-0123.

WANTED: 5749, 5751, 6660, 6913, 7027, 12AZ7, Genalex or Mullard KT-88. Marcus Frisch WA9IXP, P.O. Box 385, Elm Grove, WI 53122.

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FOR SALE: TenTec Argonaut 509 w/p.s. and MFJ-721 CW/SSB audio filter, $250. Icom IC-2AT $160. Heath 10 watt 2-meter amp $25. Heath 40 watt 2-meter amp $35. WD9EKA, Bob, RR 15 Box 416, W. Terre Haute, IN 47885. 812-533-8981 after 22:30 GMT.

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HEATH HW-32A, HP-23; $175. WA1TYY 413-773-8739.

ICOM 720-A, ICPS15 power supply, SM5 desk mic, extras. Under warranty. Used few hours receiving. $925. No delivery. Wanted: Kenwood TS-930S w/wo accessories. Yilmaz 212-684-4703, 150 East 39th Street, New York, NY 10016.

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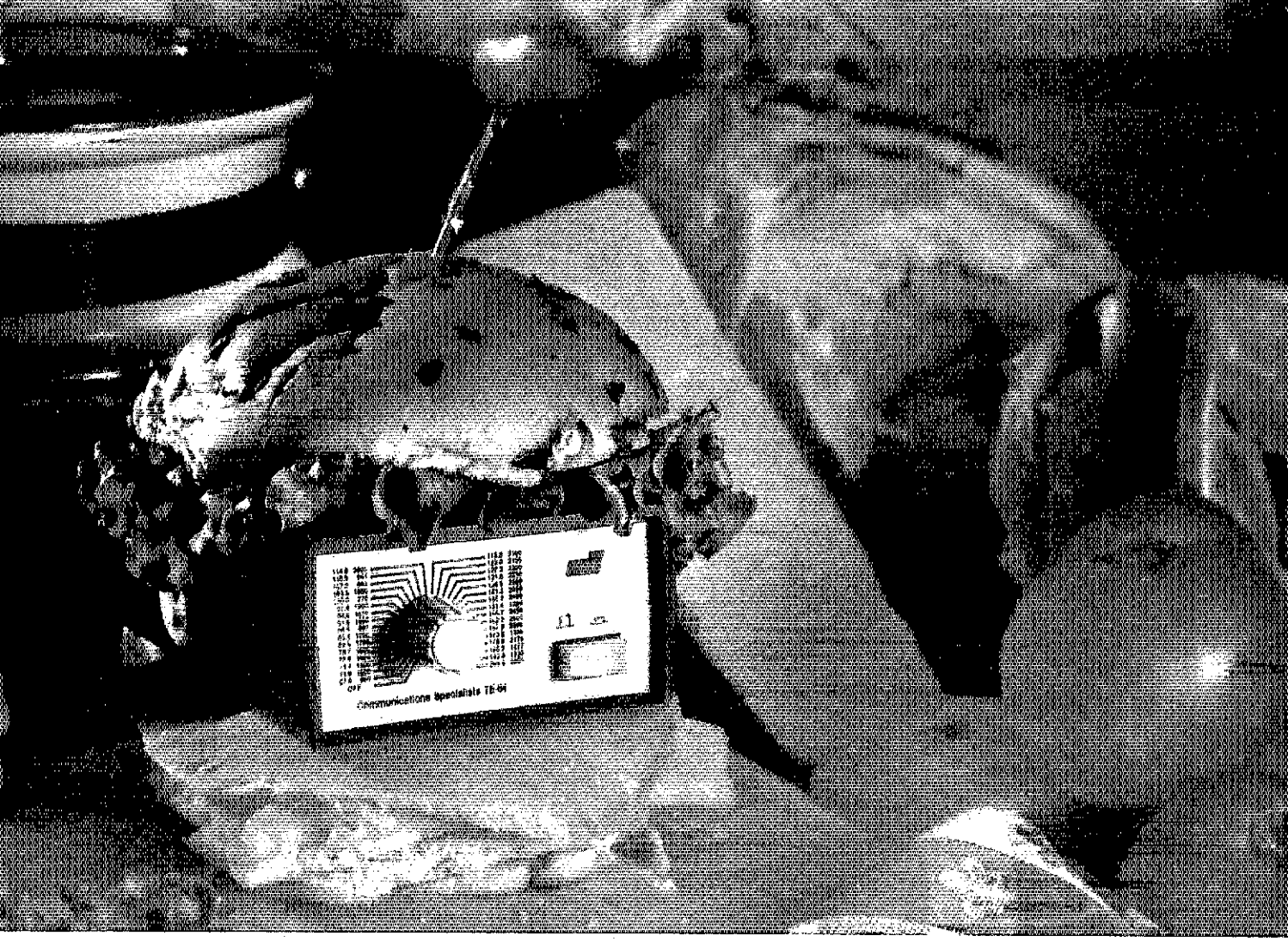

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74.4 WA	97.4 ZB	127.3 3A	167.9 6Z
77.0 XB	100.0 1Z	131.8 3B	173.8 6A
79.7 SP	103.5 1A	136.5 4Z	179.9 6B
82.5 YZ	107.2 1B	141.3 4A	186.2 7Z
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WANTED - Collins 75S3B round, KWM-2 and 516F2. W3QVQ, 105 Circle Drive, Fairmond, W Va 26554.

WANTED: Quality SWL receiver: HQ225, R-530 or similar. OK if needs repair. Also wanted: Transistor Specialties 365 AR counter. David Potter, 2410 Indian Trail, Austin, TX 78703.

COLLINS WANTED!! CT-2 cable trough for KWM-2A/S-line. Appeared in mid-seventies sales literature. Also need SC-301 antenna control console which was made to replace the blank front panel in the 516F-2 power supply. Also need any original sales literature for the 30K-1 transmitter, circa 1946. AC1Y c/o ARRL Hq.

SELL QSTs 1936/1983 individually. Box 646, Orange, NJ 07050. VanNewkirk, W2HBV.

SB-221/linear kit available original factory packaging shipped prepaid UPS/upon receipt certified check for $475. W7LLS. 509-738-6540. Route 3, Box 273, Kettle Falls, WA 99141.

STATION MONITOR, Heathkit SB-614, like new, $115, KSØV, 314-291-7312.

WANTED: Old bugs for my telegraph and radiotelegraph key collection. I am trying to find each make and model of bug manufactured before 1950. Vibroplex, Martin, Albright, Warner, D&K, Boulter, TMC, MacDonald, etc. Also looking for spark keys, Boston keys, military/spy keys and keys of historical significance. 73 de K5RW, Neal McEwen, 1128 Midway, Richardson, TX 75081.

COLLINS GEAR wanted: S/Line weighted knob, 312B-3, basket case junkers. WB8IPG, 26316, Falmouth, Warren, MI 48089.

ATLAS Model 350-XL solid state transceiver with matching power supply, Drake low-pass filter, Sure mic. $675 includes shipping and manuals. Good condition. Lonnie Richardson KA8CIA, 6941 Bonanza, House Springs, MO 63051 314-677-4295.

VIC-20 Ham Software: MUF Calculator, Coil Design, Beam Headings, much more. S.A.S.E. appreciated. Walt, KA9GLB, 4880 N. 49th St., Milwaukee, WI 53218.

WANTED: Articles pertaining to RTTY. Contact Dee, N6ELP, POB RY, Cardiff, CA 92007.

SELL: Kenwood TR7800 2 mtr. Excellent condx. Accessories/manuals. I ship free. $210. KD3C, 301-661-2056.

PRECISION Slotted Line by General Radio Corp. Type-900 LB Serial-444 with probe, tips and mahogany case. Leeds and Northrup Conductance Meter with probe. Negotiable prices. Free shipment. Earl, KA1JSG, 1455 West Chester Pike, West Chester, PA 19380. 215-696-7898.

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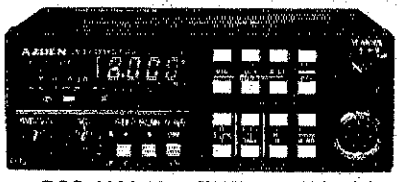

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SALE: 374A Alpha, 40 hrs on tubes. Also Robot 800 & monitor, used twice. Warranty used twice. All equipment original boxes mint. K5MXW, 505-347-2232.

ICOM 720-A, ICPS15 Power Supply, SM5 Desk Mic, extras. Under warranty. Used few hours receiving. $925. No delivery. Wanted: ICOM IC751 w/wo accessories. Yilmaz 212-684-4703, 150 East 39th Street, New York, NY 10016.

HAMMARLUND receiver service by former factory service manager. Limited supply of service manuals and parts. Send wants, S.A.S.E. Wayne Cordell, K4HCS, Blue Ridge Communications, 770 New Stock Rd., Weaverville, N.C. 28787 704-645-7070.

YAESU FT-901 DM with C.W. filter, excellent, K2CYT, R. DuPont-10 Fleming Ct-Long Valley, NJ 07853. 201-876-4444.

SELL COLLINS 75S3B including 800 Hz CW filter, 32S3 516F2 pwr supply. 312B3 speaker. Excellent condition completely adjusted repaired by retired west coast Collins expert serviceman. Orig inst. books. All cables. Can ship using Collins shipping containers. $760 plus UPS. W6VIF 213-447-8257.

FOR SALE: T/S1000 ASCII/RTTY transceive program and interface schematic. $15. Larry Willson, AF8J, P.O. Box 465, Dimondale, MI 48821.

COLLINS 75S-1, 32S-1, 516F-2, 312B-4, cables, $700 or best offer. W7HUO, John Kelsey, 5304 Robinwood, Bonita, CA 92002, 619-475-7681 evenings.

430-470 MHz "brick" amplifiers, 12 Vdc, 100-200 mW input, 10-15 W output, new, tested, with data. $8 postpaid. George Wilde, Jr., WB2CLU. 34 Fox Chase Run, Somerville, NJ 08876.

WANTED: Collins Vernier Tuning Knob for 75A receivers. K2LQ, 62 Upper Prospect Rd., Atlantic Highlands, NJ 07716.

MFJ-496 Super Keyboard II with MFJ-53 AFSK module. Used 2 months. In top condition. $160. Will ship. ND4Y. Harlan, KY.

SACRIFICE - account of sickness: Icom 740 with only 30 hours use - includes FL-44, FL-45, FL-30, FL-52A filters, FM unit, Curtis Keyer, and PS-35 - all factory installed. Must sell $955. TenTec 540 Trident with all factory options - CW filter, 100 Hz crystal calibrator and Noise Blanker - $350 or best offer. TenTec Ultramatic Keyer $50. James Mozzillo, N4ITO. 501-624-4935.

COLLINS: 75S1 32S1 312B4 516F2 mint $850. Heath SB301 SB401 excellent $450. Hallicrafters SX-100 very good cond. $175. W3BFC Ray 609-235-8421. Pickup only.

HEATHKIT SB401-SB301 combination, excellent condition $325 or trade for Yaesu 6M SSB. 803-638-9361 WA4PXZ.

WANTED: Mint IC-740, internal supply. Terry Taylor, 26102 13th Pl. So., Kent, WA 98032.

TEN-TEC Omni-D, Series B with CW filter, noise blanker and mike $500. Kenwood R-1000 $250. W7AWA, 10525 180th SE Snohomish, WA 98290. 206-668-5892.

KENWOOD TS-180-S/DFC, w/PS mic-$550, Dentron GLA-1000B 10-80M linear-$210, Hustler mobile mount plus 10-15-20 antenna-$30. Hygain 40-80 trap doublet-$25, Omega antenna noise bridge-$10, FOB W6GZG 415-537-2839.

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The ARRL Club and Training Department can help you set up licensing classes. Contact them at Hq.

ICOM '701 w/acps/mike $500. Sony ICF-2001 $125. Microlog AKB-1 CW terminal $130. Realistic 2020 FM VHF/UHF scanner $200. Emergency Beacon Corp. EBC-144JR FM xcvr w/acps/mike $225. M. Feln, 132 Locust Lane, Irvington, NY 10533.

WANTED: Several good, used or new, reasonably priced 4CX250B/7203 Orequiv. Tubes KA3IUT 814-355-2454.

GPR-90 receiver. Excellent condition. $125. W2RLG Harold Gordon, 42 Union St., Matawan, NJ 07747. 201-566-9238.

HOMEBREW 1KW linear parallel 813 heavy duty PS $100. Many tubes, meters, transformers, etc.-no charge except shipping-write your needs. Wanted-HV transformer Tektronix 560 scope part 021-222. W2IQK.

COLLINS S/line 75S3C receiver, 32S-1 transmitter and power supply. Good condition. $1,100 or best offer. K9GBN after 6 P.M. 309-347-7306.

HEATHKIT SB-104A w/F.T. ssb-2.1 kHz and CW-400 Hz. 8-pole xtal filters, Noise Blanker, SB-604/HP-1144A, SB-644A, SB-614. All manuals. Excellent cdx, $750. WB2GYS, 15 Partridge Lane, Tinton Falls, NJ 07724.

HAM/cable TV cable - connectors. Big aluminum hardline. CATV/UHF/N-type connectors, converters. Send S.A.S.E. for big list. Pete WB3BQO, 329 Little Ave., Ridgway, PA 15853.

WANTED: Hedgehog audio xfrmrs, also repair service. Buyer of low freq. rcvr, Foothills College Sept. 10th. Baldwin headphones. Hollis Button, 1025 W. Parr Avenue, Cambell, CA 95008 ex-W9PQF.

FOR SALE misc old tubes plus 12 each 813. S.A.S.E. for list. N7DG.

SSTV: Robot 400, RCA TC1000 camera, Sanyo mon. Like new, no modifications, all manuals, prepaid. $550. Please, no personal checks. K6GLJ, 805-398-2111.

HANDHELD-Yaesu 207R with TouchTone and charger. Excellent condition. $175. W 2 GXE 315-363-5582.

KENWOOD 520S, DC converter, CW filter, W6TOG mod, $450. 520S VFO $100. DG-5 Digital Readout $100. MC-50 $35. Mint, original boxes. Separate, or all $600. KJ8C 616-399-0194.

TENTEC Omni D Series B & 500 am 1.8 kHz filters, NB, 252 MO p/s. Mike, new finals $575. U-Ship W2DOR, 201-349-1892.

HEATH SB-104A including matching speaker power supply, remote VFO, mic, NB, 400 Hz crystal, Fox Tango modification by Richard Teshner N2EO. Will trade for 1 kW liner amplifier. KU9H formerly KA9KPJ 312-639-7887, 106 Park Ave., Cary, IL 60013.

COLLINS 75S-3B/32S-3/power supply $1000. Johnson Viking Navigator $35. Ten-Tec PM2B/AC5 ant. tuner/210 power supply $85. W2BTH, RR1-Box 2930, N. Anson, ME 04958 207-635-2846.

KENWOOD TV502S with low noise preamp $190, VFO820 $110. Both mint. Bill AA6S, 209-732-7163.

AZDEN 4000 $245, Regency Scanner M100 $150, like new, free UPS, trade-Icom 2AT. 5862 W. Skyline, Laporte, IN 46350. KA9JYO.

SB-102, PS, spkr, all manuals. Heath assembled as demo unit. Excellent condition. $200. May consider trade for TS-520 or VIC-20 accessories. Call and lets deal. Bob KA3KWF 301-644-6148 after 7 EST.

COLLINS WANTED!! CT-2 cable trough for KWM-2A/S-line. Appeared in mid-seventies sales literature. Also need SC-301 antenna control console which was made to replace the blank front panel in the 516F-2 power supply. Also need any original sales literature for the 30K-1 transmitter, circa 1946. AC1Y c/o ARRL Hq.

F.O.B. SELL: HQ150, $100; 75A4, 1100, 3.1, $200; NC100, $95; Valiant I, clean, $125; FT101E, $400; Clipperton L, $400; SR160, $100; Eico 753, $75; Trade Xerox plain paper copier no. 660-1. Want: Elmac 1000T, Rohn 55, Telrex 40M beam, KLM, HyGain 40-10M log periodic, Big Telrex antenna rotor, RG17, Signal One CX11 or Milspec. K8CCV 216-427-2303 weeknights 6-9 P.M.

SELL: QST in hard binders, 1961 to 1964 inclusive $25. QST in cardboard containers, 1976 to 1982 inclusive $34. Ham Radio Horizons in cardboard containers Mar-Dec 1977 and 1978 to 1980 inclusive $12. ARRL Handbooks 1937, 1941 and 1945 to 1948 inclusive $15. Money Order or Cashiers Check. You pay UPS shipping charges. W3KB.

WANTED: 220 MHz Midland 509, Clegg FM-76, or Cobra 200. WBØTCF, 13302 S. 10th, Grandview, MO 64030.

DRAKE C-Line, late serial numbers, extra crystals, Shure 444 mic. No mods, excellent condition $725/offer. Yaesu FT7, FL110, YD148 desk mic, handheld mic, mobile mount, excellent condition $500. WBØNPM.

FOR SALE: Collins 310-B3, SX-25, Scott Philharmonic, Jacobs and Winpower Wind Connectors, 32 Volt, 1800 Watt. Phil Perry, 2301 West 18th, Scottsbluff, NE 69361, 308-632-7769.

SELLING - ARC27 xcvr no p/s $140; PRC41 xcvr no p/s $170; 312B-4 w/e $165; DL-1 r/e $125; CP-1 minus 4 xtals $180. Pick-up or you ship. N2BMV 518-563-3861, 2200-0200Z.

SELL two Atlas 210X w/NB complete stations home and mobile N7AS 11702 Stendall Place, N., Seattle, WA 98133 206-367-2146.

TEN-TEC Argonaut 509 QRP rig w/mike $200. Ten-Tec Squeeze Key PR40 $35. SBE power supply 12V 3A $35. Norman Cardini K2USV.

FOR SALE: QST's. Large collection from 1918-1974. Best offer. Ken Hyde, Rt. 1, Warrenton, VA 22186.

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2m C-MOS MICROPROCESSOR CONTROLLED
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NEW! ✓ Soft Orange background Liquid Crystal Display (LCD) for direct sunlight viewing plus lighting for night viewing.

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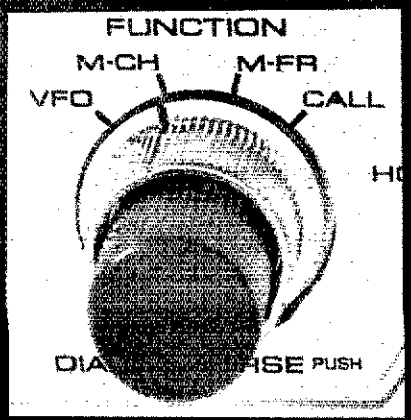

- Only memories with data are scanned; blanks are skipped.
- Complete memory back-up with power unplugged. Re-chargeable Ni-Cd with capability of several months back-up of memory.
- Single frequency sub-audible tone generator included as a standard feature.
- Tone unit switch on front panel to prevent "humming" on the wrong channel.
- Repeater input monitor capability with the push of a single momentary switch.
- Solid-state level meter for both output level and input level monitoring.
- User programmable initial characteristics for band limits, channel step size, etc.
- Odd repeater splits can be handled with the memory in the AxB mode.
- Programmable band-scan limits are stored in protected RAM.
- Modular construction with pluggable interconnecting wiring.
- Touch-Tone* microphone TM-2 is standard with each radio.
- Change channels, skip-scan or step up and down the band from TM-2 microphone.
- Audible beep for end-of-band or last memory location for better "eye's off" operation.

The KDK FM-2033 represents a significant advance in user convenience and simplicity of operation for the radio user. The KDK '33' series of transceivers provides excellent readability in any lighting condition for either the operating frequency or the memory channel number in use. The use of a warm orange background for the LCD displays improves the readability by providing an easy on the eyes contrast improvement.

Simplicity of operation has always been the mark of the KDK design team and the FM-2033 is no exception. From the single knob frequency and memory selection to the automatic recall of the desired repeater offset from memory, the FM-2033 continues to provide relaxed, comfortable mobile operation.

Once the 10 memory frequencies have been selected, a single knob is all that is required for operation on the standard simplex or repeater channels. Using the audible beep as the end of memory marker allows setting to a particular channel without even looking at the radio.

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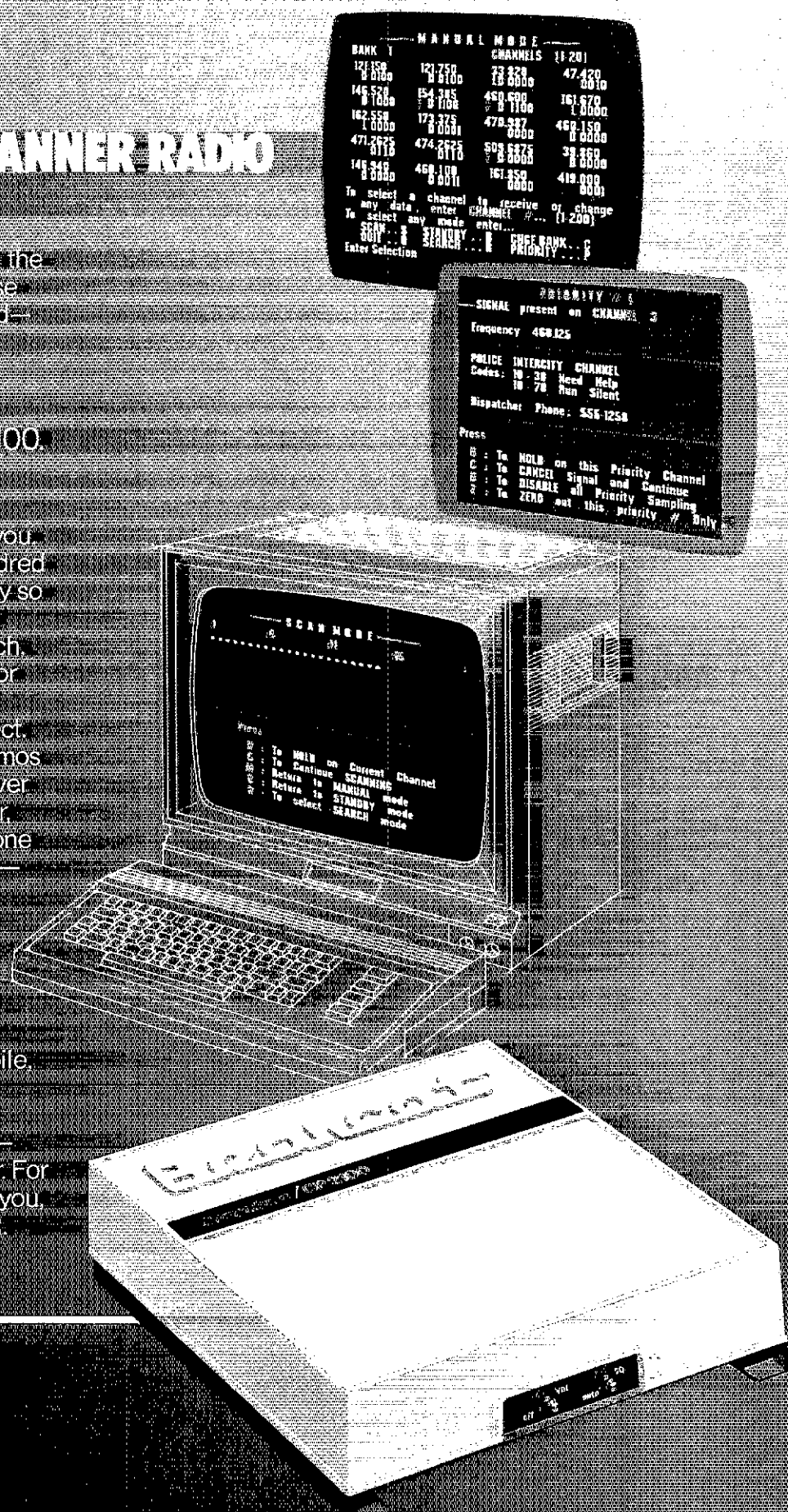

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TENTEC, Omni-D, Remote VFO, Speech Processor, PS $695. Zenith R7000 12-band receiver $175. All mint, will ship. KX8W, 3355 Kettering, Saginaw, MI 48603 517-799-4577.

WANTED: National SW3-WA4VDN. 120 W. Queen St., Edenton, NC 27932.

CLEANING OUT shack, you send address, I send you list. Evest Broussard, WA5ZIJ, 1043 Rodney Dr., Baton Rouge, LA 70808.

JOHNSON Viking kW Matchbox (250-30-3) with directional coupler, manual. Excellent condx, built to last. I ship. $125. Verne Frey, KØPUB, 3643 Sunnyside, Davenport, IA 52802.

KENWOOD TS520, mic., manuals, mint, $400. Prepaid. K6GLJ, 805-398-2111.

TS520SE, mint condition, $400. WA4PID, 919-467-0424.

Q-METER, Boonton 260-A, 5 standard inductors, calibrated. $150 FOB. K1JWX, 203-322-3621.

FOR SALE or trade: Swan 100MX solid-state transceiver & ACPS and Heathkit SB-201 amplifier $325 each. Wanted CW transceiver with 160 mtrs. W7LHO, 505-471-8377.

WANTED-WA-44C Audio Signal Generator in good operating condition. KH6YU, 3657 Tantalus Drive, Honolulu, HI 96822.

160/40 METER dipole, 115 ft long, coax-fed, $45 postpaid. Tom Evans, W1JC, 113 Stratton Brook, Simsbury, CT 06070.

MADISON - Computer Goodies: MFJ 1224 interface + MFJ software package VIC20 or COMM64 $129.95; new AEA Micropatch $129.95; Kantronics Interface + Hamtext $199.95; AEA CP1/VIC20 or CP1/COMM64 interface/software - call. Hal CWR6850 Telereader $699.95; Kantronics software - 10% list; TI99 software $79.95; Yaesu FT757GX general coverage/100% duty cycle CW filter/AM-FM $749; prices FOB Houston, subject prior sale, change without notice. Madison Electronics, 1508 McKinney, Houston, TX 77010. 1-713-658-0268 (prices). 1-800-231-3057 (orders). Mastercard/VISA/COD.

DRAKE T-4XB, R-4B, AC-4/MS-4 30 M crystals. Excellent. $400 plus UPS. Bob Vann (KQ4I). 10505 Winding Wood Trail, Raleigh, NC 27612. 919-847-6066.

HIGH-POWER, quality amplifier parts, S.A.S.E. for list. Brian Edward N2MF, 100 Bradford Hgts. Rd., Syracuse, NY 13224.

REPLACE rusted antenna bolts with stainless steel. Small quantities, free catalog. Elwick, Dept. 503, 230 Woods Lane, Somerdale, NJ 08083.

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MFJ 202B Noise Bridge, new, $40. KLM 4:1 balun, $15. HAL 9" b/w monitor, almost new, $50. 150+ feet of 50 ohm Hardline with UHF connectors, $70. U-ship. Trades? Want KLM 40M rotatable dipole. Mike, KC7WG, 503-664-2472 or 779-9835.

SALE-HW-101 transceiver w/ps-receive little weak-may need tubes-$310. HW-16 cw transceiver-keying circuit needs repair-$65. HD-1410 electronic keyer-good condition-$45. Manuals included-send postal money order-KA4EBW Jim Howell, 18 Dan St., Salisbury, NC 28144.

CLEANING UP shack-lotsa goodies; S.A.S.E. DE WB9YBM.

SELL: Heath SB-104A, power supply, NB, CW filter, SB-604 speaker, D-104 mic, very nice. $425 Heath HW-8 QRP CW xcvr with power supply-excellent $140, Diawa RF-440 speech processor-new condition $50, after 0000Z, Fred WØULU, 612-459-4643.

VIC-20: Complete Logger. Call, Name, QTH, Freq., Comments, etc. w/time. Fast. $5. KA1JRZ Brian Kearney, 225 Cook Ave., Meriden, CT 06450.

WANTED: Swan-Mark one linear amplifier, W1HTK, 51 Peterson Rd., Vernon, CT 06066.

ALPHA 76PA amp. mint $1600. Tall Twister, never used $240. N7CAP. Mac 206-783-2694.

RARE National WRR-2 receiver with cart. $450. Pick-up only, L.A. area. Dan Burbach, 805-529-2243, evenings, weekends.

FOR SALE-75A4, #1568, with manual. Needs power transformer? Make offer. WBØMRX 913-776-0260.

SELL-Diawa HF-440 Speech Processor $50. Hy-Gain TH3MN3 Tri-Band beam $50. Pick up. Wanted-Ham "M" rotator. W9VYW, 1-608-868-3503.

SWAN 250 with 117XC power supply, or Heath SB110 wanted. WA3YPB, 40 East Trenton Avenue, Morrisville, PA 19067. 215-295-1650.

TEKTRONIX Spectrum Analyzer Plug-Ins 1L10, 1L30 - $600 ea. A. Emerald, 8956 Swallow, Fountain Valley, CA 92708.

WANTED: Regency ATC-1 pen cell powered Mobile Ham Band Converter; Heath SB640 VFO. WA9VKT, Oliver Zivney, 309-924-1208, Stronghurst, IL 61480.

WANTED: Heath SB-644 Remote VFO, Mint only. WA4GZA. Tel. 804-787-2508.

WANTED: Drake TR-4CW or TR-4CW/NB/RIT (filters) with MS-4 Power Supply Speaker. Mint condition Immaculate! WB6BYK Tom 714-861-4977, 236 Cottonwood Cove Drive, Diamond Bar, CA 91765.

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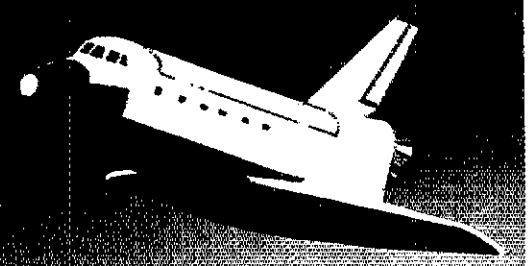

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SELL Viking Valiant I xmtr, Hallicrafters SX-110 rcvr w/spkr, Turner 254 HC Ceramic Mike, cords and fittings for push to talk operation. Manuals and some spare tubes. $200. W1KFD 603-448-1139.

WANTED, working digital display board for Swan 350D. Please state price and condition. W1UAX, Box 99, Carlisle, MA 01741.

COLLECTORS-Have Radio Craft/Radio Electronics magazines from 1937 through 1955 almost consecutive, make offer. W6RFM, 619-747-8873.

SELL: Alpha 76. Rick, K5UR, 501-988-2527.

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HAMMARLUND Super Pro model BC 1004 C receiver, excellent condition, with manuals. $225. Pick up only, L.A. Area. Dan Burbach, 805-529-2243.

WANTED: DG-5 digital display for Kenwood TS520S-Harry WA3BIE, 215-828-5896.

TRADE IC-751, IC sp & phone patch. IC-PS20 HM10 Ham 7 Mic. Want late Collins KWM2-A 516F-2 312B-5. TS930 w/AF. Trade TS430S w/SP 20-amp supply 4 filter & FM board installed. Drake L7 Import model w/ten meters. All bought Shelby Hamfest 1983. Want Collins 30S-1. KC4PF Coy, 704-857-9507.

COLLINS: 312B-4 round $195, CP-1 crystal pack $165. Filters F455FA-31 $35, F455H-21 $35. Drake C-4 console $255. K5UR, 501-988-2527.

HEATH Model SO 4541 Commercial Scope. Solid-state, factory built, $150 plus shipping. 218-744-1818. NØEWA, Box 5, Iron, MN 55751.

HANDHELD SALE: Standard SC-146A 2-meter HT w/5 pair crystals, base station charger, two antennas, external microphone, and leather case in excellent condition. $90. Contact K2AWA at AC 212-224-2448.

PHASE IIIB: IC490A $450. Mirage D1010N $225. All purchased 8/83. Factory fresh with one hour air time. Boy is going to school. Must sell. 412-981-6044 W3HV.

TOWER PACKAGE, 67' Tristao self-supporting crank-up with tilt-over accessory, 10 sq. ft. rating, Ham III rotor, 15 M 6 ele. KLM beam. $900 or best offer, will separate, AG6X. Upland, CA 714-981-6883.

RTTY/CW VIC-20/C-64 Interface, easy-to-build kit, with power supply. Introductory price $89.95. Ham Log program VIC-20 +8K, logbook format printout, $9.95. $3 shipping/order. VISA, MC, m.o. S.A.S.E. for complete catalog of all kits, software. WES-COM Inc., WDØCDU, 4915 Galena Dr., Colorado Springs, CO 80918. 303-598-5745, 7-10 P.M.

3.5-30 MHz Completed Station. Loaded Drake "C" line with FS-4 and Johnson Thunderbolt 2000 watt linear. $1099. Bob, WB6VEB, 2119 Schmidt Ct. S.E., Rochester, MN 55904. 507-282-9190 evenings.

YAESU FT 101EE, Kantronics Mini Reader plus chrome Bencher Paddle, all excellent condition $550. Cliff Moore KA4DOL, 9101 Royal Oak, Louisville, KY 40272. 502-937-7237.

TEKTRONIX Type 535A Delayed Sweep oscilloscope with type CA dual trace plug in unit. Super clean. $349. Type 202-2 Adjustable Scope Mobile. Mint. $100. Bob, WB6VEB, 2119 Schmidt Ct. S.E., Rochester, MN 55904. 507-282-9190 evenings.

WANTED: Blonder-Tongue UHF TV converter model BTU-2S. (circa 1960). Please check your junkboxes. W3CRH, Box 20, Macomb, IL 61455.

WANTED: VHF RF module or input cavity for AM-6155/GRT amplifier. WB4FDU, 704-545-3052.

HEATH SB104A, CW filter, SB604, HP1144, NB, manuals, mint $450. 344 Oliver Road, Cincinnati, OH 45215. WA8STW 513-821-3048.

QST - 1958 to to present. Except Dec. 1978 thru July 1980. CQ - 1959 thru Feb. 1983 complete. For Sale - Best offer - K1JPR 203-227-3609.

MICROPHONES: Amateur and Professional. Microphone Specialists, Box 1372, Burnsville, MN 55337.

FT-101EE $450. K1EPE 203-775-2117.

WANTED: Collins KW-1 transmitter for parts. Chuck, WA4GGL, Box 766, Dahlgren, VA 22448.

COLOR Computer Ham User Group forming. S.A.S.E. NØDYP.

HEATH HL-2200 2-kW amplifier, like new. Built-in surge protection, wired for 220-V operation, $650 plus shipping. Paul K. Pagel, N1FB, 4 Roberts Rd., Enfield, CT 06082.

1984 CONTEST CALENDAR: Dates shown with "SScw," "CQph", "VHFss," etc. Three color on chrome Mylar. Attractive. Hangs flat. Eighteen inches square. Send $8 ($10 overseas). KB1T Radio Specialities, Box 1015, Amherst, NH 03031.

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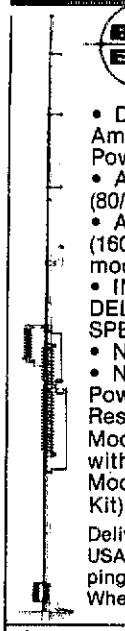
ADVERTISING DEPARTMENT STAFF

Lee Aurick, W1SE, Advertising Manager
Sandy Gerli, AC1Y, Assistant Adv. Mgr.
Danielle Huot, Advertising Assistant

203-667-2494 is a direct line, and will be answered only by Advertising Department personnel

Index of Advertisers

ANTENNA/TOWER SALE!

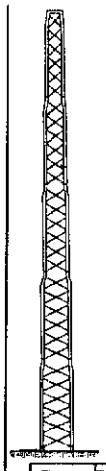


BUTTERNUT ELECTRONICS CO.

- Designed to operate on all Amateur Bands at "FULL" Legal Power Input.
- Automatic Band Switching (80/10 meters).
- Automatic Band Switching (160/10 meters) with optional model TBR-160 HD.
- IN STOCK for IMMEDIATE DELIVERY & LOOK at very SPECIAL PRICES . . .
- New Model HF6V $129.00
- New Model TBR-160HD (High Power 160 meter Base Resonator) $49.00.

Model RMK-11 (roof mount kit with multiband radial kit $39.00. Model STR-2 (Stub Tuned Radial Kit) $29.00.

Delivery Anywhere In The Continental USA At No Additional Cost. (Free Shipping On Butternut Accessories Also When Purchased With Antenna.)



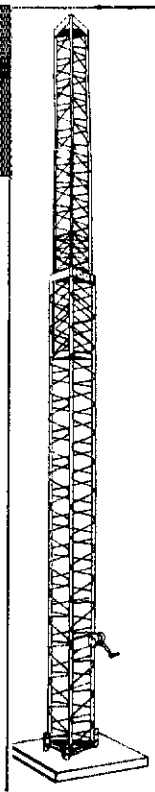
UNARCO-ROHN Self Supporting Towers — On Sale!

Freight Prepaid

These rugged beauties are being offered at Big Discounts and - we are shipping them freight prepaid! Look over the specifications and pick the unit most suited for your needs, then - Call us to place your order with Mastercard/Visa or write and include your check for quick shipment - Freight Prepaid!

And — Save even more — include antenna and rotor of your choice with the order and we will ship them along freight prepaid also! How's that for good old fashioned savings?

Tower Model	Tower Ht.	Load Rating	Ship Weight	Tower Base	Tower Price	Base Price	Total Price
HBX40	40 ft	10 sq ft	164	BXB6	289	24	313
HBX48	48 ft	10 sq ft	303	BXB7	369	26	395
HBX56	56 ft	10 sq ft	385	BXB8	449	30	479
HDBX40	40 ft	18 sq ft	281	BXB7	339	26	365
HDBX48	48 ft	18 sq ft	363	BXB8	429	30	459



hy-gain CRANKUP SALE!

All Models Shipped Factory Direct— Freight Paid*!

Check these features:
- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting— no guys needed

Model	Height	Load	Sale Price
HG37SS	37 ft.	9 sq. ft.,	$ 967
HG52SS	52 ft.	9 sq. ft.,	$ 959
HG54HD	54 ft.	16 sq. ft.,	$1499
HG70HD	70 ft.	16 sq. ft.,	$2399

Masts—Thrust Bearings—Other Accessories Available —Call! Prices Shown Are Your Total Delivered Price In Continental U.S.A.!

RG-213U $.29/ft $279/1000 ft

Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables.
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-8X $.19/ft $179/1000 ft

- RG8X—95% Bare Copper Shield
- Low Loss
- Non-contaminating Vinyl Jacket
- Foam Dielectric

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Impad.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	6.8
RG-58/U	52	1.4	1.9	6.0	12.5
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HARDLINE/HELIAX™

Lowest Loss for VHF/UHF!

½" Alum. w/poly Jacket . . . . . $.79/ft
½" LDF4-50 Andrew Heliax ™ $1.49/ft
⅞" LDF5-50 Andrew Heliax ™ $3.99/ft
select connectors below.

HARDLINE & HELIAX™ CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Alum	$19	$19	$19	$25
½" Heliax ™	$22	$22	$22	$22
⅞" Heliax ™	$49	$49	$49	$49

AMPHENOL CONNECTORS

Silver PL259 . . . $1.25 Nickle PL259 . . . $.90
UG21B N Male . . $2.95 UG23D N Female $2.95

ANTENNA WIRE & ACCESSORIES

12 Ga. Copperweld $.12/ft 14 Ga. Copperweld $.10/ft
14 Ga. Stranded $.10/ft 18 Ga. Copperweld ¼ mi $30
450 Ohm H.D. Line $.16/ft H.D. End Insulators $2/ea
Van Gorden 1:1 Balun $11
Van Gorden Center Insulator $6

HUSTLER

4BTV 40-10 mtr Vert $89 5BTV 80-10 mtr Vert $129
G6-144B 2-mtr Base $89 G7-144 2-mtr Base $119

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$12	$12	$15	$18	$22
2KW Super	$18	$20	$22	$26	$36

Bumper Mounts - Springs - Folding Masts in Stock!

CUSHCRAFT

MULTI-BAND HF ANTENNAS

A3 3-el Tribander . . $219 A4 4-el Tribander . . $289
R3 20/15/10mtr Vert $279 A743/A744 40mtr Kit . $75

HF MONO-BAND ANTENNAS

10-3CD	$ 95	10-4CD	$109
15-3CD	$119	15-4CD	$129
20-3CD	$199	20-4CD	$279
40-2CD	$289	D40	$149

VHF/UHF BEAMS

A50-5	$ 79	617B	$199
214B	$ 79	3219	$ 95
220B	$ 95	424B	$ 79

OSCAR/TWIST ANTENNAS

A144-10T	$ 52	A144-20T	$ 75
A147-20T	$ 63	416TB	$ 59
A14TMB	$ 29	PS4	$ 69

VHF/UHF FM ANTENNAS

A147-4	$ 29	A147-11	$ 49
214FB	$ 79	228FB	$219
A449-6	$ 29	ARX2B	$ 39

HY-GAIN

Broadband 3-el Triband Beam Explorer-14, In Stock—$289

QK710 30/40 mtr. Add-On-Kit . . . $79.00
V2S 2-mtr Base Vertical . . . $39
TH5MK2S Broad Band 5-el Triband Beam . . . $389
TH7DXS 7-el Triband Beam . . . $439
TH3JRS 3-el Triband Beam . . . $179
TH2MK3S 2-el Triband Beam . . . $159
HY-QUAD 2-el Triband Quad . . . $299
402BAS 2-el 40-mtr Beam . . . $219
205BAS 5-el 20-mtr Beam . . . $329
155BAS 5-el 15-mtr Beam . . . $189
105BAS 5-el 10-mtr Beam . . . $129
204BAS 4-el 20-mtr Beam . . . $249
203BAS 3-el 20-mtr Beam . . . $149
153BAS 3-el 15-mtr Beam . . . $89
103BAS 3-el 10-mtr Beam . . . $69
DB1015BAS 3-el 10/15 mtr Beam . . . $179
64BS 4-el 6-mtr Beam . . . $59
66BS 6-el 6-mtr Beam . . . $119
18HTS 80-10 mtr Hy-Tower Vertical . . . $429
LC-160 160-mtr Coil Kit for 18HTS . . . $39
214 14-el 2-mtr Beam . . . $39
2B0Q 80/40 mtr Trap Dipole . . . $59
5B0Q 80-10 mtr Trap Dipole . . . $119
8N86 80-10 mtr KW Balun W/Coax Seal . . . $19

MOSLEY

CL-33 3-el Triband Beam . . . $279
TA-33 3-el Triband Beam . . . $249
TA-33JR 3-el Triband Beam . . . $189
TA40KR 40mtr Kit for TA33 . . . $119

Tri-Ex TOWERS SPECIAL PRICES! SAVES!

Model	Height Up	Down	Wind Load	List	Sale
W36	36.0 ft	20.5 ft	9.0 sq ft	$694	$579
WT51	51.0 ft	20.5 ft	9.0 sq ft	$1154	$999
LM354	54.0 ft	21.0 ft	16 sq ft	$2010	$1599
LM470D (Motorized)	70.0 ft	22.0 ft	16 sq ft	$4195	$2999
DX86 (Motorized)	86.0 ft	23.0 ft	25 sq ft	$6200	Call

ALPHA DELTA COMMUNICATIONS

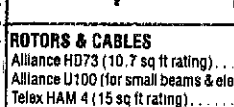
Transi-Trap ™ Surge Protectors—In Stock Now!

Model LT 200W UHF Type . . $19
Model HT 2KW UHF Type . . $29
Model LT/N 200W N Type . . $39
Model HT/N 2KW N Type . . $44
Model R-T 200W Deluxe . . . $29
Model HV 2KW Deluxe $32

KLM

KT34A 4-el Broad Band Triband Beam . . . $309
KT34XA 6-el Broad Band Triband Beam . . . $469
3.8-1 80-mtr Rotatable Dipole . . . $429
7.2-1 40-mtr Rotatable Dipole . . . $159
7.2-2 2-el 40-mtr Beam . . . $289
7.2-3 3-el 40-mtr Beam . . . $439
7.2-4A 4-el 40-mtr Beam . . . $599
6el-20mtr Big Stick Monoband Beam . . . $599
6el-15mtr Big Stick Monoband Beam . . . $389
6el-10mtr Big Stick Monoband Beam . . . $229
10-30-7LP Log Periodic Broad Band Beam . . . $599
144-148-13LBA 13-el 2-mtr Beam . . . $79
143-150-14C 14-el 2-mtr Satellite Antenna . . . $79
420-470-18C 435 MHz Satellite Antenna . . . $59
432-16LB 432 MHz Long Boom Antenna . . . $59

MINI-PRODUCTS HQ-1 only $159!



Wing Span - 11 ft
Boom - 54 in. long
Wind Area - 1.5 sq ft
1200W P.E.P. Input
6-10-15-20 mtrs

ROTORS & CABLES

Alliance HD73 (10.7 sq ft rating) . . . $109
Alliance U100 (for small beams & elevation) . . . $49
Telex HAM 4 (15 sq ft rating) . . . $199
Telex Tailtwister (20 sq ft rating) . . . $249
Telex HDR300 Heavy Duty (25 sq ft rating) . . . $479
Kenpro KR-500 Heavy duty elevation rotor . . . $189.00

Standard 8 cond cable $.19/ft (vinyl jacket 2-#18 & 6-#22 ga)
Heavy Duty 8 Cond cable $.36/ft (vinyl jacket 2-#16 & 6-#18 ga)

UNR-ROHN GUYED TOWERS

10 ft Sections 20G $37.50 25G $46.50 45G $107.50

Foldover Towers

Model	Height	Ant Load*	Price
FK2548	48 ft	15.4 sq ft	829
FK2558	58 ft	13.3 sq ft	$ 899
FK2568	68 ft	11.7 sq ft	$ 959
FK4544	44 ft	34.8 sq ft	$1159
FK4554	54 ft	29.1 sq ft	$1259
FK4564	64 ft	28.4 sq ft	$1359
25G Foldover Double Guy Kit			$199
45G Foldover Double Guy Kit			$229

*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex.

All Foldover Towers Shipped Freight Pre-Paid!
Foldover prices 10% higher west of Rockies.
All Rohn 25G & 45G Accessories in stock - Call!

TOWER/GUY HARDWARE

3/16" EHS Guywire (3990 lb rating) . . . $.13/ft
1/4" EHS Guywire (6000 lb rating) . . . $.16/ft
5/32" 7 × 7 Aircraft Cable (2700 lb rating) . . . $.12/ft
3/16" CCM Cable Clamp (3/16" or 5/32" Cable) . . . $.35
1/4" CCM Cable Clamp (1/4" Cable) . . . $.45
1/4" TH Thimble (fits all sizes) . . . $.30
3/8EE (3/8" Eye & Eye Turnbuckle) . . . $5.95
3/8" EJ (3/8" Eye & Jaw Turnbuckle) . . . $6.95
1/2" EE (1/2" Eye & Eye Turnbuckle) . . . $8.95
1/2" EJ (1/2" Eye & Jaw Turnbuckle) . . . $9.95
3/16" Preformed Guy Grip . . . $1.99
1/4" Preformed Guy Grip . . . $2.49
6" Diam - 4 ft Long Earth Screw Anchor . . . $12.95
5000 Guy Insulator (5/32" or 3/16" Cable) . . . $1.39
502 Guy Insulator (1/4" Cable) . . . $2.49
5/8" Diam - 8 ft Copper Clad Ground Rod . . . $12.95

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating) . . . $.29/ft
HPTG4000 Guy Cable (4000 lb rating) . . . $.43/ft
HPTG6700 Guy Cable (6700 lb rating) . . . $.69/ft
9901LD Cable End (for 2100/4000 cable) . . . $6.95
9902LD Cable End (for 6700 cable) . . . $7.95
Socketfast Potting Compound (does 6-8 ends) . . . $12.95

GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
.12 in Wall	$25	$39	$59	$79
.18 in Wall	$39	$69	$99	$109
.25 in Wall	$69	$129	$189	$249

SOUTH RIVER ROOF TRIPODS

HDT-3 3 ft Tripod . . . $19 HDT-5 5 ft Tripod . . . $29
HDT-10 10 ft Tripod . . . $49 HDT-15 15 ft Tripod . . . $69
Heavy Duty Tripods include mtg hdw-UPS Shippable

TEXAS TOWERS

DIV. OF TEXAS RF DISTRIBUTORS INC.

1108 Summit Ave., Suite 4 / Plano, Texas 75074

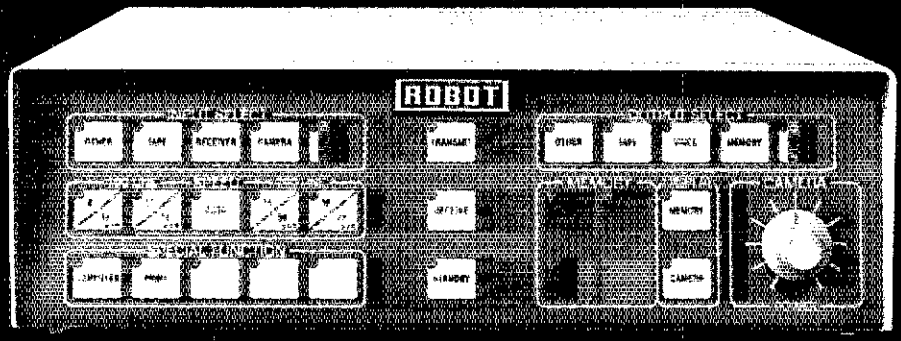
ALL PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Mon.-Fri.: 8:30 a.m. - 5:30 p.m. Sat. 9 a.m. - 1 p.m.

TELEPHONE: (214) 422-7306

CIRCLE 43 ON READER SERVICE CARD

COLOR SSTV



Introducing the Robot 450C and 1200C Single Frame Color SSTV Converters

Robot's new color slow scan TV converters provide you with a whole new dimension of Amateur Radio activity. Now you can exchange color pictures of your latest DX QSL card, the best stamp in your collection, or even that terrific sunset scene you shot last summer.

Robot's microprocessor controlled color SSTV equipment provides a significant breakthrough in the transmission of single frame color images known as "Time Multiplex Color Component System" (TMCCS). This method was chosen as being faster, easier to use and more reliable than the cumbersome frame or line sequential systems now in use, as well as being black and white compatible with the thousands of slow scan stations already on the air world wide.

In addition to having fast, single frame color capability as with the Robot Model 450C, the Model 1200C also offers sharp, high resolution color pictures that rival commercial broadcast television! With all their flexibility, interfaceability and dependability, the Models 450C and 1200C will be in the forefront of technology for years to come. Their new multi-dimensional SSTV standards will be the pace-setters in the industry.

There are even more features and capabilities too numerous to be listed here, such as computer interface, automatic fine tuning, multi speed operation and many more; so see your dealer today for literature and a demonstration, or write:

ATTENTION MODEL 400 OWNERS: Now you can have single frame color SSTV capability too by installing the Model 400C Update Kit to your unit. All necessary parts and hardware are included for an easy single evening installation.

ROBOT

Also introducing the new Robot Model 800C Super Terminal with color graphics capability when used with the new Robot color scan converters. Also has expanded memory with lithium battery back-up, and has both serial and parallel printer interface. A complete terminal for RTTY and Morse Code.

ROBOT RESEARCH, INC.
7591 Convoy Ct., San Diego, CA 92111 (619) 279-9430

World Leaders in Slow Scan TV, Phone Line TV and Image Processing Systems

YAESU FT-726R TRIBANDER

NEW GALAXIES OF PERFORMANCE ON VHF AND UHF

FULL DUPLEX!!

ATELLITES!! SCATTER!!

!!! EME!!

The New Yaesu FT-726R Tribander is the world's first multiband, multimode Amateur transceiver capable of full duplex operation. Whether you're interested in OSCAR, moonbounce, or terrestrial repeaters, you owe yourself a look at this one-of-a-kind technological wonder!

Multiband Capability

Factory equipped for 2 meter operation, the FT-726R is a three-band unit capable of operation on 10 meters, 6 meters, and/or two segments of the 70 cm band (430-440 or 440-450 MHz), using optional modules. The appropriate repeater shift is automatically programmed for each module. Other bands pending.

Advanced Microprocessor Control

Powered by an 8-bit Central Processing Unit, the ten-channel memory of the FT-726R stores both frequency and mode, with pushbutton transfer capability to either of two VFO registers. The synthesized VFO tunes in 20 Hz steps on SSB/CW, with selectable steps on FM. Scanning of the band or memories is provided.

Full Duplex Option

The optional SU-726 module provides a second, parallel IF strip, thereby allowing full duplex crossband satellite work. Either the transmit or receive frequency may be varied during transmission, for quick zero-beat on another station or for tracking Doppler shift.

High Performance Features

Borrowing heavily from Yaesu's HF transceiver experience, the FT-726R comes equipped with a speech processor, variable receiver bandwidth, IF shift, all-mode squelch, receiver audio tone control, and an IF noise blanker. When the optional XF-455MC CW filter is installed, CW Wide/Narrow selection is provided. Convenient rear panel connections allow quick interface to your station audio, linear amplifier, and control lines.

Leading the way into the space age of Ham communications, Yaesu's FT-726R is the first VHF/UHF base station built around modern-day requirements. If you're tired of piecing together converters, transmitter strips, and relays, ask your Authorized Yaesu Dealer for a demonstration of the exciting new FT-726R, the rig that will expand your DX horizons!

Price And Specifications Subject To Change Without Notice Or Obligation

YAESU
The radio.

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YAESU ELECTRONICS CORPORATION 6851 Walthall Way, Paramount, CA 90723 • (213) 633-4007
YAESU CINCINNATI SERVICE CENTER 9070 Gold Park Drive, Hamilton, OH 45011 • (513) 874-3100

Digital DX-terity...

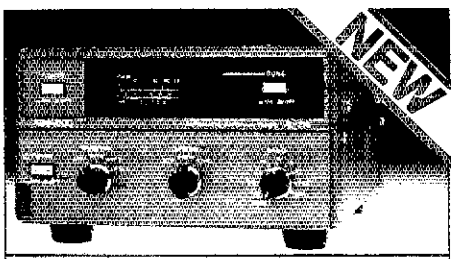
General coverage, Superior dynamic range, 2 VFO's, 8 memories, Scan, Notch...COMPACT!

TS-430S

The TS-430S combines the ultimate in compact styling with advanced circuit design and performance. An all solid-state SSB, CW, and AM transceiver, with FM optional, covering the 160-10 meter Amateur bands, it also incorporates a 150 kHz-30 MHz general coverage receiver having a superior dynamic range, dual digital VFO's, 8 memories, memory scan, programmable band scan, IF shift, notch filter, all-mode squelch, and built-in speech processor.

TS-430S FEATURES:

- **160-10 meter operation, with general coverage receiver**
  With 160-10 meter Amateur band coverage, including WARC 30, 17, and 12 meter bands, it also features a 150 kHz-30 MHz general coverage receiver. Innovative UP-conversion digital PLL circuit, for superior frequency stability and accuracy. UP/DOWN band switches for Amateur bands or 1-MHz steps across entire 150 kHz-30 MHz range. Two digital VFO's continuously tuneable from band to band. Band information output on rear panel.
- **USB, LSB, CW, AM, with optional FM**
  Operates on USB, LSB, CW, and AM, with optional FM, internally installed. AGC time constant automatically selected by mode.
- **Compact, lightweight design**
  Measures only 10-5/8 (270) W x 3-3/4 (96) H x 10-7/8 (275) D, inches (mm), weighs only 14.3 lbs. (6.5 kg.).
- **Superior receiver dynamic range**
  Use of 2SK125 junction-type FET's in the Dyna-Mix high sensitivity, balanced, direct mixer circuit provides superior dynamic range.
- **10-Hz step dual digital VFO's**
  10-Hz step dual digital VFO's operate independently, include band and mode information. Different band and mode cross operation possible. Dial torque adjustable. STEP switch for tuning in 10-Hz or 100-Hz steps. A=B switch quickly shifts "B" VFO to the same frequency and mode as "A" VFO, or vice-versa. VFO LOCK switch provided. RIT control tunes VFO or memory. UP/DOWN manual scan possible using optional microphone.
- **Eight memories store frequency, mode, and band data**
  Memories store frequency, mode, and band data. Eighth memory stores receive and transmit frequencies independently. M.CH switch for operation of memory as independent VFO, or fixed frequency.
- **Lithium battery memory back-up**
  Estimated five-year life.
- **Memory scan**
  Scans memories in which data is stored.
- **Programmable automatic band scan**
  Scans programmed band width. Scan speed adjustable. HOLD switch interrupts band or memory scan.
- **IF shift circuit for minimum QRM.**
  IF passband may be moved to place interferring signals outside the passband, for best interference rejection.
- **Tuneable notch filter built-in**
  Deep, sharp, tuneable, audio notch filter.
- **Narrow-wide filter selection**
  NAR-WIDE switch for IF filter selection on SSB and CW when optional filters are installed. (2.4 kHz IF filter built-in.)
- **Speech processor built-in**
  Improves intelligibility, increases average "talk-power."
- **Fluorescent tube digital display**
  Indicates frequency to 100 Hz (10 Hz modifiable).
- **All solid-state technology**
  Input rated 250 W PEP on SSB, 200 W DC on CW, 120 W on FM (optional), 60 W on AM. Built-in cooling fan, multi-circuit final protection. Operates on 12 VDC, or 120/220/240 VAC with optional PS-430 AC power supply.
- **All-mode squelch circuit, built-in**
- **Noise blanker, built-in**
- **RF attenuator (20 dB)**
- **Vox circuit, plus semi break-in with side-tone**



Optional AT-250 Automatic Antenna Tuner
Designed to match the TS-430S in size, color, and appearance. Functionally compatible with any HF transceiver of 200 watts PEP or lower. (Requires manual bandswitching.)
• Covers 160-10 meter incl. WARC • ABC Automatic Band Changing System (when used with TS-430S) • SWR/Power meter • 4 antenna terminals • Built-in AC Power Supply.

Other optional accessories:

- PS-430 compact AC power supply.
- PS-30 or KPS-21 AC power supplies.
- SP-430 external speaker.
- MB-430 mobile mounting bracket.
- AT-130 compact antenna tuner, 80-10 m incl. WARC.
- FM-430 FM unit.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filters.
- YK-88SN (1.8 kHz) narrow SSB filter.
- YK-88A (6 kHz) AM filter.
- MC-42S UP/DOWN hand microphone.
- MC-55 (8P) mobile microphone.
- MC-60A deluxe desk microphone.
- MC-80 UP/DOWN desk microphone.
- MC-85 multi-function desk microphone.

More information on the TS-430S is available from all authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

KENWOOD

pacesetter in amateur radio

Specifications and prices are subject to change without notice or obligation.